Short Skip

REPEATERS

Freq	Location
147.000	Merrillville
147.240	St. John
442.075	Merrillville

All Lake County ARC Repeaters are open to all amateurs. All repeaters must have a PL of 131.8 set in order to access.

FROM THE PARADE STAND
by Tim, N9CA, LCARC President

Thank you VP Bill Leaming N4GIX for a terrific program at the January Meeting.

Next Club Meeting: Friday March 13th at 7:30 pm.

The Program: "How Big Telecoms Handle Equipment Repair When Disaster Strikes".

ARRL vows to Oppose the FCC's plan to remove "existing non-federal secondary radiolocation and amateur allocations" in the 3.3 - 3.55 GHz (3300 MHz – 3550 MHz) band.

WEATHER SPOTTER CLASSES Tuesday, March 3

6:30pm – 8:30pm   Spotter Training - Valparaiso, IN (Porter Co.)
3100 Ivy Tech Dr, Valparaiso, IN 46383   Main entrance door > down the hall to auditorium
Tuesday, May 5, 2020
6:00pm – 8:00pm Spotter Training - Merrillville, IN (Lake Co., IN)
Merrillville Branch, Lake County Public Library, 1919 81st Ave, Merrillville, IN > downstairs

HAMFEST: Sunday March 8th – Sterling – Rockfalls ARC   Rockfalls Illinois (CST)
Saturday March 14th – Wabash Valley ARC   Brazil Indiana   (EST)
SQUAWKERS: I think we all know that passenger aircraft carry what is affectionately called a "tail squawker". The squawker transmits the ID of the airplane; tail number, altitude, airline, flight number, departure and ETA, as well as other aircraft telemetry. This ID is tracked by Aircraft Controllers on their radar to safely direct air traffic.

DRONES: The FAA is now proposing to require remote identification of all so-called "unmanned aircraft systems" (UAS), which include drones and hobby aircraft. A growing number of radio amateurs utilize camera-equipped drones for aerial photography purposes, to examine antenna systems, and to operate hobby aircraft remotely on amateur radio frequencies. Comments on the Notice of Proposed Rule Making (NPRM) in Docket FAA-2019-11 are due by March 2, 2020.

The Federal Aviation Administration has new special regulations for all drones during emergencies. The agency put in temporary flight restrictions. Hobbyists or people who are just curious are told they cannot send out drones during a crisis. But the agency will quickly register government, nonprofit and commercial drones involved in helping recovery efforts. The agency tracks flight plans for the drones — such as where they will fly, how high and when — to prevent collisions

Tropical Storm Harvey (Texas August 2017) disrupted at least 17 emergency call centers and 320 cellular sites, and it caused outages for more than 148,000 Internet, TV. Both AT&T and Verizon have confirmed they now use drones to help with recovery efforts.

BTW, Amateur Radio plays a big part in any of these recovery operations. Letting loved ones and friends know if fellow residents were OK. With their ARES and RACES drills, plus familiarity with the locale, they are very helpful when disaster strikes.

Currently, companies are embedding drone crews with their repair crews. The drone can get pictures of a cell tower, and then the repair team can see what's actually wrong with it. Knowing what's wrong is important. It is a big waste to send a crew out that doesn't have the right repair equipment.

Drones can also be used to figure out which areas to avoid — which areas aren't flooded, where there are large piles of debris — and then repair teams can find ways to get out to the cell towers and other facilities without wasting time.

Unfortunately, the entire state of Florida is a target for hurricanes. There is a lot of ongoing coordination. In season, drone teams stay stationed just outside of Florida.

MEETING MINUTES

February 14, 2020 Russ, KB9HO

Meeting called to order at 7:31PM.

Minutes were read and accepted as read.

The treasury's report was read. The club insurance has been paid Nick has moved to accept the Treasury's report and the motion carried.

Tim and Andy have adjusted the repeater audio and made a few tweaks to correct problems.

Tim has said the Tech Class is going OK, but has a request for VE's to help with the testing.

Tim has asked to move the club meeting to the Tri-Town Safety Village.

The club audit will be done before the March Meeting.

Ken has taken a fall so the audit committee will wait for Ken.

Introductions were made with 15 attending the meeting.

Jim reminded every that dues need to be paid and after March he will drop those that have not paid the dues.

Bill will present the program on MicroBITX. It is made in India by ladies from a nearby village. The ladies add some parts to the board to complete the board and test the board for operation before shipping. As a kit you only need to put on the parts not soldered to the board. You just use the connectors and wire to hook the external parts to complete the radio.

