



APPLICATION NOTE AN-00300

Addressing Linx OEM Products

INTRODUCTION

The Linx OEM products to date are effectively made with the KH series transmitter and receiver. The KH, in turn, is made with the LC transmitter and receiver and Holtek encoder and decoder chips. The Holtek chips have ten address lines and eight data lines. The address lines are all tri-state (ground, Vcc, or floating) giving 3^{10} or 59,049 individual addresses. The line is floating if it is not connected at all. This is not possible when used with a microprocessor that can only pull the lines to Vcc or ground.

The encoder sends a packet with the states of each of these lines. The decoder then looks at the received packet, compares the received address bits with the current state of its own address lines, and, if they match, reproduces the received data bits on its data lines. If the addresses do not match, then the decoder ignores the packet.

SETTING THE ADDRESSES

As stated above, the Holtek ICs have ten address lines, A0 through A9. The OEM products are not always able to make use of all of the address lines, so setting the address bits can sometimes be a little confusing. This note will look at each product in turn and demonstrate how to set its address.

The chart below shows the possible settings for each address bit in each of the OEM products and the KH series. Choose the transmitter and receiver you wish to use and find them in the chart. The address lines can be set to the values listed in each cell, but shaded cells cannot be changed. If one

device has lines that cannot be changed, then set the same lines to “floating” on the other device. Pick the values you wish to use for each cell that can be changed, then set the addresses on the transmitter and receiver. The most important thing is that the transmitter and receiver must match. If the addresses do not match, then the receiver will ignore the transmitter and nothing will happen.

When the addresses match, the transmitter and receiver will communicate with each other and they can be successfully used in production. The rest of this note will describe how to set the address on each product.

Address Bit	Transmitters					Receivers			
	CMD-HHTX	CMD-HHCP	CMD-HHLR	CMD-KEYX	TXE-XXX-KH	FCTN-DEC1	FCTN-WALL	FCTN-RLY4	RXD-XXX-KH
A0	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd, Vcc	Float, Gnd, Vcc	Float, Gnd	Float, Gnd	Float, Gnd, Vcc
A1	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd, Vcc	Float, Gnd, Vcc	Float, Gnd	Float, Gnd	Float, Gnd, Vcc
A2	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd, Vcc	Float, Gnd, Vcc	Float, Gnd	Float, Gnd	Float, Gnd, Vcc
A3	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd, Vcc	Float, Gnd, Vcc	Float, Gnd	Float, Gnd	Float, Gnd, Vcc
A4	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd, Vcc	Float, Gnd, Vcc	Float	Float, Gnd	Float, Gnd, Vcc
A5	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd, Vcc	Float, Gnd, Vcc	Float	Float, Gnd	Float, Gnd, Vcc
A6	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd, Vcc	Float, Gnd, Vcc	Float	Float, Gnd	Float, Gnd, Vcc
A7	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd, Vcc	Float, Gnd, Vcc	Float	Float, Gnd	Float, Gnd, Vcc
A8	Float	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd, Vcc	Float, Gnd, Vcc	Float	Float	Float, Gnd, Vcc
A9	Float	Float, Gnd	Float, Gnd	Float, Gnd	Float, Gnd, Vcc	Float	Float	Float	Float, Gnd, Vcc

TRANSMITTERS

HANDHELD TRANSMITTER

To set the address of the CMD-HHTX-*** remove the screw in the back of the case. Open the case and look for the DIP switch as shown below.

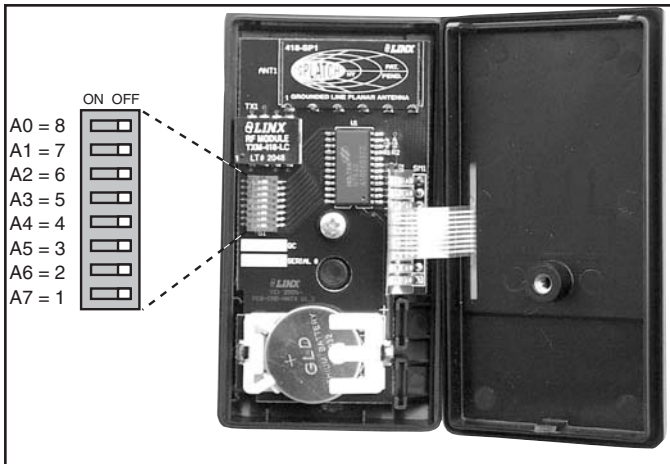


Figure 1: CMD-HHTX DIP Switches

Switch number one is at the bottom and corresponds to address line A7, as shown in the figure. When the switch is on, the pin is connected to ground, otherwise it is floating. **This transmitter does not make use of address lines A8 and A9, so the receiver/decoder must have these lines floating.**

COMPACT HANDHELD TRANSMITTER

To set the address of the CMD-HHCP-*** remove cover plate on the back of the case to reveal the DIP switch as shown below.

