

# Introduction into two way radio communications

By

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In the world of communications and 2-way radio's there are many ways to build a complete communications system and network for your family and prepper group without spending a great deal of money in the process. Even the price of Amateur radios have dropped over the years as the technology has advanced, not that long ago a 2 channel, VHF mobile radio would have cost \$1500 and taken up most of your trunk to mount it. Today, a VHF mobile with all the bells and whistles is not must bigger that a old CB set and cost about \$140 new in the box.

Can you still spend a thousand dollars for a good Amateur radio? Well, yes. But it will cover almost every band and mode assigned to Amateur operators and has a 100 watt power output. Below are links to wikipedia pages about each service that will give a starting point. If you have any questions, feel free to e-mail me and I will do my best to answer your communications questions.

Abbreviation	Service Name	License Service
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<b>FRS</b>	Family Radio Service	No license required
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FRS radio unlimited to their range as the Federal government has set the maximum power output of a 250 milowatts which translates into a range of about one mile unimpeded by Jill terrain, buildings or other obstructions.

<b>GMRS</b>	General Mobile Radio Service	License required
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GMRS offers greater flexibility in range as they have a power output of 25 watts and have the ability to go through a repeater that will increase your range considerably depending terrain, and other obstructions. Mobile two mobile communications in this service will generally give you a consistent communications up to ten miles and by using a repeat your this range could be increased up to 40 miles. Even the use of handheld radios without a repeat your login you approximately three miles range and with the use of a repeater the range to be extended up to twenty miles or greater depending upon terrain or other obstacles.

Another advantage in this service is not many people in the general public are aware of it and therefore it can be used more covertly than other forms of communication such as citizens band.

**CB**                      Citizens Band Radio Service                      No license required

Just about everyone knows about CB radio, but very few of these days know about amateur radio, GMRS or MURS frequencies. CB radios can be purchased just about anywhere and do not require a license to operate where amateur radios are not readily available to the general public and are not sold unless the purchaser can produce their license from the Federal Communications Commission.

The problem with using citizens band is that anyone Including the basic morons and functional illiterates in our society have the basic knowledge to hook one up in their car and listen to everything you say whether it be communications about you were supply, how the corn is growing or your security plans for the night when you're setting out guard positions. On the other hand, having a citizens band in your communication shack to monitor communications on those frequencies is always a good idea. Additionally, CB is considered to be high frequency and therefore have the ability to communicate over long distances.

**MURS**                      Multi-Use Radio Service                      No license required

The multiuse radio service was established as a means for businesses to have communications on job sites without having to resort to either licensed and radios or using CD sets an all out up to two watt output. This radio service is also FM in operates in the 159 to 160MHz range which means most people would not have the equipment other than a scanner which would have to be programmed for these frequencies in order for them to monitor your communications.

Granted, the Federal Communications Commission has limited these radios service to a maximum output of two Watts, but I know of many people who are using these Franklin season with a much higher help put radios and radios for this service such as a Motorola Radius can be purchased on eBay for less than \$100.00 per unit. Others that have taken 50 and 60 watt the V.H.F. amateur radios Include them to go out of band and have used them in this service.

Note. I am not, nor will I ever advocate anyone taking a radio intended for one service and using it in another.

**HAM**                      Amateur Radio Service                      License required

The amateur radio service will offer you the greatest range of the frequencies and modes of operation of all of the other radio services combined with the ability to not only talk a locally but across country, and around the world on one radio. In this service you have the ability to use handheld, Mobiles and base radios with or without repeaters in frequency modulation (FM) along

with amplitude modulation (AM) and single sideband (SSB) both upper and lower modes. Granted, amateur radio is not considered to be a secure means of communications, and unless you were able to scramble the communications between you and know the unit no matter what service you use there's a possibility of an unwanted party eavesdropping on what to say. There's also what is known as packet communications in the amateur radio service which was the original e-mail of its time wearing a computer is connected to an item called a terminal node controller (T.N.C.) and then to a radio where text messages can be sent between stations giving you a fairly secure means of sending and receiving messages between other stations that have the same equipment.

