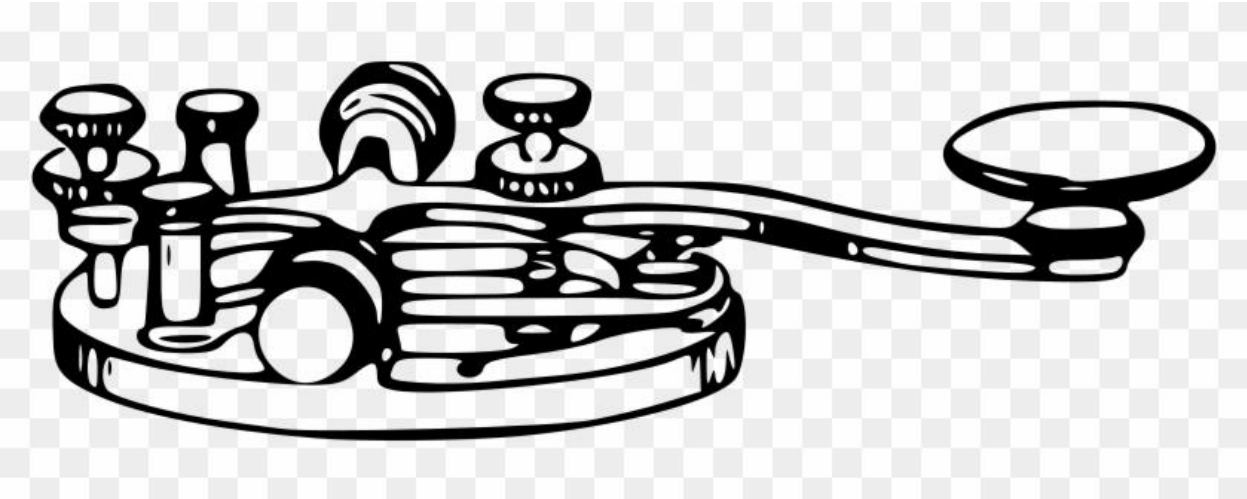
QSA-5

Marin Amateur Radio Society Monthly Newsletter

Established 1933 **November, 2024**



When all else fails, you can count on Amateur Radio

From Our President:

The election is almost upon us… No not that election... The MARS board election. At the next meeting on November 1st, I will announce the candidates running for the board term starting January 1st, 2025. Around the 18th of November current MARS members will receive an email with access to an online ballot. Please fill out your ballot and submit it by November 24th. The results will be announced at the December regular meeting. The Bylaws review committee is in the process of updating the bylaws and you will be asked to vote on an amendment to the bylaws. You will be given a chance to review the text of the amended bylaw around the 11 th of November. I urge you to be a part of the process of electing your board as it is their job to make the club work for you. If you have questions, please contact me.

At the last board meeting we discussed having a Christmas celebration. The sense of the group was to try something different this year. Rather than a catered lunch at the club house which we did last year we are contemplating luncheon at the Cantina restaurant in Mill Valley. We will discuss that at the November regular meeting and the board will make its decision at the November 14 th board meeting.

At the December regular meeting I will be announcing the recipients for club awards. All awards are optional and are based on contributing time and effort to the club. You can recommend anyone for consideration for an award. It would be helpful to let us know why that person should be considered. For a reminder of what awards the club has please review them at https://w6sg.net/site/members/club-awards/ This month you are saved from a longer screed from me.

73 de wa6uds

From the Editor:

Halloween is over and Thanksgiving is heading our way. It seems as if it was just summer! During the last weekend of October, the World QSO Party was held. I have never seen the HF bands so packed, especially on the 10-meter band! There

was literally no empty space to be seen! Thankfully, the Solar conditions remained good, so participants were able to fill their logbooks. It was good to see some Technician license holders working the 10-meter band! With winter heading our way and Solar Cycle 25, it's going to be an exciting time for HF radio and Dxing in general.

I've always been a bit of a loner and preferred it that way. However, after joining the Marin Amateur Radio Society, I realized how much I enjoy being part of a larger group. In addition to being the Editor (fancy title for the cut and paste guy), I'm on the VE team. I look forward to hanging out with club members as we test new amateur radio operators and upgrade existing license holders. I feel part of a family other than my own (don't worry, I'm not suddenly turning into a weepy dude). Club members made me feel welcome from the moment I joined. I mention this because the future of amateur radio depends on attracting new blood, bringing in younger generations. MARS is extremely good at this! I see our membership going up because we're a great club to be a member of! Thanks to everyone who welcomed me and welcomes our newest members into the world of amateur radio.

The QSA-5 continues to include articles geared towards newer members of the amateur radio community. I hope these articles will also offer a little insight to more experienced operators. Thanks to Curtiss Kim for his great articles about club activities. Thanks, as well, to the usual suspects for their contributions. As always, if you have any questions, comments, or contributions, please contact the QSA-5 and we'll make sure they are taken care of.

QSA-5Editor@w6sg.net

New Members:

Jay Hamilton-Roth KO6FIR - Mill Valley

Christopher Guiao KO6GIE - Sausalito

Nancy Wein KO6GII – Novato

Michael Abrahams KO6GIG - Tiburon

Jay Dean KO6GHQ - Larkspur

Ed Sangster N6ZNR - Novato

“Your parents hath given you a name. And the FCC hath given you another…

Marin Amateur Radio Society

Board of Directors Meeting

10/10/2024

Call to Order 19:30 Hours (7:30 PM) 19:32

Attendance:

President: Curtis Ardourel WA6UDS
Director: Ed Essick K6ELE
Secretary James Saltzgaber KM6WWY
Treasurer Bruce Bartel N6VLB
Trustee K6GWE Brian Cooley K6EZX
Director Richard Cochran AG6QR
Director Steve Toquinto KB6HOH
Director Jeffrey Young KM6Y
Trustee W6SG Marc Bruvry KF6VNT

Members Present: Skip Fedanzo KJ6ARL; Milt Hyams KM6ASI; Dan Sobel N6HLZ; Gerald McCarthy W6NOV; Steve Wilson W6SDY; Rob Rolands NZ6J; Larry Bradley KK6QPE; Scott Pasternak KN6ZDN; Ken Brownfield AB6JR; Larry Loomer KI6LNB; Charlie Benet AI6TT

Adopt agenda: MSC

Approve minutes of: 12 September board meeting,

Secretary's Report/Communications: Minutes were published in QSA-5

Treasurer's Report: Report published in QSA-5

Committee and other Reports:

1. **Membership** Curtis WA6UDS- Current membership is 154, representing 93% of last year's total at this time.

2. **Facilities** Skip KJ6ARL – Molly Maid will be at the clubhouse this Friday at 2:30, he will be there to let them in. He needs credit card information for payment, Curtis will give him it. The clubhouse closing sign has been made, framed and will be mounted near the front door. Scott KN6ZDN questioned which trash cans were ours and when to put them out.

3. **VOAD/RCV** Skip KJ6ARL-VOAD is alive and well and will be participating in the Great Shakeout Exercise, 10/17 at 10:17am, with RCV and ACS RACES. RCV duty roster and instructions will be out soon. Creating a "Resource Net" will be a primary objective, then deployment and IC-205 comm plan will be built.

