

Backpacking with a Pocket-sized *Shortwave* Radio

Bruce Prior N7RR

In the midst of a blizzard in early May 2005, a Pacific Crest Trail thru-hiker named John Donovan disappeared near San Jacinto Peak in California. During his trek, he apparently fell and found himself in Long Canyon¹ with no obvious way to escape. He was alive for some days before expiring. A delayed search for Donovan was soon abandoned. John had no way of communicating his predicament.



Palm Springs Aerial Tramway

A year later, a poorly-equipped Texas couple stumbled across John Donovan's makeshift camp and backpack after days of struggle. Brandon Day and Gina Allen had wandered away from the Mountain Station of the Palm Springs Aerial Tramway and had lost their way with no camping gear or warm clothing. The famished and thirsty Texas couple found matches in Donovan's backpack, enabling Brandon to set a large fire which precipitated their own rescue. John Donovan's body was finally spotted by a helicopter crew eleven days later.²

Imagine taking a trailside lunch break in a remote wilderness far from any internet or cellphone facility, while chatting or texting with somebody across the country or

¹ <https://www.dmagazine.com/publications/d-magazine/2006/december/lost/>

² <http://www.backpacker.com/trips/lost-found>

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on another continent. That is only possible using *shortwave* radio, which is now available to ultralight adventurers. *Shortwave* radio is by far the best option for sending a detailed emergency message from a remote place, even from a deep canyon.³

Modifying the Ten Essentials

The *ten essentials list* has been publicized for years. Here is a modified version:⁴

1. Navigation
2. Sun Protection
3. Insulation
4. Illumination
5. First Aid Supplies
6. Fire
7. Repair Kit and Tools (including knife)
8. Hydration and Nutrition
9. Signaling
10. Emergency Shelter

The modified version combines **hydration** and **nutrition** into #8, and adds **signaling** as Essential #9.

8) Hydration and Nutrition

Emergency food is rarely critical in the short term, so nutrition itself cannot be classed as “essential,” although it is helpful for comfort. Spare water could be a matter of life and death, however. There are many ways of scrimping to minimize a backpack burden, but we should never venture outdoors without an abundance of water and light-weight capacity to carry more, plus the means to treat water of unknown quality.⁵ In frigid conditions, an adequate water supply requires fuel to melt snow with a winter-grade stove. A hydration bladder⁶ can be suspended with a looped cord around a person’s neck and under clothing to stay liquid in extremely cold conditions.

9) Signaling

The *Mountaineers Ten Essentials* list doesn’t include signaling gear and skills, although the *Mountaineering: The Freedom of the Hills* textbook makes a passing reference to “Signaling device: whistle, cell phone, etc.” in a sample equipment list. Start with a *loud pealless whistle*, like the many models marketed by Fox40.⁷ A *signal mirror* is only useful when the sun is shining,⁸ but it can send alerts long distances, including to passing aircraft. Practicing with the mirror in situations where no false alarms are

³ *Shortwave* communication is possible from deep valleys using a phenomenon called *near vertical incidence skywave* (NVIS) propagation. https://en.wikipedia.org/wiki/Near_vertical_incidence_skywave

⁴ adapted from Ronald C. Eng, editor, *Mountaineering: The Freedom of the Hills*, 8th Edition, Seattle: 2010, The Mountaineers, p. 35

⁵ <http://www.backpacker.com/survival/which-water-treatment-is-for-you/>

⁶ <https://www.outdoorgearlab.com/topics/camping-and-hiking/best-hydration-bladder>

⁷ <http://www.fox40world.com/>

⁸ <http://www.rei.com/c/signal-mirrors?r=c&ir=category%3Asignal-mirrors&page=1>

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triggered is essential. An internationally-recognized emergency signal is three or six flashes. A flashing headlamp can also be used for signaling, using a hand for blocking so that three or six flashes are sent in regular sequences.

Emergency *satellite communicators* such as the **SPOT GEN3** personal communicator⁹ or the or the **ACR ARTEX ResQLinkPLB™** or **ResQLinkPLB+™**¹⁰ or the **Garmin inReach SE+ 2-Way Satellite Communicator**¹¹ or the **Garmin inReach Explorer+ Satellite Communicator**¹² could be critical for backcountry adventurers with no technical communications skills. All of those devices require usage fees. It is unlikely that a *satellite communicator* would have worked for John Donovan deep in a canyon, however.

