User Instructions for MXA013 *(10 Channel Encoder/Decoder)*

What it does:

These two modules allow the user to switch up to 10 different channels over just 2 connecting wires.

What this looks like:

Encoder Module Decoder Module

Fig 1: Product as received

KitStop and KitStop Retail Systems are units of
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Technical Specs:

- Power supply: 6-12VDC
- Input Current: 20mA max. (Combined for 2 modules)
- Output Voltage from Decoder: *(Refer below for more detailed information)*
- Output Current from Decoder: 0.8 mA per output *(Refer below for more detailed information)*
- PCB dimensions:
    - Encoder : 63mm X 46mm
    - Decoder: 67mm X 60mm
- Number of different System Codes possible: 243
    (Refer to Understanding the "C" input section for more detailed information on these System Codes)

How it works:

This system uses the MC145026 Encoder chip, and the MC145027 Decoder chip, which are designed to work as a pair for remote control applications.
The MC145026 encodes 9 lines of information and sends this information serially over a pair of wires. The MC145027 receives the serial data stream, decodes the transmitted data and then outputs that data onto it's relevant pins.

The MXA013 Encoder module automatically encodes each of the Switches into 4 bits of the data stream, which are then transmitted out.

In the Decoder module, the MC145027 chip will decode a "Valid" transmission and identify the relevant 4 bits of data from the switches. It will then send this data out on pins 12 to 15 , where they are then sent to a second IC , the "CD4028" chip. This IC is designed to convert the 4 data bits (which it sees as "Binary Coded Decimal" information) and decodes this information as one of 10 possible outputs.

The "9 lines of Information" used for every transmission consist of the following key elements:

- 5 lines are hardwired from each of the "C" inputs on each module.
- 4 lines are set from whichever switch is used on the encoder.

Understanding the "C" input:

The MXA013 allows the user to select their own unique code for their system. This is done by using the 5 input pins which are marked as "C". Each input pin can be wired to any of 3 different states. The Encoder and the Decoder MUST have their "C" inputs matched to identical codes, for a transmission to be decoded as "valid".

The 3 different options for each "C" input are: High, Low or Open.
Hence with 5 inputs, the "C" code can be any of 3^5 (= 243) different codes.

When working properly, any push on one of the switches of the Encoder, will result in the matching LED of the Decoder turning ON, and a high Voltage will be applied to the corresponding output pin.

Circuit Diagram:

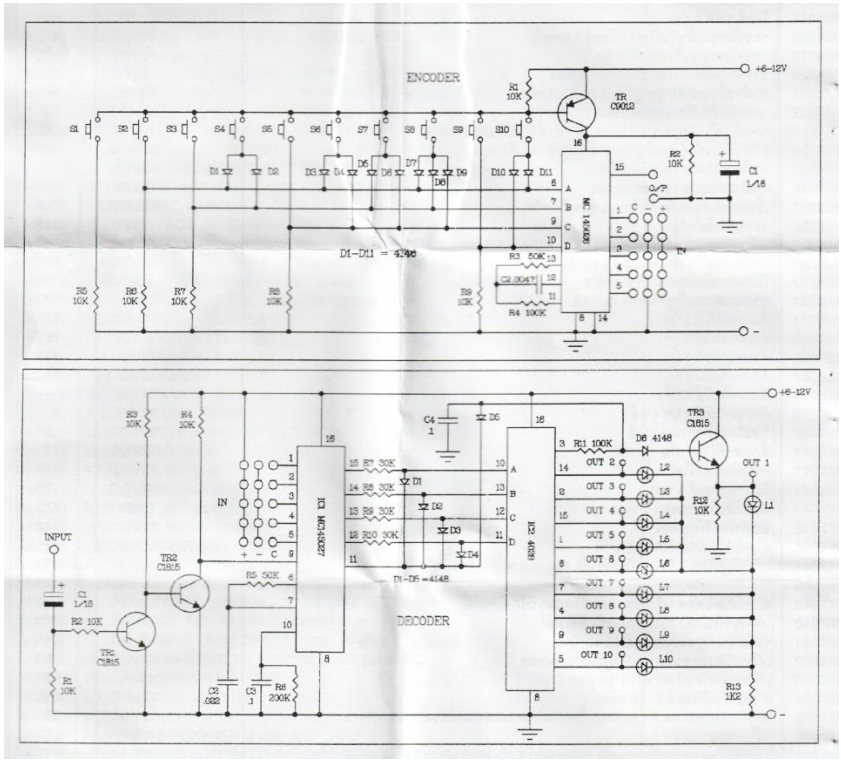

Fig 2: Circuit Diagram for the system.

