The MINUTEMAN

Official Newsletter of the Minuteman Repeater Association

Volume 22, Number 5 May/June

The President's Corner

Andy Morrison, N1BHI

As those of you who were there could attest, our flea market was a success; the credit goes to Walter Ching and the crew who helped him run it....in fact, Walt deserves high praise for his efforts while I have been out of commission for the last couple of months. He's been running the show smoothly while my available time has been severly curtailed because of a labor dispute at work. A couple of items worthy of mention....we are going to have field day again; Mike, N1KRJ, has taken on the job of planning the affair; we will once again have the use of Bob Feltmate's diesel generator to power everything. We should be at the same location, Slygo Hill, and expect to have an even better time. Right now we plan a "2A" operation with a novice and packet station. So if you want to get involved, get in touch with me, Walt, N1HBR, or Mike on the air or by phone.

As you know, we went to quite a lot of effort to raise funds to acquire some test equipment. Well, through the good graces of Chris Conti, N1NVL, and his boss, who turned out to be sympathetic to our cause, we have a damaged but fixable IFR 1000S. It is a full service monitor with a spectrum analyzer. It was damaged in shipment, and just sitting around...Chris managed to convince his boss that it would be put to good use by the MMRA and that we deserved to have it. We are now investigating the cost to restore it to service; it looks like that will fall well within what we raised with the raffles. So cross your fingers....if all goes well, we will have it operational this fall! Don't forget, the May meeting is election night, so try to be there...hope to see you.

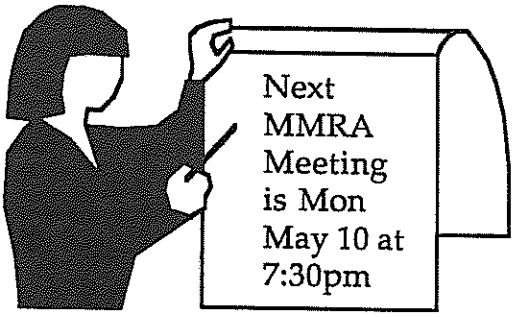
Slate of Officers nominated for 1993-1994:

President:	Andrew Morrison, N1BHI
Vice President:	Walter Ching, N1HBR
Secretary:	Frank Morrison, KB1FZ
Treasurer:	Ian MacLennan, AF1R
Clerk:	Al Williams, KA6BUV
Director, 93-95:	Mike Ryan, N1KRJ
Director, 93-95:	Chris Conti, N1NVL

Continuing Officers:

Director, 92-94: Tom Qualtieri, WB1GMA
Director, 92-94: Al Kunian, KA1AL

Items of Interest



- General Elections
- Field Day Planning
- HT Clinic (see page 9 for more info)
- Last meeting until September.

MAX Systems 5 Element Quad 2 Meter Directional Antenna

A Product Review by KD1GG

I ordered one of these antennas to test and see how much of a difference a directional signal would make for me. My QTH is at the bottom of a hill so my signals to that direction (south) were not so good. Unfortunately, my Dad lives is southeastern Connecticut and we

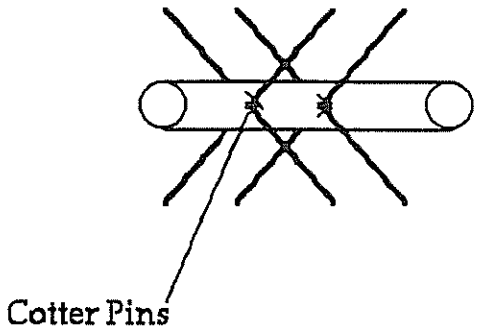
occasionally talk through the Cranston, RI Repeater and my signal to that repeater and the signal I hear from that repeater weren't good enough for me. So, I decided to try one of these since they appeared to have several qualities that made it attractive to me.

1) Size. Yes, the 17 element boomers are nice but not the type of thing my XYL wants on the roof. (wait till she sees my tower this summer though!)
2) Cost. The 5 element verison was $59.95 plus a little shipping and a few bucks for Gov. Weld.
3) Ease of installation. No heavy mast or major rotator necessary.

So once I sold myself on the features and benefits I ordered one by sending a check. 6 days later I was sitting in my living room assembling it. Try that with a boomer! The installation was a breeze although I must add one small safety point. The spreaders are fiberglass and have some small slivers in places. Have you ever tried to find a fiberglass sliver in your hand? I suggest a pair of lightweight gloves when handling the spreaders. The wire is not the typical dipole wire that is difficult to bend. It is described in the literature as "19 strand copper-clad #14 silky wire". It feels to me like flex weave.

