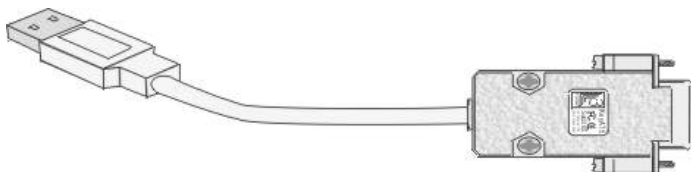




# KeyAT-5

## Version 5.0



**RS232 to USB    Copyright 2006-2010**  
**Keyboard/Mouse    L3 Systems, Inc.**  
**Port Adapter        Redmond, WA**

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## Introduction

The KeyAT-5 keyboard port adapter allows you to send keyboard keystrokes and/or mouse instructions to a computer via an RS-232 interface.

Typical uses for the KeyAT-5 are:

- **Testing software** - With a KeyAT-5, you can send keys and mouse movements that simulate user input from another computer using RS-232 communications.
- **Remote Access** - The KeyAT-5 allows remote access to a system where the software does not provide any other method.
- **Attaching input devices** - Allows you to attach RS-232 devices to the keyboard port such as bar code readers, scales, and credit card readers.

**Note:** The KeyAT-5 also operates during boot mode, for use with BIOS menus. However, mouse commands are supported for this use. The Status command (~?, pg 11) denotes boot or OS mode.

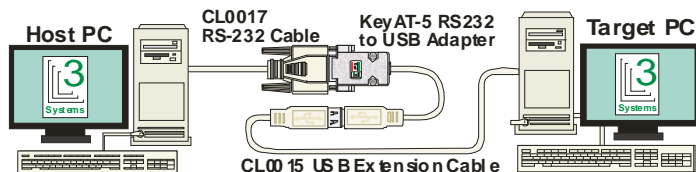
# KeyAT-5 Keyboard Port Adapter

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## Connections

The following illustrates a typical connection of the KeyAT-5.

1. The USB connector connects to the target computer either directly, or via a USB extension cable, such as L3 Systems part number CL0017.
2. The RS-232 connector connects to an RS-232 port on the host system either directly, or via an RS-232 extension cable, such as L3 Systems part number CL0015.



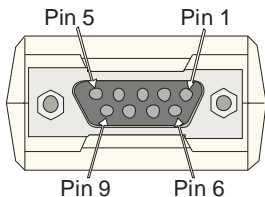
The above example shows two extension cables, one on each connector of the KeyAT-5. Generally only one extension cable is used.

# KeyAT-5 Keyboard Port Adapter

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## Serial Port Connector

The port is configured as a DCE device. On the 9 pin DB-9S connector, it transmits data on pin 2 and receives data on pin 3. No other RS-232 signal is required for it to operate.



Pin	Signal	KeyAT-5 Function
1	DCD	Not Used
2	RX (Receive) from KB232	RS-232 Output
3	TX (Transmit) to KB232	RS-232 Input
4	DTR	Not Used
5	Signal Ground	Ground
6	DSR	Not Used
7	RTS	Not Used
8	CTS	Not Used
9	RI	Not Used.

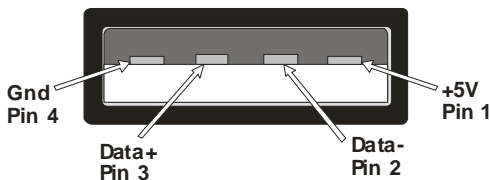
# KeyAT-5 Keyboard Port Adapter

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## KeyAT-5 USB Connector

The following connector shows the pin definitions for the KeyAT-5 USB connector. Note that this provides power to the KeyAT-5 Adapter.

### USB Series A Connector



## Sending Data

The main job of the KeyAT-5 is to transfer data from the RS-232 port and send it through to the computer's keyboard port. Data can be sent using ASCII, ASCII control codes, HID keyboard scan codes or ASCII hex. A line can have a maximum length of 80 characters and should end with an <ENTER> (CR, hex 0D). When using immediate mode, data and commands are interpreted as received with buffering up to 80 characters. If you get more than 80 characters ahead of the computer, the additional characters will be ignored.

## KeyAT-5 Keyboard Port Adapter

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In line turn-around mode, the KeyAT-5 sends a colon prompt after the data has been processed, signaling that it is ready for another command. Below shows the ASCII characters 'DIR<ENTER>' being sent via the KeyAT-5.

Example: KeyAT, V5.0x1, [C]L3 Systems, Inc.  
2010

```
:DIR^M<ENTER>  
:
```

### **Commands**

Commands are instructions to the KeyAT-5 to do something other than just pass data through to the computer. All commands begin with a ~ (tilde, hex 7E) character followed by a command character, and in some cases additional data.

