

SECTION 14: EQUIPMENT SELECTION AND CONFIGURATION

This section provides guidelines to help you choose and prepare equipment and deployment kits. The information provided here is intended to help you make your own decisions about what to include in your ARES emergency packs, based on the equipment you own, your transportation, your ability to carry gear, and the various scenarios for activation.

Once you complete this section, you will be able to:

- Take steps to protect and recover equipment
- Set up shared stations
- Build emergency packs (ready packs) and kits
- Prepare your equipment for emergencies
- Make decisions about buying and configuring equipment for ARES use
- Select appropriate battery types
- Plan alternate power sources, such as generators.

LABELLING AND RECOVERING EQUIPMENT

During times of emergency, it's quite likely that you will become separated from some of your equipment (for example, during shift changes at stations, while loaning items out to other operators, or simply during transit). It is very important that you clearly label all equipment to make sure that it finds its way back to you at the end of the operation. Any valuable piece of kit should be marked with your callsign. You may also consider labelling your equipment with:

- your name
- your phone number
- your email address

Tip: You can stick a white Avery label on the equipment and write the information on it, or you can use a label-maker to make a semi-permanent label.

Labelling packs, bags and containers

You should also label or tag any packs, bags or containers you are likely to use during an ARES operation (including your Ready Pack and any 'subpacks' within it). Use Avery labels or adhesive equipment labels on any 'hard' items like Pelican cases or briefcases. Use luggage tags on any soft items.

SETTING UP SHARED STATIONS

A shared station is:

- a station that will be manned by more than one operator at a time, or
- a station at which operators will work in shifts using a consistent equipment configuration

If you are asked to set up a shared station, see [“Station configuration” on page 15.1.](#)

EMERGENCY PACKS AND KITS

Ready Pack (emergency pack)

A *Ready Pack* is a portable package of equipment and supplies that will let you operate comfortably from any location for at least 24 hours (and hopefully longer). You should keep the Ready Pack somewhere accessible, such as the closet close to your front door, or in your car's trunk (so that it is accessible while you are at work).

Suggested contents:

- backup handheld radio with antenna, microphone or headset, and spare alkaline or high-capacity batteries for 12 hours operation
- speaker mike with earphone, or a headset
- 2m magmount (or mini-magmount) with antenna adapters for handhelds
- extra 25' of coax cable with connectors (more is better!)
- barrel connector to mate mag mount cable to extra coax
- cigarette lighter cord & extra fuses
- cigarette lighter female to car battery adapter
- printed copy of ARES procedures
- printed ARES/NTS forms
- reflective identification vest or tactical harness/vest
- ziplock bags (for packaging and for preventing exposure of gear to water, weather or contamination)
 - If you are working outside in wet weather, a ziplock bag over the radio and an elastic band around the antenna will keep the equipment dry. After the assignment, remove the radio from the bag to air out and dry it.
- water for 12 hours (2 litres)

- any required medications
- snack food for 12 hours or longer (snack bars, chocolate, trail mix, etc.)
- single-serving sugar packets
- sunhat or ball cap
- sunblock and sunglasses
- insect repellent
- small first-aid kit
- 'disposable' rainwear (sold by Canadian Tire for about \$3)
- flashlight and spare batteries
- large pad of paper, pens x3, mechanical pencil, black heavy permanent marker
- clipboard
- electrical tape
- duct tape
- basic set of tools
- Swiss army knife or multitool
- 3m string
- 10m of #10 wire
- Velcro adhesive 'buttons' or strips
- permanent black marker with fine and coarse tips
- set of FRS/GMRS handheld radios with batteries
- breathmints
- nametag
- good photocopies of photo identification (such as your driver's license)
- any identification cards or documents provided to you by ARES or EMO
- business cards (or some sort of cards with your name, phone number and email address)
- regional street map
- \$40 in cash (useful for coffee, snacks, etc.)

