W5YI

National Volunteer Examiner Coordinator

REPORT

Up to the minute news from the world of amateur radio, personal computing and emerging electronics. While no guarantee is made, information is from sources we believe to be reliable. May be reproduced providing credit is given to The W5YI Report.

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EXPLOSIVE USE OF SPECTRUM TODAY!

The following speech by Private Radio Bureau Chief Ralph Haller was given at the Spectrum Summit for Emerging Technologies in Washington on Nov. 7. The conference was attended by entrepreneurs drawn to the high-stakes opportunities in new radio services. It addressed spectrum efficiency and the prospects for introducing improved RF technologies into an environment of spectrum congestion and entrenchment of old ideas about how the spectrum should be regulated.

Although Amateur Radio was not the subject of the event, Haller's remarks are relevant because he called for development of new techniques to get more out of the spectrum. He did not suggest that such development come out of the Amateur Service; rather, he pointed to "refarming" of existing commercial spectrum and reliance on the marketplace to produce better technology.

Other methods cited by Haller and other presenters include economic incentives for spectrum entrepreneurs. For example, licensees might obtain exclusive rights to their spectrum, which they could sub-lease to others for a price. They might pay fees to the government that would be less if highly-efficient technology is employed; greater if conventional technology is used. Probably the most-often discussed economic approach is outright auctioning of FCC licenses to the highest bidder. The licenses would probably be for spectrum now occupied or shared by government stations, though some of it might come from the 1.8-2.2 GHz microwave band.

[Auctions may become a reality now that key Congressmen are said to be leaning more in the direction of competitive bidding as the government's fiscal condition becomes more worrisome. Some officials, such as Secretary of Commerce Robert Mosbacher, recommend that the money received -- which could run into the billions -- be contributed to the general Treasury. Other proponents such as Congressman Don Ritter (R-PA), himself an engineer, recommend that the spectrum windfall be used to fund new telecommunications projects that use fiber-optics and high-speed computer networking. Still others believe the FCC should benefit from the money, as it has been chronically underfunded for years. Most proposals to auction the spectrum would exempt Amateur Radio, but whether spectrum shared by amateur and other services could be auctioned is still unclear.]

We present excerpts from the Private Radio Bureau Chief's remarks -- transcribed from an actual recording made directly on-site -- so that amateurs will have a better idea of the challenges faced by the rest of the spectrum-using world.

"The demand for spectrum is unparalleled. Since 1968, there's been over a 400% increase in

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the number of licensed land mobile transmitters in this country. That is a 10% annual growth rate. in the last six years alone, the total number of transmitters below 470 MHz has increased from 7.5 million to 11.5 million. And if that wasn't enough, the traditional users of land mobile radio are anticipating even more advanced kinds of services. More remote control. More digital. More automation. All of these things place a heavy demand on the spectrum.

"I was recently amused by a comment received in one of our proceedings from a logging company in Oregon. It was very straightforward and if it could be implemented, it would solve our spectrum problem. Let me read that comment to you: 'All that is required is to provide more frequencies so the use of privately owned, operated and licensed systems can continue to grow.'

"Well, I don't know how to provide those additional channels without some very difficult and perhaps expensive changes in the way that we do our processes at the Commission and the types of systems we license. It's a tough balancing act, and one that's not going to get easier for the government generally or for the FCC in particular. The tight budget under which our agency is forced to operate this fiscal year, and next fiscal year, will require us to do more with less, notwithstanding the explosive use of spectrum today.

"The FCC today has about 1,800 employees. Ten years ago it had 2,400. Ten years ago we didn't have hardly half of the proposed uses of the spectrum that we have today. Our mainframe computer, where we do our processing of a million licenses a year, is 20 years old. The Smithsonian Institution has asked for it. (Laughter.) And there it well should be, in fact. Yet, even with these limitations I think that we at the Commission can provide effective management of the spectrum.

"As a federal regulator. . .I think of myself as sort of an acrobat on the high wire. On the one hand, I'm charged with trying to ensure as far as possible that new technologies can come on line and have a place, a home in the spectrum. Then on the other hand, with the number of transmitters I've just told you about, there is a tremendous existing investment out there. So we have to be careful that changes that we implement don't overnight, wipe out that existing investment.

"It also means letting people try so far as possible, to bring new applications into the marketplace. Section 7 of the Communications Act requires the Commission to encourage the provision of new technologies and services to the public. One of the problems is that we have no way of knowing what those technologies are going to be. So very often our rules are way behind the industry. A new idea is presented to us, and we have to go through a lengthy rulemaking process to get that technology on the air. By the time we've gone through the process, the poor entrepreneur is bankrupt and the technology goes away, and we never see it.

"We have to be smarter as regulators to craft rules that allow for the flexibility of new technologies coming on board without having to go through the long regulatory process that most surely will kill those ideas.

"We're going to have to let bad ideas go on the air. The market will sort them out. People in the early days of television had considerable doubt whether it would ever succeed, and there were very few takers for TV licenses even though they were handed out by the Commission free. Similarly, cellular telephone entrepreneurs would lay awake at night and worry if this service would ever take off. And yet there are five million users in this country for a service that essentially didn't exist ten years ago.

"Some ideas are going to fail, some will succeed. The government has to go along with both. And while we can try to make choices early on, many times the choices that we make are not nearly as good as the choices made by the marketplace. . .

