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**WANT: HEATH SB500 2 meter inverter. Larry KF6WV 874-1000.**

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**HIGH GAIN 15 M monobander, 5 el \$200. PALOMAR P410X pre-amp 160/6 M \$75. MASTER CONTR. 110V, 4-pos. w/lights \$10. AUTEK audio filter, SSB/AM/CW, \$40. HEADPHONES ask. ANT SWITCHES ask. MICRONTA meter, 50 kOhms, \$20. VIKING 2000, filter RF \$25. Bill KA6JLP 823-5652.**

**HEATH 5228 VTVM \$50. CONWAY mint digital meter, V, Ohm, AC, plug-in pwr \$35. HEATH HM9 QRP wattmeter, 5W/50W, mod. adapted for 50/148 MHz, manual \$20. HEATH CANTENNA \$10. Hank W6DTV 823-7885.**

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**ASDEN PCS-4000, with manual \$225. GENAVE GMT-1000 140-175 MHz, 40W, good for packet \$200. Al W6MEO 538-4935.**

**RADIO SHACK 100 laptop PC \$125. REGENCY HR2A 2 mtr transceiver 15W, xtal. \$25. Phil KC6BSI 544-2572. (cont page 10)**

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# The 9th Annual SCRA INDOOR/OUTDOOR - FLEA MARKET/AUCTION

**Sebastopol, CA Saturday, Sept 28**

You are cordially invited to the 9th annual SCRA Flea Market. Just an hour's drive north of the Golden Gate Bridge, in the heart of the Sonoma County wine country, ours is the last major flea market of the year -- come and see what we have to offer!

**INDOOR SELLING AREAS:** There is also a large paved parking lot for sellers who prefer to set up outside.

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Doors open at 8.  
Auction around Noon.

**LOCATION:** The Holy Ghost Society hall, 7960 Mill Stn. Rd, just north of Sebastopol on Hwy 116. Plenty of free parking.

Questions? Call Al N1AL (707) 538-7115.

## SELLER REGISTRATION:

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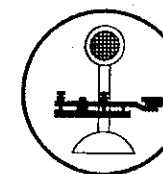
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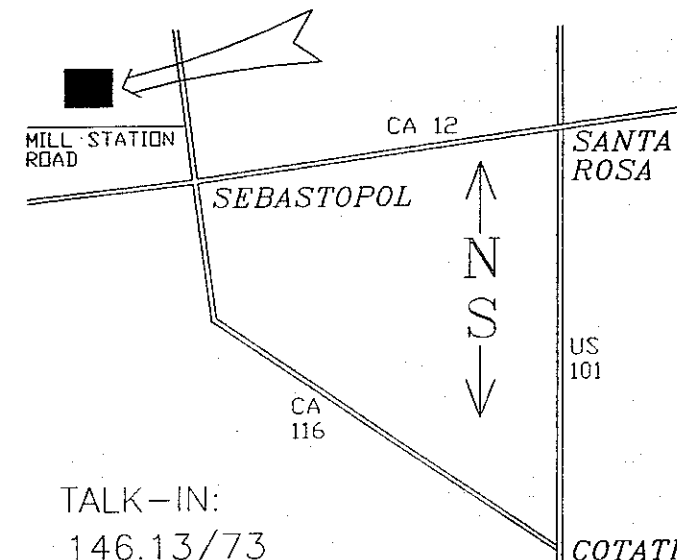
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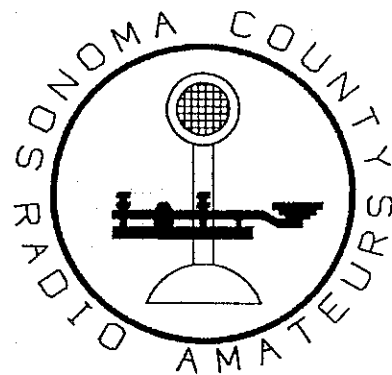
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TALK-IN:  
146.13/73



Be there or be ☐



OFFICERS FOR 1991			
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VICE PRESIDENT:	Brian Torr	N6IIY	575-5871
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TREASURER:	Merlyn Pfeiff	N6VUC	584-3898
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	John Wallack	W6TLK	833-1873
REPEATER CHAIRMAN:	Jim Rutherford	WB6PER	526-2972
SHORT SKIP STAFF:			
EDITOR:	Alan Bloom	N1AL (e)	538-7115
1578 Los Alamos Rd, Santa Rosa, CA 95409 (d) 577-3981			
CIRCULATION MGR:	Harvey Lawrence	K6KZ	
ADVERTISING MGR:	John Wallack	W6TLK	833-1873
SWAP SHOP:	Hank Davis	W6DTV	823-7885

ARRL Liaison: Alan Bloom N1AL 538-7115  
 Ast. Director: Chuck Sabin N6DDK 795-2371  
 Badge Chair: Connie Freitas N6FYV

## Activities Committee:

Pub. Service: Bill Splaine N6GHG 431-8636 (days) 577-2913  
 Flea Market: John Wallack W6TLK 833-1873  
 QSL Mgr: John Wallack W6TLK 833-1873  
 TVI/RFI: Al Bloom N1AL 538-7115  
 Awards: Steve Lund WA8LLY 823-4544  
 VEC Exams: Steve Lund WA8LLY 823-4544  
 +N1AL WN6D WW6D WW6F WB6FRZ K6UXO  
 Education: John WB6FRZ 838-6398  
 +N1AL KF6WV K6XZ K6ZWB  
 Refreshmnts at meetings: Bob Olsten WD6DPE  
 Greeter at Meetings: Jane Vanderslice N6NTB  
 Raffle at meetings: Philip Gaul KC6BSI  
 Membership lottery: Bob Scolnick K6GEV

