CQ

January 1972
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cimal point is automatically placed with ge selection. Panel light indicates over- ge.

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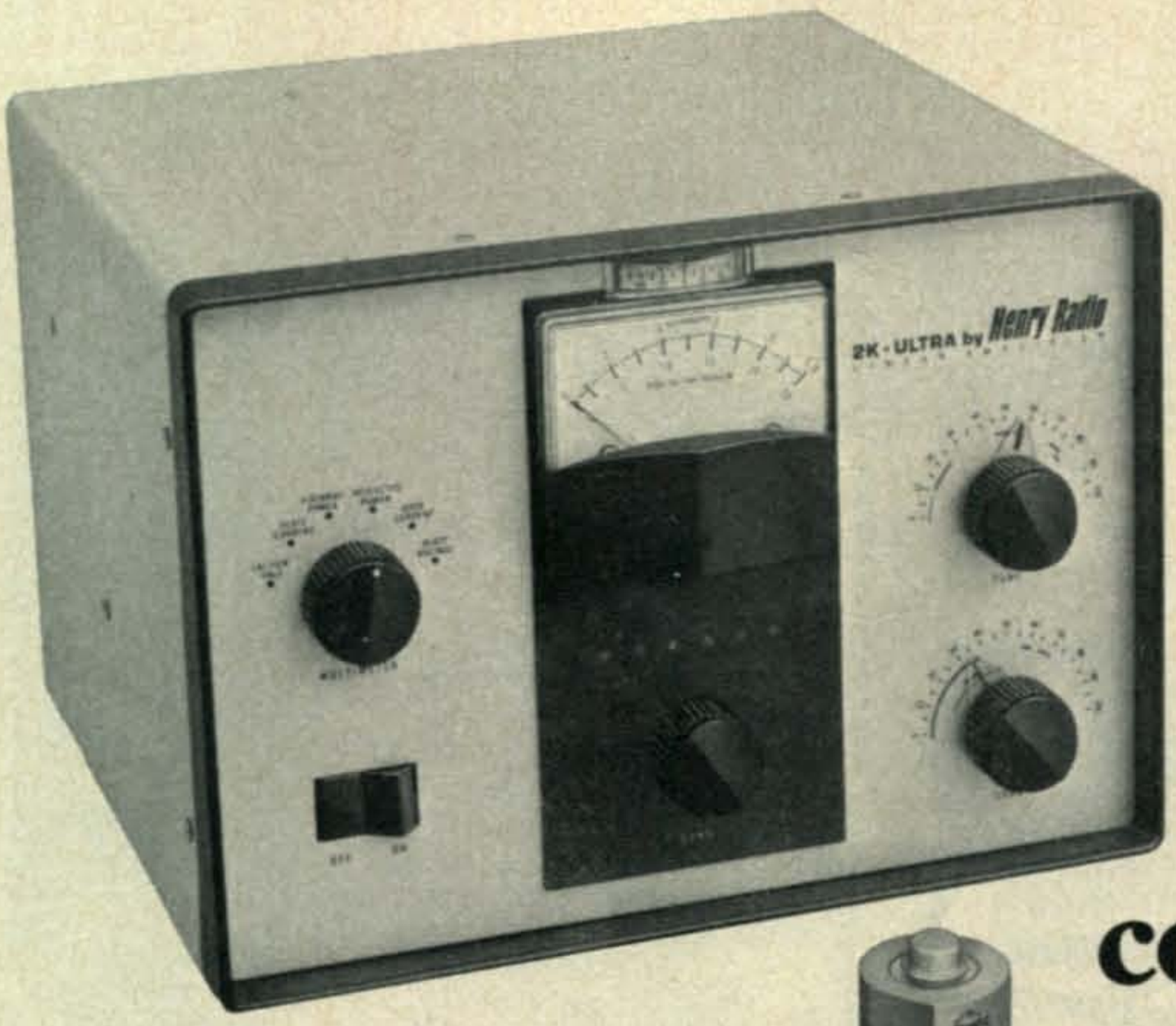

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CQ

JANUARY, 1972 VOL. 28, NO. 1

The Radio Amateur's Journal

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DEPARTMENTS

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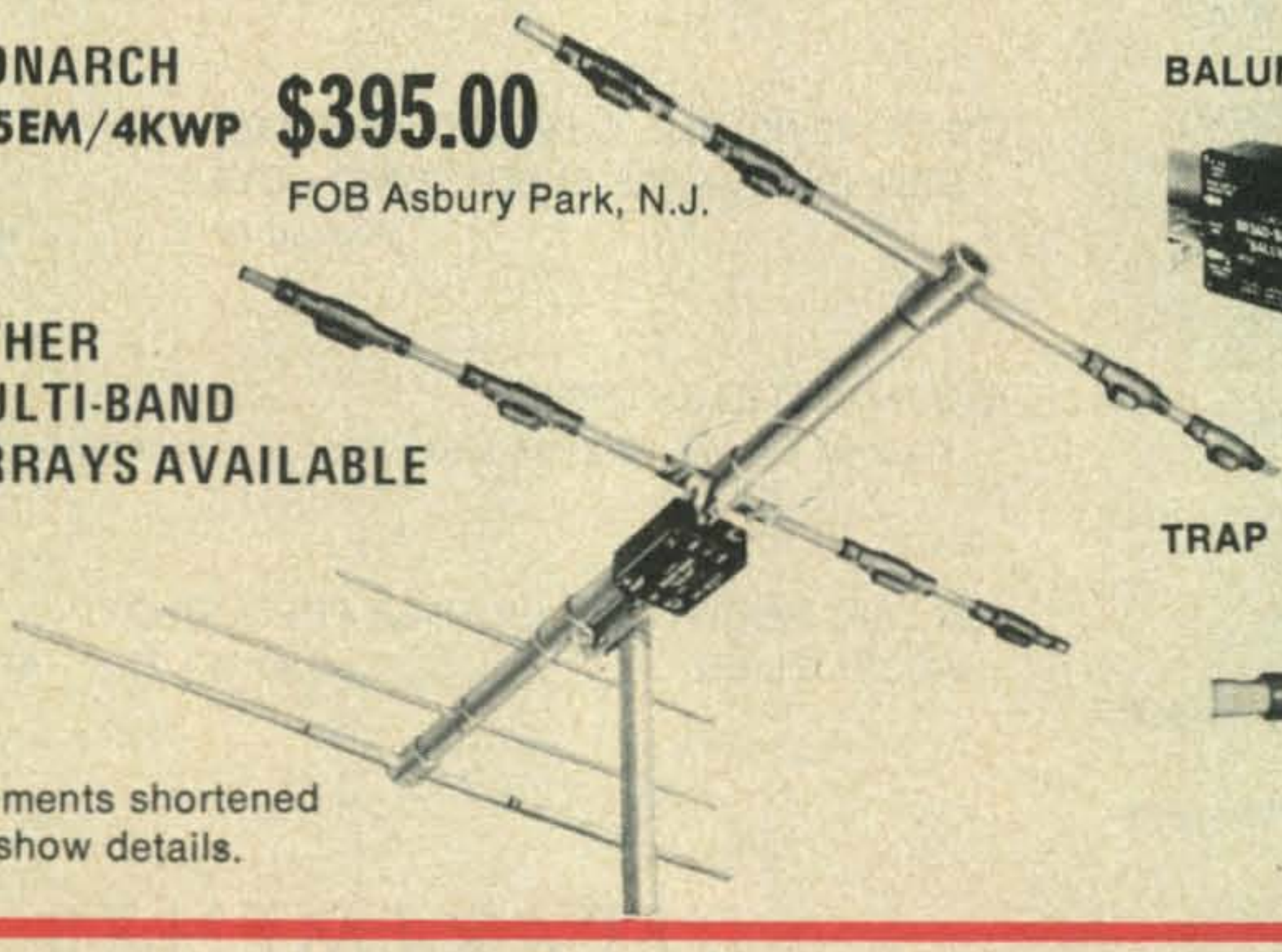

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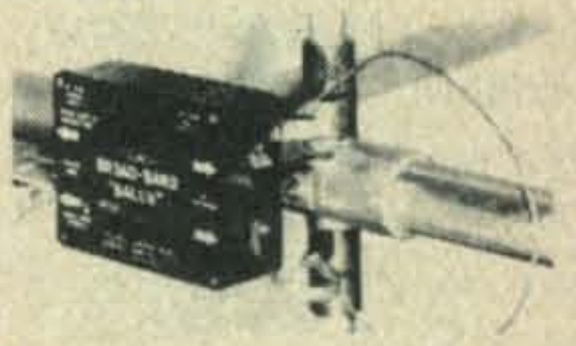

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OUR READERS SAY

It's Worth The Effort

Editor, *CQ*:

I think this might interest some people on the Novice standpoint about the 13 words a minute code speed. I am now trying for my General, but it took a lot of hard work for me. It did not take too long to get to 10 words a minute, but it takes a hard jump to get to 13 and I think those extra 3 words will prove if you really want to be a ham.

Also, *CQ* is an FB magazine for me.

David C. Winslow, WN4THP
Clearwater, FL

Fond Memories

Editor, *CQ*:

Presently being on temporary duty in Southeast Asia, my only contact with amateur radio has been my monthly copy of *CQ*. After reading the letters to the editor in the October issue a thought came to me which may interest others, especially old timers.

Just as the restrictions on fire arms by the Gun Control Act of 1968 has created a re-newed interest in muzzle loaded weapons and black powder sport shooting. The present feeling that the growth of factory produced rigs leaves little to get excited about in amateur radio could create an interest in building and using rigs such as those used in the days of the SW-3.

Although I won't qualify for the Old Timers Club for another eight years, my first transmitter was built from the plans in a 1938 copy of *How to Become a Radio Amateur*. I have never received as much pleasure from anything I have since built as that first rig when I turned it on, tuned it up, and it worked!

Of course present day technical standards would prohibit the use of some of the older transmitters from the golden years of amateur radio.

I enjoy the advantages of modern communications equipment and techniques as much as any other amateur but a DX contact using 20 watts to a dipole with a regenerative receiver is a change of pace and certainly more sporting than the same contact using 2 kw s.s.b. to a beam 50 feet up.

I have gained a special interest in reading *CQ* these past months, but hope to be home in November, take the rig out of mothballs and have it fired up and on the air again in time for the *CQ* WW DX CW Contest.

Capt. Paul H. Valentino. K4FPF
APO San Francisco

Editor, *CQ*:

Bill Orr's story on the 1934 rig, last issue, seemed like a fair wind blowing through the oppressive electronic jungle that is the current ham game. Through Bill's teasing style one can clearly read his joy in contemplating those days when amateur radio was a participating and not a spectator sport, as in spirit it is today.

In that past wonder-world of which Bill writes, every individual amateur station was an original creation, a genuine expression of each ham's personal ingenuity, not to mention his dreams. Visit an amateur station today and what do you see: "Boxes, little boxes, very technical (and expensive), but all are just the same." Where's the fun in that?

All this leads one to ask: "is change always progress?" If one views amateur radio as basically a *sport*, we seem to have made little gain through all of our growing sophistication. In those wondrous old times we were better shopmen and we probably had a better grasp of theory than most hams have today. We didn't have the big signals then, but we probably enjoyed each QSO more. In fact, we worked as much with 50 watts than as they do with 500 today; we were pretty sure then where each little watt went. Today we have so many watts, we just hook-up, plug-in and let the devil take the leavin's, polluting the whole electronic world for our ego's sake. Is that progress? Vive la decade 1930!

C. F. Rockey, W9SCH
Deerfield, IL

Schematic Skiddoo

Editor, *CQ*:

I'm certainly impressed by your treatment of my old-time transmitter article in the November issue of *CQ* Magazine.

However, let me point out an old-time error in the old-time schematic of Fig. 1. A jumper should be included between coupling capacitor C_6 and the grids of the 46 tubes.

Builders of this equipment who leave this vital connection out will no doubt be surprised when the amplifier stage refuses to work.

And, as they said in 1934, "You can bet your Certified Cremo on that!"

Bill Orr, W6SAI
Menlo Park, CA

Reader George Mickey's letter below is typical of the many fine comments we've received noting the above error. The reader response to Bill's series has been very good and more articles are planned. It is also interesting to note that the classified section is starting to get many ads buying and selling older parts and equipment. For old times sake why not try building something then sit around and watch the tubes light up.

—*Ed*

Editor, *CQ*:

I've read many FB articles by oldtimer W6SAI including *CQ*, November '71, "Build A 50 Watt, 1934-Style Transmitter for Fun!"

You, too, can have a lot of fun if the junction of C_6 and *RFC* is not connected to the grids on both 46's (schematic, p. 18).

Please add this to "Technical Problems," p. 19.

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As a further service to our amateur friends, Swan now offers a Revolving Credit Plan that permits you to purchase any Swan equipment, and charge it!

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The article, however, brought back old memories of the time I took my first commercial FCC exam. They, too, had a schematic with errors which had to be corrected in order to pass.

I wonder how many of your younger readers study each schematic?

George N. Mickey, W9BVK
WLS-TV, ABC Chicago

Announcements

Fresno, California

The 23rd annual California DX Conference will be held on Jan. 22 and 23 at the Del Webb Town House in Fresno. The Southern California DX Club will host the affair. There are many activities planned along with notable DX speakers, plus the grand prize of a Signal/One CX7A as a pre-registration prize. The pre-registration fee of $14.50 should be sent to SCDXC Treasurer Jack Hollander, WB6UDC, 13531 Malena Dr., Tustin, Calif. 92680. Please make your checks payable to the Southern California DX Club and include an SASE if you wish a receipt. You will receive your ticket at the Conference registration desk. Deadline for pre-registration is January 7, 1972; after that date the registration fee will be $16.00.

Stolen Equipment

A Collins KWM-2A radio transceiver, serial number 13815, was recently stolen from an Air Force installation on or about September 2, 1971. Anyone who has any information concerning the location of this radio or any information which could result in recovery of this radio should contact *CQ* magazine, who in turn will relay this information to the USAF.

Goldwater Elected QCWA President

Senator Barry Goldwater has been elected president of the Quarter Century Wireless Association for the 1972-1973 term. QCWA, which was founded in 1947, is a non-profit international organization of radio amateurs who have been licensed for 25 or more years. Current membership is over 5200 of which more than 450 have been licensed for 50 or more years. Other new officers are: Vice President, Harry Gartsman, W6ATC; Treasurer, Mark Devaney, W2NQR; Secretary, A. G. Wentzel, W2HX; Board of Directors: George W. Bailey, W2KH, J. R. David, W4YK, Art Miligan, W8KW, H. H. Robinson, W3RE, Clarence Seid, W2KW.

Liberian LRAA Election

H. Walcott Benjamin, EL2BA, was installed as President of the Liberian Radio Amateur Association (LRAA) at a dinner held on Sept. 24, 1971. He was sworn into office by His Honor James A. A. Pierre, Chief Justice of the Supreme Court of Liberia. Mr. Benjamin is also General Operations Manager for the Mesurado Fishing Company.

hint list for your XYL or YL

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- ☐ I.F. Noise Blanker, **Model NB500** . . **$ 89**
- ☐ Audio Notcher Peaker Accessory, **Model ICAF** . . . . . **$ 59**
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- ☐ Complete power supply for 117 volts 50-60 cps in matching cabinet for Swan's Transceivers, **Model 117-XC** . . . . . **$ 99**
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- ☐ **Swan 500CX,** 550 watt 5 band transceiver **$489**
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- ☐ **Swan 600R,** receiver **$395**
- ☐ **Swan 600T,** 600 watt transmitter for 10-80 meters **$535**

- ☐ 2000 Watt Linear Amplifier. Price includes tubes and power supply. **Mark II** **$599**
- ☐ **FM-2X** two-meter FM Transceiver . . **$259**

- ☐ **VHF-150.** 150 watt 2-meter Amplifier. Built-in 117 volt AC power supply **$279**
- ☐ **14C** DC Converter for VHF 150 . . . **$ 65**
- ☐ Swan 4 element heavy-duty multiband beam antenna. **Model TB-4H** **$129**
- ☐ Our 3 element multiband beam antenna, **TB-3** . . . . . **$ 94**
- ☐ **TB-3H** (heavy-duty) **$109**
- ☐ Two element multiband beam antenna, **Model TB-2** . . . . . **$ 79**
- ☐ High performance trap vertical, **Model 1040V** . . . . . **$ 49**
- ☐ Swan's 5 band Manual Switcher Mobile Antenna, **Model 45** . . . . . **$ 69**
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Just one thing. They all buy more pages of advertising in CQ than in any other ham magazine. In fact, more than half the companies listed above will buy more ad pages in CQ this year than in *all the other hams mags combined!*

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SO..

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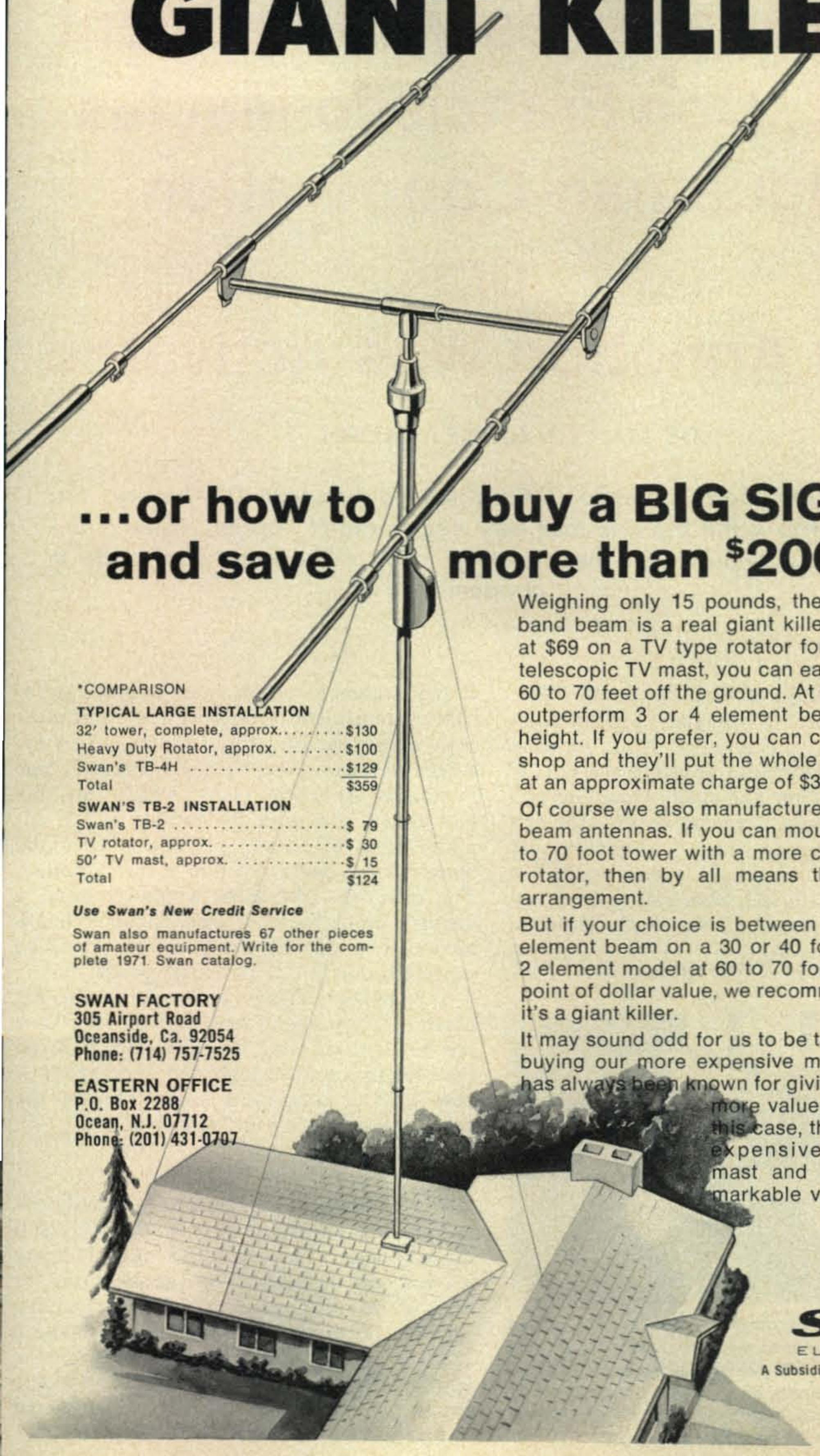

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Weighing only 15 pounds, the Swan TB-2 tri-band beam is a real giant killer. With the TB-2 at $69 on a TV type rotator for $30, and a $15 telescopic TV mast, you can easily get the TB-2 60 to 70 feet off the ground. At that height it will outperform 3 or 4 element beams at a lesser height. If you prefer, you can call your local TV shop and they'll put the whole thing up for you at an approximate charge of $30 to $40.

Of course we also manufacture 3 and 4 element beam antennas. If you can mount these on a 60 to 70 foot tower with a more costly heavy duty rotator, then by all means this is the ideal arrangement.

But if your choice is between putting a 3 or 4 element beam on a 30 or 40 foot tower, or the 2 element model at 60 to 70 foot, from a standpoint of dollar value, we recommend the TB-2... it's a giant killer.

It may sound odd for us to be talking you out of buying our more expensive models, but Swan has always been known for giving the radio ham more value for his dollar. In this case, the TB-2 on an inexpensive telescopic TV mast and rotator is a remarkable value.

*COMPARISON

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32' tower, complete, approx.	$130
Heavy Duty Rotator, approx.	$100
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With His Majesty's-President S. E. Don Francisco Macias Ngueman-Cooperation or How Annobon Was Activated

BY MARTIN LAINE,* OH2BH

Probably the most successful DXpedition in amateur DX history, the Annobón trip is the big one that very nearly didn't happen. Here is the story of this long-awaited new country, and of the men who made it happen.

THE island of Annobón in the South Atlantic has captured the thoughts of radio amateurs for years, and because of the location of the island she manifold fulfills the DXCC requirements. Time and again, Don, Gus and many others strove to render possible the first DX-pedition, but in vain . . . Annobón and Fernando Poó islands, together with Rio Muni on the mainland, were part of the Spanish colonies until 1968. With General Franco's compliant help these dominions became independent in October 1968 and presently constitute Equatorial Guinea. This incident was also noted by radio amateurs and facilitated Annobón plans, which thus far had always met with the refusal of the administration of Spain, prohibiting even the Spanish from operating in their own colonies. The road was paved for a new country, a country which breathes independence, but is obviously aware of the problems involved especially due to lack of export goods.

Who would engage in "meeting the big chiefs?" They might well be friendlier than the colonial officers. The OH-gang took up the job, sweated through and succeeded! A new DXCC country number 323 on the country list. Was it easy? Surely not . . .

*Paatsamatie 5A12, 00320 Helsinki 32, Finland.

Ville, OH2MM, operating in Annobón. The pile-up was huge—sometimes we were clearing it at a speed of almost 300 QSO's an hour. He couldn't even enjoy the bottle on the table—it was Spanish water, we carried 5 gallons of it all the way to Annobón, 620 miles.

Preparations for the Trek

Our preliminary concerns were already discussed during the latter part of 1970; OH2NB made contact with some of his "useful" Spanish acquaintances. We sent applications for visas in the very beginning of 1971 explaining that the purpose of the trip was to make a radio amateur operation, the first since the country's independence. The one and only Embassy of the country, in Madrid, answered and requested reasons for making the trip.

Reasons for reasons! We found out that the senóres legation officials hadn't dwelt on their English homework and so the papers were submitted in Spanish. The answer we received was next to hilarious (the typewriter lacked letters and was apparently falling apart), but promised us the visas well before our departure; which was due in four months. Week after week slipped past and no answer. A few weeks before the planned date of departure we set up a soon-to-Annobón scheme to do our utmost to realize the trip. The Embassy was flooded with letters of recommendation and inquiries—our representative in Spain visited the Embassy daily. At times it seemed that this must be the first real problem facing Equatorial Guinea during her young independence. Manana—manana and the set date was passed. We certainly wouldn't give up, so OH2NB and OH2BH flew to Madrid to personally take the bull by the horns. The visas had been promised—why not issued?

Often we sat for periods of four hours in the Embassy waiting room without progress! It took the Finnish Embassy to wake up the Guineans. Our ambassador went to work on the problem and finally things were in order. The timid Guinean secretary of the legation wrote us tourist visas numbers 6 and 7, but wouldn't take any responsibility for the radio operation. Nevertheless the visas had been issued knowing the purpose of our trip—we were sure to give it a good try. OH2MM had made it in time to Spain with the radio gear and got his visa and vaccinations, now we could buy tickets. We bid OH2NB farewell at a cocktail party arranged by our Embassy and he returned home having succeeded in person in making the arrangements which previously had been holding everything up.

Goodbye Europe

In Spain we still ran into many complications, which were brilliantly solved with the help of EA4LH and EA4JL. They were real ham-spirited fellows, the least to say.

June 20th, a sunny and beautiful day—our final day of departure. We hopped aboard an Iberian DC-8, which was to take us to Fernando Poó, 3C-country. The plane took off after a long delay and flew over North Africa and finally after six hours reached Santa Isabella's short runway. Our feelings were mixed as we knew nothing of what lay ahead. We had experienced much during the past

Fernando Poó, an island ten miles in length, faces Cameroun near the coast of Africa. Equatorial Guinea consists of three parts; Fernando Poó is the administrative center with the capital Santa Isabel which is a clean and idyllic city—it has everything you can think of. The high-standard Hotel Bahia at the edge of the city provides lodgings for all foreign visitors.

years and expeditions but this was new and exciting. The climate was sultry and damp and as beginners we soon were soaked through. It was the rainy season in the area but we could see no trace of refreshing rain. Having filled out several entry papers we were finally facing the customs officials. That inspection should have made me fly home instantly—too late, ten officials searching through the smallest trifles. Our papers seemed to be of interest and the bitter truth is that they confiscated all of them. Damn it! . . .

The President's palace in the center of the city is a stately building. Even the pathways in the park showing in the foreground are paved with mosaic. The roads surrounding the building are all closed and the palace is heavily guarded from all sides. The DX-peditioners went through a thorough body-search nine times and towards the end were granted admittance without a special reason. The President was indeed friendly towards the tourists numbered 6 and 7.

After a successful landing on Annobón we had to suck fuel from the fuel-bin of the plane. It took two hours and during this time our flight captain gulped at least two dozen "fuel grogs." 20 gallons was enough for a week. In the front the Commandant is keenly observing.

we need the papers, where will they accept hand waving in place of credentials? "The President will look at the papers and they will be returned to you tomorrow morning," one of the customs officials muttered. What's that? The President? Must be strict fellow that President . . .

Santa Isabel and the Seven Days of Work

Our hotel was in the beautiful and idyllic city of Santa Isabel. The only hotel on the island, the Spanish-styled Hotel Bahia was very cozy. One of the services of Bahia was a restaurant under the shade of palm trees near the seashore. We went to our top-floor room and fell asleep completely exhausted. What about our radio equipment? Well, we didn't even dare think about that after such a customs inspection; we left the gear at the airport for better days to come. Next morning we waited for our papers—but nothing happened. Something had to be done, we decided to sound out the situation. The next flight to Europe was due after a week and the whole world was waiting for us to be on the air. Incidentally, are we leaving on that flight—or any flight for that matter?—Forgive me, but my thoughts keep returning to those days.

By mere chance we discovered the American Embassy. That's it—the yanks have always been our friends! Mr. Alfred Erdos, the chargé d'affairs welcomed us cordially and took us in. We explained the situation to him and our sincere intentions but . . . before we had finished the sentence he almost blew up. "Did I get it correct? Radio contacts from here? Act as if you were never born and scram out of here on the next plane, that is if you'll be able to . . . here the police check telegrams, letters are left unsealed to the Post Office and every foreigner is followed . . . you must be *insane!*" He certainly was not of much help. "Good bye."

In course of the discussion we learned the names of two Swedes and sought them immediately. They were working for the ITU, training the locals. Next morning we headed for the Ministry of Home Affairs with the Swedes. The Chief of Department Sr. Pale-Pale received us and listened patiently. Our discussion lasted only a short moment, the decision making was even quicker—Pale-Pale's convincing "no" was so vehement that it grounded us at once. The DX-pedition was over. We decided to concentrate in getting out of the country.

Not quite—this was just the beginning. While strolling down the beautiful streets of Santa Isabel an Army Land Rover pulled over beside us and three militia jumped out. They waved us into the car. Will this mean a violent and sad end to the story? The events of last year's New Year's celebration in Santa Isabel flashed through our minds. According to the Swedes three white people had been sacrificed to gods in a big stadium. We reckoned they had already two for the next feast. But the militia only went for an interpreter and drove us to our hotel. The interpreter forwarded us the President's warm regards and wishes for a pleasant vacation as well as all our papers. The militia shook hands in a good mood and left.

What was to be our next move as the President seemed to have forgotten the radio business? We hastily composed a letter to the President and took it to the President's palace. We were directed into a waiting room after a body-search; two hours of waiting as becomes the African spirit and eventually the Protocol Chief received us. We delivered our letter with enclosures and returned to the hotel looking forward to the President's answer. On our way back we dropped in at the airline company's cargo station and noticed our equipment was unpacked in a storage room. We had arrived four days ago and seemingly the days were becoming more and more exciting.

