



YAVAPAI SIGNAL



The Yavapai Amateur Radio Club • Prescott, Arizona • DM-34 • Volume 25 – No. 4 • April 2010

From the President's Desk...



Hello Again:

This month the YARC Meeting started off very well, the entire meeting went off without a major glitch. Rick Aldom, W7STS, our guest speaker gave a very detailed description on how to support special events or disaster teams with weather monitoring and reporting. Rick is an advanced Sky Warn Spotter and Former Aerostat Flight Director, and he brought his expertise to the meeting and shared his experiences with the group. This was a great presentation, enjoyed by all. Thanks again Rick.

Ken West has been moved to Good Samaritan Society 3380 N. Windsong Dr. Prescott Valley, AZ in the Sun Flower Suite. Ken is making progress, and has a very determined attitude, for his recovery. Yes, Visitors are welcome, just not a large group at once. Our thoughts and prayers go to Ken and his family, for a speedy recovery.

YES! It is TRUE; this year's Yavapai Hamfest has been canceled. This is as a result of Recent concerns and questions brought about by a Potential Sponsor, over Liability Issues and proper permits. The Yavapai Hamfest committee chairman and his staff, recommended the hamfest be canceled this year. I concur, with the chairman's recommendations, and canceled this event. I am disappointed on one hand, but on the other hand we have many other events to keep us occupied in the near future.

Friday March 26, 2010 is the scheduled Wild Fire Exercise for ARES/RACES. Whiskey Off Road 2010 will be held on Saturday April 24, 2010. This is a mountain bike event on the trails in Prescott National Forest.

Remember the FOX Hunt will be on Sunday April 04, 2010 at 1:00 P.M. starting in The parking lot of Az State Credit Union, (Willow Creek Rd. and Gail Gardner Way). This time Jim Ball WB7UZV will hide the transmitter. Check in on W7YRC, 146.880 - off set, and a CTCSS tone 100.0 Hz.

Respectfully, Pete K6VVR



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YARC Officers for 2010

President	Vice President
Pete Morrison, K6VVR <i>pm_service@earthlink.net</i>	Jim Ball, WB7UZV
Secretary	Treasurer
George Imburgia <i>ad7rl@netsecs.us</i>	Mary Vince, AB7NK <i>ab7nk@ARRL.net</i>

Board of Directors (includes Club Officers)

- Terry Pemberton -- KB7TRE
- Will Taylor -- AD7WW
- Richard Bozeat -- KE7DTR
- Walter Schumann -- KF6SPS

Newsletter Editor: Joe Oliver, AC6AA

Welcome to the Yavapai Amateur Radio Club

The Yavapai Amateur Radio Club (YARC) is an ARRL affiliated Special Service Club. The club participates in many activities in the tri-city area by providing communications for local events, emergency communications, and promotion of the hobby throughout the community.

Membership in the YARC is open to any interested amateur or non-amateur alike. Dues are \$20.00/year (Full-time students \$15). The YARC meets at 7:00 p.m. local time on the first Thursday of every month in the Technology Room 404, at the Granite Mountain Middle School, 1800 Williamson Valley Road in Prescott. It is about ½ mile north of Iron Springs road, and all amateurs and non-amateurs as well are invited. Programs of interest are included as part of the meeting.

The weekly Net is held every Wednesday at 7:00 p.m. local time on 146.880- repeater. All amateurs are invited to participate, and visitors are always welcome.

The Yavapai County ARES/RACES Net is held on Monday nights approximately at 7:00 p.m. local time on the 145.290- repeater on Mingus Mountain. A PL of 127.3 is required.

Club Repeater

The YARC 146.880- repeater is located on the hill above Willow Creek road and requires a PL of 100.0 Hz. Our deepest gratitude to Bill Kafka, W2YAV for allowing us to acquire the original club repeater.

Minutes of March 4, 2010 Board Meeting



Meeting was called to order at 1810 hrs by the President, K 6 V V R .

KF6SPS, WB7UZV, AB7NK, AD7RL and AD7WW were also in attendance.

May 29, 2010 Yavapai Hamfest planning continued. Representatives of VVARA and YARC have met, and agreed to donate proceeds to GMMS. Trademark issues are resolved.

On motion from KB7TRE, seconded by WB7UZV, meeting adjourned at 1840 hrs.

Respectfully submitted,
George Imburgia, AD7RL
Secretary

VE Testing

By Mary Vince, AB7NK

March 6, 2010 test results:

20 applicants resulted in 15 technicians, 3 generals and 1 extra class amateur.

