EQUIPMENT CHOICES FOR EMERGENCY COMMUNICATIONS

There is no one 'best' set of equipment that will ensure success for every assignment, but the following will help you make a better choice.

Transceivers.

VHF/UHF

The most universal choice for emergency communications is a 25-50 watt mobile transceiver. Radios in this class are usually rugged and reliable, and operate at a reasonable high duty cycle.
Handheld transceivers should only be used when portability is needed, such as walking with an agency official, or when adequate battery or other DC power is not available. Handheld radios should NOT be relied upon to operate with a high duty cycle at maximum power.

Both portable and mobile dual band radios can be used to monitor more than one net, and some models allow simultaneous reception on more than one frequency at a time. For high traffic locations, such as Net Control or the Emergency Operations Centre, a separate radio for each net is a better choice, since it allows both to be used at the same time by different operators. Antennas must be correctly separated to avoid 'de-sensing'.

HF

Operation from a generator equipped JOC can be done with an AC powered radio, and having both AC & DC capabilities ensures the ability to operate under all conditions. Most 12 volt HF radios fall in either the QRP (5 watt) or 100 watt category. Unless power consumption is extremely important, 100 watt output radios are adequate. This gives you the ability to overcome noise at the receiving station by using high power or to turn it down to conserve battery power when necessary.
Do NOT use DC to AC inverters to power radios. Most use a high frequency conversion process that generates significant broad-spectrum RF noise at HF frequencies that are difficult to suppress. Using direct battery power is more efficient in any case.

Receiving Performance

For radios on all bands, several aspects of a radio receiver's performance can effect its suitability for emergency communication work. These include sensibility (ability to receive weak signals), selectivity (ability to reject signals on adjacent frequencies), and intermodulation rejection (ability to prevent unwanted signals from within the radio which causes interference). When operating near public or business radio transmitters, an FM receivers 'intermodulation rejection' is very important. Receiver filters are important for effective HF operation. DSP (digital signal processing) may be the single most important filtering feature available.

ANTENNAS

VHF/UHF

A good antenna, mounted as high as possible, is more important that high transmitter power. Not only does it provide gain to both the transmitter and receiver, but a higher gain antenna may also allow output power to be reduced, thus battery life is longer.

In flat terrain, use a mast-mounted single band antenna with at least 3db gain. Operating in a valley, the low angle of radiation offered by a gain antenna may actually make it difficult to get a signal out of the valley.

Low or unity gain antennas have flatter radiation lobes and are better suited for this purpose. Unity gain 'J pole 'antennas are rugged, inexpensive and easily built. For directional 2 metre coverage with about 7 db gain, a 3 or 4 element yagi can be used.

A magnetic mount mobile antenna is useful for operating from a vehicle. They can also be used indoors by sticking them to any steel surface such as a filling cabinet, beams or even upside-down.

Rubber duck antennas have negative gain. Use at least a 1/4 wave flexible antenna for most operations, and consider using a 5/8 wave antenna for long-range use.

Even a 'roll-up j-pole antenna made from 300 ohm tape can be used in place of a 1/4 wave. As long as you get the J-pole tacked to the wall or raise it up with string. You can even use a 1/2 wave or 5/8 wave antenna with a handheld if you have the correct fitting.

HF

There is no perfect antenna for HF. The choice depends on the size and terrain of the area you need to cover.

For local operations (up to 500 km), a simple wire dipole is the easiest to deploy. An antenna tuner is necessary for most wire antennas and is a good idea for any HF antenna.

Beam antennas are usually expensive, large and difficult to store or transport.

FEED LINE

Feed-line for VHF/UHF should be low loss dielectric co-ax. For short runs, less than 30 meters, use RG58 but for longer runs use RG213 or RG 214 (double screened).

OPERATING ACCESOIRIES

Headphones are very useful and should be mandatory in many locations. Operators in a JOC or Incident Command where multiple radios are in use, headphones should be used. Consider using a mic/headphone combination which also works very well.

BATTERY POWER

Battery power is critical for emergency communications operations. AC power can not always be relied on for any purpose, and extended portable operation periods are common. Batteries should be chosen to match the maximum load of the equipment and the length of time that the operation must continue before they can be recharged.

NiCD, NiHM and LIon

For handhelds, the internal battery type is determined by the manufacturer. NiMH batteries store more energy than NiCad batteries of the same size. Many smaller radios are using LiON (Lithium Ion) batteries which have higher power densities, without the so-called "memory effect" of NiCad's.
Many handhelds have optional alkaline battery cases, and are a recommended emergency communication accessory. Common alkaline batteries have a higher voltage (1.5 v) than NiCad's (1.2v) and are readily available at most stores, but unfortunately cannot be recharged. Most handhelds will work off external power (13.8 v) from an external battery or a cigarette lighter as long as the voltage polarity is observed. For maximum flexibility, build a DC power cable for each of your radios, with suitable adaptors for each battery type you might use.

TYPES of BATTERIES

There are two types of lead-acid batteries: flooded (wet), and sealed lead-acid.
Wet batteries or car batteries can spill if tipped, whereas sealed lead-acid batteries cannot spill and can be operated in any position.

BATTERY CHARGERS

For all your radios you should have two batteries per radio, so that one can be in use whilst the other is charging. The type of charger required depends on the type of batteries that you use. For instance, NiCad chargers will also charge NiHM batteries but not Lion batteries.

Several new chargers are available that can charge almost any type of battery available. A rapid rate charger can shorten the life of a battery's overall lifespan. It is best to low charge all batteries, since it helps to avoid overheating and extends their overall life span. Gel sel batteries should be charged slowly to avoid damage.

All batteries produce hydrogen sulphide gas while recharging. Non sealed batteries vent the gas out. Sealed acid batteries do what is called "gas recombination". This means that the gas generated is recombined into the cells. Sealed acid batteries actually operate under pressure of about 3 psi for most batteries. If the battery is charged faster than the gas can be recombined, it overpressurises causing it to overheat, swell up and it can be dangerous. All batteries should be charged at about 1/3 of the rated capacity. i.e. if the battery is rated 7 AH then you should charge it at no more than 2 amps.