## Repeater Control Op's:

WB6PER Jim 526-2972 N6PTM Jim 823-7947  
 WD6CKP Hoppy 542-6750 W6TLK John 833-1873  
 Interference Committee: WB6PER Jim 526-2972

### SHORT SKIP ADVERTISING RATES:

Business cards: \$10

\$11 First 1/4 Column  
 \$3 Additional 1/4 Columns  
 (\$32 Full Page, 1 side)

Pre-printed inserts: \$32/sheet

Guaranteed circulation: 200/month  
 AD DEADLINE: 10th of previous month

### ARE YOU NOT AN SCRA MEMBER?

IF SO, then this is a complimentary copy. Our club is involved with almost every area of Amateur Radio: Repeaters (13/73), Field Day, license classes (Novice through Extra), volunteer exams, RACES, DX programs, packet radio, hidden xmtr hunts -- you name it.

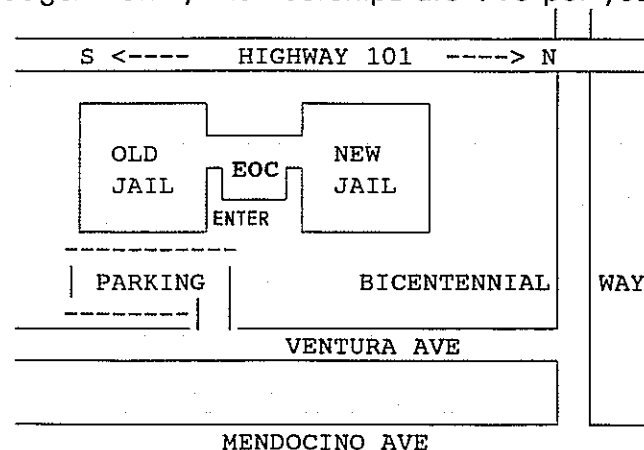
We invite you to attend our next monthly meeting (see below) or check into the Tuesday night SCARS net on the 146.13/73 repeater at 7PM. You will hear the latest Amateur Radio Newline broadcasts, announcements of SCRA activities and a Swap Shop. If you would like to join SCRA, please refer to the dues listed below. Hope we can have an "eyeball" QSO with you at the next meeting! 73 ...

## Club Meetings:

7:30 PM, 1<sup>st</sup> Wednesday each month at the EOC (Emergency Operations Center). Anyone interested in Amateur Radio is welcome.

NEXT MEETING: September 4, 1991

DUES: \$12 per year, plus a one-time \$4.00 initiation fee. Dues are pro-rated \$1/month for new members who get an SCRA call/name badge. Family memberships are \$18 per year.



## WORLDWIDE DISTRIBUTION

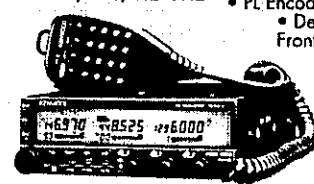


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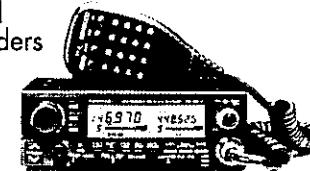
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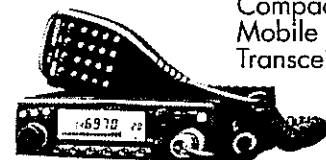
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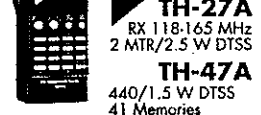
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**MINUTES** (Continued)  
The **PROGRAM** was "Hints and Kinks" by various members. Jim N6PTM explained the proper use of a Grid Dip Oscillator. To tune an antenna to resonance, you couple the GDO coil to a device whose technical name is a "gazopolis" (see right). You can calibrate the GDO dial with a receiver or frequency counter loosely coupled to the coil.

Jim also displayed a "noise bridge" which can be used for measuring antenna impedance. Al N1AL briefly described the new hand-held MFJ-207 SWR analyzer.

John W6CCY and Bill N6OLD discussed the various types of coax available and methods of weatherproofing antennas and feedlines. Water inside your coax will ruin it in short order.

Hank W6DTV described a cheap 'n easy mobile two meter antenna using a mic clip and rubber ducky (see article this issue.)

Brian N6IYY showed two simple methods of measuring inductance and capacitance using circuits you can build easily.

**OLD BUSINESS:** Connie N6FYV asked if it isn't about time to donate again to the Amateur Radio Newsline, whose news broadcasts we play on the Tuesday night net. N6PTM said this topic is on the agenda for the next Board meeting.

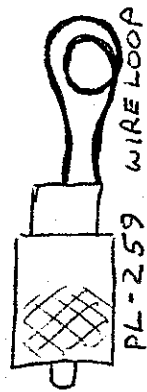
The **FLEA MARKET** is coming up on Sept. 28. Contact John W6TLK (833-1873) if you would like to help.

K6ZWB agreed to continue as Net Control Station for the Tuesday night net.

