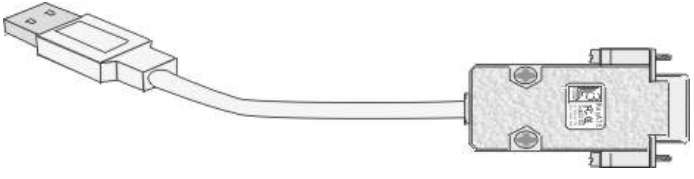
KeyAT-5

Version 5.3



RS232 to USB Keyboard/Mouse Port Adapter

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L3 Systems, Inc.
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:

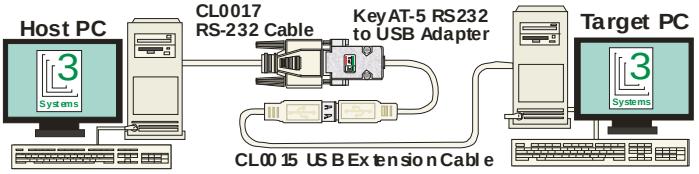
- **Testing software** - With a KeyAT-5, you can send keys and mouse movements that simulate user input from another computer using RS-232 communications.
- **Remote Access** - The KeyAT-5 allows remote access to a system where the software does not provide any other method.
- **Attaching input devices** – 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.

Connections

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

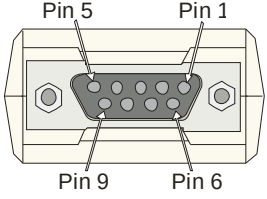
1. The USB connector connects to the target computer either directly, or via a USB extension cable, such as L3 Systems part number CL0017.
2. The RS-232 connector connects to an RS-232 port on the host system either directly, or via an RS-232 extension cable, such as L3 Systems part number CL0015.



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

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.

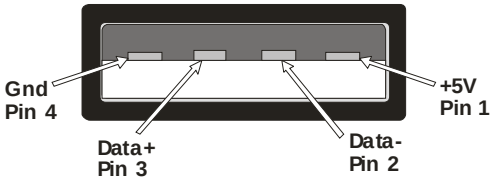


Pin	Signal	KeyAT-5 Function
1	DCD	Not Used
2	RX (Receive) from KB232	RS-232 Output
3	TX (Transmit) to KB232	RS-232 Input
4	DTR	Not Used
5	Signal Ground	Ground
6	DSR	Not Used
7	RTS	Not Used
8	CTS	Not Used
9	RI	Not Used.

KeyAT-5 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.

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, V5.3a, [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).

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)*

Press and hold a key

If you want to send a scan code and have it be held down, then use the ~+nn command.

~+nn Send & hold Scan Code – Hold down key nn.

~- Release Key – Releases key held.

Examples: :~+04<ENTER> *(Holds down "A" key)*
:~-<ENTER> *(Releases "A" Key)*
:~:E0~+06<ENTER> *(Holds Ctrl-C)*
:~-<ENTER> *(Releases Ctrl-C)*

Modifier Keys

The following commands allow you to prepend one or more modifier keys to a subsequent key. Capitalized command letter specifies the left key, whereas 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)*

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).

Examples:

```
:~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)
:
```

Mouse Commands

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

Move mouse

This command allows moves the mouse pointer.

~M± xx±yy Move Mouse – Moves mouse ± xx steps in x-axis and ± yy steps in y-axis.

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

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

Mouse Buttons

The command below allows you to send mouse button presses.

~Bnn Mouse Button – Press & release buttons
~Pnn Mouse Button – Press & hold buttons
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
nn=00 – Releases buttons for ~Pnn command

Examples: :~B01<ENTER> *(Left Button click)*
:~B02<ENTER> *(Right Button click)*
:~B01~B01<ENTER> *(Left Double click)*
:~B03<ENTER> *(Left & Right click)*
:~P01<ENTER> *(Press & hold left button)*
:~P00<ENTER> *(Release all buttons)*

Mode Commands

Line, Immediate and Quiet 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.

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

"Quiet mode" (~Q) turns off all RS232 transmissiom from the KeyAT. This is useful for applications with devices such as scanners.