Program started at 7:47PM.

Motion to adjourn motion carried at 8:20PM

SIGNAL IDENTIFICATION GUIDE

Ever hear a signal on the radio and you don't know what it is? Check out this website for audio files of over 377 different digital signals, both amateur and commercial. Most interesting.
https://www.sigidwiki.com/wiki/Signal_Identification_Guide

NEED HELP? CALL ON THESE ELMERS

- Tim N9CA
- Bill N4GIX
- Bill Young N9QLS
- Russ KB9HO
- Andy W9FXT.
- Mark K9MQ is an ARRL Tech Specialist and can also be called on.

NEW QUESTIONS RAISED OVER TESTING FOR RF EXPOSURE

Amateur Radio Newsline - Feb 14, 2020

We begin this week with a story about wireless safety. The FCC requires all wireless devices sold in the U.S., including ham radio equipment, to demonstrate that even at maximum power, their RF exposure is below the minimum allowable level of Specific Absorption Rate or SAR, for safety. A recent test of mobile phones' RF levels, however, has raised doubts about the testing process itself. Kent Peterson KC0DGY has that story.

KENT: In an investigation conducted last year by RF Exposure Labs for the Chicago Tribune newspaper, a number of phones from Apple, Samsung, and Motorola were discovered to exceed the the FCC's SAR limit. A subsequent investigation done by the FCC, however, failed to corroberate those findings. The lab used phones purchased from retailers; the FCC received its phones directly from the manufacturers themselves.

More recently, a test by the lab for Penumbra Brands - which sells mobile-phone protection devices - found an iPhone 11 Pro also exceeded the allowable levels. That test drew its conclusions based on the study of a single phone that had been purchased at retail.

The IEE Spectrum reported on these developments on its website on February 7th. None of the phones' manufacturers were reached for comment.

A University of California Berkeley researcher told the IEEE however that regardless of whose findings end up being valid, the real fix needs to be made at the FCC. Researcher Joel Moskowitz said the agency's testing for RF exposure needs to be made more comprehensive -- and brought into the 21st century.

For Amateur Radio Newsline I'm Kent Peterson KC0DGY.

HAM RADIO TRIVIA
answers on W9LJ.org

Q: Every mobile antenna should have at it's tip a corona ball or corona tip. TRUE or FALSE?

Q: Which agaency issued amateur licenses prior to the FCC?
- The Department of Commerce
- The FLB
- The FRC
- The RCC

Q: Who sent the first radio signal across the Atlantic Ocean?
- James Clerk Maxwell
- Heinrich Hertz
- Guglielmo Marconi
- Ferdinand Braun

MARCH PROGRAM

Scan this code to go directly to our web page w9lj.org

UNDERSEA EXPEDITION PLANNED TO RETRIEVE TITANIC'S RADIO GEAR

from ARRL Leter, Feb 6, 2020

A recreation of the Titanic radio room.

The company with sole rights to salvage artifacts from the RMS Titanic has gone to court to gain permission to carry out a "surgical removal and retrieval" of the Marconi radio equipment on the ship, a Washington Post article reports. The Titanic sank in 1912 on its maiden voyage after striking an iceberg in the North Atlantic. As the radio room filled with water, radio operator Jack Phillips transmitted, "Come at once. We have struck a berg. It's a CQD, old man," and other frantic messages for help, using the spark transmitter on board. CQD was ultimately replaced with SOS -- which Phillips also used -- as the universal distress call. The passenger liner RMS Carpathia responded and rescued 705 of the passengers.

As might be expected, the deteriorating Marconi equipment is in poor shape after more than a century under water. The undersea retrieval would mark the first time an artifact was collected from within the Titanic, which many believe should remain undisturbed as the final resting place of some 1,500 victims of the maritime disaster, including Phillips. The wreck sits on the ocean floor some 2 1/2 miles beneath the surface, remaining undiscovered until 1985.

A just-signed treaty between the UK and the US grants both countries authority to allow or deny access to the wreck and to remove items found outside the vessel. "This momentous agreement with the United States to preserve the wreck means it will be treated with the sensitivity and respect owed to the final resting place of more than 1,500 lives," British Transport and Maritime Minister Nusrat Ghani said in a statement.

