



# SIGNAL



April 1999 Volume 8 Number 4

## This Months Meeting

This month's meeting speaker is Ranger Curt Rudge from the Massachusetts Bureau of Ranger Services. Curt manages Search and Rescue activities for the Massachusetts Department of Environmental Management. He will talk about what goes on in a SAR situation. He will bring some information on the Central Mass Search and Rescue group which is a volunteer group active in search and rescue activities.

The Groton Road Race is coming up. Contact Erik Piip KA1RV if you would like to help out.



## Minutes of the February Meeting

Last month's presentation was "Antenna Couplers Why and How" by Bob Reif W1XP. Bob talked about the different type of designs and how they worked.

It was noted that elections were coming up in April and if anyone was interested in a position they should talk to one of the current officers.

It was announced that the fox was being modified to add some features. Several people had asked when it was going back out so it was decided to delay any further changes for now and put it back out starting Saturday April 10<sup>th</sup>.

Adopt A Highway cleanups start in April. We have renewed our commitment for the coming year. We are planning a cleanup for the Sunday April 18<sup>th</sup>, the weekend after the meeting. The first cleanup of the year is always the most work so we would like to have 12 volunteers for this one. This is the weekend before the Groton Road Race so it would be nice to clean up this section of the roadway.

## Equipment for Sale

Much of the equipment Erik is liquidating has been sold. But there are still some pieces available. As of this writing the available equipment is as listed. The list has now been more widely distributed and there are no bidding dates. When a reasonable offer is received the item will be sold. So if you want something don't hesitate.

Man	Mod #	Number	Desc
ICOM	IC-275A	144 MHz	SSB/CW/FM
Kenwd	PS-430		Power Supply
Kenwd	TS-130S		HF XCVR
Kenwd	TS-430S		HF XCVR
MFJ	MFJ-422		Electronic Key
Digimax	RF-500	RF	Sampler
Power Designs	2015R		Power Supply
Kantronics	V5.0		All Mode Modem
Yaesu	FT-480R		2 MTR All-Mode
Yaesu	FT-208R		2 Mtr HT
Yaesu	NC8	AC Pwr	Supply/Charger
ICOM	IC02AT		2 Mtr HT
ICOM	BC35		Battery Charger
ICOM	HM46L		Speaker/Microphone
Adv. Rcvr.Res.	SP144VDG		LNA
Adv. Rcvr. Res.	SP432VDG		LNA
Daiwa	CN520		SWR Meter

## Groton Road Race Needs You

"Antenna rotator, Azimuth plane, w/control, (Quantity: 2)"

"Antenna rotator, Elevation plane, w/control"

## Field Day



We are planning to run Field Day from the Groton schools and permissions are in the works. If you have questions or want

to help out contact Craig Kalley N1ABY who is coordinating.

## The MFJ HF/VHF SWR Analyzer Model MFJ-259B

### An Equipment Review

A few months back while up at the repeater site the discussion on the ground, while Ralph was working on the antenna, got around to antenna test instruments I mentioned that I had seen the new MFJ SWR analyzer advertised and that it had a lot of new features. Stan offered to buy one if I would write a review for the newsletter. I said sure. I am always ready to play with some new radio toys. Especially if some one else pays for them. Well Stan kept his part of the bargain so now I am keeping mine.

First a little background. The MFJ model 259B is the latest of a line of antenna test instruments that MFJ has been building for some time. The model 249 was the first to offer the combination of a low power wide range tunable signal source, a SWR indicator, and a frequency counter in one battery powered package. This instrument has matured into the 259B. The 249 provided a portable means of antenna SWR measurement. The tunable signal source provides the test signal, the internal SWR meter provides the SWR measurements, and the internal frequency counter provides an accurate indication of the measurement frequency. As a result of the current level of digital integration it is more effective to include an accurate frequency counter than to try to produce a tunable oscillator with accurate dial calibration and high stability. The 249 covered the frequency

range from 1.8 to 170 MHz. This includes all amateur bands from 160 to 2 meters. A real advantage was that it includes the frequencies outside the amateur bands. So you could find the SWR minimum even if it was outside the ham band. No longer did you have to plot the slope of the SWR curve across the band to try and determine if the antenna is too short or too long. You could find the minimum SWR in seconds by turning the frequency knob for the minimum indication on the SWR meter and then reading the frequency from the counter display. It took the drudgery out of antenna testing and trouble shooting. The 249 was copied by other manufactures and they included other features. MFJ responded by adding an antenna resistance readout. But the 259B is a real leap forward. It is now much more than just a simple SWR indicator. It is an impedance measuring instrument. It still provides an SWR indication, but now it provides a measure of the actual impedance of what ever circuit is connected to the terminals. It can not only be used for antenna testing, but for component evaluation and RF cable testing.

