The Minuteman Repeater Association

# The Minuteman

Volume 34, Number 5 May 2005

## MMRA Board Minutes — by Bob Evans, N1BE

The MMRA Board met at 7:00 PM in Chin's Restaurant, Marlboro MA on April 27th. Present were K1IW, W3EVE, K1KWP, N1BDA, W1BRI, and N1BE. The following summarizes the items discussed.

K1KWP presented a Treasurer's report. This showed balances in MMRA accounts at the beginning of this fiscal year, at the date of the last board meeting, and at the date of this meeting. Kevin reported year to date income and expenses for the date of the last board meeting and for the date of this meeting. (A significant increase in electric bills for Slygo was attributed to greater usage of 147.27, the new 147.27 repeater, and higher fuel charges.) Looking forward, the report covered expected income and expenses for the remainder of this fiscal year. Combining the current balances with expectations the report concludes with a projected year end balance that is ~15% increase over the entire fiscal year.

The board considered some optional spending for the remainder of the year without making a commitment for these expenses — MMRA infrastructure improvements like lightning protection, and a small donation to a worthy cause like BPL defense.

The board discussed keeping the current 449.925 repeater available as a backup, in the shelter, for the new 449.925 repeater. Since MMRA depends on SCOM 7K repeater controllers and the 7K has gone out of production, we also considered whether to purchase another 7K controller for about $500. K1IW recommended the replacement SCOM model 7330 to meet our needs. (See http://www.scomcontrollers.com/ for more info.)

W1BRI will supply a UHF beam antenna for our Echolink node to replace K1IW's antenna that sometimes gets pressed into service for other uses. Bryan also said there would be a small repeater report this month; he had not done much to the system.

A June 11 morning work party at Weston was planned.

K1KWP and K1IW agreed to be the nomination committee for the May election. All officers and directors whose terms will expire have agreed to nomination for their current office.

Finally, we considered the venue and topic for the May meeting. We will ask for permission to meet at the MEMA EOC in Framingham.

## Work Party!

All MMRA members are invited to come to the Campion Center in Weston on the morning of Saturday June 11th for a work party. We plan to start at 8AM and be all done before noon.

Directions to the Campion Center are on the www.mmra.org web site and talk-in will be on the 146.82 MHz repeater.

More details of this event will be discussed on Tuesday night nets and via the email group.

## MMRA Elections

Nominations are open for the election at the May MMRA meeting. Two directors and the following officer positions will be elected: President, Vice President, Treasurer, Secretary, and Clerk.

K1IW and K1KWP, as nominating committee, found all incumbents agree to nomination for their current office.

Nominations will remain open until the election. If you have interest in any office, even just for curiosity sake, please contact Bob or Kevin.

Inside this issue:



* pages only in email edition

# About the Minuteman Repeater Association

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

The Minuteman newsletter is mailed one week before each meeting. Members are encouraged to submit articles. Articles may be sent to the editor via email to newsletter@mmra.org. The deadline for articles is the last Friday of the month preceding the meeting.

The MMRA meets on the 3rd Wednesday of September, November, January, March, and May. Meeting time, locations and talk-in frequency vary. These are announced in the newsletter and on weekly nets. Meetings are open to all interested parties.

Each Tuesday evening at 8PM the MMRA links most of the repeaters for an open net. The topic is "Technical Information and Other Stuff". Feel free to 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 mmra@mmra.org. The MMRA maintains a web site at: http://www.mmra.org/

An email distribution list for club members named "MMRA" has been established on: http://www.yahoogroups.com/

***MMRA requests that no part of this newsletter be copied or posted elsewhere without prior approval from the club. Your cooperation in this matter is greatly appreciated.***

## Repeater and Frequency Information

| Location | MHz | PL | Call | Note |
|---|---|---|---|---|
| Bolton | 29.620 | 131.8 | W1OJ | Affiliated, FTL |
| Marlboro | 53.810 | 71.9 | W1BRI | PTL |
| Belmont | 145.430 | 67.0 | WA1RTT | Affiliated, PTL |
| Marlboro | 146.610 | 146.2 | N1BHI | FTL |
| Quincy | 146.670 | 146.2 | W1BRI | PTL |
| Stoneham | 146.715 | 146.2 | N1NVL | PTL |
| Weston | 146.820 | 146.2 | N1BE | PTL |
| Brookline | 146.985 | 88.5 | W1FCC | Affiliated, PTL |
| Marlboro | 147.270 | 146.2 | W1MRA | PTL (to 10 Meters) |
| Hopkinton | 223.940 | 103.5 | N1BHI | FTL |
| Quincy | 224.400 | 103.5 | N1KUG | FTL |
| Weston | 224.700 | 103.5 | N1NOM | FTL |
| Marlboro | 224.880 | 103.5 | W1MRA | FTL (to 10 Meters) |
| Stoneham | 446.725 | 88.5 | N1NVK | PTL |
| Milford | 446.825 | 100.0 | WA1QGU | Affiliated, PTL |
| Brookline | 447.875 | 136.5 | K1IW | Affiliated, FTL |
| Shrewsbury | 449.575 | 88.5 | W1BRI | FTL |
| Belmont | 449.650 | 67.0 | WA1RTT | Affiliated, FTL |
| Marlboro | 449.925 | 88.5 | W1MRA | Network Hub |

