IARU
Paris to Geneva

HAM RADIO HORIZONS

JANUARY 1979 / $1.25

RESCUE OF A CASTAWAY

TAKE YOUR TOWER WITH YOU

BUILD THE COLLINEAR CROSS ANTENNA

A new concept from Atlas

5 band receiver $229.

Some people have called the Atlas RX-110 a stroke of genius. But it didn't take much genius to design it, just a lot of common sense.

Newcomers to amateur radio like to begin by monitoring amateur activity so they want an inexpensive receiver. Many old-timers like to have an extra receiver for their living room or bedroom so they don't have to stay in the shack or car waiting for band openings.

But with the recent popularity of the transceiver concept, the economical receiver simply disappeared. Now Atlas reintroduces a low price receiver: The RX-110 for $229.

DON'T LET THAT LOW PRICE DECEIVE YOU! It's really a high performance amateur band receiver.

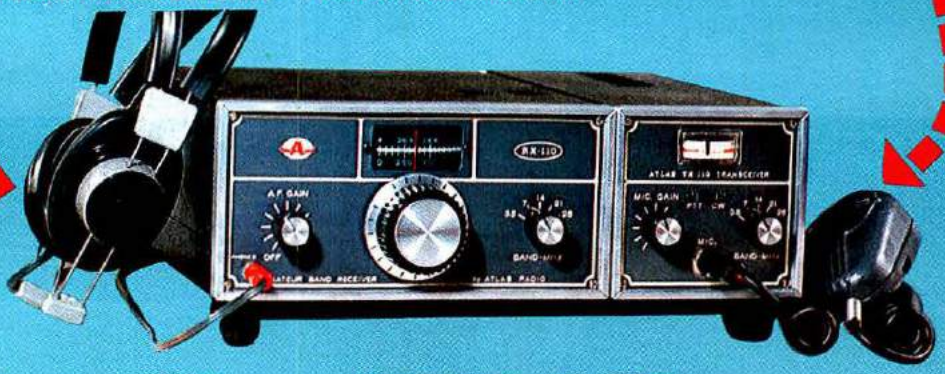
It's all solid-state and provides coverage of 80, 40, 20, and 15 meters, and 28 to 29 MHz of the 10 meter band. It's fully self-contained with its own AC supply and built-in speaker, and can operate on 12 to 14 VDC. The RX-110 is really a hot performer, with exceptionally high sensitivity, selectivity, and dynamic range.

But the RX-110 story doesn't end here. There's more!

Transmit module $159.

This is where our new concept makes even more sense (and saves you thousands of "cents"). Since many stages in a receiver are also required in a transmitter (VFO, IF Systems, Crystal Filter, Carrier Oscillator, Band-Pass Filters, and Diode Ring Mixer), we provided a connection on the back of the RX-110 so the TX-110 Transmitter Module can utilize these common stages, eliminating the cost and labor of duplicating these steps. But there is absolutely no compromise on performance with this new concept.

Simply connect the TX-110 Transmit Module to the RX-110 Receiver and you have a complete 5 band CW-SSB transceiver!



Complete 5 band CW-SSB transceiver

- Provides CW and SSB communications on 10, 15, 20, 40, and 80 meters with a choice of two power levels.
- The TX-110-L runs 15 watts input on 20, 40, and 80 meters; 10 watts input on 10 and 15 meters.
- The TX-110-H runs 200 watts input on 20, 40, and 80 meters; 150 watts on 15 and 100 watts on 10 meters.
- Semi-break-in CW with sidetone monitoring is a standard feature.
- PTT (Press-to-Talk) operation on SSB. Lower sideband on 40 and 80 meters. Upper sideband on 10, 15, and 20 meters.
- TX-110-L 15 watt module runs on AC supply in RX-110, so it is completely self-contained, including speaker. Simply connect antenna, and key or mike.
- TX-110-H requires additional AC supply to supply high current for 200 watt amplifier (Model PS-110).
- 200 watt amplifier may be added to TX-110-L at a later date, thus converting it to a TX-110-H.
- The RX-110, TX-110-L, and TX-110-H will all run directly from a 12 to 14 volt DC battery supply for mobile or portable operation. When the two units are mechanically joined (brackets supplied with TX-110), the transceiver slides into a plug-in mobile mount, Model MM-110.

SUGGESTED RESALE PRICES:

RX-110	$229.
TX-110-L	$159.
TX-110-H	$249.
PS-110	$ 89.

ATLAS RADIO

MADE IN U.S.A.

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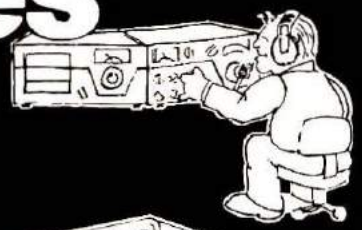
Start Your Year Off With HF Values From Longs

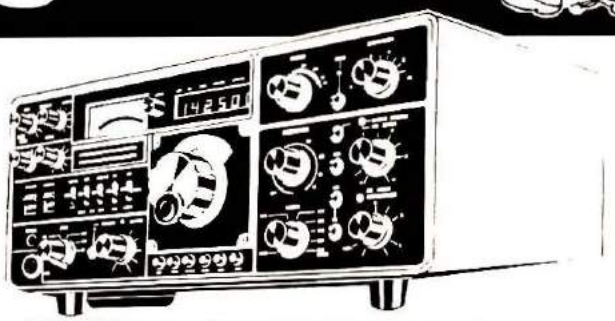


Shown with power supply.

ICOM IC-701 HF transceiver

Features: RF speech processor, 100 W continuous on all bands, all modes. USB, LSB, CW, CW-N, RTTY operation. Double balanced Schottky Diode Mixer TX/TX, dual built-in digital VFO. IC-701 PS power supply optional $215. 160 thru 10 meter coverage

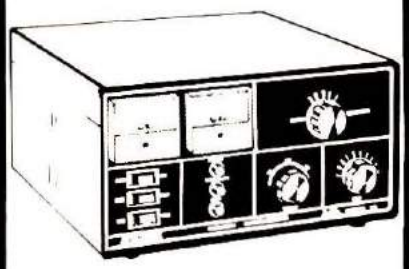
1310.00 Call for yours today.



YAESU FT-901DM HF transceiver

Reject tuning, variable IF band width tuning, audio peak frequency tuning, LED w/memory TX/RX, no external VFO required for split freq. operation, built-in Curtis keyer, 6146B final tubes, & 160 thru 10 meter coverage.

1459.00 List. Call for quote



DENTRON DTR-200L Precision linear amplifier

Features freq. 15-160 meter bands — 1.8-23.50 MHz. 2000 W PEP. A Broadcast proven 8877 tube, a continuous duty built-in power supply with a vacuum impregnated power transformer. Cooling is EIMAC spec. forced air, dual metering and more.

1099.50 List. Call for quote.

KENWOOD TS-820S transceiver

Features digital freq. readout, 160 thru 10 meter coverage, integral IF shift, RF speech processor, VOX, noise blanker, PLL, Built-in 25 KHz calibrator, CW side tone & semi-break-in, IF OUT, RTTY, & XVTR, and phone patch terminals.

1249.00 List. Call for quote

CUSHCRAFT ATV5 trapped vertical antenna

Five band operation on 80 thru 10 meters, high Q traps are optimized for wide operating bandwidth, instructions provided for adjusting resonance to preferred part of band, built-in coaxial conn., hgt 293", 2000 watts PEP on all bands The ATV-4 is for 4 band use List Price 89 95

109.95 List. Call for quote

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THIS MONTHS HORIZONS

IARU Story

The IARU. Do you know what the letters mean? Author W8FX describes the International Amateur Radio Union and the vital part it plays in helping to preserve ham radio on the international scene. It's even more important now as delegates prepare for the 1979 World Administrative Radio Conference.

Adventure in Central America

Amateur station TI9AEL was active from Coco's Island in April, 1977. Interesting reading for those who are city-bound and wonder what goes on during a DXpedition to a rare location. The story is by the chief (and only) operator, TI9AEL.

Trailer-Made Ham Stations

Building restrictions got you down? Neighbors muttering uncomplimentary things about you? Don't give up — there are lots of wide open spaces out there, and it's not all that difficult to take your station and go. N6NB tells how he and some friends get away from the crowding, noise, and neighborhood hassles that drive so many hams off the air.

A Collinear Cross Antenna

You can use the old reliable antennas for years — the dipoles, slopers, vees, — but sooner or later you'll start thinking "what would happen if..." Now, you're an experimenter in a field that is endless. It happened to author Gray years ago, and he's still at it. Fortunately, he kept some notes and is willing to share them with you; no hard-and-fast rules, just observations, reasoning, and a bit of digging into the antenna books.

Low Two-Meter Record

Hilltopping, shivering operators, numb fingers, and windswept rocks are familiar surroundings to many vhf enthusiasts when they want to try for great distances with their signals. Sooner or later, someone had to think of going to the opposite extreme, and WB6NOA did just that. The location was opposite in both elevation and temperature, and what is more, several hams worked the expedition to earn the NOA's Ark award.

The Story of a Shipwrecked Sailor

What would you do if you were washed ashore on a tropical island during a storm? If you found yourself injured, far from home, with only the bare essentials of survival? An exciting tale of adventure during a holiday begins on page 24. It's by Courtney Hall, a long-time contributor to Amateur Radio publications.

They Never Come Back

The biggest antenna, the best rigs, the most power, and a receiver that can hear the weakest and most rare station as though he were next door — sounds like the DX hunter's dream of paradise, doesn't it? As with most deals that are too good to be true, there's a catch in it somewhere. It's enough to make you weep — or revise your operating techniques.

The Cover

Paris, site of the first International Telegraph Union (ITU) meeting in 1865, and later, the first International Amateur Radio Union (IARU), in 1924, is recognized the world over as the home of the Eiffel Tower. Erected for the Paris Exposition of 1889, this 305-meter high tower was the site of many early radio experiments in France. In 1898 Ductretet transmitted wireless signals that were received near the Pantheon, 4 kilometers away. Today the Eiffel Tower supports antennas for radio and television broadcasting as well as microwave communications links. Photograph by Harold M. Lambert Studios, Inc., of Philadelphia, Pennsylvania.

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Postmaster send form 3579 to Box 711, Whitinsville, Massachusetts 01588.

NEW! MFJ INTRODUCES THE GRANDMASTER MEMORY KEYERS

At $139.95 this MFJ-484 GRANDMASTER

memory keyer gives you more features per dollar than any other memory keyer available — and Here's Why . . .

WEIGHT CONTROL TO PENETRATE QRM. **PULL** TO COMBINE MEMORIES A AND B FOR 1, 2, OR 3 FIFTY CHARACTER MESSAGES.

MESSAGE BUTTONS SELECT DESIRED 25 CHARACTER MESSAGES.

RESETS MEMORY IN USE TO BEGINNING.

SPEED CONTROL, 8 TO 50 WPM. **PULL** TO RECORD.

MEMORY SELECT: POSITIONS 1, 2, 3 ARE EACH SPLIT INTO MEMORY SECTIONS A, B, C, D (UP TO TWELVE 25 CHARACTER MESSAGES). SWITCH COMBINES A AND B. **POSITION K** GIVES YOU 100, 75, 50, OR 25 CHARACTERS BY PRESSING BUTTONS A, B, C, OR D.

LEDs (4) SHOW WHICH MEMORY IS IN USE AND WHEN IT ENDS.

TONE CONTROL. PULL TO TUNE.

VOLUME CONTROL. POWER ON-OFF.

DELAY REPEAT CONTROL (0 TO 2 MINUTES). **PULL** FOR AUTO REPEAT.

LED INDICATES DELAY REPEAT MODE.

NOW YOU CAN CALL CQ, SEND YOUR QTH, NAME, ETC., ALL AUTOMATICALLY.

And only MFJ offers you the MFJ-484 Grandmaster memory keyer with this much flexability at this price.

Up to twelve 25 character messages plus a 100, 75, 50, or 25 character message (4096 bits total).

A switch combines 25 character messages for up to three 50 character messages.

To record, pull out the speed control, touch a message button and send. **To playback,** push in the speed control, select your message and touch the button. That's all there is to it!

You can repeat any message continuously and even leave a pause between repeats (up to 2 minutes). **Example:** Call CQ. Pause. Listen. If no answer, it repeats CQ again. To answer simply start sending. LED indicates Delay Repeat Mode.

Instantly insert or make changes in any playing message by simply sending. Continue by touching another button.

Memory resets to beginning with button, or by tapping paddle when playing. Touching message button restarts message.

LEDs show which 25 character memory is in use and when it ends.

Built-in memory saver. Uses 9 volt battery, no drain when power is on. Saves messages in memory when power loss occurs or when transporting keyer. Ultra compact, 8x2x6 inches.

PLUS A MFJ DELUXE FULL FEATURE KEYER.

Iambic operation with squeeze key. Dot-dash insertion.

Dot-dash memories, self-completing dots and dashes, jamproof spacing, instant start (except when recording).

All controls are on front panel: speed, weight, tone, volume. Smooth linear speed control. 8 to 50 WPM.

Weight control lets you adjust dot-dash-space ratio; makes your signal distinctive to penetrate QRM.

Tone control. Room filling volume. Built-in speaker.

Tune function keys transmitter for tuning.

Ultra reliable solid state keying: grid block, cathode, solid state transmitters (−300 V, 10 ma. max., +300 V, 100 ma. max.). CMOS ICs, MOS memories. Use 110 VAC or 12 to 15 VDC. Automatically switches to external batteries when AC power is lost.

OPTIONAL SQUEEZE KEY for all memory keyers. Dot and dash paddles have fully adjustable tension and spacing for the exact "feel" you like. Heavy base with non-slip rubber feet eliminates "walking". $29.95 plus $2.00 for shipping and handling.

THIS MFJ-482 FEATURES FOUR 25 OR A 50 AND TWO 25 CHARACTER MESSAGES.

- **Speed, volume, weight, tone controls**
- **Combine memory switch**
- **Repeat, tune functions**
- **Built-in memory saver**

$99.95

Similar to MFJ-484 but with 1024 bits of memory, less delay repeat, single memory operating LED. Weight and tone controls adjustable from rear panel. 6x2x6 inches. 110 VAC or 12 to 15 VDC.

THIS MFJ-481 GIVES YOU TWO 50 CHARACTER MESSAGES.

- **Repeat function**
- **Tune function**
- **Built-in memory saver**

$79.95

Similar to MFJ-482 but with two 50 character messages, less weight controls. Internal tone control. Volume control is adjustable from rear panel. 5x2x6 inches. 110 VAC or 12 to 15 VDC.

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More details? Ad Check page 86.

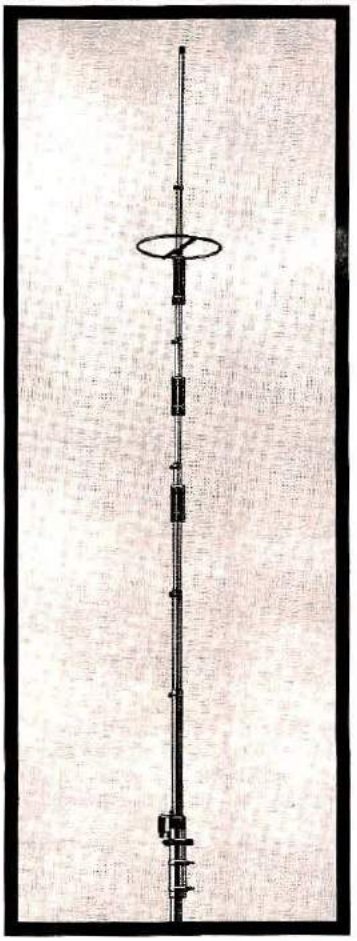
NEW HF VERTICALS BY CUSHCRAFT

Cushcraft's new multiband vertical antenna systems have been optimized for wide operating bandwidth and provide the low angle of radiation which is essential for long-haul DX communications on the high-frequency amateur bands. The high Q traps which were designed especially for these verticals use large diameter enamelled copper wire and solid-aluminum air-dielectric capacitors; the trap forms are manufactured from filament-wound fiberglass for minimum dielectric loss and high structural strength. High strength 6063-T832 aluminum tubing with 0.058" (1.5 mm) walls is used for the vertical radiator. The massive 2 inch (50 mm) OD double-walled base section and heavy-duty phenolic base insulator ensure long life and durability. For maximum performance with limited space, choose a Cushcraft multiband vertical; all models may be roof or ground mounted on a 1¼" - 1⅞" (32 - 48 mm) mast.

10-15-20 METERS

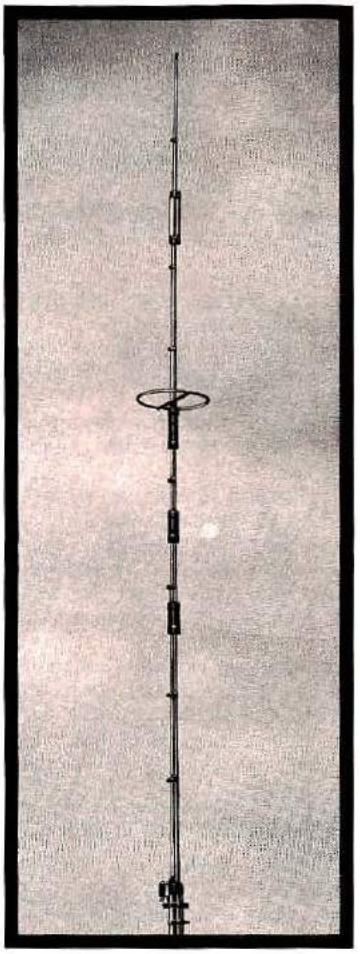
ATV-3 Cushcraft's ATV-3 multiband vertical provides low VSWR operation for both SSB and CW on 10, 15, and 20 meters. Matched to 50 ohms; built-in connector mates with standard PL-259. Stainless-steel hardware is used for all electrical connections. The ATV-3 is a compact 166 inches (4.2 meters) tall. Rated at 2000 watts PEP.

10-15-20-40 METERS

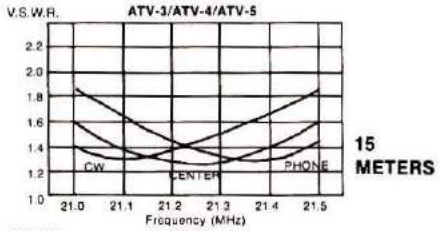


ATV-4 The Cushcraft ATV-4 four-band vertical antenna has been optimized for wide operating bandwidth on 10, 15, 20, and 40 meters. SWR is less than 2:1 over the CW and SSB segments of 10, 15, and 20. The 2:1 SWR bandwidth on 40 meters is approximately 240 kHz; may be quickly and easily adjusted to favor any part of the band. Coaxial fitting takes 50-ohm transmission line with PL-259 connector. Overall height, 233 inches (5.9 meters). Rated at 2000 watts PEP.

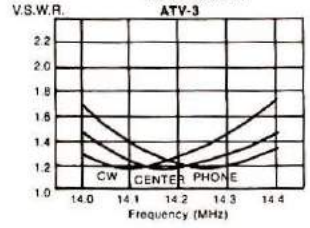
10-15-20-40-80 METERS



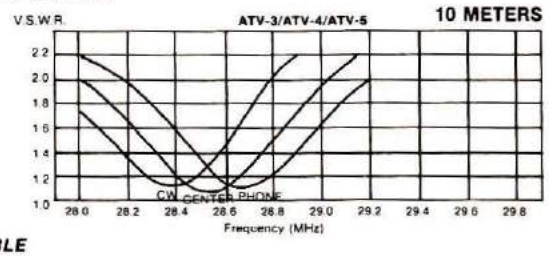
ATV-5 The ATV-5 trapped vertical antenna system has been engineered for five-band operation on 80 through 10 meters. The high Q traps are carefully optimized for wide operating bandwidth: 2:1 SWR bandwidth with 50-ohm feedline is 1 MHz on 10 meters; more than 500 kHz on 15 and 20 meters; 160 kHz on 40 meters; and 75 kHz on 80 meters. Instructions are provided for adjusting resonance to your preferred part of the band. CW or SSB. Built-in coaxial connector takes PL-259. Nominal height, 293 inches (7.4 meters). Rated at 2000 watts PEP on **all** bands.



15 METERS



20 METERS



10 METERS

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More details? Ad Check page 86.

January, 1979
Volume 3, Number 1

HAM RADIO HORIZONS

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CONTENTS

During the past year Amateur Radio has undergone more rapid change than at almost any time in its long history. Our staff here at *Horizons* must often move quickly to stay on top of everything that is going on out there. A perfect case in point is the K4SDS article, which we ran last month. Further research has shown that many of the purchasing ideas which worked so well just a few years ago don't necessarily apply today.

Your choice of gear used to be easy. How much could you afford to spend? With that guideline you would proceed to purchase the best rig available in your price range. However, it's not that easy anymore because you are now offered the widest range of equipment ever marketed to Amateurs.

Although ads, catalogs, and magazine articles can be a lot of help, there is simply no substitute for the good reliable help that can be obtained from working with a dealer. There is no other place you are going to find the unbiased assistance you need as you evaluate such purchasing decisions as extended frequency coverage, hybrid vs all solid state, and digital or analog displays.

Your Amateur friends may have interesting comments, but those ideas will be based on their own needs and preferences. They don't have personal experience with all of the major equipment lines — most dealers will. And you must remember that this help in selecting new gear is not cheap; typical hourly costs today, including overhead, run $15 to $22.

Service for new gear is also a much different matter than it used to be. Your 1979 radio will be far more complex and sophisticated. You are apt to run into a number of interesting problems with it that will be quickly solved if you have a friendly dealer at your side; these same problems could become quite frustrating if you had to go back to the factory for satisfaction, particularly if you had merely misunderstood the installation instructions.

Former ideas about new equipment not needing much service in the beginning apply less and less these days. It is a nature of solid-state designs that most problems occur fairly quickly. After you get past the first few months of operation most of today's radios will virtually run forever. But those critical first few weeks can produce a number of unexpected glitches as circuitry burns in. It's comforting to know that you have an experienced cooperative dealer at your side to help you over these rough spots.

I'm afraid that some of the potential discount savings were grossly overstated last month by K4SDS. Dealers have traditionally been given rather narrow trade discounts by the Amateur manufacturers; in the last few years these margins have been tightened up still further. Several major lines of gear are offered to dealers with trade discounts of only 20 per cent or less. And this discount not only covers the dealer's profit, but must also pay all his overhead costs.

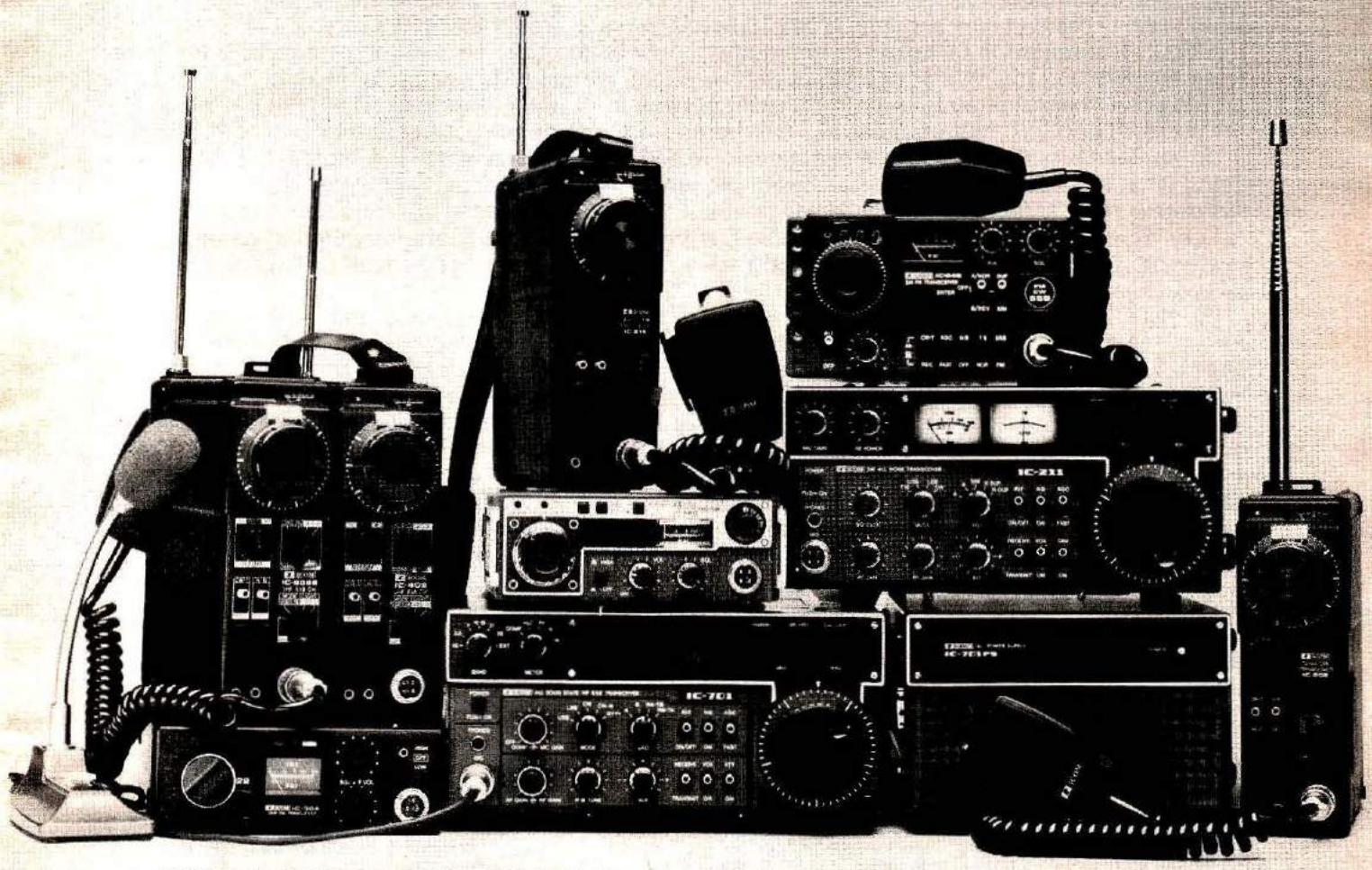
There are several other important facts which should also be considered. Much of the most popular equipment is in limited supply. A dealer only has so many to sell and thus would be foolish to offer heavy discounts on them. He has the responsibility to keep his business in healthy financial shape so that he'll be there when you need help further down the line. This is much more important in a highly specialized field like Amateur Radio than it is with widely sold general consumer products such as TV sets, cameras, or automobiles. In these cases there are usually several other local outlets more than ready to step in and take over.

Amateur Radio is a unique market. Our numbers are relatively insignificant by modern standards, yet we demand highly complex, reliable products which must be made in very small quantities. Even with the problems of low volume manufacturing and highly engineered designs the list price of most models is far below the cost of the components if you were to try to build that same equipment on your own.

You might not have to pay full list for your next piece of gear, but if you do find yourself getting a break, it will be much smaller than it may have been in the past. Your dealer simply doesn't have that much margin to work with.

Skip Tenney, W1NLB
Publisher

ICOM stacks it all in your favor.



All ICOM radios significantly exceed FCC specifications limiting spurious emissions.

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As the editor I would like to think that our articles have more effect on you, the reader, than anything else; if not the most immediate effect, certainly the longest lasting. To be completely realistic, however, the one department which has the greatest impact on readers is circulation. If your issue is mangled by the Postal Service, or is late in arriving, or doesn't come at all, little time is wasted in letting our Circulation Manager know about it! I would hope that our response is just as immediate.

In the magazine business the word "fulfillment" is used to describe the internal business procedures which ensure that you get your mailed copy each and every month of your paid subscription. All magazines use a computer for this task, and we're no different. In the past all subscription orders were keypunched here in Greenville, and the punched cards were sent on to a computer house in Boston which filed the information on magnetic tape in zip code order. That two-step procedure has generally worked well, but thanks to you, our readers, the circulation of *Horizons* has quite simply begun to outgrow the system. To both reduce errors and improve service to our subscribers, we recently contracted with a professional magazine circulation fulfillment service to do the entire task. That means that the subscription information must be transferred from one computer to another.

If this were a perfect world the changeover would go without a hitch, but Murphy's Law being what it is, there almost certainly will be some mistakes and garbled digits. We have instituted every safeguard we have available, but when you are faced with the humongous task of transferring more than 45,000 names, addresses, and subscription expiration dates, a few errors are inevitable. As the old saying goes, "Computers are not perfect — they're only as smart as the data given to them!"