Far and away the most effective backcountry communications facilities are available to licensed radio amateurs, also called ham operators.

Shortwave Radio

Although ham operators often use *Very High Frequency (VHF)* spectrum, which ranges between 30 MHz and 300 MHz, as well as *Ultra High Frequency (UHF)* spectrum between 300 MHz and 3 GHz, most of that activity takes place through terrestrial repeaters, which are usually located on high places for the purpose of re-transmitting signals for stations within line-of-sight of the repeaters. Much of the backcountry, especially in remote lowland areas, is beyond the range of terrestrial Amateur Radio repeaters.

Shortwave radio is also called *high frequency* or *HF* radio. That's between 3 MHz and 30 MHz in the radio spectrum. A special characteristic of *shortwave* radio on planet Earth is that its waves can propagate beyond the horizon – even across continents and oceans – without the use of intervening infrastructure. Those radio waves accomplish that by being bent by an invisible shell surrounding Earth called the *ionosphere* and reflecting back to Earth, spanning distances much longer than line-of-sight. The lower segments of the *shortwave* spectrum propagate most effectively at nighttime, whereas the higher parts do best in the daytime.

Shortwave radio is used for long-distance aviation and maritime communications. There are still a few active private and government *shortwave* broadcast stations. Some government time stations are also available.¹³ Sending broadcast-style information

⁹ <http://findmespot.com/en/>

¹⁰ <https://www.acrartex.com/products/outdoor/>

¹¹ <https://www.rei.com/product/119864/garmin-inreach-se-2-way-satellite-communicator>

¹² <https://buy.garmin.com/en-US/US/p/561269>

¹³ **time frequencies: WWV (male voice), Fort Collins CO AM: 2.5 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz, and sometimes 25 MHz; WWVH (female voice), Kauai HI AM: 2.5 MHz, 5 MHz, 10 MHz and 15 MHz; CHU, Ottawa, Canada USB: 3.33 MHz, 7.85 MHz and 14.67 MHz**

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around the world normally is done these days on cable or satellite TV and on the internet. Are you heading into the remote backcountry or across an ocean? Guess what? No internet!

Shortwave radio still hums with activity, but mostly via non-commercial or **Amateur Radio**, also called **ham radio**. Ham operators worldwide inhabit the *shortwave* spectrum in nine frequency bands. Those nine bands are well spread out within the *shortwave* spectrum, giving hams great flexibility to adapt to changing ionospheric conditions. Nobody should attempt a blue-water ocean voyage in a small vessel without an Amateur Radio license and a *shortwave* transceiver, plus the skills to operate it in difficult conditions.

Common modes used on the *shortwave* spectrum are Morse code telegraphy (CW), single sideband voice (SSB) using either lower sideband (LSB) or upper sideband (USB), slow-scan television (SSTV), also called image, plus various text modes. Hams sometimes use *amplitude* modulation voice (AM) or *frequency* modulation voice (FM), but most voice Amateur Radio operation on *shortwave* frequencies uses SSB, since it is efficient and reliable.

Shortwave Amateur Radio

Here are some general characteristics of the *shortwave* bands which are available to Amateur Radio operators:

80 m band: 3.5 MHz to 4 MHz: CW, text, LSB & AM voice, SSTV – This large band is especially useful for regional communications across a state or province and beyond. There are daily message-traffic and chatting networks which meet on 80 m, mostly using CW and LSB. At nighttime the 80 m band is full of activity.

60 m band: USB, CW and text in 5 channels from 5.3305 MHz through 5.4035 MHz. This limited band is useful for regional communications, like across a state or province. Beginning in 2017, a tiny 15 kHz segment of 60 m became an international Amateur Radio band, so its popularity will likely increase when the Federal Communications Commission authorizes its use in the USA.

40 m band: 7 MHz to 7.3 MHz: CW, text, LSB & AM voice, SSTV – The 40 m band is almost always open for ionospheric communications, night or day.

