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**Drake R4/T4X  
Owners' Report**

# HAM RADIO HORIZONS

**INSIDE ICOM:  
A FACTORY VISIT**

**BETTER STATION  
PERFORMANCE:  
A LOOK AT  
ACCESSORIES**

**TRUE GRIT —  
A HANDICAPPED  
HAM TALKS  
TO THE WORLD**



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Model 1528



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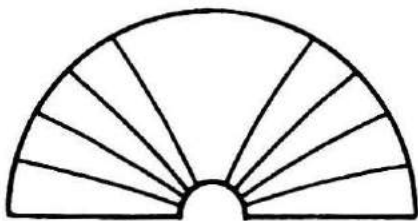
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# THIS MONTH'S



# HORIZONS

## Drake Twins — A User's Report

Remember that User's Survey Form we printed back in July? Well, the results are in, and comments are varied and interesting. Many good features were pointed out, and some that were not so good. The stack of returns makes very informative reading, and the summary starting on page 12 presents some of the comments along with the numbers and percentages of good and bad.

## Ham Shack Accessories

Accessories, accessories, accessories . . . what do you *really* need to get the most out of your basic equipment and the investment it represents? W8FX has the lowdown on what is often a most confusing subject.

## Anglo-American Connection

Voices across the sea led to trips across, and a memorable visit that worked both ways. Could an American family open their home to one from England? Would there be difficult times of adjustment for both? Fortunately, the problems were minimized by the friendships developed through many rag chews on the ham bands. This part of the two-sided story is told by W1HEO,

with things observed and experienced from the American viewpoint, naturally enough. **Part 2** will give us some insight into the British side of things.

## Visiting the ICOM Factory

We've all seen them on the market, many of us have used them on the air, and a few of us have marveled at the compact design of the various ICOM rigs. A visit with the people who make this equipment would be a treat for almost any ham, and W8JJO jumped when he had the chance. Fortunately, he made notes and took photographs so he could share the experience with the rest of us.

## DX Profile — 9Z3AA

Chasing DX is one of the most popular facets of Amateur Radio. At any ham gathering you will hear Amateurs swapping DX "fish stories" with the DX becoming more rare and the competition keener with each retelling of the tale. But nobody has yet been able to top working the Shaikdom of Pistachio.

## True Grit

The dictionary defines grit as indomitable spirit; pluck. Every field of endeavor has individuals with that quality, and there are many in Amateur Radio. WB3IGG met one who was close to him in both call letters and location. Quite naturally, a visit resulted from their first QSO, which in turn produced this story. If you can think of no other answer, keep this in mind when someone asks, "What good is Amateur Radio?"

## Equipment Survey No. 2

The results from our first User's Equipment Survey were very gratifying — almost overwhelm-

ing, in fact. There were many useful suggestions about rigs to include in our next survey, so, undaunted by the pile of paper, here we go again. The rigs for this survey are the Heath HW/SB-104, the Ten-Tec Triton IV, and the Yaesu FT-101B (or later). If you own, or have used, one of these, grab your pencil and turn to page 47 for the report form. Oh, yes, just in case you missed it, the first of three reports from the previous survey starts in this issue as well.

## The Cover

Here's a reflection that should make any red-blooded ham sit up and start checking what's under his Christmas tree. It's the new Pro-mark KWM-380 from Collins (or Rockwell/Collins, if you will). The transceiver is all solid-state, and covers lots of frequencies — 0.5 to 30 MHz for the receiver; it transmits from 1.6 to 30 MHz. Output is 100 watts, and the power supply is built in. Perhaps, if you're very well-behaved, Santa will bring you one.

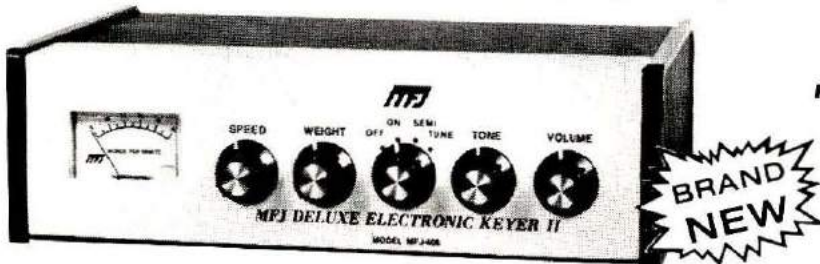
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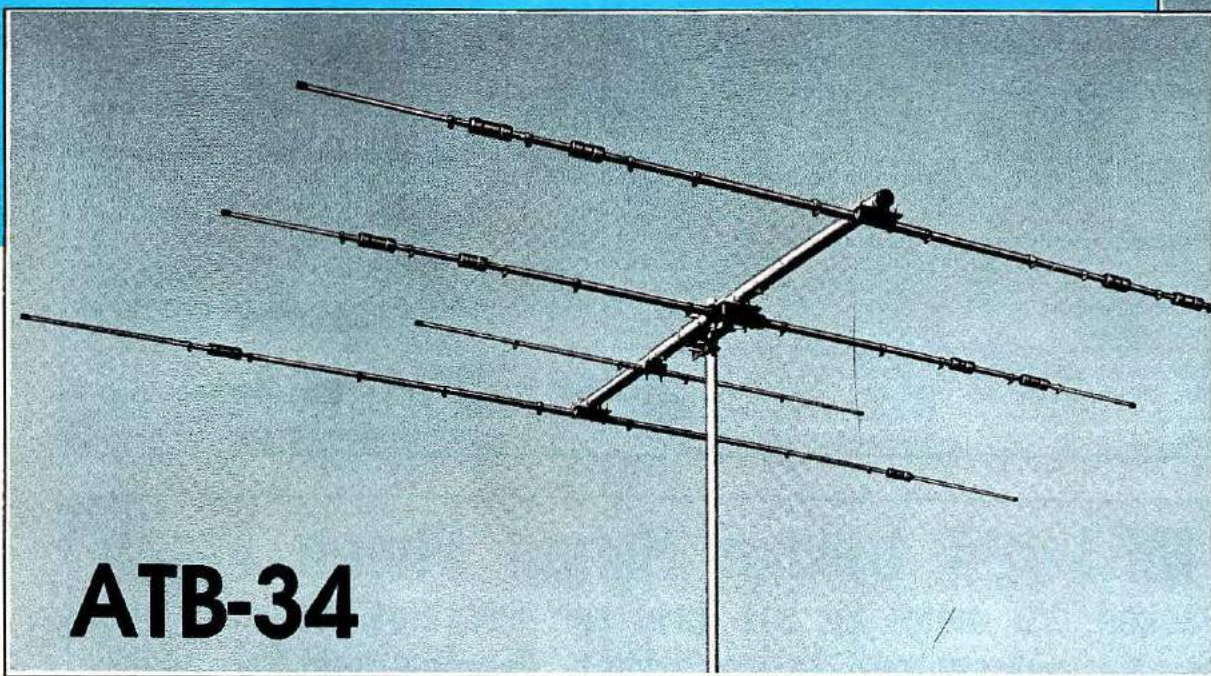
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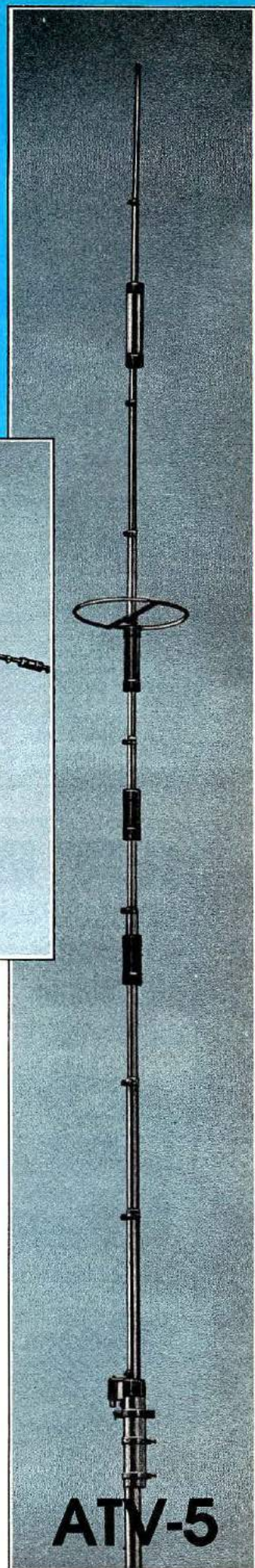
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# THE VIEW FROM HERE



Several months ago I mentioned briefly one of the time-proven tactics for success in working DX — listen, listen, and listen some more. It's still good advice. But after you listen, then what?

With the DX-contest season approaching, I thought it would be worthwhile to pass along some words of wisdom gleaned from successful contest operators with average equipment but above-average operating knowhow. It's difficult to compete against high power and elaborate antennas, but it can be done. The formula is simple: sharp operating and a little luck. The idea is to refine the first so the second will be a free bonus.

Consider the inevitable pile-up of stateside stations trying to work a choice DX multiplier. The DX station will be making contacts at a tremendous clip. Often he won't send his call for 15 or 20 minutes. To compound the problem, many Amateurs in the United States will work him and *they* don't send his call either — it takes too much time. Although this practice is fairly common, it's illegal for U.S. hams.

If you're with it, you'll note the DX station's frequency, move on and work others, then check his spot at frequent intervals. Sooner or later his identity will be made public. Meanwhile, the competition will have wasted precious time and contest points frantically trying to identify the mystery station.

The next step is to plan your strategy so you can leap in, latch on, and leap out. This is by no means as easy as it sounds. Here are some ideas that will help.

Note how the DX station answers calls. Perhaps he replies to stations clustered above and below his frequency; or maybe he works stations who transmit a few kHz higher each time. After a few contacts, a pattern will emerge. For example, how often does he answer stations on the low side of his frequency before he changes to those on the high side? By playing the law of averages, eventually you'll score.

If all seems useless despite your efforts, the wise thing to do is to move on and work other stations. Later you can return to the original pile-up, which will probably have diminished, and you can try again. Let the high-power fellows knock themselves out trying to make one difficult contact while you're busy racking up points.

After the contest is over, you'll probably want to exchange QSL cards with some of the rarer DX stations you worked. Trying to smoke out QSLs from rare DX stations has always been a problem, but here's an idea used by one enterprising DX enthusiast to increase QSL returns. Raised aluminum letters, such as those used for signs and house numbers, are arranged on a colored card. The card is then sprayed with a contrasting color of lacquer. Before the lacquer sets up, the card is decorated with multicolored glitter (the stuff used by stores for display ads). After the lacquer dries, the letters are flipped off. Result: a unique two-color QSL with call letters in silhouette.

Anything homemade seems to appeal to foreign Radio Amateurs. If you can boast a personalized QSL, your returns on confirmations should increase.

**Jim Fisk, W1HR**  
editor-in-chief





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## FOCUS & COMMENT

In one of my earlier soap-box sessions on this page, I hinted that something should be said about SWR and its importance (or lack thereof). The response to that one little sentence was doubly gratifying: first, it reassured me that someone out there was reading; second, some people actually wanted to hear more. There is plenty of literature which covers the entire SWR story in great detail, but I have a suspicion that it isn't much read by the average newcomer to Amateur Radio for just that reason — it's too detailed. Let's see if I can condense chapters into a paragraph or two.

Item — SWR is important in two or three ways, but not as important as you may think. As far as your station is concerned, SWR is important only when it is high enough to prevent the circuitry in your final from transferring power to the transmission line. Even there, SWR is not the disease, it's the symptom. The way to cure the problem is to cure the disease — namely the mismatch at the *antenna* end of the transmission line. Now, before someone who has been grossly misled starts yelling about efficiency, let me point out that the reflected power must be eventually radiated. Think about it — there's nowhere else for it to go. It doesn't get fed back to the plate of the tube. (What would the tube do with it? Pass it farther down the line to the driver, the oscillator, and eventually to the crystal or VFO?) Therefore, it must all be radiated. Oh, sure, there is *some* loss because of the natural losses of any conductor, but this is a minuscule portion of the total, unless your feedline is made of parallel strands of rusty barbed wire.

Therefore, SWR is important to your rig only when the mismatch is so bad that your final can't handle it. And, you would be surprised how high that SWR can get before most rigs start complaining — well-designed rigs, that is. Some, with marginal output-circuit designs, have trouble with a lowly 2:1 SWR. The problem is further compounded by solid-state rigs with overanxious protection circuits that throttle back the power when the SWR starts to climb.

Item — SWR is important when rf "backs up" on the outside of your coaxial cable and gets into your microphone, keyer, speech processor, digital frequency readout, or remote VFO (as well as your TV, stereo, garage-door opener, or whatever). Again, the SWR is not the sickness, but rather the symptom. The rf is getting into places it doesn't belong because you didn't give it a proper path to get to where it should go. How do you do that? Gosh, every publication, antenna manual, and Amateur's handbook since the beginning has had its share of articles telling how to make antennas that match the feedline: how to build networks that act as a go-between so an odd-ball antenna will get along well with common transmission lines. If there is no other solution, there are many ways to build a "Matchbox," a "Transmatch," or a "what-you-may-callitmatch" that will fool your rig into thinking all is well at the antenna. It's worth noting that the losses of such a matching device sometimes exceed the loss of efficiency incurred if you just let the rig do the best it can with the SWR.

Lastly — and I am reluctant to mention this — SWR is important to the people who make and sell the wondrous gadgets that an unsuspecting ham (and CBer) can be talked into buying "to improve your signal." If everyone understood the true meaning of SWR, then these gadgets would revert to their proper place in the radio world — a tool to be used when making adjustment to your antenna; an indicator that a change has or has not taken place at the other end of your feedline. The SWR-measuring instrument should never reach the level of importance that causes you to worry when its reading changes from "1:1 up to 1.15:1," as in a QSO I overheard on the air recently. (A well-known engineer and long-time Amateur told me, years ago, that "A VSWR of 1:1 is impossible to achieve, and even harder to measure." He was smiling when he said it, but he wasn't entirely in jest.)

In case you're still skeptical, let me cite further: before coaxial cable became plentiful and inexpensive, we used open wire lines, which almost always had an SWR of major proportions. If we fed an antenna on more than one band, the SWR was guaranteed to be bad on all but one of them. We worked a lot of DX, and had fun, with rigs that were no more efficient, and often much lower-powered, than what is being used today; SWR didn't scare us.

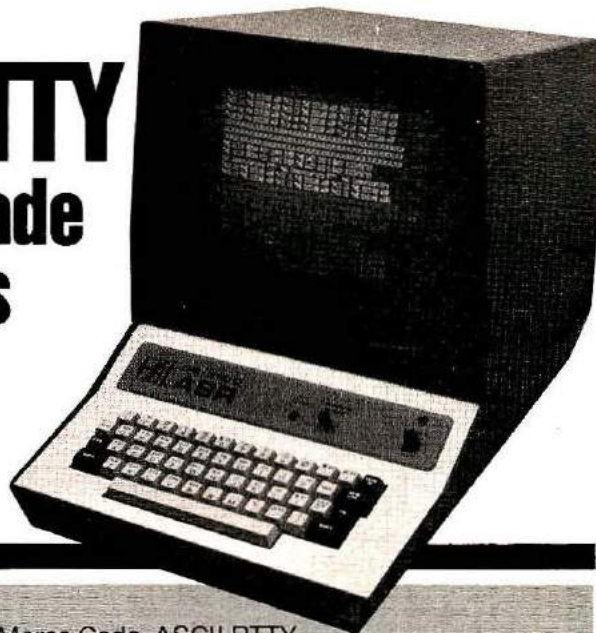
Also, there are communications satellites in use today wherein the antenna system requires a precisely engineered mismatch in order to get the power/bandwidth characteristics needed for the many channels of TV, speech, digital data, and so forth. The resulting SWR doesn't keep the satellite from doing its job — not in the least.

Keep your SWR meter in the category of a tool — and go back to enjoying ham radio.

**Thomas McMullen, W1SL**  
Managing Editor

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Today's Amateur demands rugged, rapid and accurate communications between Hams in the know. That's why they choose the Wilson Mark Series of hand-held radios. With exceptional qualities like these . . . why not choose the most popular radio available for yourself?

## FEATURES

Advantages such as solid state circuitry, rugged Lexan® case, removable rear panel (enabling easy access to battery compartment) and compact mini-size enhance the Mark Series portable radio's versatility. In addition, Wilson carries a full line of accessories to satisfy almost any of your requirements.

## SPECIFICATIONS

The Mark radios offer: • 144-148 MHz range • 6 Channel operation • Individual trimmers on TX and RX xtals • Rugged Lexan® outer case • Current drain: RX; 15 mA, TX; Mark II: 500 mA, Mark IV: 900 mA • A power saving Hi/Lo Switch • 12 KHz ceramic filter and 10.7 monolithic filter included • 10.7 MHz and 455 KHz IF • Spurious and harmonics, more than 50 dB below quieting • Uses special rechargeable Ni-Cad battery pack • LED battery condition indicator • Rubber duck and one pair Xtals 52/52 included • Weight: 19 oz. including batteries • Size: 6" x 1.770" x 2.440".

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Options available, include Touch Tone Pad, CTCSS, Leather Case, Chargers for Desk Top, Travel or Automobile, Speaker Mike and large capacity, small size batteries.

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# NEWSLINE

PRELIMINARY REPORTS OF WARC progress by mid October reveals that some Amateur matters have been considered by various working groups and committees. Committee 7 (General Administration) reached agreement that CW will remain an international "requirement" below 30 MHz. Only Canada and Japan supported the U.S. proposal to change the wording to "recommended." Working Group 5D (frequencies above 900 MHz) voted to reduce the Amateur portion of the current 1215-MHz band to 1240-1300 MHz, with Amateurs a secondary service; they also set aside 1250-1260 MHz for Amateur satellite uplink service.

Working Group 5C (29.5-900 MHz) saw China revise an earlier position to one that supports Amateur exclusive use of 28-29.7 MHz. The proposed 25-MHz band was deferred for further discussion by Working Group 5B.

These Decisions Were Reached in committee, and cannot be considered final at this time — any of them can be modified before the final report. Also, remember that it could take years to implement any changes that come out of the conference.

ASCII WAS ACCEPTED, paving the way for its use by Amateurs in the near future, at the Commission's meeting in Washington on October 10. After considerable discussion, the Commissioners agreed to let Amateurs use ASCII for RTTY, and instructed the staff to prepare rules for its implementation. During the discussion, identification of Amateur stations operating on RTTY was a key issue, and the present requirement that RTTY users must identify using CW — a sore point that's been the subject of a number of Petitions for Rule Making — was the telling argument in getting the Commissioners to agree on the ASCII okay.

Other Possible RTTY Modes were also considered at the meeting, but it was decided that they should be discussed separately in a future Notice of Proposed Rule Making. If the necessary rule changes can be prepared and approved quickly by the Commission, ASCII could be heard on the U.S. Amateur bands by year's end.

A YACHT AGROUND ON A REEF 250 miles east of Papeete was saved October 1, thanks to Amateur Radio. WA6CUP was monitoring the 20-meter Maritime Service Net when KA6HBQ broke in to report that the yacht he was on, the 53-foot "Skana," had gone aground on Aratika Reef in the Tuomoto Group, and appeared badly damaged. WA6CUP, and neighbor W6TIO immediately got San Francisco Coast Guard on the telephone, and NCS ZL1CU turned the net over to WA6CUP so he could link KA6HBQ to the Coast Guard.

The Coast Guard Contacted the U.S. Pacific Fleet, which in turn advised the French Navy of the mishap. A French naval vessel was able to reach the Tuomoto Group in a matter of hours, and by noon the next day, with the help of some island natives, the "Skana" was pulled off the reef and patched well enough to head for port for permanent repairs.

A SOUTHERN CALIFORNIA AMATEUR WAS JAILED October 5, as a result of 2-meter jamming and related activities. K6EOA's arrest by federal officers was for alleged violations of Title 18, subpart 875C, transmitting threats, and subpart 1464, the use of "four, profane, and abusive language" over the air. Only a few days earlier, K6EOA had denied FCC engineers, who were investigating jamming, access to his station. Following his arrest, K6EOA was arraigned and placed in detention in lieu of \$10,000 bail.

WB6LHB'S LICENSE HAS BEEN SUSPENDED by the FCC as a result of his having pled guilty to charges of using abusive language over the air earlier this year. The suspension of his Amateur operator and station licenses became effective September 6, with the adoption by the Commission of an order to show cause why both licenses should not be revoked. The next step in the proceedings will be when WB6LHB, Scott Lookholder, appears before an FCC Administrative Law Judge to answer the show cause order.

THE NATION'S SECOND OLDEST REPEATER, the Mt. Wilson machine formerly known as WR6ABM, has closed down after 18 years on the air. The repeater, most recently WR6AMD, was shut down by owner K6OQK as a protest against on-going harrassment by inconsiderate users and abusers — a problem that had also plagued its previous owners but which has recently escalated greatly to the detriment of many southern-California machines.

Mt. Wilson First came on the air in 1962 as an AM system as WA6TDD. It was later converted to combination AM/FM but has, of course, been FM-only for some years. In his announcement on September 22, K6OQK stated he'd be shutting it down in mid October, and a number of other Los Angeles repeaters are reported to be "temporarily" off the air in a sympathy protest.

JA6HOZ/BY SPENT ALMOST AN HOUR on the air from the Canton (China) city hall August 15, but a whistling, music-playing jammer marred much of his demonstration for three high-ranking city officials. During the operation his S9-plus signals were worked by five JAs, one of whom greeted the observers in their own language.

Although No Written Authority had been given for the experiment, he did have oral permission from top city officials. The operation was basically successful, but JA6HOZ feels it may still be a long time before the Chinese people will be permitted to operate.

# THE DRAKE TWINs

## Users' Report



BY THOMAS MCMULLEN, W1SL

Ask a group of hams for an opinion about most subjects, and you'll get almost as many opinions as there are Amateurs in the group. However, in the case of the Drake Twins in our *User's Report Number 1*, there were many similar opinions, and some were identical.

We've learned quite a bit from this survey, both about the Drake equipment and about conducting surveys. One recurring notation on many of the forms was, "Why not put your address on this form?" Oops! It'll be on the next one we print, for sure. Another area of confusion was the similarity between "Accessories you would like," and "Features you would like." That one will require a bit of thought to get the separation we intended. The original idea was to see what available accessories the

user didn't have, versus features that could have been built-in to make this type of rig better.

On the whole, the response was absolutely great, 158 by count. Many of the comments made a lot of sense; let's look at some of them.

### The good features

Many hams were quite enthusiastic about the versatility of the Twins (the ability to plug in extra crystals for coverage of other bands). "It's reliable and simple . . . a real station rig. With the FS-4, I have a transceiver capable of handling any new Amateur frequency" — AB9F. Joe, W8DYF, says, "I don't know, the rig has so many (good features) . . . it won't be outmoded if we get new bands . . . and it's rugged." Incidentally, Joe added a note

saying that his wife gave him the Drake Twins as a surprise Christmas present!

Robert, K2HBX, states, "In general, the rig is easy to use; the controls are well designed and functional. I particularly like the ability to transceive with the PTO in either unit . . ." From Mr. E. B. Collins, VE3GVH, "(the best feature) is the option of purchasing additional crystals to customize the rig . . . in case frequencies are changed (because of WARC), or new ones allocated, the rig can be brought up to date without modification."

Richard Stevens, AK4T, likes the "Flexibility, i.e., two VFOs, either controls (the rig) — or split. (When) used with the FS-4 as I do, it can hear everything from 1.5 to 30 MHz, plus 6 and 2 meter converters. My interests in ham radio are varied, so

a do-anything rig is needed."

Jan Williams, N2AE, likes "separate receiver and transmitter — very flexible this way. (Also, the) general-coverage receiver with the optional crystals." **Table 1** lists many other good features.

### And the bad features

The VFO dial mechanism drew quite a bit of criticism for such things as backlash, sticking, rubbing the numbers off, and the like. In fact, Danny, WB5JAQ, said the worst feature was "that Mickey-Mouse VFO dial assembly!"\* Gordon, W4XI, also complains about the "lack of smoothness in dial mechanism, and backlash due to friction between the concentric dials."

From Steve, WB0UGO, "That undersized mike plug is hard to find . . . (the finals) need a built-in cooling fan." Lloyd, WA4ZPO, states, "I had second thoughts about buying a tube rig . . . because of concern over tube replacement." (But then, in answer to Question 25, he said yes, he'd buy the same rig again. I guess the tubes treated him well.) And Neil, K2MRB, complains that "VOX controls are hard to get at," and mentions the "poor mechanical design of the VFO control, VFO can 'warble' from only a small amount of dirt on the control shaft."

However, from K1FI, "I find nothing wrong with the Drake Twins." And Henry, W3ZO, says, "Don't know of any . . . haven't found any that detract from the operation of the equipment." It seems that 14 per cent of the reports agree with this.

