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SIGNALS

Rockwell Collins

Monthly Newsletter of the

Amateur Radio Club

Volume 36 Issue 10 **Web Site** http://www.w5rok.us **July 2015**

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RCARC
Membership Meeting

Tuesday 28 July 2015
1700 Social 1730 Meeting
1800 Program

Methodist Richardson Medical Center
At Bush/Renner/Shiloh Intersection
Second Floor Conference Room 200

Subject:
Modeling in 3D
By Konley Kelley

Local Club News

Meeting Notice

This month's presentation showcases the work of an individual who has blended his love for history, scale modeling and 3D modeling into a fulfilling hobby and creative outlet. Using examples drawn from history, the presentation walks the audience through the research, planning, design and delivery of a completed 3D project. 3D modeling tools and techniques are covered as well as the role of photography and Photoshop. The presenter also showcases his favorite examples of past projects, drawing on some of the most famous aircraft, armor and ships from 20th century military history. Konley Kelley is a published author and award-winning scale modeler and digital artist. He is a member of the Commemorative Air Force B-29/B-24 Squadron and trained as back-end crew on "FIFI" and "Diamond Lil." He is also publisher of the Squadron newsletter. Konley is the Director of Corporate and Community Relations for Richland College where he has worked for 18 years. He resides in Carrollton and is happily married and the father of two children, including a new high school graduate headed to UNT. Go Eagles!

W5ROK Field Day Report

W5ROK operated in the annual ARRL Field Day. There were 4 licensed operators: Bob Kirby K3NT, Joe Wolf N5UIC, Gerald Dehoney KA0QIZ and Dennis Cobb WA8ZBT. Vickie Marrero also operated. W5ROK had 1168 contacts of which 396 were phone and 772 CW. Here is the breakdown.

Band	Mode	QSO's	Points
7	LSB	78	74
14	CW	372	618
14	USB	126	104
21	CW	228	392
21	USB	67	61
28	CW	172	292
28	USB	63	45
50	USB	62	44
TOTALS		1168	1630

W5ROK only operated for 16 of the 24 hours. Due to the limited number of operators, there was no operation between 0200 Sunday and about 1000. W5ROK was "silent" for that 8 hour period.

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VE SESSIONS

Dallas tests are held on the fourth Saturday of each month at 1000 hrs. 13350 Floyd Rd. (Old Credit Union) Contact Bob West, WA8YCD 972.917.6362

Irving tests are held on the third Saturday of each month at 0900. Fifth and Main St. Contact Bill Revis, KF5BL 252-8015

McKinney VE test sessions are held at the Heard Museum the first Sunday of the month. The address is 1 Nature Place, McKinney TX. The time of the testing is 1430, ending no later than 1645. ***Note: no tests given on holiday weekends.***

Garland testing is held on the fourth Thursday of each month, excluding November, and begins at 1930 sharp. Location is Freeman Heights Baptist. Church, 1120 N Garland Ave, Garland (between W Walnut and Buckingham Rd). Enter via the north driveway. A HUGE parking lot is located behind the church. Both the parking lot and the Fellowship Hall are located on the east side of the church building, with big signs by the entrance door. Contact Janet Crenshaw, WB9ZPH at 972.302.9992.

Plano testing is on the third Saturday of each month, 1300 hrs at Williams High School, 1717 17th St. East Plano. Check Repeater 147.180+ for announcements.

Greenville testing is on the Saturday after the third Thursday, 1000 hrs at site TBA, contact N5KA, 903.364.5306. Sponsor is Sabine Valley ARA. Repeater 146.780(-) with 118.8 tone.

Richardson The Richardson Wireless Klub (RWK) VE team hold license testing on the third Thursday of each month at St. Barnabas Presbyterian Church, 1220 West Beltline Rd. Testing begins at 1900 hrs in room 12. Enter through the Northern most door on the east side of the church building. For further information contact Dave Russell W2DMR, at 972.690.9894 or E-mail warhog4@tx,rr.com.

President's Message

THIS SPACE RESERVED FOR PRESIDENT'S AND/OR VICE-PRESIDENT'S MESSAGE

Secretary's Report

23 June 2015

The meeting was called to order by President Mike Schmit WA9WCC at 1745.

The following members were present at the meeting:

Dennis Cobb	WA8ZBT
Chris Havenridge	KF5GUN
Bob Kirby	K3NT
Mike Schmit	WA9WCC
Jim Skinner	WB0UNI
Joe Wolf	N5UIC

Officers and Committee Reports:
President's Report: There was no formal President's Report.