Once the electricity goes out, most forms of communications will cease within 72 hours as the backup power supplies begin to run a fuel or their backup batteries die. Cellular telephone services will be one of the first to go offline and will be followed shortly thereafter by television and radio stations. Also, the Internet will slowly began to die as the power that runs the server computers goes out and a battery backups began to die.

Knowing what's going on in the outside world is not only a luxury, but it is imperative that you know what is happening not only in your city or state, but across the country and around the world. Simply having a CB set or a high frequency receiver might not be enough to provide adequate communications so you can stay informed of not only the general news but relief operations that may be ongoing by the government.

It is my recommendation that you contact your local amateur radio club and invests a few hours of your time to obtaining a license and learning all you can about to way radios, what frequencies are for short range and which frequencies are used for one range communications. A single all mode radio that operates on a twelve volt power supply, a simple automatic tumor and 50ft. 18 to 22 gauge wire can provide you with all the communications equipment needed to not only monitor what is going on nationwide but allow you to communicate with others across the country and around the world.

However, operating a two way radio in the aftermath of a disaster or pandemic that has global implications can be tricky at best and hazard is at worst. Never treat a two way radio as you would a telephone in such a situation. Remember, there are many people out there that have the knowledge and ability to hook up a radio and your every thing you say. It is also very easy to take two receivers and pinpoint your location within a half mile radius. The rule of thumb for operating to way radios in a disaster situation is like the old adage about children; they should be seen, not heard.

Use the radio to gather information and only use it to give information when you're absolutely sure does it may be listening cannot understand what you're saying or have no idea where you are located. For shore range in local

communications handheld radios operating on the V.H.F. or you U.H.F. simplex and set too low power will only have the ability to transmit two or three miles under the best conditions. These are best used for hunting parties to communicate back to your base of operations or for security teams either on patrol ordered six position.

I cannot stress strong enough that the use of citizens band radios for a any of these uses should be avoided at all costs. Anybody including looters can get their hands on a CB set by breaking into any truck stop, Wal-mart or radio shack, or by simply taking one out of a tractor trailer truck abandoned on the side of the highway. The whole concept of using to a radio as is to make an insecure system as secure as possible and to prevent a bad guys from learning your location. The reasons I suggest amateur radio as a primary means communications are as follows;

1. Many of those with an amateur radio license have volunteered with disaster relief organizations and therefore will most likely have more reliable and trustworthy information then the general public. I am not saying that's anyone with an amateur radio license can be trusted, but is more likely that they will be over those in the general populace that stole CB out of radio shack.
2. Also, there are many modes of operations in amateur radio that the average person would not be able to detect. One of these is called packet radio where a laptop computer is connected to a device called a terminal node controller and then to a radio allowing you to communicate with other amateurs using the same mode of communications without everyone knowing what you are sending or receiving. " We used packet radio in the aftermath of hurricane Katrina with great success to send messages between a control point and evacuation shelters without having any one including the news media eavesdrop on us" additionally, for all the money spent by Homeland security, all of the towers and all the repeaters and mobile radios emergency management did not have the ability to communicate 90 miles to the state capitol and communications were not established until ham radio operators stepped in.
3. CB radios are made very cheap and are not very reliable where most amateur radios today are made to military specifications and are very rugged allowing them to be abused and still survive.
4. Having a good, world band receiver that is battery operated is a necessity and a survival situation as it will allow you access to news and information from around the world. The AM/FM radio in your vehicle for home will only pick up stations within 100 miles of your

location and if the stations have gone off the air for one reason or another your source of a vital information has been severed. This is another reason I recommend that you look into amateur radio has the H.F. radios that are used by hams have the ability to monitor the world wide broadcast bands that are commonly used today on the 80m band where licensed and unlicensed radio stations are operate around the world.

5. Finally, the most important aspect of amateur radio is that it is not infrastructure based. This means it does not depend upon outside resources to communicate from one person to another. This in itself means that this form communications can be used in almost any situation as long as you have the means to charge a single 12 volt battery, for a small solar battery charger that can be purchased for under \$100.00 at stores such as Harbor Freight or stores like it. These type of charges did not have the ability to run lights for any length of time But they do produce enough power to charge handheld radio batteries or rechargeable batteries for transistor type of receivers.