Assembly consisted of inserting the spreaders through the PVC boom and securing them with small cotter pins. There are cotter pin holes drilled through the spreaders that keep the spreaders properly aligned on the boom. (see figure)

The tricky part is slightly bending the spreaders to get the wire over them and in small grooves at the end of the spreaders. If you have done things properly, the groves line up and the 5 square elements are then perfectly aligned. The complete assemby took about 45 minutes.



Performance

I can't make any precise scientific measurements because I do not have a nice antenna range and sophisitcated measurement equipment, so all I can report is my observations. With my 2m vetertical on the roof at about 25 feet, I can barely bring up the Fitchburg repeater with 1 watt. I can also barely hear it. With the Quad on a 10 foot boom pointed in about the right direction, I brought it up clean and all the LCD segments of the HT lit up. Fitchburg- 59. Turning the mast towards Rhode Island (and it's easy to miss Rhode Island if you don't align perfectly) I worked the Cranston repeater 59 also. So, my imprecise observations really don't need precise verification to know that it makes a big improvement over my vertical.

Specifications

Again, I don't hve the gear necessary to verify these specs, but after seeing the results, I don't have any probem believing them either!

Freq Range:	144-148
Polarization:	Selectable
Gain	9.5db
F/B	25db
SWR 144-148	1.01 min - 1.5 (verified!)
Boom Length	57"
Weight	3lbs
Power	1KW
Matching	50 ohms
Connector	UHF

Well, I am glad I put up a nice directional antenna so I can have a better quality signal to talk to my Dad. I need now to try 2m SSB. Trivia Quiz: Do you think it is better to use an antenna with great forward lobes like this and high F/B numbers or a good vertical for Packet Radio? (answer later in the issue)

Important ARRL Bulletin!

Do you ever read the ARRL Bulletins? They are available in from many places. They are always posted on packet (on the various BBSs and the YCCC Packetcluster as well as many phone BBSs). I captured this one from the Internet. This one is significant to amateurs since it describes some new non-ham activity on the 440mhz band, however I am inserting it here to also let you know of another good source of Amateur Radio information.

(sri about the CAPITALS, I don't mean to YELL at you, but that is how they come!)

QST DE W1AW
ARRL BULLETIN 36 ARLB036
FROM ARRL HEADQUARTERS NEWINGTON CT
APRIL 3, 1993
RELAYED BY KB8NW/OBS & BARF-80 BBS
TO ALL RADIO AMATEURS

SB QST ARL ARLB036
ARLB036 WIND PROFILER NPRM

THE FCC ON APRIL 1 ISSUED ITS NOTICE OF PROPOSED RULEMAKING AND NOTICE OF INQUIRY ON THE SUBJECT OF WIND PROFILER RADARS (ET DOCKET 93-59).

THE FCC PROPOSES TO ALLOCATE THE 448-450 MHZ BAND ON A PRIMARY BASIS TO WIND PROFILER RADAR SYSTEMS (WIND PROFILERS) AND REQUESTS COMMENT ON WHETHER WIND PROFILERS ALSO SHOULD BE ACCOMMODATED ON A SECONDARY BASIS IN THE 915 MHZ BAND, AS PROPOSED BY RADIAN CORPORATION, OR IN SOME OTHER FREQUENCY BAND.

BASED ON A STUDY BY THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION (NTIA), **THE FCC CALLS FOR COMMENT ON WHETHER POTENTIAL INTERFERENCE BETWEEN 449-MHZ AMATEUR AND WIND PROFILER OPERATIONS COULD BE ALLEVIATED BY USING RF SCREENS OR BY ALTERING REPEATER ANTENNA RADIATION PATTERNS.**

THE FCC ALSO SAYS IT WILL CONSIDER ZONES AROUND WIND PROFILERS IN WHICH AMATEUR TRANSMITTERS WOULD BE PROHIBITED. THE FCC SAYS THAT SINCE 449-MHZ WIND PROFILERS ARE PLANNED PRIMARILY FOR RURAL AREAS, IT EXPECTS FEW AMATEUR OPERATIONS TO BE DISRUPTED. AND THE FCC SAYS IT IS NOT PROPOSING TO CHANGE AMATEURS' SECONDARY STATUS IN THE 448-450 MHZ RANGE, SINCE AMATEURS ALREADY ARE REQUIRED TO PROTECT AGAINST INTERFERENCE TO GOVERNMENT SERVICES WITH WHICH IT ALREADY SHARES THAT SPECTRUM.