Vice-President's Report: There was no formal Vice President's Report.

Secretary's Report: The Secretary's Report is in this newsletter.

Treasurer's Report: There was no formal Treasurer's Report.

Website Manager's Report: There was no Website Manager's Report.

Station Trustee's Report: There was no Station Trustee's Report.

Database Manager's Report: There was no Database Manager's Report.

Old Business:
Bob Kirby, K3NT, thanked Chris Havenridge, KF5GUN, for his working with IT in getting the phone patch working. Chris and Dennis Cobb, WA8ZBT, got the phone line working for auto patch. It also allows control operator access.

New Business:
General:

Bob also thanked all those who assisted in setting up for Field Day.

Bob was at the Ham Radio Outlet and found that they sell the Yaesu Fusion repeater (open source). He also mentioned that Frank Krizan was heard on the W5VV, 442.8 MHz repeater inquiring about batteries for clocks. He also wants to buy an antenna boss.

Joe Wolf, N5UIC, mentioned that pads and pencils are needed in the radio room and he will send a list of everything else that is needed to Bob.

Dennis recommended buying new memory keyers. Also, he said we should consider buying a new radio since we currently have sufficient funds.

Dennis also said a 30/17/12 meters antenna is needed—maybe a vertical or M^2 log periodic.

Field Day Preparation: Dennis, WA8ZBT reported on the state of Field Day preparation.

All three computers are synced; could operate class 3D, but may not be a good idea.

N1MM is installed and checked out.

If modes other than CW and phone are going to be operated, setup will be required.

Otherwise, everything appears to ready. Participants will meet at approximately 1130 Saturday to do the final setup.

40 Meters Report: Bob reported fantastic operation on 40 meters recently—10 over S9 listening to a SWL station!

Adjournment:
The meeting was adjourned at 1817.

Program:
The program consisted of a video on Field Day operation.

RCARC Community Service Activities

Siren Testing Dennis Cobb WA8ZBT, Chris Havenridge KF5GUN, John McFadden K5TIP and Jim Skinner WB0UNI participated in the Richardson emergency siren testing on 1 July 2015. All sirens tested operated normally, with one siren unreported due to lack of an observer. The siren testing is performed on the first Wednesday of each month. The sirens are monitored by amateur radio operators and reports made using the Richardson Wireless Klub (RWK) repeater at 147.120 MHz.

Crime Watch Patrol Jim Skinner WB0UNI participated in Richardson Duck Creek Crime Watch Patrol (CWP). CWP members, after successful completion of Richardson Police Department Training, patrol their neighborhoods and report all suspicious activities to the Police Department.

NIST and NTIA Seek Industry Partners for Public Safety Communications Test Bed

The Commerce Department's Public Safety Communications Research (PSCR) program is signing up a new round of industry collaborators for the test bed used to evaluate advanced broadband equipment and software for emergency first responders.

So far, 39 telecommunications companies have signed new, five-year Cooperative Research and Development Agreements (CRADAs) to participate in the test bed program, according to Dereck Orr of the National Institute of Standards and Technology (NIST).

Firefighter Phone Credit: ©Lakeview Images/Shutterstock

The PSCR is a joint effort of NIST and the National Telecommunications and Information Administration. The test bed, the Public Safety Broadband Demonstration Network, has been operating at the Commerce Department's Boulder Laboratories for more than five years. It is part of the PSCR's effort to provide objective technical support—research, development, testing and evaluation—to foster nationwide interoperability in public safety communications.

Based in part on test bed evaluations to date, the PSCR has worked with industry organizations to get public safety requirements included in next-generation (LTE) communications standards, and contributed data to support standards for The First Responder Network Authority (FirstNet), an independent authority created to establish, operate and maintain an interoperable public safety broadband network.

The current version of the PSCR demonstration network was developed with equipment and support from more than 70 vendors. The network has begun testing new equipment and software capabilities such as how to best identify priority users and enable them to take over bandwidth from other network users in emergencies, Orr says.

Vendors and other telecommunications companies wishing to become CRADA partners on the demonstration network project may contact Dereck Orr at (303) 497-5400, ordereck.orr@nist.gov. Partners may participate in many ways such as donating equipment, providing access to infrastructure or supporting tests.

Media Contact: Laura Ost, laura.ost@nist.gov

(*Contributed by Bob Kirby K3NT*)

Seeking Ham Operators To Be Placed in IT Industry (In Dallas Texas)

As a ham operators, we have a thirst for technology. Many of us converted the ham experience into a career in telecommunications.

