

We are pleased.....

to present our ideas on upgrading simplex on-site UHF radio systems to wide area repeater operation or setting up a brand new digital radio system.

The typical situation

Most on-site radio systems operate on the UHF frequency band, more often than not without a license, on so called unlicensed "color dot" business band or GMRS frequencies in the simplex mode. The lack of coverage between handheld portable radios can be corrected by the addition of a repeater station although an additional frequency is required (a repeater uses separate frequencies for transmit and receive). The second issue deals with additions and replacements of existing radios while considering the age of current radios as well as regulatory compliance issues that will have some impact on the equipment selected.

Addressing the need for a repeater

We offer three different models of repeaters – analog only which is comparable with most current UHF equipment (if reprogrammed for repeater operation), digital only (MotoTRBO) and analog/digital multi-mode (ICOM). Any of these repeaters will address and correct most coverage issues. The prices and models including a required FCC repeater license are as follows:

Ritron analog repeater with FCC licensing, antenna and cable kit	- \$1,995
MotoTRBO digital repeater with FCC licensing, antenna and cable kit	- \$2,495
ICOM analog/digital repeater with FCC licensing, antenna and cable kit	- \$2,995

A 10X gain antenna system adds \$1,500 to the price of any of the above referenced repeater stations. The Ritron analog repeater is compatible with all current models of UHF analog radios and complies with all FCC regulations through 2018 (See attached list of three of our most popular analog radios).

If you wish, existing UHF radios can be reprogrammed to retain your existing frequency as well a new repeater channel. For more information on FCC licensing requirements for repeaters, visit <http://falconinfo.blogspot.com/search/label/FCC%20Information>.

The MotoTRBO repeater is not compatible with existing analog radios unless it is programmed for analog operation, in which case it cannot operate in the digital mode for use with MotoTRBO digital mode portable radios. The MotoTRBO technology is a proprietary digital standard that is not compatible with the products of any other manufacturer which can be an issue with some users. Still, it is a popular favorite.

The ICOM repeater is compatible with new or existing analog radios programmed for digital operation as well as any digital radio utilizing dPMR (also known as NXDN technology – See the Digital Radios section of www.falconinfo.blogspot.com for more information).

Portable Radios

We offer a choice of four portable radios for repeater operation. All these radios are rated at 4 watts, MIL-SPEC 810 approved and designed for commercial use. The TEKK XU1000 is an excellent choice if you do not plan to upgrade to digital and you have an assumed replacement life of 3 years. The ICOM F50 is somewhat more expensive, but better suited for outdoor use with upgraded environment protection (it is rated for submersible operation) and a longer replacement cycle (5 years or more). Both the ICOM F4061D and the Motorola XPR6300 are capable of digital operation and have a predicted useful life of 7 to 10 years. Prices are as follows:

TEKK XU1000 – 4 watt analog Tier one capability	-	\$209
ICOM F50 – 4W analog Tier two capability	-	\$419
ICOM F4161S – 4W analog/digital Tier three capability	-	\$649
Motorola XPR-4300 – 4W digital Tier three capability	-	\$729

Service Programs

The standard warranty on the TEKK radio is one year, ICOM is two years, and the MotoTRBO portable - three years. Repeater warranties are one year on the Ritron, two years on the ICOM, and three years on the Motorola. All factory warranty programs assume return of defective equipment to the respective manufacturer where the necessary repairs will be made and equipment returned prepaid.

We also offer a warranty supplement program known as TimeShare. In essence you pay a onetime cost of just \$25 for partial ownership in a spare radio, or radios as desired. If you ever need service, you pay just \$25 for a same or next day exchange radio and all shipping cost during the warranty period. No other service program even comes close!

Equipment Pricing





For your consideration, we have prepared the following price guides on repeaters, portables, and repeater/base stations. One of them should be just right for YOU!



Looking for.....

the best value in UHF repeaters? Look no further! Our top three models all include a high specification duplexer for single antenna use, free programming, and great pricing! A Quick Review Chart is provided below. More detailed information is available at:

www.info4u.us/Liberty.pdf, www.info4u.us/FR5000.pdf, and www.info4u.us/xpr.pdf

Specifications	Ritron Liberty	ICOM FR600	Motorola XPR8300
  			
Frequency Band	450-470 MHz	450-470 MHz	450-470 MHz
Operating mode	Analog	Analog AND Digital	Analog or Digital
Size	2.12" x 8.0" x 5.75"	19.1" x 3.5" x 10.25"	5.22" x 19.0" x 11.67"
Weight	3.5 pounds	12.3 pounds	31 pounds
Number of channels	1	32	32
Transmitter power	5 Watts	50 Watts	40 Watts
Duplexer included	Yes	Yes	Yes
Bandwidth	25 or 12.5 kHz	25 or 12.5 kHz	25 or 12.5 kHz
LTR 6.25 kHz capable	No	Yes	No
Warranty	2 years	2 years	3 years
Price with FCC license	\$1,995	\$2,995	\$2,495
Price without license	\$1,495	\$2,495	\$1,995
Antenna System – 10X*	\$1,500	\$1,500	\$1,500
Programming kit (optional)	\$129	\$129	\$374

* Antenna system includes lightning protection, cable, connectors, and battery backup. For additional information, please visit www.info4u.us/BaseAntennas.pdf.