AS FOR THE INQUIRY INTO 915 MHZ WIND PROFILERS, THE FCC CALLS FOR TECHNICAL INFORMATION AND SAYS IT WILL CONSIDER THE PROPOSAL ''WITH OTHER EXISTING AND PROPOSED USES.''

COMMENT DATE IS JUNE 15, 1993. REPLY
COMMENT DATE IS JULY 15, 1993.
NNNN

The MMRA might want to start considering PL tone access for the 449.925 machine as it falls right into the place where interference may result. As an owner of UHF/VHF Ham gear, you might want to consider what it takes to add tone encode to your radios as the day when they will be needed is not far away. (not only for this problem, but the ever inreasing usage of radio frequencies by other entities like paging companies).

TCP/IP BASICS

Dave Pascoe KM3T
Andrea Preciado WS1C

Have you ever heard people talking about TCP/IP and wondered what the heck they were referring to? Well, TCP/IP is just the term for a type of packet radio that does not use the AX.25 protocol that most people are familiar with. TCP/IP is a standard set of protocols used to transfer data across networks of different computers (IBM PC, Macintosh, etc.). TCP stands for Transport Control Protocol, which is what is called a reliable stream service. This just means that TCP makes sure the data sent from you to someone else gets there reliably. IP stands for Internet Protocol, and the purpose of IP is to make sure certain rules for formatting data packets are adhered to. IP is a lower level protocol than TCP, hence the term TCP/IP, since TCP runs on top of IP.

With TCP/IP your standard TNC is used in KISS (Keep It Simple Stupid) mode. KISS mode just means that the TNC is being used only as a modem, not as a terminal node controller. Software running on your computer is used to create data packets. This software is commonly referred to as KA9Q, or NOS. Written originally by Phil Karn KA9Q, this package (as well as all its descendants) is a complete implementation of TCP/IP. Others have added enhancements to Phil's original package (PA0GRI, N1BEE, WG7J, PA2AGA, and others), but the package is still commonly referred to as NOS (or GRINOS, JNOS, etc.). It is available for a variety of platforms, the most popular being the PC and Macintosh versions. At the end of this article you'll find a list of places to obtain this software.

You may not see any advantage to this right away, but using TCP/IP software instead of AX.25 opens up many new possibilities. You aren't stuck with the need to upgrade TNC firmware, for one thing. When you want to upgrade you simply get a new copy of the NOS program (free). With TCP/IP, flexibility is greatly enhanced. And you don't have to worry.....AX.25 support is built right into NOS, so with NOS you can run both TCP/IP and AX.25.

The other great thing about TCP/IP is that it has built-in networking capabilities. Each station has its own address, called an IP address, which is represented as a four-octet number (for example, 44.56.0.132). The address of each station is known to all parts of the network. All parts of the network know how to get to

any other part through the use of gateways, which are called switches. So, if you wish to send a message to someone you just indicate the callsign of the person you are sending the message to and when you finish writing the message in your mailer program, which is a part of the TCP/IP software, the message is forwarded automatically to that person.

Another feature of TCP/IP packet is the ability to connect to another station and transfer files. This is accomplished by giving your software the command to "ftp" to a specified station. It then connects you to that station, you log on, and voila, you can give commands to the other station's computer and send and receive files. But don't worry, other stations can only have the level of privileges on your machine that you specify. If you want any station that connects to be able to read files only in a certain directory, you simply make a simple entry into the ftpusers file. If there is a specific station who you want to have read and write privileges, you may specify that also, and perhaps there is another station who you want to give the additional ability to delete files and to change directories. All of this is easy to configure in NOS..

Once you get your hands on NOS, the following steps should be taken to get up and running. First, you must have an IBM PC-compatible computer (or Macintosh, but the details of running NOS on a Mac are beyond the scope of this article). Even an XT will do the trick. It is a good idea to load as many TSRs into high memory as possible to facilitate your ability to shell out of NOS while it is running so you can go run other applications on your machine. (NOS only runs in the low memory area). In fact, it is better to run NOS under Windows and let Windows perform the memory management for you. As a matter of fact, as I write this I am using a 386/25 MHz machine with 8M of RAM. I am using Windows and have NOS in one window and Microsoft Word in another. However you need not use Windows to take advantage of the multitasking capabilities of NOS. All you need do is give the shell command from NOS and you will get the DOS prompt.