The antenna analyzer is a box a little bigger but weighting less than a brick. It has two analog meters, and a liquid crystal digital display. There are two RF connectors. An SO 239 (UHF) coax connector is where the antenna or circuit under test is connected. A BNC connector is provided for connecting a signal into the frequency counter. This is an additional feature of the 259B which I will discuss later. There are two knobs that set the range and frequency of the internal signal generator. One knob selects one of the six bands the 1.8 to 170 MHz. range is divided into. These ranges are shown in Table I. The second knob tunes the oscillator over the range selected by the range switch. The operating frequency is always displayed on the digital display. A Power on/off push button and a Mode and a Gate push button complete the controls. There is a ground connection terminal and a coaxial power connector for use with an external 12 volt supply, or AC adapter. The small size and internal battery supply allow easy use in the field. Even at the top of a tower. The internal battery supply is made up of ten "AA" size cells. This battery can be either alkaline or conventional "AA" cells or NiCad rechargeable cells. Depending on the type of battery used it is necessary to remove the case and position a jumper so that an internal battery charging circuit is either connected or not. With rechargeable batteries and the jumper in the proper place the batteries may be recharged through the external supply connector. This is a low rate charger and recharg-

ing can take over ten hours. Battery replacement is possible via a removable cover plate on the bottom of the case. The unit draws about 150 ma when in use. It is important to turn it off when not in actual use. This can extend the useful life of the battery. The unit has a sleep mode which when enabled reduces the battery drain to about one tenth of normal after two minutes of inactivity of the controls or frequency adjustment. This mode may be disabled. I find using the antenna analyzer as a signal source very useful for things like adjusting the null on a directional receiving antenna. In this case it is necessary to disable the sleep mode. This is possible by holding down the mode push button when the power is turned on.

Frequency Band Coverage Table

Band	Coverage (MHz)
1	114 - 170
2	70 - 114
3	27 - 70
4	10 - 27
5	4 - 10
6	1.8 - 4

Table I

When the unit is turned on, the digital display briefly displays a revision number and then an MFJ software copyright date. The next message is a voltage check display. It displays a "voltage OK" or "voltage low" message followed by the actual supply or battery voltage. Note that while in use the unit monitors the battery voltage. When the voltage goes below the level where the accuracy is reduced by the low battery voltage the operator is informed on the display. The display then goes to the "Main Mode" of operation. There are two modes. "Main" and "Advanced." Each Mode has a menu of functions that are cycled through by the mode push button. To toggle between the Main and Advanced mode the Mode and Gate push buttons are depressed together for several seconds. The following functions are available in each mode. See table II. MFJ uses the word "Mode" to describe two different things, which is confusing.

Modes of Operation

Main Mode

Advanced Mode

Resistance & Reactance	Impedance (polar form)
Coax cable loss	Return loss, Reflection Coef.
Capacitance in Pf	Distance to fault
Inductance in Uhy	Resonance (R + jX)
Frequency counter	Transmit Efficiency

Table II

In all modes except the Frequency counter mode the SWR is displayed on the analog SWR meter. In the Resistance & Reactance mode the frequency, SWR, and resistance R and Reactance X are displayed on the LC display. The SWR is also displayed on the analog SWR meter, and the magnitude of the impedance is displayed on the Impedance analog meter. Tuning the frequency adjusting knob the frequency change can be observed on the LC display and the SWR can be read on the analog meter or the LC display. Tuning the frequency for the SWR minimum is easier on the analog meter in most cases. The resistive component of the complex impedance can be read from the digital display as can the reactance magnitude. The sign of the imaginary component (reactance) is not provided. As stated in the manual, this can usually be inferred from knowledge of the circuit you are testing, or by observing the direction of change in relation to the direction of a small frequency change. If X increases as F increases the reactance is positive, or inductive. If X decreases as F increases then the reactance is negative or capacitive. I will discuss this further under the capacitance and inductance modes. For most antenna adjustments this is the mode to use. It provides both a analog meter indication of the SWR and a digital display of the same data. As mentioned earlier finding the minimum on the analog meter is probably easier than on the digital display. The R and X values are of interest if you are trying to design a matching network for the antenna in question. Having the R and X value for the complex impedance  $Z = R + jX$  is all you need to design an L, pi, or T matching network. Before instruments like this were available it was difficult to make such a measurement, particularly in place on the antenna. So "cut and try" was the common method of adjusting such an antenna. Using the MFJ259B the "cut and try" can be replaced with "measure, match and use". Having the impedance value the design of a matching circuit is straight forward. But even if you are not in to such activities, the 259B has much to offer.

Here is an example of what you can do with it. I used the 259B to carefully measure the impedance of an 8 foot mobile whip mounted on the

back of my Blazer at six meters. I first used the 259B to cut a piece of coax cable one half wave long so I could make the measurements from inside the vehicle. The half wave coax line allowed me to read the impedance of the antenna at the end of the line since the impedance on a line repeats every half wavelength. After carefully recording the reading, I plotted them on a Smith chart. This told me among other things that I had the sign of the reactance correct. I then designed a three element matching network which consisted of two coils ( or one tapped coil) and a capacitor. Using the 259B I then measured coils I wound and adjusted them to the calculated values. I soldered them in place on the antenna base and added a fixed capacitor. Eureka! Better than 2 to 1 SWR (again measured on the MFJ 259B) over the band. Isn't science fun?

