

73 AMATEUR RADIO

International Edition

DECEMBER 1989

ISSUE #351

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CAN \$3.95

A WGE Publication

Hand-helds!

Home-Brew:

Atari ST color SSTV—cheap!
Bargain booster for your HT
Under-\$1 hamsat antenna
A VOX on your 2AT

Reviews:

Breadboarder's Paradise: Elenco test Blox
Ramsey \$30 40m transmitter kit
Tale of two HTs:
Yaesu 470 dual-band micro HT and
ICOM 2SAT 2m handheld
Communications Satellites



 ICOM

Dual Band Mobile & Handheld



Kim Bottles K7IM

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Double your operating pleasure with Icom's new dual band IC-3210 mobile and IC-32AT handheld FM transceivers. Each unit incorporates a wealth of special features and options designed to move you into the forefront of today's expanded 2-meter and 440MHz activity. Icom dual banders: the FM enthusiasts dream rigs!

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CIRCLE 354 ON READER SERVICE CARD

NO OTHER FULL DUPLEX PATCH OR REPEATER CONTROLLER GIVES YOU SO MUCH FOR SO LITTLE

FULL DUPLEX AUTOPATCH USING DUAL BAND RADIOS...

Most people are within radio range of their base station 90% of the time. Why not install an 8200 and enjoy your own private full duplex mobile telephone system? Only 3 connections are required. The 8200 provides both full duplex and half duplex operation.

(Inquire about Private Patch V for simplex operation. Operates in enhanced sampling or VOX modes...user selectable.)

ADVANCED AUTOPATCH FEATURES...

The 8200 incorporates many features which are simply not available in any other product. For example...

90 Phone Number Auto Dialer: The 8200 will store (in non-volatile memory) 90 phone numbers which can be dialed with abbreviated two digit key codes. The auto dialer is programmable over the air or with the built-in keyboard.

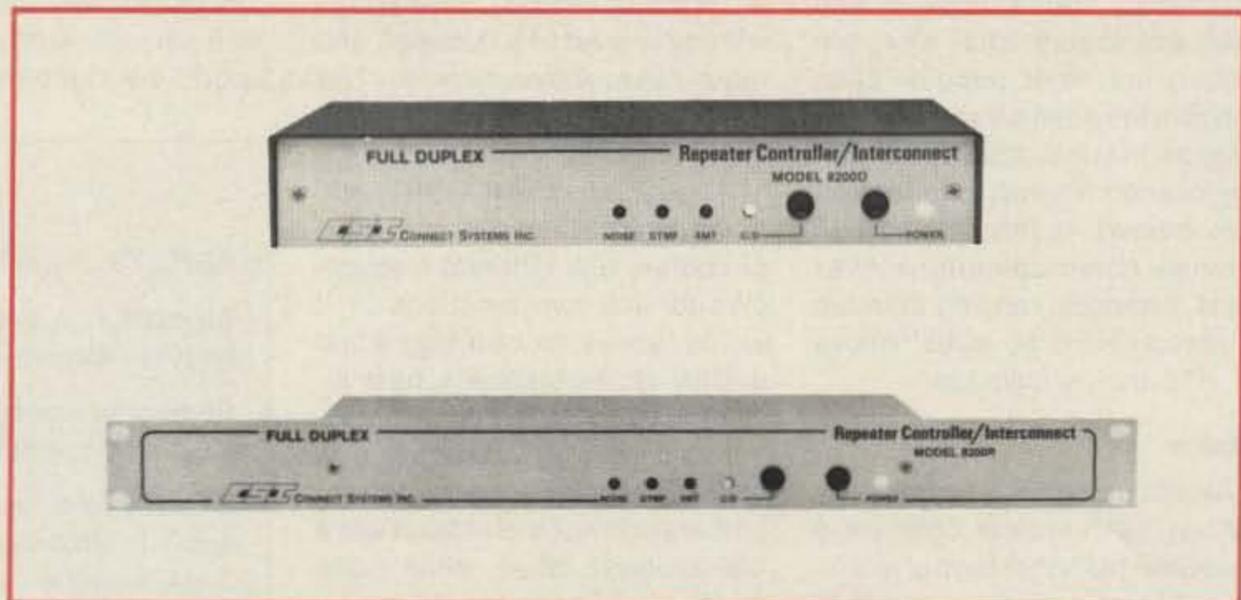
Last Number Redial: Redialing the last number called is reduced to a single digit (plus access code).

Hookflash: Operates call waiting etc. Simply press * three times. Only CSI has it.

Call Progress Tone Detection: Busy signals and second dial tones are detected and cause automatic disconnect. Ample time is allowed for dialing second dial tones when required.

Powerful Toll Protection: One to four digit sequences can be restricted. For example, you could lock out 0, 1, 976 and 911. Additionally, digit counting will prevent dialing more than 10 digits. A separate 2 to 6 digit toll override code allows making toll calls when desired. Re-arm is automatic.

Dial Access Remote Base: The 8200 can be accessed and controlled from any telephone. Call up and drop into the system from your desk phone at lunch hour!



Ringout Selective Calling: Ordinary calls can be received using ringout (reverse patch) and mobiles can be selectively called using regenerated DTMF.

Optional ANI access codes: This option will allow up to 50 separate (remotely programmable) 1 to 6 digit access codes. A call can only be disconnected with the code that initiated the call. Thus eliminating sabotage disconnects.

AN ADVANCED REPEATER CONTROLLER...

The 8200 is a powerful repeater building block and is perfect for all private and club systems.

The 8200 contains everything necessary to convert any receiver and transmitter into a powerful repeater. Only one connection to the receiver and two to the transmitter are required.

Menu style programming is accomplished with the built in keyboard and display. The user can select a 3 digit repeater up/down code, CW ID message, CW ID interval, hang time, activity timer time, and you can even select any Morse character as a courtesy beep!!

An optional plug-in CTCSS board converts the 8200 to private use. The incoming CTCSS is filtered out and replaced with fully regenerated tone. 32 tones are dip switch selectable.

STANDARD FEATURES...

- Line in use detection
 - 90 number auto dialer
 - Redial
 - Hookflash
 - User programmable CW ID
 - Regenerated tone/pulse dialing
 - Selectable activity, timeout and hang time timers
 - 3 digit repeater on/off code
 - Two remotely programmable 1-6 digit autopatch connect codes. (Regular and Toll Override)
 - Powerful toll protection
 - Remotely controllable relay (relay optional)
 - Ringout (reverse patch)
 - Busy channel ringout inhibit
 - Ring counting
 - Auto answer
 - Telephone remote base
 - DTMF-DTMF selective calling
 - Courtesy beep (any Morse character)
 - Automatic busy signal and dial tone disconnect
 - MOV lightning protectors
 - Non-volatile memory
- And MUCH more!



CONNECT SYSTEMS INC.

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WELCOME NEWCOMERS

Walkies!

Have you ever met a ham who didn't own a hand-held transceiver? I doubt it. These radios, known as HTs, handie talkies, walkies, handhelds, squawk boxes, and goodness knows what else, are among the most popular playthings in the amateur radio hobby. They permit us to enjoy radio from any location. Thanks to **repeaters** (see below), a tiny walkie can provide communications over great distances, ranging from ten to several hundred miles! Above all, HTs are just plain fun.

Basics

Almost universally, walkies are **FM** rigs, with the clear, crisp audio associated with that form of modulation. They operate in the **VHF** and/or **UHF** bands, the 2 meter VHF band being the most popular. Their transmitters put out between 1 and 5 watts of **RF** energy, which may not sound like much but is very effective for local use, especially in conjunction with repeaters.

The typical HT has **digital memories** which store frequencies and other operating parameters, making operation easy. It has a rechargeable battery good for a few hours of use after each charge. It comes with a "rubber duck," which is a **helically wound**, rubber-encased, flexible antenna. It is fairly small, so you can clip it to your belt or even drop it in your pocket. It has a **DTMF** Touch-Tone™ pad which permits you to send tones over the air for telephone **autopatch** or other control applications. It may include a subaudible tone or **CTCSS** encoder, enabling access to repeaters which require it.

Psst . . . Pass it On

The key to the HTs' popularity is the proliferation of repeaters, which are automated stations designed to receive the handhelds' weak signals and retransmit them with much greater power. These stations, usually strategically located on a hill or tall tower, can often be heard up to 60 or more miles away. Due to their large, well-placed antennas, they can receive signals from nearly as far. A small radio with a **simplex** (direct station-to-station) range of only a few miles has the power and

range of the repeater, as long as it can reach the big station.

Who operates repeaters? Some are owned by individuals, but most are run by ham clubs. There are few areas in the United States without at least one repeater, and most towns have several. The **ARRL** publishes a directory listing them all in a thick little book.

Since a repeater transmits and receives at the same time, it must, of course, use different frequencies for the two functions or it would receive its own signal and quickly go to feedback heaven. The difference between the transmit and receive frequencies is called the **offset** or *shift*. Most repeaters on the 2 meter band use a 600 kilohertz offset, while those on the UHF bands use a 5 megahertz offset. On the 1¼ meter (220–225 MHz) band, the offset is 1600 kHz (1.6 MHz).

The transmit frequency may be higher or lower than the receive frequency. A **band plan** specifies **frequency pairs**, and few repeaters deviate from it. The HT, of course, transmits and receives on the same frequencies, but in reverse. Thus the handheld's transmit frequency is the same as the repeater's receive frequency, and vice versa.

Some repeaters provide functions beyond simple retransmission. One of the most popular extras is the **autopatch**, which allows connection to the landline telephone network. With it, you can make phone calls from any walkie equipped with a DTMF pad. Observation of the rule prohibiting business-oriented transmissions is especially important when using the autopatch. Other functions include voice-synthesized time, date, and signal reports, and even the ability to link multiple repeaters into a network permitting communication over hundreds of miles. Imagine using your handheld to talk with someone three states away while you walk down the street!

Miss Manners

Operating through a repeater requires etiquette altogether different from that used on the HF bands. Instead of calling **CQ**, you say "(your call) listening." Signal reports are given in terms of **quieting**, rather than strength; it's

impossible to know the originating station's strength into the repeater because you are listening to the retransmitted signal. A report of "full quieting" means you are coming through with no background hiss, while one of "70 percent quieting" means your signal into the repeater is scratchy.

Because only one station can use the repeater at a time, it is considered very discourteous to tie it up with long monologues. Short, succinct transmissions

keep the conversations flowing smoothly and promote acceptance and friendliness toward new users.

Getting Out

HTs are designed to be used on the go, so get out there and have fun. Bring yours along when camping, hiking, walking, or even shopping. And of course, what ham would be caught dead at a hamfest without his trusty walkie?

... Michael Jay Geier KB1UM

Glossary

ARRL The American Radio Relay League.

Autopatch A repeater function that permits connection to the landline telephone network.

Band plan A gentlemen's agreement regarding usage of frequencies within the band.

CTCSS Continuous Tone Coded Squelch System. *PL*™, "private line," is Motorola's trademark for CTCSS. Some repeaters use these tones to avoid reception and retransmission of unwanted signals.

CQ ("Seek-you") A CW abbreviation meaning "calling any station."

Digital memories Storage registers in HTs, used to hold frequencies and other operating data, such as offset.

DTMF Dual Tone Multi Frequency. The generic term for the tones produced by a Touch-Tone™ phone. Used for autopatch and repeater control.

FM Frequency modulation. Nearly all walkies, repeaters, and mobile rigs are FM. An FM receiver isn't sensitive to amplitude variations caused by impulse-type noise or fading signals.

Frequency pair The transmit and receive frequencies used by a repeater.

Helically wound Wound in a spiral shape, like the wire in a rubber duck antenna.

Offset The difference between the transmit and receive frequencies, also known as the *shift*.

Quieting The degree to which a received FM signal overcomes the background noise. A full quieting signal is the best possible signal.

Repeater Automated station which simultaneously retransmits signals on a frequency different from the frequency on which they were received.

RF energy Radio frequency energy. The radio wave spectrum begins at 20,000 Hz (cycles per second) and extends to beyond 300 billion Hz.

Rubber duck A flexible rubber-encased antenna with internal helically wound wire.

Simplex Receive and transmit on the same frequency.

UHF Ultra High Frequency. The UHF spectrum ranges from 300 to 3000 MHz. Amateur UHF bands are the 70cm (420–450 MHz), 33cm (902–928 MHz), and 23cm (1240–1300 MHz). 23cm is often considered a microwave band.

VHF Very High Frequency. The VHF spectrum ranges from 30 to 300 MHz. Amateur VHF bands are the 6 meter band (50–54 MHz), the 2 meter (144–148 MHz), and the 1¼ meter (220–225 MHz) bands.

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Contract: Just by reading this, you have entered into a binding legal contract. To avoid being prosecuted under every penalty provided by law, you will spend a minimum of two hours per week on ten meters talking with Novices and encouraging them. No excuses will be accepted. No exceptions. Ask questions—get them to talk—make hamming fun for them. Keep notes—a report will be required.

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DEPARTMENTS

FEEDBACK... FEEDBACK!

It's like being there—right here in our offices! How? Just take advantage of our FEEDBACK card on page 17. You'll notice a feedback number at the beginning of each article and column. We'd like you to rate what you read so that we can print what types of things you like best. And then we will draw one Feedback card each month for a free subscription to 73.

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Cover photo by Frank Cordelle
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See page 18 for more on this little wonder.

NEVER SAY DIE

Wayne Green W2NSD/1



How You Can Help Save Amateur Radio!

Here comes that confounded Gloom & Doom Wayne Green again. Sigh. Naw, au contraire, I cometh with solutions, not problems. Good solutions, too. Maybe even fun solutions.

I've always remembered the sign on the Director's door at a research institute where I studied forty years ago. It said, "Bring me solutions, not problems." Chap named L. Ron Hubbard—maybe you've read about him—made billions. It's a good concept.

Alas, before we plunge into the solutions, I should at least give some hints as to the problems. The bottom line problem is that we've had pitiful little growth in the last 25 years and, so far, no visible prospects for much more. We're watching our fellow old timers running our ham clubs and tottering around with their walkers at ham-fests, muttering to themselves.

I've heard all the rationalizations (which I'm sure you passionately believe) for why we aren't

attracting youngsters any more. It's the code. Kids have too many other interests today. They're too lazy. They're all into computers. Yep, all those things are true, but they're just excuses, they're really not the main problem.

W6NKE, in a letter in the *QCWA Journal*, said it. If we want to attract youngsters (or anyone, for that matter), hamming has to be fun. One only has to listen to the bands today to realize that operating isn't much fun anymore. Between DX pileups, where we have massive proof that intentional interference is alive and well, DX jamming, net jamming, repeater jamming and language which wouldn't even have been considered possible 25 years ago, if you want to interest someone in amateur radio you'd better not let them listen to our bands.

It won't be easy, but I believe we can fix the mess we've allowed to happen. As a matter of fact, it'll be fun fixing it. I think we can clean it all up—yes, even the DX pileups.

Okay, let's suppose we're actu-

ally able to clean up the garbage on our bands. Then where are we? Then we're left with the same old banal signal report contacts which have been amateur radio's quagmire ever since the hobby started. No, we've not only got to clean up our garbage, we're going to have to do it ourselves, without asking or expecting any help from the FCC, the ARRL or any other bureaucrats, and then we're going to have to set about making ham contacts actually interesting. Wow, what a concept! I believe we can do all this—and it'll be fun. You'll see. Now stop being a curmudgeon and see what I'm going to propose. Yes, I already can hear the whining arguments that it won't work. Baloney.

A couple years ago the gullible were convinced that the Novice Enhancement program was going to save amateur radio. Spoilsport Green said no, it won't. Now it's the no-code malarky. I don't care whether you are in favor of a no-code license or not, the present ARRL proposition is a hoax. It's a safe way to be in "favor" of no-code, all the while burning it at the stake. All the fire and fury will distract the membership from actually thinking, seems to be the theory. Good theory.

As I pointed out in my recent talk at the Huntsville hamfest, no-code today is a religious matter. It's something about which you have no facts, and that you believe in passionately. That's religion and we kill people who disagree with us on religious matters. Oddly enough, we don't seem as anxious to kill people over facts.

The proposed no-code salvation for American amateur radio meets the requirements for being a duck. It looks like the Canadian no-code license, smells like it, walks like it, sounds like it... by golly, it is a duck! The Canadians, for those of you who have been

continued on p. 82

CQ's Dastardly Attack on the ARRL

The amateur radio community was shaken to its foundations by the recent vicious and unprovoked attack by *CQ Magazine* (October 1989) against the ARRL. Tsk.

The *CQ* editorial took The League to task for wasting some \$600,000 or so on their new W1AW hamshack. Worse, instead of using ham gear, which they probably could have had for free, they spent top dollar buying commercial communications equipment.

What do we have to do, form a committee to stop these political attacks on The League? Obviously the *CQ* editors, motivated by greed, are trying to destroy our beloved ARRL. As an ARRL member with a 50-year pin proving beyond any question my total devotion to this great organization, perhaps I should head such a committee. Do I hear from any volunteers to start local chapters?

In the meanwhile I hope you will flood the *CQ* editors with letters expressing your revulsion and disgust at their sorry, bumbling attempt at sowing discord and distrust among true-blue ARRL stalwarts.

Heck, I say that if The League's directors don't think the Kenwood, ICOM, Yaesu and Ten-Tec gear is good enough for their paid commercial ham operators to use, I think we should respect their decision. Who would possibly know better than the ARRL and *QST* what equipment is best for a top-notch ham station?

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- MC-55 8-pin mobile mic.
- MC-60A/80/85 Desktop mics.
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- SP-41 Compact mobile speaker
- SP-50B Mobile speaker
- PS-430 Power supply
- MB-201 Mobile mount
- PG-2N Power cable
- PG-3B DC line noise filter

- PG-4H Interface connecting cable
- PG-4J Extension cable kit
- TSU-6 CTCSS unit

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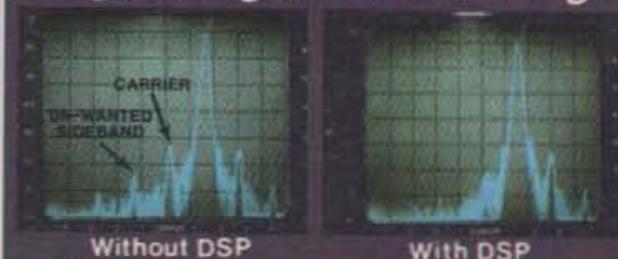


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The Ultimate Signal.



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Optional Accessories

- VS-2 Voice synthesizer
- SP-950 External speaker w/AF filter
- SM-230 Station monitor w/pan display
- SW-2100 SWR/power meter
- TL-922A Linear amplifier (not for QSK)

Specifications, features and prices subject to change without notice or obligation. Complete service manuals are available for all Kenwood transceivers and most accessories.



Smile for the Camera!

Have any color ham radio related photos—ham clubs, humor, etc.? Give'em world-wide exposure in the QRX column, one of 73's hottest departments. Any reasonable submissions stand a good chance of appearing here in the near future. No polaroids, please; we need prints from 35mm or better film. Make sure to send them to the attention of QRX.

Ham License Fees

The US House of Representatives passed and sent on to the Senate the 1989 federal deficit reduction bill that includes a \$30 fee for amateur radio licenses. The Senate is expected to act quickly on the measure and then send it along to President George Bush for his signature. Stay tuned for a full report.

UK Novice

The Radio Society of Great Britain (RSGB) proposed a pair of new entry level Novice class licenses for the UK. "Novice B" would be a code-free certificate with VHF voice privileges above 30 MHz. Passing a five wpm code test, to receive the "Novice A" ticket, adds phone privileges on 160 meters.

If the British Department of Trade and Industry gives its nod to the RSGB proposal, the applicant will have to take a 30-hour training course, given by a DTI-approved instructor. The RSGB says this would replace the Morse code test as a method of assuring the proper standards in the British Amateur Service. These licensees would be granted many emission modes applicable to the bands and band segments assigned to the current license class, but at a maximum power of only five watts. There would be no minimum age to get either ticket and both would carry a three-year renewable license term.

The RSGB says this proposal is based on a survey of its members up to age 25. They add that a Novice ticket is needed to help offset the severe shortage of skilled electronics technicians and engineers in the UK. The UK has a

no-code license, but it requires an extremely high level of skill to obtain.

If the DTI approves the RSGB Novice proposal, the UK will be second only to Japan in its liberalization of amateur licensing using no-code as an entry point.

PRB-1 Wins in Costa Mesa

Hams in this California city have something to cheer about: a new antenna ordinance that gives them a lot more than they expected.

For many years, the Costa Mesa city government told permission-seeking hams to put up whatever system they wanted. Several years ago, however, the city suddenly enacted a 30' maximum height ordinance. When the city decided that it was time to change the variance requirement, Fried Heyn WA6WZO appointed Art Goddard W6XD to promote a drive for a less restrictive ordinance. Goddard organized a mass turnout of hams to a Costa Mesa City Council meeting that lasted until 2 a.m. That motion was passed, and the Council also enacted a second motion that held off enforcement of any antenna ordinances against hams until there was one mutually agreed-upon by the City and the resident amateurs.

Heyn supplied to the Council, in September '88, PRB-1 material from attorney Wayne Overbeck N6NB and an emergency communications news story about Costa

Mesa resident Gordon West WB6NOA. This led to a second City Council meeting. The Costa Mesa City Attorney felt that the terms of PRB-1 took precedence over anything the city might want. As a result, Costa Mesa agreed that its current ordinance was not within federal pre-emption guidelines. Heyn, Overbeck and Goddard met with local hams and city planners to work up an ordinance acceptable to both.

In mid-August, that proposal went before the City Council which passed it with little discussion. It calls for a maximum antenna height without variance of seven feet, grandfathering of all existing towers and antennas as long as they are registered with the city before May 1990 and exclusion of any antenna weighing 80 pounds or less. The city even took the unusual step of writing to each ham living in Costa Mesa detailing the new and more liberal ordinance!

Pirate Taxi Dispatches

The New York City FCC office asks the help of area hams to rid the 10m amateur band of illegal taxicab dispatch services. Hams in the Northeast have been outraged by the indifference of the NYC FCC office to this problem. The illegals even threatened one ham's life.

Kevin McKeon, Engineer in charge of the NYC Field Operations Bureau, inspected many cabs in May and June, which led

to the closing down of some illegal dispatch stations. The problem is far from licked, though, and the FCC asks for your help. If you have any info on the illegal operators' identities, their hours of operation, their locations, addresses and/or vehicle license numbers, please send it to the NYC FCC, 201 Varick Street, New York, NY, 10014.

Court Appeal to Save 220-222 MHz

The ARRL went to court to stop the reallocation of the lower 40% of the 1 1/4 m band to commercial service. League Counsel Chris Imlay N3AKD filed the petition to review the FCC reallocation order, in joint cooperation with a second Washington law firm that specializes in these matters. The petition demands that the US Court of Appeals for Washington DC set aside the reallocation of 220-222 MHz over to Land Mobile services and then to remand the matter to the FCC for re-disposition. In its filing, the League claims the reallocation action was arbitrary, capricious, and an abuse of discretion. Case number 89-1602 has been assigned by the court.

Ham Wins Grammy

The National Academy of Recording Artists and Sciences recently honored Larnell "Stu" Harris WD4LZC, of Louisville, Kentucky, for the best male performance by a gospel singer. Harris received his award at the 31st annual Grammy Awards Ceremony in Los Angeles.

Big Thanks

... to Westlink Report, David Black KB4KCH, and Roy Neal K6DUE, for furnishing this month's news items. Keep your ham radio-related news items and photos rolling in to 73 Magazine, WGE Center, Forest Rd., Hancock NH 03449, Attn: QRX. You may also submit text as E-Mail to the Sysop on the the 73 BBS, (603) 525-4438, 300/1200 baud, 8 data bits, no parity, and one stop bit.

Harrison Indicted

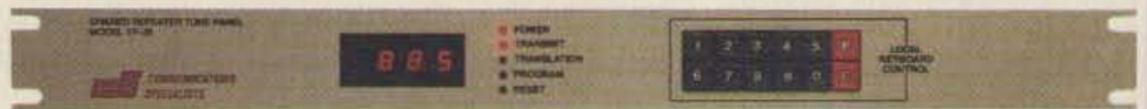
An Oceanside, New York ham faces a possible maximum sentence of 250 years in jail and 12.5 million dollar fine if convicted on all 50 counts of alleged mail fraud. Michael D. Harrison WB2PTI was indicted by a Grand Jury of the US District Court on charges of mail fraud. The indictment states Harrison placed full-page ads in amateur radio journals claiming that the long defunct Atlas Electronics had joined forces with Uniden to bring out the very popular HR-2510 10m mobile rig. The ad indicated that Atlas operated out of a post office box in Lynbrook, New York and offered the transceiver for only \$220. The government says that Harrison never delivered the promised radios even though he received a substantial number of prepaid orders, including one for over \$3,000. On 26 January, Harrison was arrested and charged with mail fraud. He was released after posting a \$25,000 bond. No trial date has yet been set and prosecutors say that the full dollar amount of the alleged swindle may never be known.



Catch of the day!

Have you been trawling the bounding main for a new product? We have just netted it—the TP-38 microprocessor controlled community repeater panel which provides the complete interface between the repeater receiver and transmitter. Scuttle individual tone cards, all 38 EIA standard CTCSS tones are included as well as time and hit accumulators, programmable timers, tone translation, and AC power supply at one low price of \$595.00. The TP-38 is packed like a can of sardines with features, as a matter of fact the only additional option is a DTMF module for \$59.95. This module allows complete offsite remote control of all TP-38 functions, including adding new customers or deleting poor paying ones, over the repeater receiver channel.

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CIRCLE 10 ON READER SERVICE CARD

VOX for HTs

VOX circuit for the IC-2AT and other HTs.

by Thomas E. Warfel KA8HML

The classic ICOM 2AT is the "VW bug" of amateur radio: It's reasonably priced, rugged, and reliable. Unfortunately, there have been no commercial VOX units for it. This article presents a small, low-power VOX circuit for an ICOM 2AT, or just about any other handie-talkie, which you can build using standard surface-mount components.

Circuit Overview

To minimize power consumption, I used a Texas Instruments TLC1079 IC, a quad low-power, low-voltage op amp. Each op amp forms the core of one of four sub-circuits that together make up the VOX. One acts as a buffer to reduce the combined load of the VOX and radio on the microphone, while the other three form the actual voice-detect/switching circuit. See Figure 1.

IC-1B isolates the microphone from the radio. This way, when the transmitter engages, it doesn't change the load at the audio input to the VOX. Note that C4 acts to remove the DC bias from the output signal being fed to the radio. This is important because, while the AC component carries the audio, it is the DC component (switched by Q1) that actually switches the transmitter on and off.

The remaining three op-amps are used only to detect the presence of speech, not to pass speech faithfully. The first VOX stage is an audio filter designed to pass frequencies from about 100 Hz to 800 Hz while providing a net gain of around 50. This is adequate to amplify speech while reducing the likelihood of picking up stray audio noise.

The second VOX stage is little more than a comparator. When the incoming signal (the sum of the DC virtual ground plus the AC amplified/filtered audio signal) exceeds the DC threshold set by R10, R12, and R13, the output of IC-1D goes high. This threshold level, the VOX sensitivity, is adjusted by potentiometer R12 and stabilized by C10. Not all speech sounds will be loud enough to exceed the threshold; maybe only twenty percent or so will cause triggering.

The third VOX stage is needed to "prolong" the pulses from the second VOX stage

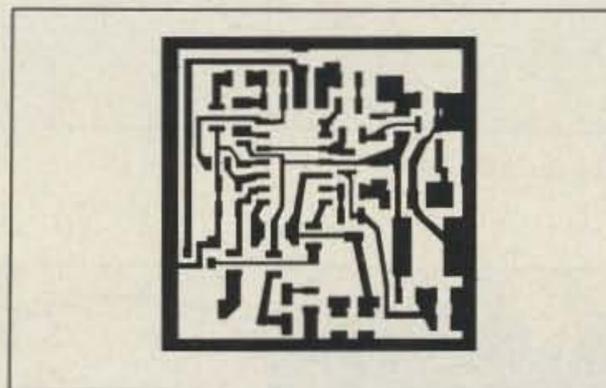


Figure 1. 1:1 printed circuit board etch-resist pattern.



Photo A. How the author mounted the VOX with switch and battery. The "belt clip" is formed from two press-on cable guides.

so that the transmitter stays on, rather than just pulsing on and off. R16 adjusts how long the VOX stays on per triggering. The ICOM 2AT is keyed by pulling the microphone line low through Q1.

Constructing the Circuit

The IC is a static-sensitive device, so use a grounded iron if possible. Since the components are small and the circuit traces even smaller, a low-wattage iron generates more than enough heat for these purposes. Unless it's temperature-regulated, anything over 30 watts is likely

to lift traces off the circuit board.

Most of the challenge of building with surface mount components is putting the devices where you want them. You will need a free-standing magnifying glass (or some other kind of hands-free magnifier), clean tweezers, small diameter rosin core solder, and thin "unsoldering" copper braid. Avoid vacuum-type desoldering tools; they tend to suck up components as well as solder. Taping down the corners of the circuit board makes soldering much easier.

Solder the parts directly; don't glue them down first. Tin the copper foil pads, gently position the component on the board with your tweezers in one hand, and touch the tip of the iron to the pad with your other hand. When soldering the IC, use as little heat (and solder) as possible, and wait at least ten to twenty seconds between soldering each pin. The "D" SOIC (Small Outline Integrated Circuit) package is smaller than a normal IC, so the heat dissipation is less than a normal IC as well.

Assembling the Circuit

Go slow when soldering the parts on the board. It takes me about three hours to assemble one board; allow twice as much time if you're new to surface-mount technique. Refer to Figure 3 for parts placement.

Follow this sequence for smooth assembly:

1. Install the two jumpers J1 and J2.
2. C1, C12, C16 (100 pF). Make sure C16 is not bridging any adjacent circuit traces.
3. C15 (1000 pF).
4. C2, C4, C6 (0.1 μ F).
5. C3, C13 (220 pF).
6. R1 (5.6k); R4, R5 (100k); R6, R14 (1 M).
7. Diode D1—use voltmeter to verify device polarity!
8. C5 (10 μ F to 30 μ F). Note that the end with the white band is toward the center of the board, not the edge.
9. R2 (1k); R3 (2.2k).
10. If you haven't done so yet, take a break!
11. R15 (1 M); C11 (.47 μ F)—white band points inward; R10 (2.2 M); R17 (100k).

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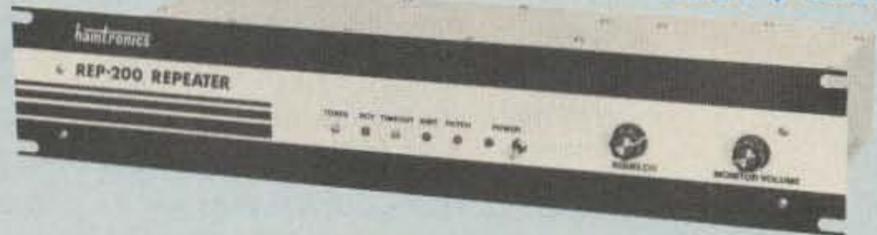
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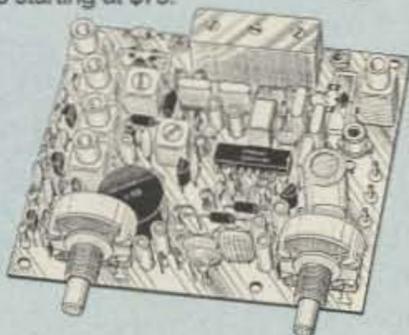
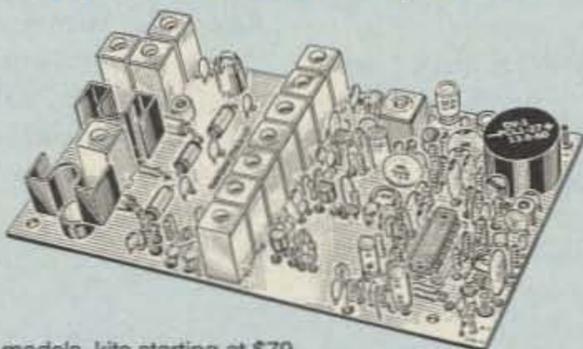
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• R901 902-928MHz FM RCVR.

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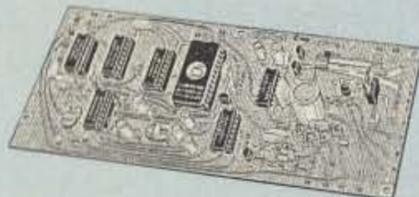
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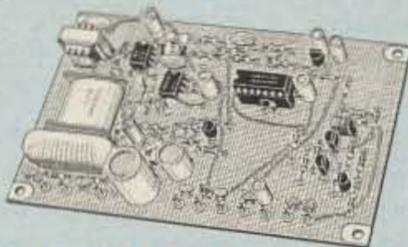


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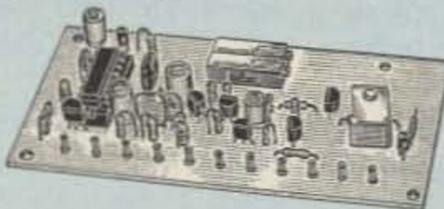
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LNS-(*) IN-LINE PREAMP

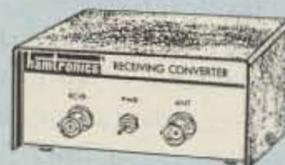
ONLY \$79/kit, \$99 wired/tested



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- *Specify tuning range: 120-175, 200-240, or 400-500 MHz.

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CIRCLE 5 ON READER SERVICE CARD

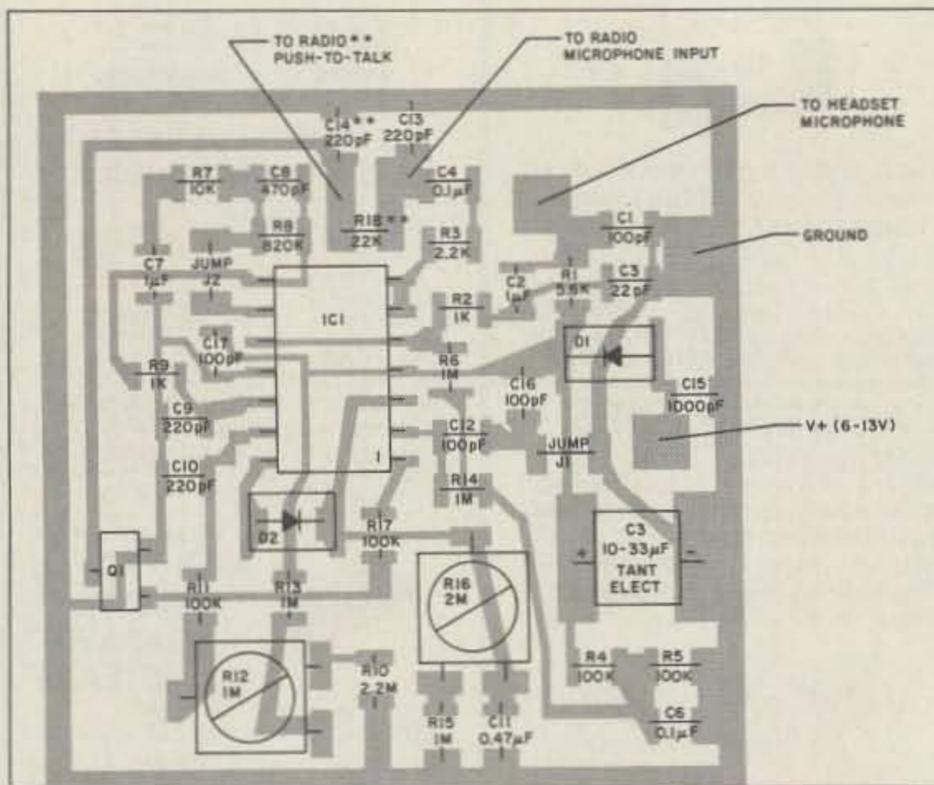


Figure 3. Parts placement diagram.

ly. Slowly rotate R16 clockwise until the pin 1 stops bouncing and just stays high. Stop speaking and verify that pin 1 goes low again. The VOX circuit assembly is now complete.

Installation and Use

There are times when a headset/PTT arrangement may be more appropriate than VOX. I wired my VOX unit with a 3-way toggle switch, an Augat Alcoswitch CST-023TA, to easily switch between the two. Center is off, one side is momentary PTT, and the other side is VOX.

I used a DP3T instead of a DPDT-center off to avoid keying the transmitter when turning the VOX off. Merely turning off circuit power essentially turns the microphone off. This generates electrical noise which is picked up by the VOX as if it were a sound spoken by a person. As the circuit consumes so little power, the residual charge left on C5 (the despiking capacitor) can easily switch the transmitter on for a moment. Ideally, one would solve this problem by using a resistor/capacitor combination to buffer microphone power separately from circuit power. In this way microphone power would stay on just a

bit longer than circuit power when the unit is turned off, thereby avoiding the "noise." Unfortunately, this would require around a 220 μ F capacitor, which is larger than the rest of the circuit! With a DP3T switch, you can instantly quiet the circuit by draining C5 as soon as you disconnect power. See Figure 5 for details.

I mounted the entire assembly (VOX, switch, 9 volt alkaline battery, jack for the HS-10 headset) in a 3.75" x 1.25" x 2" blue plastic Unibox and added a belt-clip. The circuit itself takes very little space; it's the battery, wires, switch, and headphone jack that take up the room.

Other Radios

You can use this same VOX circuit with other handi-talkies with only minor alterations. Yaesu HTs have the same type of PTT detections as the ICOM and can work unmodified.

Kenwood HTs have a slightly different means of detecting a PTT condition with their external microphone. To use this circuit with a Kenwood HT, install VOX component C14 instead of R18, and then wire the "To-radio-push-to-talk" pad to the Kenwood PTT line (microphone jack "ground") and the "to-radio-microphone-input" pad to the radio microphone-input line. The VOX circuit ground must then connect to the external speaker ack ground (and not to the external microphone jack "ground" connector).

Conclusion

The final circuit is roughly

Parts List for the 2M VOX

| Component | Value | Supplier/Part ID | Each | Total |
|--|--------------|----------------------------|------|-------|
| R2, R9 | 1k | Garrett MCR10JW102 | 0.14 | 0.28 |
| R3 | 2.2k | Garrett MCR10JW222 | 0.14 | 0.14 |
| R1 | 5.6k | Garrett MCR10JW562 | 0.14 | 0.14 |
| R7 | 10k | Garrett MCR10JW103 | 0.14 | 0.14 |
| R18 | 22k | Garrett MCR10JW223 | 0.14 | 0.14 |
| R4,R5,R11,R17 | 100k | Garrett MCR10JW104 | 0.14 | 0.56 |
| R8 | 820k | Garrett MCR10JW824 | 0.14 | 0.56 |
| R6,R13,R14,R15 | 1 M | Garrett MCR10JW105 | 0.14 | 0.56 |
| R12 | 1 M pot. | Garrett G4E105M | 1.98 | 1.98 |
| R16 | 2 M pot. | Garrett G4E205M | 1.98 | 1.98 |
| R10 | 2.2 M | Garrett MCR10JW225 | 0.14 | 0.14 |
| J1,J2 | 0 Ω | Garrett MCR18JW000 | 0.08 | 0.16 |
| C1,C12,C16,C17 | 100 pF | Garrett 0805N101J101 | 0.28 | 1.12 |
| C3,C4,C10,C13,C14 | 220 pF | Garrett 0805N221J101 | 0.30 | 1.50 |
| C8 | 470 pF | Garrett 0805N471J101 | 0.30 | 0.30 |
| C15 | 1000 pF | Garrett 0805N102J101 | 0.35 | 0.35 |
| C21,C4,C6, C7 | 0.1 μ F | Garrett 08052104M500 | 0.25 | 1.00 |
| C11 | 0.47 μ F | Garrett 1812B474K500 | 1.25 | 1.25 |
| C5 | 33 μ F | Garrett 267M1602336M | 1.68 | 1.68 |
| Q1 | 2N3904 | Garrett MMST3904 | 0.30 | 0.30 |
| D1,D2 | 1N4148 | Garrett RLS4148 | 0.15 | 0.30 |
| IC-1 | TLC1079ID | Marshall Industries | 7.25 | 7.25 |
| DP3T | momentary | Augat Alcoswitch CST-023TA | 2.50 | |
| PC board, battery clip, mounting case, headset jack, radio plugs, wire | | | | 12.00 |

Parts Suppliers

Garrett IEU, Inc.
3130 Skyway Dr., #104
Santa Maria CA 93455
(805) 922-0594

Marshall Industries
in Pittsburgh PA
(412) 788-0441

Augat/Alcoswitch
(call for local distributor)
1551 Osgood Street
North Andover MA 01845
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Northport NY 11768

1.2" by 1" wide, draws less than 0.5 mA, and is relatively resistant to ambient RF. Total cost of parts and mounting, excluding the headset, is around \$40. Circuit boards and parts kits are available through the Carnegie-Mellon Amateur Radio Club. Send an SASE to Tom Warfel, CMUARC, 414 South Craig St. #176, Pittsburgh PA 15213. **73**

Thomas E. Warfel, licensed as a Novice in the late '70s, currently holds an Advanced license. He graduated cum laude in Electrical Engineering in 1988, and is now in his second year as a medical student. His address is 120 Ruskin Ave., #603, Pittsburgh PA 15213.

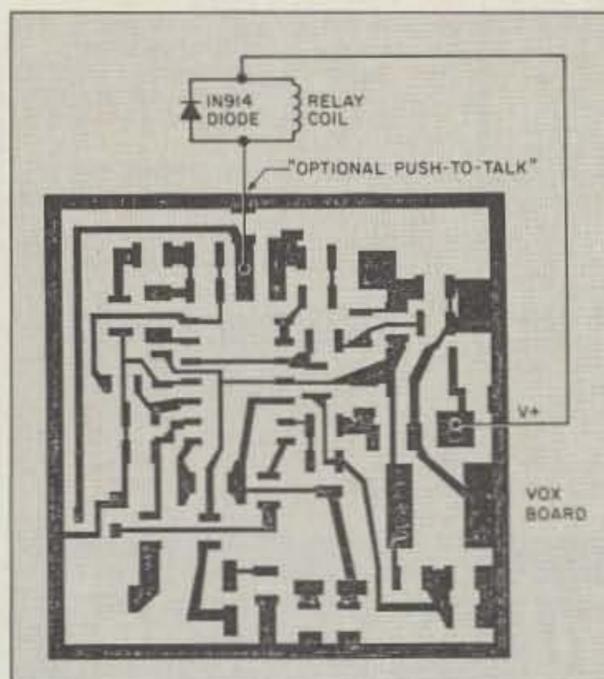


Figure 4. Connecting a relay to the VOX board.