The request to enter the rapidly disintegrating wreck was filed in US District Court in Eastern Virginia by RMS Titanic, Inc. of Atlanta, Georgia, which said that it hopes to restore the Titanic radio transmitter to operating condition, if it is allowed to go forward.

The company plans to use a manned submarine to reach the wreck and then deploy a remotely controlled sub that would perforate the hull and retrieve the radio equipment.

HOW LARGE IS LOTW STORAGE?

Mike K1MK-- Michael Keane, K1MK -- IT Manager, ARRL

FWIW, the size of the complete database including all of its tables, the overheads of various indexes, etc. currently sits at 1619 GB. Not large by any measure.

The key requirement for the LoTW DB has always been its speed which in terms of specs ultimately comes down to the number of I/O operations per second (IOPS) the storage array on which the DB resides can support. The IOPS bottleneck did represent a challenge some 7 or 8 years ago but this was completely eliminated by shifting from using magnetic drives in a storage area network to using solid-state disks in a dedicated LoTW DB server.

Growth of the storage array is quite manageable. The storage array needs to be expanded by an additional 200 GB solid-state drive every 18 months or so.

73,

Mike K1MK-- Michael Keane, K1MK -- IT Manager
ARRL, The National Association for Amateur Radio™

HAM RADIO Q & A

from Ham Radio Hijinks — **Ham Hijinks**

- "Newly licensed Technician here! I got this sharp Yaesu VX-3R HT and it works great into the local VHF repeater. Thing is, these guys are kinda boring. Is this the best ham radio has to offer? With hope, Bored to Silence"
- Dear Silence, we hope we didn't mislead you. Yes, it's the best we have. You might try buying more radios, to make yourself feel better, like us. 73
- "I got a Baofeng UV5R for my wife. How did I do? Thanks, Betrothed in Bedford."
- Dear Betrothed, sounds like a good trade! 73!
- My neighbor says my new off-center-fed dipole is ugly. What should I do? Sincerely, Sensitive Receive."
- Dear Sensitive, We heard your neighbor said your hair was ugly, too. Going to the barber tonight? Of course not! Carry on, OM! 73
- "I've always wanted to be a policeman. Sometimes I walk outside and yell 'UP! UP! UP!' at cars. Where do I apply? Thanks, Brainless in Seattle."
- Dear Brainless, Sounds like you're already on the job! Now go to the lower end of 20m phone and get those DX chasers transmitting UP where they belong! 73!

FOR SALE: Got some radio gear for sale? Looking for some radio gear to purchase? Check out the new FOR SALE page on the club's website — **https://lcarc.weebly.com/**   -sale. Scroll down to see the most current items or click on the ARCHIVE section to see items for sale in previous months. If you have something that has been sold, be sure to contact John, W9WY for information to have your listing removed. There is no charge for club members to list their items. This is a service for members.

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US AIR FORCE SPACE FENCE NEARING OPERATIONAL ACCEPTANCE

from ARRL Web Site

Space Fence is located on Kwajalein Atoll in the Marshall Islands. [US Army photo]

According to NASA's most recent Orbital Debris Quarterly News, the space agency calculates about 17.6 million pounds of objects are in earth orbit, a number that will grow as launches proliferate -- including thousands of small satellites -- presenting a huge problem. The US Air Force Space Fence -- a second-generation space surveillance system now nearing completion -- is expected to play a crucial role.

Space Fence is located on Kwajalein Atoll in the Marshall Islands. [US Army photo]

Using advanced solid-state S-band radar technology, Space Fence is located on Kwajalein Atoll in the Marshall Islands. Such critical space-based technologies as weather forecasting, banking, global communications, and GPS navigation are under threat from space junk orbiting Earth. Collisions already are frequent, and defunct satellites and rocket boosters have increased the amount of space debris.

The Air Force Space Surveillance Network tracks about 25,000 objects. When Space Fence comes online, the catalog will expand considerably, and when fully operational, it will be the world's largest and most advanced radar system, offering unprecedented space situational awareness. Beyond cataloging objects, Space Fence will detect closely spaced objects, breakups, maneuvers, launches, and more.

Contractor Lockheed Martin reported last spring that Space Fence was able to detect debris from a microsatellite destroyed by India as part of an anti-satellite test. It then was able to determine the orbit of the remnants and predict when the space junk would pass through the fence again.

