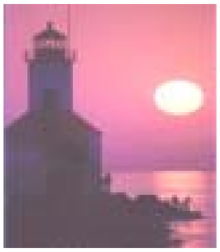


LAPORTE COUNTY / HARBOR BEAM
APRIL 2015

146.970 / 441.950 (W9LY)
Echolink Node: 193001
146.610 (K9JSI)

WHO WE ARE

Communications:
Matt Lasayko, KC9KUD
Dave Kaufman NU9I

Repeater Committee:
Matt Lasayko
Ron Broviak
Dan Sheetz
John Rozinski
Ken Osborne, Todd Saboff
Dan Foster, Dave Kaufman
Mike Broviak, Curt Yeater

Internet:
Stan Vandiver
Mike Broviak, Todd Saboff

Field Day:
John Phillips

NEWS LETTER:
Ken Osborne

Activities:
John Phillips

VE TESTING:
Scott Tharp

PUBLIC RELATIONS
Barb Cave

MEMBERSHIP:
Troy Harrison

AMATEUR RADIO A BRIDGE TO FRIENDSHIP

President:
Brian Salzer KB9HMR

Vice President:
John Phillips KA9PGC

Secretary:
Barb Cave KA6OJX

Treasure:
Ken Osborne N9ZIP

Board Members:
Ron Broviak, WA9RON
Dan Foster, KC9GFO
Scott Tharp N9NKK

Trustee W9LY:
Dan Sheetz W9DWS

Trustee K9JSI:
John Rozinski, N9CJR

Tower Site:
Ken Osborne
John Phillips
Dan Foster
Bob Smith

Fund Raising:
Brian Salzer
Ken Osborne
Troy Harrison
Ron Broviak

MEETING NOTICE:
Next LaPorte County Amateur Radio club meeting is Monday April 20th 7pm
@ **THE KNIGHTS OF COLUMBUS**

LAPORTE COUNTY AMATEUR RADIO CLUB

P.O. Box 148,
Michigan City, Indiana 46361
WEBPAGE: http://lpcarc.org
EMAIL: info@lpcarc.org
FACEBOOK: lpcarc
A 501 (c) (3) Public Charity # 35-1390856

ARES EMERGENCY COORDINATOR:
Dan Foster, KC9GFO
RACES OFFICERS:
Ken Osborne, N9ZIP
Dan Foster, KC9GFO
Ken Maynard, W8KRM
SKYWARN:
Ken Osborne, N9ZIP

News & Events

In This Issue

WELCOME

TO
THE
LaPorte County Amateur Radio Club

lpcarc.org

PICTURE OF THE MONTH

The LaPorte County / Harbor Beam is published on the Saturday, before the monthly clubmmeeting, 12 times each year, as a service of the LaPorte County Amateur Club; for it's members and those interested. **Inquires and submissions should be sent to the LaPorte County / Harbor Beam Editor at our e-mail address info@lpcarc.org.**

CLUB DUES

Club dues for 2015 is only $15.00.
Your dues goes towards our repeaters and pays for our insurnace, which is our largest expense, for the club. Our fundraisers keep our dues low and support of activities. Your dues can be paid at any club meeting.

Your can also be mailed.
Our mailing address is...
LaPorte County Amateur Radio Club
P.O. Box 148
Michigan City, Indiana 46361

Support the club!
Support our repeaters!
Membership is open to all.

GOING DIGITAL

Fusion is comming to LaPorte County. We have been talking about, now we are getting closer. Our new Digital Fusion repeater should arrive late April with a scheduled install date some time in May 2015. The new system will be on 146.970 MHz., W9LY. We will also have one the UHF system too.

Until now, FM repeaters were only used for conventional FM communication, and digital repeaters were only used for digital communication. There has been no option for cross-communication in a single repeater. However, System Fusion can be used in multiple ways, for digital communication, for conventional FM communication and even internet communication. Most importantly, System Fusion enables intercommunication between all users. This is enabled by the AMS (Automatic Mode Select) function used in System Fusion. With AMS, the modulation of your station is automatically selected according to the received signal. If a member transmits in conventional FM, the other radios in the System Fusion automatically select their modulation to conventional FM to communicate between all members.