| | | | | |
|---|---|---|---|---|
| Marlboro | 144.390 | none | N1QPR-2 | APRS Digipeater |
| ??? | 145.630 | 146.2 | W1MRA | Fox Box |

| | |
|---|---|
| Internet | Echolink node 94940 connects to the Network Hub |

**Notes:** FTL = Full Time Linked (usually to the Hub).
PTL = Part Time Linked (on schedule or demand).
Most repeaters link to the MMRA hub. Several can link to an alternate destination.
Additional repeater information is on the MMRA web site.

**PL:** PL is required to prevent interference. The code **750** will temporarily disable the MMRA PL requirement.

**Using the Autopatch:** Only the hub has a telephone line.
(1) Link to the hub if necessary.
(2) Then bring up the patch using the 449.925 autopatch codes.

**Control codes are sent to members upon receipt of dues.**

# Grant Nearing an End for EMCOMM Courses - by Steve Ewald, WV1X

Greetings from ARRL HQ. This note of clarification is going to Section Emergency Coordinators, District Emergency Coordinators, Emergency Coordinators and Section Managers. Please feel free to pass the word along to others.

As you have likely heard in recent months, ARRL is now well into the final year of the grant-sponsored Amateur Radio Emergency Communication Courses. With this grant, the $45 registration fee paid upon enrollment will be reimbursed after successful completion of the course. At this time, it's only available to ARRL members.

Students need to enroll during the May or the June registration periods to be eligible for reimbursement under the Corporation for National and Community Service (CNCS) grant. That also means that students will need to have completed their course work, and their Mentor/Instructor must upgrade their student status at the ARRL Mentor/Instructor Site to "Passed" by August 31, 2005, to qualify for reimbursement from the CNCS grant.

Registration for the ARRL Amateur Radio Emergency Communications Level I on-line course (EC-001) opens Monday, May 2, 2005, at 12:01 AM EDT. Level II (EC-002) registration opens the same time on the following Monday, May 9. Level III (EC-003) will also open at the same time, but on Monday, May 16. On-line registration (and further information about the courses) is found at

http://www.arrl.org/cce.

ARRL members will be able to register for the remaining on-line course seats at the ARRL EXPO area of the ARRL National Convention at Dayton. Applications and payment via credit card, check or cash will be accepted there.

Registration by mail is also an option. Make the check or money order out to ARRL, and mail it to 225 Main Street, Newington, CT 06111.

Please mark the envelope "ATTN: CCE." In the comment segment of the check or money order, write "CCE EC-00# Registration." # means the course number such as 1, 2, or 3.

Include your call sign, current mailing address, preferred e-mail address, age, gender and veteran status, and complete telephone number with your check or money order. Missing information will cause delays in registration, and there is no time left for delays.

For more information, contact Emergency Communications Course Manager Dan Miller, K3UFG, 860-594-0340 or send your query to cce@arrl.org. Thank you.

# Quaboag Valley Radio Club Foxhunt — May 21st

The Quaboag Valley Amateur Radio Club will be hosting a fox hunt on Saturday, May 21. This will be a multiple part hunt, incorporating the use of GPS and radio. The starting area will be in Warren, MA and those wishing to enter should be there and ready to go by 10AM. Entries will be accepted up to 11AM. There are no restrictions regarding equipment, but for the most part, an HT, or scanner and a handheld GPS will do the trick. *[Warren is about 15 miles West of Worcester, near the Mass Pike. — Ed]*

We've tried to create an even playing field for all, so that no one has a serious advantage. We're also looking for teamwork here and we will be sending out your team of 2 to 4 at a timed interval. There will be no entry fee and entrants do not need to be licensed. If anyone wants to know more, we have an info sheet that can be snail mailed. SASE is not necessary. Please contact N1XLG or KB1HXO, either by email or snail mail. Both are listed on QRZ.com.