4. **Technical** Milt KM6ASI- Repeaters have been returned to Paul Mason. The rented lift truck was an asset, he will be turning in approximately $375.00. A budget of $150.00 is requested for mounting hardware for the clubhouse vertical antenna. MSC to appropriate $150.00. The RACES radio room has been dismantled and equipment removed. A mechanical-type volunteer is requested to help with hardware installation and guying the antenna. The EOC radio room Packet station and router system has been removed, KB6HOH will configure the Packet station, and it will be installed in the main radio room above the EOC.

5. **Public Service** Rob NZ6J-The 2024 Public Service has completed its successful season. Scott Pasternak KN6ZDN will be assuming the lead of organizing our public service program. Rob Rowlands, Don Magdanz and Oliver Lu will be heading the various events.

6. **VE Testing** Jim KM6WWY- Our last test session for 2024 is this Saturday, 10/10 at 1pm. We currently have 7 applicants, 5 VE's and 4 new/returning VE's scheduled.

7. **Comm Truck** Jim KM6WWY- Nothing new to report. I would like to recruit 2 or 3 members to help with the Comm Truck ongoing service checks, cleaning and updating radios, antennas, and installed equipment.

8. **NBAM** Bruce N6VLB- Last meeting was held September 18th. Most of the equipment stored in the club house has been updated and inventoried. Field equipment is in the process of being inventoried and will be updated with the K6GWE callsign and data rather than individual operators as it is now. Next NBAM Meeting will be on October 18th. Rich Cochran and Scott Pasternack both have new Mesh nodes up and running thanks to Rob Rowlands.

9. **Bylaws** Curtis WA6UDS- Bylaws Committee has had its first meeting. Members are commenting on the existing bylaws. Next meeting will be 10/17

10. **Nominating** Curtis WA6UDS- 5 board positions open, 4 current board members running as well as 1 additional candidate volunteer. He is hoping to find at least 1 or 2 additional candidates. The deadline for candidates to volunteer to run for the board is the November General Membership Meeting.

Old Business:

1. **Paint the Clubhouse** $9280 Current web page S meter is at S4.5 We will continue soliciting contributions until the end of the year.

2. **Revitalizing Babble Class** Curtis WA6UDS – Nothing new to report this month.

3. **Donations Committee Charter** Curtis WA6UDS- The committee has a draft charter that they are reviewing and proposing modifications.

New Business:

1. **Antenna removal work $1440** – Curtis WA6UDS – Alan Bowker had pre-arranged with Curtis that on his passing his wife would not have to be burdened by removal of his antennas. He had pledged a $5k donation, and in fact did make a $10K cash donation to the club. AJM General contracted to remove the vertical for $1440. MSC to pay this invoice. Discussion was held on the equipment that we have vs. what is needed to complete it, i.e. antennas and their respective controllers, etc. We will do an inventory of what we have in the clubhouse and will contact others who may have the complementary parts and pieces. Milt KM6ASI and Jim KM6WWY will start on this and will enlist the assistance of Jerry WA6BXV.

2. **Christmas Celebration**- Curtis WA6UDS – A show of hands survey at the general meeting show some interest for a Holiday/Christmas luncheon. Rob NZ6J asked if the winter COVID increase would prevent indoor celebrations. Scott – UCSF Med has not started covid masking but has reported Bird Flu recently. Discussion of the possibility of having it in the clubhouse and the consensus was it would be both an organizational and financial challenge. As an alternative, Rob & Scott will investigate a "no host" party at the Cantina in Mill Valley as we often do lunches there on an informal matter. The board will revisit this after they have some information. The proposed time frame is in the first two weeks of December.

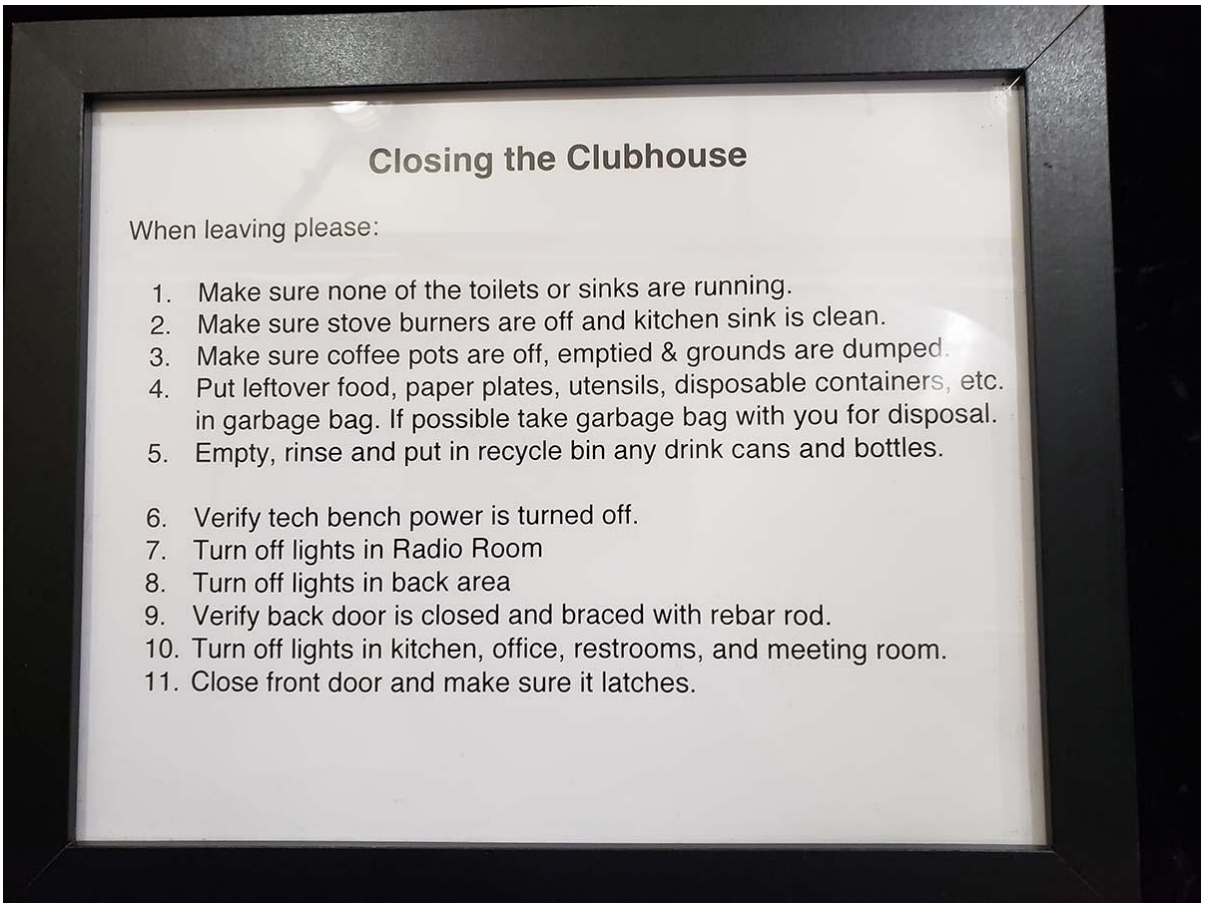
3. **Jane Rogers and Michael Fischer Fund** – Michael Fischer K6MLF and Jane Rogers have made a $500 donation for the club building fund. This is a restricted donation and can only be used for building expenses. We need to determine a fitting use. Skip suggested that tree trimming would be a possible use.