~@ Disable Commands – All commands are disabled until 10 consecutive tildes (~~~~~~) or reset/power cycle.

~~~~~ Reset/Enable Commands – If commands are disabled, sending 10 consecutive tilde (~) characters will enable commands. If commands are enabled, this will reset the KeyAT-5 (& run power-up string if loaded).

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## Send a scan code

If you want to send a scan code without going into scan code mode, then use the `~:nn` command to send the hexadecimal scan code value. This is useful for function keys, arrow keys or any other keys that don't have an ASCII equivalent. See the "Scan codes" table later on for valid scan codes.

`~:nn` Send Scan Code – This scan code `nn`.

Examples: `~:4B<ENTER>` (*sends PgUp*)

`~:E1~:4B<ENTER>` (*sends Shift-PgUp*)

## Modifier Keys

The following commands allow you to prepend a modifier key to a subsequent key. You can prepend multiple modifiers to a single key. Capitalized command letter specifies the left key, lower case specifies the right key

`~S` Left, `~s` Right Shift – Apply Shift to next key

`~C` Left, `~c` Right Ctrl – Apply Ctrl to next key

`~A` Left, `~a` Right Alt – Apply Alt to next key

`~G` Left, `~g` Right Gui – Apply Gui to next key

EX: `~Sa<ENTER>` (*Sends a Shifted "A" key*)

`~CX<ENTER>` (*Sends a Ctrl-X key*)

`~a~:3A<ENTER>` (*Sends an Right-Alt-F1 key*)

`~S~A~:3B<ENTER>` (*Sends a Shift-Alt-F2 key*)

`~C~A~:4C<ENTER>` (*Sends the Ctrl-Alt-DEL key*)



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## Raw Mode

The ~R command enters a special mode, called Raw Mode, where the KeyAT sees all serial input as bytes of data directly interpreted as scan codes. For example, hex 41 is the letter "A" in ASCII, but in Raw Mode it is interpreted as the "F8" key. (See the Scan Code Table towards the end of this manual.)

The only two bytes that are not considered scan codes are hex 02 (Ctrl B), which is interpreted as an end-of-line, and hex 03 (Ctrl C), which is interpreted as a command to exit Raw Mode. In Raw Mode commands are effectively disabled, and the bytes received are not echoed.

Note that this mode is not practical to use from the command line with Tera Term or Hyperterm. It is designed to work with a script (such as the Tera Term macro language) or a programming language (such as C/C++ or Visual Basic).

Example:

```
: ~R<ENTER>
: <Byte 04><Byte 05><Byte 02> (Send keys A & B)
: <Byte 1E><Byte 1F><Byte 02> (Send keys 1 & 2)
: <Byte 03><Byte 02> (Exit Raw Mode)
:
```

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### Mouse Commands

The KeyAT-5 allows you to send commands that mimic mouse usage.

#### **Move mouse**

This command allow you to move the mouse pointer.

-**M± xx±yy** **Move Mouse** – Moves the mouse ± xx increments in the x-axis and ± yy increments in the y-axis.

**Examples:**    : ~M+07-32<ENTER>    (*Moves mouse right 7 and up 32*)  
                  : ~M-12+23<ENTER>    (*Moves mouse left 12 and down 23*)

Note that mouse sensitivity is controlled by host computer settings. For Windows, look for mouse settings in the control panel.

## KeyAT-5 Keyboard Port Adapter

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### Mouse Buttons

The command below allows you to send mouse button presses.

**~Bnn Mouse Button** – Presses mouse button(s), where:

- nn=01 – Left Button      nn=02 – Right Button
- nn=03 – Right & Left    nn=04 – Middle Button
- nn=05 – Left & Middle   nn=06 – Right & Middle
- nn=07 – Left, Right & Middle Buttons

Examples:    :~B01<ENTER>    (*Left Button click*)  
              :~B02<ENTER>    (*Right Button click*)  
              :~B01~B01<ENTER>    (*Left Double click*)  
              :~B03<ENTER>    (*Left & Right click*)

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## Mode Commands

### Line Mode and Immediate Modes

Data can be sent and interpreted one line at a time, or be processed immediately. The default setting is for "Line Mode" (~L). This is the recommended method of use. Line Mode is better for automated control and provides more reliable interaction.

"Immediate Mode" (~I) can better simulate keyboard operation in some cases. **Warning:** *Immediate mode provides no throttling of input, thus data sent to the KeyAT can be lost if it exceeds the keyboard input rate of the computer.*

- L     **Line Mode** - Set to a line oriented basis, each line must end with an <ENTER> or <CR>, hex 0D.
- I     **Immediate Mode** - Data is interpreted 'on-the-fly'. Note that in this mode <ENTER> or <CR> (Hex 0D) is passed on to the computer. Caution should exercised in Immediate Mode, as it is easy to overrun the PC's keyboard receive buffer.

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## Send CR Mode

Normally the "Enter" or ASCII <CR> character merely determines the end of a line of input. An "Enter" key can be sent with a ^M, which is a caret (^) preceding an "M" character. Or you can send it as a scan code: ~:28. Optionally, you can put the KeyAT-5 in a mode where the "Enter" or ASCII <CR> character is passed through.

**~F Send CR mode** – This causes the "Enter" or ASCII <CR> character to be passed through. The setting persists until the next ~I or ~L command, or until power is cycled.

## Status Request

~? Request Status - The response format is:

**LEDs = n, Boot/OS Mode** where: **n** LED status:  
"0"=All Off, "1"=Num Lock ON, "2"=Caps Lock ON  
"3"=Num & Caps Lock ON, "4"=Scroll Lock ON  
"5"=Num & Scroll-Lock ON, "6"=Cap & Scroll-Lock ON  
"7"=Num-Lock, Caps-Lock & Scroll-Lock ON

Ex: ~?<ENTER> (When running OS)  
LEDs = 2 OS Mode (Caps-Lock LED on)  
:

Or: ~?<ENTER> (When in BIOS)  
LEDs = 1 Boot Mode (Num-Lock LED on)  
:

## KeyAT-5 Keyboard Port Adapter

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### Test LEDs

**~T Test LED Control** - ~T tests the Keyboard LED control for any keyboard attached to the computer. It's recommended to start this test with all keyboard LEDs (Num-Lock, Caps-Lock & Scroll-Lock) off.