Congratulations and welcome to the ham radio family.

VE Testing March 27, 2010

The next VE testing will be held Saturday, March 27, 2010 at 9:00 A.M. at Embry Riddle University. We'll meet in the lobby of the AXFAB Bldg #75.

If you have any questions, please email ab7nk@arrrl.net

Minutes of March 4, 2010 General Meeting

Meeting was called to order at 1854 hrs by K6VVR. Introductions were made following the Pledge of Allegiance.

Attendance: 64, 38 of whom signed in.

Minutes of the February meeting were approved, on motion of WB7UZV, second of KB7TRE and no dissenting.

New member Ken West, KE4ZWZ welcomed unanimously.

Treasurer's report presented by WB7UZV; Beginning balance \$4315.27, income \$303.00, expenses \$316.19 ending balance 4302.08 Repeater Fund balance of \$905.92.

COMMITTEE REPORTS:

ARES/RACES: Presented by WA6ZZJ.

Wildfire Exercise, Friday March 26. 6 operators needed.

Wildfire Expo, Saturday April 17, 1000-1500. MARC will be there.

Thanks to Ragnar Relay participants. 20 operators involved. Amateur Radio played a large part in recovering the event after a runner was hit by a car, and participants had to be shuttled around the road blockage.

Saturday April 24 is the Whiskey Off-Road mountain bike race.

Whiskey Row Marathon on May 1. This will be the 12th consecutive year for YARC providing communications.

NEWSLETTER: AC6AA reports the Yavapai Signal is OK.

CLASSES: W7JLC reports a General class will be held on March 13 & 20.

Last month's Technician class had 20 students. W7JLC and K6VVR thanked Dave WN7L, Lee K7CBK, John WB9VGJ and Bob KC8BOB for conducting the Technician class.

IRLP: W7JLC reports IRLP up and running on 442.350+ 100 HZ PL, and a temporary EchoLink connection is linked to the 147.220 repeater.

SHIRTS: W6CCD has supply of club shirts available at \$19.00. w6ccd@arrl.net

BADGES: W6CCD@arrl.net is accepting orders at \$ 6.75 for the custom engraved YARC badge.

REPEATER: W6CCD reports the club repeater is functioning well.

REFRESHMENTS: K6UWV advised there are plenty of cookies, coffee and soft-drinks available.

ELMER: KA7JAS welcomed Will AD7WW and Jim WB7UZV to Elmering.

SCHOOL CLUBS: KB7TRE reports the BMMS club is cruising along, studying, getting on the radio and enjoying themselves tremendously.

YOUNG (and NEW) HAMS: KI6AHH reports record check-ins on the 147.22 repeater every Sunday evening at 7 PM. Everyone is welcome to join the net.

SLOW CODE: WB7UZV reports new participants on the Slow Code net on the 146.88 repeater every Sunday night at 7:30 to 7:45 after the Young and New Hams net. Practice code tapes are available. Sheets with Q-signals, W1AW schedule and time conversion sheets are also available.

FOX HUNT: K6VVR announced that T-hunts will be held regularly on the Sunday following the club meeting,

from 1300 to 1500 starting at the Arizona State Credit Union on Gail Gardner Way near Willow Creek Road.

FOOD BANK: A collection table is at the meeting.

OLD BUSINESS:

YARC/VVARA: K6VVR reports a meeting was conducted with representatives of both clubs. All of the proceeds from the Hamfest go to GMMS. The event has been re-named and trademarked as Yavapai Hamfest, will be held at GMMS, and is sponsored by ARES/RACES, VVARA and YARC. Updates can be found at www.w7yrc.org.

NEW BUSINESS:

Volunteers are needed for a number of club activities.

Tonight's Program was presented by Rick Aldom W7STS, on weather monitoring technology.

50/50 Drawing of \$60 was won by KB7TRE.

Meeting adjourned at 1923 hrs.

Respectfully Submitted,
George Imburgia – AD7RL
Secretary

When was the SOS distress call first used at sea?



SOS had been officially designated as the universal distress call in 1908, but a number of years passed before it actually replaced the previously used CQD call. The first recorded American use of SOS at sea was in August 1909. Wireless operator T.D. Haubner transmitted this distress call from the S.S. *Arapahoe* when it ran into trouble near Diamond Shoals, known as the "Graveyard of the Atlantic." The call was received by the United Wireless station at Cape Hatteras. A few months later, Mr. Haubner *received* an SOS sent from the S.S. *Iroquois*. So he was involved in both of the two initial uses of SOS in America.

