

# Sierra Signals



Sierra Foothills Amateur Radio Club  
Auburn, CA  
An ARRL Special Service Club

<http://www.sf-arc.org/>

MAY 2009

PO BOX 1005. NEWCASTLE. CA



**At the key of SFARC**

## OFFICERS

### PRESIDENT

Norm Medland, W6AFR  
norm.linda@surewest.net

### VICE PRESIDENT

Al Martin, NI2U  
amartin4@wavecable.com

### SECRETARY

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dxwayne@juno.com

### TREASURER

Leslie Nye, K7NYE  
leslie@incite1.com

### DIRECTORS

George Simmons, KG6LSB  
grsim@mindspring.com  
Chuck Minton, KG6FFK  
chuckminton@wizwire.com  
Kurt Hess, N6RS  
khess01@comcast.net

### REPORTERS

Satellites: Greg, KO6TH  
History: Gary, KQ6RT  
Misc Radio: Fred, K6DGW

## RESOURCES

### REPEATERS

145.430 (-0.6 MHz/PL 162.2)  
440.575 (+5.0 MHz/PL 94.8)  
223.860 (-1.6 MHz/PL 100.0)

### CLUB NET

Thursdays, 7:30PM, K6ARR/R  
145.430

### CLUB MEETINGS

Second Friday of the month,  
7:30PM at the Library, 350  
Nevada St, Auburn CA

### CLUB BREAKFAST

Last Sat of the month at  
Susie's Café, Cirby at Riverside,  
Roseville - 8:00 AM

### NET CONTROL OPS

Dave Jenkins, WB6RBE  
Gary Cunningham, KQ6RT  
Norm Medland, W6AFR  
Casey McPartland, W7IB

### NEWSLETTER EDITOR

Matthew Diridoni, KC6RUO  
916-749-3032  
matteod@comcast.net

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## Calendar of Events

- |           |  |
|-----------|--|
| May 8     | Club Meeting   |
| May 1-3   | PACIFICON 2009 - Circus<br>Circus Hotel, Reno NV.  |
| May 17    | North Hills Radio Club<br>HAMFEST (SWAP)-Natomas<br>High School, off Truxel Rd.<br>Sacramento  |
| Jun 27/28 | 2009 Field Day! - Nyack CA<br>Field Day is a Family Event!<br>Preliminary plans are for a BBQ<br>and Dinner. More specific<br>details will follow. Reserve the<br>dates. |



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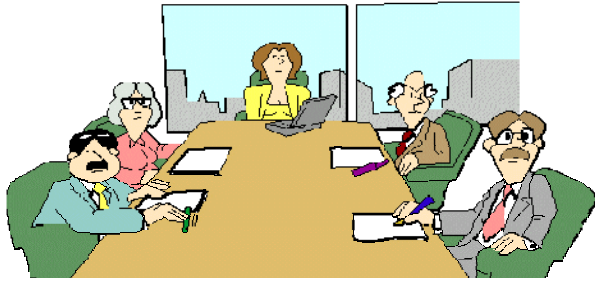
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## May Meeting Program

The program for May is going to be on Space Communications and will be provided by Greg KO6TH  
(See page 7 for a preview)  
**Bring a friend, visitors welcome!**  
**See you all there!**

**We encourage members to receive Sierra Signals via email to save the Club the cost of reproduction and mailing**

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## Board of Directors Meeting

The meeting was called to order by President Norm, W6AFR. A quorum was present. After the last meeting, Jettie, W6RFF brought to the attention of several of the officers that our affiliation with the ARRL had lapsed. It seems that the current officers were unaware that it must be renewed yearly and if the ARRL had not heard from a club in two years, the affiliation would lapse. Norm, W6AFR, Al, NI2U and Leslie, K7NYE, are taking steps to update the membership, including our standing as a special service club.

Treasurer Leslie, K7NYE, informed the board that the club has approximately \$2010 in the bank.

Because AL, NI2U, will not be at the May meeting, George, KG6LSB, will obtain the key for the meeting room from the library.

Norm, W6AFR, informed the officers that he may be able to get a group of members of the club on a tour of the PAVE PAWS radar facility and would make the announcement to the club.

George, KG6LSB, will request of the members volunteers for the MS Walk on 4/25, the motorcycle enduro on 5/3 and a cycle race on 6/6.