Space Fence is expected to become fully operational this year. -- Thanks to AMSAT News Service via Milsat Magazine; Lockheed Martin

VALENTINE'S GIFT A 'BIG HIT' FOR RADIO OPERATOR

By WB0RUR, on the scene

NACODOCHES, West Virginia — Mr. Harold "Butch" Crutchfield of Upper Combover County is nursing a gunshot wound to the upper thigh, after presenting his wife with an outstanding Valentine's Day present: an Alpha 9500 amplifier!

"She'd been hinting around that she wanted something really special this year," says the 63-year-old civil engineer. "So I thought about it for a while… and chose the amp. It's a great piece of equipment!"

Crutchfield, a ham radio operator since 1988, ordered the amplifier online. It was delivered just days before the traditional "lovebird" holiday.

"I didn't even have a chance to gift wrap it before she ripped into the packaging. We've been married for 32 years," says Crutchfield. "And I've got to be honest. I'm about out of creative gift-giving ideas."

According to a spokesman for the local ham radio club, Marti Jane Crutchfield (the ham's wife) was so excited upon un-boxing the amp that she retrieved her husband's shotgun to fire celebratory gunshots into the air.

Apparently one of the blasts caught Butch in the upper thigh.

"I'll be alright eventually," he says philosophically. "But I won't be climbing my tower anytime soon, that's for sure."

A year ago, Mr. Crutchfield presented his wife with an RG -58 coax bouquet, complete with silver and gold Teflon connectors, which he says "shimmered like my wife's eyes."

Local hams may recall the freak accident last year, when the coax bouquet twisted around Crutchfield's left forearm and broke his fall from the 2nd story balcony.

WEBSITES OF INTEREST
Click on the highlighted links to go to the website

Check out the West Mountain Radio Website at **http://www.westmountainradio.com/pdf/Quarter-2-2019.pdf**. Lots of good information not just on their products but ham radio topics as well.

Interested in DX? Join (FREE) the NWI DX Club and/or read the monthly newsletter. See them on the web at: **http://nwidx-club.weebly.com/**

Want to buy or sell "stuff". Checkout the club's website for great deals. **https://lcarc.weebly.com/for-sale** Right now there are some GREAT deals on /\/\otorola Mobile and Portable (HTs) DMR radios and accessories.

SPACE FORCE OFFERS FIRST PEEK AT CAMOUFLAGE UNIFORM

from **Military.com** *By Hope Hodge Seck*

The United States Space Force has only one member so far, but it appears the service utility uniform is already well under development.

The official Twitter account of the month-old military service posted a teaser photograph Friday night appearing to show a variant of the Operational Camouflage Pattern used by the Army and Air Force.

Above the left breast pocket in Navy embroidery reads: U.S. Space Force.

"The first #SpaceForce utility uniform nametapes have touched down in the Pentagon," the tweet read.

The uniform depicts four-star rank, indicating that the uniform belongs to Gen. John "Jay" Raymond, the first commander of U.S. Space Force. It also has the Command Space Operations badge embroidered above the service nametape.

On the left sleeve of the uniform is the United States Space Command patch, denoting the military's newest combatant command, formed shortly before Space Force itself activated Dec. 20. And above that patch is a full-color American flag patch -- a departure from the flags that soldiers and airmen typically wear on their right shoulders in OCP uniform.

Many questions remain. Space Force has yet to announce a rank structure, a full system of uniforms or even what to call members of the new service. In a Thursday briefing, Pentagon spokesman Jonathan Hoffman said Raymond was developing a plan regarding every detail.

"We've got some steps to go through," he said. "General Raymond's team has a -- a massive, incredibly well thought out and planned implementation process for ... uniforms, pay, songs, that they need to go through to get a Space Force ... I don't know the timeline on it but we can probably get you guys an update on some Space Force-related issues in the near future."

-- Hope Hodge Seck can be reached at hope.seck@military.com. Follow her on Twitter at @HopeSeck.

You would think they would have called the branch "The United Federation of Planets (or the Federation for short). Then again why would they need a typical camo pattern for space?— ed

U.S MILITARY REPORTEDLY SCAMMED BY ANTENNA DEAL

For Amateur Radio Newsline I'm Kent Peterson KC0DGY

If you've ever bought a piece of radio equipment that turned out NOT to be quite what you'd ordered, you're in good company with some folks at the Pentagon. Kent Peterson KC0DGY has that story.

The United States Navy's Special Warfare Command thought it was buying 450 VHF/UHF ultra-light wearable body antennas for use by its elite Navy SEAL teams. Instead it got scammed by a delivery of cheap knockoff antennas, according to federal officials quoted in a recent report on the website Quartz.