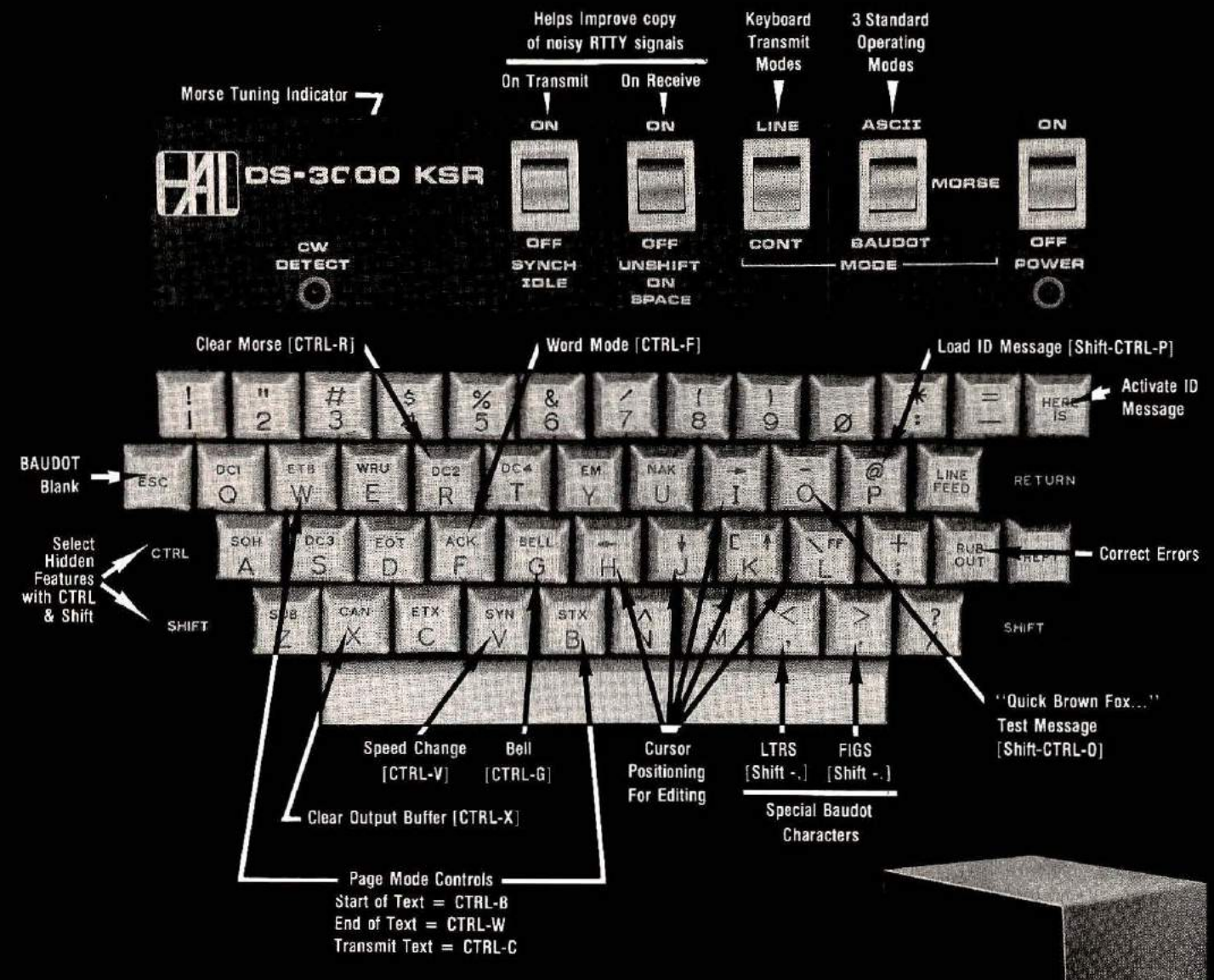
We have been laying the groundwork for this changeover for several months, so we don't foresee any *major* problems. However, if your address label is garbled in the data transfer, please write to Ham Radio Horizons, Subscription Fulfillment Service, Post Office Box 711, Whitinsville, Massachusetts 01588. A correction will be made just as quickly as possible.

Although all subscription renewals, changes of address, and the like are to be mailed directly to our fulfillment service in Whitinsville, all correspondence to our editors or advertising department must be sent to our offices in Greenville. In the past, when readers have written to us about a subscription matter, they have often taken that opportunity to pose a question to our staff, or to comment on one of our previous articles. Such comments and questions are immensely useful as we plan future material for the magazine, but in the future such questions and comments should be separated from subscription matter and mailed directly to Greenville. Otherwise our staff won't have the benefit of your suggestions.

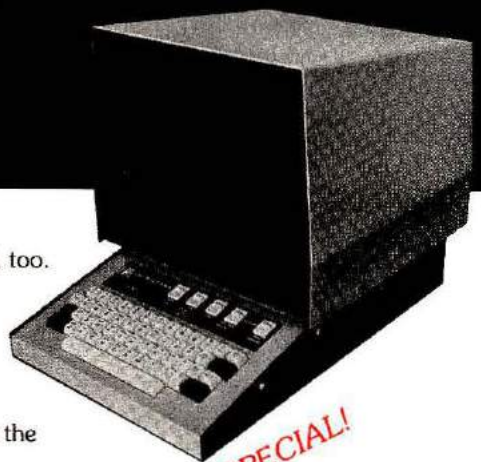
If you have an occasion to write to our fulfillment service in Whitinsville with a correction, please be patient (for fastest service, be sure to include the mailing label). Just remember that the computer does its work several weeks before the magazine goes into the mail, so there is considerable lead time involved (up to six weeks). This presents a problem for us, too, because we won't know a mistake has been made until you tell us about it, and we won't be certain the problem has been corrected until the computer prints the address labels for the next issue. However, with patience and understanding from you, our readers, the task will go much more smoothly. Thank you for your help.

Jim Fisk, W1HR
editor-in-chief

Super Terminals with
Hidden Features



For super operator convenience,
Our keyboard works in MORSE, BAUDOT, and ASCII codes *and* controls the terminal, too. You can edit a message, program the HERE IS message, send the "QUICK BROWN FOX . . . " test message, change speeds, and change the terminal modes, all from the keyboard itself. In fact, the KOS (Keyboard Operated Switch) feature even turns the transmitter on and off from the keyboard, The DS-3000 KSR also features full-length 72 character lines (16 lines per screen), 5 speeds of BAUDOT and ASCII RTTY and Morse code from 1 to 175 wpm (Version 3), and word wrap-around to prevent splitting of words at the end of a line. When combined with the HAL ST-6000 Demodulator, you have the ULTIMATE in RTTY equipment.



DS-3000 KSR Version 3 (MORSE, BAUDOT, ASCII) ..... ~~$1575.00~~
DS-3000 KSR Version 2 (BAUDOT & ASCII only) $1195.00

YEAR END SPECIAL!
DS-3000 V3
$1425

Write for our latest catalog & RTTY guide.

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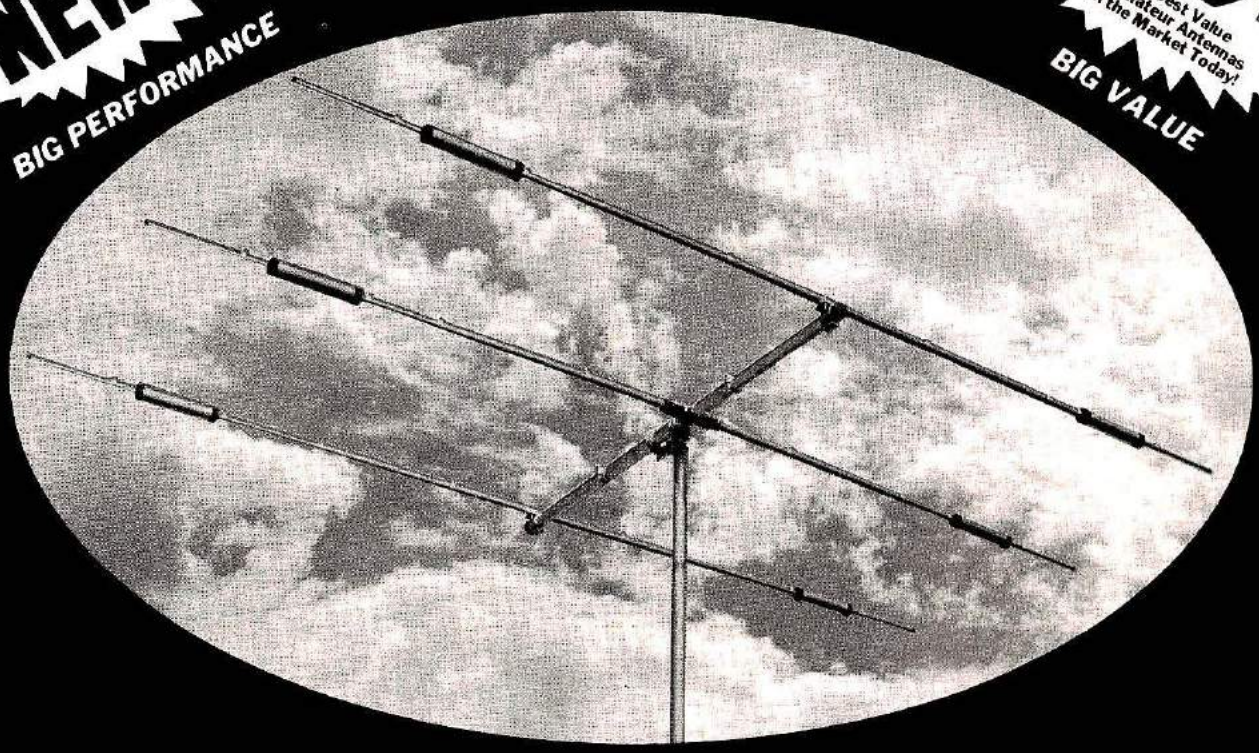

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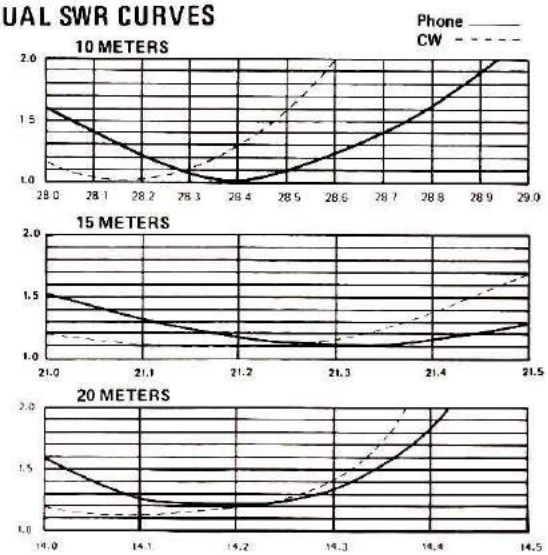

SPECIFICATIONS

Band MHz	14-21-28
Maximum power input	Legal limit
Gain (dbd)	8 db
VSWR at resonance	1.3:1
Impedance	50 ohms
F/B ratio	20 db
Boom (O.D. x length)	2" x 14'4"
No. elements	3
Longest element	27'4"
Turning radius	15'9"
Maximum mast diameter	2" O.D.
Surface area	5.7 sq. ft.
Wind loading at 80 mph	114 lbs.
Assembled weight (approx.)	37 lbs.
Shipping weight (approx.)	42 lbs.
Direct 52 ohm feed or balun maximum wind survival	100 mph

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NEWSLINE

"SAVE WHEN YOU BUY," an article in the December Ham Radio Horizons, is causing understandable unhappiness in the already financially troubled Amateur Radio retail industry. In recent months cutthroat price cutting has become a way of life in the Amateur market, with the result that some dealers — particularly those who offer a good deal of service along with their sales efforts — are struggling to keep even.

In The Article, author K4SDS states several times that he saved 22.5% on the purchase of a major piece of equipment by soliciting bids, but dealers and manufacturers with whom the article was discussed all said that Amateurs who expect to do that well are almost certainly doomed to disappointment. Markups in the Amateur market have always been low, typically 20-25%, with a few specialized items carrying even lower profit margins. Subtract from that dealers' shipping costs, manufacturer to the dealer and dealer to buyer, and the dealer is a sure loser if he discounts as heavily as K4SDS suggests.

"Broadcast" Requests for bids, the method the author advocates to achieve such bargain prices, were also condemned by many of the article's critics. Responding to such requests, particularly when they are for a package purchase or involve a trade-in, is a time-consuming task. Some of the dealers contacted have found their success rate with "mass-produced" requests to bid is so low that it costs them more to respond than they can make on any eventual sale. As a result, such requests often end up going into the "circular file."

Other Complainants Cited the author's downgrading of service, which many dealers do provide on the premises. When a new radio must go back to the factory, many dealers will replace it with a loaner so the frustrated buyer will be able to stay on the air until his new pride and joy returns. Local distributors also provide an opportunity to examine new gear and get professional advice on it and equipment-related problems, they say — and that is a valuable service not often provided by the lowest bidder.

Though It Always Makes Sense to drive a hard bargain, price is not the only consideration. Overlooking that fundamental point could drive some well-established dealers from the Amateur market in months ahead, and then Amateur Radio as a whole would lose.

RUSSIA'S "RS" SATELLITES ARE UP and operating after a successful launch Thursday, October 26. According to a TASS news release, three satellites, two Amateur (dubbed "Radio-1" and "Radio-2") and one in the COSMOS scientific series (COSMOS-1045), were put into orbit at the same time.

The Orbit Of The RS Satellites is considerably higher than that of any of the OSCARs, about 1050 miles. This should increase range by 300-400 miles, and passes should be three or four minutes longer than those of OSCAR 7. According to an RS-relayed announcement monitored in Europe on 29.380 MHz, the uplink is 145.88-145.92 MHz with a 29.36-29.40 MHz output.

RS's Period Is Slightly over 120 minutes and its equatorial inclination about 83°, resulting in an orbit-to-orbit increment of just over 30°. Orbits are opposite in direction to those of the OSCAR spacecraft, descending on evening passes and ascending in the morning for U.S. listeners.

Both The "RS" And "RS RS" ID are from Radio-1, the "RS RS" meaning the transponder is operating. The new birds are designed for only 3 watts ERP uplink (Russian "Technicians" are limited to 5 watts), while 8 watts or more will overload and cut it off. Once shut down it must be reactivated from the ground. RS-1 is an open, unsealed package, while RS-2 is hermetically sealed. Both have rechargeable batteries and solar panels. Saturdays and Sundays (UT) will be the only days open for general use, with Wednesdays "educational days" and the rest of the week for scientific work.

Daily RS News Bulletins, first in Russian (phone and CW) and then in English (CW only), are being sent on 7040 kHz at 0900Z by satellite command station RS3A.

AUTOPATCHES WEREN'T BANNED by the FCC in its action on interconnects last October despite a rumor to that effect circulating on both coasts. What the Commission did was to reaffirm the requirement that a control operator be on duty any time a repeater is used for autopatch, incoming or outgoing. "Automatic control" of a repeater is not permitted during autopatch operation.

A Repeater During autopatch is not a repeater, the Commission also decided, as it is not then operating as a repeater but as a conventional Amateur station making a phone patch. As a result, the rules governing regular Amateur station operation, not the repeater rules, apply during autopatches.

353,362 U.S. AMATEUR LICENSES were in force at the end of September, up from 324,148 a year earlier. Extras increased from 17,712 to 21,792, Advanced from 75,979 to 82,454, General from 111,686 to 117,805, Technician from 64,068 to 68,281, and Novice from 55,703 to 62,930 during the same period.

NO HARMFUL NONTHERMAL EFFECTS were found to result from low-level microwave radiation by researchers reporting their results to the recent Symposium on Electromagnetic Fields in Biological Systems in Ottawa, Canada. More than a third of the 60 papers presented were on the effects of microwave radiation on various physiological systems, and not one of them reported finding any adverse effects other than heating from low-level radiation.

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Gate Time 1 second - 1/10 second
Sensitivity 25MV 150 & 250MHZ 75MV 550MHZ
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3600A	50Hz - 600MHz	Oven .5 PPM 17° - 37°C	10MV	10MV	50MV	8	.5 Inch	115VAC or 8.2 - 14.5VDC	2⅛"H x 8"W x 5"D
3550W	50Hz - 550MHz	1 PPM 65° - 85°F	25MV	25MV	75MV	8	.5 Inch	115VAC or 8.2 - 14.5VDC	2⅛"H x 8"W x 5"D

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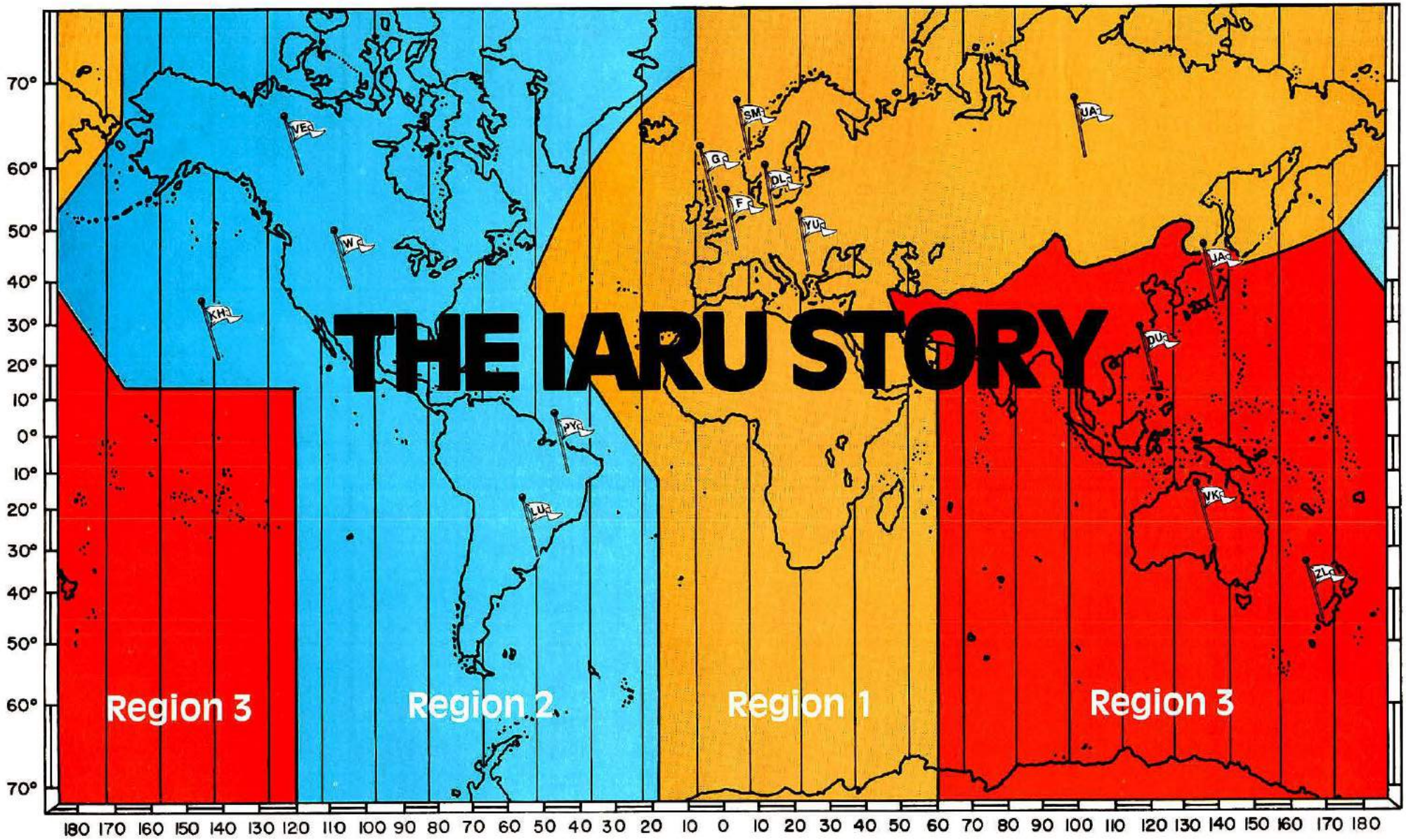

THE IARU STORY
Region 3
Region 2
Region 1
Region 3
70°
60°
50°
40°
30°
20°
10°
0°
10°
20°
30°
40°
50°
60°
70°
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180

BY KARL T. THURBER, JR., W8FX

The International Amateur Radio Union has been with us since 1925, but relatively few amateurs even know what the initials stand for. Yet, it's a very important organization because it effectively represents, or "lobbies for," ham radio worldwide. It is also destined to play a key role in the preparations for the upcoming 1979 World Administrative Radio Conference, or WARC, to be held in Geneva, Switzerland.

The IARU is an international "organization of organizations." Its members are the roughly 100 major national amateur radio societies of the world, who in turn represent virtually all the world's amateur population of about a million operators. It was formed 54 years ago in Paris by the late Hiram Percy Maxim and other far-sighted amateur-radio pioneers to better coordinate on a global basis this "new-fangled" service.

Let's take a look at the IARU — first, in its formative years, and second, as it is today. Then let's talk about the big challenges which face the IARU (and all of us, as amateurs) and what it is doing to prepare for the all-important 1979 WARC.

The early years

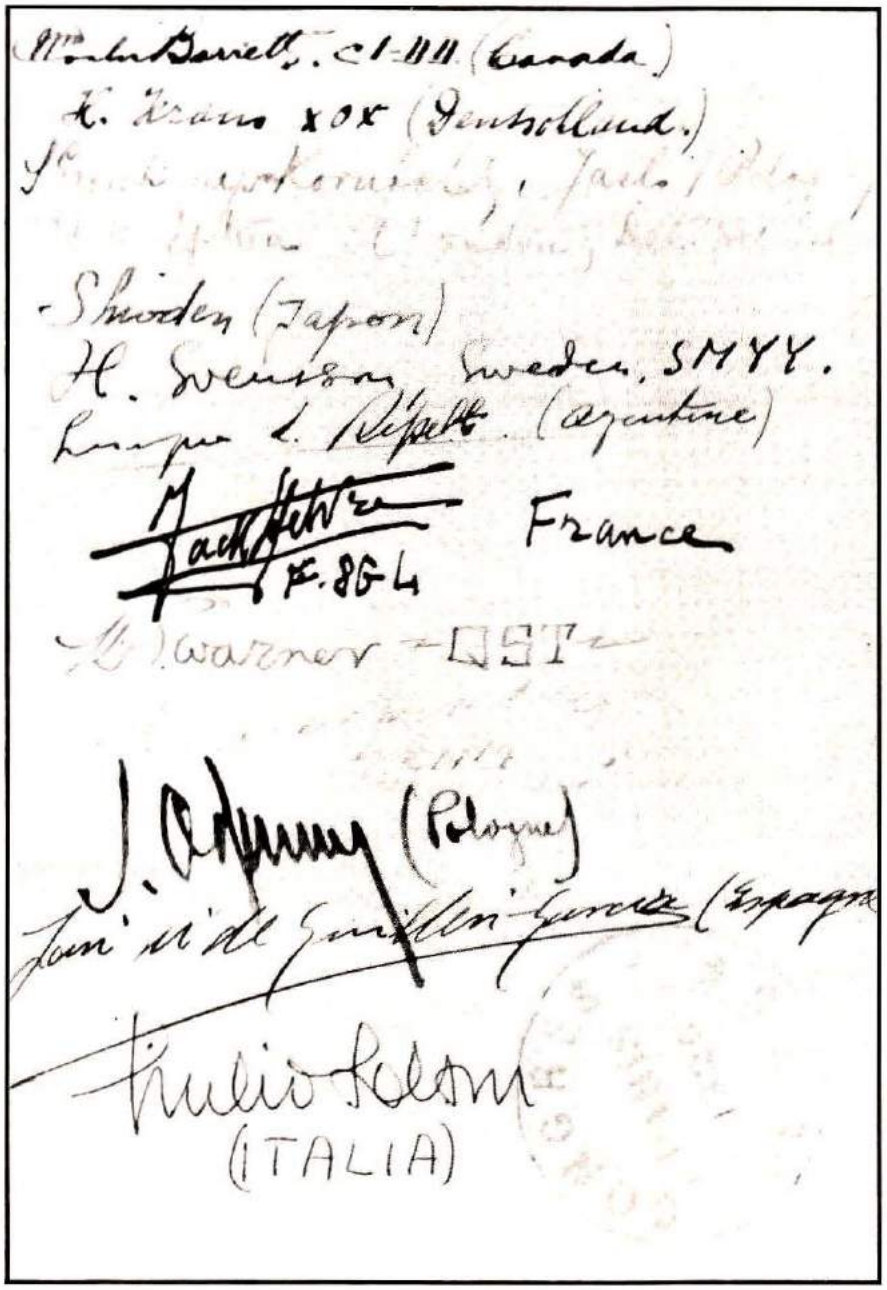
The spanning of the Atlantic by amateur-radio signals in the early twenties had become routine DX by 1924. Many far-sighted amateurs saw the real need for some kind of international organization to defend the interests of amateurs on a worldwide basis and to coordinate the efforts of the major radio associations, such as the Radio Society of Great Britain and the American Radio Relay League. Then too, pressure from government and commercial interests to ban amateur radio was increasing at an alarming rate.

Recognizing these trends, Hiram Percy Maxim, W1AW, an American inventor and founder of the ARRL, traveled to Paris in 1924 to represent American wireless buffs among prominent amateurs of nine different countries, informally assembled at the Hotel Lutetia. He found that in the aftermath of World War I, ham radio was not nearly as well developed in Europe as in the United States, but the other amateurs present at the meeting (from France, Belgium, Switzerland, Italy, Spain, Luxembourg, Canada, and Great Britain) all saw the same need for an international forum to promote their interests in the "short waves," protect their privileges, and channel their activities. At the March 12, 1924, meeting they quickly and enthusiastically decided on the name for the organization which we know today, but they decided to delay its activation in order to convene an international "amateur congress" in Paris during Easter of 1925.

A provisional committee deliberated, and constitution drafts were circulated during the ensuing year. The First International Amateur Congress convened a year later, in April 1925 (hosted by the French), with some 250 delegates representing 25 national radio societies present. Among the prominent hams in attendance were Hiram Maxim, 1AW, Kenneth Warner, 1BHW of the ARRL), Leon Deloy, 8AB, and Fred Schnell, 1MO. (The two latter individuals had made the first two-way contact between the United States and Europe in November 1923.) According to British records, the Russians were there, but their delegate was not "authorized" to vote on any of the questions before the Congress. (It wasn't until 1963 that the Radio Sport Federation of the U.S.S.R. was admitted to IARU membership.)

The Congress got down to business on the afternoon of April 14, 1925. It dug into both the legal and the technical problems facing amateur radio, and it worked on such matters as recommending wavelengths for amateur use, standardizing communications abbreviations, setting up procedures for conducting international two-way amateur tests, and setting up call-letter identifiers so that the country of origin of a station could easily be determined. The conference ended up recommending a pattern of long-distance (DX) "normal wavebands" between 85 and 120 meters for Canada, the United States, and Europe, and another pattern of "extra-

The Delegates to the Paris Conference in 1925 signify their unity of purpose by posing arm-in-arm. Maxim, 1AW, is sixth from the right. Identification of some of the other delegates (see page 17) is not readily available, but certainly many old-time Amateurs will recognize them (*photo courtesy IARU*).



Here are the signatures of some of the Amateurs who met in Paris in the Spring of 1925 to formally organize the IARU (*photo courtesy IARU*).

short wavebands" between 35 and 43 meters. They suggested that hams use wavelengths other than these for routine local work to minimize interference with long-haul DX communications.

Some delegates at the Congress recommended *Esperanto* as the international communications language, though English won out. The Congress also recommended that callsigns conform to an international standard or pattern, so that each country's callsigns would begin with a certain known number (such as 8 for France). This system was adopted by most European countries and was used for some years until there were so many licensed stations that it was necessary to assign additional numerals and, later, letter prefixes (such as W, K, or N).

By far, however, the most important thing the Congress did was to give birth to the IARU. Its constitution was approved by the delegates on the evening of April 17, 1925, the date which is usually considered the "birthdate" of the IARU. The new organization's main purpose was to be the coordination and fostering of international amateur communications. Its first officers to be selected were Hiram P. Maxim (u1AW), president; Gerald Marcuse (g2NM), vice-president; Jean G. Mezger (f8GO) and Frank Bell (z4AA), councilors-at-large; and Kenneth B. Warner (u1BHW), secretary-treasurer.*

Emphasis was initially on *individuals* as members; the IARU's constitution provided that membership should be open to anyone seriously interested in amateur-radio communications. But the constitution also provided that in countries in which there were 25 or more members, a "National Section" could be formed, with its own officers. By 1928, enough sections had been formed so that the IARU could reorganize into the federation of national associations that the founders had originally envisioned. These sections later evolved into the member *societies* that make up the backbone of the IARU as we know it today.

There were no provisions for financing the organization, so the delegates agreed to have one of the stronger societies act as the international headquarters, which would include conducting the Union's routine affairs and providing the top officers and staff. The ARRL was chosen as the headquarters society, with

*The call-sign prefixes are those in use at the time of the 1925 meeting. The sorting out of country designators and the recommendations for changes was one of the early actions of the ITU. Later, the United States prefix u became W; g and f became official and were printed in upper case on cards and correspondence; and z became ZL.

The IARU Scrapbook

Mr. Marcuse of Great Britain

Kraus, of Germany

Jimmy Morris, 4IO

Mezger, Madame Marcuse, Warner

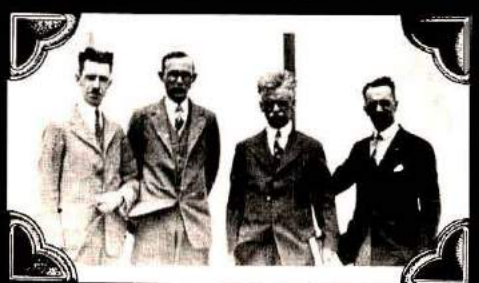
Lacomb, from Brazil

English delegation in a huddle

Warner and HAM sandwich!

Warner, Marcuse, and Madame in a planning session

Col. Borrett



Warner, Gordon Hight (4BQ), Madame, Borrett on the way home

The author and *Ham Radio Horizons* extend sincere appreciation to Mr. W. C. Borrett, ex-c1DD, for the use of these photographs and for help in identifying the people in them. *Editor*

Noel Eaton, VE3CJ, is currently President of IARU. He has been very active in international affairs, including attendance at IARU Region 1 conferences, participation in the 1971 ITU space conference, and has served as treasurer and executive committee member of the Union Interamericana de Radioaficionados (IARU Region 2). Noel was nominated to be President of IARU in 1974, and the nomination was confirmed by the member societies without dissent. He is the 6th President, and the first from outside the U.S. (*photo courtesy IARU*).

offices to be located at West Hartford, Connecticut.

The world has changed a good deal since 1925. The need for an international organization has become even more pressing, particularly as we face the 1979 WARC, where much of the future of amateur radio will be cast. A new "table of frequency allocations" is to be decided upon for all users of the radio spectrum.

In 1975, the IARU revised and updated its constitution both to strengthen the organization in the face of the preparations for the WARC, and to recognize the existence of the three IARU *regional associations* which represent the interests of hams in the three regions of the world which the International Telecommunications Union (ITU) uses for administrative and frequency-allocation purposes.

The new constitution focuses on the major objectives for which the IARU exists. They are:

1. The promotion and coordination of two-way amateur radio communication.
2. The encouragement of agreement between the national amateur radio societies on matters of common interest and welfare.
3. The advancement of the radio art.
4. The representation of two-way amateur radio communication interests at and between international telecommunication conferences.
5. The encouragement of international friendship.

The IARU today is made up of about 100 national amateur radio societies, one to a country. A group in a country in which there is no IARU affiliate, or a group in a "new" country, can apply to the international organization for membership. Although there are no entrance charges or dues, the regional organizations may levy dues, and the headquarters may investigate the application to establish the eligibility and desirability of the prospective member society. It's important to point out that the constitution says that only *bona fide* national ham groups may apply for membership — the members must be *noncommercial* associations of radio amateurs ". . . ubstantially devoted to the interests of two-way amateur-radio communication and experimentation, and substantially covering by influence and recognition the country or separate territory in which it is located."

