



← **Officers and Board Members:** →

**President** - John Yocum, K6JGY @ [johnk6jgy@gmail.com](mailto:johnk6jgy@gmail.com)

**Vice President** - Chuck Sweeten, AI6I @ [ai6i@verizon.net](mailto:ai6i@verizon.net)

**Secretary** - A replacement is needed

**Treasurer** - Dave DeGross, WA6DF @ [wa6df@earthlink.net](mailto:wa6df@earthlink.net)

**3 Year Board Member** - Jon Herber, KR6ER @ [kr6er@msn.com](mailto:kr6er@msn.com)

**2 Year Board Member** - Karen Burkart, KJ6HFX @ [karen92316@yahoo.com](mailto:karen92316@yahoo.com)

**1 Year Board Member** - Howard Kagebine, KB6UGS @ [kb6ugs@msn.com](mailto:kb6ugs@msn.com)

**Membership/Quartermaster** - Doug Burkart, KE6UUC @ [hamop22@yahoo.com](mailto:hamop22@yahoo.com)

**Swap Meet Chairperson** - Karen Burkart, KJ6HFX @ [karen92316@yahoo.com](mailto:karen92316@yahoo.com)

**Newsletter Editor** - Cliff Wickey, N6CTW @ [n6ctw@msn.com](mailto:n6ctw@msn.com)

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**Announcements-**

***Brenden Geary, KJ6HVP, member of the Inland Empire Amateur Radio Club- How many of you seen the front page of September 12, 2010, Daily Bulletin, titled "Upland's whiz kid". The story is about his launch of his weather balloon. If you do not get the Daily Bulletin, they go to: [www.dailybulletin.com/news/ci\\_16054216?source=rss](http://www.dailybulletin.com/news/ci_16054216?source=rss) on the internet, and read about him***

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***It is nomination time! Who do you wish to be the next President, Vice President, Secretary, Treasurer and Board Member of your club? Cast your wishes for your candidate of your chose at the October Meeting. And vote for your favorite candidate in November, that hopefully will hold the office in 2011.***

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*As proof that the "Push to Talk" is reaching out to others, here is an automatic reply that was receive by one individual, as a result of the September edition:*

I'm holidaying where there is no electricity, internet or phone service. Ham Radio may not be reliable either.

....Peter

--

73 ....Peter VE7REZ

President --- Desert Radio Amateur Transmitting Society of Palm Springs

" The Desert RATS"

<http://desertrats.am>

Palm Springs Hamfest January 29, 2011

*(I wonder where Peter went to. Could he have gone back to the Austailian bush country? Sounds like a good place, where ever it is.)*

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**For those who are not members of the ARRL, this message was forward to Cliff Wickey, N6CTW, from Ron Baker, WA6AZN, on 9/16/10.**

This is a Forwarded Message from our ARRL Orange Section

> of interest to local hams who are not subscribed to these events.

> Ron, WA6AZN.

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>> September 17 - 19 2010 Southwestern Division Convention - San Diego.

>>

>> Welcome to the San Diego, ARRL Southwestern Division Convention. It

>> will be held at Four Points Hotel Sheraton, 8110 Aero Dr., San Diego,

>> CA

>>

>> Please join us for a variety of speakers, vendors, visit the W1AW/radio

>> shack, and swapmeet. For more information, please visit the website:

>> [www.sandarc.net](http://www.sandarc.net) .

>>

>> October 9 - 17 2010 - Southern California Fair - Perris, CA -

>>

>> The Southern California Fair is once again promoting Amateur Radio Expo

>> and other Amateur Venues. We had a great success last year with lots of

>> visitors inquiring about our hobby and emergency operations.

>>

>> We are looking for interested Amateur Radio groups and individuals to

>> display our hobby. Looking also for those who would like to volunteer

>> time with ATV and someone to do a T-Hunt in the fair grounds. If you

>> are interested in volunteering your time, we would like you to contact:

>>

>> Bob Turner W6RHK at [w6rhk@yahoo.com](mailto:w6rhk@yahoo.com) for details on how to become

>> involved.

