

The Open Feed Line

A Publication of the Michigan Amateur Radio Alliance (MARA)

Volume 17, Issue 3 - Friendship, Community Service & Advancement of the Hobby - July-Sept. 2008

MARA's Foxhunt and Picnic - This Weekend !

By Jim ki8jd

This weekend, MARA will be holding a foxhunt, with the End-of-Summer Picnic immediately following. You are invited.

The foxhunt will start at 3:00 PM on August 23rd, 2008. It will end at 5:00 PM. Talk-in is on the 145.230 MARA repeater. Further information and rules can be found on the club's website, <http://www.w8usa.org>.

The potluck picnic, at least the eating portion of it, will begin at 6:00 PM, at Larry and Peg Dells' house at 4317 Willow Drive, on the banks of the beautiful Grand River. Bring your own meat, your favorite chair, small dish to pass, table setting, beverage, etc. Coffee will be provided. The Dells will provide a gas grill and a charcoal grill, but you will have to cook your own meat. After dinner, there will be a small bon-fire, and fireworks across the river. Larry's pontoon boat will be available for rides. Children are welcome as long as the adults are watching them. The insects haven't been too bad, but you may want repellent later in the evening.

September Events

BY Jim ki8jd

MARA is holding a fund-raising Spaghetti Dinner on Friday, September 26th. The finest MARA cooks will be in the kitchen, so the food should be excellent. There is a flyer with more information on page 7.

GRARA's Grand Rapids Area Hamfest will be on Saturday September 6th, at the Kent County Fairgrounds in Lowell, Mich. There is a flyer on page 7 of this newsletter with more information.

Operation Care Labor Day

We'll be setting up at Noon on Saturday, August 30th and operate in 4-hour blocks till September 1st, Monday, at about 8PM. This is a great way to help keep weary motorists awake and alert while they're on their way back home from the Labor Day outing. We'll be once again serving hot coffee, orange drink and cookies. We also have gained a new donator. Mike Bisbee has been donating Voortman cookies for the Operation and it's time we said "Thank-You, Mike." We really appreciate your wonderful gesture in helping to make Operation Care successful.

If you're interested in volunteering to fill a shift, please visit <http://www.w8usa.org> and click on Operation Care. It's your effort that has made this successful over the years.

2008 Pillars Of Society Award

By Chuck W8VOM

The Michigan DX Association is the home of the Amateur Radio Pillars Of Society Award.

This year will mark our 5th offering of this beautifully framed award. This award is offered to all Hams in the Great Lakes Region! Officers of the MDXA are not eligible unless it is for their work with "another" organization or community public service.

If you know of any person you would like to nominate for the Amateur Radio Pillars Of Society Award, please respond by contacting our Events Manager Dave Smith-KC8PCL at kc8pcl@yahoo.com with the nominee's Call-Name-QTH and a brief description as to why you are nominating them! Please make your nominations before October 1st.

Past winners are ineligible. For past winners, or more info, please see: <http://mdxa1.org/pillarsaward.html>

The Open Feed Line

The Open Feed Line is published quarterly. It is the official journal of the Michigan Amateur Radio Alliance, or MARA for short.

MARA, an American Radio Relay League affiliated club, was created to provide opportunities for friendship, community service, increasing technical knowledge, and upgrading our skills in the hobby of Amateur Radio.

You may freely reprint any material in the Open Feed Line, but please credit the Open Feed Line, the original author, and the original publication, if given.

Everybody is encouraged to submit original articles on topics relevant to the hobby of Amateur Radio to the editor. The deadline for submission is the end of January, April, July, and October, and the newsletter will be published within the following month.

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Membership Information

Annual dues to MARA are \$20. Family memberships are an additional \$5. Persons aged 70 and over - \$5.00. Membership is free to students under 21. Memberships expire on December 31st, and club dues are due on January 1st. MARA membership is open to all interested persons.

Please send change of address information and membership applications to the club secretary.

Great Lakes Award

Send inquiries regarding the Great Lakes Award to the Awards Manager
Larry Dells KC8KVR c/o
MARA
P.O.Box 670
Comstock Park MI 49321-0670
E-mail- LLDGRD@netscape.net

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* Some of these positions become open occasionally. If you'd like to volunteer, contact one of the board members and let them know what your interested in. *

Club activities

MARA holds their weekly 2-meter Net, every Thursday, at 8 PM on the MARA W8USA repeater, 145.230 MHz -600Khz PL. 94.8. MARA holds their monthly meetings on the 2nd Wednesday of the month at 7:30PM, at the Steepletown Building, located on the SW corner of 5th street and Davis NW, in Grand Rapids. This site is handicap accessible, with additional parking on the West side of the building. All are welcome to attend our meetings.