At the time of deployment, remember to add the following items to your Ready Pack:

- primary radio equipment, antennas, microphone or headset, power supply and spare batteries
- cellphone and spare batteries
- ARES access keys for designated station, centre, location or vehicle (if any keys have been issued to you)

Consider adding the following items, if convenient:

- garden tractor battery (if it can be transported safely), gel cell, or other portable battery system
- charger for your battery system
- simplex repeater module
- GPS
- second flashlight (preferably a long-life LED type)
- 12-to-120V auto inverter/adaptor for your power supplies
- disposable camera
- tape recorder with batteries and tape
- wetnaps or wash napkins
- blanket
- foldout seat
- sleep mask (the type provided on long-distance flights to aid sleep)

When deciding what to include in your Ready Pack, remember that you may have to carry your pack some distance, depending on where you are deployed. Try packing your Ready Pack with everything you would take on an actual emergency, and then take a 10 minute walk with it to make sure you will be comfortable carrying it when the time comes.

If you are not comfortable carrying the pack, and cannot minimize the contents of the pack, consider leaving it in the trunk of your car. In most situations, you will use your car to get to your deployed location.

You can also break out groups of items into ‘subpacks’ within your Ready Pack, so you can remove them easily when they are not needed, letting you re-organize your pack quickly. For example, you may bundle your gel cell and trickle charger in a bag within your Ready Pack so you can pull that gear out quickly if it is not needed, or is too heavy to carry to your destination.

TIP: Ziplock sealable bags are great for packaging the content within your Ready Pack. Not only do they let you see their contents at a glance, they open and reseal easily and provide an additional layer of weatherproofing.

Another technique is to keep a small, minimal Ready Pack within a larger Pack. The smaller Pack contains the most essential gear, and can be carried easily. The larger Pack contains the gear that is less essential. In a situation where you may have to carry the Pack for an extended distance, you can leave the larger Pack behind in a safe place.

You may also be able to use a suitcase cart, granny grocery cart, or hand cart to move your equipment.

Extended operations kit

In some situations, you may be asked to provide services for longer than 24 hours, or you may volunteer to provide emergency communications outside your normal operating area. In these situations, you should take additional supplies, hardware and comfort items to meet the needs of the situation and to allow you to operate for longer periods or in situations where you may not have immediate support. Suggested items include the following:

- change of clothes (two changes, if possible)
- any medications you might need during extended operations
- sleeping bag or bed slip
- eyeshades and earplugs
- basic toiletries
- paperback books or other entertainment materials
- maps for any areas in which you may be called to operate
- plastic coffee cup
- dry soup packets, hot chocolate, etc.
- canned food and high energy snacks
- can opener
- spoon and cup
- first aid / medication / toilet kit

- deodorants
- moist towelettes
- Purell (waterless hand wash)
- extra cash, including small bills and coins for public phones
- fanny-pack or back-pack
- space blanket
- small refillable water bottle
- large trash bags
- tools
 - Swiss army knife and/or Leatherman-type tool
 - screwdrivers: Phillips and flat
 - needle nose pliers
 - vise grips
 - electrical tape
 - digital voltmeter (DVM)
 - duct tape (rolls in different colours)
 - crimper and wire stripper
 - butane-powered soldering iron
 - butane-powered micro torch (for soldering antennas, grounds, Powerpole connectors, etc.)
 - assorted adapters, connectors, screws and nails

- radio gear
 - photocopy of amateur radio license
 - backup radios
 - spare battery packs (charged)
 - AA-cell battery adapter
 - spare speaker-mic (needed for third-party communications when shadowing)

A speaker mike makes a handheld radio easier to use as a "base" radio. It also keeps the operators hands free when using it when walking, driving, etc. In some cases, a small speaker can be used to advantage as it will give clearer and louder audio than the built-in speaker.

- spare headset (recommended for discrete shadowing)
 - switching power supply (A/C)
 - 50 feet extension cord
 - multi-outlet AC power strip
 - assorted Powerpole cables and connectors
 - dual-band mag-mount antenna
 - 50 ft RG8X coax with UHF connectors
 - BNC or SMA to PL259 adapters
 - female-female UHF-UHF barrel adapters
 - 12V gel cell (75 A/H recommended, if possible) with charger
 - spare fuses
- HF accessories
 - key
 - headphones, ext speaker
 - NVIS antenna (NOT a mobile vertical)
 - 75m dipole with ladder line or 130 ft of wire or equivalent
 - antenna tuner with built-in SWR meter
 - insulators
 - guy rope
 - pegs for guys
 - weight and 50 ft light line for tossing over tree branches. (A plastic water bottle can make a good weight, since you can adjust the weight by pouring out water.)
 - bright marking tape to warn passers-by of guys and lines.
- power
 - generator kit: generator; fuel; oil; outdoor-grade three-prong 12-14 gauge power cable (50 ft); block of wood to place generator on (if used on damp earth); small tarp, two 2-ft wood pegs, two 3-ft wood pegs; 80 ft nylon rope (used to provide some protection against theft, and to set up a generator rain

