



The Minuteman Repeater Association

A non-profit organization providing communications infrastructure and volunteers for community and emergency events.



The Minuteman

Volume 46, Number 2

November 2016

November Membership Meeting ~ Wednesday, 16 November, 7 PM

Linux in the Hamshack

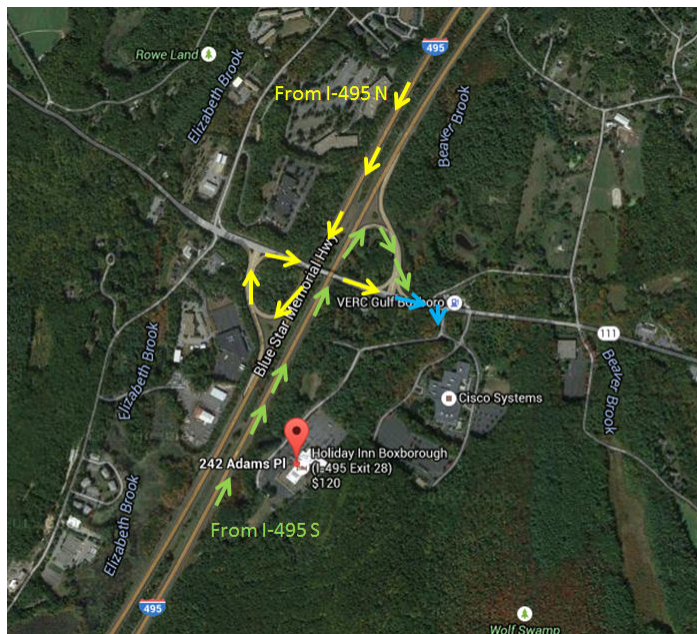
Andy Stewart, KB1OIQ

There's a lot of good, free software out there to make our hobby more fun and operating easier. Come hear about it from Andy.

Andy has been running Linux user groups since 1997, and taught Linux classes for several years in Chelmsford. Two students, who were hams, convinced Andy to become a ham in 2007.

Andy has been the President of the Police Amateur Radio Team (PART) in Westford for the last 8 years, and holds an amateur extra license. He created "Andy's Ham Radio Linux" in 2011 as a way to give back to both the ham and Linux communities. Andy is also an ARRL Assistant Section Manager for EMA.

Andy has a master's degree in electrical engineering from WPI, and by day works as a digital logic verification engineer.



Holiday Inn Boxboro: take Exit 28 off Rt.495 and head East. Take the first right off Rt.111 to hotel.

James, N1DDK's talk on CHIRP is now an ARRL Webinar; look for it on the ARRL YouTube channel.

The MMRA has a number of rolls of 1 5/8" hardline available for sale for \$300. See the President's Corner for details, page 3.

Quincy: 146.67 and 224.40 are rebuilt, back on the air at full power, and linkable. (See page 4.)

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About the Minuteman Repeater Association

The Minuteman Repeater Association (MMRA) is dedicated to Amateur Radio and public service. The MMRA maintains a large system of repeaters in Eastern Massachusetts.

The MMRA meets (usually) on the 3rd Wednesday of each month from September to June. Meeting times, locations, and talk-in frequency vary and are announced in this newsletter and on weekly nets. Meetings are open to all interested parties. Guest speakers and programs of general interest occur in September, November, January, March, and May. The intervening meetings are also open to all members and are for general business.

The Minuteman newsletter is Emailed one week before each general interest meeting. Members are encouraged to submit articles which can be sent to the editor at newsletter@mmra.org. The deadline for articles is the last Friday of the month preceding the meeting.

Each Tuesday evening at 8PM the MMRA links most of the repeaters for an open net. The topic is "Technical Information and Other Stuff". Join us!

Membership in the MMRA is open to all radio amateurs. Annual dues are \$25 per individual or \$35 per family. See our website for details.

Email to the club leadership should be sent to contact@mmra.org. The MMRA maintains a web site at: <http://www.mmra.org/>

An email distribution list for club members named "MMRA" is at: <http://groups.yahoo.com/>

You can also follow us on twitter @mmraham and like us on Facebook: <https://www.facebook.com/mmraham>.

MMRA QRM Policy

MMRA members and all other operators are strongly encouraged to report repeater activity that does not abide by Part 97 rules or accepted amateur radio practice to the board of directors at contact@mmra.org or via other means.