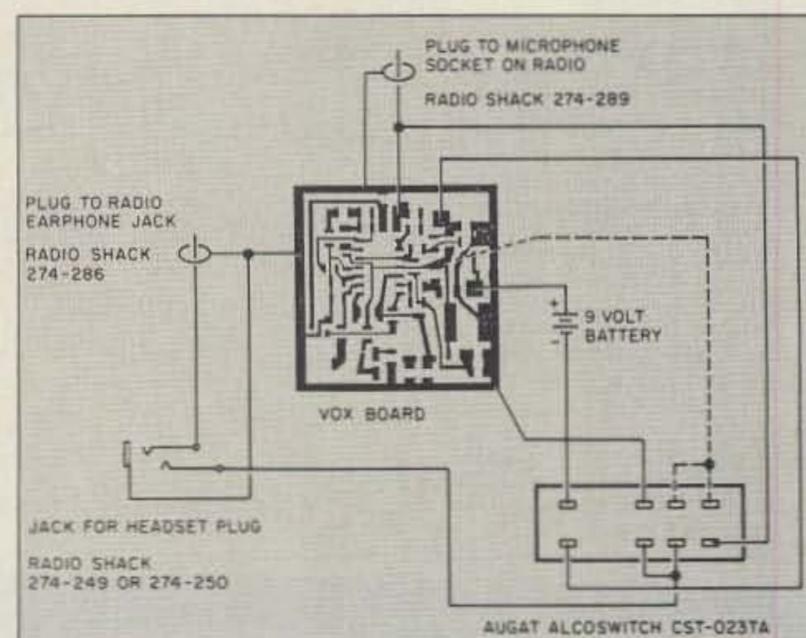


Figure 5. Putting it all together. This shows how I wired my VOX to my ICOM 2AT so that by throwing the switch in one direction, I had VOX, center was off, and the other direction was a momentary PTT.

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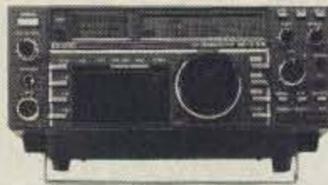
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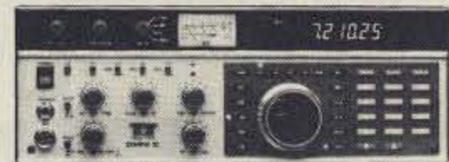


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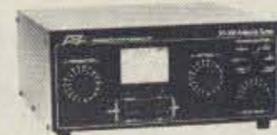
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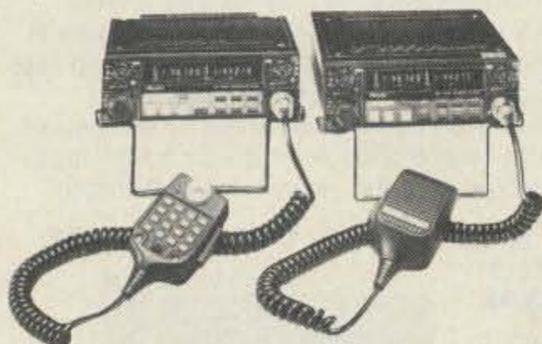
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Linda Reneau KA1UKM. Linda is 73 Magazine's Senior Editor.

Nurse, Author, Poet, Ham

Linda Reneau KA1UKM has been an editor at 73 Magazine for two years. Last summer she got her Novice license and continues to study for an upgrade. As an adolescent, she was an SWLer and science fiction fan. She belonged to the Astronomy Club of Kansas City, Junior NASA, and

the Civil Air Patrol. One of her goals is to start a dream discussion net.

At present, she reads about two SF books a week and is active in astronomy. For physics, she reads Fred Wolf's intriguing books. She's lived in Louisiana, Missouri, New York City, Arizona, Alaska, California, and now New Hampshire. Besides writing and editing, she's worked as a nurse, firefighter, and bookkeeper, among other things.

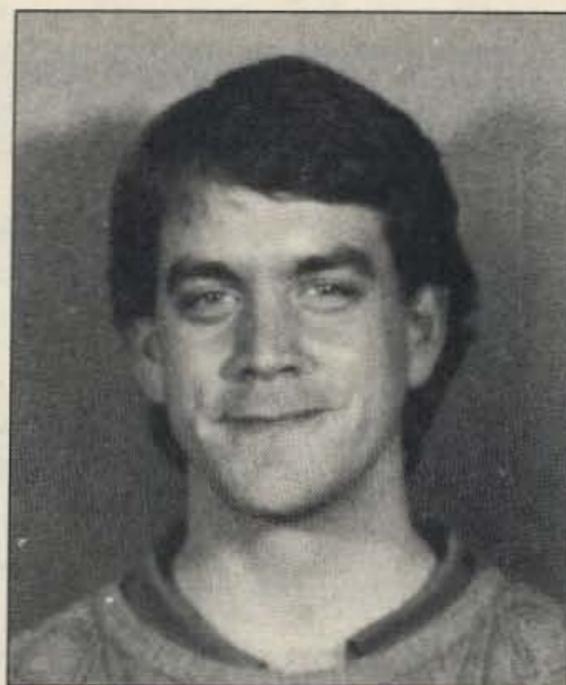
Recently she completed a book, *A Manual of Dream Art/Science. To the Sky*, a book of poetry, was published in 1984 by Orca Press in Alaska. Other poems have been published in anthologies, and many articles on dream studies have been published in *The Dream Network Bulletin*. She is currently working on a new book, *Dreaming for Spiritual Growth*.

"Da Schmooze"

Jim Bail KA1TGA is a ham with many interests and talents. He was once an aspiring college and semi-pro baseball player. Before graduating from college, he travelled to Germany to open a white-water rafting program for the AFRC (Armed Forces Recreation Command) and in his spare time was a mountain climbing guide in the Bavarian Alps. After teaching environmental education at an outdoor education school in Trinity, Texas, he spent a season as mainsail driver on an ocean racing yacht.

His first job in the communications field was as "Sky Watch One," an airborne traffic reporter for KTRH newsradio in Houston, Texas. He then moved to WKBK radio in Keene, New Hampshire, where he was News Director and hosted a talk show where he interviewed presidential candidates during the 1988 campaign. He has worked for 73 Magazine for two years and is now an advertising sales representative.

Jim is a community volunteer for the Contoocook Valley (NH)



Jim Bail KA1TGA. Jim is a member of the 73 Magazine advertising sales team.

High School's solar racing car and Amateur Radio Club and a member of the Board of Directors of the Red Cross. He will also coach an area Babe Ruth baseball team where he hopes to have a winning season AND to expose his team to the excitement of amateur radio.

Jim is not the only ham in his family. His late grandfather W8BWD, his father NV3J, and his brother N8KIR share and pass on their enthusiasm for the hobby. **73**

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73 Review

by Michael Jay Geier KBIUM

Yaesu FT-470

2m/70cm HT

Yaesu USA
17210 Edwards Road
Cerritos CA 90701
Tel. (800) 999-2070;
(213) 404-2700.
Price Class: \$500

Dual-band fun in an HT only slightly larger than the FT-411.

Yaesu introduced the first dual-band walkie a few years ago. The FT-727R, though somewhat large and power-hungry, was an instant success, and many are on the air today. Recently, miniature dual-banders have begun to appear, and Yaesu is once again at the forefront of the technology with the introduction of the FT-470.

Resembles FT-411

The 144/440 MHz FT-470 is patterned after the highly successful FT-411 series of single-band walkies, and it's impossible not to compare the two rigs. The '470 has the same basic look, a very similar keypad function layout, and a slightly longer and thicker case. It uses the same batteries, mikes, and most of the other accessories.

Small, Powerful Battery

The battery was the first thing I noticed when I opened the box. It was about 1/2-inch shorter than the FNB-10 which was shipped with my '411. A glance at the back, however, revealed that it had the same 7.2-volt, 600 mA-hour capacity. As it turns out, it even uses the same charger! There is no electrical difference between the two packs. I immediately ordered one for my '411, and I love it; now the rig is truly pocket-sized, with no compromise in performance. If you want to get one, the battery's model number is FNB-17.

The FT-470 is small as dual-banders go. It's about one inch longer than the '411. The supplied YHA-28 duck is actually longer than the radio! By the way, the duck is flexible and appears very well made. The rig fits comfortably in my hand, and the keys are larger and easier to press than those on the '411.

Simultaneous Monitoring

The top of the radio has four controls: squelch (which operates on both bands simultaneously), volume, balance (concentric with the volume control), and the "dial" knob. The balance control adjusts the relative volumes of the two bands. That's right, you can monitor both bands at once! Also on top are the mike and earphone jacks and, of course, the antenna connector.



The Yaesu FT-470 dual-band HT.

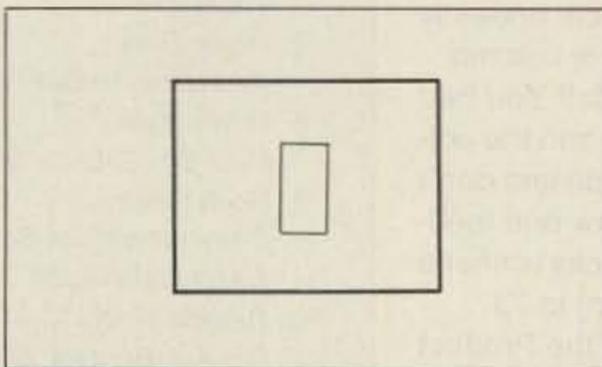


Figure 1. The Kaboom Audio Enhancer for the FT-411 (June '89) works equally well for the FT-470.

The left side houses the rubber buttons for the PTT, squelch monitor, and lamp. As for the '411, the lamp lights the keypad as well

as the LCD. I find this very handy for night operation.

All other functions are performed from the keypad. In addition to the usual sixteen keys, there are four more, permitting you to do some commonly-used operations without pressing the FUNCTION button. This arrangement is especially nice for the REVERSE function, which requires only one keypress, instead of the two used on the '411.

Another improvement is the separation of the keypad lock and PTT lock into two keys. Now you can lock the PTT without locking the pad.

The LCD is large and easy to read. The numbers and icons are clearer than the '411's. Both the main band and sub-band are shown, with the main band's frequency on the left in large numbers, and the subband's on the right, in smaller numbers.

Yaesu opted for a 5 1/2-digit display. The half digit refers to the kHz display. Rather than a zero or a five, there is just nothing for a zero, and a small block which shows "50" for a five. This is somewhat disconcerting when entering frequencies from the keypad, because the display looks the same (for frequencies ending in a zero) before and after you've entered the last digit. Actually, the decimal point only comes on when you finish the entry, but it's easy to overlook. Several times I was unsure whether or not I had entered all the digits. There seems to be no advantage to this kind of display.

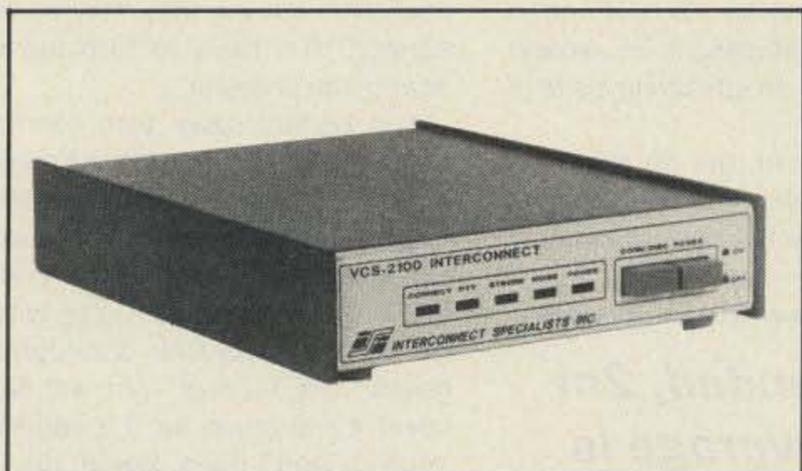
The FT-470 includes nearly all the features of the '411. The only thing missing is the vox circuit, which few of us are likely to use, anyway. Of course, there are new features related to dual-band operation. The BAND key transposes the main and subbands. The SUB key turns the subband on and off. The ALT key allows the rig to alternate between bands during memory scanning.

Memory Functions

The rig has two memory banks, one for each band. Each bank contains 20 memories, any of which can hold odd splits, and the frequency and status of the included CTCSS encoder/

BEST

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decoder. Two memories in each bank set upper and lower scan limits. Memories may be locked out from scanning, or hidden entirely.

Each band also has a "call" memory, accessible from the CALL key. This memory is just like the others, except that it doesn't get scanned, and you can access it with one key-press. It's especially handy for simplex and hamfest use. It shares one quirk with the '411: If you turn the dial on top of the radio while you are using the call memory, it transfers the frequency to the VFO, trashing whatever was there. The regular memories don't do that.

There are two VFOs for each band, for a total of four! That's a lotta VFOs. Of course, you can never be too rich, too thin, or have too many VFOs, and in a pinch, you can use them like extra memories.

As on the FT-411, memory management is very flexible. Memories can be fixed or tunable, and you can perform various kinds of scanning and priority operations. But this radio can do all of it on two bands at once! You can be memory scanning on 2 meters while band scanning with sequential priority watch on 440! It may sound confusing, but it's easy to do. A multitasking microprocessor with the usual lithium battery backup makes it all possible.

The DTMF pad has a ten-number autodialer. The '411 also has this feature, and I have grown to love it. If you're in walkie range of the repeater, you'll find yourself using it to dial friends while you drive, instead of trying to manually key the autopatch codes and phone number into your mobile rig.

Radio Performance

The receiver and transmitter operate well. The receiver seems considerably more sensitive on VHF than the '411's, especially for public service band scanning. The NOAA weather channel, which is fairly weak on my '411, is full quieting and nearly full scale on the '470's LCD S-meter.

There isn't much 440 activity here in northwestern Vermont, so it is hard to check sensitivity on that band. The local repeater, however, comes in fine. The transmitter sounds crisp on the air. With the supplied battery, it puts out 2.3 watts on both bands. At 12 volts, you get 5 watts. A "low" position cuts the output down to much less, saving battery power. Interestingly, the high/low setting is specific to each band. For instance, you can be set for high on 2 meters and low on 440, or any other combination you desire.

The FT-470 can operate full duplex because it continues to receive on the subband even while transmitting on the main band. Hearing the receiver come to life while you're transmitting is an eerie experience that takes some getting used to. If you add a connection from the earphone jack to the mike jack (with appropriate attenuation, of course), and key the PTT, you've got an instant crossband repeater! [Ed. note—The author recently became aware of a crossband repeater function, programmable from the rig's keypad by turning on the HT while depressing the RPT key. Tests performed at 73 HQ, in which I and Jim KA1TGA QSOed via the 470 using a 2m HT and 70cm

base station, respectively, confirmed the existence of this function. We also confirmed KB1UM's claim that the rig is locked in low power in this mode. (This was likely set since the high power setting in this mode could lead to receiver desense.) It also appears that Michael's suspicion is true that the audio between bands in this mode is acoustically coupled (that is, the audio passes from speaker to mike), since audio quality is considerably poorer at the end receivers when signals are 470-repeated, than it is when the end rigs receive signals directly, and when the 2m HT received a 2m signal from the 470 via the W2NSD/R repeater. Look for KB1UM's mod for better TX/RX signal coupling in crossband repeating with the 470 in an upcoming issue of 73. . . Bryan NS1B]

As received from Yaesu, the rig only covered 144–148 MHz. There was no extended coverage, and nothing in the book about how

"Once extended, 2m receive coverage is 130–180 MHz, and transmit is 140–150 MHz. UHF coverage is 430–450 MHz."

to extend it. I tried the reset procedure used on the '411, and after about five tries, it worked! If you need to extend the receiver, just turn off the rig; hold down both arrow keys; then turn it back on. If it still tunes only 144–148, do it again until it works. Of course, all the frequencies in memory will be lost and require re-entry. Once extended, receive coverage is 130–180 MHz, and transmit is 140–150 MHz. UHF coverage is 430–450 MHz. I am not aware of any way to extend it.

Problems

The FT-470 is a very nice radio. It has advanced features and, with its ability to monitor both bands at once, is like having two radios in one small, handy box. There are some problems, however, about which you should be aware, to make your operation as smooth as possible.

When monitoring both bands at once, the IF "whoosh" noise from the band not being received leaks into the audio of the received signal. It's not nearly as bad as if the squelch were truly open on both bands, but it is fairly objectionable.

There are two ways to avoid this. You can either turn the subband off (which is fine if the signal you're receiving is on the main band), or you can rotate the balance control toward the band you want.

By the way, there is no indication on the display of which band is being received! If you're monitoring both bands and you get a call, you must either rotate the dial or turn off the subband to see on which band the signal

lies. Otherwise, you may respond on the wrong band! In future models Yaesu should consider using a blinking dot or other icon next to each frequency to neatly avoid this kind of confusion.

On the FT-411, rotation of the dial temporarily disables the battery saver, so that you can hear channel activity as you pass through the frequencies or memories. On the '470, that function was omitted (although the saver disables properly during automated scanning operations). Thus, you can turn the knob through all your memories, or a segment of the band, and the frequencies will appear vacant even though they may be bursting with activity! You have to turn the saver off to correct the problem.

The battery saver also seems to "miss" sometimes, taking up to ten times as long as it should to notice a signal. I've seen it wait as much as ten seconds before opening up on a signal that was there the whole time. I suspect that it doesn't wake the rig up long enough for the PLL to reliably lock, although that's only a guess. The receive light will flash on each saver cycle (such as 0.5 seconds), but the squelch won't open. Again, the fix is to shut the saver off.

As on the FT-411, the receive audio is not very good. The '470 has the same speaker and grille, and benefits greatly from the Kaboom Audio Enhancer described in my FT-411 review (73, June 1989). (See Figure 1.)

The audio makes a substantial "pop" when the squelch opens, which makes it painful when using an earphone. It's no big deal, however, in normal speaker operation.

As on the '411, the low battery icon gives almost no warning at all before the battery dies. I clocked it at 20 seconds from the time the icon blinked (during transmit on high power) to total radio shutdown.

The rig has the same annoying keypad beeper, with its double beeps and tunes. You can turn it off without losing the AUTO POWER OFF warning beeper.

There's a rubber plug flush with the right side of the rig. Pulling it revealed a hole obviously meant for a coaxial DC power jack (which would be nice to have). Yaesu currently doesn't install this jack on the '470.

Future Fixes

I spoke with Chip Margelli, Vice President of Marketing for Yaesu USA. He confirmed the company's awareness of the squelch leak and battery saver problems, but said that there were no fixes at this time. He did say, however, that when solutions became available, Yaesu would fix any FT-470s sent to them.

Conclusion

All in all, the '470 is a very nice radio. If you don't plan on lots of dual-band monitoring, and are willing to work around the battery saver, you'll probably be very happy with it. It's small, powerful, and offers more flexibility than you're ever likely to need! **73**

Michael Geier KB1UM is 73's troubleshooting "Ast Kaboom" columnist. You can reach him at 7 Simpson Court, S. Burlington VT 05403.



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Two Meter Mobile Rig

Turn your HT into a 40W, 2m mobile rig.

by Mike Gray N8KDD

The Problem

For several months I had been using my 2 meter HT as a mobile rig. It worked, but I complained frequently about the low RF power, poor audio quality in a mobile environment, and the tiny extension microphone. I really wanted a rugged mobile rig, but I couldn't justify the expense.

The Answer

My solution was to construct a "module" consisting of an RF power amplifier, a comfortable microphone, and a large speaker. Construction was easy and the cost low. I was able to salvage several of the components.

The enclosure is an extruded aluminum box with removable panels and circuit board slots. The external dimensions are 6.5L x 5.5W x 2.5D. You can buy a similar enclosure at the larger electronic supply houses or through the mail.

I simply drilled appropriately-sized holes in the end panel for the connectors and perforated the top panel to serve as a speaker grill.

Amplifier Assembly

The amplifier is a kit from Ramsey Electronics. Performance is just as advertised, and assembly was easy. I have a few complaints, however.

The instructions are complete, but not clear. The text is partially handwritten, and if you follow the order of component installation, you end up having to do some desoldering. It's best to fit the parts on the board first, then decide on the order of assembly. I found that the kit came together the most easily in this order:

- 1) RF transistor
- 2) Trimmer capacitors
- 3) Inductors (coils)
- 4) Coaxial cable

I also bought the optional RF-sensed relay kit, which includes a nice pre-tinned circuit board. The relay in the kit will work, but I decided not to use it because it appeared to be too fragile for the task. The terminals were loose in the base, and it was difficult to distinguish one contact set from another. I used a better looking (and more expensive) relay obtained, along with the aluminum enclosure, from Newark Electronics, 4801 N. Ravenswood Ave., Chicago, IL 60640-1084; (312)-784-5100. The relay is a general purpose type made by Potter Brumfield.

It is important to install a large aluminum heat sink on the amplifier board and attach it to the enclosure.

Speaker and Relay

I installed a 3-inch speaker in the aluminum enclosure, attaching it with butyl tape. This installation method may raise a few eyebrows, but it's really a very good way to mount a speaker to an irregular surface. Butyl tape is a bead of very sticky rubber compound used to install windshields. Most glass shops use less than one roll per job, so they have many partial rolls as scrap. A whole roll costs about five dollars, and it has many uses. Cut butyl tape only with a pair of diagonal cutters. The tape will stick to scissors, and you can't tear it off.

Peel some tape off the roll and stick it around the perimeter of the speaker. Determine placement in the enclosure, then carefully press the speaker into place. Be sure you have it in the right place before pressing—removal is difficult!

The relay I chose has 4 contact sets. Only two were needed for the RF, so I used the other two for TX/RX indicators. I used two LEDs because I had them, but one LED which would change color as a function of polarity would be neater.

The Microphone

You'll likely pull a mike off of an old CB rig. Most CB microphones are 600-800Ω. Measure the resistance of an unknown mike with an ohmmeter. The PTT switch and microphone element are in series, and the correct pins can be determined by finding the two which have a resistance of 600-800Ω with the PTT switch depressed (or take it apart and look at it). Yaesu HTs have an audio input impedance of 2200Ω. Consult the

manufacturer or owner's manual for the input impedance of other radios. Then, add a resistor between the radio and microphone, equal to the *difference* between the impedance of the microphone and the impedance of the radio.

In my case, I had to install a 1.6kΩ resistor in series to match the radio's 2.2kΩ input impedance:

$$\begin{aligned} &\text{Audio input impedance} \\ &- \text{Microphone impedance} \\ &= \text{Resistor value} \\ &2200\Omega - 600\Omega = 1600\Omega \end{aligned}$$

The pin assignments are industry standard. Connect the pins on the left side (as viewed from the pin-end of the cord connector) of the index key to the audio input (see Figure 1).

I then removed the mike connector, speaker, and SO-239 connector from the CB radio, and gave the rest of it to my nine-year-old son for further disassembly. If you have to buy these components, they shouldn't cost more than 20-25 dollars.

Final Assembly

I used a dry cell case to connect the radio to a 12 volt source on the amplifier board. The case is easy to drill, and a coaxial power jack fits nicely in the side. I used the same size power jack for both the dry cell case and the power connector on the enclosure, so I could use the radio on low power without the amplifier.

I have 3 different types of cables which provide a 12 volt source. All three have a coaxial power connector on one end. One cable has a lighter plug, another has alligator clips, and the third is hard-wired and remains in the truck.

I have more than one HT, so I decided to mount one semi-permanently, using double-adhesive foam. Though well-secured, I can remove it easily if I have to. There are many more ways to mount the radio, such as with hook-and-loop fasteners, or even attaching a soft case to the enclosure so you can slip the radio in and out.

I now have a reliable 40 watt mobile radio with excellent audio and a microphone that won't get lost or inadvertently keyed. (I later added a simple switch in series with the relay coil to provide a high/low power selection.) Using some salvaged components, the total cost was \$44. Not bad at all for mobile QRO from an HT! **73**

You may contact Mike Gray N8KDD at 465 W. Maple Rd., Milford MI 48042.

Parts List

| | |
|---|-------------------------|
| 1 power amplifier kit | Ramsey Electronics PA-1 |
| 1 RF sensed relay kit | Ramsey Electronics TR-1 |
| 1 aluminum enclosure | |
| 1 8Ω speaker, 3-inch | RS 40-248 |
| 1 microphone | RS 21-1172 |
| 1 SO-239 bulkhead connector | RS 278-201 |
| 1 miniature phone plug | RS 274-286 |
| 1 subminiature phone plug | RS 274-289 |
| 1 chassis mount microphone connector | RS 274-002 |
| 1 BNC socket, bulkhead type | RS 278-105 |
| 2 coaxial power jacks | RS 274-1563 |
| 2 coaxial power plugs | RS 274-1569 |
| 1 dual color LED | |
| 1 1600Ω resistor | 1/2 watt* |
| 1 620Ω resistor | 1/2 watt* |
| 1 BNC patch cable | NPN |
| 1 18-inch length RG-58 coaxial cable | RS 278-1326 |
| 1 5-inch length of RG-174 coaxial cable (RG-58 will work just fine) | optional |

*Not critical. Improvise, if necessary!

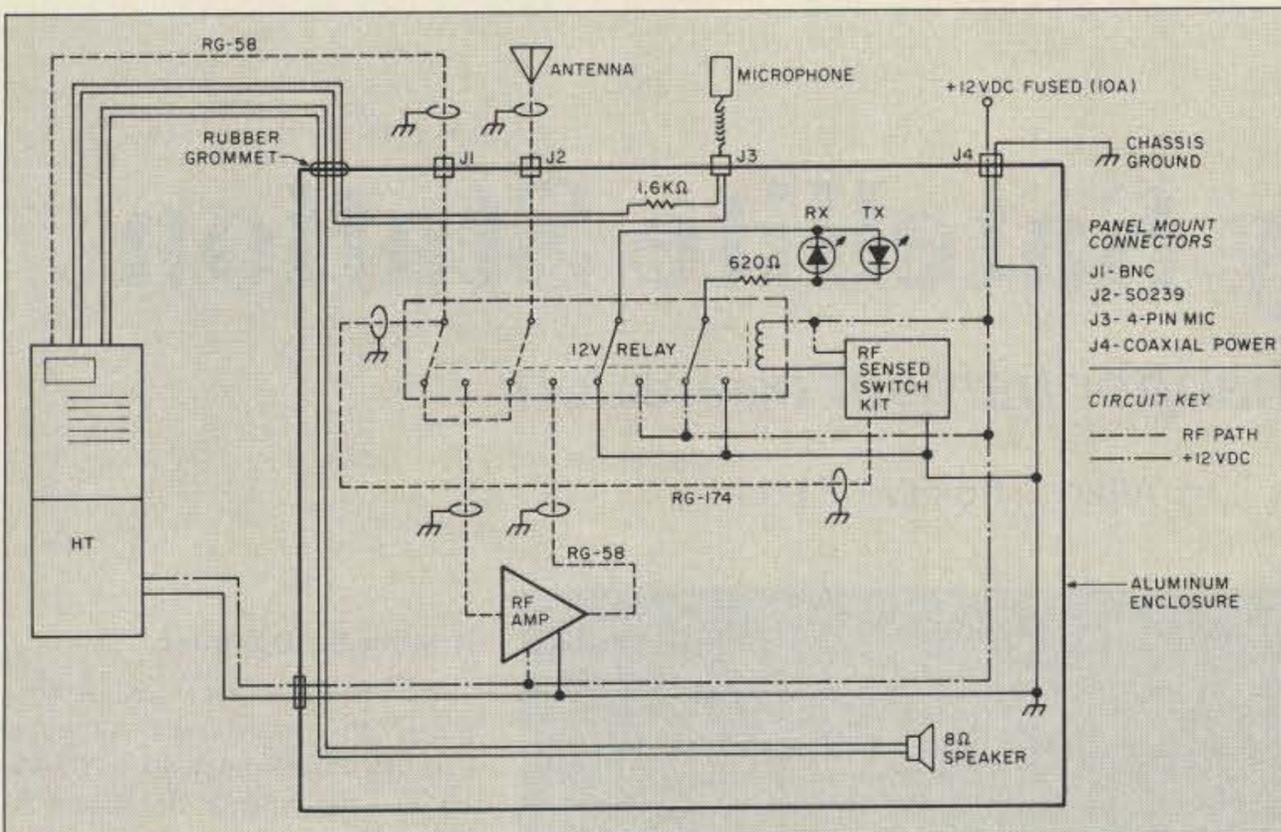


Figure 1. Schematic for the HT booster. Cost for all the parts is less than \$50!

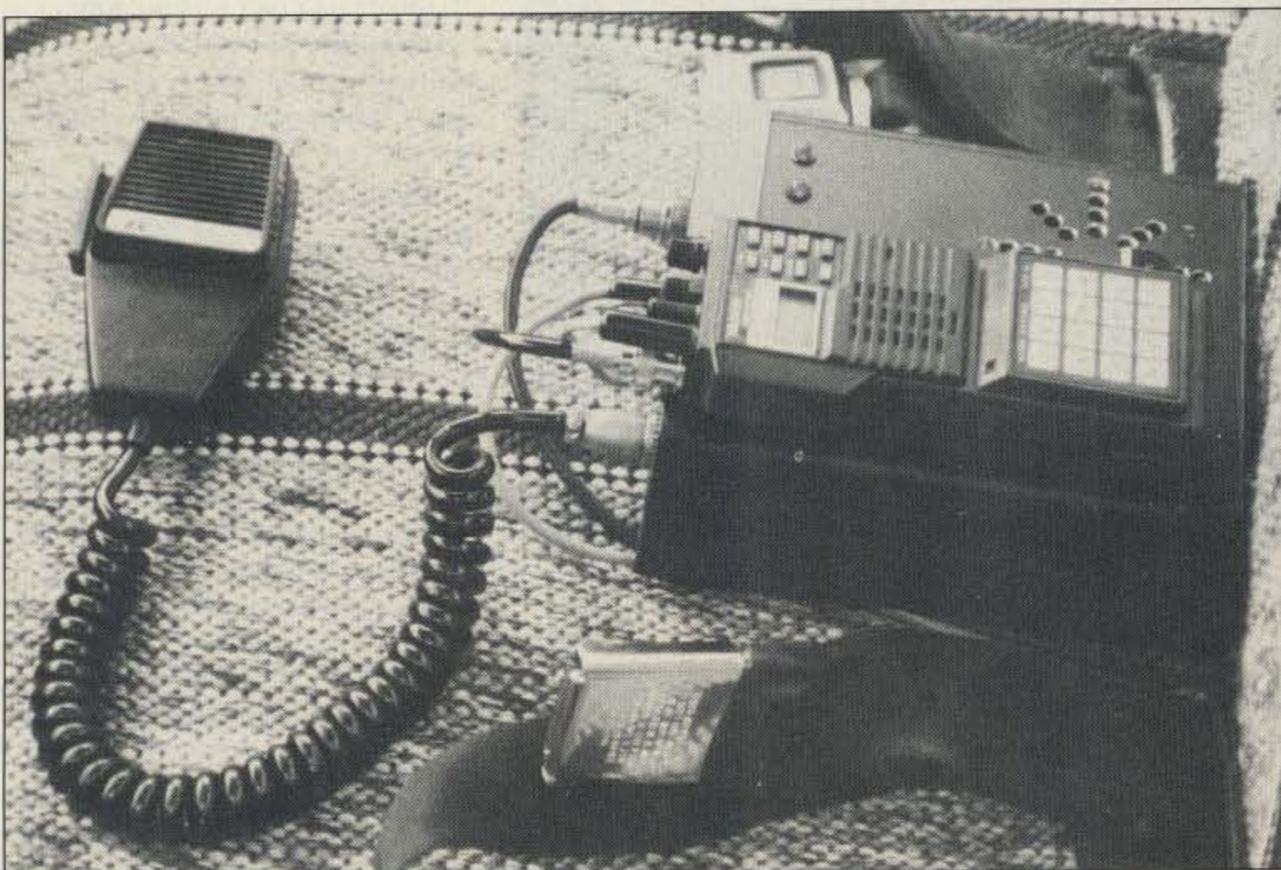


Photo A. N8KDD's mobile station setup. The HT is the Yaesu 23R.

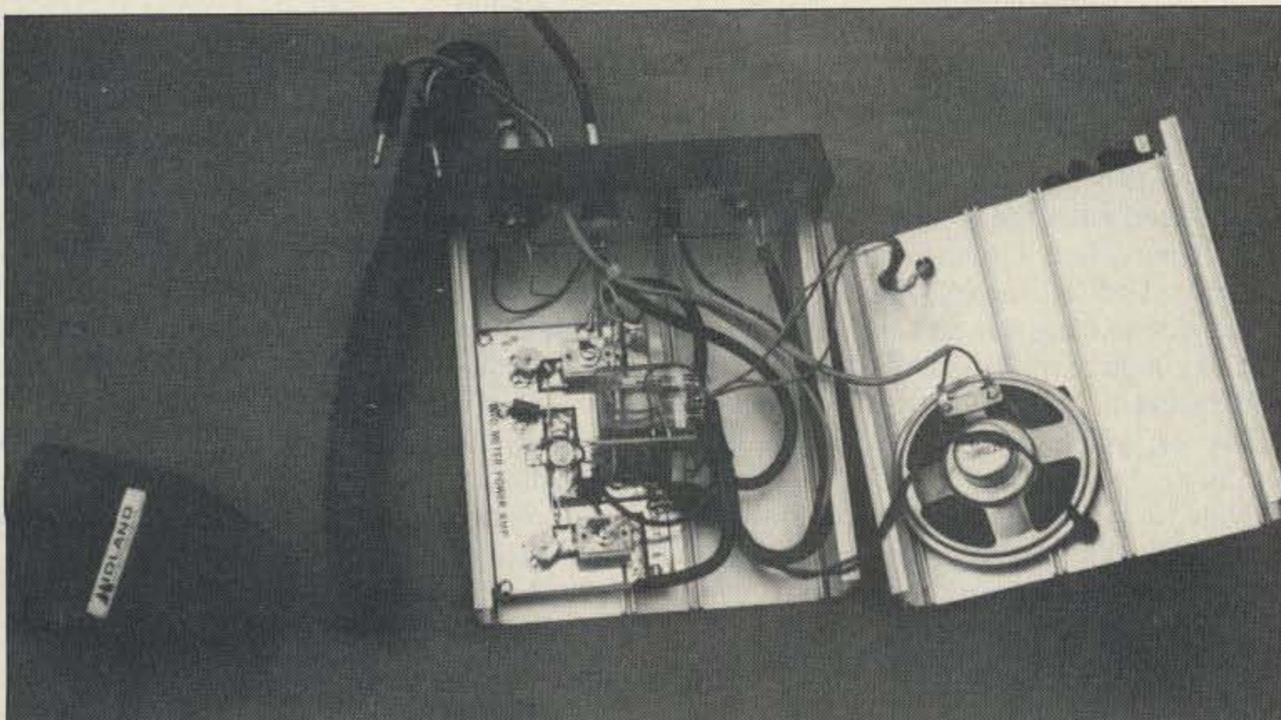
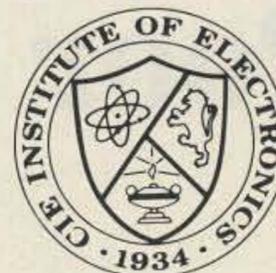


Photo B. Inside the 40W booster.

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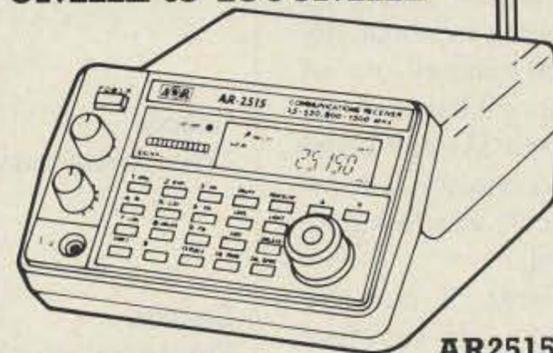
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CIRCLE 355 ON READER SERVICE CARD

Poor Boy Satellite Station

Coat-hanger hamsat operation!

by Allan J. Fox IV N5LKJ

My satellite chasing began about a year ago, when Carl Kotila WD5JRD, my neighbor, asked me to attend the Houston COM-VENTION '87 with him. There I met Jack Douglas KA5DNP and Andy MacAllister WA5ZIB who were giving a talk on amateur satellites. Jack explained that the Russian satellites RS-10/11 were in a nearly circular, low earth orbit, and did not require expensive equipment or elaborate antennas to operate.

Although I am only a neophyte satellite chaser, I have the satisfaction of having helped several hams become avid satellite enthusiasts on a limited budget.

Original Ground Plane Antenna Station

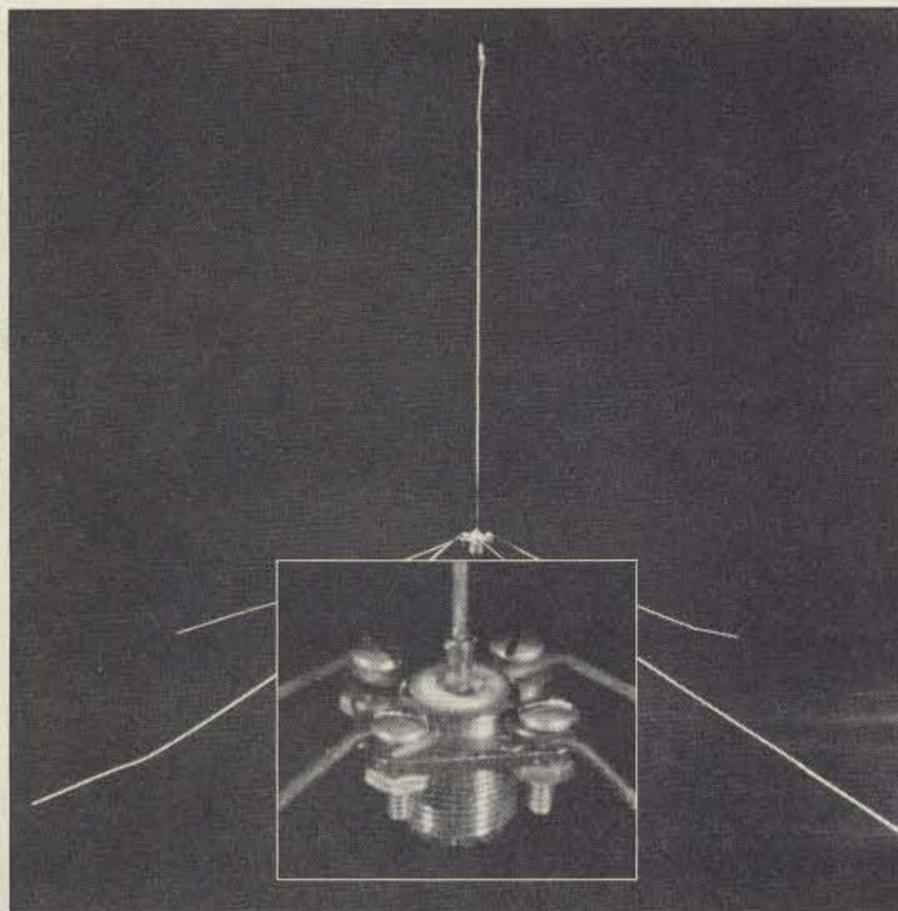
My station at the time consisted of a 25 Watt, 2 meter all-mode transceiver and a home-brewed ground plane antenna in the attic, similar to one mentioned in the *ARRL Handbook*. I built my antenna in about fifteen minutes out of five coat hangers and a used SO-239 chassis connector. The total cost was less than a dollar.

First, I cut the hooks off the five coat hangers and straightened them

out, forming five straight pieces of coated steel wire. To allow a good electrical connection, I put one end of each wire into the hot coals in our fireplace to burn the paint off.

The next step was to solder the bare end of one of these wires into the center conductor of an SO-239 chassis connector to form a vertical radiator. Then, with the aid of needle-nose pliers, I bent a loop in the bare end of the other four wires. This allowed me to attach them to the mounting holes in the SO-239 with four #6-32 1/2" machine screws and nuts. These wires were then bent down at a 45 degree angle to serve as radials.

At this point all that remained was to cut



Two-meter home-brew ground plane antenna.

Now for the Downlink

According to Jack and Andy's presentation, my station contained half the requirements to work RS-10/11—the uplink on Mode A. Since Mode A is 2 meters upper sideband, or CW uplink, with a 10 meter downlink, all I needed was a 10 meter receiver and antenna.

I bought an old Swan 350B transceiver for \$50. All I needed was a 10 meter antenna to get on RS-10/11!

While searching the garage for antenna materials, I found an old piece of 12/2 type NM wire, more commonly called Romex. I stripped the Romex to bare copper, and attached it to short pieces of PVC pipe used as insulators. After making a simple 10 meter dipole antenna, I stretched it in the attic and connected it to the Swan. My Poor Boy Satellite Station was almost ready to go on the air!

Frequencies of RS-10/11, Mode A

| | Transponder RS-10 | |
|----------------------|-------------------|--------------|
| | Downlink (MHz) | Uplink (MHz) |
| Beacon | 29.357 | |
| Transponder bandpass | 29.360-.400 | 145.860-.900 |
| | Transponder RS-11 | |
| | Downlink | Uplink |
| Beacon | 29.407 | |
| Transponder bandpass | 29.410-.450 | 145.910-.950 |

Finding and Working the Birds

There are several ways to do this. The first and easiest is to ask an avid satellite enthusiast when and where the next good orbit for your QTH will be. Another method is to use a computer with the appropriate software.

(See the May '89 issue of *73* for comparisons of different tracking programs.) We didn't have a computer in our household, but we did have a calculator. Therefore, my method was to tune in the beacon frequency and wait until I heard it. This can be tedious, but I have done it several times.

First, tune in 29.357 MHz for the RS-10 beacon, and wait until you hear the beacon transmitting a series of dots and dashes. This indicates that the satellite is in your "window"—that is, your range. You need to work fast because with the optimum pass (direct overhead pass) you will have only 20 minutes with the bird. Note the time and tune through the downlink band, 29.360-29.400 MHz,

all the wires to the proper length. With a tape, I measured each radial 20-3/16 inches and cut them. Then I measured the vertical radiator 19-5/16 inches and cut it. Since I intended to hang this antenna in the attic, I had to cut an extra 1/2 inch from the vertical and install a ring lug to use as a hanger. However, you could just as easily bend an eye in it.

Now, it was time to connect the feed line and check the standing wave ratio (SWR). Without any adjustments, the SWR stayed below 2:1 throughout the band.

Total investment in this antenna was less than \$1.00 and about fifteen minutes construction time.

73 Review

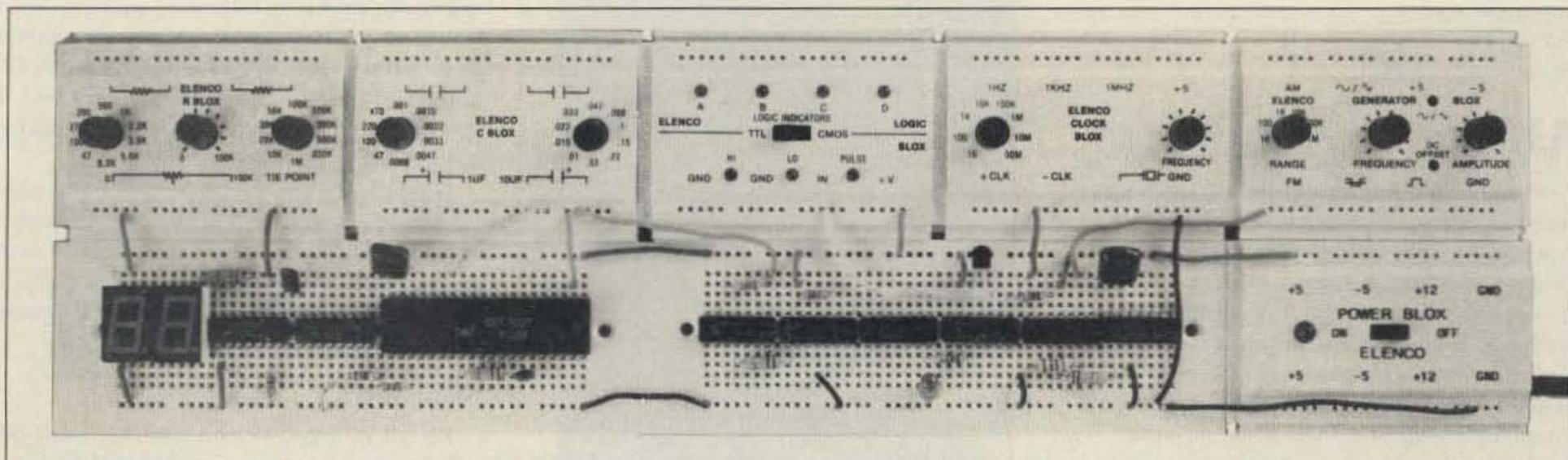
by Larry R. Antonuk WB9RRT

Breadblox

Breadboarding System

Experimenters, take note!