Good of the Order-Nothing Noted

Executive Session- Not required

Adjourn 20:44

Next Regular Meeting 1 November 2024
Next Board Meeting 14 November 2024



Closing the Clubhouse

When leaving please:

1. Make sure none of the toilets or sinks are running.
2. Make sure stove burners are off and kitchen sink is clean.
3. Make sure coffee pots are off, emptied & grounds are dumped.
4. Put leftover food, paper plates, utensils, disposable containers, etc. in garbage bag. If possible take garbage bag with you for disposal.
5. Empty, rinse and put in recycle bin any drink cans and bottles.

6. Verify tech bench power is turned off.
7. Turn off lights in Radio Room
8. Turn off lights in back area
9. Verify back door is closed and braced with rebar rod.
10. Turn off lights in kitchen, office, restrooms, and meeting room.
11. Close front door and make sure it latches.

Invoice

AJM GENERAL

2134 SMOKETREE CT
SANTA ROSA, CA 95403

Date	Invoice #
10/5/2024	4220

Bill To
Louise Fay 16 S Grove Hill Ave San Anselmo, CA 94960

P.O. No.	Terms	Project
wa6dnr	Net 30	

Quantity	Description	Rate	Amount
1	Site Work October 5 2024 Travel to San Anselmo to remove the antennas and feedlines from Alan Bowker WA6DNR house. Remove antennas, feedlines, control cables, MESH radio and UBNT camera. Transport all of this material to the Marin Amateur Radio Society ham club back yard. Unload material at this location, then return to Santa Rosa. Depart time 0800 Arrival at job site 0900 Disconnect and remove antennas and feedlines until 1230 hrs Transport materials to Ham Club Yard, arrive at 1300 hrs Finish unloading at 1330 hrs The above work performed on contract dated August 10 2024	1,440.00	1,440.00

It's been a pleasure working with you!

Total $1,440.00

Marin Amateur Radio Club

Balance Sheet Comparison

As of October 29, 2024

	TOTAL	
	AS OF OCT 29, 2024	AS OF OCT 29, 2023 (PY)
ASSETS		
Current Assets		
Bank Accounts		
B of A Facilities Account - 8795	3,489.90	5,900.61
B of A General account - 4328	77,792.59	79,647.83
CD	0.00	0.00
Money Market	0.00	0.00
VE Session Cash	0.00	-129.00
VE Session Cash Received	0.00	-45.00
Total Bank Accounts	**$81,282.49**	**$85,374.44**
Other Current Assets		
Uncategorized Asset	385.00	-95.00
Total Other Current Assets	**$385.00**	**$ -95.00**
Total Current Assets	**$81,667.49**	**$85,279.44**
Fixed Assets		
club house- 27 Shell Rd. MV	58,983.00	58,983.00
Total Fixed Assets	$58,983.00	$58,983.00
TOTAL ASSETS	$140,650.49	$144,262.44
LIABILITIES AND EQUITY		
Liabilities		
Total Liabilities		
Equity		
Opening Balance Net Assets	124,400.00	124,400.00
Retained Earnings	13,748.91	-20,412.57
Net Income	2,501.58	40,275.01

Total Equity	**$140,650.49**	**$144,262.44**
TOTAL LIABILITIES AND EQUITY	**$140,650.49**	**$144,262.44**

Marin Amateur Radio Club

Profit and Loss

January 1 - October 29, 2024

TOTAL

	JAN 1 - OCT 29, 2024	JAN 1 - OCT 29, 2023 (PY YTD)
Income		
Christmas Party Income	640.00	
Donations	23,996.00	1,699.17
Dues	8,920.51	7,074.75
Interest Income		792.77
Public Service Refund	168.15	450.00
Rent	29,100.00	23,400.00
Unapplied Cash Payment Income	385.00	
Total Income	**$63,209.66**	**$33,416.69**
GROSS PROFIT	**$63,209.66**	**$33,416.69**
Expenses		
Accounting	1,600.00	1,215.00
Awards		299.99
Car & Truck	2,224.89	2,327.80
Car & Truck Gas	152.42	258.02
Total Car & Truck	**2,377.31**	**2,585.82**
Christmas Party	2,970.23	
Contractors	22,549.00	
Field day	854.66	1,370.26
Food	467.02	
Garbage	507.96	485.04
Housekeeping	1,123.80	

Insurance	4,506.00	5,537.00
Comm Van Insurance	2,385.18	2,721.00
Total Insurance	**6,891.18**	**8,258.00**
Meals	235.24	
Office Supplies & Software	18.00	
Other Business Expenses		104.93
Picnic	1,705.10	1,757.51
Public Service Expense	4,188.44	1,379.96
Reimbursable Expenses	542.00	2,496.73
Repair & Maintenance	2,362.06	
Repeater	2,138.67	1,567.50
Taxes & Licenses	4,099.67	25.00
Utilities	3,697.58	3,849.95
VE Session		174.00
Water	1,330.79	949.03
Total Expenses	**$59,658.71**	**$26,518.72**
NET OPERATING INCOME	**$3,550.95**	**$6,897.97**
Other Income		
MESH Grant Income		33,500.00
Total Other Income	$0.00	$33,500.00
Other Expenses		
MESH Grant Disbursement	1,049.37	122.96
Total Other Expenses	**$1,049.37**	**$122.96**
NET OTHER INCOME	**$ -1,049.37**	**$33,377.04**
NET INCOME	**$2,501.58**	**$40,275**.01

LIFE IS SIMPLE

MARS Club News

Amateur Radio Put to the Test

From Curtiss Kim: Sometimes we overlook just how good we have it. Our region is broadly classified as a Mediterranean Climate. Translated, summers are dry, sunny and warm and winters are said to be mild, wet and occasionally stormy. While we have felt the effects of climate change, nowhere else has Mother Nature shown her wrath than the southeastern part of the nation. Back-to-back storms, Helene and Malcolm have stretched resources to the maximum and put amateur radio communications to the test. The wicked weather has wiped out entire towns, killed over 200 residents, taken numerous power grids offline and left roads and street impassable. While landlines, cell service and the internet have disappeared in those areas, amateur radio remained the one constant. In many cases, licensed operators have been working side by side with first responders in the affected areas. The National Association for Amateur Radio (ARRL) is tracking amateur radio in critical situations and reports a significant impact in all phases of the rescue and recovery efforts. There are numerous stories of how operators have delt with stranded people, the need for water and medications and alternative evacuation routes. ARRL reports individual hams have established pop up nets, maintained mountain top repeaters and supplied logistical support. In Marin County, MARS has taken the lead in providing supplemental radio communications. Members are actively involved in ACS/RACES (Auxiliary Communication Service/Radio Amateur Civil Emergency Service) under the authority of the Marin County Sheriff's Department. The goal is to provide additional communications to assist the Office of Emergency Management. (OEM) MARS members often do this on their own time using their own equipment. In addition, MARS has a second support organization called Radio Communication Volunteers. (RCV). Operators, when approved, fall under the jurisdiction of the county's Department of Public Works. RCV members will deploy to various community-based organizations after a major emergency has affected Marin County. The members will stay with that organization to provide radio communication in the days following the initial disaster. Some of the

organizations taking part include the San Francisco-Marin Food Bank, Canal Alliance and Homeward Bound. In both instances, the groups hold regular check-ins, meetings and drills. According to Rob Ireson, K6RGI. Chief RACES Officer, ACS-RACES activates when requested by OEM or other public health and safety agencies. "We do not self-activate, however we do anticipate and prepare for activation when conditions warrant." In short, amateur operators in Marin stay prepared as illustrated by this month's Great Shakeout exercise. The "no notice-protocol" called for assembling a roster of available amateurs who could provide needed support for a specific incident. Recent areas of concern in Marin include the prolonged power safety power shutoffs by PG and E, and the potential for flooding caused by atmospheric river events. When all else fails…there is still power in Marin, the power of amateur radio.