## Types of radio equipment.



### YAESU FT-1900R 2M 55W MOBILE TRANSCEIVER W MH48A6J DTMF MIC

The FT-1900R is a ruggedly-built, high-performance 55-Watt 144 MHz mobile FM transceiver with outstanding receiver performance and crisp, clean audio. Optimized for ease of operation day or night, the FT-1900R is one tough radio for operating in a tough world!

HRO Discount Price: \$164.95  
Yaesu Mail In Rebate available on this product.

After Rebate (-\$30.00) Price: \$134.95

<http://www.hamradio.com/detail.cfm?pid=H0-010077>



### YAESU FT-2900R 2M 75W TRANSCEIVER W MH-48A6J DTMF MIC

HRO Discount Price: \$199.95  
Yaesu Mail In Rebate available on this product.

After Rebate (-\$40.00) Price: \$159.95

The FT-1900R is a ruggedly-built, high-performance 55-Watt 144 MHz mobile FM transceiver with outstanding receiver performance and crisp, clean audio. Optimized for ease of operation day or night, the FT-1900R is one tough radio for operating in a tough world!

<http://www.hamradio.com/detail.cfm?pid=H0-010078>



HF radio  
Yaesu FT-450D

Regular: \$939.00  
Discounts: -\$240.00

Net Price: \$699.00 after Mail In Rebate

- 3 YEAR EXTENDED WARRANTY + \$89.00
- MARS/CAP Modification for HF radios + \$49.00
- LDG YT-1200 AutoTuner + \$233.00

<http://www.gigaparts.com/Product-Lines/HF-6M-Radios/Yaesu-FT-450D.html?gclid=CJep6JObmsQCFQiUaQodamYAWQ>

## Handheld radio by Feidaxin



Model No.FD-880(Dual-band)  
Frequency Band VHF&UHF  
Frequency Range 136-174  
Channel Capacity 128  
Operating Voltage 7.2V DC  $\pm 15\%$   
Antenna Impedance 500  
Channel Spacing 12.5kHz/25kHz

<http://www.feidaxin.com/en/listproduct.asp?ID=317>

E-bay has several sellers that carry this and other Feidaxin models at fair prices. When searching e-bay simply put in the model number and all of them should appear in the search results.

## Passive antennas



**Brand:** MFJ  
**Manufacturer's Part Number:**MFJ-1778  
**Part Type:** [Wire Antennas](#)  
**Product Line:** [MFJ G5RV Multi-Band Antennas](#)  
**DXE Part Number:**MFJ-1778

**Assembled Wire Antenna:** Yes  
**Wire Antenna Type:** Multi-band, non-resonant  
**Antenna Power Rating:** 1,500 W  
**Wire Antenna Length:** 102.00 ft.  
**Antenna Tuner Required:** Yes  
**Feedline Connection Type:** UHF female, SO-239  
**Minimum Recommended Feedpoint Height:**35.00 ft.  
**Wire Gauge:**14-gauge  
**Center Insulator Maximum Rope Size:**0.375 in.  
**Wire Antenna Weight:**2.90 lbs.  
**Quantity:** Sold as a kit.

**Notes:** A balun is not recommended for this antenna and it will tune normally when installed with 70 ft. of coaxial cable. A feedline current choke may be used at the station end of the feedline.

The passive antenna for any frequency is nothing more than any length of wire or metal such as conduit that is insulated from earth ground can be in virtually any configuration from a vertical to horizontal, a straight line or what is referred to as an inverted "V". In the world of amateur radio one constant Over the past hundred years or so is that amateur radio operators tinker. They build radios from scratch, the overhaul junk and make it usable again and one of the bigger aspects of the hobby is antenna construction. Some build antennas are so large and complicated that they could virtually take up the person's entire property melted on towers anywhere between 50 to 100ft tall and in some cases higher, where others design antennas that are virtually invisible or blend into the environment.

