KE72 and KE72-T
PC Keyboard Encoder
User Manual

Thank you for purchasing the model KE72 Keyboard Encoder.

HAGSTROM ELECTRONICS, INC.

is pleased that you have selected this product for your application. The KE72 unit is configurable in a variety of ways in order to meet your specific requirements. Please take a few minutes to read this manual before using your KE72.

In addition to this printed manual, other resources are included with the product CD which provide information and tips on using the KE72 and making the most of it's features.

If you have any questions about the use of the KE72 not covered in this manual, please contact us directly. We offer toll free technical product support from 8:00am to 5:00pm M-F Eastern Time **888-690-9080**. You may also send an email to

sales@hagstromelectronics.com

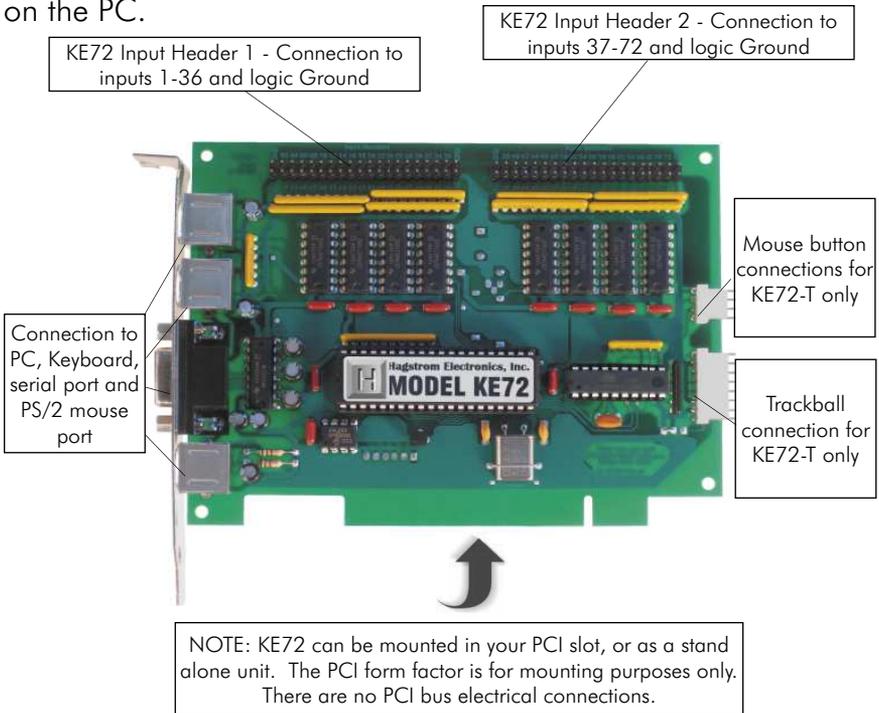We respond to all email requests within one business day.

CONTENTS

Introduction to the KE72

The KE72 Keyboard Encoder is a product designed to interface switches or keypads to the computer's PS/2 keyboard port. The KE72 appears as a keyboard to your computer system (and also a mouse with the KE72-T). The response to the activation of any of the 72 Individual inputs on the KE72 may be programmed to emulate a key or sequence of keys found on a standard PC keyboard.

The KE72-T features a trackball interface port which allows connection of the optical signals from a trackball to the unit. The signals received on this port are converted into mouse movement on the PC.

KE72 Input Header 1 - Connection to inputs 1-36 and logic Ground

KE72 Input Header 2 - Connection to inputs 37-72 and logic Ground

Mouse button connections for KE72-T only

Connection to PC, Keyboard, serial port and PS/2 mouse port

Trackball connection for KE72-T only

NOTE: KE72 can be mounted in your PCI slot, or as a stand alone unit. The PCI form factor is for mounting purposes only. There are no PCI bus electrical connections.

The KE72 uses standard drivers for its functions. No special software is required for the unit to work with your PC. Once programmed, the KE72 can be used with any PC compatible operating system.

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Connection to your Computer

The KE72 attaches in line between the PC and the system keyboard. Use a standard Male/Male PS/2 type connecting cable from the KE72 connector marked "PC" to the PS/2 keyboard port on the computer. Plug the system keyboard into the KE72 port marked "KBD". The **KE72-T** additionally connects to the computer's PS/2 mouse port with the same Male/Male PS/2 style cable. Use the serial port on the KE72 for serial data to keystroke translation or for serial loading of the KE72 configuration.

TO Keyboard Port on PC

From External Keyboard

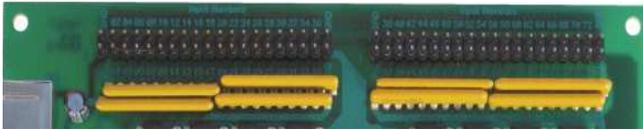**RS-232 Serial Port**

TO PS/2 Mouse Port on PC
(KE72-T Only)

Note: *Make connections to the KE72 with power off.*

The KE72 is powered directly from the keyboard port, no external power is required. The KE72 may be powered remotely if used in an RS-232 only application where no connection to the PC keyboard port is made. See Appendix C for remote power connections.