Volunteer Examiner News: Last VE Session of the Year

From Curtiss Kim: MARS is finishing off the year with one of the biggest VE sessions in recent memory. Nine candidates turned out on October 12th to either earn their first amateur radio license or upgrade to the next level. In addition, Jim Saltzgaber, KM6WWY, Lead Volunteer Examiner, was pleased to see four new VE's turnout to familiarize themselves with the testing procedures in the exam process. Sitting shoulder to shoulder with the veteran examiners, the new VE's graded test results, oversaw application registration and signed off on the paperwork. Michael Ham, WA6LCN, Luis Membrila, WA6LM, Gerald Mcarthy, W6NOV, and Nancy Coombs, KN6GTR were anxious to experience the requirements of the job. Each of the new VE's echoed a similar theme, that they wanted to help the next generation of amateur radio operators. Membrila, WA6LM, said he had burning desire to be a VE ever since he got in the hobby but had to wait until he turned 18 to take the VE exam. McCarthy, W6NOV, said it was all about giving back and it had nothing to do with being a rock star, earning money or making himself more charming. "Without VE's, there would no future in amateur radio." Ham, WA6LCU, said being a VE was

part of the process to re-immerse himself back into amateur radio after an extended layoff. Coombs, KN6GTR, lives in Richmond and made the trek across the bridge to learn from the best. She said she emailed six different radio clubs in her area to make herself available as a VE. MARS responded, inviting her to participate. To become a VE, you must be licensed, have familiarize yourself with the rules and regulations of each test and pass an open book exam. Those holding a General license can only test applicants applying to become Technician amateurs. Extra Class license holders can grade any level. Another first, three of the nine candidates taking the recent tests were women. Saltzgaber mused it might have had to do something with the weather-related problems in the nation's southeast. All three women testing, passed. The VE's approved 7 new Technicians, two were upgraded to Generals due to past licenses that had lapsed. One amateur upgraded to General. Saltzgaber was pleased by not only the testing turnout but the support of licensed operators to become VE's. Also in support roles, JoAnne Saltzgarber, KN6FXH and Curtiss Kim, KM6GUY. The need for amateur radio operators was never more important after the recent storms Helene and Milton in the southeast. Many enthusiasts not only kept lines of communication open but fielded questions about food, fuel and medications. Emergency communication was heroically upheld by amateur radio.

First picture, Ken Brownfield, AB6JR and Nancy Coombs, KN6GTR Second picture, Hugh Patterson, KN6KNB with Luis Membrila, WA6LM Third picture, Jerry Foster, WA6BXV, and Michael Ham, WA6LCU. Fourth picture, Gerald McCarthy, W6NOV with Jim Saltzgaber, KM6WWY, Lead Volunteer Examiner. The following is from Jim Saltzgaber KM6WWY, Lead Volunteer Examiner:

MARS VE Team,

I would like to congratulate you all on a very successful 2024 ARRL/MARS VE Examination program. I would also like to thank each of you for your support and selfless volunteer hours. As you all know, it takes a knowledgeable and dedicated team to successfully conduct VE sessions, and I am very thankful to have all of you on our team.

I also want to thank the 4 new VE's that joined us for their first time at the October 12th session: Luis Membrila WA6LM, Nancy Coombs KN6GTR, Gerald McCarthy W6NOV; and Michael Ham WA6LCN (previously a VE but returning from an extended absence)! Welcome to the MARS VE team!

We had a total of 27 applicants, 25 were successful in obtaining a new or upgraded license. There were 13 new Technician Class hams, 7 General Class upgrades (1 passed tech and general), and 5 Extra Class upgrades. Only 1 Tech and 1 General applicant did not receive a license/upgrade. On the VE side, 15 of our 17 VE's volunteered for at least 1 session, with a total of 31 "VE Sessions". That does not include our "Full Time" Non-VE Assistant, JoAnne Saltzgaber KN6FXH with 4 sessions this year.

I received a great many thanks and appreciative remarks and emails from our applicants. We do provide a very special and necessary service to the Ham Radio hobby, and to the Marin Amateur Radio Society, at no cost to the MARS club. Thank you all again!

Our 2025 schedule will be Jan 11th, Apr 12th, Jul 12th, and Oct 11th. Please mark your calendars. I look forward to working with all of you again next year.

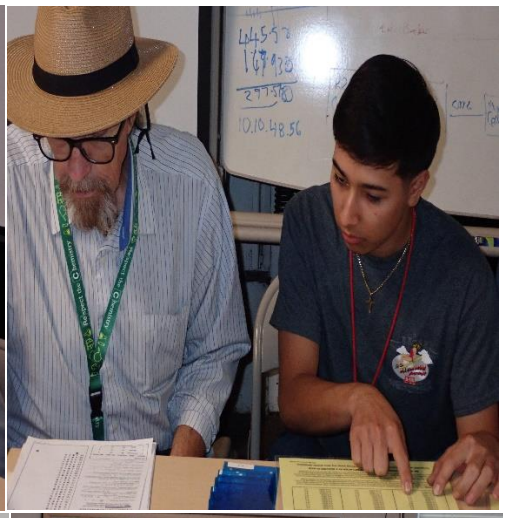
Jim Saltzgaber KM6WWY

Lead Volunteer Examiner

Marin Amateur Radio Society

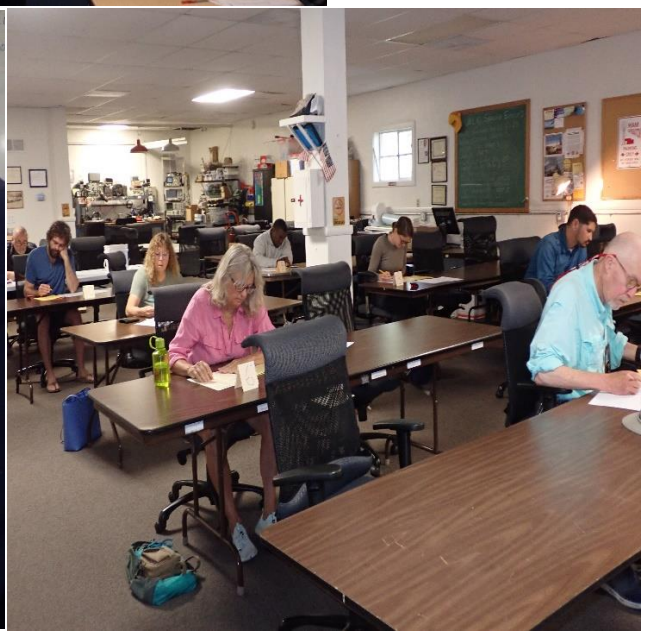
27 Shell Rd.

Mill Valley, CA 94941




KAUAI


CHART OF ELECTROMAGNETIC RADIATIONS



North Bay Critical Mass Report

From Milt KM6ASI: There were enough of you contacting me about the PACIFICON/Critical Mass conflict that I consulted with my colleagues on the NB2MCM team and we agreed that there was enough interest in the Go-Box topic for the next session to cancel the session for this Sunday and to reschedule the Go-Box training to the November meeting which will be held at 10AM, November 17th as described in the initial notice, below. Sorry for the confusion. We will know better for next October. All of that said, you now have no excuse to not attend the Go-Box session next month.