On Wednesday we got things going. We received an invitation to arrive immediately

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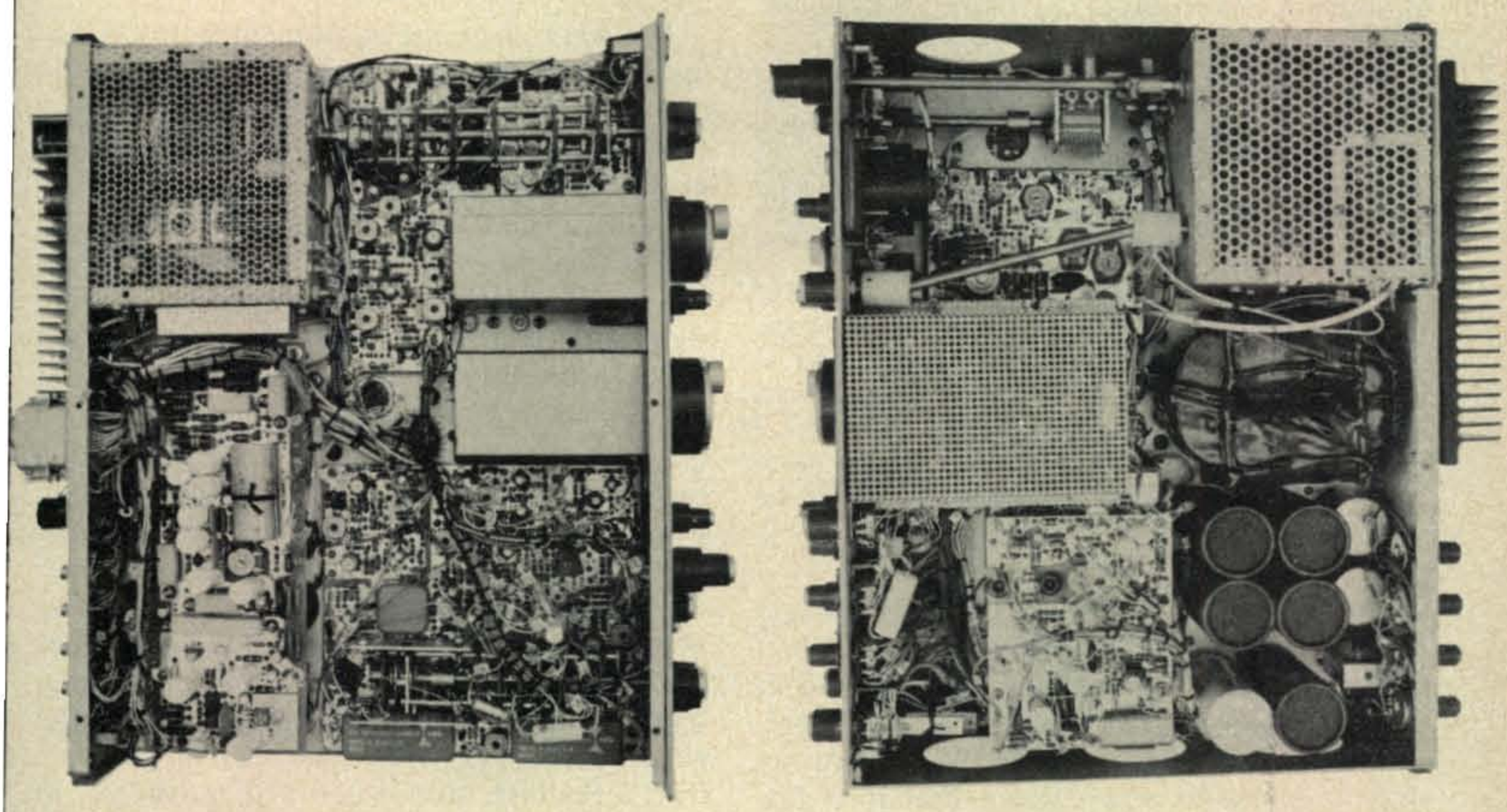

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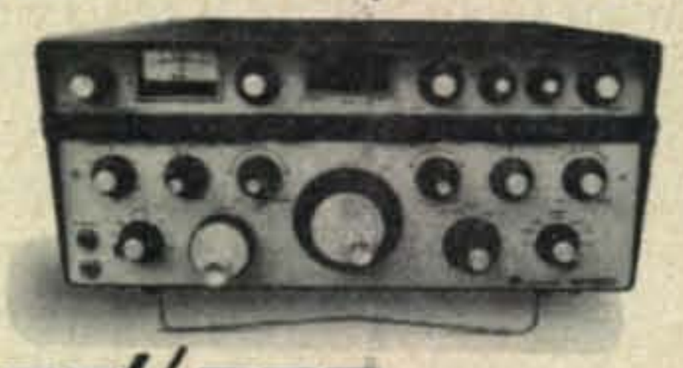

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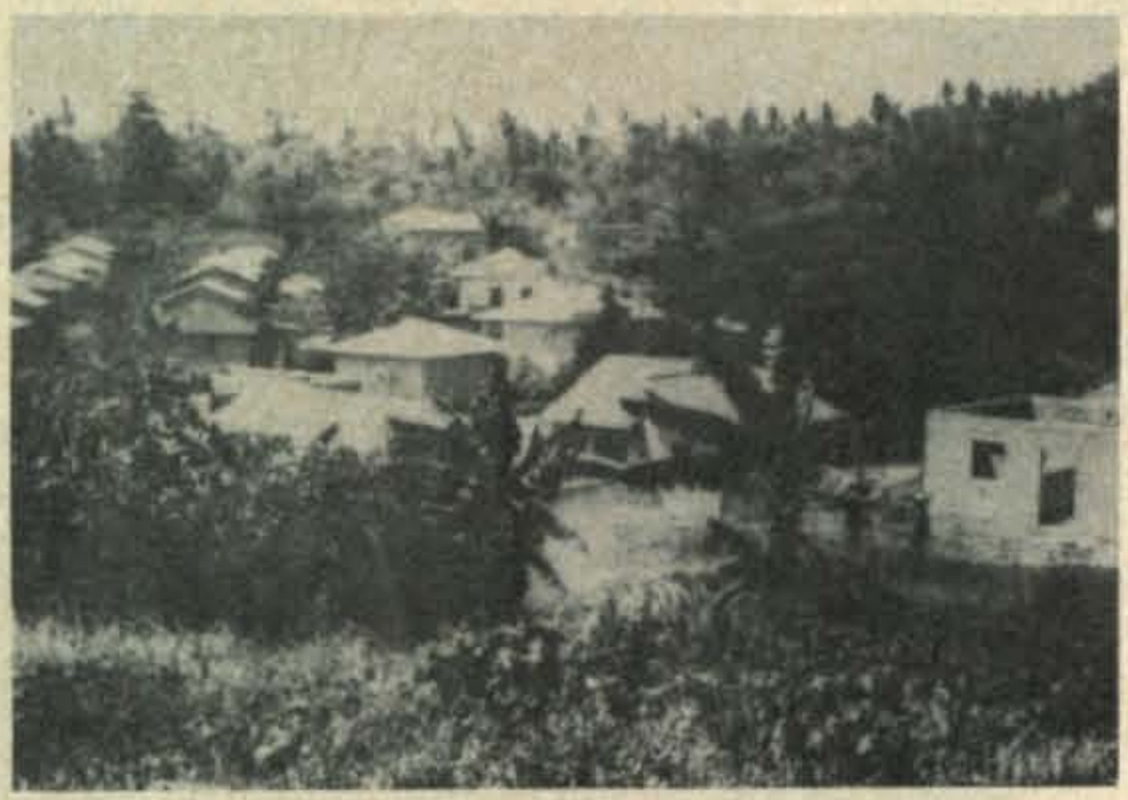

The volcanic island of Annobón is about four and a half by two and a half miles in size. The village of San Antonio is located in the southern part of the island and virtually all of the 1436 inhabitants live there. Fishing, the main source of livelihood is done from canoes carved out of a single piece of wood. The climate of the island is told to be the healthiest in the world.

to the President's palace. After a few obligatory hours of waiting the Protocol Chief announced that the President had granted us a radio-amateur permit which we could collect the following morning. We spent an uneasy night—it was evident that in a few hours we should get into something. To the President's palace once more in the morning; this time we received a permit beginning with the words of the title of this article. The permit also promised us all the help and cooperation which would be required to carry out an operation of this kind in Santa Isabel and Annobón. In addition to this we were asked to visit or "report ourselves" at the local Telecoms office and the Ministry of Home Affairs where the formerly mentioned Sr. Pale-Pale was sorry for his naughty words and now greeted us with a big smile. Thus a valuable day had slipped by once again. It took us all Friday to explain about our equipment and amateur procedures to Sr. Mateus, the Chief of Department at the Telecoms office. Mateus probably hadn't heard before that ITU had granted independent Guinea a 3C-callsign. Mateus was eager, however, to approve of the callsign—as requested by the President—and was even speculating on the next callsign. The customs had a day off on Fridays so we agreed to meet Mateus the following morning when we could call for the equipment. Mateus expressed his regret that we would be unable to contact other amateurs on the island as there were none; and surely our 200 watts would never reach the mainland of Africa. They hadn't had much success with their own 5 kw BC station on longer distances. Let's leave Sr. Mateus alone: he's only a novice in radio amateuring.

3C1EG and 7500 Contacts

We were given the equipment in the morning without any problems and brought it to our hotel room. Operation began and Hotel Bahia soon turned into Radio Bahia as expressed by the manageress of the hotel. The equipment had endured the trip undamaged and was performing superbly. The dipoles on top of a 33-foot shining mast were sending S9 signals all over the world. Equatorial Guinea is an exceedingly rare country and consequently there was a huge pile-up. Amidst all the high activity we constantly kept in mind the ultimate purpose of our trip: Annobón was our goal as the 1.5 kw generator in the corner of our room kept reminding us.

We visited the harbour every day inquiring about a ship that might take us the 450 miles to Annobón. The results were discouraging, there were only a few fishing vessels in the country and they were in constant use. We met a Spanish shipowner who promised to help if we waited for two months; at that time he was too busy with the fishing season at its best. We met him almost every night and stuffed him with our questions and requests. Before long we were able to change our friend's mind and so we had the ship. Three days to Annobón, two there and three on the way back; the price tag of a voyage on a 20-ton vessel including a six-man crew: $2200 and no chance for bargaining anyway. This was a deal and now we could imagine ourselves at the shores of Annobón. Next day we went to the Ministry of Maritime Affairs to arrange the necessary papers. The departure was certain and already at the docks we were sketching the installation of the MM-antenna. In the meantime the pile-up at Radio Bahia would be continuing for another three days until our departure.

Next day brought with it one of the big back-lashes of the trip—our friend, the owner of the ship told us the deal was off. We were told that he had been threatened with his life not to go tourist-sailing and give up fishing, which is so necessary for the country's economy. Our friend was afraid because so many of his countrymen had been exiled for similar attempts. He was sorry, but firm.

We informed the gang that we'd have to

give up Annobón for this had been our last hope. We felt the world was sharing our grief and many expressed their concern. But not all merely grieved and something unpredictable occurred. The DX world showed its unity and vast resources by finding our transport over the sea to this remote island south of the Equator. There was plenty of effort by Eva, PY2PE of Brazil. She studied several possibilities to reach Annobón from Douala in Cameroun or Librevillé in Gabon. The choices were many and Eva had tangled the Ambassadors and consuls of these countries for the cause. The owner of an 300-foot fishing vessel sailing nearabouts was contacted at Puerto Rico and he agreed, only the price was such that Ville and I doubted the place of the decimal point. Robert, TY1ABE, from Dahomey solved the problem: an army Cessna will pick up the boys from Santa Isabel and fly to Annobón—$1900 and a weeks flying secured. But, mind you, how? There's no airfield on Annobón. The only recorded landing was by a small plane four years ago. . .

Farewell Santa Isabel—Mission Annobon

We'd gamble once more—on Monday we were waiting for the Cessna at the airport. We had inquired about the runway of Annobón but almost everybody insisted that there was none, they had all witnessed it themselves.

The plane flew from Dahomey to Santa Isabel and landed as notified beforehand. We were greeted by two cheerful African pilots. Everything was okay and we were ready to start —runway or no runway. Radio amateurs from the other side of the world had arranged for the plane to fly to the island—hardly even knowing where it was so who were we to argue. The pilots were ready to make an effort, they were army pilots at that. They were clearing the red tape while we were loading the small 4-seat plane with our gear. Then the pilots interrupted us to tell us the game's over. No permit would be issued because there's no runway. The chief of the airport wouldn't take responsibility for a flight to an island without a runway. They also told us it is prohibited to land on Sao Thome (CR5), halfway, because the relations of the countries are completely broken off. If we landed on Sao Thome we'd have to keep out of Guinea afterwards. A flight directly to Annobón was out of question as well, in case landing was impossible our fuel wouldn't take us

A snow-white beach surrounds the village of San Antonio. The blue waves of the Atlantic caress the shores of Annobón. The people are friendly and happy. They know what is happening elsewhere but want no part of it. They want to live on their own beautiful island which the encyclopedia described as the only paradise on earth.

back. This time as before we relied on the method so suitable in this country. All of us, the pilots, airport officials and radio amateurs into the Land Rover and off to see the President—we could always count on him, and rightly so. The plan soon read: first to Librevillé, the capital of Gabon (TR8) where we could fill up with fuel and from there fly 290 miles to Annobón. They didn't know anything about the possible runway at the President's palace either, so we suited ourselves with this solution. This was our ninth visit to the Presiden's palace. Just before dusk we took off and flew in bad weather towards Librevillé, a very European-like city and very expensive. The prices were quadruple compared to those at home. Fresh and expectant we were ready for this century's number one flight waiting at the Librevillé air terminal. This Thursday morning at the beginning of our fourth week we were thinking of Annobón, DXCC country no. 323, forlorn in the swelling and roaring southern Atlantic.

Welcome to Annobon — An Island of Paradise

We left mainland Africa behind us and made our way over the sea. Our only means of navigation was a compass as we flew above the clouds to maintain the minimal altitude. After two hours we dived near sea level observing possible landmarks. Onwards and onwards— no sign of Annobón. At last Lt. Tognisso said: "She could be behind those clouds in front of us." He was right, there was the island covered with dense fog. We reduced

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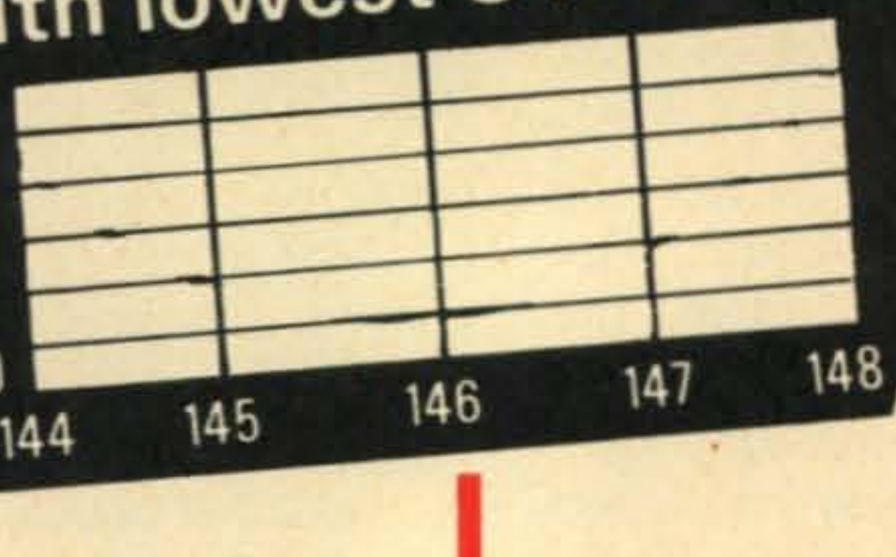

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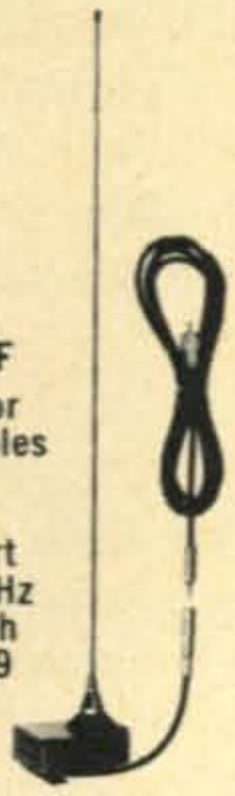

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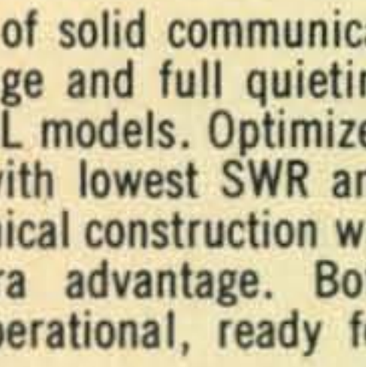

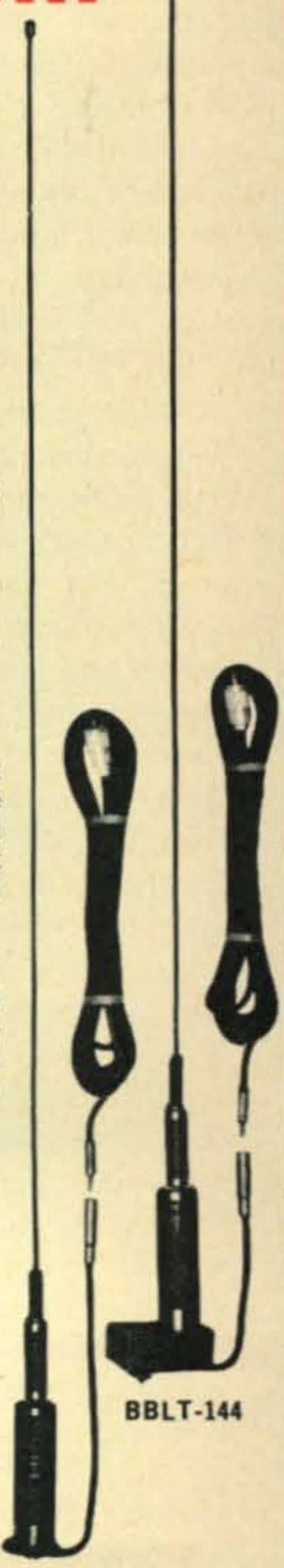

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altitude and approached the northern tip of the island, flew over the village and its peculiar-looking huts but couldn't make out any runway. "Right there, below us—there's the airfield covered with bushes and scrubs," Tognisso cried out. "Let's go down," were his words before diving. I was fervently praying . . . the plane was swallowed by the vegetation . . . I was scared to death . . . the wheels met the ground. Several-feet-high bushes were pushed aside as our Cessna 337 kept tearing through the jungle like a thick-skinned machine. There were neither stones nor ditches and we halted in the middle of the bushes with tufts of grass stuck to the wheels. Lt. Tognisso and Capt. Ayossa shouted like winners of a state lottery: "We did it, the army of Dahomey did it." We weren't left out of the slapping and celebration although we were in back of the plane stiff with fright. The "airfield" was soon crowded with people. It seemed as if all the 1400 inhabitants were present. They wouldn't come too near but jammed in a crowd about a 100 yards away. A man with a uniform stepped out of the crowd and slowly walked towards us. He turned out to be the Commandant of the island. He welcomed us and told us that we were the first white men on the island for four years—the very first since the country's independence. He also told that the President had sent him a wireless message telling of our arrival. The Commandant was sorry that the runway hadn't been cleared but had planned to start clearing it the following day. The people grew braver and edged their way around the plane. The children had never seen such odd-coloured men and the plane was worth reconnoitering as well. Finally a mile-long queue started out towards the village. The two white men were guests recommended by the President and therefore weren't even let carry their own bags. We threw a glance to see the plane take off also expecting it back in four days. Full speed through the bushes again. It barely rose up at the edge of the "runway." The plane saluted us with a pass overhead and waved its wings before leaving. The takeoff was such a narrow escape that it wouldn't bear four of us with all the equipment—take-off friction and loss of acceleration due to vegetation makes it impossible.

We cast aside the problems of the future, the beginning of the DX-pedition was so near. We walked some two miles to the village

This mast was a product of the island. It helped us to push the signals to JA and ZL behind the 3000-feet-high three-tipped mountain ridge. We are sorry, but we couldn't have possibly managed the beam with us.

where we were shown our quarters. A good stone building at the other side of the village. The house was built especially for guests of the island—only there hadn't been any for years. A recently reconditioned living-room, a kitchen with gas and a refrigerator, a bedroom for both of us and on top of all this luxury a bathroom with running water . . . Whoever told stories about savage natives, we can't agree—the natives were thoughtful hospitable people who knew the word luxury although they lived in grass huts themselves. The house has electricity—where's the end? we got 220 volts 50 Hz three hours a day. There was enough oil for the generator for a few weeks more, after which the island would be met by total darkness.

Up with the antennas and get our own

This team explores the world ignoring the distances and the expenditures when a good DX-pedition is at stake, e.g., to the island of Annobón in the South Atlantic. What is their next destination? From left to right: Ville, OH2MM, Armas, OH2NB and Martin OH2BH—they are the ones who know.

generator gonig! 3CØAN is in ether after years of waiting. Bill, W3RX, got the first QSO while the dipole was only about 5 feet high. The pile-up was immense . . . G5AFA, the first one from Europe, VE3ACD from Canada—the world was falling on us. We quit for a moment to lift the antenna—the nosiest had been r.f.'d on their fingers and were on the alert. During the first few days natives gathered around our house but soon got used to our strange bustling and accepted us as part of the island. Victor, the radio-operator of the island, spent much of his time with us—practiced with the el-bug and even chatted with the Spanish on s.s.b. The 84-year-old priest came to see us and asked us to forward a letter to his colleague in Santa Isabel. All told we got about 60 letters to take back with us. We thought our sun-glasses and watches would furthermore broaden the understanding between the islanders and us. The Commandant of the island nowadays boasts with OH2MM's watch—it's all for amateur radio you know?

The operation went on non-stop except for a pause for fueling the generator once an hour. Conditions were excellent—24 hours a day and we hardly had time to open our few food cans. We were operating full capacity to make everyone happy around the world.

Friday dawned, the plane was supposed to return that day. It did and landed beautifully on Annobón's *airfield*: 500 women (men don't work on the island) had spent four days clearing the field. In return the pilots brought batteries and tobacco for the islanders. Visiting the village that evening we found out they had found good use for the batteries, music was playing in every hut. The village formed a touching sight against the tranquil surface of the Atlantic. Saturday morning was sad, we left our true friends, the magnificent village of Annobón, its rugged mountains, white beach and magnificent climate. We left the people on their own island of paradise. The people were waving as the odd-coloured strangers bid farewell to Annobón, always treasuring the pleasant and plentiful memories of the island.

From Librevillé we flew to Santa Isabel the same evening where we spent our last Africa-evening with our pilot-chums, we were all equally happy about the success. Next morning we had to take leave of the pilots as well

[*Continued on page 98*]

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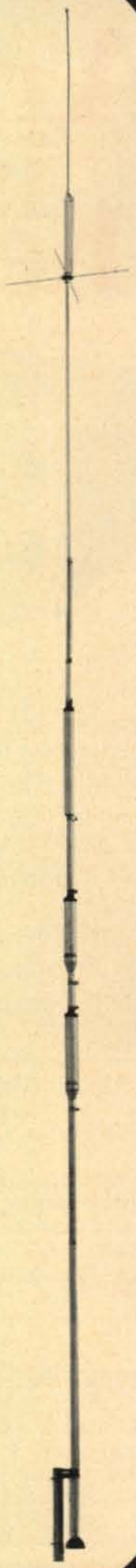

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CQ Reviews: The Sonar FM-3601 2 Meter FM Transceiver

BY GLEN E. ZOOK,* K9STH

ANOTHER communications manufacturer has jumped into the amateur f.m. market with both feet. Namely, Sonar Radio Corporation of Marine communications fame. Sonar's contribution to f.m. is the FM-3601, a solid state, 10 watt output, 8 channel, unit with dual-conversion and narrowband standards. The FM-3601 is an outgrowth of their marine model 1803. The unit comes from Sonar with crystals for 146.34/146.94 MHz and 146.94/146.94 MHz. Other crystals are available. The unit may be operated from 12 v.d.c. negative ground or from 117 v.a.c. with the PS-2923 optional power supply. Front panel controls include microphone jack (mic included), squelch control, off-on-volume control, and transmit and power pilot lamps. The front panel is an attractive wood grained finish with black and chrome trim.

Technical Details

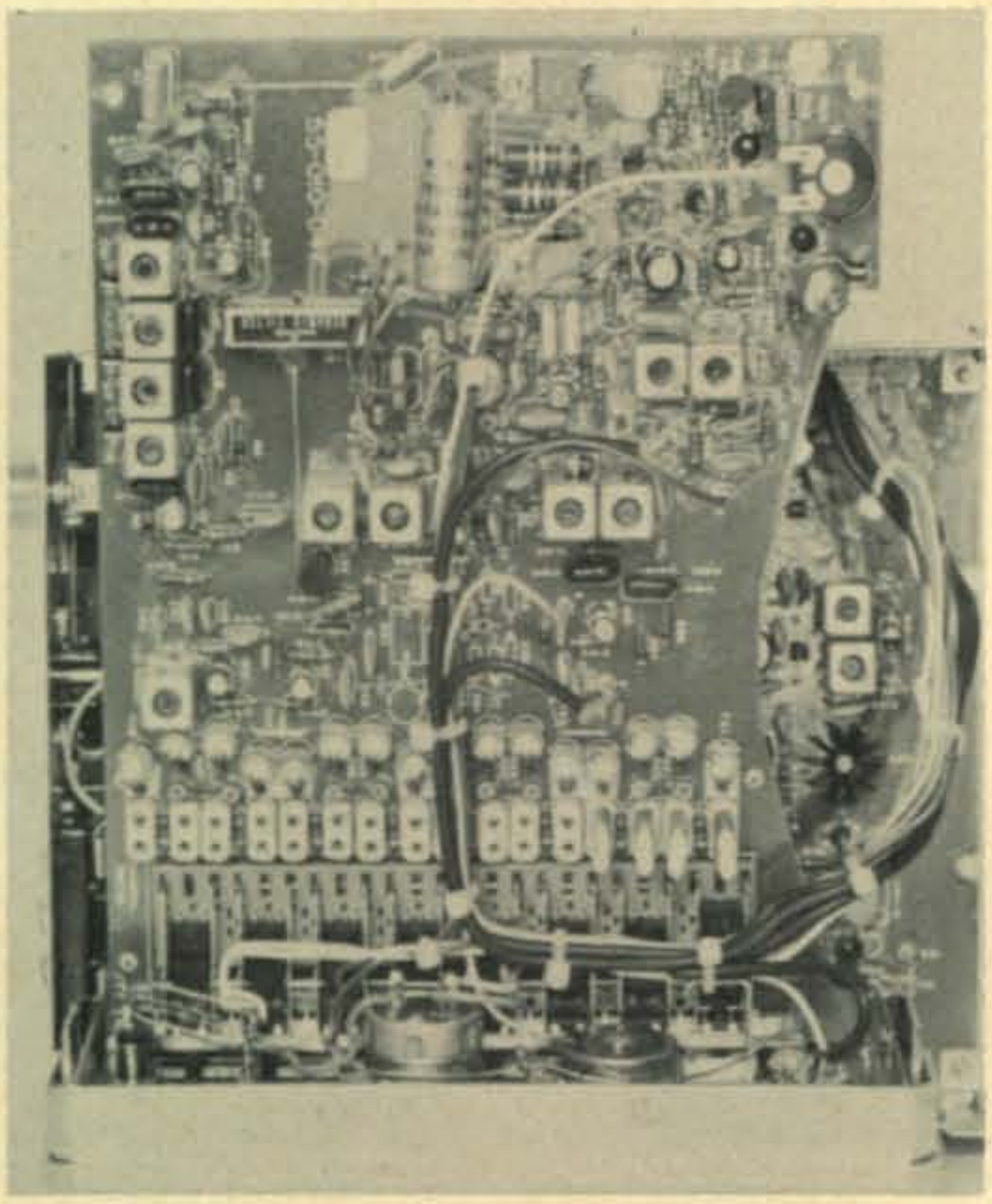
The Sonar FM-3601 is fully solid-state. Channel selection is with eight push buttons on the front of the unit. External speaker connections are on the rear of the unit as is the 12 v.d.c. power connector. Construction is on excellent G-10 epoxy boards.

TRANSMITTER: The transmitting section of the FM-3601 is fully solid state using 12 MHz crystals in an eight-channel circuit. Each crystal is provided with a separate trimmer capacitor for adjustment to desired operating frequency. Frequency multiplication is twelve times which is accomplished in seven stages including oscillator and driver and final. Modulation is phase type which is accomplished using limited and filtered audio. The audio stages are an audio amplifier transistor, diode limiter circuit, and a two-transistor "roll-off filter" circuit. The microphone is controlled magnetic with a 1500 ohm impedance. The transmitter does not incorporate a high reflected power sensing circuit as do some other solid state amateur f.m. units. However, the final transistor is de-rated enough to be able to dissipate the power should a shorted or open antenna occur. A low pass filter and antenna change-over relay complete the transmitter section.

RECEIVER: The receiving portion of the Sonar FM-3601 is a fully solid state, dual conversion (10.7 MHz and 455 kHz i.f.'s), 8 channel circuit. The front-end transistor is an RCA 40235 bi-polar and the first mixer is an RCA 40673 dual-gate IGFET. There are four tuned circuits between the first and second mixer with no amplification taking place at 10.7 MHz. First mixer injection is provided by a two transistor oscillator multiplier (× 3) circuit using 45 MHz crystals. Each crystal has an individual trimmer for on frequency operation. An 11.155 MHz signal is provided from the second oscillator to the second mixer (bi-polar). The resulting 455 kHz signal is passed through a ceramic filter for selectivity into an RCA CA3076 integrated circuit. In the IC limiting and amplification takes place. The processed 455 kHz signal is then fed into a transistor amplification stage and applied to the discriminator. The audio section, consisting of an emitter follower for matching, differential amplifier (2 transistors), driver, and complementary audio out-

*FM Editor, *CQ*.

The Sonar FM-3601 is a solid state, 10w. class, 2 meter f.m. transceiver. This eight channel unit is housed in an attractive woodgrained metal cabinet.



The FM-3601 splits into 2 portions for service. Note the position of the crystals and trimmer capacitors. The boards are epoxy with very good workmanship.

put complete the voice portion. A noise derived squelch circuit completes the receiver.

Specifications and Performance

After receipt the Sonar FM-3601 was put through its paces both on the air and under controlled circumstances. Before the review was written, Sonar called the unit back for incorporation of production and engineering changes. When the unit was received the second time it was again put through its paces under controlled circumstances. The power output from both a 13.8 v.d.c. source and from the optional a.c. power supply was in excess of 11 watts (compared to 8 watts minimum specification). The audio quality of the transmitter was good, but the preset deviation was about ±8 kHz rather than the ±5 kHz specified in the manual. According to Sonar, this was intentional, for amateurs in wideband areas have been complaining about too low transmit audio, so the units are now being set to about ±8 kHz deviation.