The most effective way (and probably the only effective way) to deal with an individual causing QRM is to NOT engage that individual on the air. Please include the time and date of any incident. Measures are being taken to make audio recordings of repeater activity.

Repeater and Frequency Information

Band	XMTR Location	Freq	PL	Call	Linking	
					To Hub 1	To Hub 2
MMRA Voice Repeaters						
10m	Marlborough	29.680	131.8	W1MRA	PTL	PTL
6m	Marlborough	53.810	71.9	W1BRI	PTL	PTL
Remote receive in Hopkinton PLin = 173.8						
2m	Brookline	145.160	na	K1MRA	D-Star	
	Belmont	145.430	146.2	KC1CLA	PTL	FTL: DARI
	Mendon	146.610		K1KWP	FTL	PTL
	Quincy	146.670		W1BRI	PTL	PTL
	North Reading	146.715		KC1US	PTL	PTL
	Weston	146.790		N1BE	PTL	PTL
	Boston	146.820		K1BOS	FTL	PTL
	Remote receive in Brookline Boston: PL = 127.3					
Marlborough	147.270	146.2	W1MRA	PTL	PTL	
1½m	Hopkinton	223.940	103.5	KB1LOY	PTL	FTL
	Quincy	224.400		N1KUG	PTL	FTL
	Weston	224.700		N1NOM	PTL	FTL
	Marlborough	224.880		W1MRA	PTL	FTL
70cm	Lowell	442.250	88.5	K1LVF	FTL	PTL: 446.775
	Weston *	442.700		KG1H	Network Hub 2 (PTL to Hub 1)	
	North Reading	446.775		W1DYJ	FTL	PTL
	Marlborough	448.225	na	W1MRA	D-Star	
	Marlborough	449.575	88.5	W1BRI	PTL	PTL
	Marlborough *	449.925		W1MRA	Network Hub 1	
33cm	Boston *	927.0625	D244	K1RJZ	PTL	PTL
	Marlborough *	927.700		W1MRA	PTL	PTL
PL out = 131.8						
Marlborough		144.390	none	W1MRA	APRS Digipeater	
???		145.630	146.2	W1MRA	Fox Box	
*Internet	HUB1- 449.925: IRLP node 4133 / Echolink node 4133					
	HUB2 - 442.700: IRLP node 4136; Connected to 220 Reflector 9124 on Tuesdays					
	927.0625: IRLP 4977			Normally linked to the NE900 Reflec- tor, 9125. Linked to MMRA via IRLP for the TIAOS net. Normally linked together.		
	927.700: IRLP 4978					

Notes: FTL = Full Time Linked (or default state) PTL = Part Time Linked (on schedule or demand)

President's Corner ~ David Wolfe, KG1H

The following is a summary of the MMRA activities at the recent Boxborough Convention:

MMRA Door Prize winners:

TYT MD-380 VHF Analog & DMR radio portable: WA3ITR
Cushcraft A5-5s 6M 5 element beam: K1WVU
Diamond X50A 2m/440 dual band vertical base station antenna: KC1CLA
ARRL Antenna Book: N1JAF

Other interesting data:

Membership Renewals at MMRA suite: 17
New members joined at MMRA suite: 4
MMRA Door Prize Tickets sold at MMRA suite: 178
Others from donations and recent renewals ~ 455 tickets total
Free MMRA membership applications (VE) at Boxboro sessions: 19

DMR was discussed at the recent MMRA Board Meeting and the board determined that incorporation of new DMR repeaters or modification of existing FM repeaters was not in MMRA's best interest. Besides, there are no 2M frequency pairs available for a new repeater, and adding a 440MHz repeater may be impacted by PAVE PAWS. In addition, eastern MA is already sufficiently covered by DMR repeaters and sorry to say that ham activity on these DMR repeaters appears to be sparse.

MMRA has been awarding free one year memberships to new hams passing the VE Session examinations. As the free memberships are only valid for one year, those who have not renewed will be deleted from the membership roster. The MMRA is using these free memberships to attract new hams with fresh ideas, so please do renew. Renewal can be done on-line at <http://www.mmra.org/renew.html>.

Stored in Hopkinton are about a dozen rolls of 50Ω foam core 1 5/8" diameter heliax cable with DIN connectors. These are used but in good condition, about 165 ft of length in each roll. The board moved to approve sale of these cables at \$300 per roll. If interested, send an email to W1DYJ@mmra.org with the number of rolls you would like to purchase. The rolls must be picked up in Hopkinton.