### Mixed bag

There were many comments

which did not fit into the majority of categories as shown in **Table 1**. Here are some samples: "It is R. L. Drake Company, which means to me U.S. made, rugged, high-quality design, dependable, stable, and backed by a customer-oriented company" — George, KA1DF. "You can't work a station you cannot hear, so a hot receiver is a must. This, and a good, clean transmitter, makes for great hamming" — Ken, WB2POG. "Using the filters on 40-meter CW has become a real pleasure. Noise blanker is very nice around noisy neighborhoods" — Tom, W7KHN. "I am surprised at lack of detail in service manual. Definite lack of foil layout on PC boards" — Norm, VE3CZI. "CW operation (transceive) is in lower side-band position. Impossible to listen to USB and return on CW without separating the VFOs"

proven design, and should offer many trouble-free years of operation . . . It affords me everything I want in ham radio" — Brad, WA1YIO. "Balanced-modulator diodes in T4XC shorted. Drake service people were very helpful" — John, WB9AUJ. "It seems to have a problem of burning out dial lamps. In the past 10 years I have owned 9 Tempo Ones, 4 FT101s, 1 Swan 500CX, 1 Heath SB102, and have serviced all types of rigs. I have kept the Drake the longest and had the best service" — Hugh, AE4N. (Worst feature) "If it really is one, it takes longer to tune up than a solid-state, broadband rig" — Joe, W8DYF. "Lack of trimmer capacitors for each band crystal . . . requires recalibration of dial for band change" — Charlie, WA5ZVL. (Worst features) "Receiver audio tinny and distorted: Transmitter level control

**Table 1.** The most-often-mentioned categories under "Best Feature" and "Worst Feature."

Best Feature	Per Cent
Flexibility (split operation)	21.3
Versatility (extra frequency coverage)	19.3
Selectivity (filters)	10.0
Reliable (rugged)	10.0
Pass-band tuning	9.3
Stability	5.3
Signal quality (CW and SSB)	5.3
Ease of operation	6.0
Sensitivity	4.0
Worst Feature	Per Cent
Tubes in final (heat, failure rate)	15.3
Retuning time and difficulty	8.0
Control and connections placement (on sides and rear panel)	6.6
VFO drift from heat	6.6
Noisy receiver	6.6
Receiver audio quality (distortion, hum)	6.6
Not solid state	4.6
Dial mechanism (sticks, backlash, sloppy)	5.3
Poor quality control, construction	2.6
Microphone plug size	2.6
None	14.0

\*No slight is intended toward Mickey Mouse or any of his comic-strip pals. The term is believed to come from the Mickey-Mouse watches of yesteryear, considered to be toys by upper-crust watchmakers of the day. Interestingly enough, original models of these watches are valuable collector's items today. **Editor.**

— Ed, WA1HYN. "Good design, good factory support, good manual . . . very impressed with Drake. I think the R4C is the best receiver available" — Jack, JY9JR/W3DYO/W2NXC. "Seems to me as if this is a

provides too large a change with too little rotation: TV sweep tubes in final without fan for cooling" — Ray, WA0DYZ. Jim Snell, WD8ORZ, says, "Sweep tubes for finals — Ugh! They should have been

6146s." But, he goes on to say, "I worked long and hard so I could buy the Drakes. With a wife and two kids, and today's prices, they better last a long time. I have every confidence they will!" According to WD4AEO, the rig's best feature is the R4C's "ability to tune in a net station which is slightly off frequency, while transmitting on the net frequency with the T4XC." He also mentions that he liked the use of tubes, which makes it easy for him to check and replace them.

### Troubles

Then we come to question number 12 — a very important one for newcomers buying their first rig, or for anyone who finds the Drake Twins in the classified ads or at flea markets. The answers to Question 12 (Have you had any problems?) stack up like this:

No = 34.8 per cent  
Yes = 65.2 per cent

For a closer look at the troubles, see **Table 2**. I've used the actual number of occurrences reported, rather than percentages, because several users named more than one trouble.

One noteworthy item that does not show up in **Table 2** is the speed with which some early troubles were taken care of. Diode failure in the power supply is a good example. Most reports of power-supply trouble noted that it occurred within the first two weeks to one month of purchase, and that Drake Company provided very fast service in repairing the rig. Another instance is the Notch-filter adjustment. Most of those reporting this type of trouble had the problem when the receiver was new, and stated that Drake was most helpful, and either repaired the receiver very quickly, or explained things by telephone in enough detail that the owner could fix it himself in short order.

### Servicing

Speaking of service and repairs, in answer to the ques-

**Table 2.** Of those who answered "Yes" in response to Question 12, the following troubles were reported. Some respondents reported more than one problem.

Trouble	Number of instances
Antenna relay (Transmit-receive relay)	14
Poor solder connections	11
PTO (VFO) dial sticks, backlash	10
Switches (dirty, broken, worn out)	10
PTO (VFO) drift, frequency jumping	8
Noise blanker not working	7
Tubes (shorted, microphonic, noisy, weak)	7
Power supply diodes failed	6
Notch adjust not working	6
Final tubes (overheated, shorted)	5
VOX not working	5
Out of alignment	4
Noisy audio (hum, distortion)	3
Balanced modulator failed	3
Bad crystal	3
Recurring pilot lamp failure	3
Defective parts	3
Intermittent (audio level, transmitter output)	3
Poor sensitivity	2
Crystal calibrator failed	2
S-meter opened	2
Tuning capacitor shorted (plate or output)	2
Miscellaneous mechanical	2
Mixer (noisy, oscillates)	2
Receiver product detector bad	1
Poor calibration	1
Bad SSB filter	1
No sidetone	1
TVI on Channel 4 from R4C tuned to 10 meters	1

tion, "Have you had the rig serviced?" replies look like this:

No = 42.1 per cent  
Yes = 57.9 per cent

Of those who had the rig serviced, 68.1 per cent had it fixed by the manufacturer, and, of that percentage, five hams found the service unsatisfactory; one was undecided (!).

Dealer service accounted for 9 per cent of the repairs, with only one unsatisfied customer.

In the "Other" category, we find 22.7 per cent of the repairs, all were by "myself," and all were satisfied (naturally!).

Among those who were unhappy with the service they received, we find such things listed as unresolved intermittent operation, persistent drift problems which were not cured, and unnecessary replacement of tubes. "Back to the factory three times . . . helped, but did not cure, the

problem of loss of drive during warmup" — Bob, W1MM. "PTO failed within one year. Paid Drake to fix it . . . they didn't do it right — still shifts frequency" — Dick, WA9AKO.

On the other hand, Dick, AK4T, says, "Within 90 days of purchase, the notch adjust went haywire; then the receiver went dead. I sent it back to Drake. They kept it only six days, including shipping time!"

And, from Harold, WD4BHF, "Extreme power difference from separate to receiver to transmitter (control). A letter to R. L. Drake Company brought a fast response and a list of items to check and correct myself without having the expense of returning (the rig) to the manufacturer."

### Accessories bought

Sizeable numbers of hams bought extra goodies to make their Drake station play better, or to mold it more nearly to



their idea of what a receiver/transmitter combination should do. Only 7 per cent of those replying stated that they bought no accessories for their Twins. An indication of the popularity of accessory items is given in **Table 3**. I've eliminated some categories, such as power supply, speakers, and microphone because many hams feel that these are essential items, needed to make the station work, and not properly in the accessory class; some respondents would include these in answer to the question, some would not. Items that appeared in less than 3 per cent of the answers are: phone patch, preamplifier, oscilloscope, low-pass filter, keyer, vhf adapter (or modification kit), fan (for finals), solid-state tube replacements, and product detector kit. Filters for the receiver got the most attention, with the Sherwood equipment and modifications being mentioned often. All the accessories listed in **Table 3** are not necessarily made by Drake.

### Satisfaction

Question 16 brought only two replies that they could not obtain the accessories and parts they wanted. However, there were a couple of complaints from Canada that the items must be ordered from the States. Six hams noted that they suffered repeated foul-ups on crystal orders — one had to order three times before he got the correct crystals, and another gave up after two tries

**Table 3.** Accessory items purchased for the Drake Twins.

Item	Per cent
I-f filters	60.5
Noise blanker	36.8
Extra crystals	36.8
MN-2000 tuner	12.5
Frequency synthesizer	9.8
Speech processor	8.5
Linear amplifier	6.5
Digital readout	5.2
C4 console	3.9
W4 wattmeter	3.9

with Drake and ordered from an outside crystal manufacturer — where he received fast and accurate service. While these cases are undoubtedly aggravating to the hams involved, I don't think it indicates a trend. There were over two dozen reports with added comments about Drake's excellent order service and fast response to inquiries.

In response to Questions 17 and 18, it appears that an overwhelming majority are satisfied with the accessories they have; only 11 answered in the negative, and 8 did not answer the question at all. That's 7.2 and 5.2 per cent, respectively. Six of the 11 who were dissatisfied complained about the noise blanker: "Noise blanker was too expensive and quite ineffective" — W7KEQ. "All accessories are satisfactory except the noise blanker. It causes distortion on strong signals, and its effectiveness is minimal, especially for \$75" — WA2IUS.

Other complaints dealt with poor operation of 8-pole CW filters, and with the poor sensitivity (and high noise) of vhf receiving converters. Another report stated, "The FS-4 synthesizer was unusable for reception of WWV at 5, 10, and 15 MHz, due to a strong spurious (signal) on frequency" — WA0YDZ.

Among those who were satisfied with accessories, several made favorable comments as well as checking the "yes" box. For example, W2NJN says, "Sherwood + Drake = Unbeatable!"

### Accessories and features wanted

Some hams wanted something to add to their Twins, and some didn't need anything else to make their Drakes do what was needed, like WD6BMX, "... the Drakes, with noise blanker and CW filter, are totally adequate for me." And, from WA4GWN, "All the accessories I need are on the market."

On the other hand, K1PD (who divides his time between DXing and rag chewing) says no accessories are needed, and "Bells and whistles just add to the cost — and don't make it perform any better."

The accessories mentioned as desirable include: digital readout (many, many times), fm detector, matching linear, fan (for finals), monitor scope, vhf transverters, speech processor (second only to digital readout), wattmeter, audio filters, phone patch, NBVM adapter, matching keyer, and noise blanker.

Under the features-wanted category we find: smaller, better product detector, speech processing (again), full break-in (QSK), more solid-state, audio filter (again), ALC metering, i-f and audio output jacks, "idiot lights" (to tell which VFO is in use), antenna switch that follows the bandswitch, WWV position, controls on front, OSCAR coverage, RIT for transceive, better finals (6146s), and a remote VFO.

### The ratings

Ah, yes, the ratings! Evaluating this part of the survey made me begin to see the worth of microprocessors (mini-computers!), and made me long for one equipped with an optical-scanner input system, or whatever.

Note that **Fig. 1** shows the ratings in percentages, not actual numbers. This was done to avoid any apparent discrepancies where one make of rig would bring a considerably higher number of responses than another.

Also, the percentages reflect only the number of people who answered the question. For instance, if you never had the rig serviced, there would be no basis for an evaluation of dealer service; the blank responses were not counted. Similarly, people who never bought accessories did not answer that part of the rating question, and these blanks were excluded from **Fig. 1**.

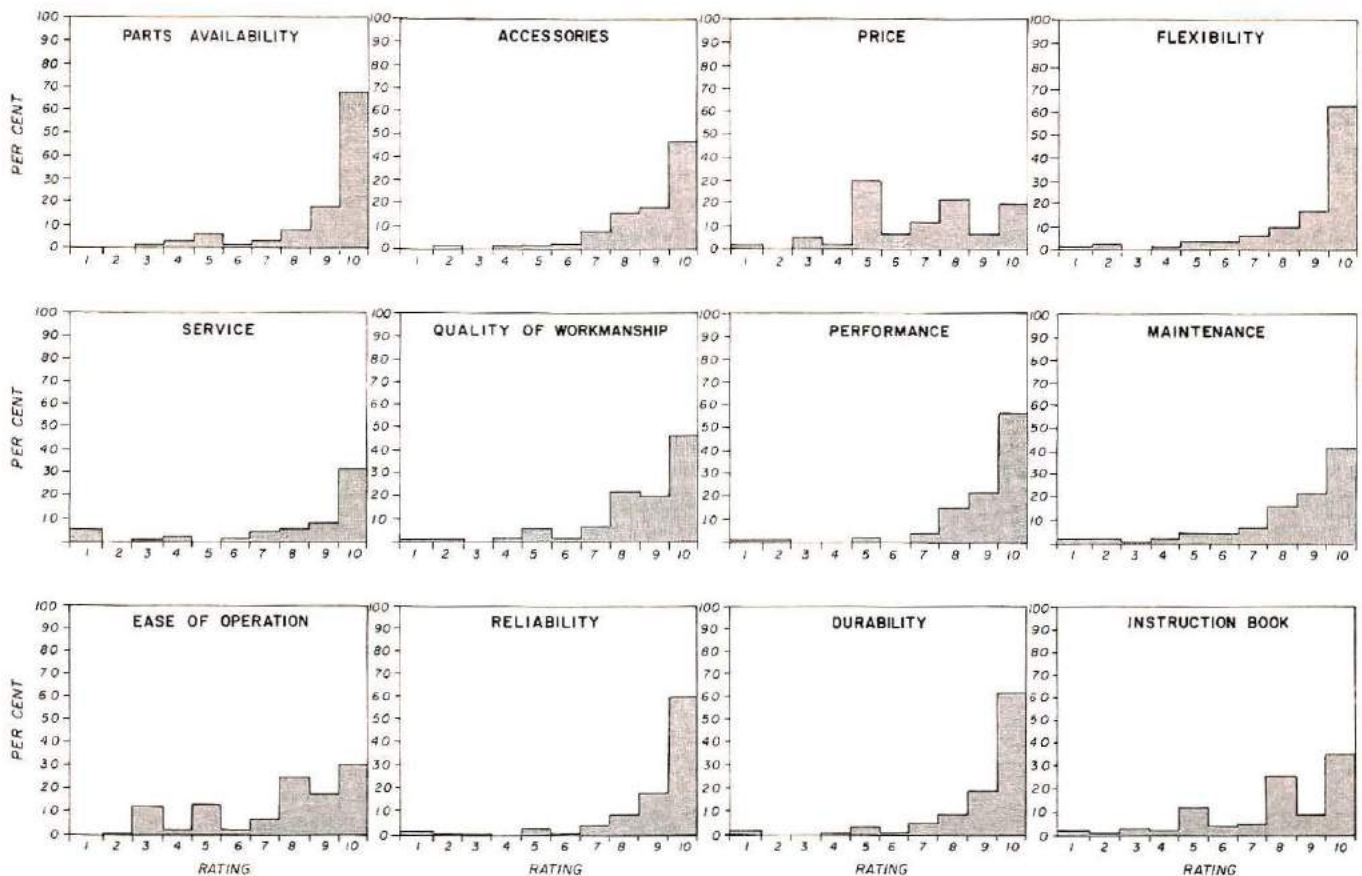


Fig. 1. The answers to Question 21 are shown in percentages of the total number of answers to each category. Reports that were left blank in any rating category were not included in the tabulation for that rating. Most users were very pleased with their Drakes, as shown by the "weight" on the upper end of the scale.

### The bottom line

The true test of the success of any piece of equipment is how many people like it well enough that they would buy the same rig again. The answers stack up like this:

Yes	= 76.2%
No	= 17.9%
Don't know	= 5.9%

It seems obvious that most of the people who have had problems with the Twins don't hold those problems against the equipment. In response to Question 12, 65.2 per cent stated that they had experienced difficulties, yet 76.2 per cent of the users state they would buy the same rig again. One respondent, who asked to remain anonymous, said, "Absolutely. I believe it's about the best rig of its generation. From all I have seen, Drake makes excellent quality gear." This same person then named

five relatives who have Drake equipment. (No, they don't live in Ohio!)

Of the 28 who answered in the negative, only 12 gave an unqualified "No," while 16 added notes indicating that they wanted a solid-state, broadband (no tuning for band-changes), or other modern rig instead.

### Where did they come from?

This may seem like a step back, to look at a question that was near the beginning of the form, but I assumed that the good and bad points, and why, were the most important things to talk about, and the lesser information could be covered later, depending upon time and space.

Dealers sold 63.3 per cent of the rigs, according to the answers to Question 3; 17.6 per cent were bought through mail order; 10.2 per cent were bought from an individual; 3.6 per cent through 800 number;

4.4 per cent from "Other," and 1 rig (0.6 per cent) was bought at a flea market.

In answer to the question "Would you buy from the same source again?" 88 per cent said "Yes," 7.5 per cent said "No," and 4.5 per cent were undecided or didn't answer.

### The future

There were some very good suggestions as to what equipment we should name in future surveys, and I'll be looking them over carefully when I make plans. The next three are listed in **Survey Number 2**, which you'll find on **page 46** of this issue.

And, for those of you who don't like to tear up your magazines, use a copying machine — many of our readers did. So, read the rules, get out your pencil, and start filling in the blanks. I'll sweep the old forms out of my office and make room for your replies. **HRH**

The following are excerpts from unsolicited letters and registration cards received from owners of the new TEN-TEC OMNI transceiver.

- "I sold a Yaesu to buy this and am very impressed" —WB5ULA  
 "My first QSO with OMNI-A was LA1SV on CW and second was EA8SK on SSB." —N2CC  
 "Excellent rig, just as advertised." —WB5TMD  
 "Very pleased with performance. QSK feature very slick." —WB0ELM  
 "This is my 5th TEN-TEC transceiver in less than 2 years. I loved them all and still have 3." —WB0VCA  
 "Through the years I have had complete Drake and Collins stations. I tried a 544 Digital and liked it the best so decided to purchase the 546 OMNI-D Digital." —WA4NFM  
 "Your OMNI is the best rig I have had in 20 years of haming." —K4IHI  
 "As a owner of Collins rig, your OMNI-D is the best." —K9JL  
 "I already have an OMNI-A, 544 and a TRITON IV. You may ask why I own so many TEN-TEC rigs. In case there is a great RF famine, I want to be ready!" —WD4HCS  
 "You guys really know how to turn on an old timer!" —K8ELS  
 "Best operating & most conveniences of any transceiver I've ever used." —W6LZI  
 "I like CW. Compared OMNI against IC701 (rcvr) and OMNI won hands down. XYL WD6GSB really enjoys rig on SSB. Finds rig is very stable and digital readout accurate." —AC6B  
 "Have checked it out on both modes from "top band" (160) all the way to 29 MHz. Terrific!!!" —W4DN  
 "Works well, parts layout and design much better for any possible servicing than other ham gear. The Japanese hybrid sets can't compare to TEN-TEC for audio. Audio reports excellent without special speech processors, etc., to distort the signal." —AG8K  
 "I have been using the S-Line over 15 yrs and never thought anything could outperform it. I got the biggest surprise and THRILLED with this OMNI-D even though I have been a ham since 1936." —KV4GD

- "This must be the greatest. I've spent enough money on final tubes to almost pay for this." —KA4BIH  
 "This transceiver was recommended to me by old time hams (Xtras) whom I have known for 40 yrs. Has excellent break-in." —N6AVQ  
 "Best package job I've ever seen! First licensed 6AAV in 1926. Now in operation—a sweetheart!" —W7LUP  
 "From a 32V2/SX115 to an OMNI is a big step!" —K6YD  
 "Receiver prominent—transmitter likewise—working comfortable—pleasing design." —OE1FAA  
 "First new rig for me in 10 years but seems to be very good." —W5GBY  
 "The best transceiver I ever used or owned." —W3TS  
 "I wouldn't swap my OMNI for anything on the market, regardless of price." —WD0HTE

#### OMNI/SERIES B FEATURES

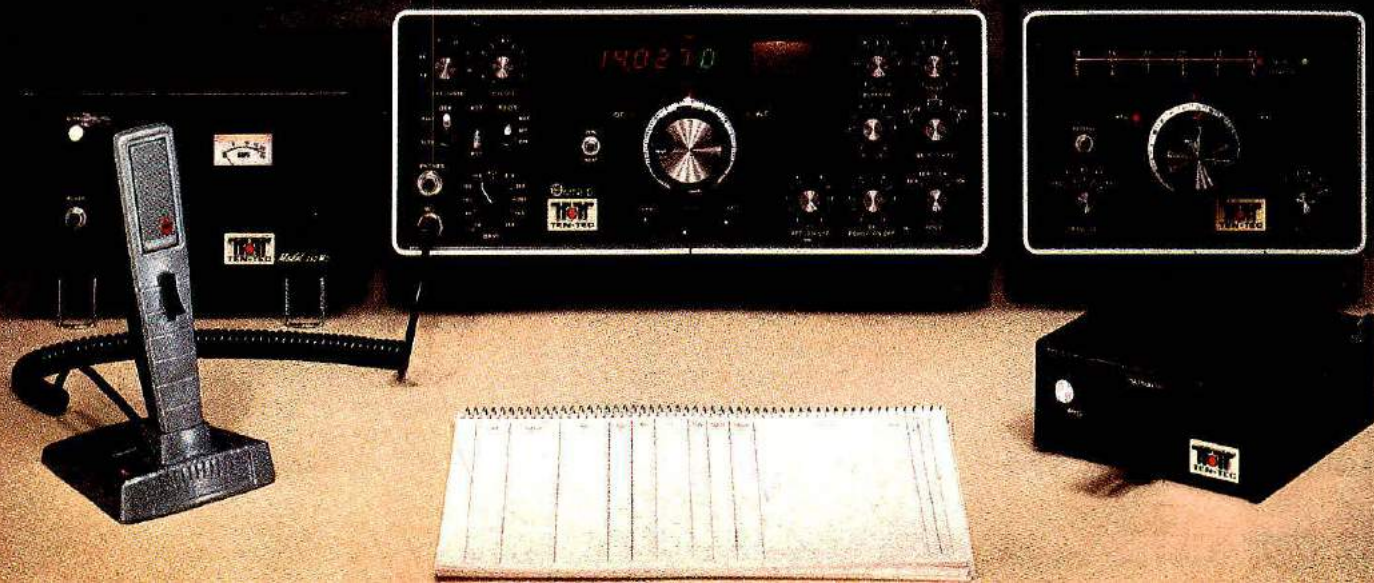
All solid-state; 160-10 meters; Broadband design; Standard 8-Pole 2.4 kHz Crystal Ladder I-F Filter + Optional 1.8 kHz SSB Filter & 0.5 kHz 8-Pole CW Filter; 3-Bandwidth Active Audio Filter; Choice of readout — OMNI-A (analog dial), OMNI-D (digital); Built-in VOX and PTT, Selectable Break-in, Dual-Range Receiver Offset Tuning, Wide Overload Capabilities, Phone Patch Interface Jacks; Adjustable ALC; Adjustable Sidetone; Exceptional Sensitivity; 200 Watts INPUT; 100% Duty Cycle, Front Panel Microphone and Key Jacks; Zero-Beat Switch; "S"/SWR Meter; Dual Speakers; Plug-In Circuit Boards; Complete Shielding; Easier-to-use size: 5 3/4" h x 14 1/4" w x 14" d; Full Options: Model 645 Keyer \$85; Model 243 Remote VFO \$139; Model 252MO matching AC power supply \$139; Model 248 Noise Blanker \$49; Model 217 500 Hz 8-Pole Crystal Ladder CW Filter \$55; Model 218 1.8 kHz 8-Pole Crystal Ladder SSB Filter \$55.

Model 545 Series B OMNI-A... \$949  
 Model 546 Series B OMNI-D... \$1119

To add your name to the fast-growing list of OMNI owners, see your TEN-TEC dealer, or write for full details.

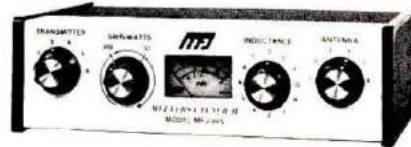
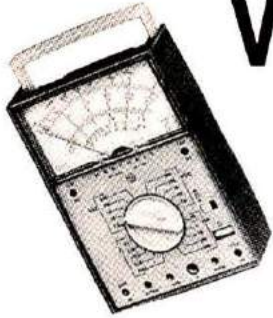
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# OMNI OWNERS SAY:





# Ham Shack Accessories: What You Really Need



Be sure your dollar buys you more performance than glitter.

BY KARL T. THURBER, JR., W8FX

All you *really* need to get on the air is a receiver, transmitter, key or mike, and antenna. But pick up a recent copy of any Amateur Radio magazine and you will soon discover the wide variety of accessories and "convenience gear" available for your station. You'll find keyers, speech processors, preselectors and preamps, audio filters, antenna couplers, SWR meters, power-output meters, and frequency calibrators, to name but a few of the myriad devices the ads try to tell you are essential to successful operating.

Of the hundreds of accessories from which to choose, how do you separate the glitter from the gold? Which accessories are necessities, and which represent frivolous expenditures you are best advised to do without? I'll review a wide range of ham-station accessories with the objective of making you more knowledgeable of what's avail-

able to improve both your transmission and reception, as well as make operating a good deal more enjoyable.

Let's look first at receiving accessories, followed by transmitting "goodies."

## Receiver accessories

In discussing receiver accessories, I'll assume that you have, or anticipate purchasing, a sensitive, stable, and selective communications receiver in good condition; it is difficult to get top-notch performance from an outdated, cheap receiver purchased for a few dollars. Adding relatively expensive accessories to a poor receiver is something like spending more on customizing a hot-rod than the basic machine is worth, and is not advisable. Of course, most of the receiver accessories described here are also applicable to the receiver sections of transceivers (combination transmitters and receivers).

## Preamps and preselectors.

Many older receivers lack adequate sensitivity, especially on the higher bands; this is also true of some modern vhf "all mode" transceivers. A preamp or preselector is a useful accessory in pepping up sluggish sets, though the improvement in the performance of a good set is marginal. The preselector, since it adds some selectivity ahead of the receiver, can also help in reducing reception of spurious signals and images, and it can significantly reduce the overall "noise figure" of your set.

If you buy a preamp or preselector for use with a transceiver, make sure it is of the kind that is designed to automatically switch itself out of the line when the transceiver is transmitting. A number of manufacturers make self-contained, easy-to-install high-frequency transceiver preamps; these include Palomar Engineers, MFJ, and Ameco. Janel makes

an excellent vhf preamp, and HamTronics markets a wide range of preamps designed for the experimenter and constructor. A list of addresses is given at the end of this article.