## MMRA Leaders

| | | |
|---|---|---|
| President | Bob DeMattia | K1IW |
| Vice President | Steve Telsey | N1BDA |
| Secretary | John McGovern | W1JMC |
| Treasurer | Kevin Paetzold | K1KWP |
| Clerk | Bob Evans | N1BE |
| Technical Officer | Bryan Cerqua | W1BRI |
| Director | Larry Banks | W1DYJ |
| Director | Tom Muise | W1CDA |
| Director | Steve Schwarm | W3EVE |
| Director | Bill Thorpe | WA1NLR |
| Emergency Coordinator | Bill Northup | N1QPR |
| Net Manager | Tim Nau | W1NAU |
| Newsletter Editor | Bob Evans | N1BE |
| Public Service Coordinator | Kevin Paetzold | K1KWP |
| VEC Liaison | Bill Wade | K1IJ |
| Web Page Editor | Bob DeMattia | K1IW |

# Marathon Net Control Radio Setup — by Kevin Paetzold, K1KWP

Amateur radio operators from all over the Northeast volunteer each year to provide communications during the Boston Marathon. Many members of the MMRA help at this event. Supporting this event requires more than 200 hams. The ham operation is divided into three groups, the starting line, the finish line, and the course. I have volunteered as part of the group on the course for several years. For the last two years I have been assigned a role at "net control" for the course. This article describes the technical RF setup that was used at net control this year. This setup seemed to work very well and for that reason it is shown an example of something fairly complex that worked well.

There are various challenges to communications for this event. The course is 26 miles in a straight line, winding between various hills and valleys. It is hard to cover the whole course with a few repeaters. It has been difficult to find a location for net control where there is a good signal at low power to every repeater that is needed.

There is a lot of radio traffic supporting the 26 first aid stations and the 48 water stations. The traffic ranges in nature from routine logistics about setup and supplies to high priority first aid messages. In 2004 more than 120 ambulance calls came into net control via ham radio. The operations plan for the course uses 10 different "channels". I refer to these as channels since more than 10 repeaters are in use; in some cases multiple repeaters are linked together to form a single channel or to eliminate the need for yet another 2M receiver or transmitter.

Placing ten 2M/70cm transceivers in one room, running up to 50 watts, hooked up to ten different antennas sprinkled randomly about the roof does not work very well. Most of the radios are transmitting at least 25% of the time during the height of the event. Experience has shown the need to avoid interference, intermod and desense at net control.

One improvement was that thanks to the Clay Center at Dexter and Southfield School in Brookline (http://www.claycenter.org/) and K5TEC there was an excellent location for net control on the fifth floor of the Clay Center Observatory. This is a high location, about 350' ASL, on the Eastern half of the course that provides good paths to most of the repeaters which were needed. From this altitude no transmitter was required to use more than 5 watts. Limiting the power when transmitting reduced the potential for radios from net control interfering which each other.

The Clay Center location has easy access through doors onto a large roof area on one side of the building and a long terrace area on the opposite side of the building. This allowed the placing the primary 2M transmit antenna on one side of the building and the primary 2M receive antenna on the other side. There was enough separation so that by using different radios for receive and transmit on a given channel, most of the operators on the 2M channels were able to hear their own signal on the repeater output through headphones while transmitting on the repeater input. Thus the net control operator knew if their signal was reaching the repeater and whether doubling or interference was occurring.

The diagram shows the radio and antenna setup. Most of the setup and equipment was provided by KB1EKN, K1IW, K1KWP, and N1UEC. Additional equipment was loaned by K5TEC, N1DB, W3EVE, and KC1US. In the diagram:

- Channels (going across the page) are identified as C4, C7, C5, C1, C3, C6, C8, C2, UCC, and T1/B6.
- Channels C7, C5, C1, C3, C6, and C8 each use different radios for receiver and transmitter.
- Channels C4, C7, C5, C1, C3, and C6 share a common V2000A 2M receive antenna. This is possible by using a four way "RX hybrid". Certain radios such as the Kenwood TMV7A and TM732 where chosen as receive radios (for example C1 and C3 on V7A#1) because they can be set up in 2M/2M mode and each half of the radio has its own independent audio jack for headphones and volume/squelch control.
- C7, C5, C1, and C6 share a common X500A transmit antenna. This is possible by using three directional couplers as seen in the lower left of the diagram.
- Considering C1 in detail: C1 uses the left half TMV7A#1 tuned to 147.270 as its receiver. The receive signal path is from the V2000A antenna through the 2M/220/440 triplexer then through the 6M/2M diplexer then through "RX hybrid" and then into the radio. C1 uses the DR570 tuned to 147.870 as its transmitter. The transmit signal goes from the DR570 through the directional couplers then through the 2M/440 diplexer and out via the X500A antenna.

Antennas were carefully placed. Like the 2M setup, two 440 MHz antennas were on opposite sides of the building from each other. The 220 MHz transmit and receive antennas were similarly placed.