Interfacing to the KE72 Input Headers

The KE72 features two 2x20 headers for interface to switch input devices. One header provides access to inputs 1-36, while the second header contains inputs 37-72. The input headers are arranged with Grounds on the two pairs of end pins on the headers, and the 36 inputs on the pins between them. The board is labeled near each header pin, designating the input number that the pin represents. Each of the pins may be programmed to emulate any standard PC keyboard key or key sequence.
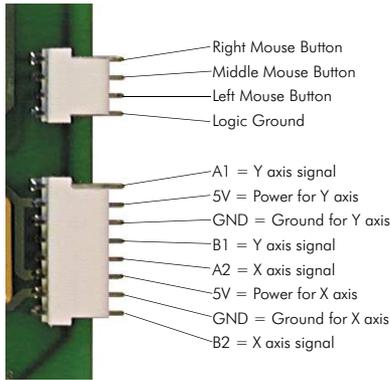

Inputs on the KE72 header are activated by shorting them through a switch to any one of the provided logic Grounds on the header. When activated, the input will report the keystroke or keystrokes that it has been programmed to emulate. If held active, the keystroke response will repeat (if programmed to repeat), based on the repeat rates and delays set within the PC operating system. KE72 inputs may be programmed to send keystrokes when the input is activated, deactivated, or at both times. The repeat of a key or key sequence is a selectable option for each input in a KE72 configuration file.

The inputs are intended to handle mechanical switch inputs and are debounced for that purpose. Logic drivers may be attached to the inputs as well, provided they are an active low, logic level signal. Refer to Appendix A on specifications for the timing of logic signals. *NOTE: Never attach any external power to the Inputs.*

The KE72 input headers are dual row headers with .100" spaced pins. This format is suitable for many readily available connectors on the market, including a typical IDE hard drive cable. Since all the inputs are activated by the same logic Ground, this Ground may be "daisy chained" to the Ground of all of the input switches.

We also offer a breakout board for screw terminal access to the KE72 input headers (our part number IOX36). This interface board attaches to the KE72 headers through an IDE cable (provided with the IOX36). See the Accessories page of this manual for details on the IOX36.

The KE72-T features an Input Header for connection of a Trackball or Spinner. The KE72-T also provides a header for connection of buttons to emulate the Left, Right and Middle PS/2 Mouse buttons.

Right Mouse Button
Middle Mouse Button
Left Mouse Button
Logic Ground

A1 = Y axis signal
5V = Power for Y axis
GND = Ground for Y axis
B1 = Y axis signal
A2 = X axis signal
5V = Power for X axis
GND = Ground for X axis
B2 = X axis signal

KE72-T - Trackball and Mouse button Interface signal assignments.
Note: *Do not supply any power into the Trackball or Mouse Button interface connector.*

The four position header shown is for connection of switches to emulate the mouse buttons. These inputs are activated by shorting them to the supplied logic Ground.

The eight position header on the KE72-T is for connection of a Trackball or Spinner. Use our KE-TBH3 cable to connect the Trackball or create a cable using the signals as shown. Power is supplied to the Trackball device from this header.

NOTE: Never connect an externally powered device to the Trackball header or Mouse Button interface connector.

The KE72-T Trackball header accepts input from active or passive drive Trackballs or Spinners.

Creating a KE72 Configuration File

The KE72 is programmed by a configuration file which is a simple text file created by the user that tells the unit what responses to generate for activity on each of the KE72 inputs. This configuration file is loaded into the KE72 by use of the utlility programs included with the KE72 and detailed in the next section of the manual.

Responses assigned to an input may be a single keystroke, or a series of keystrokes, making the KE72 a very powerful and flexible unit. The rules of creating the text file for the KE72 are simple and versatile. The following examples demonstrate the text required in the configuration file to define the response of an input.

Each input definition line begins with INXX:, where XX is a two digit decimal number between 01 and 72. This number indicates which input the line refers to for the keystroke response. The keystroke definition for an input is generally encased by square brackets [ ].

Example Configuration Lines:

IN01:[A]
The line above will program input #1 to produce the "A" keystroke when the input is activated.

IN22:[F1]
The above text will program input #22 to emulate the F1 key.

IN63:[Home]
The line above will program input #63 to emulate the Home key.

In addition to emulating a single keystroke, an input may be programmed to produce a sequence of keystrokes as well. The

following line demonstrates programming a multiple key response to an input.

IN43:[D] [I] [R] [ENTER]

The above line in the text file will program input #43 to send a sequence of "DIR" followed by the Enter key each time the input is activated.

