

“60 Meter“ Band Info and frequencies

Updated May 2012

Amateur Tuning (“Dial”) Frequency USB Only!
5330.5 kHz
5346.5 kHz
5357.0 kHz
5371.5 kHz
5403.5 kHz

FCC Releases New Rules for 60 Meters

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On November 18, the FCC released a Report and Order (R&O), defining new rules for the 60 meter (5 MHz) band. These rules are in response to a Petition for Rulemaking (PRM) filed by the ARRL more than five years ago and a June 2010 Notice of Proposed Rulemaking (NPRM). In the R&O, the FCC replaced one of the channels in the band, increased the maximum authorized power amateur stations may transmit in this band and authorized amateur stations to transmit three additional emission designators in the five channels in the 5330.6-5406.4 kHz band (60 meters).

The Amateur Radio Service in the United States has a secondary allocation on 60 meters. Only those amateurs who hold General, Advanced or Amateur Extra class licenses may operate on this band. Amateur stations must not cause harmful interference to -- and must accept interference from -- stations authorized by any administration in the fixed service, as well as mobile (except aeronautical mobile) stations authorized by the administrations of other countries.

Here is a summary of the changes. Please note that these changes have not yet taken effect. These new rules will take effect 30 days after they are published in the Federal Register. The ARRL will announce on its website when the rules are published.

- The frequency 5368.0 kHz (carrier frequency 5366.5 kHz) is withdrawn and a new frequency of 5358.5 kHz (**carrier frequency 5357.0 kHz**) is authorized.
- The effective radiated power limit in the 60 meter band is raised by 3 dB, from 50W PEP to 100 W PEP, relative to a half-wave dipole. If another type of antenna is used, the station licensee must maintain a record of either the antenna manufacturer's data on the antenna gain or calculations of the antenna gain.
- Three additional emission types are authorized. Data (emission designator 2K80J2D, for example, PACTOR-III), RTTY (emission designator 60H0J2B, for example, PSK31) and CW (150HA1A, i.e. Morse telegraphy by means of on-off keying). For CW, the carrier frequency must be set to the center frequency. For data and RTTY the requirement to transmit "only on the five center frequencies specified" may be met by using the same practice as on USB, i.e. by setting the suppressed carrier frequency of the USB transmitter used to generate the J2D or J2B emission to the carrier frequency that is 1.5 kHz below the center frequency.

Automatic control on data and RTTY is not permitted; a control operator must be in a position to exercise either local or remote control over the transmitter. The FCC noted that "amateur operators must exercise care to limit the length of transmissions so as to avoid causing harmful interference to Federal stations." This is a very important caveat: If a Federal station requires amateurs to cease using a frequency, the amateur station must be able to do so without delay.

A reasonable person might wonder what the difference is between data and RTTY. According to former ARRL Chief Technology Officer Paul Rinaldo, W4RI, there used to be a difference, but there's not much of one today. "Years ago, a B designator telegraphy for automatic reception [i.e. narrow-band direct-printing telegraphy missions] meant decoding and display on a teletypewriter (TTY) or other mechanical machine," he explained. "A D designator signified transmission of data, telemetry or elecommand intended for data processing or just storage for possible future use. When computers or computer-like devices were introduced to emulate RTTY transmission and/or reception, the line between telegraphy and data transmission blurred to the point of little or no practical distinction."

PACTOR-III and PSK31 are cited in the new rules as examples of data and RTTY emissions, respectively, that will be authorized; however, in paragraph 28 of the R&O, the Commission states that amateur stations will be permitted to use "any unspecified digital code, subject to the requirements of Section 97.309(b)." Therefore, as a practical matter it appears that any J2D data emission is to be permitted up to a bandwidth of 2.8 kHz, provided that care is exercised to limit the length of transmissions.

Amateur Radio and the 60 Meter Band

The 60 meter band is part of the larger 5.060-5.450 MHz band, which is a federal/non-federal shared band that is allocated to the fixed service on a primary basis and to the mobile (except aeronautical mobile service) on a secondary basis. The 5.060-5.450 MHz band is primarily used by federal agencies for ship-to-shore and fixed point-to-point communications. Non-federal use of the 5060-5450 kHz band includes state government licensees and licensees in the Industrial/Business Pool that operate standby and/or backup communication circuits for use during emergency and/or disaster situations, entities prospecting for petroleum and natural gas or distributing electric power, coast stations and aeronautical fixed stations.