```
:~T<ENTER>  
Testing... (Keyboard LEDs light up in  
a pattern)  
:
```

### Sleep

**~Znn Sleep** – Use sleep to provide delays. The value nn is in seconds (approx), or use .n for tenths of a second. This can be helpful when doing scripting, allowing the KeyAT-5 to help you pace keystrokes, not out-running the application.

```
:~Z05<ENTER> (delays 5 seconds, prompt  
appears when done)  
:~Z.8<ENTER> (delays 8 tenths of a second,  
prompt appears when done)  
:~Z26<ENTER> (delays 26 seconds, prompt below  
appears when done)  
:
```

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## Help Command

**~H Help** - ~H displays a help list of the tilde prefixed commands.

```
:~H<ENTER>
~@ Turn off commands
~L Set to Line mode
~I Set to Immediate mode
~R Set to Raw mode
~F CR Pass-through mode
~A Alt preset for next char
~C Ctrl preset for next char
~S Shift preset for next char
~G GUI preset for next char
~H Display this help screen
~T Test Keyboard LED control
~V Display Version Info
~? Display LED Status
~:nn Scancode nn
~Znn Delay nn
~nn ASCII byte
^X Control-X
--- Mouse Commands ---
~Mxy Move mouse x and y
~Bnn Press Mouse buttons nn
:
```

## Displaying Version

**~V Version** - ~V Displays firmware version.

```
:~V<ENTER>
KeyAT, V5.0x1, [C]L3 Systems, Inc. 2008-
2010
:
```

# KeyAT-5 Keyboard Port Adapter

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## Setup Mode

The KeyAT-5 has commands for configuration, status and testing which are accessed by entering setup mode with following command:

```
: ~*SETUP<ENTER>  
Setup>
```

## Leaving Setup Mode

You can exit setup mode with the "Q" command:

```
Setup>Q<ENTER>  
:
```

## Configuration string

The KeyAT-5 stores operating parameters in a configuration string located in non-volatile flash memory. These include parameters such as the settings of the baud rate, enabling command mode and determining the turn-around character.

## Displaying Configuration

To display the configuration string, do the following command. (Note that the results shown below are the default settings.)

```
Setup>PC<ENTER> (Displays Configuration Data)  
9600 , 8 ,NoPar , Yecho , YesCmd , NoCR , LM , 0D , 7E , 03  
Setup>
```



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The configuration settings are defined as follows. The underlined characters represent the minimum required entry in each field:

**9600** – *Baud Rate*: 1200, 2400, 4800, 9600, 19200, 38400, and 57600 are valid. 9600 is the default setting.

**8** – *Number of RS232 Data bits*: Valid settings are 7 or 8. This must be 8 if parity is disabled. The default is 8.

**NoPar** – *RS-232 Parity*: Valid settings are NoPar for no parity, Even for even parity, and Odd for odd parity. The default is NoPar.

**Yecho** – *Echoing RS-232 characters*: Valid settings are Necho for no echo, and Yecho for echo enabled. The default is Yecho.

**YesCmd** – *Command mode*: YesCmd enables KeyAT commands and NoCmd disables these commands. The default is YesCmd.

**NoCR\_** – *CR Pass through mode*: NoCR does not send through the <CR> or <ENTER> at end of command line. YesCR will send it through.

**LM** – *Entry Mode*: LM (default) enables “line Mode”, IM enables Immediate mode

**OD** – *End-of-line character*: Default is OD, (<CR> or <ENTER> character)

**7E** – *Command prefix character*: Default is 7E, tilde (~) character.

**03** – *Delay between keystrokes*: Default is 03, (30ms).

# KeyAT-5 Keyboard Port Adapter

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## Changing Configuration

You can change operating parameters of the KeyAT-5 adapter with the LC command. You can either use a menu interface by typing "LC<ENTER>", or type the configuration string after the LC command.

The following shows the LC menu:

```
Setup>LC
Config Parameters:
0 Baud: 9600
1 Data: 8
2 Parity: NoPar
3 Echo: Yecho
4 Commands: YesCmd
5 CR Pass-Thru Mode: NoCR
6 Line/Immediate Mode: LM
7 EOL Char: 0D
8 Command Char: 7E
9 Inter-Char Delay: 03
Select 0,1,...9 or S (Save & quit), or [Enter]
(quit, no save):
```

In the above menu, you can exit without saving changes by just hitting <Enter>. Typing "S" saves the changes and exits

The following illustrates attaching a string to the LC command, changing the baud rate to 4800 from default, and enabling the "CR pass-through mode":

```
Setup>LC4800,8,NoPar,Yecho,YesCmd,YesCR,LM,0D,7E,03<ENT>
```

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Below shows the minimal entry for the same setting:

```
Setup>LC48,8,N,Y,Y,Y,L,0D,7E,03<ENTER>
```

### Powering on to Default Settings

Should you make a mistake in configuring the settings of the KeyAT-5 configuration string, you can force it to use the default settings if you send an RS-232 "Break" condition to the when applying power. This will cause the KeyAT-5 to return to the following settings:

```
9600,8,NoPar,Yecho,YesCmd,NoCR,LM,0D,7E,03
```

Specifically, this will force it operate at 9600 baud with no parity. If you use the application "Tera Term", send ten Alt-B's and then quickly connect the KeyAT-5 while the break is in progress.

# KeyAT-5 Keyboard Port Adapter

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## Setting Configuration Default Settings

Restore the KeyAT-5 default configuration with the D command:

```
Setup>D<ENTER>  (Restores default settings)
Setup>
```

You can add up to two options to the default settings. Valid Options are:

“N” = Disables Commands    “C” = CR pass-thru mode  
“I” = Immediate Mode

```
Setup>DC<ENTER>  (Default settings w/ CR pass-thru mode)
```

```
Setup>PC<ENTER>  (Displays Configuration Data)
9600 , 8 , NoPar , Yecho , YesCmd , YeCR , LM , 0D , 7E , 03
Setup>
```

```
Setup>DIN<ENTER>  (Default settings w/ Immediate Mode &
Setup>              Commands Disabled)
```

```
Setup>PC<ENTER>  (Displays Configuration Data)
9600 , 8 , NoPar , Yecho , No_Cmd , YeCR , IM , 0D , 7E , 03
Setup>
```

# KeyAT-5 Keyboard Port Adapter

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## Key Scan Code Table

The KeyAT-5 allows you to assign one or more keyboard keys to an ASCII character.

### Loading Key Scan Codes

The LK command loads a key scan code table entry:

LKaa=bb,cc...

Loading Key Scan Codes

**Example:** Setup>LK2A=57<ENTER> (ASCII "+" character maps to a "+" key)

In the preceding example, the entry defines what happens when the ASCII asterisk character "\*" is sent via the RS-232 port to the computer. Normal mappings are shown in the ASCII Scan Code table at the end of this manual. The custom scan code table can be used to map keys to any ASCII character. The key code "57" defines the "+" key, Special scan codes E0 to E7 are the modifier keys, such as Shift, Alt and Ctrl. When these are included in a table entry, the next key is "modified". Examples are: "E1,04" would be a shift-A key, and "E0,E2,4C" would be the infamous Ctrl-Alt-Del key.

**Example:** Setup>LK3F=E1,0B,08,0F,0F,12<ENTER>

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In the preceding example, when the ASCII “?” character is sent, keys generate the typing of “Hello”, with the “H” shifted.

The table space allows for 50 entries

### Displaying Code Table

The code table can be displayed to review entries:

```
Setup>PK<ENTER>      (Displays Code Table)
AS Codes
-- -----
2A 57                ← Shows data of 1st preceding example
3F E1 0B 08 0F 0F 12 ← Shows data of 2nd preceding example
Setup>
```

### Erasing the Key Code Table

The “EK” command deletes all entries in the Key Scan Code table. If you want to change existing entries in the code table, you must clear the table with the “EK” command and re-enter the codes with the “LK” command.

```
Setup>EK<ENTER>      (EraseKey Scan Code Table)
Setup>
```

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## Setup Help info

**H Help** Displays short help information on setup commands.