This is probably a good place to talk about the accuracy that you can expect from such an instrument as the MFJ259B. MFJ claims that the instrument is accurate for Reactance values  $>7$  ohms and  $<650$  ohms. For values outside this range they just provide a  $<7$  or  $>650$  indication on the display. They make no specific claim of accuracy. I made some comparisons with a Vector Voltmeter and came to the conclusion that the agreement was reasonable but subject to the value of the impedance being measured. For this test I measured a 13 ohm and 200 ohm load (4 to 1 SWR) through three different cable lengths. The agreement was best when the load was mainly real I.E. not very reactive. The disagreement increased as the magnitude of the reactance increased. These tests were done at 146 MHz. and 50 MHz. I also measured a 13, 51, 99 and 200 ohm resistor load at six frequencies from 2 to 118 MHz. The analog meter always measured the 4 to one loads (13 and 200 ohm) low. It indicated 3 to 1 while the digital display had a reading of 4 to 1 within 5 % through 30 MHz. Above 30 MHz. the Analog scale was reading lower still for the 13 ohm load, and the digital readout was high (4.5 to 1 at 66 MHz, and 4.6 to 1 at 118 MHz.) for the 13 ohm load. The 2 to 1 load was much better on both readouts. At 1 to 1 they both did very well, but this is the null reading. I consider this performance adequate for a portable instrument of this price range. MFJ claims they do cross checks to improve the accuracy, but are limited by the 8 bit A/D converter used, and the diode detectors.

The cable loss mode of the MFJ259B is useful for measuring the loss in a length of a 50 ohm coax transmission line. You simply enter the cable loss mode by depressing the mode push button until "Coax Loss" is displayed on the digital dis-

play. It is the second mode under the main mode menu. Pressing the mode push-button cycles around the menu. After displaying the title for several seconds, the display indicates the frequency and the loss in any length of 50 ohm cable connected to the antenna connector. It is necessary that two conditions be fulfilled. First the cable must be 50 ohm cable, and second it must be open or shorted at the far end. An antenna can not be connected to the cable at the time as this will give an unrealistic loss reading. I measured several lengths of coax and compared these readings with measurements using an HP 608 signal generator and HP436A power meter. I found very close agreement, I. E. 0.1 dB at 1dB. I then looked at several pads and found the error somewhat larger. A 9.65 dB pad measured 8.1 dB at 146 MHz.

The next two modes are the capacity and inductance modes. In these modes the antenna analyzer operates in a mode similar to the R X mode, but the digital display indicates the reactance value of the R X measurement, and the value of capacitance (or inductance) that has the same reactance at the measurement frequency which is also displayed. In the capacity mode it displays the capacitor that has the reactance of the measured circuit, and in the inductance mode the inductance that has the same measured reactance. The capacity is in Pf, and the inductance is in Uhy. This is useful for tuning a load impedance. For example measuring the impedance of a vertical mobile antenna, using the R X mode, might give a reading of  $50 - j50$  at 40 meters. Switching to the Capacity mode would read 455 Pf and the same 50 ohms of reactance. Switching to the inductance scale would read 1.1 Uhy, and the same 50 ohms of reactance. Now knowing the antenna is shorter than a  $1/4$  wave on 40 meters (about 33 ft), one can predict that the antenna is capacitive. The antenna analyzer has given us the value of the inductor that we need to resonant (tune) out the capacitive reactance. Placing the 1.1 Uhy inductor in series with the antenna and connecting the antenna analyzer to the resulting circuit should measure 1 to 1 on the SWR meter and display zero on the reactance display. By doing the math for us, it has simplified our task. It has made the matching of our somewhat simple example easy. The hardest part is designing the coil which can be done from handbook expressions and a hand held calculator. We can then measure the coil with the MFJ to verify the design.

The last mode in the Main Menu is the Frequency counter. This allows the user access to the internal frequency counter via the BNC con-

necter on the top of the case. The gate time and counter resolution can be selected at 0.01, 0.1 and 1.0 seconds. These gate times correspond to 10 kHz, 1 kHz, and 100 Hz resolution. The accuracy of the counter is not specified but it seems to agree well with one of my hf transceivers at room temperature. I am certain it is adequate for all antenna measurements. The stated sensitive is 10 millivolts at the low end of the frequency range and 100 millivolts at the high end. The maximum input is specified at 2 volts peak.

This concludes the functions in the main mode of operation. Now to review the Advanced modes of operation. The first mode is the Impedance mode. This is similar to the R X mode in the Main menu but now the impedance is displayed in polar form, I.E. magnitude Z and angle theta. Again the sign of the angle is not given but it can be determined from the frequency change as in the R X mode, or from knowledge of the antenna or circuit, In my opinion the rectangular mode is more useful. The magnitude of the impedance is also displayed on the analog impedance meter.