From the American Museum of Radio and Electricity



Need a Hand?

If you need assistance, we want to help you. If you are just starting out in ham radio, or simply have run across something that you could use a hand with... technical assistance or answers to questions about the Yavapai Amateur Radio Club, are available from knowledgeable club members.

Don't Hesitate to Ask for Help!!

Call: **Neil Vince**, KA7JAS at: (928) 775-2158

Jim Ball , WB7UZV (928) 445-2997

Will Taylor, AD7WW (928) 445-1717

Yavapai Amateur Radio Club

March 2010 Treasurer's Summary

Income

3/4	K7CBK	Lee Cunningham	R	7794	\$ 20.00
3/4	K7CBK	Lee Cunningham	ARRL/R	7795	39.00
3/4	KE7DTR	Bruce Jaeger	R	5976	20.00
3/4	WN7L	Dave Drown	R	cash	20.00
3/4	KF7ANT	Sue Drown	R/F	---	---
3/4	WB6ODR	Bob Smith	R	cash	20.00
3/4	KE7EEO	Linda Smith	R/F	---	---
3/4	WA6AQK	Ken Severence	R	4125	20.00
3/4	KD7FDA	Lorraine Severence	R/F	---	---
3/4	KD7FCZ	Cheryl Severence	R	4125	20.00
3/4	WA6AQK	Ken Severence	ARRL/R	4124	55.00
3/4	KD7FDA	Lorraine Severence	ARRL/R/F	---	---
3/4	KD7FCZ	Cheryl Severence	ARRL/R/F	---	---
3/4	AC7FH	Michael Ritter	R	2745	20.00
3/4	W7ZW	Joseph Holtey	R	1016	20.00
3/4	W1OTH	Ramon Fobes	R	2355	20.00
3/4	KC5DKN	John Marsh	R	4068	20.00
3/4		50/50			<u>120.00</u>
Total Income					\$ 414.00

Expenses

3/10	ARRL	K7CBK – ARRL Renewal	1135	37.00
3/10	Allegra	Newsletters Inv #44725	1136	32.87
3/10	ARRL	WA6AQK – ARRL Renewal	1137	53.00
		KD7FDA, KD7FCZ – ARRL/R/F	---	---
3/4	KB7TRE	50/50	cash	<u>60.00</u>
Total Expense				182.87

Beginning Balance	\$ 4,302.08	February ending repeater balance	\$905.92
March Income	<u>414.00</u>		
Sub Total	4,716.08	March repeater fund	<u>20.00</u>
Expenses	<u>< 182.87 ></u>	March repeater fund balance	\$925.92
General Fund Balance	\$ 4,533.21		
Increase	\$ 231.13		

Learning the Code

By Dawn Williams, KC9LQS

(See <http://YLOnTheAir.blogspot.com>)

One of my former neighbors holds a PhD in chemistry. Always in awe of people of science – especially in the days before I’d discovered my inner ham – I asked how holding an advanced degree had affected her as a young woman.

“It made me realize,” she said after some thought, “that if I could earn this degree, I could probably do anything.”

That’s precisely how I feel since making my first CW contact last night.

All those dits and dahs beeping into one’s headphones are music to some, and terrifying chaos to others. Since the FCC dropped its Morse code requirement in early 2007, there is little motivation for those in the chaos camp to learn CW.

I was among the first wave of “no code” hams licensed that year, and I can see both sides of the debate over the wisdom of the FCC’s decision. On the one hand, the hobby became accessible to many people who would have shied away from radio altogether because of the challenge of learning Morse code. On the other, it seemed to me, an important tradition and useful emergency communication skill stands to be forgotten.

Learning code, in this new era, is a personal choice. Admittedly, it wasn’t the easiest aspect of radio that I’d attempted to embrace. For almost a year after upgrading to Amateur Extra, I would jump in, learn a few characters, then jump back out in frustration. Finally, after making the commitment to stick with it, I started making progress.

Why learn code when you don’t have to? There are many reasons from which to choose:

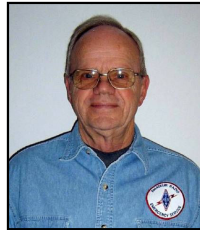
- **For the tradition.** Morse code was the only means of radio communication for hams until the end of the 19th century. Until the year 2000, proficiency at 20 wpm was a licensing requirement for Amateur Extras.
- **For the convenience.** CW can be used on all bands in the U.S. except 60 meters.
- **For the efficiency.** Code requires less equipment, less power and less bandwidth than other modes. It’s easier to

copy code compared to voice, even in high noise/low signal situations.