The Commission added the Amateur Radio Service as a secondary allocation after determining that such frequencies could be useful to the Amateur Radio community for completing disaster communications links at times when existing frequencies in the 3.500-4.000 MHz (80 and 75 meter) and 7.000-7.300 MHz (40 meter) bands are not available due to ionospheric conditions. It concluded that such an allocation represented the best compromise available to give the amateur service access to new spectrum while assuring the federal government agencies that their use is protected.

At the request of the National Telecommunications and Information Administration (NTIA), the Commission restricted amateur stations operating on the five channels in the 60 meter band to upper sideband (USB) voice transmissions (phone emission 2K80J3E), and to a maximum effective radiated power (ERP) of 50 W peak envelope power (PEP). The Commission adopted these operating restrictions to decrease the interference potential between amateur stations and federal stations.

In October 2006, the ARRL filed a Petition for Rulemaking with the FCC, requesting that the Commission amend Parts 2 and 97 of its Rules to replace one of the allocated center frequencies (5368 kHz) with a less encumbered frequency (5358.5 kHz), to increase the maximum ERP from 50 to 100 W PEP and to authorize the use of additional emissions types, limited to emission designators 150HA1A, 60H0J2B and 2K80J2D. In its Petition, the ARRL pointed out that its proposals were designed to facilitate more efficient and effective use of the secondary Amateur Radio Service allocation in the 60 meter band. As part of its petition, the ARRL attached a letter from NTIA, indicating that it would “look favorably” on the ARRL’s proposed modifications.

60-Meters Frequently Asked Questions (courtesy of ARRL website)

In May, 2003, a long-awaited FCC *Report and Order (R&O)* in ET Docket 02-98 granted US amateurs secondary access to five discrete channels in the vicinity of 5 MHz. The

atypical amateur allocation becomes available to US amateurs at midnight (12 AM) local time on July 3, 2003. The limited spectrum and stringent operating requirements will mean amateurs will have to demonstrate their best behavior and operating skills if the Amateur Service ever hopes to get an actual band segment at 60 meters.

As ARRL CEO David Sumner, K1ZZ, put it: "In terms of Amateur Radio spectrum, we usually say, 'Use it or lose it.' The watchword for 60-meter operators should be, '*Misuse it and lose it.*'" Sumner predicted that, over time, amateurs "will develop a record of disciplined, responsible use of the five channels in the public interest that will justify another look at these rather severe initial restrictions."

The FCC grant followed a period of experimental operation on 5 MHz under the WA2XSY Part 5 license granted to ARRL. The channelized scheme is similar to the 5-MHz experimental operation under way in the [United Kingdom](#). The FCC granted amateurs access to channels centered on 5332, 5348, 5368, 5373, and 5405 kHz. The last channel is common to the UK amateur 5-MHz experimental band plan. Who will be the first to log a transatlantic QSO with the UK or a DX QSO with Hawaii or one of the US Pacific territories on 60 meters?

This new allocation presents some new twists in amateur HF operation as well as some unfamiliar technical demands. The channelized format was the result of a compromise between the National Telecommunications and Information Agency (NTIA), which administers spectrum occupied by government users--the band's primary occupants--and the FCC. The channels will be available to General and higher class licensees.

Amateurs may operate upper-sideband voice (emission 2K8J3E) at a maximum of 50 W effective radiated power (ERP) and an audio bandwidth not exceeding 2.8 kHz. The operating rules, which amount to fewer than 170 words, are spelled out in §97.303(s), Frequency sharing requirements (see sidebar, "[What the FCC Rules Say: §97.303\(s\).](#)")

The following frequently asked questions are based on actual inquiries from ARRL members regarding the new 5-MHz/60-meter allocation. This FAQ will be updated as new information becomes available.

1. [How come the FCC gave us channels instead of a band?](#)
2. [How can I be sure I'm within the specified channel allocation?](#)
3. [How can I be sure I don't exceed the power limit?](#)
4. [Why won't the FCC let us operate CW or PSK31? Narrowband modes like these seem ideal for the new channels.](#)
5. [But if USB is the only permissible emission, how can hams "tune up" on 5 MHz? That might mean putting out a carrier.](#)
6. [Should I operate on 60 meters? If I do, what type of operating should I expect?](#)
7. [What is a domestic, secondary allocation?](#)

8. [What should I do if someone comes on the air and tells me to leave the frequency?](#)
 9. [How can I modify my transceiver to operate on these channels?](#)
 10. [But isn't it illegal to modify my ham gear?](#)
 11. [Can I call CQ on 60 meters?](#)
 12. [Where can I find more information?](#)
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1. How come the FCC gave us channels instead of a band?