A first draft of a next fiscal year budget proposal was presented at the recent board meeting. The intent is to develop this document further for approval by the board in April, and presentation to the membership for vote at the general meeting in May. This would let us work more with a plan and less in reaction to unfolding events during the fiscal year that begins on June 1, 2017.

Bob, K1IW, presented a plan for technical improvements to the MMRA system. The board took action on some of these items and noted others for the future. A key aspect of this proposal is a new type of repeater controller under development by James, N1DDK. Ultimately, the new controllers would be used at sites that host multiple repeaters and the other sites would get the SCom controllers that are capable of Internet control. Thus all MMRA repeaters could be controlled via the internet. Bob expects this project would take 3-years for development and deployment.



David, KG1H, and Clark, N1NVK at Boxboro

Quincy Update ~ Bob DeMattia, K1IW

Photos: Bryan Cerqua, W1BRI

146.67 and 224.40 are rebuilt, back on the air at full power, and linkable.

The MMRA Quincy repeater first went on the air in the mid-70's from the Quincy city hospital. In the early 1980's, American Cablesystems wanted to install a cable headend at the hospital. MMRA was forced to move, but was able to find an equally good site not too far away on Forbes Hill. The castle-like structure, clearly visible from I-93, actually surrounds a steel standpipe. The standpipe and granite building were built at the turn of the century (the 20th century, not the recent one) as part of the Quincy water supply system. When built, the roof was open to the public as an observation deck. (See the next page for some historical information.) Space is tight inside this structure, as there is only about three feet between the granite wall and the steel standpipe inside!



Earlier in the summer, the thirty-year-old repeater controller began to misbehave, most likely due to a deterioration of the lithium power cell used to retain the programming. The controller began to lose programming code, causing it to behave erratically. The MMRA board chose to replace the controller rather than fix it. In the process, the "hodgepodge" arrangement of the 2m repeater and 222 repeater would be rebuilt into one compact setup, entirely within the Mastr-II rack panel.



To accomplish the work, the entire repeater was removed and brought to K1IW's garage where it could be taken apart and reconstructed. MMRA's portable DR1X repeater was put into service to keep 146.67 on the air during this two month period.

Quincy Before

Two meters in rack panel. Short pieces of 2x4s used to keep things in place. Old SCOM 7K with no display. Linear power supply at bottom. The 224.4 repeater was located on a shelf behind the rack, with each component kind-of sitting there. Notice the width of the rack and the amount of space on either side to the walls. That's all the space there is!



Quincy After

All components are now located in one rack - and all bolted down. You can turn this rack on its side (we did to get move it to the site) and nothing will move. Notice the new SCOM 7330 controller (center) and new energy efficient switching power supply (bottom). The lightning protection and duplexers remain behind the main rack.



This article about Quincy is from the September 1983 newsletter



The Minuteman



Volume 12 Number 1

**The OFFICIAL NEWSLETTER of the
MINUTEMAN REPEATER ASSOCIATION**

September 1983

The following article was researched and donated by Jack, N1AXJ, a regular on the 07-67 repeater. The article researches the history of the Forbes Hill water tower which became the site of the Quincy repeater last year. I think that it makes interesting reading, particularly the cost for the construction.

Editor

FORBES HILL RESERVOIR AND MASONRY TOWER

A contract for building this reservoir was made with Beckwith & Quackenbush of Mohawk, N. Y., on July 7, 1900; and when work was suspended, at the close of the year 1900, the masonry gate-chamber of the reservoir was finished and the earth embankments were nearly ready for the concrete lining. During the winter the reservoir was kept full of water, in order to protect the embankments from freezing. In April, 1901, the water was drawn off, and the contractors resumed work on May 6. The work of placing the concrete lining was commenced June 10 and completed September 18. Water was pumped to the reservoir on September 23, and on September 27 it was filled to within 2 feet of high-water mark. The laying of the granolithic walks and the surfacing and seeding of the embankments were not finished until early in November.