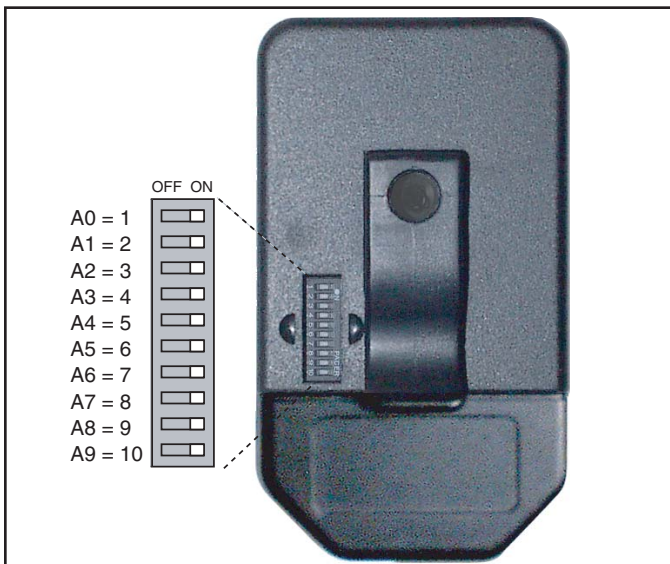


Figure 2: CMD-HHCP DIP Switches

Switch number one is at the top and corresponds to address line A0, as shown in the figure. When the switch is on, the line is connected to ground, otherwise it is floating.

LONG RANGE HANDHELD

To set the address of the CMD-HHLR-*** remove the cover plate on the back of the case to reveal the DIP switch as shown below.

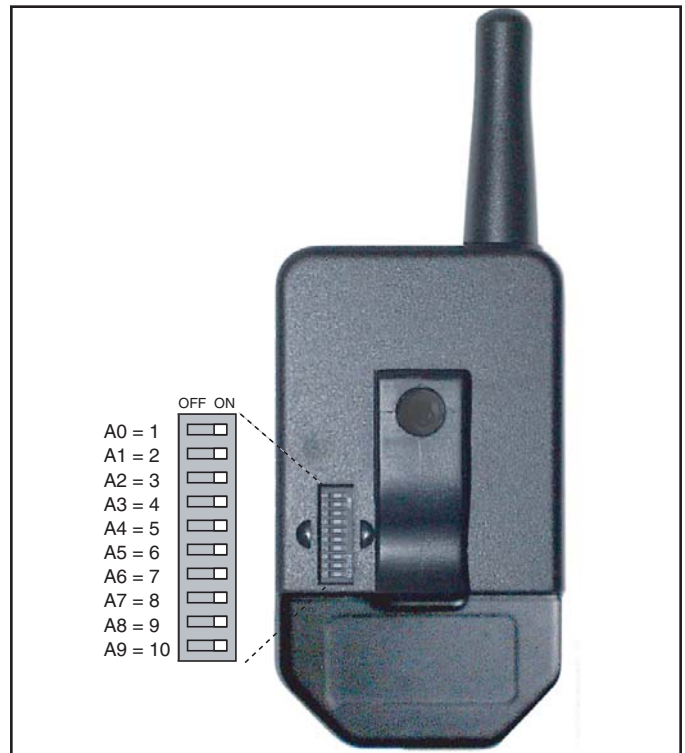


Figure 3: CMD-HHLR DIP Switches

Switch number one is at the top and corresponds to address line A0, as shown in the figure. When the switch is on, the line is connected to ground, otherwise it is floating.

KEYFOB TRANSMITTER

To set the address of the CMD-KEYX-*** open the case at the seam. Look for the Holtek IC in the middle of the board above the battery. At the top of the chip there are traces that run from the address lines to ground, as shown in the picture below.