30 m band: 10.1 MHz to 10.15 MHz CW and text – Amateurs in the USA can use a maximum of 200 W *power* on the small 30 m band, where no voice modes are allowed. Propagation is similar to that on the 40 m band.

20 m band: 14 MHz to 14.35 MHz CW, text, USB & AM voice, SSTV – This band is the most popular Amateur Radio spectrum for long-distance communications. It can be open from before dawn until after dark.

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17 m band: 18.068 MHz to 18.168 MHz CW, text, USB & AM voice, SSTV – Since antennas designed for this band can be relatively short, pedestrian-mobile operation¹⁴ is common on 17 m in daylight. Propagation is similar to that on the 20 m band, but usually during the daytime only.

15 m band: 21 MHz to 21.45 MHz CW, text, USB & AM voice, SSTV – This large daytime band can propagate long distances with low transmitting *power* and there is usually little interfering static noise when it is open. Propagation is seldom marginal. Usually the band is either open or closed for a given path.

12 m band: 24.89 MHz to 24.99 MHz CW, text, USB & AM voice, SSTV – This is a relatively-underutilized Amateur Radio band, but it can be effective for long-distance communications at miniscule *power* levels when it is open for *skywave* propagation.

10 m band: 28 MHz to 29.7 MHz CW, text, FM, USB & AM voice, SSTV – This largest of the *shortwave* Amateur Radio bands is used regularly for local communications and for excellent long-distance communications on the infrequent daytime occasions when the ionosphere allows such propagation. There are a few scattered 10 m FM repeaters available in some regions.

Summits on the Air (SOTA)



Wolfgang Sontag OE2WNL on Asitzkopf in Austria <https://www.qrz.com/lookup>

An increasingly-popular backcountry Amateur Radio activity is called *Summits on the Air*.¹⁵ SOTA provides an excuse for getting outdoors and visiting high places which we may not have known about except through the SOTA program. Let's face it. Amateur Radio is mostly a sedentary pursuit. SOTA is to ham radio like John Denver and Joan Baez have been to popular music: it's literally a breath of fresh air. The program is operational in many countries. Most SOTA summits are hikes rather than technical mountaineering projects. Other SOTA objectives can be accessed using 4-wheel-

¹⁴ <http://www.hfpack.com/>

¹⁵ <http://www.sota.org.uk/>

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drive vehicles. In the USA, many wilderness SOTA summits have no official names except for their elevation in feet and are seldom visited. Talk about solitude!

SOTA *activators* climb qualified summits and set up their ham stations within 25 m elevation of the true summit and contact other ham *chasers* in any other location, including occasionally *activators* on other SOTA summits. A scoring system for SOTA awards points – ranging between 1 point and 10 points – is based on the elevation of the summit, not the difficulty of climbing it. Points are awarded both to *activators* on or near a summit and to *chasers*. An *activator* must contact at least four other stations directly without the use of land-based repeaters in order to earn points.¹⁶ To qualify as a SOTA summit, a mountain must have a topographic prominence¹⁷ of at least 150 m in most regions and 100 m in relatively flat regions. SOTA often offers a 3-point seasonal bonus to activators: it might be during a monsoon or during the winter or during the summer – whenever outdoor operating is especially challenging.

On popular summits, *activators* try to avoid overuse of the summit area by operating away from the actual summit, but still in that chunk of territory within 25 m elevation from the top. Most SOTA *activators* try to adhere to the seven *Leave No Trace*TM outdoor ethics principles.¹⁸

Although some use of technology can enhance our safety and our outdoor experiences, our focus should be the outdoors, not gizmos. Activating SOTA summits is just one more excuse for getting outdoors. Exploring the high country within the limits of our personal abilities is one of the rewards of the SOTA program. We can appreciate new vistas and watch wildlife – always from an appropriate distance so we don't encroach on their space. Heading toward obscure SOTA summits will get us to places where other people seldom go.

Parks on the Air (POTA)

Another outdoor Amateur Radio program is called Parks on the Air (POTA), sponsored by World Wide Flora & Fauna.¹⁹ Subject to local regulations, a ham can operate from anywhere within those places as an *activator*. Hams and unlicensed *shortwave* listeners can become POTA *hunters* by contacting or logging POTA *activators*.