Membership applications are circulated to the member societies by means of the IARU *Calendar*, which is a semi-annual publication distributed to all the member organizations. When proposed for membership, an absolute majority of the votes received at the IARU headquarters (within five months of the *Calendar* issue which the new member is proposed) is required for acceptance. A member society may resign with 90 days' notice to headquarters; the only reason for expulsion of a society from membership is failure to fully support the interests of amateur radio communications.

The IARU is run by a slate of officers consisting of a

If you have one of these on your shack wall, then you were lucky enough to work one of the special-events stations set up at IARU conferences. This one was at the Region 2 conference in Miami, Florida in April of 1976.

INTERNATIONAL AMATEUR RADIO UNION
REGION II CONFERENCE - MIAMI, APRIL 1976

AI4ARU

This station was operated from April 9 to 18, 1976, from the Deauville Hotel, Miami Beach, Florida, site of the Triennial Conference of the Union Interamericana de Radio Aficionados/ IARU Region II Division. The Conference brought together the representatives of national amateur radio societies throughout North and South America for the discussion of mutual problems, in particular the preparations underway for the 1979 World Administrative Radio Conference. The assistance of the Dade Radio Club in providing station facilities is gratefully acknowledged. Host for the Conference was the American Radio Relay League.

Confirming QSO	Date	UTC	RST	Band	2X
	April 1976			3.5 7 14 21 28	

QSL via:
Evelyn D. Gauzens, W4WYR
2780 NW 3rd St.
Miami, Fla. 33125

73

Operator

president, vice-president, and secretary. The headquarters host society, the ARRL, provides the key officers for the IARU; thus, top officers of the ARRL wear "second hats" as IARU officials. The present officers of the IARU are: President, Noel B. Eaton, VE3CJ; Vice-President, Victor C. Clark, W4KFC; and Secretary, Richard L. Baldwin, W1RU.

The officers and staff of the Union have the normal responsibilities for supervision of the headquarters, handling funds, processing correspondence, maintaining records, organizing seminars and conferences, and coordinating WARC preparations. An important point is that none of the Union's officers can be in any way identified with the manufacture, sale, or rental of radio equipment.

The headquarters itself is collocated with the ARRL, but the constitution doesn't specify that the ARRL be the host. Rather, the location of the headquarters is subject to the vote of the membership and the headquarters can be moved elsewhere at the request of either the host society or the membership. Since the ARRL is the host, it has to pay for the normal expenses of operating the headquarters from its own funds.

We mentioned that the IARU recognized the three regional organizations which closely coordinate and represent their member national societies. The IARU organization functions on a regional basis (**Fig. 1**) which exactly corresponds to the ITU's regions: Region 1 includes Europe (including all of the Soviet Union), Africa, and the Middle East; Region 2 includes North and South America and Hawaii; and Region 3 includes all the countries of the Pacific and Asia, except those in Region 1. (One important reason for this pattern is that ITU's frequency allocations are made on a regional basis.)

Here are some of the Amateur Radio journals and magazines published by the member societies of the IARU. More than 40 languages are used in talking about Amateur Radio in all parts of the world (*photo courtesy IARU*).

Each region's organization elects an executive committee which normally includes the regional president, vice-president, secretary, treasurer, and several members-at-large. Each regional organization may have its own rules, management and finances, but there can be only one IARU regional group in each ITU region, and its activities cannot contradict the IARU headquarters rules, agreed-on policies, or the constitution.

Why have the regional organizations been set up? Because although the IARU represents amateurs on a worldwide basis, not all the issues and problems facing ham radio are truly international in scope. In some cases, it's more effective for the regional societies to meet among themselves to work out necessary arrangements than to try to resolve all issues on a global basis. A good example of this kind of regional coordination is in the case of two-meter band planning. The amateur service is limited to 144-146 MHz in Region 1 (and Japan in Region 3) whereas in Region 2 we have the full 144-148 MHz available. Thus, it's not possible to develop a truly worldwide plan for the use of two meters for various emission modes (FM, ssb, CW) or for specialized communication purposes; it's more effective to work these things out regionally. It's important, too, to locally coordinate certain ham activities, such as repeater channelization in Europe, where the small countries and dense population make close regional cooperation necessary. On the other hand, certain "rules of the road" have to be coordinated on an international basis: moonbounce (vhf earth-moon-earth) and satellite communications procedures and operating patterns, for example.

I've shown the IARU's organization as paralleling that of the ITU — but I should point out that the IARU is *not* an official arm of the ITU. While the IARU aims to present a united front for Amateur Radio to the ITU, it really does not have any direct voice or power of vote at the ITU's meetings. The IARU's voice is felt at conferences through the official delegates from the member countries who attend the conferences and committee meetings. But the IARU is still represented at ITU conferences

Panamanian delegate Juan Chen, HP1JC, speaks up at the Region 2 conference in Miami (*photo courtesy IARU*).

(including the upcoming WARC) as a registered official observer, so that it has access to committee meetings and working groups where the "spade work" is done. The IARU President has advised that at such conferences, the organization should be represented by at least one delegate from each of the three regions. (More on WARC later.)

The lifelines linking the headquarters, the regional groups, and the individual member societies are the several IARU publications. The main one is the *Calendar*, mentioned earlier, which is issued in June and December of each year. It transacts the official business of the Union, such as proposals, circular letters, questionnaires, and information intended for the member societies. The IARU also distributes a special monthly *WARC Newsletter* in several languages to help publicize ongoing activities in preparation for the 1979 WARC. Each regional organization also puts out a special newsletter for the use of member groups within its region.

Written correspondence, personal visits by IARU officers, conferences, and meetings are used to coordinate the work of the Union. Each regional organization meets in formal conference every three years (on a rotating basis) for the purpose of discussing and resolving problems of regional interest. The executive committees of each region also meet yearly, or more frequently as necessary, to carry on the business of their organizations. IARU representatives attend various seminars, conferences, and international trade fairs. They also attend functions such as symposiums on frequency management conducted by the ITU at its Geneva headquarters, and other conferences that provide amateur-radio exposure to regulatory officials and the general public in the developing nations. Over the next few months the pace of such meetings and the exchange of correspondence will pick up considerably as the IARU headquarters and the regional organizations make final preparations for the WARC in September of 1979.

Besides these activities, the IARU sponsors a number of interesting programs, such as the Intruder Watch, the IARU Fellowship, and the Radiosport Championships. They also promote the ITU's Annual World Telecommunications Day activities. Let's take a look at some of these programs:

Intruder Watch. In this program, individual volunteer hams form a worldwide "monitoring system" to detect unauthorized interlopers using the amateur bands, mostly on the high

Fig. 2. Do you use standardized, phonetic, operational abbreviations on phone? The IARU has agreed on the desirability of a uniform phonetic alphabet for convenience and clarity of communications. Their recommendations, however, parallel the old military phonetics, shown below, which have largely been replaced in favor of the modern, scientifically designed ITU alphabet, also shown below. Note that the phonetics for some letters are the same in both systems.

International Phonetic Alphabets

Letter	IARU/Old Military Phonetics	New International ITU Phonetics	How It's Said
A	Able	Alfa	Al-fah
B	Baker	Bravo	BRAH-voh
C	Charlie	Charlie	CHAR-lee
D	Dog	Delta	DELL-tah
E	Easy	Echo	ECK-oh
F	Fox	Foxtrot	FOKS-trot
G	George	Golf	GOLF
H	How	Hotel	HOH-tel
I	Item	India	IN-dee-ah
J	Jig	Juliet	JEW-lee-ett
K	King	Kilo	Key-loh
L	Love	Lima	LEE-mah
M	Mike	Mike	MIKE
N	Nan	November	No-VEM-ber
O	Oboe	Oscar	OSS-cah
P	Peter	Papa	Pah-PAH
Q	Queen	Quebec	Keh-BECK
R	Roger	Romeo	ROH-mee-oh
S	Sugar	Sierra	See-AIR-rah
T	Tare	Tango	TANG-go
U	Uncle	Uniform	YOU-nee-form
V	Victor	Victor	VIK-tah
W	William	Whiskey	WISS-key
X	X-ray	X-ray	ECKS-ray
Y	Yoke	Yankee	YANG-key
Z	Zebra	Zulu	ZOO-loo

frequencies. When an Intruder Watch member hears a suspicious signal on an amateur band, he makes note of its frequency and callsign, as well as other pertinent information about the signal. He then contacts the ARRL (or his national amateur society) and may even telephone the nearest FCC monitoring station (if he lives in the U.S.). The FCC, State Department, and other appropriate officials can then swing into action to request the government of the illegal station to investigate and to move the station from the ham bands. The Watch has done a great deal to get many intruders off our bands, though sometimes action is taken by the offending stations and foreign governments only after repeated requests. Nevertheless, this program is very important, since it helps to protect the ham bands from nonamateur use, and to convince the ITU and other governments that amateurs are serious about the sanctity of their frequency allocations. If nothing else, the Intruder Watch will help to refute any claims at the upcoming WARC that such illegal operation has not harmed any radio service, and therefore there is reason to legalize such operation. (The ARRL conducts the Intruder Watch program in the U.S. and Canada. If you're interested in participating, write them at "Intruder Watch," 225 Main Street, Newington, Connecticut 06111.)

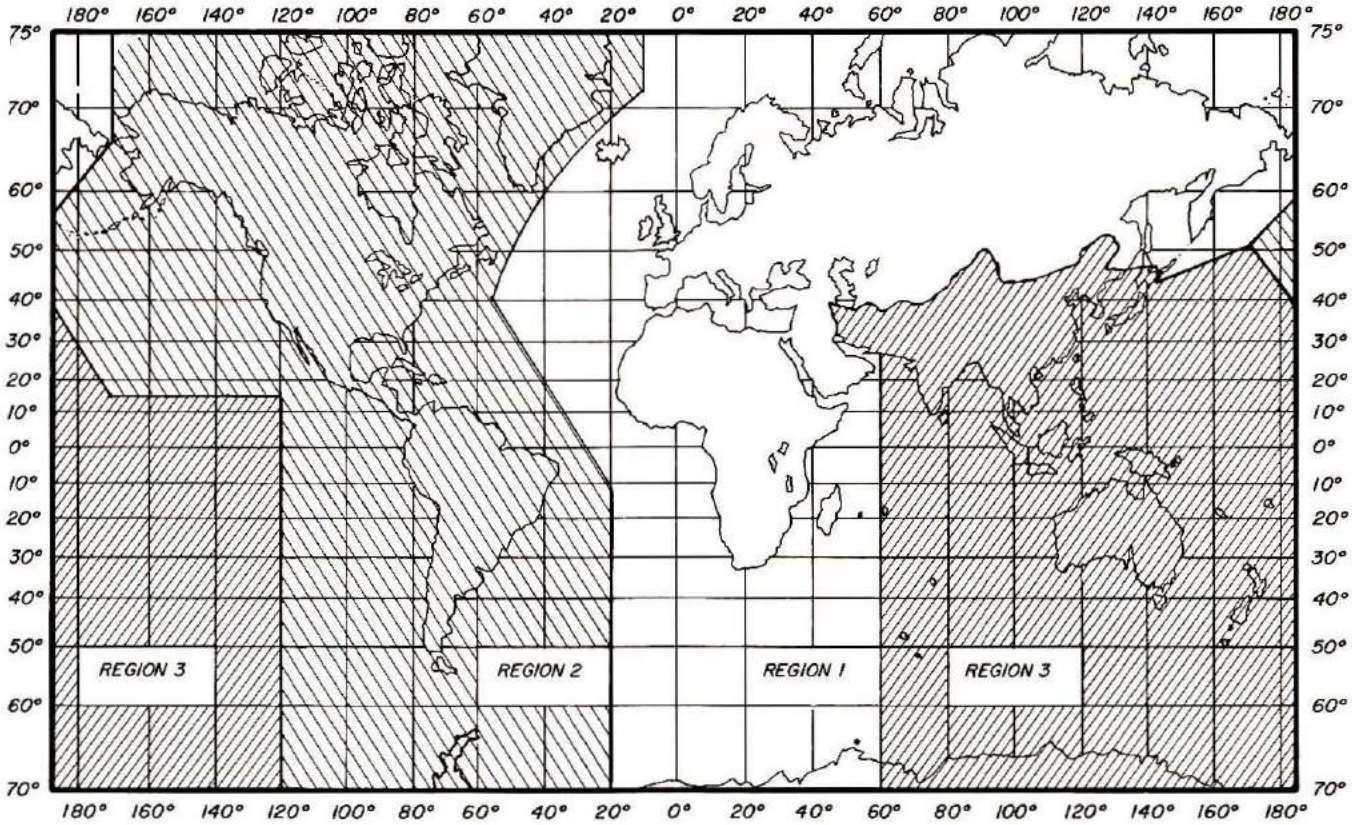


Fig. 1. The IARU is divided into three regions which closely parallel the ITU's regions, shown here. Each of the three IARU regions has its own regional association and officers.

IARU Fellowship Program. Under this program, representatives of IARU member societies from around the world are invited to the headquarters for a week or two to study international amateur radio and the status of WARC proposals and preparations. They are also given briefings on the history, structure, and policies of the IARU, ARRL, and ITU. The idea is to "transfuse" as much knowledge as possible between the headquarters people and the scholar, and to have him return to his own country knowledgeable about how to best go about preparations for the WARC. Another important aspect of the program is to have the visitor study how his own member association can best negotiate with its national regulatory administration concerning the Amateur Service, and how to effectively promote ham radio in his country. The Fellowship program is open to all the member societies. All the individual club in a foreign country need do is to pay for the transportation of their delegate to and from the United States — the headquarters picks up the rest of the tab.

Radiosport Championship. In July 1977, the IARU sponsored a major contest to promote amateur radio internationally. It was a sort of Sweepstakes, QSO party, and WAS (Worked-All States) weekend rolled into one event. The object of this special occasion was to focus on international ham solidarity in the face of the coming WARC. Amateurs all over the world talked to each other during this contest, and awards were made to the highest-scoring CW, phone, and mixed-mode entrants in each United States state, Canadian province, ITU Zone, and officially recognized DXCC (DX Century Club) country. Over 1500 stations around the world participated, in spite of poor band conditions during the contest. The affair is expected to be a yearly event and promises to be one of the best and most popular of the DX contests.

Fig. 3. Most amateurs are familiar with the R-S-T signal report system, used mainly in CW operations, but also used in radiotelephone work to indicate signal readability and strength. The phone RS system, however, says nothing about signal *quality*. The IARU's recommended RSM code, shown here, adds a new "M-number" to report on the received quality of modulation.

M-1	Unintelligible modulation
M-2	Defective modulation due to spurious or parasitic oscillations or to causes unknown
M-3	Defective modulation due to frequency modulation of the carrier (would not apply to fm)
M-4	Defective modulation due to overmodulation
M-5	Good modulation, not exceeding 100%

World Telecommunications Day. The International Telecommunications Union (ITU), the world's "traffic cop" for radio regulation and frequency allocations, sponsors this event each year on May 17. This date was chosen because it celebrates the anniversary of the ITU's founding in 1865. The idea is to call attention to the importance of telecommunications in the world. Each year a theme is chosen which focuses on a different aspect of communications, such as "Meteorology and Telecommunications," or "Telecommunication and Development." Amateurs have traditionally played a role in the activities surrounding the World Telecommunications Day, and special events — many of which are sponsored by the IARU or its member societies — take place during the week of this annual observance. For example, some countries sponsor international DX contests on the weekends bracketing the WTD week, and special-event stations sporting the "ITU suffix" are set up to promote amateur radio as an important part of telecommunications.

WAC. Besides these activities, the IARU also sponsors the popular Worked-All-Continents, or WAC award. This award recognizes the accomplishments of the ham who establishes two-way communications between his station and other amateurs in each of the six continents. Five- and six-band versions of the WAC award are issued by the IARU, the basic award being the five-band, with an additional endorsement possible to show the use of six amateur bands. Applications are normally sent by the individual amateur to his own national society, which verifies his QSL cards or logbook entries to determine his eligibility. The member society certifies his accomplishment to IARU headquarters, which issues him his certificate. Holders of the WAC award certificates are authorized by the IARU to use the letters "WAC" on their QSL cards and stationery.

Other functions. In its role as a "coordinator" of ham activities, the IARU gets into a number of administrative areas which help to make DX operating a bit easier. For example, the IARU has proposed a standard numbering system for international contests, in which a five- or six-figure contest exchange is made up of the RS (phone) or RST (CW) report followed by three figures which can begin with a number between 001 and 100 for the first contact and increase by "1" for each succeeding contact. (Under this system, your first phone QSO of a contest might be 58001, the next 47002, the next 59003, and so on.) The IARU is also a champion of uniform, internationally recognized abbreviations and signal-reporting procedures, and is constantly involved in advising activities to help cut the red tape involved in operating your equipment in a foreign country, as well as coordinating the world system of QSL bureaus.

Meeting the Challenge

That we enjoy ham radio today on such a broad scale is due in no small part to the foresight of the small band of radio pioneers who formed the IARU nearly 55 years ago. The problems amateur radio* faces now are different from those of a half-century ago, but no less important. It is even more pressing today that we have a

*For the record, amateur radio is a lot more than just working Dx, ragchewing on two meters, handling traffic, or mobiling. The *Amateur Service* is defined in the international radio regulations as "a service of self-training, inter-communication and technical investigations carried on by Amateurs, that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest." It's on *this basis* that ham radio's existence is justified on the world scene as a competitor for valuable spectrum space.

loud and clear voice at the international level.

Such questions as the impact of CB on ham radio, FCC regulation, and the like, pale alongside a larger matter: the challenge of the 1979 World Administrative Radio Conference, at which many key regulatory and frequency-allocation decisions will be made which will affect every amateur in the world through the early years of the 21st century. During the next months, the IARU is stepping into high gear to enhance the "visibility" of ham radio on the international scene and to make preparations for the amateur position at the conference. It is seeking to assure that each member society provides maximum support to amateur interests at the WARC, and it is advising regulatory officials (such as our own FCC) in planning for the event. The IARU has even arranged office space adjacent to the WARC facilities in Geneva to allow a permanent on-site headquarters for the Union during the course of the meetings and conferences.

Before going further, let's first discuss just what a "WARC" is. The term is an acronym standing for the "World Administrative Radio Conference." It is a very important event in international telecommunications, since the delegates at this ITU conference will review all frequency allocations and regulations which govern the use of the entire radio spectrum from 10 kHz to over 200 GHz. WARC-79 is especially important, since there has been a great deal of technical progress and change in the twenty years since the last major ITU radio conference was held in Geneva in 1959. The last international conference to deal with the whole radio spectrum was the Atlantic City Conference of 1947.

The WARC itself is an assembly of representatives from member countries of the ITU, numbering about 150. The conference invites other participants, such as the IARU, to attend as nonvoting observers. The conference is primarily a technological one, but, as we shall see, political factors do enter in so that the issues won't be settled on technical merit alone. Although the very survival of amateur radio as a hobby probably isn't at stake, it's important for hams to recognize the impact of the WARC on what the frequency bands will look like after the conference, as the results will certainly change the operating pattern of ham radio (particularly if there is a great loss of frequencies), not to mention its growth. Many amateurs take our allocations for granted — but, they can't be taken for granted any longer.

There will be many forces pressing the conference for spectrum space in direct competition with amateur radio. While the demand for high-frequency space for the fixed services (such as point-to-point telephone, teletype, and facsimile communications) has been reduced in the past few years by the expanded use of satellite and cable communications, the competition for spectrum space is still expected to be fierce, particularly from broadcasting interests. They will be making requests for vastly increased allocations below 30 MHz to accommodate expanded operations and to reduce severe crowding on the international short-wave broadcasting bands. The broadcasters may seek to have the shared 40/41-meter band allocated exclusively for broadcast use worldwide, which could mean a change to the 40-meter band as we know it. Of course, the IARU actively opposes any moves to take away 40 meters, or any band, at least without a tradeoff for the net benefit of amateur radio.

There are some sobering international realities that the IARU, and we hams in general, will have to face up to. They make this conference different from those of 1947 and 1959, where ham radio "did okay." Unfortunately, it's not all so

This is the place — the Conference Center in Geneva, Switzerland — where the 1979 World Administrative Radio Conference (WARC) will convene for 10 weeks. This photograph was taken during the 1978 WARC to study needs of the Aeronautical Service. IARU observes all such "mini-conferences" to monitor the proceedings and to keep in touch with the various member-countries of the International Telecommunications Union (*photo courtesy IARU*).

Regional newsletters are published to keep the member societies informed and to provide communications of a type more permanent than radio signals. This is a vital function, especially in the face of WARC-79.

rosy this time around. It's a hard fact of life that the United States, and other countries which wholeheartedly support amateur radio, cast but one vote each at the WARC. It's a system like that at the United Nations, where the "good guys" are often outnumbered by the explosion of new countries who often sport radical ideologies and social systems. Although the United States carries great weight at the WARC, the climate is different, and the outlook for expansion of ham frequencies isn't all that good. The decisions at WARC-79 will be made by the votes of the 150 or so member nations, many of which are lesser-developed countries (LDCs)* which lack a significant ham population and which don't understand or don't sympathize in the least with the objectives or purposes of amateur radio. In many such countries, technology is at a level where the need for technical training and other benefits offered by the existence of a national amateur radio service are just not recognized. Then, too, at such conferences there are many special political and economic interests which will have to be served in coming to grips with the allocations shuffle.

Because of these problems, it is especially important that concerned amateurs throughout the world agree on and support a coordinated and realistic amateur position for the WARC, and that government endorsements of this position go forward in order to counter the "anti-amateur" sentiments of the broadcasting interests, many lesser-developed nations, and most radical regimes.

Another frustrating problem which the IARU faces at the WARC is the fact that many countries have no national amateur radio association to champion the cause and bring a favorably inclined delegation to the conference. Only about half of the 150 or so countries that will be represented at the WARC have IARU-affiliated national societies, and many of these are very small and represent but a tiny amateur population. (Most of the world's one million hams are located in just a handful of countries — the United States, Canada, Japan, and the nations of Western Europe.)

I hope I've not painted too bleak an outlook for international amateur radio at the WARC. Amateur radio is not likely to be "mauled" at the conference, though its prospects for gaining frequency allocations are uncertain at best and prospects for holding its own are, perhaps, "50-50." (Our own government can object and "reserve" on actions that might, for example, abolish ham radio by eliminating all frequency allocations for the service.) All of this simply points out that there is a need, as never before, for amateurs to cast aside petty bickering and present a united front — to cooperatively support the efforts of the IARU, ARRL, CRRL, foreign amateur societies, and our own government's pro-amateur position in presenting a reasonable stance at the WARC. The stakes are just too high to do otherwise.

While it is true that most of the WARC action is pretty much in the hands of the IARU and the various official WARC planners, there are still many things that we as *individual* amateurs can and should do in

*Education of the authorities in third world countries is very important in securing support for amateur radio — they must be informed as to how amateur radio can benefit their countries and be a valuable national asset to them.

Have you ever thought of some of the real reasons why ham radio exists? Here are some of the reasons usually brought to the attention of the authorities who have power to influence the development of amateur radio in their countries: enhancement of the national image, international goodwill, emergency communications, civil defense, experienced pool of electronics and communications talent, search and rescue capabilities, and radio research and technological advancement.

the meantime to increase the credibility of the amateur service. The help of each and every one of us in proving the worth and effectiveness of the amateur service is needed. Here are some of the things we can all do to help improve our posture at the WARC:

1. Be active on the air. Use as much of the spectrum assigned to us as possible, especially on the uhf and microwave bands. As never before, the old axiom, "Use it or lose it," has real meaning.*

2. Conduct your activities in a manner that reflects well upon amateur radio — and, when public service is rendered, see that it is publicized!

3. Belong to, and support, your local amateur club and the ARRL (or your IARU-affiliated association if you live abroad.)

4. Talk-up the WARC on the air; try to raise the level of awareness of your fellow amateurs, who may not appreciate the WARC's impact.

5. Participate in standards-raising activities if at all possible, such as the Official Observer and Intruder Watch programs.

6. Help amateur radio grow in as many ways as possible: recruit that interested CBer; teach a Novice class if you have the ability.

*Stated another way, perhaps, one might say that if you effectively use allocated frequencies, you're likely to keep them. Unlike the Amateur Service, our sister, Citizens Band Service, is probably safe at the WARC. The explosive growth of CB radio has made it a very real economic and political factor that in many ways dwarfs amateur radio.

CB's present status, internationally speaking, is a curious mixture of former amateur radio allocations and frequencies assigned to the fixed and mobile services between 26 and 28 MHz. Unless the WARC decides to reallocate these bands (highly unlikely), CB should not be much affected. However, interference and the clandestine use of CB equipment in countries that don't have a Citizens Band service may generate some interesting and possibly heated discussions at the conference.

President Eaton and Soviet Deputy Minister of Communications V. Badalov discuss a point during a recent IARU reception in Geneva (*photo courtesy IARU*).

From this discussion, it's clear that the IARU — and every one of us — faces a challenging task of importance and magnitude like none that has faced the world's amateur community before. The task facing us demands a sense of urgency and a rededication to the real reasons for the existence of amateur radio.

In this article, I've traced the history of the IARU from its earliest beginnings and have taken a look at it as it exists today. I've also shown that there is, indeed, a very real challenge to the future of amateur radio as we know it, but that the IARU is working hard to enhance the prestige and status of our hobby, improve its technical base and value as an international resource, and establish effective liaison with like-minded radio hams throughout the world. We've also seen that the IARU is coordinating efforts to develop a united front for ham radio in preparation for the September 1979 World Administrative Radio Conference.

The IARU has done much for amateur radio since its founding on that spring day in 1925. With the support and encouragement of hams and friends of amateur radio throughout the world, it will help ensure that there will be such a thing as "ham radio" tomorrow.

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HRH

A VISIT TO COCO'S ISLAND

BY ALFONSO ESQUIVEL-LANG, TI9AEL

A group of Costa-Rican amateur radio operators had great interest in visiting Coco's Island to transmit from this location with the call-sign prefix TI9 and to make the maximum possible number of radio contacts. This interest was based on the fact that Coco's Island, which is uninhabited from the radio point of view, is considered as a new country for ARRL DXCC credit. Many amateur-radio operators throughout the world wish to obtain a TI9 QSL card for their DX record.

Planning the trip

The DX expedition to Coco's Island began with plans in March, 1977. At the beginning the group was quite numerous. But some of the amateurs, for different reasons, decided not to make the trip, and at the end only three were ready to go to the island: TI2CF, TI2JVA, and myself, TI2AEL.

Since Holy Week was approaching, businessmen from Puntarenas and San Jose had planned for various fishing vessels, as well as a yacht which offered a special excursion service for the entire Holy-Week holidays, to go to the island. In one of the fishing vessels, named *El Audaz*, was a group of fourteen of my fellow members of the "German 66 Sporting Club," which makes such a trip every year. This club is affiliated with the German Club of Costa Rica, as well as others throughout Central America, with whom we are always in contact. Consequently, there were some members from Guatemala and Nicaragua.

On Friday, April 1, one day before leaving, the three amateur radio operators got together to solve last-minute details and coordinate our efforts with the person who organized the excursion trip in the city of Puntarenas. Our surprise was quite great when we were told that it was impossible to make the trip because, of all the persons that were originally supposed to go on the excursion, only six were left. Together with us this

Author TI9AEL and the vertical antenna, which had been mounted on the frame of an old army cot salvaged from the beach.

number amounted only to nine, which wasn't enough to charter the yacht.

I immediately contacted my friends of the Sporting Club, who told me that *El Audaz* was full but could take one more person.

On Saturday afternoon, we got together again to finish details of my trip, since I was to be the only amateur radio operator going to the island. The rest of my friends from the "German 66 Sporting Club" would be dedicated to skin diving and fishing, a hobby which they had been practicing a long time and is the reason they go to the island every year, since Coco's Island is a real sportsman's paradise.

The two hams staying behind (TI2CF and TI2JVA) obtained a small electrical plant from TI2NA, and I took my Drake TR4 transceiver, a Hustler 4BTV vertical antenna, gasoline, cables, and personal items. Around four in the afternoon I left for Puntarenas. The rest of my friends were waiting for me. I had left all my luggage and equipment in the ship. We went to dinner, then I left my car in one of the parking places to be cared for during the week I'd be out of the country.

We went back to the ship and about midnight we left the Moreno Dock, very close to the estuary, heading toward the island at 11 knots.

Under way at last

The trip in general was very good with a relatively quiet sea and without any problems finding the island. Normally, Coco's Island is quite foggy and if the captain doesn't know the route very well, he can pass close and not see it.

Upon arrival at Chatham Bay we found four of my friends of the Club who had left a day earlier in a small sailing boat. On Monday, they took out a couple of the small boats with outboard motors to make a tour around the island and around Wafer Bay (see map on our QSL card).

At night we fished from the ship's deck. Within a few hours we landed 32 sharks. The island has a river with several ponds where one can swim. The island is covered by virgin jungle, which makes it very hard to cross by foot, but in the river one can travel long distances and arrive at beautiful ponds and falls. The island is occupied by deer, pigs, goats, chickens, and some cats.

A Brief Note for New DXers

If you've scanned the official "countries list" for DXCC credits published by the ARRL, you'll notice two separate "countries" designated "Cocos Islands." One such country-credit is the Cocos (or Keeling) islands, which are in the Indian Ocean and are administered by Australia. The other Cocos Island belongs to the Central-American country of Costa Rica, and it is officially designated (in Costa Rica) as Isla del Coco. *It is popularly known as "Coco's Island" in Central America. Isla del Coco, which has the amateur-radio call-sign prefix of TI9, is about 570 km (354 miles) southwest of Puntarenas, Costa Rica.* ***Editor***

Author TI9AEL and his radio station. The power supply was mounted in a nearby tree. Not a very comfortable shack, but who cares?

Getting on the air

Wednesday was the day to begin making my radio contacts. In the morning my friends took me to Chatham Bay, where the boat was anchored, and I began assembling the equipment. I brought along a very large pipe to bury in the sand for the antenna (when the tide comes in, it covers the beach completely). I tried to plant the pipe in the highest part of the beach but couldn't because of the large quantity of rocks. A few meters from that location I found an old cot that someone had left. I brought the cot to the beach and installed my antenna onto one of the cot frames, placing stones on the cot to stabilize it. This was my antenna mount.