**Converters.** Converters are used to permit reception on bands not normally covered by the receiver. For example, if your set does not cover the 10-meter band, you can construct or buy a converter to tune to 10 meters. The converter beats, or heterodynes, the incoming signal with another frequency to produce an output in a frequency range that your receiver can cover, say 40 meters. High-frequency converters are not as popular today as they once were, since most modern equipment is designed to cover 160-10, or at least 80-10 meters. They are still popular, however, in vhf and uhf work in "down-converting" the desired band (such as 144, 220, or 420 MHz) to a convenient range, such as 14 MHz, which can be tuned on an ordinary communications receiver.

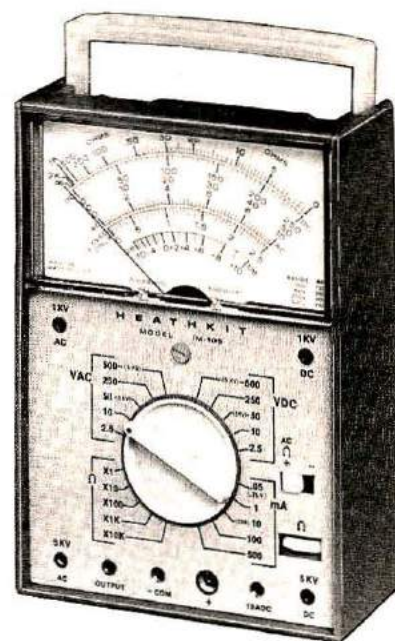
Bear in mind that overall results will depend not only on the sensitivity and stability of the converter, but on the characteristics of the basic receiver. HamTronics, Vanguard Labs, and VHF Engineering do a brisk business in these kinds of converters.

Another type of converter, the so-called "up-converter," has been popular of late. This device is popular among SWLs

(or more properly, LWLs, or long-wave listeners), in converting very-low and low-frequency signals to more conventional frequencies receivable on the ordinary communications receiver. Palomar Engineers makes an excellent vlf/lf converter that enables one to tune down to about 10 kHz by converting the signals up to the 80-meter band.

Recognizing that many hams are strictly vhf oriented, and own no other equipment than one of the "multi-mode" vhf transceivers (such as the Yaesu FT221R or Kenwood TS-700), Clegg has introduced a special up-converter that converts shortwave signals to the 2-meter band to make use of the excellent receivers that these transceivers contain. Similar models adapt ham-bands-only high-frequency transceivers to cover the entire short-wave range. You may want to consider the purchase of such a unit if you want to expand your listening coverage but do not wish to purchase a communications receiver for the purpose.

**Q-multipliers and i-f filters.** Some means of increasing selectivity and separating signals (particularly on CW) is necessary. Many older receivers, particularly those produced in the 1950s and 1960s, contain special i-f (intermediate frequency) circuitry to enable the operator to sharply peak a desired signal or null out an offending, interfering signal.



A general purpose VOM (volts-ohm-milliammeter) is an indispensable piece of test equipment; consider buying one, or a similar VTVM (vacuum-tube-volt-meter) or digital multimeter. The VOM is necessary not only for troubleshooting your equipment, but in checking wiring interconnections and cables for shorts and opens. The Heath IM-105 portable VOM shown here costs about \$80 in kit form (photo courtesy Heath Co.).

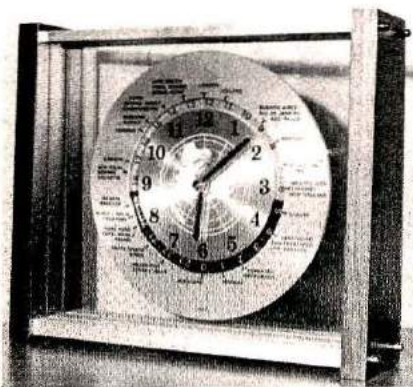
Several firms later came out with separate "Q-multiplier" add-ons (most popular of these was the Heath QF-1), which enabled the operator to connect the device to his receiver for improved selectivity. The Q-multiplier really works, though some patience is required in learning how to use it. Also, most of the commercial units are tube-type jobs and require a source of high-voltage dc, something not found in most modern solid-state transceivers and receivers. Also, to add the device to your receiver requires that you dig into the set to tap into an i-f stage.

If your set is not equipped with a narrow-bandwidth CW filter, you may want to purchase an accessory filter if you're inclined toward serious CW work. These filters bring the set's selectivity down to 400 or 500 hertz. They usually cost about \$50.



"Combination" antenna tuners are becoming increasingly popular. This MFJ tuner is relatively inexpensive, yet matches any kind of antenna from 160 through 10 meters, and includes a dual-range wattmeter, antenna-selector switch, and a built-in balun for matching to twin-lead or open-wire transmission lines. It handles up to 300 watts rf output (photo courtesy MFJ Enterprises).

**Active audio filters.** At least a dozen firms now market these very effective QRM-reducers. Some are designed for CW, others for SSB, some for both modes. Most of them are self-contained, include their own power supply, and are simply connected to the output of the receiver. Most allow you to vary audio selectivity from just a few hertz for super-sharp CW single-signal work, up to a completely "flat" response. Some also have highpass and lowpass modes, and some can be used to notch out an interfering signal or heterodyne while allowing the desired signal to be passed without loss. At least one popular unit allows you to notch out and peak at the *same time*; another unit has a built-in noise limiter should your receiver not have this feature. While these filters cannot make a very poor receiver into a razor-sharp set, they can do much to improve the receiver that is just a little bit "wide." I have had much success with my Autek QF-1 filter and find that it does quite well in improving the wide response of



This Verichron timepiece features direct world time readout, so that at a glance time can be determined in any time zone or major city on a 24-hour basis. Such a clock is very useful in determining the time of day at the other end of a QSO without consulting a chart or graph. Similar clocks are made by Yaesu and several other manufacturers.

my FRG-7 communications receiver when used on either SSB or CW. In fact, the results are almost as good as those I get from my Tempo 2020, which



A tunable preamplifier or preselector can bring the most sluggish receiver or transceiver to life, especially on the higher bands, and can improve unwanted signal (image) rejection as well. This Palomar Engineers preamp features up to 20-dB gain and bilinear operation, meaning that it can be used with transceivers as well as receivers without damage (*photo courtesy Palomar Engineers*).

has an excellent, narrow-bandwidth CW filter built in. One result of using such an audio filter is that, if you own a receiver or transceiver that includes only the SSB filter (with the narrow CW filter as an accessory), the purchase of an optional CW filter might prove to be unnecessary, as the audio filter would likely provide all the selectivity you could use.

Active filters are available from about \$50 up; various models are made by Autek Research, MFJ, Datong, Electronic Research Corporation of Virginia and others.

**Frequency standards.** It is important to know just *where* your receiver is listening, especially since it normally provides a cross-check against your transmitted frequency. Many modern transceivers and receivers include a frequency calibrator or standard as regular equipment. If not, and if the calibrator is available as an accessory, by all means obtain one for your set. Several inexpensive accessory standards are available, and include units sold by MFJ, Rainbow Industries, Ten-Tec, Kantronics, and others. Most of these provide strong, precise marker frequencies every 100, 50, or 25 kHz,

up to at least 30 MHz. Some go well into the vhf region so that they can be used in conjunction with 6- and 2-meter equipment. All can be calibrated to WWV or a local broadcast station by means of a small trimmer capacitor for accurate settings. Some have their marker-output signals modulated so as to produce a distinctive sound for positive identification in a crowded band. You will find the frequency calibrator a useful standard of reference for your shack.

**External speakers and headphones.** Most ham equipment produced today contains a "minimal" internal speaker. In most cases, the overall audio quality is poor, which results in poor performance from an otherwise excellent transceiver or receiver — the "weak link," so to speak. Most equipment lines have provision for an optional external speaker, and I recommend you obtain the matching speaker at the time of purchase (you may be unable to obtain one later on). If you can't obtain the matching speaker for your set, you can use almost any communications speaker as long as the impedance matches that of

your set's output, usually 8 ohms. Stay away from hi-fi speakers, as they will unnecessarily accentuate low-frequency hum and high-frequency noise and hiss.

If you don't already own a pair of headphones, now is the time to obtain a set — especially if you are a CW operator. Many DX signals are too obscured and weak for good copy on a loudspeaker; headphones will help considerably in pulling such signals out of the pack. Use of headphones will also minimize distractions to other members of your household. It is probably best to buy a good pair of communications-type headphones at the start, since you probably will use the same pair for your entire Amateur career. Good headphones have a narrow frequency response, are sensitive, can be adjusted easily, and have a comfortable set of earmuffs. Regular hi-fi headphones can also be used, but, since they are designed for stereo use, their leads must be paralleled for monaural use. Also, as in the case of hi-fi speakers, their wide frequency response may accentuate receiver hum and noise.

**Tape recorders.** Small cassette recorders have a wide range of applications in the ham shack. They can be used for recording DX QSOs, checking transmitted audio quality, recording messages for later relay, code practice, and other purposes limited only by your imagination. Hi-fi reproduction isn't a necessity, but the recorder should have low distortion, an auxiliary input (for direct connection to the speaker by using a Y-adaptor and patch cord) and a recording-level indicator. It pays to buy a recorder that also has low wow and flutter so that it may be used later on for recording slow-scan television (SSTV) transmissions should you develop an interest in that fascinating mode.

Some hams even use their recorders to pre-record CQs. This isn't a bad idea for rapid-fire contest operating or for trying to work a particularly rare state for WAS. However, if you try to use your recorder on transmit you may find it to be susceptible to RFI (radio frequency interference) from your own transmitter, and you may have to do some RFI-proofing on its innards.

**Other receiver accessories.** We've covered most of the receiver accessories you're likely to need. If you've purchased a receiver or transceiver without the deluxe accessories offered by the manufacturer,



Heath Cantenna is a popular dummy load useful in avoiding interference to others during transmitter tuneup. It's a "wet" model, meaning that oil is used for cooling the internal power-dissipating resistor. This unit can be used up to 400 MHz and will handle 1 kW. Other similar dummy loads are now made by several manufacturers, such as Drake, Yaesu, DenTron, SST, and others (photo courtesy Heath Co.).

you might consider adding some of the optional goodies as soon as possible after purchase to insure their availability when you need them. Some manufacturers offer the noise blanker, digital readout, notch filter, narrow-band CW filter, and internal clock as optional items. Most of these are useful accessories, espe-

cially the noise blanker and CW filter, and should be considered for purchase.

### Transmitter accessories

The same comments regarding starting with the best receiving equipment you can afford apply equally to transmitter selection; it doesn't pay to load down a junk transmitter with expensive accessories, since performance will never equal that of newer, better equipment, and will be a financial drain. As a Novice, however, you may want to start with a simple, CW-only transmitter of 1950 to 1960 vintage, which is entirely acceptable. However, trying to convert such outdated gear to SSB operation or vhf work is destined to produce unsatisfactory results.

Assuming you have a good, reliable, operating transmitter (or transceiver) you may want to add some of the following accessories to enhance its performance and flexibility:

**Electronic keyers.** As a Novice, you are probably using a manual telegraph key, and should probably continue to use it until you have upgraded your license in order to develop your "fist" and acquire a good sense of keying rhythm. However, after you attain a speed of 13-15 WPM, it's a good time to shift either to a semi-automatic key (a "bug") or a fully automatic keyer. The bug is a mechanical device that sends only the "dits" automatically; it has largely been replaced by the fully automatic keyer, which sends near-perfect code with minimal effort on the part of the operator. In using the electronic keyer, the operator sends dits and dahs automatically as long as he holds the paddle to the right or left side, respectively. Dozens of different keyers are available, and you can build your own as well. Nye Viking, Ten-Tec, Palomar Engineers, MFJ, Autek Research, and many others provide some excellent choices.

Many of the newer keyers have memory features, useful in pre-programming CQs and contest exchanges. Be sure to select a high-quality mechanism for your keyer; a junk paddle will serve you poorly.

**Power output indicators and SWR meters.** While your transmitter or transceiver may provide some indication of relative power output, you will want to have a better measure of its actual output in order to detect loss of performance over a period of time. For this reason, a calibrated hf wattmeter is a handy accessory to any station, and it need not be expensive. The SWR bridge is often combined with the rf wattmeter to indicate not only forward power but reflected too. This will allow you to assess the degree of mismatch (if any) between the output of your transmitter and the antenna. Most CB-type rf power meters and SWR bridges will handle moderate Amateur power levels, and are accurate enough for use on the high-frequency bands. For vhf, and high-power work, however, you should purchase a specially designed unit intended for Amateur use on the higher frequencies. Choose from units by Eico, Heath, Swan, Yaesu, Tempo, Sigma, Bird, and others. Electronic Research Corporation of Virginia makes a digital SWR meter. Several manufacturers include power/SWR meters in their antenna couplers.

Three related instruments may find application in your hamshack. The first is the grid-dip oscillator. This is a great instrument for determining the resonant frequency of your antenna system and for checking the electrical characteristics of tuned circuits. It is both a good piece of test equipment and a practical antenna accessory.<sup>1</sup> A second extremely popular goodie is the rf noise bridge. It is a self-contained device that is very helpful in quickly adjusting your antenna system to resonance by using

your receiver alone — no transmitter energy needs to be fed to the antenna to make measurements.<sup>2</sup> MFJ, Radiokit, Palomar Engineers, Heath, and Electrospace Systems make a variety of grid-dip oscillators or noise bridges.

The third instrument is the field-strength meter, sometimes abbreviated FSM. This is a cousin to the simple crystal set; it senses rf fields but requires no direct connection to your transmitter. It's handy for checking relative power output and letting you know that your signal is radiating. Heath makes a nice FSM kit that sells for around \$12. Swan



An ac-powered supply is needed when you want to operate your mobile transceiver indoors, either for regular operation or for troubleshooting. A small supply such as this 4-ampere Yaesu model will allow your mobile set to do double duty (*photo courtesy Yaesu*).

sells a ready-made meter for \$14.<sup>3</sup>

**Antenna tuners and couplers.** For best results, the transmitter, feed line and antenna should each be matched or tuned to each other's electrical characteristics. Most contemporary transmitters use a pi-network final output circuit that is specifically designed to work into a matched (flat) 50-75 ohm coaxial line; the power transistors in most solid-state equipment will not tolerate serious impedance mismatches. For this reason, and to accommodate the range of antenna types you may use with your rig, antenna tuners and couplers have become very popular

accessories. In addition, because of their tuning function, they tend to filter out harmonics of your signal which might otherwise cause interference with local television reception. Thus, many knowledgeable hams use an antenna tuner in their output line even if not absolutely required. You can purchase a coupler for as little as \$30 (designed for simple matching of single-wire or "random wire" antennas), up to more than \$300 for a deluxe model. The fancier units allow you to feed almost any antenna, including dipoles, inverted vees, verticals, beams, long-wires, and mobile whips.

The antenna tuner makes a convenient spot to install an internal power/SWR meter, lowpass filter, antenna switch, and dummy load as well. I recommend one that can handle a broad range of antenna types and that sports a built-in meter. In the low-price range, MFJ's Versa Tuner II (\$80) has many of these features; among the more expensive couplers, the Dentron MT-3000A (at \$350) even has an internal dummy load and a dual-meter power and SWR bridge.

**Microphones.** For some reason, most transceivers and transmitters are furnished with an inexpensive, mobile-type microphone. This is true even of those units intended primarily for fixed station use. It's a good idea to replace this with a high-quality desk microphone. In doing so, select one that is specially tailored for communications use; stay away from CB-type "power mikes." Also, be sure that any mike you buy matches the impedance of your transmitter; (or better yet, obtain a dual-impedance mike, such as the Kenwood MC-50 or the Yaesu YD-844A, that will match almost any rig you may purchase. For mobile work on vhf fm, you may want to buy one of the new touchtone-encoder mikes that have a built-in tone pad installed on





The Autek Research QF-1A active audio filter is representative of the "new breed" of selectivity-enhancing devices. It can be used in conjunction with SSB, CW, or a-m transceivers. It allows razor-sharp reception and a high degree of QRM rejection by electronically shaping or processing the receiver's audio-response curve. The unique design of this filter allows simultaneous peaking of the desired signal and notching-out of an interfering signal (photo courtesy Autek Research).

the rear case. This built-in feature makes it a lot more convenient to work via autopatch repeaters, especially in view of the fact that many fm transceivers don't have an accessory pad input. Finally, if you do a lot of mobiling, you may need a boom headset/microphone assembly so you don't have to hold the mike while driving. You should buy the one-ear type so that regular traffic sounds are not filtered out. Be sure, again, that the boom mike's output impedance matches the input impedance of your rig. Also, stay clear of the cheap boom assemblies designed for Citizens Band use.

**Variable frequency oscillators (VFOs).** Many older Novice transmitters were designed for crystal-controlled operation, in keeping with FCC requirements of the era. Today, the Novice is not restricted to crystal control, but is free to roam his segment of the band. To make the most effective use of such gear, a VFO is a necessity; the days are gone when you can own one or two "rocks" (crystals) and count on a wealth of contacts. Very few manufacturers make general-purpose VFOs today, although Kantronics, MFJ, and Ten-Tec sell accessory units

that can be adapted for use. Also, the Heath HG-10 and Johnson Viking VFO are sometimes available on the used-equipment market and give good results, providing you have a high-voltage dc power supply to furnish the voltage required.

Another type is the so-called "remote VFO" designed as a matching unit for the transceiver. Almost all transceivers contain their own internal VFO frequency control, but the transmitting and receiving frequencies are interlocked. The RIT (receiver incremental tuning) feature many transceivers have won't completely solve the problem of interlocked frequency control, but the remote VFO allows you to separately tune the transmitter and receiver portions of the set for special applications — such as listening for DX stations outside the regular U.S. phone-band segments while transmitting within the American portion of the band. The remote VFO should be considered a luxury accessory and is probably not needed unless you expect to become an avid DX-chaser (sometimes an insidious affliction!). In that case, it's a must. However, many serious DX-hunters prefer entirely sepa-

rate transmitters and receivers for what they consider optimum performance.

Depending on your specific operating needs, you may want to consider the purchase of several other worthwhile items. These may include lowpass television interference (TVI) filters, necessary if your transmissions bother nearby TV sets (B&W sells a special bandpass TVI filter for 2-meter rigs); dummy loads, very useful in making transmitter adjustments and tuning up off-the-air; and phone patches. Both TVI filters and dummy loads should be considered as necessities in almost every ham shack. An outlay of less than \$20 for each will handle full legal power levels. (You may also want to install highpass filters on your own TV sets to minimize interference from overloading).

### Don't forget the test equipment

Most of us don't consider test equipment until we need — and then it's too late. While the complexity of modern Amateur gear often turns us into "appliance operators," there still is a need for some basic test equipment in each and every Amateur's shack. Some



The bi-directional wattmeter, such as the Heath unit shown here, performs double-duty as an accurate rf power-measuring device and as a standing-wave ratio (SWR) meter. It allows you to monitor the actual power output of your transmitter over a wide frequency range, and check the match to your antenna (photo courtesy Heath Co.).

items you will want to consider:

**Multimeters.** The first piece of test equipment you should acquire is a multimeter. The multimeter is a basic piece of ham-shack equipment that



A good, dependable frequency counter is useful for your shack or on your test bench. Shown here is the Yaesu YC-500 frequency counter, one of a series of three Yaesu counters which count to 500 MHz with varying degrees of accuracy. All have 6-digit displays (with dual-range, 8-digit readout capability), and can operate from either 100 Vac for bench use, or on 12 Vdc. Accuracies of from 0.02 to 10 parts-per-million are possible, depending on the model selected. An interesting feature of the Yaesu counters is the rear-panel oscillator output jack; for extra accuracy in making vhf or uhf measurements, you can couple this output to your communications receiver and have a continuous calibration against WWV (photo courtesy Yaesu).

allows you to make resistance, current, and voltage measurements. These instruments range from simple and inexpensive pocket volt-ohm-milliameters (VOMs), through heavy bench-type vacuum-tube voltmeters (VTMs), to state-of-the-art digital multimeters. Each kind has its advantages and disadvantages, but the fact is that you need at a minimum some sort of device to make simple continuity checks and voltage measurements, even if you don't ever plan to take the cover off of that shiny new transceiver. The multimeter is invaluable in checking for shorted connections in power cables and transmission lines, making ac line-voltage checks, checking your station's grounds, and performing many similar chores. If you purchase

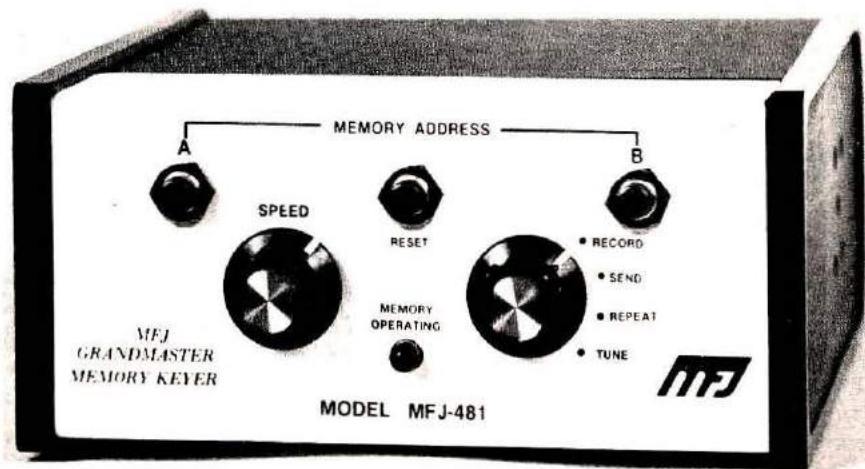
a conventional type of multimeter, select one from a known manufacturer who publishes accuracy figures for the meter, and select one with at least 20,000 ohms-per-volt internal resistance. Look for a meter with a large, easy-to-read face. And, if you go the digital route, select one with the newer LED-type readout rather than the older-style neon "Nixie" tube display. Heath makes several kits (of both the analog and digital type), and Sabtronics has introduced an especially fine digital kit that is quite inexpensive and comes with very detailed assembly instructions.

**Frequency counters.** Originally extremely expensive, counters that work well up to about 30 MHz are now priced at under \$100, and 500-MHz counters now boast price tags under \$200. The counter is just the ticket for "walking" 2-meter crystals onto a repeater frequency, and in precisely checking your transmitter's output frequency independently of your receiver. Hufco makes an adapter that allows you to use your counter as a digital frequency readout for your transceiver or receiver. You can also purchase an inexpensive pre-amp that increases the counter's sensitivity to the point

where it can pick up the weak local-oscillator energy in your receiver or transceiver.

In looking for a counter, I recommend selecting one that will take measurements up to the highest frequency band you expect to use; 150-MHz counters for example, are only slightly more expensive than their 30-MHz cousins. Look for one that boasts good frequency accuracy and at least 8-digit output (for good resolution). Also, you might want to purchase one of the newer counters that will work from a source of dc (such as your 12-volt automotive power system) for field use far from ac mains.

**Bench power supplies.** A handy source of 12 Vdc is important if you want to operate your mobile equipment indoors, or do any kind of service work on it. For light duty work, such as powering the typical 10-watt fm transceiver, a low-current capacity, CB-type power supply will usually fill the bill, provided it has good filtering and regulation. More flexible and generally satisfactory is a well-regulated, bench-type test supply that is capable of delivering 5 to 8 amperes or more for a variety of test purposes. You may want to look for one of the multi-



One of the several MFJ memory keyers currently available, the MFJ-481 requires an external paddle mechanism of your choice. It features two separate memories, useful for recording CQs and basic contest exchanges (photo courtesy MFJ Enterprises).

purpose supplies that furnishes 5-volts dc as well, for use in solid-state construction projects. Also, a supply that furnishes 10 to 12 amperes will usually be satisfactory for the 100-watt class of power amplifier.

### Do you need these?

Among the ads for Amateur station accessories, you will see some exotic equipment catalogued. Among these are CW/computer interfaces and CW keyboards, SSTV adapters, RTTY converters and adapters, ATV (Amateur television) cameras and scan converters, and similar devices. Most of these are quite exotic and are best left for the time when you have upgraded your license and are more experienced in basic modes of operation and in good operating procedures.

Other equipment advertisements are a spillover from Citizens-Band ads that tout complex accessories that, in many instances, are more hype than substance. Examples of such devices are call sign boxes that light up when you key or modulate your transmitter, gold-plated microphones, "power mikes," and the like. Most of these devices are geared toward establishing a feeling of power in the operator, and are perhaps best passed by.

A third category of "do I need these?" accessories constitutes what may be called the "vanity market." Here I'm speaking of call-letter plaques, ham pendants and key rings, call-letter license plates, Amateur bumper stickers, and similar items that are more concerned with the "look, ma, I'm a ham" appeal than with a real need. Whether or not you need or want such items is up to you, but understand that such "accessories" are often quite expensive relative to their utility.

### Summary

In this article, I have

surveyed the most important Amateur accessories with the newcomer's needs in mind. I have looked at a wide range of accessories designed to be used in conjunction with transmitters, receivers, and the "shack" as a whole. I have also



Many transceivers are furnished with handheld, mobile type microphones. A good investment is a quality base-station type microphone. Be sure to check for proper impedance (high or low impedance) and stick to a mike specially designed for Amateur communications use (photo courtesy of Yaesu).

taken a look at operating aids and basic test equipment you may want to consider, and at some accessories you might not need.

Worth considering is the fact that accessories are just that — devices you should consider for purchase only if they will materially improve your station's performance or your operating convenience, or will fulfill some other valid need. Perhaps the bottom line is, *will the accessory give me more value in improved operating than I have to pay for it?* If it passes this test, consider its purchase; if not, think about it the next time around.