>>

>> October 15-17 2010 - Pacificon 2010

>> San Ramon, CA - Yes, Pacificon is back home! For further details

>> [www.pacificon.org](http://www.pacificon.org)

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## **Announcements- (Con't)**

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>> If you have an event that you would like posted to the ARRL email  
>> route, please contact me and I will make sure that it is posted.

>>

>> [wu6d@arrl.org](mailto:wu6d@arrl.org)

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>> 73

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>> ARRL Orange Section

>> Section Manager: Carl H Gardenias, WU6D

>> [wu6d@arrl.org](mailto:wu6d@arrl.org)

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## ***Vice President's Message-***

Hello Club Members,

I understand it is now Autumn. What a good time to make sure you are ready for winter.

We need to make repairs to your antennas. Check your radios to be sure they are working correctly.

In case of an emergency do you have a plan as to what you are going to do?

Where are you going to meet? Who are you going to call, outside of the affected area? (Or state)

How much food and water do you have?

Do you have clothing, shoes, medicine, glasses and other items ready to go?

Important contact numbers?

These are some of the things to think about. Are we ready? Food question to ask oneself.

Now for the report on the club repeater, we are now fully coordinated by Tasma, That is the  
2meter repeater.

Radio classes are ongoing. Currently there are two in the class. A new class will start on October 4, 2010.

Time is 7pm to 9pm on Monday night. Place is 9140 Haven Ave. Suite 115 Rancho Cucamonga.

Cost is \$60.00 which include the text book Ham Radio License Manual and VE testing.

For more information I can be reached at 909-263-5842 or email me at [ai6i@verizon.net](mailto:ai6i@verizon.net).

That is all for this session. Have a great Autumn and am looking forward to seeing all at the club meeting.

73

DE Chuck AI6I, Club Vice Pres .

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**Board Meeting Minutes Report –**  
*As taken by Bob Burnap, KE6QET*

**Board Meeting Minutes**

The board meeting was called to order at 8:32 am September 4, 2010 by John K6JGY President of the club.

This board meeting was called to discuss and vote on the changes to the By - Laws and to discuss the money that was made from the sell of the club's radio equipment on E-bay.

There was some discussion about the proposed changes to the by laws. What John K6JGY thought should be changed and what the rest of the board wanted to see changed.

Motion by Chuck AI6I to accept the changes to the By-Laws was seconded by Karen KJ6HFX. Motion carried.

This board meeting was attended by all members of the board.

Board meeting was closed at 8:57.

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*The I.E.A.R.C. By-Laws, changes were administered to by the Officers and Board members. Below are the changes, as illustrated in bold lettering. Additions of words to the By-Laws are in **Green** and the removals of words are in **Red**. Members, please read the By-laws carefully, you will be asked to vote on these changes at the next meeting.*

**CONSTITUTION AND BY-LAWS OF THE INLAND EMPIRE AMATEUR RADIO CLUB**

An Amateur Radio Club known as the "Inland Empire Amateur Radio Club", hereafter referred to as the CLUB, has been formed and Incorporated October 3, 1988.

**PURPOSE OF THE CLUB**

1. To promote the growth of Amateur Radio in the western end of San Bernardino County including the surrounding communities.
2. To offer the general public a source of instruction that will lead to Obtaining and/or upgrading an Amateur Radio license.
3. To train and maintain an organized team of radio operators for Emergency and civic use.
4. To work in close conjunction with all emergency services organizations and to make available the talents and equipment of our Members to these organizations, as well as to other agencies and contiguous communities engaged in public service.
5. To make the CLUB available to the communities for special events and activities whenever they may be required.

*The I.E.A.R.C. By-Laws (Con't.)*

**STRUCTURE OF THE CLUB**

**GENERAL MEMBERSHIP:**

Membership in the CLUB requires that the individual seeking to join have An interest in Amateur Radio. The CLUB does not discriminate as to Age, Race, Creed, Color, Handicap, Sex, Religion, or National Origin.