```
Setup>H<ENTER>
--- Setup Commands ---
Pn-Print, Ln-Load
  n=C - Config Buffer
  n=K - Key Scan Codes
  n=P - Power-On Buffer
D Set Default Config
EK Erase Key Codes
H Help, V Version
Setup>
```

## Power On String

The KeyAT-5 can execute a command string when power is applied. This string can include keys to send to the computer and/or KeyAT-5 commands. It's strongly recommended when using this feature to start the string with a delay command (~Znn) to allow the KeyAT-5 to wait for the computer to finish its power on sequence.





### **Recovery: Load and Setting Defaults**

For cases when the configuration string, power on string or reset string causes the KeyAT-5 to become inaccessible, two recovery methods are available:

Send RS-232 Break on Power-up: If you send a break condition (type Alt-B ten times using Tera Term) to the RS-232 port when applying power, the KeyAT-5 will start with default configuration settings. Configuration, Power On, and Reset Strings will not be changed. The message "Loading Defaults..." will be sent to the RS-232 Port.

Keyboard 20 Consecutive Num-Locks: Typing 20 Num-Lock keys consecutively, causing the Num-Lock LED to turn on and off 10 times, will cause the KeyAT-5 to load the default configuration string, and the Power On and Reset strings will be cleared. When this occurs, all the keyboard indicators will light for a second, and the message "Setting Defaults..." will be sent to the RS-232 Port.

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## Tera Term

For use with Microsoft Windows, we suggest using Tera Term. It's free to download and use. Tera Term is a terminal emulator that also has a macro (or scripting) capability. The terminal emulator provides a simple way to test and experiment the operation of the KeyAT-5. You can also create scripts to automate the keystrokes.

## Examples:

### Command shell examples:

- `:dir^M<ENTER>`      *Sends a "dir" and an "Enter" key*
- `:dir~:28<ENTER>`    *Sends a "dir" ended with a "Enter" key*
- `:~F<ENTER>`            *Puts KeyAT in "CR Pass-Thru Mode".*
- `:dir<ENTER>`            *Sends a "dir" command ended with implicit "Enter" key*
- `:~L<ENTER>`            *Ends "CR Pass-Thru Mode".*

### Sending Keys that don't have ASCII equivalents:

- `:~:3A<ENTER>`            *Sends F1 key*
- `:~C~:3A<ENTER>`        *Sends Ctrl-F1 key*
- `:~A~:3A<ENTER>`        *Sends Alt-F1 key*
- `:~:52<ENTER>`            *Sends Up-Arrow key*

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## Scan Codes

| Scan Code |     | Key | KEY | Dec | Hex | Key | Key          |
|-----------|-----|-----|-----|-----|-----|-----|--------------|
| Dec       | Hex | Pad |     | Dec | Hex | Pad | Key          |
| 00        |     |     |     | 28  | 1C  |     | Y            |
| 01        |     |     |     | 29  | 1D  |     | Z            |
| 02        |     |     |     | 30  | 1E  |     | 1 / !        |
| 03        |     |     |     | 31  | 1F  |     | 2 / @        |
| 04        | 04  |     | A   | 32  | 20  |     | 3 / #        |
| 05        | 05  |     | B   | 33  | 21  |     | 4 / \$       |
| 06        | 06  |     | C   | 34  | 22  |     | 5 / %        |
| 07        | 07  |     | D   | 35  | 23  |     | 6 / ^        |
| 08        | 08  |     | E   | 36  | 24  |     | 7 / &        |
| 09        | 09  |     | F   | 37  | 25  |     | 8 / *        |
| 10        | 0A  |     | G   | 38  | 26  |     | 9 / (        |
| 11        | 0B  |     | H   | 39  | 27  |     | 0 / )        |
| 12        | 0C  |     | I   | 40  | 28  |     | Enter        |
| 13        | 0D  |     | J   | 41  | 29  |     | Esc          |
| 14        | 0E  |     | K   | 42  | 2A  |     | Backspace    |
| 15        | 0F  |     | L   | 43  | 2B  |     | Tab          |
| 16        | 10  |     | M   | 44  | 2C  |     | Spacebar     |
| 17        | 11  |     | N   | 45  | 2D  |     | - / _        |
| 18        | 12  |     | O   | 46  | 2E  |     | = / +        |
| 19        | 13  |     | P   | 47  | 2F  |     | [ / {        |
| 20        | 14  |     | Q   | 48  | 30  |     | ] / }        |
| 21        | 15  |     | R   | 49  | 31  |     | \ /          |
| 22        | 16  |     | S   | 50  | 32  |     | € (Euro) / 1 |
| 23        | 17  |     | T   | 51  | 33  |     | ; / :        |
| 24        | 18  |     | U   | 52  | 34  |     | ' / "        |
| 25        | 19  |     | V   | 53  | 35  |     | ` / ~        |
| 26        | 1A  |     | W   | 54  | 36  |     | , / <        |
| 27        | 1B  |     | X   | 55  | 37  |     | . / >        |

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### Scan Codes (cont.)

| Scan Code |     | Key Pad | KEY          |     |     | Key Pad | Key          |
|-----------|-----|---------|--------------|-----|-----|---------|--------------|
| Dec       | Hex |         |              | Dec | Hex |         |              |
| 56        | 38  |         | // ?         | 84  | 54  | Kpd     | /            |
| 57        | 39  |         | Caps Lock    | 85  | 55  | Kpd     | *            |
| 58        | 3A  |         | F1           | 86  | 56  | Kpd     | -            |
| 59        | 3B  |         | F2           | 87  | 57  | Kpd     | +            |
| 60        | 3C  |         | F3           | 88  | 58  | Kpd     | Enter        |
| 61        | 3D  |         | F4           | 89  | 59  | Kpd     | 1 / End      |
| 62        | 3E  |         | F5           | 90  | 5A  | Kpd     | 2 / Dn Arrow |
| 63        | 3F  |         | F6           | 91  | 5B  | Kpd     | 3 / Pg Down  |
| 64        | 40  |         | F7           | 92  | 5C  | Kpd     | 4 / Lt Arrow |
| 65        | 41  |         | F8           | 93  | 5D  | Kpd     | 5            |