Unfortunately, various telecom skills are fading away, and so are companies (like Nortel).

Today it is all about IT technology and many ex-telecom engineers are forced to retool, and the natural progression is to the IT industry.

ITC-L is a local licensed vocational school in the state of Texas, and we are expanding to a new building in Richardson. Our programs are only 12 weeks, 4 hours a day, and the State of Texas mandates we place a HIGH percentage of our students.

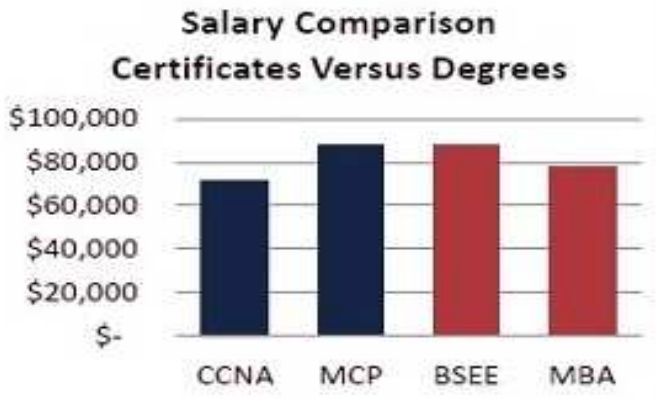
ITC-L is specifically targeting ham operators. ITC-L will accept only 25 students. We believe a technologist (ham operator) has the background and will be the easiest to place in the IT industry.

ITC-L is local (Richardson or Allen Texas), and our classes start on Sept 1, completing on Nov 20, 2015.

The IT certificates that you will obtain are A+, N+, MCP (Microsoft), and CCNA (Cisco),

Unlike college or seminars there is no mandate to place the student. We (ITC-L) are mandated by the State of Texas, hence we are only enrolling those we can place!

Many of you may recall the First Class FCC license. During those days the salaries for FCC First Class holders were on a par with BSEEs.



The same is today, however it is the IT certificates that pay better than even the BSEE, or MBA, as shown on the table to the left.

There are 477 Cisco Channel partners alone in the Dallas area, and 100+ Microsoft channel Partners. The demand is overwhelming

(*Contributed by Steve Phillips K6JT*)

"Phone Fray" — New SSB Contest

A new 30-minute contest has been developed with the notion of enticing newcomers to Ham Radio or contesting, others who want to hone their operating skills or test out stations and others who need to add more States for awards. Here's a summary of the announcement from the creators:

It's called Phone Fray. The start date is Tuesday (evening) July 28 (July 29 UTC). To accommodate busy schedules, the contest lasts for just 30 minutes and will be great for fast-paced NAQP practice and welcoming new contesters of all skill levels. 100 watts max makes everyone loud! No logs, just report scores to 3830scores.com. The schedule is every Wednesday, 0230-0300 UTC (which is Tuesday night from 9:30 to 10:00 p.m. Central Daylight Saving Time).

The Phone Fray is planned to operate every Tuesday throughout the year and offers a challenge for personal operating improvement. You might only work one station the first Tuesday. Set a goal to double that the following week. Good operators will probably achieve 30 QSOs in the 30 minutes. Experienced ops may be able to hit 90 or 100, but don't let that intimidate you. Use this late night contest as a learning opportunity. If you're new to contesting, you'll learn how to score your results and a few things about reporting your score on-line.

The rules for this new weekly SSB event, based on the North American QSO Party (NAQP), are located here: http://www.perluma.com/Phone_Fray_Contest_Rules.pdf

Exchange: Name and State/Province/NA_Country

A free Yahoo Group reflector has been formed for Phone-Fray communications. Please consider joining in the fun using the following link: https://groups.yahoo.com/neo/groups/PhoneFray/info

If this link does not work, send me a note and I will send you a direct invitation to join the group. Any questions, please send me a note any time. Thanks! 73, Dean, NW2K nw2k@arrl.net.

(*Contributed by Frank Krizan, K5HS* (*ex KR1ZAN*))

Membership Renewals

It is time for membership renewals for 2015. Please get your renewals in to Joe Wolf N5UIC. Joe's email address and telephone number are on page 2 of this newsletter.