**BOARD OF DIRECTORS:**

The Club will be governed by a Board of seven (7) Officers and Directors, each with one vote with the exception of the President. The President will preside over the Board and will vote only in the case of a tie. The Board of Directors will be made up of the President, Vice President, Secretary, Treasurer, and three (3) Board Members at Large. The President, Vice President, Secretary, and Treasurer will be elected annually. The three (3) Board Members at Large will serve a three (3) year term of office with one Board Member at Large being elected each year. These members will be elected from the General Membership, by a majority of those members in good standing who are present. Any and all business conducted by the Board will require a quorum of four (4) members to be present. Prior notice of all Board meetings will be announced and all Board meetings will be open to the General Membership.

**DESCRIPTION OF THE OFFICERS AND DIRECTORS OF THE CLUB AND THEIR DUTIES**

The following Officers will serve a one year term, ~~with a maximum of three (3) consecutive terms allowed.~~

All Officers will place the interest of the CLUB above their own individual interests.

**PRESIDENT:**

- Will preside over all General Membership and Board meetings.
- Will act as Spokesperson for the CLUB when dealing with the public on any matters concerning the CLUB.
- Will appoint any and all Chairpersons to Standing and Temporary committees to facilitate the business of the CLUB. These Chairpersons report to the President.
- Will be an Ex-Officio member of all committees.

**VICE PRESIDENT:**

- Will assist the President in carrying out his/her duties.
- Will act as President in the absence of the President, and act in any and all assignments made by the President.

## *The I.E.A.R.C. By-Laws (Con't.)*

### **SECRETARY:**

Will attend all General Membership and Board of Directors meetings and record all proceedings, then will be required to report at least a summary of these meetings to the membership at the next General Membership meeting. The Secretary may utilize a recording device and then summarize the report of the meeting.

Will maintain the records of all General Membership meetings and maintain a copy of the inventory of the CLUB.

Will maintain records showing the attendance by name of all present at Board and General Membership meetings.

Will have on hand legible copies of the minutes at all meetings for reference.

Will turn over all records to the next duly elected Secretary prior to the start of the next term of office.

Will make a backup copy of all minutes taken during the year to computer CD. This CD should be given to the club President and kept in a safe place.

### **TREASURER:**

Will maintain all financial records of the CLUB.

Will receive and deposit in the CLUB bank account ALL money received by the CLUB.

Will disburse funds as needed to pay bills incurred by the CLUB which are included in the Annual Budget or have been approved by a motion of the Board of Directors or General Membership.

*Will prepare appropriate tax returns for the IRS to maintain the club's 501c3 status. Present the returns to the board for approval.*

Will present a complete and current financial status report regarding all CLUB accounts and transactions at each General Membership meeting.

Will obtain a yearly audit of the Club's finances by a Board approved Audit Committee and will be responsible for providing the Audit Committee all necessary records to complete this task. The Audit will be done prior to the next Treasurer taking office and will cover the entire time period not covered under any and all previous audits.

Will deliver, as his/her final act of office, the completed Audit to the Board of Directors, reporting on it and surrendering it to the newly elected Treasurer prior to the start of the next term of office, along with all other previous financial records in their possession.

### **BOARD MEMBERS AT LARGE:**

Board Members at Large may not serve in this position for more than one term of three (3) years without a one year break in service as a Board Member at Large.

All Board Members at Large will place the interest of the CLUB above their own individual interests.

### **ELECTIONS**

Any Member of the CLUB for at least 3 months may hold office if the following qualifications are met:

1. Is a Member in good standing, (i.e. dues are current).

### ***The I.E.A.R.C. By-Laws (Con't.)***

2. Is a licensed Radio Amateur. For the Office of Secretary ***or Board member at Large***: A Member who meets all qualifications with the exception of having an Amateur Radio license may run for the Office of Secretary ***or Board member at Large***. A three (3) month grace period from the start of the term of office will be given during which an Amateur Radio license must be obtained.
3. The member is at least 18 years of age at time of nomination.
4. The member is capable of carrying out the duties of the elected position.
5. The member must accept the nomination.
6. The Offices of President, Vice President, Secretary and Treasurer may not be held by more than one member of a family or household in any given year.

#### **NOMINATIONS:**

All nominations will be opened from the floor at the October General Membership meeting. Once nominations are opened, they will remain open until the election in November at which time the nominees will be voted on by written ballot of the General Members in good standing who have valid membership in the Club at least three months prior to elections and are present. Write-in candidates are permitted.