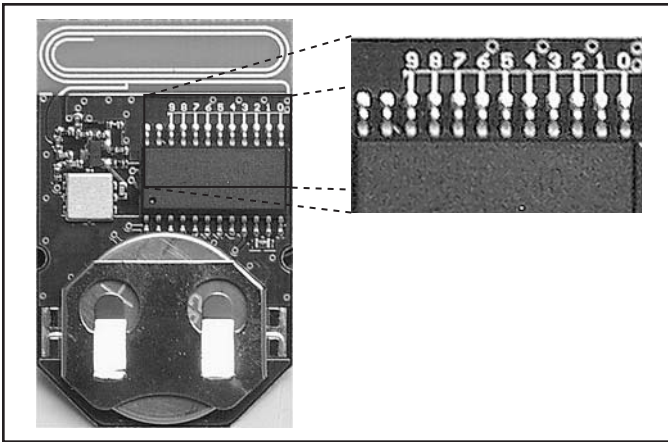


Figure 4: CMD-KEYX DIP Switches

The number above the trace corresponds to the address line, trace 0 to bit A0, etc. To set the address, use a hobby knife or razor blade to cut the traces on the board. If the trace is intact, the line is connected to ground, otherwise it is floating.

KH SERIES TRANSMITTER

The pin diagram for the TXE-***-KH transmitter is shown below.

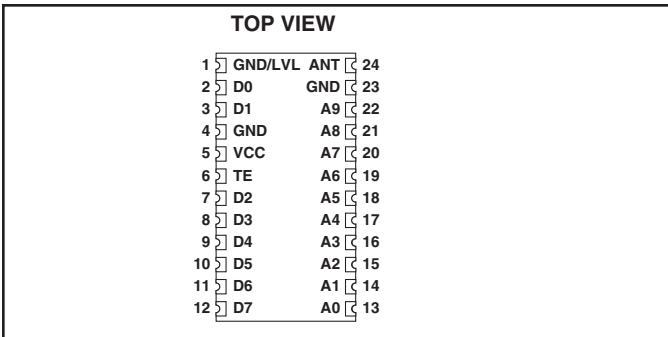


Figure 5: KH Series Transmitter Pin-Out

The address lines A0 through A9 are shown on the bottom right of the diagram. These lines are tri state (ground, Vcc, or floating) but if this module is being used with one of the OEM receivers, then the lines will be either ground or floating. If a KH receiver or LC receiver and decoder chip are being used, then the option to use all three states exists, giving 3^{10} or 59,049 individual addresses. When correctly addressed, and a data line is pulled high on the transmitter, the corresponding data line goes high on the receiver. This makes the KH excellent for transmitting button presses on remote controls.

LC SERIES TX AND A HOLTEK ENCODER

The KH series transmitter is essentially a LC transmitter that is connected to a Holtek encoder and put into a single package. If desired, the designer could purchase these parts separately and connect them as in the figure below. The addressing and data out would work the same as for the KH transmitter.

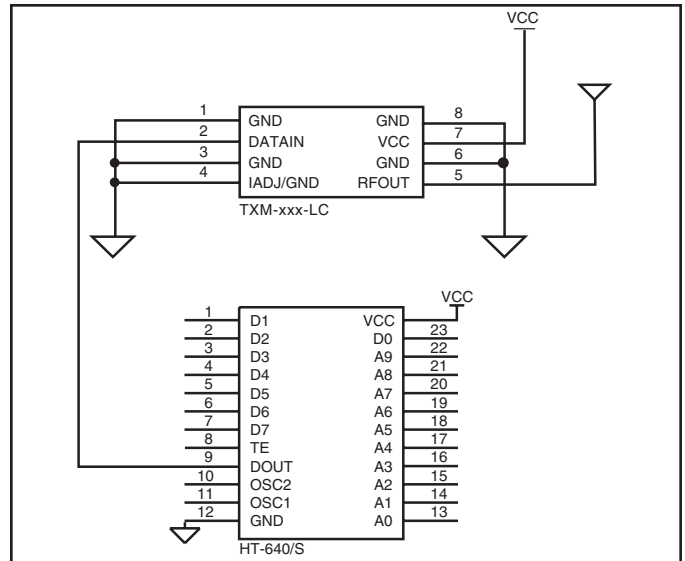


Figure 6: LC Series Transmitter With Holtek Encoder

RECEIVERS

AC FUNCTION MODULE

The DIP switches for the FCTN-WALL-*** are located on the side that plugs into the outlet as shown in the picture below.