- The V2000A primary 2M receive antenna, a beam for 443.600 MHz transmit/receive and a quarter wave 223.100 MHz transmit/receive antenna were mounted on a single tripod in the front roof area of the building.
- The X500A primary 2M transmit antenna, a 444.600 MHz transmit/receive antenna and a 222.340 MHz transmit beam were mounted on a tripod at the back terrace in the corner which had the most separation from the 2M receive antennas.
- A 124WB beam for the 146.640 repeater was located by itself clamped to the terrace rail at the opposite corner from the X500A.

*(Continued on page 5)*

# Marathon Net Control Radio Setup (cont.)

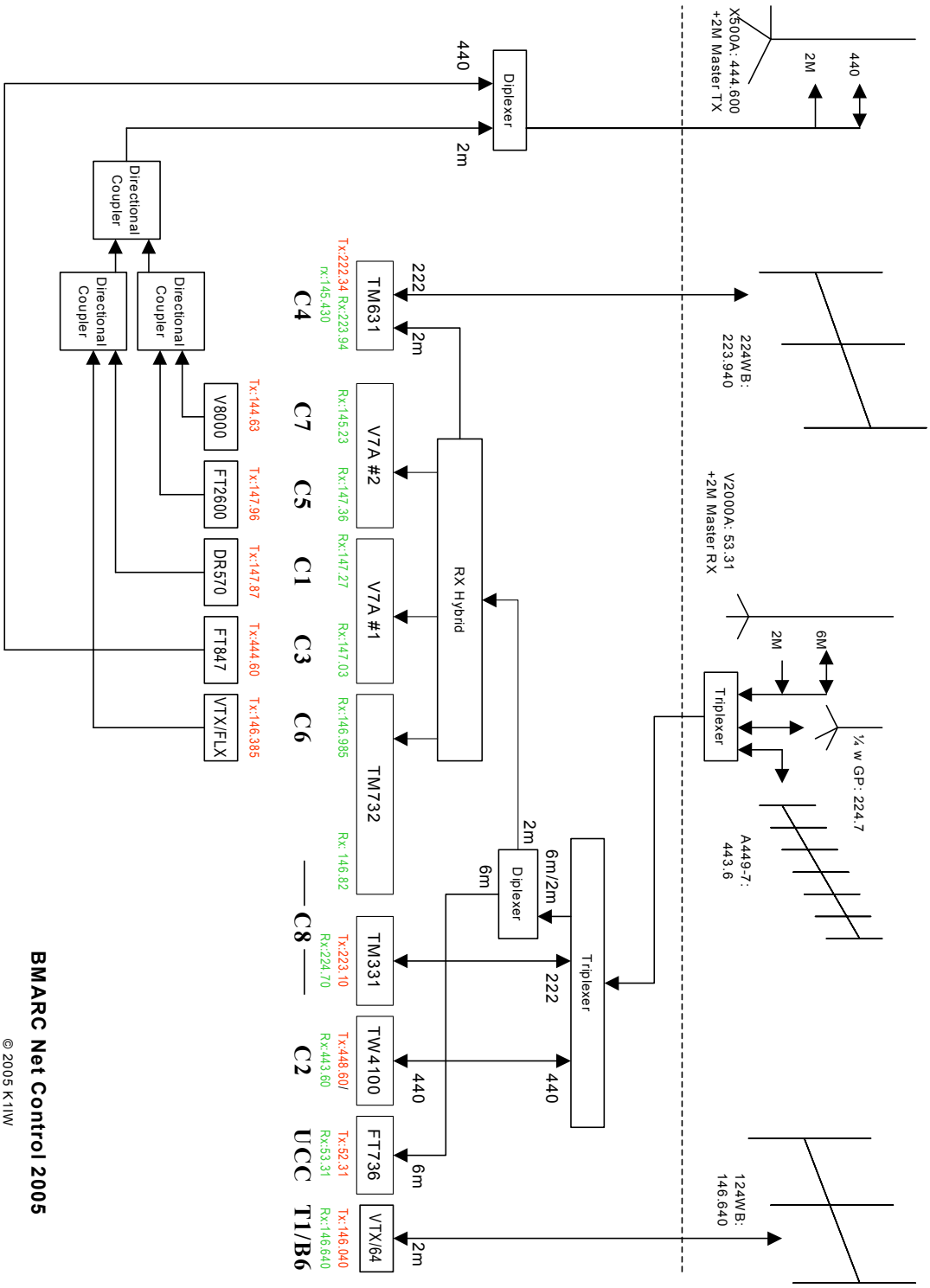
*(Continued from page 4)*

Six antennas, thirteen radios, and sixteen repeaters were required to provide the ten channels. Repeaters were linked together to form some of the channels. Some channels which had field stations on one band actually used receivers or transmitters on a different band at net control. For example:

- Weston [146.820 224.700], Brookline [447.875], and Marlboro [449.925, 146.610] were linked to form the course wide channel C8. Net control used 224.700.
- Belmont 145.430 and Hopkinton 223.940 were linked to form C4. Field stations used 145.430; net control used 223.940.
- Norwell 443.600 was linked to Framingham 146.150 to provide C2. Field stations used 147.150; net control was on 443.600. The path from net control directly to 146.150 did not work well.
- Wellesley 147.030 was linked to Wellesley 444.600 was C3. Field stations used 147.030; net control used 449.600.