The Navy had been shopping last year specifically for antennas made by the New York-based company, Mastodon Design. The antennas were to be delivered by a small business authorized to be a dealer or reseller of Mastodon products. The winning bid was submitted by California-based Vizocom which -- according to the Navy's account of the deal -- instead delivered lower-cost substitutes that had been provided with fake spec sheets and serial numbers identifying them as Mastodon products.

It cost the Pentagon $165,000 but according to investigators' review of the company's purchase order, Vizocom paid little more than $12,000 for the antennas. Details in a government search warrant of Vizocom's premises in December said that when the special operations force received the antennas, their poor quality was evident and they looked different from previous Mastodon products used by the SEALs.

According to Quartz, the investigation is still under way. No official charges have been filed.

Vizocom has done more than $30 million in recent business with the U.S. government, much of it with the military.

YEAR-LONG EVENT CELEBRATES THE DAWN OF SDR

For Amateur Radio Newsline I'm Ed Durrant DD5LP KC0DGY

For most of 2020 hams will be marking the anniversary of a groundbreaking development more than 3 decades ago. Ed Durrant DD5LP has the details.

What began in a lecture given in 1985 by Ulrich L. Rohde, DJ2LR / N1UL, has since transformed much of the amateur radio landscape. His talk came at the dawn of digital signal processing via Software Defined Radio, or SDR. SDR is now considered the standard when it comes to generating or decoding radio signals - and Ulrich Rohde is considered a pioneer. In 1982 he was part of a team working at RCA under a U.S. Department of Defense Contract which led to the first software-defined radio's development.

Special event station DL35SDR, which began activity this month, is marking the 35 years since he delivered his lecture in London at a conference on HF communications. The special event station will be on the air throughout much of the year operating from the greater Munich area where Ulrich's family busines, the test-equipment company Rohde and Schwartz, is based.

RESISTANCE IS NOT FUTILE
IT IS VOLTAGE DIVIDED BY CURRENT

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INDIANA DMR INFORMATION

Jay Farlow to Hoosier DMR

Jay Farlow to Hoosier DMR

I have completed many updates to the Indiana DMR Repeater/ Talkgroup Matrix, a spreadsheet on Google Sheets that anyone can view. I removed repeaters believed to be permanently removed from service, those that no longer support DMR on a full-time basis and those that are located outside of Indiana (except for those whose RF coverage areas include parts of Indiana). I updated talk group lists, based on information obtained directly from repeater owners, from network websites and from the Crossroads c-Bridge. There are only two or three repeaters about which I'm still awaiting information. I added columns for various types of new data. I created a document (linked below) that explains the spreadsheet, how to use it, and how its data affects codeplugs for DMR radios. I strongly recommend that users read this document, especially hams who are new to DMR. The document contains a link to the spreadsheet. Both can be viewed at will online, without downloading, which means you'll always see the latest versions. Let me know if you spot errors (I'm sure there are some!).

Using the Indiana DMR Repeater Matrix Introduction Indiana Amateur radio (ham radio) operators who use the digital mobile radio (DMR) mode need a way to know what repeaters are available to them and what talk groups they may use on each repeater. This information is essential to creating "codeplugs" (configuration files) for their DMR radios. To provide the above information, Christopher Morgan, KC9TKJ, created a spreadsheet that cataloged all Indiana DMR repeaters and their talk groups. In 2020, Jay Farlow, W9LW volunteered to begin updating that spreadsheet. To make the latest version constantly available to all users, Farlow uploaded the spreadsheet to Google's "Google Sheets" application. It can be viewed by anyone by following this link. Spreadsheet Description by Column Use the information below to gain an understanding of the data held in each spreadsheet row and column and how that data affects the creation of a codeplug.

Row 2: Time Slots, Talk Groups and Other Information Row 1 is intentionally empty. The primary purpose of row 2 is to identify talk groups, by name and number, that repeaters carry. Two cells in row 2 identify "time slots." DMR repeaters can carry two, simultaneous conversations by dividing their signals into two, 30 millisecond time slots, known as "slot one" and "slot two". With the exception of repeaters on the Brandmeister network (see below), a talk group can be accessed only on the time slot to which the repeater owner assigned it. For example, if a repeater owner assigned North America (talk group number 3) to time slot one, attempts by a radio to access that talk group on time slot two will be unsuccessful. Codeplug writers must therefore note to which time slot each talk group is assigned. Time slots are identified in row 2 of the spreadsheet, with associated talk groups listed to the right of the corresponding time slot label. The first cell in row two contains other information, including the URLs of various DMR network websites and a notation to see the bottom of the spreadsheet for additional information.