The reservoir is in the form of a rectangle, 280 feet long by 100 feet wide at the bottom, and 339-1/2 feet long and 159-1/2 feet wide at the high-water line. The embankment is 15 feet wide at the top, with an inner slope of 1.75 horizontal to 1 vertical, and an outer slope of 2 horizontal to 1 vertical. The embankments are composed of clayey hardpan, excavated from the interior of the reservoir. This material was placed in 4-inch layers and thoroughly rolled with grooved rollers. The bottom and sides of the reservoir are covered with concrete to a point 2 feet above high-water mark. This concrete lining was put on in two layers, a lower layer of natural cement concrete and an upper layer of Portland cement concrete, separated by a plastering of Portland cement mortar about half an inch in thickness. The plastering also was placed in two layers, the bottom layer composed of 1 part of cement and 2 parts of sand, the upper layer of neat cement, which was rubbed to a hard, smooth surface, in order to make it as impervious as possible. The lower layer of concrete is 4 inches thick on the bottom of the reservoir and 6 inches thick on the slopes. The upper layer is 4 inches thick on the bottom and 5 inches thick on the slopes up to elevation 185, above which it gradually increases to a thickness of 2 feet at the top, which is at elevation 194. The upper layer of concrete on both bottom and slopes is laid in blocks, about 10 feet square, and given a smooth finish. A granolithic walk 6 feet wide extends around the reservoir on the top of the embankment, access to which is obtained by granite steps on either side of the gate-chamber.

The gate-chamber is constructed entirely below the level of the top of the embankment. It has walls of Portland cement concrete, and contains two chambers. One of these chambers is 11 feet by 3 feet, and contains screens, a 30-inch sluice valve and a 12-inch drain valve. The other chamber, from which water is excluded, is 11 feet by 9 feet 6 inches, and contains valves for controlling the flow of water to and from the reservoir. A wire fence 5 feet high and about 2,035 feet long has been built around the reservoir, on the line dividing the water works property from adjoining estates. When filled to high-water level, the elevation of the reservoir is 192 feet above Boston city base, the depth of water is 17 feet, area of water surface 1.23 acres, and the capacity is 5,120,000 gallons.

The cost of the reservoir, exclusive of engineering, to December 31, 1901, was \$36,833.11.

On May 23 a contract was made with James E. McCoy of Boston for the construction of a masonry tower around the steel standpipe which was erected in 1900. The work was commenced on May 27, and it was expected that the tower would be entirely finished before the end of the year; but, on account of delay in receiving cut granite, the masonry is still unfinished, and practically nothing has been done on the iron stairway and roof. The circular wall of granite masonry surrounding the standpipe is now built to a point about 70 feet above the ground and about 7 feet below the top of the finished coping. When completed, the tower will be provided with an observation roof reached by a spiral staircase built between the steel tank and the masonry wall.

The cost of the work to December 31, 1901, exclusive of engineering, was \$11,774.05.

At the close of the year 1901, James E. McCoy, the contractor of the construction of this tower, had built the circular masonry wall encircling the standpipe to a height of about 70 feet, or 7 feet below the finished height. The work progressed slowly, and was not completed until July 19. The tower is 77 feet high from the surface of the ground to the tops of the merlons. It is circular in design, having an inside diameter of 36-1/2 feet, leaving a space of 10 feet between the wall and the outside of the standpipe which it encloses. The wall is built of uncoursed masonry, with joints of about 3/4 of an inch, and with cut-stone trimmings; and is 4.75 feet thick at the base and 2 feet thick at the top just below the cornice. The granite used for the masonry was all furnished from the Quincy Quarries, and the cut stone from both Quincy and Rockport. At the top of the tower there is a granolithic roof, which is accessible to the public by means of an iron stairway encircling the standpipe. The roof or floor is 260 feet above Boston City Base, and affords an extended view of the surrounding country.

The total cost of the tower, exclusive of engineering, was \$26,120.



Additional Historical Info about Quincy

Thanks to Brian Cerqua, W1BRI, for digging up this great stuff!

Forbes Hill Standpipe

From Wikipedia, the free encyclopedia

The Forbes Hill Standpipe is a historic water tower structure located on Reservoir Road in Quincy, Massachusetts. The tower was built in 1899-1902 to contain a 330,000 US gallons (1,200,000 l; 270,000 imp gal) steel water tank. The site originally included an adjacent reservoir that supplied the City of Quincy with water from the Metropolitan Boston Water System. The standpipe was taken out of service in 1955, and the reservoir was filled in.

It was added to the National Register of Historic Places in 1990.

History

The tower was constructed by the Metropolitan Water Board (now the MWRA), after the City of Quincy joined the system in 1897. Dexter Brackett was the supervising engineer for the project. It is built from local Quincy granite, and is 30 feet (9.1 m) in diameter and 64 feet (20 m) in height. Although now closed to the public, the crenelated tower roof is accessible via a spiral staircase located between the steel tank and inside tower walls. The standpipe and reservoir were fed from the Chestnut Hill Reservoir. The adjacent rectangular reservoir measured 280 feet long by 100 feet wide at the bottom, with sloping concrete sides, and an average depth of 18 feet.