D-STAR Repeaters Can Cause Interference Too!

By Ray Abraczinskas, W8HVG

Digital communications activity utilizing ham radio repeaters keeps expanding. The lure of the many capabilities in connecting repeaters through the Internet keeps growing. Modes such as Echo Link, IRLP, VOIP, Wires, and D-STAR, etc. are all present day technology means of connecting radios and repeaters to the Internet allowing talking with hams all over the world. Some people say that it isn't really ham radio, but truly it is, and it will continue to grow and affect every amateur radio operator's future both for the good and bad.

How are all these advanced technology digital voice modes being implemented and provided for? Successes are being touted all over the country. Hams are jumping on the digital bandwagon everywhere. What are they learning? There are ham nets growing everywhere on the Internet but what if the Internet capability goes down? What real purpose do nets on the Internet serve? Will the only ham repeater stations operating in the future be reflectors and gateways? Cell phones are everywhere and affecting ham radio utility. Ebay and the price of gas are affecting hamfest attendance and if people reduce their driving habits, more than likely the role of repeaters will become affected also. Will we still need repeaters, repeater networks, and link repeater systems? Commercial FM broadcast stations are discovering "interference effects" from digital transmissions in-between the analog FM channels. Digital TV is coming in February 2009 with its associated weather-related antenna reception problems (pixel fadeouts) that will raise ire while watching TV. As hams are we all heading for that inevitable question someday (God forbid), "Do we need ham radio at all?" Will it too eventually follow the way of the 8-track and VHS cassettes?

Most every ham has some knowledge of Icom and D-STAR. Simply, it's a versatile digital communications mode for voice and data. It can connect D-STAR users to other D-STAR radios all over the world through the Internet. It's growing everywhere but not all hams are jumping into the fray for various reasons, i.e., knowledge, compatibility, expense, naivete, and band plan constraints.

The Michigan Area Repeater Council (MARC) started addressing making provisions for D-STAR repeater frequency coordination in latter 2006. It

was a challenge because most 2M-repeater frequencies in the lower-Michigan 20 kHz band plan are fully assigned with analog repeaters. As a provisional means, the MARC created several channels in the 145 and 147 MHz bands to allow 2M D-STAR repeaters to exist in-between the coordinated analog repeaters frequencies. The resultant 10 kHz spacing necessitated focusing on distance separation for adjacent channel repeaters. Initially it was 20 miles and after further deliberations in June 2007, it was made 50 miles (without any reference to TX power levels). However, due to variability's, further tests and observations may be required to adjust the 50-mile adjacent channel repeater separation factor even further and also consider including limits on D-STAR transmitter output power. As is, the burden falls mostly on all repeater owner/trustees (involved) to show that the newly assigned D-STAR repeater will be compatible. Realistically, that may take (?) years to prove because of all the variability's involved, e.g. equipment differences, repeater profiles, propagation variability (10 to 25 dB band enhancements), D-STAR transmitter power levels, terrain, observation methods, and observation times, etc.

While D-STAR sellers and users tout a narrow operating bandwidth, supposedly allowing more operating channels, the fact remains that D-STAR repeaters must fit into the existing repeater spectrum band plan, which differs from state to state. In lower-Michigan in early 1984, by repeater owner/trustee agreement through the Michigan Repeater Council then, the 2M-repeater band plan was made 20 kHz, which took over four years to fully implement including "flipping" inputs and outputs in the 147 MHz band to conform to the new ARRL band plan. All the surrounding states including Michigan's Upper Peninsula and Ontario, Canada, opted or stayed on a 15 kHz band plan for their 2M-repeaters giving them 15 more repeater frequencies but complicating (somewhat) the coordinating process (then).

Another factor sometimes ignored, is that all ham radios commercially manufactured and sold (for ham repeater use) have different receive selectivity factors among other things including FM discriminator response. This becomes an important factor in rejecting adjacent channel interference 5 or 10 kHz away. It's called "capture effect" response.

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D-STAR Repeaters Can Cause Interference Too!