Kurt, N6RS, requested status on the backup repeater. Richard, WA6RWS, said the outlook was to get it up in April.

Al, NI2U, said he will bring up Field day to the membership. The meeting was adjourned at 7:28 PM.



### Local ARRL Exam Sessions Courtesy of the ARRL

02-May-2009

**Sponsor:** UNSPONSORED

**Time:** 8:00AM (Walk-ins allowed)

**Contact:** LARRY R HODGE

(916)361-2476

**Email:** LARRYHODGE2000@COMCAST.NET

**VEC:** ARRL/VEC

**Location:** RALEY'S COMMUNITY EVENT CENTER

6845 DOUGLAS BLVD

GRANITE BAY, CA 95746

02-May-2009

**Sponsor:** RUBICON TRAIL FOUNDATION

**Time:** 8:30AM (Walk-ins allowed)

**Contact:** BARBARA D OLSON-ARENZ

(530)644-1135

**Email:** BDOA@COMCAST.NET

**VEC:** ARRL/VEC

**Location:** OAK RIDGE HIGH SCHOOL

1120 HARVARD WAY

EL DORADO HILLS, CA 95762

16-May-2009

**Sponsor:** RIVER CITY ARCS

**Time:** 8:00 AM (Walk-ins allowed)

**Contact:** KENNETH M HALL

(916)492-6115

**Email:** WO6J@ARRL.NET

**VEC:** ARRL/VEC

**Location:** CARMICHAEL ELKS LODGE-USE EAST

ENTRANCE

5631 CYPRESS AVE

CARMICHAEL, CA 95608

06-Jun-2009

**Sponsor:** UNSPONSORED

**Time:** 8:00AM (Walk-ins allowed)

**Contact:** LARRY R HODGE

(916)361-2476

**Email:** LARRYHODGE2000@COMCAST.NET

**VEC:** ARRL/VEC

**Location:** RALEY'S COMMUNITY EVENT CENTER

6845 DOUGLAS BLVD

GRANITE BAY, CA 95746

20-Jun-2009

**Sponsor:** RIVER CITY ARCS

**Time:** 8:00 AM (Walk-ins allowed)

**Contact:** KENNETH M HALL

(916)492-6115

**Email:** WO6J@ARRL.NET

**VEC:** ARRL/VEC

**Location:** CARMICHAEL ELKS LODGE-USE EAST

ENTRANCE

5631 CYPRESS AVE

CARMICHAEL, CA 95608



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Telephone (530) 888-8483



I am all jazzed up about Field Day! Since the Rocklin Jubilee was canceled this year, I don't have to work overtime like I always do. This great tradition, which started 76 years ago, is the premier weekend for many radio amateurs and clubs throughout the United States. According to the ARRL, Field Day is part educational, part operating event, part public relations, and Family fun. There will be something for everyone whether you're new to the hobby or have been at it for a number of years. If you want to improve your CW skills, learn contesting techniques, solve antenna problems, learn how to prepare for an emergency, or just come up and socialize, then mark your calendars TODAY for June 27 & 28th and support SFARC. More details will follow at the next meeting and on the weekly nets. My understanding is there is at least one BBQ planned.

Matt Diridoni, KC6RUO

## SFARC Membership Meeting

The meeting was called to order by President Norm, W6AFR at 7:32 PM. After the flag salute, Norm, W6AFR, shared a bit about his vacation to Egypt (sans radios) and passed around a nice book of photos of the experience. The President also mentioned that he was working on a tour of the PAVE PAWS radar facility for members. The date was as yet unknown but he will provide any details as they become available.

George, KG6LSB, announced that there were three events coming up that would allow members to volunteer to aid the community. The first is the MS walk on April 25. The next is the motorcycle enduro on May 3 and then finally a new event for us, a cycle race on June 6. Let George know if you can help out the community.

Gene, KG6NYH, also reminded members that they could also help out with communications for the Western States 100 and the Tevis Cup.

Vice-President AL, NI6U, brought up Field Day, to be held the last full weekend in June. A discussion as to location and all other details would be considered. Input is definitely wanted. Treasurer Leslie, K7NYE, informed the members that the balance in the club's account was \$2010.03 and that the PG&E bill and phone bill were running in the range of \$26 and \$15 monthly.