The National Telecommunications and Information Administration (NTIA), which administers spectrum regulated by the federal government, raised eleventh-hour opposition to ARRL's request and the FCC's proposal that would have given amateurs a 150-kHz wide band at 5 MHz (5250 to 5400 kHz). The NTIA's opposition, expressed after the period for comments already had expired, cited ongoing spectrum requirements of federal government licensees having homeland security responsibilities. Following some give and take between the FCC and the NTIA, the latter agency reviewed its assignments in the vicinity of 5 MHz and found five channels that were "lightly used" that it felt it could share. Contrary to speculation elsewhere, the channels are no harbinger of a new trend in Amateur Radio allocations in general. This is a special case.

[Back to questions](#)

2. How can I be sure I'm within the specified channel allocation?

There are two concerns here. One is your suppressed carrier radio frequency and the other is your audio frequency bandwidth. There's apparently some confusion between the two as they involve using these new channels. The channels the FCC has allocated for the Amateur Service in its *R&O* are 5332, 5348, 5368, 5373 and 5405 kHz. These are *channel-center* frequencies, *not* the ones you'd tune your radio to. The NTIA has told the FCC that hams "must assure that their signal is transmitted on the channel-center frequency." This means the amateur signal must be centered within the 2.8-kHz-wide channel.

The FCC has provided scant guidance beyond suggesting--in a footnote that follows the NTIA's advice--that amateurs tune 1.5 kHz *below* the center-channel frequencies to be "on channel." Amateurs will need to be sure that the tuning display readout reflects transmitted (ie, carrier) frequency (most do). Consult your transceiver's manual if you're not sure.

This chart from the NTIA suggests appropriate tuning frequencies for each center-channel frequency:

Channel Center	Amateur Tuning ("Dial") Frequency
5332 kHz	5330.5 kHz
5348 kHz	5346.5 kHz
5358.5 kHz	5357.0 kHz
5373 kHz	5371.5 kHz
5405 kHz (common US/UK)	5403.5 kHz

Following this chart will ensure that you are within the channel if your radio has a lower audio bandpass of 100 Hz or higher--which should apply to most commercial amateur transmitters/transceivers. The FCC expects your "occupied bandwidth" to be within the 2.8 kHz channel. This means--assuming a --1.5 kHz suppressed-carrier offset--you must keep your *audio* bandwidth between 100 Hz and 2900 Hz (2.9 kHz) to ensure that you do not go outside the 2.8 kHz channel. Most modern transceivers default to an SSB bandwidth in this range, but some are capable of bandwidths on SSB of 3.0 kHz or greater.

ARRL Laboratory Manager Ed Hare, W1RFI, believes prudence calls for ensuring that your low-end ("bass") audio sharply attenuates below 200 Hz while your high-end ("treble") audio sharply attenuates above 2800 Hz. This yields an occupied bandwidth of 2.6 kHz, well within the channel limits. Hare explains that most transceivers roll off low-end audio at 100 to 200 Hz, so if the suppressed carrier is 100 Hz below the channel, the occupied bandwidth will fit neatly within the 2.8-kHz channel. You'd probably be well advised to keep your audio processor at a minimal setting if you use one at all.

Some newer transceivers permit users to "tailor" transmitted audio response to boost or roll off on the high and low ends. If yours does, rolling off the extreme low-frequency and high-frequency audio and following the tuning scheme suggested by the NTIA should keep you within the channel. Sometimes a simple choice of microphone element might be all that's needed too.

Amateurs also need to take into consideration any third-order (or higher) intermodulation distortion (IMD) products. These can affect your overall transmitted bandwidth. Radios that exhibit poor or marginal IMD characteristics are the ones that cause "splatter" on the bands. (ARRL tests and presents graphs of worst-case IMD in all MF/HF transceiver "[Product Review](#)" columns in *QST*.)

You might ask someone with a quality "band scope" or--far less common but more definitive--a spectrum analyzer, to measure your actual transmitted audio bandwidth.

A PSK31 software "waterfall" display can make a simple and handy tool to help determine your radio's transmitted AF response curve. Generating a PSK31 signal into a dummy load, set your PEP output at a convenient power level--say 10 W--in the center frequency of the waterfall display. Then note how far on either side of center you can transmit before your output power drops off significantly. The waterfall should display at least 3 kHz of spectrum. If you're able to measure your PEP accurately, you should be able to gauge your transmitter's audio passband by using a little math.

