# PASSWORD TRANSMITTER

**PROJECT REPORT**

*Submitted by*


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**AIM:** To Transmit and Display a 4 bit password on a 7 segment display using IC HT12E and IC HT12D

**COMPONENTS:**

**1) TRANSMITTER SECTION:**

1. HT12E RF Encoder IC (Data sheet)
2. 443 MHz ASK RF Transmitter (Data sheet)
3. Resistors: 1.1 Mohm
4. 4 push buttons

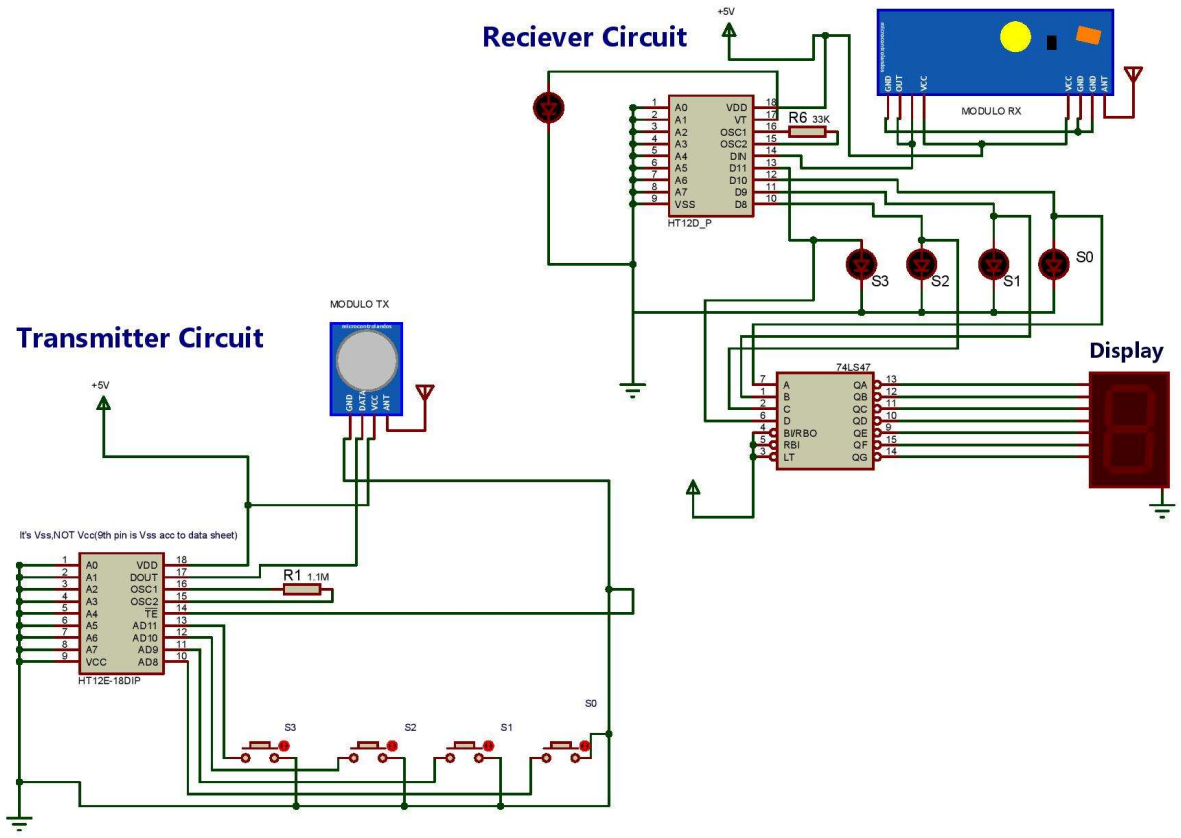
**2) RECEIVER SECTION:**

1. HT12D RF Decoder IC (Data sheet)
2. 443 MHz ASK RF Receiver (Data sheet)
3. Resistors –33K ohm
4. LED

**3) DISPLAY SECTION:**

1. TTL 74LS47 BCD to 7-Segment Decoder (Data sheet)
2. 7 Segment Display (Common Cathode)

**CIRCUIT DIAGRAM: (Proteus diagram)**



## PROCEDURE AND DETAILS ABOUT THE CIRCUIT IN OBTAINING THE OUTPUT

### General Concepts used in the project:

- Serial data is easier to transmit and will provide No loss of information, moreover the successive bit of data will not be sent without the previous bit being received at the Receiver side. The order of the bits to be received are known and set earlier unlike parallel data where the data bit can be received in any order according to various other factors, so loss of information is slightly higher there.

-The Address pins can be configured in any unique manner, giving alternate high and low or all as high etc. The aim is to have a unique address so that other Transmitters are not able to control the Receiver Output thereby providing security to transmission and receiving.