- **For the “brain aerobics”.** Joe, NA9A pointed out that using Morse code exercises the brain as effectively as learning a foreign language or playing a musical instrument. Researchers have made a strong case for the ‘use it or lose it’ approach to keeping our cognitive skills sharp as we age.
- **For emergencies.** When the chips are down, any device capable of simulating an on-off signal can get a message to the outside world. Sending a simple SOS with a flash-light could save your life.
- **For the community.** Hams are among the most generous group of mentors I’ve ever met. They encourage, teach, and share their knowledge and their passion freely and gladly. Part of this tradition of helping new operators stems, I think, from a sense of generativity. We seek to give of ourselves to the future. Taking the torch – learning the code – and passing it on to those who follow is a fitting way to honor what they’ve made possible for the current generation of hams.
- **For the accomplishment.** CW is a challenge! Copying is much more difficult than sending for most people. But, oh! The thrill of facing that mountain and proving that you can, indeed, reach the top is a thrill beyond measure.
- **For the fun of it.** My elmer, Jeff N9JZN, and my daughter Susie and I sometimes sit around the kitchen table sending CW messages to each other via a homemade oscillator. Jeff and I have used code to communicate in situations where privacy is both essential and unavailable. It’s like passing messages as kids, which can only be read by those who possess the secret decoder ring.

Jeff called me “Code Girl” all evening as we rehashed my CW debut and basked in the glow of that shared accomplishment. The moniker may be a bit premature, as I have a lot of work to do in the weeks ahead. Difficult, frustrating, true. But the reward is very sweet indeed. ■

A stylized graphic with the words "Happy Easter" in a bold, bubbly font. The letters are filled with a gradient of colors including purple, blue, and yellow, and have a thick black outline.



By Lloyd, WA6ZZJ

ARES/RACES.....

The next ARES/RACES event on this year's calendar will be the annual Wildfire Expo that is held on the Cortez Street side of the Courthouse Square. It is scheduled for Saturday, April 17, 2010 from 10:00 a.m. until 3:00 p.m. This event attracted approximately 4000 attendees last year and it is an excellent event to get Amateur Radio and Emergency Communications introduced to the general public. The ARES/RACES MARC will be on display along with equipment from fire and police organizations in the Prescott area.

There will be a sign up sheet for ARES/RACES members at the April YARC meeting.

SPECIAL EVENT COMMUNICATIONS.....

THE RAGNAR DEL SOL RELAY RACE...



ARES/RACES MARC at Watson Lake Site

The weather was cool and crisp on Friday, February 26, 2010 when nineteen members of YARC were preparing for Special Event Communications in the running of the Ragnar Del Sol Relay Race. This event was a 203.5 mile foot relay race with approximately 325 teams of 12 runners. Each runner would be responsible for running 3 legs of the race which varied from 3.6 to 8.8 miles each. Along with the 325 regular teams there were also 17 Ultra teams which

consisted of 6 runners with each runner being responsible for 6 double legs of the race. YARC's part consisted of the first of 6 legs of the race which was from Prescott to Kirkland and the Start line at Watson Lake Park in Prescott.

This was the second year that YARC participated in assisting the Maricopa County Emergency Communications Group (MCECG) in communications for this event. This is a fun event with team names such as: 'Cougars and Kittens', 'Saints and Sinners', 'What were we thinkin?', 'Manly Men of Maplewood' and 'Dude where's the van?' running in the race....

The event started off and run very well until it was marred by an incident at 1:30 in the morning when one of the runners was struck by a car on State Route 74 near Lake Pleasant. As I understand, the young man was not running at the time, but was exiting the team support van to assist another runner with water. Unfortunately, the runner, who was a senior at Brophy College Preparatory, passed away a few days later at St. Josephs Hospital in Phoenix.

Amateur Radio communications played a very important part in the recovery of the event when the road was closed and runners had to be shuttled around the accident area. The participants in the event were never left unsupported. Although, we don't want to be tested in this way it is an excellent example of why we are there to provide our communications support for these events.