Row 3: Column Headings Row three mostly contains labels for columns, as described below. Column B: Status Column A is intentionally empty. Column B is labeled, "Status". Cells in this col-umn indicate whether each repeater is "on air," "off air," "off net" or "planned." Repeaters that are listed as "off air" are typically unavailable temporarily for maintenance. Repeaters listed as "off net" are typically on air and available for local communications but not for communications beyond the local repeater.

Column C: Location Cells in column C indicate the town and state nearest the physical location of a repeater. Except for out- of-state repeaters whose RF coverage includes part of Indiana, only repeaters located in Indiana are listed in the matrix. An asterisk (*) next to a location name indicates that important information is available far to the right, in the "Notes" column.

Column D: Network DMR repeaters are typically networked with other DMR repeaters via the internet. Different DMR networks exist, with differing functions. These networks can be divided into two main types - the Brandmeister network and networks based on special servers known as "c-Bridges." Examples of c- Bridge networks are Crossroads, Chicagoland and Tri-State. Cells in column D indicates the name of the network to which a repeater is connected. c-Bridge Networks c-Bridges provide each repeater owner a high level of control over how the repeater is used. A repeater on a c-Bridge network carries only the talk groups that the repeater owner chooses and only on the time slots the owner chooses. DMRPlus DMRPlus is a c-Bridge network that differs from others in its use of user-selectable reflectors. The Tri- State DMR network, to which a few Indiana repeaters are connected (e.g. Valparaiso, LaPorte and Crown Point), uses DMRPlus. Users of these repeaters should refer to the Tri-State DMR website for information on using this network. Brandmeister the Brandmeister network allows repeater users more control of where their signals go. Every one of more than 1,400 talk groups is available to every user of any Brandmeister repeater. In addition, users of Brandmeister repeaters may program any talk group on any time slot.

Column E: Network Type Cells in column E (labeled, "NT") indicate whether a repeater is connected to a c-Bridge network ("CB") or Brandmeister ("BM"). The difference is explained above.

Column F: Mode Many DMR repeaters support only the DMR mode, but some repeaters in Indiana use a multi-mode digital voice modem (MMDVM). MMDVM repeaters can support any combination of DMR, DSTAR, P25 or C4FM (the mode on which Yaesu's System Fusion is based). Repeater owners or administrators can enable any or all such modes per their preferences. Cells in column F (labeled, "M" for "mode") indicate which repeaters are DMR-only ("D") and which are MMDVM ("M"). The matrix lists only MMDVM repeaters on which DMR is normally enabled. Users on another mode, however, can temporarily block DMR use, so MMDVM repeaters might not respond to every transmission by a DMR radio.

Column G: Repeater ID Like user radios, every repeater has a unique numeric ID. Cells in column G identify each repeater's numeric ID.

Column H: Call Sign Cells in column H indicate each repeater's FCC call sign.

Column I: Frequency Cells in column I indicates each repeater's transmit frequency in MHz. In other words, this is the frequency to

which a user radio's receive frequency must be set.

Column J: Offset Cells in column J indicate the difference and direction of the user radio's transmit frequency, based on the user radio's receive frequency (column I). For example, "+5" (typical of UHF repeaters) indicates that the user radio's transmit frequency should be set 5 MHz above the receive frequency. An entry of "-0.6"

(typical of 145-146 MHz repeaters) indicates that the user radio's transmit frequency should be set 0.6 MHz (600 KHz) below the receive frequency.

Column K: Color Code Cells in column K indicate each repeater's color code. In DMR, color codes, despite their name, are numbers (0-15) that serve a function similar to the continuous tone-coded squelch system of FM repeaters: They prevent unintended access to a different repeater on the same frequency pair. In current practice, repeater owners in Indiana rarely use a color code other than "1". Users must, however, know and select the correct color code in their codeplugs.

Column L: Prefix Most user DMR radios have limitations on the number of characters that will fit in a channel name or zone name. Cells in column L suggest abbreviations that codeplug writers may use in zone names or in channel names, to distinguish channels associated with one repeater from those associated with another. Where a location has more than one DMR repeater on the same band, letters such as "A" and "B" are appended to separate them. In the case of repeaters on different bands, the matrix uses "V" for VHF and "U" for UHF.