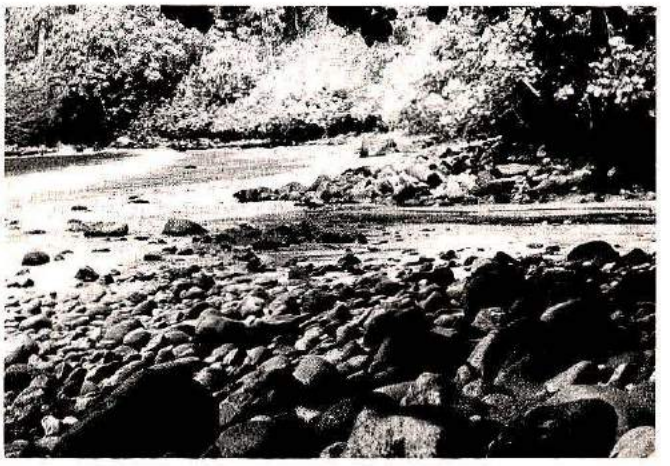
I placed the electrical plant in an old tree. The radio equipment and a small lamp that I used during the night was placed over an old gasoline drum to which a small wooden piece had been installed. Several hours later I began transmitting. It was near 1050 local time (1650 UTC).

My first contact was made with HC1AZ, Esteban, in Quito, Ecuador. After some time, due

On the beach at Coco's Island showing some of the friends who made the trip.

Looking seaward from Puntarenas.

Our ship, *El Audaz*, anchored in Chatham Bay at Coco's Island off Costa Rica.

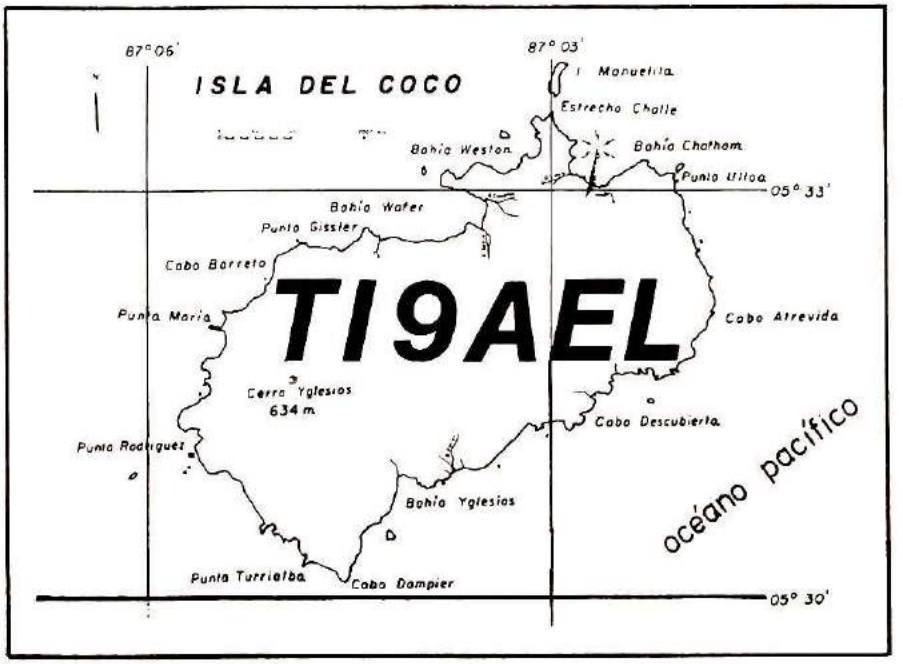


View of the beach at Chatham Bay. Lots of rocks made it difficult to erect an antenna.

to very poor conditions, I worked a Costa-Rican station, my friend Elias, TI2EPG. Our Ecuadorian friend relayed, and we were able to pass a few messages. That day I made very few contacts; conditions for Costa Rica were poor and it started raining quite early. The equipment was almost without any protection, covered only by the shadows of a few almond trees.

When it began to rain I turned off the equipment and covered everything with plastic bags until the rain, which lasted several hours, was gone. Since this was my first trip to the island I wasn't prepared for the inclemencies of weather.

Early in the evening some friends came by in a boat, picked me up, and took me



The QSL card for TI9AEL, which shows the island's geometry. Do you have one?

back to *El Audaz*, where a very good dinner had been prepared, complete with liquid refreshment. The boat's cook had prepared local fish and lobsters.

On Thursday, April 7, I arrived at the ham location and removed the plastic bags that covered the equipment. At 1830 UTC I began transmitting again, sitting as always over a rock covered with a towel (the softest seat I could find). One of the first contacts was with Jose Antonio, YN5JAR, a Nicaraguan surgeon living in Costa Rica. Also, Fernando, TI2FAG, greeted me. Fernando had been to the island with a group of Swiss amateurs, but this was his first contact with the island.

At 2240 UTC I received a call from TI2CF, Carlos Fonseca, one of the amateurs who couldn't come and who had promised help from Costa Rica with contact lists. That day I made many contacts with America and Europe with Carlos's help and from other amateurs in El Salvador, Guatemala, the United States, and Canada. Saturday was the last day, and I transmitted until 1300 local time after which my equipment and I were picked up in a small boat for the trip to *El Audaz*.

The sea was rough and the small boat took on a lot of water which wet much of the equipment, antenna, and papers (luckily, the log wasn't spoiled). Aboard the yacht I washed part of the equipment to avoid corrosion. We were hoisted aboard *El Audaz* at 1700 local time. We weighed anchor from Chatham Bay then took a complete turn around the island. Coco's Island has several bays and beautiful beaches, but most of the coastal area consists of rocks forming a wall around the island. The two most-visited bays are Chatham and Wafer. Iglesias Bay has a beach with coconut trees and a beautiful waterfall. At 1800 local time we headed straight toward Puntarenas. We had excellent weather and favorable wind, which made the return trip possible in 28 hours, although the entrance at Nicoya Gulf was quite rough. A north wind had created great waves, which engulfed our ship.

We arrived home at 2200 local time. Some of the people in the group returned to San Jose during the same evening. The remaining friends stayed in Puntarenas to return home on the following day after some deserved rest. It was, indeed, a great experience. **HRH**

Chatham Bay on Coco's Island. Our ship, *El Audaz*, is at the left. The sailboat, right, brought some friends from the "German 66 Sporting Club" of Costa Rica, who were interested in skin diving but who helped during the ham adventure.

You can take it with you!

BY WAYNE OVERBECK, N6NB

Take a lesson from your boating and biking friends — put your tower on a trailer and head for the hill tops

It was a big ham-radio convention, and three men settled into their seats at the hotel bar to renew an old friendship.

"Joe, where have you been? I haven't heard you on twenty meters in years," one of them asked another.

"Well, Bob, you know my new job took me to New York, and I just can't get on the air. I live in a 22-story apartment building, and the manager would never let me put up an antenna."

The third man interrupted. "Yeah, that's my problem too, even though I own my place. It's a condominium and antennas are strictly *verboten*. Once I put up a two-meter ground plane, but they made me take it down."

"You guys think you have problems? You obviously haven't heard what happened to me," Bob replied.

The trio paid for their drinks and Bob continued. "You fellas knew I bought a brand new house way out in Ventura County, didn't you?"

"Sure. Two stories, three-car garage, two fireplaces, and $120,000, right?"

"Right. It costs me more than a thousand bucks a month, when you count the mortgage payment, taxes and all."

"That's great if you can afford it, Bob. So why don't I hear your big signal on twenty anymore? Did you have to hock your rig to make those payments?

"I might as well have. The city passed an ordinance forbidding all antennas more than ten feet above the roof, and it's even worse outside the city limits. The county won't allow any antennas at all unless you spring for a conditional use permit, which costs nearly a thousand bucks and requires the unanimous consent of all your neighbors.

"I had to choose between a nasty lawsuit and taking my beam down, so it came down.

Now all I have is a dipole in the attic."

The three became more and more depressed as they compared horror stories. Somebody suggested another round of drinks . . . .

An urban society

As America becomes more urbanized, thousands of amateurs are encountering the kinds of problems these three face. Unfortunately, a lot of them accept defeat and limit their hamming to mobile work through the local FM repeater.

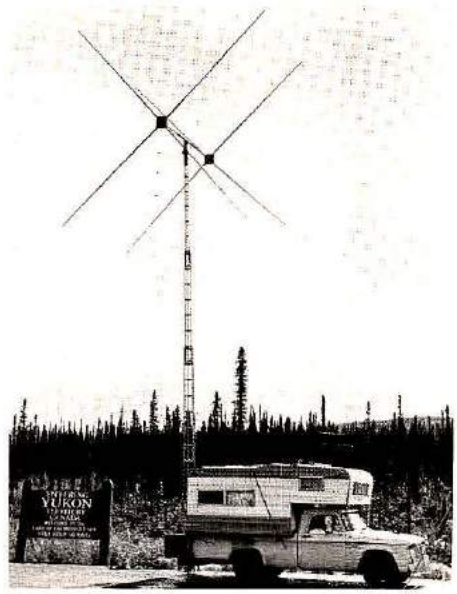
That's too bad, because it doesn't have to be like that. It certainly isn't for devotees of other pastimes.

According to industry estimates, there are more than a million American boat owners who live nowhere near the water. Most of them are just like radio amateurs — they live in houses on small lots or in apartments. But they have a solution. They keep their boats on trailers or carry them atop their cars and go on weekend outings.

Quite literally, these people, "go portable" every time they pursue their favorite pastime. They load up their gear, gather family and friends, and head out to a body of water for a day or a weekend of fun. It may take a lot of time and effort — maybe an hour or more — to rig and launch the boat, but that doesn't bother them. They do it all to pursue their hobby for a few hours.

And if few sailors own waterfront homes, what "dune buggy" or "dirt bike" enthusiast owns his own private desert? Thousands of off-road vehicle devotees load their "sand toys" onto trailers and tow them away for the weekend.

So where are the radio amateurs? If we hams were as dedicated to our hobby as sailors and bikers are to theirs, the best hilltops around any big city would be crowded every summer weekend. Amateurs would jockey for the best places to set up portable towers and beams for some hamming — far from television interference, line noise, and hostile zoning ordinances.



How to talk home from faraway places. Here's the original "cabover kilowatt" camper-mounted station set up to work 20 meters from the Yukon Territory in Canada (VE8).

But most hams think of operating portable as something the local club does on field day, and nothing more. Oh, a little mobile operating is fun, but taking a hundred pounds of radio gear and a tower out somewhere just for the weekend? You'd have to be crazy to do that!

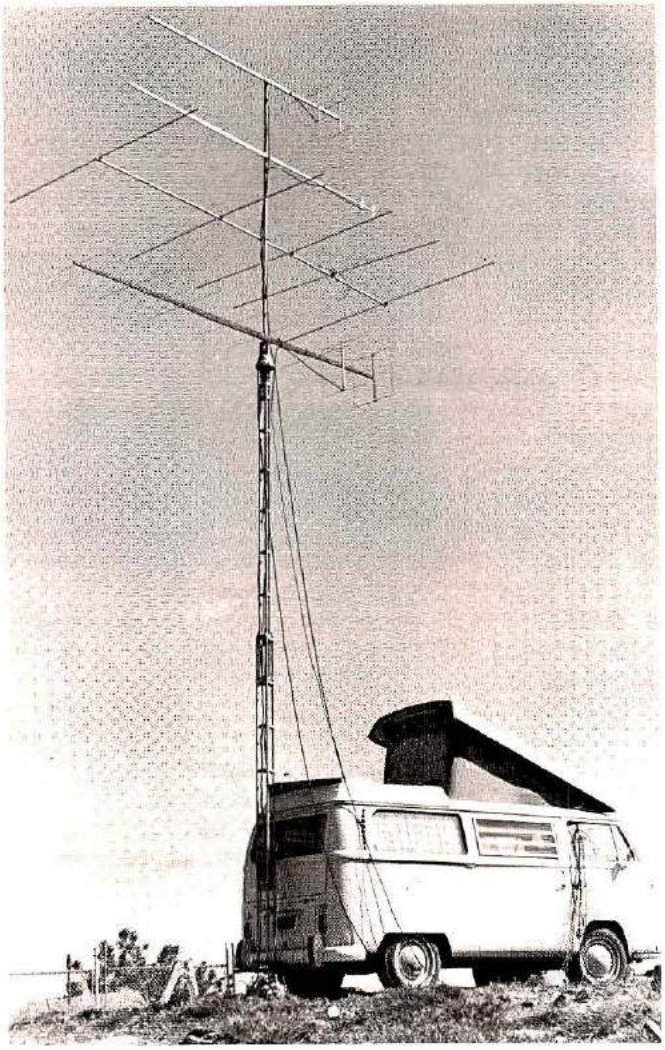
Sure you would: just like those million-plus boating enthusiasts and bikers are crazy! If they don't let a little thing like not owning a lakefront home or a private desert discourage them, hams shouldn't let a little thing like not owning a hilltop estate interfere with their hobby either.

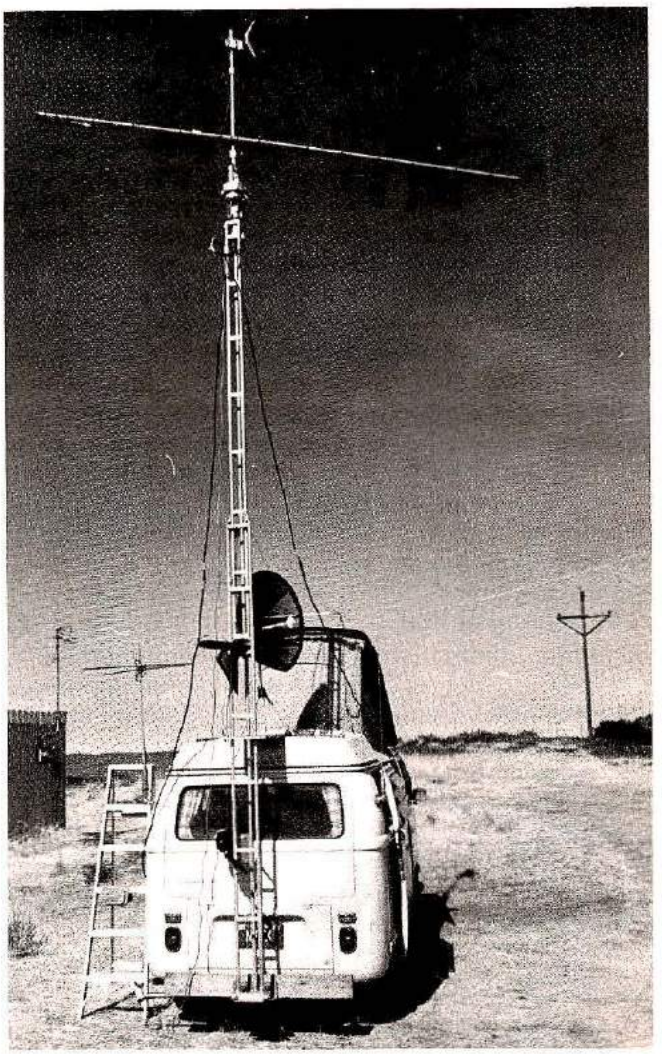
As a matter of fact, some hams don't let where they live dictate their ham radio activities. This is the story of how some of these hams pursue their hobby, written to encourage more hams to take their pastime afield.

The seven-element Chevy

Probably the simplest way to "go portable" is to mount some sort of vhf beam on your car and park in a good radio location. The photo shows an

The seven-element Chevy. I worked Hawaii on two meters with this setup at a time when a kilowatt and big beams at home produced nothing!





Here are two versions of the "crank-up Volkswagen," by N6NB and N6TX (right). Both support a two-section tower on a trailer hitch arrangement, and both can be driven normally with the tower (but not the antennas) in place (*N6TX van photo by KØJHI*).

easy way to do it. The car can be driven with the antenna in place, so setup time is negligible.

What are the advantages of doing this? Let me tell a little story.

In June of 1976, there was a two-meter band opening from California to Hawaii, one of several that have occurred in recent years. At the time, I had a big two-meter antenna system up 70 feet at home (at a house right by the beach). Yet I couldn't work Hawaii from there, even with a kilowatt. But I drove a few miles down the coast with "the seven-element Chevy" and found a spot where mobiles in Hawaii were sometimes so strong they pinned my S meter.

If I hadn't "gone portable," I wouldn't have worked Hawaii on two meters!

Depending on where you live, you may or may not ever work Hawaii on two meters from your car, but a simple setup like this will let you choose your favorite hilltop and work all sorts of DX you can't work at home. It's easy, and until you've tried vhf "mountain-topping," you haven't experienced one of the greatest thrills in ham radio.

The crank-up Volkswagen

After you've done some portable hamming with a small vhf beam attached to a car, you may ask yourself, "How can I put up some bigger antennas out there?"

There are many good ways to do it, but here's one example: the crank-up Volkswagen.

The photos show two different installations, one belonging to Paul Schuch, N6TX, and the other to me. Both use a small, two-section, crank-up tower (a Tri-Ex T-218) mounted on a trailer hitch. We both have brackets attached to the VW's rooftop luggage carrier to support the tower.

Yes, Paul and I drive down the highway (and up mountain roads) with the towers upright. All states allow vehicle height of up to at least 13 feet, and the top of the tower is barely 12 feet high (with the rotor

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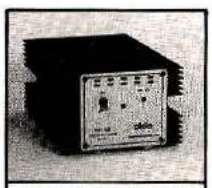

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For base station operation, you'll need an ac power supply. The Alda PS-130 will give you full rated power on SSB and CW. The PS-115 will give you full power on SSB and 75% of full power on CW.

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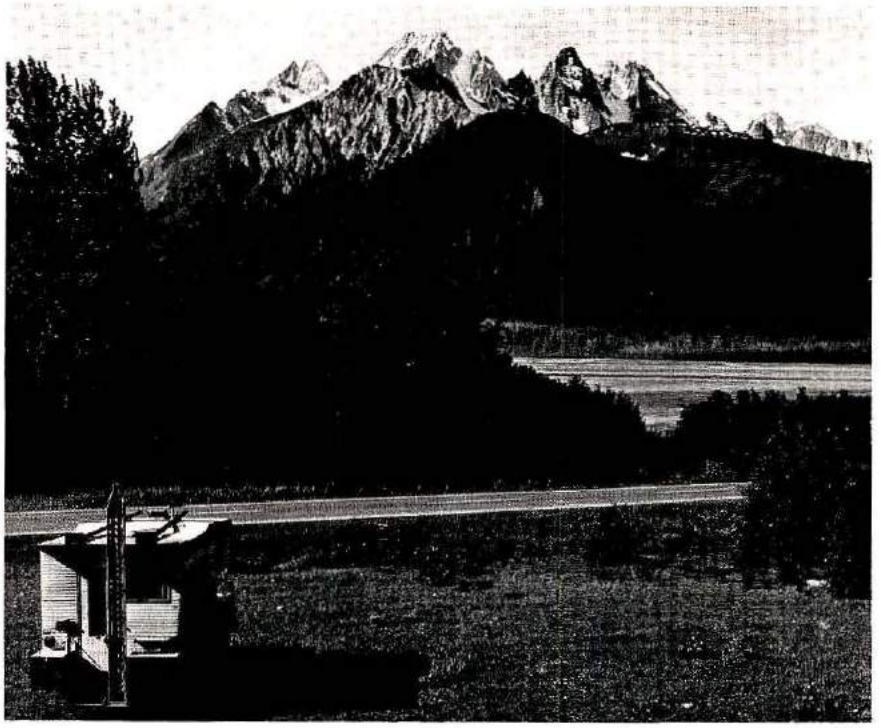


Cabover kilowatt number one set amidst the scenic and rugged mountains of southeastern Alaska. With an arrangement like this you can have your scenery and your radio too.

removed). We have to watch it when we drive into gas stations, however.

You'll notice that the photos of both Volkswagen installations show stacked beams for the vhf bands. That's because both Paul and I are vhf contest enthusiasts. But a triband beam for 10, 15, and 20 meters would be no more difficult to put up than the stacked vhf arrays. With my crank-up Volkswagen, I can be on the air with a good antenna less than 15 minutes up at a site.

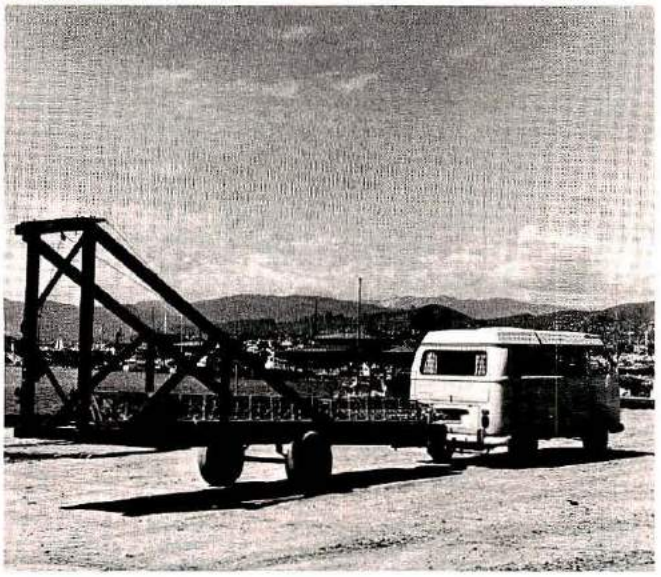
Oh yes, other motorists stare and ask stupid questions like, "Boy, you must love your TV," or, "What's that, an oil derrick?" But other motorists don't work as much DX as I do!

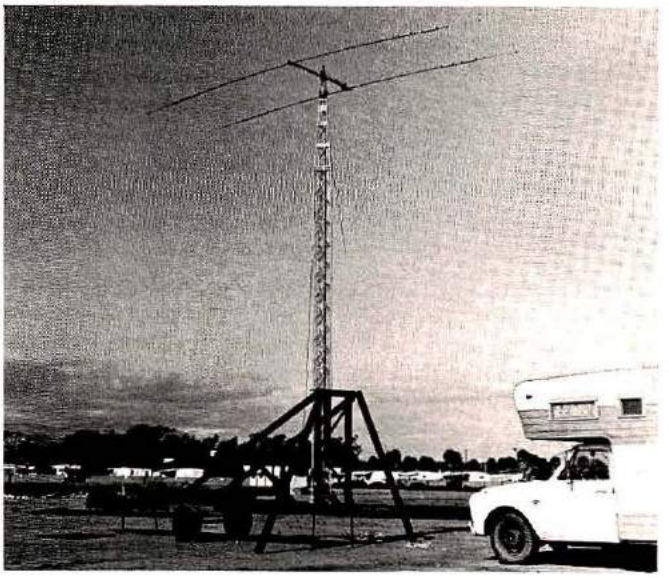
The original "cabover kilowatt"

After you've mounted beams on your car or van, the next step in complexity is something like the setup I've always called "the cabover kilowatt." This rolling radio station appeared on the cover of *QST* magazine some years ago[1] and it turned heads wherever it went, which was something like 100,000 miles.

As the photos indicate, it's a 3/4-ton truck with a cabover camper. It had a four-section, crank-up tower on the rear deck, along with a 2500-watt gasoline generator, and storage for the rotator and coaxial cables. Either a tri-band quad for 10, 15, and 20 meters or a bunch of vhf beams could be carried on the roof. Inside there was a console to house an elaborate ham station, all hooked up and ready to transmit.

One of the photos shows the cabover kilowatt ready to work





A wooden tower trailer — or is it a guillotine? This is the prototype trailer, forerunner of the others described. Here it is shown with a small tribander, although it has been used with arrays as large as a 5-element 15-meter beam, which it will support at 70 feet. Note the diagonal braces from the wooden uprights shown at the right. They contact the ground to provide increased stability for the tower. A cable and turnbuckle between the legs provide tension to keep them firmly in contact with the ground.

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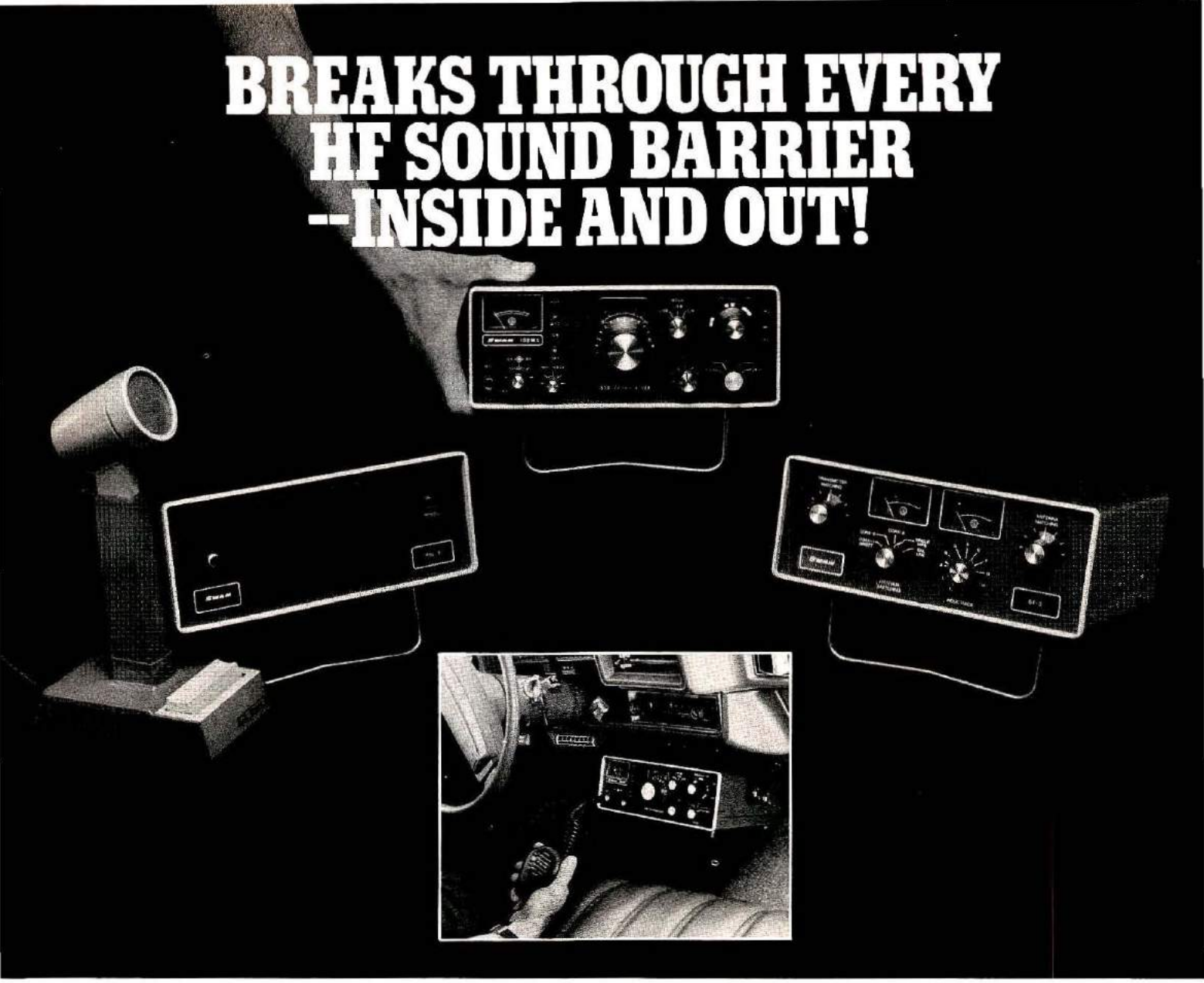

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Here's Will Anderson, AA6DD, at home ("What's a ham to do in a place like this?") going through the full sequence of getting on the air with his tower trailer. Notice the clock on the California Federal building in the background: From the moment Will arrives at his site until he has the antennas at full height is only 16 minutes, and three minutes later his generator is running and he's on the air!

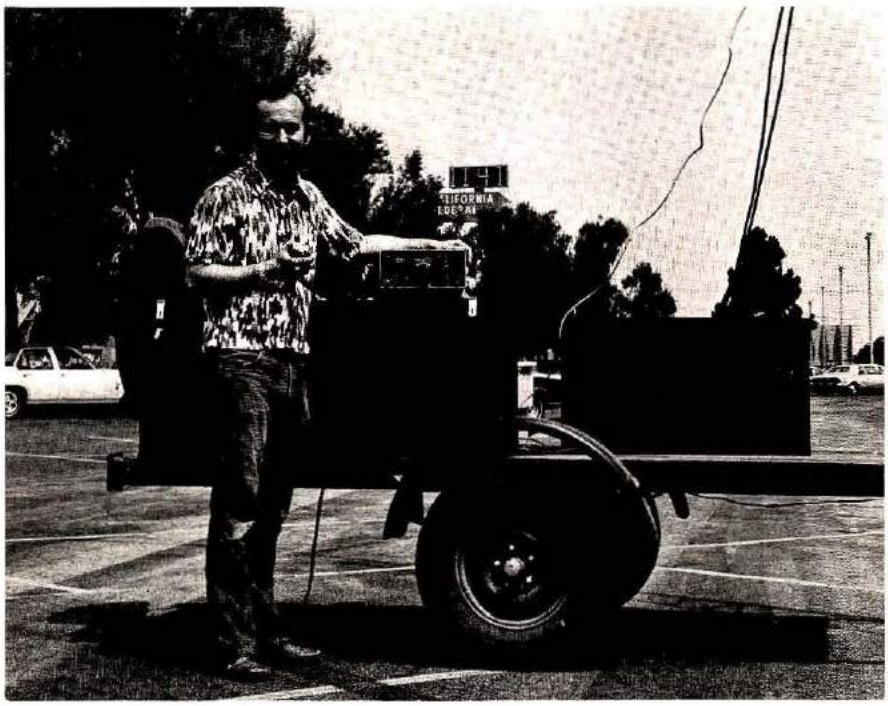
DX on 20 meters from the border of Canada's Yukon Territory. Another shows a rear view of the rig with Alaska's majestic glacier-carved mountains in the background.

Wherever I went with the "cabover kilowatt," I could be on 20 meters with a kilowatt and a beam in less than 20 minutes after parking for the evening. With a station like that, you're never out of touch.

"Cabover Kilowatt" the second

If the cabover kilowatt station was so good, why is all of this in the past tense, you ask?

Perhaps it's just human nature never to be satisfied. The cabover kilowatt was put out to pasture — sold to a non-ham as an ordinary camper and



truck, *sans* towers, generator, and radio gear. It's replacement is a one-ton truck with a bigger chassis-mounted camper. That means more room, a bigger and quieter electric generator with its own gas tank (no more pouring gas from cans), dual rear wheels, and, simply, more carrying capacity.

With this setup, the record is less than ten minutes from pulling to a stop to full operational status with a 20-meter beam up 40 feet. Not many home stations offer more operating convenience than this station on wheels.