The Forbes Hill reservoir provided a reserve capacity of 5,100,000 US gallons (19,000,000 l; 4,200,000 imp gal), as part of the southern high-service system that fed Quincy, Milton and parts of nearby Dorchester.[6] The Forbes Hill reservoir and standpipe were discontinued in the 1950s, after the construction of the Blue Hills Reservoir in the southern part of Quincy.



September Membership Meeting and Boxboro Update

The September Membership Meeting was held at the Boxboro 2016 ARRL New England Convention. **Bob, K1IW**, presented a walk through of the MMRA repeater network, including a technical discussion of how linking is done. A general Q&A period followed.

Two of our members gave talks at the convention:

Rick Zack, K1RJZ, moderated a discussion about **Digital Radio Repeater Modes**. Some of his introductory slides are shown below.

James Lee, N1DDK, gave two talks: **Program Your Radios with Open Source Software** ([CHIRP](#), highlighted in our September MMRA Newsletter,) and **Care and Feeding of Astron Power Supplies**. James subsequently gave his CHIRP presentation as an ARRL Webinar.

The five digital voice repeater modes used in New England.

Or... "Why am I so confused?"

An unbiased look into each in order of debut date

- APCO **P-25** by Will Bartlett, N1PXA
- JARL **D-Star** by Tony Souza, NN1D
- ETSI Digital Mobile Radio or **DMR** by Bill Barber, NE1B
- **NXDN** or **IDAS** by John Frye, N1OTY
- Yaesu **Fusion** C4FM by Wes Grey, KJ6YC
- Plus a couple of surprises!



What operational
feature changes
have we seen in
FM repeaters
since 1956

NOT MUCH!

The biggest question is...

"Everyone uses FM right now.

So why go to a digital mode if the only feature difference is the modulation type?"

The biggest question is...

A: If there are no feature differences, then

DON'T MIGRATE TO DIGITAL !

After features, what mode should I chose?

- Not another Betamax vs VHS
- No winner take all, try them all if possible
- As with computers, ham digital technologies will always improve and evolve.
- That is very good!

After features, what mode should I chose?

- Where do your friends hang out?
- What is available in your area? This will vary widely.
- What is your "XYL-approved" budget?

So what features are different in the digital world?

- Static-free audio
- Some modes support both data and audio
 - text messaging, email, binary file transfer
- Some modes support TWO conversations on one RF channel
- Most modes support wide area IP-based networking
 - Networking becomes even more important in rural areas
 - Valuable for emergency communications

Boxboro Update

Rick Zack, K1RJZ, Digital Radio Repeater Modes, continued

So lets take an introductory look at all five modes by when they first came out.

The first was APCO P-25 Phase-1

- Designed from Day-1 to service police, fire, public safety in a narrow-band digital mode.
- Uses the oldest, original VOCODER by DVSI of Maynard, MA
- Most users nationwide are still in Phase-1 of two phases
- Phase-2 is TDMA and is more like DMR (multiple time slots)
- One voice path per RF channel, not noted for digital data
- Multi-site linking: difficult but possible with time and money

The second was D-Star

- Designed from Day-1 to service hams, [very well established nationally](#)
- Open standard from JARL, not ICOM
- Uses a slightly newer VOCODER than P25 by DVSI of Maynard, MA
- One voice path per RF channel, also supports data but slow rate
- Multi-site linking: now very common by using third party products
- A very robust third party market. A very positive change!
- Poor ICOM repeater RX performance has been well overcome by using third party RF guts. Very robust third party options. The poor intermod rejection hampered early D-Star deployments in New England. Problem now well addressed and at lower cost.

The first was APCO P-25 Phase-1

- Although "the first" digital repeater mode used by hams, ham P25 use has been greatly diminished by newer modes.
- Only one ham P25 repeater left on the air in Massachusetts
- Popular: Buy a used police P25 radio as a cheap P25 scanner.