". . .The Commission recently adopted rules to release the 220-222 MHz band for narrowband technology. This provides for the first time, a home for very spectrum-efficient narrowband voice and digital technology, using about one-fifth to one-sixth the spectrum of existing two-way services. At a time when spectrum availability is very scarce in the large metropolitan areas, we have great hopes that this new service at 220 MHz is going to provide an expansion area for systems.

"Very recently also, we adopted a plan to give a preference to people who manage to uncover private radio channels that are subject to takebacks for failure to construct. If you don't construct a system in a certain amount of time in the private radio services, your license cancels automatically. Now, we have a very good enforcement program to try to find that, but occasionally there will be systems that slip through the cracks, or systems that were built at the one-year mark, the company eventually goes out of business say in two years, and we would have no way to know that channel is available until renewal at five years. This program provides an incentive for others in the area to keep track of channel use. When they find a channel that's available, they bring it to us, and if we recover that channel they are first in line to receive the channel.

"I think this is a perfect example of industry and government working together for effective spectrum management. In a time of declining budget and

WOULD YOU LIKE TO BECOME A VOLUNTEER EXAMINER under the W5YI Report Program? If so, please send a copy of your Extra Class license, the following signed statement and a SASE.

"I am a currently licensed ☐ Advanced, ☐ Extra Class amateur radio operator and wish to be a volunteer examiner. I have never had my station or operator license revoked or suspended. I do not own a sig-

increasing demands on the Commission, this is just one idea that we've had, that I think will be successfully implemented to improve spectrum efficiency. The problem is, we need about 50 more ideas that are at least as creative in spectrum management.

"We're looking at the area particularly below 470 MHz. These are the oldest private radio channels and they are heavily shared channels. Channels that in the major markets, have hundreds of users licensed. It makes the channels very difficult to use. It's like the old party line telephone. You've got to wait until somebody else gets off before you can use those channels.

"So we're trying to look at refarming of that spectrum. We have next week a panel to explore technical options, policy options, and then options in conjunction with the government and international plans to make our spectrum more efficient in the future. We think that use of packet radio, use of narrowband technology, use of spread spectrum, perhaps even overlaying spread spectrum systems on the existing land mobile channels, will provide increased capacity. . . .

"Refarming is a very major effort. It's the most significant issue taken up by the Private Radio Bureau in the last 30 years. Because it was about 30 years ago that we had our last channel split, that effectively doubled the spectrum. Doubling the spectrum today is not sufficient. We have to go beyond that. We have to look at five times, ten times -- and I'll tell you where we're headed -- we're looking at a 50 times increase in spectrum productivity within the next ten years. But that's only possible with a tremendous amount of research and work on the part of the industry. . . .

"I envision a future of yet unrealized possibilities. Driverless cars. Pilotless airliners. Portable videophones. Or any of a number of other services that will improve the quality of our lives and the productivity of our industry.

"But it all comes back down to one word: Spectrum. We have to be very, very smart in the next three years in order to provide capacity for the next 20 years. Thank you."

MOTOROLA ASKS FOR 300 MHZ OF SPECTRUM

Motorola is urging Congress, the Bush Administration and the FCC to make available more spectrum if the U.S. is to better compete with Japan and Europe. Motorola wants this spectrum reallocated to mobile communications -- both terrestrial and satellite -- to accommodate the expected explosion in the use of wireless communications.

Motorola Vice Chairman John Mitchell told government officials recently that the number of spectrum users could triple if 300 MHz of additional allocations are made. "By the year 2000 ...we expect the numbers of land mobile users to increase from 34 million to over 150 million." He noted that Japan has made available 600 MHz of spectrum for mobile uses.

Motorola expects by the beginning of the next decade to see a shift from wired to wireless systems, from mobile to portable, from voice to combined voice and data, fax, images and even video ...and from business to consumer and business. The firm asked for an allocation of 317 MHz of spectrum by the year 2000. Two new public services alone will require 110 MHz of spectrum ...a PCS system based on cellular technology and a "...consumer digital wireless service"

Motorola officials said spectrum is needed for car locator systems, for the Motorola Iridium project -- a massive global LEO (low-earth-orbiting) satellite telephone system using 77 satellites -- as well as Personal Communications Networks of terrestrial pocket telephones. [Low-power LEO satellites are less expensive to build than larger more powerful and higher-flying geostationary satellites. WARC-92 will determine the home for small LEO networks. Under consideration is spectrum just above and below the Amateur two meter band ...and frequencies at 400 MHz.]

New route guidance and nagivation systems, such as intelligent vehicular highway systems, due to be deployed in 1994, will require an additional 10 MHz of spectrum, Motorola said.

"The U.S. has just begun talking about new spectrum while other countries in Europe and the Far East all have assigned new spectrum and are installing systems. Unless the U.S. accelerates allocations for new mobile serices, we are in danger of becoming a second-rate power in communications within one year."

- The Canadian government has set aside four megahertz of spectrum between 944 and 948 MHz for a low-power **digital cordless two-way telephone service** and reserved another four megahertz between 948 and 952 for future expansion. Canada's Department of Communications is now concentrating on developing a standard and screening applicants for licenses.