Free programming is included with all models. Service is a major consideration. We offer a unique service program known as the TimeShare program. We think you'll like it! In essence you pay a onetime cost of just 1/12th the price of any desired radio for partial ownership in a spare radio. If you ever need service, you pay just 1/10th the original cost of the radio which provides a next day replacement, and all shipping cost during the warranty period. No other service program even comes close!

All radios listed are available for evaluation. You're going to like doing business with us! Our job is taking care of YOU!

The Best Price Team

At your service!


Phone: 866.903.2602 - Fax: 928.832.5340 – Email sales@bestpriceradio.com



Looking for.....

the best value in portable radios? Look no further! Our top three MIL-SPEC 810 approved models with, fast delivery, free programming, and great pricing! A Quick Review Chart is provided below. More detailed information is available on the Internet at

www.info4u.us/F50.pdf, www.info4u.us/F3161.pdf, and www.info4u.us/xpr.pdf

Specifications	ICOM F50	ICOM F4061S	Motorola XPR6300
 			
Frequency Band	VHF or UHF	VHF or UHF	VHF or UHF
Operating mode	Analog	Analog AND Digital	Analog or Digital
Size	3.8" x 2.4" x 1.4"	5.29" x 2.2" x 1.53"	4.21" x 2.28" x 1.46"
Weight	9.9 Ounces	12.0 Ounces	11.98 Ounces
Number of channels	128	512	32
Transmitter power	5W VHF, 4W UHF	5W VHF or UHF	5W VHF, 4W UHF
Audio output	500 mW	500 mW	500 mW
LCD alpha display	Yes	Yes	No
LTR 6.25 kHz capable	No	Yes	No
Warranty	2 years	2 years	3 years
Regular selling price	\$603	\$895	\$1,002
Our Price	\$419	\$649	\$729
Programming kit (optional)	\$129	\$129	\$374
Battery type/Life	Li-Ion 10 hours plus	Li-Ion – 14 hours plus	Li-Ion 9-13 hours
Type charger	Desk rapid	Desk rapid	Desk conditioning

Note: Information on the TEKK XU1000 (not shown above) is available at www.bestpriceradio.com.

Free programming is included with all models. Information on our available service programs is available at www.UltraCarePlus.com. In particular, check out the TimeShare program. We think you'll like it! In essence you pay a onetime cost of just \$25 for partial ownership in a spare radio. If you ever need service, you pay just \$25 for a next day exchange radio, and all shipping cost during the warranty period. No other service program even comes close!

Our most popular accessories are as follows:

Carrying case—\$39

Speaker-microphone—\$69

Spare battery—\$79

All radios listed are available for evaluation. For additional information please visit our special web page at <http://ultracareplus.com/trials.aspx>. You're going to like doing business with us! Our job is taking care of YOU!

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Looking for.....

the best value in mobile radios? Look no further! Our top three MIL-SPEC 810 approved models with, fast delivery, free programming, and great pricing! A Quick Review Chart is provided below. More detailed information is available on the Internet at

www.info4u.us/F121.pdf, www.info4u.us/F5061.pdf, and www.info4u.us/xpr.pdf

Specifications	ICOM F221	ICOM F6061	Motorola XPR4300
			
			
System Type	Tier One	Tier Two	Tier Three
Frequency Band	VHF or UHF	VHF or UHF	VHF or UHF
Operating mode	Analog	Analog AND Digital	Analog or Digital
Size	5.9" x 1.6" x 6.6"	6.3" x 1.8" x 5.9"	6.89" x 2.01" x 8.11"
Weight	2.4 pounds	2.9 pounds	4.0 pounds
Number of channels	128	512	32
Transmitter power	50W VHF, 45W UHF	50W VHF or 45W UHF	25W VHF or UHF
LCD alpha display	Yes	Yes	No
LTR 6.25 kHz capable	No	Yes	No
Warranty	2 years	2 years	3 years
Regular selling price	\$425	\$895	\$685
Our Price	\$329	\$649	\$545
Programming kit (optional)	\$129	\$129	\$344
Rear mount kit	Not available	\$100	Not available
Roof mount antenna	\$26	\$26	\$26
Extend warranty to 5 yrs.	\$57	\$57	\$108
AC power supply	\$155	\$155	\$155
Desk microphone	\$119	\$119	\$119
Office station antenna	\$43	\$43	\$43



Note: The mobile radios above are available with optional accessories to allow them to function as a fixed office station. If you choose the Tier 1 analog system, you can use the Ritron Jobcom fixed station shown at the left as a very affordable and efficient fixed station unit. The price is only \$289 complete! Additional information is available on the Jobcom station at www.usa-radio1.com/prices/basestations. Tier 2 and Tier 3 systems can use a portable radio with desktop charger for fixed use if desired.