#### **INSTALLATION:**

Newly elected Officers and Directors will be installed at the December ***Christmas*** Party/Meeting.

#### **SPECIAL ELECTIONS FOR VACANCIES :**

Should a vacancy occur of an Officer or Board Member at Large it will be filled as follows:

1. The President will announce at the next General Membership meeting that a vacancy exists and accept nominations from the floor.
2. At the next month's General Membership meeting the nominations will be closed and nominees will be voted on by written ballot by the General Members in good standing who have valid membership at least 3 months prior to the election and are present. The President will announce the outcome of the election and the newly elected Officer or Board Member at Large will be installed immediately.
3. If the vacancy is the Office of President, the Vice President will become President of the CLUB and a Special Election will be held to fill the Office of Vice President.

## *The I.E.A.R.C. By-Laws (Con't.)*

### **APPOINTMENTS BY THE PRESIDENT**

The President is the only Officer with the power of appointment, and all appointees report directly to the President.

There are two types of appointments: STANDING Committee appointments and TEMPORARY Committee appointments.

A Standing Committee is one that has been in existence from the previous year and it has been determined by the Board of Directors necessary to continue this Committee every year for the CLUB to conduct itself in accordance with its goals.

All Standing Committees will be reviewed by the Board of Directors on an annual basis. The termination of a Standing Committee requires Board approval.

A Temporary Committee is one that becomes necessary to enable the CLUB to further its immediate goals but not necessarily ongoing. At the discretion of the President, any number of Temporary Committees may exist and remain in operation until the President chooses to either disband them or present to the Board of Directors a request to make them a Standing Committee.

### **APPOINTEES:**

Appointees will be known as Committee Chairpersons. Except for their status when acting in their appointed capacities, they will only have General Membership privileges and have no voting rights other than those of a General Member of the CLUB. A Chairperson may enlist the help of others to carry out their duties. There is no limit on the time Appointees may serve in their respective capacities.

The following appointments are Standing Committee appointments:

- A. Education Chairperson: Responsible for coordination of classes provided by the CLUB.
- B. Swap Meet Chairperson: Responsible for the operation of the swap meet.
- C. Judge Advocate: Should be an attorney admitted to practice before the State Bar of California. Membership in the CLUB is desired but not required.
- D. Quartermaster: Responsible for storage and maintenance of the CLUB equipment and submitting proposals to the Board of Directors for new acquisitions of equipment as needed. Will also be required to prepare and have on file with the CLUB Secretary a current inventory of all CLUB equipment.
- E. Membership Chairperson: Responsible for issuing membership cards, badges and keeping membership records.
- F. Newsletter Editor: Responsible for the **monthly** publication of the CLUB newsletter.
- G. Trustee: Responsible for maintaining current paperwork and licensing in regards to the W6IER repeater and the W6IER call sign.

## *The I.E.A.R.C. By-Laws (Con't.)*

### **CHANGES TO THE BYLAWS**

To enact any changes, additions, and/or deletions to the Bylaws of the CLUB a draft of those changes must first be submitted in writing to the Board of Directors at a Board of Directors meeting. The Secretary will be given a complete copy of the proposed changes to be published following that Board meeting. The Board of Directors will review the proposals, and then recommend to either approve or disapprove them. The General Membership will then be notified of the proposed changes and a vote will be held to approve/disapprove such changes not less than ten days or more than thirty days following notification. Approval of changes requires a two-thirds (2/3) vote by secret ballot of the Members in good standing present at a General Membership meeting. The changes will take effect immediately.

### **NOTICE OF PROPOSED BY-LAW CHANGE:**

Notice of any proposed changes to the By-Laws of the CLUB will be accomplished in one (1) or more of the following ways:

1. Publication in the CLUB Newsletter.
2. Written (including e-mail) notice directly mailed to each CLUB member.
3. Oral presentation to the General Membership present at a regular General Membership meeting.

### **MEETINGS**

All General Membership and Board meetings will be conducted in accordance with Robert's Rules of Order.