Column M, etc.: Talk Groups Beginning with column M, cells indicate whether each talk group is available on each repeater and if so, on which time slot (see, "Row 2: Time Slots, Talk Groups and Other Information", above) and whether the talk group is available full-time ("FT"), is push-to-talk (PTT)-activated ("PT"), is a Brandmeister talk group on a Brandmeister repeater (and therefore available as PTT-activated on any time slot, see "Brandmeister" under "Column D: Network", above), or not available. Full-time vs. PTT-Activated Most repeater owners designate one or more talk groups to be always on, also known as static or full- time. Users tuned to these talk groups will hear any ongoing traffic, without taking further action. Owners of repeaters connected to c-Bridges usually configure other talk groups as on-demand, also known as dynamic or PTT-activated. Local users tuned to these talk groups will hear nothing, even if the talk group is in use, unless and until they "activate" a talk group by transmitting once on that channel. Once activated, a PTT-activated talk group will remain active for an amount of time since the most recent local transmission - typically (but not always) 15 minutes. Many repeater owners prefer that users activate PTT-activated talk groups only when the users intend to make a contact, not solely to monitor the talk group. On a repeater connected to a c-Bridge, any talk group that is configured neither as full-time nor as PTT- activated is not available at all on that repeater. In other words, on such repeaters, users can access only those talk groups indicated with either an "FT" or a "PT".

All Brandmeister talk groups, however, that are not already configured as full-time, are available on all Brandmeister repeaters as PTT-activated, regardless of whether those Brandmeister talk groups appear in the Indiana DMR matrix. Duplicate Talk

Group Names Some talk groups are common between c-Bridge and Brandmeister networks, but others are not. One example is the North America talk group, which is number 3 on c-Bridges but number 93 on Brandmeister. These talk groups are not interconnected. In addition, talk group 93 is not normally available on c-Bridge repeaters and talk group 3 is not available on Brandmeister repeaters. Other talk groups, however, share the same numbers on both networks and are interconnected. For example, the Indiana statewide talk group is available under the same number (3118) on c-Bridge and Brandmeister repeaters and any traffic on that talk group can be heard on either network. Other examples of cross-network talk groups include Midwest (3169), TAC 310 and TAC 311. When creating channels in a codeplug for a repeater, it is important, therefore, to pay close attention to the matrix to assure selection of the talk group numbers supported by that repeater. "BM" and Empty Cells If a talk group is not available on a repeater, that cell with be blank, with only a gray background on that repeater's row. There is one exception that involves Brandmeister repeaters: If a Brandmeister repeater has a talk group set as full-time on one time slot, and if that same talk group appears in the opposite time slot's list, it will appear as blank in the opposite time slot's list. This is intended to discourage users of Brandmeister repeaters from PTT-activating a talk group on one time slot, when that same talk group is already full- time on the opposite time slot.

Apart from the Brandmeister exception above, a blank gray talk group cell usually indicates:

• "That talk group is provided to c-Bridge repeaters but not Brandmeister repeaters (or vice-versa), as in talk groups 3 and 93."

• That talk group is available, but not on the referenced time slot (c-Bridge repeater).

• "The owner of a c-Bridge repeater has chosen to not make that talk group available at all.

The matrix uses the entry, "BM" in talk group cells as a reminder that the spreadsheet row belongs to a Brandmeister repeater and that the talk group is available on the Brandmeister network, which means it can be PTT-activated on that time slot (as can any other Brandmeister talk group).

Column DH: Notes Cells in column DH provide various notations, including how the row was recently updated, or valuable information about the repeater. Note that the "Notes" column will be in a column other than DH, if talk groups have been added or removed since the writing of this document. The column will always, however, have the heading, "Notes."

Column DI: Updated Cells in column DI provide an automatic time and date stamp that shows when that row was most recently changed (e.g. to modify a repeater's talk group list).

Keeping the Matrix Up-to-Date The data in the matrix is only as good as information contributed to its editor. If you are aware that a new DMR repeater has begun operation, that a listed repeater has ceased operation, or that a listed repeater has changed its full-time or PTT-activated talk groups, please contact, or have the repeater owner contact, Jay Farlow, W9LW, at **rsw9lw@gmail.com.**

The link to the spreadsheet is: **https://tinyurl.com/vy39yyw**