

CQ CHATTER

JUNE 2022

VOLUME B22 • ISSUE 4

WOOD COUNTY AMATEUR RADIO CLUB

President	KG8FH/W8PSK	Jeff Halsey/Loren Phillips
Vice President	WE8TOM	Tom Leingang
Secretary	N1RB	Bob Boughton
Treasurer	KD8NJW	Jim Barnhouse
Board Member	WB8NQW	Bob Willman

Field Day Plans

ARRL Field Day will be held on June 25-26 this year. The location for the WCARC is the Wood County Historical Museum on the East side of the facilities. This is a chance for you to meet in person the people you talk to on the air. Activities will start on Saturday at around noon, with the traditional hoisting of the antennas. Determination of whether the dinner is to be potluck or ordered out will be made at the June 13 Club meeting.

If you have any equipment you want to contribute to the Club's effort, please contact Bob at boughton@bgsu.edu. The ARRL has decided to continue the policy where home stations can contribute to the Club score by sending in an entry. ■

Jubilee QSL Card Available

GB70 will be used by special event stations honoring the 70th jubilee of QEII. If you contact a GB70 station during June, a professionally-designed QSL card will be available on request from the appointed professional QSL Manager.

Bureau QSL cards are free of charge, from MOOXO OQRS with the first batch of cards anticipated

to be sent during July 2022. Cards requested by direct post will be subject to a postage and packing charge. Please do not send us your QSL cards; all QSOs will be uploaded to LoTW. ■



Net Check Ins-I

May 3

Traffic: 0

WB8NQW (NCS)
WD8LEI
KD8NJW
K8BBK
KD8RNO
N1RB
KE8CVA
WD8ICP
KG8FH
KC8NKC
W8PSK
WE8TOM (12)

May 10

Traffic: 0

N1RB (NCS)
WE8TOM
KE8CVA
KC8EKT
WD8LEI
KE8NEC
WB8NQW
KE8QGV
W8PSK
KD8RNO
KA8VNG
WD8ICP (12)

May 17

Traffic: 0

KG8FH (NCS)
KE8QGV
KD8RNO
WB8NQW
WE8TOM
W8PSK
KA8VNG

Brain Teasers

1. What typical construction technique do amateurs use when building an amplifier containing a monolithic microwave integrated circuit (MMIC)?
 - a.) ground plane “ugly” construction
 - b.) microstrip construction
 - c.) point-to-point construction
 - d.) wave soldering construction
2. What causes receiver desensitization?
 - a.) audio gain adjusted too low
 - b.) strong adjacent channel signals
 - c.) squelch gain adjusted too high
 - d.) squelch gain adjusted too low
3. What type of propagation is probably occurring if a beam antenna must be pointed in a direction 180 degrees away from a station to receive the strongest signals?
 - a.) long-path
 - b.) sporadic-E
 - c.) transequatorial
 - d.) auroral

June Contests

The contest lineup for the month of June is given below. Please note that the WARC bands (60, 30, 17 and 12 m) are never open to contesting.

Jun 4-5	<i>1300 to 0100 Z</i>	160 m to 10 m
Kentucky QSO Party		all modes
Jun 4-5	<i>1800 to 2359 Z</i>	160 m to 6 m
ARRL Int'l Digital 'test		Digital
Jun 11	<i>0000 to 2359 Z</i>	160 m to 10 m
VK (Australia) Shires 'test		CW/SSB
Jun 11-12	<i>1200 to 1200 Z</i>	80 m to 10 m
Portugal Day 'test		CW/SSB
Jun 11-13	<i>1800 to 0259 Z</i>	6 m up
ARRL VHF 'test		all modes
Jun 18-19	<i>0000 to 2359 Z</i>	160 m to 10 m
All Asian DX 'test CW		CW
Jun 18-19	<i>1600 to 0400 Z</i>	80 m to 10 m
West Virginia QSO Party		all modes
Jun 18	<i>1800 to 2359 Z</i>	80 m to 2 m
ARRL Kids Day		Phone
Jun 25-26	<i>1200 to 1200 Z</i>	160 m to 10 m
King of Spain 'test SSB		SSB
Jun 25-26	<i>1800 to 2059 Z</i>	160 m on up
ARRL Field Day		all modes

Net Check Ins-II

May 17 continued

N1RB
KE8CVA (9)

May 24 Traffic: 0

KD8NJW (NCS)