By Ray Abraczinskas, W8HVG

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That is, in receiving an FM signal using a discriminator circuit, it will generally lock to the strongest signal in its capture range. It can even capture on strong signals 10 kHz away and hence, with a strong D-STAR carrier, it would swamp out the desired signal and sound just like noise. That is called interference at the user receiver and even though some people suggest it, using a tone encoded squelch will not solve the problem. Only by reducing receive signal levels or by controlling transmit power and distance separation will the problem be solved. With a 10 kHz band plan, this becomes a huge burden for everyone involved. NOTE: Some coordinating bodies used to consider 5 kHz and 10 kHz spaced channels as "co-channel" in their coordinating processes.

Some D-STAR experts are suggesting the user needs a more selective radio, but why did Michigan go on to the 20 kHz band plan in the first place? Answer: to easily manage adjacent channel interference problems both internally and with the surrounding states and Canada. It was based then on a typical receiver bandwidth spec of 13 kHz at 6 db and 30 kHz at 100 db. Placement of D-STAR repeaters in a 10 kHz channel spacing with analog repeaters using those receivers may allow the D-STAR repeater to work OK but it will probably cause heart burn for many repeater owners and their users (and the frequency coordinators). It can and will also raise the noise floor in many cases which affects overall analog repeater sensitivity.

Besides the Michigan peninsula VHF band enhancement phenomena typically occurring 8-months out of the year affecting the problem, there are other factors that can affect the described situation. One is called third order intermod resulting in interference that, usually, most hams are neither concerned about nor capable of checking for.

Let's describe a typical situation involving an analog repeater transmitter and a D-STAR repeater transmitting (10 kHz away) with a user in a mobile (or a base station) located between the two repeaters running reasonably high power and transmitting into either repeater. There are potential intermod frequency products that can be created in either the mobile transmitter (because it

has no rejection filtering), which then could interfere with one of the repeaters, or there could be intermod products created in either repeater transmitter because the repeater duplexer cannot reject it from occurring (10 kHz away). Also, most repeater owners do not use isolators or even check for intermod effects. This problem then becomes a hellacious burden on the repeater owner to track down and eliminate, all because adjacent channel repeaters are placed too close in frequency and too close in distance relative to their users.

In July 2008 in southeastern Michigan, an enthusiastic D-STAR systop placed his new D-STAR repeater in operation supposedly on a frequency that was NOT recommended by the Michigan Area Repeater Council. Immediately, several hams using long time coordinated analog repeaters 10 kHz away, up to 45 miles around the area began noticing "cutouts" in reception blaming it on the analog repeater they were listening to. Even when some mobiles were operating close to the analog repeater, their mobile receiver was completely blanked by the strong D-STAR signal any time it was up. It was very obvious that there was something outside the analog system affecting it. The involved analog repeater(s) trustees were informed of the problem with one being a Michigan statewide linked repeater system trustee and the other a knowledgeable former MARC Board member. Hours were then spent analyzing what was happening with frustrations building because nothing in either repeater system appeared to be wrong. Suggestions were made to those users observing the cutouts to check and see if a D-STAR repeater was involved, as it was known that the MARC had assigned "splinter channels" for D-STAR.

Bingo! A new D-STAR repeater was found operating on a frequency 10 kHz away from the analog repeaters (that the MARC supposedly did not assign). Apparently, the enthusiastic D-STAR systop jumped the gun! After several communications between all involved including the MARC, the systop turned the interfering D-STAR repeater off and stated that he will be moving it to a newly assigned frequency. He also expounded that the problem is not the DSTAR repeater, it's really the users FM receivers; they should use a more selective receiver! Like my 8-year old granddaughter frequently says these days, "Duh"!

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D-STAR Repeaters Can Cause Interference Too!

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In June 2008, there were four D-STAR 2M-repeaters assigned "splinter" frequencies listed in the MARC on-line directory with eight more assigned waiting to be added. The WX8GRR D-STAR repeater on 147.29 MHz south of Grand Rapids is not listed yet. D-STAR is an exciting mode and systops are saying it's much better than analog FM in many ways. Some say it takes much less transmit power with D-STAR to communicate as far as analog. Therefore it would make sense for the MARC to consider limiting the D-STAR repeaters power output in these provisional assignments (say five to ten watts maximum) for splinter frequency compatibility. D-STAR itself is not the problem; the MARC provisional "splinter" implementation plan may need refining.