73 and thank you for your forbearance--

Milt
KM6ASI

North Bay Critical Mass will be held Sunday, November 17th at 10AM, at the Marin County Civic Center Juror's parking lot as usual. Here is the agenda for the November North Bay Critical Mass:

The topic will be a show and tell and employ of Go Boxes. We will have a number of our own home brew go boxes as well as official go boxes such as the issue MARIN RACES Yellow Box. There will be a short presentation on each, antennas to be used in the field and a short drill using the boxes on display. This will be your opportunity to try various radios and gets some ideas for your own. If you have one already, please bring it and be prepared to describe its components and show it off.

We will start at the usual place and then disperse around the grounds to give you a chance to set up a station and get on the air. The following photographs are from a previous North Bay Critical Mass meeting:

ACS/RCV Mission Statement

Mission: During national, regional, or local emergencies provide effective backup radiocommunications in support of the EOC/VOAD and Community Based Organizations (CBOs) or other non-public safety agencies within the Marin County OA when requested by competent authority.

Capabilities: Proven ability to establish and maintain radio communications between OA EOC/VOAD and CBOs during exercises including the three annual Golden Eagle and two Great Shakeout exercises. Ability to deploy and operate

portable stations as needed to establish reliable communications in areas that are otherwise out of touch with the EOC/VOAD.

Resources: Develop and maintain the resources that may be needed to support the overall mission:

1. Operators – A corps of trusted radio operators with: (1) basic skills and a commitment to establishing radio communications when needed; (2) ongoing participation, training, and practice in accurately passing message traffic using a variety of basic analog and specialized digital means.

2. Mobile stations – Individual operators routinely test and maintain their own radio transceivers and related equipment including power supplies, which can be deployed to locations otherwise lacking reliable communications with the EOC/VOAD or between two or more CBOs.

3. Relationships – Establish on-going relationships of familiarity and trust between RCV operators and with key staff of served agencies, including EOC and VOAD.

HF Radio 101

Introduction

This month, in this beginner's guide to HF radio, we'll take a deeper dive into basic antenna theory. If you can simply buy an HF antenna, why bother with theory? HF antennas are not like VHF/UHF antennas. While an antenna for the 2-meter or 70 cm band will generally work out of the box, the same is not true for HF antennas. Many antennas require being resonant or of a very specific length. When you purchase an antenna, it often isn't cut to the correct length or needs an adjustment to its length (in the case of telescoping antennas). If you don't understand some basic theory, you might cut a wire antenna too short or never be able to get that telescoping antenna to its resonant length. Knowing a little theory will ensure you get the most out of an antenna.

This month, we'll look at the key concepts that create the foundation for antenna theory and start looking at antenna types as well as baluns and ununs.

Basic Antenna Theory: A Deeper Dive

The amateur radio operators who successfully make contacts around the globe with modest equipment understand antenna theory and tend to build their own antennas. These amateurs often take advantage of locations other than their homes for operating. They own multiple antennas and know which antenna to use for specific operating conditions. I have a dozen or so antennas, with the majority of them being homemade. You could simply follow along with YouTube videos and websites, build antennas and avoid the bulk of antenna theory. However, you'd never get your antennas to work as well as they did in the video or on the website.

Antennas are the crucial interface between electronic devices and electromagnetic waves in radio communication. For HF (High Frequency) radio operators, understanding antenna theory is paramount for achieving optimal performance and maximizing communication range.

Antenna design and characteristics significantly impact the efficiency of radio transmission and reception. The physical dimensions of an antenna, particularly its length, are closely related to the frequency of operation. This relationship is known as resonance, and it's essential for achieving maximum power transfer. By understanding resonance, operators can select or design antennas that are well-suited for their desired frequencies.

The radiation pattern of an antenna describes how it distributes radio waves in space. Some antennas are omnidirectional, radiating equally in all directions, while others are directional, focusing the signal in a specific lobe. The choice of antenna depends on the desired coverage area and operating conditions. For example, a directional antenna can be used to target a specific region, while an omnidirectional antenna is suitable for general communication.

Antenna gain is another important factor to consider. Gain refers to an antenna's ability to concentrate radio waves in a specific direction. A higher gain antenna can improve signal-to-noise ratio and extend communication range. However,

higher gain often comes at the expense of bandwidth, which is the range of frequencies an antenna can efficiently handle.

Proper installation and tuning are crucial for optimizing the performance of an antenna. The antenna should be placed in a location with minimal obstructions and adequate height. Impedance matching between the antenna and the transmitter or receiver is also essential for efficient power transfer. By understanding antenna theory and applying these principles, ham radio operators can significantly enhance their communication capabilities and achieve successful results.

We're going to look at some concepts in greater detail to expand your knowledge base. All the following play a critical role in successfully working the HF bands. I've been able to work with modestly priced equipment and get results that leave the operators with high-end transceivers wondering how I did it. Spend the time now to learn basic antenna theory and you'll save both time and heartache for years to come! We'll start by looking at a crucial concept in all radio communication, resonance.

Resonance in HF Radio

Resonance is a fundamental concept in physics and plays a crucial role in radio communication. It occurs when a system is excited at its natural frequency, resulting in an amplified response. In the context of HF radio, resonance is essential for efficient antenna operation. When an antenna is resonant at a specific frequency, it exhibits maximum efficiency in radiating or receiving electromagnetic waves. This means that more of the transmitted power is converted into radio waves, and more of the received signal is captured by the antenna. By understanding and utilizing resonance, ham radio operators can optimize their antenna systems for better performance and communication.

To achieve resonance, the physical dimensions of an antenna must be carefully calculated to match the desired frequency. This involves determining the appropriate length of the antenna elements based on the wavelength of the radio wave. Factors such as the type of antenna, its environment, and the desired operating frequency influence the resonant length. By carefully matching the

antenna's dimensions to the operating frequency, hams can maximize signal strength and efficiency.

Impedance in HF Radio

Impedance, a measure of the opposition to the flow of alternating current, is a critical concept in HF radio. It represents the complex interaction between resistance, capacitance, and inductance within a circuit. In the context of antennas, impedance matching between the antenna and the transmitter or receiver is essential for efficient power transfer. A mismatch results in power loss, reduced signal strength, and potential damage to equipment.

Ham radio operators strive to achieve a low Standing Wave Ratio (SWR), which indicates a good impedance match. Techniques like using antenna tuners, baluns, and understanding the characteristics of different antenna types help in optimizing impedance matching. By carefully considering impedance, operators can maximize the performance of their radio systems and enjoy improved communication.

Polarization in HF Radio

Polarization refers to the orientation of the electric field component of a radio wave. In the simplest terms, it describes the direction in which the wave is oscillating. There are two primary types of polarization: vertical and horizontal. Vertical polarization occurs when the electric field is perpendicular to the Earth's surface, while horizontal polarization occurs when the electric field is parallel to the Earth's surface.

The polarization of an antenna must match the polarization of the incoming wave for optimal reception. For HF radio, vertical polarization is commonly used due to its efficiency in ground wave propagation. However, skywave propagation can affect polarization, as the ionosphere can rotate the plane of polarization. Understanding polarization is crucial for antenna design and selection, as well as for troubleshooting reception issues.