Elenco Electronics
150 West Carpenter Avenue
Wheeling IL 60090
(312) 541-3800
Price Class: \$19-\$29 per unit



The complete six-blox Breadblox system—a circuit experimenter's paradise!

It's probably been quite a while since anyone "breadboarded" up a circuit on an actual breadboard, but the name is still with us. Since that time, experimenters have tried spring-loaded clips, styrofoam blocks, you name it—anything to make it easier to test circuit ideas. The current state-of-the-hobby is represented by the white rectangular "proto boards," those interconnected wonders that eagerly accept DIP ICs. These boards even come in desktop enclosures, complete with power supplies, function generators, and several-hundred-dollar price tags. Prebuilt breadboard working stations are great, provided you have the cash and the room to store them in. But what about the guy who doesn't have space in the apartment to set up a workbench? Or the low-budget hobbyist? Is he stuck with his flea market function generator and "proto board," taped to the kitchen table?

Every once in a while, someone comes along with a blend of existing ideas that solves several different problems at once. The engineers at Elenco Electronics have done just that. They've taken the plain old "proto board" and spun it together with some space age surface-mount technology. The result is a series of "Function Blox" that snap onto their regular "proto boards."

The benefits are many. The Breadblox system is small—four different Function Blox and two Bread Blox (proto boards) will collapse into the same space as a small paperback book. Breadblox all interlock, making for an

integrated, easy to move system (an important point for apartment dwellers). They're inexpensive, but provide quality performance. Unlike complete breadboarding systems, Breadblox can be purchased one piece at a time. If you already have a logic probe there's no need to pay for another—just buy what you need.

"Having this much capability at your fingertips makes breadboarding fun again."

The Blox

There are six different Function Blox, identical in form and color to a standard proto board. The system is powered by a small Power Blox. This snaps to the other Blox, and provides +5, -5, and +12 volts for design use and to power the other modules. (The power is actually produced by a plug-in wall transformer, connected by a cable.)

Resistor and capacitor decade boxes are also available. Twenty resistance values from 47Ω to 1 megohm are available, along with a 100k pot. The Capacitor Blox provides 20

caps from 47pF to 10 μF. Unlike the standard decade box configuration, these units have more than one output. The Resistor Blox has an output for the low values, one for the high values, and one for the pot. The Capacitor Blox has a high and low output, and a 1 μF and 10 μF fixed output. This means that you can actually use four caps at once from one decade Blox.

As far as active devices go, the Digital Clock Blox provides a system clock function. Output frequencies from 1 Hz to 50 MHz are available. In addition, you can lock the unit to an external crystal of your choice. The Function Generator Blox produces sine and square waves from 0.1 Hz to 1 MHz, and can be frequency or amplitude modulated. And, if you don't have your own logic probe, the Logic Probe Blox consists of a 1.5 MHz logic probe, and four LED logic level indicators.

The Elenco Electronics Breadblox system is a low-cost, high-quality, well-designed product. Having this much capability at your fingertips makes breadboarding fun again. And who knows, maybe in fifty years we'll all be "bloxing" up our circuits! **73**

Larry Antonuk WB9RRT has written numerous reviews on test equipment and electronics books for 73 Magazine. He currently works as a project manager for a land mobile service shop in Keene NH. Contact him at 29 Forrest Dr., P.O. Box 452, Marlborough NH 03455.

73 Book Review by Andy MacAllister WA5ZIB

Communications Satellites— A Monitor's Guide

Communications Satellites—A Monitor's Guide

by Larry Van Horn
Third Edition, 1987
Grove Enterprises
PO Box 98
Brasstown NC 28902

Where can you find more satellite data? Right in Larry Van Horn's third edition of *Communications Satellites*. Within the large paperback's 255 pages, Larry covers virtually every type of space communications from hamsats to the Soviet manned-space program. Detailed information on any satellite, whether it's historical information on Telstar 1 or current military Fleetsatcom frequency data, is right here. For those rare items that may have slipped by the author, there are dozens of references included in the appendix.

Complete Coverage

Even if you're familiar with satellite monitoring, don't pass up the first chapter. The material may surprise you with its complete explanation of satellite monitoring needs. Although it's written so the newcomer won't get lost, it also presents information everyone needs for successful listening. Receivers, antennas, and accessories are examined for modes from CW to TV, and for frequencies from the low MHz through the high GHz.

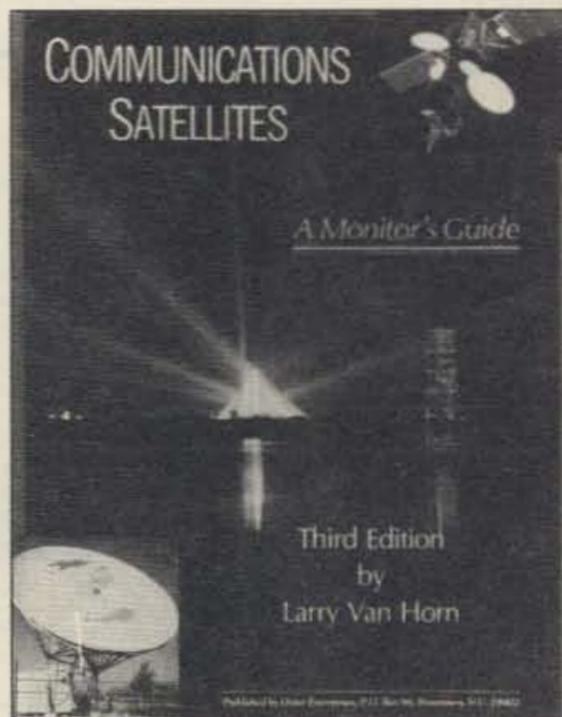
Of particular interest to hams is the section on the amateur satellite program. There is remarkably accurate and complete historical coverage from the birth of OSCAR 1 (Orbiting Satellite Carrying Amateur Radio) to the frequency charts of AMSAT OSCAR 13. Since the book's publication date two years ago, a few AMSAT nets have changed, but the 20 meter net is a constant source of up-to-date hamsat news every Sunday at 1900 UTC on 14.282 MHz.

Space Missions Well-Documented

The ham-in-space activities of Owen Garriott W5LFL and Tony England W0ORE are well-documented. The sometimes forgotten mission of DP0SL on the Challenger shuttle is explained in detail, along with little-known facts about the obscure Russian ISKRA hamsats.

I found myself enthralled with the chapters describing weather satellites and domestic TV satellites. The abundant use of photos and figures makes a dramatic presentation. The equipment requirements listing for weather and TV satellite monitoring is sketchy, but satellite frequencies and transmission format listings are quite complete.

Material covering the manned space programs of the US and the Soviet Union is exciting, and in-



spires an urgent desire to listen in. While the Soviet *Mir* space station activities on 145.55 MHz are too recent for coverage in the book, many of the frequencies used for normal communications to ground stations with official mission operations are listed and their purposes explained.

Intercepting the Military

The lure of catching transmissions from US military satellites is satisfied by the lists of frequencies used by the various branches of the armed services for both communications and remote detection satellites. A Yaesu FRG-9600 or an ICOM IC-7000 covers the UHF bands.

Information on the Soviet unmanned satellites is hard to find. In one chapter, the author has compiled enough historical data mixed with personal observations to help the enthusiast to ferret out Russian signals from space and identify them. Many of the frequencies used by the Soviets are available on reasonably priced VHF receivers. Geoffrey Perry, of the now-famous satellite sleuthing Kettering Group in England, has spent over three decades pursuing Soviet and Eastern Bloc satellites.

His influence is apparent in this section of the book. The satellite history and compelling volume of satellite data overshadow the somewhat disorganized presentation of some chapters and the rather curious typesetting flaws. After the first reading, the book becomes an invaluable reference.

With frequency lists that go from low HF to "light," just paging through the appendix is captivating. Christmas is coming. Put this book on your list, or better yet, buy it now and tell Santa about some new rigs and antennas. **73**

while listening for QSOs. Callsigns of bird users will usually give you an idea whether the satellite's orbit is tracking from north to south or from south to north. Each orbit progresses 26.4 degrees west of the preceding orbit. Also, each orbit takes 105 minutes.

Now tune the radios to 145.870 MHz CW uplink and 29.380 MHz downlink, and put on a headset. Since satellite operation is full duplex, wearing a headset is a good practice. Feedback can be unbearable without one.

Second, transmit your callsign, and then send a string of dots on CW—just long enough to find your signal. Adjust the downlink frequency for the best copy. Keep the string of dots *as short as possible* so that, if you discover your downlink is on top of a QSO, you QRM that QSO for no longer than absolutely necessary. Adjust your uplink frequency up or down, following with the downlink tuning in step until you find a clear downlink channel. Now you are ready to call CQ and stand by for your first satellite QSO. If you want to operate phone, be sure to change to the USB mode.

Doppler shift is minimal, but noticeable, on Mode A. You will hear some frequency shift of your signal, and you'll have to compensate your downlink frequency slightly. A little practice, and you'll be accurately guessing the location of the downlink signal.

Summary

RS-10/11 are low-orbit satellites (only 600 miles up)—one of the reasons why you can work them with a simple setup. On one occasion my Swan was in for repair, and while a friend was tuning it, we copied a QSO on RS-11. The Swan was connected only to a dead-end piece of RG-58 coax in his attic with no antenna. Although a preamp helps for RS operation, you usually don't need it.

These satellites do have some drawbacks. Since they are in a low orbit above the earth, the optimum pass gives you only 20 minutes of access to the bird. Definitely not much time for ragchewing! I have made, however, as many as four contacts on a pass. Also due to the low orbit, the satellite "footprint"—the area on Earth from which hamsatters can access the bird at a given point in the orbit—has a radius of only 1500 miles. Even with that, however, you can work most stateside hams to get WAS (Worked All States) via these birds from my QTH near Houston, Texas, and from other mid-western states.

RS-10/11 have several modes of operation other than Mode A, such as Mode K, Mode T, combination Modes KA and KT, and the ROBOT (or QSO machine). However, I have no experience with these. Remember, the control on license-class requirements is the uplink frequency! This makes it possible for even a Novice to operate CW when RS-10 is in either Mode K or Mode T.

Good luck! And don't laugh at my poor boy operation. At 1016Z on 25 November 1988, with only 25 Watts into the coat hangers, I made contact and had a QSO with Musa Manarov U2MIR on 145.550 MHz FM direct, while he was on board the Russian Space Station *Mir*. See you on RS-10/11! **73**

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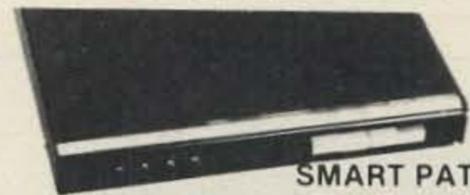
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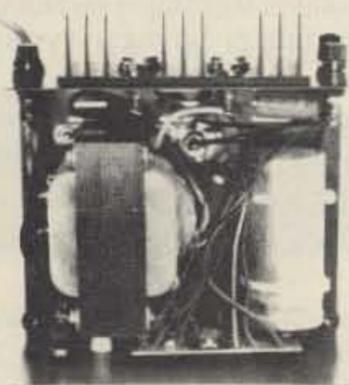
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MODEL RS-50A

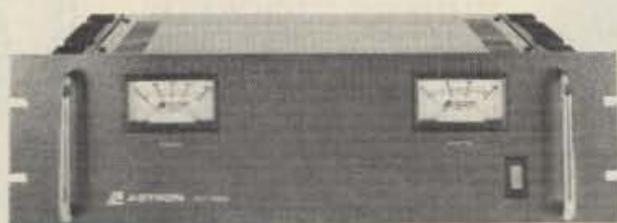


MODEL RS-50M



MODEL VS-50M

RM SERIES



MODEL RM-35M

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|--------------------------------|------------------------|-------------|---------------------|---------------------|
| RM-12A | 9 | 12 | 5 1/4 x 19 x 8 1/4 | 16 |
| RM-35A | 25 | 35 | 5 1/4 x 19 x 12 1/2 | 38 |
| RM-50A | 37 | 50 | 5 1/4 x 19 x 12 1/2 | 50 |
| • Separate Volt and Amp Meters | | | | |
| RM-12M | 9 | 12 | 5 1/4 x 19 x 8 1/4 | 16 |
| RM-35M | 25 | 35 | 5 1/4 x 19 x 12 1/2 | 38 |
| RM-50M | 37 | 50 | 5 1/4 x 19 x 12 1/2 | 50 |

RS-A SERIES



MODEL RS-7A

| MODEL | Continuous Duty (Amps) | ICS* (Amps) | Size (IN) H x W x D | Shipping Wt. (lbs.) |
|--------|------------------------|-------------|-----------------------|---------------------|
| RS-3A | 2.5 | 3 | 3 x 4 1/4 x 5 1/4 | 4 |
| RS-4A | 3 | 4 | 3 1/4 x 6 1/2 x 9 | 5 |
| RS-5A | 4 | 5 | 3 1/2 x 6 1/2 x 7 1/4 | 7 |
| RS-7A | 5 | 7 | 3 3/4 x 6 1/2 x 9 | 9 |
| RS-7B | 5 | 7 | 4 x 7 1/2 x 10 3/4 | 10 |
| RS-10A | 7.5 | 10 | 4 x 7 1/2 x 10 3/4 | 11 |
| RS-12A | 9 | 12 | 4 1/2 x 8 x 9 | 13 |
| RS-12B | 9 | 12 | 4 x 7 1/2 x 10 3/4 | 13 |
| RS-20A | 16 | 20 | 5 x 9 x 10 1/2 | 18 |
| RS-35A | 25 | 35 | 5 x 11 x 11 | 27 |
| RS-50A | 37 | 50 | 6 x 13 1/4 x 11 | 46 |

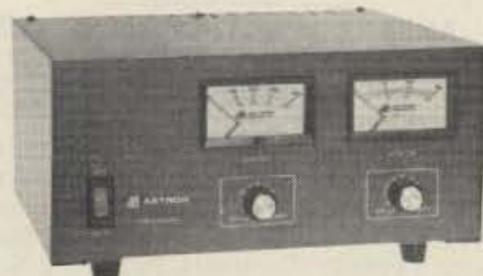
RS-M SERIES



MODEL RS-35M

| MODEL | Continuous Duty (Amps) | ICS* (Amps) | Size (IN) H x W x D | Shipping Wt. (lbs.) |
|---------------------------------|------------------------|-------------|---------------------|---------------------|
| • Switchable volt and Amp meter | | | | |
| RS-12M | 9 | 12 | 4 1/2 x 8 x 9 | 13 |
| • Separate volt and Amp meters | | | | |
| RS-20M | 16 | 20 | 5 x 9 x 10 1/2 | 18 |
| RS-35M | 25 | 35 | 5 x 11 x 11 | 27 |
| RS-50M | 37 | 50 | 6 x 13 1/4 x 11 | 46 |

VS-M AND VRM-M SERIES



MODEL VS-35M

- Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

| MODEL | Continuous Duty (Amps) | | | ICS* (Amps) | Size (IN) H x W x D | Shipping Wt. (lbs.) |
|--------------------------------------|------------------------|--------|-------|-------------|---------------------|---------------------|
| | @13.8VDC | @10VDC | @5VDC | @13.8V | | |
| VS-12M | 9 | 5 | 2 | 12 | 4 1/2 x 8 x 9 | 13 |
| VS-20M | 16 | 9 | 4 | 20 | 5 x 9 x 10 1/2 | 20 |
| VS-35M | 25 | 15 | 7 | 35 | 5 x 11 x 11 | 29 |
| VS-50M | 37 | 22 | 10 | 50 | 6 x 13 1/4 x 11 | 46 |
| • Variable rack mount power supplies | | | | | | |
| VRM-35M | 25 | 15 | 7 | 35 | 5 1/4 x 19 x 12 1/2 | 38 |
| VRM-50M | 37 | 22 | 10 | 50 | 5 1/4 x 19 x 12 1/2 | 50 |

RS-S SERIES



MODEL RS-12S

- Built in speaker

| MODEL | Continuous Duty (Amps) | ICS* Amps | Size (IN) H x W x D | Shipping Wt. (lbs.) |
|--------|------------------------|-----------|---------------------|---------------------|
| RS-7S | 5 | 7 | 4 x 7 1/2 x 10 3/4 | 10 |
| RS-10S | 7.5 | 10 | 4 x 7 1/2 x 10 3/4 | 12 |
| RS-12S | 9 | 12 | 4 1/2 x 8 x 9 | 13 |
| RS-20S | 16 | 20 | 5 x 9 x 10 1/2 | 18 |

73 Review

by Michael Jay Geier KBIUM

The ICOM IC-2SAT

One of the world's smallest full-featured HTs.

ICOM America, Inc.
2380-116th Ave. N.E.
Bellevue WA 98004
Tel. (206) 454-7619
Price Class: \$440

Can a walkie ever be *too* small? Not as far as this op is concerned. The smaller the better! So I was especially excited to get to try out a little beauty, the new ICOM IC-2SAT.

The operative word here is "wow." The pictures in the ads don't do justice to the compactness of this thing. At first glance, it looks like a toy. It doesn't feel like one, though. The front is firm plastic, and the back is metal and serves as the heatsink for the RF output stage (as with most new rigs). The radio is very solid and, at about 10 ounces (!), it seems hefty for its size. It is somewhat thicker than most small rigs, and has a contoured, sculpted shape, resulting in an unusual, but attractive, appearance. It fits beautifully in your hand. ICOM has paid great attention to the cabinet design, and it shows, the fit and finish being the best I have yet seen in a mini-rig.

After "wow," your next thought may be, "Where's the battery?" Indeed, there is no battery included in the shipping box. This radio has an INTERNAL battery. Yep, this tiny HT is totally self-contained! It has only a 300 mA-hour capacity, though, so ICOM wisely offers optional batteries, in various voltages and current capacities, which snap on the bottom of the rig in the conventional manner.

Good Looking with Nice Touches

The supplied rubber duck is thin, flexible, and somewhat longer than most provided with today's small rigs. In fact, it is slightly longer than the entire radio. No doubt, it has a bit more gain (perhaps less loss is a better description) than the "stubby" ducks usually employed, and that's important here because the rig is rated at only 1½ watts output on high power with the internal battery. The package includes a belt clip (though I can't imagine wanting to put such a small rig anywhere but in a pocket), a wrist strap, wall charger, and a fairly well-written manual with a full schematic. Also included is a crib sheet, a very handy item with a rig this complex. Various options, from the batteries to speaker-mikes and carrying cases, are available.

The top of the radio has the antenna connector, squelch, volume, and "dial" knobs. Also located on top are the DC input, mike, and earphone jacks. The DC jack permits direct operation up to 16 volts (meaning you can plug it into your car cigarette lighter or a DC power supply) and internal battery charging.

On the rig's left side are round, rubberized PTT and FUNCTION buttons, which have an especially nice feel. The LIGHT button, which is also used for a few seldom-performed programming operations, is on the right side. The mike and speaker are located in the middle,

with the keypad below them. The keypad has very tiny keys, but they are well separated from each other and easy to press. They are also set in from the front, making accidental keypresses unlikely. It's a nice touch.

Readout Display

The LCD is very large and easy to read, although it loses contrast unless viewed from the bottom. The display shows frequency, ± offset (called "duplex"), memory channel number, power output selection, S-units, and other assorted operating data. It is a 5½ digit display, with no "0" or "5" at the end of the frequency. To display frequencies ending in a 5, a small "50" appears. Many new rigs are taking this approach, and I do not see the advantage; a fully displayed frequency avoids ambiguity and is easier to read.

For night operation, a press of the LIGHT button illuminates the display with an unusual, deep reddish-orange color generated by two LEDs, one on each side of the LCD. It's very pretty, but not overly bright. It should be adequate in most situations. The lamp circuit has a timer that keeps the display lit for a few seconds after the last keypress, or you can turn it off manually by pressing the LIGHT button again. The keypad buttons do not light up.

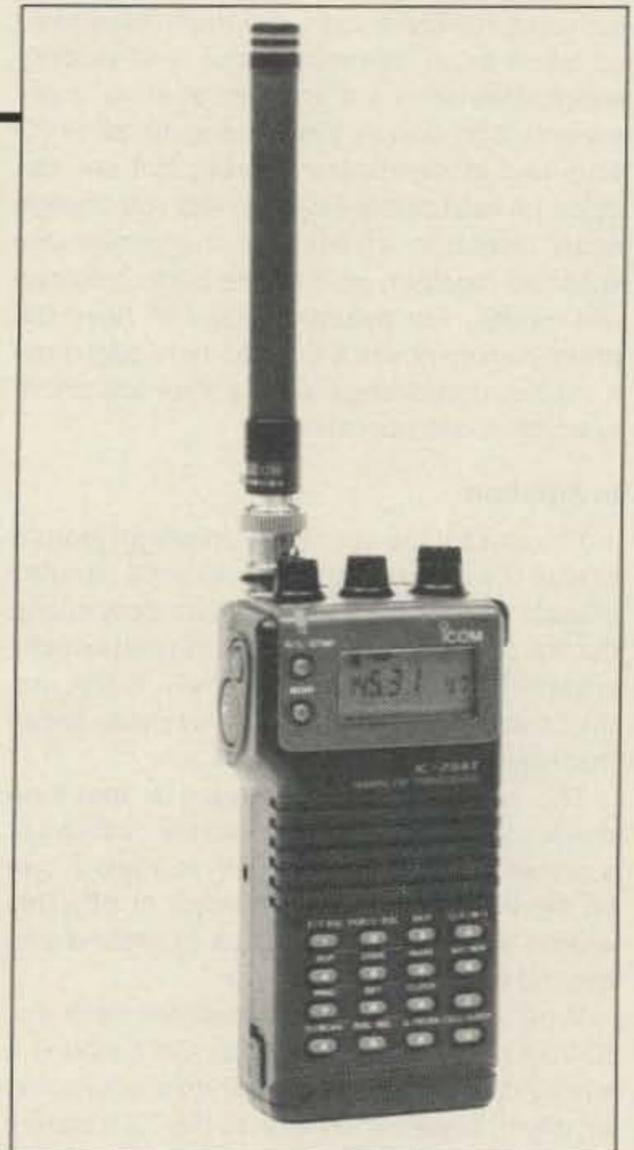
Alternate Frequency Entry

Another recent trend has been toward the inclusion of a "dial" knob on top of the rig, and this is a good thing. It began with the Yaesu FT-23R, which did not have direct keypad frequency entry, making the knob essential. Now, even direct-entry rigs like the IC-2SAT have the knobs, and they are very handy, permitting easy selection of memories and CTCSS tones, as well as an alternate method of frequency entry.

This rig has provisions for CTCSS boards (an encoder or encoder/decoder) and a DTMF decoder. Neither is included. The new DTMF feature permits coded squelch using the tones generated by any rig with a keypad. Thus, you can use it to ignore any station not transmitting your personal code. You can use it with multiple codes, and even display them on the LCD so you know who's calling! This could prove very handy in large cities where repeater overcrowding makes continuous monitoring tedious. To my knowledge, the IC-2SAT is the first handheld to incorporate such a decoder.

Memory Management

The rig has 48 memories which store frequency and offset, including a handy "call" memory accessible with one keypress. They



The ICOM IC-2SAT, the ultimate in miniaturization.

are fix-tuned. That is, they cannot be used like separate VFOs. (The contents of any memory can easily be transferred to the VFO, though.) The first 10 can hold odd offsets, but not independently entered RX and TX frequencies; you must know the offset. The other memories use whatever offset has been programmed into the VFO. The choice of up or down, of course, remains independent.

Memory management, while fairly flexible, is also a bit unusual. There are four banks of 10 memories each. To get to a memory in your current bank, all you need to do is press its number on the keypad. (You must, of course, be in memory mode first.) To get to a memory in another bank, use the dial knob to step through all the memories in between, or press the MR key until the bank appears. Once you have selected the memory bank, enter the last digit from the keypad.

Here's an example: You are at memory 3 and you want to go to 28. Press MR key until the "tens" digit becomes a 2. Then press 8 on the keypad. It's a bit less convenient than simply pressing "28" and then MR, but it's not hard to get used to.

Skipping and Scanning

Memories can be skip-scanned or hidden entirely. They can also be used to make the

VFO skip certain frequencies during band scanning, another feature I had never seen before. In fact, the frequencies of memories set for skip-scan will also be skipped during VFO scan. It seems like a good idea, but it doesn't really work too well because the rig stops on adjacent frequencies.

The IC-2SAT has several kinds of scanning, including full-band scan, programmable limited-band scan, memory scan and priority watch. Memories are scanned at about 3 per second, a bit slow by today's standards. (VFO scanning is significantly faster, but still not zippy.) A twist of the dial knob lets you change scan direction at will. All memories are scanned together, as if in one bank. You can mix modes. For example, you can have the priority watch check a new memory each time it checks, combining memory scan and priority watch in one operation.

In Addition . . .

You can set the automatic power-off feature to shut the rig down after 20, 40 or 60 minutes of inactivity. It warns you with four beeps, and the warning works even if the keypad beeper is shut off. The beeper, by the way, is soft and unobtrusive. It is one of the few made today that I like to keep turned on.

The timer function includes a real-time clock, and you can set it to turn the radio on at a preset time. The battery saver interval can be set for 1/2 second, 2 seconds, or off. This seems a bit limited. A choice of around one second would have been nice.

Where most HTs have a *reverse* button, the IC-2SAT has one called *MONI*. On simplex, it simply opens the squelch. When you're using an offset, however, it shifts to the TX frequency too! It's nice if you want to check the input frequency of a repeater. If, on the other hand, you just want to open the squelch because the repeater's signal is weak, you'll have to use the squelch knob. Also, you cannot transmit on the reversed frequency pair, as you can with a normal *reverse* switch.

The rig has a 10-number by 15-digit autodialler. While sending, it keeps the rig keyed for the duration of the number, even if you let go of the PTT. Also, you hear the tones as they are transmitted. Programming numbers is fairly straightforward, but sending them is not. If you happen to have already selected the autodialler memory you want, then you simply press the DTMF button with the PTT down, and the number is sent. If, however, you need a different number, you must first go to DTMF memory mode, select the desired memory, exit that mode, press PTT and then DTMF. This requires five keystrokes, nearly as many as most numbers! This complexity limits the usefulness of the autodialler unless you usually use only one number anyway.

Radio Performance

The receiver, which covers 138–174 MHz, is very good. It is reasonably sensitive and selective, and the sensitivity holds up very well outside the ham band. The received audio sounds surprisingly good for the size of the rig. An experiment with a Kaboom Audio Enhancer (see the Yaesu FT-411 review on page

14 of the June '89 issue of 73) improved the audio even more, but the enhancer probably isn't necessary with this radio.

The transmitter, which covers 140–150 MHz, is rated at 1.5 watts output on high power when you are using the internal battery. At 13.8 volts, you get more than five watts output. Reports regarding the transmitted audio suggest that it is clear, but a bit tinny and underdeviated. Overall, it was considered quite acceptable, but not great. It may be that the deviation is an adjustable parameter, but I have no way to know.

Nit Picks

This rig has many advanced features, some common ones seem to have been left out. There is no low-battery warning of any kind. When the battery dies, attempts to transmit result in a flashing display, with no RF output. At that point, of course, it's too late.

In addition, there is no auto (ARRL band plan) repeater shift, a common feature on new HTs. Here, you must set the offset memory. Speaking of repeater shifts, offsets are available only in 25 kHz steps. You can't, for example, enter in a 610 kHz shift. I'm not aware, however, of any repeaters with offsets that are not a multiple of 25 kHz; all the ones I've used have the standard (600 kHz) or 1 MHz split. Also, the display doesn't indicate the status of the auto power off and battery saver functions. You have to go to SET mode to find out if they're on or off.

The manual doesn't have any instructions on how to receive outside the ham band. When entering frequencies from the keyboard, only the last four digits are accepted, so getting out of the 14X.XXX band seems impossible. In fact, the rig is already set up for extended coverage, but you can't get to it directly. You must first select the 10-MHz digit with the quick-tuning-step function by pressing the function button and rotating the dial knob. When you've got the one you want, you then either continue using the dial knob, or you enter the last four digits from the keypad. The whole thing is very inconvenient.

You write memories by holding down the MR/MW key while pressing the function key. You must hold it down for about one second, and entry is confirmed with a series of beeps. With the keypad beeper turned off, you can't tell whether entry is complete, because nothing happens on the display.

The displayed initials for some of the modes and functions are odd, and unexplained in the book. For example, the offset is "OW" and frequency skip is "PS." It's hard to remember this stuff if you are never told what it means.

Many programming procedures are complicated, and not all are consistent. For instance, most modes are terminated by pressing CLR, but the clock setting mode is terminated by pressing PTT. CLR won't work. Some procedures require holding the LIGHT button and a keypad button while turning the rig on. ICOM's walkies use procedures very different from those of the other major manufacturers, and in all fairness, I haven't had that much experience with the ICOMs. I suspect that if you have owned or used other ICOM HTs, this

unit will be fairly easy to learn. If not, though, you're in for some surprises, and you will probably want to keep the crib sheet in your wallet.

The review unit did not come with the CTC-SS or DTMF decoder boards, so I wasn't able to test those functions. However, the otherwise well-written manual is extremely confusing in the sections describing the use of the DTMF decoder, and I just couldn't make heads nor tails of it. For instance, two modes, *pager* and *code squelch*, are offered, each with its own programming procedures. Except that one uses 7 digits and the other uses 3, I couldn't see the difference between them. Perhaps if I could have tried the procedures, they would have made more sense.

ICOM's ads list the power output as 2 watts, yet the specs in the book list it as 1 1/2 watts. The actual power, as measured on my dummy load/wattmeter (admittedly no laboratory standard) was about 1.75 watts. Also, there are four power level settings available, but only two work with the internal battery. The other two work at higher voltages, such as from a car battery.

The back of the rig gets significantly warmer at 1.75 watts output than does my Yaesu FT-411 at 2.5 watts. This, and the very quick battery depletion, lead me to wonder whether the transmitter efficiency might be low. There are no current drain specs given for normal 7.2-volt operation (the only specs are for 13.8-volt use), so I can't know for sure.

As with most extended-receive rigs, there are some birdies and spurious responses, all well outside the ham band. In particular, a local FM radio station appears repeatedly in the 160 MHz band. None of these anomalies should affect normal use.

Unlike all the other microprocessor walkies I've used, this one does not use a standard lithium battery for backup. Instead, a *rechargeable* lithium battery is used. This might seem like a good idea, but the manual states that this battery will go dead and empty the memories about one week after the main battery is left discharged. So, if you run it down and then go out of town without it for a week, you may come home and find all 48 memories (and all your parameter programming) gone! ICOM may want to consider adding in 7-year lithium cells in future versions for memory/parameter management.

A Terrific Mini-Rig

This is one nifty little radio. Clearly, its greatest advantage is its size, suggesting that the best uses for it are those which do not require an external battery. After all, once you hang a battery on the bottom, it isn't significantly smaller than other mini-rigs. If your usage is light, and especially if you can use low power (the company suggests that the internal battery will be discharged quickly on high power, and they aren't kidding), this rig offers you the ultimate in miniaturization. I'm sure it will prove popular. ICOM's definitely got a winner in the IC-2SAT! 

Michael Geier KB1UM is 73's troubleshooting "Ask Kaboom" columnist. You can reach him at 7 Simpson Court, S. Burlington VT 05403.

★ ALL NEW KITS ★

2 MTR & 220 BOOSTER AMP

Here's a great booster for any 2 meter or 220 MHz hand-held unit. These power boosters deliver over 30 watts of output allowing you to hit the repeaters full quieting while the low noise preamp remarkably improves reception. Ramsey Electronics has sold thousands of 2 mtr amp kits but now, we offer completely wired and tested 2 mtr as well 220 MHz units. Both have all the features of the high priced boosters at a fraction of the cost.

PA-10 2 MTR POWER BOOSTER (10 X power gain)
Fully wired & tested \$69.95
PA-20 220 MHz POWER BOOSTER (8 X power gain)
Fully wired & tested \$69.95

- 30 WATTS OUTPUT
- LOW NOISE PREAMP
- LOW COST
- RUGGED CAST ALUMINUM CASE
- ONE YEAR WARRANTY



PERSONAL SPEED RADAR

New low cost microwave doppler radar kit "clocks" cars, planes, boats, horses, bikes, baseballs, models, runners or virtually anything that moves. Operates at 2.6 GHz with over 1/4 mile range. LED digital readout displays speeds in miles per hour, kilometers per hour or feet per second! Earphone output permits listening to actual doppler shift. Uses two 1 lb coffee cans for antenna (not included) and runs on 12 VDC. Easy to build—all microwave circuitry is PC stripline. Kit includes deluxe ABS plastic case with speedy graphics for a professional look. A very useful and full-of-fun kit.



RADIOS

20, 40 & 80 METERS HAM RECEIVERS

Sensitive all mode, AM, CW, SSB receivers for 3.5-4.0 or 7.0-7.5 MHz. Direct conversion design using NE602 IC as featured in QST and ARRL handbooks. Less than 1 μV sensitivity, varactor diode tuned, 50 mw audio output. Runs on 9VDC, has RF gain control. This kit is very easy to build, lots of fun and educational—ideal for the beginner or the old pro. The optional matching case kit features a rugged ABS plastic case with screened graphics. Included are machined aluminum knobs for a well-finished professional look.

20 MTR receiver kit HR-2 \$24.95 40 MTR receiver kit HR-4 \$24.95 80 MTR receiver kit HR-8 \$24.95 Receiver case CHR \$12.95

QRP TRANSMITTER KITS, 20, 40 & 80 METERS

Operate a mini ham shack. These little CW rigs are ideal mates to our 40 and 80 meter receivers. Features include smooth variable tuning, one watt output and excellent keying characteristics. Runs on 12 VDC and is VSWR protected. See how far you can stretch your signal with one of these mini rigs. Optional ABS cases are available.

20 MTR QRP kit QRP-20 \$29.95 40 MTR QRP kit QRP-40 \$29.95 80 MTR QRP kit QRP-80 \$29.95 Case kit CGRP \$12.95

AIRCRAFT RECEIVER KIT

Hear exciting aircraft communications—picks up planes up to 100 miles away. Receives 110-136 MHz AM air band, varactor tuned superhet design with AGC, ceramic filter and adjustable squelch. Runs on 9V battery, 50 mw audio output. 1 μV sensitivity. Optional matching ABS plastic case lets you take it anywhere, features screened graphics and machined aluminum knobs for a real professional look. Compact—great for airshows or for just plain hanging around the airport.

Complete kit, AR-1 \$24.95 Receiver case kit, CAR-1 \$12.95

SHORTWAVE RECEIVER KIT

A fantastic receiver that captures the world with just a 12' antenna! Receives 4-11 MHz in 2 MHz bands, varactor tuned, superhet design with AGC, RF gain control, and 50 mw audio output. Uses new Signetics mixer chip for less than a microvolt sensitivity, runs on 9V battery. This is a fascinating scout, school or club project, and will provide hours of fun even to the most serious DX'er. Add the optional case kit and you have a real nice looking shortwave set.

Complete kit, SR-1 \$24.95 Receiver case kit, CSR-1 \$12.95

PACKET RADIO

Commodore 64/128 packet radio interface. Uses famous German Digicom software. Features EXAR IC chip set for reliable operation—runs HF or VHF tones. Includes FREE disk software. PC board, all necessary parts and full documentation.

Complete kit, PC-1 \$49.95

FM COMMUNICATIONS/ 2 MTR, 10 MTR & 220 RECEIVERS

Sensitive superhet FM receiver tunes any 5 MHz segment of band. Listen to ham operations, high band police calls, weather or mobile phone calls! Easy to build receiver features varactor tuning, IC mixer stage, ceramic IF filters and dual conversion design with adjustable squelch. Less than 1 μV sensitivity, runs on 9 V battery, with 50 mw audio output. Optional ABS case with screened graphics and machined aluminum knobs provide a nice professional look.

2 MTR kit FR-7 \$29.95 10 MTR kit FR-10 \$29.95 220 MHz kit FR-20 \$29.95 Receiver case kit CFR-7 \$12.95

NEW MINIKITS—NEW MINIKITS

BROADBAND PREAMP

A sensitive all purpose preamp, ideal for scanners, TV sets, VHF, UHF rigs, counters, etc. Features low noise, 4 db NF, 20 db gain, 100 KHz—1 GHz operation. Runs on 9—12 VDC. 50 ohms input.

Complete kit, SA-7 \$14.95

LIGHT BEAM COMMUNICATORS

Transmits modulated infrared light up to 30 feet without lenses, up to 1/4 mile using lenses. Uses 30 KHz carrier for hum-free operation, transmits thru windows, etc. Ideal for "bugs" or listening to IR remote controls. Transmitter has sensitive mike input, receiver uses PIN detector and drives speaker output. Units operate on 9—12 VDC.

Transmitter kit, LB-6 \$8.95
Receiver kit, LB-5 \$9.95

HIGH POWER FM WIRELESS MIKE

A high power unit that will transmit up to 1/2 mile to any FM broadcast radio. Sensitive input accepts any type of mike, will pick up normal voices 10 feet away using the available mini-electric mike cartridge. Operates on 9—12 VDC.

FM-4 kit \$12.95
Sensitive microphone cartridge \$2.95

RAMSEY ELECTRONICS

Quality Test Gear & Electronic Kits for Professionals and Hobbyists



PR-2 COUNTER PREAMP

The PR-2 is ideal for measuring weak signals from 10 to 1,000 MHz • flat 25 db gain • BNC connectors • great for sniffing RF • ideal receiver/TV preamp • 3 db NF

\$49.95

wired includes AC adapter PR-2 kit \$39.95



PS-2 AUDIO MULTIPLIER

The PS-2 is handy for high resolution audio resolution measurements, multiplies up in frequency • great for PL tone measurements • multiplies by 10 or 100 • 0.01 Hz resolution & built-in signal preamp/conditioner

\$69.95

wired PS-2 kit \$49.95



PS-10B 1.5 GHz PRESCALER

Extends the range of your present counter to 1.5 GHz • 2 stage preamp • divide by 1000 circuitry • super sensitive (50 mV typical) • BNC connectors • 1.5 GHz in, 1.5 MHz out • drives any counter.

\$89.95

wired includes AC adapter



COM-3 THE COMMUNICATIONS SERVICE MONITOR THAT WORKS HARDER FOR LESS.

Introducing COM-3... the new service monitor designed by service technicians for service technicians. It works harder for less... giving you advanced testing capabilities at a very affordable price. FEATURES • Direct entry keyboard with programmable memory • Audio & transmitter frequency counter • LED bar graph frequency/error deviation display • 0.1-10,000 μV output levels • High receive sensitivity, less than 5 μV • 100 KHz to 999.9995 MHz Continuous frequency coverage • Transmit protection, up to 100 watts • CTS tone encoder, 1 KHz and external modulation

MINI KITS—EASY TO ASSEMBLE—FUN TO USE

TONE DECODER
A complete tone decoder on a single PC board. Features: 400-5000 Hz adjustable range via 20 turn pot, voltage regulation, 567 IC. Useful for touch-tone burst detection, FSK, etc. Can also be used as a stable tone encoder. Runs on 5 to 12 volts.

Complete kit, TD-1 \$5.95

COLOR ORGAN
See music come alive! 3 different lights flicker with music. One light each for, high, mid-range and lows. Each individually adjustable and drives up to 300 W. runs on 110VAC.

ML-1 Kit, \$8.95

VOICE ACTIVATED SWITCH
Voice activated switch kit provides switched output with current capability up to 100 mA. Can drive relays, lights, LED or even a tape recorder motor. Runs on 9VDC.

VS-1 Kit \$6.95

40 WATT 2 mtr PWR AMP
Simple Class C power amp features 8 times power gain 1 W in for 8 out, 2 W in for 15 out, 5 W in for 40 W out. Max output of 50 W, incredible value, complete with all parts, less case and T-R relay.

PA-1, 40 W pwr amp kit \$27.95

TR-1, RF sensed T-R relay kit 6.95

VIDEO MODULATOR
Converts any TV to video monitor. Super stable, tunable over ch 4-6. Runs on 5-15V accepts std. video signal. Best unit on the market! Complete kit, JM-7

\$12.95

LED BLINKY KIT
Alternately flashes 2 jumbo LEDs. Use for name badges, buttons, warning panel lights. Runs on 3 to 15 volts.

BL-1 Kit, \$3.95

MAD BLASTER
Produces LOUD ear shattering and attention getting siren like sound. Can supply up to 15 watts of obnoxious audio. Runs on 6-15 VDC.

MB-1 Kit \$4.95

FM WIRELESS MIKE

Transmits up to 300' to any FM broadcast radio, uses any type of mike. Runs on 3 to 9V. Type FM-2 has added sensitive mike preamp stage.

FM-1 Kit \$5.95

FM-2 Kit \$7.95

UNIVERSAL TIMER
Provides the basic parts and PC board required to provide a source of precision timing and pulse generation. Uses 555 timer IC and includes a range of parts for most timing needs.

UT-5 Kit \$5.95

WHISPER LIGHT
An interesting kit, small mike picks up sounds and converts them to light. The louder the sound, the brighter the light. Includes mike, controls up to 300 W, runs on 110 VAC.

WL-1 Kit \$6.95

SIREN
Produces upward and downward wail. 5 W peak audio output, runs on 3-15 volts, uses 3-45 ohm speaker.

Complete kit, SM-3 \$3.95

SUPER SLEUTH
A super sensitive amplifier which will pick up a pin drop at 15 feet! Great for monitoring baby's room or as general purpose amplifier. Full 2W rms output, runs on 6 to 15 volts, uses 8-45 ohm speaker.

BN-9 Kit \$5.95

TELEPHONE TRANSMITTER
Low cost with professional performance. Features include: self phone line powered, tunable from 76 to 100 MHz, polarity antisensitive, compact size (1" x 1"), easily installs anywhere on the phone line or inside the instrument itself.

PB-1 Kit \$14.95

FM RECEIVER
For built-in applications or hobby experimentation. Full fledged super-hetrodyne receiver, microvolt sensitivity, 10.7 MHz IF, integrated circuit detector, 50 mw audio amplifier, 9V external power source, operation on standard FM broadcast band as well as large portions on each side, compact (6" square), for bug detection or reception.