- shelter); reflective safety tape to cordon off generator area and mark cables and rope.
- small fire extinguisher
- solar kit: solar panels with protection diodes, Powerpole connectors
- auto power kit: vise grips (for loosening and tightening battery connections); 100 ft heavy duty 12v cable; battery clips with Powerpole connector; Powerpole connector block or distribution panel; reflective safety tape to mark cables; spare ignition key for car.
- chargers for equipment
- deep-cycle battery with charger
- spare fuses
- portable field gear:
 - canopy or shelter tent
 - umbrella (sun or rain)
 - table
 - folding chairs (2+)
 - portable light
 - materials for ad hoc antenna tower: five 5-ft 2x4 wood sections that can be bolted or screwed together; 150 ft of light nylon rope; 6 tent pegs or tie-downs; antenna base mounts; 50-ft coax (one for each antenna that might be installed); power screwdriver or torque wrench to install screws or bolts.
- hardship field gear:
 - camp cooking equipment and fuel; food rations or MREs; water (4L per person per day) -- may not be needed if deployed to a shelter or other site with its own canteen or feeding station
- extended hardship field gear (for deployments of days or weeks at a site without accommodation or amenities):
 - sleeping tent. (You do not want to be sleeping at the radio station during an extended posting with other operators.)
 - sleeping bag
 - wash basin, dish soap, face soap, shampoo
 - wash towel
 - solar water heater shower bag

Auto kit

You should keep a limited kit in your car, separate from your Ready Pack, to facilitate in-car operations. The auto kit should include the following items:

- mag-mount 2m antenna (if your car does not have an installed antenna)
- auto power adapter

- fused female cigarette lighter plug with large alligator clips for direct-to-battery connection, with a cable long enough to reach into the cabin through a window or body seam. (Equip this cable with in-line Powerpole connectors.)
- detailed road maps for the province
- pads of paper and pens

Station kit

If you are responsible for station setup at a specific location, you need additional equipment and supplies specific to that location and the equipment that will be used there. For example, your station kit may include the following items:

- any equipment (transceivers, antennas, power supplies, batteries, etc.) specifically intended for use at that station
- fold-up table or card table (if the location does not provide an operating position)
- ARES forms and procedures
- paper pads, pens and pencils
- a backup VHF radio for operator talk-in
- signage
- comfort items, if appropriate:
 - coffeemaker or kettle, with coffee or tea
 - hot chocolate packets, in cold weather
 - folding chairs
- bottled water
- additional tools and hardware
- voltmeter
- soldering iron (battery or butane powered), resin-core (electronic) solder, desoldering wick or solder sucker
- selection of Slot, Phillips, Robertson and Torx screwdrivers
- selection of pliers - long nose, adjustable, mini-wise grip, wire cutters, crimping tools
- hookup wire, wire-nuts, tape, crimp connectors
- splice kits, 1/4 in. phone jack plugs, mini phone plugs, RCA plugs and adapters
- alligator clip jumpers

- generator and fuel
- extension cords
- trouble lights or lanterns
- 2-prong plug adapters to 3 prong (AC receptacle)
- 1 to 3 plug adapters (AC receptacle)
- 12 V power supply(s) for HF/ VHF / UHF rig(s)
- extra battery packs, Gel Cell(s), Ni-cad cell(s)
- cigarette lighter adapter
- spare fuses for rigs for AC line and DC cables
- mobile power cords, adapters, wire nuts, tape
- variable voltage AC to DC power supplies and plugs

Field pack

If you are responsible for setting up an in-field station, bring the following items:

- large tent (sleeps six or more) for operations and sleeping shelter
- a second tent, if one is available, for multi-shift stations
- boundary or trail-marking tape

See [“Station configuration” on page 15.1](#) and [“Station management” on page 19.1](#).