Antenna Gain

Antenna gain is a measure of an antenna's ability to direct radio waves in a specific direction. It's expressed in decibels (dB) and compares the antenna's performance to a reference antenna, typically a half-wave dipole. A higher gain antenna concentrates more power in a particular direction, resulting in improved signal-to-noise ratio and longer communication range. In HF radio, gain is crucial for long-distance communication, as it allows operators to overcome atmospheric noise and interference.

Antennas with higher gain, such as yagi-uda or beam antennas, are commonly used for DXing (long-distance communication). However, it's important to balance gain with other factors like bandwidth and ease of installation. Understanding antenna gain helps operators choose the right antenna for their specific needs and operating conditions.

Bandwidth in HF Radio

Bandwidth refers to the range of frequencies within which a signal can be transmitted without significant distortion. In the context of HF radio, it's the measure of how wide a signal is spread across the frequency spectrum. A wider bandwidth allows for higher data rates, but it also requires more spectrum space.

For HF operators, understanding bandwidth is crucial. Different modes of operation require varying amounts of bandwidth. For instance, narrow-band modes like CW (Continuous Wave) occupy minimal bandwidth, while wideband modes like SSB (Single Sideband) require a larger spectrum. Additionally, antenna design impacts bandwidth. Some antennas have inherently wider bandwidths, making them suitable for multiple frequency bands, while others are more specialized for narrower frequency ranges.

An Introduction to Antennas

Antennas are the crucial link between your radio and the electromagnetic waves that carry your signals. In HF (High Frequency) radio, the choice of antenna significantly impacts your communication range, efficiency, and overall performance. Understanding the different types of HF antennas and their

characteristics is essential for making informed decisions and optimizing your setup.

One of the most common types of HF antennas is the dipole. A dipole consists of two equal-length elements connected at the center. They are relatively simple to construct and can be used for various frequency bands. However, dipoles are omnidirectional, meaning they radiate equally in all directions.

For directional gain, beam antennas are often used. These antennas consist of multiple elements arranged in a specific configuration, such as the popular Yagi-Uda design. Beam antennas can focus radio waves in a particular direction, improving signal-to-noise ratio and extending communication range. However, they require more space and can be more complex to install.

Vertical antennas are another popular option, especially for those with limited space. They typically consist of a single element that extends vertically from the ground. Vertical antennas can be used for both omnidirectional and directional applications. However, their performance is heavily influenced by ground conditions, and a good ground system is essential for optimal results.

Inverted-L antennas combine elements of vertical and horizontal antennas, offering a balance between omnidirectional and directional characteristics. They are often used in situations where a full-sized dipole is impractical.

Loop antennas are circular or rectangular antennas that can be relatively compact. They are known for their ability to reject unwanted signals, making them useful in areas with high levels of interference. However, they generally have lower gain compared to directional antennas.

The choice of antenna depends on various factors, including desired range, frequency band, available space, and operating environment. By understanding the characteristics and advantages of different antenna types, ham radio operators can select the most suitable antenna for their specific needs and achieve optimal communication performance.

The Anatomy of an HF Antenna

An HF (High Frequency) antenna is a complex system composed of several interconnected components. Understanding these parts is essential for proper installation, tuning, and maintenance.

The most fundamental component of an antenna is the radiating element. This is the part of the antenna that directly interacts with electromagnetic waves. It can be a simple wire, a tubular element, or a more complex structure. The length of the radiating element is crucial for determining the antenna's resonant frequency.

Supporting structures are used to hold the radiating element in place. These can be masts, towers, or other structures that provide stability and elevation. The choice of supporting structure depends on the antenna's size, weight, and the intended installation location.

Feedlines connect the transmitter or receiver to the antenna. They carry the radio frequency (RF) signals between these components. Common types of feedlines include coaxial cable and twin-lead. The length and type of feedline can affect the antenna's performance and introduce losses.

Baluns are often used to match the impedance of the antenna to the transmission line. This helps to minimize standing waves and improve power transfer. Baluns can be passive devices, such as transformers, or active devices that incorporate circuitry to provide impedance matching.

Grounding is another important aspect of antenna systems. A good ground provides a reference point for the antenna's electrical currents, reducing noise and improving efficiency. Ground systems can vary from simple ground rods to more complex radial systems.

List of Antenna Components

- Radiating element
- Supporting structure
- Feedline
- Balun
- Ground system

Antenna Components in Greater Detail

The Radiating Element: The Heart of an HF Antenna

The radiating element is the primary component of an HF (High Frequency) antenna responsible for interacting with electromagnetic waves. It converts electrical signals from the transmitter into radio waves for transmission and vice versa for reception. The design and characteristics of the radiating element significantly influence the antenna's performance, including its gain, radiation pattern, and efficiency.

The most common types of radiating elements used in HF antennas include wires, rods, and loops. Wire elements can be straight, folded, or shaped into various configurations. Rod elements are often used in vertical antennas and can be made of metal or fiberglass. Loop antennas consist of a closed loop of wire, which can be circular, rectangular, or other shapes.

The length of the radiating element is crucial for determining the antenna's resonant frequency. A half-wave dipole, for example, has a length of approximately half a wavelength of the desired frequency. This ensures optimal impedance matching and efficient radiation. However, other lengths can also be used, such as quarter-wave verticals or full-wave loops.

The shape of the radiating element can also affect the antenna's radiation pattern. For example, a dipole antenna has a relatively omnidirectional pattern, radiating equally in all horizontal directions. A Yagi-Uda beam antenna, on the other hand, has a directional pattern, focusing the signal in a specific lobe. By understanding the relationship between the radiating element's design and the antenna's performance, ham radio operators can select the most suitable type for their specific needs.

Supporting Structures: The Backbone of HF Antennas

Supporting structures play a vital role in HF (High Frequency) antenna systems, providing a stable foundation for the radiating elements and ensuring proper alignment and elevation. The choice of supporting structure depends on various factors, including the antenna's size, weight, and the intended installation location.

One of the most common supporting structures for HF antennas is the mast. Masts can be made of wood, metal, or fiberglass and are available in various heights and configurations. They are often used to support vertical antennas, allowing for adequate elevation and reducing ground losses.

Towers are another option for supporting HF antennas, especially for large or heavy antennas. Towers can be constructed of steel or other materials and can provide significant height, enabling long-distance communication. However, towers require careful planning and installation, as well as appropriate permits and regulations.

In some cases, existing structures, such as buildings or trees, can be used to support HF antennas. However, these structures may have limitations in terms of height and stability. It's essential to ensure that the antenna is securely attached to the supporting structure and can withstand weather conditions.

The choice of supporting structure depends on the specific requirements of the antenna system. By carefully considering factors such as antenna size, weight, installation location, and budget, ham radio operators can select the most suitable supporting structure for their needs.

Feedlines: The Lifeline of HF Antennas

Feedlines are essential components of HF (High Frequency) radio systems, connecting the transmitter or receiver to the antenna. They carry the radio frequency (RF) signals between these components, ensuring efficient power transfer and minimizing signal losses. The choice of feedline depends on factors such as the antenna's impedance, the operating frequency, and the distance between the transmitter and antenna.

One of the most common types of feedlines used in HF radio is coaxial cable. Coaxial cable consists of a central conductor surrounded by an insulating layer and a shield. This construction provides good shielding against external interference and minimizes signal losses. Coaxial cable is available in various sizes and impedances, allowing for flexibility in antenna installations.