The last VE session produced 7 examinees that were assisted by 9 volunteers. This session is held on the first Saturday of the month at the Raley's located at the Intersection of Auburn-Folsom and Douglas. All are welcome to drop by even if not taking a test.

The space station has a new crew so it might be a little less active for awhile, according to our satellite reporter, Greg, KO6TH. He advised to listen on the down link frequency of 145.800 MHz.

Good news from Dottie, K6DMS, was that there was no call for any "sunshine" during the last month.

Jim, K6ARR, found the repeater to be working fine at the time; he will continue to keep an eye on it. If you have yet to take advantage of the CalStar air ambulance group plan as previously announced, see Leslie, K7NYE, for details. A belated introduction of the members took place at this point in the meeting.

Don't forget the club net on Thursday evenings at 7:30 PM on the club repeater and the club breakfast on the last Saturday of the month at Susie's Cafe in Roseville.

Al, NI6U, was the presenter for the monthly Ten-Tech. His topic was baluns and he came well prepared with knowledge and a nice handout. He discussed current and voltage types and then the balancing methods of the use of transformers, resistors and core types.

The main program was the first half of a DVD tour of ARRL headquarters.

The drawing followed and the meeting was adjourned at 9:07 PM.

Respectfully submitted,  
Wayne Stilwell, W6DT, Secretary

# Miscellaneous Radio

By Fred Jensen, K6DGW

## Test Equipment

(or “How to Get a Raise Without Calibration”)

When I was a 16 yr-old, I read a short story that has stuck with me ever since. It was set a few thousand years in the future, and the characters were kids about to become “Registered <somethings>,” such as “Registered Metallurgist.” The “Registered” title was really important in society at this future time because apparently without it you were destined to spend your life asking people, “Do you want fries with that?” Education had become something quite different then. For example, the metallurgy final exams, which were called “Olympics,” consisted of using machines [test equipment] to determine the composition of unknown samples they were given, and the kids were totally dependent on the accuracy [i.e. calibration] and functioning of these machines.

George, the main character, was sent to live with some others rather than competing in the “Olympics” and being hired as a Registered Programmer as he hoped. He didn’t know why, ultimately tried to escape [actually did], and the wrinkle at the end of the story is that he finally figures out that his job is to invent and create the test equipment all the “Registered’s” did not understand and just blindly used and trusted. Every time I fire up my scope or service monitor [neither of which has been calibrated in a couple of decades] to work on something, I am reminded of this story and often wonder, “Is there a way I could do this without blind reliance on questionably calibrated test gear?”

I left for college just before my 17<sup>th</sup> birthday with an amateur extra, a 1<sup>st</sup> phone and a 2<sup>nd</sup> telegraph. I was one of the nerds in high school, but you already knew that. The 1<sup>st</sup> phone got me a job on the engineering crew at KSBY, Channel 6 in San Luis Obispo and I was able to support myself [and thus not only feel good, but also be somewhat insulated from Mom and Dad’s control ☺]. In those days, we had to do a PoP [Proof of Performance] on the transmitters every six months, and one of the requirements was to measure the actual deviation of the aural transmitter to check the calibration of the HP

Modulation Monitors in the rack in the control room. The Chief Engineer assigned that task to me. When I said, “How?” he said, “See if you can figure out a way – but it can’t depend on the periodic calibration of any of our test equipment.” Fortunately it was during a break at school and I had time ... I think he knew that, and wanted to occupy the time for me lest worse things occur. ☺

I agonized over this and did a lot of reading on frequency modulation, and I’ll spare you all the dead ends I went down, but I was making no real progress when I ran into one of my math professors in the school cafeteria. We ate together, I told him what I was trying to do, and he said, “Well, if I were you, I’d go investigate Bessel functions.” I was puzzled how that would help, but he was my professor and someone I respected, so I investigated.