The next item on the list is the TNC. The TNC is attached to the radio in the same manner as for regular AX.25 packet. However, it is used in what is called KISS mode instead of command mode. Most TNCs have the ability to enter KISS mode. To find out how to do this it will be necessary to check your TNC user manual. Most TNCs have different commands that must be issued to enter KISS mode. These commands are entered into your AUTOEXEC.NOS file (in your root directory) so that when you start NOS your TNC will be put into KISS mode automatically.

There are a large number of options to consider when configuring NOS for the first time. It is highly recommended that you get all of the manuals listed below. These will help you immensely in getting through your first configuration.

1)*Network Operating System User Reference Manual,* by Phil Karn et. al. This manual is available via anonymous ftp from ucsd.edu or can be downloaded from the ChowdaNet BBS in Rhode Island (see list at end of article)

2)*Getting Started with TCP/IP on Packet Radio,* by John Ackermann, AG9V. This manual is available via anonymous ftp from ucsd.edu.

3)*Beginner's Guide to TCP/IP on the Amateur Packet Radio Network Using the KA9Q Internet Software,* by Gary E. Ford, N6GF. Anonymous ftp to eecs.ucdavis.edu. Look in /pub.

Where You Can Find NOS

NOS is available from many sources. If you are on the Internet, then you'll find many anonymous ftp sites with NOS. If you are a BBS user, you'll be able to find the latest NOS on the ChowdaNet BBS in Rhode Island (see below), among others.

Internet Sites

For anonymous ftp, log in as user anonymous and use your e-mail address as the password.

Anonymous ftp to:
ucsd.edu
look in /hamradio/packet/tcpip/{ka9q,pa0gri,wg7j}
&
wg7j.ece.orst.edu
look in /pub/jnos

If you have access to an Archie client, try 'archie nos' and you can look through the sites Archie comes up with. If you don't know what Archie is, don't sweat it. The site ucsd.edu is the main depository for NOS-related software anyway.

You will need an ip address of course in order to get on the air. The IP address coordinator for Eastern Massachusetts is Don, KA1MF. On AX.25 packet you can send him a message requesting an IP address by using the following on your local bbs: KA1MF%KA1MF.ampr.org@WA1PHY.MA. You must then configure your autoexec.nos file with all of your information in the appropriate parts. This will be easy as long as you have the above-mentioned manuals. The Southboro switch is on 144.91 MHz and uses the callsign WA1EQU-1, with an ip address of 44.56.0.1. If you have any trouble getting all of this set up and on the air you should be able to ask around on the local voice repeaters and find someone who can give you some advice. If everything does not work on the first try, don't get discouraged, half the fun is getting there!

Editor's Column

Bob Levine KD1GG

The May meeting features the election of Officers. The MMRA Booard of Directors recommends a slate of officers and the members present vote. Many people might disagree with this method. If you are excited about Ham radio and want to get involved with the organization, get to the meeting and get yourself nominated. The MMRA DESPERATEYL needs more of the members to get involved. An organization of ~400 members could only field a handful to participate in the Flea Market. About 5% of the members were involved in last year's Field Day. We need to get ACTIVE. The MMRA is primarily known for its repeaters, but there are many other facets of Ham radio that the ~400 members are probably interested. Let's get a great Field Day going this year, how about someone starting up some CW or theory courses. Recently I heard a member suggest a Special Event Station for the Boston Marathon. What a great idea. Just do it! How about next year having a pizza/beer/soda dinner after the meetings? That way we could all meet other members on a social basis. I am a member of the Bellerica club and a good percentage of the members adjourn to the "Cove" (local pizza restaurant) after the monthly meetings where the "real" ham discussions take place. (I also notice lot of YLs & XYLs there).

The MMRA VE Team

The MMRA VE Team continues to hold sessions at the Marlboro Public Library. As of this writing, we have given 159 exams to 79 applicants in the 7 sessions. Almost 70% of the applicants are coming for the codeless Technician license The May 8th session has been cancelled but we will offer Summer sessions on the 2nd Monday evening of June, July, and August at 7:00pm at Proteon Inc. near the intersection of Rt 495 and Rt 9. A special thanks to Bill K1IJZ for setting this up. As usual, please contact me (Bob KD1GG) for reservations for any session. [(508)485-7006]

Congratulations to Mike N1KRJ, a MMR Board of Directors member (soon to be KD1??) on his upgrade to Advanced. Mike is thinking of holding cw classes, anyone interested? (know code!)