Search and rescue pack

At this time, regional ARES involvement in SAR is limited. It is expected that ARES may be used only in large-scale SAR operations (such as a passenger jet crash), but this may vary from Section to Section.

If you are interested in volunteering for deployment on possible search and rescue exercises or events, you need to build an additional pack with gear you will need during SAR operations. Your SAR Pack should include the contents of your Ready Pack, and should also include the following items:

- extended-length flex antennas for handhelds (cannot be fragile)
- regional road and topographical maps
- outdoor clothing suited to the season (including hiking or snow boots, reflective ‘hunter wear’, hats, etc.)

Consider adding the following items, if available:

- GRS (CB) handheld transceiver with earphone, flex antenna and alkaline or high capacity batteries
- FRS/GMRS handheld with spare batteries
- GPS with spare batteries (GPS should be capable of displaying MGRS and UTM coordinates)
- waist or fanny pack for equipment and batteries
- orange 'anti-hunter' vest or clothing

GENERAL PREPAREDNESS GEAR

Home

- Blankets or sleeping bags
- Warm clothes
- Additional prescription eyeglasses
- Extra pairs of house and car keys
- Cash and change
- Manual can opener
- Baby supplies: formula, bottle, pacifier, clothing, blankets, diaper wipes, disposable diapers, canned food and juices
- Additional medical prescriptions

For pets

- Water
- Food
- Blankets
- Spare leash and collar
- Medications
- Carrying case
- Favourite toy

Auto

- Blanket
- Booster cables
- Cash and change
- Change of clothes, rain gear and sturdy footwear
- Fire extinguisher
- Maps
- Shovel
- Road Flares
- Tire Repair Kit

HANDHELD EQUIPMENT

Choosing handheld radios

When you are buying a handheld radio, you may wish to consider features and accessories that will be useful during emergency operations:

- long-life batteries
- AA battery adapter or case
- external power/charger input that allows power and recharge while in use
- headset or earphone
- BNC connector or SMA-to-BNC adapter (for connection to external antennas)
- BNC-to-PL259 adapter (for connection to onsite, fixed antennas)
- belt clip or lanyard
- switchable high and low power
- weather resistant shell or case

It is recommended that you have two handhelds: one primary radio that you use regularly, and a backup radio that normally stays in your Ready Pack and can be used in case your primary radio dies. (A backup radio may also be useful in situations where you wish to monitor more than one channel, or wish to loan a radio to another operator.)

Accessories for handheld equipment

- Antennas
- Power packs

PRIMARY RADIOS

Your primary radios should be ones that you use on a regular basis, and should be kept charged and ready for use at all times. Recommended features and configurations include:

- programmed with local repeaters and ARES channels
- able to function on battery/auto/emergency power for extended periods
- headset, or speakermic with headphones
- effective portable antenna (extended-length whip for handhelds, or an external mag-mount 1/4-wave or better)

BACKUP RADIOS

Your backup radios should be ones that you do not need on a regular basis, but that are in working condition. Recommended features and configurations include:

- programmed with local repeaters and ARES channels
- AA alkaline compatible battery packs, or external battery input with an external AA battery pack
- effective portable antenna (extended-length whip for handhelds, or an external mag-mount 1/4-wave or better)
- a BNC antenna jack, or an SMA jack with an SMA-to-BNC adapter
- headset, or speakermic with headphones

POWER

Batteries

Batteries are one of the most crucial elements of your radio system. During ARES operations, most operators will spend most of their operating time running from battery packs or battery systems.

When choosing batteries, you need to consider how they will be used. Equipment that is used and recharged regularly can benefit from batteries that have high capacity but may self-discharge (run down without being used). Equipment that is used infrequently benefits from batteries that do not self-discharge, or can be replaced quickly in the field.

Most handheld radios come with their own internal or clip-on battery packs, and you may not have much choice regarding capacity or chemistry (the elements used within the battery that determine a battery's characteristics and capacity).