Thanks to the following who stepped up to assist in the communications for this event: KD7VBG, N7CW, WN7E, KF6SPS, AE7BK, WB7UZV, AD7WW, K7POF, KF7GGX, K7CJW, WA6AQK, KE7WWY, AD7UR, K7CBK, KE7WOQ, W7PRG, KE7IXS, WA6ZZJ and from the Has-sayampa Amateur Radio Klub, WA6AJC.

Whiskey Off Road 2010...

The Whiskey Off Road will be the next special communications event for this year. It will be held on Saturday, April 24, 2009. This is a mountain bike event on trails in the Prescott National Forest. There will be three different lengths of rides which will include 15 mile, 25 mile and 50 mile distances. The 50 mile ride will go as far as Skull Valley. The radio assignments will include staggered start and ending times at our communications locations.

This will be the third year for YARC providing communications for this event. There was a sign up sheet at the March YARC meeting which garnered several signups, but there is

always room for more so the sign up will be at the April meeting also. It is encouraging to see several new names on the list that are participating for the first time. The goal we have is to place at least two people to an assigned location.

Whiskey Row Marathon 2010...


The 32nd running of the Whiskey Row Marathon will take place on Saturday, May 1, 2010. This will be YARC'S 12th consecutive year of providing communications for this event. There will also be a Half Marathon, 10K and 2 mile fun run walk with this event.

Proceeds from this event go into the scholarship fund at the Prescott YMCA to assist children and families in financial need.

There was a sign up sheet for this event at the March YARC meeting as well and several members signed on to assist with communications. There were also some new members signing up to help on this event. For those who have not worked a special communications event, we will place you with one of our regular experienced operators and give you a chance to learn and see how events are run. This is an early morning event with some stations opening as early as 05:00 and others opening as runners advance along the route with the event shutting down at 12:00 noon.

With these two events running on back to back weekends an additional strain was anticipated on getting operators to dedicate time to both events, but thanks to the many members who have stepped up to the challenge, we will have them both covered.... ■

Need Cards Checked for ARRL Operating Awards?




Jim Zimmerman, N6KZ can check your QSL cards for DXCC, WAS, VUCC, WAC, etc.

For information contact Jim at:
(928) 713-0542.

Jim's QTH is at: 778 Grapevine Lane,
Prescott, AZ 86305.

Membership Count:

1st Thurs. in February.....	193
Gain/Loss.....	0
1st Thurs. in March.....	193*




* Includes 10, 3-Month Memberships

Upcoming Events

- **March 26, 2010** - Wildfire Exercise
- **March 27, 2010** - VE Testing
- **April 4, 2010** - Fox Hunt
- **April 17, 2020** - Wildfire Expo
- **April 16-18, 2010** - International DX Convention
- **April 24, 2010** - Whiskey Off Road
- **May 1, 2010** - Whiskey Row Marathon

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“Harold!!! What are you doing wasting money on more USELESS radio equipment!!!”

“Only two things are certain: the universe and human stupidity; and I'm not certain about the universe.”

-Albert Einstein (1879-1955)

Ragnar Relay Del Sol 2010

Photos by Will, AD7WW and Ken, WA6AQK

See more Photos at WB9VGJ's site: <http://tinyurl.com/yanfx93>



Jim, WB7UZV, Will, AD7WW, and Don, KE7MQB



Ragnar Runner



Team Rim Country Destroyer Van Driver



Exchange 4 - WA6AQK, KC7CJW (Above), & KE7WYY



Nine Words You Might Think Came from Science, but Which Are Really from Science Fiction

From Oxford University Press

1. **Robotics.** This is probably the most well-known of these, since [Isaac Asimov](#) is famous for (among many other things) his three laws of robotics. Even so, I include it because it is one of the only actual sciences to have been first named in a science fiction story ("[Liar!](#)", 1941). Asimov also named the related occupation (roboticist) and the adjective robotic.

2. **Genetic engineering.** The other science that received its name from a science fiction story, in this case Jack Williamson's novel [Dragon's Island](#), which was coincidentally published in the same year as "Liar!" The occupation of genetic engineer took a few more years to be named, this time by [Poul Anderson](#).

3. **Zero-gravity/zero-g.** A defining feature of life in outer space (sans artificial gravity, of course). The first known use of "zero-gravity" is from [Jack Binder](#) (better known for his work as an artist) in 1938, and actually refers to the gravityless state of the center of the Earth's core. [Arthur C. Clarke](#) gave us "zero-g" in his 1952 novel [Islands in the Sky](#).