Three hams and their trailers

Well, this is all very nice, you say, but it isn't very practical for you. Perhaps you're not ready to buy a big recreational vehicle and rebuild it into a rolling radio station.

There is another way to have a good portable station without that kind of investment, as illustrated by the following story of how three hams, all dissatisfied with the restrictions they faced where they lived, took a clue from the boating crowd and built homemade radio tower trailers, complete with generators.

Two of the trailers are small enough to be towed by a four-cylinder car and stored in an ordinary single-car garage. The third is bigger, a monster that carries a motorized 70-foot, self-supporting, crankup tower — one husky enough for stacked 20, 15, and 10 meter beams.

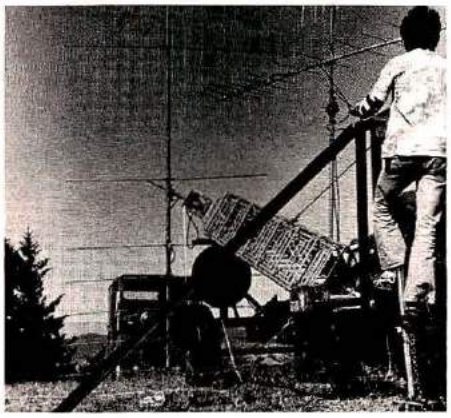
The three trailer builders (George Flammer, WB6RAL, who lived in a big apartment complex near Stanford University at the time; Will Anderson, AA6DD, who lives in an apartment in Anaheim, California; and I, a small-lot suburbanite tired of hostile neighbors, TVI troubles, line noise, and mediocre signals) talked it over.

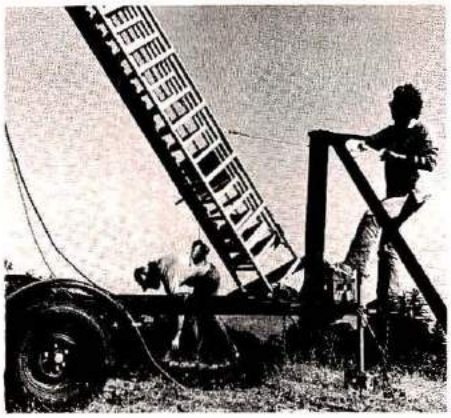
What Will and George wanted was triband beams or stacked vhf antennas up 40 or 50 feet on a tower, atop any mountain they might choose. They also needed 110-volt generators. A compact car had to pull it all up the mountain.

What I had in mind was a true monster; a 70-foot, trailer-mounted tower that was husky enough to support large stacked 20, 15, and 10 meter beams, plus a generator only slightly smaller than Con Edison's "Big Allis" plant on Long Island (New York).

At first, it all seemed like a pipe dream. Several manufacturers make just what we wanted — for the military, government agencies, and industry. For hams, the price is a bit prohibitive; up to $5000 for the trailer alone, not to mention the tower or electric generator. It's no wonder these trailers aren't targeted for the amateur market.

The DMV people were privately convinced it was really a portable guillotine for human sacrifices in the ritual of a secret religious cult, but they finally issued the license. The photos show this prototype trailer. It carries a 70-foot, light-duty, self-supporting crank-up tower and has proven to be functional — if not aesthetically appealing.





Here's George Flammer, WB6RAL, on an outing with his tower trailer. Fully extended, the tower supports a large beam 50 feet in the air. George's trailer is made of angle iron, and it, too, has braces to contact the ground for lateral stability. Don't stint on the boat winch used to raise the assembly; if it fails or slips, the heavy tower can do a lot of damage.

Moreover, building our own trailer seemed out of the question, because we knew nobody with any experience in that sort of thing. In desperation, I wandered into the showroom of a trailer-parts jobber for the industry and asked a lot of dumb questions. But I came out with an axle, wheels and tires, a set of springs, hitch couplers, and a lighting kit (I understood that part, since it was electrical). I knew nothing about welding, so the plan was to build a wooden trailer. I went to a lumber yard and bought enough four-by-fours and carriage bolts to pay for an 80 through 10 meter transceiver.

It's really a guillotine

Amazingly, the thing went together well. And even more surprisingly, I was able to persuade the California Department of Motor Vehicles to license the thing as a trailer.

But my friends were unimpressed.

Then a local amateur who is truly a master craftsman, WA6IKO, took pity and offered to teach me to weld. I bought an inexpensive ($110) ac "stick" welder and spent a weekend practicing on scrap steel. When it was over, I was no journeyman, but I was turning out structurally sound welded joints with the kind of steel used to build trailers. And my friend Will, it turned out, had some welding experience.

That settled it. George and Will put their chips down and we made another trip to the trailer-component jobber. We bought enough parts to open a small trailer factory (in fact, that's exactly what we said we were doing). Then we found an industrial steel supplier willing to do business with us and bought a ton of channel and angle stock. You should've seen the hoist operator's face when we pulled in with the wooden trailer and ordered him to drop the 20-foot lengths of steel on it!

Trailers for Christmas

Over the next Christmas vacation, my driveway became a trailer factory, much to the neighbors' consternation. We astonished everyone — most of all ourselves — when we actually produced three reasonably professional-looking steel trailers: two single-axle models for 40-50-foot crankup towers, and my tandem-axle monster for 1200 pounds of self-supporting, 70-foot tower.

So that's our story. The photos tell the rest. It took some time, but three hams with average mechanical aptitude built tower trailers that have proven to be dependable and stable.

Now George and Will can put up beams on any mountain they choose, after towing their trailers there (with four-cylinder cars). Both stations can be fully operational in less than half an hour.

As for me, I attract more attention than ever when I drive down the road. If you think that truck camper with a four-section crankup tower standing upight on the rear deck was an eye-catcher, picture that same truck towing a husky 70-foot crankup tower down the road (or up a mountain) on a tandem trailer! But let 'em stare — anywhere I go, I can get on the air with a five-element, 20-meter beam 70 feet up in about an hour's time.

You don't have to be a millionaire living in a hilltop mansion to have a big signal on the ham bands — any more than you have to own a place near John Wayne's to go sailing on Newport Bay! You just have to be as willing as sailors are to put your hobby on wheels.

Reference

1. Wayne Overbeck, K6YNB, "The Cabover Kilowatt," *QST*, August, 1971, page 48 and cover. **HRH**

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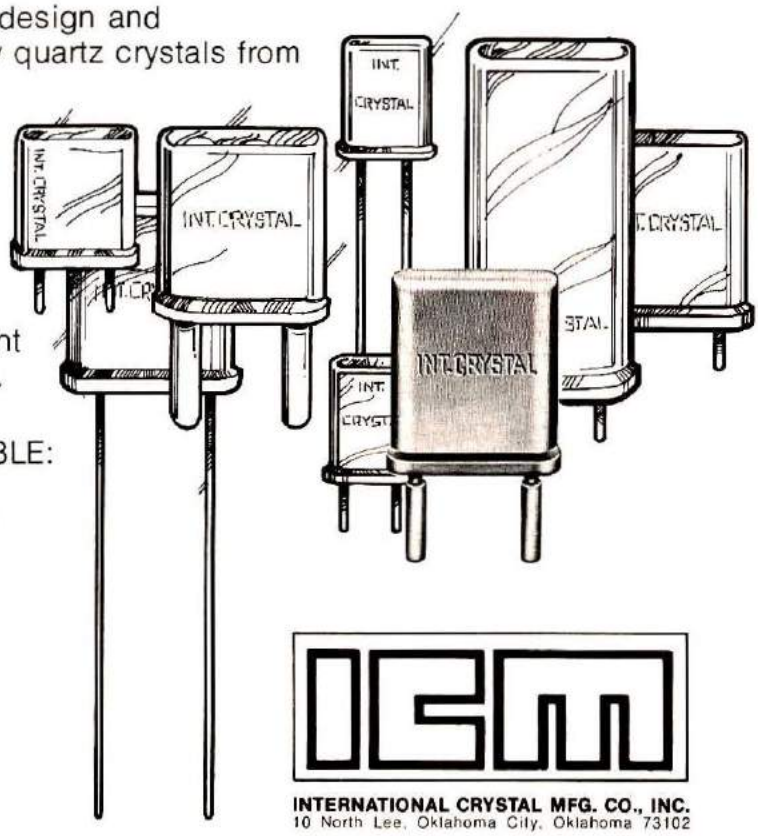

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A COLLINEAR CROSS FOR FORTY

Combining two antennas produces a composite pattern — or does it?

BY JAMES H. GRAY, W1XU

This antenna is not intended to be a multi-band antenna, and certainly not an ultimate design. Instead, it is one of a continuing series of experimental antennas I have tried in an effort to improve station performance while using simple, readily available materials. The results of my experiment proved interesting, and I'd like to share them with you in the hope that you, too, may find something useful.

Background

Before erecting this antenna, I had been using 40- and 80-meter inverted vees connected together at a common feedpoint and fed with 52-ohm cable through a 1:1 balun. These antennas were arranged at nearly right angles to one another and just about covered my small suburban lot. From an operational standpoint, they provided good general coverage in about all the directions I was interested in. As with all inverted vees, they were easy to prune to proper length for minimum VSWR at the desired operating frequency. The major drawback with these antennas was that they did not satisfy my urge to experiment!

I began by sketching different antenna arrangements and combinations that would fit within my small backyard, 23 × 30 meters (75 × 100 feet). I also made a list of features that I considered necessary and would try to achieve in any new design. These were as follows:

1. Coaxial cable feed
2. No tuner or matchbox
3. VSWR less than 2:1 over the entire band
4. Single support mast, if possible
5. Low cost, light, easy to put up
6. Reasonable appearance
7. Simplicity
8. Better performance than a dipole at the same height — at least in two desired directions

To obtain these features, I was willing to sacrifice two-band capability.

The collinear cross

Fig. 1 shows the results of my preliminary sketching. You will notice that the "backbone" of the antenna is a full wavelength on forty meters — not much different in length or arrangement from my earlier 80-meter antenna, except that it is fed off-center for reasons I will get into later. In other words, I began with what I had and worked from there. The length of the backbone was 40.85 meters (134 feet).

Several antenna reference books, including the *ARRL Antenna Handbook*, covered the merits of full-wave antennas where the currents in adjacent half-wave portions are either out of phase or in phase. In particular, the collinear arrangement seemed to fit my needs as set down in the

features list. Now, how about the omnidirectional coverage? Could I have my cake and eat it too? Why not combine a collinear with the former inverted vee dipole? Aha! I sketched the roof dimensions of my house and found that a forty-meter inverted vee would just fit, corner-to-corner! Now, if I only had room for that full-wave antenna...sure enough, it fit within the backyard with room to spare, and the two parts of the antenna could be arranged at almost right angles to each other.

The resulting combination should give me decent, all-round, directional coverage, but would the two antennas have to be fed with separate feedlines — one for each antenna? Frankly, I didn't know, but I had to find out. It certainly would be helpful if a way could be worked out to feed both antennas with the same coaxial line from the shack while meeting all the other goals I had set for myself.

Antenna theory to the rescue

The *Radio Engineer's Handbook*, eleventh edition, page 187, showed that a full-wavelength antenna could be fed at a point one-quarter wavelength from one end, and that the impedance should be about 100 ohms. On page 389 of the same book I found some information about collinear antennas, which stated that the impedance at the center of a half-wavelength section of a two-element collinear would be about 200 ohms. This was discouraging news, because it seemed to indicate that I could not combine the collinear backbone with the cross-piece inverted vee and feed them with a single coaxial cable of 52 ohms because of the various impedances present. Nevertheless, I hoped to find lower impedances in practice because these values were free-space values, and my own experience showed that dipoles and inverted vees at low heights always presented lower impedances than free-space values. Then, too, it seemed reasonable that two antennas, placed in electrical parallel at their feedpoints, would produce an impedance that was half of their sum. At worst, I hoped that the impedance would be about $\frac{100 + 50}{2}$ ohms, or 75 ohms — which would exactly match 75-ohm coaxial cable.

Physical considerations

As someone once said, "When in doubt, charge!" So I charged ahead at full speed to put up the antenna I had sketched on paper. The feedpoint of the backbone antenna would be one-quarter wavelength from one end, or 10.2 meters (33.5 feet). If I used a support located on the chimney, that quarter-wave section could slope down toward my front yard. It turned out that a lawn lamp was located at just the right distance for me to use is as a tie point for that part of the collinear.

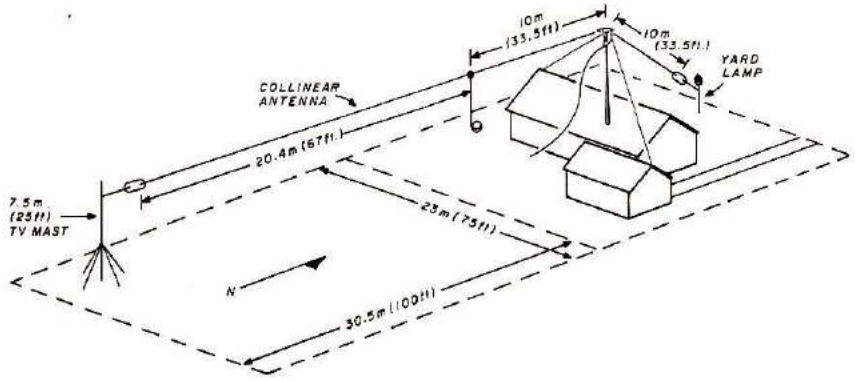


Fig. 1. An overall view of my house and lot, showing the arrangement of the antenna. A mast on top of the house supports the cross at the feedpoint. The short end of the collinear portion drops down to a lamp post in the front yard, and a tall mast supports the longer end near the back of the lot.

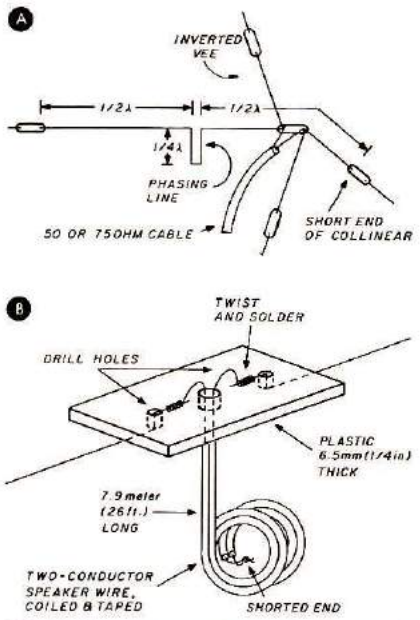


Fig. 2. The antenna is basically an off-center fed collinear (two half-waves in phase) with an inverted vee connected in parallel at the feed point, as shown in **A**. I made the phasing line from a length of speaker wire coiled into a compact bundle and taped together. A plastic block serves as an insulator and connection point for the phasing line and the antenna, **B**.

I used the same 1:1 balun at the feedpoint that I had used for the original combination, supporting the balun and feedline at the top of a 4.6-meter (15-foot) piece of TV mast by means of a small pulley and some nylon line that served as a halyard. Light pieces of nylon fishing line attached to some small plastic insulators at the end of each antenna wire were used to tie the inverted vee to some TV-type standoff insulators at the corners of my roof. The whole arrangement was light and simple, and the TV mast was easily attached to my chimney by means of a mounting bracket made for just that purpose and readily available at any TV parts store.

In the backyard I assembled two 3-meter (ten-foot) sections, and one 1.5-meter (five-foot) section of light TV mast tubing of the jam-fit type, to produce a 7.5-meter (25-foot) pole. At the

top of the pole I placed another small pulley and fed a length of light nylon line through it for later attachment of the antenna. I raised the pole and guyed it in place with more of the light nylon line. *Voila*! An antenna system — just about ready to go! In your own installation, you may want to use other supports and materials, depending on your own circumstances and desire for height, but that's up to you. As a final step, I attached the far end of the collinear backbone, by means of another small insulator, to the nylon halyard and hoisted away.

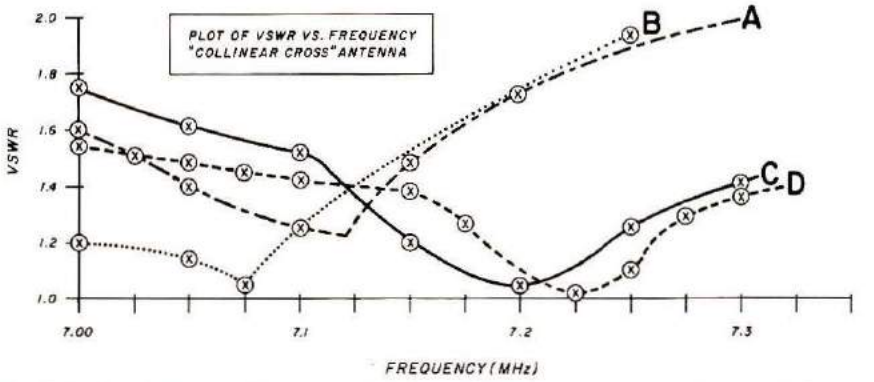


Fig. 3. A plot of vswr and frequency for the collinear cross antenna. Curve **A** is the result when the antenna was first put up. Curve **B** resulted after trimming 7.5 cm (3 inches) off the ends, curve **C** after trimming 23 cm (9 inches) from the ends, and curve **D** after realigning the arms for a 90-degree included angle.

Making the backbone collinear

You will notice that the backbone of the antenna was still a full wavelength long and broken only at the feedpoint. It was not yet a collinear antenna having two halfwave sections fed in phase, so that was the next step I had to face.

The references state that the two adjacent sections must be phased, meaning that the currents in each section should be in step, not out of step. To do this, you make up a phasing line to fool the current into getting in step. The phasing line is an electrical quarter-wavelength (at the operating frequency) composed of two-conductor line joined at point X, as shown in **Fig. 2**. I made up a light connector block of thin plastic to join the two sections of antenna together and to the phasing line. For the phasing line itself I used some two-conductor speaker wire I had lying around. Not knowing the velocity factor of speaker wire, I had to make some assumptions. You see, the physical length of a transmission line is usually *not* the same as its electrical length, because the propagation of a signal along the line is delayed in time by some amount that depends upon the characteristics of the line itself. For example, the velocity factor (delay factor by which the physical length must be multiplied to obtain the electrical length) for 300-ohm TV twinlead is about 0.84; for some types of coaxial cable it is about 0.67. For open-wire feedline, the factor is about 0.95. Since my speaker cord looked like TV twinlead, only narrower, I quite arbitrarily chose a factor of 0.75, multiplied it by 246 and divided this result by the frequency in megahertz $\frac{246 \times 0.75}{f\ (MHz)}$ to obtain a quarter wavelength dimension. This turned out to be 7.93 meters (26 feet). I cut the line to length and shorted one end by soldering the two conductors together. I connected the free end to my connector block, **Fig. 2**, with one conductor going to each "leg" of the collinear backbone. I did not want to have the phasing line drag on the ground, so I coiled it in a loose coil of about 25 cm (10 inches) in diameter and taped it with vinyl electrical tape to the connector block.

You, being much smarter and more precise than I, will not "fudge" things as I did. You will use a grid dip indicator, or similar instrument, to determine the exact electrical quarter-wavelength at your desired operating frequency. Consult ARRL's *Radio Amateur's Handbook* for details about this procedure. It's really simple! Unfortunately, when I did my experiment, I did not have such an instrument available.

Hoisting and tuning

The finished antenna is reasonably light and can be easily hoisted to the top of the masts by means of the nylon halyards. The mast hardly bent under the pull, so don't worry about that. When first raised, my own antenna was slightly crooked; meaning that the backbone was not exactly perpendicular to the crosspiece inverted vee. The result of this misalignment was apparent as an obvious pattern distortion, as I later found out.

Before trying the antenna, I wanted to make some measurements of vswr, so I cut a piece of coaxial cable into an exact half wavelength at 7.1 MHz. This is important, because it has the effect of electrically placing your transmitter and swr bridge *at the antenna*. I used this piece of 52-ohm cable as my feedline, and it turned out to be 13.7 meters (45 feet) long. If that piece had not been long enough to reach the shack, I would have made the cable exactly twice as long to preserve the necessary electrical length and make the swr measurements.

The curves in **Fig. 3** show the various stages of pruning my antenna. Yours will be somewhat different because of different droop angles of the inverted vee legs, different mounting arrangements, and different objects in the field of the antenna. However, your

results will be *similar* to mine, and should give you confidence that all is well.

Interestingly, you will note that the curves **A** and **B** were not smooth U-shaped curves as one might expect, but instead look like vees (no pun intended). However, after trimming by small amounts, as indicated in the graphs, I obtained curve **C**. After checking on-the-air results and noting some pattern distortion, I aligned the legs of the cross to make them more nearly perpendicular to each other (only a 10-degree change). Interaction between components is obvious, because the vswr curve changed, and the minimum occurred at a somewhat higher frequency, as shown by curve **D**. You'll also see that there was a general decrease of vswr over the entire band.

I did not measure the complex values of reactance or radiation resistance because I did not have the equipment. However it is probable that the assumptions about impedance were reasonably accurate because of the low height of the antenna and two antennas being fed in parallel. Suffice to say that the "plate" and "loading" capacitors on my TR-3 did not have to be changed to maintain the correct value of plate current between 7.0 and 7.3 MHz. That's an antenna I can live with!

As far as I am concerned, the antenna and feed system are satisfactory for my purpose and don't need further adjustment. You, however, may wish to make further improvements, perhaps by touching up the phasing-line length, for example. Just after finishing the antenna there were several days of heavy rain which soaked the antenna and phasing line. No change of the tuning or loading controls was needed, so I assumed that the line length was proper and relatively uncritical.

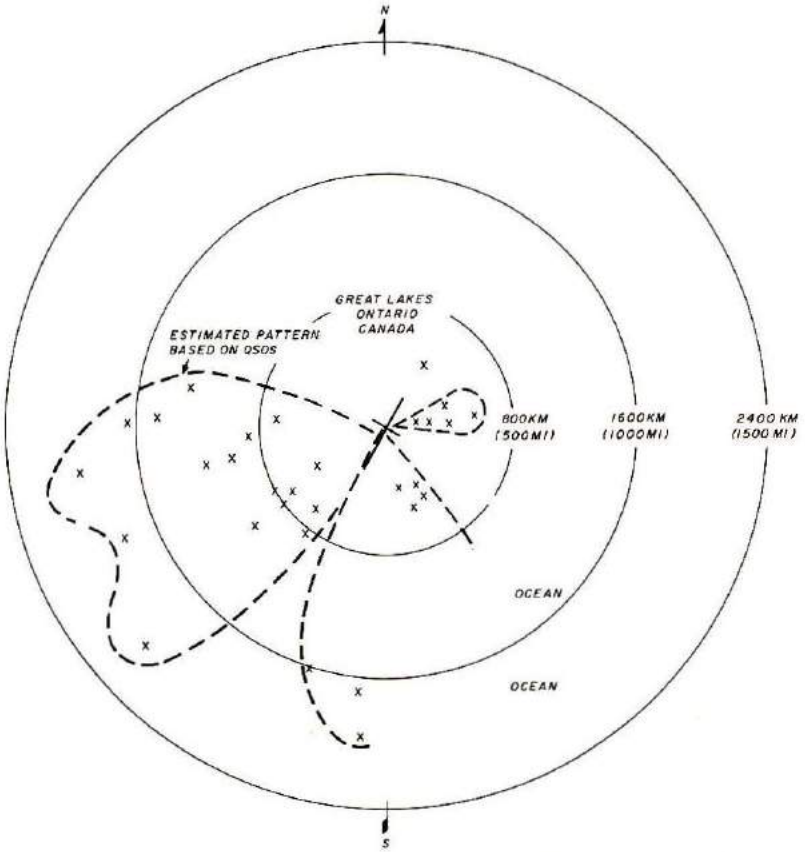


Fig. 4. A rough plot of the estimated pattern, based on stations worked and signal reports exchanged. The incomplete pattern to the south and southeast is due to a lack of stations — that area is part of the Atlantic Ocean.

On-the-air results

Performance has confirmed my hopes and provided a few surprises. **Fig. 4** is an azimuthal plot of contacts made during the first few days of operation. Instead of there being two major broadside lobes as expected from a collinear, there appears to be a single lobe which bisects the angle between the backbone and the northwest leg. A similar lobe to the south and east cannot, or at least has not, been verified thorugh on-the-air results. Here, again, I do not have antenna field strength measuring equipment to confirm or disprove the existence of such lobes. Perhaps the apparent lack of a lobe to the southeast is due to my East Coast location and the perfectly understandable shortage of stations in that direction.

Of equal interest is a minor and apparently high-angle lobe to the northwest, which includes the area I particularly wanted to reach on a regular basis for skeds, tests, and the like.

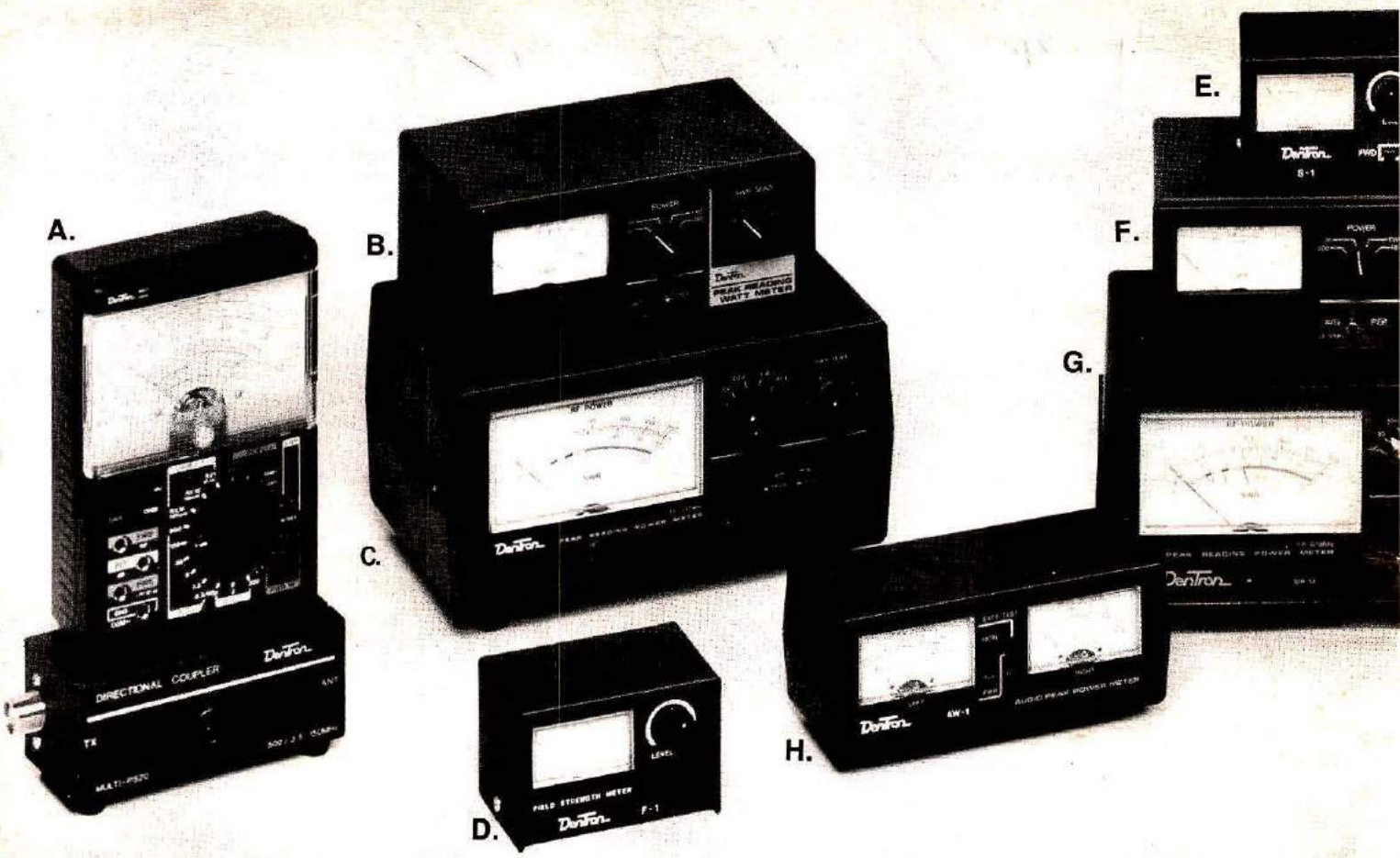
Crystal-ball gazing

These preliminary results indicate that another collinear element might be added to the short northwest leg of the antenna to provide additional gain in that direction and — perhaps — an additional lobe (or lobes?) in the northwest and northeast quadrants. A bonus effect of the short elements (crosspiece antenna) appears to be a fill-in of other directions.

Frankly, I've had thoughts about arranging the feedlines in turnstile fashion — by adding a 90-degree phasing line and driving one antenna in phase quadrature with respect to the other — to produce an omnidirectional pattern.

Well, I now have a good single-band antenna. Hmm...let's see, suppose I connected a feedline at the phasing stub, switched out the present feedline, could I feed it on 80? Or, how about...