The receiver sensitivity was about 0.3 microvolts, well within the 0.5 microvolts (for 20 db quieting) set by Sonar. The receiver audio sounded very good, but the receiver distorted with deviation inputs above ±10 kHz when first received from the factory. Howeve-, after modification the receiver accepted ±15 kHz with no noticeable distortion. Sonar reports that the receiver is designed for narrow band ±5 kHz and not all units will take the ±15 kHz deviation without

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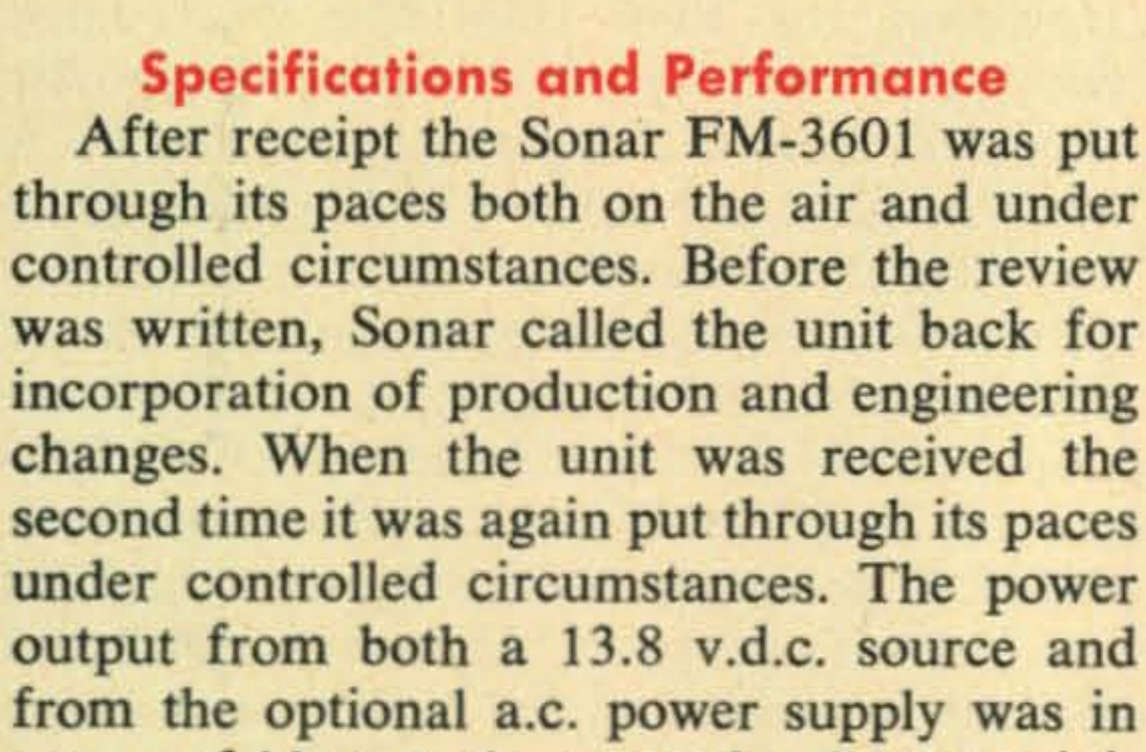

Another view of the interior of the Sonar FM-3601. The variances in board coloring are due to the translucent properties of the epoxy board material.

Sonar Model FM-3601 2M Transceiver

GENERAL SPECIFICATIONS:
Size: 6¾"w × 2⅝"h × 9"d
Weight: 5 lbs.
Power Requirements: 13.8 v.d.c. @ .175 a. stdby; 1.9 a. Transmit
Accessories Furnished: Microphone, installation hardware, power cable, crystals for 146.34/146.94; and 146.94/146.94 MHz.

TECHNICAL SPECIFICATIONS:

Receiver	*Claimed*	*Achieved*
Sensitivity (20 db quieting)	0.5 uv	0.3 uv
Adjacent Channel Rejection		
30 kHz	†	62 db
60 kHz	†	65 db
Audio Recovery (full quieting signal)		
±5 kHz	2 w. nom.	1.7 w.
±7.5 kHz	2 w. nom.	1.8 w.
±15 kHz	2 w. nom.	1.8 w.
Number of Channels	8	8
Frequency Stability	0.001%	‡
Transmitter:		
Power output (@13.8 v.d.c.)	8-10 w.	11 w.
Deviation		
Preset	±5 kHz	±8 kHz§
Maximum	±10 kHz	±17 kHz
Number of Channels	8	8
Frequency Stability	0.0005%	‡

†Sonar specifies 3 db down @ 16 kHz.
‡Both receive and transmit frequencies were within 200 Hz of correct frequency and held over several hours and periodic checks.
§See text.

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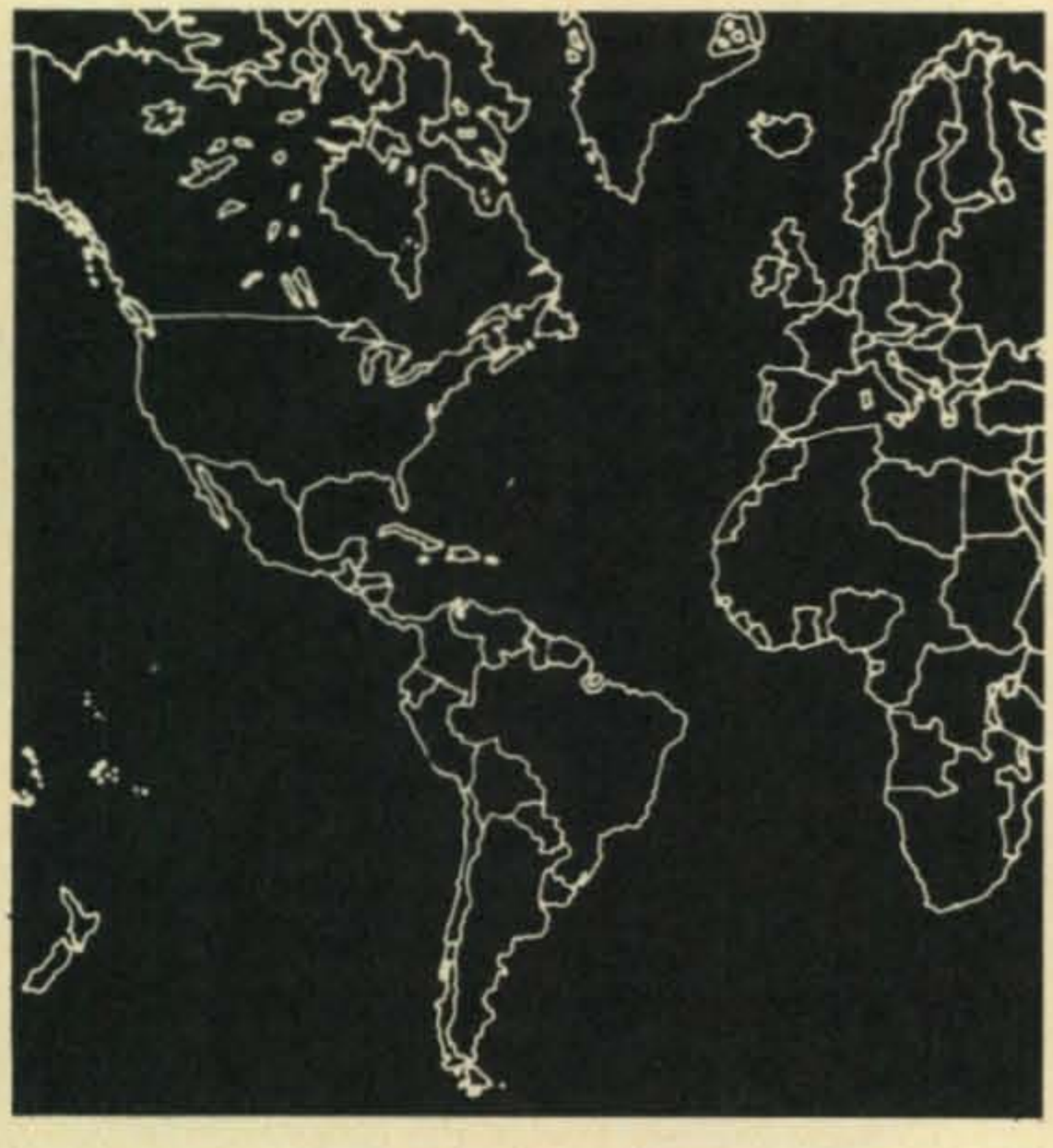

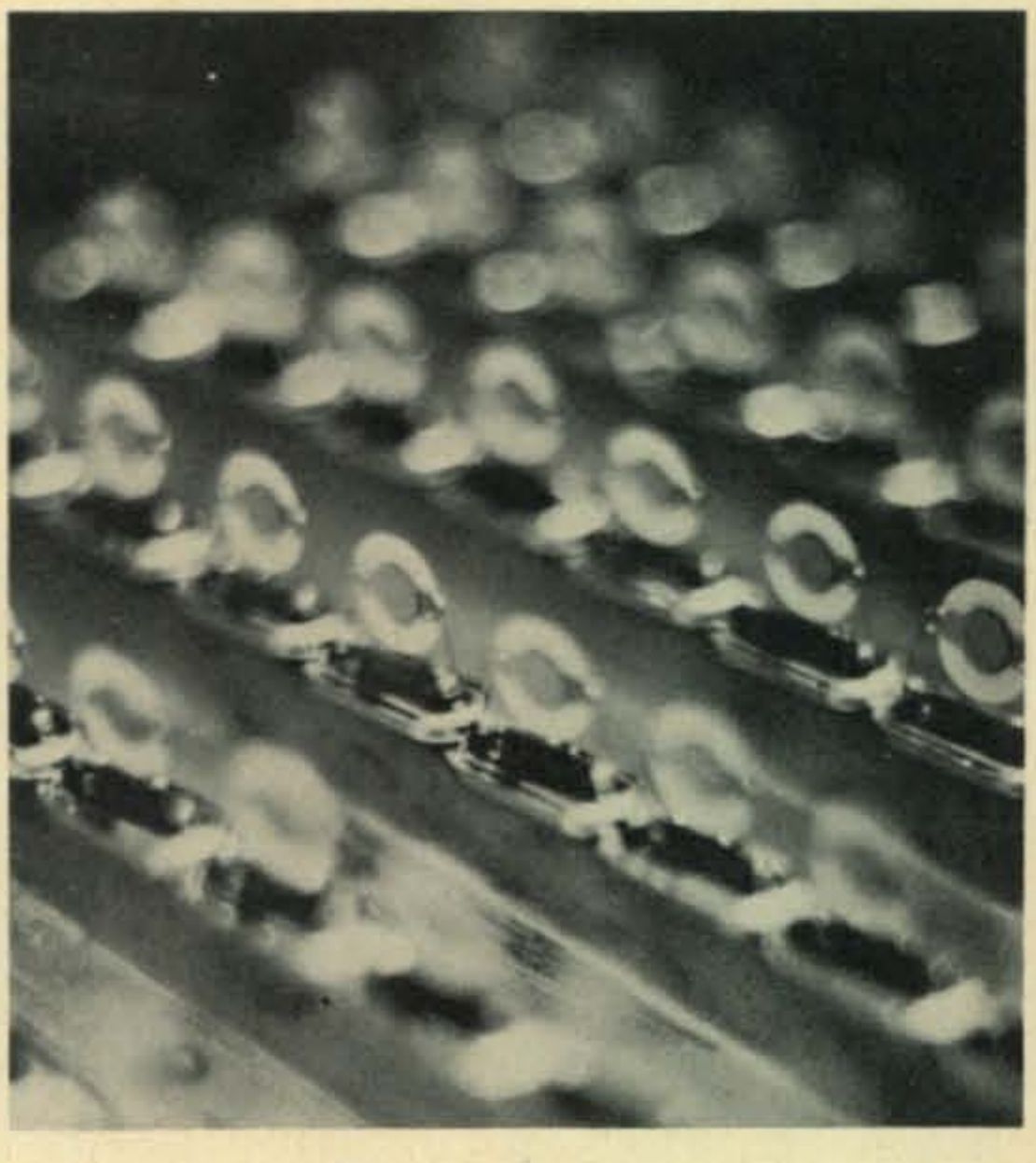

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Stabilizing Low-Cost Signal Generators

BY PAUL H. BOCK, JR.,* K4MSG

STABLE, accurate, low-cost v.h.f./u.h.f. signal generators are almost non-existant, and although many m.f./h.f. generators provide auxiliary coverage of one or more v.h.f. bands, performance is usually marginal. Nevertheless, it is possible to modify a low-cost signal generator for improved stability, thereby making it more useable, if not state of the art.

The Eico Model 324 r.f. generator is a typical low-cost unit providing frequency coverage from 150 kHz-145 MHz (fundamentals) and from 111-435 MHz (harmonics). In the m.f./h.f. regions it is reasonably stable, although the tuning rate is poor at higher frequencies. In the v.h.f. region, landing on frequency is touch-and-go, and mechanical instability is significant. However, about five bucks and a little work will improve the electrical and mechanical stability and add a bandspread feature.

The first problem to tackle is electrical stability; this is simply solved by adding a voltage regulator to the B+ line, as shown in the lower left corner of the photo. Since B+ is normally 115-120 v.d.c. unregulated, an 0B2 was chosen for the VR tube. Wiring is simple and straightforward, with one terminal strip being used to support the dropping resistor, R_{17}. Figure 1 shows the circuit modification.

Mechanical Improvements

Mechanical stability was the next problem to be considered, and there just isn't too much that can be done here without virtually rebuilding the equipment, aside from bracing the front panel and the mounting plate for the tuning capacitor, C_{12}. The two braces installed are visible in the photo; the left brace consists of a heavy gauge right angle bracket, intended to aid chassis rigidity when the panel is securely fastened to the cabinet. The right brace is intended to reduce the relative motion between the mounting plate for C_{12} and the front panel, since any such motion will cause C_{12} to change capacitance slightly, thereby shifting the generator frequency. This brace consists of a heavy-gauge metal strip, one end of which is fastened to the tuning capacitor mounting plate. The other end is fastened to a 3/4-inch ceramic standoff insulator mounted on the front panel. The metal strip should be bent, if required, to pre-

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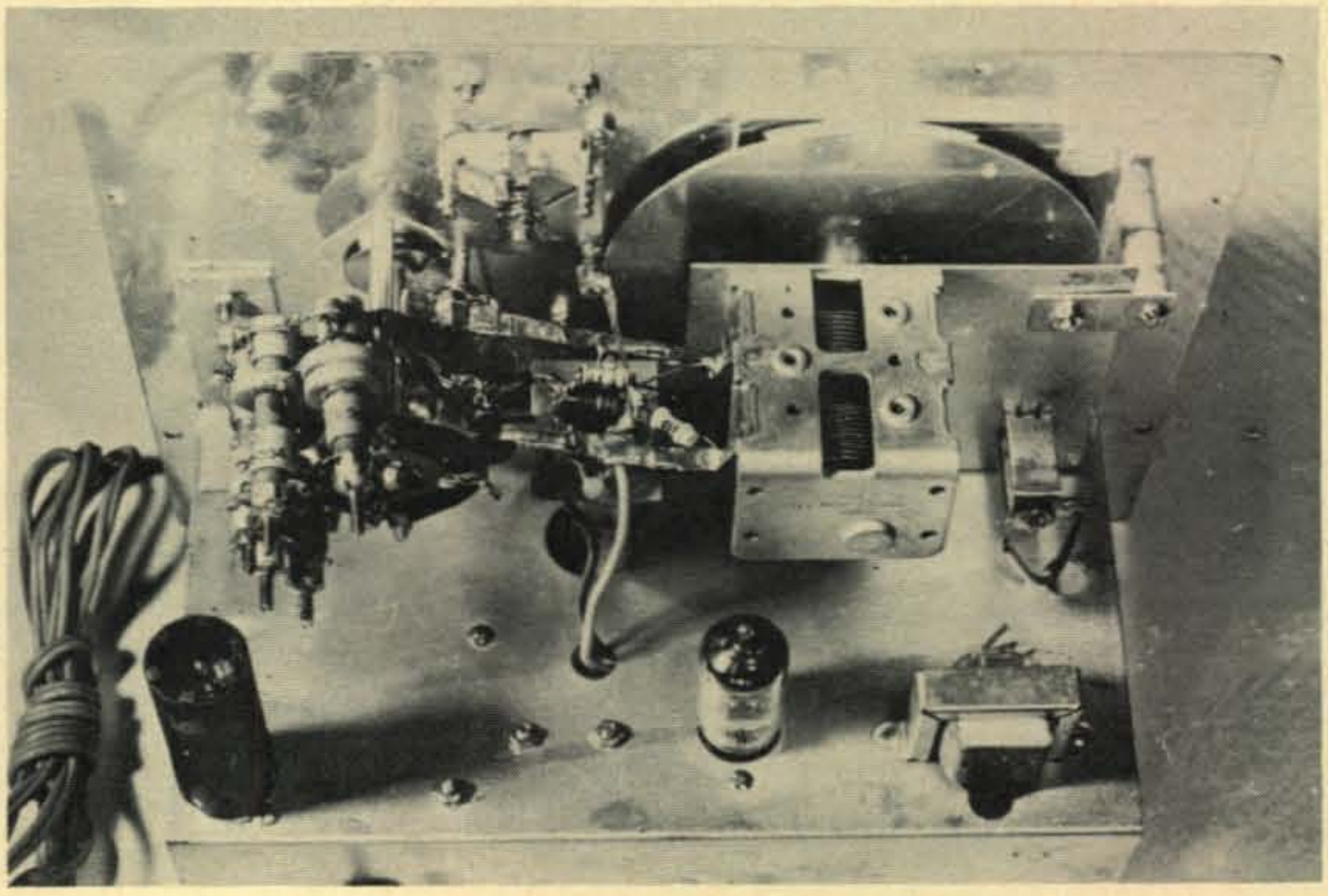

Interior view of the modified Eico 324 signal generator. At the top-center of the front panel is the modified butterfly-type variable capacitor used for band spread on the u.h.f. frequencies. At the left rear corner of the chassis is the voltage regulator tube. Note also the angle bracket added between the chassis and panel at the left, and the the small flat bracket and ceramic standoff bracing the tuning capacitor mounting plate at the right.

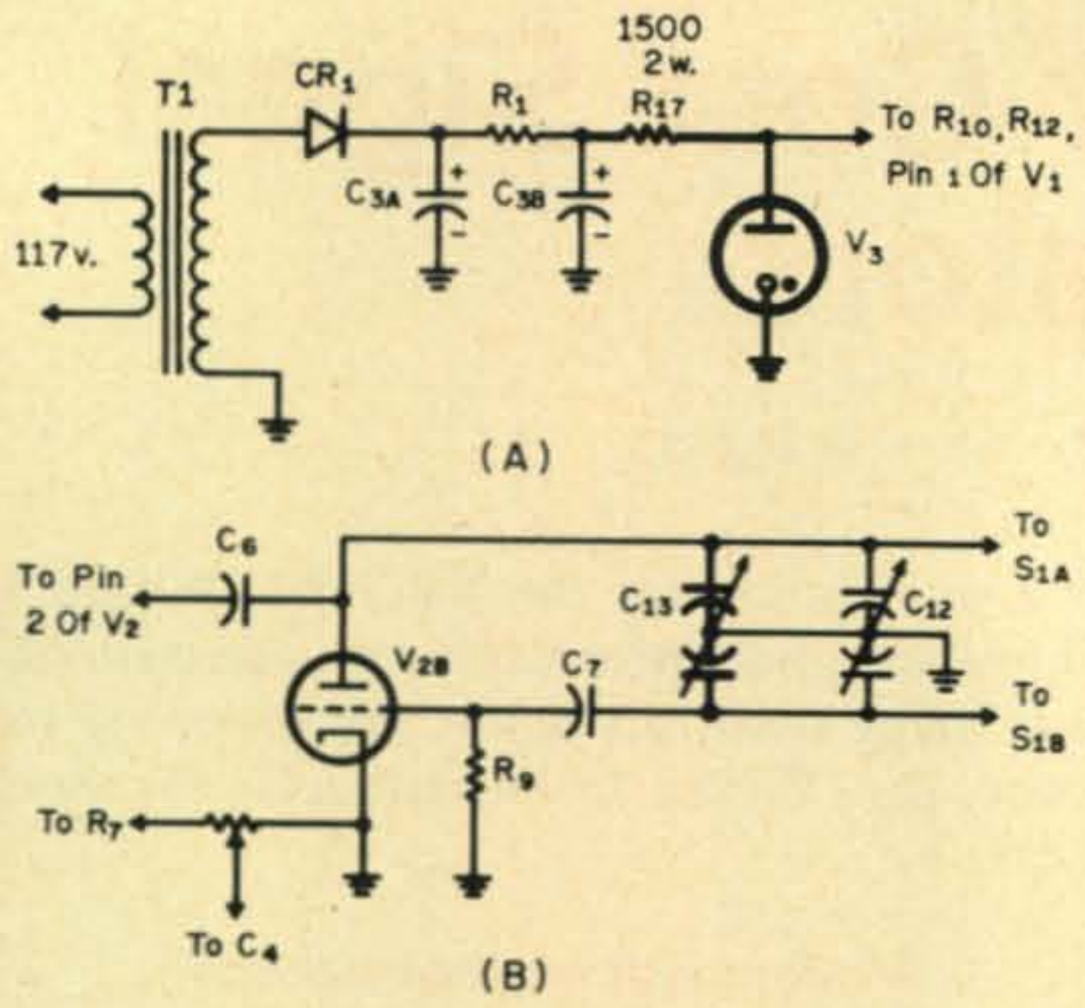

Fig. 1—(A) Schematic showing the addition of an 0B2 VR tube to the signal generator power supply. (B) Addition of bandspread capacitor C13 to the signal generator. The unit used by the author was a 2.3-10 mmf butterfly type with plates removed as described in the text. Added components are shown in heavy lines.

vent the front panel from being warped inward or outward. Otherwise, some difficulty might be encountered installing the equipment back in its cabinet.

Tuning Rate

As far as the author was concerned, the tuning rate in the v.h.f. region was the biggest shortcoming of the equipment. Several different ways of alleviating this problem were tried and rejected, and there are holes in the equipment to prove it (quite a few screws in the author's 324 do nothing but fill extra holes!). Finally, it was decided that a small bandspread capacitor for fine tuning was a simple and economical approach which should satisfactorily achieve the desired result: the ability to tune to within a kHz or two

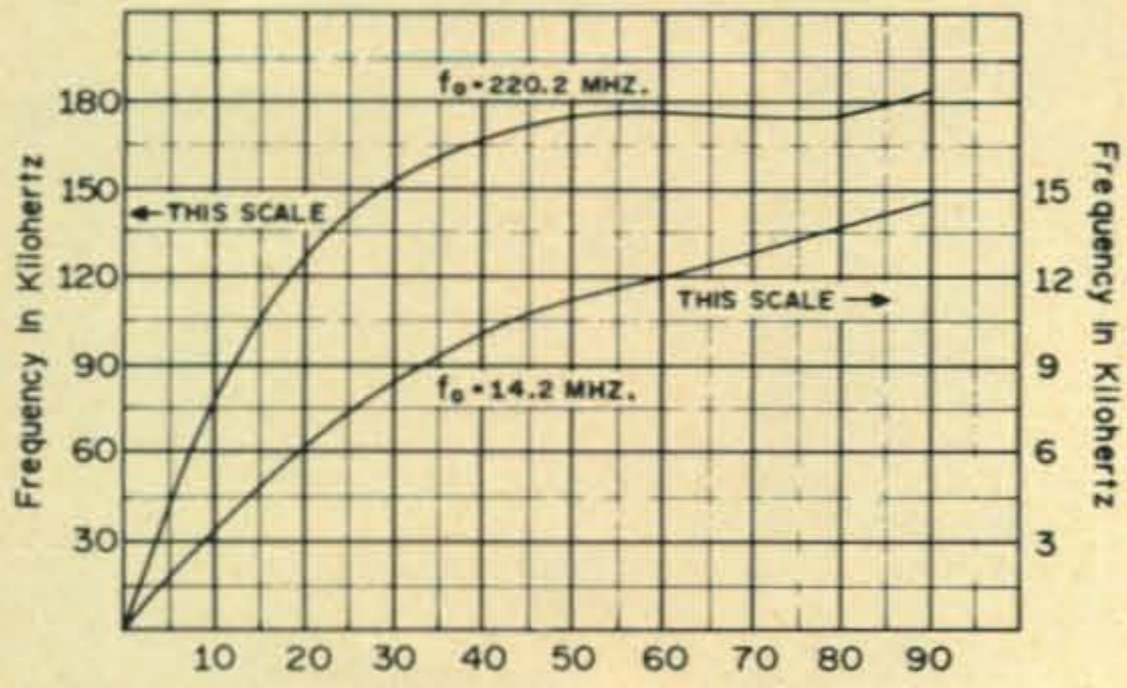

Fig 2—Drift rate curves for the Eico 324 signal generator as modified by the author.

of the desired frequency in the v.h.f. region. The bandspread capacitor, C_{13}, is visible in the photo, with the wiring modification indicated in the schematic of fig. 1. Either a butterfly or split-stator variable must be used, since V_2 operates as a Colpitts oscillator with the split-stator tuning capacitor, C_{12}, serving as the capacitive voltage divider. If the butterfly type listed in the parts list of fig. 1 is used, remove all the rotor plates but one, and all the stator plates but one, in each section. Since the bandspread is only vital in the v.h.f. region, a very small range of capacitance is all that's required. In addition, the added capacitance of C_{13} will affect the calibration, as mentioned later, so a small maximum capacitance is advantageous from this standpoint.

It is worth noting that a butterfly capacitor covers the full range from minimum to maximum capacitance in a quarter turn of the shaft, while a split-stator variable covers the same range of capacitance in a half turn. Thus, the split-stator provides twice the "band-spreading" effect of a butterfly having the same capacitance range. For this reason, the author recommends a split-stator; a butterfly was only used because it was readily available.

Note the copper strap conductors used to replace the wire conductors originally installed. The strips were cut from thin flashing copper, and were used to reduce the total inductance of the tuned circuit and thus compensate for the increased circuit capacitance introduced by C_{13}. A similar strip was used to replace the wire inductor used as the coil for Band F, and the resulting dial calibration is fairly accurate (Band F is not adjustable). Prior to these modifications, the dial showed an error of approximately 20 MHz at a frequency of 220 MHz when C_{13} was installed; after modification, the dial reads within 5 MHz of the actual frequency at 220 MHz. The excess solder on the copper strips is for weight loading, and prevents the strips from vibrating when the cabinet is bumped.

Other Changes

Two additional modifications were made, not necessarily for improved v.h.f. performance, but more as a general up-grading of the equipment. The author's 324 possessed an undesirable amount of hum in the output, a condition which was alleviated by replacing the dual-section (20-20 mf.) electrolytic in

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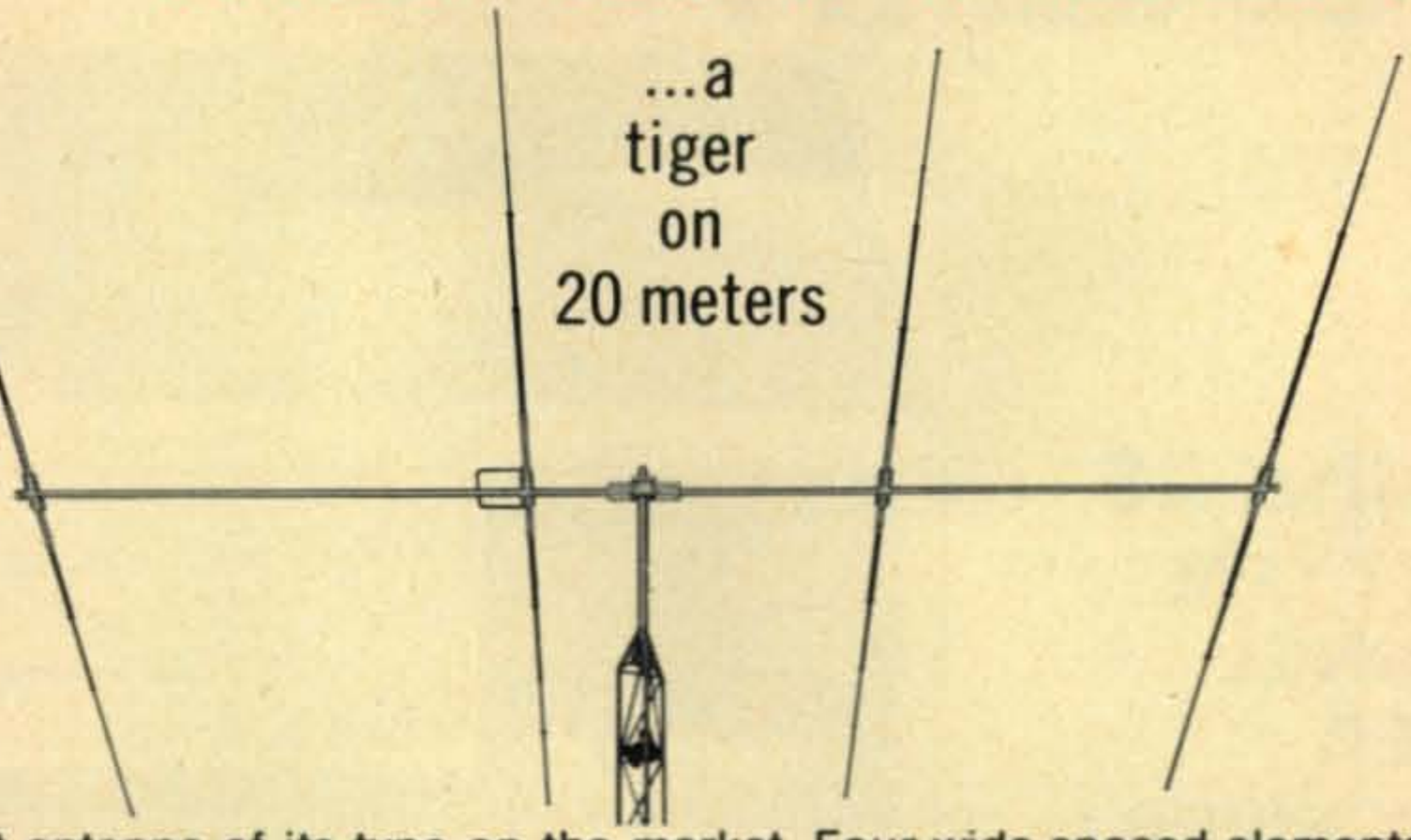

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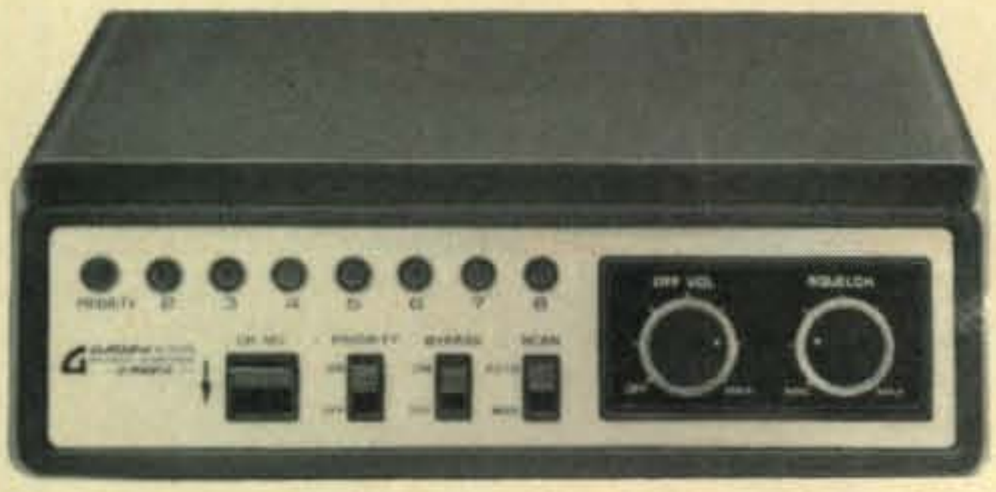

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Sunspot Cycle 20—Progress 1971: Prediction 1972

BY GEORGE JACOBS,* W3ASK

THE present sunspot cycle, the 20th recorded since solar records have been kept, began during October, 1964 with a *smoothed sunspot number* of 9.6. The smoothed sunspot number is a value derived from the average number of sunspots that have been observed on the face of the sun at the Swiss Solar Observatory over a 12-month period. It is used internationally as an index of solar activity.[1]

Cycle 20 reached its peak during November, 1968 with a number of 111. The course of the present cycle is shown graphically in fig. 1, while the actual values of smoothed sunspot numbers are given in Table. 1.