IN02:[A]
IN02|[J]

Inputs may also be programmed to send a response when the input is de-activated as well as when the input is activated. The line above will program input #2 to send an "A" key when the input is activated and a "J" key when the input is released.

NOTE: The | character is used after the input number to define the response for the input when it is deactivated.

IN03|[G]

Using the line above in a configuration file will set input #3 to send the "G" key when the input is de-activated. No response will be generated by input #3 when it is activated when programmed as shown.

There are several delimeters that may be used in the KE72 text file to futher define the character response. The following is a list of these delimeter options with examples for each.

(+) This option indicates that a "make" or press of the key only is to be done. Use this function to give the appearance of a key being held down.

ex: **[(+)Ctrl]** will emulate the press of the Ctrl key. Always be sure to send a release of any key that has been sent as a make only. (see the next example of the (-) key release option.)

(-) This option indicates that a "break" or release of the key is to be done. Use this function to give the appearance of a key being released.

ex: **[(-)Ctrl]** will emulate the deactivation of the Ctrl key.

Using the (+) and (-), the following line,
IN01:[(+)Ctrl] [F1] [(-)Ctrl]
will result in the Ctrl key being held on, the F1 key being pressed and released, followed by the release of the Ctrl key.

(N) Use this option to designate the key to be emulated is from the numeric keypad section of the keyboard.

ex: **IN01:[(N)1]** is used to emulate the "1" key from the "1/ End" key from the numeric keypad section of the keyboard instead of the "1!" key from the top of the keyboard.

(~) This option is used to designate case sensitivity on an alpha character.

ex: **IN01:[(~)A]** can be used to always emulate a capital A regardless of the current Shift and Caps Lock states.

(D) Use this option within the key sequence to suspend the KE72 and delay during the output sequence. This function is always followed by a value which specifies a delay time X .01 seconds.
NOTE: The maximum value allowed with the (D) delay command is 250.
ex: **IN01:[(D)200]** will execute a 2 second delay (200 X .01)
Delay statements can be cascaded to produce longer delays [(D)220][(D)150]

<R> This option is used when the input response is to be repeated when the input is held active. The <R> must be the first text following the : or | character on the input definition.

ex: **IN70:<R>[A]** will allow the "A" key response to repeat

while the input is held active. The rate at which the input will repeat is the same rate dictated by the system to the keyboard.

<S> Use this delimeter to send the input response to the serial port instead of emulating keystrokes. The sample.txt file included on the KE72 CD provides extended examples of the serial port function. The <S> option must follow the : or | character on the input definition line.

ex: **IN05:<S>[F]** will send an ASCII "F" out of the KE72 serial port when the input #5 is activated. In addition to an ASCII character, a numeric value may be specified for the byte to be sent. ex: **IN05:<S>[220]** will send a one byte value of 0xDC.

Inputs on the KE72 may be programmed to send up to 32 keystrokes when activated, and up to 16 when the input is released.

example:
IN28:[p][r][e][s][s][e][d]   Types "pressed" when input 28 activates
IN28|[r][e][l][e][a][s][e][d] Types "released" when input 28 deactivates

The key to be emulated is always inserted between square brackets. The following list summarizes the associated key names for keystrokes that are used in a KE72 Configuration File. All other keys are represented by their direct equivalent (ex: A = A key, B = B Key, etc.)

[Shift]	=	Left Shift	[LShift]	=	Left Shift
[RShift]	=	Right Shift	[Ctrl]	=	Left Ctrl
[LCtrl]	=	Left Ctrl	[RCtrl]	=	Right Ctrl
[Alt]	=	Left Alt	[LAlt]	=	Left Alt
[RAlt]	=	Right Alt	[Esc]	=	Escape
[F1]	=	F1 key	[F2]	=	F2 key
[F3]	=	F3 key	[F4]	=	F4 key
[F5]	=	F5 key	[F6]	=	F6 key

[F7]	=	F7 key	[F8] =	F8 key
[F9]	=	F9 key	[F10] =	F10 key
[F11]	=	F11 key	[F12] =	F12 key
[Space]=		Space Bar	[ ] =	Space Bar
[Print]	=	Print Screen	[Scroll] =	Scroll Lock
[Pause]=		Pause/Break	[Num] =	Num Lock
[Insert]	=	Insert Key	[Home]=	Home key
[PageUp]=		Page Up	[PageDn]=	Page Down
[Delete]=		Delete key	[End] =	End key
[Up]	=	Up Arrow	[Down]=	Down Arrow
[Left]	=	Left Arrow	[Right] =	Right Arrow
[LWin]	=	Left Windows	[RWin] =	Right Windows
[Win]	=	Win Apl	[Enter] =	Enter
[BS]	=	Backspace	[CAPS]=	Caps Lock
[Tab]	=	Tab key	[(N)1] =	1/End
[(N)2]	=	2/Down	[(N)3] =	3/PgDn
[(N)4]	=	4/Left	[(N)5] =	5
[(N)6]	=	6/Right	[(N)7] =	7/Home
[(N)8]	=	8/Up	[(N)9] =	9/PgUp
[(N)0]	=	0/Ins	[(N).] =	./Del
[(N)Enter]=		Enter	[(N)+] =	+
[(N)-]	=	-	[(N)*] =	*
[(N)/]	=	/		

Note: the (N) with a key definition indicates that the key being emulated is the one from the numeric keypad section of the keyboard.