## Active receiver antenna



MFJ invented the tunable active antenna! New technology uses dual gate MOSFET and a gigahertz bandwidth buffer

MFJ invented the tunable active antenna! Numerous copies have been made without success -- including most recent ones. Why? Because MFJ has made continuous improvements where others have not. The MFJ-1020C has been completely redesigned with new technology.

New technology uses a dual gate MOSFET and a gigahertz bandwidth buffer. It improves gain and selectivity, reduces noise and intermod, and is NOT prone to self-oscillations that can severely damage your receiver.

With the MFJ-1020C tuned indoor active antenna you'll rival reception of outside wire antennas hundreds of feet long and pick up signals loud and clear from all over the world.

World Radio TV Handbook says the MFJ-1020 is a "fine value . . . fair price . . . best offering to date . . . performs very well indeed."

MFJ's unique tuned circuitry minimizes intermod, improves selectivity and reduces noise outside the tuned band. You can also use it as a tuned preselector with an external antenna.

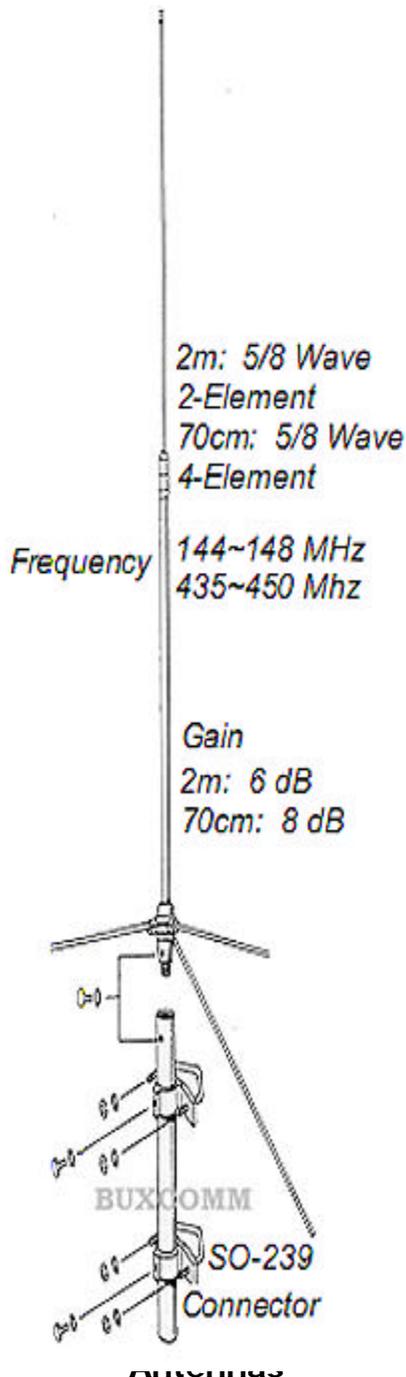
The MFJ-1020C covers 0.3 to 40 MHz including VLF, AM broadcast, all shortwave and all amateur radio bands. It has Tune, Band, Gain, On-Off/Bypass controls and SO-239 coax connectors. It uses a 9 volt battery, 9-18 VDC or 10 VAC with the MFJ-1312D. The MFJ-1020C measures 6W x 2H x 5D inches. It includes a telescoping whip.

**MFJ-1020C**

**\$ 99.95 Each**

<http://www.mfjenterprises.com/Product.php?productid=MFJ-1020C>

## Amateur VHF/UHF base antenna



UVS200

DUAL BAND HIGH GAIN BASE STATION ANTENNA 6.7 db 2 meters 8.2db 70cm. 5/8 wave vertical stacked CoLinears

### Product Information

This is a high performance, high power rating, low SWR, broadband coverage dual band VHF/UHF collinear antenna. The stacked collinear antenna was historically used by base station sites, stacking various 1/2 wave dipole elements on top of each other for increased gain connected by some equipment to correct for phase error between the elements of the array.

The higher in frequency the greater the gain.