Becoming a Licensed Ham Operator

In order to transmit on Amateur Radio frequencies, a person needs to obtain a license by passing one or more written examinations.²⁰ There are no usage fees for Amateur Radio. There is no citizenship or age requirement to earn an Amateur Radio license

¹⁶ Yes, there are Amateur Radio earth satellites and high-altitude balloons carrying repeater stations which usually receive on one frequency and transmit on another frequency. Those non-terrestrial repeaters may be used for SOTA activities.

¹⁷ https://en.wikipedia.org/wiki/Topographic_prominence

¹⁸ <https://lnt.org/learn/7-principles>

¹⁹ To get started, go to: <https://wwff-kff.com/>.

²⁰ For more information on obtaining an Amateur Radio license in the USA, see:

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in the USA or Canada. In the USA the first license is called Technician Class. Technician hams have limited access to some *shortwave* frequencies, but they also enjoy all Amateur Radio privileges above 50 MHz, where radio signals only rarely propagate far beyond the horizon. Although the examination is not trivial, almost any teenager or adult could pass the Technician exam after a few hours of study.

The mid-level USA amateur license is General Class. A bit more study is needed to pass the General Class exam,²¹ which allows access to all Amateur Radio bands, including *shortwave*, so it is definitely worthwhile for outdoor enthusiasts to attain General Class status.

Passing both the Technician Class and General Class exams is straightforward. There is no need to purchase a textbook or to sign up for an in-person course. Just subscribe to **HamTestOnline**,²² opting for a combination of Technician Class and General Class. Stick with the Study mode option, and the program will guide you through the question pools of both licenses. Passing scores are 74 percent. That's 26 correct answers out of 35 questions for both exams. Once you're scoring hits 80 percent or above on each exam, (28 correct of 35) you're ready to take the exams,²³ which cost \$15 for both exams if they are taken at the same session.

Top-level Amateur Extra Class licensees can operate on any frequency on all Amateur Radio bands. Although sub-teenagers have been known to become Amateur Extra Class hams, passing the Amateur Extra Class exam is quite difficult, about the same challenge as a first-term college course in electrical engineering.

Elecraft KX2: Featherweight 9-Band *Shortwave* Transceiver

Until recently, transceivers which cover the entire Amateur Radio *shortwave* spectrum have been too heavy to qualify for ultralight adventuring, or they have been limited to one or two modes on just a few *shortwave* bands. That situation has changed, big time.

<http://www.arrl.org/licensing-education-training> . For amateur radio licensing in Canada, see: <http://wp.rac.ca/category/uncategorized/begin/begin-2/> . Passing the Canadian Basic exam with a score of 80 percent or higher gives licensees access to all Amateur Radio frequencies. The Canadian Basic exam is about comparable to the USA General Class license exam.

²¹ A good method for preparing for those two exams is to purchase the latest editions of **ARRL's Tech Q&A** book and the **ARRL's General Q&A** book. While studying, online practice quizzes on <http://www.qrz.com/hamtest/> are helpful. A comprehensive online license-preparation system is also available: <https://www.hamradiolicenseexam.com/study.jsp>.

²² <https://www.hamradiolicenseexam.com/>

²³ To find the time and place of an Amateur Radio exam session in your area, go to <http://www.arrl.org/find-an-amateur-radio-license-exam-session> and fill out the online query form.

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(image courtesy of Elecraft® Co.)

Elecraft KX2 Featherweight Transceiver with XCPD2 Morse paddle and MH3 microphone

A well-respected California Amateur Radio manufacturer called Elecraft®²⁴ now produces a pocket-sized transceiver called the KX2 in a featherweight package. It operates with CW, SSB, AM, FM and common text modes²⁵ on all nine *shortwave* Amateur Radio bands from 80 m through 10 m;²⁶ it allows high-quality reception on all *shortwave* frequencies. The FM voice mode was added recently to the KX2 with a new free firmware download, giving operators access to FM repeaters on the 10 m band. The KX2 is so miniaturized that it is available only factory-assembled. The *mass* of a fully-equipped KX2, including rechargeable internal battery, antenna tuner, external microphone, XCPD2 attachable Morse paddle, plus a real-time clock & external devices controller is 626 g (1 lb 6.1 oz). An external battery charger is normally left at home, so its 322 g (11.4 oz) *mass* is not included in a typical backcountry load. Long-distance wilderness travelers could use a DC 9 V ~ 15 V external rechargeable battery pack and a solar charger, plus a voltage regulator.