**AWARDS:** Awards Chairman Steve WA8LLY has just received KD6HQ's Worked All States QSL cards. Steve has authority to certify cards so you don't have to send them to ARRL.

The **RAFFLE** run by Phil KC6BSI featured a number of interesting prizes. K6GEV would have awarded the **MEMBERSHIP LOTTERY** to KB6GOZ had he been present.

Adjourned at 9:33 PM. m/s N6DDK/WA6ACX Respectfully submitted, Al N1AL, Sec.



## TREASURER'S REPORT

For month ending May 31, 1991

ACCOUNT	REVENUE	EXPENSE
Refreshments at meetings ..	7.89	9.10
Raffle at meetings .....	62.50	
Dues and Initiations .....	72.00	
Fund-Raisers (Donation) ...	50.00	
Badges .....	4.00	63.74
Misc (ARRL memb & F.Day) ..	108.00	706.26
	304.39	779.10

### ASSETS:

General Fund Account	3309.27
Cash/checks on hand	178.87
Total General Fund	3488.14
Total Repeater Fund	755.43

### FIELD DAY RECAP:

Revenue .....	260.00	
Expense .....		654.26
Net Cost .....		394.26
- de N6VUC		

### HANK'S SWAP SHOP (from back page)

**TRISTAO TOWER** 55 ft freestanding crank-up, **HY-GAIN TH7DX** beam, 50-ohm balun, 15 ft 2-inch mast, guy arms, 3 - 150 ft coax, **T2X TAILTWISTER**, control, 150 ft cont. cable **TRX 89** tower raising fixture \$1100. Bud KD6XF 763-2119.

**ICOM 505** 6 meter FM, USB, LSB, CW, 10 watts plug-in or battery power \$100. **A-1015** 6 meter amp 10/150W, new, \$200. **AMPLIFIER**, 600 W, 80/15, 110V input \$300. **ANTENNA TUNER**, 160/10 \$50. Curtis KB6GIU 209-477-3279.

Jim Peimulder  
N6PTM (707) 823-7947

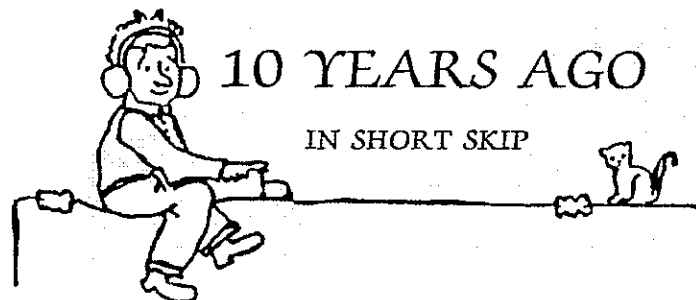
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## 10 YEARS AGO

IN SHORT SKIP



The big topic of discussion in the September 1981 *Short Skip* was the vote Aug 26 by SCRA and SCARS (Sonoma County Amateur Radio Service) to merge the two clubs. The vote was (SCRA) 30 yes, 2 no -- (SCARS) 23 yes, 3 no, 1 hell no. At that time, SCRA was the "Red Cross" club, and SCARS was the "RACES" club which ran the 146.73 repeater.

Upgrades for the month included Don WA6ACX to Extra and Alan N6DCJ to Adv.

The club picnic Sept 12 was to be in Doyle Park. Steve KD6GC and Ron WB6NBR were the sparkplugs.

DX column Editor Chod VP2ML asks DX'ers to put out a call on the '73 repeater if you work something good. Packet Clusters were not yet even a gleam in a DXer's eye!

## STAY ABOVE 222 !

Dont forget -- as of August 28, 220-222 MHz is no longer a ham band. All "220" operations must be above 222.

## NEW HRO LOCATION

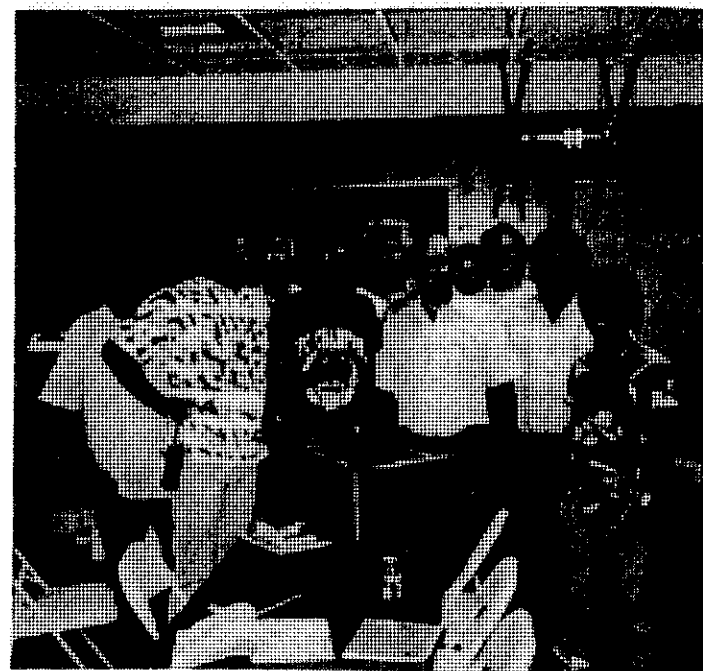
The Burlingame HRO has moved to:

Ham Radio Outlet  
510 Lawrence Expressway #510  
(408) 736-9496

It is in the same mall as Computer Literacy, Togo's etc... (Across Lawrence Expressway from FRY's Electronics & Weird Stuff!) in the Santa Clara area. de Phil KJ6NN via Usenet

## FLEA MARKET!

If you can help out with the Flea Market Sept 28, call John W6TLK Wallack 833-1873. We still need lots of volunteers.