The third was Digital Mobile Radio (DMR)

- Designed from Day-1 to service a more general business audience, neither public safety nor hams.
- Open standard from ETSI, not Motorola or others. World standard.
- Uses a much newer VOCODER than P25 or D-Star by DVSI
- TDMA: Two voice paths per RF channel, can also support data
- Multi-site IP-based linking: now very common by using third party products
- Repeaters: Two manufacturers. Motorola & Hytera but each uses different IP-based linking protocols. Both vendors are higher-end.
- Radios: Many manufacturers worldwide, hams tagging along, low prices

The third was Digital Mobile Radio (DMR)

- Typically operates as a network of networks in New England
 - NEDECN
 - EWARN
 - CT ARES
 - DMR-MARC (national and worldwide)
- Uses two "timeslots" with multiple "talkgroups" per timeslot
- Repeaters can be dual mode FM+Digital but give up IP-based linking in the process. Dual mode is almost never used in the ham DMR world. All end user radios are dual-mode FM+Digital.

The fourth was NXDN

- A standard created by ICOM and Kenwood but targeted at a lower price-point than P25. [Goal: FCC narrowbanding by 2005.](#)
- Became the national standard for the railroad industry
- Uses a much newer VOCODER than P25 or D-Star
- FDMA, one voice path per RF channel, also can support data
- IP-based linking: Possible but with some custom work by hams
- ICOM and Kenwood are major NXDN vendors

The fourth was NXDN

- Ham acceptance in southeastern Massachusetts, little in other areas.
- None in the Lakes Region
- Most NXDN hams had affiliations with the railroad industry.

Boxboro Update

Rick Zack, K1RJZ, Digital Radio Repeater Modes, continued

The fifth was Yaesu Fusion

- A unique modulation scheme, at least when used by hams (C4FM)
- Current sole manufacturer is well-known Yaesu for repeaters and end-user radios
- All repeaters can run in dual mode FM+Digital.
- Uses a much newer VOCODER than P25 or D-Star
- Multi-site IP-based linking with the next generation of repeaters
- Excellent promotional subsidies for new FUSION repeaters
 - Some are even using this repeater for D-Star with a third party board.

The fifth was Yaesu Fusion

- Also supports an optional high-bandwidth mode that provides
 - Very high-quality audio
 - Sending of binary files such as images of a tornado, etc
 - High-bandwidth mode is not narrow-banded

The fifth was Yaesu Fusion

- **Challenges:**
- So far, has been very difficult to get hams to operate System Fusion repeaters in digital mode
- Most repeaters have been used in analog mode.
- Hats off to Yaesu for excellent repeater subsidies!

Others

- **TETRA**
 - Four audio channels per RF path
 - used by transportation industries, zero ham acceptance
- **D-PMR** Chinese format in reply to DMR aka "European CB"
- **Dongles**
 - DVMEGA multi-format
 - DV4 mini
- **DV4 mobile** (all-mode mobile in five formats, over \$1000)

Others

- **Good 'ole FM**

- 95% of all active hams have some sort of 2m FM
- Universal acceptance, very low cost of entry
- Lately: Repeaters are generally quiet if not unused
- Except for nets and community events, 2M FM daily usage has been on the decline but will never go away

VOCODERS

Analog to digital converters: CODEC's or VOCODERS

All commercial VOCODERS to date have been provided by one company with MIT origins:



Analog to digital converters: CODEC's or VOCODERS

- Allocates about \$15 cost per digital radio
- Newer generations are obviously better. A lot better.
- Generally not upgradable per technology platform such as upgrading D-Star AMBE to AMBE+2
- CODEC-2 (open source & free) emerging but not heavily embraced in the "productized world" as yet. But it will happen

Analog to digital converters: CODEC's or VOCODERS

- VOCODERS are a separate and distinct from the RF modulation schemes
 - These two stages are easily confused
- VOCODERS only change analog voice into digital bits, that's all.
 - To reduce bandwidth, audio compression is added in the process
 - The same VOCODER is often found in multiple technologies
- RF modulation schemes come after the VOCODERS and they are unique to each technology

Analog to digital converters: CODEC's or VOCODERS

- | | | |
|--------------------|--|---------------------------------------|
| • P25 Phase-1 | IMBE (old but the first for land mobile radio) | |
| • D-Star | AMBE (better than IMBE but still old) | |
| • P25 Phase-2 | ✓ AMBE+2 | Analog to digital
Early generation |
| • DMR | ✓ AMBE+2 | |
| • NXDN | ✓ AMBE+2 | • since address |
| • FUSION | ✓ AMBE+2 | |
| • Various projects | CODEC-2 (open source) | • P25 Phase-1
• Poor response |

Analog to digital converters: CODEC's or VOCODERS

Early generation VOCODER issues

- since addressed in newer generations
- P25 Phase-1 IMBE
 - Poor response on non-voice audio such as truck engine noise and DTMF
- D-Star AMBE
 - "R2D2" effect when in a marginal RF coverage area

October Business Meeting

Bob Evans, Clerk, N1BE

The MMRA board met for a business meeting at the office of Stratus in Maynard, MA at 7:00 PM on October 19. In attendance were K1KWP, N1NVK, W1DYJ, W1BRI, N1BE, W1MPN, WA1NVC and K1IW.