Chemistry

The following types of battery chemistry are common:

- Lead acid
- Gel Cell lead acid
- Nickel Cadmium (NiCd)
- Lithium Ion (LI, Lion)
- Nickel Metal Hydride (NiMH)
- Alkaline
- Rechargeable alkaline
- Carbon

Lead acid batteries are suitable only for use at fixed stations, as backup supplies (or where they are normally found, in automobiles). They are not recommended for use in other mobile applications.

Gel Cell lead acid batteries are useful in mobile situations, but are often too heavy for man-carried packages (such as backpack radio kits). Gel Cell batteries have high capacity but must be charged carefully to prevent battery damage.

NiCd batteries are commonly used in internal battery packs, and are useful for external packs in their AA, C and D formats. NiCd batteries have moderate capacity and can be charged or discharged with little memory effect, so long as they are not COMPLETELY discharged or overcharged. NiCd batteries are recommended as a cheap, rechargeable battery for external battery packs (or internal AA battery cases).

LI batteries are commonly used in laptop computers and in some radio systems. LI batteries have very high capacity, but a limited charge-cycle life. LI batteries also require specialized charging circuits to avoid severe damage. LI batteries do not self-discharge. They are not recommended for any equipment that is not designed specifically to use them.

NiMH batteries are becoming more common in internal battery packs, but are readily available in AA format. NiMH batteries have high capacity and can be charged with a normal NiCd charger (though an NiMH charger is much preferred to preserve overall battery life). NiMH batteries can have up to twice the capacity of NiCd batteries, and do not suffer from memory effects. NiMH batteries do have a charge-cycle life, but are much harder than LI batteries. NiMH batteries self-discharge slowly, making them unreliable for backup or low-use equipment. NiMH batteries are recommended as a rechargeable battery for external battery packs (or internal AA battery cases).

Alkaline batteries are readily available and have good capacity. Unfortunately, regular alkaline batteries cannot be recharged, and tend to be an expensive solution. Two common brands are Eveready and Duracell. Both brands are nearly identical, with the exception that Eveready batteries self-discharge and fail at cold temperatures, and are not recommended for winter use. Alkalines are recommended for use as reserve batteries for occasional (or emergency) use in external battery packs or internal AA battery cases.

Rechargeable alkaline batteries are a little more expensive than non-rechargeable alkalines, but can typically be recharged 25 times (resulting in a great cost savings). Rechargeable alkalines require a special recharger, readily available from Radio Shack. These batteries do not self-discharge as quickly as NiCd and NiMH batteries. Rechargeable alkalines are recommended as a cheap, rechargeable battery for external battery packs (or internal AA battery cases).

Carbon batteries are the cheapest available, but have low capacity and tend to be unreliable on electronic systems. (They are intended primarily for flashlights and other fixed-current devices.) Carbon batteries are not recommended for ARES use, since they may not be able to power your handheld radio on high or even medium power.

Table 3: Battery chooser

Battery type	Primary 'regular use' equipment	Backup 'occasional use' equipment	Fixed backup power
Lead acid			X
Gel Cell			X
NiCd	X		
NiMH	X		
Alkaline		X	
Rechargeable alkaline	X	X	
Carbon			

Auto power

Cigarette lighter installations

Getting power through your cigarette lighter is fast and convenient. However, you cannot draw more than 5A through the connection reliably, and in many cars the cigarette lighter power is on only when the ignition is on.

If you are going to use low-power equipment powered through cigarette lighter connections, consider installing a second cigarette lighter female connector (or bank of connectors) with a direct, fused connection to your car battery. This minimizes voltage drop and ensures that power is available through the connector even when the ignition is off.

Anderson Powerpole connectors

Powerpole connectors are highly recommended for use in your auto power installation, in place of or in combination with the options described earlier. It is important to provide a Powerpole plug-in that will allow you to quickly install other ARES equipment into your vehicle.

Battery clip installations

A fast though messy method of connection to your car's 12V power is to use a female cigarette lighter connector with battery clips. This is suitable only for low-power equipment. You must exercise caution to prevent shorts or disconnections. This method is suitable only for short-term use, but allows you to connect to any automobile without causing damage. Powerpole connectors with alligator leads can be used to meet higher power requirements.