When saving a configuration file, it must be saved as a text file only. The text file can be created from virtually any document editing program. The file type to use for saving is typically referred to as a ".txt" file in ANSI format or "ASCII DOS Text" depending on the program used to create the file. Refer to the sample configuration file on the CD included with the KE72.

Special Programming Options

The KE72 features several special commands that may be included in the configuration file to dictate the way inputs react and how the Trackball interface is treated in the model KE72-T. These special commands may be placed anywhere within the configuration file and in any order.

Input Preload Option -   **PREL:Y** or **PREL:N**

If this line is present in the configuration file, the KE72 will ignore any switches that are on at power up or reset if the Y setting is used. Having inputs on at power up may cause keyboard error messages on some PCs. With this option set to Y, an active input at power on is ignored until it is deactivated. At this point, the input will respond normally when activated and deactivated. Note that not specifying this setting in the configuration file is the same as stating PREL:N.

The KE72-T Trackball header accepts a wide variety of Trackball devices. In order to provide the most in the way of compatibility, the KE72-T allows for the reversal of the direction of movement from either the "X" (side to side) axis and the "Y" (up and down) axis through simple settings in the configuration file.

Trackball X direction reversal (KE72-T only) - **REVX:Y**

The reported direction of the X axis of the trackball may be reversed by including a line REVX:Y in the configuration file. If this option is not specified, that is the same as defining REVX:N.

Trackball Y direction reversal (KE72-T only) - **REVY:Y**

The reported direction of the Y axis of the trackball may be reversed by including a line REVY:Y in the configuration file. If this option is not specified, that is the same as defining REVY:N.

The mouse resolution setting (KE72-T only) -

The Trackball section of the KE72-T emulates a standard PS/2 mouse. The typical drivers on the PC will dictate the resolution parameters for the PS/2 mouse. The KE72-T can be set to ignore the resolution parameters given by the system and stay in the resolution set by the MSET command. There are four settings which may be programmed for this resolution option.

MSET:n (Where n = 0,1,2, or 3)

Setting 0 = Lowest resolution (least amount of movement per input)
Setting 1 =
Setting 2 =
Setting 3 = Highest resolution (most amount of movement per input)

Note that when this MSET programming option is not included in the configuration, the resolution is automatically adjusted by the system's mouse driver.

Sample KE72 Configuration File

This is a sample configuration file for the KE72. Note that comments may be used in the configuration file, as in this paragraph. Comments may also follow a command string on the same line as shown below.
PREL:Y   Use the preload option to suppress response to inputs that are on at power up.
IN01:[D] Program input 1 to emulate the D key
IN02:[F1] Make input 2 the F1 key

IN22:[(+)Ctrl][F2][(-)Ctrl]
Program input 22 to emulate a Ctrl+F2 function

IN56:<R>[M]   Repeat the M key if the input is held active

IN06:[G]   Input definitions can be in any order.
IN06|[H]   Set input 6 to send G when activated and H when released

REVX:Y Reverse the response of the X axis of the Trackball for the KE72-T

End of File

Loading a Configuration File to the KE72

The KE72 is supplied with two load programs. The KE72LOAD.EXE found in the root folder of the supplied CD is for use in Windows based operating systems. The KE72LOAD.EXE file found in the KE72DOS folder is used for DOS based systems.

To run the programs, the contents of the CD should be copied to a folder on the hard drive. Store the CD for a backup copy of the load program.

Prior to running the KE72LOAD.EXE a configuration text file must be created as described in the earlier section.

The KE72LOAD.EXE program may be run by selecting the file directly and running it, or it may be run as a command line with options. When run with no command line options, the program will prompt the user for the configuration file to be loaded as well as the port to load through to the KE72.

The KE72 may be programmed through the keyboard port, or through the serial port. When programming through the serial port, the programming application may be run from the PC where the KE72 is attached, or a different PC that has it's Com port attached to the KE72 serial port.

The syntax for loading the KE72 through the command line:

KE72LOAD <filename> <port> </r> </e> </h>

Where <filename> is the name of your KE72 configuration file, and the <port> is the port to use for programming the KE72.

The /r,/e, and /h options apply to the Windows program only and are optional parameters.

Example: **KE72LOAD sample.txt k**

The command line above will load the configuration contained in the file "sample.txt" to the KE72 through the PC keyboard port.