- A group has petitioned the FCC to establish a new **Multichannel Local Distribution Service** at 28-GHz. MLDS employs a "CellularVision System" to deliver up to 49 interactive video, data and voice channels ...expandable to 150 channels using digital compression. Cell sites averaging ten miles in diameter are to be used to deliver high-quality television signals to subscriber's small dish antennas. The developer is asking for two 1-GHz allocations at 27.5-28.5 GHz and 28.5-29.5 GHz to permit two operators of the proposed MLDS service per market.

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AMATEUR SERVICE EXAMINATION ACTIVITY

The VEC System administers all Technician through Extra Class license testing in the Amateur Service. ***VEC System activity has been increasing in dramatic fashion!*** We are listing below the number of examination sessions, persons taking tests, test elements administered and the pass rate for the last eight years.

These figures are for the calendar year and represent all examinations administered under the VEC System since its inauguration in 1984. The 1984 figures are not really significant since the program did not really get underway until 1985. The FCC administered quarterly examinations during 1984, ...the last year that the FCC field offices administered Amateur Radio examinations of any kind.

The FCC keeps all VEC figures on a calendar year basis. The 1991 figures are through September - three quarters. If the current rate is extended through the balance of the year, the VEC System will administer approximately 160,000 examination elements to more than 100,000 applicants at 7,500 test sessions this year! This is about double the examination activity of just four years ago ...and about a 60% increase over last year! The reason, of course, is intense public interest in the No-Code Technician license class.

EXAMINATIONS ADMINISTERED UNDER VEC SYSTEM

VEC	1984	1985	1986	1987	1988	1989	1990	1991*
(Technician to Extra Class Examinations - Calendar Year)								
Sess.	413	3223	3784	4378	4903	5486	6250	5724
Pers.	8599	41439	42422	49728	53546	57417	64737	74494
Elem.	12633	62589	61921	81042	89788	96092	105763	123767
Pass	47.5%	58.2%	59.7%	60.6%	61.0%	61.5%	60.8%	66.0%

[* = The 1991 figures are through September. All other years are for the entire calendar year.]

EXAMINATIONS UNDER NOVICE PROGRAM

Novice	1984	1985	1986	1987	1988	1989	1990	1991
(Novice Examinations - Fiscal Year)								
Pers.	17392	15913	19147	22319	18550	20047	22979	19922

[All figures are for the full Oct.-Sept. fiscal year.]

The Novice program has shown little real growth over the years and it is estimated that only 16,000 newcomers to the hobby will enter at the Novice level during **calendar** year 1991. [The above Novice figures are for the full (government) **fiscal** year - October 1 thorugh September 30, 1991 - which explains the 19,922 new Novices for 1991.] At the rate we are going, it appears that 23,000 beginners will enter ham radio at the Technician level during calendar 1991.

[Source: FCC, Gettysburg, Pennsylvania]

AMATEUR RADIO CALL SIGNS

...issued as of the first of November 1991:

Radio District	*Gp."A" Extra*	*Gp."B" Advan.*	*Gp."C" Tech/Gen*	*Gp."D" Novice*
Ø (*)	AAØGH	KFØVG	NØPWO	KBØJQE
1	WY1G	KD1FB	N1KLP	KA1JQE
2 (*)	AA2HB	KF2EW	N2OMC	KB2NSX
3	WS3V	KD3ZO	N3KVK	KA3ZLZ
4 (*)	AC4LF	KO4MF	(***)	KD4GPP
5 (*)	AB5CM	KI5VD	N5XFT	KB5QNQ
6 (*)	AB6GU	KM6LK	(***)	KD6CPS
7 (*)	AA7LE	KG7VS	N7URX	KB7OFL
8 (*)	AA8FH	KF8QI	N8QWM	KB8NDI
9 (*)	AA9CC	KF9GO	N9NCH	KB9HHH
N.Mariana Is.	AHØK	AHØAI	KHØAN	WHØAAQ
Guam	KH2V	AH2CN	KH2FM	WH2AMU
Johnston Is.	AH3D	AH3AD	KH3AG	WH3AAG
Midway Is.		AH4AA	KH4AG	WH4AAH
Hawaii	(**)	AH6LM	WH6DD	WH6COS
Kure Is.			KH7AA	
Amer. Samoa	AH8D	AH8AE	KH8AI	WH8ABA
Wake W.Peale	AH9A	AH9AD	KH9AE	WH9AAH
Alaska	(**)	AL7NA	NL7ZY	WL7CDD
Virgin Is.	NP2T	KP2BZ	NP2ER	WP2AHL
Puerto Rico	(**)	KP4SX	(***)	WP4KQX

CALL SIGN WATCH: *=All 2-by-1 "W" prefixed call signs have been assigned *in every radio district except the 1st and 3rd call sign area.* Two-by-two format from from the AA-AK block are being assigned to Extra Class amateurs when two-by-one's run out.

**=All Group A (2-by-1) format call signs have been assigned in Hawaii, Alaska and Puerto Rico. Group "B" (2-by-2) format call signs are assigned to Extra Class when Group "A" are depleted.

***=Group "C" (1-by-3) call signs have now run out in the 4th, 6th *and Puerto Rico* call districts. Alaska has only one Group "C" NL7 prefix (2-by-2) call sign left and will shortly begin the WL7-by-2 letter suffix block.