| 66        | 42  |         | F9           | 94  | 5E  | Kpd     | 6 / Rt Arrow |
| 67        | 43  |         | F10          | 95  | 5F  | Kpd     | 7 / Home     |
| 68        | 44  |         | F11          | 96  | 60  | Kpd     | 8 / Up Arrow |
| 69        | 45  |         | F12          | 97  | 61  | Kpd     | 9 / Page Up  |
| 70        | 46  |         | Print Screen | 98  | 62  | Kpd     | 0 / Insert   |
| 71        | 47  |         | Scroll Lock  | 99  | 63  | Kpd     | . / Del      |
| 72        | 48  |         | Pause        | 100 | 64  | Kpd     | € (Euro) / 2 |
| 73        | 49  |         | Insert       | 101 | 65  |         | Application  |
| 74        | 4A  |         | Home         | 102 | 66  |         | Power        |
| 75        | 4B  |         | Page Up      | 103 | 67  | Kpd     | =            |
| 76        | 4C  |         | Delete       | 104 | 68  |         | F13          |
| 77        | 4D  |         | End / 1      | 105 | 69  |         | F14          |
| 78        | 4E  |         | Page Down    | 106 | 6A  |         | F15          |
| 79        | 4F  |         | Right Arrow  | 107 | 6B  |         | F16          |
| 80        | 50  |         | Left Arrow   | 108 | 6C  |         | F17          |
| 81        | 51  |         | Down Arrow   | 109 | 6D  |         | F18          |
| 82        | 52  |         | Up Arrow     | 110 | 6E  |         | F19          |
| 83        | 53  | Kpd     | Num Lock     | 111 | 6F  |         | F20          |

## KeyAT-5 Keyboard Port Adapter

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### Scan Codes (cont.)

| Scan Code |     | Key | KEY             | Dec | Hex | Key | Key             |
|-----------|-----|-----|-----------------|-----|-----|-----|-----------------|
| Dec       | Hex | Pad |                 |     |     | Pad |                 |
| 112       | 70  |     | F21             | 140 | 8C  |     | International 6 |
| 113       | 71  |     | F22             | 141 | 8D  |     | International 7 |
| 114       | 72  |     | F23             | 142 | 8E  |     | International 8 |
| 115       | 73  |     | F24             | 143 | 8F  |     | International 9 |
| 116       | 74  |     | Execute         | 144 | 90  |     | Language 1      |
| 117       | 75  |     | Help            | 145 | 91  |     | Language 2      |
| 118       | 76  |     | Menu            | 146 | 92  |     | Language 3      |
| 119       | 77  |     | Select          | 147 | 93  |     | Language 4      |
| 120       | 78  |     | Stop            | 148 | 94  |     | Language 5      |
| 121       | 79  |     | Again           | 149 | 95  |     | Language 6      |
| 122       | 7A  |     | Undo            | 150 | 96  |     | Language 7      |
| 123       | 7B  |     | Cut             | 151 | 97  |     | Language 8      |
| 124       | 7C  |     | Copy            | 152 | 98  |     | Language 9      |
| 125       | 7D  |     | Paste           | 153 | 99  |     | Alt Erase       |
| 126       | 7E  |     | Find            | 154 | 9A  |     | Sys Req         |
| 127       | 7F  |     | Mute            | 155 | 9B  |     | Cancel          |
| 128       | 80  |     | Vol Up          | 156 | 9C  |     | Clear           |
| 129       | 81  |     | Vol Down        | 157 | 9D  |     | Prior           |
| 130       | 82  |     | Caps Lock       | 158 | 9E  |     | Return          |
| 131       | 83  |     | Num Lock        | 159 | 9F  |     | Separator       |
| 132       | 84  |     | Scroll Lock     | 160 | A0  |     | Out             |
| 133       | 85  |     | , (Comma)       | 161 | A1  |     | Oper            |
| 134       | 86  |     | =               | 162 | A2  |     | Clear Again     |
| 135       | 87  |     | International 1 | 163 | A3  |     | Crsel           |
| 136       | 88  |     | International 2 | 164 | A4  |     | Exsel           |
| 137       | 89  |     | International 3 | 165 | A5  |     | 00              |
| 138       | 8A  |     | International 4 | 166 | A6  |     | 000             |
| 139       | 8B  |     | International 5 | 167 | A7  |     | Thous Sep       |

## KeyAT-5 Keyboard Port Adapter

### Scan Codes (cont.)

| Scan Code |     | Key Pad | KEY           | Dec | Hex | Key Pad | Key         |
|-----------|-----|---------|---------------|-----|-----|---------|-------------|
| Dec       | Hex |         |               |     |     |         |             |
| 168       | A8  |         | Decimal Sep   | 196 | C4  | Kpd     | %           |
| 169       | A9  |         | Currency Unit | 197 | C5  | Kpd     | ,           |
| 170       | AA  |         |               | 198 | C6  | Kpd     | >           |
| 171       | AB  |         |               | 199 | C7  | Kpd     | &           |
| 172       | AC  |         |               | 200 | C8  | Kpd     | Logical AND |
| 173       | AD  |         |               | 201 | C9  | Kpd     |             |
| 174       | AE  |         |               | 202 | CA  | Kpd     | Logical OR  |
| 175       | AF  |         |               | 203 | CB  | Kpd     | :           |
| 176       | B0  |         | 00            | 204 | CC  | Kpd     | #           |
| 177       | B1  |         | 000           | 205 | CD  | Kpd     | Space       |
| 178       | B2  |         | Thous Sep     | 206 | CE  | Kpd     | @           |
| 179       | B3  |         | Decimal Sep   | 207 | CF  | Kpd     | !           |
| 180       | B4  |         | Curr Unit     | 208 | D0  | Kpd     | Mem Store   |
| 181       | B5  |         | Curr S Unit   | 209 | D1  | Kpd     | Mem Recall  |
| 182       | B6  | Kpd     | (             | 210 | D2  | Kpd     | Mem Clear   |
| 183       | B7  | Kpd     | )             | 211 | D3  | Kpd     | Mem Add     |
