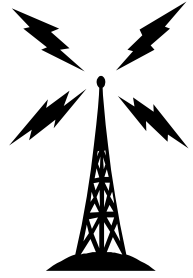


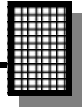
WIRELESS RF LINK TRANSMITTER/ENCODER MODULE



Ramsey Electronics Model No. TXE433

Need a data transmitter or receiver for your remote wireless application? These compact units are perfect for any project; car alarms, door openers, home security, you name it!

- **Powerful +10 dBm output – up to 600' range!**
- **SAW Resonators for high stability – no drift!**
- **Compact size with low current demand.**
- **433 MHz license free band.**
- **Automatic tuning – no manual adjustments.**
- **Operates on 5 volts DC.**



RAMSEY WIRELESS RF LINKS

- RX916 Data Receiver Module
- TX916 Transmitter Module
- RXD916 Data Receiver & Decoder Module
- TXE916 Transmitter & Encoder Module
- RXD433 Data Receiver & Decoder
- TX433 Data Transmitter Module
- RX433 Data Receiver

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- TV6 Television Transmitter

RAMSEY RECEIVER KITS

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- AR1 Aircraft Band Receiver
- SR2 Short-wave Receiver
- AA7 Active Antenna
- SC1 Short-wave Converter

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- PA Series VHF and UHF Power Amplifiers
- Packet Computer Interfaces
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Many other kits are available for hobby, school, Scouts and just plain FUN. New kits are always under development. Write or call for our free Ramsey catalog.

TX433 WIRELESS TRANSMITTER/ENCODER INSTRUCTION MANUAL

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INSTRUCTION MANUAL FOR

WIRELESS RF LINK TRANSMITTER MODULE

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THE TXE433

This wireless RF transmitter/encoder has a 4 bit data input that will be transmitted and encoded, then decoded by the receiver, RXD433. The output is CMOS compatible when the unit is run on +5 volts.

The “decoder address select” allows you to use one transmitter to control different receivers by giving each receiver a unique address. The decoder chip has eight address lines that can be connected to either +5 volts or ground, making it a simple matter of matching the address select pins on the receiver/decoder module to match the address pins on the transmitter/encoder. These outputs are also CMOS compatible when run on +5 volts.

The transmitter/encoder unit has a “transmit enable” input. When the address pins are set up properly and you are ready to transmit, you must ground the “transmit enable” pin to send the data to the receiver.

How Encoders and Decoders work:

A wireless remote control system requires a clean input signal to ensure that correct data is received. At all RF frequencies, but especially at the frequencies where unlicensed transmitter operation is allowed, the RF spectrum is cluttered with signals and noise that must be filtered for proper data reception. Rather than use microprocessors to detect and correct errors, an encoder IC and corresponding decoder IC can be used on the transmitter and receiver. A code is generated at the transmitter that must be matched at the receiver before the data is recognized as being valid. This type of system is widely used in wireless control applications since it is a reliable way of ensuring security and eliminating interference. Your garage door opener is an excellent example of such a system. All the openers on your street may be made by the same company, and may even be on the same frequency, but each has an internal code programmed into it so that when you push the button, only your garage door opens.

In our TXE/RXD modules we use the Holtek HT12 series of ICs to accomplish this encoding/decoding scheme. Following is an explanation of how these IC's work.

Let's explore how the data and address lines allow one to control many different outputs for different applications. Because of the versatility of the HT-12E encoder/decoder chips it is possible to program hundreds of possible addresses and transmit to several different receivers using the same transmitter. The HT12E encoders begin a 4-word transmission cycle when transmit enable is pulled low. This cycle will repeat itself as long as

the transmit enable is held low. Once the TE pin is pulled high, the encoder output completes its final cycle then stops. When the decoder chip receives serial data, it compares the address pulses to its address settings and if they are the same, it sends a high to the “data valid”, pin 18. At that point the data is considered valid and sent to the data output pins, 11 through 14. Each individual data line can be used as a separate output to drive individual devices or circuits, or all can be combined using suitable logic gates. Because there are four lines, they are capable of sending/receiving four bits of binary information. This allows a decimal count of 0 to 15.