The decline of Cycle 20 began during December, 1968, reaching a value of 106 by April, 1969. Solar cycle activity then remained practically constant for an unprecedented long period of time, until June, 1970. The cycle began to decline again during July, dropping to a smoothed sunspot number of 82 by the end of 1970.

Progress 1971

Solar activity declined considerably during 1971.

According to the latest available solar data, 1971 began with a smoothed sunspot number of 78. By the end of the year the cycle had declined to an estimated level of 53.

Despite this fairly rapid decline, solar activity during 1971 was still in the *moderate* range. There were, however, some noticeable changes in shortwave radio propagation conditions. For example, regular F-2 layer DX openings on 6 meters were no longer possible, and there was a considerable decrease in the number of DX openings on the 10 meter band.

Although excellent DX conditions held up on 15 meters, especially during the hours of daylight, the band opened somewhat less often than during periods of higher solar activity. A decrease was observed also on 20 meters during the hours of darkness, but otherwise this band held up very well for DX propagation during 1971.

DX propagation conditions tend to *improve* on the lower frequency bands as solar activity declines, and a slight improvement was noted during 1971 on 40, 80 and 160 meters during the hours of darkness.

Prediction 1972

The new year is expected to begin with solar activity at a level of approximately 51. By the end of the year the cycle will probably have declined to a level of 36. By mid-

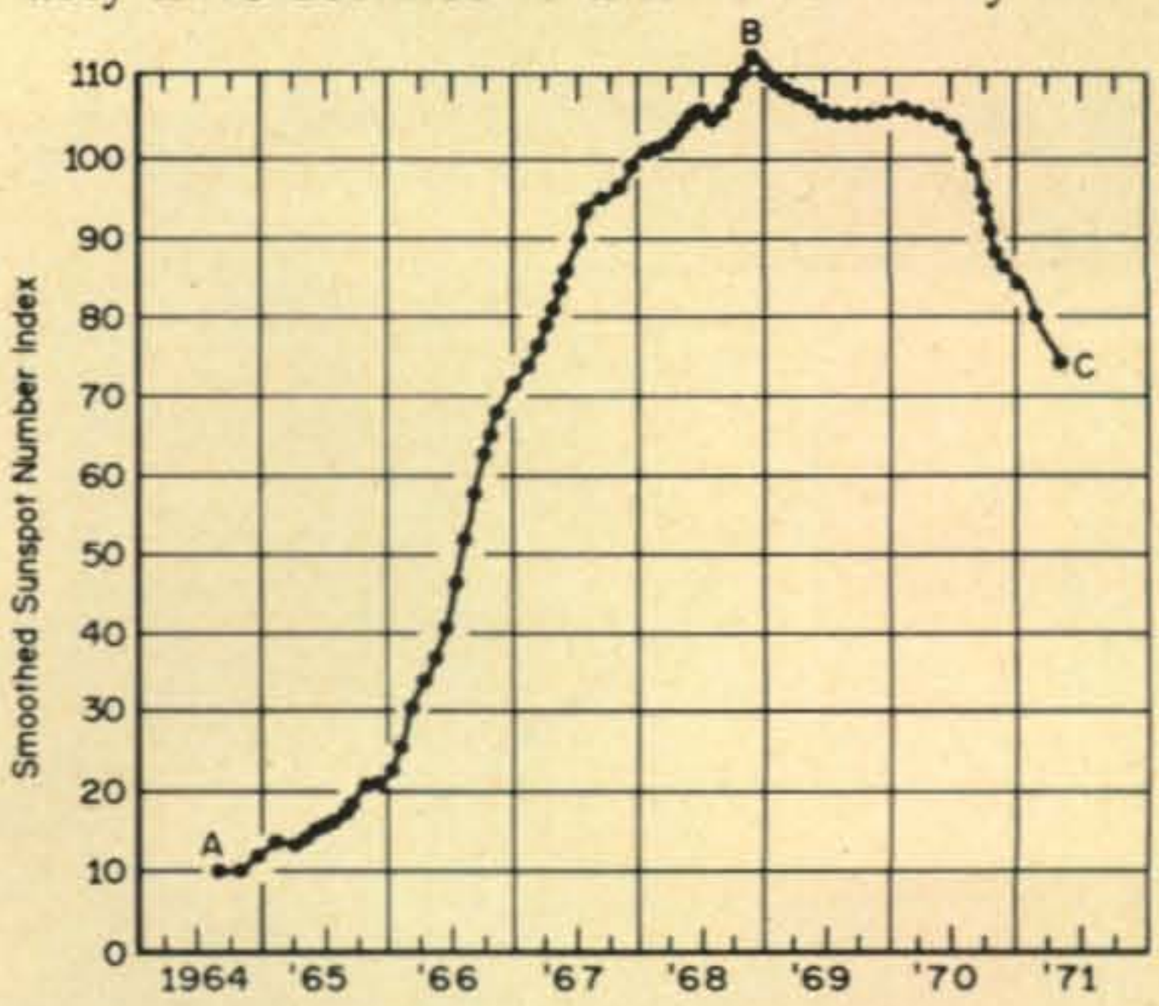

Fig. 1—Progress of Sunspot Cycle 20. At A, the cycle's beginning with a smoothed sunspot number of 9.6. At B, the peak of the cycle at an index of 111. At C, the latest available number, 75, centered on February 1971.

*11307 Clara Street, Silver Spring, Md. 20902

[1] For a more detailed discussion of solar cycles, and methods for predicting solar activity see, "A Sunspot Story—Cycle 20; The Declining Years," Jacobs, G. and Leinwoll, S. *CQ* Nov. 1969, p. 44.

Table 1

Values of smoothed sunspot numbers observed during Cycle 20. Bold face figures indicate values predicted for the remainder of the cycle.

	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Jan.	—	12	28	75	103	110	106	78*	51	35	22	11
Feb.	—	12	31	79	103	110	106	75*	50	33	21	11
Mar.	—	13	34	82	105	108	106	73	49	32	20	10
Apr.	—	14	37	85	107	106	106	70	48	31	19	9
May	—	15	41	87	108	106	106	68	47	30	18	8
Jun.	—	15	45	91	107	106	105	66	45	29	18	8
Jul.	—	16	50	94	105	106	103*	63	43	28	17	7
Aug.	—	16	57	95	105	106	100*	61	41	27	16	
Sept.	—	17	63	95	107	105	96*	59	39	26	15	
Oct.	9.6	20	68	95	110	104	92*	57	38	25	13	
No.	10	22	70	97	111	105	87*	55	37	24	12	
Dec.	11	24	73	101	110	105	82*	53	36	23	12	

*Provisional values. May vary slightly when additional data is available.

1972, the cycle is expected to enter a phase of *low* activity, when the smoothed sunspot numbers drop below 45.

Beyond 1972, the cycle is expected to continue to decline until a minimum value is reached, probably by mid-1975. The predicted remainder of Cycle 20 is shown graphically in fig. 2, and by the smoothed sunspot numbers appearing in bold face in Table 1.

With the continued decline of solar activity expected during 1972, there should be corresponding changes in DX propagation conditions on the amateur shortwave bands.

No regular F-2 layer 6 meter openings are likely to occur during 1972. DX possibilities on 10 meters should also decrease considerably. Some fairly good openings should still be possible during the daylight hours to southern and tropical regions, especially during the early spring, fall and winter months, but openings to most of Europe and Asia will be few and far between.

DX propagation conditions are expected to remain good on 15 meters during most of 1972, especially during the spring, fall and winter months, when openings are expected to most areas of the world during the daylight hours. The band is expected to fold rapidly after sunset.

Good-to-excellent DX propagation conditions are expected on 20 meters throughout the daylight hours of 1972, with the band peaking around sunrise and again during the afternoon hours. Considerably poorer conditions are expected after sunset, with little DX possible except during the summer months.

An improvement is expected in DX propagation conditions during the hours of darkness on 40, 80 and 160 meters. Good openings to most areas of the world should be possible on 40 meters during 1972, from shortly before sunset and until shortly after sunrise, especially during the spring, fall and winter months. Fair-to-good openings to many areas of the world should also be possible on 80 meters during the hours of darkness, except perhaps during the summer months when static levels are very high.

Propagation conditions on 160 meters are

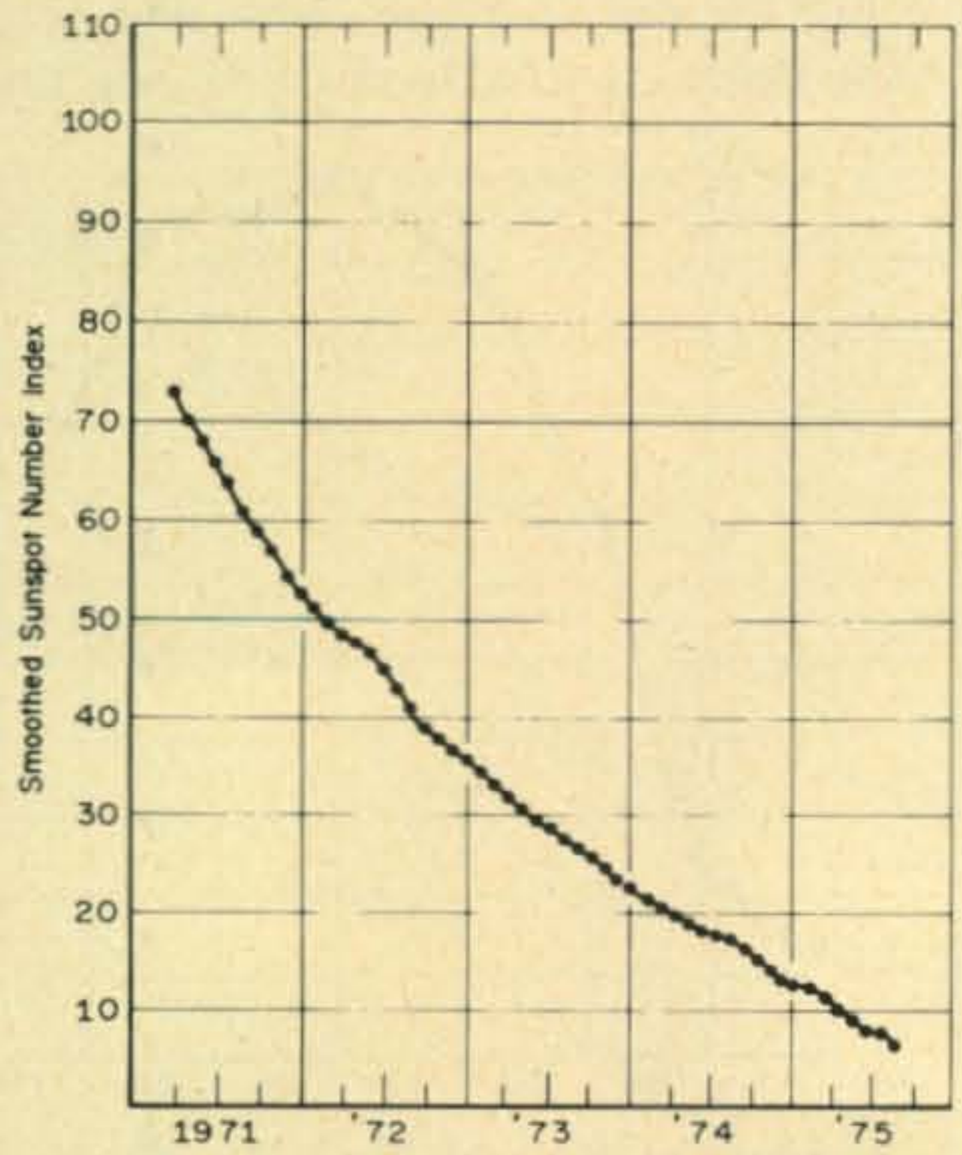

Fig. 2—Predictions for the remainder of Sunspot Cycle 20. The minimum of the cycle is expected by mid-1975. During 1972, the solar index is expected to decline from 51 to 36.

[*Continued on page 92*]

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CQ Reviews: The Curtis Devices EK-402 Programmable Electronic Keyer

BY WILFRED M. SCHERER,* W2AEF

SOME time ago *CQ* reviewed the Curtis Electro Devices "Electronic Fist," a sophisticated electronic keyer that includes automatic transmission sequences pre-programmed for the customer.[1] A newer version is one that "sophisticates the sophisticated" with the incorporation of a method by which the operator himself may set up or alter any of three different programmed sequences. This unit is the Model EK-402.

Retained are the other features of: perfect dot memory (no missed dots—no extra dots); self-completing dots and dashes; jam-proof spacing; calibrated 8-50 w.p.m. speed range; variable weighting; Iambic-squeeze or single-lever keying; provisions for manual keying; sidetone monitor with built-in speaker, level and pitch controls, transmitter-tune position; all solid-state with operation from 117 v.a.c.

General Details

The EK-402 consists of two major sections. The first is a basic Iambic keying circuit employing an instant-starting clock oscillator and a dot memory. The general data on this phase of operation will be found in the previous review.

In addition, this model differs from the earlier ones in the dash lockout circuitry and the incorporation of a feedback setup that provides increased tolerance to oxidized key contacts. Shunt diodes have been added across both the dot and dash inputs to provide protection against accidental application of overvoltages on the key terminals.

The EK-402 also has added built-in arc suppression for the reed relay and two transmitter connections; one for grid-block and cathode-keyed rigs and one for solid state gear that requires a low-resistance key circuit. A sidetone output jack is included for headphone use with rigs not equipped with an internal keying monitor.

Memory Section

The memory section of the EK-402 consists basically of a 256-bit MOS Random-Access Read-Write integrated-circuit memory steered by two divide-by-sixteen synchronous counters. The clocking signal for the counters comes from the keyer clock oscillator which free runs during programming (so it can count off pauses as well as characters).

As noted later, the memory is divided into three sections. Switching between programs is accomplished with a two-input, four-bit multiplexer IC (equivalent to a 4 p.d.t. switch) controlled by a PROGRAM switch. Five other IC's in the memory section provide timing and control functions.

*Technical Director, *CQ*.

[1] "*CQ* Reviews the Curtis Electro Devices Electronic Fists," *CQ*, January 1971, p. 54.

The Curtis Electro Devices Model EK-402 Programmable Electronic Keyer.

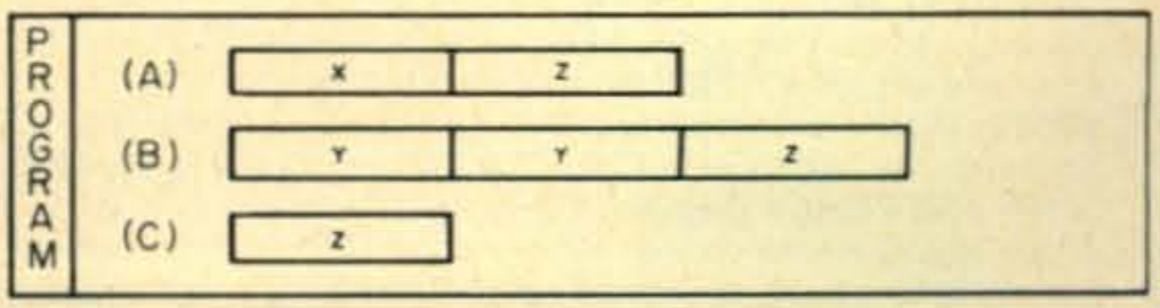

Fig. 1—Memory quadrants as they will play back on the different programs.

Programming

Any one of the programmed sequences may be selected by a switch and made to automatically operate the keyer when a start button on the keyer panel or an external switch is depressed. A panel switch also may be set to transmit one cycle of the selected program or to repeat each cycle at any desired interval of up to 30 seconds according to the setting of an additional panel control. Any sequence may be instantly stopped by depressing a STOP button on the panel or by commencing to hand-operate the keyer using the external paddles. This automatically disengages the memory, allowing the operator to break into a memory sequence for an emergency stop or to add a different ending or to start the body of a message.

The automatic repeating cycle with a variable delay is provided for send-and-wait CQ's. This can be useful when a band appears to be dead or relatively inactive, or for meteor scatter and aurora bounce work. The repeat cycle is automatically terminated when manual sending is started or when the STOP button is depressed.

Programming a sequence is simply accomplished with the PROGRAM switch set for the desired sequence and setting a READ-WRITE switch to the WRITE position. The memory writing sequence is delayed until the operator begins to key the dot or dash paddle. The delay allows mental preparation before initiating the start. The memory sequence for programming also may be initiated by depressing either the START button or an external switch (such as the straight key on a Brown Bros. Model CTL, as described in the previous review). This allows the provision of a blank space at the beginning of a program. Two panel lamps indicate the time elements involved and when one cycle of any program is completed.

The programs may be written using any speed selected by the SPEED control and when used to automatically operate the keyer, will do so at any speed subsequently selected. When a program sequence is written, any previously recorded data on that sequence is automatically erased. On the other hand, the programmed material can be retained by the memory setup for each program and thus does not have to be re-written after each transmission or whenever the power to the keyer unit has been turned off and on. This is made possible by the use of an internal battery that is switched in for the memory when line power is interrupted. The battery power is applied to only the memory cells, allowing retention of the recorded programs at a minimal power drain when the a.c.-line power is not connected. There is no way to lose memory content other than by physically removing the memory battery.

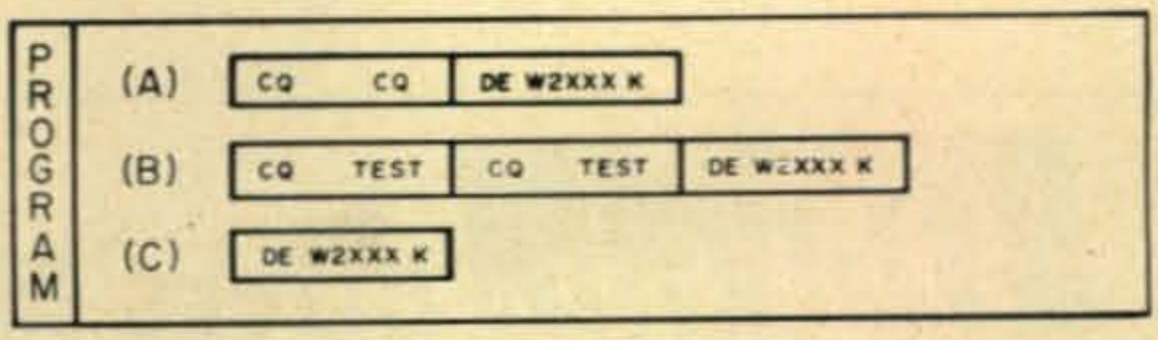

Fig. 2—Data in the quadrants can be interchanged between programs only as shown here; that is, the information can be different only between quadrants X and Y. That in quadrant Z always remains the same.

Program Material

All three programs are interdependent. There are therefore, some limitations as to the material used for each program, in addition to which the maximum possible length of a program sequence is different in each case.

A program sequence is made up of various sections recorded in "quadrants" of the memory system and is restricted to the data recorded in the different quadrants as shown at fig. 1. Quadrants X and Y each will handle up to about six characters, while quadrant Z will take about 8 characters.[2] Quadrant Z actually consists of two quadrants but functions only as one entire section.

Whatever data is recorded in quadrant X appears *once only* in program A. That recorded in quadrant Y appears *twice* in succession *only* in program B and that of quadrant Z appears *once* or as the last section in *all* pro-

[2] The number of characters in each quadrant is dependent on the length of each character.

[*Continued on page 92*]

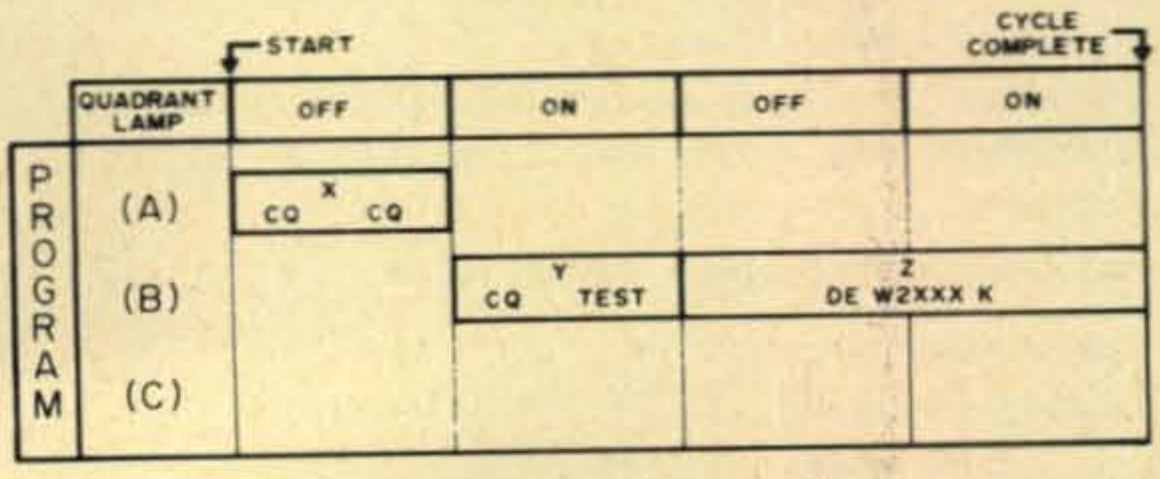

Fig. 3—Writing sequences for each program sequence in relation to quadrant-lamp indication, following which programmed sequences will play back as shown at fig. 1.

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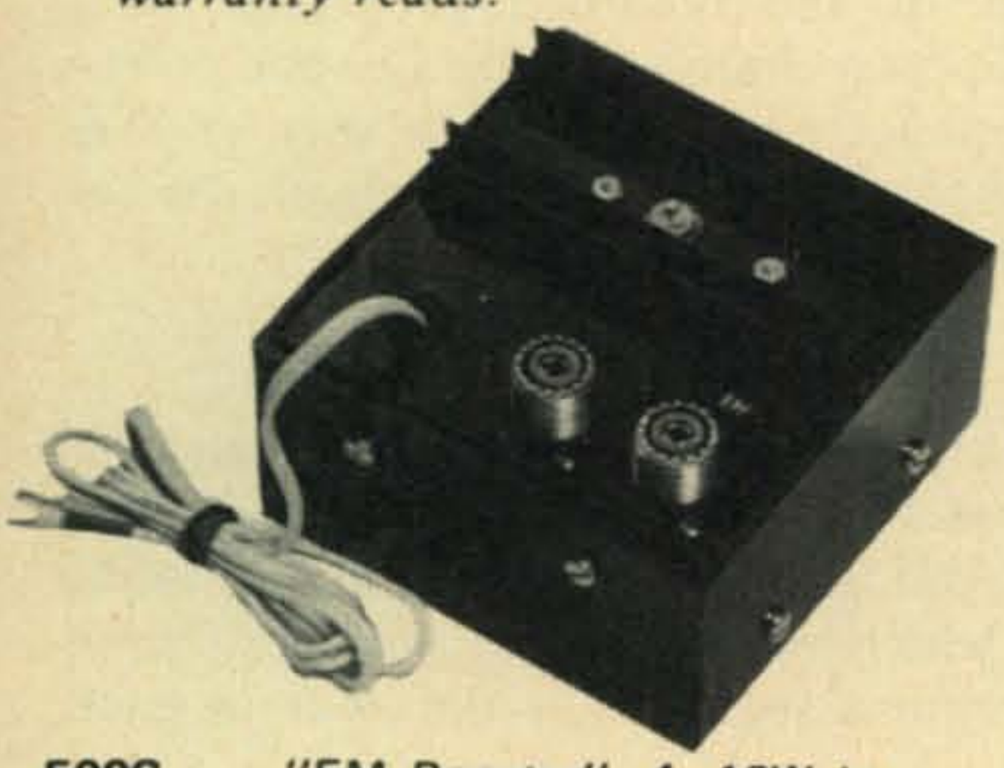

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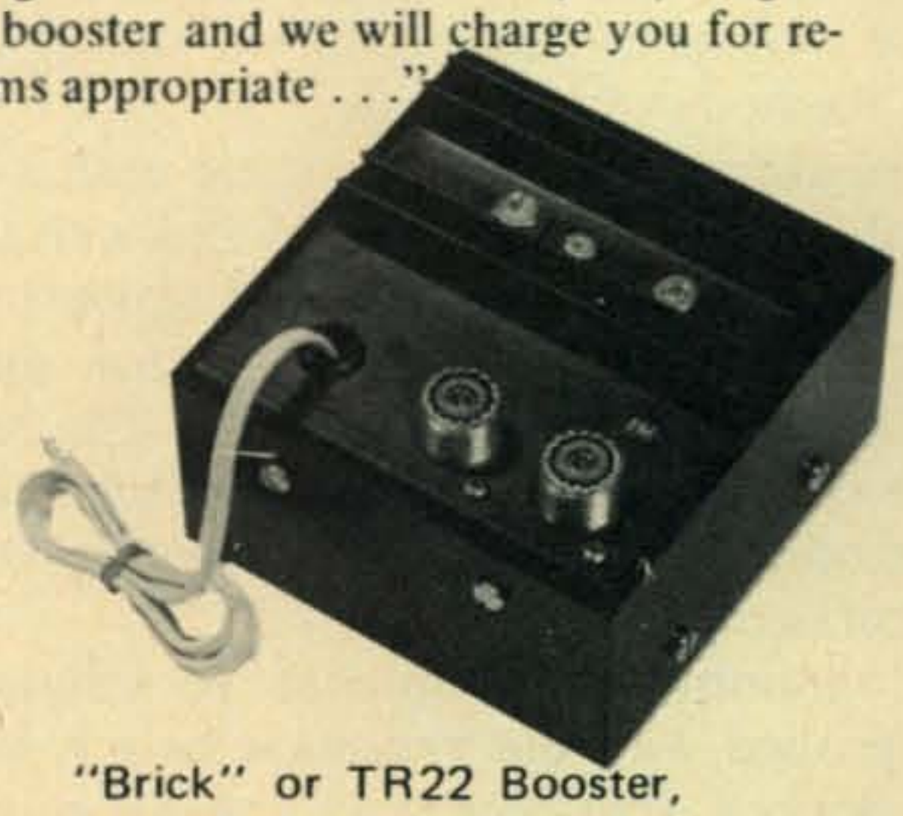

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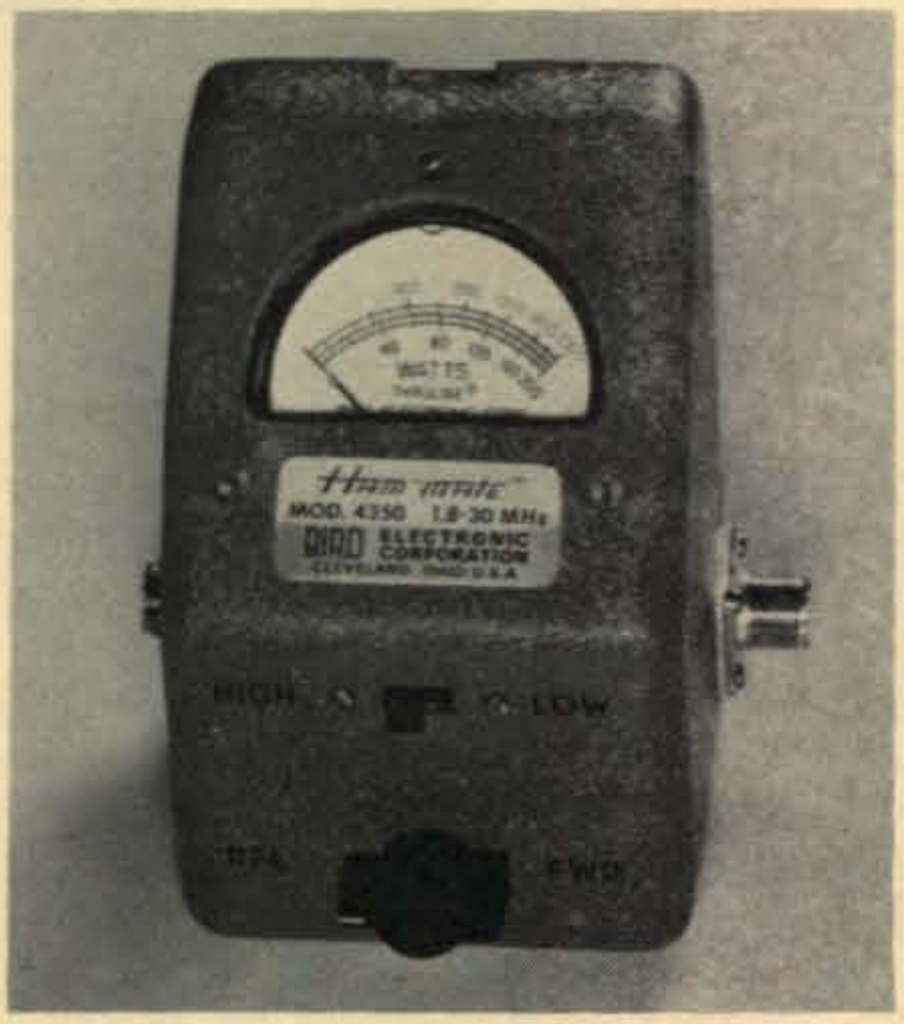
New Amateur Products

Comcraft

Here's a rather unique little item from Comcraft that should be most interesting to VHF fans. The CTR-144 transceiver operates on both a.m. and f.m. on two meters. An all solid-state rig, it runs 12 watts input in either mode, with a built-in v.f.o. and crystal provisions, as well. This unit may be operated on either a.c. or d.c. It has an S Meter, MOS front end, double conversion receiver, squelch control, noise clipper for a.m. and discriminator for f.m. Quite an interesting package. For more info., write Jack Dickenson, Comcraft Company, P. O. Box 266, Goleta, Calif. 93017, or Circle B on the reader-service card.