| 184       | B8  | Kpd     | {             | 212 | D4  | Kpd     | Mem Sub     |
| 185       | B9  | Kpd     | }             | 213 | D5  | Kpd     | Mem Mult    |
| 186       | BA  | Kpd     | Tab           | 214 | D6  | Kpd     | Mem Div     |
| 187       | BB  | Kpd     | Backspace     | 215 | D7  | Kpd     | + / -       |
| 188       | BC  | Kpd     | A             | 216 | D8  | Kpd     | Clear       |
| 189       | BD  | Kpd     | B             | 217 | D9  | Kpd     | Clear Entry |
| 190       | BE  | Kpd     | C             | 218 | DA  | Kpd     | Binary      |
| 191       | BF  | Kpd     | D             | 219 | DB  | Kpd     | Octal       |
| 192       | C0  | Kpd     | E             | 220 | DC  | Kpd     | Decimal     |
| 193       | C1  | Kpd     | F             | 221 | DD  | Kpd     | Hexadecimal |
| 194       | C2  | Kpd     | Logical XOR   | 222 | DE  |         |             |
| 195       | C3  | Kpd     | ~             | 223 | DF  |         |             |

## KeyAT-5 Keyboard Port Adapter

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### Scan Codes (cont.)

| Scan Code |     | Key Pad | KEY           | Dec | Hex | Key Pad | Key |
|-----------|-----|---------|---------------|-----|-----|---------|-----|
| Dec       | Hex |         |               |     |     |         |     |
| 224       | E0  |         | Left Control  | 240 | F0  |         |     |
| 225       | E1  |         | Left Shift    | 241 | F1  |         |     |
| 226       | E2  |         | Left Alt      | 242 | F2  |         |     |
| 227       | E3  |         | Left GUI      | 243 | F3  |         |     |
| 228       | E4  |         | Right Control | 244 | F4  |         |     |
| 229       | E5  |         | Right Shift   | 245 | F5  |         |     |
| 230       | E6  |         | Right Alt     | 246 | F6  |         |     |
| 231       | E7  |         | Right GUI     | 247 | F7  |         |     |
| 232       | E8  |         |               | 248 | F8  |         |     |
| 233       | E9  |         |               | 249 | F9  |         |     |
| 234       | EA  |         |               | 250 | FA  |         |     |
| 235       | EB  |         |               | 251 | FB  |         |     |
| 236       | EC  |         |               | 252 | FC  |         |     |
| 237       | ED  |         |               | 253 | FD  |         |     |
| 238       | EE  |         |               | 254 | FE  |         |     |
| 239       | EF  |         |               | 255 | FF  |         |     |

## KeyAT-5 Keyboard Port Adapter

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### ASCII Scan Codes

Below is the table of ASCII scan code definitions.

| ASCII CHAR | ASCII HEX | Pref | SCAN CODE | ASCII CHAR | ASCII HEX | Prefix | SCAN CODE |
|------------|-----------|------|-----------|------------|-----------|--------|-----------|
| NUL ^@     | 00        | Ctrl | 1F        | CAN^X      | 18        | Ctrl   | 1B        |
| SOH ^A     | 01        | Ctrl | 04        | EM ^Y      | 19        | Ctrl   | 1C        |
| STX ^B     | 02        | Ctrl | 05        | SUB^Z      | 1A        | Ctrl   | 1D        |
| ETX ^C     | 03        | Ctrl | 06        | ESC ^[     | 1B        | Ctrl   | 2F        |
| EOT ^D     | 04        | Ctrl | 07        | FS ^\      | 1C        | Ctrl   | 31        |
| ENQ ^E     | 05        | Ctrl | 08        | GS ^]      | 1D        | Ctrl   | 30        |
| ACK ^F     | 06        | Ctrl | 09        | RS ^^      | 1E        | C - S  | 23        |
| BEL ^G     | 07        | Ctrl | 0A        | US ^_      | 1F        | C - S  | 2D        |
| BS ^H      | 08        | Ctrl | 0B        | Space      | 20        |        | 2C        |
| TAB ^I     | 09        | Ctrl | 0C        | !          | 21        | Shift  | 1E        |
| LF ^J      | 0A        | Ctrl | 0D        | "          | 22        | Shift  | 34        |
| VT ^K      | 0B        | Ctrl | 0E        | #          | 23        | Shift  | 20        |
| FF ^L      | 0C        | Ctrl | 0F        | \$         | 24        | Shift  | 21        |
| CR ^M      | 0D        | Ctrl | 10        | %          | 25        | Shift  | 22        |
| SO ^N      | 0E        | Ctrl | 11        | &          | 26        | Shift  | 24        |
| SI ^O      | 0F        | Ctrl | 12        | '          | 27        |        | 34        |
| DLE ^P     | 10        | Ctrl | 13        | (          | 28        | Shift  | 26        |
| DC1 ^Q     | 11        | Ctrl | 14        | )          | 29        | Shift  | 27        |
| DC2 ^R     | 12        | Ctrl | 15        | *          | 2A        | Shift  | 25        |
| DC3 ^S     | 13        | Ctrl | 16        | +          | 2B        | Shift  | 2E        |
| DC4 ^T     | 14        | Ctrl | 17        | ,          | 2C        |        | 36        |
| NAK ^U     | 15        | Ctrl | 18        | -          | 2D        |        | 2C        |
| SYN ^V     | 16        | Ctrl | 19        | .          | 2E        |        | 37        |
| ETB ^W     | 17        | Ctrl | 1A        | /          | 2F        |        | 38        |



## KeyAT-5 Keyboard Port Adapter

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### ASCII Scan Codes (cont.)

| ASCII CHAR | ASCII HEX | Pref  | SCAN CODE | ASCII CHAR | ASCII HEX | Prefix | SCAN CODE |
|------------|-----------|-------|-----------|------------|-----------|--------|-----------|
| 0          | 30        |       | 27        | H          | 48        | Shift  | 0B        |
| 1          | 31        |       | 1E        | I          | 49        | Shift  | 0C        |
| 2          | 32        |       | 1F        | J          | 4A        | Shift  | 0D        |
| 3          | 33        |       | 20        | K          | 4B        | Shift  | 0E        |