The KX2 and SOTA were made for each other. The radio produces up to 12 W of transmitting *power* on the 80 m through the 20 m bands and 10 W output on the 17 m through the 10 m bands, which is ample for reliable long-distance or regional communications if the optimal band for the time of day is chosen. The KX2 includes a built-in speaker on the tilted bottom panel. There are some advantages to earbuds or headphones, however. That way, reception is clear and neighboring outdoor enthusiasts and wildlife won't be disturbed. In addition, headphones consume less battery *current* than the internal speaker does.

The high-quality and capable KX2 *shortwave* transceiver is small enough to fit inside a backpacker's trouser side pocket. To protect the radio, most backpacking KX2

²⁴ <http://www.elecraft.com/>

²⁵ Special digital modes and SSTV normally require a governing computer or another external controlling device.

²⁶ As noted above, voice modes are not allowed on the 30 m Amateur Radio band in the USA.

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owners carry the radio inside the backpack unless they choose to operate it hand-held style while in motion. Since the KX2 has a built-in microphone, carrying the external microphone is not necessary for voice operation, saving backpack *bulk* and *mass*.

Most Amateur Radio operation is done for fun — hams chat with other hams whom they may never have seen in person. In an emergency, nothing is better than *shortwave* ham radio for getting a specific message out with information which is useful to first responders.

Generating Morse code

It's possible to produce Morse code on the KX2 with an old-fashioned telegraph key, like those used in railroad telegraph offices in the 19th century or in the radio rooms of 20th century ships or even in the cockpits of old aircraft.²⁷



Telegraph operators frequently retired early, suffering from what we now know as *carpal tunnel syndrome*.²⁸ One of those telegraph keys with a heavy base could easily out-weigh a KX2, so classic Morse telegraph keys are seldom carried into the wilderness.

Most CW operators these days generate Morse code with a much easier method: they use a thumb and a pointer finger to manipulate a small single-lever or dual-lever paddle with lateral back-and-forth motions to send the short dits and the longer dahs of Morse code via an electronic keyer. Such a keyer facility is built into the KX2 at no extra cost. Pushing the paddle gently in one direction produces a short dit or a series of dits; pushing the paddle in the other direction generates one or more longer dahs. Squeezing with both the thumb and the forefinger on a dual-lever paddle produces an alternating series of dits and dahs. The result is like the difference between handwriting and key-boarding. Except for signals sent by exceptionally-expert operators, Morse code produced by a straight manual telegraph key is often harder to interpret on the receiving end than Morse which is generated by an electronic keyer.

A low-profile optional Morse dual-lever paddle, Elecraft® model **KXPD2**, is designed to mount on the front panel of the KX2. The radio itself therefore serves as a stabilizing base for the paddle, saving considerable weight which a separate base would entail. Excellent-quality dual-lever and single-lever portable paddles made in northern

²⁷ https://en.wikipedia.org/wiki/Telegraph_key

²⁸ https://en.wikipedia.org/wiki/Carpal_tunnel_syndrome

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Italy can be mounted on the KX2 with a special adapter.²⁹ Two American manufacturers, **American Morse Equipment**³⁰ and **NØSA**³¹, make low-mass single-lever and dual-lever Morse keyer paddles which are appropriate for ultralight backpackers. The most economical paddles for the KX2 are rudimentary designs made by **QRPguys**, including the single-lever³² and dual lever³³ versions.