Aero-Metrics

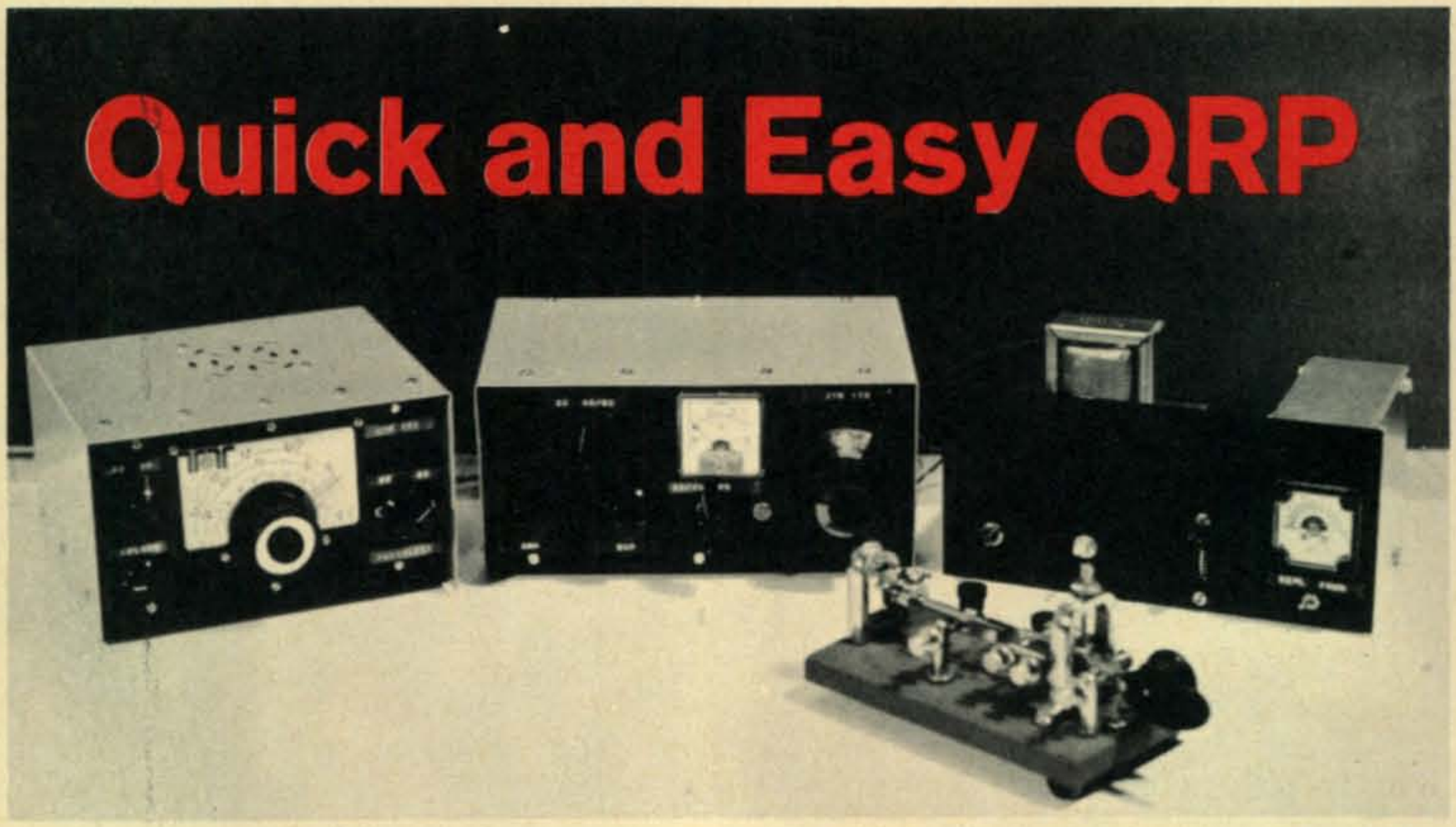
Aero-Metrics General has announced a new solid-state digital clock line, with a choice of 12 or 24 hour models. These clocks use a bright red neon readout tube complement rated at 200,000 hours or 22 years. The unit includes 15 IC's, 4 transistors and 7 diodes. Accuracy is guaranteed to within 3 seconds per year. These clocks also feature a built-in rechargeable battery to hold circuit time during short interval power failures. Also featured is a neon flash which operates for 30 seconds every 10 minutes as a station-ident call reminder. A disable switch is provided for this flasher. A variety of cabinets and prices also offered. For further information contact—Aero-Metric General, Inc., 155 Franklin St., Dayton, Ohio 45402, or circle Letter A on the reader-service coupon.



Bird Electronics

Bird Electronic Corporation announces the debut of an r.f. Wattmeter designed especially for the amateur radio market. There are actually three models, two of which cover the 1.8—30MHz range (160 meter to 10 meter bands) and the third covering 50—150MHz (6 meter and 2 meter band). The Model 4350 measures forward and reflected power in two ranges: 200W and 2000W, while the Model 4351 has ranges of 200W and 1000W. The Model 4352 has ranges of 40W and 400W covering the two v.h.f. bands of six meters and two meters. The new line of wattmeters are designated HAM-MATE , and use the well-known Thruline construction, made famous in the industrial field by the Model 43. The new Ham-Mate has a minimum of 20dB directivity which assures meaningful reflected power (and VSWR measurement). All three models are priced at $79. For more information, write to Hugh O'Neill, Bird Electronic Corp., 30303 Aurora Road, Cleveland (Solon) Ohio 44139, or circle C on the reader-service coupon.

Quick and Easy QRP



The QRPP station as used at K4JYM. Using Ten-Tec modules as its basis, the station is easily assembled. From left to right: the receiver, the transmitter, and the power supply/dummy load s.w.r. bridge. Addition of key and antenna completes the station.

BY ALEX M CLARKE,* K4JYM & LANCE H. STRICKLAND,† K4AUN

RECENT interest in QRP operation, as well as the possibility of having an alternate and very portable rig, lead the authors to a search for a simple way of getting several small rigs built up. The introduction of the Ten-Tec modules solved all of the parts problems, and seemed to offer the chance to customize a rig having the features we were interested in, rather than either be limited or inundated by the normal commercial package. Even though using these modules would take the project out of the "complete homebrew" category, enough room was left for self expression to make it fun, as well as solve the time problem which seems to be with us despite the 40 hour and shorter work week. The resulting rig(s) are real fun machines. The several auxiliary circuits developed can be used to modify the commercial Ten-Tec rigs or to add to the DeMaw transceiver.[1] Some of the packaging ideas may be of interest to

*7707 Hollins Rd., Richmond, Va. 23229
†4916 Bromley Ln., Richmond, Va. 23221

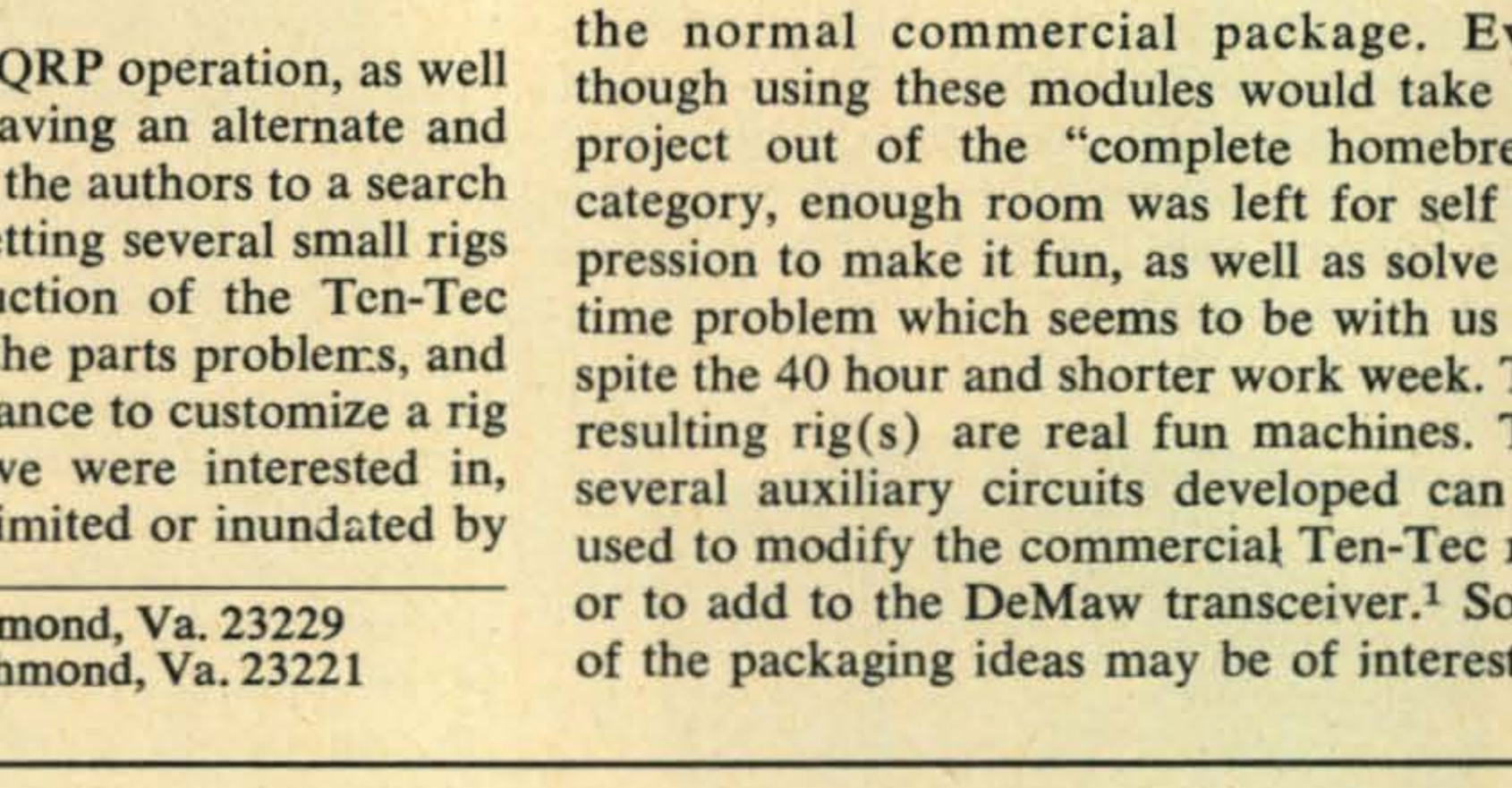


Fig. 1 — Simple v.f.o. transmitter with QSK switch for 80 and 40 m. operation. CR_1 is any small-signal diode; CR_2 is a 10v. 300 mw Zener diode; Q_1 is any PNP Silicon transistors; S_1 is a d.p.d.t. rotary switch.

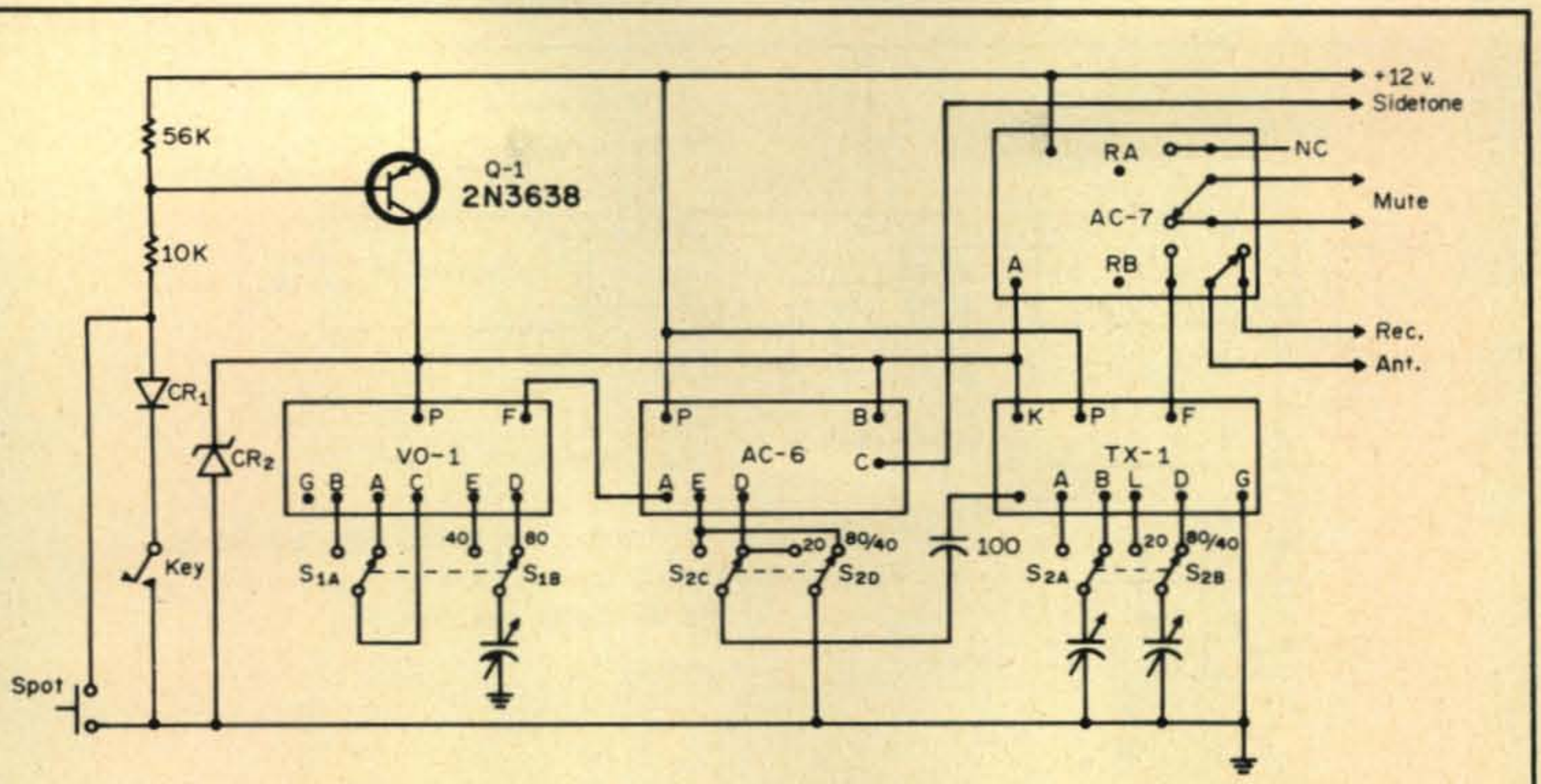


Fig. 2—Block diagram of the 80, 40 and 20 meter v.f.o. transmitter with VOX-type break-in, sidetone and mute control. S_1 is a d.p.d.t. rotary switch; S_2 is a 4 p.d.t. rotary switch.

others, but perhaps most of all, some of our mistakes could be avoided.

The Transmitters

QRP or otherwise, if full break-in operation is possible it is foolish not to use it. Both of the authors had QRO rigs capable of this type of operation, so it was a must. One of the authors was only interested in base station QRP, so his rig ended up very simple, but the other wanted a vacation rig, so some receiver control features had to be included in the second transmitter. Both 80 and 40 meters were mandatory so we could get on the air any time of the day, but 20 meters would be nice to have also. Here's how it went:

For the simplest rig, the Ten-Tec TX-1 transmitter and VO-1 v.f.o. modules were used, with hookup as suggested in the manuals supplied. A Jackson Brothers 6:1 vernier drive (available from Arrow Electronics) was used for the v.f.o. tuning, as this is by far the smoothest vernier available, as well as the cheapest. Calectro single gang 365 mmf capacitors from the local parts distributor were used for buffer and final "front panel tuning" of both 80 (max) and 40 (near min). Similar capacitors are available from Lafayette or Allied Radio Shack. A Calectro d.p.d.t. rotary switch was used to switch the v.f.o. between 80 and 40 meters. A 300 ma Calrad meter was used in the power line to the v.f.o. and transmitter stages for tuning.

The normal Ten-Tec hook-up allows the v.f.o. to run all of the time. This is not a problem if a hand-operated transmit-receive switch is used, but is murder when trying to operate QSK. Keying the whole supply was tried, but the sparking at 200 to 300 ma seemed to make this a bit crude, as well as clicky, particularly since Ten-Tec has included such a convenient way of getting around keying the final. Why not switch the v.f.o. on and off with the key? The circuit used is shown in fig. 1. Because the VO-1 seems to put out more than enough power at 9 volts to drive the transmitter module, a 10 volt Zener (CR_2) was put from the "P" terminal on the VO-1 to ground (Q_1, the transistor switch, serves as the dropping resistor). This helps considerably with the oscillator "pulling" problem. A blocking diode in the switch circuit allows the v.f.o. alone to be turned on for spotting.

The second transmitter, fig. 2, added 20 meters, sidetone, and VOX-type semi-break-in. At first 20 meter operation was attempted using doubling direct from the v.f.o., with another d.p.d.t. rotary switch used to switch both the buffer and final tank circuit taps. Unfortunately, resonance at 20, 15, and maybe 10 was also possible, so this operation mode was not feasible, it was just too hard to decide which harmonic of the 7 MHz v.f.o. was being amplified. Ten-Tec suggests a circuit for 20 and 15 meter operation in their MR-1 kit manual, but they also offer an AC-8 20 meter isolation-doubler stage (and also

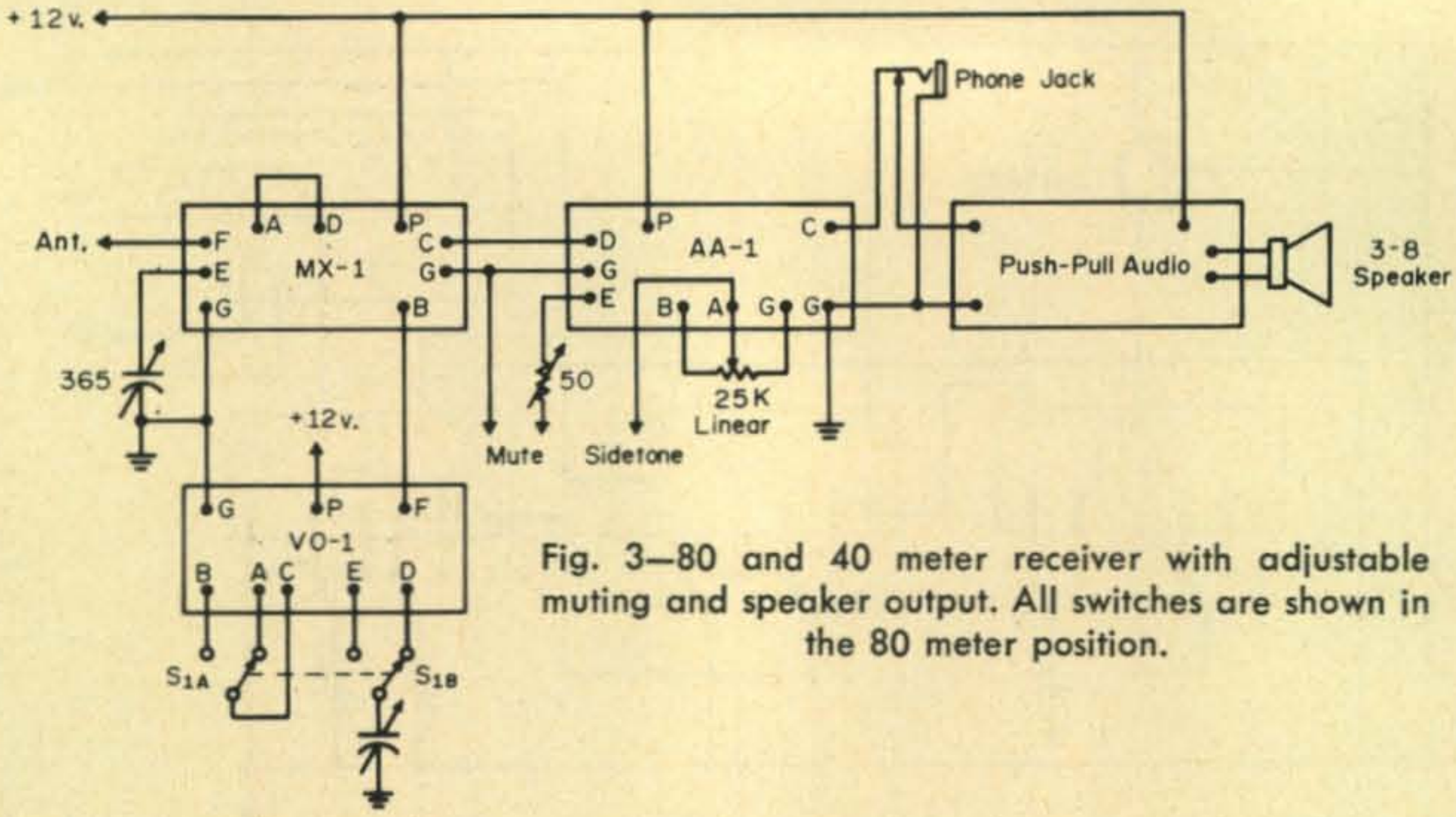


Fig. 3—80 and 40 meter receiver with adjustable muting and speaker output. All switches are shown in the 80 meter position.

an AC-6 isolation-doubler stage plus sidetone). Since at this time a receiver was also being built, the AC-6 was used. To avoid too many switches (actually, only one need be used, but this complicates the packaging) the d.p.d.t. bandswitch originally used for 80/40—20/15 operation of the TX-1 was replaced by a 4 p.d.t. Calectro switch, the extra two sections being used to cut the 20 meter module in and out as called for in the AC-6 instructions. The AC-6—AC-8 module also provides, the 80/40 meter position, an extra stage of v.f.o. isolation—well worth the addition.

After taking this outfit on the first trip, and several times "transmitting" with the rig in the receive position, the VOX type antenna transfer module was added (AC-7—slightly modified).

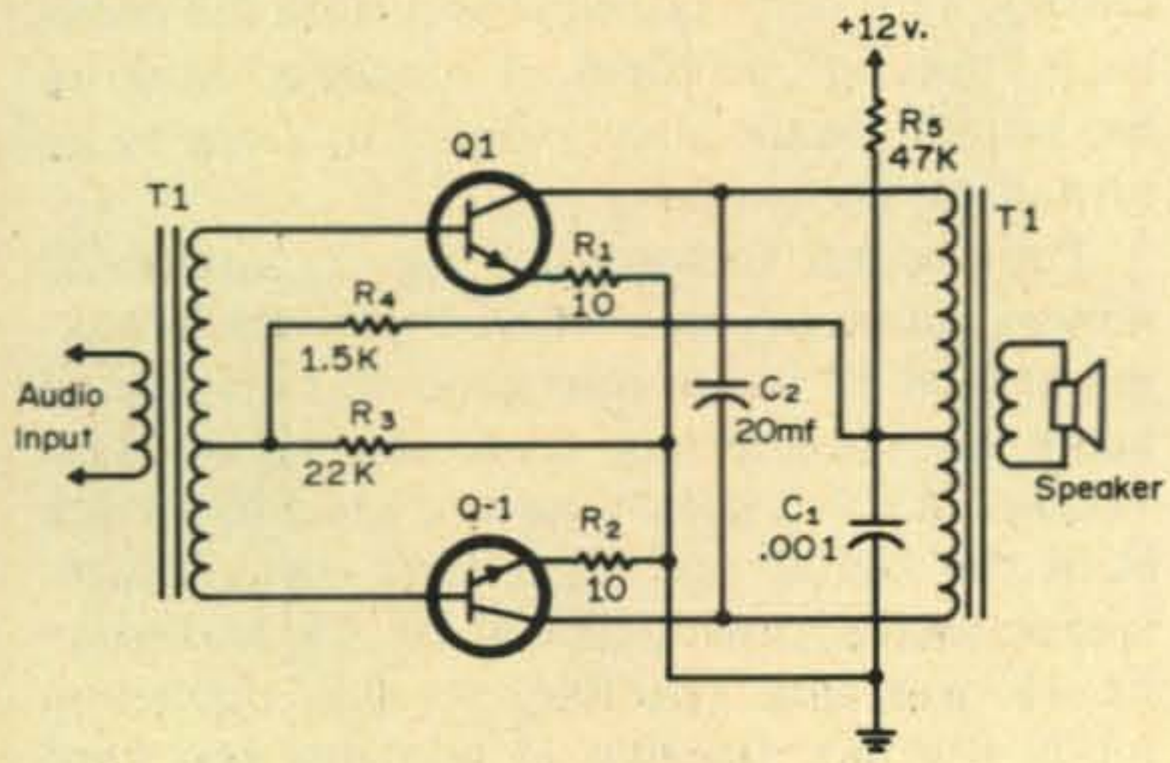
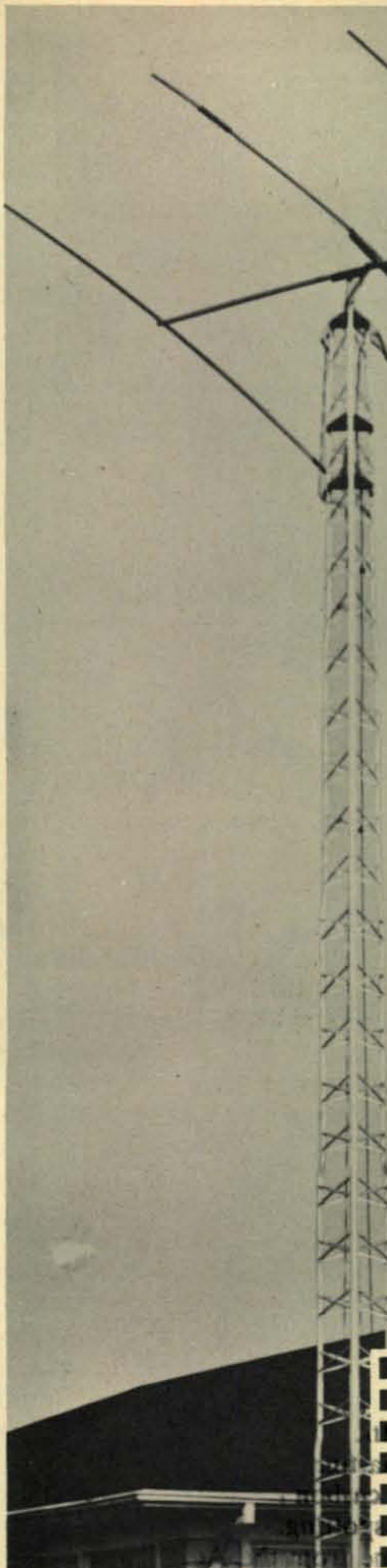


Fig. 4—Push-pull audio output stage able to drive a speaker. Q_1 and Q_2 are 2N3641 or similar. T_1 is a 1200 ohm to 1200 ohm audio input transformer (Calectro D1-724); T^2 is a 1200 ohms to 8 ohms (Calectro D1-722).