## ASSEMBLY CLASS -- 8/12/91

A class in construction techniques was held at the Spinal Cord Injury Network bldg on August 12 thanks to John WB6FRZ and Rick K6ZWB. The folks in the photo below are (L-R) Ron Spaulding, Pete Sourek KC6UXM, Ted DeCroff KB6PTA, Rick Mahan KC6UXI, Rick Reiner K6ZWB, Walt Burandt KC6RHB, Richard Polfus KC6RDH, Doug Carter KC6RHA, Jeff Young KC6PJV, and Kam Souvannaphoxay KC6NDU. The quad is by Doug Carter. Tnx to WB6FRZ for the photo.

## NEW NOVICE CLASS

A new Novice class will be starting on Monday, Sept. 30 at 6:30 PM. It will be held at the California Spinal Cord Injury Network building, 3911 Princeton Ave., Santa Rosa. The class is co-sponsored by SCRA and the California Spinal Cord Injury Network. Everyone is welcome. John Breckenridge WB6FRZ, 838-6398.

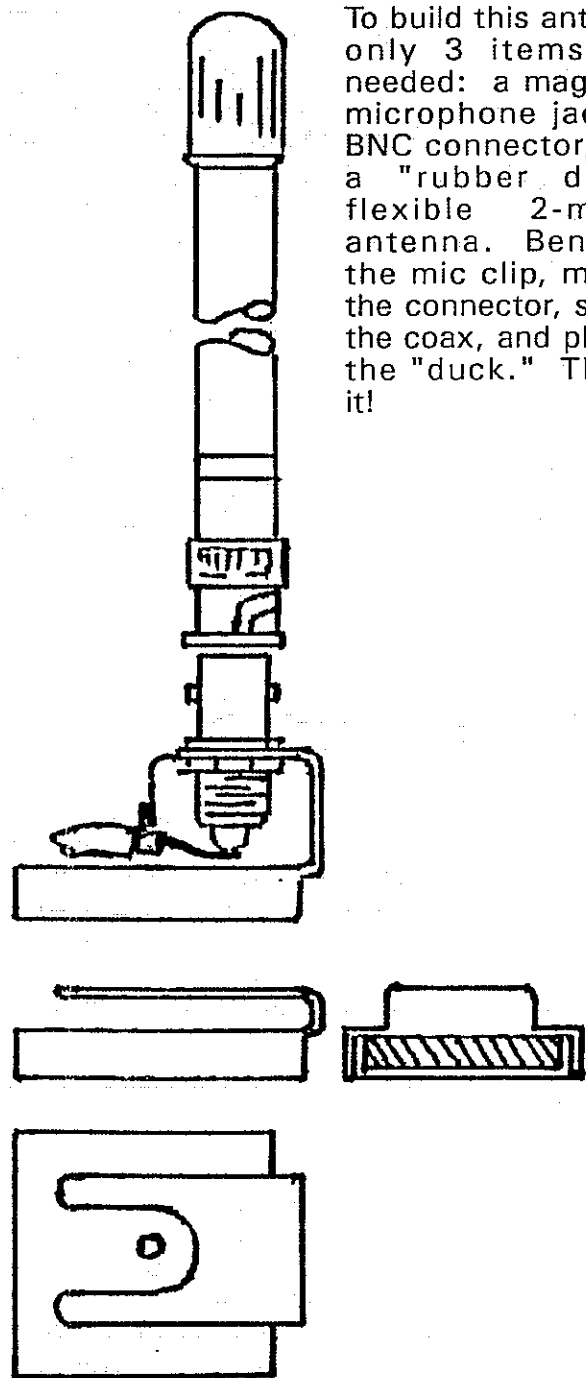
## NEED A JOB?

MCI Global Communications is looking for a transmitter technician to work at station KPH out at Point Reyes. You will need a second-class commercial radiotelegraph license, which requires you to pass an examination in rules, radio theory and 20 wpm code. For more info, call (415) 669-1003. Tnx Tracy WB6TMY

## HOMEBREW MOBILE ANTENNA

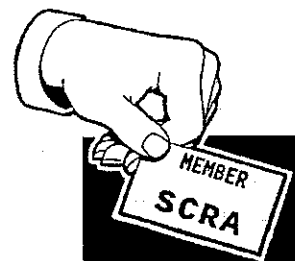
By Hank Davis W6DTV

This mount has been tested at 55 miles per hour, and it stays on the roof. It has worked from Danville and Concord back to the '73 repeater. WA6ACX got this design from QST a few years back.



To build this antenna only 3 items are needed: a magnetic microphone jack, a BNC connector, and a "rubber duck" flexible 2-meter antenna. Bend up the mic clip, mount the connector, solder the coax, and plug in the "duck." That's it!