The FCC defines "bandwidth" in §97.3(a)(8): "The width of a frequency band outside of which the mean power of the transmitted signal is attenuated at least 26 dB below the mean power of the transmitted signal within the band."

Doug Smith, KF6DX, has posted some useful information, "[How to Transmit Legally on the New 60-m Band](#)" on his Douglas T. Smith Editorial Services Web site that discusses bandwidth issues in greater detail.

The bottom line on audio bandwidth: Consult your transceiver's operating manual or manufacturer for information on its typical USB transmitted audio bandwidth. If you have any doubts about your transceiver's audio bandwidth or its ability to maintain your signal within a given channel, you should seriously consider *not operating* on this allocation until you can ascertain your radio's performance with a reasonable degree of certainty. ARRL will provide information on specific transceivers as it becomes available.

[Back to questions](#)

What the FCC Rules Say: §97.303(s)

An amateur station having an operator holding a General, Advanced or Amateur Extra Class license may only transmit single sideband, suppressed-carrier (emission type 2K8J3E) upper sideband on the channels 5332 kHz, 5348 kHz, 5368 kHz, 5373 kHz and 5405 kHz. Amateur operators shall ensure that their transmission occupies only the 2.8 kHz centered around each of these frequencies. Transmissions shall not exceed an effective radiated power (ERP) of 50 W PEP. For the purpose of computing ERP, the transmitter PEP will be multiplied with the antenna gain relative to a dipole or the equivalent calculation in decibels. A half-wave dipole antenna will be presumed to have a gain of 0 dBd. Licensees using other antennas must maintain in their station records either manufacturer data on the antenna gain or calculations of the antenna gain. No amateur station shall cause harmful interference to stations authorized in the mobile and fixed services; nor is any amateur station protected from interference due to the operation of any such station.

3. How can I be sure I don't exceed the power limit?

The FCC has said hams may run 100 W effective radiated power (ERP) on the five 60-meter channels. The new rules say, "For the purpose of computing ERP, the transmitter

PEP (peak envelope power) will be multiplied by the antenna gain relative to a dipole or the equivalent calculation in decibels. A half-wave dipole antenna will be presumed to have a gain of 0 dBd." This means if you use a half-wave dipole (about 87 feet 3 inches for the "middle" channel according to the formula), set your transmitter's power output power for 50 W PEP (many transceivers' meters can be set to indicate peaks), and you should be in compliance. The FCC asks licensees using antennas other than half-wave dipoles to "maintain in their station records either manufacturer data on the antenna gain or calculations of the antenna gain." This is a new record-keeping requirement for amateurs.

The "best" antenna configurations will be those with a proven track record on the lower bands, keeping in mind that using a loop or an array of some kind will require you to "do the math" to ensure you are not radiating more than 50 W ERP *in any direction*. The math is fairly straightforward. You must reduce your power by the number of decibels your antenna gain exceeds 0 dBd (0 dB relative to a half-wave dipole). Conversely, you can increase your transmitter power if your antenna exhibits loss compared to a dipole. Be prepared to document these situations in your station records, however.

[Back to questions](#)

4. Why won't the FCC let us operate CW or PSK31? Narrowband modes like these seem ideal for the new channels.

True as that may be, the FCC followed the NTIA's lead in permitting only upper-sideband (USB) voice and no other modes. In fact, 60 meters is the first generally available ham radio allocation that does not permit CW and the first below 20 meters where LSB is not the convention! While there has been no further explanation, ARRL believes the USB requirement stems from the fact that it's the voice mode federal government stations are most likely to employ, thus permitting some degree of interoperability between primary and secondary users. At the very least, the use of a common mode lets federal government users readily identify amateur stations as necessary.

[Back to questions](#)

5. But if USB is the only permissible emission, how can hams "tune up" on 5 MHz? That might mean putting out a carrier.

Good question! As noted already, the only permissible emission is USB voice. A dummy load would be the device of choice for "tuning up" on 5 MHz, especially since many users will be attempting to transmit on a channel that's already got some activity on it (you wouldn't "tune up" on the local repeater input, would you?). Amateurs on 60 meters also might want to gain skill at using receiver noise or other signals to adjust an antenna tuner before transmitting. Most automatic tuners do require briefly transmitting a small amount of carrier over the air. Not recommended but probably legal (as long as you're not interfering with other stations) would be the tried and true "whistling" or "helllllooooo" methods.