### Specifications:

Insulated RF Radiator

Easy assembly

Fits masts from 1 3/16" - 2 7/16"

Supplied with all mounting hardware

Length: 98.4"

Gain: 2m 6.7dB, 70cm 8.2dB

Frequency Range: 144-148 Mhz, 435-450 Mhz

Maximum Power: 200 Watts

Impedance: 50 Ohm

VSWR: Less Than 1.5: 1

Connector: SO-239 (UHF)

Shipping Weight: 4lb

<http://www.packetradio.com/catalog/index.php?cPath=8>

Today most of the general multi band receivers come with a telescopic antenna which will allow you to hear stations that are putting out a considerable amount of power and maybe with ten a few hundred miles of your home, but if you wish to receive weaker signals from stations farther away you will need to have an antenna of some type one year building or Home. These antennas as with everything come in different flavors these days and each will do a different job in a different way such as an antenna called inverted V which is nothing more than two pieces a wire connected a setup point where the elements resemble a V. going from a high to 2 points in your yard. There are also vertical and horizontal antenna configurations which will receive signals and different manners and strengths.

Antennas that are used simply for a receiver come in two distinct categories which are active and passive.

### **Passive antennas**

A passive antenna is nothing more than a piece of wire that is strung from a one point to another and are normally 40ft. or longer and any center point a wire is connected that leads into your home or shelter where it is connected to your radio. This can be accomplished by placing the wire in the attic or on the outside of your house so that it surrounds but does not come in contact on the ends, or it can be used and a straight configuration running from the trees to post, or in a inverted "V" Style configuration. This type of antenna offers no amplification or filtration of the incoming signals that you're receiving.

### **Active antennas**

This type of engine that can be installed in any configuration that you would consider using with a passive antenna with the exception being there is an amplifier/filter that is connected between the antennae in your radio allowing you to hear weaker stations at greater ranges.

There are too many types of antennas to be covered in this book, fortunately there are people out there that have already wrote books on antennas that you can order over the Internet. One of the Des sources for print material not only on antennas but radios and other equipment can be found at the amateur radio relay league web site at [www.arrl.org](http://www.arrl.org).

On a final note, when ordering material from any company is highly recommended that you buy the books instead of CDs or DVDs because when the power goes out your means of accessing that material may go right along with it. Books are forever and CDs usually end up in the garbage.

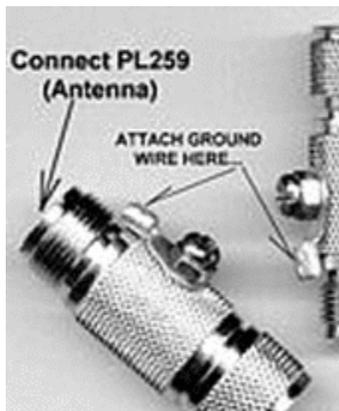
## Long wire antenna layouts

There are almost as many stars in the night sky as there are configurations for long wire antennas and I recommend that you purchase at least one book on antenna construction and deployment. However, I've used a product for long time that is called an AutoTuner that automatically tunes virtually any link the wire into a useable a HF, or high frequency antenna. The one I use is manufactured by a company called SGC which published a very nice and implemented user's manual giving many ideas and configurations for long wires. You may find this manual At:

<http://www.sgcworld.com/Publications/Manuals/230man.pdf>

They are less expensive AutoTuner is on the market, but I came across this one at a very good price and could not pass it up. However, and AutoTuner is just that, a device to tune the resonant frequency of the radio to the antenna being used which can also be accomplished by using a manual antenna tuner.

## Lightning protection



7516, An ounce of prevention is worth a pound of cure. This lightning protector provides that ounce of prevention.

- Lightning Arrestor
- In-Line Lightning Arrestor with Male PL259 to Female SO239
- With Grounding Terminal
- Durable Construction

The ideal Lightning Arrestor to protect your expensive HAM radio equipment, CB, and Marine Radios from lightning strikes and electrical storms.

These Lightning arrestors have Antenna grounding post with point gap adjustment screw.