The second mode under the Advanced menu is the Return Loss & Reflection Coefficient. In this mode the digital display has the return loss of the impedance in dB and the magnitude of the reflection coefficient. These quantities are actually just another way of expressing the SWR of the antenna impedance.

The third mode is the Distance to Fault mode. In this mode the distance to a short or open in a coax cable can be found. It is necessary to adjust the frequency to a frequency where the reactance indicates zero. At this point the Gate push button is pressed and then the frequency is increased until another point of zero reactance is found. The Gate button is pressed again and the display then reads the distance to the fault in feet. The distance displayed is the distance to the fault in feet but it must be multiplied by the VP (velocity of propagation) of the particular cable. It is recommended that several different start frequencies be used to improve the accuracy by averaging the answer. I had a long piece of 75 ohm TV coax cable that had a short some where in it. I used the Antenna Analyzer to calculate the distance to the fault from each end. This allowed me to calculate the VP of the cable since I could make both measurements, and also measure the total length of the cable. The distance indicated to the fault from the long end was off by 10 inches and off by 4 inches from the short end. This was in 86 feet of cable. By the way the VP was 0.84. I think this is a very useful function. It can save a lot of work and frustration in trying to find a fault in a long run of cable.

Especially if there are a lot of splices where any one can be at fault. It works on any impedance transmission line and can be used on open wire line if it is installed in the clear.

The resonance mode is next to the last mode of the Advanced group. In this mode the analog Impedance meter reads the magnitude of the reactance. The digital display still displays the resistance and reactance. In this mode it is easy to find the frequency of zero reactance (resonance) by adjusting the frequency and watching the Impedance meter for zero reactance. This is easier than trying to watch the digital display while adjusting the frequency. This mode is useful for measuring stubs and phasing lines.

The last mode is the Transmit Efficiency mode. This is called Match Efficiency on the digital display. I find this the least useful and potentially the most confusing mode. It is yet another method of displaying the SWR value, but it does not necessarily reflect the percentage of actual power delivered to a load. If you don't understand it (and the transmission line theory behind it) you should avoid this. You will very likely come to the wrong conclusion about how your transmission line is working.

The Bottom Line. For the price of under \$250, the MFJ 259B is a very useful instrument to the amateur that has lots of antennas to maintain and adjust. Especially if you like experimenting with antennas. It does require a knowledge of impedance matching and transmission line theory to be the most useful. But that you can learn and the MFJ 259B may be just the incentive to get out the handbook and read up on antennas and transmission lines. On the other hand if you only want to check the SWR on the mobile when the local repeater seems weak, you can use a cheaper SWR meter. Or borrow a 259B if you can get one pried out of the hands of someone who has one.

## Flea Markets (from the ARRL Letter)

18 April            Flea at MIT  
24 April            Nashua NH NE Antique  
25 Ap Poughkeepsie NY MtBARC @JohnJ HS

2 May Yonkers NY Metro70  
7,8 May Rochester NH Hoss Traders  
10 May Greenfield MA FCARA Mon  
15 May Forestdale RI RIAFMRS @VFW rt146 8A  
16 May Flea at MIT  
22 May Londonderry NH IRS @Lions  
29 May Vernon CT [NARC@TollandAgC](#)  
30 May Sorel-Tracy PQ HamfestduQuebec

4-6 June Rochester NY ARRL Atlantic Conv

**Public Service**

April 25

The Groton Road Race For more information contact Erik Piip KA1RV at 978-448-5536.

[piip@merl.com](mailto:piip@merl.com)

Boston March of Dimes WalkAmerica Bruce KC1US

Sturbridge MA Lions Club River Race Matt N1RWC 508-829-0412 mattn1rwc-1@juno.com home: 978-939-4815

May 2

Boston Walk for Hunger Bob K1IW 617-696-1682

<http://www.amateur-radio.net/cpsg>,

[rjd@alum.wpi.edu](mailto:rjd@alum.wpi.edu)

May 23

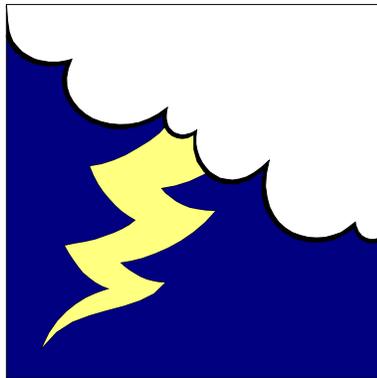
Devens MA Parker Classic Road Race Stan KD1LE 978-433-5090 kd1le@amsat.org

Jun 26-27 Boston MA Multiple Sclerosis Bike Tour John N1PYN 508-588-3250

If you are looking for volunteer opportunities see the PSLIST.

**SKYWARN**

For those interested in SKYWARN the National Weather Service (NWS) has scheduled 12 training sessions so far. The sessions closest to us are listed below.