According to the rules (adopted by the Commission Feb. 8, 1978, Docket No. 21135), Technician/General class amateurs are next assigned Group "D" (2-by-3 format) call signs when all Group "C" have been assigned. Upgrading Novices holding a 2-by-3 format call sign in the 4th, 6th and Puerto Rico call areas will no longer be able to request a Group "C" call and will be automatically assigned another more recent 2-by-3 format call sign if they do! The FCC has said they will not be going back and reassigning unused "K" and "W" 1-by-3 format call signs. The FCC does not grant any request for a specific call sign for any reason.

[Source: FCC, Gettysburg, Pennsylvania]

• The FCC has released a Public Notice advising the public that the **maximum reimbursement fee for an Amateur operator license examination will be $5.44** effective January 1, 1992. The W5YI-VEC will be charging $5.40 effective that date. The ARRL-VEC also has a history of adjusting their test fees to the next lowest 5¢ increment below the maximum and we assume they will also adjust their test fee to that amount. The $5.44 maximum fee is based upon a 3.4% increase in the Dept. of Labor *Consumer Price Index* between Sept. 1990 and Sept. 1991.

Volunteer examiners (VEs) and volunteer-examiner coordinators (VECs) may charge examinees for out-of-pocket expenses incurred in preparing, processing, administering or coordinating examinations for Technician, General, Advanced and Amateur Extra Class operator licenses. No fee is allowed to be charged for the Novice Class operator license examinations.

• We mentioned in our Oct 15th *Report* that the **W5YI-VEC had invalidated three testing sessions and separated several of its Extra Class volunteer examiners from its testing program.** This action was taken in response to complaints from the Amateur community claiming examination irregularities associated with the *California Amateur Radio School* in the Los Angeles area. The matter was turned over to the FCC for further investigation and any necessary enforcement action.

The FCC has now written letters to each of the ten VE's involved asking that they respond within 20 days to nine specific questions regarding the preparation and administration of the Amateur license tests in question.

In addition, the FCC has advised each of the applicants who requested reversal of the test invalidation, "We are currently investigating the complaints that resulted in the invalidation of your examination as well as other examinations. While this investigation continues, we cannot comment on the alleged irregularities. The volunteer-examiner coordinators have broad authority to take the steps necessary to protect the integrity of the examination sessions they coordinate. We would not disturb any VEC's decision to invalidate an examination unless there was convincing evidence of error."

The W5YI-VEC has made arrangements for each of the applicants to be re-examined without charge.

• *CQ Communications* has just published their new fully-illustrated ***1992 Communications Guide*** which includes product information, specs and performance capabilities from all major equipment and accessory manufacturers. Included are SWL receivers, scanners, CB radio and amateur radio equipment. We also wrote an extensive article on the process of getting a No-code Technician Class Amateur Radio license. The guide also contains a complete listing of rigs that are used by Technician Class amateurs. $4.95 from the CQ Bookstore at [toll-free] 800/457-7373

• **WARC-92** is only a short few months away and decisions made in Spain could have a big impact on ham radio. Actually the Amateur Service is not specifically mentioned in the WARC-92 agenda.

The items of interest are: ***"...possible extension of the frequency spectrum allocated exclusively to HF broadcasting (HFBC.)"*** This has to do with the Amateur Service in ITU Region 2 (North and South America) having full access to 7-7.3 MHz ...while the rest of the world limits Amateurs to 7.1-7.3 MHz. ***There is a distinct chance that we could lose 7.0 to 7.1 MHz from our HF allocations.*** Most nations are supporting a <u>worldwide</u> 40m ham band shift down 100 kHz to 6.9 - 7.2 MHz. This move, if adopted, would have 40 meters retain its full 300 kHz bandwidth in Region 2 ...and give ITU Regions 1 and 3 an additional 100 kHz of spectrum. The IARU is proposing a 2007 implementation date.

The IARU *(International Amateur Radio Union)* is an association of 127 member-societies and is recognized by the ITU *(International Telecommunication Union)* as representing the Amateur and Amateur-Satellite Services.

Other agenda items are the: ***"Consideration of the allocation of frequency bands to the broadcasting-satellite service and associated feeder links (sound) in the range 500-3000 MHz."*** and...

"Consideration of an allocation of frequency bands to the mobile and mobile-satellite services and associated feeder links in the approximate range of 1-3 GHz."

There are four ham bands between 500 MHz and 3 GHZ (902-928, 1240-1300 and 2300-2310/-2390-2450 MHz.) The IARU position is that Amateur spectrum must not be reduced or further shared since this spectrum is needed to meet Amateur Service and Amateur-Satellite Service requirements.

"to develop new recommendations and resolutions to the agenda of the conference, including the meteorological aids service in the frequency bands below 1000 MHz and present allocations to space services above 20 GHz which were not placed on the conference agenda."

The IARU feels that spectrum used - or could be used - by the Amateur Satellite Service should not be considered, including 435-438 MHz. **This last agenda item could also be used as a vehicle to bring up unplanned topics!**

• Rockwell Communications in Dallas has come up with a low-cost ($450) shirt-pocket size ***GPS receiving system*** that can pinpoint any location to an accuracy of 300 feet. Its **NavCore 2½"x4" receiver** decodes spread-spectrum signals from the strongest four (of twenty-four) orbiting satellites. GPS is the *Navstar Global Positioning System.* Future applications include automatic vehicle guidance systems and determining the whereabouts of lost hikers.