Wiring them up:

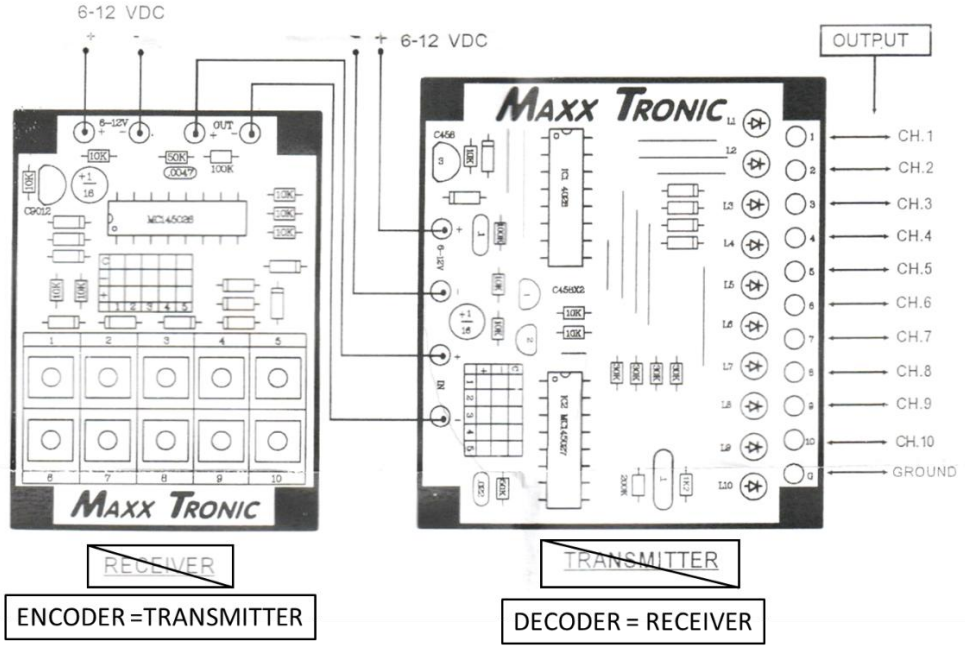

Fig 3: Connecting the modules together.

Considerations for configuring the "C" input:

The MXA013 system requires that the 5 pins of the "C" input must be configured the same on both modules.

There are 243 possible different combinations for the 5 inputs, so that multiple systems can work near each other , and not interfere with each other.

The user can decide how they wish to configure their own system.

How to Configure the "C" pins:

- Each module has a small grid marked on it, which identifies the "C" inputs.
- The User can "jumper" each "C" pin by inserting a small piece of wire and solder it from the row Marked "C" , to either:
    - Solder the other end to the row marked "+" , OR
    - Solder the other end to the row marked "-" , OR
    - Not insert any "Jumper".

Some options for consideration:

a) If no "Jumper" is inserted, then that will be interpreted as "Open".
If all 5 pins remain "Open" this is a valid code, and the system will work.

b) If NO jumpers are inserted:
    a. This is the easiest method to start to use the system .
    b. However the system may be prone to "False triggering" in an electrically noisy environment *(False triggering can be caused by random noise or interference on the connecting wires).*

c) The recommended application is to force one of the pins to a known "High" and one to a known "Low" , which will greatly reduce the possibility of random noise on the wire .
(Refer to the suggested coding from the supplied User Guide, which is copied below).

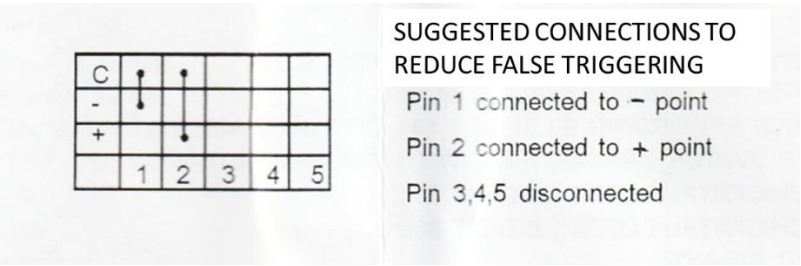

Fig 4: Recommended minimum connections for "C" inputs, to help reduce false triggering.

d) The user can of course create their own code for the "C" inputs , just as long as both modules have the same code.

Testing the system:

Do not connect any outputs to the Decoder yet!

We must first check the system is communicating correctly!

Once the communication wires are connected to both modules, then apply the power supply. The modules will operate from 6V DC up to 12V DC. It is recommended to keep the supply voltage to both modules to be the same.

Once you have the power and communications wires connected and no signs of any problems, it is time to test the switches and output LEDs.

- Push Switch 1 , and verify that LED 1 comes ON, and remains ON while Sw1 is held down.
- Repeat this test for all Switches and confirm that all LEDs work correctly.

It is now time to consider attaching any output devices to the Output pins.

Care and Warnings about the Outputs:

The output pins on the decoder module can supply a small load, but care should be used when connecting them to any external device.

Pin 1 is the only output with a buffer transistor for possibly driving an external load (e.g. a relay).

Here are a few specification limits for the outputs:

Output Current :

- Pin 1 Maximum output = 125 mA
- Pins 2 – 10 Maximum output = 0.8 mA per pin.

Output Voltage:

- Pin 1 Approx. 3.5 Volts below supply Voltage
- Pins 2 – 10 Approx. 1.5 Volts below supply voltage