Some Ham License Statistics
(Reprinted from the W5YI Report 3/15/93)

# of Amateurs by License Class:

Extra	61,615	10%
Advanced	110,089	19%
General	125,568	21%
Technician	195,385	33%
Novice	99,721	17%
	592,378	

Active Licenses (includes Clubs, RACES, & Military)

1990	1991	1992	1993 (to date)
469,004	504,567	564,95	594,9809
+5.1%	+6.6%	+12%	+5.3%

If the trend continues, (5% growth per year) there will be 1 MILLION hams in the US by 2004. That is double the number from 1991. If incentive licensing becomes easier as some people are now reccomending, the 1 million mark might happen even sooner.

Are you ready to upgrade to Extra and want a 4 character callsign in the United States? You will need to move to N. Marina Island, Guam, Johnston Island, American Samoa, Wake Island, or the Virgin Islands. Everywhere else the Group A callsigns are gone until the FCC decides to reissue them. The latest scoop from the ARRL is that they will pursue that with the FCC AFTER the current project of reinstituting CLUB callsigns. Don't count on it for a while. When it does come, don't count on it being a "buy a call" deal either.

UPS Now Does NOT Want 220Mhz!!!!

Information from the W5YI Report

In 1988 UPS made a lot of noise to the FCC about how little the Ham community was utilizing the 220Mhz segment of the spectrum. A quote from their proposal " The amateur radio community already has a generous allotment of spectrum that more than adequately

permits it to carry out it's operation. Moreover, the few amateur stations currently operating in the 220-222 Mhz band can be located elsewhere with minimum disruption"

Well, guess what - UPS has totally abandoned their plan to use 220-222 Mhz for their package tracking system! They decided to use cellular technology. 55 cellular carriers formed an alliance to serve UPS.

The FCC will hold a lottery to select commercial licenses for 220-222 Mhz.

You know what, UPS was right. Not many amateurs used 220Mhz. They picked an easy target. I bet the same fate awaits 900 mhz and then 1.2 Gig.. Already companies are starting to use technologies that transmit on 901 Mhz. Do you know where the Amateur 900mhz segment is? Look it up and see how close they are getting to us up there. Maybe the MMRA can be the first with a 1.2G repeater??? There is PLENTY of 1.2G gear appearing. It is time to stop the chicken and egg philosophy on 1.2G. People don't want to buy 1.2 gear because there aren't any 1.2G repeaters. Clubs don't want to put up 1.2G repeaters for the same reason.

Let your MMRA officers know what you think.

ARRL New England Division Convention

They are calling it the "Odd Year" compliment to the Boxboro MA Convention. The ARRL New England Division Convention will be held at the Center of New Hampshire Convention Center in Manchester NH on Saturday July 24 1993 from 8:00am until 4:30pm. This convention will have over 16,000 square feet of indoor displays and forums. The exact agenda was not available yet but I will try to have an update for the next newsletter. Some highlights of the convention are:

- Giant Flea Market
- Commercial Vendor Displays
- License Exams
- ARRL Forum
- Contest Forum
- DX Forum
- DXCC & WAS Field Checking of QSL Cards

Tickets will be $4.00 in advance and $5.00 at the door.

I think this is great. Not all of us take the summer off from Ham Radio! There are too many clubs, activities, and events that come to a screaching halt after Field Day. I hope the trend continues.

Trivia Quiz Answer & Packet Basics

No! Please don't use highly directional antennas for packet if you can avoid it. Take all the steps necessary to avoid it! Why? Remember the unique feature of packet is that many people can be using the same frequency simultaneously. This is only possible beacause they can HEAR each other and they don't transmit when someone else is using the frequency. Did you wonder what the DCD light is on the front of your TNC? (Some TNC's have a different name) That is Data Carrier Detect. Your TNC is HEARING someone else transmitting so it waits. Directionality works both ways. If you don't hear him and you key up, collisions occur and everyone suffers as data must be retransmitted.

More Packet Suggestions

Many people are amazed when they open up thier first TNC to see that there are jillions of parameters to set to run packet. I will discuss a few that I have twiddled a bit on my PK232 and PK88. Kams and MFJ's have similar parameters but the names might be different. Before I begin, I must emphasize that I normally have 100% perfectly clean operation with my TNC using defaut parameters on a dumb terminal. These suggestions are not necessary changes, just things to play with if you are having some difficulty.