• NHK, Japan's public broadcasting system, is in the process of expanding its ***Hi-Vision HDTV (high definition television) satellite broadcasting*** to eight hours a day even though there are few sets that can receive its programming. Few people can afford $30,000 for a TV set!

Hi-Vision HDTV provides widescreen resolution five times better than our current video standard ...and with digital four channel surround sound. Japan's electronic manufacturing giants believe its HDTV sets will drop to under $8,000 within three years.

Europeans have a different non-compatible satellite-broadcast scheme. The United States won't be selecting their standard until 1993. Japan believes their MUSE format will become dominant regardless of other standards since they plan to have programming and equipment available for the mass market already in place. They are clearly already working in that direction.

• To put it mildly, ***things are looking up for your local telephone company!*** First, the 3rd U.S. Court of Appeals for the District of Columbia has lifted the legal constraints that prevented the seven Baby Bells from providing new information services. Telcos have been able to transport new services since 1988, but not originate them. Now that's all changed! The Baby Bells are the seven regional telephone operating companies that were formed as a result of the breakup of the Bell System in the early 1980's.

New information services are already starting to sprout! Nyex has a new **PhoneWatch** home security system that calls a 24-hour monitoring service if the circuit is broken. Bell Atlantic is looking into remote control of home appliances.

You can even expect to see such other new telephone services as customized wake-up services offering the days headlines, remote medical monitoring and testing, travel services, dial-up access to Bell-originated data bases, talking Yellow pages, electronic mail, over-the-phone education services ...you name it! Restaurants are already considering promoting daily specials over the phone. Telcos are certain to start acquiring information service companies and forming joint ventures.

The Supreme Court unanimously denied an Oct. 17th petition seeking to reinstate the stay. All of this has the *American Newspaper Publishers Association* extremely concerned! They fear a severe loss of advertising revenue. Newspapers are now racing to enter new data and voice information services before the phone companies can corner the market.

A bill has also been introduced into Congress seeking to limit telco information services in their local service area until they face more competition.

• As if this wasn't enough, the FCC has proposed a ***plan that would let your local phone company transport (but not originate) video, voice and data services*** over their networks on a regulated basis without getting city approval. This is known as the so-called ***"video dial tone."*** Cable companies are naturally strongly opposed ...as are municipal groups. Cities want to franchise or have some way of regulating all video providers. The FCC also ruled that AT&T and other long distance companies could buy cable TV systems.

A 316-page U.S. Commerce Dept. report recommends that telephone companies be allowed to both own and provide programming to cable systems ...and cable systems to likewise provide telephone service.

The end result, of course, will be more competition for the cable and telephone industry. Competition is generally good news for consumers. But don't look for any immediate changes. Video over the telephone lines calls for deploying fiber optic cable into every home ...something that is decades away. The ruling might start getting the broadband network construction underway, however.

• The FCC has approved a ***plan that would give existing AM radio broadcasters preference*** when awarding rights to the ten new channels between 1605 and 1705 kHz. They said this would lead to reducing existing interference in the existing AM band between 535 and 1605 kHz.

• Look for the ***FCC to move from their existing Washington, DC headquarters*** in about one year. They presently lease about 300,000 square feet on "M" Street at a cost of nearly $9 million. The *General Services Administration* is considering four different nearby Washington buildings to house the FCC.

• Be prepared to hear a new word associated with personal computers. It is ***"multimedia"*** ...the merging of sound, fax, telephone and video. IBM has introduced a new brand name **("Ultimedia")** for its new multimedia products.

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NEW FIRMS ENTER HAM RADIO MARKETPLACE

A new company, **Tejas RF Technology,** is entering the amateur equipment market with kits and products for QRP (low-power) operators and experimenters. ('Tejas' is the original Indian spelling of 'Texas'.) The company has not yet announced prices, but the initial product list -- with shipments expected early next year -- includes these items:

- ***A "progressive" kit*** that begins as a simple direct-conversion ham band receiver, with 100 kHz coverage and provisions to add optional audio filter, converter for dual-band CW or SSB operation, and 2 W CW transmitter to make a transceiver. The receiver uses a double tuned bandpass filter into a NE602 mixer. All coils will be pre-wound.
- ***Single-band CW 5 W transmitter,*** builder's choice of any ham band from 3.5-21 MHz: It will have VFO control over a 100-300 kHz range (builder's choice). Features include built-in antenna changeover relay, sidetone, and mute functions for a separate receiver. A built-in iambic keyer option will be available.
- Single-band CW transceiver: The unit will provide at least 2 W transmit output. Stable VFO operation, VFO range of at least 100 kHz. Bands initially available of 80-15m (builder's choice). Keyer option also available in this model.
- Other products planned include three-band CW transmitter, three-band CW transceiver with superhet receiver and crystal filter, matching antenna tuners, QRP wattmeters, portable, multi-band antennas, solar power supply systems for portable or fixed operation, test equipment and projects for the advanced builder.

To get on the mailing list write to **Tejas RF Technology,** 17 South Briar Hollow #101, Houston, TX 77027.