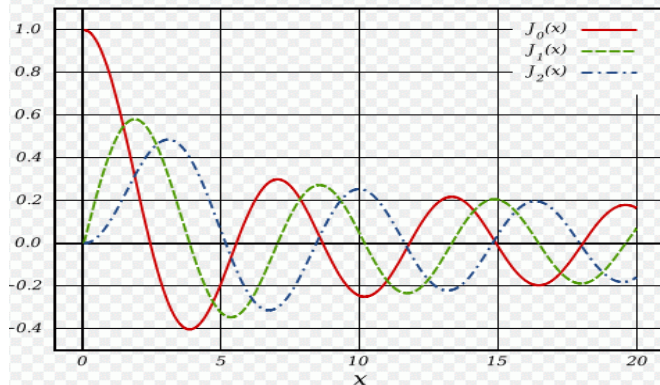
Bessel functions carry the name of Friedrich Bessel, an early 19<sup>th</sup> century mathematician and scientist, and they originally arose when he was calculating astronomical things. They come in two “kinds,” creatively named “First Kind” and “Second Kind,” and it’s common to denote those of the “First Kind” with an upper case italic *J*. There are an infinite number of them, each denoted by a subscript. In case you are interested, the Bessel functions of the first kind are given by the equation,

$$J_{\alpha}(x) = \sum_{m=0}^{\infty} \frac{(-1)^m}{m! \Gamma(m + \alpha + 1)} \left(\frac{x}{2}\right)^{2m+\alpha}$$

where that little alpha denotes the “order” of the function [or, you might just want to take my word for all of this ☺]. For my assignment, only *J*<sub>0</sub> mattered. What do some arcane astronomical mathematics have to do with measuring the deviation of an FM transmitter? Stick with me, this will connect.

The NTSC aural carrier is at the upper end of the 6 MHz TV channel and at that time, a deviation of  $\pm 25$  KHz equaled 100% modulation. Now, AM creates two identical sidebands on either side of the carrier, and the energy in the sidebands adds to the total carrier energy so the total instantaneous transmitted power varies with the modulation. FM is quite different. It too generates sidebands, but instead of just one on each side of the carrier, there are an infinite number of them on each side, spaced out at the modulating frequency. Their amplitudes decline as you go further out, and for all practical

purposes become very close to zero eventually. That point is essentially what we call the “deviation,” and defines the practical bandwidth of the FM signal. Another difference is that the total power output of an FM transmitter is constant. Since the power in the sidebands has to come from somewhere, and the only available place is the carrier, the amplitude of the carrier thus varies with the modulation level. And this was the clue to my task, for it turns out that the power in the carrier follows the zero-order Bessel function [ $J_0$ ], the power in the first sideband follows the 1<sup>st</sup>



order function, and so on for each of the sidebands.

You don't really need to go through all the math here, Bessel functions are tabulated in reference books. You can just look them up. The figure shows what they look like. The solid one is  $J_0$  and represents the power in the carrier. Note that  $J_0$  starts at one, meaning with no modulation, it is just a CW carrier. All the higher order functions begin at zero which we would expect – no modulation = no sidebands. As you increase the level of the modulating tone, the power in the carrier decreases, and the power in the sidebands increases. The sum of all the functions for any  $X$  is always 1.0, thus the sum of the power in all the sidebands and the carrier is constant. Note also that all the functions decline in amplitude, just as the FM sidebands do.

The key to my assignment was that, at some point, that solid curve goes to zero. That is, at some modulation level, the power in the carrier goes away – everything is in the sidebands. The first zero occurs at a modulation index of 2.405, the second at 5.52, third at 8.65, and so on. The critical thing for my job was that, **“Zero is the only value that doesn't require a calibrated measuring instrument.”** I can measure zero volts with anything that indicates voltage, including an S-meter; it doesn't have to be

calibrated. Zero is zero, as in “nothing.” And, in case you forgot, modulation index is just the deviation divided by the frequency of the modulating tone.

I needed an audio source with a precisely known frequency [couldn't use one of the audio signal generators, they relied on calibration], so I tapped a sine wave signal out of one of the TV sync generators that happened to be exactly one fourth the TV line rate of 15.734 KHz. Our two TV sync generators were phase-locked to the network's line rate which in turn was locked to an NBS frequency standard and thus in continuous and perpetual calibration. I “lugged” my SX-28 [the Hallicrafters SX-28 comes in at just under 100 lbs] and VHF converter up to the transmitter, tuned in our aural signal at the top end of Channel 6, put the crystal filter as narrow as I could to exclude sideband power, and sure enough there was the carrier with no sidebands. As I increased the level of my 3.936 KHz modulating signal, the carrier amplitude on the S-meter fell until it disappeared. I increased the level until the carrier just came back, and then marked half way between those points as the real zero. This corresponded to 9.46 KHz deviation or 37.8% modulation and I recorded what the HP instruments said [they were both very close]. I then increased the level until I found the second zero which corresponded to a deviation of 21.71 KHz or 86.8% modulation. Finally, I went to the third zero which corresponded to a deviation of 34.02 or 136.0% which was almost exactly full scale on the monitors.