### **GENERAL MEMBERSHIP MEETINGS :**

General Membership meetings are to be held on a regular basis.

These meetings will be held on a day and time as set by the General Membership. If a meeting date falls on a legal holiday that meeting may be changed or canceled by the President with a minimum of thirty (30) days notice to the General Membership.

### **BOARD MEETINGS :**

There are two types of Board meetings: REGULAR and SPECIAL.

A Regular Board meeting is for conducting standard business of the CLUB. Regular meetings will occur no less than once per year. Such meetings will be held at a neutral site and be open to all members.

A SPECIAL Board meeting may be called when the Board must act on important or pressing business where failure to act quickly could prove detrimental to the CLUB. At the President's discretion this type of meeting may be called with as little as telephone or radio confirmed notice to the Board Members individually. Special Board meetings should occur only when absolutely necessary and a quorum must be present in order for business to be carried out.

## **DUES**

*New member dues will be collected and be* paid directly to the Membership Chairperson who will then give the funds to the Treasurer for deposit into the CLUB account. Annual dues are deemed payable in advance upon acceptance of membership. Dues are due on the 1st of January each year. A new application is required. *Renewing members dues will be collected by the Treasurer and the Treasurer will give the applications to the Membership Chairman.*

After two (2) months, all delinquent Members will be dropped from the active membership roll by the Membership Chairperson. No refund of dues will be given. New members joining after January 1st will have their dues prorated. The amount of dues will be reviewed by the Board as deemed necessary and any changes must be recommended by the Board and approved by the General Membership.

## **EXPULSION OF MEMBERS**

Expulsion of a Member of the CLUB requires good cause. The charges must be in writing and show evidence of improper conduct. The charges must be filed with the Board of Directors by a Member or Members in good standing. The charges must pertain to and involve conduct that would be viewed as a negative reflection on the CLUB by the Community, is unbecoming to Amateur Radio as a whole, or involves engaging in illegal activities as determined by State and Federal law.

The Board will then notify the accused Member(s) to come before the Board of Directors in a closed session to answer the charges. The accused Member(s) may request the accuser(s) to be present. If the Board of Directors finds the charges to be valid, a panel of twelve (12) members randomly selected from the General Membership will be convened. The panel will then hear the case and decide upon it. The accused Member will be invited to present their defense of the charges. The panel's findings will be final. If any of the charges levied are found to be true and are of a criminal nature then the Board of Directors must take the appropriate steps to notify any and all agencies immediately to mitigate liability on behalf of the CLUB.

## **REMOVAL OF MEMBERS OF THE BOARD OF DIRECTORS**

An Officer or Member of the Board who has missed three (3) consecutive General or Board meetings without good cause and approval of the President will be automatically removed.

The President will notify the Board of the Member's absence and then create a vacancy by informing the Board thereof. The vacancy will be filled according to the procedures laid down in the By-Laws. An automatic removal may be appealed to the Board of Directors and must be approved by a majority of the Board Members to remain in force.

An Officer or Board Member may be removed from office for good cause. These charges must be made in writing to the Board and may only be filed by a Member or Members in good standing. The charges must pertain to their position and duties must show good cause why the Officer or Board Member should be removed from their position.

## ***The I.E.A.R.C. By-Laws (Con't.)***

The Board will then determine the validity of these charges and whether or not to pursue them. If the charges are found to be valid, the Officer or Board Member will then be called upon to answer them and present their defense.

The Board will have the authority to dismiss the charges or refer them to the General Membership for a vote at the next General Membership meeting. Removal of an Officer or Board Member will then require a two thirds (2/3) vote by the General Membership in good standing who are in attendance.

In the event that the Officer to be removed is the President, the Vice President will preside over the meeting and conduct the vote.

### **BUDGET**

The establishment of the following year's budget will commence at a special meeting of the incoming Board to be held in accordance with the Special Board meeting rules above, and must be completed before the January General Membership meeting. The meeting will be called and chaired by the incoming President. Members of the Club may be present and have input. The incoming Board of Directors must approve by a majority vote the proposed Budget.

The proposed Budget for the following year will be presented to the General Membership at the January meeting for review, corrections and ratification.