Another new company is **Oak Bay Technologies.** This Redmond, Washington, firm is a division of a well-established electronics firm, [although the press release did not say which one.] They are represented by Evelyn Garrison & Associates os Issaquah, WA (Tel. 206/557-9611) Their new products include:

- ***Rubber Duck Window Mount*** frees RF from the shielding confines within a car. Handles 15 watts of power, 50 Ohms ...comes with 6-ft. of coax. ($24.95)
- ***Commercial Grade Low Pass Filter*** has a 41 MHz upper cutoff; perfect for 160-10m operation. ($69.95)
- ***Heavy Duty 12-volt Power Strip*** features five separate outlets, each individually fused with the ability to handle 50 amps total. Two 30 amp and three 20 amp fuses included. ($79.95)

HIGH-TECH NOMAD, STEVE ROBERTS, N4RVE

I first met Roberts a few years ago at the *Dayton HamVention* where he was selling autographed copies of his book which detailed his bicycle jaunts across the country. He had a booth right across from mine and I got a chance to periodically chat with him ...and his lovely travelling companion, Maggie. (He is definitely not a loner!) His book was written out on the road as he pedalled across the country. He certainly has a very interesting lifestyle and I more or less have kept in touch with him since. Roberts hails from Mountain View, California, in the heart of Silicon Valley.

His bicycle, which he christened the Winnebiko, is the type you manually pedal. But that is where its conventional features stop. Installed on the bike was an unbelievable array of electronics, computer and communications gadgetry ...including ham radio. I have never seen anything like it. It was hard to imagine unless you saw it ...a curious blend of old world travel and futuristic electronics! Steve told me it was valued at over $100,000 ...and it looked it!

Now Steve has built another bicycle, his third, which he calls the BEHEMOTH. This one, valued at over a million dollars; that's right, a million dollars! It even has on board fax, cellular telephone, satellite data links and can be navigated using GPS ...Global Positioning Satellites! It took four years to build, aided by some 35 volunteers and 150 corporate sponsors. He recently took the bike out on a test run throughout the midwest.

Roberts' latest acquisition is a "mother ship" which will allow him to take his company -- Nomadic Research Labs -- to selected trade shows, speaking engagements, public events and company visitations. What started out as a fun-type fantasy has now brought fame ...and blossomed into a full time business.

And Roberts' and BEHEMOTH are indeed fast becoming well known! The bike has been featured in over 170 magazines in the US and abroad, 180 newspaper stories and over a hundred television productions (22 of which were national or international.) Roberts' own books and quarterly on-the-road magazine ("Nomadness") are filled with stories ranging from passionate encounters to cutting-edge technology.

Such well-known publications as USA Today, Christian Science Monitor, Newsweek, Popular Science, Discover, IEE Spectrum, Time magazine ...and television: CBS Morning News, PM Magazine, CNN, ESPN, the Discovery Channel, CBC (Canada) ...NHK (Japan) have all covered his escapades. Steve has shown BEHEMOTH at many trade shows including the huge COMDEX computer show four times.

We recently sent Steve an Email message to see if he would consent to an "on-line" interview. He said he would and we sent him a list of questions. Here is his unedited response...

W5YI: What is your technical/educational and employment background and where did you get the idea to construct a high-tech bicycle? Why not a motorcycle? How many miles have you "pedalled"?

N4RVE: The original motivation (1983) was to build a lifestyle that would directly incorporate all my passions: computers, ham radio, networking, bicycles, travel, adventure, publishing, learning, ...and romance (not necessarily in that order!). To do this, I needed to create tools that would render my physical location irrelevant.

Yes, I could have used a motorcycle (or even a car) but there are other issues involved -- aesthetic, physical, and cultural. Motorcycles intimidate people. Any motorized vehicle levels the hills and reduces travel to a turnkey process, making the road merely an obstacle in the way of a goal. (And they're boring!)

As to background, I'm self-taught, with only a 6-month flirtation with engineering school (essentially irrelevant from current perspective, except perhaps as a warning to keep my own passions uppermost and not let myself get assimilated into a crank-turning approval-seeking system). Passion and curiosity are stronger motivators than fear of tests, anyway, and I've been a hobbyist since I was 8. I spent my 20's doing custom industrial control system design (embedded microprocessors in the 1970's), and in the last 17 years I've had about 11 months of employment (which I didn't particularly enjoy).

I've covered about 16,650 miles in the 8 years since I started this. The first 10,000 took 18 months; the next 6,000 about a year; and I've just finished a 650-mile test ride on the new machine.

W5YI: When did you construct your first bike? What did it cost?

N4RVE: 1983. The system was my design, though a wizard framebuilder in Columbus, OH (Jack Trumbull) did the frame. The first primitive system was about $8,000 and was financed through a massive yard sale (since I was also in the process of trashing my suburban lifestyle in Ohio).

Essentially, that machine was a recumbent bike with 5-watt solar panel, Model 100 laptop, simple security system, and a CB radio for emergencies (which I described once on Evening/PM Magazine as being "culturally useless"). Actually, it did pay off a couple of times -- I ran out of water in a Utah desert and used it to get help from passing truckers.

W5YI: Tell me about your bicycles. What are the values of these vehicles. How are they financed?

N4RVE: That first machine was sleek and efficient in its own clunky way, but didn't allow me to write while riding. That was the motivation for the second (Winnebiko II), which was simply overlaid on the same frame. By then, I was getting a lot of equipment sponsorship and that smoothed the process considerably.