Understanding Antennas For The Non-Technical Ham - Part 11

Each month for the next year or so, we are including in ***SIGNALS*** *excerpts of a book by Jim Abercrombie – N4JA (SK) on antenna design. This book is available online for free and can be located at http:// www.hamuniverse.com/basicantennas.pdf. Now, part 11...*

Understanding Antennas for the Non-Technical Ham

A Book By Jim Abercrombie, N4JA (SK)

Illustrations by Frank Wamsley, K4EFW

Edited by Judy Haynes, KC4NOR

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Edited for the web , N4UJW

XIII VERTICAL ANTENNAS

1. Why Verticals Are Used

Vertical antennas have the radiator mounted at right angles to the earth. The vertical is used whenever you desire to radiate your signals in all directions at a low angle. Low angle radiation is needed to work DX effectively. Radio waves traveling to the ionosphere where they are reflected need to hit the ionosphere at a point near the horizon in order to reflect farther around the curvature of the earth. In order to get a dipole to radiate a strong signal at low angles, it has to be more than a wavelength above ground. A low dipole is not particularly a good DX antenna for 80 and 160 meters. However, the average dipole at modest heights will outperform any ground-mounted vertical having a poor ground system. Vertical antennas work very well at low frequencies such as the broadcast band, but the ground losses increase as we move higher and higher in frequency (Refer to section V concerning ground-wave propagation). It is very difficult to get a good ground for a ground-mounted vertical unless you live next to salt water. Vertical antennas, because they are unbalanced antennas, do not need baluns. They are normally fed with coax.

If a ground mounted, quarter-wave vertical is all you can put up at your location (QTH), then use it. However, it will be a mistake to put up this antenna if you are not be able to have a ground radial system and are able to put up a dipole. Most ground mounted quarter-wave verticals manufactured today are trapped in order to work multiple bands.

The ground-mounted vertical also needs to be put out in the clear away from RF absorbing objects. These facts do not apply to half-wave verticals, which are in themselves different animals, nor do they apply to high quarter-wave verticals using elevated radials.

The approximate length of a full-sized resonant quarter wave vertical can be found by dividing 234 by the frequency in MHz. Note: 234 is half of 468, the number we used to calculate the length of a half-wave antenna. The actual length for resonance may be a little different from what you calculate, because of the diameter of the vertical element. Trapped verticals are physically short of a quarter

wave in length because the traps load them. The vertical is fed at one end at the bottom where it is insulated from the ground. The center conductor of the coax connects to the vertical element and the shield is connected to the ground system.

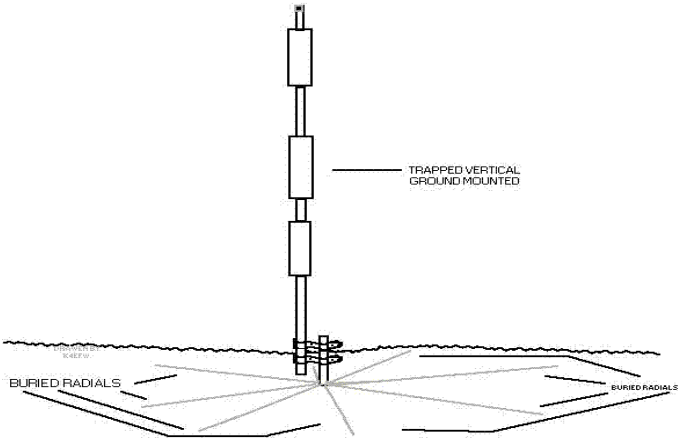

Figure 27. Ground Mounted Trapped Vertical

2. Disadvantages of Using Quarter-Wave Verticals

The most obvious disadvantage of using any vertical antenna is on 80 meters it has less than optimum high-angle radiation needed to work stations within a few hundred miles. Ground-mounted quarterwave verticals use a ground system for the other half of the antenna and the ground system losses can be very high. The ground wave signal should eventually radiate in space at angles at the horizon, but since there are very high losses in the ground wave at amateur frequencies, a ground-mounted vertical has almost no signal down near the horizon. At angles below 10 degrees, the signal will be greatly attenuated.

A ground-mounted quarter-wave vertical with an ideal ground should have an impedance of 35 ohms resistive. If you were to measure its impedance, and it measures 60 ohms resistive on an antenna analyzer, it means it has a loss resistance of 25 ohms. Moreover, that loss resistance is mostly in the ground system. Under these conditions, only 58% of the power will radiate as RF, although you will have a 1.3:1 SWR. Forty-two percent of the power will be turned into heat by the loss resistance. With the feed-point being at ground level, some more loss comes from the radiated wave being absorbed by power lines, trees, and buildings with its associated wiring. That loss does not show up in antenna analyzer measurements.