4. **Deep space.** One of the other defining features of outer space is its essential emptiness. In science fiction, this phrase most commonly refers to a region of empty space between stars or that is remote from the home world. [E. E. "Doc" Smith](#) seems to have coined this phrase in 1934. The more common use in the sciences refers to the region of space outside of the Earth's atmosphere.

5. **Ion drive.** An ion drive is a type of spaceship engine that creates propulsion by emitting charged particles in the direction opposite of the one you want to travel. The earliest citation in [Brave New Words](#) is again from Jack Williamson ("The Equalizer", 1947). A number of spacecraft have used this technology, beginning in the 1970s.

6. **Pressure suit.** A suit that maintains a stable pressure around its occupant; useful in both space exploration and high-altitude flights. This is another one from the fertile mind of E. E. Smith. Curiously, his pressure suits were furred, an innovation not, alas, replicated by NASA.

7. **Virus.** Computer virus, that is. [Dave Gerrold](#) (of "The Trouble With Tribbles" fame) was apparently the first to make the verbal analogy between biological viruses and self-replicating computer programs, in his 1972 story "[When Harlie Was One](#)."

8. **Worm.** Another type of self-replicating computer program. So named by [John Brunner](#) in his 1975 novel [Shock-wave Rider](#).

9. **Gas giant.** A large planet, like Jupiter or Neptune, that is composed largely of gaseous material. The first known use of this term is from a story ([Solar Plexus](#)) by [James Blish](#); the odd thing about it is that it was first used in a reprint of the story, 11 years after the story was first published. Whether this is because Blish conceived of the term in the intervening years or read it somewhere else, or whether it was in the original manuscript and got edited out is impossible to say at this point. ■

Joke from Washington Newsletter Archives

Dangerous Phrases

Dangerous: What's for dinner?

Safer: Can I help you with dinner?

Safest: Where would you like to go out for dinner?

Ultra Safe: Have some chocolate!

Dangerous: Are you wearing that?

Safer: You look good in brown.

Safest: Wow, look at you!

Ultra Safe: Have some chocolate!

Dangerous: What are you so worked up about?

Safer: Could we be overreacting?

Safest: Here's my paycheck.

Ultra Safe: Have some chocolate!

Dangerous: What did you do all day?

Safer: I hope you didn't over-do it today.

Safest: I've always loved you in that robe!

Ultra Safe: Have some more chocolate!

ARIZONA WORKED ALL COUNTIES

Have you worked all 15 Arizona counties? You may already qualify for this award. Check your QSL cards and logs.

Email az-wac@w7yrc.org for an rules and an application.

Choose Your 2M Frequency Wisely

By Bob Witte, K0NR - Courtesy of the Anchorage Amateur Radio Club

You've just purchased your first 2M FM transceiver and have been chatting with both old and new friends around town on the 2M band. You and your buddies decide to find an out of the way frequency to hang out on. After tuning around, you find a nice, quiet frequency that no one seems to using and start operating there. Nothing to worry about, right? *Not so fast, there are a few more things to consider when selecting a frequency on the 2M band. Let's take a look at the key issues.*

FCC Rules

The first thing we need to know are the frequencies that the FCC has authorized for our particular license class. For the HF bands, the frequency privileges depend greatly on the license class of the operator. Above 50 MHz, the frequency allocations are the same for Technician licenses and higher. In particular, the 2M band extends from 144 MHz to 148 MHz. The FCC Rules say that any mode (FM, AM, SSB, CW, etc.) can be used on the band from 144.100 to 148.000 MHz. The FCC has restricted 144.0 to 144.100 MHz to CW operation only.

Band Plans

Knowing the FCC frequency authorizations is a good start, but we need to check a bit further. Amateur radio operators use a variety of modulation techniques to carry out communications. Often, these modulation techniques are incompatible since a signal of one type can't be received by a radio set to another modulation type. For example, an SSB signal can't be received on an FM receiver (and vice versa). We need to use our authorized frequencies wisely by sharing the band with other users and avoiding unnecessary interference. Thus, it makes sense to have a *band plan* that divides the band up into segments for each type of operation.

2M Band Plan

As shown in the table, the 2M amateur band plan supports a wide variety of radio operation. Large portions of the band are dedicated to FM operation, consistent with the popularity of the FM mode. There are portions of the band designated for repeater *outputs* (which is the frequency that we tune to receive the repeater) and repeater *inputs* (which is the frequency we transmit on to use the repeater).