Permanent installations

Permanent installations can provide a good solution if you use portable equipment in your automobile on a regular basis, or if you are using high-powered equipment. A number of commercially available systems are available for in-car power, but you can brew your own easily. The simplest installation is to run the power cable for your high-powered transceiver from the cabin into the engine compartment through the firewall, and to connect it via a high-current fuse directly to the battery.

Other options

Other options for permanent installation include:

- a secondary battery, charged from the alternator through a battery isolation diode or an ignition controlled relay
- power distribution points at strategic locations in the car, such as the glove compartment, back-seat floor, or truck camper cab
- an auto-shutdown module to prevent the battery from being run down. (Koolatron sells these through Canadian Tire for about \$30.)

In addition to the rechargeable battery the operator should have a power cord for the portable to operate of a 12 volt battery or power supply. A power cord that plugs into a cigarette lighter socket is good for mobile use. A battery case that takes 'AA' batteries is a asset. For emergency power a battery holder that holds larger batteries can be carried in a pouch and used with a power cord. This is great for extended power consumption.

A small 3 amp regulated power supply can be used for most handheld radios. A "wall wart" power supply is not recommended for use as they usually do not have sufficient current and poor voltage control.

Generators

Generators are extremely useful for ARES operations, particularly for those that involve commercial power failures lasting longer than several hours. A generator is a large investment, so it is not recommended that you buy one just for ARES applications. However, you may be able to justify buying one to power your home (keeping your refrigerator or other equipment operating) during an extended outage.

***Note:** If you are planning on using a generator to power your home, you need to ensure that its capacity is high enough to run any equipment, lighting, heating or other devices that you are likely to want to run. Also, have a qualified electrician make the connection from your generator to the house wiring prior to an emergency, or connect equipment directly to the generator without using the house wiring! (If you connect a generator to your house wiring yourself, you risk voiding your home insurance, burning down your house, possibly injuring power company workers.)*

Handheld generators

Small generators like the Honda 350W can be considered ‘handheld’, since they weigh only a few pounds and can actually be dropped into ready packs and easily carried to any location. These small generators typically take little fuel (about a litre) and run for several hours on a fillup. They typically run on gasoline with a very low oil mix. They cannot be used indoors, but are safe to use just outside a building, so it is important to pack an extension cord with the generator. The output is not usually a true sine wave, so care must be taken when using cheap chargers or power supplies with the generator. (A DVM will let you check supply or charger DC output to ensure that it is not unusually high or low.)

Portable generators

A portable generator can be transported in a vehicle and carried by one or two people to where it’s needed. Portable generators range in output from 1000W to 5000W, and typically run on gasoline. They also require 2- or 4-cycle engine oil. Some generators in this range do not output true sine wave, so care must be taken when using cheap chargers or power supplies with the generator. (A DVM will let you check supply or charger DC output to ensure that it is not unusually high or low.)

Fixed generators

Fixed generators are useful when powering equipment at home or at a fixed emergency site (like an EOC). Fixed generators may run on gasoline, oil, propane or natural gas.

HEADSETS

Headsets are essential in most emergency operating locations. Headsets let you function in noisy environments (like a typical EOC) and also reduce the noise that your station generates. By increasing overall comfort, headsets let you operate longer and reduce fatigue.

For use in an automobile, a single earmuff headset is recommended. (Dual-muff headsets may be illegal if worn by the driver.)

For use at an EOC or other busy site, a double earmuff headset is recommended.

For use during shadowing or other highly mobile activities, you may wish to use a more discrete headset, like an in-ear bud or audionic headset.

EQUIPMENT CASES AND CARRY BAGS

You need to be able to transport your equipment to locations where it is needed. If you are a mobile or shadow operator, you'll need to carry equipment with you as you move. Equipment cases and carry bags make transportation and operation easier. Tactical vests make it easier to pack equipment on your person.

Equipment bags or cases should be clean and in good condition. Padding inside the bags or cases will protect your equipment from rough handling. You may wish to use a watertight or weather resistant case for high-value equipment.