FR-1 Kit \$14.95

FM MINI MIKE

A super high performance FM wireless mike kit! Transmits a stable signal up to 300 yards with exceptional audio quality by means of its built in electret mike. Kit includes case, mike, on-off switch, antenna, battery and super instructions. This is the finest unit available.

FM-3 Kit \$16.95

FM-3 Wired and Tested 19.95

MICROWAVE INTRUSION ALARM

A real microwave doppler sensor that will detect a human as far as 10 feet away. Operates on 1.3 GHz and is not affected by heat, light or vibrations. Drives up to 100 ma output, normally open or closed, runs on 12 VDC.

Complete Kit, MD-3 \$16.95

SPEECH SCRAMBLER

Communicate in total privacy over your telephone or radio. This scrambler kit features full duplex operation using frequency inversion. Runs on a 9 volt battery. Both mike and line or speaker output/inputs. Easy to connect to any radio—telephone use requires no direct connection! Easy to build, uses IC DBM circuitry. Can also be used to descramble most com. scramblers.

Complete kit, SS-7 \$29.95

Case kit, CSS-7 12.95

CT-70 7 DIGIT 525 MHz



\$139.95 WIRELESS INCLUDES AC ADAPTER

CT-90 9 DIGIT 600 MHz



\$169.95 WIRELESS INCLUDES AC ADAPTER

CT-50 8 DIGIT 600 MHz



\$189.95 WIRELESS INCLUDES AC ADAPTER

CT-125 9 DIGIT 1.2 GHz



\$189.95 WIRELESS INCLUDES AC ADAPTER

FREQUENCY COUNTERS

Ramsey Electronics has been manufacturing electronic test gear for over 10 years and is recognized for its lab quality products at breakthrough prices. All of our counters carry a full one year warranty on parts and labor. We take great pride in being the largest manufacturer of low cost counters in the entire USA. Compare specifications. Our counters are full featured, from audio to UHF, with FET high impedance input, proper wave shaping circuitry and durable high quality epoxy glass, plated-thru PC Board construction. All units are 100% manufactured in the USA.

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RAMSEY ELECTRONICS, INC. 793 Canning Parkway, Victor, NY 14564

73 Review

by Kenny A. Chaffin WB0E

Ramsey QRP-40 Transmitter

Ramsey Electronics

793 Canning Parkway

Victor NY 14564

Tel: 716-924-4560

Price Class: \$30. Case kit: \$13

Get a 40m transmitter quickly and easily with this kit.

Ramsey Electronics of Victor, New York, provides a painless way to get involved in QRP construction and operation. They offer three 1-watt output QRP transmitter kits, for 20m, 40m, and 80m. I first saw these kits advertised in *73 Magazine*, and I called to find out more about them.

Fast Delivery

I ordered the 40m version, since that's my favorite QRP band, along with the case kit. When it arrived two days later, I could hardly wait to heat up the old soldering iron. Unfortunately, I had to wait a bit. We have three kids all under three years old, the most recent addition being three weeks old. As you might imagine, this sometimes causes QRM with my hobbies.

Even so, I didn't waste any time opening up the package and checking it out. The case was machined and marked, and included the front panel knobs, but the connectors and switches were part of the QRP-40 kit. The case kit consists of the plastic case itself, custom front and rear panels, and knobs for the controls which come in the transmitter kit. Having a custom case, though not essential, simplifies and completes a project. I was pleased with everything I saw.

Design and Tuning

The QRP-40 arrived in a plastic bag de-

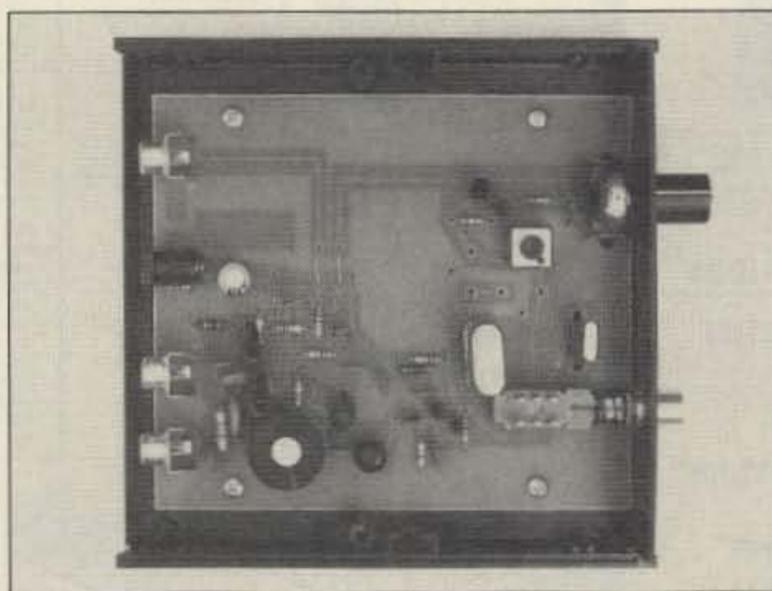


Photo A. Component side board of the QRP-40 transmitter. Parts installation is easy since the board isn't crowded.

signed to hang on a pegboard display. The bag contained the 4" x 5" (100 x 127 mm) circuit board along with all of the other parts. The first thing I did was pull out the one-page instruction sheet and examine the circuit. It's a four-transistor transmitter design with a VXO arrangement. That it's a VXO circuit wasn't mentioned in the advertisement I saw, but it's explained in the Ramsey catalog.

I was immediately pleased that it allowed for two crystals selectable by one of the two front panel controls. The other control is a potentiometer for tuning the VXO. The instruction sheet indicated a tuning range of 10 kHz,

which is about what could be expected from a VXO circuit on 40 meters.

It's disappointing that the crystal is for 7150 kHz, nowhere near either the standard 7040 kHz QRP frequency or the 7110 kHz Novice QRP frequency. If you want to operate the recognized QRP frequencies, you have to either order the right crystals or pull them out of other equipment. The supplied crystal is a standard HC18/U from Jan Crystals, but the instructions say that almost any style will work.

Antenna

I thought I'd need an antenna switch to connect my vertical antenna to either the QRP-40 or my transceiver, as in the old days when I had a separate transmitter and receiver, but I didn't. The QRP-

40 has a built-in diode switching arrangement that provides an antenna output to a receiver! Good job, guys.

Next, I checked all the parts against the parts list. Some of the transistors come in a couple of flavors, but the variations are all listed, so it shouldn't cause any confusion. A couple of hand-written additions to the instruction sheet concern the resistor-like inductors that are part of the kit. If you aren't familiar with this type of inductor, which looks almost like a resistor, it can confuse you. The most notable difference is that the inductors have silver bands on both ends and the color code in the middle.



Photo B. Front . . .



Photo C. . . . and back panel of the QRP-40.

QRP-40 Transmitter Kit

| | |
|-----------|--|
| Power out | 1 watt |
| Circuit | four transistors, crystal control |
| Controls | A/B crystal switch VXO tuning control |
| Power | 12-14 VDC |

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After verifying that nothing was missing, I carefully put all the parts back in the bag and waited for an opportunity to begin.

Assembly

My chance came the following day. With the kids and wife napping, I sneaked to the basement and heated up the ol' Weller soldering iron. Even though the QRP-40 is a relatively simple circuit with about 50 parts, it is by no means a Heathkit. It doesn't guide you step-by-step (e.g., "Insert R31 [red-brown-green] at position A12."). For this kit, you have to know what resistors and capacitors are, and how to read their values. The entire assembly instructions consist of nine steps:

1. Orient the circuit board.
2. Install jacks and switches.
3. Install capacitors.
4. Connect a 100Ω resistor to a 220 μH inductor, and install as shown on the figure.
5. Install resistors (47k on solder side).
6. Install diodes and transistors.
7. Install inductors.
8. Install crystal.
9. Check all solder connections.

The only difficulty was positioning a couple of the transistors. Q2, in my kit, is almost round. It took me a second to find the flat side. The parts placement drawing was a great help in figuring this out. Q4, on the other hand, is almost square. It does, however, have a couple of missing corners on one side. If you assume this is the rounded side, and the other side flat, you'll have it right.

Unused holes on the circuit board are indicated on the layout drawing, something often

overlooked in kits. This makes it easier to check placement.

I completed the entire assembly by the time the kids got up from their naps, about an hour and a half. This was enough time for me to check and make sure I'd installed and soldered everything properly. Depending on your experience with kit building, allow from one to three hours.

Apprehension

Power input can range from 12 to 14 volts, so I connected the board to my 2 meter rig's power supply. I had to scrounge around a bit to find connectors and adapters to connect the dummy load and antenna. The QRP-40's two antenna connectors and key connector are all phono plugs. Fortunately, from my work with the HW-7 QRP rig and a couple of home-brew preamps, I had phono-to-UHF adapters.

The switch for the crystals is not marked on either the board or the schematic as to which position is for which crystal, but it's relatively easy to figure out. The front panel of the case is marked, but, for you who get the kit without the case kit, remember that *out* is position A, and *in* is position B.

I selected position A, the 7150 kHz crystal, and connected the transmitter to my antenna via a wattmeter. I turned the power switch on for about half a second and then quickly backed it off. No smoke. Good. Everything looked fine, so I turned the power back on and pressed the key. Yeah! Power out! The wattmeter showed about 1 watt.

Adjustment and Tuning

The next step was to check the receiver and verify the frequency. Sure enough, it was at 7145 kHz. Checking the range of the tuning control, which is a 5k pot, gave a range of about 7145 to 7150 kHz. The only internal adjustment is a coil in the oscillator circuit that adjusts the tuning range. Trying various settings and adjustments, I was able to get the lower limit down to about 7140 kHz, but I could never get a range of more than 7 kHz. Close, but not quite the claimed 10 kHz. The tuning range of a VXO is highly dependent on the type of crystal and other factors, so I don't consider this a significant problem.

Later, I found some old FT-243 style crystals in my junk box and decided to try them just for grins.

They seemed to work, though the tone of the output signal was nothing to write home about, and the tuning range was non-existent. It's probably best to avoid older crystals and stick with the newer canned crystals. I tested the transmitter with a wide range of crystals, and the power output remained 1 watt, regardless of frequency.

Installing the board in the case is simple. Ramsey provides rubber feet for the bottom half of the black plastic case. The top and bottom are identical, except that the bottom has two holes for screws to secure the case. The circuit board is a tight fit. Place the front panel on the board and fit these together into the bottom. Four screws hold the board in place. After screwing the board down, you can attach the back panel and top.

I ran into a slight problem with the button for the crystal select switch. It was too loose to fit on the switch shaft, at least in my kit. Folding a strip of paper and inserting it between the shaft and the button snugged up the fit enough.

On the Air!

Operating with 1 watt with a vertical is a world apart from operating with a kilowatt and a seven element beam. You have to use a few tricks, like tail-ending, calling a station when he finishes a QSO, or answering a CQ rather than calling CQ.

At first I had no luck, even following my own advice above. Then I remembered, from the days of separate transmitters and receivers, that a CW signal has two sidebands. Most modern transceivers use only one of these. After getting on the other sideband, opposite of the way my Heath 5400 normally operates, it worked. The first CQ I answered heard me. K5KS in Albuquerque, New Mexico, was my first 1 watt contact. He valiantly gave me a 559, and we chatted for a few minutes while I attempted to contain my enthusiasm. It's quite a feeling to have a QSO going well, and even rag-chewing a little, on 1 watt. Amazing!

The next day I had a contact with Joe N3NJ in Pittsburgh, and others around the States. I haven't worked any foreign DX with the QRP-40 yet, but, since it's been done often in the past, so it's only a matter of time. I can hardly wait to work New Zealand with 1 watt.

Conclusion

Ramsey has a limited warranty on its kits and telephone help if you have problems, but with the simplicity of this particular kit it should be smooth sailing.

The final QRP-40 transmitter, installed in its case, measures about 5" x 5½" (127 x 140 mm), and is a nice-looking, although small, addition to my station.

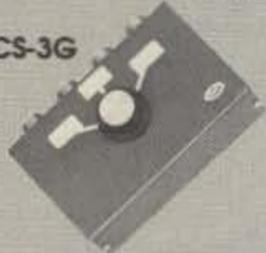
Is it worth the money and effort? Absolutely. If you're looking for an easy way to build a QRP rig, this is it. Quick delivery, complete kit with good instructions, and easy operation. And it's always more fun to get on the air using something you built yourself. If you're not into scrounging for parts, this may be the kit for you. Happy QRPing! **73**

Kenny A. Chaffin WB0E, 2942 South Wabash Circle, Denver CO 80231.

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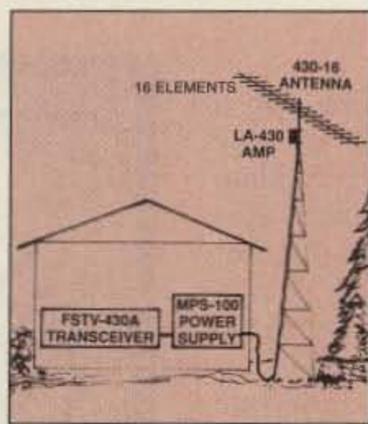
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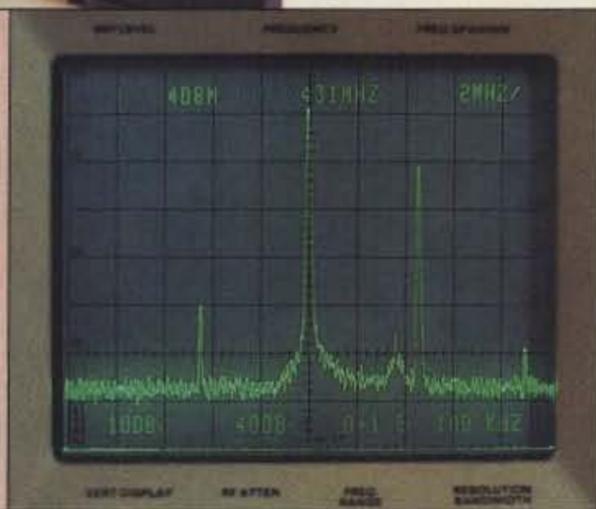
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Color SSTV for the Atari ST

Part I

Atari ST owners already have 99% of a color video station.

by John W. Langner WB2OSZ

A catchy ad contains a picture with a transceiver, a television, a tape recorder, a missing box, and the caption, "You already own 75% of a color video station." Reading the fine print, you discover that the missing piece costs \$1295. It's a very fine and popular piece of equipment, but the price is a bit steep for someone with only a casual interest in trying a new mode of communication.

A few years ago you didn't have much choice. You could either buy a commercial scan converter or home-brew a very complicated device. Very few people had the skill and patience to build it. Modern home computers, though, have lots of memory, plenty of processing power, and adequate color graphics displays to serve as the base for a slow-scan television system. Just add a simple interface and suitable software and you are on the air with SSTV video.

Part I of this two-part article gives you background on the development of amateur SSTV and describes a low-cost SSTV interface and software for the Atari ST computer.^{1,2,3} Part II will show you how to build a high performance color SSTV interface for this widely available computer.

Table 1 lists the features of this system. Before continuing, however, let's first look at how SSTV pictures are transmitted.

SSTV Transmission Formats

The original slow-scan television standard uses a tone of 1500 Hz for black, 2300 Hz for white, and frequencies in between for shades of gray. The 120 scan lines are separated by five-millisecond horizontal sync pulses of 1200 Hz. Vertical sync, between frames, is also 1200 Hz, but 30 milliseconds long. Figure 1 illustrates a single scan line.

Early color pictures were transmitted with the frame sequential method. Three separate black and white frames were generated with a red, green, or blue filter in front of the TV camera. On the receiving end, a triple exposure photograph was made with red, green, and blue filters between the CRT and camera. As technology improved, it became feasible to keep all three frames in memory and display them at the same time on a color TV. Figure 2 shows an example with five vertical color bars.



Photo A. Atari ST SSTV test patterns.

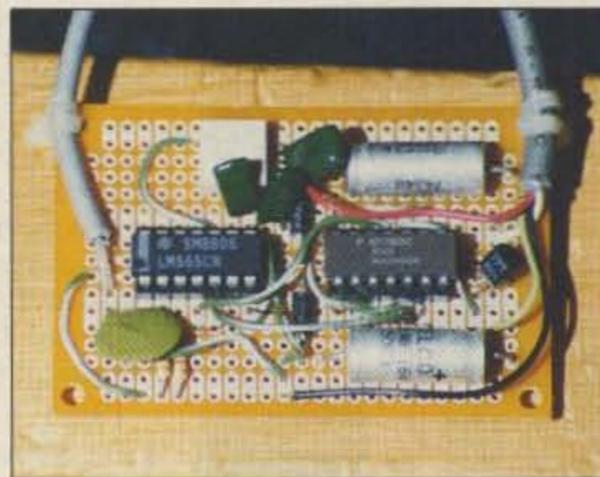


Photo B. Low-cost interface layout.

About a decade ago, several experimenters developed various single frame color schemes. One of the many formats is illustrated in Figure 3.⁴ Rather than giving equal amounts of time to the red, green, and blue components, you can use a short transmission time more efficiently by giving more time to green. This is because our eyes are more sensitive to changes in green. The first two-thirds of each scan line is for intensity of green. The remainder is for alternating red and blue information, which is the average of two scan lines.

The Robot transmission formats are different in that they transmit luminance (brightness) and chrominance (color) information rather than red, green, and blue.⁵ Luminance, represented by Y , is computed as $0.30 R + 0.59 G + 0.11 B$. Chrominance is conveyed by the two values $R - Y$ and $B - Y$. Table 2 contains luminance and chrominance values for several colors.

The possible ranges of Y , $R - Y$, and $B - Y$

are scaled into the range of 1500 to 2300 Hz for transmission (see Figure 4). At the receiving end, you can calculate original RGB values with a little elementary algebra.

A benefit of this system is that the first two-thirds of each scan line contains a black and white compatible signal. Someone with an old eight-second, black and white system can receive a 12-second color picture properly, and not even realize it was transmitted in color!

Operation

Now that you have a little background and history on SSTV, let's look at the system I've put together. To start with, there are currently two versions of the software. Version 0.9 has the capability to send and receive pictures, manipulate images, generate test patterns, and read picture files from disk. The full version, 1.1, can perform all the functions of 0.9, plus save images to disk. Version 0.9 is available at various user groups. Two groups I know of are: Atari Microcomputer Network, John Adams KC5FW, 17106 Happy Hollow, San Antonio, TX 78232, USA; and ASTUR (Atari ST Users on Radio) GEERAERT Michel, W. Elsschotlann 21, B-8460 Koksijde, Belgium. To the first group, send a formatted disk and \$2 for the program; to the second group, send two disks and three IRCs (one disk will be returned).

Version 1.1 is available from A&A Engineering in Anaheim, California. Version 1.1 is useful only for the high-performance interface, described in Part II of this article, to appear in the January '90 issue.

The screen is divided into several regions (see Figure 5). The top line contains messages, and a prompt for keyboard input, when necessary. The menu contains a list of the available commands. The selection line indicates the currently selected monitor and images. Each "TV monitor" displays an image with 128 by 120 pixels with 256 colors. You can adjust brightness and contrast with the aid of the color bars.

How can 256 colors be displayed at once? In low resolution mode, the ST can normally display from a palette of 16 colors picked from the 512 possibilities. You can increase the number by reloading with a different set of colors during horizontal blanking inter-

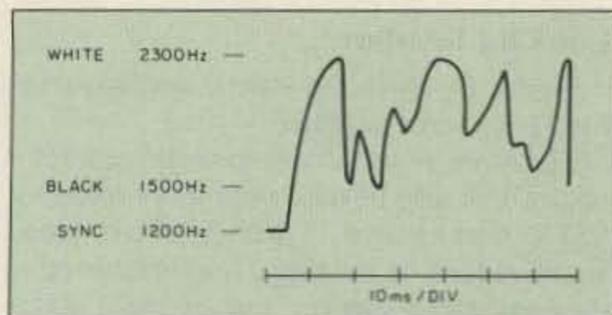


Figure 1. Single scan line plot for the original 8-second black and white SSTV format.

rupts. However, there is still a maximum of only 16 colors on each scan line.

This program uses a different technique. Two different screen images are built in memory. Each has a different palette of 16 carefully chosen colors. During each vertical blanking interrupt, the opposite screen and palette is selected to produce a total of 256 colors. The 30 Hz flicker becomes a little wearing to stare at all day, but it works very well for shorter periods.

Photo A shows the command menu. The first column contains the commands to receive, transmit, print, load from disk, save to disk, and quit from the program. The second column shows the transmission formats. The third column contains functions to manipulate images. The last column contains com-

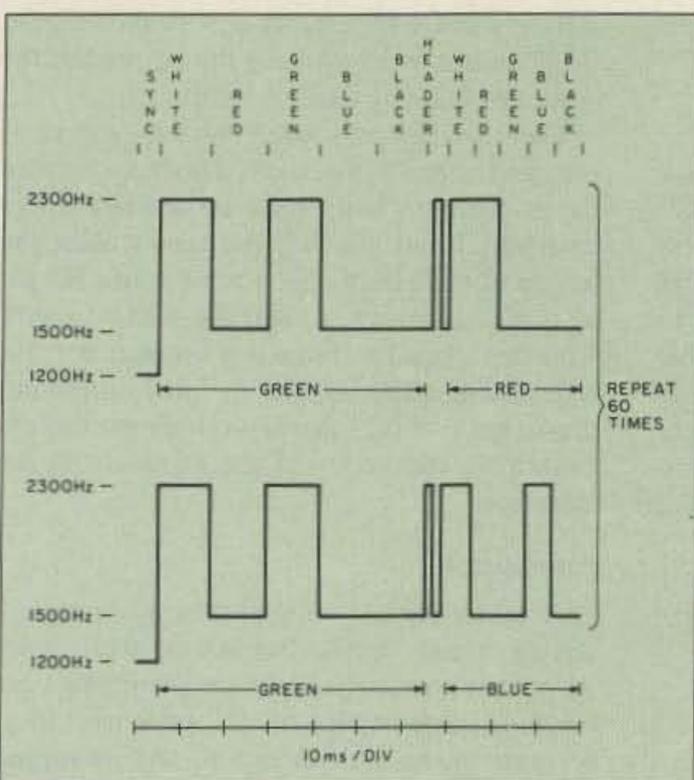


Figure 3. Sudio 12-second single frame color format.

mands to generate test patterns. The currently selected format is highlighted with a yellow background.

Most commands require only a single keystroke. Menu items ending with "." require additional input. For instance, when saving an image to a disk, you must specify a file name. A flashing text cursor appears along with a prompt for input. While a command is being executed, the menu item is highlighted by a red background. This assures you that you have pressed the correct key. When the background color returns to normal, you know the command has been carried to completion.

At any time, one of the two "TV moni-

tors" is the active or "selected" one. Most of the commands use the content of the selected monitor. Press the left arrow key to select the left monitor. The "<->" on the selection line is then highlighted in red. Press the right arrow key to select the right monitor; "->" will then be highlighted.

The 10 image-buffers in memory are numbered 0 through 9. The TV monitors can display any of the image buffers. A number above the monitor will be highlighted to show which image buffer it's displaying. You can select an image for the currently selected monitor by pressing one of the digit keys, 0 through 9. Press the up or down arrow key to select the next higher or lower image buffer.

There is one more image buffer that isn't displayed on the screen. Commands that modify an image buffer first copy the old image to the save-buffer. The UNDO key exchanges the currently selected image and the saved image.

Sending and Receiving

The first step for sending or receiving is to select the transmission format from the second column of the menu. Press "R" to start receive mode. The first frame will go into the current image. Subsequent frames will go into consecutive image buffers, and the selected monitor will alternate. Terminate receive mode by pressing the space bar.

Function key "n" transmits the current image n times. Press the shift key at the same time to transmit consecutive images, once each. For example, if image 6 is in the selected monitor, and you press Shift-F3, images 6, 7, and 8 will be transmitted. Press the space bar to terminate transmission early.

Printing

You can print the image on an Epson or compatible dot matrix printer by pressing "P," for Print. Each screen pixel is converted to a 4 x 4 group of dots on the printer. Each group can have 0 through 16 dots printed, so 17 gray levels are available when viewed from a distance.

Loading and Saving Images

Press "L" to load a picture from a disk file, and "S" to save a picture to a disk file. This program accepts the file formats of the most popular drawing programs. The proper conversion routine is selected by the file extension: NEO for NEOchrome, P11 for Degas, or STV for its own file format with 256 colors.

"V" saves the entire screen in a file called SCREEN.NEO. You can load this file into memory to transmit a self-portrait.

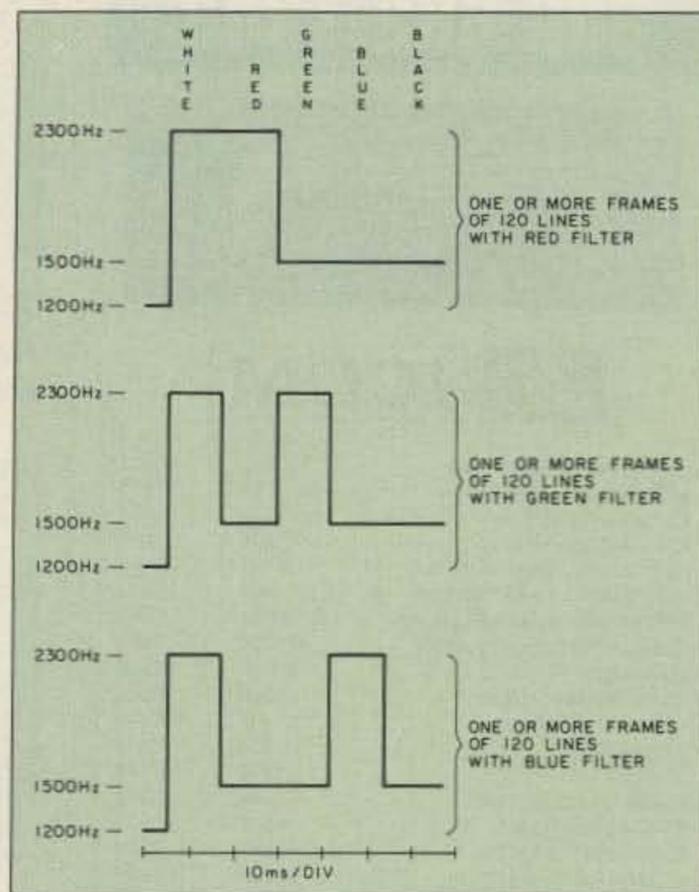


Figure 2. Frame sequential color SSTV. Three b & w frames were sent for red, green, and blue components.

Image Manipulation

You can manipulate the image in a variety of ways. Uncolor (U) converts a color image to black and white so that you can see what a color picture will look like transmitted or printed in black and white. However, you don't have to uncolor a picture before transmitting it in black and white or printing it out. Mirror (M) swaps the left and the right sides of a picture. Rotate (O) turns the image 90 degrees. Negative (N) inverts all the colors: white becomes black, blue becomes yellow, etc.; medium gray is hardly affected.

Zoom (Z) expands one-quarter of the image by a factor of two so that it fills the entire "monitor." At the prompt, type a single digit to select which quarter of the screen you want to expand: 7, upper left corner; 5, center; 2, center bottom; and so on. These positions

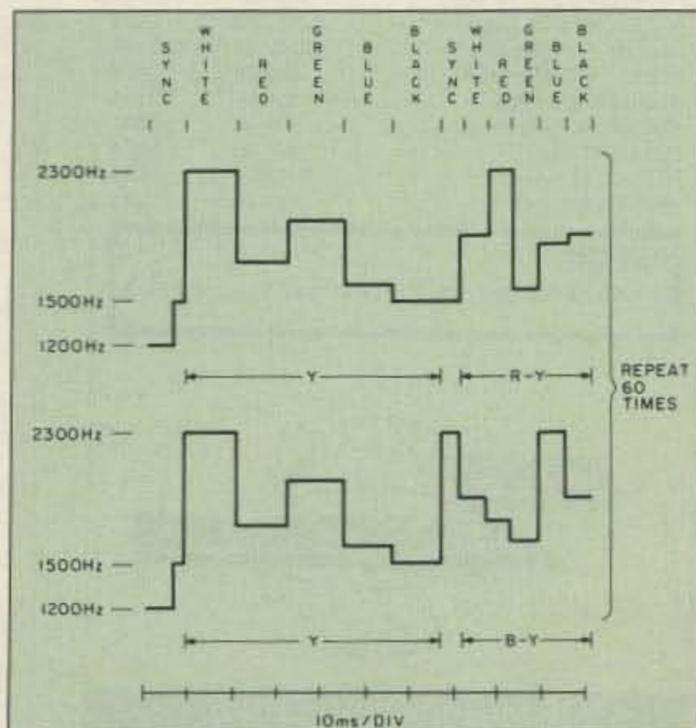


Figure 4. Robot 12-second single frame color format.

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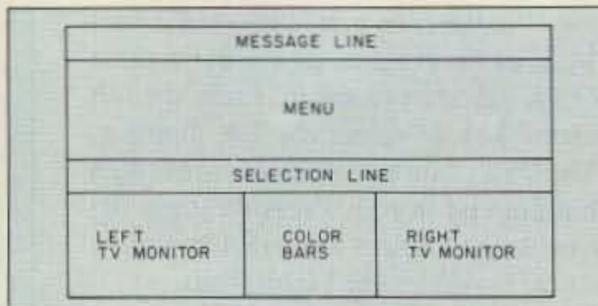


Figure 5. Screen layout for the SSTV program.

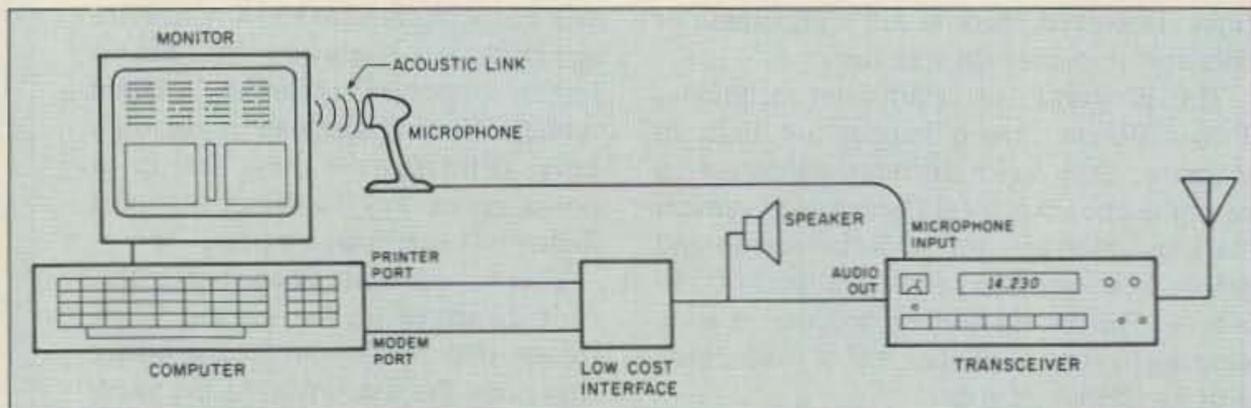


Figure 6. Station layout using the low-cost interface.

conform to the numeric keypad. Shrink (S) does the opposite of Zoom.

Finally, use Merge (E) to combine multiple images into one. Specifying only one source image produces a copy of that image. Not specifying a source image clears the current image buffer.

Pattern Generation

"C" produces a traditional 8 x 8 black and white checkerboard pattern. "K" produces a more colorful alternative. Press "G" for a gray scale pattern, "W" for colors arranged in rainbow order, and "A" to produce 256 rectangles with all the possible colors. Finally, "B" generates overlapping red, green, and blue circles. The intersections of these circles are yellow, cyan, magenta, and white. Again, see Photo A to see the last pattern.

Table 1. Summary of Features

| | |
|---|--|
| Sends and receives these popular formats: | |
| Robot: | 8 second black and white 12, 24 & 36 second color |
| Volker Wraase: | 24, 48, and 96 second color |
| AVT: | 90 second color 24, 94 second color, receive only |

Screen contains:

- Two images with 128x120 pixels of 256 colors
- Menu of available commands

Test pattern generation:

- Checkerboard, rainbow, all colors

Image manipulation:

- Mirror, rotate, zoom, shrink

Load and save images with various file formats:

- NEOchrome, Degas, Own format with 256 colors

Keep ten images in memory for instant access.

Print images with 17 gray levels.

Can use either low cost (about \$7) interface connected to modem and printer ports, or high performance interface connected to MIDI port.

Low Cost Interface

Figure 6 shows the station configuration for the low-cost interface.

The Atari ST has a built-in sound generator chip which may be used to produce tones for SSTV transmission. I have received good signal reports by holding a microphone up to the computer's speaker, but the exact placement has a big effect on the resulting signal quality. The computer has no provision for

audio input, so you'll need a simple interface for receiving. The schematic is in Figure 7 and the parts list is in Table 3.

U1 is a phase-locked loop which locks onto the strongest tone present. U2 produces a square wave with exactly a 50% duty cycle. Q1 provides protection for the computer; the output of U2 may exceed 5 volts.

The RS-232 port is used only as a source of plus and minus 5 or 6 volts. The busy input of the printer port happens to be connected to a hardware timer which is used to measure the length of each pulse. You must adjust R3 for an output of roughly 1750 Hz with no input. You don't need a frequency counter for this adjustment; pressing the "*" key on the numeric keypad will display on screen the approximate frequency of the signal from the interface.

Conclusion

A phase-locked loop works well with a strong, clean signal, but not so well under noisy conditions. Holding a microphone near a speaker driven by a square wave isn't ideal for generating a clean signal, and swapping

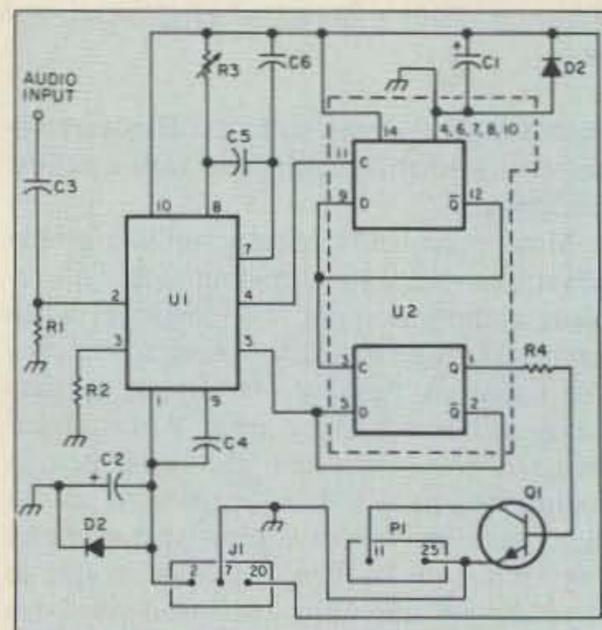
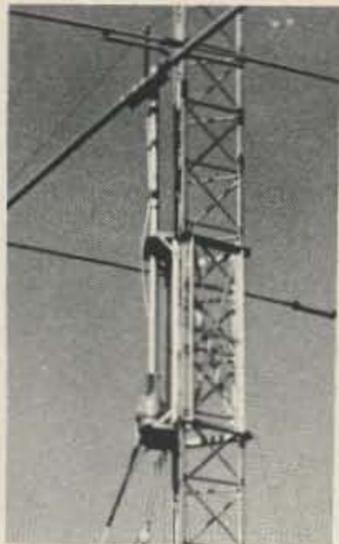


Figure 7. Low cost interface for receive.



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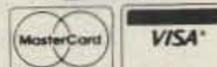
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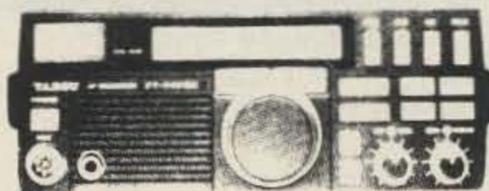
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Table 2. Conversion of RGB to Luminance and Chrominance

| Color | R | G | B | Y | R - Y | B - Y |
|-------------|------|------|------|------|-------|-------|
| black | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| dark gray | 0.25 | 0.25 | 0.25 | 0.25 | 0.0 | 0.0 |
| medium gray | 0.5 | 0.5 | 0.5 | 0.5 | 0.0 | 0.0 |
| light gray | 0.75 | 0.75 | 0.75 | 0.75 | 0.0 | 0.0 |
| white | 1.0 | 1.0 | 1.0 | 1.0 | 0.0 | 0.0 |
| blue | 0.0 | 0.0 | 1.0 | 0.11 | -0.11 | 0.89 |
| green | 0.0 | 1.0 | 0.0 | 0.59 | -0.59 | -0.59 |
| cyan | 0.0 | 1.0 | 1.0 | 0.7 | -0.7 | 0.3 |
| red | 1.0 | 0.0 | 0.0 | 0.3 | 0.7 | -0.3 |
| magenta | 1.0 | 0.0 | 1.0 | 0.41 | 0.59 | 0.59 |
| yellow | 1.0 | 1.0 | 0.0 | 0.89 | 0.11 | -0.89 |

cables to receive or print is an annoyance. The low-cost interface, however, provides a quick, easy, and cheap way to enter the exciting world of slow-scan television. Stay tuned next month when I describe how to build the high performance interface! **73**

References

¹Edwards, Jon R., Robinson, Phillip, and McLaughlin, Brenda, "The Atari 520ST." *BYTE*, January 1986, page 84.

²Robinson, Phillip, and Edwards, Jon R., "The Atari 1040ST." *BYTE*, March 1986, page 84.

³Menconi, Dave, "The Atari 1040ST." *BYTE*, February 1987, page 231.

⁴Suding, Robert W0LMD, "8 and 12 second single-frame color SSTV." *The Best of A5—Slow Scan Television*, page 34.

(Reprint booklet number 103 from ESF Copy Services, 4011 Clearview Drive, Cedar Falls IA 50613. \$10 plus \$1 postage.) Suding formats are not commonly used now.

⁵Robot Research, Inc., *Instruction Book—Model 1200C. Section Nine, "Technical Description."* Manual is available

Table 3. Parts list for Low Cost Interface

| Part No. | Description | Quantity | Price |
|----------|----------------------------------|----------|-------|
| C1,C2 | 100 µF electrolytic, 10 V | 2 | @ .19 |
| C3 | 0.1 µF disc ceramic | | .15 |
| C4 | 0.01 µF mylar | | .11 |
| C5 | 0.001 µF mylar | | .06 |
| C6 | 0.033 µF mylar | | .11 |
| D1,D2 | 1N4001 | 2 | @ .10 |
| J1 | DB-25S connector to modem port | | .79 |
| P1 | DB-25P connector to printer port | | .75 |
| Q1 | 2N3904 or similar | | .12 |
| R1,R2 | 4.7 k | 2 | @ .06 |
| R3 | 10 k trim pot | | .89 |
| R4 | 22 k | | .06 |
| U1 | NE 565, phase-locked loop | | .99 |
| U2 | CD 4013, dual type D flip flop | | .29 |
| | perfboard (RS part 276-150) | | .99 |
| | two 14 pin IC sockets | 2 | @ .39 |

Approximate total

\$7.00

Prices shown are from a typical mail-order catalog, except where a Radio Shack (RS) part number is listed.

separately for \$25 from Robot Research, Inc., 5636 Ruffin Road, San Diego CA 92123. Tel. (619) 279-9430. Essentially the same information is in "Upgrade Your Robot 400 SSTV Converter," *The Best of A5—Robot 400 Mods*, page 41. ESF reprint booklet 110. Same price as above.

Nets, Newsletters, and Magazines

The International Visual Communication Association (IVCA) has four weekly SSTV nets:

| | |
|----------------|---------------------------|
| North American | Sat. 1500 UTC, 14.230 MHz |
| South American | Wed. 2300 UTC, 14.236 MHz |
| European | Sat. 1300 UTC, 14.233 MHz |
| South Pacific | Sun. 0400 UTC, 14.247 MHz |

Another SSTV net, **The Slow Scan TV Network**, meets on Saturdays at 1800 UTC, also on 14.230 MHz. This one tends to have fewer pictures and more technical discussions.

The **Atari Microcomputer Network** meets Sundays at 1600 UTC on 14.325 MHz. This is a good source of information on ham applications for Atari computers. The group also publishes a newsletter called *Ad Astra*. The cost is \$15 US or \$18 CDN for six issues per year. Those outside US or Canada should add an extra \$5 for additional postage. The editor is Gil Frederick VE4AG, 130 Maureen Street, Winnipeg, Manitoba R3K 1M2 CANADA.

The **United States ATV Society (USATVS)** publishes *The Spec-Com Journal*. This is primarily oriented toward fast-scan TV, but there is usually some mention of SSTV. Cost is \$20 for six issues per year. Add an additional \$5 for mailing to Canada and Mexico, and \$10 for other countries. A net is held each Tuesday night at 2000 Eastern time on 3.871 MHz. The *Spec-Com Journal*, P.O. Box H, Lowden IA 52255-0408.

The **British Amateur Television Club (BATC)** publishes the quarterly *CQ-TV* magazine. Annual membership is £6. For a membership application, send an SASE to Dave Lawton G0ANO, 'Grenehurst,' Pinewood Road, High Wycombe, Bucks HP12 4DD ENGLAND. The US representative is Wyman Research, Inc., R.R. #1 Box 95, Waldron IN 46182. Write for information about current rates in \$ US.

An announcement of a new magazine appeared just as I was putting the finishing touches on this article: *Amateur Television Quarterly*, 1545 Lee St., Suite 73, Des Plaines IL 60018. A subscription costs \$15 per year. (Add an additional \$5 for postage to Canada or \$10 for other countries.)

ASTUR has a newsletter which is available only on disks. Cost is two disks (one will be returned) and a few IRCs. ASTUR (Atari ST Users on Radio), GEERAERT Michel, W. Elsschotlann 21, B-8460 Koksijde, Belgium.

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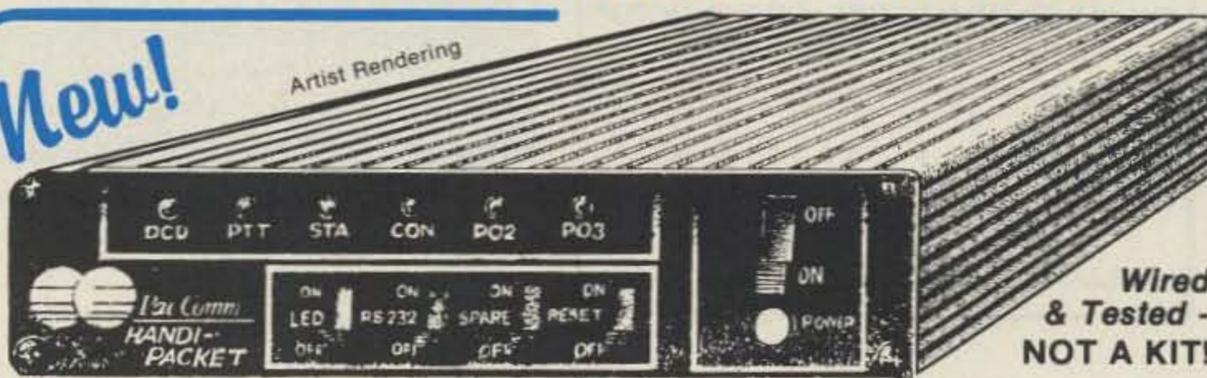


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CIRCLE 152 ON READER SERVICE CARD

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We are happy to provide Ham Help listings free on a space available basis. To make our job easier and to ensure that your listing is correct, please type or print your request clearly, double spaced, on a full (8½" x 11") sheet of paper. You may also upload a listing as E-mail to Sysop to the 73 BBS (1200 baud, 8 data bits, no parity, 1 stop bit, PH:603-525-4438). Use upper- and lower-case letters where appropriate. Also, print numbers carefully—a 1, for example, can be misread as the letters l or i, or even the number 7. Thank you for your cooperation.