Using these linked channels eliminated the need for four 2M receivers and four 2M transmitters at net control.

In summary, this article described the radio setup used at net control. Net control has many other important aspects such as the operators! Pictures from net control are available at: www.townisp.com/~k1kwp/netcontrol. I did not describe what being an operator at the Marathon is like. The May meeting of the MMRA will be an opportunity to ask questions about this or other parts of the event as well as a chance to provide constructive feedback.



# **Repeater Report** — by Bryan Cerqua, W1BRI

**Marlboro 147.27/224.88:** I fixed the Anti-Kerchunker in the link radio for 147.27, there was a bad Coto dip relay with an open relay coil. I replaced it with a Magnecraft relay that has a 5V coil. This required changing the resistor in series with the coil since it runs off of 14V. I plan to re-install the link radio Friday night.


Anti-Kerchunk board in link radio

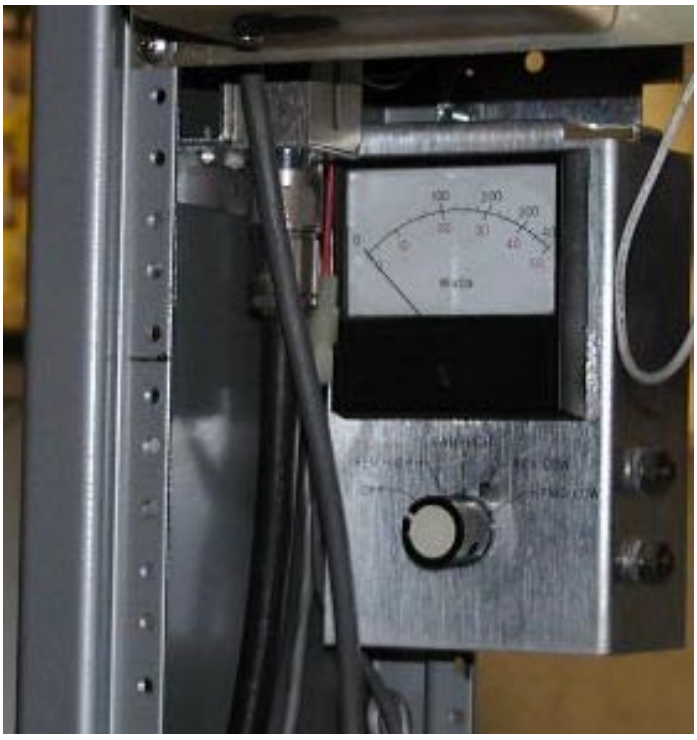
The 224.88 repeater was taken home for a few days to isolate its built-in controller and ID board so that it doesn't conflict with the 7K controller. Originally we thought that the tone heard on 224.88 and sometimes on 147.27 was the ID board getting stuck on the 224.88 repeater. This was later found to be false. The real problem is when the Phoenix link radio times out it sends an alert tone that gets interpreted as received audio. If the links are active, this alert tone gets sent out on both repeaters. Bob, K1IW is working on the controller code to prevent this.

**Shrewsbury 449.575:** As I previously reported, this repeater has not been working properly for quite sometime. The coverage is very poor and plans are in place to check out the repeater, antenna and feedline in a few weeks. Hopefully we will find a simple fix and the repeater can be back to it's normal operation.

**Quincy 146.67:** We plans to replace the small UHF whip antenna for the link radio with a three element 70cm beam. This should improve the quality of the link signal into the HUB repeater.

**Stoneham 446.725:** We need to get back to the site to solve a problem when the repeater is linked to the HUB. The 446.725 repeater is constantly being keyed up for some reason even though it has 88.5 Hz PL decode enabled. Perhaps a small filter will be required to solve this problem.

**New Marlboro 449.925 HUB:** I have installed all the components of this new Motorola Micor repeater in a nice open frame rack with wheels. The repeater has a commercial grade TX/RX preamp panel that should work very nicely. I removed an inline power meter from one of our old tube Micor stations to be used on this new repeater; it should be a very nice feature.