TACTICAL AND IDENTIFICATION VESTS

Tactical vests should be comfortable even if worn for hours. Camouflage (camo) vests are NOT recommended; they are not suitable for any ARES deployment. Ideally, wear an ARES tactical vest (which is orange, yellow or green with EMERGENCY COMMUNICATIONS, ECOM, ECOMM or COMM printed on it.

Note: Standardized ARES safety vests can be ordered directly from RAC. See <http://www.rac.ca/fieldorg/aresvests.htm> for more information.



The British Columbia Provincial Emergency Program (PEP) has also designed a vest suitable for ARES use. For more information, see <http://www.cordeoc.ca/CTV-CommunicationsVest-710x533-June-04.htm>.

COMPUTERS

Desktop computers

Desktop computers are not usable in situations where you need to relocate to an emergency site. However, if you are serving from home (for example, as a net controller, liaison or relay station), a desktop computer collocated with your station can be very useful. Ensure that your computer is preconfigured with software you can use for logging, record keeping, and packet communications.

Laptop computers

Laptop computers can be very useful at fixed locations, or where data communications is required. Ensure that spare batteries and the power supply are also packed with the computer itself. Consider using a waterproof case (such as a Pelican case) to ensure protected transport.

Handheld computers

Opinions are mixed on the usefulness of handheld computers (PPCs, Palms, etc.) in emergency contexts. Palm and PPC handhelds are not currently recommended, since they cannot be used easily for packet and data exchange, and are not as suitable as pen and paper forms in mission-critical applications and mixed environments.

SOFTWARE

An important issue is software compatibility and familiarity. Any experienced operator should be able to sit down at your logging terminal or packet terminal and use the most commonly required features.

For packet operations, it is recommended that you have ARESPACK software installed or available. (To find the most recent version of ARESPACK, or equivalent software, search the Internet for “ARESPACK”.)

COMPUTER ACCESSORIES

A number of computer accessories may be useful during an exercise or an emergency event. You do not need all these accessories, but if you have them you should consider including them in your emergency pack.

Network and wireless LAN adapters

If you are stationed at an EOC or other facility with infrastructure, there may be a LAN available, and you should be equipped to connect to it. Make sure you have an Ethernet card or port for your laptop. Also consider bringing an 802 Wifi wireless card, in case a wireless network is used.

Floppy disk drive

A floppy drive is invaluable when you need to trade data with other users at your location (for example, when sending or receiving lists of names by packet at an aid station or shelter).

USB Flash Drive

A USB drive (for example, a USB keychain memory) can be very useful if you are working in an ad-hoc situation with a number of computers.

SPECIALIZED RADIO EQUIPMENT

Cross-band repeaters

Cross-band repeaters are typically mobile VHF/UHF dual-band radios that have a cross-band repeat (CBR) function built into them. The radio receives on a UHF channel and transmits the signal on a VHF channel (or vice versa). These radios can be invaluable during ARES operations.

Simplex repeaters

A simplex repeater is a transceiver that has been configured with a specialized audio module to retransmit any received signals. The simplex repeater records the audio from a received signal on a digital recording chip, and when the signal stops, immediately begins retransmitting that recorded audio on the same frequency (on simplex). This provides a 'dirty', simple way of extending communications range.

A common simplex repeater configuration uses a basic handheld radio with an Icom-compatible mic/speaker jack, and a Realistic simplex repeater (available on clearance from some Radio Shack stores in the US, and from eBay).



The Radio Shack simplex repeater can record up to 30 seconds of audio in a single transmission. It runs on four AA batteries, or on external power.

VEHICLES

With regards to ARES participation, the most important consideration when deciding which automobile to use and equip is reliability. While heavier vehicles (like SUVs or pickup trucks) may seem like attractive choices, they aren't needed for most scenarios. While four-wheel drive vehicles can be invaluable during winter storm emergencies, most cars can be equipped with traction equipment (such as snow chains) to make limited driving possible even in severe conditions. Almost any vehicle capable of getting you to your station or duty location is enough, so long as you can rely on the vehicle to work, and be available, when it's needed.