Sat May 15<sup>th</sup> Haverhill, Ma  
Wed May 19<sup>th</sup> Marlboro, Ma

If anyone wants more information on these or the other scheduled sessions see Stan KD1LE.

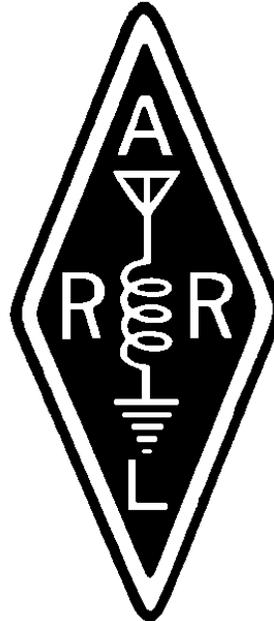
By way of the SKYWARN newsletter :The Prevailing Winds” here are the hurricane names for 1999.

Arlene, Bret, Cindy, Dennis, Emily, Floyd, Gert, Harvey, Irene, Jose, Katrina, Lenny, Maria, Nate, Ophelia, Philippe, Rita, Stan, Tammy, Vince, Wilma.

Also, if you ever wanted to know what a Hurricane Hunter Aircraft looked like here’s your chance. The NWS and the National Hurricane Center will have one on display and available for boarding on Friday April 30, from 3:30 to 5:30 PM with a hurricane presentation from 7:30 to 9:00 PM at Otis Military Base in Bourne Ma.

**From the ARRL Newsletter**

NASA PROVIDES SPACE QUALIFICATION FUNDING TO SAREX/ARISS



NASA has given a \$90,000 boost to the cause of giving Amateur Radio a permanent place in space. The money, recently transferred to the US-based Space Amateur Radio EXperiment (SAREX) team from NASA’s Education Office will support the space qualification of Amateur Radio hardware bound for the International Space Station

as part of the Amateur Radio on the International Space Station (ARISS) program.

AMSAT-NA’s Vice President for Human Spaceflight Programs and ARISS Administrative Chairman Frank Bauer, KA3HDO, says ARISS was “ecstatic” to learn of the subsidy for this crucial facet of the ARISS hardware development. “While this may sound like a great deal of funding to the Amateur Radio community, it represents approximately one-seventh of what we expect will be required to fully develop all three phases of the ARISS hardware system,” he said.

The ARISS initial station hardware—basically dualband H-Ts—is currently being prepared for launch this October on STS-101. More sophisticated transportable ham gear will be delivered in late 2000 or early 2001. The rack-mounted per-

manent station is expected to be launched in 2003 or 2004. Qualification testing—sometimes called “shake-and-bake testing”—is required of all equipment bound for the ISS or used in manned spaceflight. The detailed, rigorous testing sequences are aimed at ensuring crew safety and minimizing equipment failure.

The bulk of the \$90,000 will go to support space qualification of the ARISS initial station hardware and some early aspects of the transportable station. Space qualification of the initial station has proven to be a bit of a challenge, in part because of the international nature of the equipment contributions. The US and German-developed radio hardware will be installed inside the pressurized Russian service module, while Italian, Russian, and US-developed antenna systems will be installed on the outside. Mounting the antenna system hardware and the coaxial feedlines will require a space walk, or EVA. “Ensuring the ARISS hardware can pass the EVA safety tests is our most challenging task,” Bauer said. The ARISS team has been working at Goddard Space Flight Center with a NASA contractor team from Orbital Sciences Corporation to deliver the ARISS Safety Data Package and ensure the ARISS hardware is flight-qualified.

#### FCC INVESTIGATING TEXAS AMATEUR

The FCC is investigating information indicating that Technician licensee Leonard Martin, KC5WHN, of Houston, Texas, operated outside of the amateur bands without a proper license. Field Office personnel in Houston reportedly monitored Martin and located him using direction-finding equipment on two occasions. On February 27, he was said to be operating on 27.535 MHz and 545 MHz. On March 15, he was said to be operating on 27.370 MHz, a frequency between CB channels. FCC personnel, accompanied by local police, visited Martin on March 15, but he allegedly refused a request to inspect his station. The FCC’s Riley Hollingsworth, K4ZDH, says he has spoken with Martin, and the case is under review. “This subjects him to a large fine for unlicensed operation and refusal to allow an inspection, plus loss of his license,” Hollingsworth said.

The FCC warned Martin in writing last November 3 about operation on frequencies other than those authorized under his Amateur Radio license. “While these warning letters are a courtesy, we don’t forget who we sent them to and it is a serious mistake not to take them to heart,” Hollingsworth commented. In other actions, the

FCC sent Warning Notices to an Illinois ham alleging broadcasting and on-air harassment as well as transmission of profane and indecent language. The FCC also warned a Texas ham about causing deliberate interference on 40 meters, an Illinois ham who holds a Technician ticket about operating on 20 and 40 meters, and a North Carolina Novice who’s allegedly showed up on 2 meters.