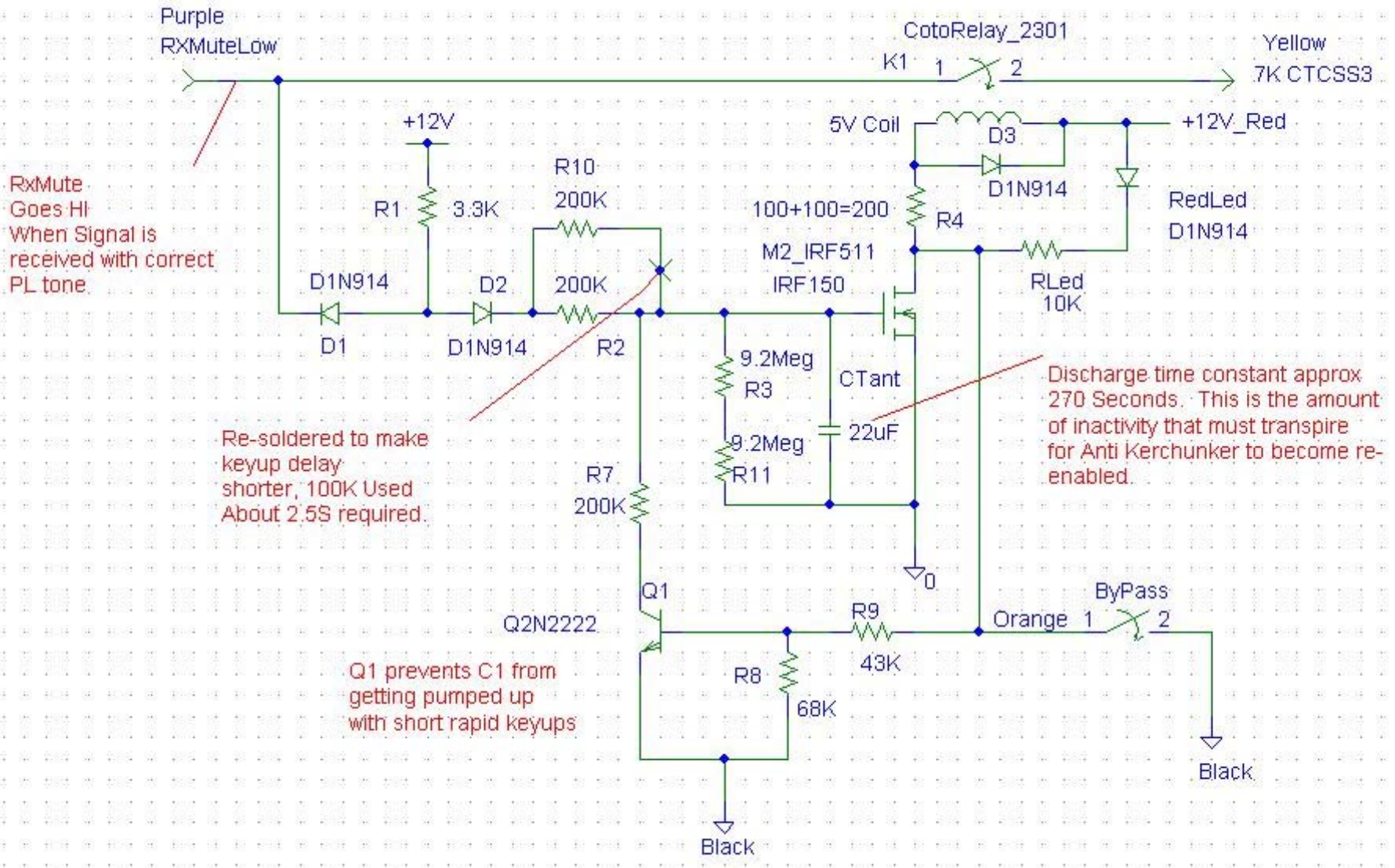


Power meter in new HUB

The duplexer on this new repeater is like new; it was obtained by trading our old 146.67 repeater to the Haverhill amateur radio club. I have some nice huge notch type cans and I plan to convert one of them to a bandpass filter, allowing some very high Q preselection for the preamp.

# Front and Back of the new 449.925 MHz HUB Repeater

# Anti-Kerchunker Circuit



# Public Service Volunteer Opportunities in the New England Division

Listing public events at which Amateur Radio communications is providing a public service and for which additional volunteers from the Amateur Community are needed and welcome. Please contact the person listed to identify how you may serve and what equipment you may need to bring.