The options for <port> are the following:

k   - Keyboard port
1   - Use Com 1 to load the configuration
2   - Use Com 2 to load the configuration
3   - Use Com 3 to load the configuration (Win version)
4   - Use Com 4 to load the configuration (Win version)
5   - Use Com 5 to load the configuration (Win version)
6   - Use Com 6 to load the configuration (Win version)

Note that for loading through the serial port a Male/Female straight through cable must be used to connect from the KE72 serial port to the Com port of the PC where the program is being run. While loading from a command line, a series of "......." characters are sent which indicate the progress of the loading.

The **/e** option suppresses the confirmation "......." characters sent as progress indicators when loading from a command line. Error messages will still be shown if they occur during loading.

The **/h** option is the same as the /e option except that error messages are supressed as well.

The **/r** option reads the current KE72 configuration instead of loading the configuration. The configuration currently residing in the KE72 is written to the file named in the command line.

Example: KE72LOAD current.txt 5 /r
Will read the configuration from the KE72 using Com 5 and create a file named "current.txt" which will hold the text representation of the configuration.

Using the KE72 Serial Port

Responses from the activation of inputs may be directed to the serial port instead of producing keystrokes as described in the earlier configuration file section. In addition to that function, the KE72 serial port may be used in several other modes as well.

Serial Data to Keystroke Modes -

The KE72 features two different serial data to keystroke conversion modes. One mode accepts direct ASCII characters while the second mode accepts "key numbers" which command the up and down state of any key. The ASCII mode is the default mode at power up and reset, but the mode may be changed and identified by special one byte serial commands shown later in this section.

The ASCII to Keystroke mode will accept printable ASCII characters and translate them into keystrokes on the PC. If an ASCII "A" is sent to the serial port, the KE72 will produce the required keystrokes to produce an upper case "A". The KE72 responds with a "!" character after each byte is received in this mode. Always wait for the "!" acknowledgement before sending additional communication to the serial port. Any characters sent to the KE72 which are not printable ASCII characters are ignored.

The Key Number to Keystroke mode allows the commanding of the up and down state of any key on the keyboard. In this mode, each key on the keyboard is represented by a number (See Appendix F for the key number table). Sending the key number to the serial port results in a "down" key state for the corresponding key. Sending the same code +128 decimal results in the "key up" message being generated for that key. Use this key number mode to emulate keystrokes and keystroke combinations such as Ctrl+F1, etc. Note that "key down" refers to the press of a key and "key up" refers to the release of a key. Always send a key up message for a key that had previously been sent as a key down

message to prevent a stuck key. The KE72 responds with a "!" character after each byte is received in this mode. Always wait for the "!" acknowledgement before sending additional communication to the serial port.

NOTE: Serial data in and out of the KE72 serial port is always at 9600 Baud, 8 bit characters, No Parity, and one stop bit. No hardware handshaking is used. Custom versions are available, please contact us with your requirements.

0xC2 - Use this one byte command to set the serial translation mode to ASCII to Keystroke. This mode is also the default mode at power on or reset. The KE72 responds with "!" to acknowledge receipt of this command.

0xC3 - This command will set the KE72 serial translation mode in Key Number to Keystroke. While in this mode, a single byte is sent to the KE72 serial port which corresponds to the up or down state of a particular key. Once this command byte is received by the KE72, the serial mode will be in the key number mode until changed by the 0xC2 command, a reset to the PC occurs, or the PC is powered down and back up. The KE72 acknowledges receipt of this command with the "!" character.

0XC4 - Use this command to poll the KE72 for the current serial translation mode. When the KE72 receives this command, a character is returned by the KE72 which indicates the current serial to keystroke mode.

"1" (0x31) is returned in response to the 0XC4 command if the KE72 is operating in the ASCII to Keystroke mode.

"2" (0X32) is returned in response to the 0XC4 command if the KE72 is operating in the Key Number to Keystroke mode.