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Tower Planner

The biggest single factor in extending communications range is height! When possible, a site with the highest possible ground elevation should be selected. Power should be available unless you want to invest in solar and a suitable enclosure should be available for your base station.

The higher the antenna support tower, the greater the view over the Earth's horizon and consequently the operating range of 2-way radios. However, there are some practical issues, such as cost, that should be considered. Fundamentally, you start with getting the antenna above the trees in the immediate area. Trees are great big signal suckers!

If there are no trees or other obstructions in the immediate area, the optimum tower heights are 50, 100, and 200 feet. Above 200 feet, towers must be painted and lighted which is generally prohibitive for all but larger users. Towers basically come in three versions – Monopole (actually not a tower), guyed, and self supporting. More information on towers at www.tessco.com/yts/industry/products/infra/infrastructure/tower/tower.html.



Monopoles require the least space but they tend to be a little pricey. For example a 100' Monopole will cost about \$180 per foot (\$18,000 for 100' installed).

A 100' self supporting triangular tower such as the Titan Series by Trylon shown at the left would cost around \$80 per foot (\$8,000 installed).

A 100' guyed triangular tower such as the Rohn #25G will cost around \$60 per foot (\$6,000) including normal installation.

From an economic/performance consideration, a 100' tower will provide the best ratio of cost versus range. Obviously, a guyed tower is the least expensive IF you have sufficient area available for guy wires which will generally extend in three directions extending 50' from the tower, secured at 30' intervals.

As strange as it may seem, a 50' tower will normally provide 75% of the coverage of a 100' tower. Don't ask us why this is. We just know from experience that it just works out this way. Engineers use terms like linearity, logarithmic progression, and other technical terms to try to explain this condition. Suffice it to say that this opens some interesting alternatives in system planning since a 50' tower with a high performance rating can often outperform a 100' tower with a lesser rating known as Effective Radiated Power or ERP.

Antennas come in all shapes and sizes and are rated with the Decibel of a measurement of efficiency. Zero dB means the antenna emits or receives the amount of power inserted (i.e. a 50 watt transmitter would have an ERP of 50 watts). A dB gain antenna would have a power factor of 2X (i.e. 50 watts input would have an ERP of 100 watts) and a 5.2 to 6 dB gain would have an ERP of 4X or 200 watts.



As a general rule, size is the determining factor for increasing the dB rating of an antenna coupled with matching the antenna to the same impedance of the associated transmission line and radio (normally 50 Ohms). A typical unity (0 dB) gain antenna for VHF will be around 20 inches high. A 3 dB gain VHF antenna will be about 8 feet and a 5/6 dB gain antenna will be around 18 feet.

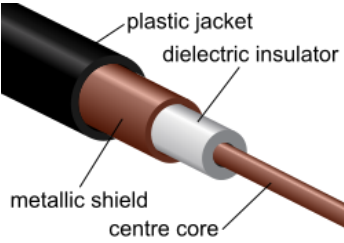
The cost of an antenna is based on dB gain, quality, and shipping (high dB gain antennas cannot be shipped by UPS and are normally shipped by Motor Carrier). Typical costs are as follows:

Unity (0 dB gain) antenna	-	\$150
3 dB (2X gain) antenna	-	250
5/6 db (4X gain) antenna	-	900

Similar antennas for UHF are rated at 0 dB, 6 dB and 10 dB gain and are approximately the same size and price.

The antenna shown at the above left is a VHF 5.2 dB open dipole type. These are commonly used for 2-way mobile radio systems. The UHF version is similar in appearance except it has eight smaller dipoles as opposed to the four dipoles shown on the VHF model. An enclosed dipole collinear antenna is generally preferred for use with portable radios (less noise on the received signal). The price is the same for VHF or UHF for either exposed dipole or collinear type antennas. The better brands, at least in our opinion, are Sinclair and Telewave.

The third component of a fixed station antenna system, along with the tower and antenna, is the transmission line. Choosing the right important line is very important since any cable will have loss – some more than others. For more information on transmission line, visit http://en.wikipedia.org/wiki/Coaxial_cable.



Transmission line conducts the power from the radio to the antenna. The least expensive line, known as RG-8A is approximately 1/2" in diameter and has a power loss of 1.575 dB per hundred feet. This would pass approximately 34 watts to the antenna from a 50 watt station.

The best value for most applications of up to 200' is a cable type known as LDF4-50A with a lower line loss which would provide a power output of approximately 41 watts for a 100' length.

A 200' length of RG-8A cable would loss approximately half the power of the associated transmitter (actually 24.2 watts) whereas a 200' run of LDF4-50A would retain an output power level of approximately 34 watts. Larger diameter cables have even lower loss figures, but for most users, we recommend LDF4-50A.

The cost of LDF4-50A cable is \$3 per foot including shipping plus \$50 for a connector kit. For more information on cable and losses, please visit www.ocarc.ca/coax.htm. We hope you have found this information helpful. We look forward to serving you!

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