[Back to questions](#)

6. Should I operate on 60 meters? If I do, what type of operating should I expect?

The decision to operate on 60 meters is, of course, up to the individual licensee. As ARRL CEO David Sumner, K1ZZ, put it in his July 2003 *QST* "[It Seems to Us . . .](#)" editorial, "If we demonstrate that we can use [the 60-meter channels] responsibly, cooperatively and in the public interest, there is no reason we cannot seek expanded access at an appropriate time. If your personal operating practices are inconsistent with that, please do yourself and everyone else a favor and confine your operating to the traditional bands."

We'd further suggest that if you own an older transceiver or transmitter that's modifiable but has an analog dial and a tendency to drift that you also avoid trying to operate on these channels--especially given the technical guidelines.

To be sure, a lot of operators will want to test the waters once the new band opens, just to say they've been on there and maybe to collect a QSL card or two to prove it. Initial activity likely will be high. But given the limited spectrum, it may not be the best allocation on which to start up an extended ragchewing session, indulge in long-winded transmissions or even to call CQ. ARRL anticipates that 5-MHz channelized operation will come to resemble repeater operation. Stations might be expected to break in to join a QSO in progress or grab a signal report and, rather than calling CQ, they'll just announce that they're "monitoring" a particular channel (assuming that it's not already busy).

The 5 MHz channels also might provide the best propagation in the event of a Caribbean storm or other disaster, when stations need to establish needed longer-range HF emergency communications links. As the FCC *R&O* states, "We believe that frequencies in the 5250-5400 kHz range may be useful for completing disaster communications links at times when the 3 [sic] and 7 MHz bands are not available due to ionospheric conditions, and [we] appreciate the desire of the amateur radio community to assist with disaster communications." Until now, emergency nets often have had to switch off between 40 meters during the day and 75 meters at night. Of course, in the event of an emergency situation, amateurs should avoid channels carrying emergency-related traffic.

[Back to questions](#)

7. What is a domestic, secondary allocation?

Whether or not you consider the five channels a "band" or not, the FCC has stipulated that our 5 MHz channels constitute a domestic allocation; it is not available worldwide (that would have to be determined at a World Radiocommunication Conference, and 5 MHz was not on the agenda for WRC-03). We're considered secondary because other users--primarily federal government stations--are primary. The most important thing is that, as secondary users, amateurs must yield to--and refrain from interfering with--primary users at all times. Giving us specific channels was one way to minimize the probability that hams might run afoul of critical government users .

Internationally, the band 5250 to 5400 is allocated on a primary basis to the Fixed Service and on a secondary basis to the Mobile Service, except aeronautical mobile stations. In

the US, the band's occupants include FCC Part 80 (Maritime) Part 87 (Aviation) and Part 90 (Private Land Mobile). Many specific government allocations are confidential.

[Back to questions](#)

8. What should I do if someone comes on the air and tells me to leave the frequency?

The short answer: Stop transmitting! Assume the request is legitimate, vacate the channel promptly and ask questions later (off the air). Such government stations conceivably could include, for example, a US Coast Guard vessel running low power into a small antenna. While it's unlikely that federal government stations ever would ask amateurs over the air to vacate a channel, it's better to play it safe, since it's their band, and we're secondary users.

[Back to questions](#)

9. How can I modify my transceiver to operate on these channels?

Different radios that were not originally designed to transmit at 5 MHz will require different modifications. If you're the owner of some of a late-model Ten-Tec transceiver, you are fortunate indeed. Ten-Tec announced in June that it would have 5-MHz firmware upgrades in place for its Pegasus, Jupiter, Orion and Argonaut V Amateur Radio transceivers via its [Firmware Update](#) Web site prior to the band's opening date to allow these rigs to be used on 60 meters. These upgrades are now available for downloading. Ten-Tec says it plans no hardware modifications to provide 5 MHz capability for older Ten-Tec transceivers at this time.

SGC has published a Web page on [60-meter operation with SGC equipment](#). The page includes information on modifying the SGC SG-2020 to allow transmission from 1.8 to 29.7 MHz, as well as notes regarding the use of the SG-2000 and STEALTH kit antenna on 5 MHz frequencies.

Elecraft is developing a new optional board, part K60XV, which provides 60-meter operation for their K2 model transceiver. However, they have also published an *experimental* modification to allow transceivers without the option to operate on 60 meters. For complete details, refer to their Web page, [Putting the K2 on 60 Meters](#).