The best ground system for a ground-mounted vertical is 120 wires, called "radials," radiating from the feed-point like the spokes of a wheel. These radials need to be a quarter wave long. At the feed-point, the radials are bonded together and are fed from the shield side of a coax cable. Not many amateurs have the resources to build such a ground system. Many short radials will be more effective than a few long ones. When using a ground mounted vertical, many hams drive an 8-ft. ground rod into the earth for their ground system. The ground losses are very high in that case. Using a ground rod for the ground system of a vertical antenna confirms the old adage: "Verticals radiate poorly in all directions."

To eliminate ground losses, you can use an elevated quarter-wave vertical with an elevated ground system called a "ground plane." The ground plane vertical, as it is called, needs to be mounted high enough to prevent the return path from coming back through the earth ground. Ground plane verticals need to be mounted above nearby objects that absorb RF. They will be nearly 100% efficient if they are high enough. The ground plane consists of two or more radials, but most ground planes have three or four. The ground plane radials do not have to be resonant, but should be at least a quarter wave long. An elevated ground-plane vertical will be more effective for working DX than a dipole.

3. Long and Short Verticals

Verticals can be less than a quarter wave in length. They can be loaded by coils or linear loading sections or a short vertical can be fed directly with a tuning unit at the feed-point. The loss resistance in a short vertical may be appreciable. Since the radiation resistance is very low at the feed-point of a short vertical, the current at the feed-point will be very high. The more current that flows into loss resistance, the higher the loss will be. Any coils used in the tuning unit and for loading should be made of as heavy a conductor as possible, since these can cause appreciable loss when the current is high. This is also true for the ground system. The loss described here is called "I squared R loss", which means the loss in watts is found by multiplying the current times itself and then multiplying that answer by the loss resistance. That means if the current into a lossy antenna system is doubled, the power lost in watts is increased four times. Making a vertical very short and tuning it to resonance with an inductor will also result in an antenna with a very narrow bandwidth.

A more subtle loss of energy in very short vertical antennas is coronal discharge from the tip end of the vertical. Corona occurs when the voltage is very high at the end and electrons flow out into the air. This can be visible at night if the transmitter power is high and you are at a high altitude. Power is lost from the antenna when corona is produced because corona is a form of light and light is another form of energy.

In 1973 while we were working for radio station WWNC in Asheville, North Carolina, a trapped vertical for 10 through 80 meters was erected. The length of the antenna was only about 25 feet. A loading coil near the top made it resonant on 75 meters. The ground system was the metal body of a 75-foot long mobile home. Fair reports were received from this set-up. The reports were not bad because of our having a good ground. One night, while working 75 meter SSB, one of the neighbors came over and said, "Youre tearing up my TV." Checking all of the inside connections proved they were tight. Our wife keyed up the transmitter

while we made a trip to the antenna to check the connection there. Before arriving there, looking up, we saw blue fire coming off the end of the vertical. The corona was responsible for the television interference (TVI). It was visible because Asheville is at a relatively high altitude and the transmitter was running 700 watts. An inverted-V was put up, the TVI disappeared, and better signal reports were received.

You can realize up to a 1.5 dBd gain from a vertical antenna by making it longer than a quarter wave, but there is a limit to how long to make it and still get low angle radiation. That limit is 5/8th-wave. To find the length of a 5/8th-wave vertical, divide 585 by the frequency in MHz. For example, to calculate the length of a 5/8th-wave vertical for 20 meters (14.000 MHz) divide 585 by 14.0. It equals 41.786 feet or approximately 41 feet 9.5 inches. A tuning unit will be needed at the feed-point of this antenna, as the impedance of a 5/8th-wave antenna is low and high current will flow into it. A tuning unit will usually have enough bandwidth to cover the entire band on each band of 20 meters and higher. A tuning unit is also called a matching network. It is similar to an antenna tuner, but has fixed inductors and capacitors. Tuning units for 80-and 160-meter verticals will cover only a portion of the bands. Outside the bandwidth limits of the tuning unit, you can use the tuner at the transmitter end. Radials or ground planes are needed for a 5/8th-wave vertical and they need to be a quarter wave long.

The impedance of a half-wave antenna is high if fed at its end. An end-fed half-wave vertical will have a small amount of gain over a quarter-wave vertical. This antenna does not have the ground losses a quarter-wave vertical has because it is fed at a high impedance point and the current flowing into the ground is negligible. Commercially made resonant half-wave trapped verticals now on the market are end fed at the bottom. A built-in matching network is found at the base, and several very short radials are mounted below the feed-point to de-couple RF from the feed-line. These antennas should be mounted as high as possible away from RF absorbing objects. Because the ground losses are lower, the half-wave vertical will outperform a quarter-wave vertical by several dB and in many cases many dB.