0XC5 - Input state command. When this serial command is received by the KE72, a string of 9 bytes are transmitted on the serial port which indicate the current debounced status of each of the 72 inputs on the KE72. The first byte returned in response to
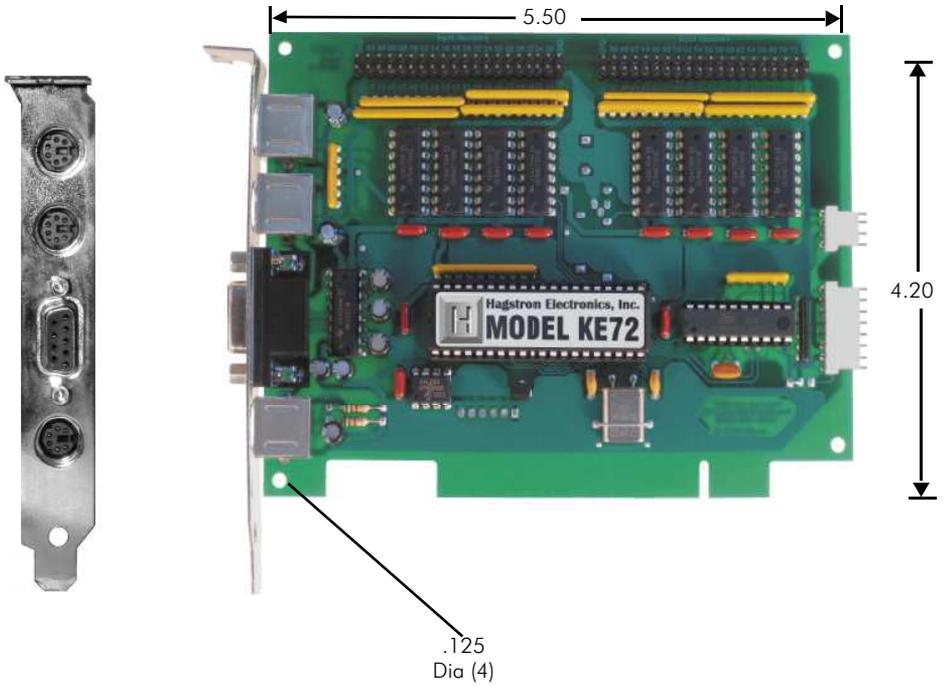
the 0XC5 command represents the state of the first 8 inputs (bit 0 = Input1, bit 1 = Input2.....), and the second byte is the state of inputs 9-16 etc.   The 9th byte sent in response to the command is the status of inputs 65-72 (Bit 7 = Input 72 state). A value of 1 in a bit position indicates that the particular input is activated. The status of the inputs is always available using the 0XC5 command independent of whether inputs are programmed to respond with keystrokes or serial data.

0X7F - Status LED Read Command. Sending 0X7F to the KE72 serial port results in the return of a character in the range of ASCII "0" - "7". The KE72 response character reflects the current state of the Caps Lock, Num Lock, and Scroll Lock LEDs.

"0"   -   No LEDS On
"1"   -   Scroll Lock LED on only
"2"   -   Num Lock LED on only
"3"   -   Scroll Lock LED and Num Lock LED on
"4"   -   Caps Lock LED on only
"5"   -   Caps Lock LED and Scroll Lock LED on
"6"   -   Caps Lock LED and Num Lock LED on
"7"   -   Caps Lock, Scroll Lock, Num Lock LED all on

The serial port on the KE72 may additionally be used to load a configuration file into the KE72 as described in the "Loading a Configuration File to the KE72" section of the manual. When loading the configuration from the serial port, the PC running the load program can be a different machine than the one which has the KE72 attached to it's keyboard port.
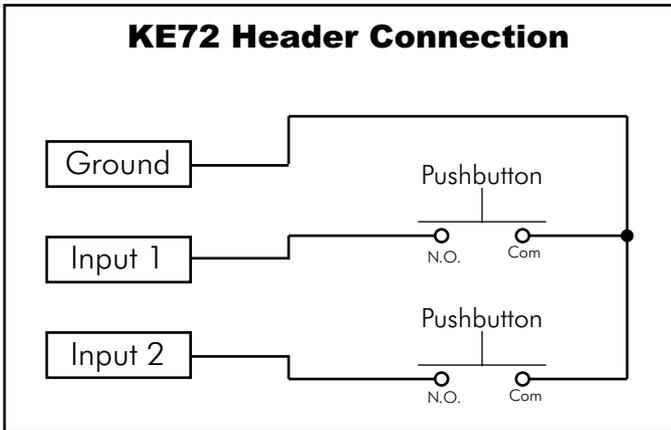
Appendix A:
Specifications

.125
Dia (4)

Note: All dimensions are in inches.

Operating Voltage	5 Volts DC +/-5%, Supplied from PS/2 port.
Operating Current	80 ma Typical
Operating Temperature	0 to 70 Degrees C
Input Header	72 individual inputs divided between two 2 x 20 headers. .025" square pins spaced at .100"
Required Input Current	1.2 ma sink current typical
Input Active Time	The input must be active for at least 20 msec to be considered valid.

Appendix B:
KE72 Input Interface

The KE72 is configured as 72 individual inputs, which are activated by shorting them to the common Ground provided on the input headers. Since these inputs are individual, they are completely separate, and cannot produce "ghosting" as in a matrix application. The KE72 inputs are debounced for use of mechanical switches for input to the header.
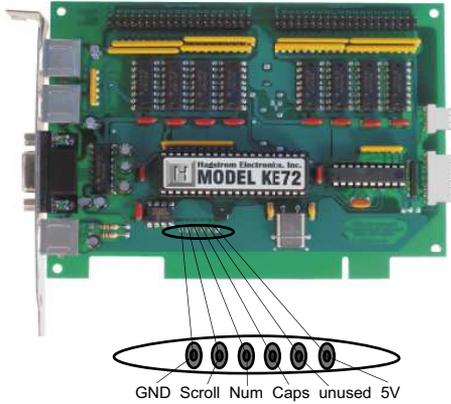

Electrical connection example for switches to KE72 inputs.