RESPTIME

The number stored in RESPTIME (RESPonse TIME) times .1 seconds is the time your TNC waits to acknowledge a packet. Sometimes, the sending TNC will unkey while sending a large string of packets while it is building up more packets to send. Your TNC will think the sending TNC is done and send an unrequested ACK (acknowledge). Typicall, the sending TNC sends the last packet with the POLL bit set which indicates that it is waiting for your TNC to acknowledge the reception. Unfortunately, if your RESPTIME istoo low, you might try to ACK while the sending TNC again keys up to send more data. Increasing the RESPTIME can help in this case. If your large file transfers are bombing, try increasing RESPTIME.

MAXFRAME

The maximum number of frames your TNC will send before stopping to wait for an ACK. On busy channels, reduce this. Keep it at 4 or 3.

FRACK

After your TNC sends a POLL frame (or I frame) with the POLL bit set (request for acknowledge) , you wait a while for an acknowledgement from the receiver. FRACK specifies that time in seconds. What can happen on busy channels is that the receiver hears your request for an ACK, but because the frequency is busy, doesn't get the ACK sent out in time and your FRACK time expires. They you send another POLL. The receiver queues up another ACK etc... Consequently several extra ACKS and POLLS are sent wasting

airtime. FRACK defaults ot 5 on my PK232, but I raise it to 7 sometimes on a busy BBS night.

PERSIST and SLOTTIME
The Most Interesting Parameter Award Winners.
These are what make packet possible. Think about retries. What if a collision occurred between 2 stations. They get no ACK, back off and try again. If they both back off the same time and try again, guess what. The infinite DO loop. PERSIST is sort of a probability of transmitting parameter. Pick a number between 1 - 255. Call that number PERSIST. When your TNC needs to transmit, it picks a random number between 1 and 255 . If the TNCs random number is LESS than PERSIST, it transmits. If it is greater, it waits. How long does it wait? SLOTTIME is a number of milliseconds*10 that the TNC waits before generating another random number (25=250 milliseconds for example). What happens if PERSIST = 255, you transmit every time and you are a frequency hog! The rule of thumb is to set PERSIST = 255/n where n=number of stations on frequency. The default is 63.

Well, these are some of the more obscure but necessary-to-know parameters. Arguably, there are many more that are just as important if not more. As in any real-lif situation, the more flexible a system is, the more complicated it can appear. Have fun

Thought from one of the MMRA's First Officers

Paul Zonderman W2ILM (formerly K1JDF)

(Text from a letter from Paul)
In the last Newsletter, Andy Morrison suggested that you might want ideas for articles. As organizations grow and become "institutions", it's healthy to look back at their beginnings, the people involved, and their goals and challenges.

We don't know each other; and with a handful of exceptions, I would venture to say thay I don't know most of the present members. Sometimes I ask myself why I faithfully send in the membership dues when I haven't lived in Massachusetts in 17 years. You could count on your fingers the number of times I have used the MMRA repeaters in that period. I wonder whether the present officers ever ponder who is this W2ILM from Schenectady, NY, whose name is carried on the membership list.

You may have noted that my membership number is 0105. My call then was K1JDF. I suppose that answers the question. I was one of the club's first set of officers. I was the Clerk. I was also the attorney who filed the papers which incorporated the MMRA. In a sense, I remain a member because of my pride in being part of the birth of a club and a repeatere that has grown into an institution.

20 years ago, we worried about getting a quorum at our first meetings. We had to compete for the 22/82 frequency, and participated in frequency coordination meetings in Connecticut. We used converted commercial gear like the Motorola 41V, trunk mounted, one frequency radios, with control heads. We met in one place and knew each other. Finding a touchtone pad and making it work was a challenge. The concept of an autopatch was a new and exciting idea. Even the concept of a repeater was something that had to be explained to people.

The birth of the club was due to the enthusiasm and vison and hard work and loyalty of a handful of people like Bob Waters, W1PIR; and Steve Rudin, W1WSN; John Pratt. WA1NPN; Father Dan; and later Lou Savoie K1RAK, and a handful of others whose names I can't recall at the moment.