#### SHORTWAVE CAN PROVIDE WINDOW TO YUGOSLAV ACTION

You don’t have to tune very far from the amateur HF bands to find different perspectives of the current crisis in Kosovo. NATO air strikes against Yugoslav targets resumed March 26, and many overseas correspondents have been expelled from Yugoslavia by the Milosevic regime.

Larry Magne, editor-in-chief of International Broadcasting Services Ltd which publishes Passport to World Band Radio, says Voice of Russia World Service, Radio Tirana, Radio Yugoslavia, and the BBC World Service offer a variety of points of view on the current happenings in the Balkans. International Broadcasting Services keeps an ear on world shortwave broadcasts from its primary monitoring site in Paraguay.

“Voice of Russia is interesting because they’ve sort of taken up the Serb cause,” Magne explained. “In a way, their reaction is more important because they have some clout.” Radio Tirana, from the Albanian capital, supports the other side of the conflict in which ethnic Albanians in Yugoslavia seek some degree of independence, while Radio Yugoslavia will offer the perspective of the Milosevic regime. Magne said it’s hard to beat the BBC World Service for a more neutral position.

Magne said he considered it a bit odd that Radio Yugoslavia, with powerful transmitters installed under the Tito regime, still was on the air as of March 25, but IBS monitoring indicated the station was active on 7115 kHz 0100-0130 UTC. The shortwave station is “typically, the first thing they go after” when bombing, he said.

Voice of Russia and Radio Tirana both can be found evenings within the amateur 40-meter band (the 41-meter international broadcasting allocation). IBS monitored Radio Tirana on 7160 kHz between 0245 and 0400 UTC. Russia is available on 7125, 7180, and 7250, as well as other frequencies. IBS has monitored Voice of Russia on 12,000, 12,020, 12,040, and 15,595 kHz during

the last 24 hours. Magne said the economic crisis in Russia has made that country's international broadcasting schedule a bit more unpredictable than in the days when it was known as Radio Moscow.

Magne says 5975 kHz is the best spot for the BBC World Service. Croatian Radio also has been heard evenings on 9925 kHz.

"Radio France Internationale, Radio Free Europe/Radio Liberty, and others are adding transmissions to the Balkans, so it is not inconceivable that some of the international broadcasters with access to large transmitting facilities may add frequencies because of the Balkan situation," Magne said.

Radio B92 (92.5 MHz) in Belgrade has been shut down by the Yugoslav government but has attempted to continued to broadcast via the Internet to avoid possible censorship. IBS says it has an unconfirmed report that the independent Radio B92 will be rebroadcast on shortwave to Yugoslavia and much of Europe. "The shortwave broadcast supposedly will operate this weekend from 0700 UTC (Saturday March 27) on 11415 USB," Magne said. "This reported transmission would appear to be via the facilities of an existing Western European hobby pirate station, probably using a modified ham rig and thus at very low power."

B92's Web site, <http://www.b92.net/>, does not mention a shortwave broadcast. The site offers English-language broadcasts, but these generally have been unavailable since the bombing began. The Web site suggests listeners try the Real Broadcast Network if they experience problems. Magne confirmed that Radio B92 Web service has been intermittent but said the station was managing to get through using telephone lines to feed its audio. The Web site also provides news in English and Serbian. B92 also has been distributing audio files of its news bulletins in Serbian at <http://www.webactive.com/webactive/events/b92/b92live.ram> or [http://www.xs4all.nl/~opennet/audio/live\\_feed.ram](http://www.xs4all.nl/~opennet/audio/live_feed.ram). These have been intermittently available the past week, but service is spotty and disconnects frequent.

Passport to World Band Radio and Passport to Web Radio are available from the ARRL. Passport to World Band Radio is \$20 (order item 7202); Passport to Web Radio is \$19.95 (order item 7059). Visit <http://www.arrl.org/catalog/> for more information.

## FCC SAYS RECIPROCAL PERMITS NOW "PAPERLESS"

The FCC is advising applicants for reciprocal operating permits that an application is no longer required. Under new ULS rules that took effect February 12, the FCC Form 610A has passed into history. The new rules also will pave the way for US hams to more easily operate in most of Europe. The FCC is expected to issue a Public Notice in the near future that will spell out the details.

Alien visitors to the US holding an amateur license issued by their home country may operate in the US without submitting any FCC paperwork—provided that a reciprocal operating agreement is in effect between the two countries. The only documentation required is proof of citizenship and an Amateur Radio license issued by the country of citizenship. These arrangements are similar to longstanding arrangements between the US and Canada.

The new rules move the US a step closer to participation in the licensing arrangements of CEPT, the European Conference of Postal and Telecommunications Administrations. The US State Department applied for US participation in 1997, and the request was approved in early 1998. Completion of the final steps to make this a reality is understood to be imminent. These include formal US notification to the European Radiocommunications Office that it is prepared to carry out its responsibilities under CEPT Recommendation T/R 61-01, and the issuance of a Public Notice in English, French and German.