- A total of 12-bits of information will be Transmitted.12-bits split into 8-bits for Address and 4-bits of user inputted data. The 8-bits of address will be transmitted first followed by the 4-bits of user data serially. On the Receiver side, the 8-bit address is verified first and must match the transmitter side in order to access the 4-bits of data. In case they do not match; the data won't be accessed.

**TRANSMITTER Section:**

The role of HT12E encoder is to convert the parallel data the user inputs through the Push button switches provided as (S3, S2, S1, S0) to Serial data.

- +5 volt is applied to VDD. The HT12E can operate from 2V up to 12V.But the recommended operating voltage is 5V, as is the case with majority of the ICs.

- Pin no A0-A7 are the input Address pins used for secured transmission of this data which are connected to the ground (Low) along with Vss (0V) in this project.

- HT12E will start working on enabling TE pin ($14^{th}$ Pin)(Active Low) with a Low signal.

- The 4-bit password to be transmitted is given as input to the pin numbers 10,11,12,13 as S0,S1,S2,S3 respectively to the HT12E Encoder IC using the Push buttons provided.

-For encoding data, the IC requires an oscillator arrangement which is done by connecting the OSC1 and OSC2 (pin 15 & 16) through a 1.1Mohm resistor to invoke it. The Capacitor is inbuilt the IC therefore completing an RC arrangement.

With a 1.1Mohm resistor being used, oscillator frequency of 3MHz is expected according to graphs provided in the datasheet.

- The encoded Serial data ready for transmission is available at DOut ($17^{th}$ pin). The output serial data is given to the RF Transmitter module(Tx).The 433MHz Transmission module will transmit the data.

**RECEIVER Section:**

- A 5V supply is given to Vcc (pin 18) and VDD (pin 9) is grounded.

- Pins A0-A8 were grounded to match the address of the Encoder IC.

- Pin 14 is connected to the Receiver Module(Rx module). The RF Receiver receives the serial data and is given as the input to pin 14 of the Decoder IC.

-For decoding data, the IC requires an oscillator arrangement which is done by connecting the OSC1 and OSC2 (pin 15 & 16) through a 51K ohm resistor.

The oscillator gets activated when the Decoder receives the data transmitted by the Encoder. Thus, the HT12D decoder was in in standby mode initially i.e. oscillator was disabled and a HIGH on DIN pin activated the oscillator.

The device starts decoding the input address and data. Once the address matches the transmitter, the data is accessed.

- The 17$^{th}$ pin (Valid Transmission pin) will be HIGH and make the LED glow when valid data is available.470 ohm resistor was connected to protect the LED from getting damaged.

- HT12D converts the serial data received at the DIN to 4-bit parallel which is then obtained at pins 10,11,12,13 as S0,S1,S2,S3 respectively.LEDs are connected to see output as binary verified with truth table.

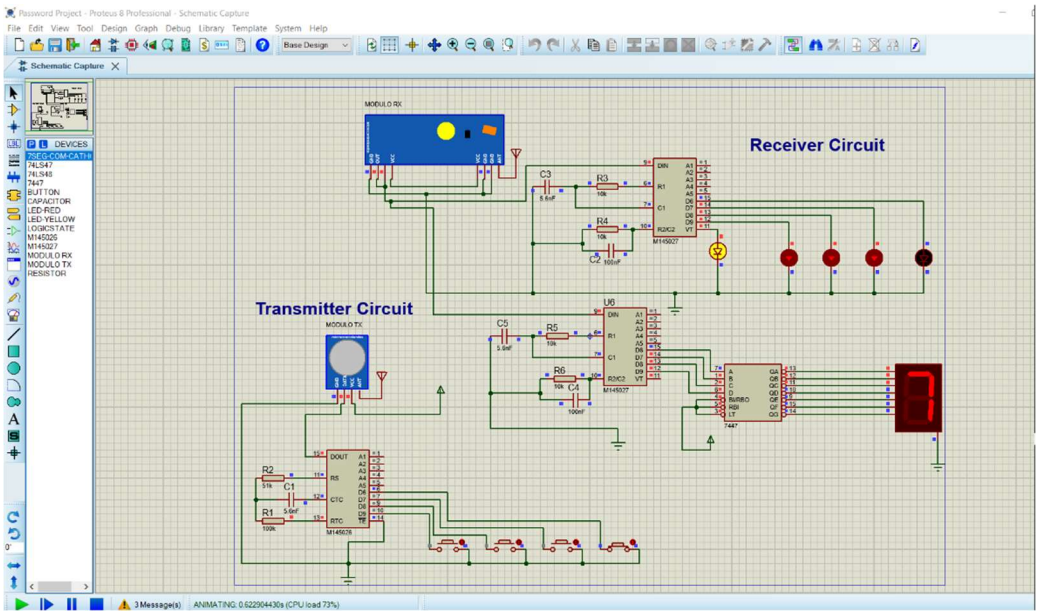
- Pins 10,11,12,13 are connected to pins 7,1,2,6 of TTL74LS47 Binary to 7 segment decoder IC as well. Pins 3,4,5 -LT,BI/RBO,RBI respectively are made HIGH.