This recent wide-area observation of D-STAR interference is probably one example of the potential problems yet to come facing the Michigan Area repeater Council and Michigan repeater owner/trustees. But then how many hams will know why their analog repeater reception is occasionally cutting out? Is it happening elsewhere now? Could it happen during an emergency communication? Who will investigate it, prove it, and then correct it? With the technologies involving digital communications apparently requiring placing more transmitters into the repeater bands, the Michigan Area Repeater Council will need everyone's support, cooperation, and patience in their volunteer efforts.

Maybe it's time to look at and consider "other approaches" to implement the 2M D-STAR repeaters in Michigan; there are probably several. One is to look at going back to the 15 kHz band plan possibly gaining up to 15 more frequencies that could contain D-STAR repeaters. There would still be some complexities with the coordination process, but possibly not as onerous and burdensome as the "10 kHz provisional plan." It was done once but it took over four years.

Another approach would be to survey and promote repeater clubs and trustees as to their "spirit and willingness in cooperating" to implement a D-STAR repeater in place of their existing coordinated analog repeater on the existing 20 kHz band plan (or a revised 15 kHz band plan). After all, there are many individuals, clubs and cities with more than one analog repeater that virtually covers the same area. It would seem feasible then that one (or more) analog repeater(s) could be sacrificed in these areas for D-STAR implementation!!! With either plan, coordination of 2M repeaters in Michigan would still be under existing proven coordination standards, not an experimental observation provision subject to long term effects and changes.

A more ambitious plan might be to investigate the possibility of integrating an analog and a D-STAR repeater operating together on the same frequency at the same site in an "either / or fashion". It would seem technically feasible albeit there might be occasional "busy lockouts" to some users while either repeater is in-use. However, that's what ham radio is about, making things work and getting along with your fellow hams!

It should be clarified that the Michigan lower-Peninsula 2-meter 20 kHz band plan only differs from the surrounding states and Ontario plans in the 146 and 147 MHz bands. That's where the extra 15 frequencies would come from if it were changed. The 145 MHz band is a 20 kHz band plan in all states around Michigan (including lower-Michigan).

The purpose of this article is to report an occurrence of typical repeater interference, which many hams may not know about or understand, and which was the fundamental reason why lower-Michigan operators selected the 20 kHz band plan in 1984. This information is also meant to create conversation among repeater owners and trustees in assisting the Michigan Area Repeater Council to accomplish their goals. Thanks for all their volunteer hard work. Comments are welcome and if I can be of further assistance to anyone please contact me at abra@i2k.com, or send them directly to the MARC at: mail@miar.com.

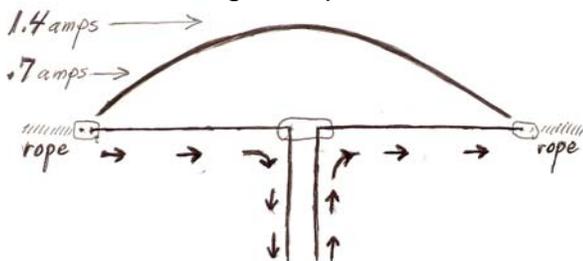
Waves III

By Jim ki8jd

This is the 3rd installment of a series on antenna and feed-line theory. If you didn't read the first 2, I suggest you go to www.w8usa.org, and follow the links to the first 2 newsletters of 2008. You will find the articles on page 6 of each newsletter.

Before we go any further, we should know that metals conduct electricity because they have a loose hold on their outer electrons. Voltage applied will cause the electrons to move from one atom to the next, as long as they have somewhere to go. Imagine laying dominos flat on a table in a straight line. If you push the line of dominos, they will all move at the same time, provided that there are no gaps between them. Electricity behaves in a similar manner: even though the electrons sometimes move slowly, they all move at about the same time, and the electrical effect seems almost instantaneous. At radio frequencies, however, a tiny bit of time becomes much more apparent and important. At 146 MHz, we have 146,000,000 cycles per second. In one cycle, the electrons switch direction twice. This means that those poor little electrons have to switch direction 292 times in a millionth of a second. Also, in a millionth of a second, an electrical signal can travel up to 984 feet. We now see that much can happen in a millionth of a second!

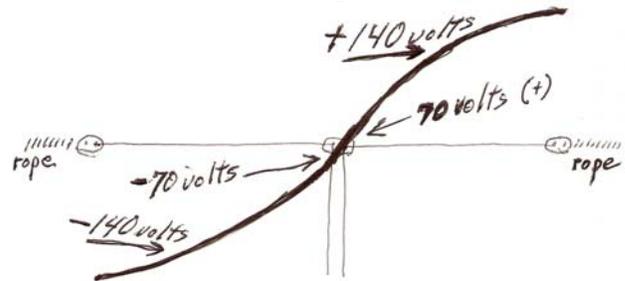
Back to the topic - antennas! I'm sure you have been waiting for a picture, so here it is.