ICOM America's Technical Support Department issued a statement by email: "At this time, there are no modifications or upgrades to any ICOM radio to allow operation on 60 meters."

Kenwood Communications Technical Support department was contacted via telephone, and they similarly stated, "There are no modifications available for existing radios to enable coverage of the 60-meter amateur band."

Likewise, Alinco's US distributor, ATOC Amateur Distributing, told the ARRL Lab, "Alinco has not released any modification information to enable 60-meter operation on their HF transceivers."

Vertex Standard (Yaesu) has told ARRL that it wants guidance from the FCC on whether it has concerns over the notion of "frequency agile" transmitters in the band and the expected degree of frequency tolerance [the rules are silent on the topic of frequency tolerance.--*Ed*]. "When these and other questions are answered by FCC and NTIA, Vertex Standard will be pleased to assist the amateur community in the most expeditious way possible in enabling transmit coverage of this new band," a Vertex Standard spokesperson said.

Yaesu's current policies regarding 60-meter modifications include the following:

- No modification kits or modification information will be available for very old sets, such as the FT-101, FT-301, FT-901, FT-757, FT-767 and FT-980. Yaesu notes that the FT-101, FT-101ZD and FT-901 service manuals do contain "some information," but notes that some transceivers of that vintage use a 5.0-5.5 MHz VFO. "So, this really is not a good situation," the spokesperson advised.
- Vertex Standard will not release "general coverage" information to help Yaesu transceiver owners modify their sets for 5 MHz operation.
- Vertex Standard is awaiting word regarding current production models.
- The company cautions users of the FT-1000MP, Mark-V and Field not to set the EDSP modulation up for 100-3100 Hz operation on 5 MHz, since the bandwidth is restricted to a maximum of 2.8 kHz.

Most modifications will "open up" your transceiver and permit it to transmit throughout the HF spectrum, so caution is in order. Some modifications involve nothing more complicated than clipping a diode or wire. There is no certainty, however, that a modified rig will meet FCC requirements for harmonics and other spurious emissions on all frequencies, so hams must either thoroughly check the post-modification performance of their equipment or wait for modification information that the manufacturer has validated.

To provide some insight on the issues that hams need to be aware of, the ARRL Lab has performed some transmitter performance testing on a selection of modified transceivers. The report of the results of this testing can be found on the ARRL Technical Information Service [60-Meter Mods](#) Web page.

A listing of modification resources available via the Internet may be found on the [AC6V Radio Modifications](#) Web site. ARRL neither endorses nor warrants these or any similar modifications in any way. All licensees have the obligation to determine whether their equipment is operating properly on 5 MHz and all other amateur allocations).

[Back to questions](#)

10. But isn't it illegal to modify my ham gear?

In a word, no. While you might void the warranty on a newer piece of gear if you decide to modify it for 60 meters--and this *may* be true even if the manufacturer provides the modification information--it's legal to modify, then use, your radio in the Amateur

Service, since FCC certification is not required. In general, however, it is illegal to use a modified radio *outside* Amateur Service allocations without the require license and FCC-certificated equipment.

[Back to questions](#)

11. Can I call CQ on 60 meters?

There is nothing wrong or illegal with calling CQ on 60 meters, but given the limited spectrum, it may not be the best allocation on which to start up an extended ragchewing session or indulge in long-winded transmissions. Since the channels are narrow, it may be best to simply drop in your call sign or maybe issue a very short CQ if the channel appears relatively quiet.

[Back to questions](#)

12. Where can I find more information?

Several news stories about the 5-MHz grant have been posted on the ARRL Web site "news crawl" and appeared in *The ARRL Letter*. Also see the July *QST* "[It Seems to Us . . .](#)" editorial. The [FCC Report and Order in ET Docket 02-98](#) is available on the FCC's Web site. ARRL Members may address specific technical questions to the ARRL Technical Information Service (TIS) via e-mail, tis@arrl.org, or non-technical, regulator questions to reginfo@arrl.org.

[Back to questions](#)

This FAQ was prepared by ARRL Laboratory Manager [Ed Hare, WIRFI](#), and ARRL Senior News Editor [Rick Lindquist, N1RL](#), with assistance from ARRL Regulatory Information Specialist [John Hennessee, N1KB](#), and ARRL Assistant News Editor [Dave Hassler, K7CCC](#).

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Page author: reginfo@arrl.org

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