-A 7 segment display is connected to this IC and will display the data the user inputted at transmitter side. Hence, the password is Transmitted and Displayed.

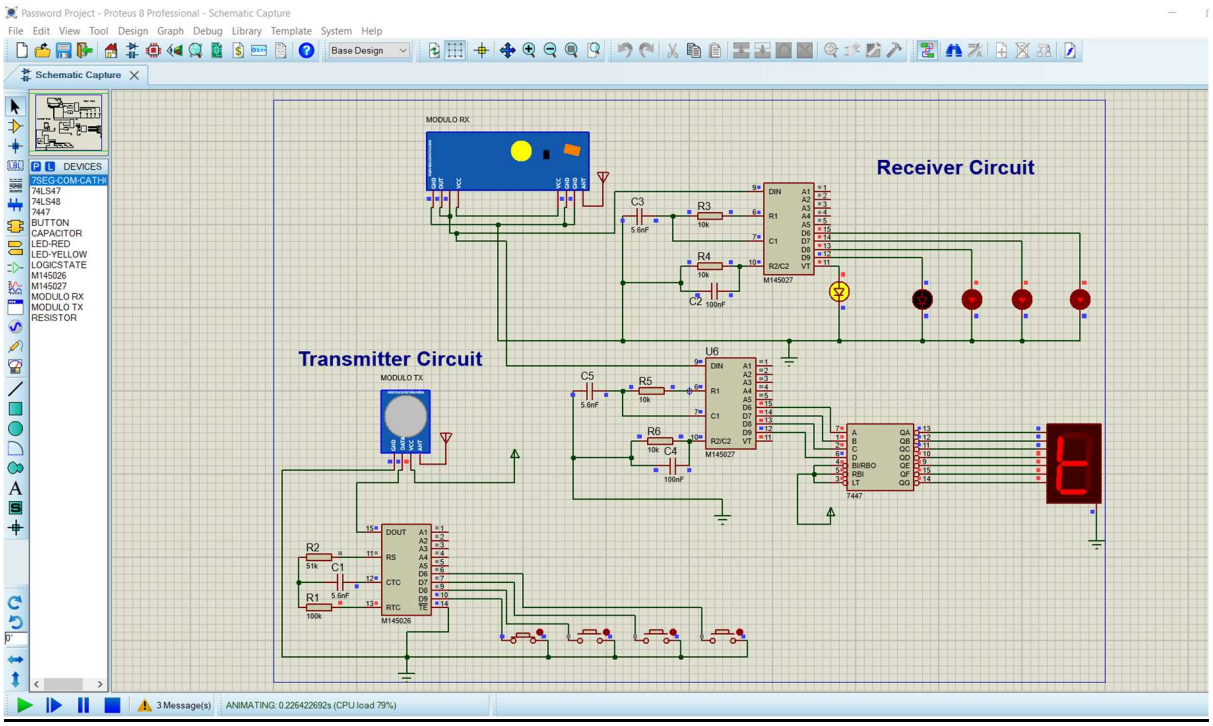
**RESULT:**

The Simulation file attached is done using a different Encoder-M145026 and M145027, as HT12E and HT12D didn't have necessary software packages making it unsuitable for simulation. The design of the circuit stands the same, except the capacitor which had to be explicitly connected as it isn't inbuilt in this IC.

*When password input is 7 in binary*




*When password input is 14 in binary(symbol is displayed)*



## EXPECTED OUTPUT:

| TRANSMITTED PASSWORD (input to HT12E IC) | | | | RECEIVED PASSWORD (output of HT12E IC) | | | | DISPLAYED PASSWORD |
|---|---|---|---|---|---|---|---|---|
| AD0 | AD1 | AD2 | AD3 | D0 | D1 | D2 | D3 | OUTPUT |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 2 |
| 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 3 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 4 |
| 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 5 |
| 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 6 |
| 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 7 |
| 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 8 |
| 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 9 |
| 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | Symbol* |
| 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Symbol* |
| 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | Symbol* |
| 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | Symbol* |
| 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | Symbol* |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Symbol* |

**Symbol*- unique symbols are mentioned in page 3 of the datasheet for numbers 10,12,13,14,15.**