Text Modes

The KX2 adds another twist. By switching modes, that same Morse code keying paddle can produce three different text modes: radio teletype or RTTY,³⁴ PSK31,³⁵ and PSK63,³⁶ which on the receiving end are usually displayed on a computer screen. PSK31 is especially convenient and robust. Messages in that mode often will propagate reliably via the ionosphere when other modes cannot, including CW. Sometimes a PSK31 signal even can be decoded when our ears hear nothing! On the KX2, as CW or text signals are sent or received, the words scroll across the large display, which takes up about half of the space on the top of the KX2. CW or those three text modes can be sent or received with the KX2 from inside a wilderness tent, on a small sailboat, on top of an airy mountain summit, or even while walking on a trail, without an external computer. In order to transmit using a text mode or CW with the KX2 alone, the operator normally must be familiar with Morse code. There is no Morse code requirement to obtain an Amateur Radio license, but learning Morse is useful, since CW is still commonly used by hams, including many SOTA **activators**, on the *shortwave* bands. If done right, learning Morse code is straightforward.³⁷ It's like learning a second language, but much easier. Children often think of Morse code as a fun game akin to learning a "secret language."

For operating at a home station, there is another way, however. A free computer program may be downloaded from Elecraft, called the **KX2 Utility**, which may be used to display CW, RTTY, PSK31 or PSK63 text. The currently-received text and a large buffer of recently sent or received text may be read on the Terminal window of the KX2 Utility. It is possible that way to carry on Morse code conversations without any aural Morse code skills! CW text may be read on the KX2 display, but in order to send it, either a computer keyboard or a Morse paddle is needed. See the end of this article for a way to send and receive Morse code and text modes in the wilderness on the KX2 without knowing Morse.

²⁹ See <http://www.i2rtf.com/adventure-dual.html> and <http://www.i2rtf.com/adventure-mono.html>.

³⁰ <http://americanmorse.com/>

³¹ Larry Naumann NØSA has no website. For an online brochure about NØSA paddles, send an email to n0sa@att.net.

³² <https://qrpguys.com/kx-single-lever-paddle-kit>

³³ <https://qrpguys.com/kx-iambic-mini-paddle-kit>

³⁴ <https://en.wikipedia.org/wiki/Radioteletype>

³⁵ <https://en.wikipedia.org/wiki/PSK31>

³⁶ <https://en.wikipedia.org/wiki/PSK63>

³⁷ <http://www.arrl.org/files/file/Morse/Learning%20Morse%20Effectively-Prior-N7RR.pdf>

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Minimizing Antenna Weight

An optional built-in **antenna tuner** for the KX2, called the **KXAT2**, weighing only 152 g (5.4 oz), makes it practical to use simple wire antennas with the KX2 on all *shortwave* bands, considerably decreasing backpacking *mass* which multiple antennas would require if separate resonant antennas were employed for each of the nine *shortwave* ham bands without a tuner. With a wavelength almost as long as an American football field, the biggest disadvantage of the 80 m band is that the most effective operation without an antenna tuner requires a fairly lengthy antenna, almost 40 m or a half-wavelength long. If very thin-gauge but strong copper-covered insulated steel wire is used,³⁸ even a lengthy antenna is light enough for ultralight backpackers to carry. However, if an antenna tuner is employed, a considerably shorter non-resonant antenna can be deployed.



With the addition of a simple BNC-to-dual-post adapter, a 58-foot (17.7 m) wire lobbed over a high tree branch, plus a shorter counterpoise 13.1-foot (3.99 m) wire placed on the ground, the KX2 equipped with the internal antenna tuner will transmit or receive efficiently across the entire *shortwave* Amateur Radio spectrum from the lower end of the 80 m band to the top end of the 10 m band.

With its 12 W output, the KX2 is capable of intercontinental communications using that rudimentary antenna system. For transmitting on the 80 m or 60 m bands where the antenna cannot be launched high above the ground, either a longer radiator wire (say, 74 feet [22.55 m] with a 17 ft [5.18 m] counterpoise) or a half-wavelength dipole antenna works better.³⁹

The antenna should be tied to a non-conductive cord so that it can be fastened to a rock or fishing weight to be lobbed over a tree branch David-sling style. A good knot to tie around a fist-sized rock is the scaffold knot.⁴⁰ The cord should be relatively long to minimize interaction of the antenna to the supporting tree, creating losses in the antenna. Thicker trees and denser forests produce greater losses.⁴¹

³⁸ <https://thewireman.com/antennap.html>

³⁹ The 80 m and 60 m bands are especially good for Near Vertical Incidence Shortwave (NVIS) propagation, enhancing operations at relatively short distances, but still beyond line of sight. For enhanced NVIS operating, the antenna works better when it is parallel to and relatively close to the ground.