~L **Line Mode** - Set to a line oriented basis, each line must end with an <ENTER> or <CR>, hex OD. Note that the ~L command will exit both Immediate and Quiet modes.

~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.

~Q **Quiet Mode** – This mode turns off all RS232 transmissions from the KeyAT-5 (character echoes and command prompts).

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)
    :
```

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 tents 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)
:
```

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-trough 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 Scan code 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
:
```

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>
```

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*: NoPar is no parity, Even is even parity, and Odd is odd parity. The default is NoPar.

Yecho – Echoing *RS-232 characters*: Valid settings are Necho for no echo, Yecho for echo enabled and Qecho for quiet mode. 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 0D, (<CR> or <ENTER> character)

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

03 – *Delay between keystrokes*: Default is 03, (30ms)
Note: Special delay entry of "**80**" implements "FastMode". This will send sequential scan codes more quickly, not sending release buffers if next scan code is different. Requires Version 5.3a or above.

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>
```

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.

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>
```

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>LK2B=57<ENTER>` *(ASCII "+" character maps to a "+" key)*

The above maps ASCII asterisk character "*" (Hex 2B) sent via the RS-232 port to a "+" key (Scan code 57) out the USB port. Normal mappings are shown in the ASCII Scan Code table at the end of the manual. The Key Scan Code Table is used to map keys to any ASCII character.

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>`

Shown above, the ASCII "?" character is sent, keys generate the typing of Hello", with the "H" shifted. Special scan code E8 can be used to prefix a scan code to indicate that the key is to be held down. Scan code E9 will release any held key. Scan code 00 will assure the release of the previous key. The following example shows Alt-1 followed by Alt-2 without releasing the ALT Key:

Example:
```
Setup>LK3F=E8,E2,1E,00,1F,00,E9<ENTER>
Setup>
```

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>      (Erase Key Scan Code Table)
Setup>
```

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.

Loading the Power ON String

The LP command loads a code table entry:

LP=<String> Loading Power On String

Ex:
```
Setup>LP=~Z80DIR^M<ENTER>   (Delay 80 seconds, &
Setup>                      send "DIR<ENTER>")
```

In the above example, when power is applied to the KeyAT-5, it first delays 80 seconds, and then sends a "DIR<Enter>" command.

Displaying Power on string

The **PP** command displays the Power On string:

```
Setup>PP<ENTER>      (Shows Power On string
~Z80DIR^M             loaded in example above)
Setup>
```

Special Characters

ASCII Hex (~nn) - ASCII hex characters can be sent by sending the hex code proceeded by a ~(tilde, hex 7E). For example, to send an M character in hex, send a ~4D.

Tilde and Caret Characters (~~ ^^) - To send a ~ (tilde, hex 7E) or ^ (caret, hex 5E) character, send the character twice. For example a ~~ will send the scan code for the ASCII character ~.

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, the keyboard indicators will light for a second, and the message "Setting Defaults..." will be sent to the RS-232 Port.

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*

Scan Codes

Scan Code Dec	Hex	Key Pad	KEY	Dec	Hex	Key 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		. / >

Scan Codes (cont.)

Scan Code Dec	Hex	Key Pad	KEY	Dec	Hex	Key Pad	Key
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

Scan Codes (cont.)

Scan Code Dec	Hex	Key Pad	KEY	Dec	Hex	Key Pad	Key
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

Scan Codes (cont.)

Scan Code Dec	Hex	Key Pad	KEY	Dec	Hex	Key Pad	Key
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		

Scan Codes (cont.)

Scan Code Dec	Hex	Key Pad	KEY	Dec	Hex	Key Pad	Key
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		*Hold Key	248	F8		
233	E9		*Release Key	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		

Note E8 and E9 are special KeyAT-5 codes

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

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

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

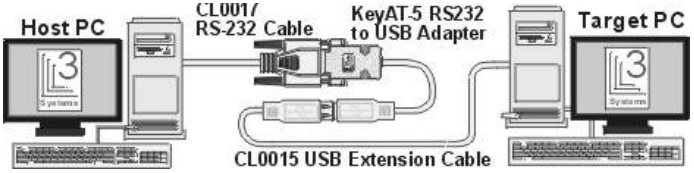
FCC Class B Approval Information

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.

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