## NEW AND MISSED MEMBERS



### SINCE LAST MONTH

Alan Bloom N1AL  
1578 Los Alamos Rd.  
Santa Rosa, CA 95409  
538-7115

Pete Sourek KC6UXM  
406 Cynthia Ct.  
Windsor, CA 95492  
838-0622

Darrrel Jones WD6BOR  
358 Patten St.  
Sonoma, Ca 95476  
996-4494

JohnRowbotham KC6WTJ  
1143 Lombardi Lane  
Santa Rosa, CA 95407  
526-5314

Harvey Lawrence K6KZ  
521 Teresa Ct.  
Sebastopol, CA 95472  
829-2350

Frank Ball KC6WUG  
513 Oak Lake Ave.  
Santa Rosa, CA 95409  
538-3693

We now have 179 members.



Credit for last month's cover (sunspot charts) should go to *World Radio* magazine.

### Radio Shack

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## SCRA MINUTES

August 7, 1991



The meeting was called to order by President Jim Pelmulder N6PTM at 7:32 PM. Other officers present: Vice President Brian Torr N6IYY, Secretary Al Bloom N1AL, Treasurer Merlyn Pfeiff N6VUC, and Member-at-Large Lou Schneider N6YMQ.

**VISITORS:** Jane N6NTB introduced 11 visitors. Included were former active members Terry WA6RNF & Judy KA6RQK who left just over 3 years ago for Idaho. Over half the members present didn't recognize them. We've had a lot of new members in the last 3 years!

**UPGRADES** since last month include KC6WTJ, KC6SOT and KC6WTE from no-code to full Technician. KC6VXM upgraded to Technician. W6DTV was first licensed 60 years ago this month. (Sarah says he's bragging.)

The **MINUTES** were approved as printed in *Short Skip*. m/s KK6WN/KD6HQ

The **TREASURER'S REPORT** shows \$3488.14 in the General Fund & \$755.43 in the Repeater Fund. Accepted. m/s N6DDK/K6ZWBB

**REPEATER** coverage is better than ever, according to N6PTM. We are starting to get occasional pirates, malicious interference and unauthorized use of the autopatch. What to do if you hear one of these turkeys: 1) Ignore them. Do not acknowledge their presence, as this only encourages them. 2) Always ID BEFORE using the autopatch so that control operators know you are legit. 3) If you allow a non-ham to talk on the radio, this is "third-party traffic." A licensed control operator must be present and in control of the transmitter. Most of the new Technicians seem to be doing a pretty good job of on-the-air procedures.

Ted KB6PTA has noticed that he often hears a busy signal on two meters. Probably due to interference from commercial paging systems.

**PUBLIC SERVICE:** Bill N6GHG is planning a critique for the Vineman Triathlon. For the most part, the event went smoothly, and Bill thanks all who helped out. There was a hit-

and run accident involving one of the runners. The most comical episode was the fully-uniformed Highway Patrolman jogging along with a contestant trying to get a statement.

The recent Healdsburg Harvest Century went well. Upcoming events include the Day on the River, Stride for Life, and the Petaluma Air Show. Bill got a big hand for his efforts.

**EDUCATION:** John WB6FRZ sent in a report read by N1AL. John's latest 14-week Novice class is finished. The following have obtained either Novice or Technician licenses: Allen Adams, Burl Don, Paul Dunn, Gary Gouger, Tom Kaminska, Bob Nellor, Phyllis Newmann and Shelly Sourek. Bob Neumann and Ron Spaulding have passed the Novice written.

John will be starting another Novice class in late September. Al N1AL will begin a Technician class about the same time.

Plans for an assembly class are in full swing. Instructors will be Larry Rau KF6WV and Rick Reiner K6ZWB. Rick passed around a sign-up sheet. The first class will be Monday Aug. 12 at 7 PM at the Spinal Cord Injury Network bldg. Topics will include construction, circuit theory, TVI/RFI, troubleshooting, and test equipment. Everybody is encouraged to build a kit or other project.

K6XZ's code class continues to meet on Fridays at 7:30 (same place). Bob is happy to accommodate those just learning the code as well as those upgrading from 5 to 13 wpm.

John also writes that Ken Ambrose (call unknown) became a silent key Monday due to a heart attack. Ken was co-founder of the Calif. Spinal Cord Injury Network. Ken and his wife Lennice have been allowing several radio classes to meet without charge at their building on Yulupa Ave.

On motion of Steve WA8LLY seconded by Ted KB6PTA, the club voted to donate \$25 to the memorial being set up in Ken Ambrose's name.

KB6PTA announced that George King KG6BW is a silent key. Hank W6DTV reports that Willits is graduating a lot of new hams.

**VE EXAMS** may be held at the Flea Market in September if Steve WA8LLY can get the extra room at the Holy Ghost Hall.  
(next page)

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A lot of the features on the newer rigs amount to high priced, useless frills.

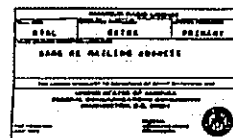
What newcomers in quest of a good HF rig REALLY need to do is seek out an EXPERIENCED Amateur who has knowledge about the older rigs. Ask what kind of rig they use. Ask what they like or dislike about it. Most Amateurs are delighted to show off their shack, and give you hands-on exposure to their setups.

I'd recommend any of the following, as they were the "standard of performance" in that "classic" age of 10 or more years ago. Most can be found in ham-fests or in trader publications for around \$200 - \$600. Collins KWM-2A, Drake TR4-C, & TR-7 transceivers; Collins S Line, Drake T4C, R4C (separate Receiver & transmitter). Again, these were the "Cadillacs" of 10 or so years ago. Solid, proven performers, and parts still readily available.