| 4          | 34        |       | 21        | L          | 4C        | Shift  | 0F        |
| 5          | 35        |       | 22        | M          | 4D        | Shift  | 10        |
| 6          | 36        |       | 23        | N          | 4E        | Shift  | 11        |
| 7          | 37        |       | 24        | O          | 4F        | Shift  | 12        |
| 8          | 38        |       | 25        | P          | 50        | Shift  | 13        |
| 9          | 39        |       | 26        | Q          | 51        | Shift  | 14        |
| :          | 3A        | Shift | 33        | R          | 52        | Shift  | 15        |
| ;          | 3B        |       | 33        | S          | 53        | Shift  | 16        |
| <          | 3C        | Shift | 36        | T          | 54        | Shift  | 17        |
| =          | 3D        |       | 2E        | U          | 55        | Shift  | 18        |
| >          | 3E        | Shift | 37        | V          | 56        | Shift  | 19        |
| ?          | 3F        | Shift | 38        | W          | 57        | Shift  | 1A        |
| @          | 40        | Shift | 1F        | X          | 58        | Shift  | 1B        |
| A          | 41        | Shift | 04        | Y          | 59        | Shift  | 1C        |
| B          | 42        | Shift | 05        | Z          | 5A        | Shift  | 1D        |
| C          | 43        | Shift | 06        | [          | 5B        |        | 2F        |
| D          | 44        | Shift | 07        | \          | 5C        |        | 31        |
| E          | 45        | Shift | 08        | ]          | 5D        |        | 30        |
| F          | 46        | Shift | 09        | ^          | 5E        |        | 23        |
| G          | 47        | Shift | 0A        | _          | 5F        | Shift  | 2D        |

## KeyAT-5 Keyboard Port Adapter

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### ASCII Scan Codes (cont.)

| ASCII CHAR | ASCII HEX | Pref | SCAN CODE | ASCII CHAR | ASCII HEX | Prefix | SCAN CODE |
|------------|-----------|------|-----------|------------|-----------|--------|-----------|
| `          | 60        |      |           | p          | 70        |        | 13        |
| a          | 61        |      | 04        | q          | 71        |        | 14        |
| b          | 62        |      | 05        | r          | 72        |        | 15        |
| c          | 63        |      | 06        | s          | 73        |        | 16        |
| d          | 64        |      | 07        | t          | 74        |        | 17        |
| e          | 65        |      | 08        | u          | 75        |        | 18        |
| f          | 66        |      | 09        | v          | 76        |        | 19        |
| g          | 67        |      | 0A        | w          | 77        |        | 1A        |
| h          | 68        |      | 0B        | x          | 78        |        | 1B        |
| i          | 69        |      | 0C        | y          | 79        |        | 1C        |
| j          | 6A        |      | 0D        | z          | 7A        |        | 1D        |
| k          | 6B        |      | 0E        | {          | 7B        | Shift  | 2F        |
| l          | 6C        |      | 0F        |            | 7C        | Shift  | 31        |
| m          | 6D        |      | 10        | }          | 7D        | Shift  | 30        |
| n          | 6E        |      | 11        | ~          | 7E        | Shift  | 35        |
| o          | 6F        |      | 12        | Del        | 7F        |        | 4C        |

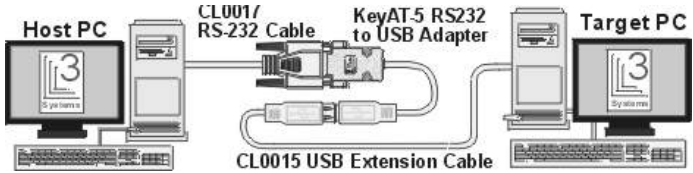
## **FCC Class B Approval Information**

NOTE: This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

## **Warranty**

L3 Systems guarantees this product to be free of defects in material and workmanship for 180 days from date of shipment to the end user. L3 Systems will repair or replace (at our option) products within the warranty period at no charge for parts and labor. All returns must obtain a Return of Merchandise Authorization number (RMA) available on request from L3 Systems. Shipping costs (plus customs and duty, if any) to and from L3 Systems must be paid by the user. Damage or defect caused by accident, misuse or neglect is not covered. Damage or defect caused by shipping is excluded. L3 Systems shall not be liable for any consequential damage or losses from the use of, or inability to use its products. Any unauthorized repair or modification of the product voids the warranty. L3 Systems makes no other warranty, express or implied, nor have we authorized anyone to make representations to the contrary.

# KeyAT-5 Keyboard Port Adapter



Use the KeyAT-5 to make an RS-232 connection to a USB port on a target computer emulating both a keyboard and mouse. Typical uses are:

- ◆ **Testing Software** - Test software input from simulated keystrokes and/or mouse.
- ◆ **Remote Access** – Remote access to systems where software does not provide other options.
- ◆ **Attaching input devices** – Such as bar code readers, scales, and credit card readers.

Some advanced KeyAT-5 Adapter features are:

- ◆ **Accepts ASCII and Scan Codes** - Accepts printable and encoded ASCII characters and maps to the correct key. Also you can send keyboard scan codes.
- ◆ **Simple Mouse Control** – Mouse movements and clicks are done with simple commands.
- ◆ **Programmable Keys** – You can load a table in non-volatile flash memory assigning a key or keys to specific ASCII characters.
- ◆ **Flexible Serial Parameters** – You can load the baud rate and parity settings in non-volatile flash memory.