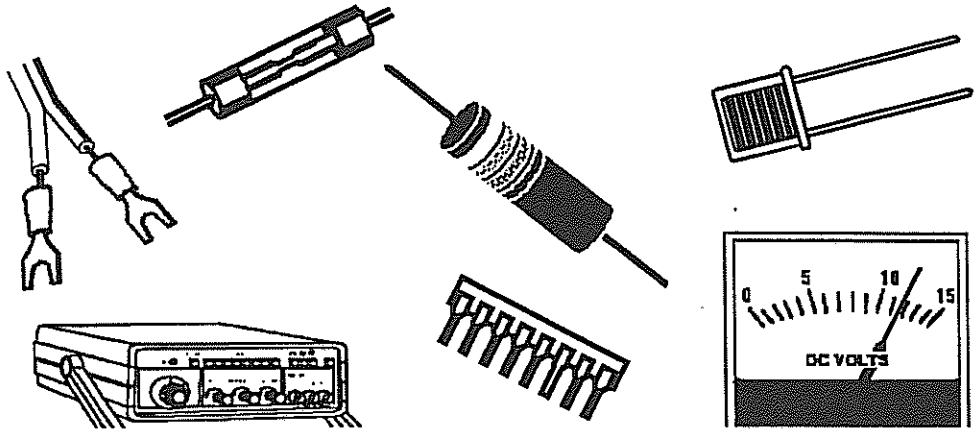
It might be interesting to dig up a list of the first officers and Board of Directors, to see who is still around. It might be interesting ot do an article on 'where they are now', what are they doing, and what comments they might have on the growth or progress of the MMRA. There might even be some old pictures around of those early days. It might be informative to publish portions of some of those early days. It might be interesting to try to get these people together as a meeting event. It might be interesting to try to get together once in a while on 75 meters.

Best of Luck
Paul

Truly a gentleman that we all owe thanks to. We don't often consider the hard work and devotion to a cause by others in the past that are the foundation for what we have today.

If any other long-time membes have thoughts to share about the MMRA's history or if anyone would like to address Paul's suggestions, please write to me and I will see that they get published in the Minuteman.
de - KD1GG

Things to Build



Home Brewing Your Own Printed Circuit Boards

Larry Freitas, N1KLF

Did any of you out there in radio land ever get the bug to build a project from the ARRL hand book or from your favorite ham/electronic magazines ? Ever wonder why construction articles include printed circuit board etching patterns? What do you do with them ?

Not to long ago I read about a process using a regular photocopy machine that transfers the etch pattern on to a special film to etch a PC board. Sounds to good to be true right ? That's what I thought. So for about a buck per 8-1/2" x 11" sheet I thought I would give it a try.

The film is called TEC-200™. When you purchase the film it comes with very simple and easy to follow instructions on how to construct your home-brew PC board. I will describe the process briefly to give you a idea of what is involved.

The process has three basic steps:

1) PHOTOCOPYING
2) PATTERN TRANSFER
3) ETCHING.

STEP 1 - PHOTOCOPYING

Using a standard copymachine replace the paper in the paper tray with the Tec-200 film. Some copiers have a single sheet feeder that can be used. Place the original circuit pattern face down on to the copier. Proceed to make a copy as you normally would. It may take a few tries to get a good contrast copy. Any film that the pattern transfer was not successful, the toner can be removed with any acetone base solvent,nail polish remover will work just fine. A word of caution the toner can flake off the film easily. Care must be taken to avoid any unecessary handling of the film once the circuit pattern has been copied onto the film.

STEP 2 - PATTERN TRANSFER

The most important part of this step is that the copper surface must be clean. The manufacturer recommends to clean the board with a mild abrasive or a non-metallic scouring pad. Then the copper should be wiped clean with isopropyl alcohol (rubbing alcohol). Be careful when handling thecopper-clad board not to leave any finger prints on the surface.

After drying the copper surface cut the film leaving no more than a half-inch border of clear film around your circuit pattern,then place the film with the pattern side down onto the copper-clad board. Press down with a hot iron set on the "cotton-linen" setting, and gently applying pressure over the entire circuit area. If you have heated the film

properly when you peel off the film your circuit pattern will appear as a solid black circuit layout on the copper. If parts of the pattern were not transferred they can be re-heated until the pattern transfer is complete. Some areas may need to be touched up by filling in circuit with a laundry marker.

STEP 3 - ETCHING

When the board has cooled off it is now ready to be etched. You will need a nonmetallic tray for your etch bath. Place the board in the tray with enough etchant to cover the board. I used PCB etchant Solution that is available at RADIO SHACK. Gently slosh the board around for about 10 to 20 minutes,or until all the unwanted copper is removed. Rinse the board under cool water to stop the etching process. The black etch resist will still be on the board. The ecth resist can be removed with a acetone base cleaner.

There you have,it a bare copper circuit PC board. Now what you need to do is drill out all component mounting holes,assemble and solder your circuit board. My recommendation is to tin all of your circuit traces. This will keep the copper from oxidizing. So where can I get this stuff ? The two sources that I know about are THE ***MEADOWLAKE CORP.***, P.O. Box 497, Northport,New York 11768 and ***OCEAN STATE ELECTRONICS*** P.O Box 1458, 6 Industrial Drive, Westerly,RI 02891 Tel 401-596-3080. Ocean State also carries copper-clad boards and drill bits for drilling out component holes.