So you don't have to run out to buy a new radio. The radio you have will still work.
We will still be using our controller. The biggest change is the options.

V/D mode (Voice/Data simultaneous communication mode) The digital voice signal is transmitted in one half of the bandwidth. Simultaneously the other half of the 12.5 kHz bandwidth channel is used for error correction of the voice signal and other data.

By incorporating powerful error correction technology developed for professional communication devices, effective error correction codes provide the advantage of fewer interruptions to conversations. The standard C4FM FDMA Digital mode provides the ideal balance of error correction and sound quality with the Digital Clear Voice technology developed for C4FM digital.

Voice FR mode (Voice Full Rate Mode) This mode uses the full 12.5 kHz bandwidth to transmit digital voice data. The increased amount of voice data permits high quality voice communication, providing superb sound quality for a “rag chew” with friends.

Data FR mode (High Speed Data Communication Mode) This high-speed data communication mode uses the full 12.5 kHz bandwidth for data communication. The transceiver automatically switches to Data FR mode when transmitting Snapshot pictures, and can be used to transmit large quantities of data at high speed.

FM mode Analog FM is effective when weak signal strength causes audio drop out in the digital mode, and enables communication up to the borderline of the noise level. Also the use of established Yaesu low power circuit designs provides far less battery consumption than the digital mode.

SPRING CLEAN UP

Well Winter is finally over. Spring Clean Up is our time of year when summer fun is right around the corner. Each year, members come out to the tower site for our annual clean up, of the grounds. May we will start having our meetings, out doors, at the tower. June we’ll have Field Day. The owner of the tower and our club has a long standing relationship. Not only is he our Trustee for W9LY, he gives us a room, electric and internet. In return, our clubs maintains the grounds. This is not a one day project. All summer long, members mow the grass.

At our next meeting, we will be selecting a date for our spring clean up. We need help, picking up debris from winter, so that our mowers have a clear path. We need chain saw, for dead tree, and fire wood.

TIN CAN FUND

Once again we need help with our Tin Can Fund. Last year with the price of gas and repairs to the mower, it seemed like the money in the can went out faster then it came in. This year, we’ll need new blades to start our season and changing the oil. Last year, with all the rain, we had to mow just about every weekend.

So please donate to the Tin Can Fund. It can found at our meetings. Also proceeds from our meeting picnic goes to the fund.

CLUB

T-SHIRTS

ARE

IN

If you ordered a club T-Shirt...
you can pick your up
at the next meeting.

Bring cash or Check
Checks payable to LPCARC

We'll also have order forms
if you would like one
and have not order one

KNOW YOU KNOW

Resistances and Reactance

Two factors measurable in antenna impedance are resistance and reactance. When we refer to antenna resistance, we are referring to its radiation resistance. It is neither a resistance like the electronic component called a "resistor," nor is it the same as the resistance found in all conductors. Those types of resistances, called "loss resistances," change electrical energy into heat energy. Heat energy disappears by radiating out into its surroundings and it dissipates away to infinity. When we feed RF into the antenna, the energy put into the radiation resistance disappears from the antenna by radiation of electromagnetic waves, and that makes an antenna appear to have a resistor in it. Loss resistance robs power from the radiation resistance and lowers the efficiency of an antenna system, but the loss resistance in dipoles is very low if the feed-line loss is low. The efficiency of any antenna system is found from a ratio of radiation resistance and loss resistance. We can either calculate the loss resistance by the loss in the feed-line from published tables and by estimating the loss in tuning units. Feed-line loss and tuning unit loss can be measured, but that is beyond our scope.

Antenna systems having reactance prevent the transmitter from delivering its full power and the reactance needs to be tuned out. There are two kinds of reactance: capacitive and inductive. Antennas have both. In antennas, reactance is a virtual reactance meaning the antenna acts as if there were a capacitor or an inductor in the antenna, but neither is there. You can only measure the sum of both reactances but not a value for either one. Using an antenna analyzer, you can determine whether the sum of the reactance is inductive or capacitive. Inductive reactance is a negative number and capacitive reactance is a positive number.