We'll call this Figure 1. It is a drawing of a resonant half-wave dipole. The arrows indicate current direction at some moment in time. (Of course, the arrows switch direction every ½ cycle.) Notice that even though the current is flowing in opposite directions on the feed-line, it flows in the same direction on both halves (sometimes called legs) of

the dipole. The curved line above the antenna indicates the amplitude of the current, at 98 watts input power. Notice that the current drops to almost zero at the ends of the antenna. This only stands to reason, since it has run out of places to go. At the feed-point (in the center of the antenna), the current still has the entire antenna to flow through, so the current is at its highest.

Here's Figure 2:



This drawing shows the voltage levels on the dipole, at 98 watts. Notice that the voltage is much higher at the ends than in the center. At the very end, the voltage could be about 700 volts. Of course, the voltages switch polarity every ½ cycle.

I used Ohm's Law to determine the current and voltage at the feed-point, assuming 98 watts input power, and 50 ohms feed-point impedance. ($1.4 \text{ amps} \times 50 \text{ ohms} = 70 \text{ volts}$). Closer to the ends, the impedance rises significantly ($140 \text{ volts} / .7 \text{ amps} = 200 \text{ ohms}$). At the ends, the impedance is thousands of ohms. Remember, these are hand-drawn graphs, and not exact. Also, notice that the power is the same all along the antenna ($1.4 \text{ amps} \times 70 \text{ volts} = .7 \text{ amps} \times 140 \text{ volts} = 98 \text{ watts}$).

Let me finish up by saying that this resonant antenna will gladly accept all of the power delivered to it, and will convert almost all of that power into radio waves. The current just bounces from one end to the other until it is converted into radio waves.

If you have questions, comments, or other input about the "Waves" articles, my contact info is on page 2. Thanks, more later, 73 Jim

Michigan Amateur Radio Alliance
PRESENTS



Spaghetti with Meat Sauce Dinner

Menu will include spaghetti with meat sauce, bread sticks, salad and desserts.

Friday, September 26, 2008

Donation: \$6.00

Children under 12: \$4.00

Family limit \$24.00

Time: 5:00 to 7:30 PM

At 5th St. Hall

Located on the Northwest Corner of
5th and Davis Sts.

Grand Rapids, MI 49504



GRAHamfest 2008

Grand Rapids Area Hamfest

Saturday, September 6

Sponsored by: The Grand Rapids Amateur Radio Association an ARRL Approved Hamfest



Annual Electronics, Amateur Radio, Shortwave,
CB and Computer Equipment
Swapmeet / Fleamarket

Opens at 8 AM

"Until it ends" usually about 1PM
Seller Setup Fri. 6-10PM, Sat. 6AM

Indoor and Outdoor Sales
VE Exams - ARRL VEC - 10AM
On-site camping, electric available
Friday Night Potluck

NEW: You can "BYOT", Bring Your Own Tables, no extra charge for inside setup, or reserve provided tables for usual fee.

Tickets \$6 at the door
K-12 Students Free

Kent County Fairgrounds
225 S Hudson St
Lowell, MI 49331



Hamfest GPS Coordinates:
N 42.931620 / W 85.341668 (EN72hw)
Talk-In: 147.26+ (94.8Hz) & 146.52

Visit www.grahamfest.org for updates, maps, directions and add'l information.

Table and Ticket Reservation Form

Indoor 8 foot reserved table - \$10/ea	<input type="text"/>	=	<input type="text"/>
Camping - \$10 rustic/\$15 elec, water	X <input type="text"/>	=	<input type="text"/>
Tickets - \$6/ea	X <input type="text"/>	=	<input type="text"/>
Outside sales and "BYOT", no extra charge, non-reserve, ticket(s) required	<hr/>		
	Total		<input type="text"/>

Name/Callsign: _____
Phone/Email: _____
Address: _____
City, St, ZIP: _____

Questions? Contact: Jack Amelar - NY8D
grahamfest08@w8dc.org or phone evenings
(616)897-6885

The dead line for guaranteed reservations
with payment is September 2.

Reservations received after Aug.25 will
be held at the door.

Mail Completed Form and Payment to:
GRARA / GRAHamfest
P.O. Box 3282
Grand Rapids, MI 49501-3282