### **EXPENDITURES:**

1. Any expenditure not included in the budget may be approved by a motion at either a Board of Directors meeting or a General Membership meeting.
2. It is required that two authorized Officers sign a check. Whenever possible, one of them is to be the Treasurer. Officers authorized to sign checks are the President, Vice President, Treasurer and Secretary.

### **CONSTITUTIONALITY**

If any of the above sections of these bylaws are found to be Unconstitutional and/or Void due to Public Policy or because of changes in the laws of, the State of California or the United States of America then it will only affect those section(s) and have no effect on the remainder of this document.

**Revised August 7, 2010**

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*General Meeting Reports –*  
*As taken by Bob Burnap, KE6QET*

*Minutes of September 4, 2010 –*

Meeting was called to order by, John, K6JGY, President of IEARC, at 9:13am, then followed by the Pledge of Allegiance, and the introduction of the members.

A special announcement was given for the ISS, available for much of the weekend, with some good opportunities to work them via radio for North America.

Motion to accept minutes, for the August 2010 meeting by: Jon KR6ER, Second by Randy KG6AXQ. No discussion motion carried.

Treasurer report: motion to accept Howard, KB6UGS, Second by Darr, WB6GGO. Discussion by John, K6JGY had completed selling some club equipment on E-bay so the proceeds are to be placed in club bank account. Motion carried.

Guest Speaker: Brenden Geary, KJ6HVP.

Subject was on his balloon adventure and his desire to launch a weather balloon to 100,000 feet. He has a camera mounted in the basket to photograph from the balloon. He wants to have photos from the balloon to show the curvature of Earth. Also in the basket are measurement instruments to gauge barometric pressure and temperature. Also a radio beacon to help with locating the payload after returning to the ground.

Committee reports:

Membership: No report.

Newsletter: No report.

Webmaster: New member Alex, KI6ZWP is working with Dave, WA6DF to improve the club website.

Tasma: No report.

VE Testing: No report

ARES and RACES: No report

Tech Committee: No report

Swap Meet: No report.

Education: No report.

Old Business:

Bob KE6QET was appointed secretary until the election.

There was a discussion about the sold radio equipment, also, the purchase of another radio.

The board has submitted the changes to the by-laws to general membership to be read will vote at the October meeting.

## ***New Members:***

*A warm welcome to Alex Tinsley, KI6ZWP, who lives in Montclair, CA. and David Siciliano, KD6DAR, who lives in Fontana, CA. Both of these individual joined the Inland Empire Amateur Radio Club in the last month. WELCOME!*

## ***Thursday Night Net- Doug KE6UUC/IEARC Net Control Operator***

Every Thursday night, the Inland Empire Amateur Radio Club conducts a weekly net. This past Thursday night, the third Thursday of the month, the net was done as a simplex net on the two meters side of the repeater, in which we found as a learning experience for all who participated as well. We all learned that in order to have a proper response, we have to have to relay to net control. With out it the system breaks down.

Some of you have learned that in order to do simplex you need a higher gain antenna and the power to get your transmission out to the proper authorities. I will not give up at doing the net on simplex because we need to know where we can go when the repeater is down. I will be working with some of the veteran club members for getting the simplex net more refined. In the mean time keep working at trying to use simplex and when on the output of the repeater say that you are on simplex so that the other person knows where to put his or her rig to talk to you.

## ***Contest – Jon Herber, KR6ER***

### **Pot Pore**

North American Sprint contest, sounds fun a contest lasting just 4 hours in the middle of the afternoon on a Saturday? Hold on before you rush out to your radio and start calling CQ CQ CQ. There are some unusual rules to this contest. The contest is sponsored by the National Contest Journal or NCJ and comes in September of each year, at least the SSB version does. The object is for North American stations to contact as many licensed radio amateurs as possible. Sounds easy right, just sit back and call CQ on a frequency, not so fast. When you call CQ and someone answers your CQ you give your Exchange: To have a valid exchange, you must send all of the following information: the other stations call your call, your serial number, your name and your location (state, province or country). You may send this information in any order. For example:

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N6TR DE K7GM 154 RICK NC K  
K7GM NR 122 TREE OR DE N6TR K
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So far so good after all ever contest has some sort of an exchange. Then the tricky part, you must leave your frequency and move to another. The person who answered your CQ then takes the frequency and calls CQ for someone to answer them. This is where it can get hard for many Ham's including myself who might not have the largest array of antenna's or a 500 watt amp. We might be in the city with noise level's that are pushing S5 or we might be using a wire antenna that can not be turned like a beam. In any case it can be difficult to hear the station calling CQ the first time. And by the time your figure out who is calling CQ he has made a contact and moved on? Given these rules, it may not be the best contest for new HAMS to venture into unless guided by an old pro with several contest under his belt.

## “Where Does 468 Come From?”

We’ve all seen this number over and over again – the “magic number” that gives us the length of a half-wavelength dipole in feet from the dipole’s resonant frequency:  $L = 468/f$ . In free-space the wavelength in feet is  $492/f$ , but a practical half-wavelength antenna is shorter so the constant is smaller. The number 468 is on the license exams and in the literature. It’s been there ever since I started reading about ham radio in the mid-1960s. It’s a pillar of amateur antenna theory. Every ham is expected to memorize it. And it’s wrong.

It would be more accurate to say that it’s rarely correct. There are certain instances where it’s close, but using it often leads to wasted wire. The usual instructions to a new ham are, “Calculate how much wire you need using  $468/f$  and then add a couple of feet.” What that really means is the value 468 is too small and we compensate for the error by “adding a couple of feet”. If 468 is not right, why do we use it? Answering that question requires a trip along the paths of history.

Recently, I had the opportunity to spend a few days at ARRL Headquarters to plan upcoming writing and editing projects. The ARRL has a great Technical Library with every edition of ARRL publications and technical publications going back decades. (If you ever get close to Connecticut, it’s well worth dropping in on the ARRL for a tour!) I had some time one afternoon and decided to find out when and how the number 468 first appeared in the ham literature.

My first stop was the ARRL Antenna Book’s initial edition in 1939. Sure enough, on page 13 in the chapter on “Antenna Properties”, the familiar formula  $468/f$  appears. The Antenna Book states that the “end effect” due to the attachment of insulators at the ends of the antenna results in the approximately 5% reduction in length from the free-space  $492/f$  to  $468/f$ . The text goes on to state that the percentage “varies slightly with different installations”, but doesn’t say how, nor is a citation provided to identify how the value of 468 was obtained.

Since it is unlikely that the value of 468 appeared in the Antenna Book without any “prior art”, I next turned to the ARRL Handbook’s first edition in 1926. That turned out to be a dry hole – no formula for antenna length and nothing in 1927 or 1928 either. Then, in the 1929 edition’s “Antennas” chapter on page 128, I hit pay dirt! The text defines natural wavelength as the highest wavelength (the lowest frequency) at which the Hertz antenna (a half-wavelength dipole) will resonate. It is stated that “The natural wavelength of the wire... will be its length in meters multiplied by 2.1” Hmmm... 2.1 is 5% longer than would be the free-space value of 2. (Remember, the text is discussing wavelength, not frequency.) Farther down the page I saw, “Speaking in terms of feet, the natural wavelength of the antenna will be its length in feet divided by 1.56.” That equation translates to  $L = (300 \times 1.56)/f$  and  $300 \times 1.56$  is 468! Here were the headwaters of the mighty River 468!

Still, no background for the correction was given. Where does the use of a correction factor originate? Back to the stacks! Did I really want to go through all of the QST magazines until I found my answer? Well, not really, but inspiration struck in the form of the online QST archives. I logged into the ARRL Web site, brought up the QST archive search page, and... hit another roadblock. I couldn’t very well search for “468” because it was unlikely to be a keyword. “Dipole” would return hundreds of hits. Then I realized that in the early days, a half-wavelength dipole would have been referred to as a “Hertz antenna” or “Hertzian antenna”. I entered the former and scrolled down to the very earliest entries.