Vice President Mike, W1MPN chaired the meeting in the absence of our president.

Mike reported on the MMRA participation at the Boxboro convention. In the raffle, 455 tickets were in the drawing, 178 of which were sold at the convention. This was profitable, MMRA proceeds were \$205 compared to \$140 in the previous year. The board discussed a suggestion is to use this excess in some way to promote Amateur Radio as our participation at Boxboro is not for profit. Mike also reported that dues were received for 17 member renewals and 4 new members; 19 free MMRA memberships were given to newly licensed hams at the VE sessions.

Kevin, K1KWP gave a treasurer's report that covered income and expenses, historical, year-to-date, and expectations for this fiscal year. Of note, no free members from past years have renewed. The recent power supply replacement at MRW reduced power cost about 30%. We predict payback in less than two years. The board moved to accept the treasure's report.

Mike then presented a first draft of a next fiscal year budget proposal. The intent is we develop this document further for approval by the board April and presentation to the membership for vote at the general meeting in May. This would let us work more with a plan and less in reaction to unfolding events during the fiscal year that begins on June 1, 2017.

Mike's proposal addresses the big picture of running the MMRA: critical resources, maintenance, system improvements, operational costs, expected income, funding emergency repairs, contingency plans, managing donations and funding special projects. This is very much a work in progress. In addition to our comments at the meeting, Mike requested further feedback from the other board members.

We then briefly discussed whether MMRA would support DMR repeaters. Our reasons for lack of DMR activity is two-fold. First, the MMRA does not have sites that would enhance DMR coverage in EMA. And because with today's technology DMR and analog FM do not co-exist on one repeater, we prefer to not lose rare 2-meter analog frequencies.

Stored in Hopkinton are about a dozen rolls of 50-ohm 1 5/8" diameter heliax cable with DIN connectors. These are used but in good condition, about 165 ft of length in each roll. The board moved to approve sale of these cables at \$300 per roll, the buyer must coordinate with K1IW to pick up the cable at Hopkinton. We prefer to have these go to Amateur Radio applications. To that end, WA1NVC and W1DYJ offered to inquire for interested amateurs.

W1BRI and K1IW report that Quincy repairs are complete. The repeaters are back to normal functioning at full power.

K1IW presented a plan for technical improvements to the MMRA system. We took action on some of these items and noted others for the future. A key aspect of this proposal is a new type of repeater controller under development by N1DDK. Ultimately, the new controllers would be used at sites that host multiple repeaters and the other sites would get the SCom controllers that are capable of Internet control. Thus all MMRA repeaters could be controlled via the internet. Bob expects this project would take 3-years for development and deployment. The board took these actions:

- Approved sale of the two spare 7K controllers.
- Approved an expenditure not to exceed \$150 for a Raspberry Pi and Freedom Pop modem to provide Internet connectivity at the Quincy repeater site.
- Approved an expenditure not to exceed \$500 for an SCom 7330 controller to be used at MRW. (The controller currently at MRW would be used as an upgrade elsewhere in our network.)
- Took no action on a proposal to similarly upgrade Lowell to an SCom 7330 controller.
- Approved an expenditure not to exceed \$450 to reimburse N1DDK for hardware needed to develop a prototype of his "PiPeater", with provision that the MMRA receives the prototype at completion of James' development effort.

We adjourned at 9 PM.

**Next MMRA Business Meeting:
Wednesday 21 Dec, 7PM**

Location: Stratus, Maynard

Upcoming MMRA Meetings

Saturday, 11 Sept ~ Membership Meeting
Introduction to MMRA & Door Prize Drawing
At the Boxboro! 2016 ARRL Convention
Holiday Inn, Boxborough

Wed, 19 Oct ~ Business Meeting
Location: Stratus, Maynard

Wednesday, 16 Nov ~ Membership Meeting
Topic—Linux in the Ham Shack,
Andy Stewart, KB1OIQ
Location—Holiday Inn, Boxborough

Wed, 21 Dec ~ Business Meeting
Location: Stratus, Maynard

Wednesday, 18 Jan ~ Membership Meeting
Topic—12V Power for Emergency Power Use in Ham Stations
Greg Troxel, N1DAM
Location—Northborough Free Library

Wed, 15 Feb ~ Business Meeting
Location: Stratus, Maynard

Wednesday, 15 Mar ~ Membership Meeting
Topic—TBD
Location—TBD

Wed, 19 April ~ Business Meeting
Location: Stratus, Maynard

Wednesday, 17 May ~ Membership Meeting
Topic—TBD
Location—TBD

Wed, 21 June ~ Business Meeting
Location: Stratus, Maynard

Don't Forget! Join Us.