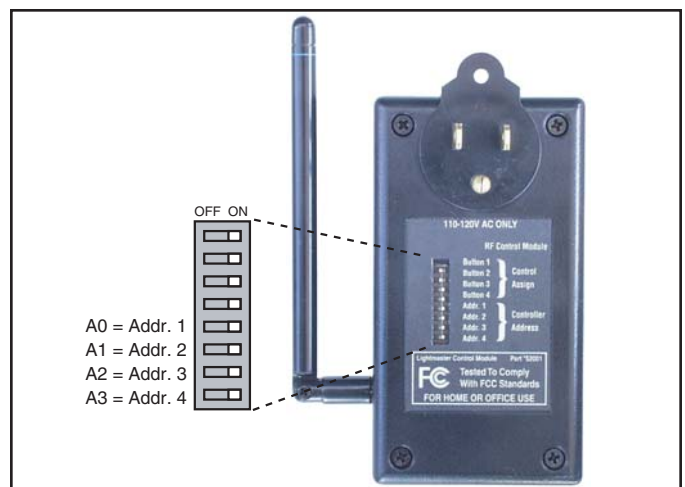


Figure 7: FCTN-WALL DIP Switches

This module only uses address lines A0 through A3 so the encoder must have A4 through A9 floating. When the switch is on, the

line is connected to ground, otherwise it is floating. The other four switches determine which buttons on the transmitter control this module. The user guide describes this feature in more detail and it is described briefly at the end of this note.

RELAY FUNCTION MODULE

The address switches on the FCTN-RLY4-*** can be found on one end of the case, as shown on the right side of the picture below.

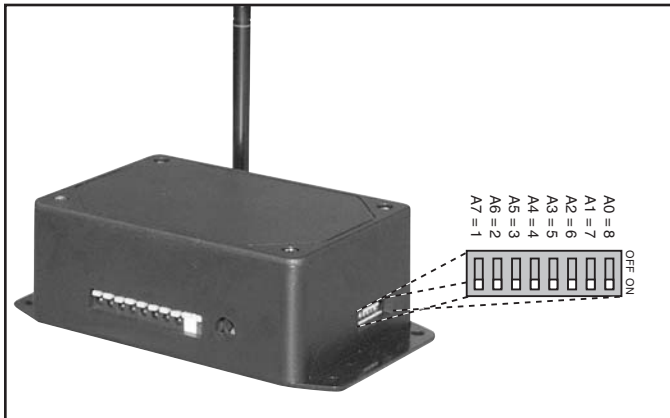


Figure 8: FCTN-RLY4 DIP Switches

This module does not make use of address lines A8 and A9, so the transmitter must have these lines floating. When the switch is on the line is connected to ground, otherwise it is floating.

FUNCTIONAL DECODER MODULE

The pin diagram for the FCTN-DEC1-*** is shown below.

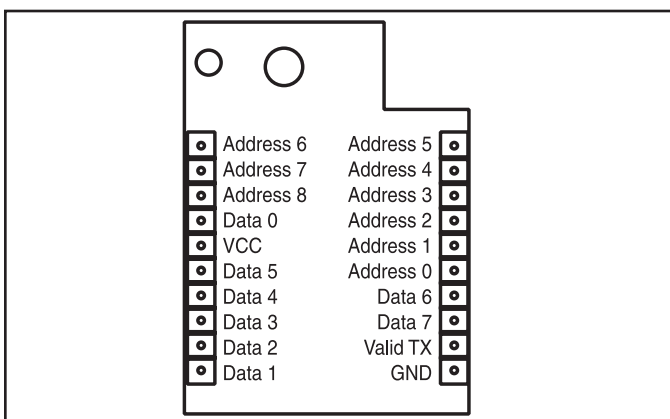


Figure 9: FCTN-DEC1 DIP Switches

The decoder module only uses 9 of the address lines, A0 through A8. These lines are tri state (ground, Vcc, or floating) so if this module is being used with one of the OEM transmitters, then the lines will be either ground or floating. If a KH transmitter or LC transmitter and encoder chip are being used, then the option to use all three states

exists, giving 3^9 or 19,683 individual addresses. When correctly addressed and a data line is pulled high on the transmitter, the corresponding data line goes high on the receiver.