Twin-lead, also known as ladder line, is another type of feedline used in HF radio. It consists of two parallel conductors separated by insulators. Twin-lead is often preferred for longer runs due to its lower loss characteristics. However, it can be

more susceptible to interference and requires careful matching to the antenna's impedance.

The length of the feedline can also affect its performance. Excessive feedline length can introduce losses and create standing waves, which can degrade the signal. It's important to select a feedline of appropriate length and to use antenna tuners to minimize impedance mismatches.

By understanding the characteristics and choosing the appropriate feedline for their specific application, ham radio operators can optimize the efficiency and performance of their antenna systems.

Baluns and Ununs: Essential Components for HF Radio

Baluns and ununs are specialized devices used in HF (High Frequency) radio systems to match the impedance of the antenna to the transmission line. Impedance matching is crucial for efficient power transfer and minimizing standing waves, which can degrade signal quality and cause equipment damage.

A balun (balanced-to-unbalanced transformer) is used when the antenna is unbalanced, such as a dipole or a vertical antenna. It transforms the balanced impedance of the antenna to the unbalanced impedance of the coaxial feedline. This matching prevents common-mode currents from flowing on the shield of the coaxial cable, reducing interference and improving signal quality.

An unun (unbalanced-to-unbalanced transformer) is used when both the antenna and the feedline are unbalanced. It provides impedance matching between these two components, ensuring efficient power transfer. Ununs are often used with vertical antennas that have a ground radial system.

The choice between a balun and an unun depends on the specific antenna configuration and the desired impedance match. In some cases, a balun may be necessary to prevent common-mode currents, while an unun may be sufficient for impedance matching.

Proper impedance matching is essential for optimizing the performance of an HF antenna system. By using baluns and ununs, ham radio operators can improve signal-to-noise ratio, reduce standing waves, and enhance overall communication efficiency.

Baluns and ununs are available in various designs and impedance ratios. The appropriate choice depends on the specific requirements of the antenna and the transmission line. It's important to select a balun or unun that is rated for the desired frequency and power level.

By understanding the role of baluns and ununs and selecting the appropriate device for their antenna system, ham radio operators can optimize their communication and achieve successful results.

Baluns and Ununs: When to Use Them

- **Balanced antennas:** Dipoles, inverted-V antennas, and slopers are examples of balanced antennas that require baluns.
- **Unbalanced antennas:** Vertical antennas with a ground radial system are examples of unbalanced antennas that often require ununs.
- **Coaxial feedlines:** Both baluns and ununs are commonly used with coaxial feedlines.
- **Impedance mismatches:** If you're experiencing high SWR or other signs of impedance mismatch, a balun or unun may be necessary.
- **Reducing common-mode currents:** Baluns are particularly useful for preventing common-mode currents from flowing on the shield of a coaxial cable.

Ground Systems and Radials in HF Radio

A well-designed ground system is essential for optimizing the performance of a vertical HF antenna. The ground acts as a counterpoise, providing a return path for the antenna's current. A good ground system helps to reduce ground losses, improve radiation efficiency, and minimize interference.

One of the most common types of ground systems used in HF radio is the radial ground system. This consists of multiple wires radiating outwards from the base of the antenna. The number and length of these wires significantly impact the antenna's performance. More radials and longer lengths generally result in better grounding.

The type of ground material also plays a role in the effectiveness of a ground system. Conductive materials like copper or aluminum are preferred, as they offer lower resistance. However, even non-conductive materials, such as dry soil, can provide some level of grounding.

The length of the radials should be as long as practical, ideally a quarter-wavelength or more of the operating frequency. However, practical limitations often dictate the length of the radials. In some cases, a combination of buried and above-ground radials can be used to optimize performance.

By carefully designing and implementing a ground system, ham radio operators can significantly improve the efficiency and performance of their vertical antennas. A well-grounded antenna can reduce ground losses, improve radiation efficiency, and minimize interference, leading to better communication and overall system performance.

Next month, I'll be going into antenna theory in greater detail. The material I introduced in the previous section was meant as a starting point.

Ham Radio News

Each month, QSA-5 searches the internet for stories about amateur radio in the news. As editor of our publication, I merely present these articles and do not take a position regarding their message or content. Our first article come from Hackaday:

Ham Radio In the Internet Age: An interesting article that looks at how amateur radio has changed with the times.

https://hackaday.com/2024/10/25/ham-radio-in-the-internet-age/

Ham radio operators prepare for active hurricane season: A good piece regarding

the preparation amateur radio operators did for the recent devastating hurricanes.

https://www.fox8live.com/2024/06/24/ham-radio-operators-prepare-active-hurricane-season/

2024 Pacificon Inspires Next Generation of Radio Amateurs: A nice article from the ARRL about the convention and bringing amateur radio to new generations of operators.

https://www.arrl.org/news/2024-pacificon-inspires-next-generation-of-radio-amateurs

Masonic Amateur Radio Club demonstrates ham radio hobby in Great Falls: A nice piece on what all amateur radio clubs should be doing to keep amateur radio alive.

https://www.krtv.com/news/great-falls-news/masonic-amateur-radio-club-demonstrates-ham-radio-hobby-in-great-falls

Amateur Radio is Put in A New Light Thanks to Brandon Radio Club: The Brandon Radio Club is getting people interested in amateur radio by getting them on the air at their events.

https://www.ospreyobserver.com/2024/07/amateur-radio-is-put-in-a-new-light-thanks-to-brandon-radio-club/

Estate Planning for Hams (What happens to all your stuff?): This is an important topic. Brought to you by the ARRL.

https://www.arrl.org/news/estate-planning-for-hams-what-happens-to-all-your-stuff

Amateur Radio Communications SAG Wagon Support for Cycling Events: A great Article from Cycle Chat regarding the assistance that amateur radio clubs provide

for cycling events.

https://www.cyclechat.net/threads/amateur-radio-communications-sag-wagon-support-for-cycling-events.299152/

Ham radio may be more important than you think: Addressing the importance of amateur radio.

https://www.mystateline.com/news/ham-radio-may-be-more-important-than-you-think/

Amateur radio club has changed my life: This is a wonderful article that touches on the benefits of amateur radio for folks with disabilities

https://www.bbc.com/news/articles/cd17nj8wpl8o

How local amateur radio enthusiasts in Colorado assist with public safety: A good reminder of the importance of amateur radio in an emergency.

https://coloradocommunitymedia.com/2024/07/25/how-local-amateur-radio-enthusiasts-in-colorado-assist-with-public-safety/

FCC Regulatory News

Here are the current regulatory changes and FCC news as it applies to Amateur Radio. This section of the QSA-5 newsletter was introduced last year. We will add new regulations and rules monthly, removing the older regulations and rules as new regulations/rules are introduced. As of the August 2021 issue of the QSA-5 newsletter, this list of FCC regulations and changes will be reduced, only covering this year's new regulations and rules. The newest regulations and changes will appear at the top of the list. Note that we are not able to cover every change the FCC has made this year within our publication. Looks like there's nothing new at the FCC:

Solar Activity Significantly Affecting Ionosphere, FCC Opens Docket for Comments on Impact: The impact of solar activity has been driven the FCC to solicit comments regarding it's impact:

https://www.arrl.org/news/solar-activity-significantly-affecting-ionosphere-fcc-opens-docket-for-comments-on-impact