### References

1. Thomas McMullen, W1SL, "Use Your Dipper," *Ham Radio Horizons*, August, 1979, page 34.

2. Jack Althouse, K6NY, "Use A Noise Bridge," *Ham Radio Horizons*, November, 1978, page 38.

3. Douglas A. Blakeslee, N1RM, "The Wavemeter — A Versatile Test Instrument," *Ham Radio Horizons*, June, 1977, page 52.

Back issues of these magazines are available for \$2.00 from Ham Radio Horizons, Greenville, New Hampshire 03048.

### Addresses

Autek Research, P.O. Box 5127, Sherman Oaks, California 91403

Barker and Williamson (B&W), Canal St., Bristol, Pennsylvania 19007

Clegg Communications Corp., 1911 Old Homestead Lane, Greenfield Ind. Park, Lancaster, Pennsylvania 17601

Electronic Research Corporation of Virginia, P.O. Box 2394, Virginia Beach, Virginia 23452

Hamtronics, 183 Belmont Road, Rochester, New York 14612

Heath Company, Benton Harbor, Michigan 49022

Janel Labs, 3312 S.E. Van Buren, Corvallis, Oregon 97330

Kantronics, 1202 East 23rd St., Lawrence, Kansas 66044

MFJ Enterprises, P.O. Box 494, Mississippi State, Mississippi 39762

Nye-Viking, (William Nye), 1614 130th NE, Bellevue, Washington 98005

Palomar Engineers, P.O. Box 455, Escondido, California 92025

Radiokit, P.O. Box 429, Hollis, New Hampshire 03049

Ten-Tec, Sevierville, Tennessee 37862

Trio-Kenwood Communications, 1111 West Walnut, Compton, California 90220

VHF Engineering, 320 Water St., Binghamton, New York 13902

Vanguard Labs, 196-23 Jamaica Ave., Hollis, New York 11423

Yaesu Electronics, 7625 E. Rosecrans, Paramount, California 90723

Note: Not all of the equipment mentioned in this article is still being manufactured — look for it in classified advertisements and at flea markets or auctions. You'll also see some of the items in current advertisements in *Amateur Radio* and other electronic magazines.

HRH



# *The Anglo-American Connection*

**BY DEE LOGAN, W1HEO, and DAVE LAKE, G3ZCA**

The yellow Cortina station wagon was winding slowly through the narrow streets of Lincoln, England, 120 miles north of London. At the wheel, our English host and fellow ham, G3ZCA, craned his neck in a futile effort to spot our destination, the town's ancient Roman arch. We were lost.

"Sorry, old man, but I'd better get some directions from a local," he said, flipping on his Heathkit mobile 2-meter transceiver. In a short while he had contacted a nearby Radio Amateur who helpfully supplied the needed directions. Soon, we parked near the town's majestic triple-towered cathedral and walked downhill to the sought-after Roman arch.

Ham radio had come through again. In fact, without it, we Connecticut Yankees — my wife and I — probably wouldn't have been vacationing in that part of England at all. Yet, it was quite natural, that after six years of chatting by ham radio with Dave Lake (G3ZCA) and his wife, Anne (G8MAY), we were invited to "cross the pond" to England and pay them a visit. Besides, we'd gotten to know them very well after being swept up in Dave's wild transatlantic game of needle in the haystack.

I'd been a licensed Radio Amateur for ten years when I first met G3ZCA, but it was the first chance I'd had to really develop an international friendship via ham radio. I knew, as do most hams, that "enhancement of international good will" is one of the

purposes of the Amateur Service established by the Federal Communications Commission. But those were just so many words. When Dave and I went beyond the usual radio topics and began discussing baseball vs cricket, comparative school systems, life styles, and tastes in ale, we were enjoying one of the most rewarding aspects of Amateur Radio. When we ultimately met, it was frosting on the cake. We humorously referred to our friendship as the "Anglo-American Connection."

It began in December of 1970. I was calling CQ on the 15-meter band and was answered by G3ZCA with a solid Q5 and S7 signal. We were soon exchanging routine information about our equipment and locations. Dave was running a Heathkit HW-100 with

a 2-element cubical quad antenna from his location in King's Lynn, Norfolk, about 100 miles north of London. After a few minutes of light chitchat, the conversation turned to Dave's keen interest in coming to the United States, but in a most unusual way.

"There's a teacher exchange program," he explained, "that allows English and American instructors to swap jobs for one year. And, since I'm an instructor of electronics at the local technical college, if I can find a counterpart in America who would like to come to England, perhaps I can operate as a portable W station for one year."

It sounded simple enough. But then we discussed the details and I found that not only did the exchange involve jobs, houses, cars, and pets, but the technical subjects taught and the type of schools would have to match as well. How do you find such a person? The challenge faced by Dave sparked my curiosity.

"How would I go about getting a list of technical schools in the States?" he asked. Frankly, I had no idea, but I agreed to look into it. "There may be some American ham/electronics teachers who would be interested," he added. "Perhaps I should write letters to the U.S. radio magazines and see if someone is interested." I agreed. Finding his needle in a haystack would be a big job.

Before ending our QSO we agreed to meet again on 15 meters to discuss his strategy further. It was the first of many contacts that would number over 270 by the summer of 1979. I volunteered to do what I could on this side of the Atlantic and began researching various technical schools and junior colleges. A list was sent off and Dave began writing the first of hundreds of letters explaining the program and inviting those interested to contact either of us. I mailed letters from my QTH to save postage, and

chatted with numerous state-side hams about the program.

Dave answered a good number of queries over the next several months, including some from hams who dreamed of operating for a year from "G-Land." Unfortunately, a precise match could not be found among hams, but Dave did agree to an exchange with a Grand Rapids, Michigan, teacher who was quite fascinated with Amateur Radio and planned to get his ticket someday. By then time had slipped by, and when the



"Big Ben" says it's radio time in London while G3ZCA, left, and visitor W1HEO prepare for a visit to the houses of Parliament not far away.

administrative machinery was meshed between London and Washington, the exchange had to be scheduled for the following year.

"Not to worry," said Dave, "we can use the extra time to thoroughly cover all the details." I saw his point. If you think about the hundreds of items that must be covered by someone leaving his house, job, neighborhood, relatives, friends, household pets, a car, and ham rig for an entire year, you can appreciate what Dave and Anne faced. And then there were Dave's bees. Raising honeybees is another of Dave's hobbies, and rather than leave

his backyard hive to an unsuspecting American, it had to be moved. Fortunately he found a sympathetic relative with a taste for fresh honey.

As the date of his departure approached, Dave and I were on the air almost daily. I became a link between the Michigan teacher and his English counterpart, and the details exchanged were considerable. Since we lived just a few miles north of New York City, we offered to meet Dave and his family — including children Timothy and Vanessa — when they arrived at Kennedy Airport. We planned a few days of sightseeing around Manhattan before they had to catch a plane for Michigan. But, before they left England, a major problem raised its ugly head.

The most economical way to cross the Atlantic at that time was by charter flight, so Dave volunteered to get tickets for both teachers and their families through an English agent. The Grand Rapids family was to pick up their tickets from an office in Niagara Falls.

On the night of their scheduled departure, our telephone rang. It was the Grand Rapids teacher calling from Niagara Falls to tell us that there was no ticket office open at the specified address. Nobody could tell them a thing about a charter airline. They were stuck. We got the word to Dave, and the family scrambled to make alternate arrangements on a commercial flight. It was an unfortunate way to start an exchange. The promoter of the bogus charter flight had grabbed their money and run. Attempts to track him down were, of course, unsuccessful.

Eventually, the day for G3ZCA's flight from England arrived. We had carefully figured how to accommodate the extra four people in our house, arranged for a week's vacation during their visit, and studied their photos to be sure we would recognize them when they emerged from customs.

"Isn't it quite risky to invite someone you have never met to stay with you?" asked one of my office associates. I admitted that it probably was, but on the other hand I had spoken with Dave extensively and therefore knew him better than I knew some of my relatives. Somehow, I was not too concerned about these "strangers" dropping in to stay a few days. They were, after all, part of the ham-radio fraternity, and, on the basis of my shortwave observations, they seemed to be warm, likable, interesting people with a good sense of humor. I enjoy people with a sense of humor.

Their flight was delayed several times, so instead of an early evening arrival it was 2:30 in the morning when the Lakes finally walked out of customs at Kennedy Airport. Despite our drooping eyelids, it was an exciting meeting. After hundreds of hours of chatting on the air we finally met face to face! We had no difficulty recognizing them, and both families easily swung into conversation as we loaded their bags into our car and started home. As late as it was, there was a steady stream of chatter as our visitors got first glimpses of America while we drove along Long Island expressways, past Manhattan's glowing skyline and up the Hudson to our home in suburban Rockland County, New York. Dave commented that we were, of course, driving on the "wrong" side of the road by British standards, but despite that we made it at last and tumbled into bed shortly before sunrise.

During the Lakes' stay, we all played tourist, taking a joint sightseeing tour of New York by boat and driving around the various points of interest. We introduced the Lakes to a backyard barbecue, something unknown in Britain, and to the delights of corn on the cob. We enjoyed long chats that extended into the morning hours. We all got along

beautifully, including the children, and time zipped by. Soon we were driving the Lakes to La Guardia Airport to catch their flight to Grand Rapids where they would begin a year's stay.

During Dave's year in America we stayed in touch by ham radio. Shortly after his arrival he put up a dipole, fired up a small transceiver, and was signing G3ZCA/W8. Amateur Radio also went along in his camper when he took a several-



Near London's Trafalgar Square, W1HEO arranges a meeting with G3ZCA by "talking him in" via the London repeater.

weeks-long tour of the country. I think that our visiting English friends saw more of our country in a year than most American families see in a lifetime.

The Grand Rapids newspaper and broadcasting stations "discovered" Dave and his family in their midst and accorded them, in my opinion, near celebrity status. There were numerous interviews and feature stories in which reporters inevitably asked the Lakes to compare the U.S. with the U.K. I still smile when I recall one of Dave's answers:

"Well, in Grand Rapids you

tend to have a church on every corner, while in England we generally have a pub on every corner," he had said. (One probing journalist asked him which he preferred!)

We saw the Lakes again before they returned to England and enjoyed looking at the many excellent slides taken during their travels. They spoke well of America and Americans, and seemed to have adjusted easily to driving on the "wrong" side of the road, fast-food diets, and our easy-going life style. We saw them off at Kennedy Airport, and as we did, were invited to cross the pond and pay them a visit in England. It seemed like a great idea.

In the spring of 1976, America's bicentennial was in full swing on both sides of the Atlantic. (Over there, the British called it the bicentenary.) TV stations in New York were broadcasting airline commercials featuring the English actor Robert Morley inviting us to "Come home America, all is forgiven!" Responding to his appeal, my wife and I checked our savings and managed to book a pair of seats on a night flight to London. Waiting for us at Heathrow would be G3ZCA, and a prime target of our sight-seeing vacation would be his home.

It's natural for American hams heading overseas to think about a license in the country they are visiting. In the case of England, it is really quite easy to receive a G5 call sign. I was not able to apply for one on my first trip to the United Kingdom, but, in 1978, I was given the call G5CQF for a standard six-month term of operation. Here is how you swing it: write to the American Radio Relay League in Newington, Connecticut, requesting information and forms for reciprocal operating permission. Complete the forms, attach a photocopy of your current FCC license and enclose payment of the \$13.00 fee. I bought a bank money order made out in British

pounds in the amount of 6 pounds, 40 pence. Allow about four to six weeks for processing. Your license will be sent from London, with all relevant rules and regulations printed on it. You can write directly to the Home Office in London for information: Radio Regulatory Department, Licensing Branch (Amateur), Waterloo Bridge House, Waterloo Road, London SE1 8UA.

American hams operating in England should be aware of the differences in privileges. British hams may operate from only 3.5 to 3.8 megahertz in the 75-meter band, for example, and also must stay below 7.10 on 40 meters and within 144 to 146 Megahertz on 2 meters. Power is limited to 150 watts dc input on most high frequency bands, or 400 watts peak envelope power on sideband. If an American operates in more than one part of the United Kingdom, the prefix is changed accordingly. In Scotland the operator uses GM instead of G, with the rest of the call remaining the same. In Wales, sign GW, GI in Northern Ireland, GD on the Isle of Man, GJ for the Bailiwick of Jersey, and GU for the Bailiwick of Guernsey. CW operators should note that their top code speed must not exceed 20 words per minute while using an English call sign.

When we arrived in London in May of 1976, we found the friendly smiles of the Lakes greeting us. It seems to me that having a ham operator on hand to introduce you to a country reduces some of the "culture shock" that confronts many tourists. In our case, it was a joy to have someone meet and greet us and immediately take us by the hand for a walking tour of London.

We inspected the usual tourist sights of London, of course, such as Piccadilly Circus, Trafalgar Square, No. 10 Downing Street, the Tower of London, Parliament, and Big Ben. We were also escorted to some off-the-beaten-path spots.

Along Portobello Road, for example, is a mammoth antique and flea market set up in the street each Saturday. Its carnival atmosphere covers a melange of sights and sounds involving sidewalk magicians, organ grinders, and entertainers performing for a few pence. Visiting ragchewers in London must make a point to visit the "Speakers' Corner" of Hyde Park on Sundays. There, anyone with something to say is



At famous No. 10 Downing Street, American visitor to London W1HEO assures an alert bobby that his handy talkie is simply for contacts via the repeater and that this is strictly a non-political visit.

free to mount a platform and make a speech lasting for hours. An appreciative crowd spurs the orators on.

The London Science Museum's Amateur Radio station, GB2SM, is another interesting spot for visiting hams. The modern station is built into an impressive floor-to-ceiling console, equipped with transceivers such as the Collins KWM-2, Trio-Kenwood TS700, and various receivers, amplifiers, and radio-teletype gear. The antenna farm on the roof of the museum includes a Mosley TA36-40 beam, dipoles, long wires, and J beams; some of

these are visible from the street below. During my visit, I was entertained by two congenial operators on duty: John, G3TLG, and Jim, G3YFF. I had worked GB2SM and brought along my QSL card to show while there. I was given an attractive new photo QSL as a memento of my visit. Before leaving the museum, I also looked over a fascinating exhibit of wireless apparatus and historic radio equipment, and I recommend it to anyone who can include this outstanding science museum in his London holiday plans.

After more sightseeing in and around London, we traveled to King's Lynn, Norfolk, as guests of the Lakes. This was a most rewarding part of our ham-radio vacation. We were able to escape the usual well-worn tourist trails and stay in the home of gracious hosts, meeting their friends in a relaxed, informal atmosphere. This is so much more meaningful than the standard tourist junket in which travelers are insulated from all personal contact with local residents.

Another noteworthy benefit of having ham hosts overseas is that they can save you lots of time by pointing out the "best" of various attractions. (They can also keep you out of trouble with suggestions about places to avoid or to approach with caution.) As an example, in England there are dozens of cathedrals, but a few are outstanding in some respect and this was pointed out to us. There are likewise many beautiful country manor houses, but Chatsworth, the home of the Duke and Duchess of Devonshire, was selected as one of the best by the Lakes. Our visit confirmed their opinion.

Dave and Anne took us on a series of local sightseeing drives through eastern and central England. Dave had his 2-meter transceiver in his station wagon, and as we motored about we chatted with dozens of local hams. Many of



Pointing to her home QTH of King's Lynn, Norfolk, England, Anne Lake, G8MAY, notes that the town is about 100 miles north of London.

the local Amateurs later met us in person during a party at Dave's house. Among the group were G4AKP, G8IUW, G4GEQ, G8MNE, G3VZD, and G3SAW.

Driving from King's Lynn to Boston, we visited a small monument near the sea erected in memory of our pilgrim fathers, who left the area in 1607 "to find religious freedom across the sea." Nearby, at Carrington, Dave introduced us to a unique event: a steam rally. Drawn together in a farmer's field were old but meticulously restored steam-powered tractors, stationary engines, and mechanical organs. The happy sounds of the carnival organs and calliopes are reminiscent of an earlier, simpler era, and we later bought recordings of some of the evergreen mechanical-organ tunes.

We found that England's personality is reflected, not by monuments, but by its people. For traveling hams, there exist opportunities to know people well. We found during our stay

that the English are most civil, courteous, understated, enterprising, and equipped with the therapeutic ability to laugh at themselves.

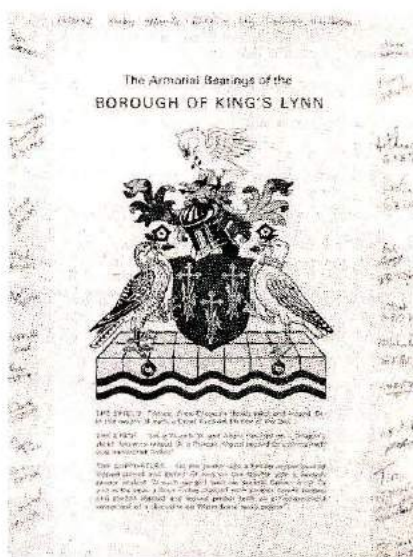
Certainly, the most interesting people we met were Anne Lake's parents, Bert and Queenie Barnes. We joined them for tea the evening before they began their retirement in most unusual style: The following morning they hopped on their bicycles and headed off on a 3-month, 4000-mile circumnavigation of the English coast, cycling all the way. The trip proved so successful that it inspired new frontiers. The delightful couple flew to Los Angeles in March of 1978 and cycled across the United States in less than 90 days, arriving at our new home in Fairfield, Connecticut, on Memorial Day. Bert is a spry 67, and Queenie is a "baby" of 62. While I can't vouch for it, this must have been the first cross-country bicycle trip by a retired couple.

When my wife and I returned to England for a second vacation in 1978, I had my English

call, G5CQF, and got on the air with a hand-held, 2-meter transceiver supplied by Dave. As we motored around the beautiful countryside I exchanged greetings with a number of hams on 2-meter fm. Dave also extended the courtesy of allowing me the use of the college radio-club station, which included an HW101, SB200 linear amplifier, and TA33 beam. With that good signal, I was able to meet some of my stateside friends on 15-meter sideband, and managed QSOs with W8AEB, KA4U, and WA2IAW, among others.

We also met for the first time with Jay, G4DFX, who works in London and had invited us to give him a call when in his town. He joined us at our hotel and drove us, one evening, around Londontown, providing interesting bits of commentary about the area that we didn't hear from the tour guides. We also visited the Royal Botanical Gardens at Kew with him and his charming wife.

Since I'm an avid DXer, Dave made sure to introduce me to Colin, G3JEC, who's on the ARRL DXCC Honor Roll for having confirmed contacts with 309 countries. Colin lives at the seaside resort of Hunstanton,



Coat of arms of King's Lynn, England, and autographs of members of Norfolk College of Arts and Technology Radio Club. Presented to W1HEO and XYL Liz, September, 1978.



and thus has a good QTH offering a good saltwater ground and a clear shot for his signals over the North Sea. His station is rather conventional, including a Swan transceiver, a linear amplifier, and crank-up tower. His beam is full-sized, however, and not a trap type, which may help account for his good signal. But the large number of framed awards in his cozy shack attests to the fact that being a good operator is far more important than extravagant equipment.

One of the most talented and creative ham experimenters we met during our visit to King's Lynn was Barry, G8CBB. While chatting with him on 2 meters during our September visit, we were invited to drop over for a dip in his pool. A swim in England in September? Curious, we stopped by with Dave, and discovered Barry's secret: he uses a swimming pool as a heat storage device for his homebrew solar-heating system. Barry built his own solar panels, circulating-hot-water system, and the required electronic circuitry to keep everything operating smoothly. Barry was also incorporating a heat pump into the system. This was an example of ham experimentation and electronic ingenuity at its best.

Ham radio and international travel are a natural combination. We decided to visit England during our vacation as a result of our friendship with Dave and Anne, and certainly, as a result of this bond, our holiday was that much more enjoyable and meaningful. There exists a warm bond of mutual respect and friendship between the two countries, and as G3ZCA jokingly says, perhaps it's time for England to become the 51st state!

The Briton's side of this story will be presented in next month's issue of *Ham Radio Horizons* — stay tuned in so you'll not miss his thoughts on cookouts, CB, dill pickles, and wide-open spaces.

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# A Visit With ICOM

## A Success Story in Amateur Radio

BY BRAD FIELD, JR., W8JJO

American Amateurs have, in the last year, noticed the introduction of all-band, high-frequency gear by ICOM, Incorporated. Many hams who never operate on the vhf bands seem to think that ICOM is a new company. Others, who have been working through two-meter repeaters for years, are well acquainted with ICOM two-meter fm gear. There is also a mistaken impression that the company is part of some vast Japanese conglomerate.

ICOM is, in fact, not a large outfit, but rather a medium-sized one. It started making ham gear over twenty years ago, specializing in ham gear almost exclusively.

The factory is in Osaka, and I stopped there for a visit in the spring of 1978. The photos show some of the interesting sights and people. ICOM had just moved into the third of its present three buildings. All are within sight of each other in the industrial southeast corner of Osaka. The buildings are of similar construction; four stories, no elevators, reinforced concrete, and designed — like all buildings in Japan — to withstand the shock of a heavy earthquake. One of the buildings is devoted to production; another to sales, shipping, and



Quick and nimble fingers wiring up sub-assemblies on a production line at the ICOM factory. Inset: Some of the test gear is homebrewed, like this one designed to test front-panel wiring on the IC-701 transceivers. The rubber elastic strap around the edge of the panel protects it from scratches.

service within Japan; and the main building contains the finance and personnel sections, as well as some shipping and packing, production lines, and a section devoted to research and development.

About 230 people work in these three buildings. There are, in addition, five other production lines run by sub-contractors who each put together a single piece of ICOM gear. There the circuit boards

are stuffed with parts. Then they are dip-soldered, the leads clipped, flow-soldered, and put through a coarse, "ball-park" tuning process, before they are sent back to ICOM for testing, final assembly, and testing again.

### A beginning

ICOM was not always this big. I had a chance to talk with its president and founder, Tokuzo Inoue, JA3FA. He

traced the company's beginning back to the days, twenty-five years ago, when he was himself a sub-contractor, making electronic sub-assemblies for a manufacturer of electro-cardiograph equipment. On the side, he began building up a rig for sale — a six-meter a-m portable. That went well enough to encourage him to specialize in the manufacture of ham gear exclusively, which the company has been doing ever since. He began in 1957 with ten employees, and fifteen years ago they incorporated, slowly growing to the company's present size.

It is still growing; sometimes the process shows at the factory in Osaka. The president's office has the usual big desk, but it also has cardboard boxes stacked in corners. In older companies there is a place for everything, and everything in its place, but a growing company like ICOM seldom has time for that. Things change fast enough that the temporary place to stack something may be the most permanent location that it ever gets. Growth



Tokuzo Inoue, JA3FA, president and founder of ICOM Incorporated, in his office in Osaka.

shows downstairs too, in the parts and purchasing section. I was told that it was due for an expansion of space soon, and it looked it. People were stand-

ing in each other's pockets. However, the Japanese are adept at moving in close quarters, indeed, quite comfortable in them. I seemed

big success," because he sold only about two thousand units. This led him to decide to concentrate, for a few years at least, on vhf gear.



The ICOM factory is located in the southeastern industrial area of Osaka. When asked about the smog, company founder and president Tokuzo Inoue, JA3FA, says, shrugging, "Oh, well, it's no worse than Los Angeles."

to be the only one there bothered by the crowding. Later, I was shown the top story of another building, a floor half empty — waiting for a manufacturing section to move up there.

Growth is also reflected in the "historical collection" of the models that ICOM has made in the past. It is not in glass cases, but stacked up helter-skelter on some shelves in a corner, waiting for the day when someone can find the time to organize it into a display.

Some of this growth came over a relatively short period, thanks, Mr. Inoue modestly claims, to a lucky accident. The company at first had tried to make a little of every kind of ham gear, though it also invested its attention heavily in research and development. The company once produced a five-band high frequency ssb/CW transmitter and receiver pair, the IC-700T and IC-700R, over ten years ago. Mr. Inoue now shrugs off its sales as "not a

At about the same time, in 1966, the Japan Amateur Radio League (JARL) entered into an agreement with the Japanese postal and telegraph authorities, the controlling agency for Amateur Radio in Japan. JARL agreed to assume the responsibility for administering the test for Japanese Amateur licenses, and then began to organize classes in Amateur Radio theory and code. The result was a sudden boom in the number of Japanese Amateur operators.

The Novice license in Japan can be renewed indefinitely. The most popular type is a phone-only, ten-watt license. It's not easy to work DX with such a restriction but it's fine for local rag-chewing. However, the high frequency bands in that part of the world are narrow, crowded, and beset by a multitude of intruding non-Amateur signals. Repeaters have never been legal under Japanese radio law, but, even so, in 1967 there was a rush to the market for vhf gear. Inoue

and his associates at ICOM were surprised by the rush, but they were also ready — by luck, Inoue says — to produce



Akio Shimzu, JA3JM, exports manager for ICOM, holds up one of the early and popular two-meter fm rigs manufactured by ICOM; to his right, the "historical bin" of still other older models of high frequency and vhf equipment.

two-meter gear of high quality and in some quantity. Thus ICOM participated in the boom.

### Exports

Of course ICOM, then, as now, was manufacturing gear for export markets too. Some of the vhf gear was specifically designed for use with American duplex repeater systems, though a large portion of its new sales at that time was in Japan, for the Japanese simplex-only market.

The requirements for the Japanese and American markets are different enough that it is more practical to design different gear for each, in preference to trying to make one design that will work in either. A simple example is two-meter gear: the American band is four megahertz wide, from 144 to 148, and most American Amateurs buy gear for use with fm repeaters and duplex operation above 146 MHz. But gear for Japan has to be designed to work on simplex only, and below 146

MHz, not above it.