HRH



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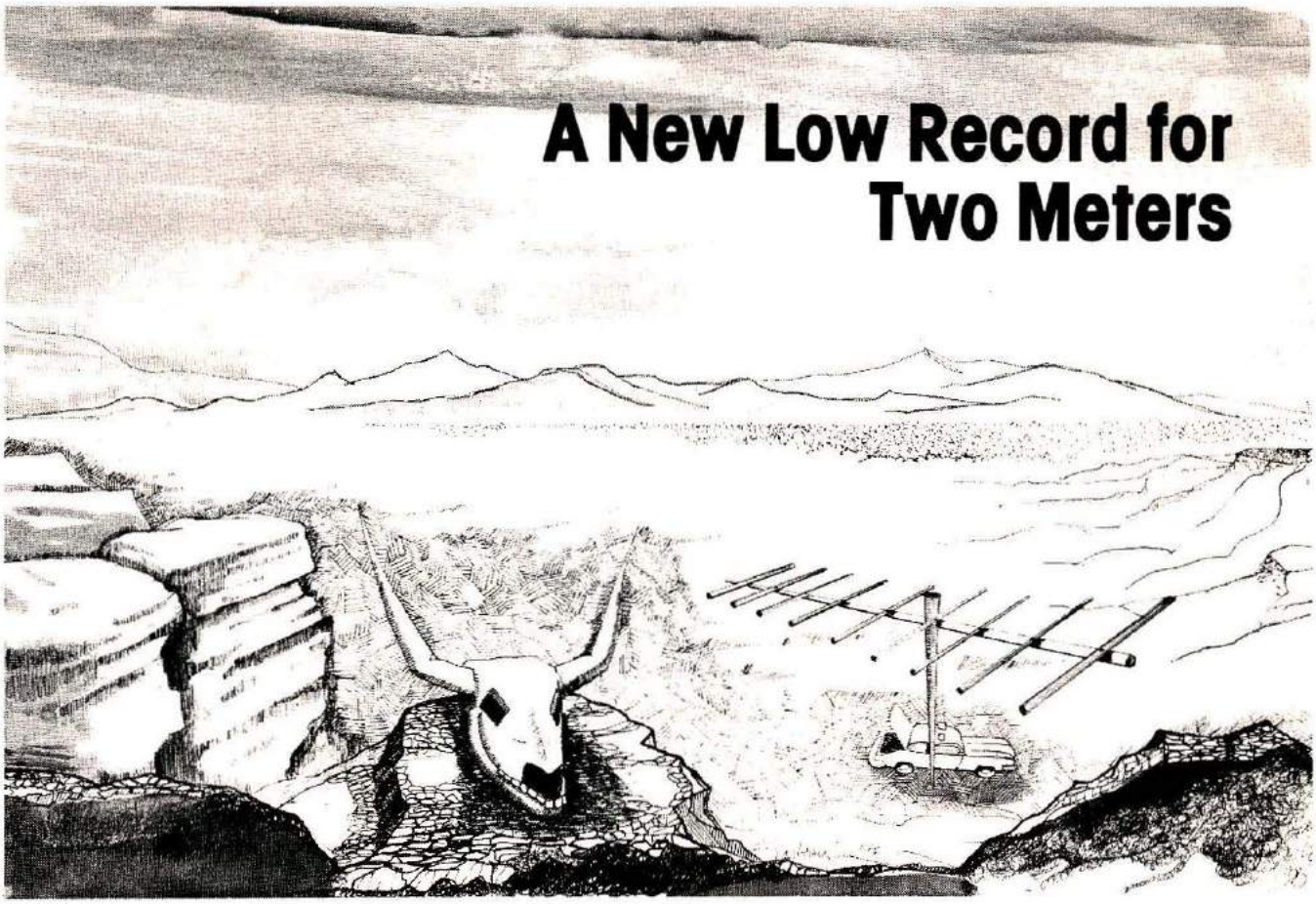


BY GORDON WEST, WB6NOA

With more and more vhf enthusiasts trying their hand at 2-meter single sideband operation, DX records are being challenged every day. Some enthusiasts scale the tallest peaks in an attempt to make their signals travel the farthest. There is considerable challenge in getting to these peaks, and once you're there, the signals literally travel "downhill" to their ultimate destination.

As an avid 2-meter sideband enthusiast, I decided we needed to establish a new kind of record — an all-time-low DX record for vhf. This goal would tie in with the final day of the three-day vhf conference in Las Vegas.

Death Valley Floor

The Death Valley National Monument contains the lowest point in the United States — 279 feet below sea level at Bad Water, Death Valley. This location is sandwiched between two towering mountain ranges — one to the east at 5000 feet, and one due west at 11000 feet. Needless to say, trying to push a vhf signal out of this spot would indeed be a challenge.

Suzie, WA6BWH, and I left the Las Vegas vhf conference early in the morning while the officials were still wrapping up the antenna-measuring contest. WA6CAX, Bill Alber, with all the camping supplies, joined us at the entrance to the Death Valley Monument. Suzie and I had all of the radio equipment. Our below-sea-level station would consist of an Icom IC-201 and an IC-202 as a back-up unit. Both would be powered by 12 volts from the car battery. We had a set of jumper cables in case we depleted our battery in the height of our excitement. The transceiver output was then fed into a TPL 250-watt power amplifier. A KLM 160 power amplifier was brought along as a spare. From the power amplifier, coax led the rf up a 17-foot vaulter's pole (from Sky Pole, Inc.), and into a KLM 16-element horizontal beam. The feed was RG-8X, 52-ohm cable. A back-up beam antenna consisted of a circularly polarized beam to counteract multi-path phase distortions, if needed.

Scorching Hot

It's about a three-hour drive to Bad Water, once you enter the National Monument area. The lowest actual point in the United States is inaccessible by vehicle, so rather than lug all of the equipment down to the exact spot, we chose a spot nearby where we could park slightly off the roadway. When we neared the lowest point on the continent, the temperature was over 122 degrees Fahrenheit. Whether this was in the shade or in the sun we don't know. It was just

hot. Everything melted — decals peeled off the windows, cigarette-filter glue began to run, all the white plastic waste-paper baskets collapsed — it was unbelievable. We spotted the location where we were permitted to park, and took the direct route rather than the recommended gravel road. After about 30 feet, Bill's Cadillac became helplessly bogged down in the soft sand. This we didn't need in all that heat. It took one hour of digging and throwing rocks into the holes before we were able to pull him out with our station wagon. What we didn't realize was that, as we were digging sand from under the tires, we were losing valuable body fluids through evaporation.

I just can't believe this heat. Are you sure the pioneers got to California this way?

Heat Exhaustion

Once we arrived at our location — probably about 260 feet below sea level — we all became dizzy, nauseated, and we knew we were becoming the victims of the intense heat and dry air. We couldn't even put up a makeshift tent. We just collapsed in any shade available — under the cars — and stayed there, drinking copious amounts of fluids. It was almost three hours before the sun at last began to dip behind one of the 11000-foot peaks. We couldn't even think about ham radio during any of that time — we just lay there, stunned at the predicament we were in.

Once out of the direct rays of the sun, we started coming back to life. Although the actual sunset was still almost three hours away, the shade of the mountains provided a great deal of cooling. We began putting our station together. Suzie connected the transceivers and power amplifiers, while Bill and I began work on the beam antennas. As is common with all beam-antenna assembly procedures, a small tear in the outside carton had allowed undisclosed amounts of nuts, bolts, and screws to escape undetected. Beam manufacturers would do well to repackage all the small hardware in a heavy indestructible bag that will resist being torn open in shipment. As we proceeded to assemble the beam, we also discovered that many of the holes in the boom did not align. Add extreme temperatures to this whole assembly procedure and you can expect a great deal of consternation.

By the time Bill and I had the beam assembled, Suzie had all of the transceivers and power

The next time you want to get stuck in the sand, Bill, pick a cooler day!

How do you divide one package of hardware between two beams?

amplifiers operational. Two separate power feeds were used on the power amplifiers and transceivers to prevent distortion of the sideband signals due to the considerable voltage drop caused by the amplifiers. This worked out well and I can recommend it for anyone involved in portable ssb operation. The TPL power amplifier consumes approximately 40 amperes at 12 volts; the KLM 160-watt amplifier consumes approximately 20 amperes.

Our "Sky Pole" pole-vaulting stick was one of the best investments ever at $20. It was sturdy enough to hold both 16-element beams, yet weighed only 6 pounds. It went up like a snap and we anchored it to the station wagon.

At 6:00 PM our station was operational from the lowest point in the United States. Everything was performing prefectly until the dc power supply in the IC-201 failed. No problem here — we switched on the 110-volt ac inverter. After a few minutes, the TPL 250-watt power amplifier gave up the ghost, probably because of too high a surface temperature on the black box itself. (When it cooled, it came back to life!) We switched to the KLM 160 and were back on the air again. There were no problems with the beams or coax.

We operated on a schedule of calls to the west on the hour, to the north at 15 minutes past the hour, to the east at 30 minutes past the hour, and calls to the south at 45 minutes past the hour. This schedule was to be run until midnight, on a frequency of 144.2 MHz. After an hour of operating, our spirits began to fade. No signals, little sun noise, and diminishing hopes of reaching anybody from the Death Valley floor. What else could go wrong?

Wind Storm

Well, we found out — just when we thought we were at our lowest point in both location and morale, we could see huge dust clouds approaching. We knew we were in for one walloping wind storm. When it hit, it riddled the front of the car with an excellent sandblasting job. Bill's anemometer recorded wind gusts as high as 65 knots. Visibility was cut to almost zero, and all three of us, calling CQ, huddled in the back of the station wagon. Inadvertently, when we were calling to the west, we had the beam actually pointing south/southwest. We heard signals suddenly, out of nowhere, over all the wind noise. The first call we heard was W6GGV. He was immediately followed by K6ODV, who said our signals were 5 by 7 and still increasing in the Los Angeles area — a distance of more than 250 miles, but crossing 11000-foot peaks scarcely three miles away. We were making it! We were so dehydrated that we took turns doing the talking. One would drink and keep the log, another would do the talking, and the third would keep the antenna pointed in the right direction. After about 15 minutes, we would rotate the beam to a new heading, and all change jobs. It was like musical chairs — the

Bill, this element is not long enough — are you sure it's for a 2-meter beam?

most uncomfortable being that of the guy outside holding the beam, with the wind sandblasting him.

Refractions And Reflections

The towering mountains caused signals to come in as much as 40 degrees from where we thought they should. When working into Los Angeles, we needed to turn the beam antenna directly toward an 11000-foot peak for maximum reception. Phase distortion was not a problem, so consequently we used only the 16-element horizontal beam. The following Los Angeles stations were worked and will receive a special "NOA's Ark" QSL card, commemorating a contact on 2-meter ssb with the lowest point in the United States: W6GGV, K6ODV, WB6WLR, WB6ESQ, and WA6AXA.

Although stations in the San Francisco Bay Area were heard, their signal levels were not adequate for a complete QSO. At one time a meteor burst resulted in signals being received from Boise, Idaho, but again, no complete QSO. The Las Vegas boys were also faint and unreadable. This is probably because we were too close to the hills directly between Las Vegas and our lowest-point operating position.

For the best reception of the Los Angeles stations, the beam had to be elevated to about a 35-degree angle, pointed directly at the peak of the 11000-foot obstacle. If the beam was left horizontal, signals were down 3 dB. There's undoubtedly truth in the theory that vhf signal propagation is acheived by knife-edge refraction. Some experiments with the Los Angeles stations included aiming our antenna at other high mountains, and signals rose appreciably. There was a 10-degree or so window where the Los Angeles stations would come in Q5, S3.

HF Coordination

We also used an Atlas 210 on 3815 kHz to coordinate our calling times with the surrounding stations. At nighttime the signal levels were well over S9 on the low bands, after Bill rigged up a dipole antenna among the cactus bushes. It worked out much better than our 80-meter vertical whip. By coordinating on 3815 kHz, it gave us a better idea of what the Los Angeles statons were doing, and how many were still on around midnight. At midnight we decided to close down because the wind gusts were approaching 65 knots, and the noise almost drowned out the signals coming in over the receiver. There was almost an inch of sand on everything, and in everything, including the radios and our ears.

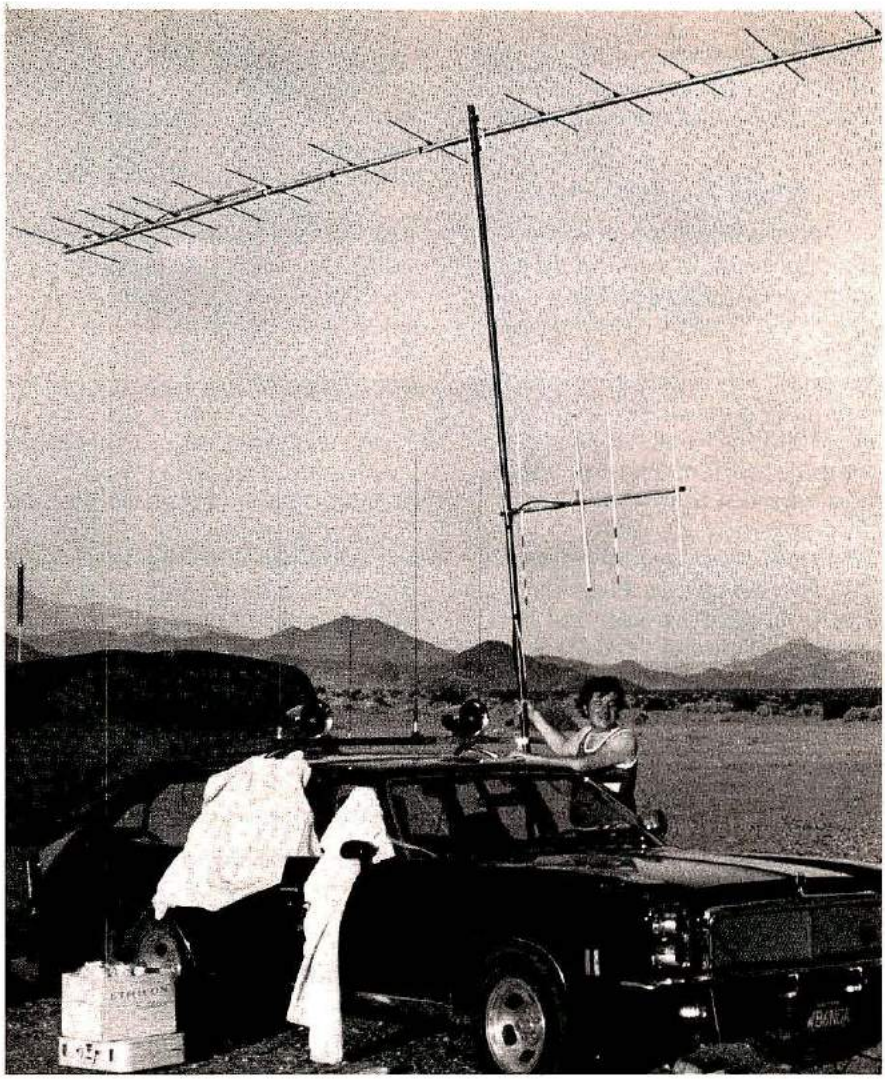
Hurry up and tighten that bolt — the boom is scorching my hands!

Hang on, Suzie, this is the last hole.

Just prior to shutting down the operation at midnight, Bill took the IC-202 and walked out a few hundred feet into the wind. He told us to listen on 144.2 MHz. Suzie found his signal and worked him — another new record! It was just after midnight, May 15, and they were probably the first with Technician Class licenses to operate legally on 144.2 MHz. As they were exchanging signal reports and cheers on their newly established record, I crawled into the back of the wagon and promptly went to sleep.

Low-point Conclusions

The first conclusion is that you don't have to be on a hilltop or high ground to make long-distance contacts on 2 meters ssb; we proved that at 260 feet below sea level, with



I know Los Angeles is the other way, but the wind isn't!

high mountains directly between us and the stations we were working. Our second conclusion is you don't need a great deal of power to make these contacts — at times we switched from 160 watts down to 10 watts and the signal was still there. The third conclusion is that receiver sensitivity is extremely important, and the inclusion of a good preamplifier in your receiver circuit is essential for picking out the weak ones. Many new power amplifiers have built-in preamplifiers, a definite advantage.

Another conclusion is that you always need a backup for everything — radios, converters, antennas, feedline, you name it. Almost everything we brought along needed some sort of backup. For field-day operation, two of everything is essential. The need for shade in Death Valley was another lesson; seeking shelter from the sun underneath your car leaves much to be desired. Also, plenty of water is necessary; not just quarts of water — gallons of water. Some you drink, some you rinse your dry mouth with, some you pour over your head, some you stick your feet in, and some you don't know where it goes but it just seems to disappear.

The final recommendation is to go out there and do it! If there's an area in your part of the country that needs to be explored by vhf radio, then go to it. The Death Valley vhf DXpedition certainly proved it can be well worth the effort.

HRH

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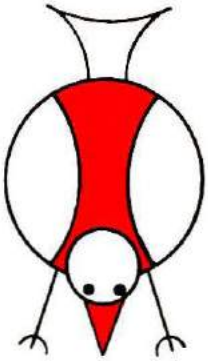

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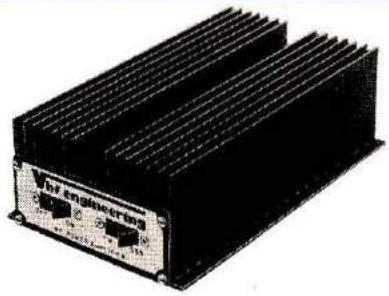

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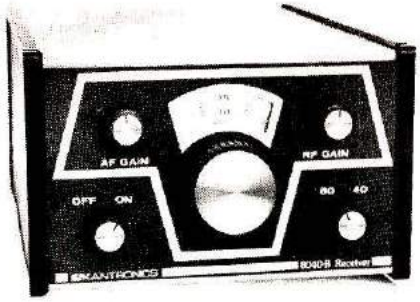

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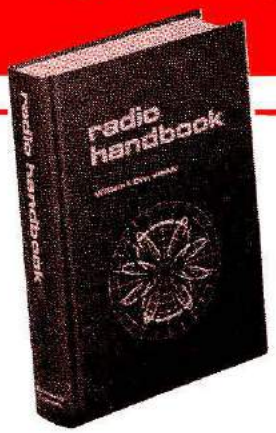

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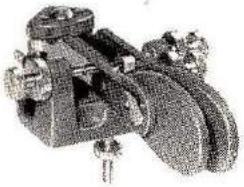

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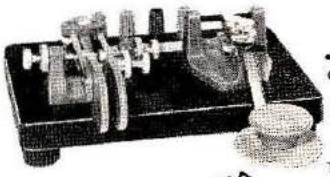

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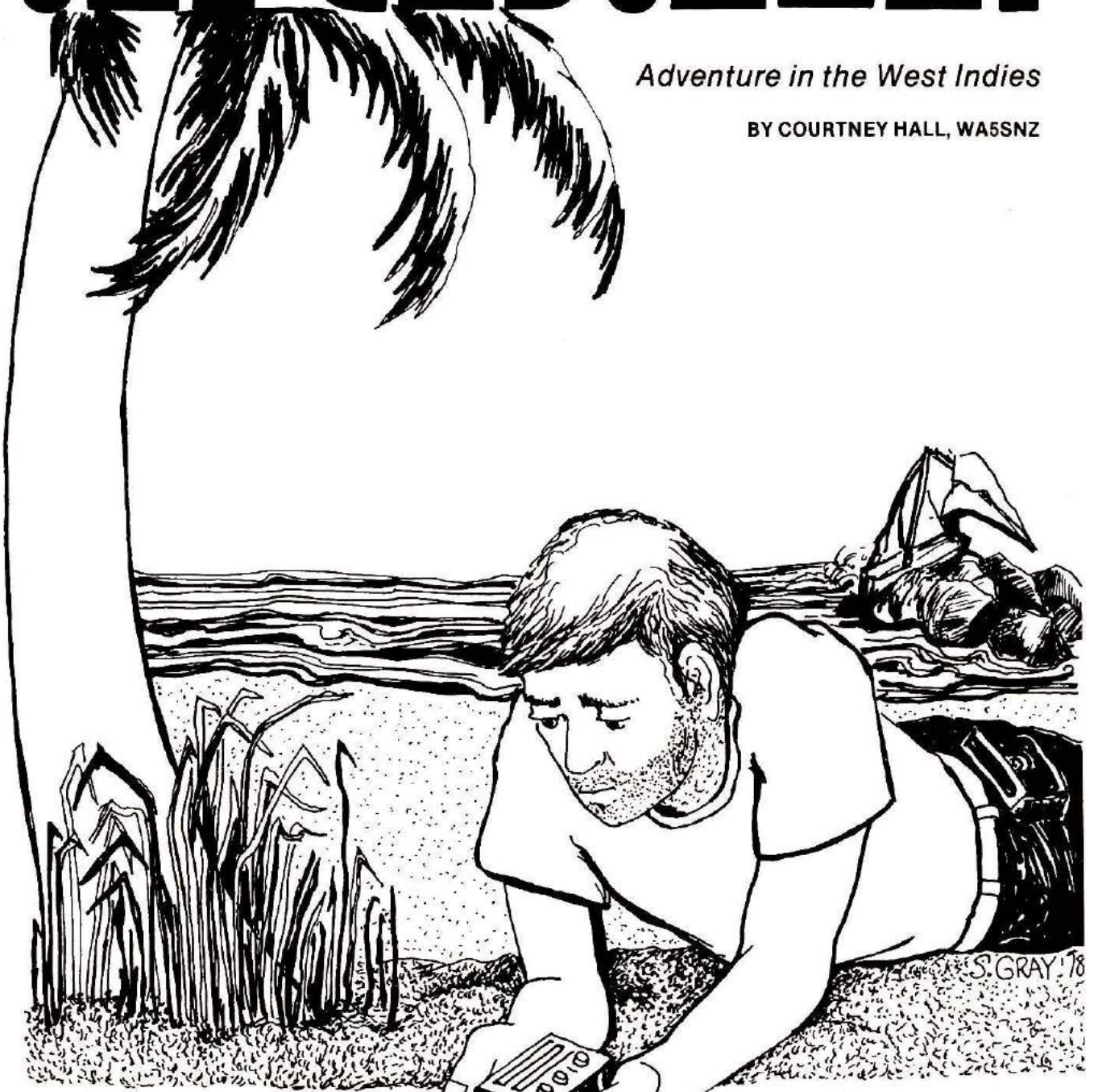
THE CASTAWAY

Adventure in the West Indies

BY COURTNEY HALL, WA5SNZ



The scene: Pete, a vacationing ham, lies injured somewhere on an island in the Bahamas. He started out from Nassau in a rented sailboat, got caught in one of the sudden storms that prevail in those latitudes. and was washed ashore. But Pete has something going for him — his skills and knowledge as an Amateur Radio operator.

Consciousness was gradually returning. He had a terrible headache, and a sharp pain was shooting up his leg. Suddenly, Pete was awake. He tried shifting his body to ease the pain — there, that was better. He raised his head and squinted in the glare of the sun. He was on a sandy beach near the water's edge. Palm trees lined the upper edge of the beach, with thick foliage covering the ground. The blue sky was covered with small, low-hanging cumulus clouds, isolated from each other like a thousand islands, and the wind carried them steadily on their way.

Memory returned: slowly at first, then racing to the point where it vanished. Pete and Cynthia Evans had come to Nassau on vacation — a sort of second honeymoon. They'd been promising themselves a trip like this for years, and the past week had been all they'd dreamed it might be. The strange beauty of the tropic islands, balmy nights, exotic food, and time to relax. It was easy to forget the routine of home.

Cynthia was afraid of the ocean, but Pete had taken quickly to the small sailboats for rent on the beach. He'd never done any sailing before, but the little boats were lots of fun and easy for one person to handle; just the one sail and the rudder handle — or did they call it the tiller?

Pete's fascination with boats intensified with each new skill he learned, and the hours flew by as he watched his sail capture the wind and thrust the boat through the water. Then there was the sudden storm. When was it? It must have been late yesterday afternoon. It seemed to come out of nowhere. Pete put on his life vest and made for shore, but the friendly breezes had turned fierce and harsh, thrusting him farther out to sea. It started to rain. Darkness fell. Gentle swells had changed to heavy waves, and the wind tore at the sail.

Pete had just started to take in the sail when the mast snapped and he fell backward. His mind held no clue to events after that. Somehow,

he'd been washed ashore. But where? There was no trace of the boat in view.

Pete eased up his pants leg to assess the damage. His right leg was swollen badly above the ankle, the color of the tight skin blending from varying shades of purple into red. It hurt too much to even think about walking or crawling. He was perspiring. The sun was high and the clouds were dissipating rapidly. He'd have to get to the shade of the trees, some thirty yards away.

Slowly, Pete experimented to find the least painful method of dragging himself across the sand. Moving on his left side seemed best. He began to inch his way up the beach, letting his vision wander out across the incoming waves. What was that? It looked like a silvery balloon bobbing in the water a hundred yards or so out. He stopped and watched it intently as it dipped with the motion of the sea. Yes. It was moving very slowly toward shore.

Cynthia Evans quietly paced the floor of the hotel room. She wasn't ready to accept the idea that Pete was gone. Too nervous to sleep, she'd spent the night staring out her window at the storm, and the strain was beginning to tell.

She jumped at the sudden sound of a knock at the door. The visitor was a short, stocky man, holding his hat over his chest.

"Mrs. Evans?"

"Yes?"

"I'm John Colton. From the police. We talked on the phone early this morning." It took her a moment to sort out her thoughts and realize what he was saying.

"Oh, yes. Mr. Colton. Please come in. Please excuse me — I'm very upset."

"I understand, ma'am," he said softly. They sat down. Cynthia thought Colton seemed a bit grim, as though he had an unpleasant task ahead of him.

"We've had planes and boats looking for Mr. Evans since dawn," he said. An uncomfortably long pause. "That was a terrible storm last night. His boat could have been blown a very long distance. He had a life vest, though, so even if the boat sank . . . ." He didn't seem to know how to finish the sentence. She sensed his nervousness.

"How long will you search?" Her candor caught him off guard. Colton coughed and cleared his throat. "Well, ma'am, we'll keep looking for the rest of the day and most of tomorrow for sure. And longer if we find anything — that is, any traces of the boat." He cleared his throat again.

"Is there any possible way I

can help?" she asked.

"That's why I'm here, ma'am. Can you tell me anything more about your husband, what he was wearing, what he had with him? Just try to relax. Tell me anything that comes to mind."

With conscious effort Cynthia managed to relax a little. "I'm afraid I wasn't very helpful on the phone this morning. Yes, I do remember now. Pete was wearing a white tee shirt, khaki pants, and sneakers. He had a portable radio, a couple of sandwiches, and a thermos of water."

"Can you tell me anything about the radio he had?" Colton was scribbling notes on a small pad.

"Just a small a-m/fm portable."

"Anything else? Anything at all?"

"Oh, yes, he bought a small pocket compass when he got the thermos." She thought a moment. "I guess that's all, except he had one of my large plastic bags in which he kept the radio and sandwiches. He was afraid they'd get wet. It was a bag with a plastic zipper so you can seal it." Colton scribbled more notes.

"I see. That's fine, Mrs. Evans. Now if you could just tell me a little about your husband. What he does. Is he good with sailboats? Does he have any hobbies? Anything at all about him. You never know what bits of information will prove helpful."

"As far as I know, he'd never sailed a boat until we came here. He enjoyed it very much, though. He's in electronics — a consultant. He keeps very busy and doesn't have much time for hobbies. He used to play golf . . . and he has an Amateur Radio station at home, but he hasn't had it on in some time."

"Um-hmm," mumbled Colton, still scribbling on his pad. "Was he ever in the military?"

"Yes. He was a pilot in the Korean War."

Colton arose and closed his pad. "Well, I know you must be tired, Mrs. Evans. Try to get some rest, and we'll contact you as soon as we hear anything."

"Thank you, Mr. Colton. I appreciate your coming."

Colton handed her his card as he left. "You can reach me at this number."

The balloon-like object bobbed in the surf just a few yards from shore. Pete remembered sealing the zipper on the plastic bag soon after the storm began. The warm rays of the sun had caused the air to expand inside the bag until it had almost the shape of a stuffed pillow. He could see the red and white of the radio's plastic case in the bottom of the bag. Painfully, he turned his body on the sand and elbowed his way down to the water's edge in time to retrieve the bag as it washed aground. He grabbed a corner of it between his teeth and began the torturous journey up the beach to the trees.

He was very tired and thirsty by the time he reached the trees. Opening the plastic bag, he found the radio and one cheese sandwich, still dry. He was hungry, but eating might aggravate his thirst, so he left the sandwich in the bag. The radio was still working. Pete picked up some music. He listened until there was a news break.

"Searchers are looking for Peter Evans, lost yesterday afternoon when his small sailboat was caught at sea in a sudden storm. No trace of his craft has been sighted, but authorities say it's too early to form any opinion of his fate."

Pete turned off the radio. In the distance he heard the faint drone of an airplane engine. Raising his head, he scanned the horizon and the sky above him but saw nothing. He wasn't even sure from what direction the sound was coming. Then it was gone.

Pete dozed for an hour before being awakened by the throbbing in his leg. The sky was clear now, and the early afternoon sun blazed down. Though shaded by a grove of trees, Pete was perspiring freely in the high humidity. He realized he would not last long without water.

Perhaps there was fresh water inland but he doubted he could negotiate the foliage with his bad leg. If he got in there and couldn't get out, they might never find him. Besides, there might not be any water within his range, whatever that was. Pete was afraid of snakes, too, and he felt sure there must be several poisonous types in these islands. No boats came into sight, and he heard no more planes until a large passenger jet flew overhead at dusk. Cynthia would be very worried, and he wished he could tell her he was all right.

When the moon rose, it cast beautiful yellow reflections on the rippling sea. Pete's mouth was very dry. How long would they search for him — two days, a week? How long could a man survive without water? What could he do to help himself?

He took inventory. One a-m/fm radio, one cheese sandwich, one plastic bag. One pocket knife, a pair of fingernail clippers, a wallet with credit cards and money, a handkerchief, a compass, a wristwatch, and a life vest.

His most immediate need was water. Long ago he'd seen a television program about plane-crash victims stranded in a Mexican desert. Somehow they'd used a thin sheet of plastic to condense moisture from the air. They'd used a stick and made a little tent with the plastic.

Let's see, how would that work? Air, carrying moisture, could enter around the edges of the tent. Trapped and warmed by the sun, the air would rise to the top of the tent. But as air becomes warmer, it can hold more moisture, so why would water condense on the plastic? Maybe it wouldn't work, but

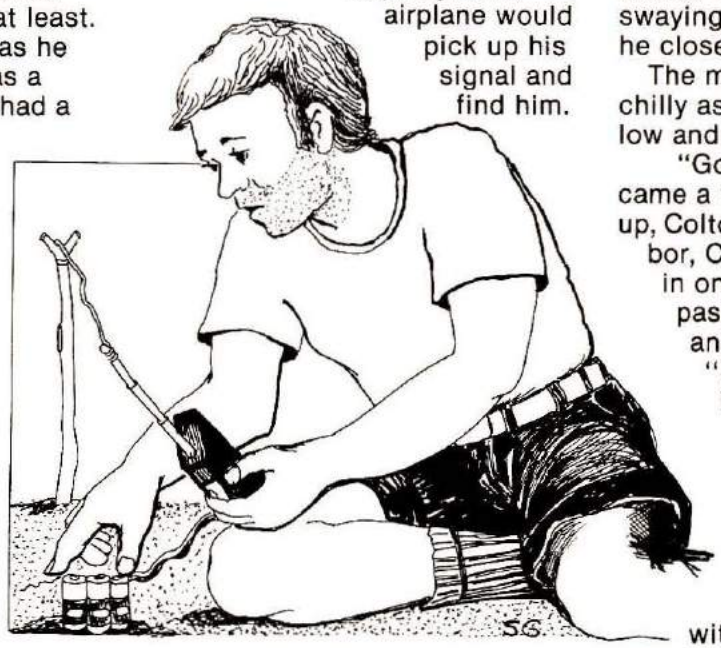
maybe it would. Pete decided to get started on it first thing in the morning.