I am looking for accessories for my Yaesu FT-101Z such as external VFO, speaker, etc. Persons with anything for sale for the 101Z please write or call with description, condition and price. Also, need any technical information for the Tandy Model 600 laptop computer such as Memory Map, how to access the serial port from BASIC, use of the external disk drive port, and how to use MS-DOS/PC-DOS DEBUG to write library routines for the Model 600 (an 8088 machine like the IBM.) Contact: *Heyward Bozard, Jr. N4VFK, 234 Pinehill Road, N.W., Orangeburg SC 29115, (803) 536-0720/534-5350 (BBS), Compu-serve 70270,530/Genie HBOZARD.*

Wanted: Assembly sheets, parts list, schematics and instructions for Conar Model 400 transmitter. Purchased through National Radio Institute. Will pay copying and mailing cost.

Charles Hall, 495 West 19th, Russellville AR 72801, I am researching a book on the life and times of Arthur Godfrey. I understand Mr. Godfrey had a very early, unusual call sign. Can anyone tell me what it was? Thank you. Contact: *Lee R. Munsick, 20 Harriet Drive, Whippany NJ 07981-1906.*

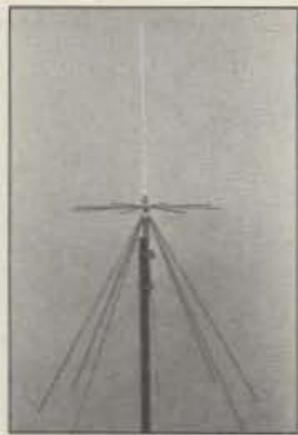
I am in need of schematic diagrams of a 150 watt generic switching type power supply used in a IBM XT clone, and also of a 2400 baud generic internal modem (which says BDP, Inc. or Best Data Products as a possible company name on it). Contact: *Marvin Moss W4UXJ, Box 28601, Atlanta GA 30358.*

I need an operating manual and schematic for a Yaesu FT207R. I will pay all associated costs for a copy, or I will copy and return the original. Thank you. Contact: *Don Richmond, PO Box 153, Talcott WV 24981.*

Needed: A schematic and manual for a Hallcrafters Model S-38C. Also, any updates on the ICOM IC-22S, A-B switch and the 145 MZ MOD. I will pay for copying and handling. Contact: *Ted Jenson KE6WF, HCR 58 Box 7-A, Spooner WI 54801.*

Help me please! . . . I need a service manual and diagram for my Atlas 350 XL Transceiver. I will pay for copy. Hoping for your answer as soon as possible. Thank you. Contact: *Paulo Cesar dos Santos PP2 ZD, Rua Osmundo Rodrigues da Cunha,, No. 605, Araguari MINAS GERAIS 38440, Brazil.*

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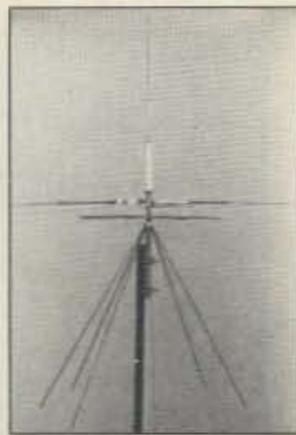


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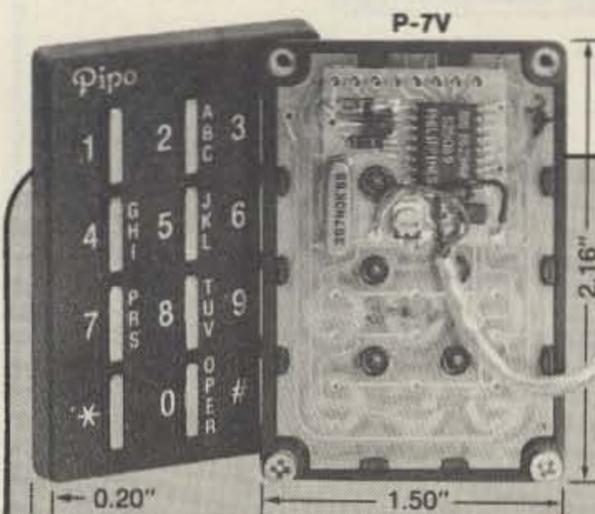
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CIRCLE 66 ON READER SERVICE CARD

73 Review

by Pete Putman KT2B

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Mirage has added a new "brick" in its extensive line of solid-state power amplifiers. The D15 is intended for general use in the 70cm (420-450 MHz) band and is class AB1 linear biased to facilitate FM, SSB, CW, and even ATV operation.

What makes this particular design different is its simplicity, made possible by the use of a Toshiba S-AU4 power module instead of discrete transistors. The circuit board layout is simplified considerably. RF-sensed keying is used for TX/RX operation, but there is no provision for hard keying. A potentiometer is accessible through the side panel to set the drop-out delay in the SSB mode, while drop-out is instantaneous in the FM mode.

The heat sink and chassis are similar to the B22 and C22 series amplifiers, except that a new slotted cover is used for better cooling. Front panel controls are POWER ON/OFF and SSB/FM MODE. Two LEDs indicate when the unit is in line and when it's keyed up. Incidentally, the D15 does not use an antenna relay, relying instead on diode switching. This makes a lot of sense at this frequency, and the "clunk" of

| 432.000 MHz | | 446.000 MHz | |
|-------------|--------------|-------------|--------------|
| IN | OUT | IN | OUT |
| 0.5 W | 0* | 0.5 W | 2 W |
| 0.65 W | 2 W | 0.65 W | 4 W |
| 0.7 W | 4 W | 0.7 W | 5 W |
| 0.8 W | 6 W | 0.8 W | 8 W |
| 0.9 W | 8 W | 0.9 W | 10 W |
| 1 W | 10 W | 1 W | 13 W |
| 1.5 W | 15 W | 1.5 W | 17 W |
| 2 W | 18 W @ 3.0 A | 2 W | 18 W @ 3.4 A |

*There is a sharp "knee" on the 432 range as the power rises from little or no output and quickly soars to 4-5 Watts output. In both cases, the amplifier becomes saturated with 2 Watts of drive.

Table 1. Power input vs. output for the Mirage D15 amplifier.

relay contacts pulling in isn't missed.

Mirage states that the amplifier will develop over 15 Watts output when fully saturated with 2 Watts of drive, and that the insertion loss is less than 1.5 dB. (The D15 has no internal preamplifier.) According to the manual, as little as .25 Watts will result in 6 Watts output across the 70cm band, so the D15 would seem to be ideal for hand-held users and ATV enthusiasts with 1 to 2 Watts output available.

Performance

The Mirage D15 was tested with a variable 70cm RF source using two Bird Model 43 meters—one at the input and one at the output. A Termline resistor was used to terminate the D15. Two 50Ω attenuators were used before the amplifier to ensure linear power output from the 70cm source. Measurements were made at 432.000 MHz and at 446.000 MHz, covering the weak signal, ATV, and FM segments of the 70cm band. See Table 1.

Conclusions

The D15 is a well built amplifier that essentially meets the published specifications for all-mode operation. The workmanship is of excellent quality. The most likely users of this product would appear to be hand-held transceiver owners looking for a bit more power from home or the car, and ATV operators typically equipped with QRP transmitters. While Mirage claims full rated output with an intermittent duty cycle and no cycle times are claimed, I found the output fairly stable during a 3 minute key-up test into a 50Ω load. **73**

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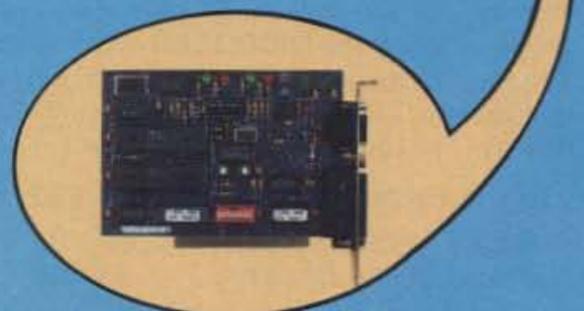
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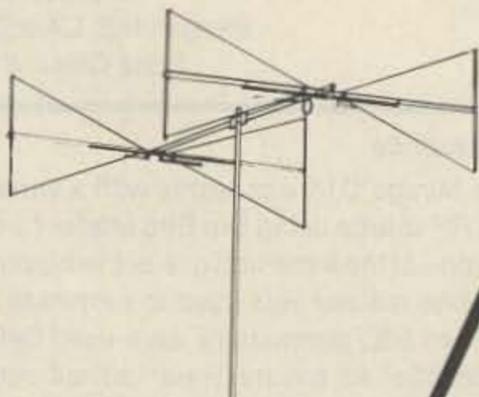
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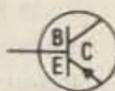
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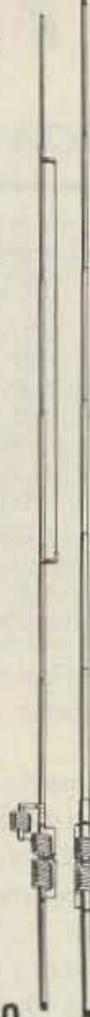
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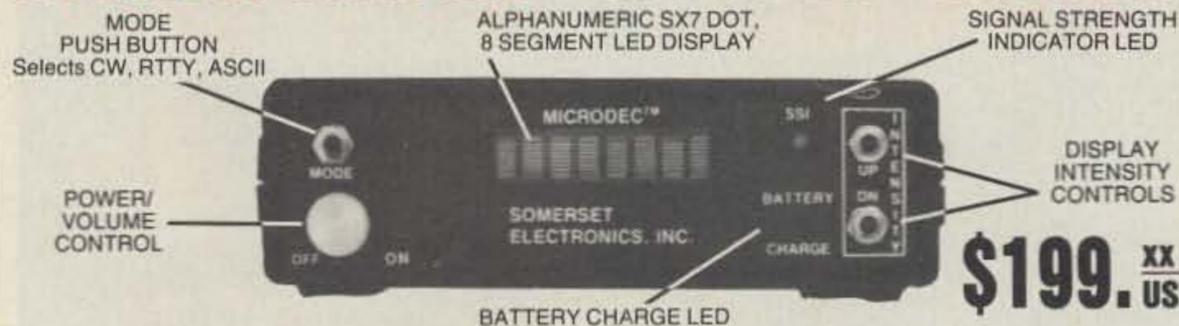
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Apologies

I recently spoke with Tom Moulton W2VY of the Radio Amateur Telecommunications Society (RATS) about my article on networking (pp. 60-62) in the October packet issue of 73. Tom is the author of the ROSE networking package. He spotted some errors and unclear statements in the article.

First, the ROSE packet switch does not contain an implementation of the OSI transport protocol TP1. Second, the statement, "ROSE can't communicate with NET/ROM, NET/ROM can't communicate with TexNet, and TexNet can't communicate with ROSE," is incorrect. Although they can't intercommunicate on the network level, all these protocols can indeed communicate at the AX.25 level. Users can manually set up a path involving all of these different types of network node as long as they set up the path like KA-Node: by issuing a connect command at each point along the way. Such a network can't switch packets between the different networks automatically.

If you're interested in the ROSE packet switch, and you want more information about it, contact Tom Moulton W2VY at RATS, 206 North Vivyan Street, Bergenfield, New Jersey 07621; (201) 387-8896.

A Disturbance in the Ether

Over the past two years many packet radio enthusiasts have had to deal with nasty messages, excessive QRM, and verbal abuse. The complaint? "You (fill in the blank—TCPers, NET-ROMers, TEXneters, etc.) are ruining packet radio for us 'legitimate' users." I have also heard, "My digipeater/NET-ROM is for legitimate packet radio use—not for TCP/IP." How about this one, "That BBS is making it so that I can't have a QSO with Fred (or Jim, or whoever). That *!-&\$% BBS owner ought to get his own frequency and quit messing up ours." My personal favorite is, "You can't legally send TCP/IP over the air because it isn't AX.25 and the FCC regs only allow AX.25 packets on the air."

No, It's Not Illegal!

There are really three problems: people who like to monitor everything on the channel and who don't like all the binary "garbage" from the networking protocols; too many people on one frequency; and poor frequency sharing. The first problem turns out to be an oversight on the part of the people who wrote the firmware for early TNCs. Every AX.25 packet contains a field called the Protocol Identifier (PID). This tells the receiver what kind of data is contained in the packet.

In the early days of packet, everything was sent with the same PID (hex value F0) indicating that the packet contained ASCII text. NET/ROM, TEXnet, TCP/IP, ROSE, and text all use different PID values to differentiate between them. These PID values are part of the AX.25 specification. The monitor mode of many TNCs ignores the content of the PID field, so if you turn your monitor on, you see garbage on the screen or on the printer. The solution is to get a later version of firmware for your TNC or get a new TNC.

This also touches on the complaint that use of TCP/IP, NET/ROM, TEXnet, ROSE, or any other networking or special protocol is unlawful. Not true! Each of the above mentioned protocols uses a technique called encapsulation, i.e., every TCP, NET/ROM, TEXnet, or ROSE transmission is completely contained in a perfectly valid AX.25 frame. All of these protocols are perfectly valid and legal in an amateur packet radio environment, on HF or VHF.

To go one step further, the FCC regulations do not even require an amateur station to send data using AX.25. They only require that the operator maintain a written description of the modulation and encoding techniques used at the station, and that the encoding/transmission method be used to enhance communications and not be intended to prevent others from receiving and decoding the transmissions.

Frequency Crowding

In populated areas, too many people may be on one frequency. A 1200 baud channel can handle only about 700-800 bauds aver-

age throughput. When you have several people typing to one another, the channel can handle many users before it reaches saturation, but as you throw in a computer that can type faster than a human, you begin to see problems with channel capacity. The BBS is a perfect example of this.

The answer? Provide more frequencies to divide the load and improve channel sharing. There is a simple reason why most people do not want to move to a different frequency: without a packet switch or BBS on the new frequency, they can't reach the rest of the world from there. On the other hand, trying to cram all the users in one area onto one or two frequencies is pretty crazy, too. Instead of putting up more digipeaters, it would be better to spend the time and money putting up duplex digipeaters (dual-frequency, real-time, digital repeaters) and cross-band packet switches.

Obviously, more frequencies will help eliminate overcrowding. There are LOTS of frequencies available for packet. Six meters, 220 MHz, and 70cm (430-450 MHz) are grossly underused. 33cm (902-928 MHz) is virtually unused. 23cm (1.2 GHz) is also underused AND it is one of the bands where Novices can operate.

Efficient Use of Frequencies

Surprisingly, file transfers and BBS operation don't have to monopolize a frequency. Several years ago, I set up three stations on 220. I set station A transmitting a file to station B, B sending a file to C, and C sending a file to A. Here were three stations all engaged in file transfers simultaneously. All three file transfers proceeded concurrently without a hitch. The final result was a channel throughput of about 800 bits per second, and a retry/retransmission rate of about 5%. How did I do it?

The first thing I did to improve performance was to use a duplex digipeater (input on 222.06 and retransmit on 223.66). With a duplex digipeater, there was no digipeater delay, so all transfers proceeded at full speed. The duplex digipeater also made it possible for all three stations to hear one another. This reduced collisions at the digipeater, which meant fewer retransmissions.

Next I took advantage of p-persistent CSMA, using the persist and slottime commands in my TNC, now a standard part of all

Kantronics and AEA TNCs. With p-persistent CSMA I was able to greatly reduce the number of collisions caused by two or more stations trying to transmit at the same time (a situation I guaranteed by having several file transfers going at once).

The third thing I did was to use TCP/IP. TCP does several things that AX.25 does not. First, TCP measures the time it takes to get an ACK back for every packet it sends. It keeps a running tally of this round-trip time and sets the retransmission timer (FRACK in AX.25 parlance) to twice the average round-trip time. If there are fewer users and the channel loading is light, the round-trip time is short. If there are many users, or the channel loading is heavy, the round-trip time is much longer. The net result is that TCP does not resend packets unnecessarily.

Another feature of TCP is something called backoff. Every time TCP must resend the same packet, it waits longer. This results in the channel becoming quieter very quickly when there are lots of collisions and lots of lost packets.

Just for fun, I tried the same experiment again and tried establishing an AX.25 connection on the same channel. The file transfers proceeded as before, but the AX.25 station could not keep from timing out and eventually breaking the connection.

Making AX.25 More Efficient

There are some things that you can do to make your AX.25 operations more efficient and to make your station share the channel more efficiently. First, if your station supports p-persistent CSMA (that is, if your TNC has the persist and slottime commands), use it. Set DWAIT to 0 and set slottime and persist as I described in 73's Packet issue (October 1989). Set MAXFRAME to 1 so that everybody gets a shot at the channel with every packet.

Lastly, set FRACK to a much bigger number so that your packets will have a chance to get to the receiver, and the ACK will have time to get back.

Consideration

The bottom line is this: packet radio is a hobby, and we owe it to each other to act in a courteous and thoughtful manner. Complaining without understanding will not get anyone anywhere. We owe it to each other to discuss issues rationally, without casting aspersions. **73**

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T-Hunting Fun on Six Meters

Most hams in the USA think of 2 meter FM when someone brings up the subject of transmitter hunting. But there has been—and still is—lots of hunting excitement on other bands. In my Novice days, HF mobile was the rage, particularly 10 and 75 meter AM. So that's where hams did T-hunting. (Ask me about my trunk-mounted vibrator-powered DX-40 sometime.) Nowadays, inexpensive mobile and portable rigs are available for almost every band, so the possibilities for foxhunting fun are limitless.

Transmitter hunts have been a monthly activity of the Southern California Six Meter Club (SCSMC) for over three years, using 50.300 MHz FM, the local calling frequency. When SCSMC volunteered to put on the hunt for the 1989 ARRL Southwestern Division Convention, the SCSMC officers decided to have one of the three hidden transmitters be on 50.300. Substantial cash prizes created a sudden swelling of interest in 6 meters among serious southern California T-hunt competitors.

Because 6 meters is on the border between HF and VHF, it has some of the characteristics of each. The ground wave is very reliable for local QSOs, but the band opens for great DX via the F layer when sunspot activity goes up. Sporadic E propagation livens things up in the late spring and summer months. As a bonus, there is added excitement from aurora and meteor propagation at times.

Six meters is a very interesting band for transmitter hunting. It most closely resembles 10 meters, but reflections and multipath from hills and other features of the terrain are more likely. Reflections are much less prevalent than on 2 meters, however.

SCSMC holds hunts once a month on Saturday morning. The boundary is a 15 mile radius from the hilltop starting point. The hider must use a vertically polarized antenna and be on the air continuously. The team with lowest mileage from start to finish wins

the hunt. Time is not a factor, which encourages safe driving and careful T-hunting techniques.

Despite these restrictions, hidiers can still put on challenging hunts because of the varied urban and rural terrain in the area. Transmitting antennas are larger than for 2 meters, but hidiers find clever ways to conceal them.

Rigs Are Plentiful

I can hear you saying, "How can I hunt on six? I've never even operated there." Too bad. You've missed some great fun. But you don't have to shell out big bucks to join the action. Look around—you may find you have most of your setup already.

Small battery-powered portable rigs, such as the Yaesu FT-690R, are popular for T-hunting, although the dynamic range of the S-meter is too wide for my taste. Older solid state rigs, such as the Yaesu FT-620, show up inexpensively at flea markets. They work on 12 volts and are easy to modify for an external S-meter, internal attenuator, and other goodies.

"Loop users frequently win the local hunts."

Do you have a scanner in your shack? Chances are good that you can use it for T-hunting. Sony, Kenwood, AOR, Bearcat, Regency and Cobra have scanner models that receive at least part of the 6 meter band and work on internal batteries or an external 12 volt supply. Older commercial handie-talkies for 30–50 MHz by Motorola and RCA are inexpensive and convert readily to 6 meters.

As on other bands, there are several options for 6 meter hunting antennas. The one you choose depends on how you're searching (foot or vehicle), what you're hunting (horizontal or vertical, fixed or moving, weak or strong), and how much effort you want to expend in preparation.

Loops Are Easy

The simplest 6 meter RDF scheme is the loop antenna. As



Photo A. Bob Hastings K6PHE uses a 6 meter T-hunting loop on his vehicle and on foot.

regular readers know, I dislike loops on other VHF bands, but small loops perform adequately on 6 meters when there is enough signal strength. Many hunters use them successfully. You can build a competitive loop in just a few minutes.

The loop design in Figure 1 comes from John Wendt WA6BFH. All you need is a 27½-inch piece of RG-11 75Ω coax, two PL-259 connectors, a UHF Tee connector, and adapters to get to your download.

Install PL-259 connectors on each end of the RG-11 coax piece, leaving the center conductor connection open on one end. Connect the PL-259's to the Tee to form the loop. Cut the jacket and braid of the RG-11 coax at the exact center (top of the loop), leaving a half-inch gap with the center conductor and dielectric intact.

Cover the gap with black electrical tape and hook the loop to the receiver with a suitable length of RG-58 or RG-8X coax. No tuning is necessary. You will get two sharp nulls (minimum signal points) looking through the loop, exactly 180 degrees apart. Signal peaks will be in the plane of the loop, at right angles to the nulls. The nulls give the most accurate line of bearing. When the signal is too weak to discern the nulls, use the peaks instead.

Mount the loop on a length of PVC pipe or a wooden broomhandle as in the photo. Hold it up over your head when taking bearings, keeping it as far away as possible from the vehicle to avoid distortion of the nulls. Power lines, metal fences, and the like can also cause bearing inaccuracies when they are near 6 meter loops, so stay away from them.

You can hold your loop out the window when mobile, but it's much better to provide a sturdy mount with a 360 degree indicator to give an accurate line of bearing for map plotting and triangulation. For best results in all weather, mount the mast through a hole in the car roof (see "Homing In" for July 1989).

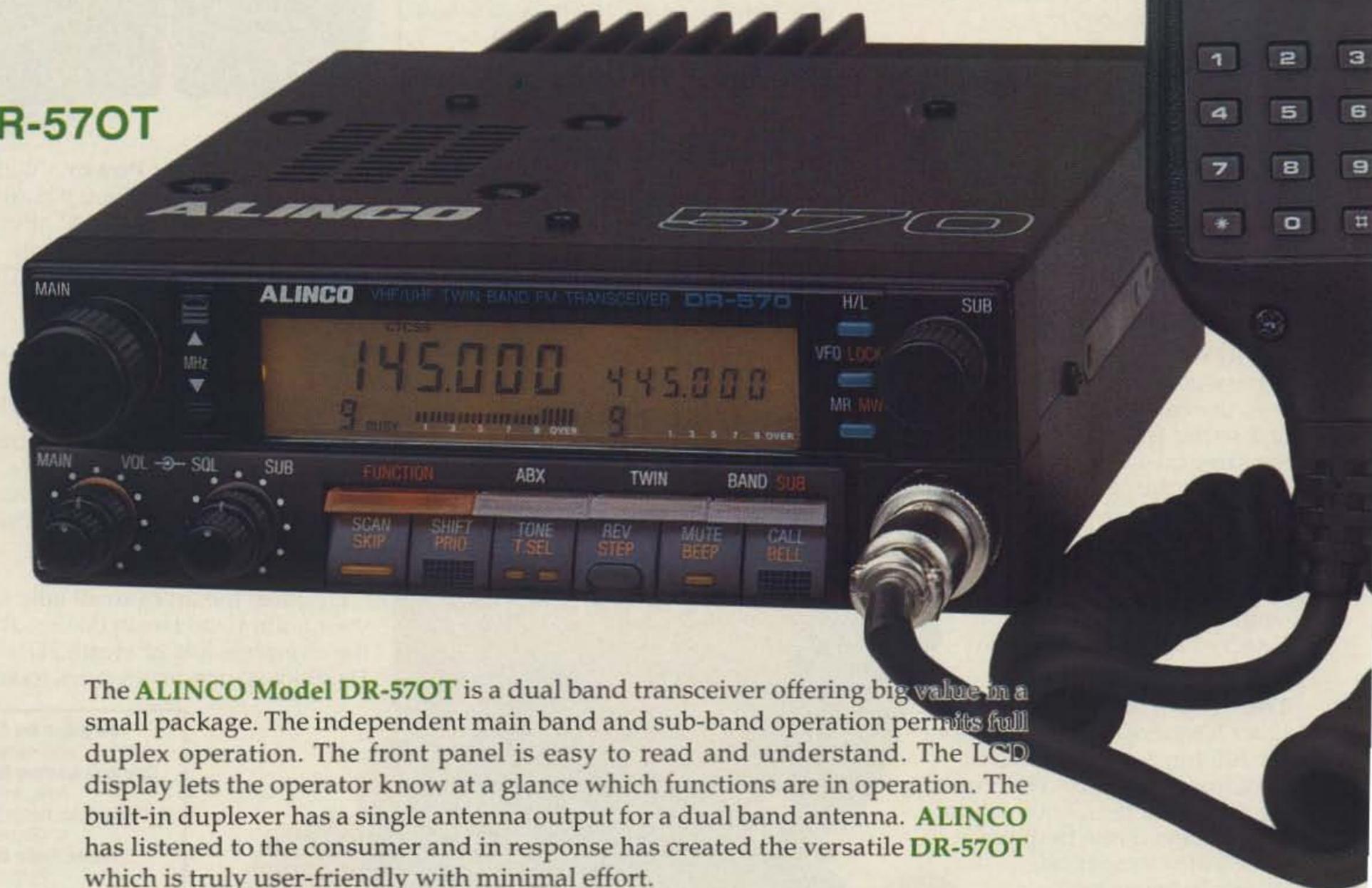
As you close in on the fox, the signal will get so strong that it will fill in the nulls, so you'll need an internal or external RF attenuator capable of at least 80 dB gain reduction ahead of the receiver (see "Homing In" for March 1989).

Ahead or Behind?

I have previously pointed out that the biggest disadvantage of simple loops is their bidirectional patterns. You have to carefully plot bearings and "circle in" on the hidden transmitter with a dual-null antenna, or else you could find yourself going away from the transmitter instead of toward it.

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The art of small talk



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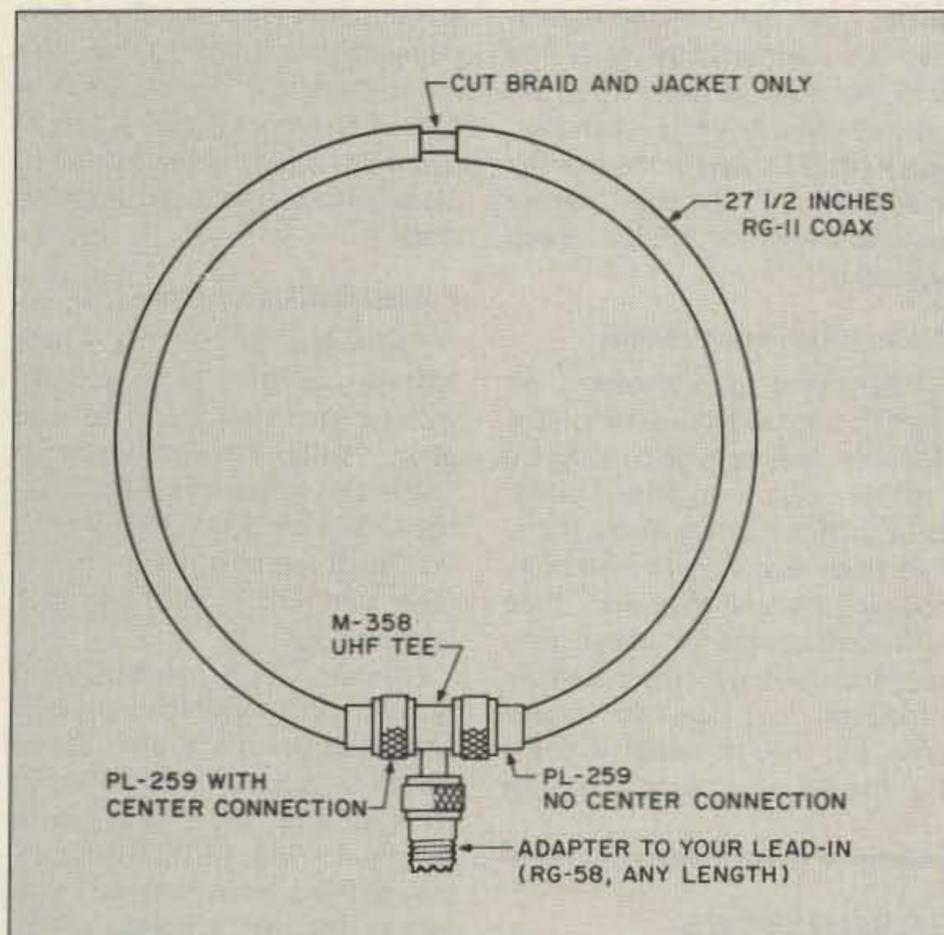


Figure 1. A simple loop for 6 meters.

For mobile hunting, there is a convenient way to resolve the figure-8 problem. A whip antenna mounted on the fender near a corner of the vehicle has a pattern that is unidirectional on some ham bands. Mount a quarter-wave whip on the left rear deck and

you'll find that S-meter readings are higher when the hidden T is in front of you and somewhat to the right. The directional lobe is broad, but it's good enough to tell which of the two loop nulls to follow.

This trick may seem crude, but

it works quite well for 6 and 10 meters on most vehicles. You'll want a 6 meter whip on your car anyway, so you can talk to the hider. This puts it to another good use. Use a coax switch for rapid selection of the loop or the whip during the hunt.

By the way, standard Hustler HF mobile masts (except for the MO-4) are 56 inches long (without resonators), so they work fine as quarter-wave mobile verticals on six. Another good choice is the Larsen 2 meter $\frac{3}{4}$ -wavelength magnetic mount antenna. The whip is a quarter wavelength on six. It matches quite well without modification at 50.3 MHz.

It's possible to add a "sense" antenna and phase shift network to a loop to resolve the directional ambiguity. The surplus AT-249/GRD and AT-339/PRC units are ready-made RDF antennas incorporating this technique. Both are rugged, easy to use, and cover 47 to 55.4 MHz by design. Unfortunately, they are becoming difficult to locate since T-hunters have discovered their usefulness and snapped them up.

Beginner's Luck?

Despite its lack of sophistication, the simple loop does the job

on 6 meters. Loop users frequently win the local hunts. Kevin Kelly N6QAB, an experienced 2 meter hunter, came out on his first 6 meter hunt recently. He used the WA6BFH loop, a whip, a scanner with S-meter, and an external attenuator. His 2 meter hunting experience paid off, because he ended up with low mileage that day.

A loop is by no means the best 6 meter hunting antenna. The small capture area of a fractional wavelength loop makes it much less sensitive than larger antennas. This by itself is not usually a severe problem, because the SC-SMC rules require that the hidden T provide a signal that is copyable on loop antennas at the starting point. But if your receiver isn't "hot," you'll want to add a preamp.

There are other good ways to hunt on 6 meters, but there is no more space this month. Next time, I'll tell you how quads and homing RDFs can help you win 6 meter hunts. Thanks to Bob Hastings K6PHE, Gracie Hastings N6FSL, Wil Anderson AA6DD, John Wendt WA6BFH, and all the other SC-SMC hunters for their technical assistance and for helping to promote T-hunting on 6 meters. **73**

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More on Direct Conversion

Although most selectivity in a DC receiver is done in the audio chain, a good solid front end helps. A single tuned front end improves operation a great deal.

A double tuned circuit is even better. Look at the circuits in Figure 1, created by Denton Bramwell K7OWJ, for each one. Values are given for 30 and 40 meters. All the coils are wound with #22 gauge wire. Be sure the leads are long enough to solder to the board. Since this is not going to be a step-by-step construction project, there is no large schematic; rather, what we have are some good add-on circuits.

Radio Shack sells a perfboard with a copper ground plane, ideal for building small receivers or transmitters. It's easy to cut and work with. I've been using it for a good long time, with excellent results.

Product Detection

The input circuit really helps cut down AM detection. It's not a cure-all, but it helps a lot. One of the best places to stop AM detection is in the mixer or product detector. I built a small DC receiver using a 40673 MOSFET. Worked great! The only trouble was that, after dark, when the shortwave broadcast stations came on. Picked them up rather well, all of them, all at the same time. To make matters worse, the circuit was built for 40 meters—broadcast station heaven! So, for only the simplest emergency or portable gear, leave the 40673 in the parts bin. You'll be glad you did.

A singly balanced product detector is the next best. However, you don't see too much of this type of detector around. In most cases, you'll need to use either a matched pair of JFETs or an IC, such as a RCA CA3028A.

You can obtain the best results with a doubly balanced product detector. The detector can be either passive, using diodes, or active, using either transistors or an IC chip. The most common doubly balanced product detector uses

Low Power Operation

hot-carrier diodes. However, for us home-brewers, we can get good results with high speed switching diodes, such as the 1N914s. It's best to get a matching set of diodes. This is easily done with a VOM.

When using a passive detector, we have a conversion loss. Likewise, using an active detector, you may obtain some gain. A diode-ring detector above 30 meters requires an RF amplifier ahead of the detector. Figure 2 shows a working diode-ring detector. In building this, be sure to

anced mixer and voltage regulator. Most importantly, with this chip the input voltage MUST be under 9 volts. Any more than that, and POOF! I know. In the months that follow, I'll have some simple circuits using the NE602. Keep watching.

Audio Chain and Preamp

After the product detector, we start working with the audio chain. While some people go directly to a high gain audio amplifier, I prefer to add some passive audio filters. I've used old 88 mH telephone coils for this and they work quite well. Only trouble with these, they are much too big for most portable receivers. You can use smaller coils, but they're harder to come by. The 88 mH coils are hamfest

so I'm not really picky about how many stages of filters I use. The most common circuit uses a LM324 op amp. I'll have a simple circuit for that in a later column, along with the final audio amplifier stage.

Pulsed Battery Charger

The August project, the pulsed battery charger, did generate quite a lot of mail and several phone calls. First things first: There are some errors in the schematic. The blocking diode wasn't labeled. It can be a 1N4001 or any other junk box diode rated at 1 amp or more.

Of course, if you use the LM350 with its 5 amp current rating, you'll need a larger diode also. Radio Shack sells a 3 amp diode and, I think, a 6 amp diode. If you plan to use the LM350, you'll need to increase the current from the transformer and diode bridge setup. You'll also need a larger transformer to handle the extra current. Junk box!

The unmarked resistor on the collector of the transistor is 220Ω. The transistor should be a 2N2222 or equal. And last but not least, the 2.2kΩ resistor is shown as a trimmer, which it is NOT. Use a 2.2kΩ resistor and forget about the wiper connection.

Gell Cell Batteries

Aside from the critters making a living in my schematics, most of the phone calls and letters asked about those crazy gelled batteries we all find at the hamfests. I did some digging and came up with a charging manual from the Globe Battery Division on Gel/Cell™ batteries.

According to Globe, the gelled battery likes to be charged using a constant voltage-limited current charging technique. There are also two types of batteries, "A" and "B." Type "A" batteries are used for standby applications. Expect a life of 100 cycles. Applications include intrusion alarms, fire and smoke detectors, uninterruptible power systems, emergency lighting, and computer memory standby power.

Type "B" batteries are for deep-cycle use. According to Globe, a new type "B" battery has an initial capacity of 80-90 percent. After 30-40 complete charge cycles, it reaches its nominal rated capacity. After 200 cycles, the capacity slowly drops. With only minor discharges (40% or less of capacity), you may get up to 1000 cycles. Typical applica-

"One of the best places to stop AM detection is in the mixer or product detector."

watch the phasing of the coils. Winding these critters and getting them correct the first time is fun.

If you're not really up to winding a diode-ring product detector, and I can't really blame you, a commercial unit, the Mini Circuits Lab SBL-1 DBM is available. It's not cheap, but it's easy to work with. Radio Kit in Pelham NH (603-635-2235) sells them. Also ask for a catalog from the Small Parts Center, 6818 Meese Dr., Lansing, Michigan, 48911. They also sell them.

A newer circuit on the market, the Signetics NE602, has given rise to a host of DC receivers. This chip, also available from the Small Parts Center, has an on-board oscillator as well as a doubly bal-

specials.

One of the best reasons for using a passive filter is power transfer from the detector to the active audio stages. Also, the filter removes most of the high frequency audio (2-15 kHz) from the high gain audio chain. If you've ever used a pair of those lightweight walk-thing headphones and tuned into a 15 kHz beat note, you will be able to appreciate this filter.

A low noise preamplifier sometimes follows the passive filter. While you can use junk box transistors, and I've used about everything you can think of, a low noise transistor works best.

From the preamplifier, we go to an active audio filter. I don't care for my audio to be super-filtered,

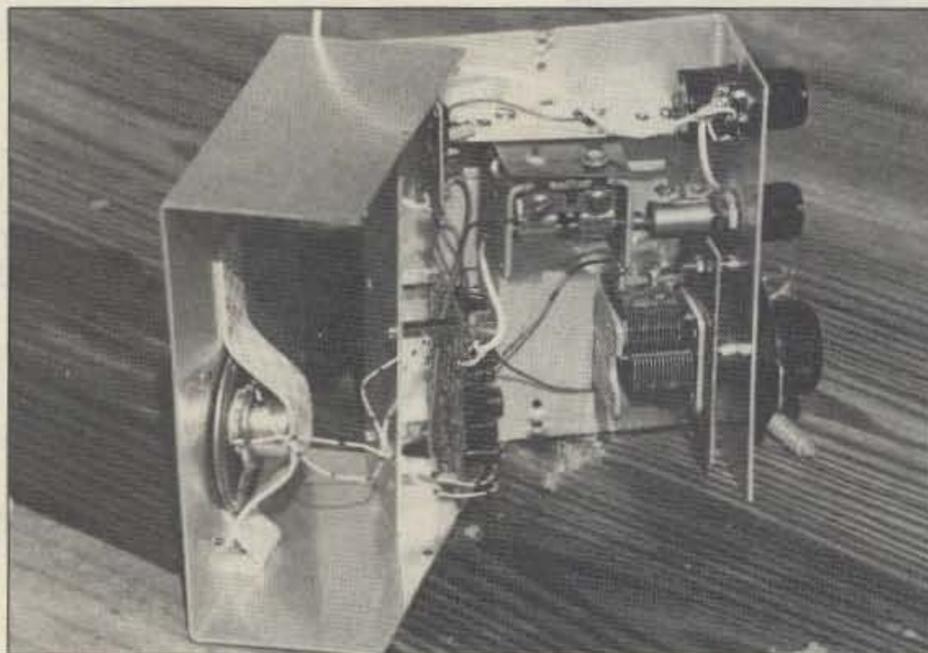


Photo A. A small home-brewed DC receiver.

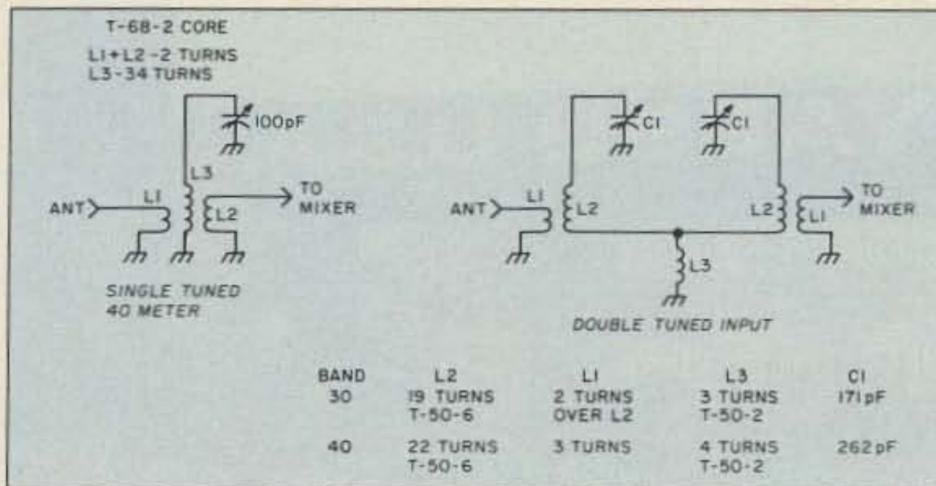


Figure 1. Tuned circuits for DC receivers.

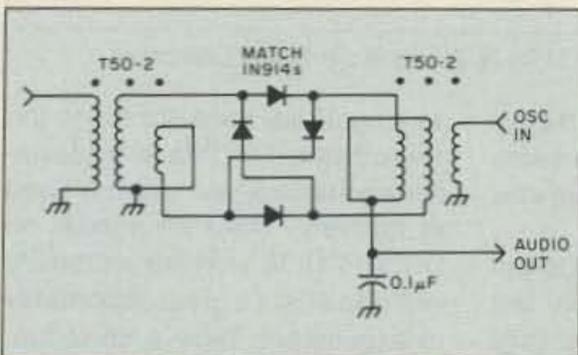


Figure 2. Passive diode product detector. Use matched 1N914s.

tions include TV and radios, video tape recorders, computers, and tools.

As far as I've been able to determine, a battery is type "A" or "B" depending on how you use it. In standby systems, the battery be-

comes a type "A" battery. If you use the same battery for deep-cycle, it becomes a type "B" battery.

The open circuit voltage for a fully charged gelled battery is 2.12 volts. Of course, the voltage is higher when you first remove the battery from the charger. For a fully discharged battery, the terminal voltage should be 1.75 volts after steadily drawing the current it's rated for after a 20-hour period. You can charge a gel-cell at 2-3 times the rated current. For example, you can charge a 6 volt, 4.5

Ah battery at 7.2 volts (2.4 volts per cell), that is rated at a discharge current of 300 mA, with the charge current limited to between 675 and 900 mA. The battery is fully charged once the charging current stabilizes at a low level for a few hours.

For standby applications in which the battery is operated with continuous charge, as in emergency lighting, for unattended charge a voltage of 2.25 to 2.30 is recommended. For a 6 volt battery this would be 6.75 to 6.9 volts.

For cycle use, optimum recharge time is obtained when a charge voltage of 2.4 volts per cell is used. Our 6 volt battery would require 7.2 volts (2.4 volts per cell

x 3 cells). The battery is fully charged when the current drops to a low value. See the table. If you want to keep the battery on the charger, switch to the lower float voltage of 2.25 volts per cell.

Any Mods?

Since I'm not the only person picking up gelled batteries at the hamfests, I'll have more about these critters next month.

Still looking for mods for the Heath HW-9 for the third edition of the *Hot Water Handbook*. If I use them, you'll get a free copy of the book.

With the weather getting colder, now is a good time for some low-power fun. QRP—better living with less. **73**

| Battery Rated Capacity, Amps | Limit Initial Current, Amps | End of Charge Current, mA |
|------------------------------|-----------------------------|---------------------------|
| 0.9 to 1 | 0.15 to 0.20 | 10-20 |
| 1.5 | 0.23 to .30 | 20-40 |
| 2.0 | 0.30 to .40 | 20-40 |
| 2.6 | 0.40 to .50 | 30-60 |
| 4.5 | 0.70 to .90 | 50-100 |
| 6.0 | 0.90 to 1.20 | 60-120 |
| 7.5 | 1.1 to 1.5 | 80-160 |
| 20.0 | 3.0 to 4.0 | 100-300 |

Table 1. Capacity and initial current vs end of charge current for gelled batteries.