The Receiver

Meanwhile, a matching receiver, fig. 3, was built in a separate enclosure using the VO-1, AA-1, and MX-1 modules, again with the Jackson vernier dial for the v.f.o., the Calectro 365 mmf variable for preselector (MX-1) tuning, and the d.p.d.t. rotary switch on the VO-1 for band switching between 80 and 40 meters. A 25 K *linear* pot is needed for a volume control. This makes a receiver very much like DeMaw's DC 80-10 job[2], or the receiver section of his later QRP transceiver. The headphone problem (forgetting them) prompted including a speaker. Although the AA-1 would drive a speaker when matched through a 1200 ohm to 8 ohm transistor output transformer (Calrad, Calectro, Lafayette, etc.), we wanted more volume. Figure 4 shows the schematic for a simple transformer coupled push pull class B audio "power" stage. The R_DC_D decoupling net is absolutely necessary, and the capacitor across the collectors was needed to cut out a high pitched audio howl. The amplifier idles at 3 ma, and only draws 25 ma at ear splitting volume. A vectorboard bread board with old Sub-ouncer transformers was built, as well as a printed circuit version. Both worked well, but it was found that magnetic coupling between the output transformer in the P.C. version and the AA-1 audio module caused feedback problems. The Vectorboard version worked all right when shielded and thus was used, but had the enclosure design allowed placing either power stage in a more remote position, the trouble would not have appeared (it did



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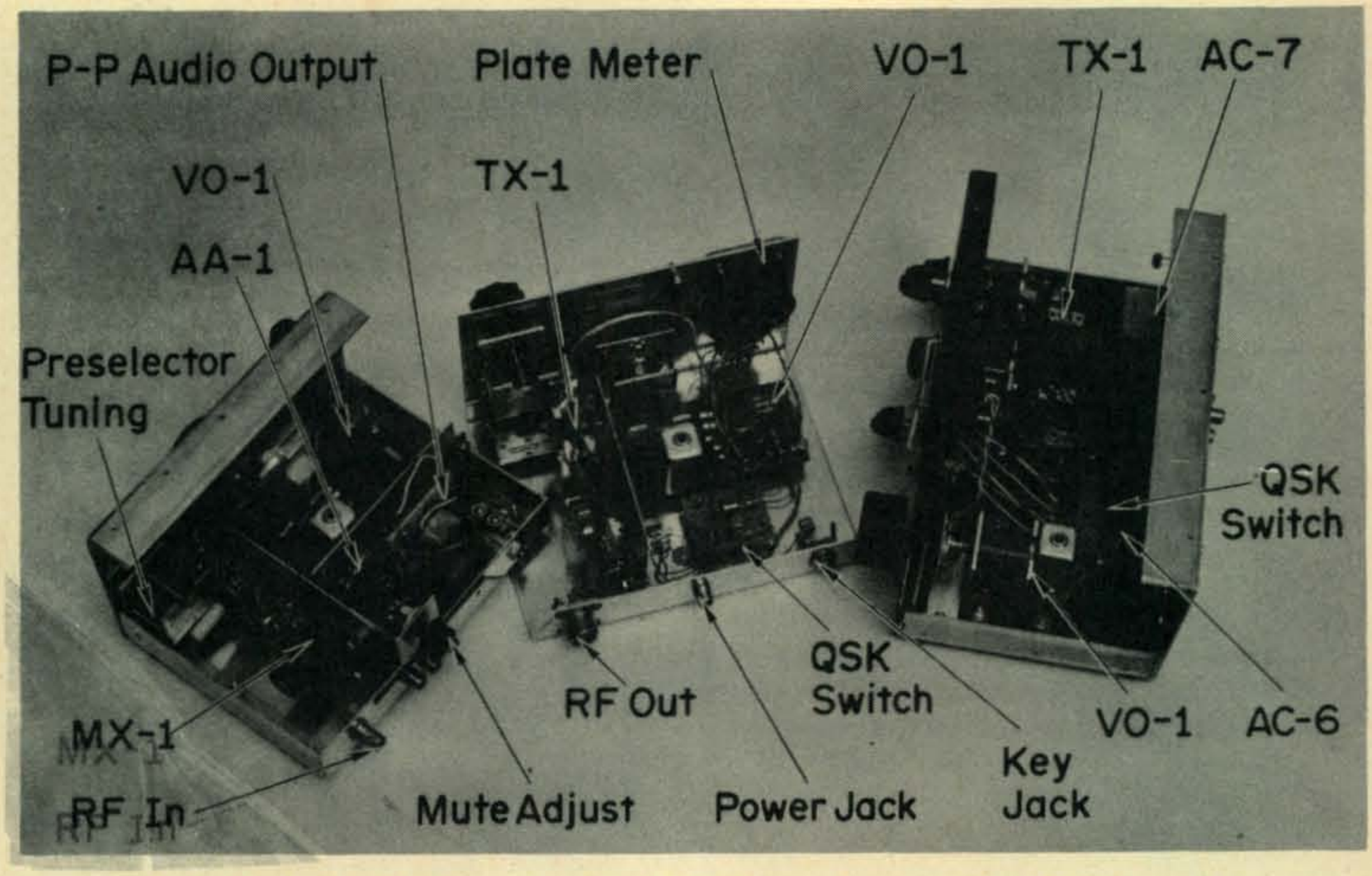

Left-to-right: the K4JYM receiver, the K4AUN transmitter, and the K4JYM transmitter.

not until the boards were mounted in the cabinet). Additionally, the particular speaker originally used also caused magnetic coupling effects. An external speaker could be used with no feedback problems, but this defeated the reason for the inclusion of the speaker in the cabinet. A smaller speaker took care of the matter, but had we been able to put the speaker in the "correct" place away from the input to the high gain audio module, the problem would not have arisen. No provision was provided to cut the power on the audio amplifier, except to use a circuit-interrupt jack for headphones, such that the audio stage is not driven when the "cans" are plugged in.

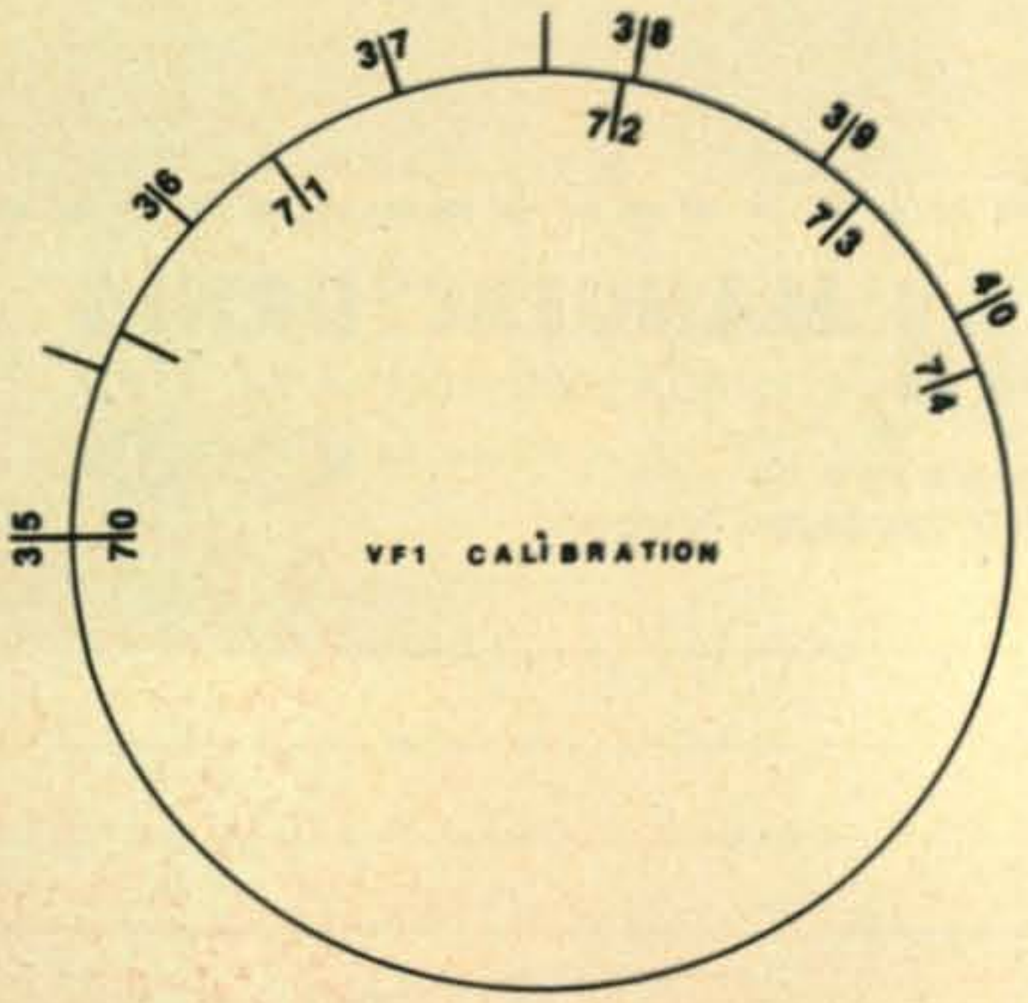

Fig. 5—Actual size calibration scale for the Ten-Tec VF-1 v.f.o. tuning capacitor.

The mute and sidetone circuit modifications deserve a word. The mute circuit in the AC-7 VOX changeover shorts out the input of the AA-1 audio module when hooked up as recommended. This so thoroughly cuts out any signal getting through to the audio module that it is not possible to monitor the transmitter with the receiver. By placing a a 50 ohm pot in series with the muting lead, the spotting or monitor signal level can be varied from completely muted to very loud. Note that spotting, in this case, is done by keying the whole transmitter. So as not to swish across the band, a lever switch in front of the antenna tuner is used to switch in a 2 watt, 50 ohm carbon resistor dummy load for tune up and spotting.

The sidetone from the AC-6 was found to be weaker than we thought useful when hooked directly across the audio gain control as recommended by Ten-Tec. Taking a hint from the Heath sidetone circuit, the audio output was hooked directly onto the wiper arm of the volume control, making the volume relatively constant at whatever level is

[*Continued on page 88*]

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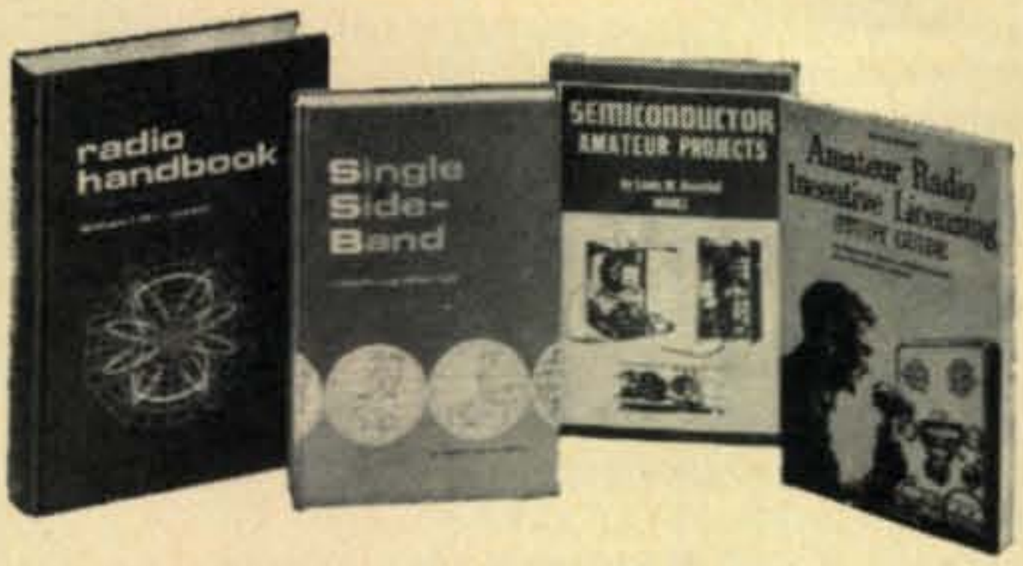

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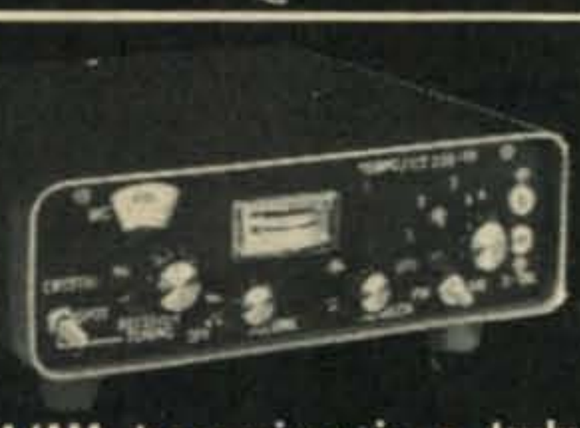

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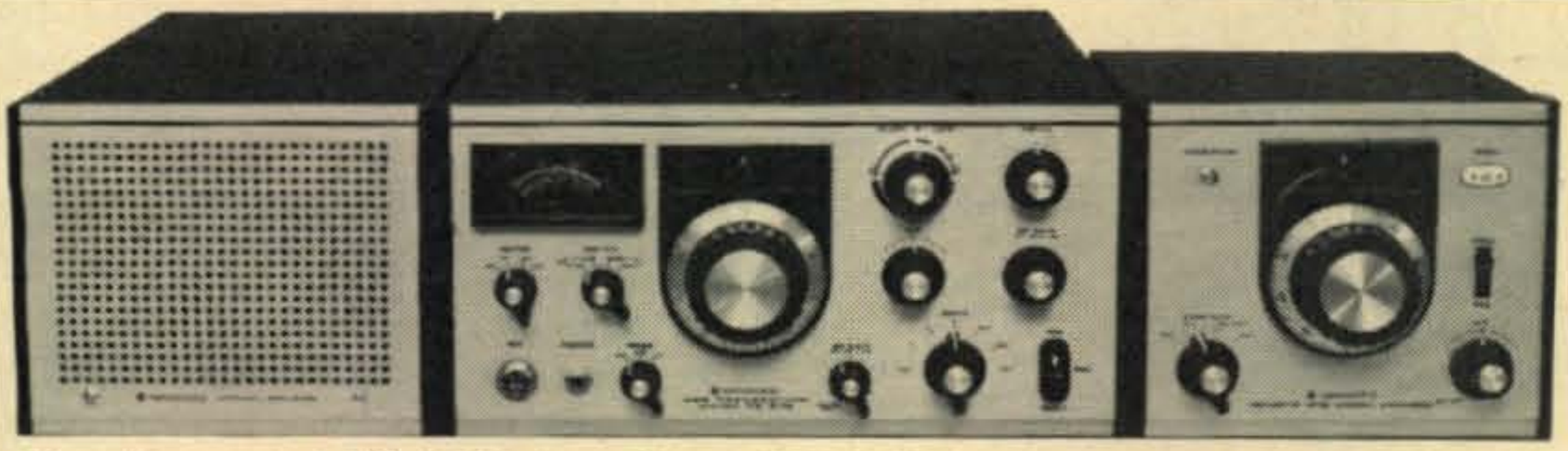

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28.5 - 29.1 mHz
29.1 - 29.7 mHz

MODES: LSB, USB, CW

INPUT POWER:
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SENSITIVITY:
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28.0-29.7 mHz band; 1.5 uv S/N 10 db and less than 100 cps frequency drift per 30 minutes after warm-up

SELECTIVITY:
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CW more than 0.5 KC (at 6 db)

AUDIO OUTPUT: more than 1 watt (10% distortion)

TUBE & SOLID STATE COMPONENTS:
10 Tubes, 1 IC, 37 Transistors, 4 FET, 52 Diodes

PRICE: $398.00

ACCESSORIES:
Power Supply with built-in speaker $105.00
External VFO $99.00
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F. M.

BY GLEN E. ZOOK,* K9STH/5

ONE year ago this month *CQ* formally recognized the rapidly growing trend towards f.m. operation. This recognition, of course, was the inclusion of this column as a regular portion of each issue. The first year's columns concentrated on getting the repeater going and keeping the various equipment used by individual amateurs in tip-top shape (test equipment, *etc.*). The lion's share of attention has been given to the two meter activity. This is only proper, for most of the amateur f.m. activity is presently on two meters. W2JTP and myself have been trying to promote activity on the 220 MHz band through simple, but effective, modifications to high-band equipment. This band, as well as the other v.h.f. and u.h.f. bands need population by amateurs to keep the frequencies.

*818 Brentwood Lane, Richardson, Texas 75080

Fig. 1—A 220 MHz final amplifier stage. Use a g.d.o. as a different layout will have an effect. The output of the prototype was 20 watts with 450 v.d.c. on the plates.

C_1—4-30 pf ceramic trimmer
C_2—18 pf max. butterfly
C_3—50 pf max.
C_N—18 pf max.
L_1—2 t. #12, ¾" d., spaced ¾", 1 turn link, same.
L_2—2 t. #12, ¾" d., spaced ½", 1 turn link to side.

During the first year changes in the make-up of the average repeater user have become evident. The off-the-shelf two meter f.m. rig has brought many amateurs onto the local and national f.m. scene. An editorial in the October issue of the bulletin published by the Miami Valley F.M. Association (Dayton, Ohio) does an excellent job of presenting the picture of f.m. as we now approach repeater saturation in some areas. Just substitute the name of your town for Dayton, and the names of neighboring towns where mentioned, and put in local FM frequencies where needed. Sounds just like your town, doesn't it?!!

One Man's Opinion

Isn't it great to cruise the streets of Dayton, or sit at home listening to '76. We get to hear all the chatter from Cincinnati and from Columbus: Sometimes we get lucky and also hear Fort Wayne, Newcomerstown, and several others all at the same time. And isn't it great to be working from your mobile in the Dayton Area and get clobbered by the Cincinnati or Columbus Repeater? Who are we benefiting by staying on this "accepted" 34-76 (*editors note: and .34-.94*) frequency combination. The infrequent out of town visitor who is able to raise someone while zipping thru Dayton? Perhaps its time to stop catering to the very small minority, and switch to a frequency that will benefit all of our members. Most of us used to monitor 76 constantly at home and in the car. Then we found it hard to "stomach" all the garbage coming in at home on our sensitive receivers. Now, its very difficult to monitor at all! Tone burst does not seem to be much of an answer. It saves wear and tear on our repeater, but does not stop the other repeaters from coming thru.

It's obvious that "Changing Times" are catching up with us. We no longer have our own little party line repeater. Its also obvious that we can not preserve "old times." If conditions change, we are going to have to change with them. F.m. and particularly repeater operation still presents the most challenging and rewarding mode of amateur radio to come along in a long time. Lets talk it over, make decisions and "get with it."

There are many sources of thought in this editorial (unsigned, by the way). Repeaters on 34-94 or 34-76 are fine, but do all in an area have to be on these frequencies? By using narrowband techniques there are 13 repeater input channels between 146 and 147 MHz with space in the middle for direct activity. Then, by going to the 15 kHz channel spacing as has done the commercial services (using the same narrowband equipment as with 30 kHz spacings), the number of channels can be doubled. Sure, its beneficial to the travelling amateur to have a repeater on the standard pairs, and probably the first repeater in a given area should go on the standard 34-94

or 34-76 pairs. However successive repeaters within the usual range of the first repeater should then go to one of the other recognized repeater pairings. Coordination of these frequencies is accomplished in many areas through cooperation. Keep the national calling channels covered, but not swamped.

Gee, I'll bet that you didn't expect such a long editorial for the 1st anniversary! Enough opinions for a while.

Technical Talk

This first anniversary Technical Talk will cover several items, including the 5894 final amplifier stage mentioned last month for 220 MHz, use of the Sentry solid-state oscillator decks for adding two or more frequency capabilities to receivers (transmitters next month), a solid-state COR, and other goodies.

220 MHz Final

The modification of the Motorola "G" transmitter to the 220 MHz band (alon with the Sensicon "A" receiver) was covered last month. The output of the final amplifier in the "G" transmitter to the 220 MHz band (along with the Sens- substitution of a 2E26 (see last month why) in the output stage. This low power is sufficient for local work, but a bit more power is often helpful. By adding a 5894 final amplifier the power output can be easily raised to 20 to 30 watts or more. The amplifier used in the K9STH (in Dallas WA-5STI) 220 MHz rig was based on the 2 meter amplifier in the *RSGB VHF MANUAL* (with a little help from the *ARRL VHF Manual*). The grid is tuned, the screen neutralized, and the entire amplifier is very stable. As in any v.h.f. construction a g.d.o. is a must. The data on the coils is taken from the amplifier presently in use. However, minor differences in layout at these frequencies can effect changes on the resonant frequencies. Therefore, each coil should be checked with a g.d.o. Also, the screen neutralizing capacitor must be adjusted for maximum output and no take off. In the prototype amplifier the 5894 would not self oscillate, but would shut itself down when not neutralized! This project is definitely not a first attempt, but many f.m.'ers have built before.

The amplifier was constructed in an LMB box which fit the space on the "T" bracket used to mount the transmitter in the rack (from a defunct T51). However, this box is quite compact after mounting the 5894. In fact, only by using a replacement assembly for a Motrac final amplifier tube (U71LHT version) would the amplifier fit into the box. However, this compact construction is not required, and a larger enclosure can be used. Just make sure to bypass and shield the entire amplifier.

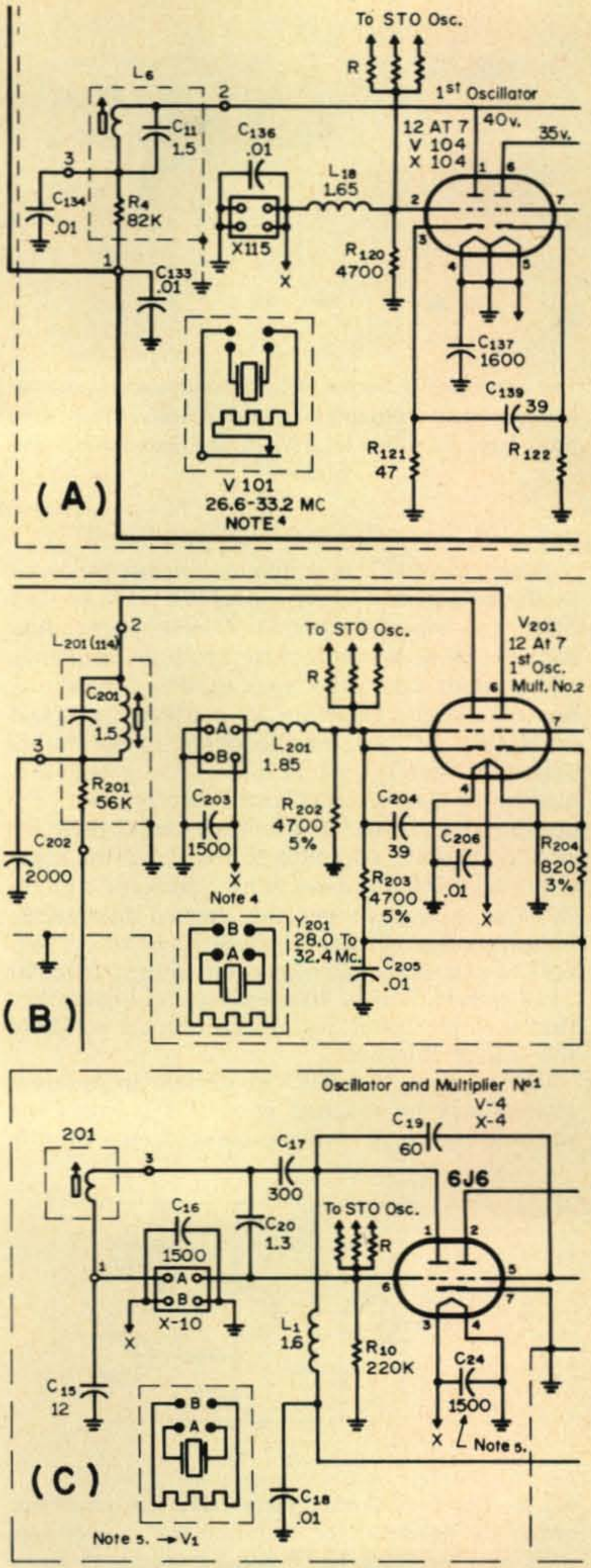
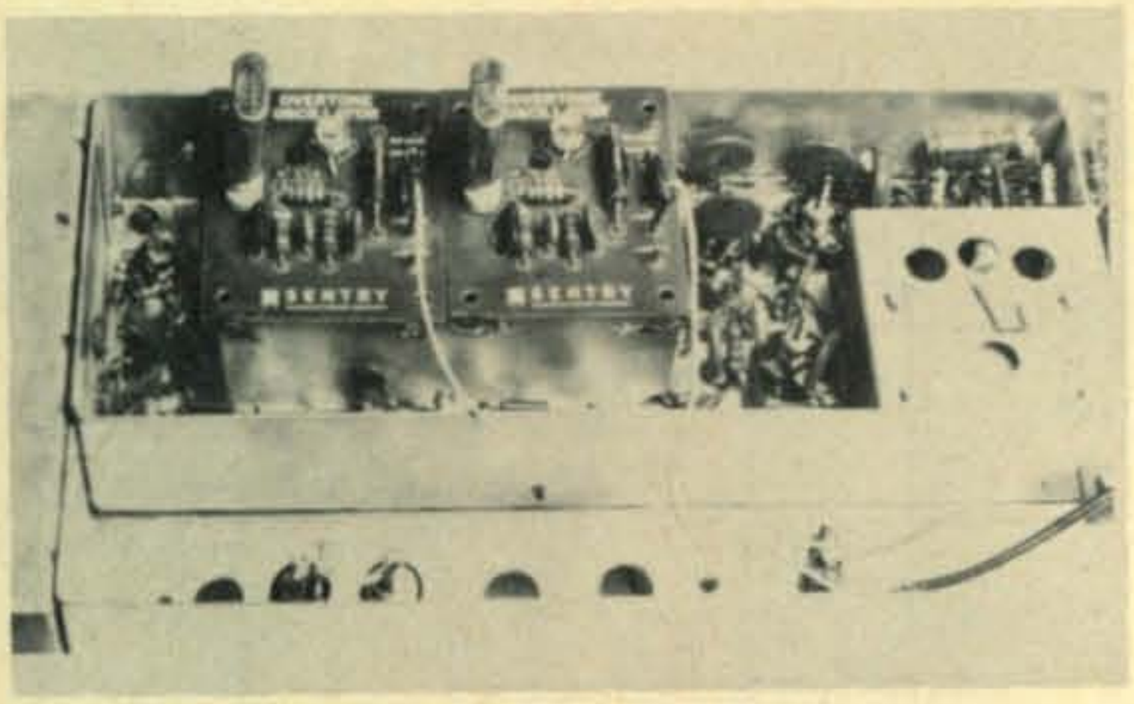


Fig. 2—(A) The Motorola "Uni-Channel" was tried with the Sentry STO osc. using 33 ohms at R. This may have to be increased with more than two oscillators. (B) Connections of the Sentry STO ocillators to the Motorola "Sensicon G." See text and (A) for discussion of "R". (C) Connections of the STO series to the Motorola "Sensicon A".



The Sentry STO Series Oscillators are excellent for adding multi-frequency to older units. Here they have been installed on a Motorola high-band "Uni-Channel".

Multiple Frequency Assemblies

Sentry Crystal is now manufacturing transistor oscillator circuits which cover 70 kHz to 165 MHz (in various ranges). These asssemblies seemed just about perfect for multiple frequency operation of older tube-type f.m. gear. Therefore, two each of the fundamental oscillators (STO-3 @ $5.00) and two of the overtone oscillators (20-40 MHz, STO-30, @ $7.50) and proper frequency crystals were obtained. Sentry spec's the oscillators at 0.0035% when used with their SC or SGP crystals. Although this is not to the usual 0.001 or 0.0005% expected by amateur f.m.'ers there is a way to get the desired tolerances. Simply order the higher priced types of crystals desired and specify for operation in the particular STO circuit. Sentry has assured this columnist that with the better crystals the circuis will hold the desired tolerance.

The use of the STO-30 circuit in receiver circuits will be touched upon this month. The transmitter circuits will be covered next month.

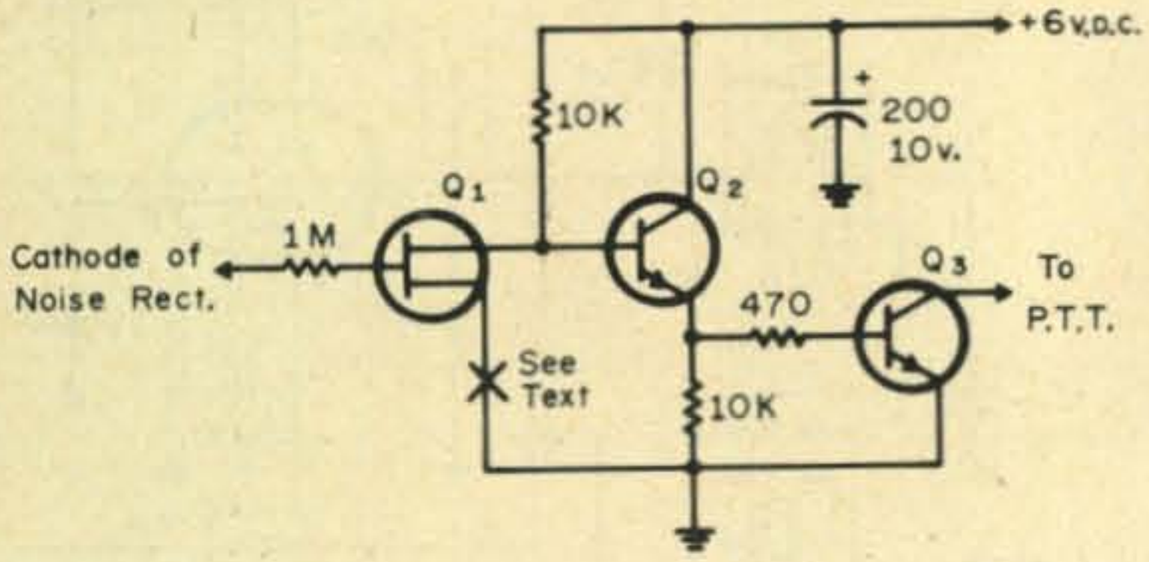


Fig. 3—The K5FOG solid state COR. The circuit was originally designed for Motorola a.c. power supplies and receivers, but it can be used with many other systems. Resistance may have to be added at "X" when used with other than Motorola units.

Q_1—HEP801
Q_2—Cheap NPN switching (2N2222, etc.)
Q_3—Cheap NPN power.

The sample units were tried in an old Motorola high-band "Uni-Channel" which, at one time, was the author's primary single-frequency base receiver for two meters. The original plan was to modify the existing oscillator circuit to act as a buffer stage rather than as an oscillator. However, there was no need to make any electrical modifications to the 12AT7. Changing the grid resistor value did not help or hinder performance. Therefore, it seems best to leave well enough alone, and just feed the output of the circuit into the grid of the former oscillator tube. The output of the STO is capacitor coupled. However, when using two or more of the STO units with the outputs in parallel a series resistor must be added to isolate each stage. This is quite common in newer equipment like the Motorola U73MHT-3190 series with four channel elements. In the case of the STO units they can be considered as "channel elements." With only two oscillators 33 ohms was sufficient, but with more oscillators this will probably have to go up to about 150 ohms.

The voltage requirements for the STO-30 oscillators is 9-12 v.d.c. @ 10 ma. maximum. In negative ground mobile units this can be obtained from the battery or primary input voltage. However, for base stations and for other mobiles using either 6 volt automotive systems or positive ground systems another approach must be taken. By the way, this also works fine with 12 volt negative ground systems. Borrowing a trick from the hi-fi manufacturers we can easily obtain the proper operating voltage from the cathode of the audio output tube. This is usually a 6AQ5, 6V6, or similar characteristic tube. The cathode is usually from 9 to 11 volts above ground. Also, this point is usually well filtered. Therefore, we can tap the cathode for proper operating voltage for the STO oscillator. This voltage is switched from oscillator to oscillator to change channels.