Got a little more to spend? Icom 745 (my current HF rig), Kenwood TS-830, TS-430. \$600 - \$800 range. SOLID performers (even if they ARE transistorized!).

If you're still doubtful about the hobby, seek out an experienced Amateur to consult and/or go shopping with, and go for one of the "classics" of recent time. Get on the air. It won't take you long to become hooked on HF operating. It's day and night compared to VHF repeater operation. Besides, you'll always be able to sell it at a hamfest if you ever lose interest. But if you're convinced that Amateur Radio is for YOU, then go ahead and look at those kilo-buck+ specials, visit your friendly Credit Union if necessary, and GO FOR IT! ■

## ARRL VEC EXAMS IN CALIFORNIA



City, Contact Phone, Contact Person:

### AUGUST 31

Carson, 213-539-5040, William Marple  
Fairfield, 916-662-0801, Gerald D Newton

### SEPTEMBER 03

Culver City, 213-292-2183, C Lutz

### SEPTEMBER 07

Bakersfield, 805-861-6743, Glenn Ricketson  
Cupertino, 408-984-8353, ARRL Info Hotline  
Modesto, 209-883-2968, Chet Jensen

Oakhurst, 209-683-8430, Charles M Alessi  
Sacramento, 916-925-0159, Lyle B Aufranc

### SEPTEMBER 08

Eureka, 707-822-4541, Irma D Ruegg  
Thousand Oaks, 805-484-3309, Cathi Wilkinson

### SEPTEMBER 14

Novato, 415-897-8950, Nels Lecklikner  
Redding, 916-243-6339, Kenna Pine

### SEPTEMBER 19

Fountain Valley, 714-846-6984, Cam Harriot  
SEPTEMBER 21

Cupertino, 408-984-8353, ARRL Info Hotline

ARRL/VEC infoline: 203-666-1541 x282 ■



## COMING EVENTS:

SCARS NET: 146.73 MHz  
Tuesdays at 7 PM.

VE EXAMS HOTLINE NR:  
408-984-8353

### SEPTEMBER:

- 2 - RACES etc. Net 7:30 PM
- 4 - SCRA meeting 7/7:30 PM
- 13 - Deadline for October *Short Skip*
- 14 - Foothill College Flea Market
- 14-16 - ARRL September VHF QSO Party
- 16 - RACES etc. Net 7:30 PM
- 19 - CDF/VIP Meeting 7:30 PM
- 27-29 - Computer Networking Conf, San Jose
- 28 - SCRA Flea Mart, Seb. Holy Ghost Hall
- 28-29 - CQ Worldwide RTTY Contest



## DX NEWS



**DESECHEO ISLAND, KP5.** The KP2A/KP5 team is set for a ten day visit starting Aug 23.

**CHAD, TT.** TT8SA, by ex-TR8SA, will be QRV for one year starting next month.

**CONGO REPUBLIC, TN.** TN1AT is expected in September with F6EUV.

**GLORIOSO, FR/G.** FR5ZU/G during Sept.

**TROMELIN, FR/T.** FR5ZU/T during October.

**CAMBODIA, XU.** XU1NQ, by OK1NQ, has been active. Watch 20 and 15 meter CW.

**LAOS, XW.** XW8KPL frequently works 21290 kHz. Fridays/Saturdays seem most productive.

**CROZET, FT8W.** FT4WC will QRT in November. If you need this one, try 20 meters at 1300z. QSL via F6GVH.

**JAN MAYEN, JX.** JX3EX, by LA3EX, will QRT in November. QSL to LA5NM.

**TOGO, 5V.** F2JD will be active until the end of the year. Girard likes RTTY, OSCAR, SSB.

**PREFIX CHANGES.** ZS3 call signs are now in use by amateurs in Cape Province, Republic of South Africa. Novice class amateurs in the United Kingdom have been issued call signs from the 2E through 2W block.

**NEW VQ9 QSL BUREAU.** The new address is VQ9 QSL Bureau, c/o Russell Shaw, KA0MXI/VQ9RS, NSF Box 16, FPO AP 96464. The ARRL Outgoing QSL Bureau will now be able to forward cards bound for Diego Garcia.

**ROTUMA, 3D2.** Ron ZL1AMO, operates CW around 25 kHz from the band edge using 3D2RW. Also check 3506, 10105 and 18074 Khz. Ron was heard operating RTTY on 14093 kHz around 1130 to 1230z. QSL via ZL1AMO.

**CUBA, T4.** K6ELX/T4 is with the American news crew covering the Pan Amm Games. QSL to K6ELX. Others include KK6NE/T4, VY2TX/T4 (op Nick, says QSL via home call) and T40PAN (QSL via Box 1, Havanna, Cuba).

**BYELORUSSIA, UC.** Dick UB5MAF, will be signing RC50/UB5MAF from oblast 007 beginning Aug 20. For SSB: 14210 or 21275 kHz. CW: 14010 kHz around 0400z. QSL to Box 1, Lugansk 348034, Ukraine.

**GRAND CAYMEN ISLANDS, ZF.** ZF2QQ has been very active on the WARC bands this week. Check 18115 kHz around 2030z and 24955 kHz around 1830z. QSL via N4UCK.