4. Unscientific Observations of Verticals

At our home, an old Hy-Gain trapped quarter-wave vertical for 40-10 meters was erected in 1961. It was mounted on the roof and had two quarter-wave radials for each band. It worked, but it was never compared to another antenna. It gave the impression it was a mediocre antenna. Other antennas replaced it.

One time in 1964, a grounded 60-ft tower was shunt fed as a vertical on 75 meters. Without having any radials, the transmitted signal was 10 dB weaker on this vertical 650 miles away in New York than on the inverted-V.

In 1969, a 4-band trapped vertical was put up on the top of a 60-ft tower. A 15-meter 4-element yagi under it was used for the ground plane. It was probably the best vertical installation we ever tried. It was good because it was high and in the clear and the 15-meter yagi made a good ground plane.

While we are on 80 meters, a ham 200 miles away frequently joins in the roundtable. He uses a trapped quarter wave vertical with a chain link fence as the ground. Several of the others are also 200 miles away run the same power. His signal is 10 to 20 dB below everyone elses on the frequency. It is good there are no interfering signals or noise or he will not be copied.

Another ham uses a Hy-Gain Hy-Tower vertical with 3 ground rods as the ground system. According to our S-meter, his signal is 40 dB down below those of the other guys.

Charlie, AD5TH, works 40 meters using a Hustler 5-BTV vertical ground mounted with 72 quarterwave radials. He has an outstanding signal for a ground-mounted vertical. His installation is out in the clear away from RF absorbing objects. He says, because of antenna restrictions at his location, it is the only antenna he can put up.

Another ham friend, N2HGL, has both a dipole and a half-wave trapped vertical on 40 meters. At a location 160 miles away, he is 10 dB stronger on the dipole, but he is equal in strength on both antennas in Indiana 600 miles away. This comparison shows the superiority of the half wave vertical over the quarter-wave one because his signal with the half-wave vertical was equal to his signal from the dipole. If he were using a quarter wave vertical, we would expect his signal would be better on the dipole in Indiana. It also demonstrates the superiority of a dipole over a vertical for working short distances.

Bill, W4ZQL, runs a ground-mounted SteppIR vertical. He lives beside a salt-water river in Florida that he uses for a ground. He puts out a very good signal on 40 meters. No ground losses!

5. The Inverted-L Vertical

The inverted-L antenna is a wire vertical antenna with part of the top end bent horizontally. It resembles an "L" turned upside down. The inverted-L is used to reduce the height required by a vertical and still keep the antenna resonant and full sized. It is fed at the end at ground level the same way a ground mounted vertical is fed, and all the losses we described for a ground-mounted vertical apply here. Some current flows in the horizontal part of the inverted-L and for that reason, it has both strong vertical and weaker horizontal polarization. If you make it a half-wave antenna, you wont need a good ground because negligible current flows into the ground. A half-wave inverted-L antenna needs to be fed with 50-ohm coax and a tuning unit.

An inverted L for 160-meters is usually made of wire one-quarter wavelength long or about 127 feet. It runs vertically

from near ground level to the top of a support, perhaps 60 or 70 feet. Then the end runs horizontally and is tied to a nearby support. The antenna is coax fed at ground level between the vertical section and ground system across some type of insulator. A matching network at the feed-poimt will be required to match it if the impedance is not equal to 50 ohms.