WD8ICP
KC8EKT
WB8NQW

KE8PJM
W8PSK
KD8RNO
WE8TOM

N1RB
WD8PIC
KA8VNG
KE8CVA
KG8FH
KE8QGV (14)

May 31 Traffic: 0

WB8NQW
KE8CVA/P
KC8EKT
KG8FH

KE8PJM
KD8RNO
KE8OZE
N1RB
KE8TOM
N8VNT
KA8VNG
WD8ICP
KC8ZJW
W8PSK (14)

Brain Teaser answers: (E) 1-b, 2-b, 3-a

How to Use Amateur Radio Moonbounce-EME Propagation

from Hamster Group

Earth-Moon-Earth, EME, or Moonbounce propagation is a really challenging, but interesting form of radio propagation for radio amateurs to use. Moonbounce propagation presents a number of significant technical and operating challenges, but in this it provides a real sense of achievement and enjoyment when a contact has been successfully achieved. Using VHF and UHF amateur radio bands, along with relatively high power, high gain antennas and sensitive receivers, it is not a mode for all, but with today's technology it is a mode that is within the reach of a large number of amateur radio stations with those wanting challenge.

Moonbounce basics

The basis of operation of EME is the use of the Moon as a passive reflector. In view of the very large distances involved and the fact that the Moon's surface is a poor reflector the path losses are colossal, but nevertheless it is still a form of communication that is theoretically possible to use, and one that many radio amateurs regularly use.

Concept of EME propagation

With radio signals being very low-strength, it is found that galactic noise becomes a significant factor. This noise emanates from a variety of sources in the galaxy - planets, stars, etc. emit noise throughout the radio spectrum, and EME systems are very sensitive and will be able to hear this noise. The level of noise is not constant across the sky and this means that some times the sky around the Moon can be very noisy and at other times it can be much quieter.

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WCARC Weekly Net

Tuesdays at 2100 all year

147.18 MHz 67 Hz PL

Net Control Roster

<i>June</i>	<i>7</i>	<i>N1RB</i>
<i>June</i>	<i>14</i>	<i>KG8FH</i>
<i>June</i>	<i>21</i>	<i>KD8NJW</i>
<i>June</i>	<i>28</i>	<i>WB8NQW</i>
<i>July</i>	<i>5</i>	<i>N1RB</i>
<i>July</i>	<i>12</i>	<i>KG8FH</i>

NEXT MEETING

Business Meeting

Monday

June 13

TIME: 7:30PM/7:00EB

PLACE:

Sheriff's Training Room
S. Dunbridge Rd. &
E. Gypsy Lane Rd.
Bowling Green, OH

10 meter Net

***informal group
meets***

Sunday

@ 20:30 local

on 28.335 MHz

Fusion Net

Thursday

@ 19:30 local

on 442.125 MHz

***Wires-X Operators
welcome***

Informal net

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It is found that sky noise is normally worst when the Moon is crossing the galactic plane (i.e. the Moon appears in the Milky Way), and this occurs twice each month. Fortunately software used for amateur radio EME indicates this and thus helps choose the optimum times for any activity.

Equipment considerations for EME

To overcome the losses and enable amateur radio radio communications to be established using Moonbounce, very high radio transmitter power, directive antennas and very sensitive receivers are required.

With the distance of the Moon from the Earth being between 360 and 405 thousand kilometers and its diameter being 3475 kilometers, it subtends an angle of only 0.52 degree to observers on the Earth. In order to illuminate the Moon with little wasted power either side, enormously directive antennas are required. Also these antennas must be completely steerable to be able to track the steadily changing position of the Moon.

Frequencies used for Moonbounce are generally in the VHF or UHF portion of the spectrum. This allows antennas with sufficiently high gain to be used to overcome the path losses. Although frequencies as low as 50 MHz have been used, it is more normal for the 144 MHz,

432 MHz or 1296 MHz amateur radio bands to be employed.

Moonbounce propagation effects

Any signals transmitted for EME communications are subject to a number of signal propagation effects:

- **Huge path losses:** To quantify the path losses the distances and reflection efficiency of the Moon are required. The Moon is around 385 000 kilometers distant from the Earth. The surface of the Moon also reflects only about 6% of the radio signal power that reaches it. Added to the path loss for the signal traveling to and from the Moon, the overall path loss is at best approximately 252 dB on 144 MHz and 271 dB on 1296 MHz.
- **Variable path losses:** The level of loss also varies because the distance between the Moon and Earth is not constant. There is a "perigee" when the Moon is closest to Earth when it is said to be a *large* Moon. There is also an "apogee" when the Moon is at it furthest point from the Earth each month. This distance variation results in a difference in path loss of around 2 dB between the apogee and perigee positions. For small stations, where making contacts using Moonbounce may be marginal, the choice of time in the month can make a difference.