I wrote everything down including how I did it and left it on Charlie's desk. On my next shift, he came into the control room with a big grin and gave me a \$1.00/hr raise. This was significant for me since my rate had been \$3.25/hr, above the “Do you want fries” level for those days, but the additional buck an hour was welcome – I was finally able to fix the brakes on my fairly old truck. I didn't know it then, but this was already known as the “Bessel Zero Method.” So much fun to re-invent things, I think he could have told me, but then I wouldn't have gotten the raise.

I've always found it somewhat fascinating at the connections that occur in the world. Who would ever think that a dreary mathematical function that arose from computation of the perturbations of the orbits of planets and moons would also describe the characteristics of a modulation

technique that wouldn't be invented for another century? You can read "*Profession*" by Isaac Asimov on the web at [www.abelard.org/asimov.php](http://www.abelard.org/asimov.php). The fact that Bessel's name was Friedrich, German for my given name, has no bearing on this tale.

73, Frederdrick, K6DGW

**North Hills Radio Club 2009 SWAP Meet Information**

<http://www.k6is.org/>

**MAY 17, 2009**

**Natomas High School, 3301 Fong Ranch Rd  
Sacramento, CA 95834**

Talk-In: 145.19(-) (PL 162.2) & 224.4(-) (no tone), For more information, contact, Les Cobb, W6TEE, 916-481-6040, Email: [w6tee@qsl.net](mailto:w6tee@qsl.net).



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Saturday 9 a.m. to 3 p.m.

**Rumors**

By Fred Jensen, K6DGW

Word has apparently gotten out that I will not be participating in the WSER and Tevis this year so I thought I'd give everyone the straight poop. Last summer, the VA diagnosed me with prostate cancer. It was very early stage [great call by my VA doctor!] and very small. It was also not at all unexpected. While serving in Vietnam in the mid-60's, my combat team and I got some extreme Agent Orange exposure when the Ranch Hands [the defoliation unit] overflowed our position and emptied their tanks on us several times. It soaked us and our equipment and got into our rations and water. It also started corroding our rifles.

I began night jump school with 24 airmen in early 1964. In the next 3 ½+ years, I lost four of them to combat, and 21 of us came home at the very end of 1967. In the years since, we've lost two to lymphomas and one to leukemia, all likely the

result of the exposure, and two to accidents. There are 16 of us still alive. I am the 16<sup>th</sup> and last member of the team to be diagnosed with prostate cancer, and of course, being "last" gave my guys something to rag on their Lieutenant for awhile. ☺

They did the radioactive implants on 11 Sep 08, 73 of the little guys. One of the few effects of the radiation is that my energy levels are depressed and I get tired quickly. I'm told this will bottom out at about the 1 year anniversary and then will improve over the next year. So, I'm going to sit this year out of the events. Sadly, I do not glow in the dark. Thanks to all who have inquired or sent cards. I'm OK.

73,

Fred K6DGW



**Fifty Years Ago at SFARC**

Meeting of May 6, 1959

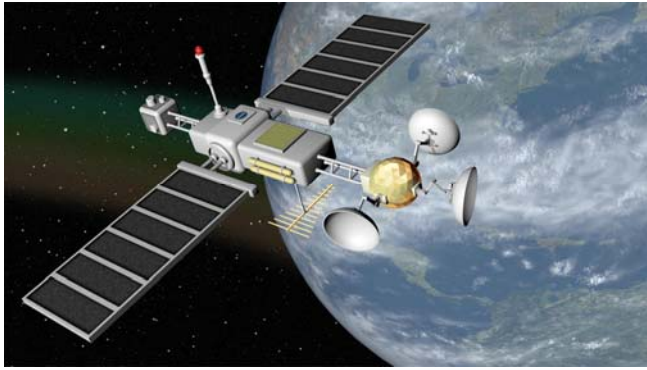
Don Richier resigned as vice president. Lloyd Evans and Doctor Lynn present. Bruce Witmer has signal generator (Hickok) for sale. Also a DX 100. \$5.00 received from Doctor Lynn. Mike Bowman won \$5.00 gift certificate. Gus explained his transistor receiver and 522 transceiver. Also he talked on his experimental 2 meter rig.