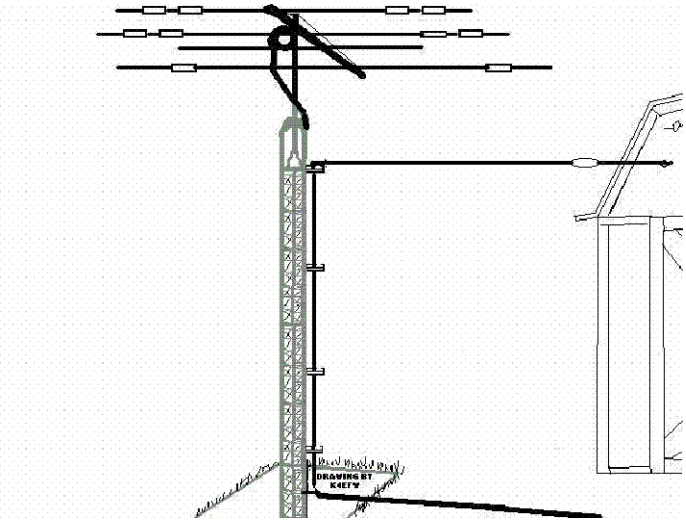

Figure 28. Inverted-L

The picture shows an inverted-L running up the side of a tower. The feed-point is at ground level with the center conductor of the coax attached to the bottom end of the wire. The coax shield connects to a ground system of radials. The total length of wire used in this antenna is half of what is needed for a dipole since the other half of the antenna is the radial ground system. The inverted-L is used mostly on 160 meters, but some have built them for 80 meters. The inverted-L antenna can also be cut for a halfwave to reduce ground losses.

6. Vertical Mobile Antennas

We have heard many good signals from mobiles, many being stronger than those from hams using ground mounted quarter-wave verticals. The mobile antenna, being so short, has a large capacitive reactance. A coil is inserted in the antenna to provide an equal amount of inductive reactance to make it resonant. As we said in the paragraph on short verticals, a coil of this type, carrying a large amount of antenna current, causes some loss resistance in the system. To reduce losses in the coil, wind it with a conductor as large as practical. (That's exactly what some mobile antenna manufacturers have done.) The sources of loss in mobile antennas are in the coil losses, losses in the conductors making up the radiating part of the antenna, corona discharge, and the ground loss from the vehicle on which its mounted. However, because of the large amount of metal in the body of the vehicle, the ground losses are not as high as the losses from ordinary ground mounted verticals. Matching transformers are now available that step down the impedance of 50-ohm coax to the very low impedance of the loaded vertical. Good advice is to use the transformers rather than to rely on the internal tuner of the transceiver.

Some low priced single-band mobile antennas are constructed by using a polymer shaft and a small gauge wire encapsulated in polymer material running beside the shaft. The loading coil made of the same wire is also encapsulated in the polymer. The small wire, because of its size and because it carries a large RF current, will lose a lot of power by becoming hot. This type of mobile antenna is rated for 200 watts. If the wire didn't get hot, there would be no power limit.

All mobile antennas have corona loss and for such, there is no remedy. Most amateurs, because they can't see it, don't believe its there. Corona will not be visible unless you run high power and it is dark.

Ground losses from the vehicles body diminish with increasing vehicle size. This is why 18-wheeler hams have such big mobile signals. To diminish the ground losses on any mobile installation, you should use as large as a conductor as possible to bond the coax shield to the vehicle body. All metal parts of the vehicles body, fame, and drive system need to be bonded together with heavy ground straps. To make the mobile antenna system more efficient, use an antenna with an adjustable inductor and use as long a "stinger" as practical above the coil. You will increase the radiation resistance by using a longer stinger, and then the loss will be less because you will require less coil inductance. The ratio of radiation resistance to loss resistance becomes larger by raising the radiation resistance and reducing the loss resistance. As we said earlier, the efficiency of any antenna system is found from the ratio of radiation resistance to total resistance, or radiation resistance divided by total resistance times 100%. The total resistance is equal to all the loss resistances plus the radiation resistance.

The latest development in HF mobile antennas is motor driven variable inductors. These antennas are known as "screwdriver antennas." The name refers to the electric screwdriver motors used to vary the inductance. A control cable is run from the motor to a switch at the operators position so it can be tuned from the operators seat in the front of the vehicle. Because a mobile antenna has a very narrow bandwidth, you will have to tune it often as you move frequency (QSY). It hasn't been many years since we had to get out of the vehicle to make inductor changes or make changes in the length of the stinger when the frequency was changed.

Mobile antennas for 20 through 10 meters do not require the care in installation that is needed for 160, 80, and 40 meters because the length of a mobile antenna becomes closer to a quarter wave as you move to higher bands. The radiation resistance increases on each higher band. While moving to higher bands, less inductance is needed to tune the antenna, and that lowers the loss resistance. A 96-inch

mobile whip is just a couple of inches short of being a quarter wavelength on 10 meters and a loading coil is not needed there. The band that has the least mobile antenna efficiency is 160 meters. If you reach a radiation efficiency of 2% on 160 meters on your mobile installation, you will be doing well.

Below is some information concerning mobile antennas, which was received in an email. There was a 75 meter mobile "shoot-out" in California. (A shoot-out is an event where a group of hams gets together and compares signals radiated from various antennas.) Supposedly, equal power was applied to each antenna under test. Apparently, some type of field strength meter was used. A screwdriver antenna and a bug catcher, both with top hats, were used as the standard by which other antennas were compared because they put out equal signals. The other antennas are measured in how many dB they were below the standard. Here are the results of that test, and because it is hearsay, the accuracy of these figures is not guaranteed, but they do compare to what we have observed.