The data is latched, meaning that the information sent stays at the same level until new data is sent, even when the transmit enable is no longer present on the transmitter. If you desire a momentary output, the circuit on the following page is an example of one way to make the data output on your RXD916 momentary. The transmitters and receivers each have 8 address lines that can be pulled high or pulled low. To enable the address lines on the receiver unit they must match the transmitter unit. This gives 256 possible variations in address – imagine 256 receiver units all waiting for the proper signal and ready to be used for different applications!

Because the transmitters all use the same frequency you would run into interference if you tried to use more than one transmitter at the same time. We’ve all had this experience when travelling; you’re tuning the radio and happen to be caught between two stations. Each station competes with the other and neither of them comes in clearly. This type of situation would not be welcome when trying to control different functions since any data received would be corrupted. However, since each receiver is “listening for” its own address you can have several receivers on and waiting for the proper address signal to activate. Each receiver module will receive any transmission on its frequency but will reject all but the proper transmission since the address settings don’t match.

It is obvious that we must set the address lines on both the transmitter and receiver so that they are the same. This entails tying each line either high or low by running a jumper to either ground or +5 volts. You may want to run wire jumpers for each individual receiver if you’re using more than one but since you only need one transmitter to operate several receivers, the connections you make on the transmitter module should be more easily changed. A simple way to accomplish this is to use DIP switches. These can be set up so that each individual address line is connected to +5 volts through a 10K resistor when open. The other side of the switch should be connected directly to ground. This way, any switch and its corresponding address line that is left open is tied high via the 10K resistor.

To pull an address line low, simply flip the switch for that address line. Match the address settings on the desired receiver module and you're ready to go.

ANTENNA CONSIDERATIONS:

The simplest antenna consists of a piece of wire approximately 6 to 7 inches long. If you desire more range you can try a ground plane antenna or a Yagi such as the Ramsey 4004 model. The antenna should be tuned for the 433 MHz band for best operation.

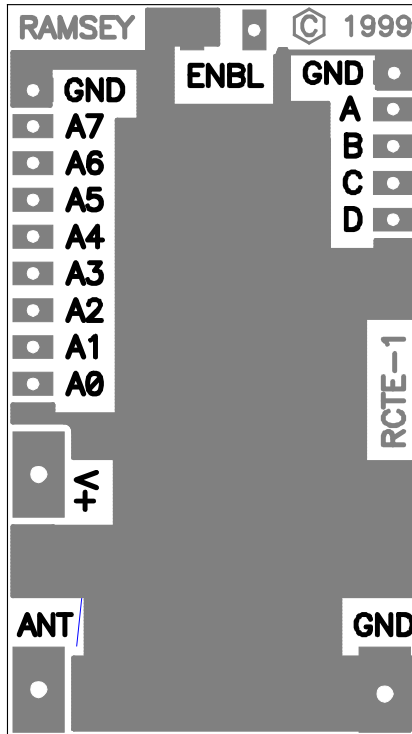
Remember that the range you get will depend on terrain, obstructions, and height of antenna. Buildings can reflect RF energy making it difficult or impossible to receive the desired signal. Also, if a reflected signal is "bounced" off of a building or other object, it can be received along with the direct signal. If the reflected signal is out of phase with the direct signal, it is possible for the direct signal to be partially cancelled by the weaker, reflected signal. Since the wavelength of the 433 MHz signal is about two feet, moving the antenna slightly can effect the phase of a reflected signal. The ideal conditions for best transmission and reception are line of sight and outside with no obstructions.

Enable: Ground the transmit enable pin to send data to the receiver.

Address lines:
Ground individual lines to match RXD-433 receiver address lines.

V+: Attach your +5 volt source here.

Data lines: Input your data here. Data output at RXD-433 will match data input to transmitter.



Antenna: Attach your antenna here.

GND: Attach your power supply ground here.

A0 through A7: A0 through A7: These are the address lines. Individual address lines should be connected to +5 volts or ground to match the RXD433 transmitter address lines. Lines should be tied high or low and should not be left open.

A through D: These are the data output lines. The input to these lines will match the output at the RXD433 transmitter data lines.

Enable: When you are ready to transmit, ground the transmit enable pin to begin sending data to the receiver.