Notice that these segments are positioned 600 kHz apart consistent with the standard 2M repeater offset. There are also frequencies designated for FM simplex.

On the low end of the band, we see segments for some of the more exotic modes. At the very bottom is the CW por-

tion, which includes Earth-Moon-Earth (EME) operation. EME operators communicate by bouncing their signals off the moon.

Further up the band, we see segments for SSB operation and beacon operation. SSB is the preferred voice mode for so-called "weak signal" operators. The mode is more efficient than FM when signals are weak, so it is the way to go when you are trying to push the limits of 2M DX. Beacons are transmitters that are always on, transmitting a short CW message as a propagation indicator for distant stations. We often think of 2 Meters as a local coverage band but when conditions are right, contacts can be made with stations over a thousand miles away. Of course, conditions are not always right so having a beacon on the other end of the desired communication path lets you know how propagation is in that direction.

144.00-144.05	EME (CW)
144.05-144.10	General CW and weak signals
144.10-144.20	EME and weak-signal SSB
144.200	National calling frequency
144.200-144.275	General SSB operation
144.275-144.300	Propagation beacons
144.30-144.50	New OSCAR subband
144.50-144.60	Linear translator inputs
144.60-144.90	FM repeater inputs
144.90-145.10	Weak signal and FM simplex (145.01,03,05,07,09 are widely used for packet)
145.10-145.20	Linear translator outputs
145.20-145.50	FM repeater outputs
145.50-145.80	Miscellaneous and experimental modes
145.80-146.00	OSCAR subband
146.01-146.37	Repeater inputs
146.40-146.58	Simplex
146.52	National Simplex Calling Frequency
146.61-146.97	Repeater outputs
147.00-147.39	Repeater outputs
147.42-147.57	Simplex
147.60-147.99	Repeater inputs

Radio amateurs also use 2 meters for OSCAR satellite operation, sending signals *to* a satellite (uplink) or receiving signals *from* the satellite (downlink). The OSCAR segments don't specify a particular modulation type since CW, SSB and FM are all used for OSCAR operation. Because of their elevation above the earth, satellites can hear signals from all over the US simultaneously, so they are very susceptible to interference.

Most of this non-FM operation can be easily interfered with by signals from other users. EME signals, for example, are usually quite small since the signal has to make the round trip from the earth to the moon and back. If a local FM operator fires up in the EME portion of the band, an EME signal that can't be heard by an FM receiver can be wiped out by the FM signal. Similarly, an operator chatting across town on 2M could interfere with a satellite hundreds of miles away and not know it. This is particularly a problem with FM receivers, which won't even notice low level CW and SSB signals.

FM Operating

The most common 2M rigs are basic FM mobile or handheld transceivers. These radios usually tune the entire 2M band from 144 MHz to 148 MHz in 5 kHz steps. The band plan indicates the proper range of frequencies for FM operation, but there is more to the story. FM operation is "channelized", meaning that specific 2M FM frequencies are identified by the band plan. The use of channels is especially important for repeaters, since they don't easily move around in frequency and are coordinated to minimize interference. The idea is to have all stations use frequencies that are spaced just far enough apart to accommodate the signal without interfering with the adjacent channels.

You might think that the spacing between channels would be 5 kHz, which is the tuning step of most FM radios. This doesn't work because an FM signal occupies a bandwidth that is more than 5 kHz wide. Even though we talk about a signal being on a specific frequency, the signal actually spills out on either side of the frequency by about 8 kHz. This means that a typical FM signal is about 16 kHz wide. (You may recall that amateur 2M FM uses ± 5 kHz frequency deviation. So doesn't this mean the bandwidth is 10 kHz? No, it doesn't work quite that way and the signal is actually wider than 10 kHz. I might be able to show the math behind this but it makes my head hurt. Perhaps in some future article.)

The channel spacing needs to be at least as wide as the bandwidth of the signal, which allows room for each signal without interfering with the adjacent channel. In Colorado, the channel spacing is 15 kHz, which is a bit tight for our 16 kHz-wide signal. In other parts of the country, a 20 kHz spacing has been adopted to provide for more separation between channels. Obviously, you get more channels on the

band with 15 kHz spacing than with 20 kHz, but you have to put up with more adjacent channel problems.

When using a repeater, you just need to dial in the published repeater frequency and set the transmit offset, either + 600 kHz or - 600 kHz. Most modern 2M radios automatically take care of setting the proper offset (based on the band plan). If you need to set the offset manually, the rule is very simple. If a repeater's output frequency is in the 147 MHz range, it uses a + 600 kHz offset. Otherwise, it requires a - 600 kHz offset. For repeaters that require a CTCSS tone for repeater access, you will have to set the proper tone frequency on transmit.