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It's Fixed!

The Mode S (70 cm uplink, 13cm downlink) transponder is finally working to specifications. Thanks to the efforts of Peter DB2OS, with the aid of ON6UG and G2BFO, the transponder passband can be commanded ON

A Simple Matter of Timing

A series of tests were performed by Peter DB2OS. Peter is one of the OSCAR 13 ground control stations. By changing the timing of the system commands embedded in the onboard software, Peter was able to achieve a combination that brought the satellite's Mode S transponder passband up while bringing down the

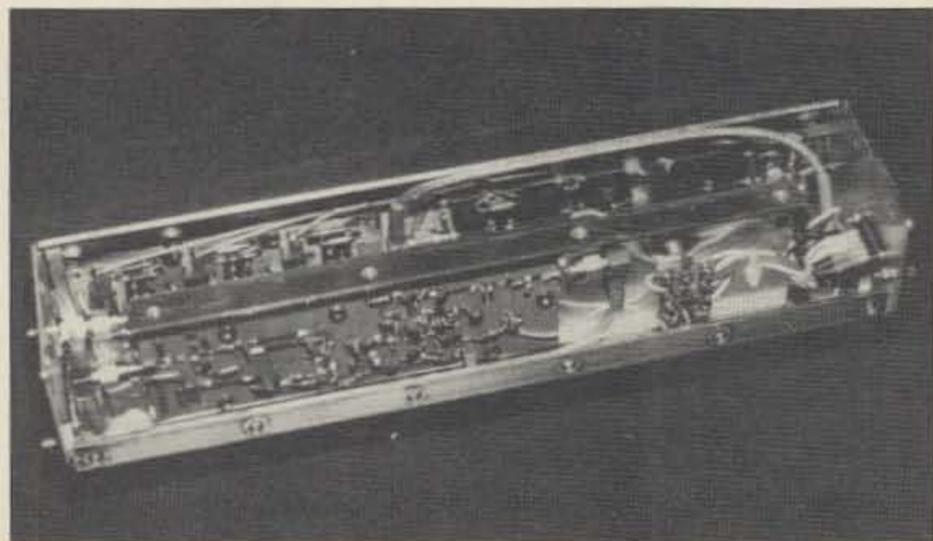


Photo A. The AMSAT-OSCAR-13 Mode S converter, now working well, is just over a foot long.

and the telemetry beacon OFF. That's the way it's supposed to work, but until early August it didn't.

Mode S transponder designer and builder, Bill McCaa KØRZ, created the device so that either the beacon or the passband could be activated, but not both at the same time. The transponder passband is enabled by a logic line that comes from the satellite's IHU (Internal Housekeeping Unit computer). If the telemetry beacon is on, then the logic line is supposed to turn it off and activate a transistor in the passband electronics.

Until now it wasn't happening that way. Commands were sent with no effect. The beacon signal would stay on and the passband would stay off. As a result, 20 dB more uplink power than anticipated was required to make Mode S contacts. The signals from the ground had to force their way through the deactivated transistor in the passband electronics. Where 1000 watts erp (effective radiated power) might have been fine according to the original design, it actually required more like 100,000 watts erp. Many contacts were made with much less uplink power, but the received downlink was always weak.

telemetry beacon. ON6UG and G2BFO listened to the Mode S downlink frequencies during the tests to keep Peter instantly informed on the effects of his software modifications. The results were dramatic. Hams using less than 100 watts erp CW were able to make quality contacts through the Mode S passband. Thanks to the efforts of Peter and other tireless supporters, we now have a fully functional microwave transponder on an amateur radio satellite.

An Extra "Feature"

While equipment users call glitches in computer systems "bugs," programmers would rather refer to them as "features," not all of which are desirable. When the Mode S passband came online in August, unexpected signals were heard. Apparently a portion of the Mode B uplink passband also appears in the Mode S downlink.

The normal Mode S uplink range is from 435.602 MHz to 435.638 MHz. The corresponding noninverting downlink is from 2400.711 MHz to 2400.747 MHz. Mode B uplink signals on frequencies between 435.480 MHz and



Photo B. The Yaesu USA building in Cerritos, California.

435.516 MHz are also being downlinked on 13 cm in the same band segment with Mode S operators.

Mode S enthusiasts have found this feature an asset with few drawbacks. On the plus side, they can use the Mode B frequencies for uplinking, and be heard on both S and B downlinks. This intrigued Mode B users. The downlinked 2 meter signals are heard on lower sideband, since the B passband is inverting while Mode S is not. The B user can then reconfigure his uplink signals to

as long as we have access to the 13cm band. The Phase 4 geostationary hamsat will use the band extensively. The transponder on OSCAR 13 is working extremely well and offers a great opportunity to experiment, have a lot of fun, and make a lot of contacts. Give it a try!

The "ZRO" Test

The K2ZRO Memorial Station Engineering Award Program, a contest focusing on operating skill and equipment performance, was started a few years ago via AM-



Photo C. One of the many benches for radio repair at Yaesu USA in California.

match the Mode S user and make contact. The S user can then tell the B operator the level of copy on 2400 MHz thus publicizing the existence of an operational Mode S transponder passband.

The downside of the multiple uplink/downlink feature is the competition for space within the rather narrow 40 kHz Mode S passband. The B frequencies which cross to Mode S are very popular. Finding an open spot to operate within the 2.4 GHz downlink can be a problem.

Mode S is a mode that will be with the amateur satellite program

SAT-OSCAR-10. Named in honor of Kaz Deskur K2ZRO, designer of the Satellite OSCAR tracking

A-O-13 Mode B ZRO Test Schedule

downlink signals on 145.840 MHz

| Date | Time |
|---------------|----------|
| Nov. 25, 1989 | 2030 UTC |
| Dec. 2, 1989 | 1240 UTC |
| Dec. 16, 1989 | 2000 UTC |
| Dec. 30, 1989 | 1600 UTC |
| Jan. 13, 1990 | 1200 UTC |
| Jan. 20, 1990 | 1530 UTC |

calculator and long-time AMSAT supporter, the program tests the listening capabilities of individuals with the best equipment they can bring together for amateur satellite operation.

Since the attitude of OSCAR-10 is no longer controllable, OSCAR-13 is used for the tests. A control station sends and repeats numeric code groups through the satellite's transponder at gradually reduced power levels, starting at a level equal to the general beacon. Participants monitor and record the numbers until they have either copied the 10 wpm CW down to level "Z9" (27 dB below the beacon), or until they can no longer hear the control station's signals.

Those who can hear the satellite's beacon will also be able to hear level "Z0" of the test and qualify for the basic award. The certificate is available through AMSAT-NA. For free verification reports to qualify numbers copied, send an SASE to my address above. The fun comes from upgrading station performance and then pursuing endorsement stickers for the lower power levels. The goal is to encourage stations to improve their downlink reception. Those who hear poorly tend to resort to unnecessary uplink ex-

cesses which drain the satellite's batteries and desensitize the satellite transponder for low-power operators.

The Table shows the dates and times of ZRO Tests scheduled for the end of this year and into 1990. They were chosen for coverage, convenience, and optimum operating conditions. The downlink frequency via the Mode B transponder is 145.940 MHz. Other tests will be set up for Mode L with a downlink of 435.945 MHz. You can find the dates and times on the AMSAT HF Nets.

Only a handful of stations have copied and reported accurate "Z9" reception via Mode B. The ERP from the Test Control Station is usually less than ONE watt at the "Z9" level. Only superb attention to detail, care in assembling their stations, and a quiet RF environment will allow this kind of receive performance.

But don't wait until you have the "perfect" station to participate. Reports have been received from enthusiasts using many types and sizes of antennas. One operator was on a boat with a 2 meter dipole. Another was in a car with a magmount. Others using simple 4-element yagi antennas, no preamps, and stock radios without exotic fil-

ters, have copied signals down to 15 dB below the beacon.

Next time a ZRO Test is on, listen. Just how good is your 2 meter station? How does it stack up with other satellite enthusiasts?

A Look at Yaesu

I was in California recently, at the invitation of Yaesu USA, to participate on their advisory council. As I escaped the incredible traffic of Los Angeles and headed for their location in Cerritos, California, the satellite antennas, aimed at the sky, caught my eye before anything else. A pair of KLM crossed yagis were silently tracking the passage of OSCAR-13. The mirrored front of the 17,000 square foot facility, with over 40 employees, soon blocked my view, but I didn't mind—the new FT-736R, auto-tracking system and RF Concepts amplifier couldn't be far away. Within minutes I was investigating the gear and checking out the orbital predictions.

Chip Margelli K7JA, Yaesu's Vice President of Customer Services, had been tracking the satellite. In addition to his fascination with DX, Chip had caught the ham bug. Earlier this year Chip traveled to MV Island between Finland and the Soviet Union to

put a new country on the satellite.

Yaesu has been featuring satellite-oriented gear for many years. Prior to the FT-736R and FT-726R, older HF rigs sported optional transverters with extra positions on the band selector labeled SAT. 1, SAT. 2 and SAT.3. With the addition of an extra 10 meter receiver, the HF rig/transverter would become a complete full-duplex satellite station for Modes A (2 meters up and 10 meters down), B (70cm up and 2 meters down), and Mode J (2 meters up and 70cm down). The newer rigs represent the logical progression from years of experience with satellite earth-station functions.

A tour of the building proved fascinating. New rigs ready for shipment in the warehouse, carefully-labeled parts bins for rig repair, and well-organized lab-bench areas occupied most of the complex. Some offices and conference-room areas were on the second floor, but most of the activity was in the sales and customer service section. A new computerized system was being implemented for customer records and ordering information.

If you are in the Cerritos area, drop in. The satellite station is right up front and ready for contacts. 73

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LOOKING WEST

Bill Pasternak WA6ITF
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Thoughts of Dayton

I know it's strange to be writing about the 1989 Dayton Hamvention at this time of year, but then again, we're already more than halfway to the 1990 gathering. Just the other day I found myself writing a letter of confirmation to their program chairman to tell him I would be attending. The Dayton Hamvention is amateur radio's largest and most popular gathering, with well over 30,000 people attending this April event each year. Start making your plans for Dayton now—hotel rooms and plane seats get booked up early!

220 MHz—ICOM Says: Use It!

As far as new gear for the repeater user, my personal opinion is that ICOM stole the show at Dayton '89 with the introduction of the world's smallest full-feature 220 MHz handheld radio. The ultra tiny IC-3SAT weighs a mere 9.9 ounces and measures only 1.9" x 4.0" x 1.2", including its built-in 300 mAh, 7.2 volt battery. And when that power source is expended, you don't have to run to find a rapid charger. Simply connect one of several optional battery packs to the bottom of the transceiver and keep right on operating!

This mini-mite of the handhelds has features that will make you the envy of the local club. These include 48 fully programmable memory channels that store operating frequencies and other information required for repeater operation; a call-channel with the same features; a DTMF encoder for auto-patching or control, with 10 DTMF code memory channels of up to 15 digits; receiver full scan, memory scan, memory skip and priority channel watch; up to five watts power out, using a specially designed ultra small high efficiency power module that requires only 13.7 volts DC; and an external power jack that doubles as a charger port for the internal battery.

It also has a feature never before found in a handheld: The IC-3SAT has a built-in clock that lets it double as an alarm clock! The radio can be pre-programmed to turn itself on and off at pre-programmed times to allow you to fall asleep listening in on a late-night QSO and to wake up to the chatter of drive-time, if you so desire!

Options include the UT-49 DTMF Decoder, UT-50 Tone Squelch Unit, and UT-51 programmable Tone Encoder. Availability through factory authorized ICOM dealers was late June. Regardless of what the FCC has in store for 1 1/4 meters, the amateur radio industry is keeping its commitment. ICOM is showing its commitment to the users of 220 with a new radio that can only be described as astounding for its size and performance.

There is now also a 2SAT and 4SAT available, for 2m and 440 MHz, respectively.

Looking Toward 1990

I have reason to believe that Hamvention '90 will have a new look to it. You might say a

younger look because in 1990 the Hamvention hopes to attract some of the younger members of our "New World of Amateur Radio." To do it, they have turned to one of the stars of that show—an energetic 18-year-old college student from Southern California named Kelly Howard N6PNY. And it really does read like a movie script:

Scene 1. A Mexican restaurant in suburban Dayton. It was over dinner, before catching flights home, that Burt Hicks WB6MQV, Nathan Pyle KB6PLH, Kelly and myself joined the Hamvention team for an after-it's-all-over celebration dinner. Kelly struck up a conversation with a number of key Hamvention planners. Among them were General Chairman Bill McNabb WD8SAY, Assistant General Chairman (and 1990 General Chairman) Ed Hillman N8ALN, and DARA Youth Activities Director Terry Falknor N8EEO. Her subject was simple. She wanted to see more young adults in amateur radio, and the astute Miss Howard realized that the Dayton Hamvention is an event that can dazzle the most cynical teenager. It was time for the Hamvention to have a session specifically geared for young people, but not one run by an "old guard" type who is mostly interested in selling Morse code.

Who knows teens better than another teen?, argued Kelly. Her words found fertile soil. By the time Noel McKewon WB8QQC dragged us off to the airport, Kelly got *carte blanche* to help organize any youth activity for Dayton '90. As we made our rush to our respective airlines—she and Nathan on American to San Diego and Burt and me on TWA to Los Angeles—it was obvious that Kelly Howard N6PNY had some fascinating ideas on recruiting teens to amateur radio. Fade to black.

Scene 2. My den and office in Saugus. Kelly is now living in Los Angeles and getting ready to start college. This particular afternoon we are talking about Dayton weekend. It was her first and my 17th or 18th. She tells me what she wants to do at Hamvention '90. She wants to have a session where teens who are hams talk to teens who are interested in becoming hams. Where those with licenses and the ability to communicate with their peers give the hands-on experience of amateur radio to teens who know ham radio only as something that their dad or neighbor plays at as an old person's hobby. Kelly tells me young hams like herself can reach other teens and young adults. She says that it's important for her to try. So, I suggest that she tell this to the folks in Dayton and see what they say.

Scene 3. Dissolve to my living room. Sharon is watching TV. I'm reading a copy of another ham mag. A few minutes and two phone calls later, Kelly emerges from the office with the biggest smile across her face that I have ever seen. She sold her idea well enough to be asked to host the first-ever Dayton Hamvention Young People's Forum. And what will she present? Freeze-frame and font over "To Be Continued."

Actually, she will be telling you that herself. I invited Kelly to be a guest writer for the next

Looking West column. In the meantime, those of you with youngsters from 9 to 19 might want to make plans to bring them with you to Hamvention '90. Kelly and her friends have a very special day planned. Who knows, after this session you may be arguing with your son or daughter over who's going get first dibs with the radio on weekends, or shelling out some extra bucks to buy your offspring an HT.

The Lights of the City

I really cannot end this month's column without a personal word of appreciation to the Dayton Amateur Radio Association and the Hamvention Committee. In April of this year they chose to honor me as the 1989 Radio Amateur of the Year. It was something that caught me completely by surprise, and it's an honor I will treasure to my dying day.

Some may view an award of this type as a measure of personal success. I look at it quite differently. To me, receiving an award—any award—means that you're making a valid contribution, and that you now have an even greater responsibility to continue and do even better so that you continue to deserve such an honor.

When I accepted the award, I asked everyone present to join me in dedicating it and the years ahead to the renewal of amateur radio—to the young and young of heart, who will pick up the banner of this great hobby and service, and carry it forth into the next century and beyond. Thanks to young, energetic and dedicated young hams like Kelly Howard N6PNY and Nathan Pyle KB6PLH, we are beginning to see a tiny bit of light at the end of a dark tunnel called apathy. There is still a long way to go.

As I close this month's *Looking West*, I ask that each of you join with me in this dedication, and that we direct our energies to bringing the youth of this nation to the hobby that we love. If we each "Elmer" into amateur radio only one new young ham, we can significantly boost our ranks—and give our nation a new base of potential engineers and technicians that it so badly needs.

Let's stop hoarding amateur radio as if it were some secret to be prized by the few and kept from the many. Let's open our doors to all who have the interest.

The 1990s will soon be with us and the day when Morse Code is King is dead. The new "Morse Key" is the hand-held most of us carry on our belts. The new long-wire is the rubber-ducky. The new DX is relayed by ham satellites in the sky. Some of us might even live long enough to hold a QSO through the first repeater on the moon. But only the young can make that happen, and the young will only come to amateur radio if they can bring their modern thinking with them. I for one say it's time to stop idolizing the traditions of yesterday and start building the traditions of the future. I say this because I love ham radio from the deepest reaches of my heart.

Thank you, Dayton, for making 1989 a year that will live with me into eternity. More important, thank you Dayton for recognizing that the future of amateur radio is with the young. You are doing more than your share. Let's hope other conventions and hamfests will follow your lead. It's time to tell the kids of the nation that we want them and that we care!... de WA6ITF 73

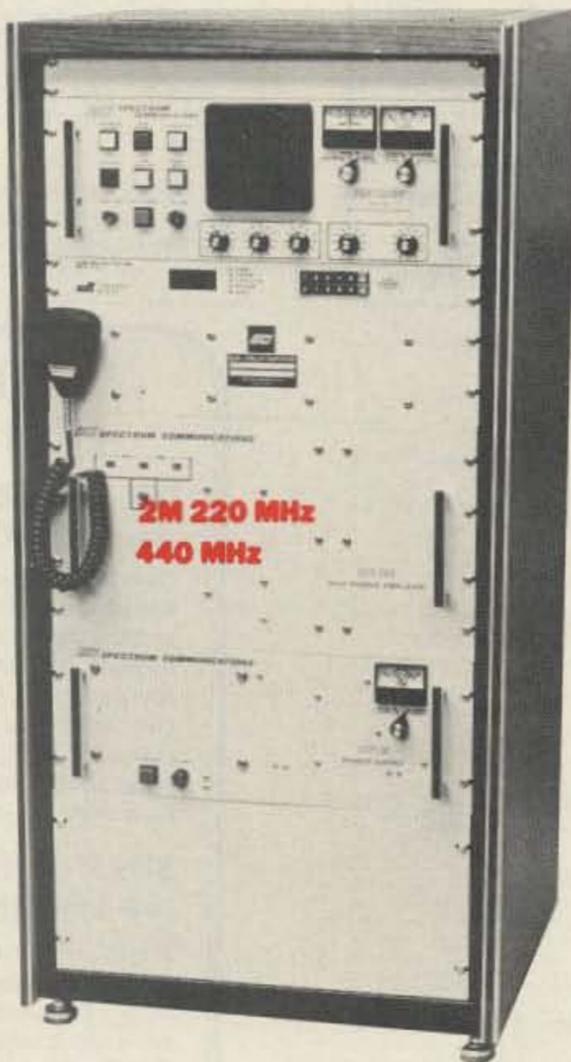
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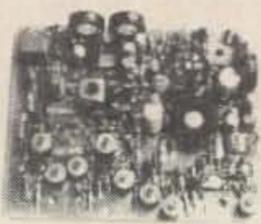
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SPECIAL EVENTS

Ham Doings Around the World

Listings are free of charge as space permits. Please send us your Special Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the June issue, we should receive it by March 31. Provide a clear, concise summary of the essential details about your Special Event.

DEC 2-3

APACHE JUNCTION AZ The Superstition ARC 4th Annual Hamfest will be held at the P & M Rodeo Grounds Saturday from dawn to dusk, Sunday from dawn to noon. Talk-In: 147.12/Repeater. Contact *Bill or Marge Glaze, KA7SUF/K1YCYZ (602) 832-3955.*

1st Saturday Every Month

LITTLETON CO The Denver W5YI VE Team holds exam sessions at 9 AM at the Bemis Library. Contact *Tony Marquette, (303) 773-2087 or Ken Chaffin, (303) 696-7046.*

SPECIAL EVENT STATIONS

DEC 2-3

SACRAMENTO CA The Sacramento ARC will operate Station W6AK from Sutter's Fort from 1730Z Saturday to 2330Z Sunday to celebrate Sacramento's Sesquicentennial. Frequencies: SSB: 14.300, 21.400, 28.450 (day); 3.962, 7.270, 14.300 (night). CW: 14.050. For QSL send SASE to *Sacramento ARC, P.O. Box 161903, Sacramento CA 95816.*

EVERGLADES NATIONAL PARK FL Station W4SVI will be operated at the Flamingo Camp Grounds by the Everglades ARC, from 1400 UTC Saturday until 1900

UTC Sunday, to celebrate the 42nd Anniversary of Everglades National Park. Frequencies: Phone: 7.230, 14.240, 21.330, 28.375; CW: 7.030, 14.030, 21.130. Send QSL and 2 units of postage for an unfolded certificate to *Everglades ARC, P.O. Box 113, Homestead FL 33090-0113.*

DEC 26-31

SAN BENITO TX The San Benito ARC will operate Station WA2VJL to celebrate the well deserved "R & R" of Santa and Rudolph in the Lower Rio Grande Valley of South Texas. Let the little ones wish Santa a safe trip home. Exchange local weather info and anything else. Frequencies: SSB 21.350 and 28.325. Time of operation will depend on band conditions, with (weekday) 1500-0200, and all day weekends. For certificate send 9 1/2 x 11 with QSL to *Santa Claus, c/o San Benito ARC, P.O. Box 1382, San Benito TX 78586-1382.*

DEC 30-JAN 1

PASADENA CA The Relay Repeater ARC will operate KE6PE from the Wrigley Mansion to commemorate the 101th Anniversary of the Tournament of Roses. The station will operate from 1600Z-0400Z each day. Frequencies: 14.260, 21.335 and 28.450 Novice/Tech frequencies and/or QRM. For Certificate send QSL and 9 x 12 SASE to *Relay Repeater Club, P.O. Box 81, Arcadia CA 91006-5019*

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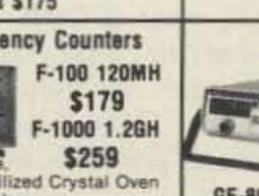
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UPDATES

DXDA Country List/ October 1989

A group of countries were accidentally dropped from the list before it went to press. They are: Chad (TT), Chagos (VQ9), Chatham Island (ZL), Chesterfield Island (FK8), Chile (CE), China (BY), Christmas Island (VK9X), Clipperton Island (FO0), Cocos Island (TI9), Cocos/Keeling Island (VK9Y), Colombia (HK), Comino Island (9H), Comores (D6), Congo (TN), Cook Island (ZK1), Corsica (TK), Costa Rica (TI), Crete (SV9), and Cuba (CO). 73 regrets any inconvenience this may have caused anyone.

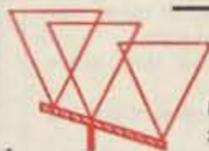
Kaboom Micro Keyer/ September 1989

John Curtis of Curtis Electro Devices sent us his suggestions for enhancing the Kaboom Micro Keyer. Connect pin 12 of the 8044 either to pin 16 or to pin 1 for termination. This "unfloats" the CMOS input, reducing battery drain and the chance of it going into oscillation. John also suggests using a single transistor for the output, and, if necessary, lowering the value of the drive resistor (e.g., from 4.7kΩ to 1kΩ) to give increased drive.

For previous changes to the original Micro Keyer article, see "Updates" in the October issue of 73. **73**

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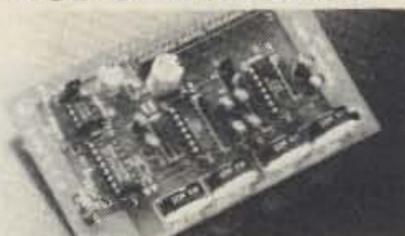
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PLL Brick Oscillators

Not wishing to re-invent the wheel (and being lazy), I would like to introduce you to the "Brick," a phase locked local oscillator packaged in a small metal block housing about half the size of a small paving brick.

This surplus high-stability microwave oscillator is the same type used for narrowband FM and SSB contacts on 3, 5, and 10 GHz. For a 10 GHz preamplifier, see the August 1989 issue of 73. This receiving low-noise amp with 18 dB gain also doubles as a transmitting amplifier with about +8 dBm output. This preamp and brick oscillator combination make a very simple microwave transceiving converter.

A simple, stable local oscillator (LO) is the key to operating on your chosen band. Even in some of the better kits for our microwave bands, the LOs lack stability and purity, both crucial items. You can build mixers and amps from surplus devices.

All the oscillators I've obtained over the years have been surplus items costing \$20-50 each, depending on condition. Recently, I picked up some bricks from Alan Dickerson N5BXH, who obtained them from Collins Microwave sales in Richardson, Texas. Many years ago, I attended a microwave school at the same Collins plant,

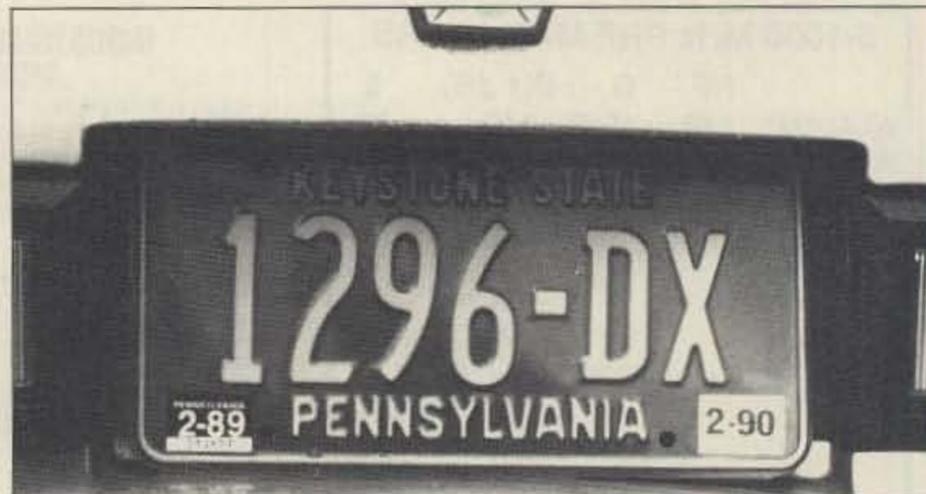
and spent my time off in their salvage store picking up my first brick. I had been using them commercially, but this was the first one I could experiment on, as they were very expensive then at \$1700 each.

Brick oscillators are popular because they're compact and easy to use. In a microwave station, they eliminate the need for any other oscillator multiplier chain or signal source from microwave to your basic IF conversion frequencies. With a brick oscillator and its respective internal crystal, and a mixer, you have the basic setup for transceiving on either narrowband FM or SSB; on 10 GHz, or other microwave frequency.

"A simple, stable local oscillator (LO) is the key to operating on your chosen (microwave) band."

Inside the Brick

Though there are many brick manufacturers, California Microwave and Frequency West (both in the San Francisco area) are the most popular. All brick oscillators have a high power microwave oscillator in the 1.2-1.4 or 1.7-2.0 GHz range. Power output is about 1 watt. Two, three, or four transistors in parallel form the oscillator circuit for different power output levels. Sometimes companies junk these devices when



Ed Barbacow K3ZCY (FM09AV) advertises his passion in ham radio on his license plate.

one of the transistors goes open, lowering output power. Though it's unsuitable for commercial use, it's still fine for amateur use.

The high power oscillator is multiplied to the higher microwave band by a very efficient step-recovery diode (high priced varactor), producing many high

short term (several day) stability. Frequency drift over a week of operation would yield errors at 10 GHz of 5 to 10 kHz. With better temperature stability applied to the 100 MHz crystal, errors have been reduced to 2.4 kHz per week. The surplus cost of the brick, modest compared to a crystal oscillator and its multiplier string, makes the brick more than worth it. Thus, this makes them ideal for narrowband operations, or operations that require high stability, such as packet and other data transmissions and SSB.

How the Brick Works

It's quite simple. The brick operates from a -19 volts. An internal crystal reference oscillator operates in the 96 to 108 MHz range, depending on microwave output frequency. The crystal oscillator is buffered and amplified in a power amplifier to about 1/2 watt.

The power amplifier stage drives a varactor to produce a signal rich in harmonics to the signal mixer. The high power microwave oscillator is also injected into another port of the signal mixer. The sum/difference product from the signal mixer is applied to a video amplifier whose output controls a varactor in the high power microwave oscillator cavity. See Figure 1 for a block diagram of the brick oscillator.

The sum/difference product applied to the video amplifier changes its DC output higher or lower, biasing the varactor to try to lock up the microwave oscillator to a harmonic of the crystal reference. The circuitry of the brick oscillator is such that, if lock is lost, there is a sweep circuit that will cause the microwave oscillator to vary in frequency (slow fixed-rate sweep) in an attempt to regain lock.

However, if the circuit is so far out of lock, you have to restore (lock) range with a mechanical

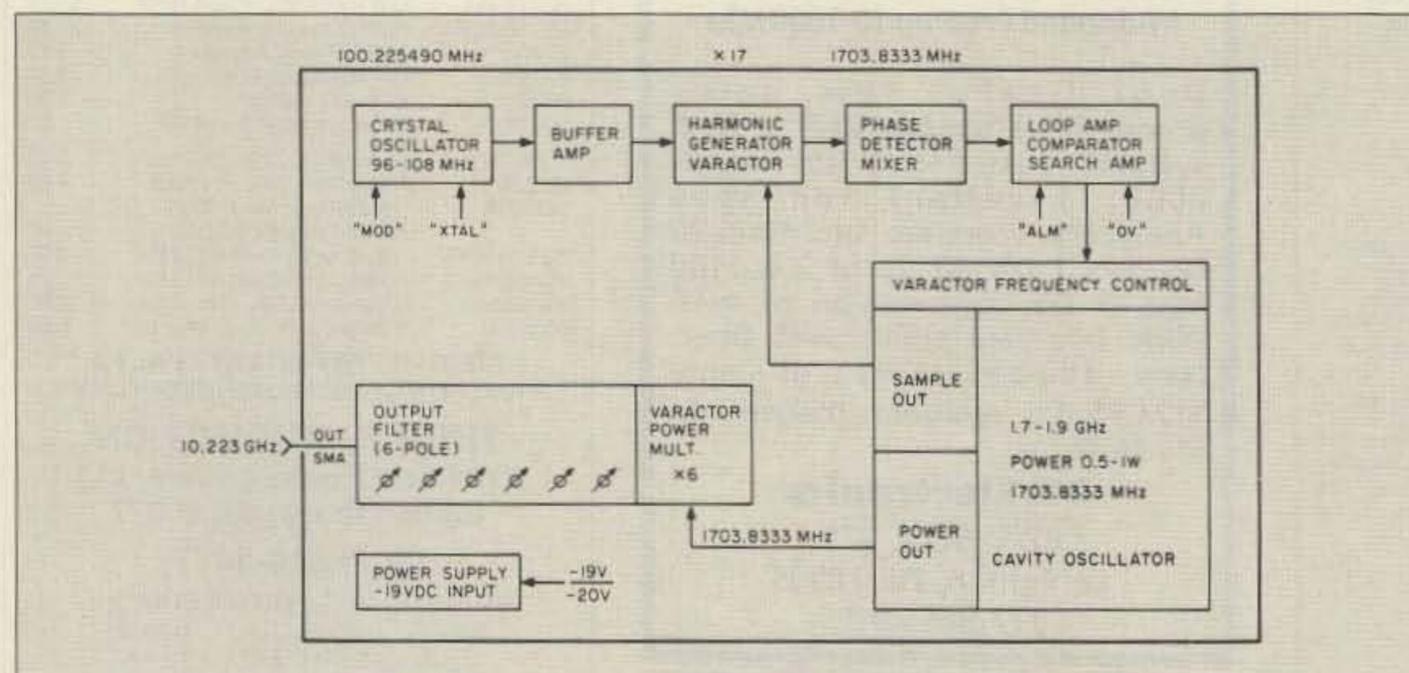


Figure 1. Block diagram for your basic microwave brick oscillator.

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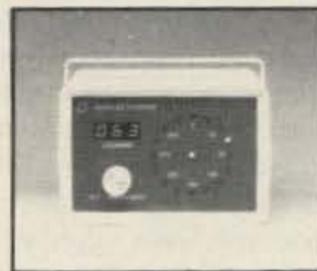
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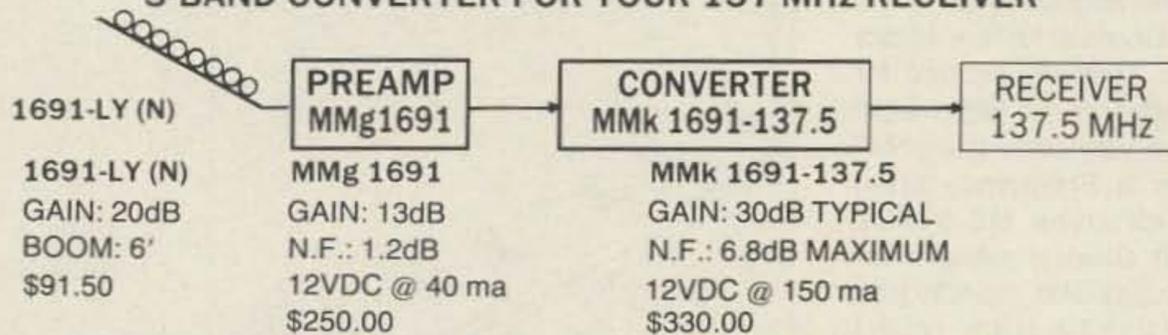
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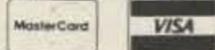
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adjustment. Normally, the microwave oscillator will lock over a 10 to 20 MHz range. All this house cleaning is taken care of with internal circuitry, as the brick is completely self-contained. Lock indication is verified by the "0V" or phase terminal on the brick. When not in lock, the brick will be fixed at -9.5 volts.

When the brick is in lock, adjust the microwave cavity while watching the "0V" or phase terminal with a voltmeter; it will vary from about -2 to about -13 volts. The brick is mechanically set to -7.5 volts, the center of its lock-in range.

You can verify that the crystal oscillator is functioning properly by metering the crystal terminal. You'll read about 1-2 volts, depending on crystal activity and circuit adjustment. Built for the telephone companies where power is positive ground, these units require a -19 volts at 500 mA, with slightly higher current until the crystal oven throttles back. Some of the oscillators are marked for -20 volts, and the difference is that these units have an internal rectifier diode protecting the oscillator from accidental reverse polarity. It also drops the input voltage 0.7 volts, making both oscillators otherwise identical.

Crystals for the bricks are specially ordered for each type, as they are cut to a very close tolerance. For a Frequency West brick, type MS-54XOL (10 GHz) is needed for 10.223 GHz. Specify part #585132 from International Crystal. If your brick is different, and you're unable to locate the exact type of crystal, give them all the information on your oscillator type. Cost per crystal runs about \$15.

Modifications for the Brick

With simple modifications, you can outfit brick oscillators with connectors on the high power oscillator, tapping part of the power for uses still locked in the 1.2 or 1.7 GHz range, depending on which type of brick you have. Also, you can use this connector for injection to a different varactor multiplier filter for other frequency combinations.

These bricks don't operate on

our bands, so you need to adjust them. First, adjust the output filter to pass the next lower frequency harmonic. This retunes them from 11 GHz to the lower 10 GHz range. In my Frequency West brick model MS-740MXOL-37, a

power output is just less than 1 milliwatt. This has worked paths over 100 miles. How about that for QRP? Couple this with relay switching and preamps, and you have an excellent station operating SSB or 5 kHz deviation FM.

"All the (microwave) oscillators I've obtained over the years have been surplus items costing \$20-50 each, depending on condition."

crystal at 100.225490 MHz is mixed (the seventeenth harmonic) with the microwave oscillator (locked) at 1703.8333 MHz. The 1703.8333 MHz oscillator (high power) is multiplied (times six) to

Mailbox

That's it on the brick this month; I'll soon cover mixers and their use. Now, for the Mailbox. Curt Law WA2PIV/KL7 reports installation of a new 10 GHz beacon oper-

WR-75 (WG-17), the next size smaller guide than the normal WR-90 (WG-16). Not to fret. Ed's solid state Raytheon radio is quite usable at 10 GHz, especially the brick oscillators and the TWT (traveling-wave tube) amplifier (20 watt output), mixers, and waveguide components. The radio's baseband IF system can be bypassed and replaced by a 2 meter HT.

In the above case, if SSB or narrowband FM is desired, the rest of the equipment isn't used. But if TV were used, the entire IF system might be used at 70 MHz. Concerning the antenna feed, it's best to stay with waveguide due to its very low loss. 30 feet of waveguide WR-75 would have about 1.3 dB loss, far better than any coaxial cable. See Ed's license plate in the photo.

Stephen N8JAF in the Dayton area would like to establish a 10 GHz link about three miles away. He'd like to hear from any other microwavers in the Dayton area. Jay N1GBS is collecting components for his microwave station, while Bruce N8IRW is looking for a manual or schematic to an Alfred 654C 7-11 GHz sweep oscillator. He would appreciate any assistance. Andy N6HDS reports that all the BMWs and Porsches react when he goes 10 GHz mobile! Looks like the radar detectors are working just fine.

James Fisher from Sacramento writes, "I am a 'soon to be Novice' radio Ham." He expects to take his exam in a few weeks. He is very interested in microwave communications and is looking forward to experimenting with home-brew microwave equipment. He is especially interested in various technical publica-

tions concerning microwave related items. I notified him about the North Texas Microwave Group newsletter. If you're interested in this bi-monthly publication, contact **Wes Atchison WA5TKU, Rt. 4, Sanger, Texas 76266**. Dues are \$12 a year.

Wish I could comment on all the letters I've received, but space dictates only a few. Thanks for your support. As always, I'll be glad to answer any questions. Please send an SASE for prompt reply. 73s, Chuck WB6IGP. **73**

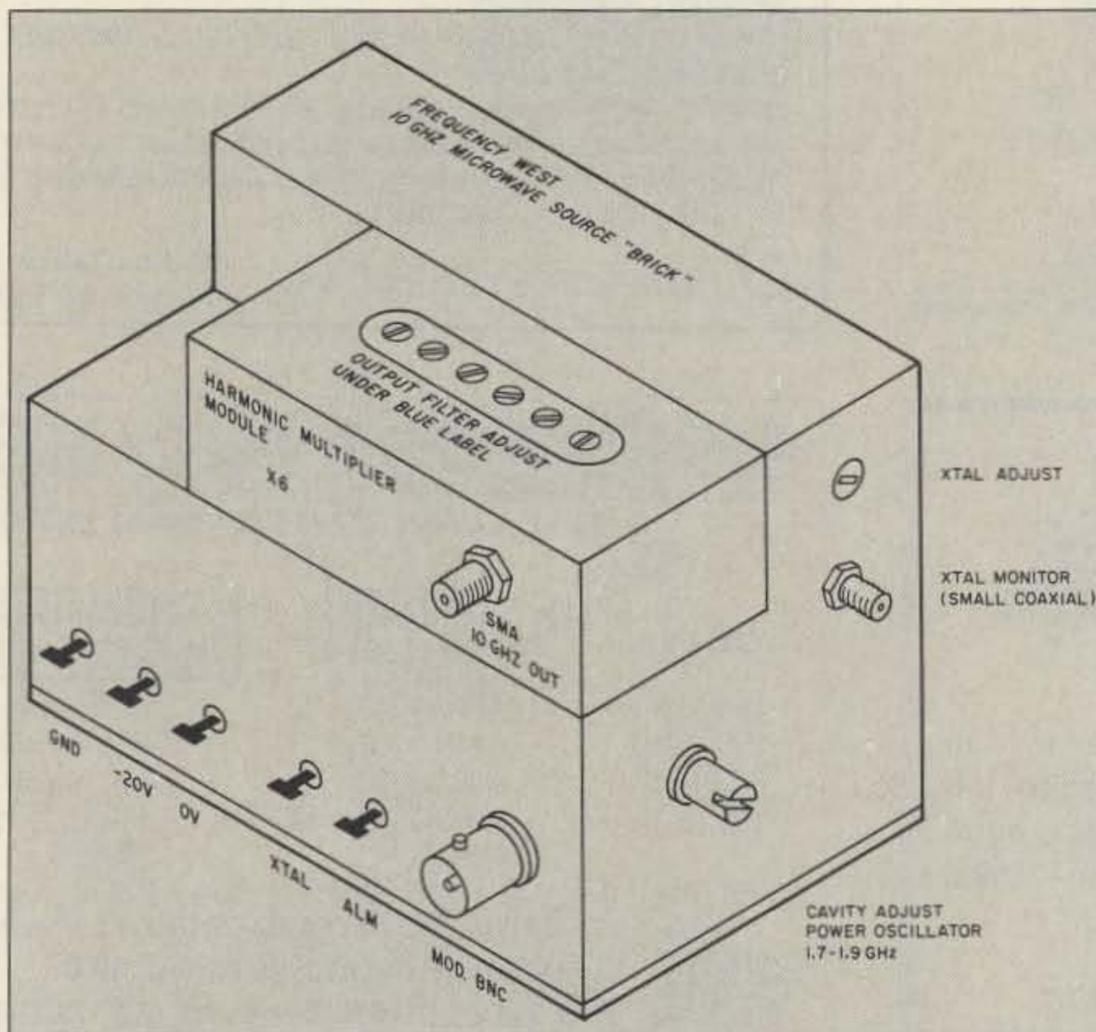


Figure 2. Frequency West 10 GHz microwave source "brick."

our 10 GHz frequency, or 10.223 GHz. This is mixed with a 2 meter IF 145 MHz, and then you have 10.368 FM or SSB, depending on the IF unit capability.

The most common surplus bricks I've obtained are in the 10, 6, 3, and 2 GHz ranges. The oscillator scheme is similar in all other models. Once you obtain an oscillator and mixer combination for any of our microwave bands, you're almost ready to place a microwatt transceiver in operation. With such a setup (no preamp),

ating from Kodiak Island on the northern edge of the Heitman Ridge. The beacon operates on 10.260 GHz, 10 mW, 75 feet up a tower. The antenna is a 17 dB horn pointed towards Washington State. The beacon will be on the air until the access road to the microwave site freezes. Contact Curt for info at PO Box 1538, USCG, Kodiak AK 99619.

Ed K3ZCY reports having an 11 GHz surplus transceiver and wants to know how to turn it into a 10 GHz transceiver. The unit uses

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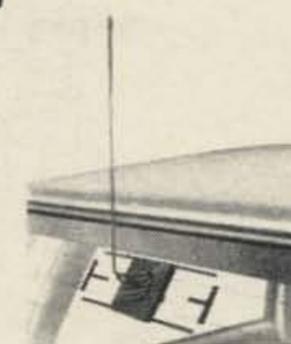


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Great Ideas From Our Readers

Copy Better RTTY on the KAM

I came up with this circuit because I was getting a lot of hits on traffic nets using RATT (Radio TeleType), known as RTTY in the ham circles. I use the Kantronics all-mode (KAM) TNC and the Kenwood TS-440S, which has a good AGC system. It responds however, to only the strongest of the two tones in a RTTY signal. Unfortunately, I've found no way to disable the AGC action in the 440S. Changing the time constant or biasing the radio up a bit with the RF gain control can help reduce the problem, but not defeat it entirely.