The reactance of an antenna forms the "J" factor in antenna impedance measurements. The "J" factor is measured in ohms and the reactance is expressed as + or "J" ohms depending on whether it is capacitive or inductive reactance. Capacitive reactance is expressed as +J ohms and inductive reactance is expressed as -J ohms. Capacitive and inductive reactance are opposite factors and one can cancel the other. An antenna having 6 ohms capacitive reactance or + J 6 ohms and an inductive reactance of J 5 ohms will result in an antenna with a reactance of 1 ohm capacitive or + J 1. Since one term is positive and the other term is negative, you subtract smaller value from the larger.

The answer has the sign of the larger one. In antennas, the reactance and resistance together determine the overall impedance of the antenna. The J factor is mentioned here only because you may see it in other books and on the extra class examination, but it will not be used further here.

A resonant antenna has equal amounts of inductive and capacitive reactance, and the sum of the reactance equals zero. As an example, when the inductive reactance equals J 5 and the capacitive reactance equals +J 5, their sum equals zero. When the sum of the total reactance of an antenna is tuned to zero, its impedance is totally resistive. The use of an antenna analyzer will tell you if the antenna is too long or too short for resonance. The simplest way to tune out antenna reactance is to change its length. The sum of the reactance of a long antenna will be inductive, and the sum of the reactance of a short antenna will be capacitive. If an antenna is short because it wont fit your property, it can be tuned to resonance by putting an inductor (coil of wire) in each leg. These coils are called “loading coils.” An equal amount of inductive reactance will cancel the excessive amount of capacitive reactance. An antenna with loading coils is described in section “X.” When an antenna is too long, the sum of its reactance will be inductive, and a variable capacitor can be inserted in each leg to tune out the inductive reactance. This is seldom done because it is easier to shorten the antenna.

A resonant antenna may still have SWR if its radiation resistance is not exactly 50 ohms. Not many resonant antennas have a radiation resistance of exactly 50 ohms, and most real antennas have a small amount of SWR. An antenna is resonant only at one frequency per band. It will also be resonant on its harmonic frequencies, where its radiation resistance will range from high to very high. Hams talk about using resonant antennas. What is meant by this is they use an antenna on its fundamental frequency close to resonance, the resistance is near 50 ohms, and the SWR without a tuner is near 1:1. To calculate the impedance of an antenna with both resistance and reactance requires a mathematical procedure called the Pythagorean Theorem. That type of math is beyond our scope here. However, you should know how to use the Pythagorean Theorem to solve impedance problems on the Extra-Class test. Otherwise, you will have to memorize the answers from the question pool.

Feeding Dipoles Efficiently

For maximum power transfer from transmitter to the antenna, the antenna system must be resonant, and the resistance of the load (antenna system) has to be equal to the internal resistance of the source (transmitter). Notice we said an antenna system, not the antenna, must be resonant. As mentioned previously, an antenna system consists of the antenna, the feed-line, and any matching networks (tuners).

A tuner at the input end of the feed-line can make a non-resonant antenna system resonant, and have a resistance of 50 ohms, and that matches the internal resistance of the transmitter. A tuner will not change the SWR between the tuner and the dipole part of an antenna system, and will not remove the reactance from the dipole. When the load of an antenna system does not match the source and the impedance is high, the load will not draw power from the source and high RF voltages will be present at the output of the final transistors. In this case, high RF voltages can damage the output transistors of the transmitter. When the impedance of the load is low, too much of the power may be dissipated across the internal resistance of the transmitter possibly destroying the output transistors. These are the two reasons why transceivers "fold back" their power when the SWR is high.

It is a myth that the dipole part of an antenna has to be resonant to be efficient. When power reaches the radiating part of the antenna system, it obeys the "The Law of Conservation of Energy." The Law of Conservation of Energy states, "Energy can neither be created nor destroyed. Only its form can be changed." (What is important is to get the power to the dipole itself, because in some systems power is lost in the feed-line, especially when using coax with high SWR) The miniscule amount of power in the dipole that does not radiate is changed into heat, another form of energy.