Under the CEPT arrangements, a US Technician licensee will be recognized as holding the equivalent of a CEPT Class 2 (VHF-only) license. Holders of Tech Plus through Extra tickets will have the full HF and VHF privileges of a CEPT Class 1 license. Novice licensees will not be eligible.

Additionally, the ARRL has informed the US State Department that it plans to go forward in April with arrangements to issue International Amateur Radio Permits to US hams in accordance with the CITEL Amateur Convention, signed by several countries in the Americas. The League has offered its services to issue IARPs to US hams. An IARP is not a license, but it certifies the existence of a license.

The new rules will not change the procedures for US hams wishing to operate overseas in countries that are not CEPT members or CITEL Amateur Convention signatories.

#### HAARP LISTENING TESTS GO OFF WITH A HITCH

HAARP was heard round the world the last weekend in March, but a few glitches injected a little intrigue to the research facility's 1999 listening test. The test on 6.99 and 3.39 MHz from the High Frequency Active Auroral Research Facility in Gakona, Alaska, was conducted March 26 and 27. Those who tuned in the first day to copy the test signals and CW message encountered what sounded like either severe multipathing or deliberate interference. Some listeners were convinced that another station was sending CW right on top of the HAARP signal.

It proved to be a false alarm, however. The first-day "interference" turned out to be largely related to apparent technical problems with a little multipathing thrown in, according to HAARP Technical Manager Ed Kennedy, K3NS. HAARP is still looking into the matter, but Kennedy said it now appears that while some transmitters were being keyed properly, others were not being keyed at all. "The net effect was not only a change in transmitted power between on and off, but also a pattern change," Kennedy explained.

Kennedy said the keying problem combined with auroral multipath to produce CW that was intelligible to some listeners and with quite a bit of multipath to others. The problem seemed to be most severe for stations in the Northeast. Some stations in the western US were able to copy the complete CW message. On the March 27 test, the same situation existed during the 6.99 MHz call-up only, Kennedy said, but it was corrected immediately. The announced plan also had called for some antenna-pattern "tapering" during the carrier signal-measurement periods on 6.99 MHz. It appears that might not have happened on the first day either. This also was fixed on Day 2, Kennedy says.

HAARP's plan had called for directing the array's main lobe vertically, which meant that anyone outside of Alaska heard the HAARP transmissions by virtue of one of the antenna pattern's sidelobes. Just which pattern or patterns were employed is not yet clear, and not all listeners noticed the tapering effects, although some reported dramatic differences in signal strength. Total power output

was in the vicinity of 400 kW, about half-power for the present HAARP facility.

Kennedy says HAARP is still analyzing the results and reports that he plans to post some "quite detailed measurements" on the HAARP 1999 Listening Test Results Web site.

HAARP's huge signals literally were heard on the other side of the world. "Your signal on 3390 was very weak, and I had to use a narrow filter to be able to read your carrier and signals," reported Tony Magon, VK2IC, in Sydney, Australia. State-side reports--many from hams--flowed in from Arizona, Michigan, Connecticut, Florida, Missouri, Maryland, and elsewhere.

Reception reports for the 1999 test are welcome. HAARP will provide an attractive QSL card only in response to listener reports mailed to High Frequency Active Auroral Research Facility, PO Box 271, Gakona, AK 99586.

HAARP is managed by the US Air Force and the US Navy. For more information, see "The High Frequency Active Auroral Research Program" (QST, Sep 1996, p 33) or visit the HAARP Web site, <http://w3.nrl.navy.mil/haarp.html>

#### SECOND ANNUAL CQ VHF NATIONAL FOXHUNTING WEEKEND

CQ VHF magazine has announced the second annual National Foxhunting Weekend, April 17-18. The magazine is encouraging radio clubs and other groups to conduct "foxhunts" during that weekend--or another convenient weekend in April--and to report their results.

"There are no mandatory time periods, no universal rules and no log sheets," writes event coordinator and foxhunting veteran Joe Moell, K0OV in the April issue of CQ VHF. "It's just a weekend to set aside for your club, school or Scout group to try this exciting aspect of ham radio." Moell points out that foxhunters don't even have to have a ham ticket "since they will be receiving, not transmitting."

Foxhunting may be done by car or on foot, and the magazine is encouraging ham groups to use either one or both during the National Foxhunting Weekend. "Foxhunting is certainly fun and a competitive challenge," says CQ VHF Editor Rich Moseson, W2VU, "but it also teaches important direction-finding skills that may be called upon in

searching for a downed airplane or lost hiker using an Emergency Locator Transmitter, or for tracking down sources of interference."

Moell, who is also the ARRL ARDF Coordinator, notes that the first International Amateur Radio Union Region 2 ARDF Championships will be held this August in Portland, Oregon, as part of the sixth biennial Friendship Radiosports Games.