⁴⁰ <https://www.youtube.com/watch?v=QPI8jSDc3I>

⁴¹ See Kai Siwiak KE4PT and Richard Quick W4RQ, "Live Trees Affect Antenna Performance," *QST* February 2018, pp. 33-37.

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KX2 Bottom Line

The basic 296 g (10.44 oz) KX2 can be purchased for \$749.95 plus shipping. A removable KXBT2 battery pack costs \$59.95 (plus \$24.95 for an external KXBC2 charger) for an additional 152 g (5.4 oz). Most KX2 owners will pay another \$179.95 for the optional 152 g (5.4 oz) KXAT2 internal antenna tuner. Some also may want to buy another module, the 4 g (0.14 oz) KXIO2 real-time clock module for \$69.95, which includes a circuit for controlling two external electronic devices. A 146 g (5.15 oz) MH3 external microphone with *frequency* up and *frequency* down buttons costs \$59.95. The 28 g (0.98 oz) KXPD2 keyer paddle costs \$109.95.⁴²

The KX2 allows mountaineers or long-trail thru-hikers or cross-country cyclists or sailors to communicate from remote places anywhere on earth or at sea to almost any other places via ham radio. The only condition is that the operator must be qualified as a licensed radio amateur. At just over one pound with all internal options, the KX2 will fit into any ultralight backpacker's weight budget. Had John Donovan been carrying a KX2, he almost certainly would have been rescued from that California canyon.⁴³

No Morse code Option

By itself, the KX2 requires skill in the Morse code for operators to use CW or the PSK31, PSK63 and RTTY text modes. Now there is an opportunity for licensed operators in remote locations to use those modes without any knowledge of Morse code. The *QRPworks*⁴⁴ company manufactures a 40-character 140 g (4.9 oz) accessory unit for the KX2 transceiver called the *SideKar*TM and a larger 80-character 255 g (9 oz) *SideKar Plus*TM which allow transmission and reception of those modes without a Morse code paddle.

⁴² Prices exclude shipping charges and sales tax for California residents.

⁴³ The KX2 was not available in 2005. The only lightweight Amateur Radio *shortwave* transceivers on the market then were frequency limited, and mostly CW only.

⁴⁴ <http://www.qrpworks.com/sidekar.html>

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SideKar Plus™ mounted on a KX2 transceiver

The *SideKar*™ is sold with either of two different keyboards for \$289 plus shipping. The *SideKar Plus*™ with either keyboard costs \$309 plus shipping.



SideKar™ with Slim Wireless Keyboard

(images courtesy of QRPworks.com)

The Compact Wireless Keyboard is 71 g (2.5 oz), whereas the Slim Wireless Keyboard is 213 g (7.5 oz) and takes up more room in a backpack. Some operators may choose to buy both keyboards so that they can use the larger one at home and the

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smaller one in the wilderness. The *SideKar*[™] and the *SideKar Plus*[™] also do automatic contact record keeping and have room for 20 @ 80-character text or macro memories. That's a lot of computing power in such a tiny box.

A more economical kit product called the *KX-QRP 2nd LOOK*⁴⁵ displays 80-characters in two lines.

Technician-Class Licensees on *Shortwave*

It's much better to study a bit more and earn a General Class Amateur Radio license. However, Technician hams in the USA have some access to *shortwave* radio. With the KX2 plus the *SideKar*[™] or the *SideKar Plus*[™], Technician hams can operate CW on some *shortwave* frequencies without knowing Morse code. They are allowed CW-only *shortwave* transmitting on three bands: 80 m, 40 m and 15 m, plus CW, text, and SSB voice on the 10 m band. The American Radio Relay League has proposed expanded text and voice spectrum for Technician-class hams on the 80 m, 40 m and 15 m bands. We are awaiting a response from the Federal Communications Commission.

⁴⁵ <http://www.k8zt.com/2ndlook>