Since the problem is selective fade on only one tone at a time, that tone falls below the TTY detector threshold of the KAM and the character fails to print. Curing the problem with an amp may first come to mind, but the input specs of the KAM prevent you from giving it more than a 1 p-p signal. By slightly amplifying the weak tone signal with a single-stage op amp (without letting the strong tone over-drive the detector in the KAM

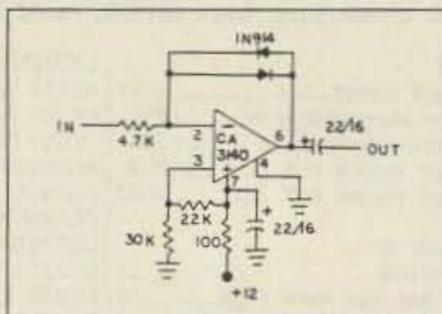


Figure 1.

unit), you can achieve improved circuit operation and better printing.

As long as the output of the op amp is below the barrier potential of the diodes (1N914), the amplifier stage has a gain of 10,000. As pin 6 (output) goes above this level, the feedback through the diodes reduces the gain to less than unity. Consequently, everything, including noise, is amplified and clipped to about 1 volt p-p. This happens on a cycle-to-cycle basis. The limit is soft to the extent that the edges of the output are rounded, minimizing harmonic distortion. Now hits occur only when one of the tones goes completely away; that will simply kill a letter, rather than a whole word.

At first, I used a dual ± 12 volt DC supply, but later decided to

use the station signal +12 volt DC supply. I used a readily available GE/RCA CA3140 op amp, which is a good op amp with FET input and operates well on a single voltage power supply. The circuit worked better with pin 3 biased to pin 7 rather than to 6 volts DC. Using a 1 μ F coupling capacitor, I obtained a differentiated wave shape output, but a 22 μ F output coupling capacitor solved this problem.

NOTE: This circuit does not work on HF packet. The amplified noise keeps the TNC in the KAM from sensing an open channel, preventing transmission.

Phillip W. Elrod
K4COF/AFA2KQ
Doraville GA

Drive the MM 432/28 with the IC-745

Here's a way to use the 745, or any HF rig that has a minimum output of 10 watts, to drive the Microwave Modules 432/28 transverter. I turned the output all the way down and used a 16 dB attenuator in the output. The accompanying circuit is the attenuator. Refer to the *VHF/UHF Manual* from G. R. Jessop G6JP, published by the Radio Society of Great Britain, for an extensive discussion of this.

Parts: R1, R2 = 68 Ω , 1W; R3, R4 = 39 Ω , 1W; and R5, R6 = 68 Ω , 1/2 W.

Bob Bartelings VE6CBN
Alberta Canada

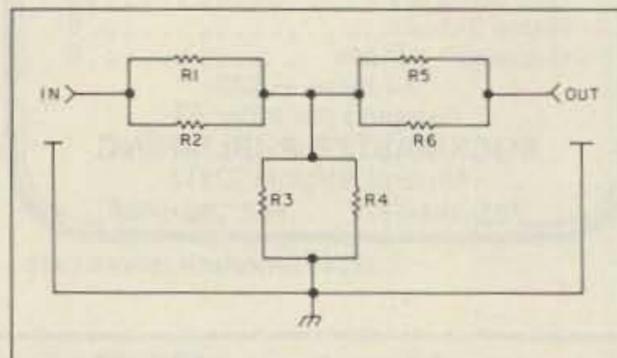


Figure 2.

3-Position, Multi-Mode Switch Box

It's not uncommon to find stations outfitted with RTTY, packet, FAX, and SSTV equipment. A 3-position switch adds convenience and saves time—no more disconnecting and reconnecting.

This control box was designed for the Kenwood TS-830S. It'll also work with the 520, 820, and 530S, and rigs which use a standard 4-pin microphone jack. The circuit consists of a 3-pole, 3-throw (3P3T)

nonshorting rotary switch.

Mount the switch on the chassis. I put the cabling and 3-input jacks on the back panel and rotary switch on the front. Follow the pin layout carefully; be sure you don't cross-wire any connections, since you're working from the back of the chassis-mount microphone jacks.

Before using the control box, recheck your work with an ohmmeter. Shorts or cross-wiring could damage your transceiver or any interfacing equipment.

Parts: 3 4-pin chassis mount

socket, RS 274-002, \$1.29 each; 1 4-pin mike plug, RS 274-001, \$1.69 each; 1 metal cabinet, RS 271-251A, \$2.99; and 1 3P3T rotary nonshorting switch. Other items include solder, hook-up wire, and single conductor wire with braided shield. For the finishing touch, try DATAK™ transfer lettering and a light coat of clear spray enamel.

No more multi-mode patch cord blues!

David K. Pelaez
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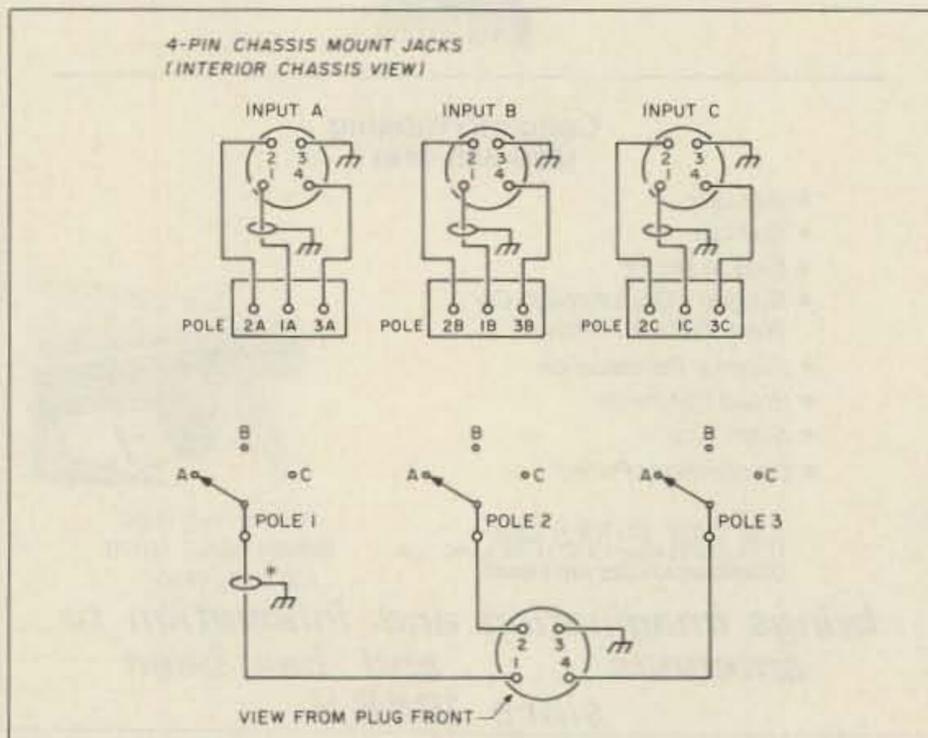


Figure 3.

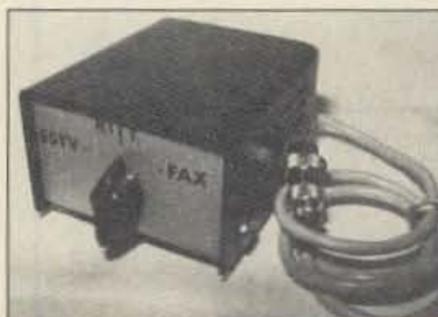


Photo A. Multi-mode controller, front view.



Photo B. Multi-mode controller, back view.

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Walkies and Chips— It's a Mod, Mod World

While researching another article, I recently spoke with Chip Margelli K7JA of Yaesu USA. I mentioned the FT-411's lack of receiver sensitivity on the public service bands, and he described a modification to improve the performance. I tried it and it works, (although not as dramatically as I'd hoped). If your rig is out of warranty and you'd like to do the mod, the section below tells how:

First of all, please don't do this unless you feel competent to do so! This radio incorporates the most up-to-date miniaturization techniques, including extensive use of surface mount technology, and I do not want to be instrumental in anyone's damaging his rig. If you're not sure you're up to it, enlist a friend who is.

FT-411 Modification

Remove the battery pack and the two silver screws on the bottom nearest the front of the radio. Now, remove the two black screws on the back. One is just below the PTT switch and the other is just below the hook for the carrying strap. Now, carefully lift the front panel up from the battery end, then pull gently downward. It'll pop open at the top.

Gently turn it over to the right. It is held by a ribbon cable, and you must not pull hard on it, or it could break. Look down at the circuit board contained in the back half of the radio. There are three small IF cans mounted in a vertical row on the motherboard. Using a small adjustment tool, turn the top two of them fully clockwise, then back them out just a tad. When turning them in, be extremely careful that you don't force them past their natural stopping points, or you may damage the cores or the coils themselves.

That's all there is to it! Close the rig up by fitting the front panel in at the top and then pressing the two halves together. (Don't forget to replace the strap hook first!) Finally, replace the screws.

Chip claims there is little or no effect on ham band reception, and that reception of the public service

band frequencies will be significantly enhanced. This seems to be the case with my rig. (In fact, new '411s are being aligned this way at the factory.)

Alignment Tool

By the way, if you don't have a proper plastic alignment tool, you can make a temporary one from a Q-Tip, as long as it's the kind with a wound paper stem. The blue plastic kind doesn't work.

Just cut one end off, then shape the stem end by cutting it with a pair of dikes. It should last long enough to get the job done. One thing I definitely don't recommend is using a screwdriver to adjust coils. The cores are brittle and they can crack very easily if they stick while you're turning them with a screwdriver. A cracked core is a disaster!

Thanks for the Memories

I got a very nice letter from Bob K9JMP, in which he relates an idea suggested by Claude WA9KCU. You can use any walkie that can store independent receive and transmit frequencies in memory to hold extra frequencies, as long as they're just for receiving. Simply program them in as the split transmit frequencies, and then use the "reverse" function to get at them. Voilà—two frequencies in one memory.

Of course, they won't scan, but at least they'll be there. Seems to me the technique should be especially useful when you're traveling and run out of memories in which to place local repeaters. Stash some of your home or public service band frequencies as Claude suggests, and you're ready to go! It's one of those ideas that makes you wonder, "Why didn't I think of that?"

Too Much QRM, OM

Sounds like something you'd hear on 20 meter DX, right? Well, now we have auto-QRM on 2 meter packet as well. No, not QRM from cars. I'm referring to hash from the TNC getting into the rig and making reception difficult or even impossible. It appears to be worst on 145.01 (good old Murphy), and especially seems to be a problem when TNCs are used with walkies.

Unlike mobile rigs, many HTs

have partial or even total plastic cases, and the hash can get right into the receiver without benefit of antenna. Toroids on connecting cables, and even remote antennas, may not help. The TNC's clock oscillator generates a harmonic which just happens to fall on 145.01, causing this problem.

The solution is to open up the TNC and look for a trimmer capacitor associated with the clock crystal. Turn it slightly while listening to the receiver, and you should be able to shift the harmonic away from the packet frequencies. TNC operation should not be affected in any way, as the oscillator's frequency change will be very slight.

If your TNC has no trimmer, check the schematic and you should find a fixed capacitor of maybe 47 pF or so, either across or in series with the crystal. Try adding another cap, perhaps 4.7 pF, in parallel with it and that should do it.

Pass the Chips

We all know that our gear is filled with integrated circuits, or chips. Most of us know what they look like. Surprisingly, though, lots of hams have little or no idea what is inside those little black boxes with all the legs. So, let's explore them.

You've heard that chips can contain lots of transistors. How the heck do you fit all those things into something so small? What's more, how do you connect them? Are there little tiny wires or what? Well, sort of, but not quite. There are lots of parts and conductive paths between them, but they're not separate. Instead, they're integrated on a common surface, called a substrate. Hence the name "integrated circuit."

Transistors are made by implanting certain chemicals into a semiconductor surface, usually silicon, in layers. The meeting points of the layers constitute the junctions where the transistor effect occurs. So, why not build these layers on a large area and make many transistors at once? Obviously, simply using a large area would result in one big transistor! Some sort of isolation from area to area is needed to establish a circuit path.

Photography provides the means. If you've ever developed your own film, or made a printed circuit board, you're familiar with the concept of etching. A light-sensitive solution is placed on the material to be etched (for a PC board, that's copper), and then

the pattern to be etched is focused on the surface by means of a mask. The areas which receive light chemically harden, while the dark areas do not. A dip in an acid bath leaves only the hardened areas, and the board is ready to be drilled and stuffed with parts.

Essentially the same thing is done with chips, except on a microscopic scale. Starting with silicon, not only the conductive paths, but the parts themselves, are etched onto the chip layer by layer. Chips are really three-dimensional, often with several layers of aluminum conducting paths as well as various multilayer transistors, resistors, and even capacitors. Many chips can be made side by side on the same "wafer," or piece of silicon.

Inside the IC

Getting all this to actually work requires some of the most expensive and sophisticated manufacturing equipment on Earth. The alignment of the masks from layer to layer must be extremely precise, or the circuit elements won't line up. Machines called "wafer steppers" do the job, and each one costs about one million dollars!

At that size scale, the tiniest piece of dust is like a giant boulder, and can obscure a piece of the circuit during the exposure process, rendering the finished chip defective. Elaborate "clean rooms" are used—the cleanest rooms in existence, making the average hospital operating room look positively filthy. All told, millions of dollars' worth of equipment are required to produce even a single chip. ICs are cheap only because so many can be made at once, splitting the cost among millions of chips. If there were only 10 microprocessors in the world, each one would probably be worth about \$50 million.

The fundamental limitation on how many parts can be put on a chip is, of course, how small each part can be made. Currently, that is limited by the wavelength of the light used to expose the wafer. Surface features less than one micron (one one-millionth of a meter) in size are now being explored using electron or ion beams instead of light.

Whew! There's lots more to chip making, from the precise "cooking" of the chemicals into the silicon, to the packaging and connecting of leads. But this should give you a good feel for what's inside those leggy little

beasts comprising so much of your radio's innards.

Now let's look at some letters:

Dear Kaboom,

When my son was in Japan, he bought me a Kenwood TH-21. Period. No "A," "AT," etc. The rig has no offset switch at all. Please describe how I can install the plus/minus feature.

**Signed,
The Simplex Blues**

Dear Simplex,

Wow, that's a tough one! The regular TH-21AT uses separate crystals in one of the heterodyne oscillators, along with some TX/RX switching, to achieve the offsets. Since yours has no offset switch, I would expect that it also doesn't have the supporting offset circuitry. Especially considering the '21's miniaturization level, which includes extensive surface-mounting of parts, it's likely not worth trying.

You'd be better off using the rig for packet (which is a simplex operation) or selling it to someone for that purpose, and getting another HT. But before you do, check to see that the radio is actually designed for simplex use, and does not simply have a fixed offset.

Dear Kaboom,

My old Yaesu Memorizer mobile rig picks up quite a bit of alternator whine, especially in transmit. I can live with it, but I want to know, can it hurt the rig to use it this way.

**Signed,
Whine, Whine, Whine**

Dear Whine,

It sure can. Alternator whine is caused by spikes on the DC power line. The spikes are caused by the rectified current pulses from the alternator being fed to the car battery. They can be quite large and can damage transistors and ICs in your rig. The cure is fairly simple.

Go to Radio Shack or an auto parts place, and get a noise filter choke. Put it in series with the positive power input to your rig. If there is still some whine, try placing a large filter cap (a few thousand microfarads or more), rated for at least 50 volts, across the radio's power leads, AFTER the choke. Be sure to observe correct polarity when installing the cap, and do it with the positive lead disconnected from the car. That ought to clear it up. **73**

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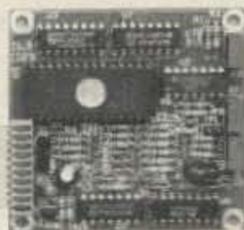
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NEW PRODUCTS

Compiled by Linda Reneau KA1UKM



PRODUCT OF THE MONTH ICOM AMERICA, INC. THE ICOM IC-24AT

Icom's new IC-24AT is super compact at 2"W x 5.4"H x 1.4"D and 12 ounces. The multi-functional, dual-band transceiver delivers a 5W output at 13.8 volts DC. Audio output power is more than 200 mW at 10% distortion with an 8Ω load. It can turn itself on at a preprogrammed time and turn itself off when unused. A battery pack from BP-81 through BP-86, or external DC power jack 6-12V DC, supplies power. Select tuning step increments of 5, 10, 12.5, 15, 20, 25, 50, to 100 kHz, or 1 MHz. Other features include dual-band display, scan and monitor functions, and optional tone squelch function.

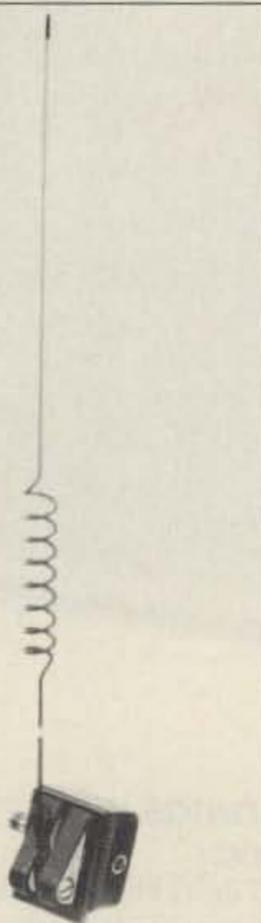
The IC-24AT can simultaneously transmit on 144 MHz and receive on 440, or vice versa. The keyboard, complimented by the top panel tuning control, makes it easy to program the 80 memory channels and use the two call channels. You can store frequently used phone numbers in the four DTMF code memory channels for automatic dialing.

Suggested retail, \$629.00. Icom America, Inc., 2380 116th Ave., NE, PO Box C-90029, Bellevue WA 98009-9029. Tel. (206) 454-8155. Customer Service (206) 454-7619. TEL: 152210/ FAX: (206) 454-1509. Or circle Reader Service No. 201.

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The Antenna Specialists Co.'s new Model AP-143 "On-Glass"™ disguise antenna covers the 2 meter band. It borrows the "pigtail" configuration of cellular antennas to disguise the presence of professional radio equipment inside the vehicle.

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The Commander HF-2500 high frequency amplifier delivers 1500 watts of continuous carrier output using a pair of Eimac 3CX800A7 triodes requiring 50-80 watts of drive. It operates on 160, 80, 40, 20, and 15 meters, and the WARC bands. With an easy modification, it can perform on 10 meters. Maximum plate dissipation is 1600 watts. It can handle high duty cycle emissions, such as RTTY, SSTV, FM and AM, as well as SSB rag-chewing and CW.

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rated output, and full-cabinet pressurized forced-air chassis for cooling.

The 70-pound, 17"x16"x7 3/4" Commander HF-2500 is \$2188. Command Technologies, Inc., 1117 West High Street, PO Box 939, Bryan OH 43506. (419) 636-0443 or Customer Service (800) 736-0443. Or circle Reader Service No. 202.



TCE LABORATORIES

TCE Labs of San Antonio announces almost 100% of the users of their Model BX TVI filter report no trace of interference. Tom W4PSC, retired research engineer and ham for 52 years, says he designed this filter out of necessity; he had tried every filter available on the market, and his TVI remained unchanged.

The Model BX TVI filter attaches to the F-connector cable TV input or coax cable VCR input. TCE Labs sells the BX filter for \$23, and Model CX for the neighbor's TV or VCR for \$18 (shipping included; Texas residents add 8% sales tax). TCE also sells an effective telephone filter for \$16 (add \$2 S&H, if ordered separately). Send check or MO to TCE LABS, 5818 Sun Ridge, San Antonio TX 78247. Or call (512) 656-3635 for more information or (800) 545-5884 (1800 KILL TVI) for immediate delivery. Or circle Reader Service No. 203.



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The WX-1000 produces hard copy images from radio facsimile services, including NOAA weather chart, NFAX, press photo, and satellite weather pictures from NOAA, GOES, and METEOR, etc. It requires audio output from a shortwave or S-band receiver capable of receiving facsimile signals. The built-in high resolution, 24-pin thermal printer produces crisp images. It's also capable of producing gray scale, ideal for APT (Automatic Picture Transmission) by weather satellite.

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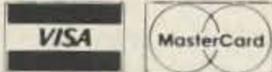
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The Touch-Tone activated mailbox lets users leave messages for each other. The *system* will leave you messages if you miss a reverse patch or alarm. Paging support includes all popular tone formats so users can always be available without having to listen.

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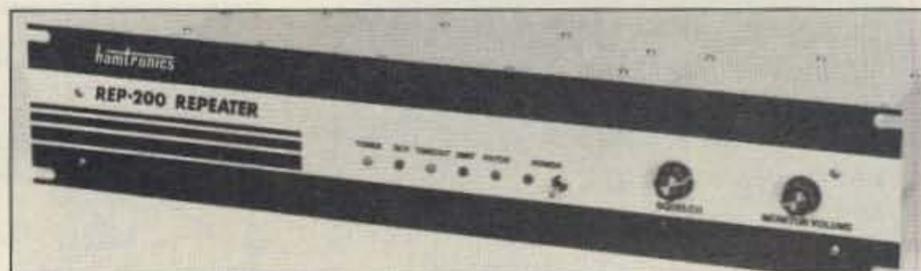
ENGINEERING CONSULTING

Engineering Consulting now has the "Packet Talker," model PKTA, for the Commodore 64 and compatibles. "Packet Talker" converts ASCII messages into speech. You can store messages for up to 300 users and retrieve them with TouchTone commands, and use the "Packet Talker" to link your TNC with any voice repeater.

A similar option for the PK8 and PK1 TNCs is available for the Ultra Com Shack 64 repeater con-

trollers. Used with the Ultra, the "Packet Talker" is much more powerful, allowing complete control of the repeater, remote screen transfer of all active parameters, voice message, and remote programming.

Model PKTA provides hardware and software interfacing for the C64. It sells for \$190. *Engineering Consulting, 583 Candlewood St., Brea CA 92621. Tel. (714) 671-2009. FAX (714) 255-9984. Or circle Reader Service No. 206.*



HAMTRONICS, INC.

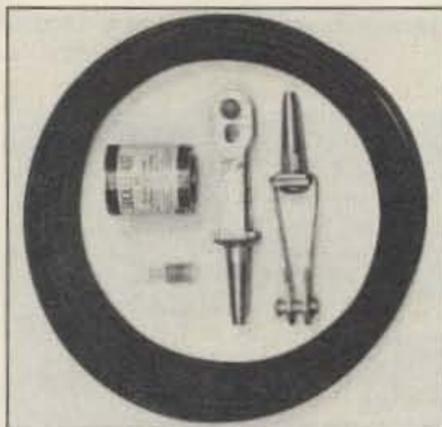
Hamtronics' new REP-200 repeater has everything their existing repeaters have, plus a microprocessor-controlled COR, CWID, autopatch, and DTMF decoder/controller with over 45 functions, including built-in testing features. It's available for 10m, 6m, 2m, 220 MHz, 440 MHz, 902 MHz, and for HF and UHF commercial bands.

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For 2m and adjacent commercial band, a new 25W RF output option is available. If you need even more power, you can add the 100W PA. On UHF, choose from 10W with basic repeater or up to 65W with add-on PAs. On 900 MHz, choose 10W basic repeater or 40W with add-on PA.

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LETTERS

Appeal for Young Hams

I've heard about your call for youth in ham radio. I am an eighteen-year-old General class licensee, and am very concerned about the future of ham radio. Ham radio has been around since before World War I, and is still strong, but the old guard slowly dwindles and there are not enough young adults to carry on the ham radio tradition.

It's everyone's responsibility to get young people involved before it's too late. We need to show them there's more to life than parties or who's wearing what. We need to open their eyes to the wonderful world of ham radio. How?

Show them how special they are. Show them that they can get on a radio and talk to anyone in the world. Get them involved in public service, such as in events that demand communications, like parades, 10k

From the Hamshack

races, etc. Yes, it will not be easy at first, but now is the time to really start searching for them, especially with no-code in progress. If we could get them to put as much energy into ham radio as they do with parties and fashion, then the hobby will be carried from generation to generation. The young folks are who we really need to shoot for, and the way to be successful is to show them how valuable they really are in this world of ours.

Kelly Howard N6PNY
Saugus CA

Closer Look at ROSE

I would like to address some of the comments made about ROSE in the article "Amateur Packet Networking" in the October '89 Packet Issue. It is stated that, "The... protocol used... is called AX.25 because it is based on the worldwide computer networking protocol X.25." AX.25 actually

is only a small portion of X.25. The original authors of the AX.25 protocol wanted to include the full features of X.25 because in many countries X.25 MUST be used for networking.

"The major advantage of ROSE is that it is available from RATS at little or no cost." We should not evaluate networking solutions using cost as a major consideration. Technical merits of a solution might be more important.

It is stated that the major problem with VC-based networks is that "a disconnect anywhere along the line breaks the entire link to the destination." One factor overlooked is that the VC method reduces BBS message duplication greatly. This is one of the real advantages of ROSE.

"ROSE can't communicate with NET/ROM, NET/ROM can't... TexNet, and TexNet can't... ROSE, etc." This is true only on the network level. On the AX.25 level, they communicate quite well. In New Jersey, we forward at least 1000 messages each month between ROSE and NET/ROM networks on the AX.25 level.

I personally feel that networks based upon "the worldwide computer networking protocol" should be given serious consideration if we are to ever create a global amateur packet network.

Thomas A. Moulton W2VY
Clifton NJ

See the Packet Talk column by Brian Lloyd WB6RQN in this issue for clarification of misleading statements in the October '89 packet issue...

Linda KAIUKM

Make it Fun

Until your editorial about high school ham clubs, I didn't know we started a high school ham club in tough times in 1972. Four of us were already hams and we convinced my physics teacher to be our faculty advisor. We showed how learning the code and theory was fun. We provided communications for school competitions. The last time I checked the Callbook, our club callsign, WB4DDF, was still listed. Emphasize ham radio as fun, and you will get positive results.

Steven Putman N8ZR
Fairborn OH

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|-------|--------------|-------|--------|--------|---------|------------|------------|-------------|
| | | Input | Output | NF-dB | Gain-dB | | | |
| 0550G | 50-54 | 10 | 280 | .6 | 15 | 13.6 | 42 | UHF |
| 1450G | 144-148 | 10 | 400 | .6 | 15 | 13.6 | 54 | UHF |
| 1452G | 144-148 | 25 | 400 | .6 | 15 | 13.6 | 50 | UHF |
| 2252G | 220-225 | 25 | 250 | .7 | 14 | 13.6 | 36 | UHF |
| 4450G | 420-450 | 10 | 180 | 1.1 | 12 | 13.6 | 39 | N |
| 4452G | 420-450 | 25 | 180 | 1.1 | 12 | 13.6 | 36 | N |

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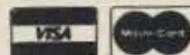
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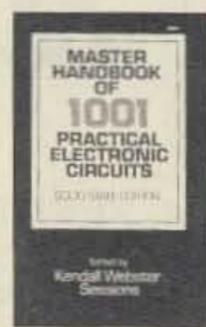
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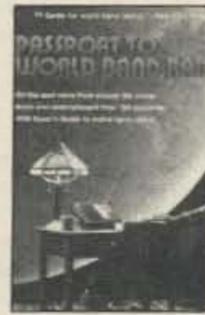
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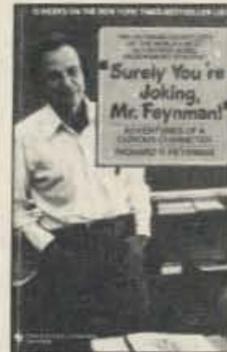
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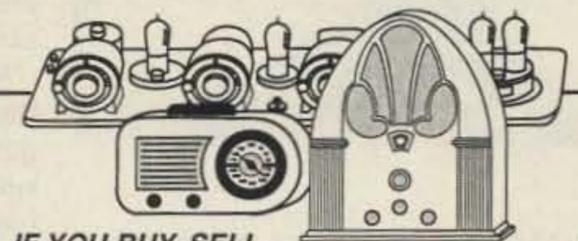
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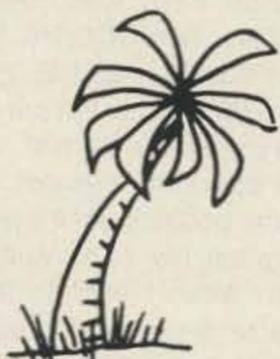


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Never Say Die

continued from p. 4



WA3YQY, Carlos Opus I, the Scourge of Eddyville (NY), has cleaned his area of jammers, breaker-breakers, tail-enders, and long-winded wimp old-timers with nothing whatever of interest to talk about.

living in caves, came up with a wonderful no-code license several years ago. It's incredibly like the ARRL proposal. It also has attracted less than 100 takers so far. Talk about a bomb. We couldn't pick a worse model to emulate if we had even the slightest interest in actually solving our problem. No, this debacle had to be planned—it's too dumb to be an accident.

Three Steps to Winning

Yes, I believe amateur radio can be saved. I believe it's possible for us to (1) clean up our bands so any thinking newcomer will not compare us unfavorably with CB; (2) actually have many interesting conversations over the air, not only locally, but even internationally; (3) attract youngsters to our hobby on the basis that it's fun.

It doesn't take much listening to discover that we have some serious people problems in our bands. Hams like K1MAN need to have the concept of others' rights explained to them. KV4FZ needs to understand the ramifications of his actions and how severely he is damaging our hobby. I singled those two out because I have a stack of recent complaints about them. There are hundreds of hams who are lousing up our nets, repeaters, traffic handling and so on. Many of these are not going to be easily convinced to stop messing up our bands. Many are going to be major challenges to our inge-

nuity since they seem to be all mouth and no ears.

We need some sort of Band Police system. Unfortunately, all too often the police become as much a part of the problem as the solution. We have only to watch the police in Chile beating people to death—the army/police in Israel shooting children—the army/police in China shooting thousands of children—the death squads in Central and South America “disappearing” thousands of troublesome people—to see where police action can go wrong.

What about our “police,” the FCC? Every few days I get copies of complaints filed with the FCC citing well-documented intentional ham interference cases. Some groups, frustrated by the FCC disinterest, have started peppering their congressmen with complaints. Unfortunately, these complaints

are far more destructive to the future of amateur radio than the perverse actions which are causing them. Bureaucrats tend to shoot the whistleblowers—kill the messenger.

Well, if I'm not suggesting our forming vigilante parties to string 'em up, nor our turning to what we perceive as our authorities for help, where can we turn? We do have an almost completely unused strength—a powerful strength. If we use this strength, I believe we can clean up our bands in a surprisingly short time. This strength lies in our thousands of ham clubs. It lies in our working cooperatively to clean up the mess. Remember, we outnumber the bad guys a hundred to one—if we cooperate.

By organizing our defense against the garbage on our bands—against the ham terrorists who are ruining amateur radio for the rest of us—we can, if we work smart, get them to cooperate.

This starts at home. At the next club meeting, form a garbage cleanup committee whose purpose is to tackle local repeater problems. The committee will be looking for jammers, offensive language and other inconsiderate activities. Getting the hams who are making the mess to clean up their act requires both tact and firmness. If you come on as officious and unreasonable, you'll stir up a worse hornets' nest.

When I'm in the middle of a

QSO on a repeater, breaking back and forth, I get as irritated as anyone else when someone comes on and lectures me about the FCC regulations on identifying. If he broke in and asked for my call, I'd have no problem. Few people are comfortable with being told what to do, but most of us will go that extra mile if we're asked.

If someone uses bad language, why not break in and ask him to please be careful, that your granddaughter or friends are listening? That may get more cooperation than your reading him the regulation against bad language, which can easily turn the frequency blue for quite some time.

Hunting jammers is real fun. It'll give your club some first rate direction finding experience. You can do fine with cars, but if you have a member with a plane you'll be able to home in on jammers in minutes. I remember a Massachusetts club which had a persistent jammer. DFers discovered it to be none other than the club president trying to force unwanted hams off “his” repeater! Hi, Bob.

By working in club groups and reporting repeat offenders at meetings, you'll have strength. If you find some local hams who can't be helped to improve their ways, it's time for stronger measures. This is where you need to be creative. For instance, you might consider a whole-club visit some evening to his house. Fifty or so hams knocking on the door might make an impression on even the most sour type of ham.

Now and then I get nasty letters about my editorials. I welcome ideas and facts, but not nastiness. When I get letters like that I feel sorry for the ham's family—they have to live with him every day. No nice person suddenly is nasty in a letter—that takes someone with mental problems. It's just the same on the air.

We do have some serious sickos in our hobby. Contrary to the popular myth, the code test has been a total failure in keeping out undesirables. I'm not yet completely convinced that it's the code which makes hams crazy, but I have noticed an otherwise unexplainable correlation between class of license and the number of loose marbles rattling around in many heads.

Once your club garbage cleanup committee has had success on your local repeaters, it's time to tackle low band crazies. First look for nearby hams who are screwing up, and apply your now well-de-

veloped group reasoning powers. If you hear more distant ops messing things up, try reason first. If that fails, see about getting help in their area. I'd love to list the clubs in 73 which have formed garbage cleanup squads so you'll be able to get help when you run into persistent spoilers. Their local clubs may have more success getting through to them.

The idea is to be polite but firm. You want to get their cooperation, not get them so mad they'll jam your net until they die. If we manage to make the papers with our efforts, I'd prefer it be for picketing his home rather than fire-bombing his car.

Can We Finally End Pileups?

Pileups are caused by poor DX operating. We need to educate DXpedition ops and ops in rare countries on how to avoid pileups. Pileups are like a shark-feeding frenzy—they get started by a DX op and then get out of hand, with the DX-chasers losing all perspective and reason.

How can a DX op with a weak signal keep pileups from happening? It's easy. I've DXpeditioned from many rare countries and I've learned how to keep the pileups from happening. To brag just a bit (as usual), I've operated from KP1, 3D2, 3D6, 7P8, 7Q, 5W4, 5Z4, KS6, KW6, KG6, KR6, 9M6, 9M8, 9N1, YK1, OD5, HS, YA, EP, FO8, FK8, VU, HL, VS6, 9V1, JY, OH0, FP8, etc., so I'm not without some experience at this.

My operating system, once I hear the beginnings of a pileup, is to explain my rules and go by them rigidly. I explain that I'm going to stand by for about 30 seconds and write down just the last letter of any calls. I don't want anyone to send anything but the last letter of their call—one letter. I suggest they not all transmit immediately, but wait and space out their calls—with no more than two transmissions of their last letter.

I then break in and ask each letter I've heard to stand by while I list everyone calling. I keep this up until the frequency is silent. Then I ask each letter I've heard to give their call once and nothing more. I confirm the call, give the report and ask for my report, with absolutely no breakers. I then confirm my report, and without missing a beat, ask for the next letter's full call only. Once I've worked all the letters I've listed, I give my QSL information, explain the rules again and stand by to list more

letters. In this way I'm able to get right down to the QRP, weak DX and mobile stations with no pile-ups, no DX crush and no panicky DXers wondering how soon the band will change. I don't even need a strong signal to make it work.

When someone with poor operating manners insists on botching things up, I explain that if he keeps it up, no QSL.

We can cure all our miseries if we cooperate and persist.

Making Contacts More Interesting

Though I've written about this before, I haven't yet noticed any signs that anyone has been paying attention. Yes, it's difficult to make contact with someone you've never talked with before and try to develop interesting conversations. It's easier to mindlessly babble about your rig, antenna and weather, none of which is of any more interest to him than is his station to you.

The up side of our having very few young hams is that most of you can read. The question arises, if you *can* read, are you actually reading? Let's be rotten about this—when is the last time you read a book? Any kind of book? I'm having some interesting non-ham books included in the Uncle Wayne's Bookshop, just in case you want to give reading a try.

I look at it this way. If an old coot like me can publish 73, put out a major music magazine (*CD Review*), and a handful of other smaller publications, run a record company, a mail order music company, etc., and also manage to read a big stack of magazines plus a couple books a month, why can't you? I'm not superhuman, I just spend my time carefully.

I also watch TV, see most of the better movies, get to concerts, go on skiing and diving trips, get to business conferences and ham-fests, but that doesn't keep me from reading. So, when you contact me on the air—and yes, I even get on the air—I'll be delighted to talk with you about almost anything. If I know about it, fine. If I don't, I want to.

I can't remember anyone ever asking me what I've read recently. I often ask. I can't remember anyone in the last 50 years asking me first what I do.

You know, if you just started asking the chaps you talk with what restaurants in their area they recommend and why, you'd soon have the makings

of a restaurant guide book.

Maybe they know some well-known people? Have you ever asked 'em? No one has ever asked me—and I've known a few. I also have some great stories I can tell about 'em. Ask me about Amelia Earhart, about aviation pioneer Frank Hawkes, Steve Jobs, King Hussein.

One way to help us get more interesting contacts is to have nets set up for discussing specific interests. Special Interest Group Nets (SIGNs). I occasionally call into the submariners net, the ex-GE employees net and the Mensa net. If there were nets devoted to cosmology, UFOs, new ham technologies, Gaia, the greenhouse problem, educational technologies, etc., I'd be on the air much more.

If you've got a good signal and are willing to sponsor a net, find a frequency and time which won't get others all upset and get it started. Let me know the time/day/frequency and I'll publish it in 73 so you'll have the whole country from which to draw.

The slow scanners should have a net frequency—not for sending pictures, but for discussing new circuits, new equipment and late developments. OSCAR ops have such a net. Every ham special interest should organize nets as meeting places. I remember running into a doctor net, airport manager net, ham flyer net, Westinghouse employees net—so where are the skier and skin diver nets?

Talk to me about books, music, places you've traveled, your other hobbies—talk to me! But please don't tell me what rig you bought or what antenna you've got up there. Please! I don't really even want to know my signal report—more than you're hearing me fine or, more probably, with some difficulty. I hate getting a 5-9 and then finding that about 2% of my transmissions have actually been heard. I also hate finding that the only reason someone has called me is because they "need New Hampshire." For what?

I have this strange concept of amateur radio—that it's best used for communications. I'm not sure what the driving force is behind someone having to work every country in the world. I could see wanting to talk with every country, but ten-second contacts just to get QSL cards? That's crazy!

Okay, okay, I know I just got through explaining how to make fast, stupid contacts. Well, I can't change the world in a day. And,

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| #9 GAYTE PBBS from Great Britain | | |
| #10 BBSLIST List of all PBBS's in the world. In D-base format and ASCII | | |
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CIRCLE 126 ON READER SERVICE CARD

yes, I even encourage this sort of madness with my DX Dynasty award. You can't imagine how much I hate myself for that. Talk about being my own worst enemy! But when I saw the blundering mess DXCC has become, it just seemed to me that, no matter how dumb the premise, someone ought to do it better. So I started the DX Dynasty, which has 400 countries—all legitimate countries. That's how many the official IARU member societies accept as countries—and who knows better what is or is not a country than the IARU official amateur radio societies? This keeps me out of the country decision hassle and all those weird rationalizations which have hamstrung (sorry) the ARRL.

Thus, on the one hand I have an award available for hams who are unable to prevent themselves from being stupid—and on the other I'm saying don't ruin our hobby by going for these operating awards. You're going to have enough to answer for when you get your "silent key" award without having to find out how much you've aggravated hundreds of hams with your 10 kilowatt rock crusher when they replay "this was your life." If you'd read some books, you'd know what I'm talking about.

Step Three

Let's fantasize that we've reconditioned the jammers and made them honored members of our ham society. That's step one. Next we've managed to get a reasonable number of hams to actually talk about interesting things on the air. Step two. That still

leaves step three, getting newcomers. At least by now we'll have a hobby of which we can be proud—something we can feel good about to sell. By the time we get to step three, it'll be easy to attract new hams. When we're ready we can tackle this hurdle. We're not ready yet.

Now, The Clubs

While there is no doubt in my mind that there are some really progressive ham clubs hidden around the country, the sad fact is that a high percentage are disasters. I mentioned addressing one recently where I was one of the youngest people present.

I wish I had the space in 73 to publish the endless letters I get from younger hams telling me about their terrible experiences in trying to get help from a local ham club. Maybe I can get these onto the 73 BBS so you can see some of the mail I get and perhaps develop a better understanding of our root problems.

I pointed out that the FCC should not be perceived as a strength upon which we can lean. I don't think they hate amateur radio, they just don't want to be bothered. Amateur radio has been a royal pain in the butt for them for years, with little on the up side.

Well then, we certainly can depend on the ARRL, right? Trying to discuss the ARRL evenhandedly is about as fruitful as trying to discuss agnosticism at a Baptist revival meeting, so I'll leave you with your beliefs and not upset you with facts. I will say that it is my considered opinion that any belief that the ARRL is going to be

helpful in solving our problems is more fantasy than reality.

Okay, if we can't depend on the FCC or the ARRL to save us, certainly the ham industry, which is totally dependent on ham sales, will do it, right? Wrong.

The only strength we really have to work with is our ham clubs. We do have a few of these which are being intelligently guided—which are going all out to attract youngsters to our hobby—which are taking an interest in trying to rebuild our hobby. Alas, we have an awful lot of clubs, run by old men, which are doing all they can to keep kids out.

What I suggest you do is this: Take the time and interest to find out when your local ham clubs meet. Go to the meetings. See how they are running. Are the meetings interesting or are they dominated with "business" discussions which make them dreadful bores? Do they have exciting speakers?

Speakers. Let me discuss speakers. You'll be able to get some really interesting speakers if you try. But if you treat them the way I've been treated they'll quickly stop addressing ham clubs.

When you are able to attract a good speaker make sure that you do something special about it. Get notices in the newspapers and on local radio stations to attract an audience. Talk it up with announcements on local repeaters.

Have a pre-meeting dinner to get the speaker together with a few selected interesting club members. This will help the speaker know what the audience will be most interested in hearing about.

At the meeting immediately introduce the speaker and let the speaking commence. No "short" business meeting. No yearly elections. If you absolutely can't prevent yourself from these destructive activities, at least leave them for after the speaker has gone.

Give the speaker plenty of time to talk and answer questions. Then have the coffee & doughnuts, with a further informal talk session. Thank the speaker and give him or her some memento of the occasion.

A good friend of mine, a top ham speaker, won't talk to a club unless he gets \$1,000 up front. It isn't that he needs the money, it's just that this is what he found it takes before a club will take him seriously enough to pay him some respect. I tried that and, sure enough, I found I got a lot more respect when I charged

\$1,000 than when I speak for free.

I remember being invited to address a ham club near Boston. They neglected to tell me how to find the meeting place—just check in on the repeater for directions. So I drove to the town and called in. No one on the repeater knew where the meeting was. I persisted and finally someone came on who was able to give me directions. When I got to the meeting, they were busy with Field Day preparations, so it was after 10 p.m., when everyone was tired and ready to go home, before there was time for me to talk. No, I don't speak to many clubs these days.

If you take the time to infiltrate your local clubs you'll be in a position to improve the meetings. Anyone who speaks up at club meetings is quickly made the club president. Get yourself in a position to make sure the club goes after youngsters and then gets 'em licensed. Make sure the meetings are fun for everyone. Get a garbage committee going to help clean up our bands. Club meetings are show biz, so they have to be planned.

Plan B

Let's indulge in the unlikely fantasy that my plan for you to get your local ham club to form a Garbage Committee to clean up our bands has fallen on the usual deaf ears. The "little old ladies" who are running the club don't think the club should "get involved" with anything as controversial as that.