KE72 Inputs may also be driven from logic gate outputs, provided they do not drive voltage above the 5V supply on the unit. The logic signals must produce an active logic low signal for the appropriate amount of time as listed in Appendix A.
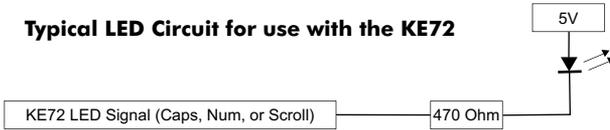
The recommended maximum cable length from the KE72 input header to the input devices is 10 feet. The recommended maximum cable length of the PS/2 cable from the PC to the KE72 is 10 feet.

Note: *The KE72 allows any number of the 72 inputs to be activated simultaneously. The responses to each input will be processed in the order they are detected.*

Appendix C:
KE72 Status LED Signals

GND Scroll Num Caps unused 5V

Typical LED Circuit for use with the KE72

Keyboard status light drive is available with the KE72. The unit provides a connection point for the Num Lock, Caps Lock, and Scroll Lock status LEDs.

The signals present on the KE72 require a 470 Ohm 1/4 Watt resistor in series with the signal and the LED from the KE72. The KE72 LED signals are active low when the LED is to be lit.
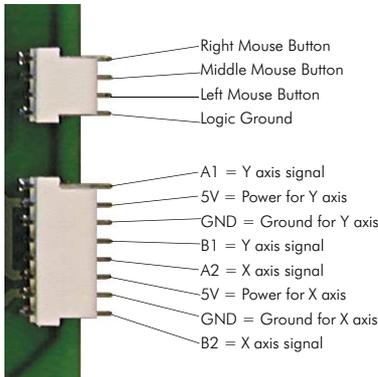
Attach the anode side of the LED to the 5V source on the header and attach the cathode leg of the LED to one end of the 470 Ohm resistor. Connect the other end of the resistor to the signal from the KE72.

Note that in a stand alone serial application (No connection to PC KBD or Mouse Port), a regulated 5V supply must be used with the unit. The 5V supply may be attached to the 5V and GND pins shown in the diagram above.

Appendix D:
KE72-T to Trackball

The KE72-T features an interface connector which accepts optical signals from a device such as a Spinner or a Trackball. Power is supplied to the trackball interface from the KE72-T for 5 volt operation only. This interface is compatible with most popular active or passive Trackballs and Spinners currently on the market. Use our KE-TBH3 cable to connect from the KE72-T directly to a Trackball or use the diagram below to make a connecting cable.

The KE72-T also provides a header for connection of buttons to emulate the Left, Right and PS/2 Middle Mouse buttons.
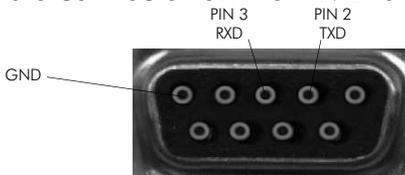

Right Mouse Button
Middle Mouse Button
Left Mouse Button
Logic Ground

A1 = Y axis signal
5V = Power for Y axis
GND = Ground for Y axis
B1 = Y axis signal
A2 = X axis signal
5V = Power for X axis
GND = Ground for X axis
B2 = X axis signal

KE72-T - Trackball and Mouse button Interface signal assignments.
Note: *Do not supply any power into the Trackball or Mouse Button interface connector.*

Appendix E:
KE72 Serial Connector Pinout

The KE72 serial port is an RS232 connection. The pinout of the DB9 female connector on the KE72 is as defined below.

PIN 3
RXD

PIN 2
TXD

GND

The KE72 serial port requires connection only to the three pins shown. TXD is RS-232 serial data out of the port and RXD is RS-232 data into the KE72. This pin arrangement allows for use of a Male/Female stright through cable to connect the KE72 to a standard PC com port.