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June Hamfests

June 18 General Motors ARC Hamfest. Packard Proving Grounds, Shelby Township, MI.

web: <http://www.gmarc.org>

June 18 Monroe county RCA Hamfest. Monroe County Fairgrounds, Monroe, MI.

web: <http://www.mcrca.org>

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- **Faraday rotation:** At frequencies of 1296 MHz and above it is not a problem, but on 432 MHz it is believed that polarization rotations of up to 360 degrees are common, and below this, the signal plane may rotate through several complete revolutions. This may result in stations only being able to communicate in one direction at times.
- **Libration fading:** This effect occurs on EME signals because the surface of the Moon is not flat and the reflected signal consists of a variety of wave-fronts each with differing phases because the distance travelled by each one is slightly different due to the rough Moon surface. The received reflected signal is therefore a sum of all the wave-fronts. As the Earth and the Moon are moving relative to each other the sum of these wave-fronts is always changing and this

results in a signal onto which is superimposed a rapid flutter as well as deep fading (sometimes up to 20 dB) and some peaks. These peaks can often be very helpful to stations with less power or smaller antennas. After reflection by the Moon, the reflections seen from the Moon wavefronts have a variety of phases which sum to give the overall signal. As these change with the relative movements of the earth and the Moon this results in libration fading.

- **Doppler shift:** The relative movement of the Earth and the Moon can result in some degree of Doppler shift being added to the signals. This will vary according to the relative movement of the two bodies, and also to the frequency in use. As an example of how Doppler shift affects a Moonbounce signal it is found that at "Moonrise", a 2 meter signal may be shifted up in frequency by as much as 350 Hz. It is then found that this figure decreases, reaching zero

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when the Moon is passing the particular longitude in which you are located (due south or due north azimuth heading). After this, the Doppler shift starts to move in a negative direction, reaching an offset of around -350 Hz by "Moonset." As signal levels are low using EME, very narrow bandwidths are often used, and as a result Doppler shifts can be of importance.

- ***Signal polarization changes:*** Another problem that can occur with Moonbounce is that as stations are located at different positions around the globe, a horizontally polarized signal in one area of the globe will be at right angles to a horizontally polarized signal a quarter of the way round the globe. This spatial polarization problem adds to the difficulties caused by Faraday rotation.

Equipment for ham radio EME

Comparatively few EME contacts are made on 50 or 70 MHz in view of the local noise as well as building the sort of antennas that would be needed to provide the required gain.

For 144 MHz, the sensitive receivers and transmitter excitors are relatively commonplace. A good pre-amplifier is needed at the antenna, and a high power linear amplifier needed to develop the maximum legal power. Antennas are

manageable even at 144 MHz, but high gains are required. Also feedline losses must be kept to an absolute minimum.

As the selection of the relevant amateur band moves into the UHF portion of the spectrum, there is a steady move from Yagi antennas to parabolic reflector or dish antennas, and it becomes more difficult to generate the levels of power needed to drive the antenna.

Calculations indicate that antenna gains of around 20 dBd are needed on 144 MHz and 23 dBd on 432 MHz are needed to achieve Morse contacts. To achieve these levels of gain one arrangement is to use four long Yagi antennas that are stacked and bayed. With 3dB additional gain being required on 432 MHz to cover the additional path loss, eight long Yagis are required.

That said, many stations are able to make contacts with stations having huge antennas, effectively piggy-backing off their antenna gain. Also using the low signal modes available now, there are significant reductions in the antenna requirements.

Modes for amateur radio EME

Although SSB has been used on some occasions by stations using exceptionally large antennas, the majority of contacts used to be made using Morse. Now with computer technology and specialized data modes, these are widely used, and because there are low signal modes, this has considerably reduced the

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requirements on the equipment, bringing Moonbounce within the reach of many radio amateurs.