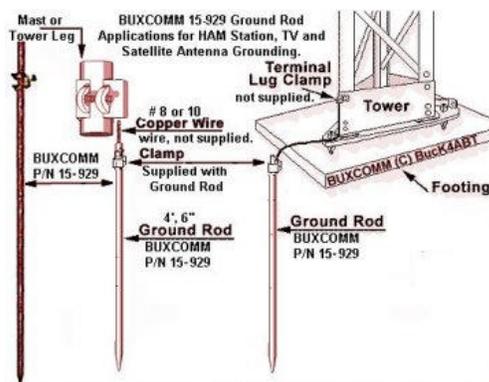
They are high-quality style UHF connector which they fit onto your equipment UHF female (SO239).

Lightning Lester's also known as a polyphaser is designed so that when lightning strikes the antenna the current travels down the Feedline and when it reaches the prevention device a small glass tube disintegrates shunting the

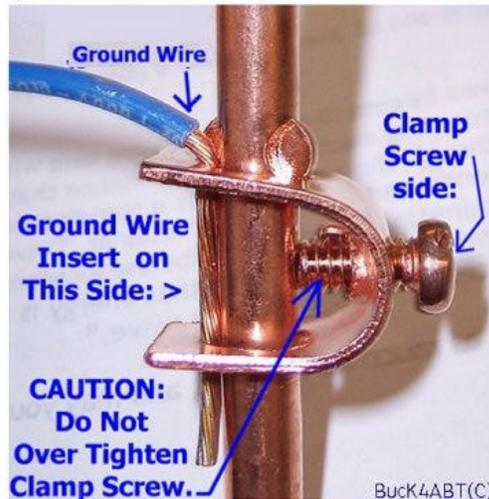
current to the grounding rod and then to the ground rod preventing the surge from entering your home.

Lightning protection devices are listed on the Internet starting at \$10.00 and range all way up to \$50.00 but basically do the same job no matter what price you pay for them. My recommendation is that you use one within your price range and purchase it from a company that you trust. As for myself, all of the polyphasers I have purchased over the past ten years came from a company called Buxcomm whose web addresses [www.packetradio.com](http://www.packetradio.com)

### Antenna grounding



Whenever you are installing an outside antenna, no matter if it is on a push up pole or on a tower the structure should be properly grounded using a grounding rod along with a heavy duty cable clamp and chemicals such as no lo-ox which prevents corrosion between dissimilar metals and will insure a proper ground for many years. Many people have used items such as rebar as the grounding rod, however a copper clouded ground rod and at least 4ft. in Lincoln is recommended.



## **Radios and equipment suppliers;**

Buxcomm	<a href="http://www.buxcomm.com/catalog/">http://www.buxcomm.com/catalog/</a>
MFJ	<a href="http://www.mfjenterprises.com/">http://www.mfjenterprises.com/</a>
Ham Radio Outlet	<a href="http://www.hamradio.com/">http://www.hamradio.com/</a>
Amateur electronic supply (AES)	<a href="http://www.aesham.com/ham-radios/">http://www.aesham.com/ham-radios/</a>
Ham City	<a href="http://www.hamcity.com">http://www.hamcity.com</a>
Ham Radio Classified Ads	<a href="http://www.swap.qth.com/">www.swap.qth.com/</a>

Swap, buy or sell amateur radio QTH.com Free Ham Radio Classified Ads from QTH.COM. The biggest and best ham radio classifieds on the web! Buy, sell, trade HF and VHF equipment.

## **Publications**

Amateur radio relay league (ARRL)	<a href="http://www.arrl.org/shop/What-s-New">http://www.arrl.org/shop/What-s-New</a>
W5YI	<a href="http://www.w5yi.org/exam_locations_ama.php">http://www.w5yi.org/exam_locations_ama.php</a>

W5YI's web site as a page just for locating what are called volunteer examiners that give test for all classes of ham radio licenses. You can also uses page to contact the volunteer examiner listed on a page for your city or town as a contact for your local ham radio club if you're looking for a testing session or just one more information on ham radio. First, select a state and then your city and you'll find the e-mail and phone numbers for the V.E.'s in your area that are certified by W5YI to administer test. And