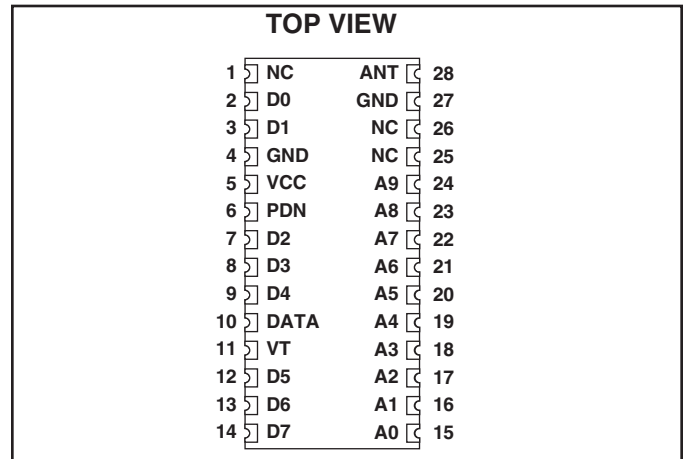


Figure 10: KH Series Receiver Pin-Out

KH RECEIVER

The pin diagram for the RXD-***-KH receiver is shown below.

The address lines A0 through A9 are shown on the bottom right of the diagram. These lines are tri state (ground, Vcc, or floating) but if this module is being used with one of the OEM transmitters, then the lines will be either ground or floating. If a KH transmitter or LC transmitter and encoder chip are being used, then the option to use all three states exists, giving 3^{10} or 59,049 individual addresses. When correctly addressed and a data line is pulled high on the transmitter, the corresponding data line goes high on the receiver. This makes the KH excellent for transmitting button presses on remote controls. The output is momentary, going high for only as long as the button is pressed, so if a latched output is needed then an external circuit or microcontroller will need to be used.

LC SERIES RX AND A HOLTEK DECODER

The KH series receiver is essentially a LC receiver that is connected to a Holtek decoder and put into a single package. If desired, the designer could purchase these parts separately and connect them as in the figure below. The addressing and data out would work the same as for the KH Receiver.

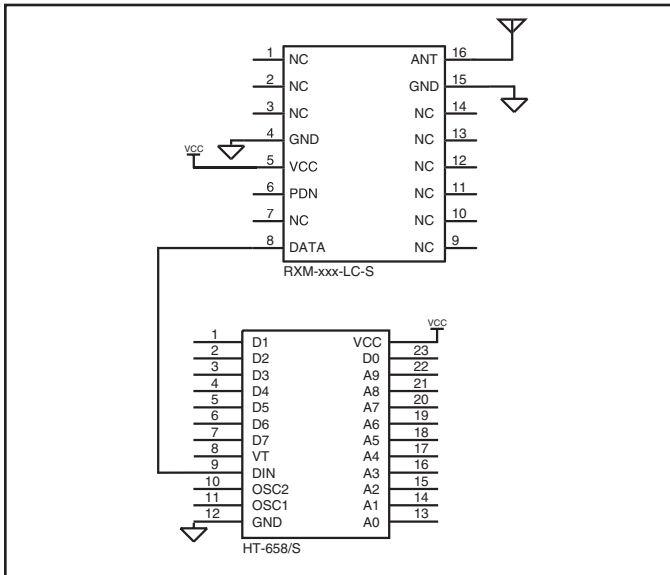


Figure 11: LC Series Receiver With Holtek Decoder

LR SERIES RX AND A HOLTEK DECODER

The new LR Series receiver can be used with the Holtek decoder to provide a 5 to 10 times range increase over the KH Series receiver or the LC Series receiver and Holtek decoder combination. The pin-out and connections are the same as the LC-S receiver. The addressing and data out would work the same as for the KH Receiver.