Screwdriver/bug catcher with top hats 0 dB reference

Screwdriver/bugcatcher without top hats -3dB, -50%

Hustler -7 dB, -80%

Outbacker -9 dB, -88%

Hamstick -12 dB, -94%

Whip with autotuner -14 dB, -96%.

The efficiency of the best 75-meter mobile antenna is from 5% to 10%. In using the best mobile antenna on 75 meters, a 100-Watt mobile rig will radiate 10 Watts at most. This means that a Hamstick being fed with 100 Watts will radiate only 0.6 watts, which is 6% of 10 Watts. Ninety-nine and four tenths Watts will be converted to heat. The person sending this information said it was published on the Internet in some news group. Again with good band conditions, it is amazing how little signal can be used to communicate.

The things that increase the efficiency of mobile antennas are

Place the loading coil about half way from the feed-point to the antenna tip. Efficiency decreases if you put the coil above or below this point.

Mount the antenna as high up on the vehicle as possible. This reduces the ground losses because it reduces the capacitance of the antenna to ground.

Use a loading coil with a Q as high as possible. See the ARRL Handbook for a discussion of coil Q.

Make the antenna as long as possible. Note: long antennas are prone to strike tree limbs and bridge overpasses.

Increase the size of the mast between the loading coil and feed-point.

Put a capacity hat above the loading coil. The capacity hat reduces the number of coil turns needed to resonate the antenna.

Make the coil with as large a diameter wire possible. This decreases the coil loss, which is a large part of the total loss of a mobile antenna.

Any changes made in the antenna system that raises the radiation resistance will increase the efficiency.

Upcoming Events

AUGUST

1-2 **AUGUST UHF** The objective is to work as many amateur stations in as many 2 degrees by 1 degrees grid squares as possible using authorized amateur frequencies above 222 MHz and all authorized modes of emission. Date: First full weekend of August. Begins 1800 UTC Saturday, ends 1800 UTC Sunday (August 1-2, 2015). Entrants may use as much of this time as they wish. More info at http://www.arrl.org/august-uhf.

15-16 **10 GHz & Up – Round 1** The objective is for North American amateurs to work as many amateur stations in as many different locations as possible in North America on bands from 10-GHz through Light. Amateurs are encouraged to operate from more than one location during this event. See detailed rules for restrictions. Date: Third full weekend of August. May operate for 24 hours total. The weekend begins at 6:00 AM local Saturday though 12:00 midnight local Sunday. More info at http://www.arrl.org/10-ghz-up.

September

5-6 **EME - 2.3 GHz & Up** The objective is to work as many amateur stations as possible via the earth-moon-earth path on any authorized amateur frequency above 50 MHz. May work full weekend 48-hour period (0000 UTC on Saturday through 2359 UTC Sunday). More info at http://www.arrl.org/eme-contest.

REGULAR ACTIVITIES

Daily	DFW Early Traffic Net (NTS) at 6:30pm 146.88 – PL 110.9Hz
Daily	DFW Late Traffic Net (NTS) at 10:30pm 146.72 – PL 110.9Hz
Daily	Texas CW Traffic Net (NTS) at 7:00pm on 7053 KHz and at 10pm on 3541 KHz www.k6jt.com
1st Wednesday	Richardson Emergency Siren Test. At noon using the Richardson Wireless Klub (RWK) repeater at 147.120 MHz.
2nd Wednesday	ARES North Texas HF Net Every month—3860 KHz at 8:30 pm—9:30pm

Rockwell-Collins

Amateur Radio Club

Mail Station 461-290

P.O. Box 833807

Richardson, TX 75083-3807

TO:

CLUB STATIONS
(972) 705-1349

W5ROK REPEATER
441.875 MHz +5 MHz Input
131.8 Hz PL - RX and TX

W5ROK-1 PACKET BBS ROK Node
145.05 MHz

W5ROK-N1, W5ROK-N2 & W5ROK-N3 HSMM-MESHNET Nodes 2.4 GHz

Tuesday 28 July 2015

1700 Social **1730 Meeting**

Methodist Richardson Medical Ctr
At Bush/Renner/Shiloh Intersection

Second Floor Conference Room 200

NEXT SIGNALS INPUTS DEADLINE:
➔➔➔ 14 August 2015 ➔➔➔