## *Odds & Ends & Tidbits (Con't.)*

The oldest article on Hertz antennas was in the July 1925 issue by 9BXQ and titled “The Hertz Antenna at 20 and 40 Meters” but it didn’t discuss a formula for length. The next oldest article, October 1926’s “The Length of the Hertz Antenna” by G. William Lang, turned out to be what I was looking for. In the article, Lang (who was apparently not a ham, but worked in the Dept of Radio Operations for Radio Station WBZ in Boston) set up some Hertz antennas at amateur station 1KA and also measured antennas at station 1CK and 1KF. He used an oscillator and a wave meter to determine the frequency at which the antenna resonated then measured the entire antenna - tip-to-tip, including the counterpoise. A table of correction values was derived, with the free-space wavelength in meters multiplied by an average value of 1.46 to get the antenna’s resonant wavelength in feet. This corresponds to an equation of  $L = 438/f$ . This is the first suggestion that the actual resonant length of a practical amateur antenna can be predicted by using a correction factor to a free-space wavelength.

The early experiments of 1925 and 1926 took place on or near 40 meters. In those days, CW operation on what we now call the “low bands” of 80 and 40 meters was the norm. At these wavelengths, a half-wavelength dipole was of a reasonable length. It could be made of ordinary copper wire, probably #8 to #14 AWG, and installed in the back yard at heights of 20 to 40 feet. For these antennas,  $1/8^{\text{th}}$  to  $1/4^{\text{th}}$  wavelengths above ground, a value of 468 is about right, resulting in the equation printed in the ARRL Handbook in 1929.

In truth, many variables affect the resonant frequency of a half-wavelength dipole, the two primary factors being the length-to-diameter ratio of the antenna conductor and most strongly, the antenna’s height above ground. These can combine to change the actual correction factor quite a bit! (Insulation can also affect an antenna’s electrical length.) In my November 2009 QST column, “Hands-On Radio: Antenna Height”, I modeled a typical 20 meter dipole made of #12 AWG un-insulated wire at heights from  $1/8^{\text{th}}$  to 2 wavelengths over realistic ground and calculated the correction factor at each height. It varied from 466 to 481 over that range! Clearly, using  $468/f$  would lead to an antenna being too short most of the time.

If 468 is, too small and rarely correct, what should you do? Realistically, you should expect to trim your dipole to get the resonant frequency you want. Instead of being frustrated that the calculations aren’t exact, learn to adjust the antenna’s length efficiently by using an instrument such as an antenna analyzer. Start with an estimated value based on a more realistic formula such as  $490/f$  that results in a small amount of extra wire for attaching insulators. During tuning, twist the wire connections together or use clamps, then raise the antenna into position and measure. When it’s right, only then solder and weatherproof the connections. Recognize that every antenna’s circumstances are slightly different – height, ground conductivity, thickness of wire, nearby conductors, and so forth.

Another lesson to learn from this exploration is to realize that “magic numbers” in formulas have often been determined through experimentation under specific circumstances. As such, they likely depend on a variety of factors that you may not be able to replicate. They will only approximate what you actually encounter. If the assumptions behind the value are given – you can use that information by comparing it to your situation. If the assumptions are not known – you should allow for variations or try to find a more accurate model representative of your own circumstances.

***Newsletter*** – *Thanks goes out to the all of those people who contribute to this newsletter. Next month, we hope it will be bigger and better.*

Cliff Wickey reports, that the next cutoff date for all the reports and information from the membership is: **October 27, 2010.**



# Inland Empire A.R.C. Inc.

ARRL Affiliate Club #2176

## Membership Application

Effective 6/6/09



Check if new member

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Family Member: \_\_\_\_\_ CALLSIGN: \_\_\_\_\_ CLASS: \_\_\_\_\_

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CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_

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Do You Want a Club Badge yes  no  CHECK FOR NON-PUBLICATION Phone  Email  Address

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Inland Empire ARC owns & operates 2 repeaters, which is funded through our Swap Meet and membership dues, 145.460 – PL 77.0 & 447.220 – PL 77.0 This system operates 24 hours a day, 7 days a week for our members. We ask that you participate in public service or make a donation to help maintain this equipment. Please check the appropriate to participate in public service or make a donation, please indicate below.

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