Mr. Inoue grimaced as he told how he gets letters now and then from Americans who had, on a trip to Japan, purchased some ICOM two-meter gear. The letters typically complain that when the American got his gear home "it wouldn't work." Inoue sighed, "We try to help people who write us in that situation," he said, "but the equipment is not under guarantee, and it costs a lot of money to rework it for the American band." Then he rubbed his forehead gloomily. Clearly, the problem gave him a pain.

### Engineering and research

The ICOM factory has good facilities for custom work, but it is all committed to research and development for future products. There are twelve engineers at ICOM who spend their time at little else; ICOM has always had a large contingent of engineers in development. Mr. Inoue once discussed with Art Collins, the originator of Collins Radio, the

as it is now. Collins told him that was the only way to go.

That is the way ICOM has gone. The rigs that they market now are the result of development work begun years ago. The digital twin VFO was first projected before 1975 when one ICOM engineer, Kiyoshi Sakurai, JA3FMP, began design work on a transceiver that could be controlled by a remote computer. That meant a rig that had no mechanical linkage to its own front panel, only an electronic one, and that, in turn, meant a digital VFO. He also knew that two VFOs would be, under Amateur operating conditions, a great convenience.

There was no single integrated circuit available with sufficient capacity, so he did some breadboard work with Motorola chips. The size, and the manufacturing cost, of the resultant circuit made it impractical. But, about that time, some manufacturers of CMOS devices announced that they would take orders for custom-designed chips. The



ICOM vhf gear on the test bench, receiving the standard checks applied to every piece after assembly.

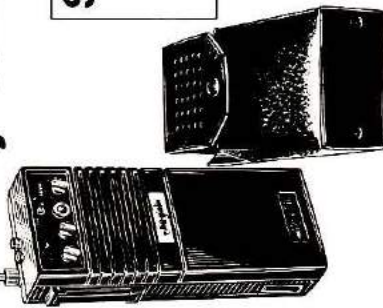
question of the best proportions of staffing a company — research versus current production. ICOM then had a research section proportionately as large

engineer transferred his breadboard work to a design pattern for an LSI chip. It took eight pages of paper taped together; he finished with a

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In the engineering section of ICOM, work is done on a possible design for some future piece of gear.

drawing twelve meters square!

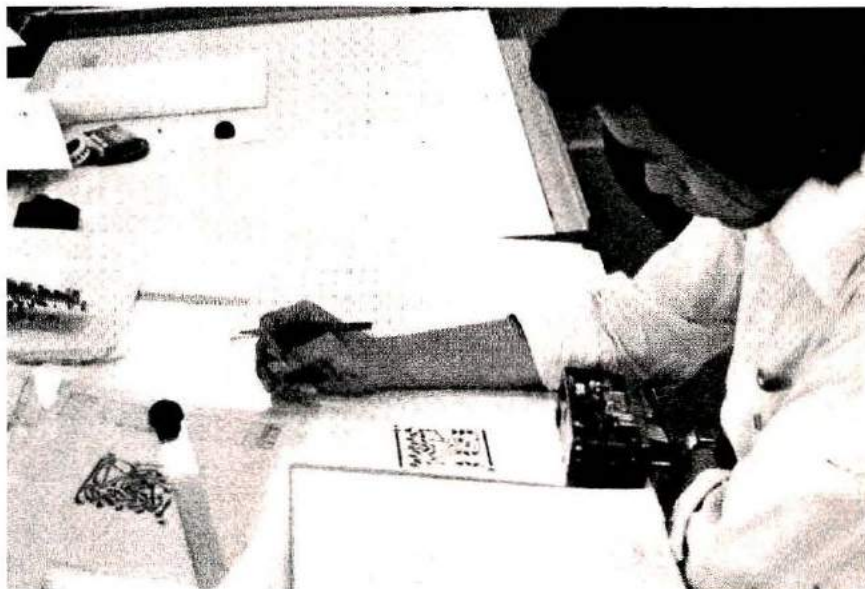
The maker of the chip, Nippon Precision Electronics, a subsidiary of Seiko, the watch manufacturer, then took over for further design work. The drawing was gradually reduced by photography to its present size, 6.3 by 6.1 millimeters. That seems small, but it is, at this writing, the biggest CMOS LSI device in Amateur use. It took about fourteen months of adjustment and modification to get chips that would pass ICOM's tests, and even now sixty chips are rejected for every ten that are accepted.

The future of ICOM involves further experimentation with remote control. Both the IC-211 and IC-701, as well as several other ICOM rigs, are controllable by the computerized remote box, the IC-RM2, which has four memories. Three rates of frequency change, simplex or duplex operation, any of 12 standard tones, and any valid Amateur frequency may be programmed, stored, and applied to either of the transceiver's VFOs. Mr. Inoue suggests that much of the equipment that we now habitually expect to see on the operating desk will soon disappear into black boxes

tucked away in corners, out of sight, and that the controls may all be contained on a small panel, the size, perhaps, of a typical hand-held calculator.

#### The future

In the ICOM engineering



An ICOM engineer poring thoughtfully over the pattern for a circuit board; under his right elbow, the circuit diagram of the whole rig; close in front of him, the sub-assembly itself.

section I saw some other developments as well; some with computers, some bread-

board work, and some last refinement of equipment before it is put into manufacture.

The electronics business is subject to forces beyond the control of the people in it. One such force is the rules changes that sometimes come from various governmental agencies. Another is the sudden boom in new modes of communication, such as the one for ssb that put many American manufacturers on the sidelines in the late 1950s. In *QST* for March, 1978, an editorial threatened us with another such revolution from the "frequency compander." A third influence is the world economic situation; the nose-dive of the dollar in 1977 and 1978 has markedly increased the effective price of Japanese equipment in the United States. American firms are more and more tempted to get back into the ham market again. But, in the field of high-quality equipment, where the price is not as important as the performance, the small or medium-sized company with a commitment to research and

development, like ICOM, is going to be hard to match.

HRH



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# Shaikdom of Pistachio: A DX Profile

BY DOUG STIVISON, WA1KWJ

Certainly one of the greatest attractions of Amateur Radio is talking with far-away places.



One of the most elusive of DX QSL cards — 9Z3AA in the tiny Zone 41 Shaikdom of Pistachio.

Most dyed-in-the-wool hams have a good atlas close at hand in which they pinpoint each DX contact. Frequently, too, collecting DX QSL cards opens the door to the world of exotic postage stamps. In Amateur Radio, distance for its own sake is a technical challenge which can be boiled down to a miles-per-watt computation. There is no way, however, to quantify the romance, adventure, and appeal of exotic DX lands.

Working 9Z3AA was my introduction to the world of truly rare and unbelievably exotic DX. Not many fellows have 9Z3AA in their logbooks, and some of the biggest of the West Coast and North Jersey big-gun DXers will not even admit that it exists. This is because, like Shangri-La and the Isle of Atlantis, it is a real

stumbling block to earning the WAMP (Worked All Mythical Places) award. Some of the WAZ and DXCC boys just can't face not having a complete set of prestige wallpaper. Over the years, however, I have worked 9Z3AA many times, exchanged dozens of letters, and become something of an authority on this little country and its dedicated ruler.

## Desert oasis

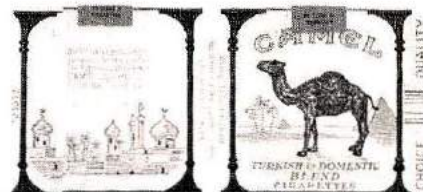
9Z3AA is the call of I. Emma Pirate in the tiny, yet staunchly independent, Shaikdom of Pistachio. Written off by many as a mere desert mirage, it is nonetheless a very real and beautiful oasis in the great uncharted desert of zone 41.

It surprises many hams to learn that it is the shimmering desert skyline of the Shaikdom which appears on the back of every package of Camel cigarettes. And it is the proud and stern-faced national mascot which peers proudly from the front of the same package.

As for 9Z3AA, the operator is none other than the Shaik of the Shaikdom of Pistachio. In the spirit of ham radio equality, and like AC3PT and JY1 before him, Emma refuses to use any pretentious titles on the air or on his QSL card. Emma's grandfather was an Oxford-educated inventor who is best remembered for inventing the now-ubiquitous camel patching kit. The familiar package is a

common sight in toolboxes wherever great "ships of the desert" need repair. Today it is the production of this single item that provides the industrial base for Pistachio's thriving economy. Emma is also quite an inventor. He holds several radio-related patents, including one for a turban with built-in headphones. This is now quite popular with many Arabic and East Indian hams.

Although burdened with affairs of state and the personal supervision of the camel-patch factories, Emma still finds time to get on the air with his state-of-the-art BC-610 and RCA AR-88 combination. Understandably, whenever he gets on the air fierce pileups form instantly. To relieve some of the pileup pressure he has invited some well-known American DXers to be his guests for a marathon DXpedition. Because our State Department refuses to acknowledge the existence of this little nation, visa and passport problems have prevented the realization



Everybody has seen a pack of Camels — but how many know that the package shows a view of this truly rare DX locale?



of this plan — at least for the present.

The common people of Pistachio are a cheerful lot with a great pride in their country and loyalty to their Shaik. Almost all Pistachioans are great sports fans, although Pistachio avoids all international sporting competition, preferring intramural competition in distinctly Pistachioan sports. Golf, for example, was introduced into the country a century ago by a Scottish missionary. Bearing the imprint of Pistachio's desert climate, the game is now played on a course entirely of desert sand with tiny traps of greenery on both sides of the pin.

### Coins and stamps

There was a flurry of publicity in the world financial press recently when Pistachio instituted a new monetary system. The old system, based on the British shilling and pound, was considered a throwback to the colonial period and was an irritant to growing Pistachioan national pride. The Shaikdom's new basic monetary unit is the Pistachio *doubledip*. One *doubledip* is equal to two *scoops*. In turn, each *scoop* is equal to an imprecise number of *chocolatejimmies*. The current price of a one-year subscription to this magazine, for example, is a Pistachio *double-dip* with *chocolatejimmies*.

Closely related to the monetary system are the Shaikdom's world-renowned postage stamps. Emma is quite a philatelist and all stamp designs are subject to his personal approval. A noteworthy recent issue commemorated the victory of the Shaik's forces over those led by the insurgent Mufti of Marshmallow.

Another recent issue, with a face value of one *scoop* but a collector's price of many times this value, bears the national coat of arms. This consists of a palm tree surrounded by Pistachioan hieroglyphics expressing the national motto. The

motto is derived from an ancient chant in the archaic Pistachioan tongue, and even the Shaik himself is unsure of its exact meaning. Transliterated, it sounds like *see-cue*

Pistachio Worldwide is found around 6195 kHz with Middle-Eastern music and sports scores in Pistachioan. The station identifies itself with a distinctive musical ID consist-



Pistachio's sole export is the world-famous camel patching kit invented by 9Z3AA's grandfather.

*dee-ex, see-cue dee-ex*. In spite of the fact that its original meaning was lost centuries ago, all agree that it is a hypnotic and powerful chant.

Being a remote desert oasis, Pistachio can be reached only by camel caravan or by air. There is regularly scheduled monthly air service to Pistachio International Airport by two Junker 52s (Iron Annies) of the Royal Pistachio Airlines. Ever since the press dubbed President Carter's campaign airplane as "Peanut One," the Shaik has been referring to his royal aircraft as "Pistachio One."

### SWL note

Shortwave listeners, incidentally, can log this country's lone shortwave broadcast outlet. Heard only under the best of conditions, Radio

ing of the first few bars of *God Save the Shaik* played on a kazoo-like instrument. Although very slow in QSLing, Pistachioans boast the most coveted QSL card in all of shortwave listening. Reflecting as it does a very different cultural perspective towards various human activities, it is mailed in a plain brown wrapper.

Most Amateurs will never hear a Pistachioan station, much less work I. Emma Pirate himself. A select, lucky few, however, will be able to flaunt a 9Z3AA QSL card — clearly marking them as champion DXers. Most hams, though, will just have to sigh whenever they see a pack of Camels or buy a camel-patching kit — knowing that's the closest they will ever come to working the rarest of the rare.

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100W	100H	100A	100C	0100D	100E
250W	250H	250A	250C	0250D	250E
500W	500H	500A	500C	0500D	500E
1000W	1000H	1000A	1000C	01000D	1000E
2500W	2500H				
5000W	5000H				

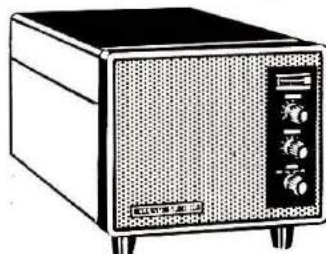
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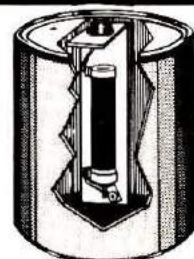


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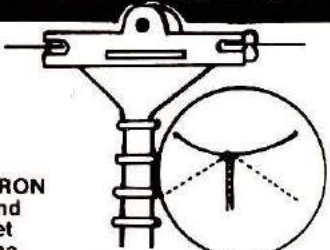
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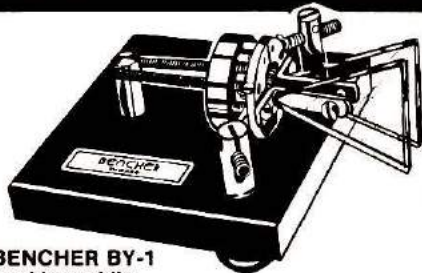
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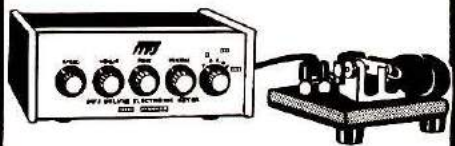
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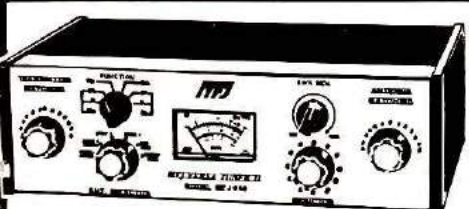
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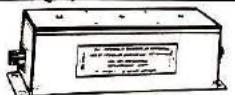
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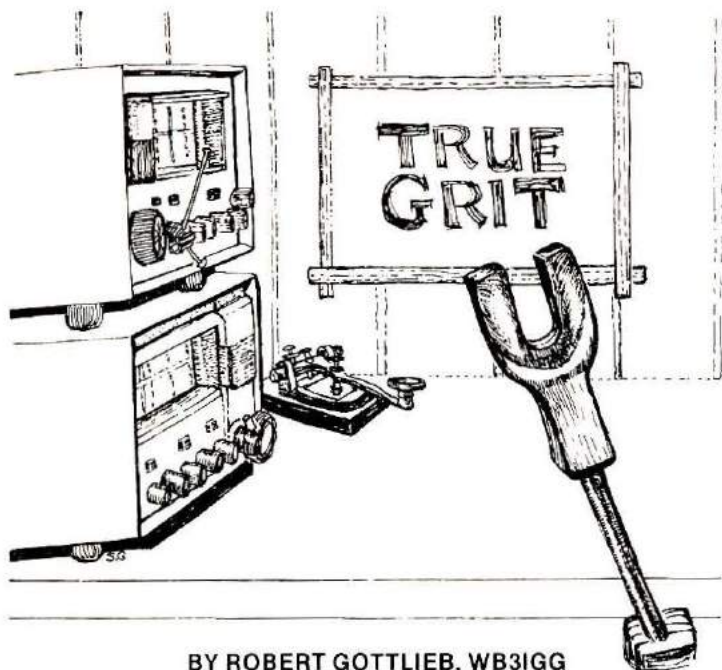


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# s Electronics



BY ROBERT GOTTLIEB, WB3IGG

Did you ever go through that moment of confusion as you thought you heard your own call sign being used on the air? I did, once. Here's what happened.

Early one Sunday morning, I felt like doing a little work with CW, so I moved the VFO down into the 40-meter Novice section, fired up the Kenwood, and sent out "CQ CQ CQ de WB3IGG." Then I sat back to listen, and thought I heard an answer just a little off my frequency. I tuned the receiver just a bit, and heard "CQ CQ CQ de WB3IGT" — almost the same call, but not quite. I replied, "WB3IGT de WB3IGG Careful OM our calls sure are almost alike." That started one of the most memorable QSOs I've ever had. Let me tell you about it, and about WB3IGT.

From the closeness of the call signs, I knew we both had gotten our Novice tickets at about the same time, in May of 1977. Later, I got my General-Class ticket on Pearl Harbor Day, December 7, 1977. But, listening to WB3IGT, his fist sounded a little awkward; somehow different. I remember thinking, "My gosh, in almost a year, he should have a little better rhythm than that." We chatted back and forth for about forty-five minutes. I got

used to his style and enjoyed the ragchew.

At one point, I asked a question I always ask. I'm interested in who people are and what they do, besides being hams. So I asked my unseen ragchewer what he did for a living. He replied that seven years ago, at age 16, he had been in a car accident and has since been confined to a wheelchair. This, I thought, explained his "fist." I figured he probably had some problem

with manual dexterity, and I was partially right.

WB3IGT had to end the QSO, his folks were taking him to church. So we exchanged good-byes and agreed to QSL. I pulled out my callbook and found that WB3IGT was Larry Deck and he lived only about twenty miles from me, near Myerstown, Pennsylvania. I filled out a QSL card, smacked a 9-cent stamp on it (the good old days, it's 10 cents now) and called it a day. As with many QSOs, you wonder if you will talk again, or even meet.

About a week later, I received an envelope in the mail, with both a QSL card and a typed letter from Larry. He explained what ham radio meant to him. Even though he was confined to a wheelchair, he could *really* "Tune in the World." His spirit and good cheer just radiated from that letter. I figured I just had to meet this ham. Well, one phone call was all it took, and several nights later, following the typed directions which he sent me, I was on my way to the Deck Dairy Farm.

When I pulled into the barnyard, Larry was out waiting for me in his electric wheelchair. That's when I learned that,



Larry, WB3IGT, at his ham station. The equipment, at left, is a Hallicrafters transmitter and receiver. The forked device in front of the typewriter is Larry's contact with the Amateur world.



Larry forms Morse code by pressing the rubber-tipped stick to the key, and moving his head up and down.

except for the ability to make a very slight motion with his right arm, Larry was totally quadriplegic. On top of that, at the age of twenty-three, he was learning to talk all over again. But the smile on his face let the spirit within shine through. You could see that he wasn't hung up on handicaps; he was doing the best he could with what he had.

Nudging a short control stick with his right hand, Larry steered his electric wheelchair into the farmhouse and back to his combination bedroom/ham shack. He wheeled up to his desk and showed me his radio equipment. To the left was his Hallicrafters HT46 transmitter and SX146 receiver; to his right was an electric typewriter specially rigged with a large roll of paper to feed it. Between the two, placed in a socket-type holder, was what looked like a piece of half-inch wood dowel about 18 inches long. On the upper end of this stick was a U-shaped piece of wood, while the other end had a rubber tip.

Larry asked if I would like to see how he sends code. I said yes, so he bent his head forward and took the U-shaped end into his mouth, clamping his teeth down on it. Holding it in this manner, he touched the rubber-tipped end to his key.

By bobbing his head up and down, he closed the key to send code. Now I understood the style of his "fist."

Larry uses the same device to adjust the controls on his radio. The control knobs have long machine screws stuck radially in them, and Larry can twist the knobs with the end of the stick. He also types, when receiving, using the same technique: He hits each typewriter key in turn with the stick held in his teeth.

By now, you might be won-



Tuning is accomplished by using the stick to press against long screws in the control knobs. Larry's next project is to get his General-class ticket; then, he can use voice-operated transmit systems (VOX).

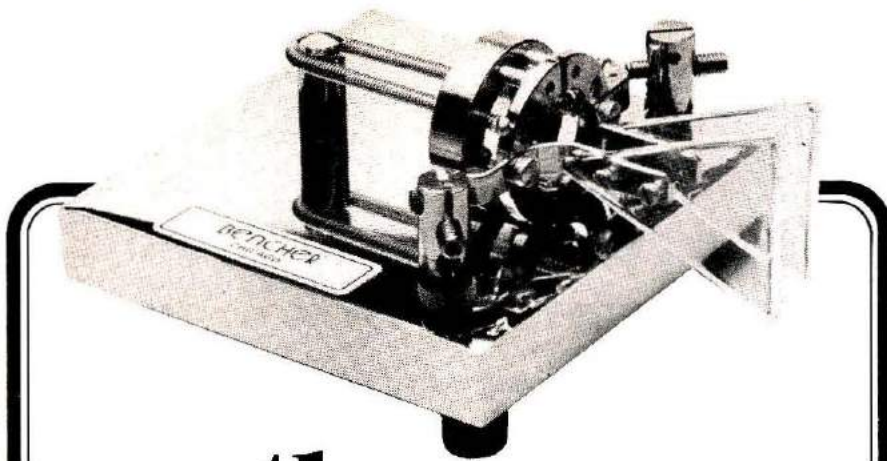
dering how Larry got started in ham radio. Well, like most of us, Larry had an Elmer.\* Larry's Elmer was Dennis Shaak, K3WFW. Dennis worked with Larry, set up his equipment and 40-meter antenna. Then he patiently taught Larry to send code, and to learn the basics needed to pass the Novice exam. Dennis just has to be a very special Elmer. Matter of fact, while I was visiting, Dennis and another of Larry's ham friends, Dave Strasz, WB3IGS, stopped in to visit; the evening turned out to be a wonderful eye-ball ragchew session.

What's ahead for Larry? Well, his goal is that General-class ticket, and I'm sure he can get it. By that time, he feels his speech will have improved and that he will be able to use a voice-operated transmitter.

So, those of you who hang out on the 40-meter Novice band, when you hear "CQ de WB3IGT," give Larry a call and enjoy a ragchew with a very special ham. John Wayne starred in a movie called *True Grit*. Larry Deck has "True grit, ham radio style."

\*Elmer = One who lends a guiding hand; a sponsor.

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# 1980

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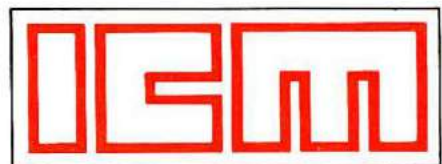
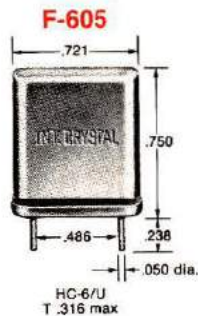
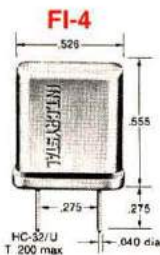
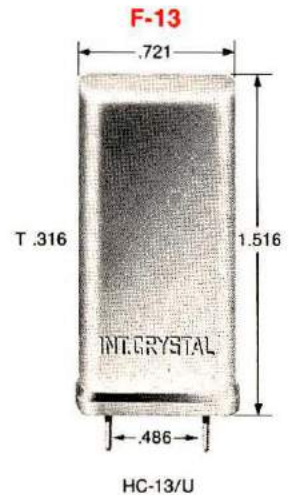
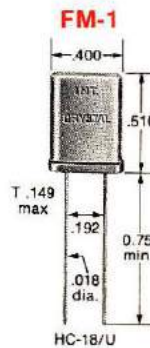
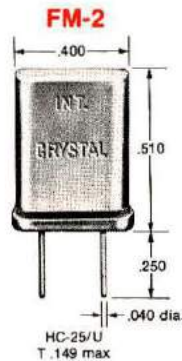
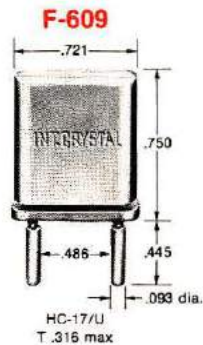
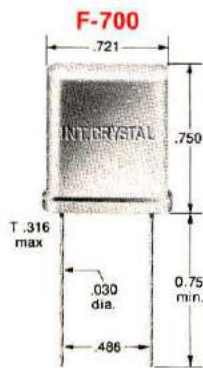
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# Amateur Radio Equipment Survey

Here's your chance to tell the world what you think of your equipment.

BY THOMAS McMULLEN, W1SL

If you have read the results of our User's Survey on the Drake Twins, elsewhere in this issue, it's almost a sure bet that you are ready to give us your thoughts on some equipment that you own, or have used.

Well, here's your chance — if you own a Heath HW/SB-104, a Ten-Tec Triton IV, or a Yaesu FT-101B (or later).



I know, from looking at equipment advertisements in classified sections, from comments made on the air, and from correspondence, that there are sizeable numbers of each of these rigs in use in the Amateur world, so your response should be a pretty fair cross-section of opinion about these three rigs. Look carefully at the letter suffix on the FT-101, if that's your rig. I'm limiting the questions to those with a suffix of B, or later, because the first FT-101s on the market were not really the same as the later ones. The engineering changes in more recent 101s were sufficient that they're almost different rigs, at least as far as operating problems and servicing are concerned. Also, here's your chance to sound off about a rig

you may have assembled — the HW-104 or SB-104. There's a space for you to give the Instruction/Assembly manual a rating, which will prove useful to newcomers who want to build a rig, and to manufacturers who print manuals and instructions.

Now, about that rating system . . . It was very clear, as I tabulated the results of Survey Number 1, that it was too easy. People who "loved" their Drake equipment just jotted down a 10, while those who had many problems of one sort or another gave it a rating of 1. The histograms with the report in this issue reflect this; the "weight" is all at the upper end of the scale. Accordingly, I've changed the rules just a bit, and you'll have to spend a few more seconds thinking about your rig before you give it a



number. For instance, 10 now means the rig is perfect. (If an overwhelming majority of the answers indicate any one particular rig is *perfect*, I'm going to start wondering about some of the "good deals" I've been conned into!)