CONCLUSION

We sincerely hope that you will enjoy the use of this Ramsey product. As always, we have tried to compose our manual in the easiest, most “user friendly” format that is possible. As our customers, we value your opinions, comments, and additions that you would like to see in future publications. Please submit comments or ideas to:

Ramsey Electronics Inc.
Attn. Hobby Kit Department
590 Fishers Station Drive
Victor, NY 14564

And once again, thanks from the folks at Ramsey!

The Ramsey Kit Warranty

Please read carefully BEFORE calling or writing in about your kit. Most problems can be solved without contacting the factory.

Notice that this is not a "fine print" warranty. We want you to understand your rights and ours too! All Ramsey kits will work if assembled properly. The very fact that your kit includes this new manual is your assurance that a team of knowledgeable people have field-tested several "copies" of this kit straight from the Ramsey Inventory. If you need help, please read through your manual carefully. All information required to properly build and test your kit is contained within the pages!

1. DEFECTIVE PARTS: It's always easy to blame a part for a problem in your kit. Before you conclude that a part may be bad, thoroughly check your work. Today's semiconductors and passive components have reached incredibly high reliability levels, and it's sad to say that our human construction skills have not! But on rare occasions a sour component can slip through. All our kit parts carry the Ramsey Electronics Warranty that they are free from defects for a full ninety (90) days from the date of purchase. Defective parts will be replaced promptly at our expense. If you suspect any part to be defective, please mail it to our factory for testing and replacement. Please send only the defective part(s), not the entire kit. The part(s) MUST be returned to us in suitable condition for testing. Please be aware that testing can usually determine if the part was truly defective or damaged by assembly or usage. Don't be afraid of telling us that you 'blew-it', we're all human and in most cases, replacement parts are very reasonably priced.

2. MISSING PARTS: Before assuming a part value is incorrect, check the parts listing carefully to see if it is a critical value such as a specific coil or IC, or whether a RANGE of values is suitable (such as "100 to 500 uF"). Often times, common sense will solve a mysterious missing part problem. If you're missing five 10K ohm resistors and received five extra 1K resistors, you can pretty much be assured that the '1K ohm' resistors are actually the 'missing' 10 K parts ("Hum-m-m, I guess the 'red' band really does look orange!") Ramsey Electronics project kits are packed with pride in the USA. If you believe we packed an incorrect part or omitted a part clearly indicated in your assembly manual as supplied with the basic kit by Ramsey, please write or call us with information on the part you need and proof of kit purchase.

3. FACTORY REPAIR OF ASSEMBLED KITS:

To qualify for Ramsey Electronics factory repair, kits MUST:

1. NOT be assembled with acid core solder or flux.
2. NOT be modified in any manner.
3. BE returned in fully-assembled form, not partially assembled.
4. BE accompanied by the proper repair fee. No repair will be undertaken until we have received the MINIMUM repair fee (1/2 hour labor) of \$25.00, or authorization to charge it to your credit card account.
5. INCLUDE a description of the problem and leg ble return address. DO NOT send a separate letter; include all correspondence with the unit. Please do not include your own hardware such as non-Ramsey cabinets, knobs, cables, external battery packs and the like. Ramsey Electronics, Inc., reserves the right to refuse repair on ANY item in which we find excessive problems or damage due to construction methods. To assist customers in such situations, Ramsey Electronics, Inc., reserves the right to solve their needs on a case-by-case basis.

The repair is \$50.00 per hour, regardless of the cost of the kit. Please understand that our technicians are not volunteers and that set-up, testing, diagnosis, repair and repacking and paperwork can take nearly an hour of paid employee time on even a simple kit. Of course, if we find that a part was defective in manufacture, there will be no charge to repair your kit (But please realize that our technicians know the difference between a defective part and parts burned out or damaged through improper use or assembly).

4. REFUNDS: You are given ten (10) days to examine our products. If you are not satisfied, you may return your unassembled kit with all the parts and instructions and proof of purchase to the factory for a full refund. The return package should be packed securely. Insurance is recommended. Please do not cause needless delays, read all information carefully.

Price: \$5.00

Ramsey Publication No. MTXE433

Assembly and Instruction manual for:

RAMSEY MODEL NO. TXE433