The most up-to-date copy of this list is maintained as http://purl.org/hamradio/publicservice/nediv

**Every event listed is looking for communications volunteers.**

| Date | Location | Event | Contact | Tel/Email |
|---|---|---|---|---|
| May 7 | Grafton | MA Grafton Road Race | Bob KA1OTQ | 508-865-6957 ka1otq@@arrl.net |
| May 14 | Westford | MA Apple Blossom Parade (8:30AM - 12:00 Noon) | Bo WA1QYM | 978-692-6084 wa1qym@arrl.net |
| May 15 | Devens | MA Parker Classic Road Race | Stan KD1LE | 978-433-5090 |
| July 2 | Princeton | MA Longsjo Bicycle Race | Ralph KD1SM | 978-582-7351 kd1sm@arrl.net |
| July 3 | Fitchburg | MA Longsjo Bicycle Race | Ralph KD1SM | 978-582-7351 kd1sm@arrl.net |

This list is published periodically as demand warrants by Stan, KD1LE, and Ralph, KD1SM. Our usual distribution is via packet to NEBBS, via Internet mail to the arrl-nediv-list and ema-arrl distribution lists, and on the World Wide Web (see URL above). If other mailing list owners wish us to distribute via their lists we will be happy to oblige. Permission is herewith granted to republish this list in its entirety provided credit is given to the authors and the URL below is included. Send comments, corrections, and updates to: (via packet) KD1SM@K1UGM.#EMA.MA.USA, (via Internet) KD1SM@ARRL.NET.

We make an attempt to confirm entries with the coordinator unless the information is from another published source. We very much appreciate the assistance we have been receiving from our 'scouts'; everyone is welcome to send us postings.

Refer to http://purl.org/hamradio/publicservice/nediv for the most recent version of the PSLIST. AR

# Last Meeting

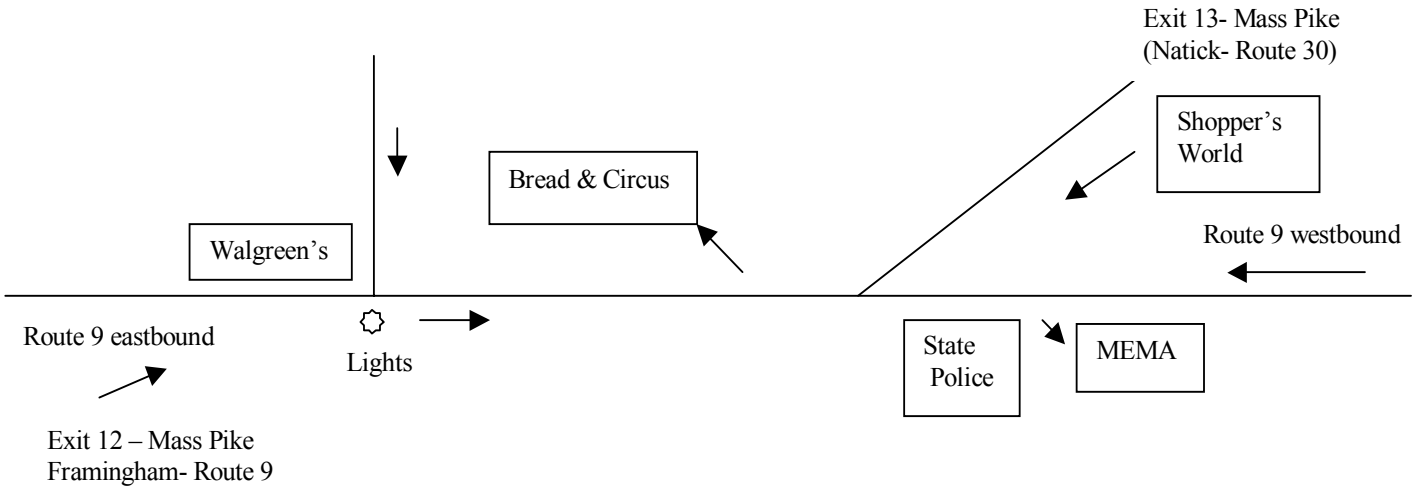
Daniel Murphy, Station Superintendent, explaining power distribution

# Worcester CERT Training

Worcester's Emergency Management along with the Worcester Emergency Communications Team (WECT) is sponsoring ongoing Community Emergency Response Team (CERT) Training at the Worcester EOC at 50 Skyline Drive, Worcester, Mass. each and every Thursday until June 9th. Classes include Search and Rescue techniques, Fire Safety and putting out small fires, victim triage, victim transportation, disaster preparedness, etc. The classes have begun however there are still about 6-8 additional spaces that have been created and anyone holding a ham license is welcome to attend. These classes are free and as previously noted are geared to ham radio operators committed to EmComm. Classes run 2.5 hours from 6:30 - 9 pm and are taught by instructors from Worcester's Emergency Management, Worcester Fire Dept. and Worcester Police Department. Each trainee receives a CERT backpack which includes a CERT hardhat and vest, flashlight, workgloves, whistle and masks, as well as a comprehensive

*(Continued on page 9)*

# Directions to the MMRA Meeting




We will be meeting at the Massachusetts Emergency Management Agency, 400 Worcester Road (Route 9 eastbound), Framingham, MA. The MEMA telephone is (508) 820-2000. **Please monitor the talk-in on 146.82 in case we must make a last-minute change of plans.**

**From the West:**

1. Take Mass Pike East to Exit 12 (Framingham Route 9).
2. Travel approximately 2 miles to MA State Police Headquarters on the right, immediately followed by MEMA. (MEMA has several tall communications towers).
3. Enter through the gate.
4. MEMA is underground. Enter building and follow the ramp to the reception desk.