Other revisions on the form simply removed a somewhat

redundant question, as in the case of "Best Feature," and "Why?" Most of the respon-



dents named the best feature and told why in one long paragraph, or else they knew *what* the best feature was, but couldn't find the right words to explain *why*. The same goes for "Worst Feature." These changes also leave a bit more room in the next question for an explanation of troubles.

Plans for future User's Surveys call for a trio of vhf rigs, and then some more high-frequency types. By that time, there should be a fair population of the newest crop of rigs in use, such as the TR-7s, the 901s, the Omni D, and many others that came on the market in late 1978 and 1979.

It's going to be an interesting winter — and I may have to learn to use a minicomputer in self-defense. Fill out the form, and drop it in the mail right away. Here's another change you'll notice — our address is given at the bottom of the second page, thanks to several of you who suggested that we print it on the form.

HRH





16. Have you been satisfied with these accessories? Yes \_\_\_\_\_ No \_\_\_\_\_

17. If not, why? \_\_\_\_\_

18. Additional features you would like to see built into a rig of this type \_\_\_\_\_

19. Give the equipment a score from 1 to 10 (with 1 being poorest, 4 to 6 average, and 10 perfect).

Ease of operation _____	Performance _____
Reliability _____	Maintenance _____
Durability (in continuous use) _____	Parts Availability _____
Instruction Book (Assembly Manual) _____	Accessories (ease of connection) _____
Factory/Dealer Service _____	Price _____
Quality of Workmanship _____	Flexibility _____

20. How long have you been licensed? \_\_\_\_\_ Your Age \_\_\_\_\_ License Class \_\_\_\_\_

Principal activities: Contest \_\_\_\_\_ DX \_\_\_\_\_ Rag Chewing \_\_\_\_\_  
 Traffic Handling \_\_\_\_\_ Experimenter \_\_\_\_\_

21. What antenna do you use most? Beam \_\_\_\_\_ Wire \_\_\_\_\_ Other \_\_\_\_\_

22. What rig would you like to see reported on in the future? \_\_\_\_\_

23. Would you buy this same rig again? \_\_\_\_\_

24. (Optional: fill in the following only if you wish.)

Submitted by: Name \_\_\_\_\_ Call \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

\_\_\_\_\_  
(Signature)

(Your signature authorizes *Ham Radio Horizons* to quote portions of your comments in our report.) May we use your name and/or call?

Yes \_\_\_\_\_ No \_\_\_\_\_

Note: If you own more than one of the rigs indicated, please write to us for additional copies of this form. Use a separate form for a report on each rig.

**Completed survey forms must be returned no later than January 31, 1980, to be included in our report.**

**Mail To: Ham Radio Horizons, User's Report No. 2, Greenville, NH 03048**

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303-893-5525

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Thomas Communications  
Newington, CT 06111  
203-667-0811

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302-478-2757

Delaware Amateur Supply  
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302-328-7728

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Supply, Inc.  
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Tufts Radio Electronics  
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Northboro, MA 01532  
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Farris Radio  
Hazel Park, MI 48030  
516-398-6645

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216-585-7388

Astro Video Equipment  
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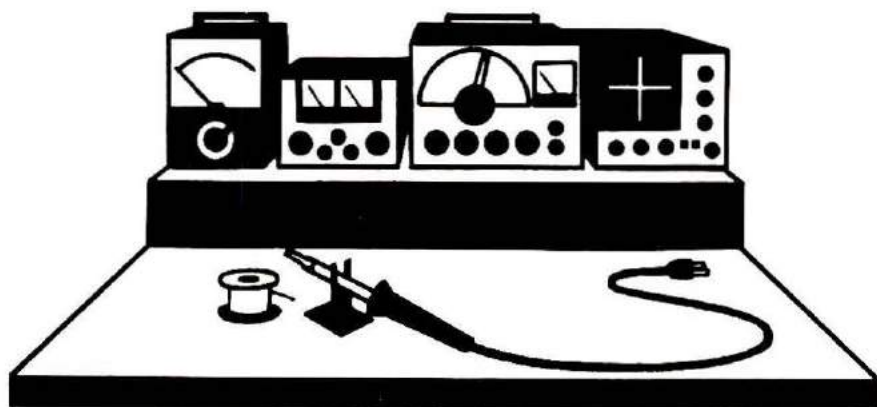
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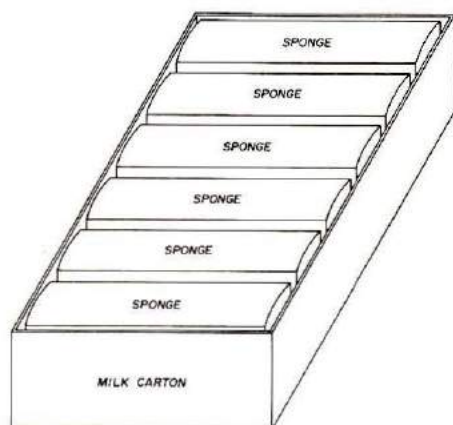
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# BENCHMARKS

## Soldering Tip Cleaner

A clean soldering-iron tip helps make reliable solder connections. Fig. 1 shows an inex-



SOLDERING IRON TIP CLEANER

pensive tip cleaner made from a half-pint (¼ liter) milk container and some sponges cut to fit the container. Best results are obtained when the sponges are kept moist. To clean your soldering iron, just insert the tip between the sponges.

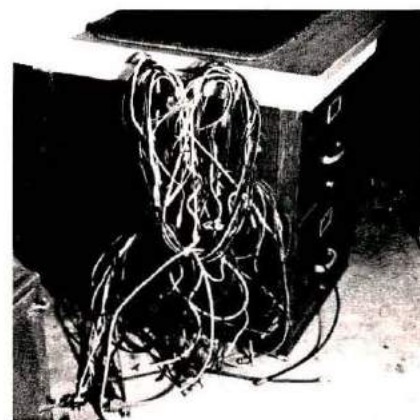
Gary Tater, W3HUC

## Cliplead Carousel

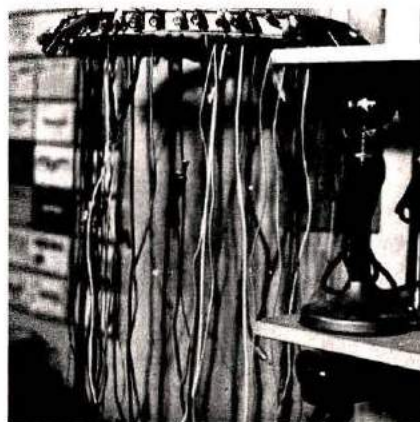
After many frustrating encounters with tangled test leads and several complaints from the YL about "that ball of spaghetti and alligators" hanging from the end of an otherwise neat work-

bench, I decided there had to be a better way. Encouraged by a sensible system I had admired at the junior college I attend in Rhode Island, I began my improvisation. The method used in school was a long board with slots cut into its edge to accept the ends of the test leads. This was functional, but it took a lot of wall space I didn't have, what with QSL cards, world map, bookshelves, and all. So I "borrowed" a wheel from my son's bicycle parts pile and cut slots into one side of the rim all the way around the wheel. Thinking ahead, I cut some of the slots wider than the rest to accommodate coaxial-type patch cords. The wheel's axle was then secured to the end of a wall bracket with the wheel horizontal at about eye level with the slotted side up. I used a piece of 5-cm (2-inch) aluminum for the bracket, but a standard shelf brace would do as well. Clip leads and patch cords can now be passed up through the inside of the rim and dropped into the slots. This holds them firmly and neatly, easy to see and to get at. Even the space between the axle and the rim does not go to waste; this is where I hang my less popular probes. The wheel turns freely on its bearings, putting any and all test leads at your fingertips yet using a minimum of wall space.

Robert E. Best, WB1AQM



This tangled mess of clipleads . . .



can be made much neater . . .



with a modified bicycle wheel.

## Radiogram Processing Aid

When your club or group sets up a station at a large public meeting or fair, you can be called upon to handle hundreds of messages in a couple of days. In an effort to reduce the errors and make it easier for the public to take part in our efforts, I've developed the following system

additional windows cut in it. Through appropriate holes, the editor assigns a number, priority, and other items that go into the preamble. He then checks to see if an ARL numbered radiogram can be used to reduce the length of the text.\* The completed message is then ready to be handled by the station operator and relayed by the amateur traffic system.

see it as an aid to using the form. Out of the 15,000 people attending the fair, over 4000 of them visited the Amateur Radio room. The fair, the Amateur Radio demonstration, and the message handling were a resounding success.

Pete Radding, W2GJ

**"ANYWHERE NORTH AMERICA"**

TO WHOM ARE YOU SENDING THIS MESSAGE

NAME \_\_\_\_\_  
 STREET \_\_\_\_\_  
 CITY \_\_\_\_\_  
 STATE/ZIP \_\_\_\_\_  
 TELEPHONE \_\_\_\_\_

PLEASE PRINT

WE RESERVE THE RIGHT TO EDIT FOR EASE OF HANDLING

YOUR MESSAGE OF 20 WORDS OR LESS

YOUR SIGNATURE \_\_\_\_\_

THANK YOU FOR YOUR INTEREST IN AMATEUR RADIO

NUMBER	PRIORITY	HANDLING	STATION	COUNTY	CITY	DATE
TO _____						
BY _____						
DATE _____						
ARL VERSION OF ORIGINAL MESSAGE						
ORIGINAL MESSAGE						

Two versions of the message stencils are needed. The one at left is used by the person who wishes to send a message. Instructions should be brief and clear. The form at right is used by the editor, who assigns a number, priority, and a preamble to the message. He can then abbreviate the text, if possible, for ease of handling. The completed message is then ready for handling by the traffic operators.

which was first used at the Corning, New York, Market Street Trade Fair. It proved very successful, and helped the traffic handlers to keep things flowing smoothly.

The secret is two manila folders with windows cut in them at appropriate places. The first one is given to the person sending the message — the originator, not the Amateur Radio operator. A piece of paper inside can be written on through the windows, and the sender writes the address of the recipient, complete with telephone number and zip code, in the first window. He then writes the text of the message in the second window, followed by his signature in the last one.

The message is then given to an editor, who places the sheet inside a second folder with

The number of folders needed will vary, depending upon the size of the expected crowd. My club used four of the first type and two of the editor's type, which allowed us to process some 315 messages over a two-day fair. A sample message was posted where the public could

\*The ARL numbered messages are an abbreviated form of many of the most common greetings sent by either the general public or Amateurs. In use, the original text, "Having a wonderful time at the Trade Fair. Wish you were here," can be condensed to: ARL SEVENTY SEVEN, THE TRADE FAIR X. This shortened version is relayed by the Amateur Radio traffic operators, and the operator who delivers the message to its destination looks up the text for ARL SEVENTY SEVEN and makes the delivered message read exactly like the original. ARL numbered message lists can be found in ARRL logbooks, or obtained as an operating aid from The American Radio Relay League, Communications Department, Newington, Connecticut 06111.

## Binaural hearing

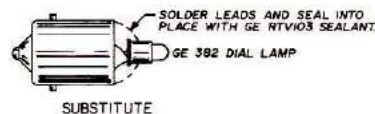
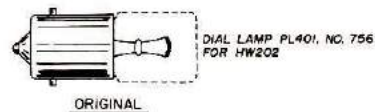
Some of us older hams have hearing difficulties. Although I do not yet wear a hearing aid, one ear is about 20 dB below the other. I didn't really realize it for a long time but when listening to the speaker I hear with only one ear. The same is true of a pair of equal-volume headphones. I recently acquired a pair of stereo headphones with individual volume controls. I now turn the good ear volume down about 20 dB with respect to the poor ear and this gives equal apparent volume to both ears. Amateur Radio has suddenly become about twice as understandable as before. If your stereo headphones do not have individual volume controls, an outboard attenuator control may be wired in for the good ear.

Bob Baird, W7CSD

## HW-202 Lamp Replacement

To decrease the time and trouble of transceiver disassembly, try the idea shown below the next time the dial light on your HW-202 fails. This lamp provides good illumination and has a prolonged life. Use caution when breaking glass on a burned-out bulb.

H. C. McDonald, W5UNF/6



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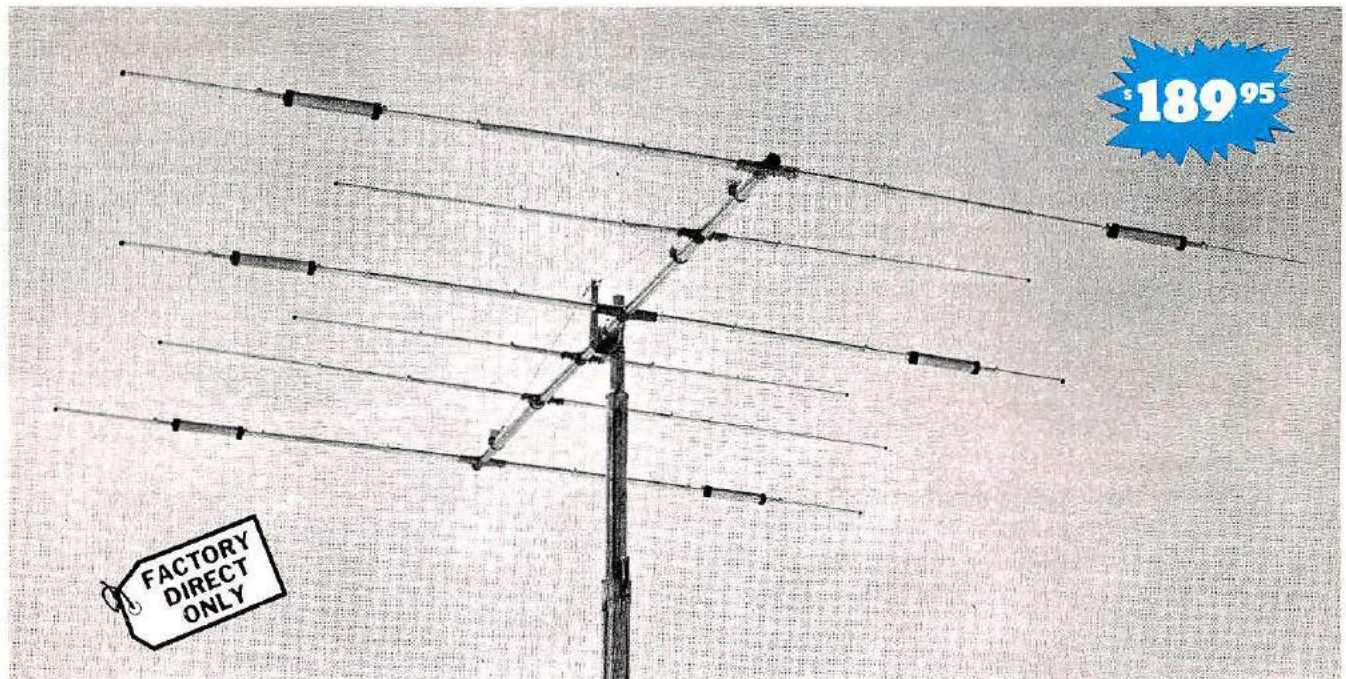
## KENWOOD TS-520SE



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# WILSON SYSTEMS, INC. presents the SYSTEM 36



A trap loaded antenna that performs like a monobander! That's the characteristic of this six element three band beam. Through the use of wide spacing and interlacing of elements, the following is possible: three active elements on 20, three active elements on 15, and four active elements on 10 meters. No need to run separate coax feed lines for each band,

as the bandswitching is automatically made via the High-Q Wilson traps. Designed to handle the maximum legal power, the traps are capped at each end to provide a weather-proof seal against rain and dust. The special High-Q traps are the strongest available in the industry today.

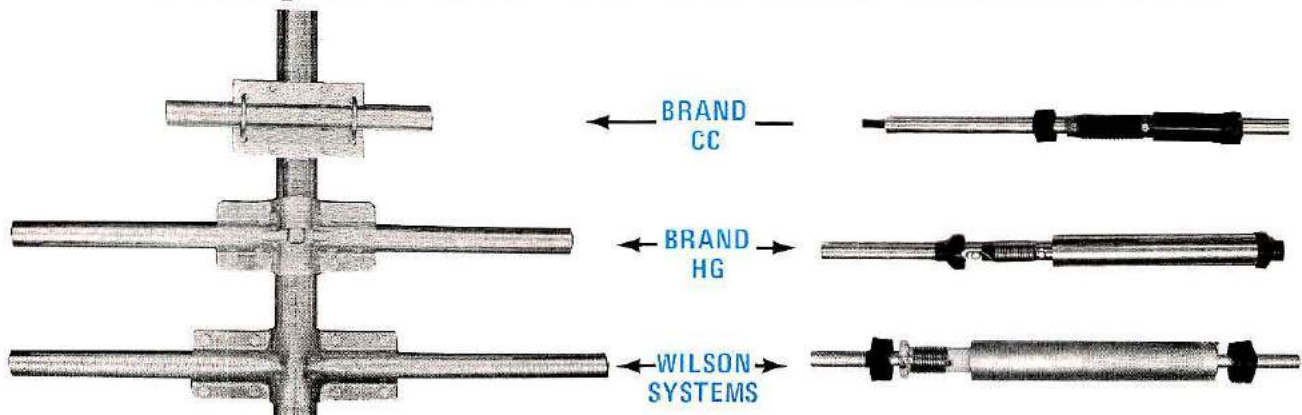
## SPECIFICATIONS

Band MHz . . . . . 14-21-28  
Maximum power input, legal limit  
Gain (dBd) . . . . . Up to 9 dB  
VSWR @ resonance . . . . . 1.3:1  
Impedance . . . . . 50  $\Omega$   
F/B ratio . . . . . 20 dB or better

Boom (O.D. x Length) . . . 2" x 24'2 1/2"  
No. of elements . . . . . 6  
Longest element . . . . . 28'2 1/2"  
Turning radius . . . . . 18'6"  
Maximum mast diameter, 2"  
Surface area . . . . . 8.6 sq. ft.

Wind loading @ 80 mph . . . 215 lbs.  
Maximum wind survival . . . 100 mph  
Feed method . . . . . Coaxial Balun  
Assembled weight (approx.) 53 lbs.  
Shipping weight (approx.) . 62 lbs.

## Compare the SY-36 with others . . .



Compare the size and strength of the boom to element clamps. See who offers the largest and heaviest duty. Which would you prefer?

Wilson Systems traps offer a larger diameter trap coil and a larger outside housing, giving excellent Q and power capabilities.

**CALL  
FACTORY DIRECT  
1-800-634-6898**

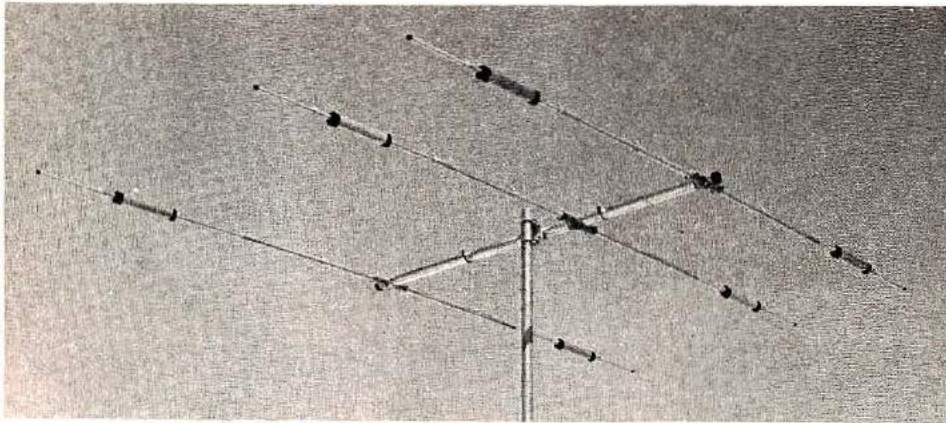
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SYSTEMS, INC.**

4286 S. Polaris Ave., Las Vegas, Nevada 89103

Prices and specifications subject to change without notice.



# WILSON SYSTEMS INC. MULTI-BAND ANTENNAS



**\$139<sup>95</sup>**

## SYSTEM 33 (FORMERLY SYSTEM THREE)

FACTORY  
DIRECT  
ONLY

Capable of handling the Legal Limit, the "SYSTEM 33" is the finest compact tri-bander available to the amateur.

Designed and produced by one of the world's largest antenna manufacturers, the traditional quality of workmanship and materials excels with the "SYSTEM 33".

New boom-to-element mount consists of two 1/8" thick formed aluminum plates that will provide more clamping and holding strength to prevent element misalignment.

Superior clamping power is obtained with the use of a rugged 1/4" thick aluminum plate for boom to mast mounting.

The use of large diameter High-Q traps in the "SYSTEM 33" makes it a high performing tri-bander and at a very economical price.

A complete step-by-step illustrated instruction manual guides you to easy assembly and the lightweight antenna makes installation of the "SYSTEM 33" quick and simple.

The same quality traps are used in the SY33 that are used in the SY36.

### SPECIFICATIONS

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

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SYSTEMS, INC.**

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**\$44<sup>95</sup>**

## WV-1A

### 4 BAND TRAP VERTICAL (10 - 40 METERS)

No bandswitching necessary with this vertical. An excellent low cost DX antenna with an electrical quarter wavelength on each band and low angle radiation. Advanced design provides low SWR and exceptionally flat response across the full width of each band.

Featured is the Wilson large diameter High-Q traps which will maintain resonant points with varying temperatures and humidity.

Easily assembled, the WV-1A is supplied with a hot dipped galvanized base mount bracket to attach to vent pipe or to a mast driven in the ground.

#### Note:

Radials are required for peak operation. (See GR-1 below).

#### SPECIFICATIONS:

- Self supporting—no guys required.
- Input Impedance: 50  $\Omega$
- Powerhandling capability: Legal Limit
- Two High-Q Traps with large diameter coils
- Low Angle Radiation
- Omnidirectional performance
- Taper Swaged Aluminum Tubing
- Automatic Bandswitching
- Mast Bracket furnished
- SWR: 1.1:1 or less on all Bands

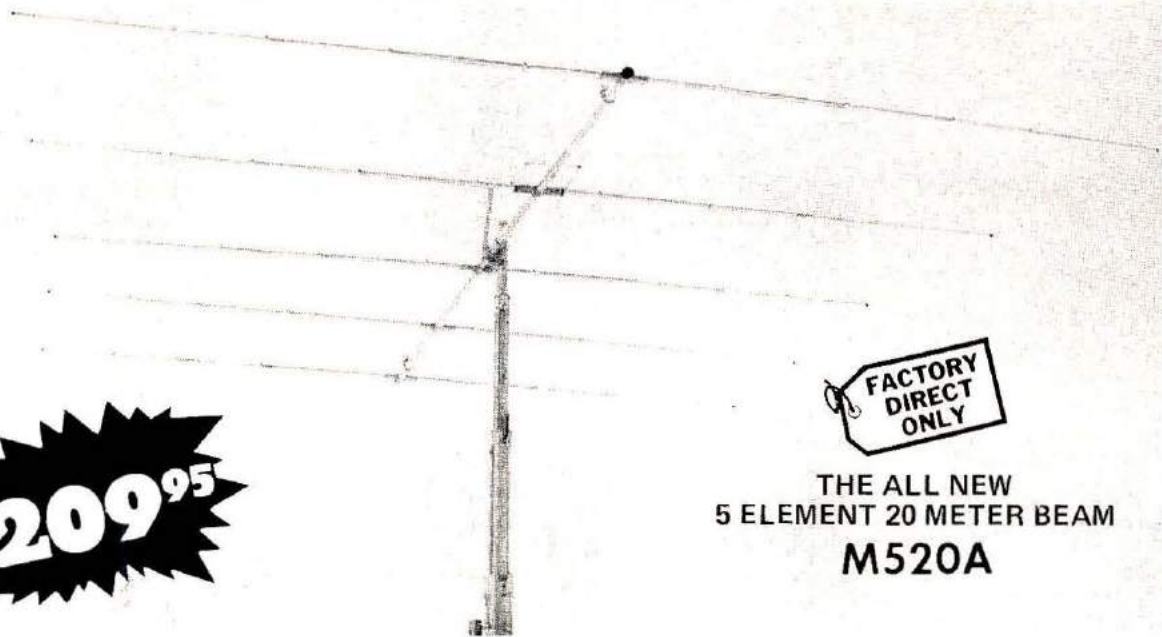
## GR-1

**\$9<sup>95</sup>**

The GR-1 is the complete ground radial kit for the WV-1A. It consists of: 150' of 7/14 stranded copper wire and heavy duty egg insulators, instructions. The GR-1 will increase the efficiency of the WV-1A by providing the correct counterpoise.

# WILSON MONO-BAND BEAMS

**\$209<sup>95</sup>**

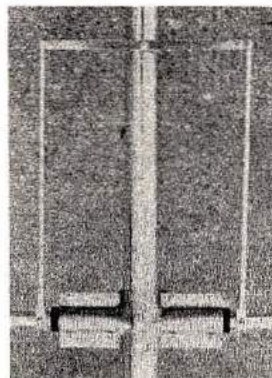


**FACTORY DIRECT ONLY**

**THE ALL NEW  
5 ELEMENT 20 METER BEAM  
M520A**

At last, the antennas that you have been waiting for are here! The top quality, optimum spaced, and newest designed mono-banders. The Wilson Systems' new Monoband beams are the latest in modern design and incorporate the latest in design principles utilizing some of the strongest materials available. Through the select use of the current production of aluminum and the new boom to element plates, the Wilson Systems' antennas will stay up when others are falling down due to heavy ice loading or strong winds. Note the following features:

1. **Taper Swaged Elements** – The taper swaged elements provide strength where it counts and lowers the wind loading more efficiently than the conventional method of telescoping elements of different sizes.
2. **Mounting Plates – Element to Boom** – The new formed aluminum plates provide the strongest method of mounting the elements to the boom that is available in the entire market today. No longer will the elements tilt out of line if a bird should land on one end of the element.
3. **Mounting Plates – Boom to Mast** – Rugged 1/4" thick aluminum plates are used in combination with sturdy U-bolts and saddles for superior clamping power.
4. **Holes** – There are no holes drilled in the elements of the Wilson HF Monobanders. The careful attention given to the design has made it possible to eliminate this requirement as the use of holes adds an unnecessary weak point to the antenna boom.