For simplex operation, the standard simplex frequencies listed in the table below should be used. These simplex frequencies are grouped in the 146 MHz and 147 MHz range as listed in the table below. The National Simplex Frequency (also referred to as the calling frequency) is 146.52 MHz.

2M FM Simplex Frequencies

146 MHz Range	146.400, 146.415, 146.430, 146.445, 146.460, 146.475, 146.490, 146.505, 146.520, 146.535, 146.550, 146.565
147 MHz Range	147.405, 147.420, 147.435, 147.450, 147.465, 147.480, 147.495, 147.510, 147.525, 147.540, 147.555, 147.570, 147.585

The FCC View on Band Plans

The FCC has clearly stated that they expect hams to share the bands by following accepted band plans. More importantly, this is the right thing to do for the benefit of the amateur radio service.

Summary

The fine points of the band plan can be a bit confusing. However, a few simple guidelines can help, especially if you are operating only FM.

- FM voice simplex and repeater operation should occur only above 145.100 MHz (and only in the OSCAR sub-band if you are working an FM satellite)
- When operating through a repeater, make sure you are tuned to the published repeater frequency with the proper transmit offset.
- When operating simplex, use a simplex frequency designated by the band plan.

We've only covered the 2-Meter band in this article. If you are operating on other bands, be sure to check the appropriate band plan before transmitting. ■

Weekly Breakfasts



Tues. Morning Breakfast:

**7:00 a.m. at
Back Burner Cafe**
8400 E. Long Mesa Drive
& N. Robert Road
Informal – all are invited.

Wed. Morning Breakfasts:

**7:00 a.m. at
Iron Horse Restaurant**
(Hwy 89 in Chino Valley)
(N 34°43'56.5" W112°27'15.4")*
informal – all are invited

**8:00 a.m.
Masonic Lodge**
(1280 Willow Creek Road,
2nd Floor; above Bank of America)
informal – all are invited

* Location data (per WGS84) provided
by Fred Zimmermann, N7PJK

Area Repeaters

Fre- quency	PL	Location	Owner/Club	Auto- Patch	Rem. BaseOr Linked	Vo IP	Notes:
52.560-	100.0	Mt. Union	N7NGM			IRLP	Node 3301
145.290-	127.3	Mingus Mtn.	ARES/RACES				
146.780-	91.5	Williams Mtn.	BWARC			IRLP	
146.880-	100.0	Prescott	YARC				
146.980-	162.2	Flagstaff	CARC				
147.000+	162.2	Mingus Mtn	MMRG				
147.040+	107.2	Prescott Heights	W2YAV				
147.140+	162.2	Flagstaff/-Mt. Elden	ARA		Linked to Mt. Ord -		Mt. Ord=147.36
147.220+	162.2	Mingus Mtn	VVARA				
147.260+	103.5	Mt. Union	ARES/RACES				
224.080-	156.7	Mt. Union	WA7JC				
442.150+	100.0	Mingus Mtn	W1OQ/Northlink				
442.350+	100.0	Glassford Hill	N7KPU			IRLP	
445.300-	100.0	Prescott	WINSYSTEM		Node 3727	IRLP	
448.475-	100.0	Flagstaff-Elden	ARA	Yes			
448.500-	100.0	Prescott	K6JSI				
448.875-	100.0	Flagstaff-Elden	Northlink		Linked		
449.175-	100.0	Towers Mountain	Northlink		Linked		
449.675-	88.50	Prescott Airport	WB7BYV		Linked to P Mtn.		P mtn=927.3875
927.0875-	151.4	Mingus Mtn	WB7BYV				
927.3875-	151.4	Prescott	WB7BYV	Yes	Yes	Echo	Be Nice

Y.A.R.C. IRLP NODE
Node Number 3182
442.350+ MHz with a
PL Tone of 100.0 Hz

For more Repeater Information & Listings refer to:

- www.w7ara.org/Web/
- www.azrepeaters.net
- www.azfreqcoord.org/listings.htm

YAVAPAI AMATEUR RADIO CLUB

P.O. BOX 11994

PRESCOTT, AZ 86304

Visit us on the web at <http://www.w7yrc.org>

Many thanks to Bob Smith, WB6ODR, our Webmaster