There is now a third system (BEHEMOTH) that has likewise rendered #2 obsolete. Estimated value of this system, including human time, is a rather frightening $1.2 million. This is, of course, a totally bogus number since it includes years of volunteer human effort, engineering, and help from various companies. Actual out-of-pocket cost is a tiny fraction of that.

W5YI: How did you go about getting support from various corporations? Do you have "assistants" to help you - or is this effort basically just "Steve Roberts." I note your address shows Sun Microsystems?

N4RVE: This whole project has become a 3-way symbiosis among the bike, the media, and about 150 sponsors. New toys yield interesting applications on the bike, which yield interesting stories, which further pique industry's interest. I'm just project coordinator, as overloaded as anyone serving a similar role in the business world (though I do get some interesting fringe benefits, like being able to ride it for months at a time... although sometimes, schlepping a 580-pound machine up a mountain doesn't feel like a benefit!). I've also had help from about 35 individuals who have been intrigued enough by various subsystems to contribute spare time.

Sun Microsystems is the leading unix workstation vendor, and has taken an interest in some of the nomadic computing and packaging issues involved in this project. The company has provided a lab and access to resources, including a lot of very creative people here in Silicon Valley.

W5YI: When were you first licensed? Did you become a ham to have communications capability while on the road?

N4RVE: I'm currently a general. I had a novice ticket (WN4KSW) back when I was a kid (12 or so), but it lapsed as I got seduced by the microprocessor revolution (you may recall a time when computers and radios were quite divergent paths...). After being reminded on that first trip of the general horror of 11 meters, I became KA8OVA and began using 2 meters and packet on the second trip. I've since upgraded to general and am N4RVE.

W5YI: Did you have a ham radio rig on your first bike? Describe your Amateur Radio installations.

N4RVE: First bike: no ham radio. Second: Yaesu 290 and Pac-Comm TNC, to which I later added a Ten-Tec Argonaut when I upgraded to general in North Carolina.

My third system (BEHEMOTH) has a very extensive station. HF is an ICOM 725, with CMOS Super Keyer, Autek filter, Magic Notch (amazing), and SWR/PWR meter. This feeds a folding dipole made of two Outbacker Junior antennas atop an extendible fiberglass mast attached to the trailer, and performs amazingly well for a bicycle-mobile 7-band HF rig.

VHF and UHF multimode is covered by the Yaesu 290 and 790, an ICOM IC-28 dual-bander goes in my detachable manpack, and an ICOM micro-2AT has been hacked and built into the console for low-power bike-to-bike and local repeater use.

AEA's ATV unit is also mounted in the trailer, though I have no experience using it yet. And for packet, PacComm TNC's take care of normal BBS mail and an MFJ-1278 handles AMTOR and APLINK. (I also have a pair of Motorola RNET UHF business band data radios for backpack-to-bike file sharing -- much of that traffic involves manuscripts and business Email).

W5YI: How useful is ham radio to you while out on the road? Do you have satellite capability? What is your AC/DC power source?

N4RVE: I would describe ham radio as absolutely essential to this lifestyle -- not only for the social support but also for emergencies. I broke my trailer frame on a tiny Wisconsin road, and arranged help via some folks on the Sturgeon Bay repeater across Green Bay. An impromptu call for local info led to a delightful 3-day visit with John Glaeser WB9ESH and family. And so on. It's part of my daily reality.

I've played a bit with OSCAR-13 and the Microsats, but cannot currently access them from the bike (antenna limitations only). All power is provided by a 12-volt system primarily charged by a 72-watt solar array on the trailer. It can also be charged by an AC line, a car cigarette lighter, or -- soon -- reclaimed braking energy.

W5YI: What other communications capability and equipment do you have on the bike?

N4RVE: Perhaps the most dramatic communication system is the Qualcomm OmniTRACS terminal, a 14 GHz satellite earth station that allows me to pass Email via the GTE GSTAR geosynchronous bird. This has been interfaced locally to the bike's Macintosh, and at the San Diego hub to internet. The net effect is a transparent path from the bike's console to any net-connected computer in the world. Obviously, I have to limit access to this to avoid wearing out my welcome on the transponder -- we'll be using it primarily for communication with my base office and key correspondents.

My internet address at Sun (wordy@bikelab.sun-.com) currently receives 20-40 pieces of mail a day, and I'm badly overloaded. (Why, then, did I just give it to you? Well, out of that overload emerges the occasional interesting contact....)

I also carry the obligatory cellular phone, along with a CellBlazer modem and a Microcom 1042. These allow high-speed net connections (up to about 10K baud), and there's also a fax board. By the time I'm on the road again, we should be using a protocol called Dialup IP to allow full use of internet services when I'm near cell sites, in addition to the Email-only coverage though the continental US via satellite.

Speaking of satellites, I carry a Trimble GPS receiver, which yields lat-long, elevation, speed, and time to staggering accuracy. This data is useful for the security system (which, among other things, can call 911 and give its location via speech synthesizer if it's moved without the right password). Hopefully, by the next trip it will be interfaced with the DeLorme map CDROM to yield a graphic display of location and access to my contact database via map icons.

And yes, I do still have a CB -- since there are times and places where help is much more likely available from a passing trucker than from an unmonitored repeater. I haven't turned it on yet, but it's available.

W5YI: You do a lot of writing while out on the road. How do you do this? What equipment/software do you use? Do you write and pedal at the same time?