Appendix F:
Key Number Table

Key	Make	Break
~`	01	129
1!	02	130
2@	03	131
3#	04	132
4$	05	133
5%	06	134
6^	07	135
7&	08	136
8*	09	137
9(	10	138
0)	11	139
-_	12	140
=+	13	141
BS	15	143
Tab	16	144
Q	17	145
W	18	146
E	19	147
R	20	148
T	21	149
Y	22	150
U	23	151
I	24	152
O	25	153
P	26	154
[{	27	155
]}	28	156
|	29	157
Caps	30	158
A	31	159
S	32	160
D	33	161
F	34	162
G	35	163
H	36	164

Key	Make	Break
J	37	165
K	38	166
L	39	167
;:	40	168
`"	41	169
Enter	43	171
L Shift	44	172
Z	46	174
X	47	175
C	48	176
V	49	177
B	50	178
N	51	179
M	52	180
,<	53	181
.>	54	182
/?	55	183
R Shift	57	185
L Ctrl	58	186
L Alt	60	188
Space	61	189
R Alt	62	190
R Ctrl	64	192
L Win	70	198
R Win	71	199
Win APL	72	200
Insert	75	203
Delete	76	204
L Arrow	79	207
Home	80	208
End	81	209
Up Arrow	83	211
Dn Arrow	84	212
Page Up	85	213
Page Dn	86	214

Key	Make	Break
R Arrow	89	217
NumLock	90	218
7 (Num)	91	219
4 (Num)	92	220
1 (Num)	93	221
/ (Num)	95	223
8 (Num)	96	224
5 (Num)	97	225
2 (Num)	98	226
0 (Num)	99	227
* (Num)	100	228
9 (Num)	101	229
6 (Num)	102	230
3 (Num)	103	231
. (Num)	104	232
- (Num)	105	233
+ (Num)	106	234
Enter (Num)	108	236
Esc	110	238
F1	112	240
F2	113	241
F3	114	242
F4	115	243
F5	116	244
F6	117	245
F7	118	246
F8	119	247
F9	120	248
F10	121	249
F11	122	250
F12	123	251
Prt Scr	124	252
Scrl Lk	125	253
Pause/Break	126	------

The Pause Key has no Break Code

When sending data to the KE72 serial port in key number mode, use the values shown to produce the "make" and "break" code for the corresponding key.

Accessories

We offer several accessories for use with the KE72.
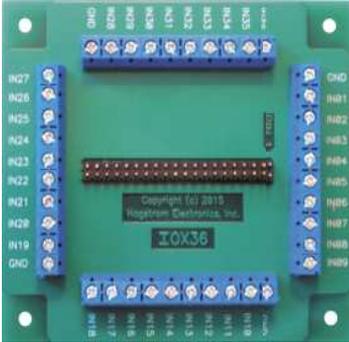
KE-MM6-mini
6 Ft. Male/Male miniDIN Cable

Use this cable to connect the KE72 to the PC keyboard port. The KE72-T requires an additional KE-MM6-mini style cable to connect from the KE72-T to the PC Mouse port.

IOX36

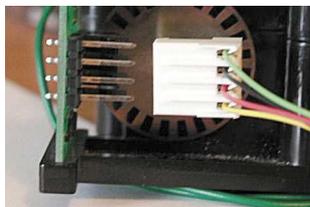Input Header to screw terminal breakout board. This product connects to the KE72 input header through a s t a n d a r d IDE cable (included). Each input is brought out to a separate, labeled, screw terminal. Use for solderless connection to the KE72 and KE72-T.

KE-TBH3

Trackball interface cable. This cable attaches the KE72-T Trackball input to the Trackball itself.

Custom KE72 Options

We offer custom and special modifications to our standard KE72 unit to conform to your exact specifications. We can add special features such as output controls and display interfaces, just to name a few. Give us a call to discuss your custom requirements.

Special Output Controls

LCD Interface

LED Interface

Rotary Switch Inputs

MIDI Output

Questions or Comments?
Please give us a call!

Toll Free
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www.hagstromelectronics.com

email: **sales@hagstromelectronics.com**

Warranty

HAGSTROM ELECTRONICS, INC. warrants this product against defects in material or workmanship for a period of ONE YEAR from the original purchase date. We will repair or replace (at our option) the returned defective unit at no charge during this warranty period.

No responsibility is assumed for any special, incidental, or consequential damage resulting from the use of or inability to use this product. In no case is **HAGSTROM ELECTRONICS, INC.** to be liable for any amount which exceeds the purchase price of the unit, regardless of the claim.

No other warranty, written or verbal, is authorized. This warranty is applicable only to units sold in the United States. Units sold outside the United States are covered by a similar warranty.

Depending on the state in which you live, you may have additional rights.

Great care has been taken during the assembly, testing, and burn-in of your KE72 to ensure its performance. If you have any questions, please send us an email or give us a call. Support is available Monday through Friday, 8:00 am to 5:00 pm (EST).

customer service email*:*   *sales@hagstromelectronics.com*

Call Toll Free **888-690-9080**, or **(540) 465-4677**

NOTICE: The KE72 product is designed to be used by technically oriented computer users. When the KE72 is in use, your computer's signals and voltages are present on the unit. Prudent handling and packaging is necessary to prevent damage to your computer.

Your keyboard encoder is designed for OEM use, and is not FCC part 15 approved. Because the packaging and use of the product will directly affect the characteristics of the unit, it is the responsibility of the purchaser to obtain final approval of their application, if required.

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