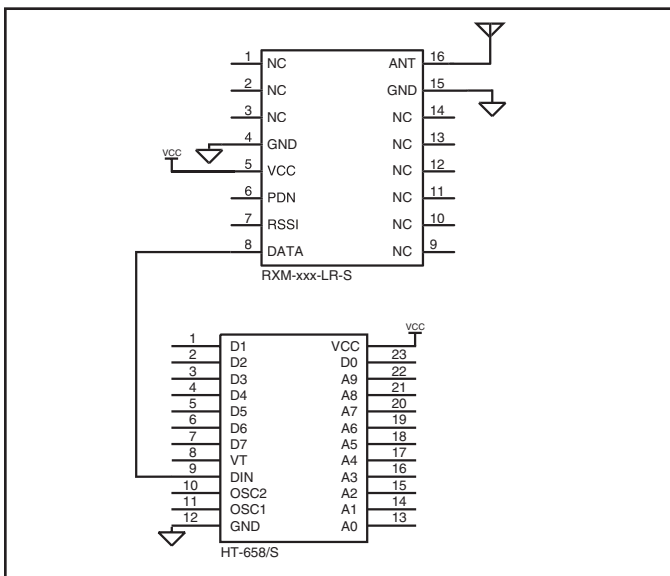


Figure 12: LR Series Receiver With Holtek Decoder

DATA LINE CONNECTIONS

Another important consideration when choosing OEM products is the way each product uses the data lines. The figure below shows the relationship between the button locations and the encoder data lines for the handheld transmitters.

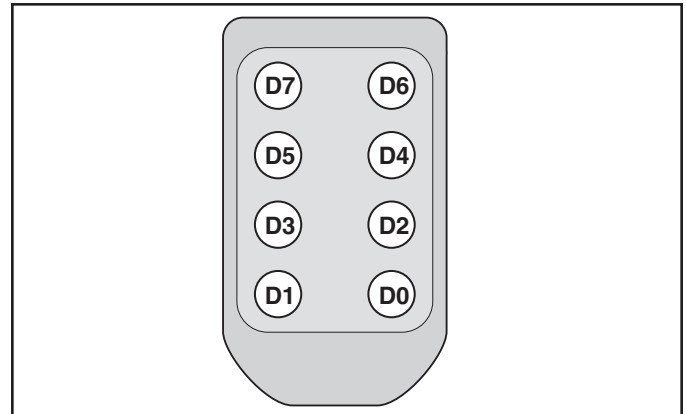


Figure 13: Handheld Transmitter Data Line Buttons

The figure below shows the relationship between the button locations and the encoder data lines for the keyfob transmitter.

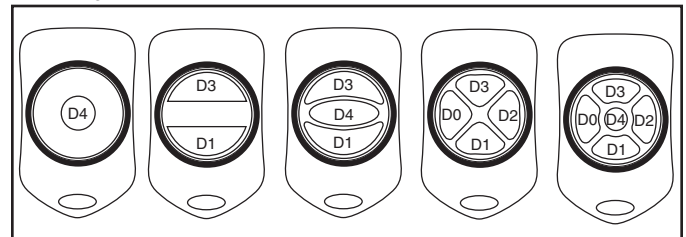


Figure 14: Keyfob Transmitter Data Line Buttons

The Function Relay Module uses one data line to activate each relay and another one to deactivate them. This means that the four relays use all eight data lines as shown in the table below.

Relay	Data Lines	
	Off	On
1	D7	D6
2	D5	D4
3	D3	D2
4	D1	D0

The Function Relay Module uses all eight data lines when in latched mode and only the data lines that turn the relays on in momentary mode. This means that the keyfob transmitter can only control relays 3 and 4 in latched mode and relays 2, 3, and 4 in momentary mode.

The AC Function Module is also turned on with one data line and turned off with another. This module allows the user to choose which button pairs operate the module. The top four DIP switches are labeled “Button 1” through “Button 4” and correspond to the data line pairs as shown in the table below.

DIP Switch Label	Data Lines	
	Off	On
“Button 1”	D7	D6
“Button 2”	D5	D4
“Button 3”	D3	D2
“Button 4”	D1	D0

If the DIP switch labeled “Button 1” is set to the “ON” position then data line D6 will turn the module on and data line D7 will turn the module off. If the switches labeled “Button 1” and “Button 2” are both on, then lines D4 and D6 will turn the module on and lines D5 and D7 will turn it off. Likewise, if all of the DIP switches are on, then all of the data lines will work with the module according to the table above.