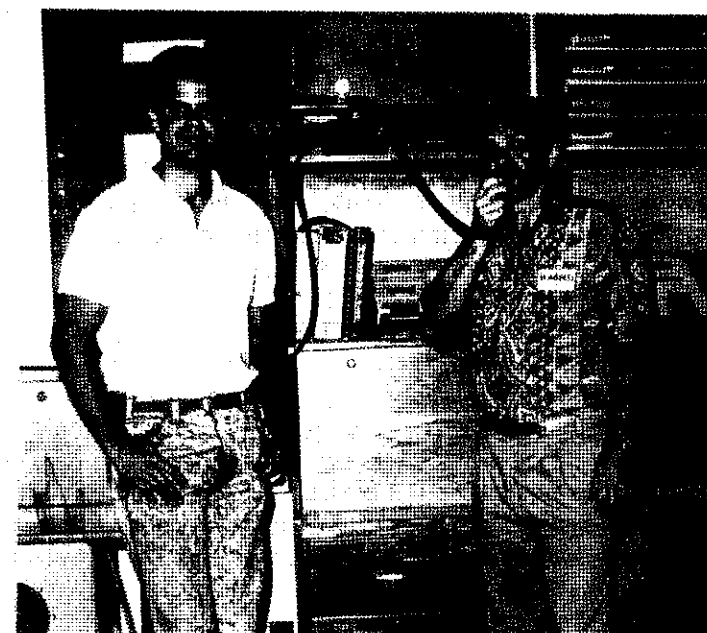
Thanks to W1AW, Allen, N2KW, the TriState DX PacketCluster Network, Rashid 3B8FP of the Mauritius ARS, the N. Ohio ARS, N. Ohio DX Assoc, Ohio/Penn Packet Cluster Network, WB3LHD, WK3N, K4CEF, K8OSF, W8XD, K8YSE and OPDX/BARF80 for this info. ■



## RACES NEWS: SSU RACES STATION

As of July 1, Sonoma State University has an official RACES station, thanks to the efforts of Phil Richardson WA6SEU, Mike Weihman N1DJE, Jim Andrews KC6PJW and Rick Sealock N6RXA. An ICOM 228H, 45 Watt two meter rig is now installed in the "public safety secondary EOC cabinet" in room 15 of the PE building. The antenna is a dual-band Diamond X 500. All equipment was purchased by the University.

The photo below shows N1DJE and WA6SEU trying out the new rig. ■



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THE PROBLEM  
WITH  
DIGIPEATERS

by Tom Clark W3IWI  
via the AMSAT Bulletin



I am sitting here in the shack feeling very frustrated. I am watching the activity on 145.01 (although the problem is just as severe on 145.05 or any of the other frequencies in use in this area.) WA4XXX is tying up the frequency for most of Northern VA, MD, WVA and EPA, trying to connect with a BBS in Pittsburgh via SIX(!) digipeaters. He is having no luck and undoubtedly is wondering why. The basic answer is very simple: *Packet radio doesn't work through more than 2 or 3 digis!*

"Oh yes" I hear you saying, "You are wrong -- the AX.25 protocol permits up to 8 digis!" True, but just because something is permitted doesn't mean it will work. Here's why:

Assume you are trying to connect to another station via 6 digis. At every step along the way, the packet may be hit by QRM. My observations are that on the very best paths, about 5% of packets get clobbered every hop. For this example, that means 95% of the packets make it through the first hop, 95% of those get past the second, and so on. Only 70% of the data makes it through to the end:

.95 \* .95 \* .95 \* .95 \* .95 \* .95 \* .95 = .70

**BUT WAIT, THERE'S MORE!!!** AX.25 packet protocols require the end station to send you back an "ack" (acknowledgement) packet which then has to wind its way back through the same route. Again, only 70% of these packets get back to you. Thus on a high-quality 95% link through 6 digis, only .7 \* .7 = .49 of your packets are successful.

**BUT WAIT, THERE'S MORE!!!** Few paths achieve 95% reliability except perhaps at 4 AM when nobody else is on the air. Links you tend to think of as "pretty good" probably lose 10-20% of your packets on any given hop. In general, if P is the probability of each link working, and N is the number of links, then the probability of success is given by:

PA = P(2N+2)

**BUT WAIT, THERE'S MORE!!!** You no doubt have heard that packet data is sent at a rate of 1200 baud (120 characters per second). But the packet gurus have lied to you -- there is overhead associated with packet headers, plus time wasted in returning that all-important ack, plus your radio's transmit/receive changeover time, plus time waiting for a hole to open up on the channel. The best you can expect is about 600 baud. But for every digipeater you use, another set of similar delays is added. For a perfect set of links through N digis, your average baud rate would drop to about:

RATE = 600 / (1+N)

**BUT WAIT, THERE'S MORE!!!** Each time your packet gets clobbered, it is retried, until it gets through (or you time out). So the REAL effective baud rate is even slower:

RATE = 600 \* PA / (1+N)  
= 600 \* P(2N+2) / (1+N)

I have worked out a number of cases for links ranging from perfect (P=1.0) to pretty scuzzball (P=.5) and for 0 through 8 digipeaters. My advice is not even to attempt to use a path for which PA < 0.5. Unless you have an exceptional path (better than P = .95), these tables clearly show that using more than 1 or 2 digipeaters is an exercise in futility which will make you very unpopular with your peers.