(Tec-200 ™ is a trademark of The Meadowlake Corp.)

A sincere thanks to Larry for this interesting contribution to the Minuteman. I hope you will not forget about this column over the summer while you are enjoying the nice weather. If you come across an interesting product for home-brewing or you actually do some home-brewing (not in the alcoholic sense!), I hope you will consider submitting it for the next issue of the Minuteman. - *de KD1GG*

1993 Flea Market

Walter Ching, N1HBR

The 1993 MMRA Flea Market, held March 20th, was quite successful. The biggest thing in our favor is that it didn't snow like it did in 1991! We came close, however; the Blizzard of '93 was only the week before! We had over 30 vendors across nearly 45 tables all set up by 10 o'clock that morning, and a crowd of around 300 people streaming in as soon as we opened the doors. It was, at times, a more than slightly frustrating event to pull off, but a tremendous pleasure to see it accomplished.

There is no question, however, that if it weren't for the help of many, many, people, the whole event would have flopped. Some people just have to have special mention: N1NVS (Lauryn), who arranged for the rental tables; K3BUZ (Barrie), who had to organize the entire concessions effort at the last minute; and the setup/takedown crew [KD1GG (Bob), N1KLF (Larry), N1NVK (Clark), and WA1ZJE (Bob)], who short-handedly moved all those tables and faced near-certain deafness from the Junior Class dance that Friday night.

I wish there was enough space to mention what everyone else did to help out, but it will have to be sufficient to give thanks to: KD1AC, KA1AKD, N1BHA, N1BHI, KA1CLX, KB1FZ (as always!), W1JDO (ditto!), N1KRJ, KD1LV, N1NVL, N1OCS, and KA1YQB. My apologies to anyone I may have left out, and thanks again to all who helped. The planning for 1994 has already begun, hope to see you all there.

HT Clinic

In case you missed the March meeting or didn't bring your HT, Chris Conti, N1NVL, will be holding another HT clinic at the May 10th meeting to check frequency & deviation of your rig in exchange for a small donation to the MMRA Test Equipment fund. If there is sufficient support, we hope to have this become a regular feature of the meetings.

The Last Words

This is the last issue of the Minuteman for the season. I hope you enjoyed the contents of this years issues. I look forward to working on the newsletter again next season. I would like to expand the newlsetter to a few more pages in the future but this will significantly increase the cost because we are now at the limit for a 29 cent postange stamp. So, in order to do this, we will need significantly more advertising. If you would like a larger newsletter, please help me to find new advertisers.

73 and have a good summer.
Bob - KD1GG

The Minuteman

Newsletter of the Minuteman Repeater Association - May 1993
Volume 22 Number 5

Repeater Information:

Weston	146.82	KA1AL/R	PTL	P
Marlboro	146.61	N1BHI/R	FTL	P
Marlboro	449.925	N1HBR/R	FTL	P
Stoneham	146.715	N1DKZ/R	PTL	P
Quincy	146.67	KA1HKP/R	PTL	P
Quincy	224.40	KA1CLX/R	FTL	
Weston	224.70	N1HBR/R	FTL	
Hopkinton	223.94	N1BHI/R	FTL	

FTL=Full Time Linked PTL=Part Time Linked P=Autopatch

Officers and Board of Directors:

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	Scott Bullock, KA1CLX	Mike Ryan, N1KRJ/AA
Newsletter Editor:	Bob Levine, KD1GG	508-485-7006

Membership Meetings: 2nd Monday of Sept, Nov, Jan, Mar, May (except Sept 21 this year) at Campion Center, Weston at 7:30pm

Board Meetings: 2nd Monday of Oct, Dec, Feb, Apr. Meetings are open and members are welcome. If a visiting member wants to be on the agenda, please contact Andy Morrison beforehand.

The MMRA is dedicated to Amateur Radio and the public service. The MMRA is a registered non-profit Massachusetts corporation. Membership is open to all amateurs. Annual dues are $25.00 individual, $35.00 family.

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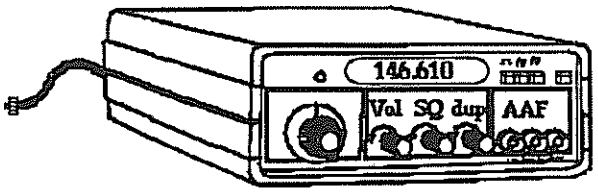

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