- ***Morse contacts*** : When using Morse, speeds are generally kept to between about 12 to 15 words per minute. The reason for this is that if the speeds are too high then copy becomes difficult in the presence of noise, whereas if the speeds are too slow then the characters become affected by the libration fading which again makes copy difficult. Additionally, the weighting of the individual dots and dashes is often increased slightly to aid copy. Normally when making Morse code contacts, the signal levels are low, and therefore only the basic contact details are exchanged. For a contact to be deemed to be completed a minimum of the callsigns, and reports must be exchanged with a confirmation that the report has been received.
- ***WSJT:*** WSJT is an ideal and the most widely used format for ham radio EME contacts. Normally the JS65 variant within the WSJT software suite is used and this provides some considerable advantages. The WSJT screen has been designed for amateur radio EME and even provides Moon direction information. WSJT

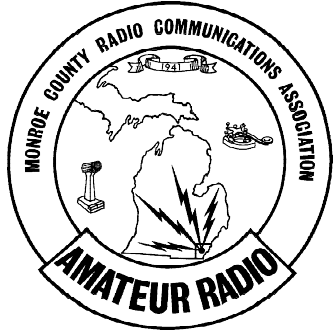
operation on 144 MHz typically takes place between 144.100 and 144.150 MHz.

- ***SSB:*** For stations with very high gain antennas and high power levels, it can be possible to use single sideband. However the propagation characteristics mean that copy can be distorted at times.

When using any mode, a good first check of a station can be gained by listening for echoes of one's own signal. If these can be heard then there is a good chance of others hearing. However even if the echoes cannot be heard, it is possible that others with higher gain antennas may hear.

Although many stations call CQ, this is only viable for stations using high powers and high gain antennas. For stations where signal strength may be marginal, arranged contacts produce a far better possibility of a contact. These arranged contacts use accurately timed transmit and receive periods to enable the participating stations to have the best chance of communicating.

The use of EME propagation is a challenge to any radio amateur wanting to use this mode of radio propagation, but it can yield some excellent results. Those with the right equipment are able to make contacts with stations in many different areas of the globe when the Moon is in the right position relative to the Earth. In this way it is a particularly interesting form of propagation to use. ■



MONROE HAMFEST

and Computer Show

Father's Day - June 19, 2022

7:30am to 1:00pm - Set-up 6:30am Presented by:
The Monroe County Radio Communications Association

Monroe County Fairgrounds

M-50 at Raisinville Rd. (2 Miles west of Monroe)

FREE PARKING

Indoor Facilities / Trunk Sales
Computers and Equipment
Distributors / Hot Food

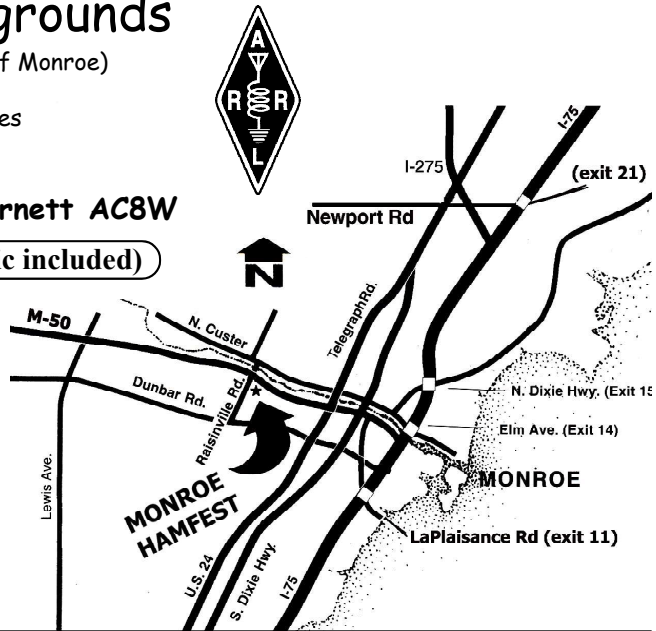
QSL Card checking by Stan Arnett AC8W

Over Night Camping \$40 (electric included)

Tables indoor 8': \$15 each, does not include admission ticket. Electric available in all buildings, bring cords.

Trunk 10' Spaces: \$10 each, does not include admission ticket.

Tickets Advance \$7 each.



Ticket, Trunk Sales, & Table Reservations online at: <http://www.mcrca.org>

Mail to: Fred VanDaele K8EBI, 4 Carl Drive, Monroe, MI 48162, ka8ebi@yahoo.com

Name _____ Call _____ e-mail _____

Address _____ City _____ State _____ Zip _____

Tickets _____ Trunk Spaces _____ Tables _____ Amount Enclosed _____

Advance Tickets \$7 ea. / 10 ft Trunk Spaces \$10 ea. / 8 ft Tables \$15 ea.

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