Groups participating in the CQ VHF National Fox-hunting Weekend are encouraged to send reports of their activity directly to Joe Moell, K0OV, at PO Box 2508, Fullerton, CA 92837, or via e-mail to foxhunt@cq-vhf.com. For more information on foxhunting techniques and equipment, visit Moell's Web site, <http://members.aol.com/homingin/>--CQ VHF

### SUBMARINES ON THE AIR

The Submarine Veterans Amateur Radio Association will activate submarine radio rooms in late April to commemorate the anniversary of the submarine service. Upwards of 20 museum submarines in the US and overseas will be on the air the weekend of April 24-25 with volunteer operators. "Some of the museum boats have the radio rooms restored and operable with the original equipment," said Carl Raish, KG0HS, of the SVARA.

Stations will operate on or around 3943, 7243, 14,243, 21,313, and 28,343 kHz. A certificate of participation is available for those obtaining at least four QSLs from submarines worked. The Submarine Veterans meet on the air daily except Sundays. Raish says the most popular on-air gathering is Saturdays, 1700 UTC on 14,243 kHz. This net was started about 25 years ago by World War II submarine veterans as a means of keeping in touch, and it has remained active ever since.

For a certificate, send copies of at least four cards from submarines worked to Jim Flanders, W0OOG, 1539 California Tr, Plano, TX 75023-4300; jaf@sprintmail.com. For more information, contact Flanders or Carl Raish, 1873 S Tennyson St, Denver, CO 80219; kg0hs@juno.com, or visit <http://www.flash.net/~jflanders/index.html>. (A list of participating museum submarines is available in The ARRLWeb Extra news section on the ARRLWeb Members Only site.)

VIRGINIA ISSUES SPECIAL AMATEUR RADIO ID CARDS:

Qualified Virginia Amateur Radio operators now can obtain Department of Emergency Services photo identification cards and license plates bearing the RACES logo through the Virginia Division of Motor Vehicles. Registered members of Virginia ARES or RACES who meet stringent requirements may be issued the new photo ID and RACES-logo plates (ARES members, by formal agreement, are also RACES when activated by a governmental entity). Virginia State RACES Officer Frank Mackey, K4EC, says "law enforcement, emergency management officials and security professionals have become more concerned about who is allowed to enter secure areas during times of emergencies." The standardized, high-security ID will be easily recognized by authorities in charge of disaster and emergency situations. The plates and ID cost \$15 for a two-year term (renewable). Applications and further information are available at <http://aresva.org/news/news.html> (click on the Virginia RACES ID Cards Information link).--Martin Gary, W2MG; Frank Mackey, K4EC

BY1DX is on the air: The Beijing-Chaoyang-Nokia Amateur Radio Club, BY1DX, is on the air. With support from Finnish cellular-telephone maker Nokia, the club, located in Beijing's business district in a tall building that overlooks the city, is the first-ever foreign corporate-sponsored Amateur Radio club in China. The station master is Chen Jia Zhuang, BG1CJZ. Martti Laine, OH2BH handles QSLs to his home address: OH2BH, Nuottaniementie 3D20, 02230 Espoo, Finland.--Tim Totten, N4GN

### \$The April Treasurer's Report \$

Income for March was \$35 in dues. Expenses were \$13.20 for newsletter postage. Nothing was expended from the Community Fund. Current balances:

General Fund	\$450.56
Community Fund	\$440.92



Also, the newsletter address label always contains your next membership renewal date. If you're ever in doubt, check there or double-check with me at any club meeting.

73, -Ralph KD1SM

## NVARC Flea Market

The Following items are listed by Dave N1MNX

Cordless Phones used	2	BO
New Nortel Desk Phone		BO
w/lots of features	1	BO
Standard 2M HT Exp Coverage	1	BO
10/11 meter AM HT	1	BO
Ranger VHF Marine New w/war	3	
Kenwood UHF Commercial two way will do	440	
W/programming I'll supply		
Amber Strobe	2 ranges	

Swaps will be considered  
dpeabody@net1plus.com



### **Nashoba Valley Amateur Radio Club**

PO Box # 900  
Pepperell Mass 01463-0900

Pres.: Erik Piip KA1RV  
V Pres.: Den Connors KD2S  
Secretary: Ian Norrish NZ1B  
Treasurer: Ralph Swick KD1SM  
Editor: Stan Pozerski KD1LE  
PIO: Jon Kinney N1JGA

Meetings are held on the 3rd Thursday of the  
month - 7:30 p.m. - Pepperell Community Ctr.

Talk-in 146.490 simplex  
442.90 + 100Hz Repeater

This newsletter is published monthly. Submis-  
sions, corrections and inquiries should be directed  
to the newsletter editor. Articles and graphics in  
most IBM-PC formats are OK. You can leave  
items on PEPMBX, at Packet address:

[KD1LE@N1FT.NH](mailto:KD1LE@N1FT.NH) or  
[pozerski@net1plus.com](mailto:pozerski@net1plus.com)