**From the East:**

1. Take the Mass Pike West to Exit 13 (Natick/Framingham Route 30).
2. Take Route 30 West towards Framingham and drive for approximately 2 miles going through all lights until the end.
3. Take a right onto Route 9 Westbound. (Note that the MEMA communication towers are visible across Route 9 on the eastbound side.)
4. Continue approximately ½ miles on Route 9 Westbound.
5. Turn right into the Bread & Circus parking lot to turn around.
6. Take a left out of Bread & Circus onto Prospect Street.
7. Take a left at the lights heading Eastbound on Route 9. MEMA is approximately 1.5 miles on the right.
8. Enter through gate.
9. MEMA is underground. Enter building and follow ramp to reception desk.

**From the South:**

1. Take Route 128 (95) North to Route 9 West (Exit 20B).
2. Follow Route 9 for approximately 8 miles. MEMA is on the Eastbound side of Route 9 and is marked by several tall communications towers.
3. Take your next right into the Bread & Circus parking lot to turn around.
4. Take a left out of Bread & Circus onto Prospect Street.
5. Take a left at the lights heading Eastbound on Route 9. MEMA is approximately 1.5 miles on the right.
6. Enter through gate.
7. MEMA is underground. Enter building and follow ramp to reception desk.

**From the North:**

1. Take Route 93 South to Route 128 (95).
2. Follow above directions, from the South step 2

## CERT Training (cont.)

*(Continued from page 8)*

CERT training manual.

For details about the class including a class outline, please go to www.wect.net. Registration is as simple as e-mailing wb1arz at wb1arz@arrl.net or e-mailing WEMD Deputy Director, Dick Bedard at BedardR@ci.worcester.ma.us.

## More Public Service Events

Public service events including the following are listed on the CPSG web site, http://cpsg.amateur-radio.net/

- Sun, May 22, Wellsley Parade
- Sun, Jun 5, Boston AIDS Walk
- Sun, Jun 12, Positive Spin for ALS
- Sat, Jul 16, Blackburn Challenge row boat race

# **Next Meeting** — Wednesday May 18, 2005
# Ham Radio Operations at the Boston Marathon

Complementing the article in this newsletter, W3EVE, K1KWP and K1IW will discuss the use of Ham Radio to support the Boston Marathon.

This Boston Marathon is a huge public service event with over 20,000 runners and 500,000 spectators spread over the 26.2-mile course. Hundreds of Hams serve with high visibility at this second largest single day sporting event. Over 1000 media personnel representing 250 outlets observe and report on the marathon.

We will meet at the MEMA EOC. Directions and map are on the previous page and on www.mmra.org.

The meeting will start at 7:30PM. **Please monitor talk-in on 146.820, a last minute change in plans may be necessary if MEMA needs to respond to an emergency or if there is a change in the Homeland Security Threat Advisory Level.**

## Calendar of Ham Radio Events

| | |
|---|---|
| **May 14:** | EmComm Meeting, MEMA EOC, Framingham MA |
| **May 15:** | Flea @ MIT, Cambridge MA |
| **May 18:** | **MMRA annual meeting** |
| **May 21:** | Quaboag Foxhunt, Warren MA |
| **May 28:** | NARC Flea, Tolland CT |
| **Jun 6:** | EMA ARES hurricane drill |
| **Jun 12:** | Positive Spin for ALS |
| **Jun 19:** | Flea @ MIT, Cambridge MA |
| **Aug 17:** | **MMRA board meeting** |
| **Aug 26:** | **MMRA Newsletter Deadline** |
| **Sep 21:** | **MMRA meeting** |

(Flea market info from W1GSL list. http://mit.edu/w1gsl/Public/ne-fleas)

### MMRA VE Sessions

3rd Saturday of each Month
9 AM at the Marlboro Public Library
**Contact: Bill Wade, K1IJ**
781-891-9079 Evenings 6 to 10 PM,
Weekends 8 AM to 10 PM.
**Accredited by the ARRL VEC**


THE MINUTEMAN REPEATER ASSOCIATION

**MMRA**
**P.O. Box 669**
**Stow, MA. 01775-0669**

Email: mmra@mmra.org


WE'RE ON THE WEB!
HTTP://WWW.MMRA.ORG/