Because the dipole part of an antenna system is made of conductors with low loss resistance, 99% or more of the power reaching it will radiate regardless of its length if that length is reasonable. The loss resistance of the conductors of the radiating part of most antenna system is so low it can be ignored. (Short mobile HF antennas are an exception because they may be lossy because of the very high current flowing in them.)

Not all the energy fed into an antenna system will reach the antenna itself. If the system has a tuner, part of the power is lost in the inductor of the tuner and part is lost in the feed-line. When properly tuned, tuners using T-networks lose about 10% of the power and L-network tuners lose about 5% of the power being fed to them. Notice we said properly tuned. However, improper tuning of the antenna tuner may cause you to believe the feed-line is matched, but when this happens there is a very high circulating current in the inductor causing it to get hot. This causes extremely high losses, and very little power reaches the radiating part of the antenna. In addition, so much heat is produced in the inductor that it can be damaged. We melted the plastic insulation that forms the inductor on one tuner this way. For this reason, some hams dont like tuners, preferring to use resonant antennas. Read the instructions for your tuner for proper tuning or you may wind up with a poor signal and a damaged tuner. The resistive losses in the conductors of the feed-line and the dielectric losses in the feed-line also rob power from the system. These are the reasons for you to use the best tuners and feed-lines possible.

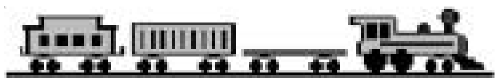
Another loss to be considered is feed-line radiation. Any energy that radiates from the feed-line does not reach the radiating part of the antenna, and it may be absorbed by near-by objects and may not radiate in the desired direction. When coax radiates, it is called common-mode radiation. If the feed line can radiate, it can also receive signals. This can be detrimental because the coax can then pick up noise from near-by power lines, etc. Feed-line radiation will also destroy the directional pattern of a beam antenna.

As we pointed out earlier, when you are using a half-wave resonant dipole fed with low-loss coax without using a tuner, almost all of the power coming out of the transmitter will radiate. On its resonant frequency, the dipole is one of the most efficient antenna systems a ham can use. However, a half-wave resonant dipole has a finite bandwidth. Why use a tuner with resonant antennas? On 160 and 80 meters the bands are wide compared to the percentage of frequency. The width of 80 meters is 500 kHz and its frequency is 3500 kHz. The width of 80 meters is 14% of the frequency. The 350 kHz of 40 meters is 5% of the frequency and most of the band can be covered without a tuner. The 350 kHz width of the 20-meter band is 350 divided by 14000 kHz, or 2.5 % of the frequency, etc. The percentage of frequency for a band will determine if a resonant dipole will work the whole band without a tuner.

The 350 kHz width of the 20- meter band is 350 divided by 14000 kHz, or 2.5 % of the frequency, etc. The percentage of frequency for a band will determine if a resonant dipole will work the whole band without a tuner. If you are planning to move around on 160 or 80 meter bands, it makes sense to have a tuner, because the bandwidth of resonant dipoles on those two bands is narrow. For example, the normal 2:1 SWR bandwidth of an 80- meter dipole is less than 200 kHz and the band is 500 kHz wide. However, if you have an antenna resonant for the voice portion of the band, you can still use a tuner to work the CW part of the band without inducing more than a dB of loss. Except for 40 and 10 meters, full-sized resonant dipoles on the rest of the HF bands will have enough bandwidth for them to cover the whole band.

We’ll stop here, and pick up next month with this discussion.

Calendar of Events



GET ON BOARD
JOIN IN THE FUN
WITH AMATEUR RADIO

LaPorte County Amateur Radio Club Meeting Calendar for 2015

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Meeting	19	16	16	20	18	15	20	17	21	19	16	TBA
Location	LP	LP	LP	LP	TS	TS	TS	TS	TS	LP	LP	TS

LP= LaPorte Knights of Columbus TS= Tower Site, U.S. 35 & Schultz Rd.

SPRING CLEAN UP

FIELD DAY JUNE

FOX HUNTS

LIGHT HOUSE WEEKEND

HESTON

JOTA