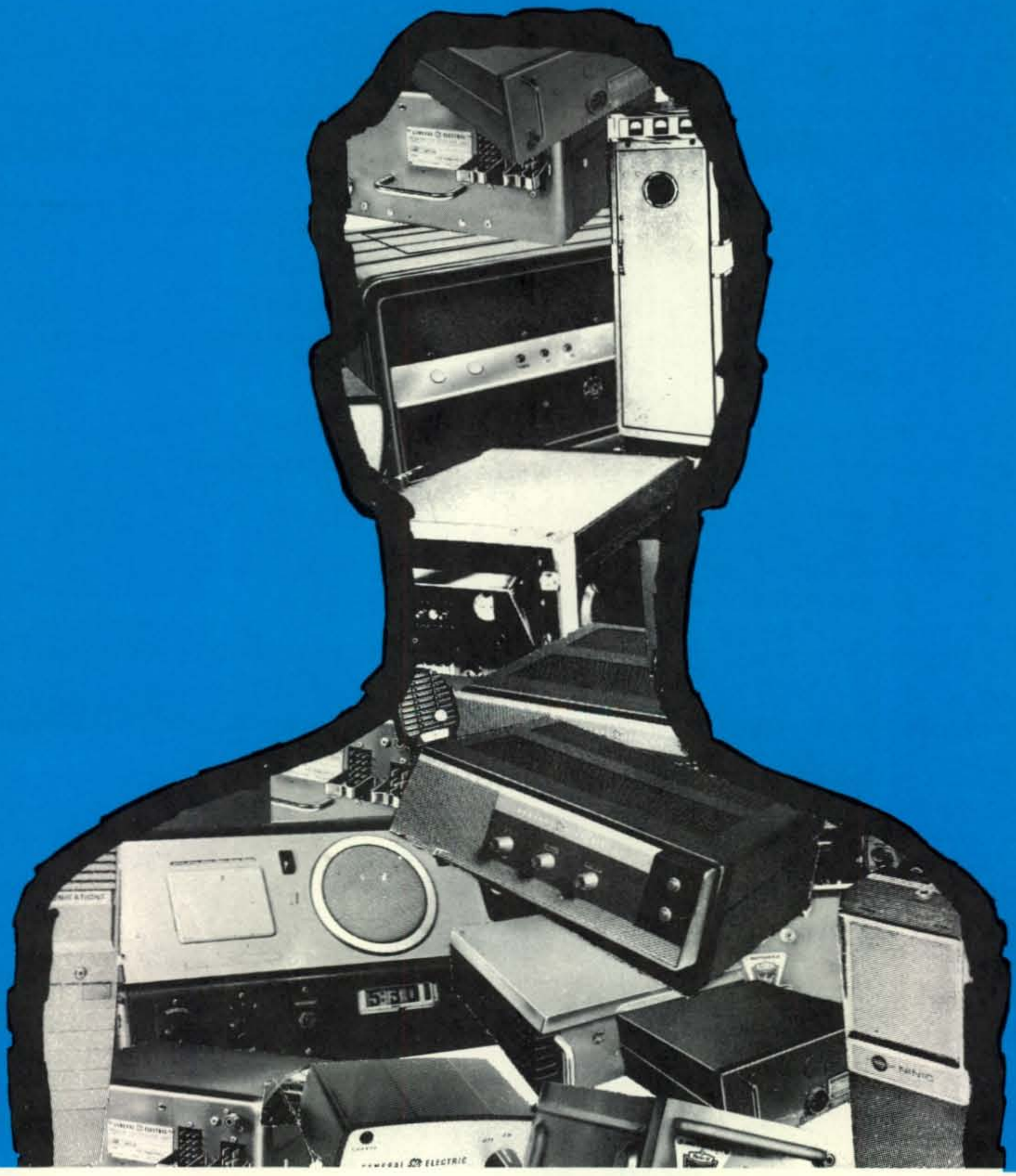
In the test receiver the oscillator meter reading (position 6) was only about 1/2 that when using the 12AT7 as an oscillator. However, the injection was sufficient to easily meet the original specifications. In fact, the 20 db quieting point was slightly under 0.3 microvolts. Not too bad for a 20 year old receiver. The crystal can be warped onto frequency by the built-in trimmer capacitor.

Although the oscillators were tried only with the "Uni-Channel" receiver, it should work in the same manner with most other receivers. For example, the early Motorola high-band "G" receivers (TA140 and 140A) have an oscillator quite similar. Other receivers may require a slight bit of experimenting to get just the right level of signal, but that should not be difficult.

The construction of the STO series oscillators is excellent, as is the workmanship.

[*Continued on page 86*]

1972 CATALOG



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Fully narrow band
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PO17 Progress Line,
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100 watt, fully narrow
band base.....$318.

VO18 Progress Line
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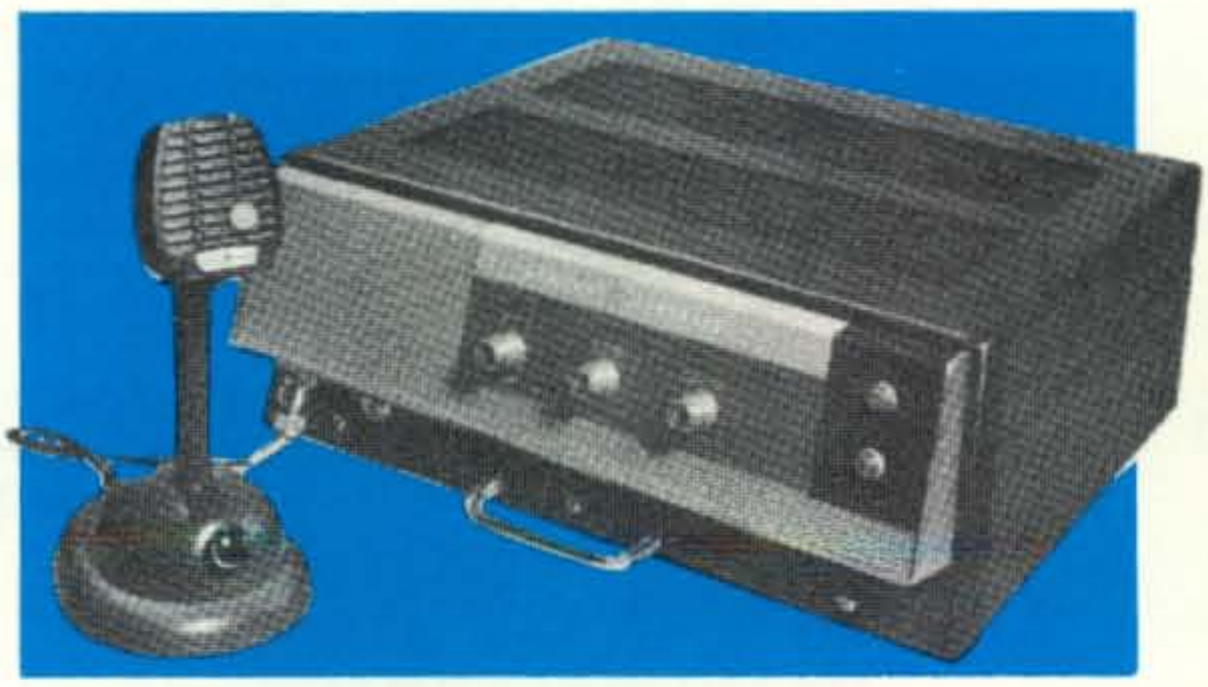
250 watt, fully narrow
band..... $388.



TI/13N Progress Line, 110 volt, AC,
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narrow band..... $258.

TI/16N Progress Line, 110V, AC, Desk
Top, 60 watts, fully narrow band... $288.

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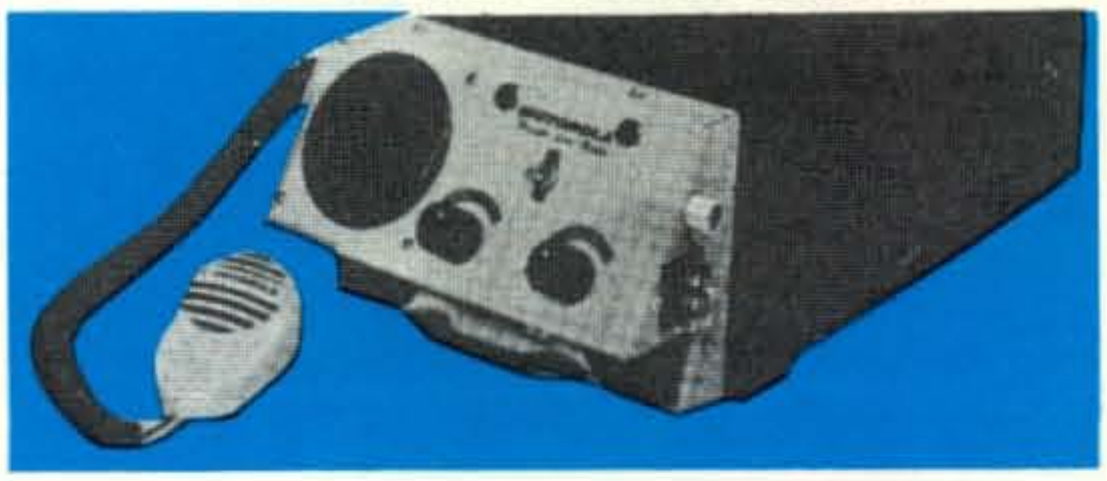
30 to 50 MHz BASE STATIONS



L-41GGB, 110 volt, AC, Utility Base,
30-40 MHz, 30 watt, fully narrow
band, with microphone..... $158.

L-41G, 110 volt, AC, Utility Base,
30-40 MHz, 30 watt, fully narrow band,
with microphone.....$128.

Complies with EIA RS-329

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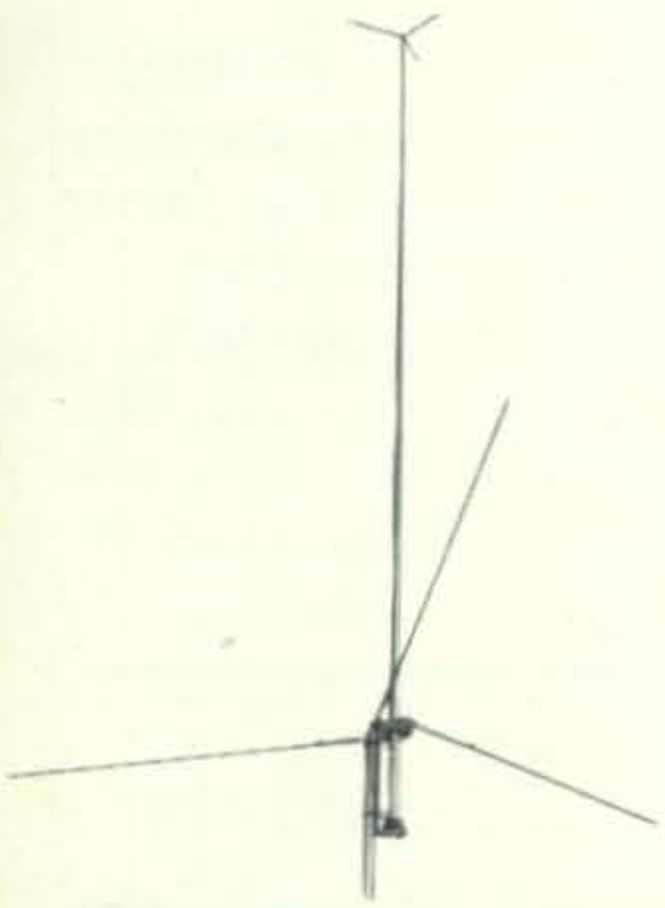
Base Station Antennas

Low Band
30-50 MHz
3 db Gain



Heavy duty. 5/8 wave. 250 watts.
Model 736 — 30-35 MHz
Model 739 — 35-40 MHz
Model 737 — 40-50 MHz
List $45.00/Dealer $31.50

VHF
148-174 MHz
6 db offset gain
3 db omnidirectional gain

Phased and stacked dipole.
550 watts.
Model 726 — 148-158.5 MHz
Model 727 — 153-164 MHz
Model 728 — 163-174 MHz
List $100.00/Dealer $70.00

VHF
144-174 MHz
9 db offset gain
6 db omnidirectional gain

Stacked dipole. 600 watts.
Model 725 — 144-159 MHz
Model 722 — 159-174 MHz
List $180.00/Dealer $126.00

VHF
148-174 MHz
3.4 omnidirectional gain

5/8 wave coaxial. 500 watts.
Model 731 — 148-163 MHz
Model 732 — 163-174 MHz
List $55.00/Dealer $38.50

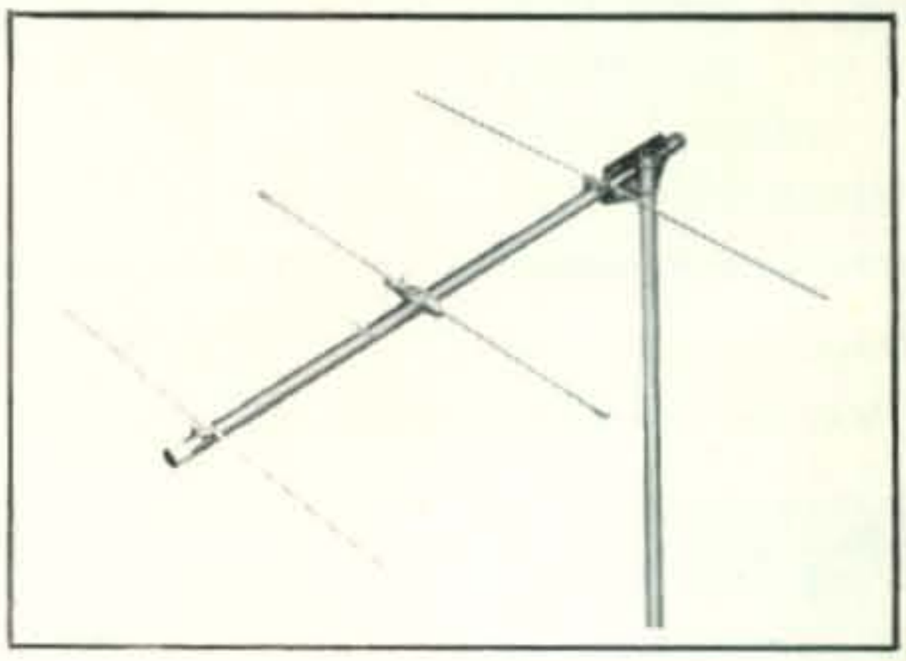
UHF
450-470 MHz
10 db gain

Corner reflector. 300 watts.
Model 753 — 450-470 MHz
List $85.00/Dealer $59.50

UHF
450-470 MHz
10 db gain

Unidirectional log periodic.
250 watts.
Model 721 — 450-470 MHz
List $65.00/Dealer $44.50

2 meter HAM



3 Element 9 db gain
Model #340
List — $9.95/Dealer — $7.80

8 element
14.5 db gain

Staggered, optimum spaced elements on 14' beam. Unique pretuned VHF Beta Match and co-axial balun. Unidirectional pattern. 1 KW power input.

No. 341 — List $19.95/Dealer $15.50

ase and Mobile Antenna Systems

Mobile Antennas

Low Band VHF
25-50 MHz

oof or deck mount. 125 watts.
Base loaded.
Model 760 — 24-30 MHz
Model 761 — 30-33 MHz
Model 767 — 33-36 MHz
Model 762 — 36-40 MHz
Model 763 — 42-50 MHz
List $28.50/Dealer $19.95

High Band VHF
130-174 MHz
3 db gain

Special 5/8 wave. No-hole trunk lip mount. 125 watts. Model 707.
List $19.00/Dealer $13.30

High Band VHF
130-174 MHz
3 db gain

5/8 wave roof or deck mount. Covers entire VHF mobile frequency. Heavy duty construction. Field adjustable for lowest VSWR. 125 watts. 50 ohms. 55" height. Stainless steel whip.

SPECIFICATIONS:

- Gain ..... 3 db (Preliminary EIA)
- Frequency .... 130-174 MHz
- Power ..... 125 watts
- Impedance .... 50 ohms
- VSWR ..... Less than 1.5 to 1
- Lightning Protection .... DC ground
- Mounting ..... Patented stainless steel claw mount fits any size hole 3/8" to 3/4"
- Height ..... 55" maximum
- Coax ..... 22' RG-58U with PL-259 connector
- Weight ..... 1.3 lbs.
- Model 764

List $28.50/Dealer $19.95

UHF 450-470 MHz
5 db gain

Roof, deck or trunk mount with optimum spaced ½ wave elements. Coil loaded. Outperforms other UHF mobile gain antennas by at least 1 db. Only 38". Fully tuned at factory. Heavy duty stainless steel whip. 125 watts.

SPECIFICATIONS:

- Gain ..... 5 db (Preliminary EIA)
- Frequency .... 450-470 MHz
- Power ..... 125 watts
- Impedance .... 50 ohms
- VSWR ..... Less than 1.5 to 1
- Lightning Protection .... DC ground
- Mounting ..... Patented stainless steel claw mount fits any size hole 3/8" to 3/4"
- Height ..... 38"
- Coax ..... 22' RG-58U with PL-259 connector
- Weight ..... 1.4 lbs.

Model 765

List $28.50/Dealer $19.95

High Band VHF
150-174 MHz
3 db gain

Cowl mount disguise antenna. AM/FM.
110 watts. Model 712.
List $26.00
Dealer $18.20

High Band VHF
108-470 MHz
Unity gain

Super portable magnetic mount ¼ wave. 125 watts.
Model 759
List $16.00
Dealer $11.20

Low band 30-50 MHz heavy duty mobile antenna with **tapered** stainless steel whip, chrome plated, heavy duty spring and low profile ball mount.
Model No. 738.
List $22.00
Dealer $15.40

Complete antenna catalog upon request.
Base Station antennas drop shipped by manufacturer prepaid.
Mobile antennas shipped FOB, Saddle Brook, N. J.

x GREGORY x

GE ELECTRONICS corp.

GREGORY ELECTRONICS EQUIPMENT CHECKED OUT ON OUR BENCHES

Motorola
FSTRU80BY, 110 volt, AC, Desk Top,
30 watt, fully narrow band..... $148.

Motorola J-53AKY outdoor, upright,
remote panel, 150-170 MHz, 50 watt
base..... $188.

RCA CSC60-B, 110 volt, AC, 60 watt,
fully narrow band,
table top base..... $188.

450-470 MHz MOBILE UNITS
GENERAL ELECTRIC

450-470 MHz - 14" case complete access.

MA/E42
6/12 volt, 15 watt,
vibrator power
supply..... $58.

MT-42, 12 volt, 15 watt,
transistor power supply..... $98.

ACCENTS

450-470 MHz General Electric Progress Line, 10 watts, 12 volts, transistor power supply, front or rear mount. Complete accessories. Model EG48S
Narrow band meets LATEST FCC TYPE APPROVAL REQUIREMENTS..... $78.
wide band..... $58.

Motorola 450-470 MHz
T44A, A6 or A6A
available only with accessories..... $28.

Motorola T44AAV 450-470 MHz, 6/12 volt
15 to 18 watt
complete accessories..... $38.
With "Private Line" minus reeds.... $68.

Motorola U44B BT 450-470 MHz, 12 volt,
15 watt transistor power supply comp.
with accessories..... $98.

RCA CMU15A, 6/12 volt, 450-470 MHz,
complete less accessories..... $18.
accessories (sold separately)..... $20.

RCA "E" line, 12 volts, 15 watts,
transistorized power supply,
including accessories..... $68.

RCA CMU15B 6/12 volt, 450-470 MHz,
less accessories..... $28.
accessories (sold separately)..... $20.

GREGORY ELECTRONICS

GREGORY ELECTRONICS EQUIPMENT CHECKED OUT ON OUR BENCHES

RCA G.E. UHF BASES

RCA CSU330, 450-470 MHz,
250 watts, upright cabinet..... $98.
TX and amplifier. No receiver

RCA CSUE15, 110 volt, 15 watt,
desk top base station..... $158.

FI/42 Progress Line, 110 volt, AC,
desk top, 15 watt..... $158.

TI/42 Progress Line, 110 volt, AC,
desk top, 15 watt..... $188.

DO42 Progress Line, 110 volt, AC,
Desk Mate, 15 watt..... $188.

ZI48S Accent Line, 110 volt, AC,
desk top, 10 watt..... $158.

MOTOROLA UHF BASES

L44AAB, 110 volt, AC, Desk top, 15 watt,
with private line.....$188.

J44AAB, 110 volt, AC, weatherproof
cabinet, 15 watt, $168.
with private line.....

REMOTE CONTROLS

Motorola P8270..... $55.

Motorola TA1200 series..... $95.

GE - RC 3..... $45.

GE - RC 4..... $75.

GE Telemote Mark-60 transistorized
remote, telephone style..... $65.

TECHNICIANS SPECIALS

Offered at reduced prices on as-is basis. Repairs are necessary and/or parts may be missing. Less accessories unless specified.

RCA CMV2, 12 volt, 30-50 MHz;
30 watts, less accessories,
less case..... $10.

BENDIX MRT-10, 12 volt, 150-170 MHz,
25 watts, less accessories,
less case..... $10.

Motorola T-44 Series, 12 volts,
450-470 MHz, 15 watts, less accessories,
less case..... $10.

G.E. Pre-Progress 40-50 MHz,
250 watt, upright cabinet..... $148.

G.E. Pre-Progress 40-50 MHz, 60 watt
desk mate..... $68.

G.E. Pre-Progress 40-50 MHz,
60 watt, pole mount..... $58.

Dumont 161-E Base, 33 MHz, 100 watts,
upright, very clean..... $75.

G.E. Pacers, EG43S, high band, 12 volt,
"T" power, 15 watt, front mount.
less accessories..... $58.

G.E. Pacers EG42S low band, 12 volt
"T" power, 15 watt, front mount
less accessories..... $58.

G.E. Pacer Power Supply Only
less strips.....$25.

G.E. 4ES1 Series, 150-170 MHz,
20 watts, 6 volts, less access..... $10.

G.E. RC-4 Remote, less case..... $35.

GREGORY ELECTRONICS

GREGORY ELECTRONICS EQUIPMENT CHECKED OUT ON OUR BENCHES

RCA Crystal Ovens. 12 volt or 6/12 volt. dozen..... $36.

RCA microphones for Super Carfones Made in Japan for RCA
reconditioned..... $3.
new..... $4.

New G. E. "T" power, 30 watt, heat sinks with transistors and wiring..... $10.

G. E. Progress Line speakers with bracket..... $5.

G. E. Progress Line baskets, less covers, less front plate..... $3.

Shure reluctance handsets with mike connector and coil cord..... $10.

Old Motorola, G. E., R. C. A., etc. control heads..... $1.
6 for..... $5.

Low Band base and spring combinations..... $1.
6 for..... $5.

Motorola receiver selective call units P-8629, some with reeds..... $15.

Motorola pack set "P" series canvas carrying case..... $3.

Outdoor weatherproof hi-power horn type P. A. speakers..... $15.

G. E. Pre-Progress Housing for 4ET6-4ER6 TX and RX..... $2.

G. E. Progress Line receiver strips
30-50 MHz, narrow band..... $35.
Wide band..... $30.
Lots of 10 - 10% discount

RCA "E" line series combination control head and power supply..... $30.

G. E. channel guard tone units, decks RC type..... $25.

G. E. channel guard tone units, Pacer channel guards, less reeds..... $15.

RCA RC Plug-in type, quiet channel..... $5.

G. E. Progress Line Pacer Base Station microphones. New!..... $10.

Motorola P-9301. A single tone burst oscillator..... $6.

RCA cases for carfone desk type bases, less front panel..... $10.

Carbon telephone handsets, as is.... $1.
Six for..... $5.

G. E. SCHEMATIC OUTLINE and Interconnection Diagrams for GE 2-way FM radios.
Vol. 1, Pre-Progress Line (1949-55) 25-50 MHz 72-76 MHz.
Vol. 2, Pre-Progress Line (1949-55) 150-170 MHz, 405-425 MHz, 450-470 MHz
each volume..... $4.50

NEW REVISED EDITION! Motorola FM Schematic Digest, 136 pages of Motorola Diagrams, up to and including Motran..... $6.50

Pre-Progress line speakers less mounting bracket..... $3.

Reeds..Private Line or Channel Guard..... $5.
Misc. CPS

4ET24 G. E. Progress Line, 450-470 MHz, Tx strip, less ovens..... $25.

PORTABLES

G. E. Pocket Mate, fully transistorized, 150-170 MHz high band, 1 watt, hand held portable with leather case, less charger..... $200.

GREGORY ELECTRONICS

GREGORY ELECTRONICS EQUIPMENT CHECKED OUT ON OUR BENCHES

Physically complete. Not subject to bench check or tuning.
General Electric H-31 series, 1.7 watt, all transistorized receiver, with microphone, less antenna, as is 150-170 MHz, with dry battery..... $65.
with Ni-cad..... $85.

G. E. Ni-Cad Power Supply & Bottom Housing for H-11 or H-31 series portables. Batteries are as is..... $15.

ODD LOT CORNER

4ET6 General Electric
6 v 30 watt, 40-50 MHz
transmitter..... $4.

12 v 30 watt, 40-50 MHz
transmitter..... $6.

4ET6 - General Electric
6 v 60 watt, 40-50 MHz
transmitter..... $5.
12 v, 60 watt..... $7.

AM Receiver strip
on 2.5 MHz..... $10.

National Electronic Laboratory Utilifone, model NEL 200, AM, 12 volt, 1½ watt, tuned on 121.9 MHz, with accessories, ideal for monitor receiver..... $18.

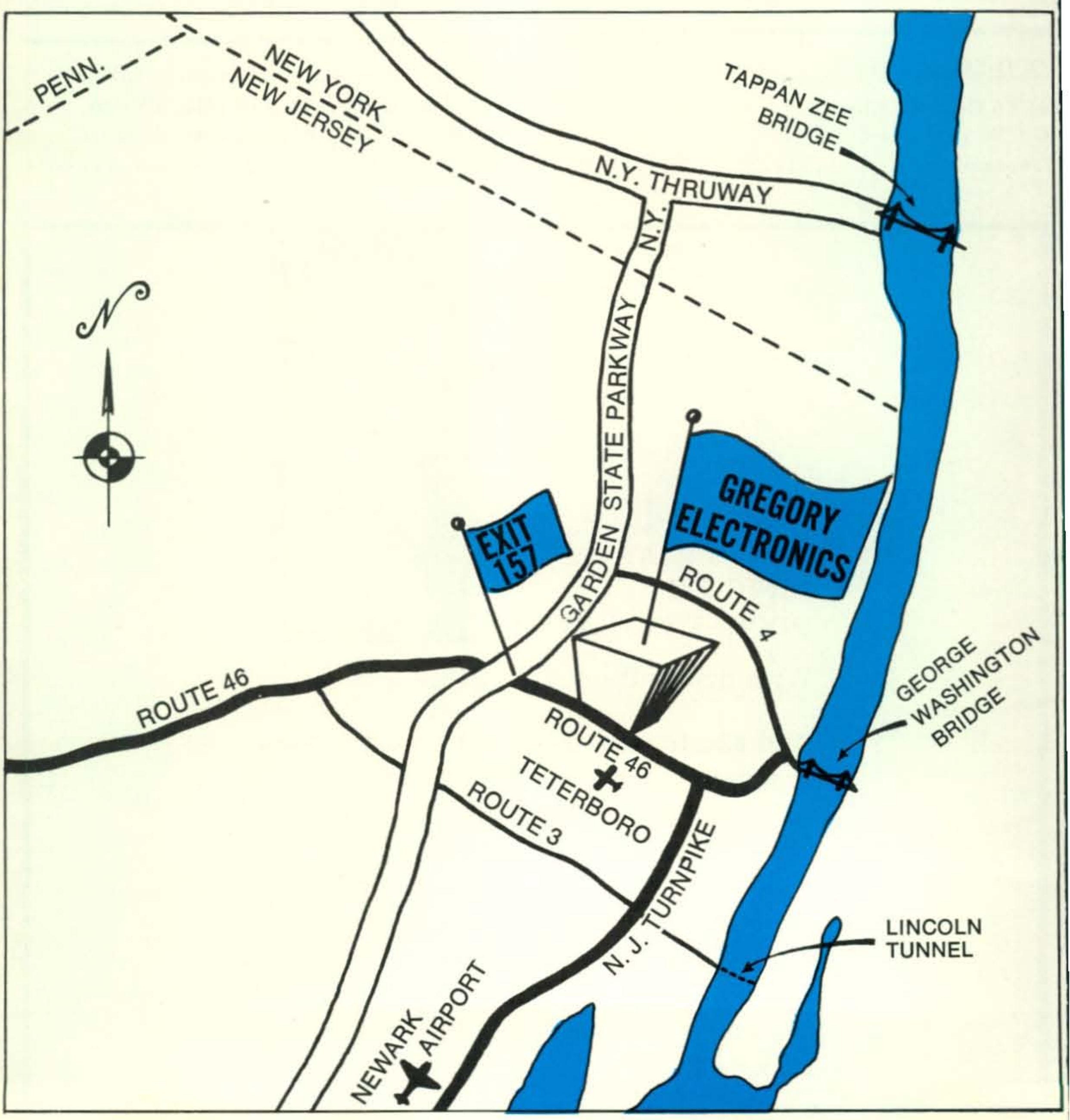
NINIC FM
POCKET RECEIVER

With dry battery..... $48.

Add $20 for crystals and tuning to your frequency. 30-50 MHz or 150-170 MHz
All units new. Solid state modular construction. Adjustable squelch. Sensitivity 0.3 microvolts to break squelch. Dual conversion crystal controlled. With conventional dry cell or chargeable ni-cad battery.
Weight: less than 1 lb. Size 6 5/8" x 2½ x 1¼".

We've Expanded...

We have expanded our warehouse to double its capacity. We can now stock a larger and more varied line of equipment. Should you be in our area (15 minutes from N. Y. C., see map below...), you are cordially invited in to browse. We now have the warehouse space to carry 15,000 pieces of used FM Mobile Communications Units.



DX

BY JOHN A. ATTAWAY,* K4IIF

WELCOME to 1972! The *CQ* staff sincerely hopes that this will be a great DX year for *you*. If your DX goals are among the highest, we hope that you will end the year challenging DL9OH, T12HP, W2TP, WA2RAU, and WA2IZS for top spot on the 2 × S.S.B. Honor Roll, W6ID and K6EC on the 2 × C.W. Honor Roll, and W4OPM on the WPX Honor Rolls. If DX is still your bag, but you're not that serious about it, we hope you'll complete WAZ and win several more WPX and *CQ* DX Award endorsement stickers. If you're a beginning DXer, send for our rules. You'll find that *CQ* has the most varied and balanced DX program of any organization in the world. Whether you like chasing zones, prefixes, or countries on either c.w. or s.s.b., we've got an award for you.