Remember that having access to a vehicle is not a prerequisite to participating in ARES. If you have restrictions that limit your mobility or prevent you from driving, if you do not own a car, if you share access to the car, or if your car is simply untrustworthy, you're still encouraged to participate. Let your EC know about transport restrictions so that plans can be adjusted accordingly.

Fuel. Vehicles that require diesel fuel may run into problems during an emergency. Access to fuel may be very limited, and the fuel most likely to be available will be regular petrol. If you will be using your diesel-powered vehicle for emergency purposes, try to ensure that the tank is kept filled at regular intervals, and consider storing additional diesel fuel (1-2 tankfuls) at a safe but accessible location.

For petrol-powered vehicles (which will include most cars), fuel may also be an issue, particularly during emergencies that limit mobility (like winter storms) or power outages that disable gas station pumps. It is a good practice in general to keep your tank over half-full at all times, ensuring that you will have at least 200 km of operating range regardless of how much warning you have that an emergency is occurring. Also, keep an empty jerry can in the trunk, to make fuel transfers easier in unusual situations.

Traction. Four-wheel drive vehicles can be invaluable during winter storm emergencies, and if you have a four-wheel drive vehicle you should consider that your primary vehicle for emergency use. However, if you have a regular two-wheel drive car, don't worry. You can take steps to improve your traction and clearance, making it safer to travel during winter emergencies:

- Install proper winter tires (and not all-season tires) in the fall.
- Keep snow chains in the trunk (and learn how to use them).
- Keep sand bags and a snow shovel in the trunk during the winter.

Electrical. Modern inverters can provide 120VAC with fairly high efficiency. It is recommended that you keep a 75 watt (or higher capacity) inverter in your car, in order to operate chargers, laptops or other 120V equipment from your 12V electrical system.

Also have a cigarette lighter splitter (plugging into the cigarette lighter and providing three power plugs instead of one).

If you have a car in which the cigarette lighter power is turned off with the key, consider modifying the circuit to keep power on, or install a second cigarette lighter power plug to allow operation of equipment without having the key in the ignition. See [“Auto power” on page 14.15](#) for more information.

Antennas. Fixed mounted antennas are more reliable than mag-mount antennas. However, if you have a mag-mount antenna available, you should keep it in the car even if you also have a fixed antenna. The mag-mount can be used as an emergency or secondary antenna, either in your car or at an operating site.

In addition to the rubber-duck antenna the operator should carry a "Roll-up half wave antenna with a 15-20 foot coax that can be used as a "throw-up" antenna. A mag-mount with a 1/2 or 5/8 wave whip antenna is good for mobile use. A collapsible "base" type antenna with 25 and 50 foot coax cables can be used in a fixed situation to get the antenna outside and improve signal quality.

Radio mounts. Even if you don't permanently mount radios and other equipment in your vehicle, you may consider installing mounting hardware so that radios can be securely placed in the vehicle when needed, with little or no installation time. You can even use self-adhesive velcro to provide a temporary mount.

Radio equipment. You may wish to include a range of equipment in your vehicle to allow interoperability and flexibility. 2m radio equipment is essential (either in the form of an external antenna and power point for your handheld, or a full-powered mobile installation). Full-powered mobile HF can also be very useful if combined with high-performance 80m and 40m whip antennas.

Other radio gear that you might include for convenience would include a portable 'bagphone' cellular phone (if you already have one for your boat or business), a GRS (CB) transceiver or handheld (or emergency-type kit), a pair of GMRS or FRS handhelds, and a general coverage VHF/UHF scanner.

Comfort items. It is a good idea to stock your vehicle with items that can make you more comfortable in situations where you are required to operate from within the vehicle. Items may include:

- 12v kettle for tea or coffee
- paperback books or magazines for downtime
- candy bars or snack bars (nonperishable)
- wetnaps or washup napkins
- blankets

VHF RADIO CONFIGURATION

Configure your radio so that the following operations are easy for you to perform:

- Access all VHF repeater frequencies in duplex mode
- Access all VHF repeater output frequencies in simplex mode
- Access all VHF simplex frequencies
- Access all packet frequencies (if your station is packet-capable)
- Toggle high and low power output
- Cross-band repeat (if your transceiver is CBR-capable; see [“Cross-band repeating” on page 10.15](#))