N4RVE: I write and pedal at the same time via a binary handlebar keyboard. It's a chording scheme devised by Infogrip (on the Winnebiko II I used my own modified ASCII code, which was slower). A task on a dedicated DOS machine deals with this, and another passes the text through a macro package called PRD+, allowing effective throughput on straight text of roughly 100 wpm. The copy is transmitted through the bike's network to the FORTH bicycle control processor, which then emulates the Mac keyboard via a FET matrix.

W5YI: How often do you "access" your communications modes while out on the road?

N4RVE: That depends entirely on what's hap-pening. Sometimes it's nice to hide; sometimes the virtual world of electronic contact is much more real than the passing landscape. Just depends on mood and the vagaries of this strange nomadic lifestyle.

W5YI: Briefly describe the various electronic wizardry you have on your bike? Who designed or thought it up?

N4RVE: A brief description of BEHEMOTH is an oxymoron. Easy answer first: it's essentially my design, though that's terribly misleading. Better to say that it's my integration of lots of amazing wizardry provided by industry, all tied together by crosspoint audio and serial matrices, a trio of FORTH processors, and as little custom logic as possible.

There's a heads-up display in the helmet, as well as ultrasonic sensors for head-tracking cursor-positioning on the Mac. A Setcom helmet audio system is interfaced with the audio crosspoint network for software-driven access to any device, including all the ham gear. Active helmet cooling allows me to pull about 75 watts from my body on a hot day.

Pneumatically actuated landing gear provide lateral stability on steep hills -- when the 105-speed transmission is in granny gear. Speech synthesis via an Audapter allows any text source to be piped to ears as well as eyes, and a Covox voice recognition system handles commands. Taillights are clusters of high-brightness LEDs. A killer stereo system with shock-mounted CD player, dual 18-watt amp, and waterproof Blaupunkt speakers keeps me motivated. There are 4 hard disk drives, and the computers are all networked together. Active power management keeps batteries happy. And a HyperCard application sits on top of all this, providing a graphic user interface to the bike that's segmented into "views" of subsystems, synthesizing FORTH command lines to isolate me from the harsh reality of actually running this crazy thing.

W5YI: Tell about your latest "bike-pedition." Did you travel alone? How many miles to you travel daily? Did you get much media coverage?

N4RVE: I just returned from a 3-month shakedown on the new system -- through parts of Iowa and then from Joliet, IL to Escanaba, MI. As always, it was an adventure (readers can get the full story by subscribing to Nomadenss: $15 to Nomadic Research Labs, P.O. Box 2185, El Segundo, CA 90245), punctuated by romance, terror, enchanting learning curves, and more. I spent a couple of days at Fermilabs, traveled for 3 weeks with a young lady who read about this in Discover Magazine and got a serious case of tire-itch, and visited all kinds of interesting folk. Daily mileage seems to average about half what it was on my first trip (back when the bike was about 185 pounds) -- now 30-40 miles a day, assuming moderate terrain and no fascinating encounters. And yes, media coverage is fairly heavy, though I've become exhausted with talking to every local paper and TV station. I kept a relatively low profile this time, with the exception of NBC's Earth Journal, First Look, NHK from Japan, and a few magazine interviews.

W5YI: Tell about your "mother ship."

N4RVE: One of the major practical problems with this lifestyle involves the existence of a base lab. Even though I carry a digital oscilloscope (Createc), Fluke DVM, Ultratorch butane soldering irons, and a robust R&D stock, I still need real space to do a major project. In the past, this has always meant stopping for months at a time and setting up a lifestyle -- not always in an area where I want to be.

I just acquired a "mother ship" -- a 20-foot Wells Cargo trailer and a GMC van to pull it. This is NOT an alternative to the bike by any means, but a way to have my support lab and inventory in the same general end of the world as I am, and painlessly take BEHEMOTH to selected trade shows and other events

Naturally, I can't leave the new machine alone. The mother ship is becoming a fourth layer in the network hierarchy: manpack plugs into bike, which plugs into mother ship, which plugs into a real or virtual home-base (internet). Solar panels on the roof, a SPARCstation and dashboard laptop, audio network hooks to the bike, and external antennas will all contribute to the sensation of simply docking the loony excursion module into a host system when high-speed relocation is necessary.

W5YI: Where do you go from here? What are your plans for the future? What new features are you thinking about adding?

N4RVE: I'll be on the road via mother ship in April, beginning a circuit of trade shows, hamfests, company visits, and media events -- all punctuated by relatively short (a few hundred miles) bike tours. Between now and then, I'm at the Sun lab, trying to finish the key subsystems before compressing 1200 square feet into 160. I'm now planning the 1992 tour, and would like to hear from anyone who's interested in having an on-site visit from BEHEMOTH and wants to discuss speaking/appearance fees and logistics.

Future bike systems? I keep thinking that with advances in technology, it should get LIGHTER, not heavier. But this is such a seductive industry... I keep increasing function-to-weight ratio by conceptual orders of magnitude, often forgetting the effect on my legs. It is astonishing that a 580-pound bike is manageable, but I must confess that it would be MORE pleasant if it were about half that. Future systems will take this into account. Incidentally, BEHEMOTH is an acronym for "Big Electronic Human-Energized Machine... Only Too Heavy"