Was there anything he could do to aid in his rescue? He took stock of his skills. He was good at electronics; he'd designed and built his own ham gear, simple as it was, and he knew Morse code. No outdoor skills, though; even a lousy golfer. He knew something about flying and aerial navigation, *circa* 1953, at least. Pete smiled to himself as he thought that now he was a shipwrecked sailor. If I had a ham rig, he mused, I'd be home free. Wishful thinking.

The portable radio on the sand beside him caught his attention. He'd put alkaline batteries in it before leaving home and it hadn't been used much, so they should last for some time. A few months ago, a tantalum capacitor had failed in the radio, and he'd taken the set apart to make the repair. There was a small schematic of the receiver pasted inside the back cover. Pete remembered being curious about the frequency of the local oscillator in the fm tuning portion. The intermediate frequency was 10.7 MHz, standard for fm, but he hadn't known whether the local oscillator was tuned to a frequency 10.7 MHz above or 10.7 MHz below the received frequency.

To satisfy his curiosity, Pete had placed the portable on the stereo receiver in his den and listened for the portable's local oscillator while tuning the stereo. By setting the dial of the portable to 90 MHz and listening to the thermal noise being quieted when the stereo was tuned to about 100.7 MHz, he determined that the portable's local oscillator was always 10.7 MHz *above* the frequency reading of its dial.

The fm-broadcast band is 88 to 108 MHz, so the receiver's oscillator would tune from 98.7-118.7 MHz. That was interesting. Pete recalled from his flying days that the vhf omnirange band, used for aerial navigation, covered about 108-118 MHz. If he could somehow use the local oscillator in the fm receiver as a transmitter, maybe an airplane would pick up his signal and find him.



But let's see — how many VOR channels are there? As best as he could recollect, the omni receivers in the planes had frequency dials that allowed you to set the frequency to the nearest tenth of a MHz. If that were true, there would be ten channels per MHz, or one hundred channels in the VOR band. One chance in a hundred of being heard any time he was transmitting! Much less than that, really.

The portable's battery pack contained six penlight cells, so the total supply voltage was about 9 volts. The oscillator circuit probably didn't draw more than a couple of milliamps, so his transmitting power would be something less than 18 milliwatts. That would never overpower any VOR station to which a plane's receiver might be tuned. Besides, pilots didn't *listen* to VOR stations except to make positive identification — they just watched an instrument whose needle told them if they were on course.

Pete faced the reality that such an attempt to contact a plane had very little hope of success. But his alternatives were also very limited. A gentle breeze floated in from the sea. He rested his head on the life vest and looked up at the stars through swaying palm branches. Soon he closed his eyes and slept.

The morning air was a little chilly as Colton left his bungalow and walked to his car.

"Good morning, John!" came a familiar voice. Looking up, Colton saw his retired neighbor, Charles Biddle, engaged in one of his common pastimes: fooling with the antenna on his roof.

"Hello, Charles. Looks like we're going to have a nice day."

"Righto!" said Biddle, with his usual enthusiasm. "Any trace of that Evans chap?"

"No, nothing yet," said Colton. "I talked with his wife yesterday. He's an Amateur Radio operator like you."

"That so?" said Biddle, resting a moment.

"Yes. By the way, Charles, what would you do if you were washed ashore somewhere, and all you had were some sandwiches and a portable radio?"

"Well," laughed Biddle, "I'd eat the sandwiches and listen to the radio, I suppose." Colton stared up at Biddle through narrowed eyes. He'd never appreciated Biddle's sense of humor.

"No Charles. I mean, is there any way an amateur could use a portable radio to send a message for help?"

"What kind of portable radio is it?"

"Just an ordinary a-m/fm radio." Biddle fingered his neat, white mustache a moment before replying.

"Guess I'd see if I couldn't figure some way to rig a low-powered CW transmitter — that's Morse code to you. Couldn't do much without tools, though."

"How would that work?" asked Colton.

"Pretty good," smiled Biddle.

"Come on, Charles, a man's life may depend on this. I mean, on what frequency would you transmit?"

Biddle thought a moment. "Now let's see. With no tools, I'd be stuck with the local-oscillator frequencies. It wouldn't be practical to use the a-m band, because an effective antenna would have to be too large. All I'd need for an fm band antenna, though, would be a few feet of wire, which might be scrounged from somewhere inside the set."

"But what frequency, Charles?"

"That would depend on whether the oscillator tuned above or below the signal frequency. If it were below, I could transmit from about 78-98 MHz. If above, it would be from 98-118 MHz. Odds are it would be 98-118."

"Thanks, Charles," said Colton, scribbling the numbers in his pad.

"Good luck!" said Biddle. He waved as Colton drove away.

Pete was awake early. The pain in his leg was a little better, but the swelling had not gone down. His mouth felt like it was full of cotton. He took his knife and slit the edges of the plastic bag so that he ended up with two sheets of plastic about two feet square. After cutting some branches from a nearby bush, Pete crawled into the sunlight and made two tepee-like tents, piling sand on the edges to hold them down but leaving an opening at the bottom of one side for air to enter. Satisfied with the arrangement, he crawled back to the shade and picked up the radio.

Using the nail-file as a screwdriver, Pete began to work loose the six screws that secured the back cover. They were tight, and this task took a little over an hour. He studied the tiny schematic inside the cover and found the fm oscillator coil. By process of elimination, Pete quickly located the coil on the circuit board. It was just a few turns of bare copper wire. How could he match a low-impedance antenna to it? Tap it a short distance from the cold end? But how far? Use a one-turn link made from another wire?

Pete stopped a moment and thought. He'd never fed a half-wave dipole antenna from its end, but he'd read about it. It presented a high-impedance load — several thousand ohms. He decided to try it: just hook one end of a half-wavelength conductor to the hot side of the oscillator coil. The whip antenna on the radio looked to be just over two feet long. What was the formula for the length of a half-wave dipole? You divide the frequency in MHz into 468 to find the length of the antenna in feet — one of those formulas he'd used too often to forget.

Writing in the sand with his finger, Pete calculated that the antenna should be about 4.1 feet in length for a frequency of 113 MHz, the middle of the aircraft VOR band. He needed two more feet of antenna, and the wire wound neatly around the a-m loopstick looked like a good candidate. Using his nail clippers again, Pete cut one end of the loopstick wire, unwound a length equal to that of the fm whip antenna, cut it, and stripped the insulation from one end. He twisted the bare end tightly around the whip antenna, next to the little ball on the end.

Then, raising himself carefully on his good knee, Pete cut a notch in the stalk of a bush and wedged the insulated end of the wire into it. When he lowered himself back to a sitting position, the wire was taut, with the radio resting in his lap. So far, so good. Inside the radio, Pete connected the internal wire from the bottom of the whip antenna to the hot end of the oscillator coil. More calculating in the sand showed that the fm dial should be set to 102.3 MHz to transmit on 113 MHz. That accomplished, Pete clipped one of the wires from the battery pack and trimmed the insulation a quarter of an inch from the end. This was to be his Morse key. Pete set the function switch on the radio to fm, turned the volume up until he could hear a hiss when he touched the wire to the battery pack, and nervously started sending in Morse code.

SOS SOS SOS PETER EVANS

PETER EVANS

SOS SOS SOS PETER EVANS

PETER EVANS

Pete kept this up for a half hour, then decided to wait until he could hear an airplane engine before sending more. His ten milliwatts, if indeed he had that much, would have a better chance of being heard then. He leaned his head back against the tree trunk and dozed.

The faint hum in his ears sounded like an insect as Pete came slowly back to wakefulness. Then he knew it was a plane. And he could see it: just a speck, far out at sea. Quickly, Pete started sending his SOS message. The plane hummed on out of sight, and he stopped sending. In about thirty minutes the plane, or another one, came back from the direction the first had gone.

Pete started sending his SOS again. He wondered if he should change frequency. He continued a moment, then increased his frequency about one MHz. The plane was nearly abreast of him now, and just close enough for him to see that it was a small, high-wing, single-engine aircraft. He gazed intently at it while keying the makeshift transmitter:

SOS SOS SOS PETER EVANS

PETER EVANS

IF COPY TURN LEFT

To his astonishment, the plane started a left turn. It had to be a coincidence.

TURN RIGHT

The plane rolled out of its left turn and banked to the right. More coincidence? He started sending again:

IF COPY WAG WINGS

Tears almost came to Pete's eyes as the plane banked, first left, then right, then left again. His hand was trembling as he sent the next transmission.

"Must be a smart cop!"

"Yeah," agreed Pete, "a *very* smart cop."

"But there's more to it than that," continued Thompson. "Rick Wilson, one of our search pilots, is an Amateur Radio operator. He told us we'd never hear a CW signal on our VOR receivers, because they don't have beat-frequency oscillators (bfos)."

WHOOPEE

The pilot must have been caught up by Pete's emotion, because the plane started into a nose-up, nose-down porpoise motion. If Pete could have danced around that beach, he surely would have. Calming himself, he sent instructions and guided the pilot to his position. The pilot waved to Pete as he passed overhead, then landed on the beach and taxied to within a few yards of Pete before cutting his engine.

"Bill Thompson here," he said.

Pete shook his hand as he stared up into the pilot's young face, still not quite sure it was really happening. "Am I glad to see you! How in the world did you happen to hear my signal?"

"Some policeman called us this morning and told us to listen for a CW SOS on all the VOR frequencies. Name was Colton. Don't know how he figured out what you'd do." Thompson grinned and said,

"Oh my gosh!" sputtered Pete. "I forgot about that. But you *did* hear me. How?"

"Well, Rick got together with the guys over in the avionics repair shop, and they rigged some haywire bfo circuits for the VOR receivers and installed them in the search planes."

"Good heavens," mused Pete, "if I'd thought about the bfo problem, I would never have tried sending an SOS in the VOR band. I guess it's a good thing I didn't think about it."

"C'mon, let's get you out of here." Thompson smiled.

As Thompson was helping Pete to the plane, he asked what those funny little plastic tents were for. Pete looked at them closely and saw that they were bone dry inside. He muttered something about water condensation and dumb TV shows. A little later the plane sped down the beach, lifted into the air, and made a slow, climbing turn over the surf. Soon it was gone. **HRH**

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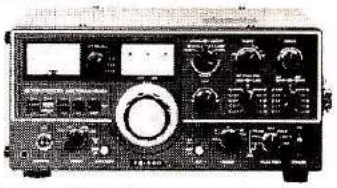

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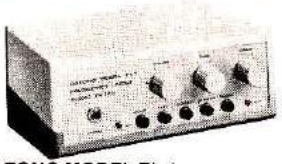

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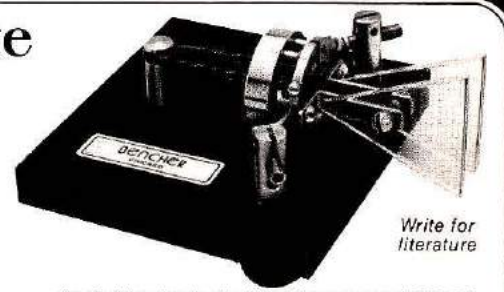

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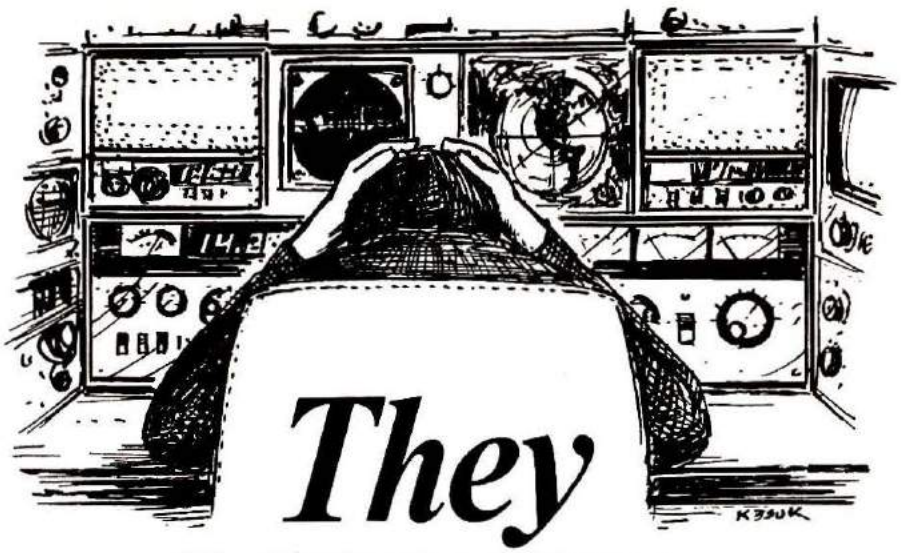


They NEVER Come Back...

BY VINCE LUCIANI, K2VJ

I must admit, ten thousand volts was a lot of juice to have kicking around the shack. But I was determined to make number one on the DX list and, after 351 countries, things were really getting tough.

It didn't matter at all that the locals wouldn't believe me when I told them I only loaded to 100 mA. Once, when a few of them dropped by, probably to check up on me, they saw proof on my plate meter, although I didn't like that remark about a hidden meter shunt. (I don't know how in the world he guessed it was a ten-to-one job.)

Still, ten kW on 20-meters CW did get in a few more rare ones, and who needs friends, anyway. They always were a jealous bunch, those locals; couldn't stand seeing me way above the herd in countries worked. I'll bet, even now, not one of them cared on the day I was testing my high voltage supply. I didn't know the interlock switch had accidentally shorted. It would have been a lot smarter on my part if I hadn't been leaning over the open chassis with my hand on the water pipe, and if I had mopped up the rainwater from the basement floor before messing around. But that's the kind of thing a guy never thinks about until afterwards.

Afterwards? I remember a brilliant flash of light when the ten-thousand volts came in one hand, through the other and out along the water pipe. That sure was a beauty!

Next thing I knew, there was this old gent, with a long robe and flowing beard, looking at me. He had a kind of strangely amused look to him, not exactly what I had expected in this situation, but it was an honest face and I can tell you I am certainly a good judge of character.

In no time at all we had a rag chew going while we strolled along a path that led to a nearby hill. The old gent, name of Luke, short for something I didn't quite get, said they had been watching my progress on the bands and admired my tactics.

"Here," says I to myself, "is an understanding sort. Not like those narrow-minded locals who always squawked when I moved in for the rare one. This feller knows a pro all right."

Almost as though he had read my mind, Luke says, "We're glad to have you join us. We've been expecting you ever since you put that new final in."

He must have seen the puzzled look on my face, but before I could get anything out he says in a nice, soft voice, "Come up to the hill with me and look over the station that's been awaiting your arrival."

Well, sir, even from the path I could see awesome sights — beyond any of my wildest dreams for an antenna farm. Everything you could imagine. But what really got me was the 20-meter bedspring mono-bander perched about 800 feet up in the air.

"Yes," says Luke, again seeming to guess my thoughts, "that's sixty-four elements on 20 meters. What you see are the fiberglass supports, because the radiators are piano wire with a *Q* you wouldn't believe. It has 4-kHz bandwidth, but don't let that bother you. It's tied to the VFO so that it automatically shifts center frequency up and down the band with an absolutely flat swr everywhere."

As we approached the door of the shack I started to get nervous and itchy all over, with

He had a kind of strangely amused look to him.

a feeling that this place was absolutely unreal. Luke threw open the door of the shack and, as we stepped inside, my legs wobbled and I started to shake at the sight of what I beheld. Banks and banks of gear, the finest stuff ever made. It almost blew my mind. And the operator's console was like the cockpit of a 747, strictly from Star Trek.

Luke was explaining functions, which I only vaguely grasped through the daze of all this glitter. "Just think of a frequency, and the headgear control unit will automatically spot you there. Rig perfectly tuned on frequency. . . ."

I barely made it to the control chair. I had the shakes that bad. I tuned up on the low end of 20 and right away heard this weak "CQ DX" through the QRM. It was A7XVJ.

A7XVJ! I had been chasing him for nearly a year, and I know he heard me once because I copied his petty grumble about my QRM on his sked. This time I'd nail him for sure. Before I could ask the question, Luke pointed to the beam control. There was a curious smile on his face, a smile made all the more strange by the eerie light of the shack.

I didn't give it another thought. I eagerly flipped the rotor into action. Suddenly, the whole shack jolted. The puzzled look on my face again brought a response from Luke. "We have so many beams and rhombics, it's easier to rotate the hill than the individual antennas." That charged my battery! I'll bet not even a W6 dentist ever had a setup like this.

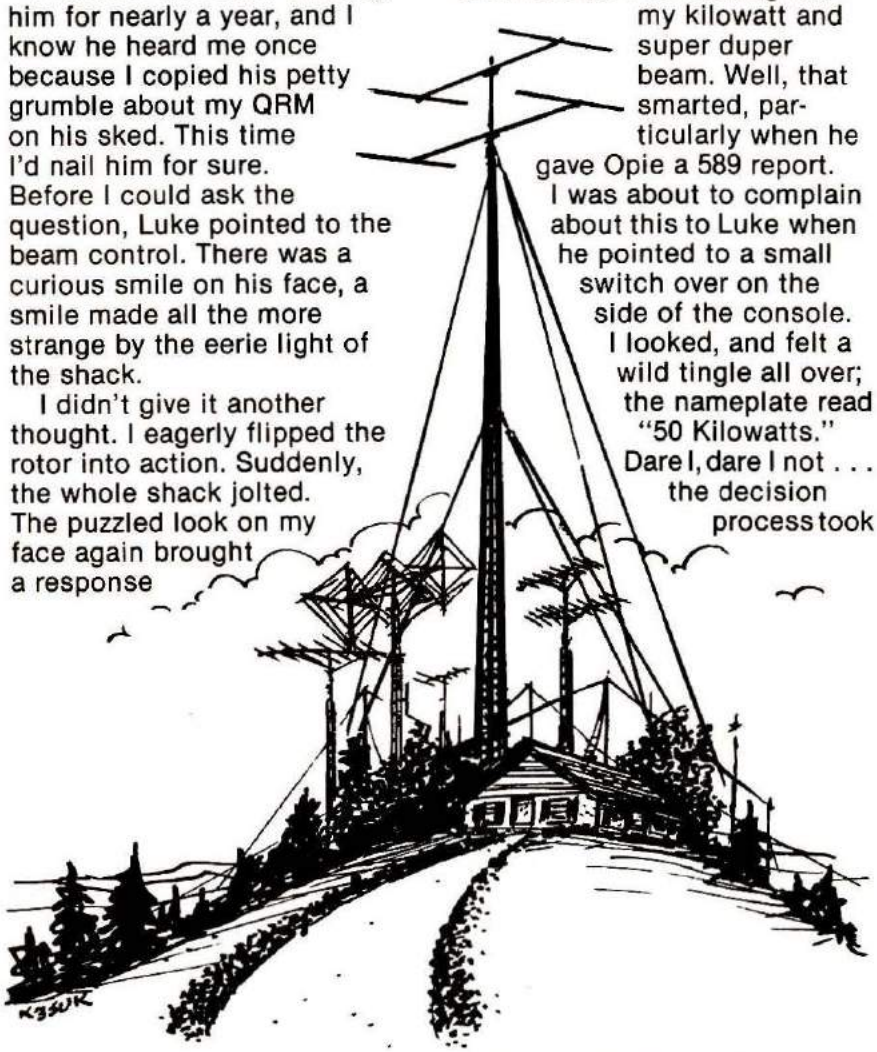
The S3 signal quickly peaked to a roaring 40 dB over 9, just like a code oscillator in the same room. Wow!

My palms were now covered with sweat, my eyes blurred, and, with a hand poised over the keyer and the rig fully tuned to the gallon limit, I breathlessly waited for his AR K and then went right in with a snappy three-by-three.

Figuring the theory of reciprocity had it made for me, I smugly stood by for a fat report.

WHAT? He went back to W2--. Why, that hot-shot Opie never ran over ten watts in his life, and here he was beating out my kilowatt and super duper beam. Well, that smarted, particularly when he gave Opie a 589 report.

I was about to complain about this to Luke when he pointed to a small switch over on the side of the console. I looked, and felt a wild tingle all over; the nameplate read "50 Kilowatts." Dare I, dare I not . . . the decision process took maybe 18 microseconds. As I flipped the switch on, a new, somewhat ominous hum filled the shack.



"Look over the station that's been awaiting your arrival."

Now I was really cracking for Opie to sign off. Anticipation kinda got to me and I jumped in with a snappy five-by-five call, just to make sure, while Opie was rattling on about QSLs — nothing important.

Get the picture. I'm envisioning A7XVJ's speaker cone rattling right off its frame from my potent signal. Just think, if he gave that QRPer an S8, my shot would burn a hole in his receiver. A thought made me chuckle right then — how nice it would be to turn the tables and jam Radio Moscow for a change.

While I'm calling, I'm happily watching the antenna-current meter. It had a "k" for kilo in front of the "A" on the face plate. I signed and stood by.

There was a moment of silence. Then . . . "QRZ? DE A7XVJ." Maybe he wasn't too swift, so I went back with another call, slower.

"W7--- DE A7XVJ R OM . . ."

Missed again? Impossible! My heart sank to my toes, and there was a new queasy feeling I couldn't explain. For the next hour I used everything in that shack to call dozens of choice DX, all of them coming in stronger than my CW sidetone. Nothing! Not one crummy contact!

Frustrated, infuriated, I turned to Luke, who had been watching all this. "Look here," I fairly shouted, "I'm pushing a megawatt ERP at stations that are blasting in. I keep calling and calling but THEY NEVER COME BACK!"

Luke turned full face and only then did I notice . . . perhaps that smile didn't seem so kindly, and the beard was more pointed than flowing. In my confusion I seemed to be drifting off into space while somewhere in the background I heard fiendish chortling and, suddenly, a deep booming voice that gleefully proclaimed:

"Yeah, that's right!"

And then I knew! **HRH**

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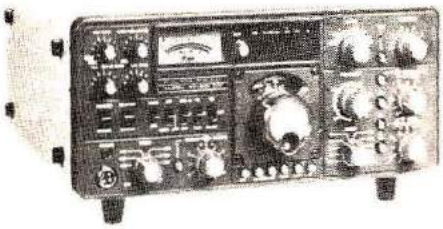

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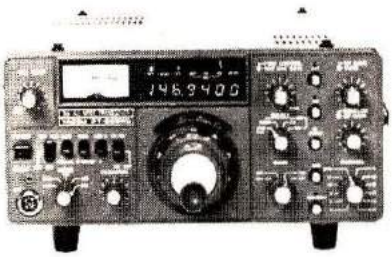

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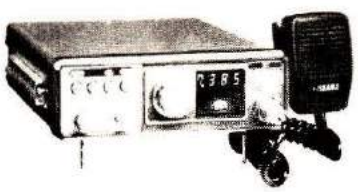

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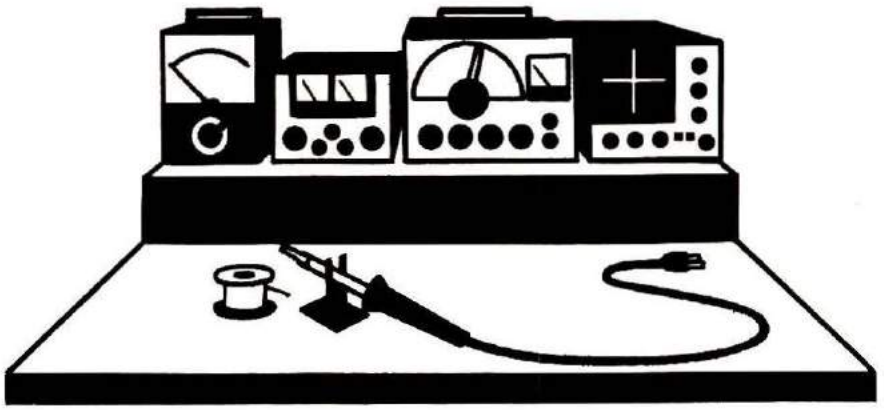


BENCHMARKS

The Nicadlyzer

Nickel-Cadmium battery packs, used by many amateurs to power their hand-held and portable vhf-fm transceivers, sometimes develop a condition known as "memory" — a condition which causes an otherwise fully serviceable battery to appear useless. A memory, in reference to Ni-Cd cells, means that the batteries have become temporarily deficient through a history of improper charge and discharge cycles.

For example, a battery continuously connected to a charger, with only brief intervals of light use, soon reaches a point where it is able to deliver power for only a short period of time. As a result, many batteries are often discarded as bad, or placed back into the charger after very little use. In reality, they have developed a memory; they have not reached the end of their useful life. Memory is a fully reversible condition, and, with the typical operating habits of most of us fm buffs, it is a common cause of premature battery problems. Cycling a battery with memory through several full-discharge to full-charge cycles will bring it back to 90 or 100 per cent capability from a level as low as 10 per cent, when it's done in the proper manner.

I built the Nicad* analyzer pictured here for use at the Springfield (Massachusetts) bulk mail facility, where about 50 RCA TAC-TEC series radios and about 100 batteries are in 24-hour service in various postal departments. As a solution to battery-maintenance problems, the analyzer has proven very effective.

Basically, the analyzer consists of a resistive load to discharge the battery at a given rate (60 minutes for full discharge of a battery with 100 per cent capacity), a timer to measure the actual time to reach full discharge, and a voltage comparator to sense the point of full discharge. In use, a battery pack which has just been charged is placed into the analyzer. The timing cycle begins as the battery starts to discharge. As soon as full discharge is reached (1 volt per cell, or 8 volts for the 10-volt TAC-TEC pack), the comparator senses this point and removes the load from the battery (to prevent deep discharge and battery damage) and stops the timer. Because the battery load is calculated to drain a fully charged battery of 100 per cent capacity in 60 minutes, shorter intervals indicate proportional loss of battery capacity. This condition is reversible with several charge/discharge cycles in the analyzer.

The circuit for the unit is straightforward and no detailed explanations are necessary. R1 sets the trip point for full-dis-

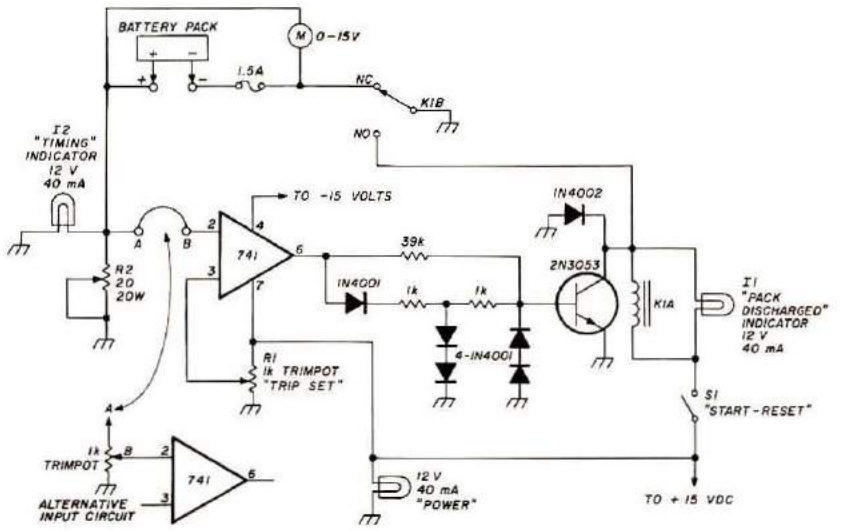


Fig. 1. Schematic diagram of the battery condition analyzer. The meter, M1, should be of a type having 1000 ohms-per-volt (or greater) internal resistance. The relay (K1) should be double-pole, double-throw, with a 185-ohm coil. Use the alternative input circuit, B, for battery packs with a voltage higher than 12 volts. If this circuit is used, set the voltage at pin 2 for 13 volts, maximum, from the battery pack.

*Nicad is a registered trademark of Gould, Inc. Ni-Cd is the proper abbreviation for all such batteries using nickel-cadmium electrodes. Some portable equipment does, in fact, use Nicad batteries made by Gould, while other equipment uses nickel-cadmium batteries.

charge shut-off. The trip point should be set by using an accurate DVM (digital volt meter) and adjustable power supply. Repeat accuracy of the trip-point setting is within ± 10mV. Resistor R2 is selected to fully discharge the pack in 1 hour; for example the 10-volt, 600 mAh TAC-TEC packs require a value of approximately 16.6 ohms for the proper rate of discharge. Battery packs of more than 12 volts can be used in this analyzer if the alternative input circuit for pin 2 of the 741 (pack voltage sense) is used, and is adjusted for about 13 volts, maximum, to the pin-2

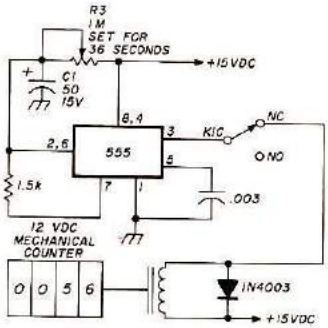


Fig. 2. The timing circuit for the analyzer uses a 555 timer IC, which pulses a mechanical timer to indicate time elapsed to discharge point. The mechanical timer should have at least a three-digit readout, and should draw low current (coil resistance 100 ohms or greater).

input. Replacement battery inserts for RCA and Motorola chargers are available from authorized dealers, and I recommend that you use them for holding the pack under test.

The timer

Conventional one-hour clock-drive time meters with mechanical resets are available, and they would be ideal for use in the analyzer if not for their prohibitive cost. If scrounging fails to uncover a suitable timer, the low-cost circuit I used will do the job well. A 555 timer IC is set for a 36-second time interval, and pulses a 12-Vdc mechanical counter to provide a direct readout of pack capacity when the discharge

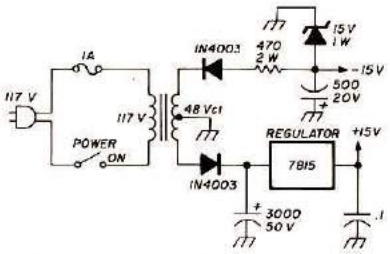


Fig. 3. The power supply for the analyzer and timer is simple — a 48-volt, center-tapped secondary transformer is used, and the positive 15-volt line is regulated by a 7815 IC.

point is reached. Once constructed, calibrated, and suitably housed, operation of the analyzer is simple: insert the pack, turn the unit on, reset the time-meter, and reset the START pushbutton to the discharge cycle.