W.G. Dowdy, Secretary



**Don Tollefson**  
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SFARC SATELITE REPORT  
GREG DOLKAS, KO6TH

In preparation for next month's club meeting presentation, here's a puzzle that ties in to the topic of orbital mechanics.

Many years ago in Junior High School, Peter, a friend of mine, had a newspaper delivery route. It's a quaint concept these days, but that was a different era back then. His job was performed with two large sacks of neatly folded papers slung over his shoulders, as he rode around the neighborhood on his bicycle, delivering the afternoon paper with a strong throw. He took great pride in his aim, putting each paper on the porch without knocking over the plants or crashing it through a window. Putting a paper on the roof, in the bushes, or under a parked car was a definite no-no. As I said, it was a quaint concept.

One house on his route was particularly problematic. It was an "L" shaped house, with the garage in front as one side of the L. There was a long porch on the side the garage (perpendicular to the street), with the front door at the far end. The garage was on the side of the porch from which he approached the house, so as he rode up to the house along the street, he could not even see the front door until he was even with it. Making things worse, there were poles holding up the porch roof. His challenge was to throw the paper and land it on the front door mat, without hitting anything. (*Your* challenge is to understand what I just described!)

**The question:** In which direction did he have to throw the paper?

- A. Cocking his arm as he rides, aim straight at the front door and throw hard, just as it comes into view.
- B. When the door appears, aim a little beyond it, in the direction of his travel.
- C. Ride up just even with the front door, but aim backwards into the garage wall.
- D. Stop the bike and walk it over. He never could throw

it there because the garage kept blocking the way.

-----  
Answer: C. Because of his forward motion, Peter had to wait until he had just passed the garage (so the door was in sight, straight down at the end of the porch), and aim his throw significantly backwards into the garage. Aiming backwards canceled out his forward motion, allowing the paper to sail directly down the length of the porch, and land on the front door mat. The faster he rode, the farther backward he would need to aim, in order to compensate.

So, what does this have to do with orbital mechanics?

Imagine that you want to put a satellite into a polar orbit (one that circles the Earth top to bottom, from one pole to the other). Your launch pad is in Florida, and remembering that the Earth is spinning, in which direction do you launch the satellite? The answer will be revealed at May's club meeting.

**DON'T FORGET TO CHECK OUT OUR WEB PAGE**

<http://www.sf-arc.org/>



HOME Meetings Breakfast Repeaters Nets Officers Newsletters Member Application

Welcome to the Sierra Foothills Amateur Radio Club's Website

Please use the navigation buttons above to view our site 

**Next Meeting: April 10th, 7:30 pm**

**Next Breakfast: April 25th, 7:30am**



**Turlock Amateur Radio Club**

**Spring Auction**

Saturday - May 2, 2009

Doors open 8:00am Auction begins 9:00 am

Turlock Youth Center, 1030 East Avenue, Turlock California

SIERRA FOOTHILLS AMATEUR  
 RADIO CLUB  
 P.O. Box 1005  
 Newcastle, CA 95658

PLACE  
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**SIERRA FOOTHILLS AMATEUR RADIO CLUB  
 2009 MEMBERSHIP APPLICATION**

**Please Print**

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Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Associate Name: \_\_\_\_\_ Call: \_\_\_\_\_ Class: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Application: (Circle One) New Renewal

Member Dues: Circle Amounts That Apply. Applications (for new members only) received in the middle of the year will be pro rated. Contact the President or Treasurer for exact rate.

Membership: (P)	\$22.00	Name Badge: (R)	\$7.00
Associate: (Q)	\$ 7.00	Repeater Donation: (S)	\$ _____
Auto Patch Donation: (T)	\$ _____	Newsletter Booster: (V)	\$ _____
Misc. Donation: (X)	\$ _____	Christmas Donation: (W)	\$ _____
<b>TOTAL: (Y)</b>		<b>\$ _____</b>	

<b>OFFICE USE ONLY:</b>		<b>DO NOT WRITE BELOW THIS LINE</b>	
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