Wilson's Beta match offers maximum power transfer.

The Wilson Beta-match offers the ability to adjust the terminating impedance that is far superior to the other matching methods including the Gamma match and other Beta-matches. As this method of matching requires a balanced line it will be necessary to use a 1:1 balun, or RF choke, for the most efficient use of the HF Monobanders.

The Wilson Monobanders are the perfect answer to the Ham who wants to stack antennas for maximum utilization of space and gain. They offer the most economical method to have more antenna for less money with better gain and maximum strength. Order yours today and see why the serious DXers are running up that impressive score in contests and number of countries worked.

With the Wilson Beta-match method, it is a "set it and forget it" process. You can now assemble the antenna on the ground, and using the guidelines from the detailed instruction manual, adjust the tuning of the Beta-match so that it will remain set when raised to the top of the tower.

## SPECIFICATIONS

Model	Band Mtrs	Gain dBd	F/B Ratio	Bandwidth @ Resonance ±1 VSWR Limit	VSWR @ Resonance	Impedance	Matching	Elements	Longest Element	Boom O.D.	Boom Length	Turning Radius	Surface Area (Sq. Ft.)	Windload @ 80 mph (Lbs.)	Maximum Mast	Assembled Weight (Lbs.)
M520A	20	11.5	25 dB	500 KHz	1.1:1	50 Ω	Beta	5	36'6"	2"	34'2½"	25'1"	8.9	227	2"	68
M420A	20	10.0	25 dB	500 KHz	1.1:1	50 Ω	Beta	4	36'6"	2"	26'0"	22'6"	7.6	189	2"	50
M515A	15	12.0	25 dB	400 KHz	1.1:1	50 Ω	Beta	5	25'3"	2"	26'0"	17'6"	4.2	107	2"	41
M415A	15	10.0	25 dB	400 KHz	1.1:1	50 Ω	Beta	4	24'2½"	2"	17'0"	14'11"	3.1	54	2"	25
M510A	10	12.0	25 dB	1.5 MHz	1.1:1	50 Ω	Beta	5	18'6"	2"	26'0"	16'0"	2.8	72	2"	36
M410A	10	10.0	25 dB	1.5 MHz	1.1:1	50 Ω	Beta	4	18'3"	2"	12'11"	11'3"	1.4	36	2"	20

**CALL  
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# New, Improved Wilson Towers



Hinged Base Plate - Concrete Pad, Heavy Duty Winch



Mounting the House Bracket



The Hinged Base Plate allows tower to be tilted over for access to antenna and rotor from the ground.

FACTORY DIRECT  
**\$249<sup>95</sup>**

## TT-45A

### FEATURES:

- Maximum Height 45' (will handle 12 sq. ft. at 38') @ 50 mph
- 1200 lb. winch
- Totally freestanding with proper base
- Total Weight, 243 lbs.

The TT-45A is a freestanding tower, ideal for installations where guys cannot be used. If the tower is not being supported against the house, the proper base fixture accessory must be selected. (Requires 12" x 12" x 36" of concrete.)

### GENERAL FEATURES

All towers use high strength heavy galvanized steel tubing that conforms to ASTM specifications for years of maintenance-free service. The large diameters provide unexcelled strength. All welding is performed with state-of-the-art equipment. Top sections are 2" O.D. for proper antenna/rotor mounting. A 10' push-up mast is included in the top section of each tower. Hinge-over base plates are standard with each tower. The high loads of today's antennas make Wilson crank-ups a logical choice.

FACTORY DIRECT  
**\$449<sup>95</sup>**

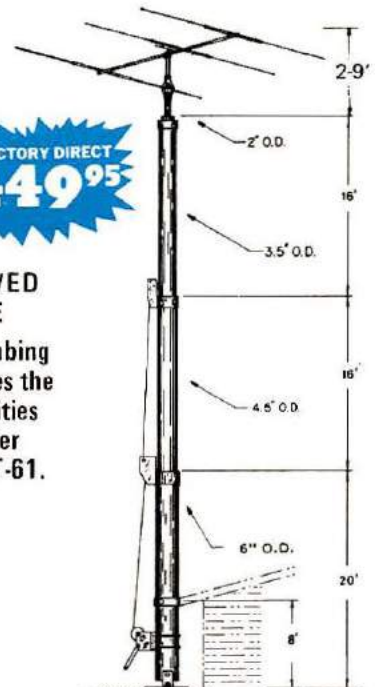
**NEW IMPROVED FEATURE**  
Heavier wall tubing greatly increases the stress capabilities over the older TT-45 and MT-61.

## MT-61A

### FEATURES:

- Is freestanding with use of proper base
  - Maximum Height is 61' (will handle 12 sq. ft. at 53') @ 50 mph
  - 1200 lb. brake winch
  - 4200 lb. raising cable
  - Total Weight, 400 lbs.
- Recommended base accessory: RB-61A, FB-61A.

The MT-61A is our largest and tallest freestanding tower. By using the RB-61A rotating base fixture the MT-61A is ideally suited for the SY33 or SY-36. If you plan to mount the tower to your house, caution should be taken to make certain the eave is properly reinforced to handle the tower. If not, one of the base accessory fixtures should be used. (Requires 18" x 18" x 48" concrete.)

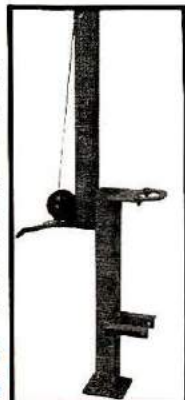


# TILT-OVER BASES FOR TOWERS

## FIXED BASE

The FB Series was designed to provide an economical method of moving the tower away from the house. It will support the tower in a completely free-standing vertical position, while also having the capabilities of tilting the tower over to provide an easy access to the antenna. The rotor mounts at the top of the tower in the conventional manner, and will not rotate the complete tower. (Requires 3' x 3' x 5 1/2" of concrete.)

FB-45A... \$ 99.95  
FB-61A... 129.95



## ROTATING BASE

The RB Series was designed for the Amateur who wants the added convenience of being able to work on the rotor from the ground position. This series of bases will give that ease plus rotate the complete tower and antenna system by the use of a heavy duty thrust bearing at the base of the tower mounting position, while still being able to tilt the tower over when desiring to make changes on the antenna system. (Requires 3' x 3' x 6" of concrete.)

RB-45A... \$139.95  
RB-61A... 199.95



Tilting the tower over is a one-man task with the Wilson bases.  
(Shown above is the RB-61A.)  
(Rotor not included)

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Las Vegas, Nevada 89103  
(702) 739-7401

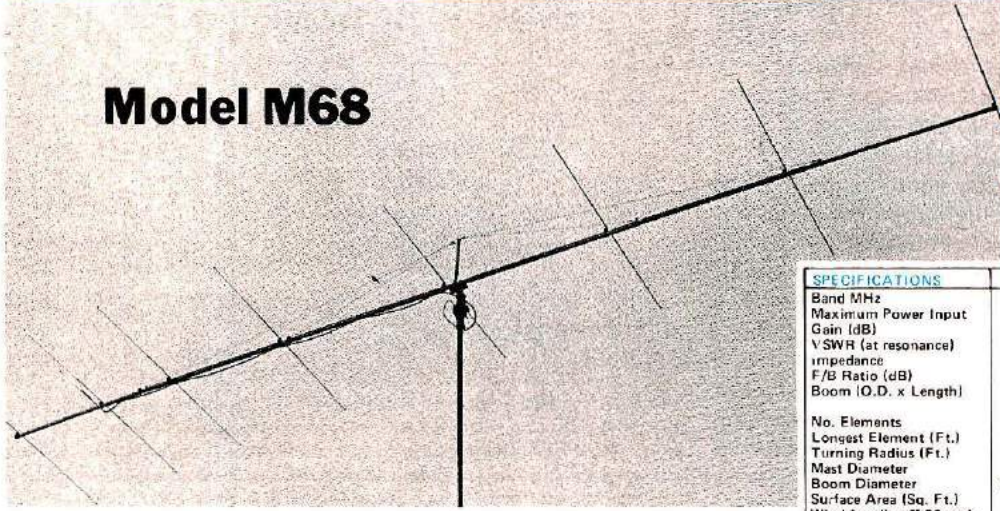
Toll-Free Order Number 800-634-6898

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# 6 METER BEAMS

## Model M68

As low as  
**\$27<sup>95</sup>**



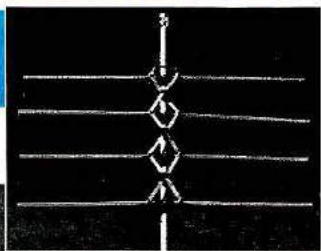
8 elements W - I - D - E spaced on a L - O - N - G 37' boom . . . for those long hauls to JA and VK land! Choose 4, 6 or 8 elements to put you in the action on six meters.

SPECIFICATIONS	MODEL M68	MODEL M66	*MODEL M64
Band MHz	50	50	50
Maximum Power Input	4 Kw	4 Kw	4 Kw
Gain (dB)	13.5	13.0	10.0
VSWR (at resonance)	1.1:1	1.1:1	1.1:1
Impedance	50 ohms	50 ohms	50 ohms
F/B Ratio (dB)	26	26	25
Boom (O.D. x Length)	2" to 1 1/2" x 36'10"	2" x 25'8"	1 1/2" x 11'6"
No. Elements	8	6	4
Longest Element (Ft.)	9'8"	9'8"	9'8"
Turning Radius (Ft.)	19'0"	13'10"	7'6"
Mast Diameter	2" O.D.	2" O.D.	1 1/2" O.D.
Boom Diameter	2" to 1 1/2" O.D.	2" O.D.	1 1/2" O.D.
Surface Area (Sq. Ft.)	5.8	4.5	1.5
Wind Loading @ 80 mph	145	112	37
Assembled wght. Approx.	34 lbs.	26 lbs.	11 lbs.
Shipping wght. Approx.	39 lbs.	31 lbs.	13 lbs.
Matching Method	Gamma	Gamma	Gamma
PRICE	\$84.95	\$54.95	\$27.95

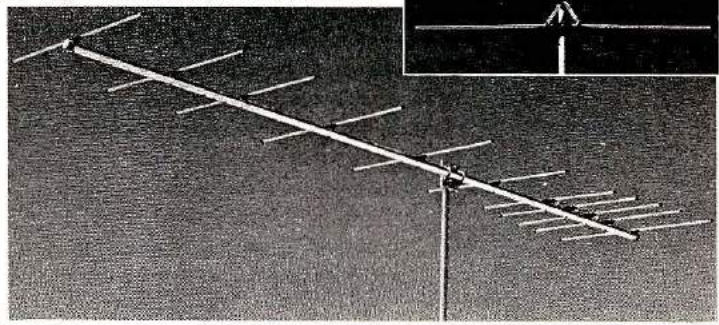
Starting at  
**\$19<sup>95</sup>**

# 2 METER BEAMS

Wilson's new 2 meter series combines the ultimate in design and quality materials. These top performing beams feature 7, 9 or 11 aluminum elements held to the heavy walled boom with the exclusive molded Lexan® boom to element mounting. The four driven elements use Log Periodic design for broad band characteristics providing full 144-148 MHz coverage with less than 1.2 to 1 VSWR across the band. Universal mounting is provided for vertical or horizontal polarization.



SPECIFICATIONS	M27	M29	M211
Band MHz	144-148 MHz	144-148 MHz	144-148 MHz
Gain (dB)	11 dB	13.7 dB	14.5 dB
VSWR	Less than 1.2:1 across band	Less than 1.2:1 across band	Less than 1.2:1 across band
Impedance	50 ohms balanced	50 ohms balanced	50 ohms balanced
Number of Elements	7	9	11
Boom (O.D. x Length)	1" O.D. x 5'4" L.	1" O.D. x 10'0" L.	1 1/2" O.D. x 12'6" L.
Longest Element	40"	40"	40"
Surface Area (Sq. Ft.)	.8	1.5	2.8
Assembled wght. Approx.	3.5 lbs.	5 lbs.	6 lbs.
Shipping wght. Approx.	6.5 lbs.	8 lbs.	9 lbs.
Turning Radius	38"	64"	78"
PRICE	\$19.95	\$24.95	\$29.95



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## FACTORY DIRECT ORDER BLANK

Toll-Free Order Number  
**1-800-634-6898**

### WILSON SYSTEMS ANTENNAS

Qty	Model	Description	Shipping	Price
	SY33	3 Ele. Tribander for 10, 15, 20 Mtrs.	UPS	\$139.95
	SY36	6 Ele. Tribander for 10, 15, 20 Mtrs.	UPS	189.95
	WV-1A	Trap Vertical for 10, 15, 20, 40 Mtrs.	UPS	44.95
	GR-1	Ground Radials for WV-1A	UPS	9.95
	M-520A	5 Elements on 20 Mtrs.	TRUCK	209.95
	M-420A	4 Elements on 20 Mtrs.	UPS	139.95
	M-515A	5 Elements on 15 Mtrs.	UPS	119.95
	M-415A	4 Elements on 15 Mtrs.	UPS	79.95
	M-510A	5 Elements on 10 Mtrs.	UPS	84.95
	M-410A	4 Elements on 10 Mtrs.	UPS	64.95
	WM-62A	Mobile Antenna: 5/8 λ on 2, 1/4 λ on 6	UPS	19.95
	M-86	8 Elements on 6 Mtrs.	UPS	84.95
	M-66A	6 Elements on 6 Mtrs.	UPS	54.95
	M-46	4 Elements on 6 Mtrs.	UPS	27.95
	M-112	11 Elements on 2 Mtrs.	UPS	29.95
	M-92	9 Elements on 2 Mtrs.	UPS	24.95
	M-72	7 Elements on 2 Mtrs.	UPS	19.95

### ACCESSORIES

	HD-73	Alliance Heavy Duty Rotor	UPS	109.95
	RC-8C	8/C Rotor Cable	UPS	.12/ft.
	RG-8U	RG-8U Foam-Ultra Flexible Coaxial Cable, 38 strand center conductor, 11 gauge	UPS	.21/ft.

### WILSON SYSTEMS TOWERS

Qty.	Model	Description	Shipping	Price
	TT-45A	Freestanding 45' Tubular Tower	TRUCK	\$249.95
	RB-45A	Rotating Base for TT-45A w/tilt over feature	TRUCK	139.95
	FB-45A	Fixed Base for TT-45A w/tilt over feature	TRUCK	99.95
	MT-61A	Freestanding 61' Tubular Tower	TRUCK	449.95
	RB-61A	Rotating Base for MT-61A w/tilt over feature	TRUCK	199.95
	FB-61A	Fixed Base for MT-61A w/tilt over feature	TRUCK	129.95

### NOTE:

On Coaxial and Rotor Cable, minimum order is 100 ft. and in 50' multiples. Prices and specifications subject to change without notice. Ninety Day Limited Warranty, All Products FOB Las Vegas, Nevada  
**PRICES EFFECTIVE NOV. 1, 1979**

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# Yesterday you could admire all-band digital tuning in a short wave receiver.\* Today you can afford it.



RF-4900

Tune in the Panasonic Command Series™ top-of-the-line RF-4900. Everything you want in short wave at a surprisingly affordable price. Like fluorescent all-band readout with a five-digit frequency display. It's so accurate (within 1 kHz, to be exact), you can tune in a station even before it's broadcasting. And with the RF-4900's eight short wave bands, you can choose any broadcast between 1.6 and 31 MHz. That's all short wave bands. That's Panasonic.

And what you see on the outside is just a small part of what Panasonic gives you inside. There's a double superheterodyne system for sharp reception stability and selectivity as well as image rejection. An input-tuned RF amplifier with a 3-ganged variable tuning capacitor for excellent sensitivity and frequency linearity. Ladder-type ceramic filters to reduce frequency interference. And even an antenna trimmer that changes the front-end capacitance for reception of weak broadcast signals.

To help you control all that sophisticated circuitry, Panasonic's RF-4900 gives you all these sophisticated controls. Like an all-gear-drive

tuning control to prevent "backlash." Separate wide/narrow bandwidth selectors for crisp reception even in crowded conditions. Adjustable calibration for easy tuning to exact frequencies. A BFO pitch control. RF-gain control for improved reception in strong signal areas. An ANL switch. Even separate bass and treble controls.

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AC/DC operation. And with Panasonic's 4" full-range speaker, the big sound of AM and FM will really sound big. There's also the Panasonic RF-2900. It has most of the features of the RF-4900, but it costs a lot less.

The Command Series from Panasonic. If you had short wave receivers as good. You wouldn't still be reading. You'd be listening.

\*Short wave reception will vary with antenna, weather conditions, operator's geographic location and other factors. An outside antenna may be required for maximum short wave reception.

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just slightly ahead of our time.





## Barry Goldwater, K7UGA; Arizona Ham-Of-The-Year

Senator Barry Goldwater, K7UGA, proudly accepts the Ham-of-the-Year award from his fellow amateurs at the 29th annual Fort Tuthill Hamfest in Flagstaff, Arizona, August 5, 1979. The award is sponsored annually by the Amateur Radio Council of Arizona.

Commenting on his position as the ranking Republican on the Communications Subcommittee, Goldwater stated that Congress would like to de-regulate all services where possible, and remove license fees. He hopes to soon have a bill ready for the floor.



Additionally, Governor Bruce Babbitt of Arizona declared the week of August 5-11 as "Amateur Radio Week" in Arizona.

Roughly 2000 attended the hamfest. Equipment exhibits were plentiful, along with varied programs and swap-'n-sell sessions. A bar-b-q rounded out the week-long hamfest in the northern mountains of Arizona (photo by Bob Drete, K7VOR).

### Dear Horizons:

Thanks to Bill Welsh, W6DDB, for the mention of our organization in his excellent article on the Lockheed Amateur Radio club (W6LS). The article can be used as a "menu" of club activities. We agree that one of the principle ingredients in a club with a large and dispersed membership is the club paper. Amateur Radio News Service is in the business of helping papers get started where they are needed, and helping improve existing club papers. Most of us are amateurs in the publishing business too, and learn from each other. The Club Paper Manual, sent to each new member, gives a club a good start in establishing a paper. For membership information, contact Doris Dennstaedt, WA3HEN, 303 N. Hammonds Ferry Road, Linthicum Heights, Maryland 21090.

**Lee Knirko, W9MOL, President  
Amateur Radio News Service  
Chicago, Illinois**

### Dear Horizons:

I do enjoy Harry Leeming, G3LLL, "What's Watt." Please give him more room, soon.

**Kirk Lightbourne  
Scottsdale, Arizona**

### Dear Horizons:

I would like to commend W1HR for his editorial in the May issue on improving operating practices on the Amateur bands. While every Amateur should read and heed his observations and suggestions, I am afraid, like most editorials, it may be skipped by many readers. My own survey to ascertain how many Amateurs had read this editorial has validated my assumption.

Because of this fact, I have taken a different approach. I have made a number of copies of the editorial for distribution to various Amateurs. I have suggested to each one who observes conduct not in keeping with W1HR's suggestions that he send a copy to that particular Amateur. The specific issue involved should be underlined as a gentle reminder to reasonable Amateurs to take a look to see if they are truly A-1 operators.

**I. L. McNally, K6WX  
Sun City, California**

### Dear Horizons:

Of the three ham magazines I receive, yours tops them all.

I look forward to it every month; keep it coming.

**Clarence W. Armbruster, K8UGC  
Bowling Green, Ohio**

### Dear Horizons:

I am 13 years old, and am interested in becoming a ham radio operator. I have been unsuccessful in locating anyone in my neighborhood. I have written to the ARRL about this problem and they sent back a name, but unlucky for me it's too far to travel.

I would like it very much if you would print this letter to see if one of your readers may know someone nearby, or perhaps, write to me. In that way, I may be able to be part of the world of Amateur Radio. I love your magazine, keep it up.

**Robert Sutherlin  
Charlestown, Massachusetts**

*Thanks for your letter, Robert. I hope we can be of some help. Any would-be Elmers in Charlestown, Massachusetts, please take note. Robert is at 16 Oak St., so how about dropping him a postcard and get things started for this newcomer.*

**Editor**

### Dear Horizons:

Just a note to tell you how much I appreciated the article "A Handy Guide to Your Rig's Controls."

I have a TR4CW and found the instruction manual to be not too clearly written. Your caption under the picture of TR4C controls cleared up a mystery that reading and rereading of the manual had not done. As a result, after one year of owning the TR4CW, I finally understand what I am doing when I tune the rig!

I would extend my subscription, but am already subscribed through 1983!

**Frank W. Hansen, KA0ASE  
Tofte, Minnesota**

**I would like to see . . . the R. L. Drake Company make an all-mode version of their UV3, for SSB, CW, fm, etc.**

**Jack LoMonaco, WA1YYK**

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5600A-W	\$179.95		.2 PPM 10°-40° C									
3550	99.95	50Hz-550MHz	TCXO	25MV	25MV	75MV	8	.5 Inch	*115 VAC or 8.2-14.5 VDC	2 1/4"	8"	5"
			1 PPM 17°-40° C									
500HH	\$149.95	50Hz-550MHz	TCXO	25MV	20MV	75MV	8	.4 Inch	*115 VAC or 8.2-14.5 VDC or NICAD PAK.	1"	3 1/2"	5 1/4"
			1 PPM 17°-40° C									

5600A wired factory burned in 1 year limited warranty, 5600A kit 90 day limited warranty. Prices and/or specifications subject to change without notice or obligation.

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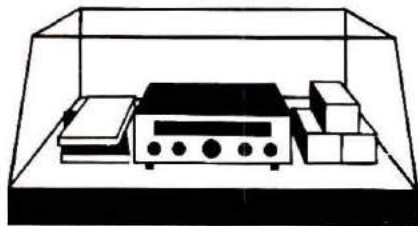
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# PRODUCT SHOWCASE



For literature on any of the Product Showcase items use our *ad-check* service on page 78.

## Quick-disconnect Adapters From Antenna Incorporated

Two new quick-disconnect adapters, for fast, easy antenna-whip removal to protect against theft or damage during car washing or garaging, are now available from Antenna Incorporated.



Quick Disconnect Adapter for Whips

Model 18016  
(For 3/8"-24 Thread)

Model 18017  
(For 1/4"-20 Thread)

According to Randall J. Friedberg, vice president, the adapters are unique because of their ease of operation and durability. Whereas other quick disconnect systems use turn-and-spring action for whip removal, Antenna

Incorporated uses a "hydraulic-hose-fitting" design. Since it doesn't have a spring, the antenna whip won't loosen up with time, age, and vibration. For long life, the adapters are made of chrome-plated brass which resists rusting.

The Model 18016 is designed for mounting any long whip with a 3/8 x 24 thread. The adapter can be used between ball and spring, or between spring and whip. It can be used on any bumper mount spring and whip, or for a fiber glass antenna on a truck mirror-mount.

The Model 18017 can be installed on any standard base-loaded antenna, above or below the spring.

For further information on these Antenna Incorporated quick-disconnect adapters, or their other two-way radio communications products, contact Randall J. Friedberg; Antenna Incorporated, 26301 Richmond Road, Cleveland, Ohio 44146.

## Basic Electricity and Electronics

This is a good pair of books for the beginner, published by John Wiley and Sons of New York. They are both written in a clear, easy-to-understand manner, and use a self-teaching format throughout each section, followed by a test at the end. You're involved in the text as you go through each subject, and the test provides a check on your performance. The illustrations in each book are well-done, and enough of them are used to make each point very clear.

*Basic Electricity* is the book to start with, unless you already have a firm foundation in that subject. Even so, a review might just show up a few weak areas in what you thought you already knew. *Electronics* is the volume of greater immediate interest to the beginning Radio Amateur, but its use depends upon the student having a working knowledge of electricity — in fact, the

introductory pages in the book state that you should have read *Basic Electricity* first.

*Basic Electricity* begins with an explanation of what electricity is, starting with the relationship of atoms and electrons, charges that attract and repel, and continues through conductors and insulators. Other chapters delve into voltage, current, resistance, magnetism, inductance, capacitance, and more. Although the list seems long, each chapter is done so well that you seem to breeze right through them, and emerge at the end with a working knowledge of a particular segment of the electrical world.

*Electronics* follows the same format, starting with a review and test of what you know (or should have learned from *Basic Electricity*). This is followed by an introduction to some simple electronic components and an explanation of how they work. Diodes, transistors, ac circuits, transformers, oscillators, and amplifiers are among the subjects covered.

Anyone who conscientiously follows the lessons in these books will have the groundwork necessary to handle all but the most exotic of electrical or electronic problems he might encounter. Certainly, the theory part of any Amateur exam should hold no fears for one who has completed these two "courses."

Both books are a part of what Wiley calls their Self-Teaching Guide, designed to be used by individuals. However, I cannot think of a better guide for anyone who is conducting a class on electrical and electronic theory. At a price of \$5.95 each, they'll earn their keep many times over.

*Basic Electricity* by Charles W. Ryan, and *Electronics* by Harry Kybett are available from Ham Radio's Bookstore, Greenville, New Hampshire 03048; \$5.95 each, plus \$1 for shipping and handling. Order JW-74787 (*Basic Electricity*), and JW-01748 (*Electronics*).