# of Digis	Link	Success	Probability	per Hop				
	1.0	.95	.90	.85	.80	.70	.60	.50
	PA = TOTAL PROBABILITY OF SUCCESS:							
0	1.00	0.90	0.81	0.72	0.64	0.49	0.36	0.25
1	1.00	0.81	0.66	0.52	0.41	0.24	0.13	0.06
2	1.00	0.74	0.53	0.38	0.26	0.12	0.05	0.02
3	1.00	0.66	0.43	0.27	0.17	0.06	0.02	0.00
4	1.00	0.60	0.35	0.20	0.11	0.03	0.01	0.00
5	1.00	0.54	0.28	0.14	0.07	0.01	0.00	0.00
6	1.00	0.49	0.23	0.10	0.04	0.01	0.00	0.00
7	1.00	0.44	0.19	0.07	0.03	0.00	0.00	0.00
8	1.00	0.40	0.15	0.05	0.02	0.00	0.00	0.00
	EQUIVALENT SYSTEM BAUD RATE:							
0	600	542	486	434	384	294	216	150
1	300	244	197	157	123	72	39	19
2	200	147	106	75	52	24	9	3
3	150	100	65	41	25	9	3	1
4	120	72	42	24	13	3	1	0.1
5	100	54	28	14	7	1	0.2	0.02
6	86	42	20	9	4	1	0.1	0.01
7	75	33	14	6	2	0.2	0.02	0.001
8	67	26	10	4	1	0.1	0.0070	0.0003
	Txn Ren AA6UY							

NEWCOMER'S GUIDE TO  
AMATEUR RADIO EQUIPMENT

by Vince Yakamavich, AA4MY  
in the Raleigh (NC) ARS Exciter.

I recently overheard two fairly new-to-the-hobby Amateurs discussing (bemoaning) the high cost of Amateur Radio gear, specifically HF transceivers. They were discussing top brands, and top-of-the line models. (Sorta like two teenagers with newly-earned learner's permits, bemoaning the prohibitive costs surrounding Porsche 924's...) "You really can't get much for under \$1,000," said they. "Horse-feathers!" sez I.

Over the past 10 years, there has been a virtual explosion in electronic technology. The technology of "yesterday" (tubes, and linear VFO's) have been replaced with ultra-sophisticated, computerized, marvels of engineering and packaging technology (for which, we pay most dearly). But let's look seriously at some of those "antiques" of the late 70's and early 80's (which are now in the \$400 - \$800 range). Did they work? Most assuredly. How well did they work? Many a DXCC and 5 band WAS earned, with untold millions of hours of enjoyment, to boot!

Unfortunately, newcomers won't find ads for the "antiques" in today's Amateur Radio mags. All they see are the ads for the new, (multi) kilo-buck transceivers from Japan Inc.

After reading some of the spec sheets on the new rigs, a newcomer to the hobby will probably think I'm off my rocker when I say most of the "features" found on the new HF rigs in the kilo-buck range are USELESS!

Just for an example, lets talk about "digital VFO's" and "memories". A "digital VFO" is really a frequency synthesizer. Synthesizers have extreme frequency stability (a very desirable trait), on the order of 20 Hz or less per hour. The "antiques," too, can boast of frequency stability. Like 100 Hz or so per hour. "But," you say, "that's FIVE TIMES WORSE than what a new rig can do!" And you're absolutely correct. But the key question is: "Will you notice 100 Hz per hour drift?" Using a tight CW filter, yes, you would--after perhaps a FULL HOUR QSO. On SSB, you'd probably want to touch the

frequency knob after about 2 HOURS of rag-chewing! Yes, those older rigs sure made Amateur Radio operating rough...

"But the new rig offers 100 "memories", while some of the "antiques" don't even offer a digital display!" Yup, you're right again! But remember, unlike the VHF/UHF FM spectrum, HF is not "channelized". HF stations will be scattered randomly on the band--NEVER will you find them exactly where you programmed your memory for yesterday!. Unless you plan to make heavy use of autostart RTTY, HF packet, or AMTOR, I doubt you'll ever need a memory on HF.

Digital display? Impressive to look at, and perhaps nice to have. But crystal calibrators (about \$20 to build, if your "antique" doesn't already have one built in) and mechanical displays have been the frequency reference for years--and yes, the new rigs' high-tech synthesizers have to be calibrated against WWV, just like the \$20 calibrator...

Solid state finals versus tubes. No doubt about it, tubes are getting more difficult to find. But they CAN be found. "Tubes are expensive!" Yes they are--but YOU can replace them. Ever try to get 4 matched RF type transistors? Ever changed a set mounted in a heat-sink buried within the bowels of a tightly packed maze where even Japanese-sized fingers fear to go? More likely than not, the average Amateur wouldn't even ATTEMPT to replace the finals in a solid state rig (IF he could find a matched replacement set!), while changing a tube presents little problem. Tubes have other advantages, too. They're infinitely more forgiving when it comes to that "ideal" 50 ohm resistive match we Amateurs are always seeking, but seldom attain. At 2:1 SWR, a tube will work just fine--a newer rig will probably go into a limited "foldback" to protect the transistors. 3:1?? Tubes are still perkin' along... Transistors? Forget it!

One disadvantage though: You will have to learn to peak the grid, and dip the plate. Hand-eye coordination. Watch the meter -- twist the knob. Yup, those "Amateurs of olden days" sure had it rough...

Speech compressor? Some DXers swear by 'em. Most rag-chewers swear AT 'em! If you need one, they exist as after-market devices for the older rigs, not to mention the "build your own" method. (next page)