Every Tuesday @ 8 PM
Technical, Informational and Other
Stuff Net

The MMRA's repeaters are linked Tuesday nights for the TIOS Net. Keep up with what's happening in the MMRA and ask your ham related questions.

Net Control Operators:

Week 1	WA1JIM	Jimmy Devaire
Week 2	W1DYJ	Larry Banks
Week 3	KC1CLA	Ed Curley
Week 4	K1KWP	Kevin Paetzold
Week 5	KB1OQA	Tom Turner

To connect using Echolink / IRLP during the Net:

- Echolink Conference *NEW-ENG2*
- IRLP node 4133

Previous issues of the MMRA Newsletter are available at:
www.mmra.org → [Newsletter Archive](#) (on the left)

MMRA Leaders

Officers

President	David Wolfe	KG1H
Vice President	Mike Neilsen	W1MPN
Secretary	John McGovern	W1JMC
Treasurer	Kevin Paetzold	K1KWP
Clerk	Bob Evans	N1BE
* Technical Officer	Bryan Cerqua	W1BRI

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Director »2017	Roger Coulson	WA1NVC
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* Hopkinton 449.575	Bryan Cerqua	W1BRI
* Lowell 442.250	Vince De La Flor	K1LVF
* Marlborough 53.810, Quincy 146.670;	Bryan Cerqua	W1BRI
* Marlborough: 29.68, 144.390, 147.270, 224.880, 448.225, 449.925, 927.700 — all as W1MRA		
	Bill Northup	N1QPR
* Mendon 146.610	Kevin Paetzold	K1KWP
* N. Reading 146.715	Bruce Pigott	KC1US
* N. Reading 446.775	Larry Banks	W1DYJ
* Quincy 224.40	Bill Dunn	N1KUG
* Weston 146.790	Bob Evans	N1BE
* Weston 224.700	Eddie Mulhern	N1NOM
* Weston 442.700	David Wolfe	KG1H

Additional, non-Voting

* Newsletter Editor	Larry Banks	W1DYJ
* Emerg. Coord.	Kevin Paetzold	K1KWP
* Pub. Serv. Coord.	David Wolfe	KG1H
* VEC Liaison	Bill Wade	K1IJ
* Net Manager	Larry Banks	W1DYJ
* Web Page Editor	Bob DeMattia	K1IW

* Appointed

MMRA VE Sessions

Third Saturday

9 AM at the Marlboro Public Library

Contact: Bill Wade, K1IJ 781-891-9079

Evenings 6 - 10 PM Weekends 8 AM to 10 PM.

Accredited by the ARRL VEC

November Membership Meeting ~ Wednesday, 16 November, 7 PM
Linux in the Hamshack
Andy Stewart, KB1OIQ

Holiday Inn Boxboro

Calendar of Ham Radio Flea Markets

For more information: <http://mit.edu/w1gsl/Public/ne-fleas>

2016

3 Dec Windsor CT VR+C Mus
115 Pierson LN

2017

21 Jan Whitman MA WARC 9AM@KoC Rt18
18 Feb Marlboro MA Algonquin ARC
5 Mar Nashua NH NEARC @ Marriott
11 Mar Chicopee MA MtTomARA @Castle
31 Mar Lewiston ME AARC ME Conv @Ramada

8 Apr Newton MA PHSNE Photographica
Sat Only @AmLegion

8 Apr Hampton NH PCARC @Masonic

13 May E Greenbush NY EGARA @FireCo

16 Apr Cambridge MA Flea at MIT

13 May E Greenbush NY EGARA @FireCo

8,10 Sep Boxboro MA

FEMARA NE Conv

THE MINUTEMAN REPEATER ASSOCIATION

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WE'RE ON THE WEB
[HTTP://WWW.MMRA.ORG/](http://www.mmra.org/)