I go out on a limb every month for you in my editorials and what do I get in return? I get timid, pukey, mewling letters saying yes, golly, I sure agree with you, but for heaven's sake, whatever you do, don't print my name or call. Spineless, wishy-washy, gutless namby-pambies. That isn't the spirit that made America great, that's the spirit that has helped us collapse into last place in the developed world in education and to lose our electronics industries to Japan.

Of course, if you don't read anything but ham magazines, and are thus a certified ignoramus, I can understand why you're terrified of expressing an opinion. I can also see why you might go into a quaking panic at the idea that the ARRL might sense some slight defection on your part. Some hams seem fearful that if even a hint that they are not absolutely delighted with every aspect of The



QSL OF THE MONTH

To enter your QSL, mail it in an envelope to 73, WGE Center, Forest Road, Hancock NH 03449, Attn: QSL of the Month. Winners receive a one-year subscription (or extension) to 73. Entries not in envelopes cannot be accepted.

League is detected, the local SCMs and their dreaded right wing "death squads" will kidnap and torture them.

Now, while this may possibly be happening in some isolated areas where there are overly zealous SCMs, I don't see where this can honestly be a serious concern for most hams.

But, if you're too much of a milquetoast to go on the air and help bring reason and order to our ham bands using your own call—if you find yourself going into a blue funk at the mere thought of standing up for what you know darned well is right—I have a solution. I have a way for you to be daring—for you to tell off (sort of) the cretins who are lousing up our bands without ever letting them know who you are. I have a way you can blame the whole thing on me. So, even if you are a lilly-livered, yellow-bellied, sasparilla-drinking coward, you'll still be able to lend a hand in cleaning up the mess on our bands you've allowed to grow into a monster. It's time to stop turning the other cheek. It's time for you to take a stand, no matter how weak.

Okay, here's a way we can work it. As you know, when you operate

my station, you're permitted to use my call as long as I have "control," right? You can only sign my W2NSD call letters within the limitations of your license or mine, so if you've an Extra Class license you can only operate in

asking some idiot who has been using bad language or jamming a net or a repeater to shape up won't get much heed, but if every 73 reader makes it his or her business to spend even ten minutes a day helping to clean up our bands,

be sure you don't jam or make more of a mess of things.

The normal reaction by the bullies who are messing up our bands is to launch into a long insulting diatribe. This is designed to make you mad and retaliate. This is what it's all about for this brain-damaged would-be CBer. I've found the best way to handle this is to immediately tune off the frequency when the hate starts and look up the band for other mental retardards to discourage.

Of course, if you have a clean-up group working with you via a repeater, you can drive the bully nuts with different voices asking him to "give me a break...this is W2NSD."

Let me know how this works out for you. If we don't have success with Plan A or Plan B, we may have to go to Plan C, which involves Dick Bash—remember him? I've heard he's now selling AK-47s. Nothing changes.

If you're panicky that I might print your call in 73, don't let that stop you from writing; just let me know and I'll keep it secret—although we are talking about starting a ham whistleblower relocation program. I expect to get some interesting stories of your

"Talk to me about books, music, places you've traveled, your other hobbies—talk to me! But please don't tell me what rig you bought or what antenna you've got up there."

the Advanced Class bands. If you're a Tech, you can only operate in the Tech bands, even using my call.

Now here's what you do. When you hear someone making a mess of things on the air, break in and say, "Please...please...give me a break!...this is W2NSD." If you say exactly that, as I've asked, then obviously I am in control of your station. If you say anything else, you're in control and you'll have to use your own call.

One voice in the wilderness

us good guys will be able to rout the baddies. A chap who misuses our bands may not pay any attention to one bleat of indignation, but if fifty voices, all claiming to be W2NSD, get after him, perhaps the message will eventually get across.

Notice that I've asked you to say "please." You're asking him to shape up, not telling him. It's much more difficult to ignore someone asking you than someone ordering you to do something. When I'm in control of your station

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CIRCLE 191 ON READER SERVICE CARD

PROPAGATION

Jim Gray W1XU

Jim Gray W1XU
PO Box 1079
Payson AZ 85541

December Forecast

December days are the shortest of the year, so expect the higher frequency HF bands, 20-10m, to close at dark or late afternoon. Occasionally, on very good days, you will find them open long after dark.

Solar activity is higher than it has been in 10 years, and you can expect some sudden ionospheric disturbances brought on by solar flares and other events on Old Sol. As shown in the daily forecast calendar, on days with a P, F or G, expect Poor, Fair, or Good conditions, respectively. Allow for an error of a day or two in either direction.

Reading the Chart

When a given band is open to a place on Earth at a specific time as indicated on the chart, look a bit earlier, just for fun. On some days, these openings may not exist at all, so try a lower band. In many cases, you'll be pleasantly surprised to find the next higher band open as well. For the WARC bands, you'll find propagation sharing some of the characteristics of the next higher and next lower adjacent ham bands.

An * means to try the next higher band. (1) means an opening may be rare, but possible on "good" days (G). When 20/40m or 40/80m are indicated, both bands are

likely to be open at the same time to the same location.

DXing

Grayline propagation, at dawn or dusk along the path of the terminator, may be especially good on all bands from 40 through 10. Keep an ear tuned to WWV at 18 minutes past the hour for current propagation conditions.

Good DX! **73**

| EASTERN UNITED STATES TO: | | | | | | | | | | | | |
|---------------------------|-----|----|-------|-------|-------|----|----|----|----|----|----|----|
| GMT: | 00 | 02 | 04 | 06 | 08 | 10 | 12 | 14 | 16 | 18 | 20 | 22 |
| ALASKA | 15 | — | — | — | — | 20 | 20 | 15 | 15 | — | — | 15 |
| ARGENTINA | 15 | 15 | 15 | 20/40 | 20/40 | — | — | — | — | — | 10 | 10 |
| AUSTRALIA | 15 | 15 | — | — | 20/40 | 20 | 20 | — | — | — | — | — |
| CANAL ZONE | 15 | 20 | 20/40 | 20/40 | 20/40 | 20 | 20 | 20 | 15 | 15 | 10 | 10 |
| ENGLAND | 40 | 40 | 20/40 | 20/40 | 20/40 | — | — | 10 | 10 | 15 | 20 | 40 |
| HAWAII | 15 | 15 | 20 | — | 40 | — | — | — | — | — | — | 15 |
| INDIA | 15 | 20 | — | — | 20 | — | — | — | — | — | — | — |
| JAPAN | 15 | — | — | — | — | 20 | 20 | 15 | 15 | — | — | 15 |
| MEXICO | 15 | 20 | 20/40 | 20/40 | 20/40 | 20 | 20 | 20 | 15 | 15 | 10 | 10 |
| PHILIPPINES | 20* | — | — | — | — | 15 | — | — | 15 | 15 | — | — |
| PUERTO RICO | 15 | 20 | 20/40 | 20/40 | 20/40 | 20 | 20 | 20 | 15 | 15 | 10 | 10 |
| SOUTH AFRICA | — | 40 | — | 20 | 20 | — | — | 15 | 15 | 15 | — | — |
| U.S.S.R. | — | — | — | — | — | — | — | 20 | 15 | 20 | 20 | — |
| WEST COAST | 15 | 20 | 20/40 | 20/40 | 20/40 | 80 | 20 | 10 | 10 | 10 | 10 | 10 |

| CENTRAL UNITED STATES TO: | | | | | | | | | | | | |
|---------------------------|----|-----|-------|-------|-------|-------|----|----|----|----|----|----|
| ALASKA | 15 | 15 | — | — | — | 40 | 20 | 20 | 20 | — | — | — |
| ARGENTINA | 10 | 15 | 20/40 | 20/40 | — | — | — | — | — | — | 15 | 10 |
| AUSTRALIA | 15 | 15 | 15 | 20 | 20/40 | 20/40 | 20 | 20 | — | — | 15 | — |
| CANAL ZONE | 15 | 20 | 20/40 | 20/40 | 20/40 | 20 | 20 | 20 | 15 | 10 | 10 | 10 |
| ENGLAND | — | — | — | — | — | 20 | 15 | 10 | 15 | 20 | — | — |
| HAWAII | 15 | 15 | 15 | 20 | 20/40 | 20/40 | — | — | 20 | — | — | 15 |
| INDIA | 15 | 20* | 20 | 20 | — | — | — | — | — | — | — | — |
| JAPAN | 15 | 15 | — | — | — | 40 | 20 | 20 | 20 | — | — | — |
| MEXICO | 15 | 20 | 20/40 | 20/40 | 20/40 | 20 | 20 | 20 | 15 | 10 | 10 | 10 |
| PHILIPPINES | 15 | — | 20 | 20* | — | — | 20 | 20 | 15 | 15 | — | — |
| PUERTO RICO | 15 | 20 | 20/40 | 20/40 | 20/40 | 20 | 20 | 20 | 15 | 10 | 10 | 10 |
| SOUTH AFRICA | — | — | 40 | 20 | — | — | — | — | 15 | 20 | — | — |
| U.S.S.R. | — | — | — | — | — | — | — | — | 20 | 20 | 20 | — |

| WESTERN UNITED STATES TO: | | | | | | | | | | | | |
|---------------------------|----|----|-------|-------|-------|-------|-------|----|----|-----|----|----|
| ALASKA | 15 | — | — | 20 | 20 | 20 | 20/40 | — | 20 | 15 | — | 15 |
| ARGENTINA | 10 | 15 | 15 | 15 | 20 | — | 20 | 20 | — | — | — | 10 |
| AUSTRALIA | 10 | 10 | 15 | 15 | 20 | 20 | 20/40 | 20 | 20 | — | — | — |
| CANAL ZONE | 15 | 15 | 20/40 | 20/40 | 20/40 | 20 | — | 15 | — | — | 10 | 10 |
| ENGLAND | — | — | — | — | — | — | — | — | 20 | 15 | 20 | — |
| HAWAII | 10 | 15 | 15 | 20 | 20/40 | 20/40 | 20 | 20 | — | — | 15 | 10 |
| INDIA | — | — | 15 | — | — | — | — | — | 20 | — | 15 | — |
| JAPAN | 15 | — | — | 20 | 20 | 20 | 20/40 | — | 20 | 15 | — | 15 |
| MEXICO | 15 | 15 | 20/40 | 20/40 | 20/40 | 20 | — | 15 | — | — | 10 | 10 |
| PHILIPPINES | — | — | — | — | — | — | 20 | 20 | 20 | 20* | 15 | 15 |
| PUERTO RICO | 15 | 15 | 20/40 | 20/40 | 20/40 | 20 | — | 15 | — | — | 10 | 10 |
| SOUTH AFRICA | — | — | — | 20 | 20 | — | — | — | 20 | 15 | — | — |
| U.S.S.R. | — | — | — | — | — | — | — | — | 20 | 20* | 20 | — |
| EAST COAST | 15 | 20 | 20/40 | 20/40 | 20/40 | 80 | 20 | 10 | 10 | 10 | 10 | 10 |

| DECEMBER 1989 | | | | | | |
|---------------|-----|-----|-----|-----|-----|-----|
| SUN | MON | TUE | WED | THU | FRI | SAT |
| | | | | | 1 | 2 |
| | | | | | G | G |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| G | F | F | F-G | G | G | G |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| F | F-G | G | G | G | G | G-F |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| F | F-P | F-P | P | P | P | P |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| P | P | P-F | F | F-G | G | G-F |
| 31 | | | | | | |
| G-F | | | | | | |

Never Say Die

successes—and your failures.

The only way we're ever going to clean up our bands is with your help.

Perhaps you noticed that when you use my call you're going to be nice, not mean. We have more meanness than we need on our bands right now, so kill these rotten scoundrels with niceness. These guys are experts at getting your goat. You'll absolutely ruin their day if you are unflappable.

This shouldn't stop you from pitying their family and friends, who have to put up with them during the few hours a day when they are not spoiling our bands for us.

Plan B, Part II

If you find it heavy going when you try to inject some intelligence

ture instruments used to beat "rotten QRMers" into either compliance or silent keys) will not change your firm principles.

Would you like to really drive some thoroughly ruttled hams absolutely crazy? Have you ever tried *not* giving them a numbered signal report? You see, there's this column in their log for a signal report. "Armchair copy" or "You're coming in pretty good" isn't there. They need a number. I've had some hams plead, reduced to tears, for their signal report.

You've never seen a tougher sonofagun than me. I tell 'em, if they absolutely must put a signal report in their log, why go ahead and make one up. No, they've got to hear it from me, otherwise it's cheating. I smile a wicked,

"Hunting jammers is real fun. It'll give your club some first rate direction finding experience."

into your contacts, I have a shortcut for you. Mark you, this is probably going to be one of the most difficult things you've ever done in amateur radio—worse even than that stupid 1920's code requirement which drove you bananas when you decided to get your ticket.

I'm asking you right here and now to take a pledge—to sign an oath—make a pact with me. I want you to go to your hamshack right now, draw a line under the last contact in your log and write this:

"I hereby swear that never again, as long as I live, will I ever divulge over the air the manufacturer, model number or any other information about any equipment I'm presently using, plan to use in the future or have used in the past.

Further, that includes every aspect of my antenna system, homemade or bought. I also agree that I will not, under any circumstances, discuss today's weather, either here or anywhere else in the world, in anything less than a declared national emergency." Now sign that pledge and start your first day as an evangelical spreader of the gospel of Better Hamming. If anyone pressures you to break your pledged word, just tell 'em you've signed the "W2NSD pledge" and that wild horses, Wouff Hongs or even Rettysnitches (infamous old ham ARRL tor-

fiendish smile as I taunt them almost beyond endurance. Nothing will force me to give them that treasured number. Yes, I realize that I may occasionally push some Extra Class hams over the edge. They deserve it.

I had a letter from an W4's XYL saying her husband has been unable to make another contact. The unfilled box in his log had brought him to a sudden halt in his hamming, so he'd started helping her with the housework and please, please send him his report so she could get him back into the hamshack and out from under foot.

Figuring that I'd done hamdom a big favor and that it was better for his wife to suffer than hundreds of hams, I refused. I knew I'd get no thanks from any of you for this public service, but it was still worth it.

So go you forth and do likewise. Don't expect any thanks. All you'll get for your trouble is abuse, but when you finally win that last big honor, your ARRL Silent Key Award (many hams are dying to get it), then's when you'll get your reward. If I'm not there already, have patience, I'll be along and pin an ectoplasmic medal on your sheet. Then we'll go down on 20m, call CQDX, sign very rare calls with weak signals and not come back to the DXers. **73**

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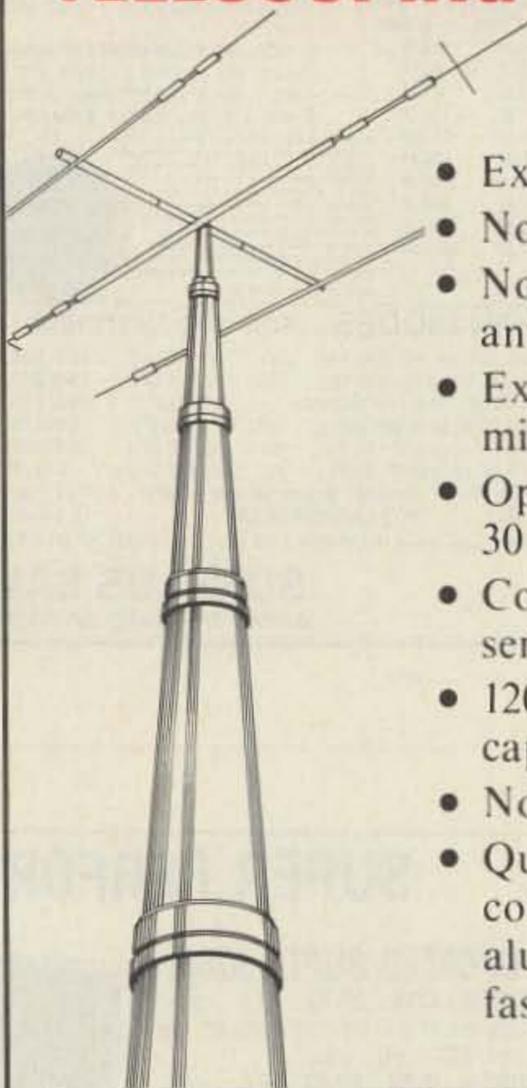
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73 INTERNATIONAL

edited by C. C. C.

Notes from FN42

It's that time of year again when we in the Northern Hemisphere start thinking of snow, ice, and winter sports, and those of you in the Southern Hemisphere think of warm weather, sunshine, and summer. I think of the very nice summer we have had in New Hampshire and of all the ham activities that I have been involved in. And now, as I reflect on the end of summer (this was written in September), I wonder how many others around this beautiful Earth of ours have enjoyed theirs as much as I have mine.

But there have been many tragedies as well. Even though the airplane is still the safest means of travel, the number of aircraft accidents appear to be higher this year. Is this because there actually are more accidents, or because of an increased awareness presented by the news media throughout the world? Are there more riots and related deaths or just increased worldwide news releases?

Is communications important? You bet! Whether it is from the news media presenting reports of worldwide significance, satellites providing up-to-the-minute pictures of hurricanes, typhoons, or other weather phenomena, the current cellular telephone craze, or just talking with a friend on the telephone or radio, communications is a very important part of our lives.

Hams have become more and more involved. Even the news media understand the importance of amateur radio communications. In the United States the Federal Communications Commission has been asked to allow the news media to use ham radio operators to gather and send information of a commercial nature in times of emergency.

How many times have hams provided health and welfare communications after hurricanes, earthquakes, and other tragedies? Thousands, at least.

I think it's wonderful to have a hobby that provides so much enjoyment and at the same time provides a much needed service to the world. Keep up the good work, enjoy yourselves, and do great things!

Happy Holidays, and may the

beginning of your new year bring prosperity and joy.

ROUNDUP

Brazil SERRA DO CACHIMBO, Brazil (AP)—Plane crash survivors who were stranded in the Amazon jungle for nearly two days said the pilot asked for their forgiveness and wished them luck as their jet crashed into dense vegetation earlier this year.

"We were ready to die, but the hand of God guided our descent," passenger Epaminondas de Sousa Chaves, 36, said after Air Force helicopters airlifted 41 survivors out of the jungle.

The Varig Airlines Boeing 737-200 crashed on a Sunday night, killing at least 10 of the 54 people aboard.

The Air Force found the plane Tuesday night after four survivors walked through the jungle and contacted authorities by **ham radio**.

[I wonder how much farther the survivors would have had to walk to get to another form of communication, and how many others might have died before help arrived.—CCC]

Next ITU Plenipotentiary Conference in Japan

Japan From the JARL News. At the Plenipotentiary Conference of the International Telecommunication Union (ITU) held in Nice, France, from May 23 to June 30 this year, it was approved that the next plenipotentiary conference,

in 1994, will be held in Tokyo, at the Science and Technology Hall at Kitanomaru Park. This approval will be officially confirmed at the ITU's Board Meeting in 1991.

The most important conference of the ITU will be held for the very first time in the Asia and Oceania area.

Since this is a good opportunity for radio amateurs to have their problems understood by VIPs and leading members of worldwide electronic and communication circles, JARL and all others will work toward making all necessary preparations for a successful conference.

Gallium Arsenide Solar Cell for JAS-1b

JARL has decided to use gallium arsenide solar cells for JAS-1b, the second Japanese amateur satellite to be launched in February 1990. The solar cells were recently delivered from Mitsubishi Electric Co., Ltd.

Compared to silicon solar cells, they are nearly forty percent more efficient in power generation. Production cost is two to three times higher than for silicon solar cells, but because of its greater efficiency, the gallium arsenide solar cell was developed and used in Japanese communication satellite CS-3, already launched by the National Space Development Agency of Japan (NASDA).

JAS-1b uses about 1,300 cells of two different sizes, 1x2 and 2x2 sq. cm. They are expected to generate 11 watts, which is 4.5 watts more than the power for FUJI, although the satellite itself has been enlarged a little bit.

[The JARL also sent a list of Chinese Amateur Radio Stations with

QSL information. Look for it on the 73 BBS (1-603-525-4438).

—CCC]

Lithuania Seeks IARU Membership

Lithuania. News release from Ed Shakalis, KA1QOF. On June 12, 1989 at ARRL headquarters in Newington, Connecticut, a delegation from the "Worldwide Lithuanian Amateur Radio Net" met with Mr. Naoki Akiyama, Assistant to the Secretary for IARU (The International Radio Union), to discuss the LIETUVOS RADIJO MEGEJU DRAUGIJA (Lithuanian Amateur Radio Society) application for membership to IARU.

The Lithuanian group included Messrs. Sakalas Uzdavinys UP2BO from Vilnius, Lithuania, Flavius Jankauskas K3JA, Bronius Uzdavinys KB1PI, and from the USA, Ed Shakalis KA1QOF.

Mr. Akiyama explained in detail the necessary steps to become a member of the IARU. The Lithuanians thanked Mr. Akiyama for his consideration and help in this manner.

Sakalas UP2BO, a radio ham for 41 years, said that an application for membership to the IARU would be initiated by "The Lithuanian Amateur Radio Society" upon his return to Lithuania. He also said that they are working to get back their original call prefix "LY" which they were allowed to use for only one month earlier this year and one month last year.

[Ed Shakalis KA1QOF, 10 John Alden Road, Plymouth, MA 02360]

Netherlands. From the Radio Netherlands Programme Information Release (Aug-Nov 1989). For those of you who wish to receive this programme release in electronic form, dial your international access code, then 31 354 5395 to reach our IBM host computer in The Netherlands. It will work at 300/1200/2400 baud. We use the standard 8-N-1 format, and both CCITT and Bell tones. Material is distributed in North America by ANARC on 913 345 1978 (the board recently moved to Kansas) or Pineland NJ on 609 859 1910.

In Britain you can now call the Merkinstead bulletin board in Manchester. The number is 44 61 434 7059. Look for Radio Netherlands material in the "Hilversummary Room." If you run a computer bulletin board and would like an electronic feed of this news, please get in touch. Electronic versions of this news release are

Calendar for December

- 1—Anniversary Day, Portugal; National Day, Central African Republic (5th for Thailand, 17th for Bhutan)
- 2—National Holiday, Laos, United Arab Emirates
- 5—Discovery Day, Haiti; Nicholas Eve, Netherlands
- 6—Independence Day, Finland (7th for Ivory Coast, 9th for Tanzania, 11th for Upper Volta, 12th for Kenya, 16th for Bahrain)
- 10—Human Rights Day, Equatorial New Guinea (others)
- 13—Republic Day, Malta (18th for Niger)
- 15—Statue Day, Netherlands; Bill of Rights Day, USA
- 16—Victory Day, Bangladesh (23rd for Egypt)
- 24—Heiligabend, Germany
- 25—Christmas Day in many countries
- 26—Boxing Day, Canada, Great Britain; Day After Christmas (Lendemain de Noel) (Weihnachtstag) (Dia de Aguinaldos)
- 27—Constitution Day, North Korea
- 28—King's Birthday, Nepal
- 30—Anniversary Day, Madagascar; Rizal Day, Philippines

updated.

A new series of QSL cards has been issued by Radio Netherlands to celebrate 25 years of the European Space Agency ESA. The technical centre for ESA is located in Noordwijk, on the Dutch North Sea Coast. Correct reception reports will get one of these new cards. The series is limited, available while stocks last.

Since September 5th, Radio Netherlands has been available in the United States through the C-SPAN "Flagship" audio channel. After initial experiments, the service is now being offered to cable companies across the US. If your cable company offers C-SPAN television, call your local cable operator and ask about the availability of the audio service. At present C-SPAN is picking Radio Netherlands off the air using professional equipment. . . if you can hear this service, tell us whether a studio feed by satellite would improve your listening enjoyment.



AUSTRALIA

Ken Goth VK3AJU
38A Lansdowne Road
St. Kilda, Vic. 3183
Australia

Ken reports that he received news about July 10 that he had won the VK HF Contest Championship for 1988. This is kind of a pentathlon minus one event, based on placings in their four annual HF contests.

The four contests are the John Moyle (emphasis on portable/field ops); the Novice (scores are loaded for low powered and club stations; separate sections for Novice and Full Calls), the Remembrance Day Contest (a sheer numbers game, involving VK, ZL, and P29 to commemorate ops killed in World War II); and finally the VK/ZL/O Contest.

The reward is a small cup—a replica of a larger permanent trophy which remains with the WIA with the names of winners over the years inscribed on it.

The meeting of the WIA Federal Executive in June resulted in plans for a new edition of the VK callbook, a recruitment drive, 80th anniversary celebrations, and a liaison with the federal government. Defeated was a move for a fairly substantial hike in WIA membership fees.

[Ken suffered a medical setback at the end of 1988, but is recovering well. He shed many responsibilities, but will continue as WIA Awards Manager, 73 Hambassador, and, of course, contesting.—CCC]



ISRAEL

Ron Gang 4X1MK
Kibbutz Urim
Negev M.P.O. 85530
Israel

Crusader Fortresses Operation

For 100 hours, four stations operated concurrently (some of them multi-rig at): 4Z1A from the Crusader ruins in the Ashkelon National Park; 4Z2B at the reconstructed Belvoir fortress overlooking the southern Sea of Galilee and Jordan River; 4Z3C in the ruined Crusader port and stronghold of Caesarea on the northern coast of the Mediterranean; and 4Z5Y at Yehiam in the Galilee, the site of the Judyn Crusader fort. 55,000 contacts were made by the stations, operating around the clock under exceedingly good band conditions at this sunspot cycle high.

A very handsome award is available to those contacting all four stations. All one has to do is to send a written request for the certificate along with an excerpt from your log showing the details of the QSOs with each of the four stations, and a handling charge of either 7 IRCs or \$5.00 US (do not send checks) to: Crusader Award, Israel Amateur Radio Club, POB 4099, 61040 Tel-Aviv, Israel.

QSL cards are being sent for each contact made through the QSL bureaus around the world, so every contact will be confirmed. The organizers of the event request that hams do not send QSLs and postage-accompanied requests for direct replies, since with the great volume of contacts these special requests cannot be accommodated.

Unofficial Report from Hungary

Ahron 4X1AT has just returned from a motor trip through Europe, and has interesting news. Although Israel does not have a reciprocal licensing agreement with Hungary, and to the best of our

knowledge not many countries do, he was granted permission to operate his mobile station there! He returns home with the as yet unofficial good tidings that radio hams from around the world, bringing with them a letter from their national radio society attesting to their being an amateur of good standing, along with a copy of their license, will be allowed to operate there. Ahron says that he was received most cordially at the border, and the officials did not even beat an eyelash at the sight of his whip antenna on the car and radio gear. Apparently, the same warm welcome mat is put out to radio amateurs visiting Hungary from all over the world.

I'm sorry to say that the above information is sketchy, and hopefully someone from the Hungarian Amateur Radio Federation will be able to supply 73 *International* with the complete details.

From Ahron: "Hungary is a beautiful country to visit, and during July, I worked ON6UG/HA on AMSAT OSCAR 13. Freddie was operating from a campground 45 kilometers west of Budapest, and his 2 meter, 70 and 22 centimeter antenna was a homemade ten-foot dish, putting excellent signals into the satellite. If this Eastern Bloc country will allow foreign nationals to operate such suspicious-looking gear on their territory, it would definitely point to the dawning of a new age of enlightenment with the relaxing of international tensions."

In Hungary there are two license classes—the HA prefix with full privileges on all the bands, and the HG prefix, apparently restricted to VHF and UHF operation. Ahron says that the responsibility for amateur licensing is apparently now in the hands of the newly reorganized Hungarian Amateur Radio Federation, and not the government. Anybody out there who can set the record straight?

The 1989 Annual Membership Assembly

In late May, in accordance with the IARC bylaws, the club members were assembled to express themselves and elect a new slate of officers for a year's term. As always, a major motive for the hundreds of hams from around the country to come is the social aspect—to meet face to face the physical entities from whom the voices, and the words on the packet-fed computer screens, emanate.

The place—a large auditorium in the Tel Aviv University, home of the world-renowned 4X6TU beacon on 14.100 MHz. Shlomo 4X6LM was elected to chair the meeting. He invited Yankele 4X4AH, IARC president, to the podium for his words of greeting to all, and praise of IARC achievements in the past year. Israel Biber 4X1OR, speaking on behalf of the Communications Ministry, praised the participation of the radio amateurs in the Israeli aid mission to earthquake-stricken Armenia. Israel told us that a new syllabus for the Grade "A" license exams had been approved and that a reciprocal licensing agreement had been signed between Denmark and Israel.

Awards: Jim 4X1RU was acclaimed outstanding amateur of the year for his operation of his packet BBS/Gateway station that serves as an important junction on the crossroads of Europe, Asia and Africa, with hundreds of messages being cleared through his station.

Hardy 4X6VH was named for his work as an instructor at 4X4HF, the Bet Miller Radio Club in Haifa, and his handling of the huge volume of QSL cards for the IARC QSL bureau. Avner 4X1GE was cited for his excellent series of technical articles in *HaGal*, the IARC magazine, articles which no amateur radio publication in the world would be ashamed to print.

Ralph 4X1IF's outstanding accomplishments in moonbounce were awarded, and Shoshana and Ahron, 4X6OL and 4X1AT, were granted the recognition due them for their successes in bringing scores of people to earning their amateur radio licenses.

Ahron 4X1AT, stepping down as IARC general secretary, recalled the Passover operation putting four stations on the air from Crusader forts for 100 hours, and said that work continues in getting Israel into the European Common License Group. Yossi 4X6KJ said that in the past year membership services greatly expanded. Michael 4X6PZ, who was the IARC liaison person with the Communications Ministry, reported that no more repeaters were being authorized on the 70 cm UHF band, as this slice of spectrum was indispensable to other services. Authorization of auto-patches on the repeaters still remains a problem, but on the brighter side the Grade "A" syllabus he had initiated had been



Photo A. Peter Strauss ZS6ET, IARU Liaison Officer, SARL, and 73 Ambassador.

authorized, and he had worked with the "Open University" on a course to prepare hopefuls for the Grade "B" examinations. Kuti 4X6OM, treasurer, gave the financial report, and Aharon 4X6SF reported on the year's special events. Moshe Laufman, IARC spokesman, said that Israel Television would be producing a documentary on amateur radio.

After the intermission for refreshments and general ragchewing, the meeting reconvened with the traditional open forum for IARC members to express their ideas and opinions. Then the serious business of electing a new executive, formed by 4X1IO, 4Z4's BQ, PE and ZB, 4X6's KJ, OM, PZ, SF and YA. Comptroller committee is 4X1FU, 4X4ND and 4Z4JT, and membership committee is 4X6LD, 4X6AS and 4X4ML. 4X6KJ's proposal for constitutional reform was passed to a legal committee that will present an amendment for next year's general assembly to vote on.

IARC New Executive Goes to Work

On the 9th of July the outgoing and incoming executives got together to hand over portfolios, and these are the new officers' positions: 4X6KJ, general secretary; 4X6PZ, second in charge and liaison to Communications Ministry; 4X6YA, secretary; 4Z4BQ, assistant secretary; 4X6SF and 4Z4ZB, special events; 4Z4PE, repeaters; and 4X1IO, packet and digipeater coordinator.

4X1FU—DXer of Distinction

Yitzhak Halfon 4X1FU has served and continues to serve with the IARC incoming QSL bureau, and his DX bulletins are available on the packet network. Now the news comes to us that Yitzhak has made the Five Band DXCC, and is also on the DXCC

Honor Roll. Hat's off for your persistence, that has paid off in these marks of distinction!

Rishon Hams Meet Weekly

Joining the tradition of weekly get-togethers of radio amateurs in the larger urban centers, the hams of Rishon Le'Tzion now meet Friday afternoons at a sidewalk cafe at the Rishon Mall. Recently, the mayor passed by the 17 hams sitting there, struck up a conversation, and ended up inviting them all to his home!

[How often has that happened to any of you?]

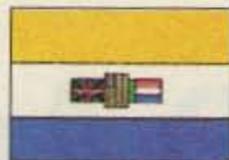
Dayton in Israel?

Israel's first real hamfest was held on the 18th of October in Natanya, a good place convenient for most amateurs. Organizers of this event were 4X6TQ, 4X1KT and 4X6KF.

[This was written in September. Hopefully it went well.—CCC]

Dataspace 1989

Representing Israeli hams at Dataspace 1989 at the University of Surrey in England from July 27 through 31 were Shlomo 4X1AS and Yair 4X4GI. Yair wrote a comprehensive article explaining the intricacies of AMSAT Phase III in the IARC publication seven years ago, and in 1984-5 gave a fortnightly series of lectures for amateurs on amateur satellites, in what was then the AMSAT-Israel chapter. Many of us who have since gone into this most exciting mode of communications will be waiting for their report of the conference.



SOUTH AFRICA

Peter Strauss ZS6ET
P.O. Box 35461
Northcliff 2115
South Africa

Peter reports through a note from SARL Headquarters that extracts of the SARL HQ bulletin will be airmailed to many publications. Local news items will be deleted. Should you require such news on magnetic media (IBM 360kB 48 TPI PC/XT) or via packet (your national licence conditions permitting), please advise the SARL IARU desk.

At present, co-ordinators for German, Portuguese, Scandinavian, French, Dutch, Spanish, Italian and Arabic languages have been or will be appointed.

The South African Radio League actively promotes the issue of temporary licences for foreign radio amateurs intending to visit the Republic of South Africa and the general liberalisation of licencing of visiting foreign radio amateurs worldwide. Since 1981 the licence authority in Pretoria issues short-term licences to applicants for a nominal fee of only Rand 12 (approx. US \$5) for a three-month period. Amateurs from countries whose administrations conclude a bilateral agreement with South Africa receive

such permit free of charge. Guest licences may be issued to applicants from any country, and have indeed been issued to visitors from many countries already.

If the administration in your country issues a guest licence only based on bilateral agreements, and no agreement as yet has been concluded with the administration in the Republic of South Africa, you are cordially invited to contact the SARL HQ to discuss preliminaries to such an agreement.

The administration of the Republic of South Africa has concluded bilateral agreements with the following list of countries: Bophuthatswana, Botswana, Chile, Ciskei, German Federal Rep. (including West Berlin), Great Britain, Israel, Portugal, South West Africa/Namibia, Swaziland, Switzerland, Transkei, Venda, United States of America, and Zimbabwe.

Foreign amateurs should, however, note that the South African licence authority will consider applications for a short-term permit from any amateur in any country holding a CEPT Class 1 or CEPT Class 2 compatible licence. Amateurs holding only a Novice grade licence may not be issued with a short-term permit, as there is no compatible licence grade available in South Africa.

New address for the SARL is: South African Radio League Headquarters, PO Box 2327, Johannesburg 2000, South Africa. Tel: (011) 484-2830. 73

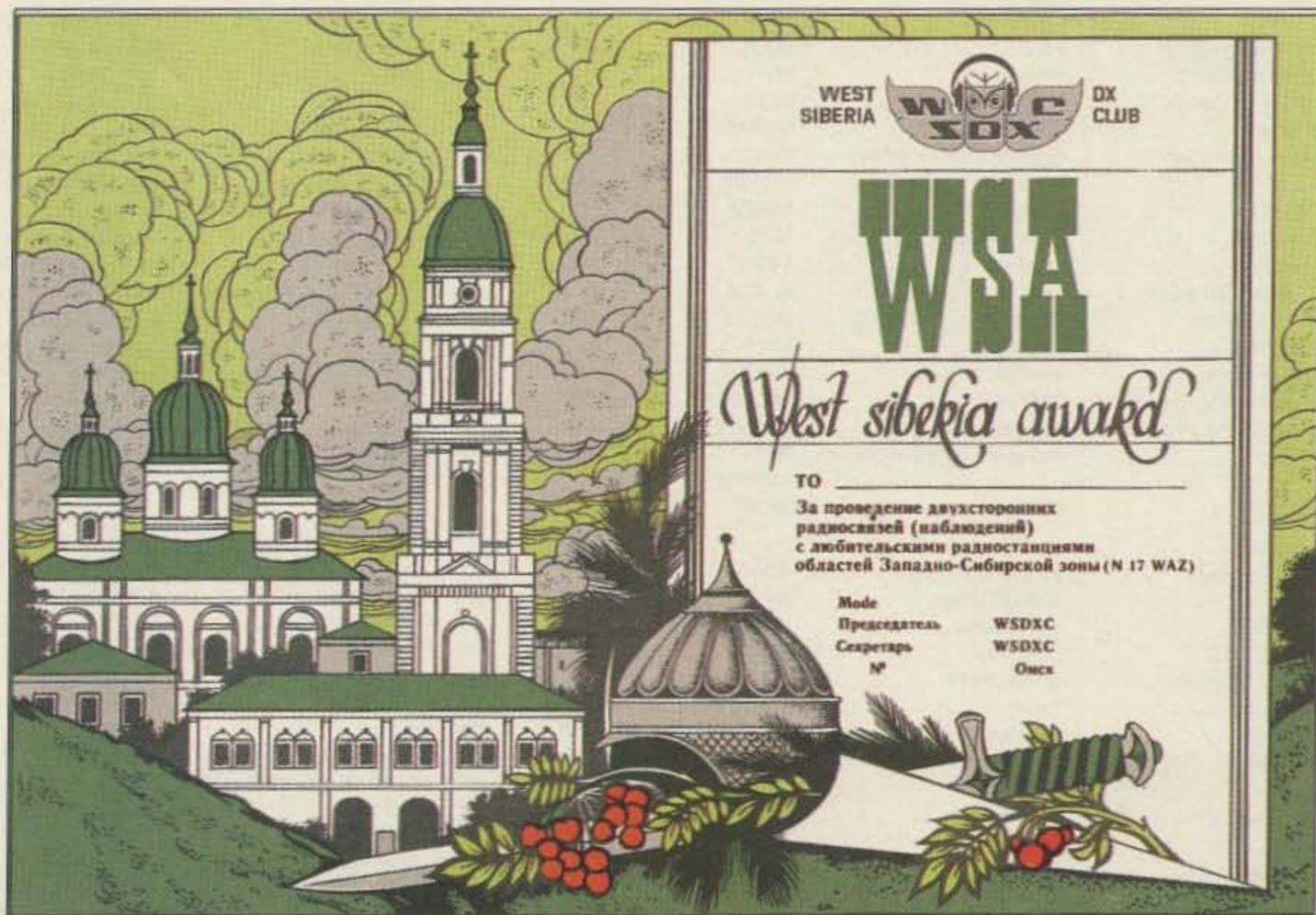


Photo B. WSA West Siberia Award from the West Siberia DX Club, sent by UA9MA.

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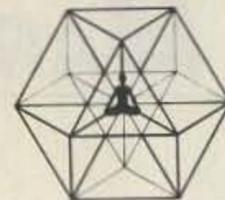
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... de K6MH



A amateur, from Latin amare, to love. One who engages in activity for the beauty of it.

Amateurity

I'm wary of the word "amateurish." It's a put-down I dislike, as if "amateur" means "immature" and where it's really at is to be "professional." The word "professional" has been given lots of moxie compared to "amateur" and I question this.

An amateur is a person who does something for the love of it, for the intrinsic value of it, the adventure, the discovery, the hope of presenting something new or useful to others. Amateurs are not motivated primarily by the desire to serve their fellow beings, but it often turns out that way. Why? Because something done for the beauty of it makes good waves.

What bothers me is all the efforts going on in the world that are not amateurish, but what we might call "professionalish." Professionalism dates back to the oldest profession (remember that one?), and pros have been with us ever since.*

Think it over. Where have the great advances come from? Amateurs. And who is busy at work destroying the planet, from the rape of the rain forests to the pollution of air, water, and soil? Professionals, people who are overemployed doing something they don't like, don't feel really good about, because they think they must.

It's been said, The world is for lovers. Is it so? Loveless, non-amateur acts are about to do us in. Maybe we should look again to the beauty of what we do, rather than to the means of

exploiting it for the almighty buck. I say we need more amateurs... and more amateurity among the professionals.

By definition, children are amateurs, amateurs who society makes every effort to professionalize. We may need more unconverted amateurs, children allowed to grow up following their curiosity, being "a light unto themselves," rather than being "whipped into shape."

The word *amateurity* has entrenched itself in my vocabulary. It's yours to use if you like. To me it means real maturity, a love of action for its own sake not only in youth but in the full-grown human who has not lost this love, this amateur spirit, or has lost it for a time, but thank God, regained it.

WW III

Hams are famous for coming through in emergencies. What we fail to realize is that we are embroiled right now in the greatest emergency mankind has ever known: wholesale extinction of species, destruction of the subtle web of support from plankton through myriads of flora and fauna all the way up to us "higher types," an interdependent design that works well only when none of the parts are missing.

World War III is already happening. It's a war worth fighting, a global war against *ignore-ance*, a war that none of us can escape.

From lesser emergencies in the past we have learned this: Without communication we are lost.

... de K6MH 

*I've heard since that the oldest profession is shamanism, but I couldn't resist the dig.

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|---|------------------|----------------------|-----------------------|
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| VFOs | 2 | 1 | 1 |
| Memory Channels Store Any Offset | 49 | 10 | 10 |
| Wide Receiver Frequency Range (MHz)—VHF | 140-173 | 138-174 | 141-163 |
| Wide Receiver Frequency Range (MHz)—UHF | 430-450 | 440-450 | 438-450 |
| Built-in CTCSS Encode/Decode | Included | Option | Encode Only |
| Memory DTMF Autodialer | 10 | None | None |
| CTCSS Paging | ✓ | Option | — |
| Programmable Battery Saver | ✓ | ✓ | ✓ |
| Backlit LCD Display | ✓ | ✓ | ✓ |
| Backlit DTMF Keypad | ✓ | — | — |
| APO, Automatic Power Off | ✓ | ✓ | — |
| 1 MHz Up/Down Stepping | ✓ | ✓ | ✓ |
| Vinyl Case | ✓ | Option | Option |
| Scan For CTCSS Tone | ✓ | — | — |
| Built In VOX | ✓ | — | — |
| Clock | — | ✓ | — |
| Odd Split, Any Tx Or Rx Frequency In Any Memory Channel | 49 | 10 | 1 |
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|--|--------------|--------------|----------------|
| Memory Channels | 42 | 20 | 20 |
| VFOs Per Band | 2 | 1 | 1 |
| Wide Receiver Frequency Range (MHz)—VHF | 130-180 | 138-174 | 140-164 |
| Wide Receiver Frequency Range (MHz)—UHF | 430-450 | 440-450 | 438-450 |
| Built-in CTCSS Encode/Decode | Included | Option | Encode Only |
| Memory DTMF Autodialer | 10 | None | None |
| Dual Receive With Balance Control | ✓ | — | ✓ |
| CTCSS Paging | ✓ | — | ✓ |
| Cross Band Full Duplex | ✓ | ✓ | ✓ |
| Programmable Battery Saver | ✓ | ✓ | ✓ |
| Backlit LCD Display | ✓ | ✓ | ✓ |
| Backlit DTMF Keypad | ✓ | — | — |
| Alternating Band Scan | ✓ | ✓ | ✓ |
| Cross Band Repeater | ✓ | — | — |
| Power Output on 2 Meter and 440 | 2.3W | 5.0W | 1.5W |
| APO, Automatic Power Off | ✓ | — | ✓ |
| 1 MHz Up/Down Stepping | ✓ | ✓ | ✓ |
| Memory Channels Store Any Offset | 42 | 20 | 20 |
| Vinyl Case | ✓ | Option | Option |
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