A final note to you amateurs who are R/C model enthusiasts: you should find this device particularly suited for use with radio flight-packs and transmitter packs. It's a good way to spot problems before an airborne craft does!

Peter J. Bertini, K1ZJH

Test Lead Hang-up

Are you tired of that rat's nest of tangled test leads and jumpers? Does your patch cord collection resemble an explosion in a spaghetti factory rather than an expert's workshop? Isn't it time you did something to clean that mess you call a shack?

Here is a nifty idea that will straighten up all the jumpers, patch cables, and test leads lying in that heap. On your workshop wall, pound two nails (or drive two screws) approximately 45 cm (18 inches) apart, allowing their heads to protrude about 12 mm (½ inch). Now stretch a wire scrap between the two nails and fasten securely. You can hang all your leads that have alligator clips (or some form of spring clip) between these two nails, and let them dangle neatly toward the floor! At a glance you can tell where a lead is and how long it is without having to scramble through the hodge-podge mess of tangled wires and clips and without accidentally pulling a clip from one of the cables. The hanging wire will easily support 20 or 30 leads, depending on the size of the clip or connector.

F. Neil Urban, W8CD

Fahrenheit — Celsius conversion scale

When you begin working a lot of DX stations, you will find that foreign hams usually give their weather reports using degrees Celsius, not Fahrenheit. It is nice to know what a particular temperature in Celsius may be in Fahrenheit, at least until more of us become familiar with the metric system. It's also good to be able to convert Fahrenheit to Celsius, so that the foreign amateur you're talking to will be able to easily understand — in his own terms — the temperature at your station. Besides, it breaks the ice to be able to talk to an amateur in another country using his own familiar terms.

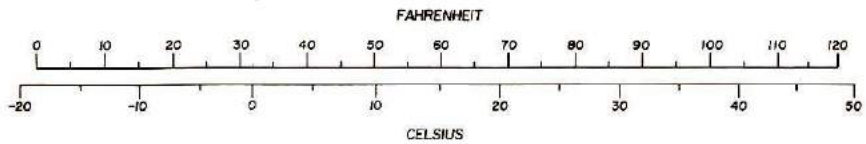
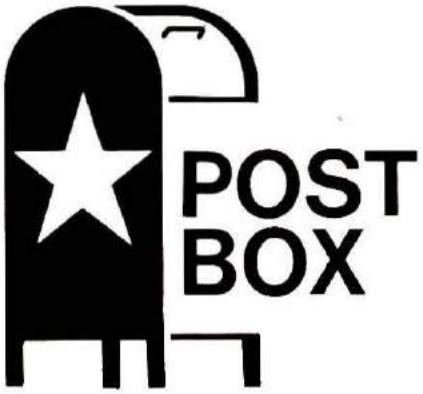


Fig. 4. A temperature-conversion scale that can be used as a convenient operating aid when you talk to DX stations.

To use the chart in **Fig. 4**, merely read the temperature on one scale (Celsius, for example) and find its equivalent on the other scale (Fahrenheit, for example).

Jim Gray, W1XU



Dear Horizons:

Congratulations on the current series of articles on the homebrew transmitter. Finally, a good opportunity to dust off the junkbox and heat up some of those goodies that have been sitting idle.

One caution, however: the article in the August issue clearly shows a female connector (socket) being used on the transmitter for power connection. One assumes that the power supply cord will terminate in a male connector (plug). When I built my first power supply (as a novice, for an ARC-5 receiver), I used this arrangement and found out the hard way that it is all too easy to have the power cord disconnected from the main (powered) unit when the power supply is turned on (stupid — but easy). Accidentally coming into contact with the bare prongs of the plug on the power cord can hurt!

This problem is easily remedied by mounting the male plug on the chassis and terminating the power cord with the female connector. This still isn't 100% idiot proof, but is a great improvement over the arrangement shown.

This series of articles shows the potential of *Ham Radio Horizons*. I hope you follow through with more.

David B. Rogers, WA7ZYQ
St. Maries, Idaho

Thanks, Dennis, Dave, and many others who took the time to write about that power plug arrangement. Author Wildenhein's comment is, "And I'm the guy who is always harrassing people about wiring safety! I must be getting flaky!" But your editor will have to shoulder part of the burden on that one too — the unit sat on a nearby table for weeks while we checked the drawings and text, but the plug didn't catch my eye. It should have, because, like David, I learned about exposed pins the hard way. Okay, Bill, let's get our chalk and write on the blackboard 1000 times "Think safety!" ***Editor***

Dear Horizons:

Bill Wildenhein's article on "A Beginner's 50 Watt Rig" was top-notch writing for us beginners. I plan to build it as soon as I can rake up all the parts. How about a follow up on a good home-built receiver?

Mark Bauer
Carthage, Texas

Dear Horizons:

I received your letter with the special subscription offer, plus the issue of "The Golden Years of Radio."

The offer is a good one, but your magazine is too interesting! My son is a charter member (WB4ICW) and both my husband and I found the magazine so readable that we became interested in amateur radio also. We are now WD4PCI and KA4ARG! My first inclination was to discard your letter, but second thoughts prevailed and I just had to thank you for the well-presented articles which encouraged us to join ham radio.

You have the best magazine on the market — keep it up.

Daphne Spencer, KA4ARG
Orlando, Florida

Thanks for your letter, Daphne, and congratulations to you and your husband for following through and getting your licenses. Welcome to our great hobby. ***Editor***

Dear Horizons:

I received my first copy of your magazine from the instructor of the Novice class I was taking. Since then I have become an avid reader. In addition, I used the random-letter code tapes from your bookstore to increase my code speed from 5 to 13 words per minute in just six weeks. I now have a General class license! Here is my subscription renewal for the coming year.

Chris Connolly, WD8KVP
Cincinnati, Ohio

Dear Horizons:

I am a new ham, and feel your magazine contributed to my success in obtaining my General ticket four months after my Novice license arrived. Maybe your readers would be interested in a nice source of CW practice. For you operators blessed with WWV/JJY capabilities in your receiver, you can find excellent CW just above the 10-MHz frequency.

Thanks for a nice magazine.

Wayne Richardson, WD4SII
Nashville, Tennessee

Dear Horizons:

Please publish another article on "A Beginners 50 Watt Rig" and tell us how to add 20 and 15 meters. Thanks for a great publication.

John E. Schott
Charlotte, North Carolina

Dear Horizons:

My first issue of *Ham Radio Horizons* arrived today and I don't remember being so pleased with a publication since my early days of hamming over 25 years ago. I have, and still do, read most of the magazines but you have just what I want; ham radio at its enjoyable best. As a communications engineer for many years, prior to the ministry, I truly enjoy a well-written and well-planned work.

I guess the simple, exciting aspects of ham radio have always appealed to me and you've done a Q5, S9 job. Keep up the good work.

W. E. "Ted" Ulp, W3BHC
New Castle, Pennsylvania

Dear Horizons:

I have just finished checking into my state's (Kentucky's) CW traffic net. I found David Boyd's (K9MX's) article, "Getting Started in Traffic Handling," (September 1978) very interesting and helpful. I never would have known the CW nets are this much fun. One thing I would like to add: not only is checking in easy, but everyone in the net is willing to help and they're really glad to have you there. Try it — you might enjoy it.

Kentucky's CW net meets nightly at 0200 GMT on or about 3600 kHz.

Scott Wright, WD4HAD
Whitley City, Kentucky

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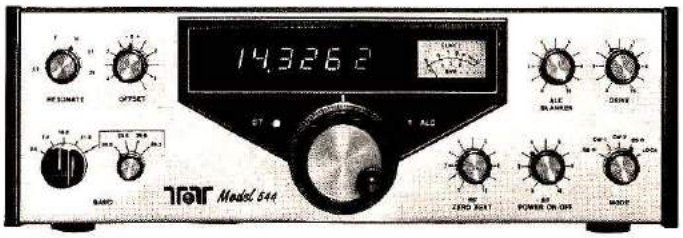

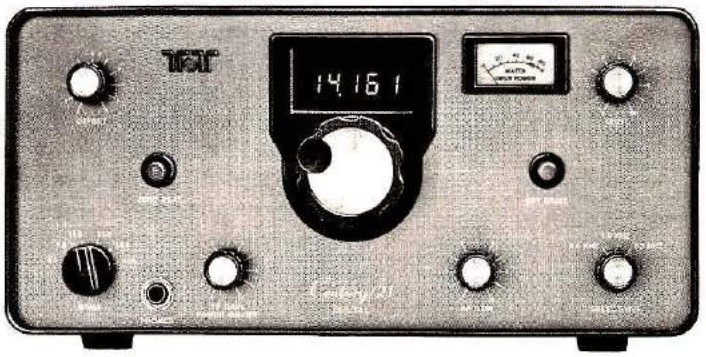

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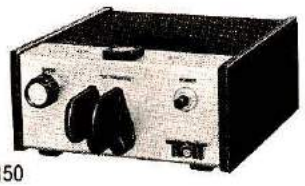

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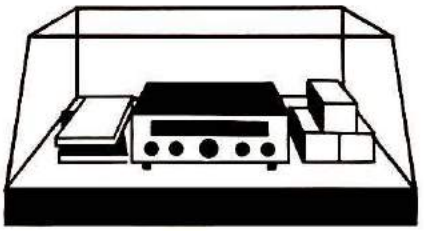
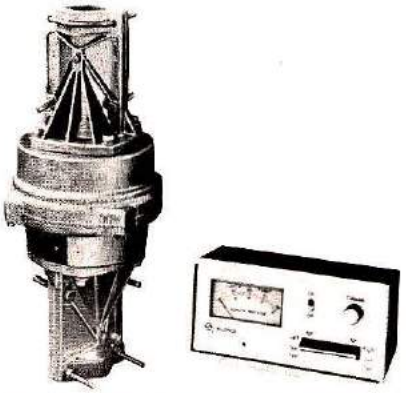


Alliance Heavy Duty Rotator



The HD-73 Heavy Duty rotator, combining wind- and ice-resistant features, plus two-speed rotational control never before incorporated into a unit of its size and performance, is offered by the Alliance Manufacturing Company Inc., of Alliance, Ohio.

Designed especially for the serious amateur who wishes to increase his capability with in-tower or mast-mounting option, the HD-73 features a unique dual-speed control with one five-position switch. It provides a one-minute-per-revolution speed for rotating over an extended arc, and a slower speed permitting pinpoint adjustments for the best signal on receiving and transmitting.

Improved automatic brake action not only simplifies positioning, but also reduces risk of antenna damage by sudden stops that impose high inertial stress on antenna, tower, and rotator.

Designed to move antennas with a maximum of 1 square meter (10.7 square feet) of load capacity, the HD-73 develops a wind-load bending moment capable of withstanding the most severe prevailing wind conditions. Icing, another weather hazard for rotators, is overcome by the heaviest hardened-steel pitch-gear teeth of any rotator in its size and price range. The consistently high performance of the unit in all weather conditions is enhanced by a factory-installed lubricant that withstands temperature ranges of +49 to −29°C (+120 to −20°F).

The HD-73's 20-volt ac, capacitor-operated, split-phase, reversible motor and its transformer are doubly protected by fuse and thermal protectors against shorts, possible connection error, and prolonged operation. No voltage on the motor or leads exceeds Underwriters Laboratory safety limits.

The meter, a dc, D'Arsonval, taut-band type, is calibrated in bold S-W-N-E-S lettering as well as with a degree-graduated scale for full 360° position recording. The voltage supply for meter indication is solid-state regulated to assure accuracy regardless of wide line-voltage or load variation. The bar switch permits dual-speed rotor control with utmost accuracy and fingertip ease.

The power required is 117 volts ac, 60 hertz. The mast mounting size range is 35 mm (1-3/8 inch) to 63 mm (2-1/2 inch) O.D.; it requires a 6-conductor cable. Total shipping weight of the rotator with 2 pairs of brackets and control box is 7.7 kg (17 lbs).

See your nearest Alliance Distributor, or write to Alliance Manufacturing Company, Inc., Alliance, Ohio 44601; or use *ad check* on page 86.

Yaesu 2-Meter Transceiver

A new state-of-the-art, two-meter, all-mode transceiver, the FT-225RD, has been added to Yaesu's quality line of Amateur Radio equipment.

The new transceiver covers the entire 4 MHz and provides for USB, LSB, CW, fm and a-m. Power output is variable, 1-25 watts. Squelch, VOX, PTT, semi-break-in CW with side tone, and tone burst are standard features of the FT-225RD. A superb noise blanker permits mobile ssb operation, and a discriminator zero-center meter allows precise tuning of fm signals. Repeater splits are the standard 600 kHz; however, any split up to 1 MHz is possible with optional crystal. Provision has been made for up to eleven fixed channels using optional crystals.

The transceiver uses high-quality, plug-in circuit boards throughout, and an optional memory unit enables the storage and recall of any frequency within the range of the unit. This allows instant programmable QSY to a favorite repeater or calling frequency with just a flick of the switch. The digital frequency is accurate to 0.1 kHz or to 1 kHz with the FT-225R, which offers the analog dial readout only and at slightly less cost.

A built-in power supply provides taps for operation on 100/110/117/200/220 and 234 volts 50/60 Hz; dc operation covers 11.5 to 16 volts, negative ground at 6.5 amps on transmit, 1.2 amps on receive.

An attractive, four-color brochure is available at your nearby authorized Yaesu dealer or from Yaesu Electronics Corporation, 15954 Downey Avenue, P.O. Box 498, Paramount, California 90723; or use *ad check* on page 86.

Sigma Power/SWR Meter

The Sigma RF-2000 has been introduced as an accurate indicator of r-f power and swr. These meters are individually

calibrated at the factory. They provide a constant swr reading with relative power and a continuously accurate "Power in Watts" indication on two scales; 0-200 watts or 0-2000 watts. Another amazing feature this meter offers is continuous frequency coverage from 3.5 MHz through 150 MHz, with calibration positions for each amateur band from 80 meters through 2 meters.

In appearance, the RF-2000 is beautifully designed. The cabinet is a glossy black with large meters inset flush with the face of the front panel. The black facing is enhanced by a white pin-stripe border and white numerals and letters. The meters themselves are scaled in green with the top end of the swr scale offset in red.

The RF-2000 sells for a modest $35.00, less than half the price of its major competitors. The RF-2000 is distributed by Amateur-Wholesale Electronics, Miami, Florida 33176; use *ad check* on page 86.

Wireless Learning Program

A wireless learning program is now available for teaching Morse code to groups of students who need code instruction and practice in preparing for their Amateur Radio license or a signalling career.

The program has been developed by P/H Electronics, the leading manufacturer of wireless stenographic laboratories and other group-instruction systems. It consists of a multichannel broadcast console, a set of preprogrammed audio tapes, and any number of combination headphone-receivers with plug-in oscillator/key units. Being wireless, the program can be easily set up in any classroom or study space. The instructor can program either live or tape transmission of code or voice at varying speeds to challenge every student from beginner to advanced.

In addition to receiving instruction, two students can practice sending and receiving each other — or an individual can practice on his own — without disturbing others. The manufacturer emphasizes that this program is most effective in working with groups of students on a regular basis, rather than for occasional one-to-one instruction. Free demonstrations may be arranged on request.

For more information, contact

P/H Electronics, 117 E. Helena St., Dayton, Ohio 45404, phone (513) 461-5898; or use *ad check* on page 86.

Compact Amateur Handheld from Standard Communications

A compact new 1-watt, 2-meter handheld amateur fm transceiver is now available from Standard Communications Corp. of Carson, California. This transceiver, designated C-118, is approximately the height and width of a dollar bill, and permits the user to transmit up 600 kHz, down 600 kHz, or receive and transmit on the same frequency with just one crystal. This provides 18-channel capability with only six crystals.

The C-118 also incorporates a built-in capacitor microphone and LED status lights for CHANNEL BUSY and TRANSMIT. Also included at no additional charge is a BNC connector with flexible antenna, provisions for an external dc power supply, and earphone. It has a frequency range of 144-148 MHz and comes equipped with one crystal for operation on 146.94 simplex and 146.34/94 MHz.

To obtain a free copy of the C-118 data sheet, write Standard Communications Corp., P. O. Box 92151, Los Angeles, California 90009; or use *ad check* on page 86.

Gemini Instruments Dial Spotter

The Series 35000 "Dial Spotter" is designed as an add-on for single conversion superheterodyne communication receivers employing additive or subtractive mixing schemes. It also can provide tuning indications for receivers with multiple conver-

sions if it is connected to the low-frequency vfo circuit of this type of receiver.

The 5-digit indicator features LED displays and indicates from 1 kHz to 35 MHz with 1-kHz resolution and accuracy. A low-frequency clock circuit eliminates rf birdies that conventional frequency counters produce and provides accurate long-term measurements. The input circuitry is fully protected from transients. The received frequency is dynamically displayed such that it will follow receiver tuning as it is varied; there is no waiting for the display to update. Conventional TTL circuitry is used for reliability and field serviceability.

Installation consists of connecting rf input cable to the output of the receiver's vfo circuit. No other receiver connections are necessary. A ± 4 kHz offset adjustment is provided to compensate for receiver misalignment.

Options include 12 Vdc and/or internal battery power, multiple i-f preset frequencies, and direct frequency-measurement capability. A comprehensive owner's manual including typical installation instructions as well as complete parts list and schematic is supplied with each "Dial Spotter." Standard power is 117 Vac. It is available from stock for $169.95. For more information contact T. H. Tighe, Gemini Electronic Sales, Box 205, Larchmont, New York 10538; or use *ad check* on page 86.

Helpful Literature for Mobile Users

A Mobile-Radio Range Estimator, dB to volts conversion scales, listings of CTCSS tones and most used signalling tones, hookups and procedures for SINAD receiver tests, and a condensed catalog of Helper Instruments Co. products — all is contained in the "Desk Reference for the Mobile Radio Shop," available free from Helper Instruments Company. Write them at P.O. Box 3628, Indialantic, Florida 32903; or use *ad check* on page 86.

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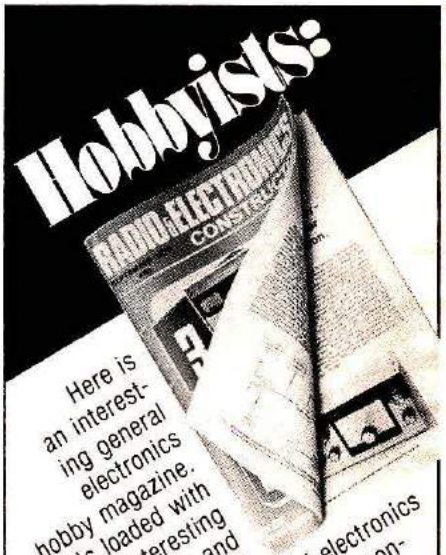

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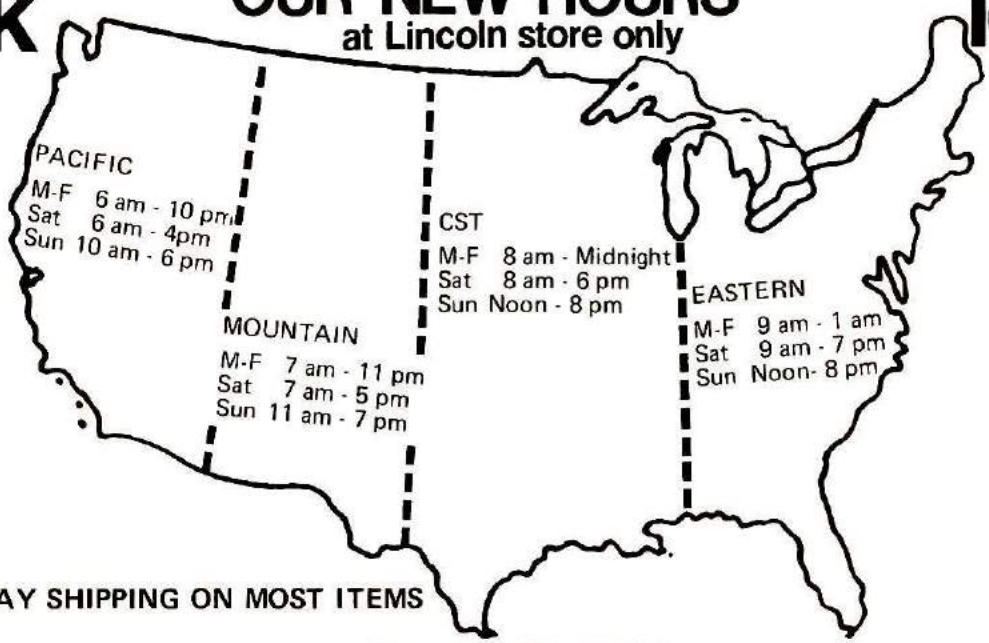

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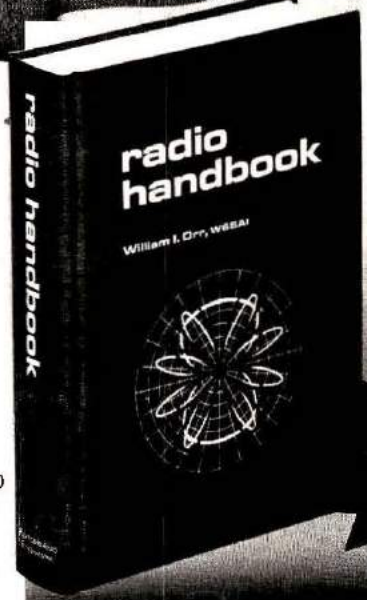

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DEADLINE 15th of third preceding month.

SEND MATERIAL TO: Ad Scan, Ham Radio Horizons, Greenville, N. H. 03048.

ELECTRONIC EQUIPMENT HOTLINE is a classified advertising newsletter for professional, industrial, and surplus electronic equipment. Subscriptions $6/year, ads 50¢/word. P.O. Box 4760, Dept. HR, Panorama City, CA 91412.

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CODE PRACTICE OSCILLATORS, hand keys, electronics keyers, other products. Free catalog. Globalman (W6PHA) Products, Box 388HO, El Toro, CA 92630. 714-533-4400.

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STOP LOOKING for a good deal on amateur radio equipment — you've found it here — at your amateur radio headquarters in the heart of the Midwest. We may not have a toll free number but we'll save you more in the long run! We are factory-authorized dealers for Kenwood, Drake, Yaesu, Collins, Wilson, Ten-Tec, Atlas, ICOM, DenTron, MFJ, Tempo, Regency, Hy-Gain, Mosley, Alpha, Cushcraft, Swan, and many more. Write or call us today for our low quote and try our personal and friendly Hoosier service. HOOSIER ELECTRONICS, P.O. Box 2001, Terre Haute, Indiana 47802. (812) 238-1456.

CUSTOM EMBROIDERED EMBLEMS — Your design, low minimum. Informational booklet. Emblems, Dept 65, Littleton, New Hampshire 03561.

NAMETAGS — 1" x 3" $3.25. Engraved with name, call letters, QTH. Limit 20 letters per line. Red, blue, yellow, black, walnut with white letters. Other colors available. Nielsen Communications, Inman, Nebraska 68742.

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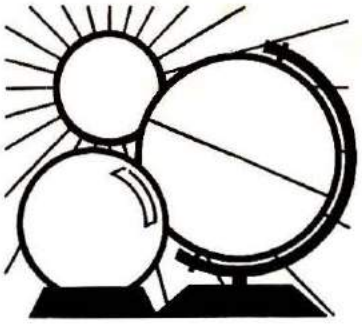
NEW CONCEPT — Novice instructional package, theory tape & study material. Complete license study package, $17.95. General study package, $19.95. MARI, 1320 Canary Drive, West Columbia, SC 29169.

FLORIDA: Treasure Coast Hamfest March 17-18, 1979, Vero Beach Community Center, Vero Beach, Florida. Talk-in on 146.13/73 - 146.52/52 - 222.34/223.94. Info. P.O. Box 3088, Vero Beach, FL 32960.

MICHIGAN: Southfield High School's Amateur Radio Club is holding its 14th annual Swap & Shop on Sunday January 21, 1979 at Southfield High School, Southfield, Michigan at 10 Mile & Lasher. (This is one of Michigan's largest). Admission is $2.00. For information send SASE to Mr. Robert Younkers, 24675 Lasher Road, Southfield, Michigan 48034 or call 313-354-8210.

MICHIGAN — The 9th Annual Livonia Amateur Radio Club's Swap 'n Shop will be held on Sunday, February 25, 1979, from 8:00 A.M. to 4:00 P.M., at the new location of Churchill High School in Livonia, Michigan. There will be plenty of tables, door prizes, refreshments and free parking. Talk-in on 146.52 Simplex. Reserved table space of 12-foot minimum available. For further information, send SASE to Neil Coffin WA8GWL, c/o Livonia Amateur Radio Club, P.O. Box 2111, Livonia, Michigan 48151.



DX FORECASTER

Last-minute predictions

The first half of the month should be relatively calm and quiet, while the last half of the month may give rise to some serious ionospheric and atmospheric activity. In particular, the period between January 20th and 30th will bear watching for signs of unusual upsets in the geomagnetic field, together with solar activity above normal for this time of year. Look on the 4th, 5th, and 6th, the 9th and 10th, and the 14th to the 16th for possible activity — but of a lesser magnitude than that anticipated for later in the month. Full moon occurs on January 14th, while perigee and new moon occur nearly together on January 28th.

Band-by-band predictions

A look at the chart will convince you that propagation conditions on the high-frequency bands are very good, indeed, and better for this time of year than they have been for quite some time. In general, *20* and *15 meters* will bear the brunt of DX activity, but just look at the anticipated openings on *10 meters*! At last, ten has really come into its own, and the band should be open nearly every day with good signal strengths — either for short skip or long skip conditions. Be sure to check the next higher band than the one listed, especially when it is marked with an asterisk (*). Ionization levels are somewhat lower than during the summer months, and for shorter periods of time each day — keyed to the shorter daylight hours. As a consequence, you can expect *40* and *80 meters* to really open up after dark — that is, about 5 PM local time — and last until the small hours, if you can stay awake! The early closing of the higher frequencies, and opening up of the lower frequencies, should bring a mixed bag of DX to all but the laziest. Five-band DXers should like January conditions!

160 meters will be a good performer during the month, particularly from about 7 or 8 PM local time until about midnight or so, and again in the morning just before sunrise. *Twilight-zone* propagation will also be particularly good during the hour surrounding sunrise and sunset, so watch the north and south paths at these times for some surprises.

VHF openings are not very likely, except during the periods of expected disturbance — most likely during the last half of the month. Moon-bouncers can do their thing at perigee on the 28th, while meteor-scatter buffs can expect some catch-as-catch-can QSOs during the late evening and early morning hours of January 3rd, when the Quadrantids enter the earth's atmosphere and leave ionized trails.

Tips on using the chart:

The asterisks (*) mean to look at the next *higher* band, because it, too, may be open on the path and at the time indicated. The arrows indicate general beam-pointing directions, with north at the top.

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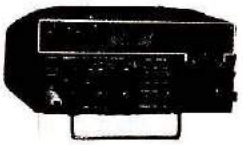
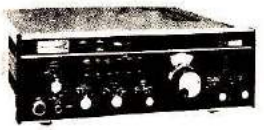
YAESU FT-901


ICOM IC-701

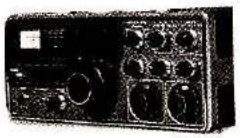

DRAKE TR-7


KENWOOD TS-820S


YAESU FT-227R


TEN TEC 544


PANASONIC RECEIVER RF 4800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More details? Ad Check page 86.

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JANUARY 1979

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800 channels in the palm of your hand

Tempo presents the S1 SYNCOM...the world's first synthesized 800 channel hand held transceiver

This amazing pocket sized radio represents the year's biggest breakthrough in 2-meter communications. Other units that are larger, heavier and are similarly priced can offer only 6 channels. The SYNCOM'S price includes the battery pack, charger, and a telescoping antenna. But, far more important is the 800 channels offered by the S1. The optional touch tone pad shown in the illustration adds greatly to its convenience and we have available a 30 watt solid state power amplifier designed to give the SYNCOM S-1 the flexibility of operating as a mobile and base station as well.

SPECIFICATIONS

Frequency Coverage:	144 to 148 MHz
Channel Spacing:	Every 5 KHz
Power Requirements:	9.6 VDC
Current Drain:	17 ma - standby 400 ma - transmit
Batteries:	Ni-cad battery pack included
Antenna Impedance:	50 ohms
Dimensions:	40 mm x 62 mm x 165 mm (1.6" x 2.5" x 6.5")
RF Output:	Better than 1.5 watts
Sensitivity:	Better than .5 microvolts

SUPPLIED ACCESSORIES

Telescoping whip antenna, ni-cad battery pack, charger.

OPTIONAL ACCESSORIES

Touch tone pad, tone burst generator, CTCSS chips, Rubber flex antenna.

Price . . $349.00 (or with touch tone pad . . . $399.00)

Tempo also offers a complete line of solid state power amplifiers, pocket receivers, the FMH-2, 5 & 42 portables, the VHF/ONE PLUS mobile transceiver, and the FMT-2 & FMT-42 remote control mobile transceiver. All available from Tempo dealers throughout the U.S. Call or write for full information.

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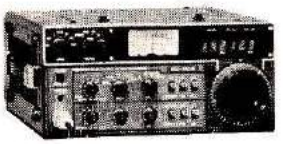

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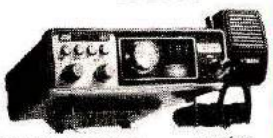

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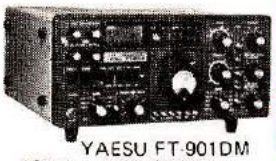

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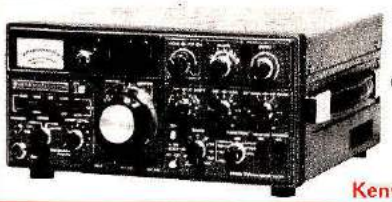

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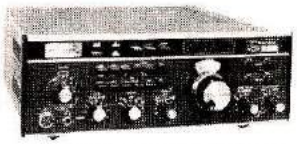

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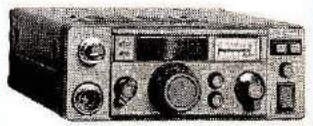

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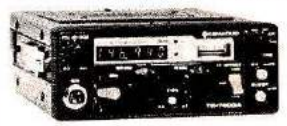

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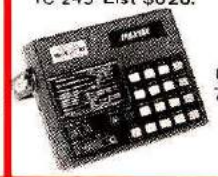

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