FCC to Require Two Factor Authentication for CORES Users: It seems that the powers that run the big show have found yet another fee to tack on to the amateur radio operators ability to operate:
https://www.arrl.org/news/fcc-to-require-two-factor-authentication-for-cores-users

FCC To Vote on Removing Symbol Rate Restrictions: From the ARRL regarding the digital modes.

https://www.arrl.org/news/fcc-to-vote-on-removing-symbol-rate-restrictions

Job Posting: FCC Recruiting Field Agents: In case any of you have wanted to become a field agent. Does it come with a badge?

https://www.arrl.org/news/job-posting-fcc-recruiting-field-agents

Propagation News

Here are some links dedicated to propagation conditions, space weather, sunspot cycle information and all things related to solar conditions:

The K7RA Solar Update: This is the K7RA solar update, which is updated regularly:

https://www.arrl.org/news/the-k7ra-solar-update-851

DX.QSI Propagation: A simple, straightforward website for propagation conditions that is regularly updated:

https://dx.qsl.net/propagation/

Radio Society of Great Britain: What's New and Propagation Now:

A great resource from the UK version of the ARRL regarding solar activity and propagation:

https://rsgb.org/main/technical/propagation/whats-new-propagation-now/

SunSpotWatch.com:

A good general interest site for amateur radio operators who follow solar activity:

http://sunspotwatch.com/

DIY Radio References

We have added a few additional links to our list and will continue to do so as we discover more websites related to the Do-It-Yourself movement! QSA-5 is going to keep adding to the original list of online resources, bringing you more resources as

we find them. If there is anything you think would be useful to other club members, contact me and I will be happy to include it in this reference section.

Microcontrollers and Single Board Computers: With the advent of the Arduino micro-controller board, the Raspberry Pi (a single board minicomputer) and Texas Instrument's Launchpad (also a single board microcontroller), Amateur Radio enthusiasts can build both accessories, such as antenna tuners, and fully functioning transceivers. I have spent the last year at the University of California studying these devices, learning how to use them and incorporate them into electronic projects. I was able to build two HF receivers based on the Arduino and Raspberry Pi devices. The best news of all is that these devices are inexpensive! I encourage you to check these websites out!

Arduino: The Arduino microcontroller board was the first to popularize these devices. They are inexpensive and can be used for a variety of radio related projects. I will include some links to radio related Arduino projects in the next issue of the QSA-5. Here's a link to the Arduino homepage:

https://www.arduino.cc/

Raspberry Pi: Did you every wish you could have a PC small enough to fit into your shirt pocket? Your dream has come true. The Raspberry Pi 4 is a fully functional Quadcore 1.6 GHz computer, about the size of a package of playing cards. It has an Ethernet jack, two USB 2 ports, two USB 3 ports and two HDMI ports. Next month, I'll post some links to radio related Raspberry Pi projects. Here's a link to their homepage.

https://www.raspberrypi.org/

Texas Instruments TI Launchpad: The Launchpad is Texas Instruments answer to the Arduino. The Launchpad is geared more towards advanced projects and is slightly more expensive. However, the Arduino still holds it own against this device. The Arduino also has more in the way of opensource software. Here is a link to the

TI Launchpad homepage.

https://www.ti.com/design-resources/embedded-development/hardware-kits-boards.html

Tools for electronics: It is a lot easier to build or repair your electronics if you have the right tool. Paperclips and duct tape are not the solution to everything (unless you are McGyver – hopefully, you got the reference). Therefore, we added some links to suppliers of electronics tools.

All Electronics: A one stop electronics shop that has a variety of tools for your repair and building needs:

https://www.allelectronics.com/category/780/tools-and-supplies/1.html

Jameco Electronics: A supplier of decent tools at a reasonable price:

https://www.jameco.com/Jameco/content/tools.html

Electronic Printed Circuit Boards (PCB): If you design and build projects that require specific circuit boards, you know how difficult it is to find a board that will work for your purposes. Designing a board and then having it made can be expensive. Here is a company that has a large number of radio PCBs you can purchase and then add components to. They also can take your design and fabricate a PCB at a very reasonable cost. The company's name is **PCBway**:

https://www.pcbway.com/project/

Electronic Components and Parts: Many of us involved in amateur radio are constantly tinkering with electronics. It seems to be part of our genetic makeup! Here are some links to companies that sell electronic components and parts, starting with San Rafael's own Electronics Plus (Support local business).

Electronics Plus: It's great to have an electronics store close by for those times when you need a part immediately:

https://www.electronicplus.com/

Digikey: A good source for DIY and Maker projects as well as parts. They claim to have the world's largest selection of electronic components.

https://www.digikey.com/

Jameco: This company is a good source for almost everything, especially mainstay items such as resistors, capacitors, etc.

https://www.jameco.com/

Homemade Antennas: Many new amateur radio enthusiasts put a great deal of time and effort into researching their first radio. However, they often neglect the most important component to a successful radio experience, the antenna. Even if you have some ham radio experience, antennas can be a daunting subject. Commercially manufactured antennas can be expensive and beyond your budget during these hard financial times. Even if you have the funds available to purchase an antenna, reading through the antenna's specs can be akin to reading some long lost ancient language. A good solution for increasing your knowledge of antennas and radio wave propagation, not to mention cutting the costs down, is to build them yourself. Here are some links to DIY (do it yourself) sites to give you a start:

Antenna building basics:

https://www.wikihow.com/Build-Several-Easy-Antennas-for-Amateur-Radio

Good Reference for several antenna types:

https://www.hamradiosecrets.com/homemade-ham-radio-antennas.html

A step-by-step guide for building a simple antenna:

https://geardiary.com/2012/07/21/building-a-simple-ham-radio-antenna-without-soldering/

Instructions for a VHF/UHF dual band antenna:

https://www.instructables.com/Quarter-Wave-Dual-Band-VHFUHF-Ham-Radio-Antenna/

Build an HF dipole antenna:

https://www.electronics-notes.com/articles/antennas-propagation/dipole-antenna/hf-ham-band-dipole-construction-80-40-20-15-10-meters.php

Introduction to antennas:

https://www.onallbands.com/ham-radio-antenna-options-for-home-and-portable-operations/

Ham Radio QRP Transceiver Kits: With the advent of SDR (Software Defined Radio), building fully functioning ham radios has become a lot easier and extremely inexpensive. While, having fewer bells and whistles, as well as being low power units, many have fully functional touchscreens and cover many of the HF bands:

An easy to build QRP transceiver. No soldering needed to build:

https://www.hfsignals.com/

An easy to build, single band CW kit:

https://qrp-labs.com/

Offering several kits and finished transceivers:

https://youkits.com/

Propagation Websites: Propagation is a key factor in successful radio

communications. Here are some links to websites that will help you with all your basic propagation needs:

Real time band conditions:

https://qrznow.com/real-time-band-conditions/

VOACAP band conditions:

https://www.voacap.com/hf/
ARRL Propagation Page:

http://www.arrl.org/propagation

Real Time HF Propagation Prediction:

https://hamwaves.com/propagation/en/index.html

Ham Radio Websites of general interest:

Ham Radio News: Here are some sites and articles you may find of interest regarding ham radio.

ARRL News Page, which is a good place to find national news regarding ham radio:

http://www.arrl.org/news

QRZ Now. Another good site for ham radio news from around the globe:

https://qrznow.com/

The Amateur Radio Newsline. An AP styled news feel page for amateur radio:

https://www.arnewsline.org/