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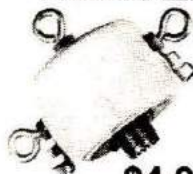
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D-40	40/15	66'	25.95	21.95
D-20	20	33'	24.95	20.95
D-15	15	22'	23.95	19.95
D-10	10	16'	22.95	18.95
<b>Shortened dipoles</b>				
SD-80	80/75	90'	31.95	27.95
SD-40	40	45'	28.95	24.95
<b>Parallel dipoles</b>				
PD-8010	80,40,20,10/15	130'	39.95	35.95
PD-4010	40,20,10/15	66'	33.95	29.95
PD-8040	80,40/15	130'	35.95	31.95
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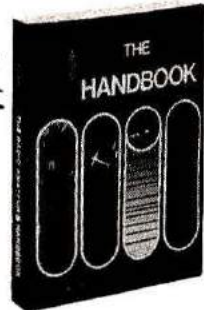
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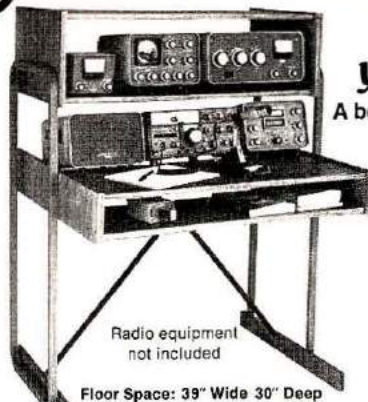
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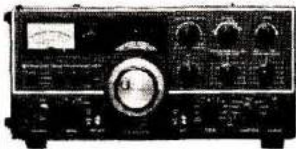
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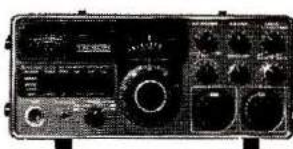
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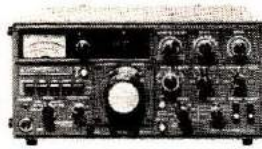
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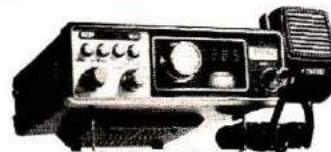
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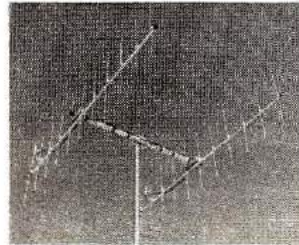
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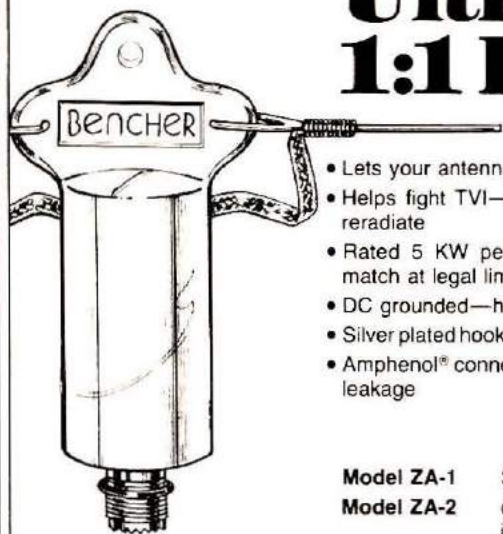
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	40, 15		

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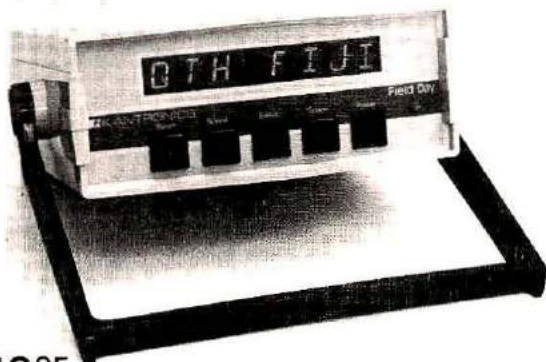
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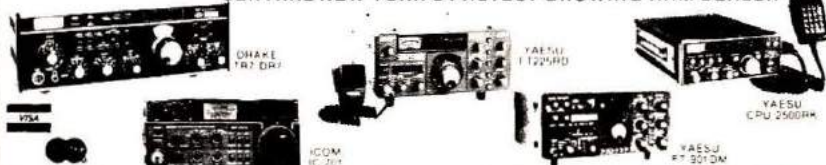
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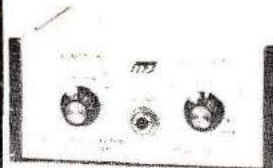
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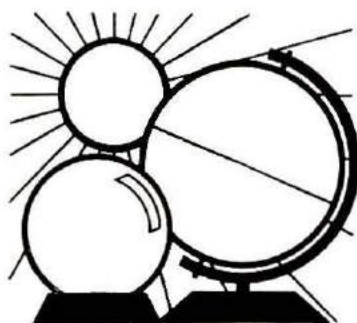
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# DX FORECASTER

## Last-minute predictions

The period between the 9th and the 15th is likely to be very unsettled, with possible geomagnetic disturbances, coupled with unusual ionospheric and atmospheric activity. The most likely dates are the 10th and 11th, although upsets can occur at any time. The first and last weeks of the month are likely to be mildly unsettled, especially between the 4th and 7th, and again around the 23rd and 24th, respectively. Full moon occurs on December 3rd, New Moon on December 19th, and perigee on December 23rd.

## Band-by-band conditions

December is not considered to be a prime DX month in ordinary times of low sunspot activity. These are not ordinary times, however, and the extraordinary activity taking place on the sun means that, even at the winter solstice, DX opportunities will abound. To be sure, the 10, 15, and 20-meter bands tend to close earlier than in the summertime, but, except for the diehards, 20 will be open long enough to make you lose considerable sleep. The 40, 80, and 160-meter bands will be coming into their own as darkness falls, and will continue into the small hours — offering excellent DX for the patient ham. Noise levels are low at this time of year, and daytime absorption due to excessive ionization is lower than at any other time, because the sun has "gone south" for the winter.

*Ten, fifteen, and twenty meters will offer excellent*

worldwide DX conditions during daytime hours, with the higher frequency bands closing earlier, and peaking earlier. For example, look for *ten* to peak in the forenoon, *fifteen* about noon, and *twenty* in the early afternoon for openings toward Europe, Africa, and the east; during the early afternoon for north-south path; and during the late afternoon and early evening for paths toward the west and northwest, including the Far East and Pacific areas. Consult the chart for your particular location and area of interest.

On *forty meters*, signals toward the east begin to peak in late afternoon and early evening, moving west and northwest by midnight, and reach a peak by daybreak. On *eighty*, look for excellent evening DX opportunities, and pay particular attention to the grey-line path, that is, the path along the lines of advancing darkness and daylight, when long-haul DX over the poles can take place following the line of twilight or dawn. *One-sixty* will be exciting again this year, with good DX available from the east, peaking about midnight, and from the west, peaking about sunrise.

Monitor WWV at eighteen-after-the-hour for ionospheric and geomagnetic-field activity updates that will offer insights into DX conditions. High solar-flux levels, coupled with low geomagnetic-field activity (low K and A indexes) usually mean good DX.


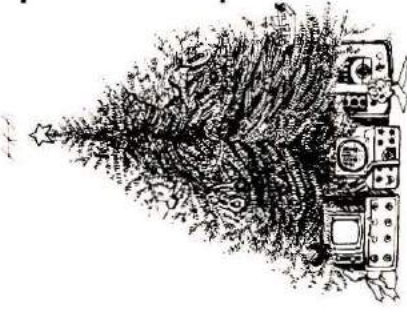
The asterisk (\*) on the chart means to check the next higher band for openings. **HRH**

GMT	WESTERN USA										MID USA										EASTERN USA									
	ASIA FAR EAST	EUROPE	S. AFRICA	S. AMERICA	ANTARCTICA	NEW ZEALAND	OCEANIA	AUSTRALIA	JAPAN	ASIA FAR EAST	EUROPE	S. AFRICA	S. AMERICA	ANTARCTICA	NEW ZEALAND	OCEANIA	AUSTRALIA	JAPAN	ASIA FAR EAST	EUROPE	S. AFRICA	S. AMERICA	ANTARCTICA	NEW ZEALAND	OCEANIA	AUSTRALIA	JAPAN			
PST	N	NE	E	SE	S	SW	W	NW	MST	N	NE	E	SE	S	SW	W	NW	CST	N	NE	E	SE	S	SW	W	NW	EST			
0000	—	—	15	15	—	15	10	15	5:00	—	—	20	15	—	10	10	15	6:00	20	40	20	15	15	10	15*	15	7:00			
0100	—	—	20	15	—	15	10	15	6:00	20	—	20	15	15	10	15	15*	7:00	20	40	20	20*	10	15*	15	8:00				
0200	20*	—	20	15	—	10	10	15*	7:00	20	20	20	15	15	15	15*	8:00	20	40	40	20	20	15	—	20	9:00				
0300	20	—	20	20	15	15	10	15	8:00	—	40	—	20	15	—	15	15	9:00	—	40	—	20	20	20	—	20	10:00			
0400	—	—	20	20	20	15	15	15	9:00	—	40	—	20	20	—	20	20	10:00	—	40	—	—	20	20	—	20	11:00			
0500	—	40	—	20	20	20	20	20	10:00	—	40	—	40*	20	20	20	—	11:00	—	40	—	—	20	—	—	—	12:00			
0600	—	40	—	20	20	—	20	20	11:00	—	40	—	40*	20	20	20	—	12:00	—	40	—	—	—	—	—	—	1:00			
0700	—	40	—	20	20	—	20	20	12:00	—	40*	—	40	20	—	20	—	1:00	—	40	—	—	20	20	—	20	2:00			
0800	—	20	—	20	20	—	20	—	1:00	—	40*	—	40	20	—	20	20	2:00	—	—	—	—	20	20	—	20	3:00			
0900	—	20	—	20	20	—	20	—	2:00	—	—	—	40	20	—	20	20	3:00	—	—	—	—	40*	—	—	—	4:00			
1000	—	20	—	20	20	—	20	20	3:00	—	—	—	40	20	—	20	20	4:00	—	—	—	—	40	—	—	—	5:00			
1100	—	20	—	20	20	—	20	—	4:00	—	—	—	40	20	—	20	20	5:00	—	20	—	—	40*	—	—	—	6:00			
1200	—	—	—	20	20	—	20	—	5:00	—	—	—	40	20	—	20	40	6:00	20	15	—	15	20	40*	20	20	7:00			
1300	—	—	—	—	20	40	40	—	6:00	—	20	—	—	—	—	40	—	7:00	20	10	—	10	—	—	20	20	8:00			
1400	—	20	—	—	—	40	20	—	7:00	—	20	—	—	—	20	20	—	8:00	20	10	10	10	—	20	20	—	9:00			
1500	—	—	—	—	—	20	20	—	8:00	—	10	—	10	—	20	20	—	9:00	15*	10	10	10	—	20	10	—	10:00			
1600	20	10	—	10	—	20	20	20	9:00	20	10	10	10	—	10	20	—	10:00	15*	10	10	10	—	10	10	—	11:00			
1700	20	10	—	10	—	20	15	—	10:00	15*	10	10	10	—	10	15	—	11:00	—	10	10	10	—	—	15	—	12:00			
1800	20	15	10	10	—	10	15	—	11:00	15*	10	10	10	—	15	15	—	12:00	—	10	10	10	—	—	—	—	1:00			
1900	20*	15	10	10	—	15	15	—	12:00	15*	15	10	10	—	15	15	—	1:00	—	15	15*	10	—	10	—	—	2:00			
2000	20	15	10	10	—	15	15	—	1:00	20	15	10	10	—	15	15	—	2:00	—	20	15	10	—	10	—	—	3:00			
2100	20	20	15	10	—	15	15	—	2:00	—	20*	15	10	—	15	10	—	3:00	—	20	20	10	—	10	15*	—	4:00			
2200	—	20	15	10	—	15	10	—	3:00	—	—	15	10	—	15	10	—	4:00	—	40*	20	10	—	10	15*	—	5:00			
2300	—	—	15	10	—	15	10	—	4:00	—	—	20	15	—	15	10	15	5:00	—	40	20	15	15	10	15*	15	6:00			



# HAM CALENDAR

# December 1979

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
						<p>North Carolina QSO Party — 1900Z Dec. 1 until 0100 Dec. 2            Logs to: Alamarite ARC, Burlington, NC — K4EG            APRIL 160 meter contest — 1-7</p>
	<p>FLORIDA HAM NEWS — SWAP            NET BY THE BROWARD ARC            146.31.91 at 7:30PM            GLENHURST RADIO SOCIETY            Transmits Amateur Radio News            146.31.91 at 7:30PM            WR2AG and 21.400 MHz USB            WEST COAST BULLETIN Edited &amp;            Transmitted by W6ZF 8PM PST            — 3540 kHz            A+ 22 WPM</p>	<p>AMSAT Earthcast Net 3850 kHz            9PM EDT (0100Z Wednesday            Morning)            AMSAT Mid Continent Net 3850            kHz 9PM CDT (0200Z            Wednesday Morning)            AMSAT Westcoast Net 3850 kHz            8PM PST (0300Z Wednesday            Morning)</p>	4	5	6	7
2	3	4	5	6	7	8
	<p>FLORIDA HAM NEWS — SWAP            NET BY THE BROWARD ARC            146.31.91 at 7:30PM            GLENHURST RADIO SOCIETY            Transmits Amateur Radio News            146.31.91 at 7:30PM            WR2AG and 21.400 MHz USB            WEST COAST BULLETIN Edited &amp;            Transmitted by W6ZF 8PM PST            — 3540 kHz            A+ 22 WPM</p>	<p>AMSAT Earthcast Net 3850 kHz            9PM EDT (0100Z Wednesday            Morning)            AMSAT Mid Continent Net 3850            kHz 9PM CDT (0200Z            Wednesday Morning)            AMSAT Westcoast Net 3850 kHz            8PM PST (0300Z Wednesday            Morning)</p>	11	12	13	14
9	10	11	12	13	14	15
	<p>FLORIDA HAM NEWS — SWAP            NET BY THE BROWARD ARC            146.31.91 at 7:30PM            GLENHURST RADIO SOCIETY            Transmits Amateur Radio News            146.31.91 at 7:30PM            WR2AG and 21.400 MHz USB            WEST COAST BULLETIN Edited &amp;            Transmitted by W6ZF 8PM PST            — 3540 kHz            A+ 22 WPM</p>	<p>AMSAT Earthcast Net 3850 kHz            9PM EDT (0100Z Wednesday            Morning)            AMSAT Mid Continent Net 3850            kHz 9PM CDT (0200Z            Wednesday Morning)            AMSAT Westcoast Net 3850 kHz            8PM PST (0300Z Wednesday            Morning)</p>	18	19	20	21
16	17	18	19	20	21	22
	<p>FLORIDA HAM NEWS — SWAP            NET BY THE BROWARD ARC            146.31.91 at 7:30PM            GLENHURST RADIO SOCIETY            Transmits Amateur Radio News            146.31.91 at 7:30PM            WR2AG and 21.400 MHz USB            WEST COAST BULLETIN Edited &amp;            Transmitted by W6ZF 8PM PST            — 3540 kHz            A+ 22 WPM</p>		26	27	28	
23	24	25	26	27	28	29
	<p>FLORIDA HAM NEWS — SWAP            NET BY THE BROWARD ARC            146.31.91 at 7:30PM            GLENHURST RADIO SOCIETY            Transmits Amateur Radio News            146.31.91 at 7:30PM            WR2AG and 21.400 MHz USB            WEST COAST BULLETIN Edited &amp;            Transmitted by W6ZF 8PM PST            — 3540 kHz            A+ 22 WPM</p>					<p>SEASON'S GREETINGS</p> 
30	31					

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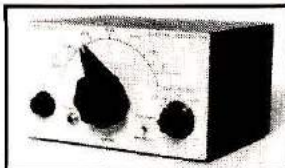
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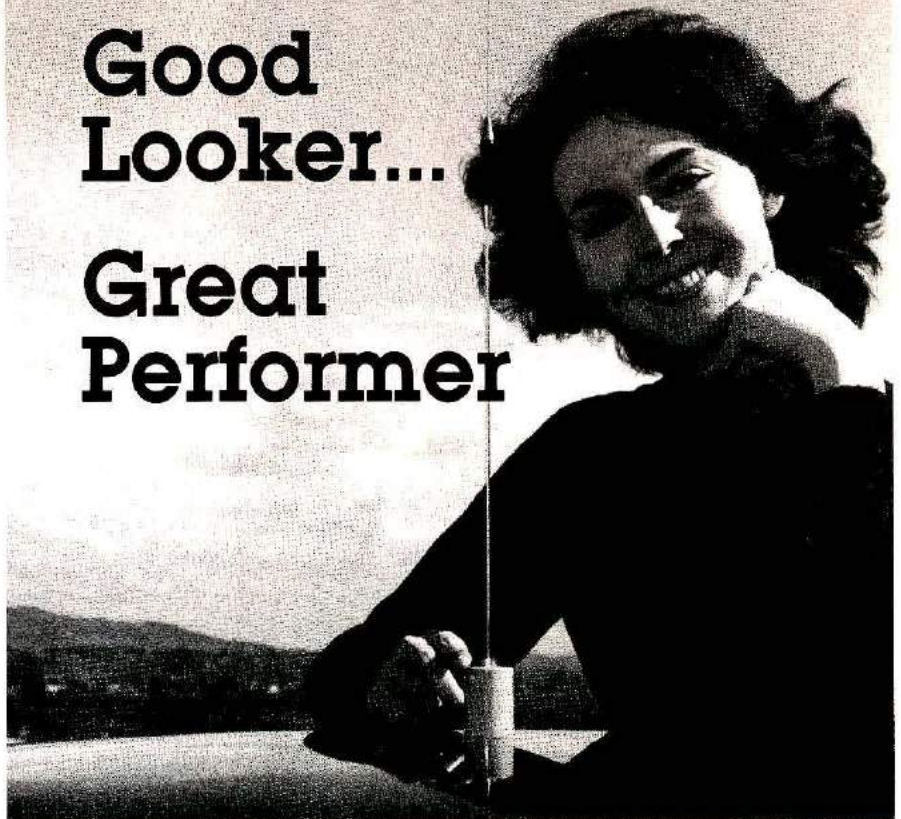
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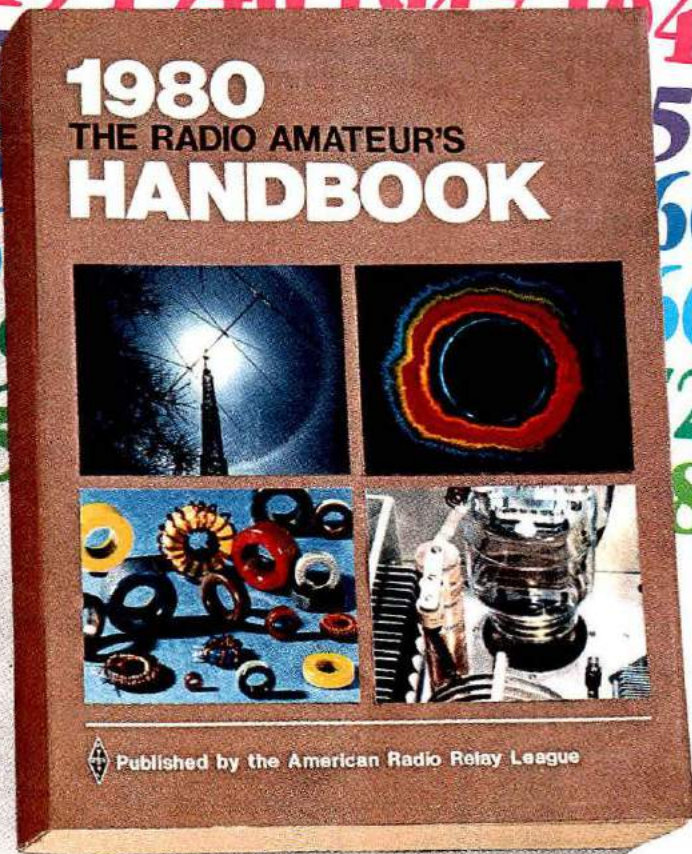
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## ...for the discerning Amateur who demands quality.

# R-1000



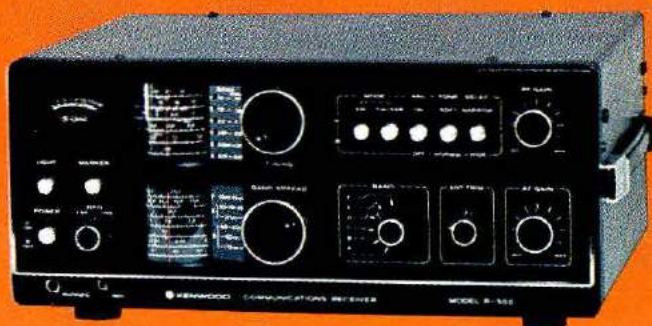
SP-100

R-1000

The R-1000 is a highly advanced communications receiver. Up-conversion, PLL circuitry and other new technology provide optimum sensitivity, selectivity, and stability from 200 kHz to 30 MHz. Featuring easy-to-operate single-knob tuning and digital frequency display, it's perfect for listening to shortwave, medium-wave, and long-wave bands. Even SSB signals are received perfectly. Included is a quartz digital clock and timer.

### R-1000 FEATURES:

- Continuous frequency coverage from 200 kHz to 30 MHz.
- 30 bands, each 1 MHz wide.
- Five-digit frequency display and illuminated analog dial.
- Quartz digital clock and ON/OFF timer.
- Multi-modes... AM (wide and narrow), SSB (USB and LSB), and CW.
- Three IF filters... 2.7 kHz for SSB and CW, 6.0 kHz for AM narrow, and 12 kHz for AM wide.
- Effective noise blanker.
- Built-in speaker.
- Three antenna terminals.
- RF step attenuator.
- Tone control.
- Recording terminal.
- Remote terminal, for access to timer relay ON/OFF circuit and muting circuit.
- SSB sensitivity of 0.5  $\mu$ V from 2 to 30 MHz.
- More than 60 dB IF image ratio.
- More than 70 dB IF rejection.



The R-300 all-band communications receiver covers 170 kHz to 30 MHz in six bands. It's ideal for listening to foreign broadcasts and other exciting transmissions throughout a wide range of the radio spectrum.

# R-300

### R-300 FEATURES:

- Continuous frequency coverage from 170 kHz to 30 MHz, in six bands.
- Multi-modes... AM, SSB, and CW.
- High sensitivity, selectivity, and image ratio.
- 500-kHz marker.
- Three-way power supply (AC/batteries/external DC), with automatic switching from AC to DC in the event of AC power failure.



# KENWOOD

...pacesetter in amateur radio

TRIO-KENWOOD COMMUNICATIONS INC.  
1111 WEST WALNUT/COMPTON, CA 90220



# Enter the exciting world of amateur radio

**A. The TEN-TEC Century/21** is the ideal beginner's HF transceiver, priced so that the initial investment necessary to enter the world of Amateur Radio is modest. This low price does not prevent the newcomer from enjoying the desirable operating features found in transceivers priced much higher. Features such as instant band change, full break-in, sufficient power to work the world, built-in power supply, side-tone and speaker, covers 80 thru 10 meters has 70 watt input, receives CW or SSB but transmits CW only. All solid state, too. **\$49.00** List. Call for quote.

**B. The KENWOOD TS-520S** has taken the Amateur world by storm. It has dependability, flexibility, and solid value for the price. A full coverage transceiver covering all the amateur bands, (160 thru 10 meters), and has outstanding receiver sensitivity, vernier tuning for final plate control, 200W PEP, RF attenuator, internal speaker, easy phone

patch connection, and an AC power supply. **\$49.00** List. Call for quote. DG5 digital display unit available **199.00**.

**C. The ARRL 1979 Radio Amateur Handbook** is packed full of the latest state-of-the-art articles on antennas, power supplies, transmitter & receiver design, solar power, etc. A must for beginners or experienced operators. **\$9.75**

**D. Tune in the World with Ham Radio** has all you need to get your Novice license. It has an illustrated text, morse code cassettes, study guide, and sample FCC test. **\$7.00**

**E. Novice Class License Study Guide** is an excellent way to launch yourself into the exciting world of ham radio! Covers radio and electronic fundamentals and prepares you to pass the Novice exam. Has all the FCC latest rules and regulations. **\$4.95**

**F. Understanding Amateur Radio** is just the book for the beginner and the Novice. Written

in an easy to understand style, it covers everything about simple transmitters, antennas and receivers. **\$5.00**

**G. The Radio Amateur's License Manual** is the key to advancing to the Extra, Advanced, General, or Technician class license. It is fully illustrated with graphs and diagrams. **\$4.00**

**H. Novice Theory Tapes** come 4 cassettes in a package and provide a thorough study guide for the beginner studying for his Novice License. **\$15.95**

**I. The ARRL Code Kit** will boost your code speed quickly from 5 wpm to 13 wpm. Pass that General class exam! It has 2 cassettes with 2 hrs of random code groups and a book full of helpful suggestions. **\$8.00**

**J. How to Be a Ham** by Ken Sessions, is an ideal guide for the newcomer in Amateur Radio. Divided into two parts, it has basic operating procedures in one and FCC Rules and Regulations in the other. **\$3.95**

Prices do not include shipping charges.

## Call Toll Free 1-800-633-3410

In Alabama call 1-800-292-8668 9:00 AM til 5:30 PM CST



# Long's Electronics