George's PROPAGATION column, elsewhere in this issue, indicates that the sunspot decline is continuing into 1972. By the end of the year, good 10 meter openings will be rare, and 15 meters will be quite spotty in comparison with what we've experienced for the past 5 years. Serious DXers will be spending more and more time on 40 and 80, and 20 will become the major workhorse band. Plans for new antenna systems should be made accordingly. More and more full size, multi-element 20 meter beams will be coming "out of mothballs" over the next couple of years, along with 20-40 meter duobanders and 40 meter monoband beams as the 10 and 15 meter arrays begin to find their way back into the attic to await better days. As the 1962 sunspot minimum proved, however, DX is always with us. When 10 and 15 go out and old reliable 20 weakens, 40, 80, and even 160 lenghten out to take up the slack. Go DX!

De Extra

There has been a great deal of comment in the DX bulletins lately regarding the operating skills of various rare DX stations. The following comments by Bev, W4CKB, are quite pertinent:

"Don Chesser, W4KVX, a savy DXer and former DX Editor of *CQ*, wrote over a decade ago that the DX operator—the man at the DX end of the line—is in absolute control of all pile-ups and operating procedures. On his skill alone rests the success of the operation, whether transceive or split frequency, and the possible variations to usual operating rules and procedures. In other words, the more skillful the DX operator, the more successfully he can break his own rules.

"From this, a corollary may be drawn: after the first towering pile-ups are created by a waiting DX world when the expedition first appears on the air, the manageability of the situation, including the need for rules, procedures, warnings, and threats, are inversely proportional to the DX operator's skill.

"Chesser's words are more true today than ever, as we increasingly encounter the use of lists, QSO's by call areas, and other such obstacles to total QSO productivity employed by the unskilled. Any set, unalterable operating tactic vehemently followed by a DX station contributes to poor usage of the best operating time.

*P.O. Box 205, Winter Haven, 33880

The CQ DX Award Honor Roll

The *CQ* DX Award Honor Roll recognizes those DXers who have submitted proof of confirmations with 275 or more countries for the mode indicated. The ARRL DXCC Country List, LESS DELETED COUNTRIES, is used as the country standard.

2XSSB

DL9OH	319	WA2EOQ	306
TI2HP	319	W6FW	302
W2TP	319	F2MO	301
WA2RAU	319	K4HJE	301
WA2IZS	319	OZ3SK	300
W3NKM	318	K1SHN	300
W9ILW	318	YS1O	300
K6LGF	317	F9MS	299
IØAMU	316	K6EC	298
K6YRA	316	XE2YP	294
G3FKM	315	K4RTA	293
W3DJZ	315	W6KZS	293
W4OPM	313	WB2RLK	289
W6NJU	312	KH6BB	286
ZS6LW	312	G3RWQ	285
I8KDB	311	HP1JC	285
W4IC	311	WA6MWG	284
W6KYE	311	W9KRU	284
W9JT	311	WAØKDI	282
XE1AE	311	OE2EGL	280
W6EUF	310	K8GQG	280
W9DWQ	310	WAØCPX	278
VE2WY	309	ZL1AGO	278
VE3ACD	308	WA3IKK	276
I1AA	307	WØYDB	275

CW

W6ID	318	ON4QX	296
K6EC	316	WA6EPQ	294
VK3AHQ	308	W6NJU	291
W4IC	304	K1SHN	286
W4OPM	304	W4BQY	286
DL3RK	300	W6ISQ	285

Few DXpeditions have created more excitement than the ET3ZU/A effort from Jabal At Tair in September, 1971. Left to right are John, K3BSY; Tony, I1IJ; Aldo, ET3ZU; Dick, F2QQ; Ron, F5QQ; and one of the lighthouse attendants.

"The highest echelon of skilled DX operators have consideration for all of us on the home end, combined with the psychic ability to convey to us, prior to QSO, the comfortable feeling of knowing exactly where we stand. There is one such top operator who used to travel the DX world and who can presently be found in South Carolina."

Bev refers of course to Mr. Gus Browning, W4BPD, first nominee to the CQ DX Hall of Fame. Browning is considered by many to be Mr. DXpedition.

Here and There

The Twin City DX Association of Minneapolis—St. Paul has re-elected Bill Higgins, WØYDB, as President; Dennis Luther, KØWWX, Secretary-Treasurer and added a Publicity Chairman, Don Tyrrell, WØMYX. President Bill is a member of the *CQ* DX Awards Advisory Committee, while club members Larry Shima, WØPAN, and Clyde Norton, WØELA, are Dakota Division Director and ARRL DX Advisory Committee Member, respectively, giving the club a strong voice in the high councils of amateur radio.

About the most productive DXer over the pole in 1971 was Venkat, VU2KV. In this photo he is operating from Port Blair in the Andaman Islands using the call VU9KV.

The ARRL DX Advisory Committee is considering the modification of criteria under which "countries" are defined for DXCC awards. It is rumored that this may lead to deletion of rocks and reefs, not definitely claimed by a real country, from the list. Presumably such "countries" as Geyser Reef, Minerva Reef, Maria Theresa Reef, *etc.* might be dropped, while claimed rocks and sandbars such as Baja Nuevo, Serrana Bank, Navassa, and Malpelo would be retained. However, this is purely speculation and it is suggested that you make your views known to your ARRL Director so that he can cast his vote according to the wishes of the DXers in his Division. At a recent meeting the Florida DX Club voted 19-2 in favor of deleting the unclaimed real estate. This column has long been in favor of removing any island from the list which under normal circumstances, was unsuitable for permanent human habitation.

The Northern California DX Club has unanimously passed two motions which honor the memory of the late David P. Baker, W6WX, an outstanding club member and CQ DX Committeeman. The first seeks to establish W6WX as the official call of the newly organized NCDXC Repeater Association, while the second involves club sponsorship of a David P. Baker Memorial Award to be given each year to the highest scoring single operator station in the c.w. contest.

The International DX Association announces that as of July 1, 1971, 1750 DXers had joined their group. This included 400 plus DX stations representing 85 countries. Club officers are

The CQ DX Award Program

C.W. DX

69.....WB6IEX
70.....YU1AG
71.....G2BJY
72.....DJ1CG
73.....DL2HQ

S.S.B. DX

160.....G3KYF
161.....K8CSG
162.....WA7JCB
163.....G3XBE
164.....WAØLMK

CQ DX Endorsements

C.W.: YU1AG—200, G2BJY—200, and DJ-1CG—150.

G2BJY—28 MHz

S.S.B.: G3KYF

Complete rules for the *CQ* DX Award program may be found on pg. 58 of the January, 1971 issue. Application blanks and copies of the rules may be obtained by sending a self-addressed, stamped envelope to the Award Manager, P.O. Box 1271, Covina, CA 91722, or to the DX Editor.

WA5REU, President, W3DJZ, Vice-President, and K3RLY, Secretary-Treasurer. The official INDXA address is P.O. Box 125, Simpsonville, Md. 21150.

Rare and Special Prefixes

1971 may well go down in history as the best year on record for new prefixes. Burgeoning activity by U.S. amateur organizations interested in commemorating major local events with special stations was an important factor, as was similar interest in other countries. In addition, the expanding amateur populations of such countries as Germany and Japan led to the activation of entire new prefix groups such as the JD, JE, JH, DB, and DF series, while the new Italian island prefixes provided a bonanza from the Mediterranean.

A quick comparison of the WPX Honor Roll in the January, 1971 issue with that in the December, 1971 issue shows that the top score in the s.s.b. category increased by 126 prefixes, while the top mixed score was up a full 100 prefixes, phone up 81 prefixes, and c.w. up 50 prefixes. All categories of the WPX Honor Roll increased in membership despite the fact that the minimum number of prefixes to qualify for Honor Roll standing was raised from 550 to 600 in each case.

The official list of special calls issued by the FCC for the late summer and early fall months is listed below.

The FCC asks that amateurs and organizations apply for special calls at least 120 days prior to the desired date of authorization for the calls.

Other rare prefixes reported in late 1971 include the following:

If you want to hear a pileup, tune in when this fellow comes on the air. He's Yonten, AC5TY, Director of Wireless Communications for the Kingdom of Bhutan. Yonten is active near 14030 kHz at random intervals during the 1300-1500 GMT time slot. He uses a 400 watt transmitter and a dipole antenna oriented east-west. QSL direct to T. Yonten, AC5TY, Director of Wireless Communications, Dechentsi, Thimpu, Bhutan. *(Photo courtesy K9KDI and Northern Illinois DX Association)*

EIØ—EIØDI operated from Dolkey Island off the Irish coast.

FMØ—FMØIX was by W7VRO and associates during September, 1971.

IH9—IH9LAW has been active from the rare Pantelleria Island.

KFØ—KFØMEX on 14 MHz during August, 1971 was at the Iowa State Fair.
QSL to WAØSWJ.

KY4—KY4CD was operated by the Georgia Southern College A.R.C. QSL to W4DQD.

KWØ—KWØSCF QSL's go to WØBKB.

LUØ—LUØASC operates near 14080 kHz c.w.

WO6—WO6BSA was a Boy Scouts of America

Call	Trustee	Event	License Period
WS1OCF	Robert Green	Orleans County Fair Barton, Vermont	Aug. 15-30, 1971
WX2MAP	Arnold Oberson	Miss America Pageant	Sept. 1-15, 1971
WD4ARF	Gregory R. Combs	National Convention of Christian Churches, Louisville, Ky.	Oct. 15-20, 1971
KF2NYS	James Boehner	New York State Fair Syracuse, N. Y.	Aug. 31 – Sept. 6, 1971
WO8HIO	Richard Egbert	Ohio State Fair Columbus, Ohio	Aug. 26 – Sept. 6, 1971 (QSL to WB8CWD)
WS9UCI	Howard Huntington	Union County, Indiana Sesquicentennial	Sept. 19-26, 1971 (QSL to W9LVH)
WM3ARW	David Heller	Amateur Radio Week in Pennsylvania, Glenolden, Pa.	Sept. 14-19, 1971
KS4DX	Roger P. Ries	Serranna Bank DXpedition	Sept. 6-30, 1971

The WAZ Program

S.S.B. WAZ

916.....DJ4VW
917.....K4IKR
918.....WA8VFK
919.....G3WGS
920.....K3SGE
921.....KØWWX
922.....JA1BLV
923.....JH1CJO
924.....DL7FP
925.....PY4AP
926.....W3HNK
927.....VU2BEO
928.....CR4BC
929.....KH6BZF

C.W.—Phone WAZ

3260.....DL1MC
3261.....KØEKR
3262.....LU3DSI
3263.....WA2HIN
3264.....W3BVL
3265.....YU1LW
3266.....DK3BS
3267.....DL8XA
3268.....DL7GK
3269.....DL6UR
3270.....DJ7GJ
3271.....W4AX
3272.....YU1SF
3273.....OE1CP
3274.....HP1IE

Complete WAZ rules are shown on pgs. 64-66 of the June, 1970 issue of *CQ*. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to DX Editor, P.O. Box 205, Winter Haven, FL 33880.

Jamboree station operating from Placentia, California on Oct. 16-17, 1971. QSL to W6ANN.
3B8—3B8DA is active daily 0300—0400 and 1200—1400 GMT near 14040 kHz.
3D6—This is the new prefix for Swaziland, formerly ZD5.
4JØ—4JØBJ was a special Soviet station. QSL to P.O. Box 88, Moscow, U.S.S.R.
8J1—8J1WJ was a special station at the Boy Scout World Jamboree in August. QSL to the JA Bureau.

Amateur Radio in the U.S.S.R.

Since the beginning of the series on amateur radio in other countries we have been anxious to present information on the status of our hobby in the Soviet Union. However, 2 years of attempts through official channels were fruitless. The Soviet Embassy in Washington was sympathetic, but nothing materialized. The Central Radio Club in Moscow was uninterested. However, a gentleman very familiar with the situation there has provided us with the following information which should be of considerable interest to you.

"In Russia their regulations strictly forbid conversational type QSO's. Amateurs may not answer questions except those pertaining to equipment, DX, and other subjects directly related to the hobby. For example, they may not answer questions such as 'Did you receive the letter I sent?'

"Since ham radio is largely self-policed, each club has a monitoring committee which *regularly* questions members at meetings and makes tape recordings of QSO's. Violators are routinely suspended. Leaders and prominent DXers get away with certain things, but fear that they may be subject to censure at any time.

"In the U.S.S.R. amateur radio is called 'radio sport'. As such it belongs to a sports federation, and internal contests, transmitter hunts and related events are the important things. International DXing is of secondary importance. High officials are not interested in DX, and it is virtually impossible to get the regulations changed.

"If you win enough contests to tally up a

[*Continued on page 109*]

The WPX Program

S.S.B. WPX

642.....W8HGH
643.....KR6RH
644.....W5QNQ
645.....WB6JJN
646.....W2SZ

C.W. WPX

1123.....W7QNI
1124.....WA3GTX
1125.....OK2BKL
1126.....K2MFY

Mixed WPX

301.....W2NUT
302.....K2MFY
303.....ON5AX
304.....WA7CGR

WPNX

38.....WN1ORL

WPX Endorsements

S.S.B.: W4NJF—950, W3DJZ—750, CR6LF—750, K2POA—550, XE1J—550, TF2WKP—400, WA2EAH—350, WA2FLA—300, and W4UPJ—250.

C.W.: W2AIW—900, K2AAC—650, WA3GTX—450, WA3GNW—450, and K2MFY 400.

Mixed: W4OPM—1250!, W4LRN—1150, W4IC—850, K2CPR—800, W2NUT—800, K1LWI—650, WAØCPX—650, K3RZK—600, W6EYY—550, WB4KZG—550, and K2MFY—450.

Phone: I1YRK—650 and F5JA—500.

80 Meters: XE1J

20 Meters: ON5AX and K2MFY

Asia: WB4KZG

Europe: VE1MF, WA3GTX, OK2BKL, ON5AX, WA6TAX, K2MFY, and JA2LA.

Oceania: WB4KZG and JA2LA

Complete rules for WPX, WPNX, and VPX may be found on pgs. 66-67 of the June, 1970 issue. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to Award Manager, P.O. Box 1271, Covina, CA 91722, or to the DX Editor.

from Ross and White

The lst 2 meter FM transceiver

with a built-in tone burst encoder*

12 channel capability
4 crystals installed.

Tone burst
encoder built-in
with 3 tones variable
from 1600 to 2400 Hz

All the quality, performance and flexibility that hams want and need for all-around 2 meter FM repeater operation.

- All solid state design—no tubes.
- Individually performance tested before shipment.
- Complete package includes mike and coiled cord.
- Front panel power output selector switch: .1, 1 and 10 watts.
- Can be used with power boosters.
- Mobile mounting bracket.

Model RW-Bnd. SPECIFICATIONS

Transmitter	
RF Power Output:	0.1W .....Low 1.0W .....Medium 10W .....High
Frequency Multiplication:	12 (3 X 2 X 2)
Oscillating Form:	Crystal Controlled
Modulation Form:	Variable Reactance Phase Modulation
Max. Frequency Shift:	±20KHz (1 KHz)
S/N Response:	More than 40 dB at 1 KHz 70% Modulation
Spurious Response:	less than —60 dB
Current Drain:	0.5A for Low, 1.1A for Medium and 2.2A for High RF
Receiver	
Receiving System:	Double Super Heterodyne
Intermediate Frequency:	1st. 10.7 MHz 2nd. 455 KHz
1st Osc. Frequency Stability:	0.002%
Band Width:	28 KHz at 6 dB down (Thru Mechanical Filter)
Selectivity:	60 KHz at 50 dB down (Thru Mechanical Filter)
Sensitivity:	—6 dB (0.5uV)
Squelch:	—8 dB
Audio Output:	0.5W at 8 ohm impedance
Current Drain:	0.22A max. including lamp 0.15A when standing-by with Squelch
Power Requirements	13.5V DC ±10%

* *Also available without tone burst encoder.*

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Propagation

BY GEORGE JACOBS,* W3ASK

THE Swiss Federal Observatory reports a monthly mean sunspot number of 48 for September, 1971. This results in a smoothed sunspot number of 72, centered on March, 1971. The sunspot cycle continues to decline at a fairly rapid pace. For an in-depth analysis of the present solar cycle and a solar and shortwave propagation prediction for the New Year see, "Sunspot Cycle 20—Progress 1971: Prediction 1972," appearing elsewhere in this issue of *CQ*.

Typical winter shortwave propagation conditions are expected to continue through January. Maximum usable frequencies should remain high during the daylight hours, dropping to seasonally low values during the hours of darkness. Static levels are expected to be at their lowest values of the year in the northern hemisphere, and signal levels are predicted to be exceptionally strong during many band openings.

The following is an overall picture of shortwave band conditions for January, 1972. For specific times of DX openings refer to the *DX Propagation Charts* which appeared in last month's column. This month's column contains *Short-Skip Propagation Charts* for January and February, as well as Charts centered on Alaska and Hawaii. The *Short-Skip Charts* contain propagation forecasts for paths varying in distances of between 50 and 2300 miles.

This propagation forecast is based upon a predicted smoothed sunspot number of 51, centered on January, 1972.

10 Meters: Some fairly good DX openings during the daylight hours, mainly to southern and tropical regions, but some also possible to Europe and the Far East. Some short-skip openings, between distances of approximately 1300 and 2300 miles, are also forecast for the afternoon hours.

15 Meters: Generally good 15 meter DX openings to many areas of the world are forecast for the daylight hours. Some openings to southern and tropical areas may occur during the late afternoon and early evening hours as well. Fairly consistent short-skip openings, resulting from regular F-layer reflection, are expected during the daylight hours over distances ranging between 1000 and 2300 miles.

*11307 Clara Street, Silver Spring, Md. 20902

LAST MINUTE FORECAST

Day-to-Day Conditions and Quality for January, 1972

Days	*Rating & Forecast Quality* (4)	(3)	(2)	(1)
Above Normal: 2, 7, 9, 15, 22-23, 29	A	A	B	C
Normal: 1, 3, 5-6, 8, 10, 12, 14, 16-17, 21, 24, 27-28, 30	A	B	C	D
Below Normal: 4, 11, 13, 18, 20, 25-26, 31	C	D	D	E
Disturbed: 19	D	D	E	E

How To Use These Charts

The following is an explanation of the symbols shown above, and instructions for the use of the *CQ* propagation predictions:

1—Enter Propagation Charts on following pages under appropriate band and distance or geographical area columns. Read predicted times of band openings at intersection of both columns.

2—Following each predicted time of band opening is a forecast rating which indicates the relative number of days the band is expected to open during each month of the forecast period. The higher the rating, the more frequent the opening, as follows: (4) band open more than 22 days each month; (3) between 14 and 22 days; (2) between 2 and 13 days; (1) less than 7 days.

On the "Short-Skip" Chart where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. Note the forecast rating for later use.

3—With the forecast rating noted above, start with the numbers in parenthesis at the top of the "Last Minute Forecast" appearing above. Read down the table for a day-to-day forecast of propagation conditions in terms of Above Normal (WWV rating high than 6); Normal (WWV rating 5-6); Below Normal (WWV rating 4); Disturbed (WWV rating less than 4). The letter symbols (A-E) describe reception conditions (signal quality, noise and fading levels) expected for each day of the month and have the following meaning: (A—excellent opening with strong, steady signals; B—good opening, moderately strong signals, little fading and noise; C—fair opening, signals fluctuating between moderately strong and weak; D—poor opening, signals generally weak and considerable fading and noise; E—poor opening, or none at all.

4—This month's short skip Charts are based upon a transmitter power of 75 watts c.w.; 150 watts s.s.b., or 800 watts d.s.b., into a dipole antenna one quarter-wave above ground on 160, 80 and 40 meters and a half-wave above ground on 20, 15 and 10 meters. For each 10 db increase above these reference levels, reception quality shown in the "Last Minute Forecast" will improve by one level; for each 10 db loss reception will become poorer by one level.

5—Local standard Time for these predictions is based on the 24-hour system.

6—The short skip Charts are valid through Feb. 1972. These Charts are prepared from basic propagation, data published monthly by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado.

20 Meters: Good DX conditions to most areas of the world are forecast for 20 meters between sunrise and the late afternoon hours. Signals may be exceptionally strong shortly after sunrise and during the afternoon hours, when conditions should peak on this band. Good short-skip openings, over distances between 750 and 2300 miles, should also be possible during the daylight hours. Openings over shorter distances, with the skip often as short as a few hundred miles, are expected during the early afternoon hours. On a few nights during the month, when propagation conditions are above normal, the band may re

main open for both DX and short-skip propagation well into the hours of darkness.

40 Meters: The band is expected to open for DX during the late afternoon hours, with conditions peaking during the hours of darkness and at sunrise. Static levels should remain at low seasonal values throughout the month, and signals often should be exceptionally strong. During the daylight hours, good short-skip openings should be possible over distances ranging between 150 and 750 miles. During the hours of darkness, the short-skip range is expected to increase to between approximately 1000 and 2300 miles.

80 Meters: Solar absorption and static levels are expected to remain at low seasonal values during January, which should permit some fairly good DX openings to many areas of the world during the hours of darkness and the sunrise period. During the hours of daylight, short-skip openings are forecast between distances of approximately 50 and 350 miles. During the hours of darkness, short-skip openings should be possible between distances of about 250 and 2300 miles.

160 Meters: On evenings when static levels are low, some DX openings should be possible on this band from a few hours after sunset to shortly before sunrise. Short-skip openings up to 2300 miles are forecast during the hours of darkness. Because of normally high solar absorption, ionospheric propagation is not normally possible during the daylight hours on 160 meters.

V.H.F. Ionospheric Openings

January will be a relatively poor month for v.h.f. ionospheric propagation. The solar cycle has declined to a point where F-2 layer 6 meter openings are no longer possible, and relatively little sporadic-E or auroral activity is expected during the month.

It is also a poor month for trans-equatorial scatter (TE) propagation, but an occasional opening may occur on 6 meters between the southern third of the USA and South America between 8 and 11 P.M., local time.

On the optimistic side, some fairly good meteor-scatter openings should be possible on the v.h.f. bands during January 3-4, when the *Quadrantids* meteor shower is expected to peak with about 30 to 40 meteors entering the earth's atmosphere each hour. While of relatively short duration, the *Quadrantids* is usually an intense shower.

Some v.h.f. openings may also be possible during periods of ionospheric storminess on the h.f. bands. Check the "Last Minute Forecast" appearing at the beginning of this column for those days that are expected to be "below normal" or "disturbed", since these are the days on which v.h.f. ionospheric openings are most likely to occur.

73, George, W3ASK

CQ Short-Skip Propagation Chart

January & February 1972

Local Standard Time At Path Mid-Point

(24-Hour Time System)

Distance From Transmitter (Miles)

Band (Meters)	*50-250*	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	*Nil*	08-10 (0-1) 10-15 (0-2) 15-17 (0-1)	08-09 (1) 09-11 (1-2) 11-15 (2-3) 15-17 (1-2) 17-19 (0-1)
15	*Nil*	09-11 (0-1) 11-15 (0-2) 15-16 (0-1)	07-08 (0-1) 08-09 (0-2) 09-11 (1-3) 11-15 (2-4) 15-16 (1-3) 16-18 (0-2) 18-19 (0-1)	07-08 (1) 08-09 (2) 09-11 (3) 11-15 (4) 15-16 (3) 16-18 (2-3) 18-19 (1-2) 19-20 (0-1)
20	10-12 (0-1) 12-14 (0-2) 14-15 (0-1)	08-09 (0-2) 09-10 (0-3) 10-12 (1-3) 12-14 (2-4) 14-15 (1-4) 15-18 (0-2) 18-22 (0-1)	06-08 (0-1) 08-09 (2-3) 09-12 (3-4) 12-15 (4) 15-18 (2-4) 18-21 (1-2) 21-22 (1) 22-00 (0-1)	06-08 (1-2) 08-09 (3) 09-14 (4-3) 14-18 (4) 18-21 (2-3) 21-23 (1-2) 23-00 (1) 00-06 (0-1)
40	07-08 (0-1) 08-09 (1-3) 09-16 (3-4) 16-18 (2-3) 18-20 (1) 20-00 (0-1)	07-08 (1-2) 08-09 (3) 09-15 (4-3) 15-16 (4) 16-18 (3-4) 18-20 (1-3) 20-00 (1-2) 00-02 (0-2) 02-07 (0-1)	06-07 (1-3) 07-08 (2-3) 08-09 (3-2) 09-15 (3-1) 15-17 (4-2) 17-18 (4) 18-20 (3-4) 20-23 (2-4) 23-02 (2-3) 02-04 (1-3) 04-06 (1-2)	06-07 (3-2) 07-08 (3-1) 08-09 (2-1) 09-15 (1-0) 15-17 (2-1) 17-19 (4-3) 19-23 (4) 23-04 (3) 04-06 (2)
80	08-10 (3-4) 10-15 (4-3) 15-20 (4) 20-22 (3-4) 22-03 (2-3) 03-07 (1-2) 07-08 (2-3)	08-09 (4-2) 09-16 (4-1) 16-18 (4-2) 18-22 (4) 22-03 (3-4) 03-07 (2-3) 07-08 (3)	08-09 (2-0) 09-16 (1-0) 16-18 (2-1) 18-20 (4-3) 20-03 (4) 03-05 (3) 05-07 (3-2) 07-08 (3-1)	08-16 (0) 16-18 (1-0) 18-20 (3-2) 20-02 (4) 02-03 (4-3) 03-05 (3-2) 05-07 (2-1) 07-08 (1)
160	09-17 (1-0) 17-19 (3-2) 19-05 (4) 05-07 (3) 07-09 (2-1)	17-18 (2-1) 18-19 (2) 19-21 (4-3) 21-05 (4) 05-06 (3) 06-07 (3-1) 07-09 (1-0)	17-18 (1-0) 18-19 (2-1) 19-21 (3-1) 21-03 (4-3) 03-05 (4) 05-06 (3-2) 06-07 (1)	18-19 (1-0) 19-21 (2-1) 21-03 (3) 03-05 (4-2) 05-06 (2) 06-07 (1-0)

ALASKA

Openings Given in GMT†

TO:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	19-22 (1)	17-19 (1) 19-20 (2) 20-22 (3) 22-23 (2) 23-01 (1)	11-16 (1) 16-18 (2) 18-21 (1) 21-22 (2) 22-00 (3) 00-01 (2) 01-03 (1)	04-13 (1) 07-12 (1)*

†To convert to Local Standard Time in Alaska, *subtract* 8 hours from the GMT times shown in the Chart in the PST Zone of Alaska; *subtract* 9 hours in the Yukon Zone and 10 hours in the Alaskan Standard Time Zone. In other USA time Zones, subtract 5 hours from GMT to obtain EST, 6 hours to obtain CST, 7 hours to obtain MST and 8 hours to obtain PST. For example 18 GMT is equal to 13, or 1 P.M. in Washington, D.C.; noon in Chicago, 11 A.M. in Denver, and 10 A.M. in Los Angeles and the PST Zone of Alaska, etc.

*Indicates predicted 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a forecast rating of (2) or higher.

Central USA	18-20 (1) 20-23 (2) 23-01 (1)	16-19 (1) 19-21 (2) 21-00 (3) 00-01 (2) 01-03 (1)	11-17 (1) 17-19 (2) 19-21 (1) 21-23 (2) 23-01 (3) 01-02 (2) 02-04 (1)	03-14 (1) 07-12 (1)*
Western USA	19-21 (1) 21-00 (2) 00-02 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-02 (2) 02-04 (1)	11-17 (1) 17-20 (2) 20-21 (3) 21-00 (4) 00-01 (3) 01-03 (2) 03-05 (1)	04-05 (1) 05-12 (2) 12-15 (1) 15-16 (2) 16-17 (1) 05-12 (1)* 12-15 (2)* 15-17 (1)*

Central USA	07-08 (1) 08-10 (2) 10-14 (3) 14-16 (2) 16-17 (1)	06-07 (1) 07-08 (2) 08-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	13-14 (3) 14-17 (4) 17-19 (3) 19-21 (2) 21-04 (1) 04-06 (2) 06-08 (3) 08-13 (2)	17-19 (1) 19-20 (2) 20-03 (3) 03-04 (2) 04-06 (1) 19-21 (1)* 21-03 (2)* 03-05 (1)*
Western USA	06-08 (1) 08-10 (2) 10-14 (3) 14-16 (2) 16-17 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-15 (4) 15-16 (3) 16-18 (2) 18-19 (1)	06-07 (2) 07-10 (4) 10-14 (3) 14-16 (4) 16-18 (3) 18-22 (2) 22-06 (1)	16-18 (1) 18-19 (2) 19-22 (4) 22-02 (3) 02-04 (2) 04-09 (1) 19-20 (1)* 20-22 (2)* 22-04 (3)* 04-05 (2)* 05-07 (1)*

HAWAII

Openings Given in Hawaiian Standard Time‡

TO:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	07-08 (1) 08-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	06-07 (1) 07-10 (2) 10-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	12-15 (2) 15-17 (3) 17-20 (2) 20-02 (1) 02-04 (2) 04-12 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-03 (2) 03-04 (1) 19-21 (1)* 21-01 (2)* 01-03 (1)*

‡To convert from HST shown in the Chart to Local Standard Time in other USA Time Zones, *add* 2 hours in the PST Zone, 3 hours in the MST Zone; 4 hours in the CST Zone; and 5 hours in the EST Zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 Noon in Honolulu, it is 14 or 2 P.M. in Los Angeles; 17 or 5 P.M. in Washington, D.C.; and 22 GMT.

PLEASE USE YOUR ZIP CODE NUMBER ON ALL CORRESPONDENCE

THE awards PROGRAM

BY ED HOPPER.* W2GT

Special Honor Roll
All Counties
#64 Andrew H. Abraham, W3JZY 9-18-71.
#65 Ella E. Koons, WØAYL 10-6-71.

USA-CA HONOR ROLL

3000		2000		1000	
WAØKQQ	83	W5OB	141	WAØKQQ	248
W3JZY	84	WAØKQQ	142	W3JYZ	249
W0AYL	85	W3JZY	143	VE4QZ	250
		WØAYL	144	WØAYL	251
2500		**1500**		**500**	
WAØKQQ	118	WAØKQQ	175	WAØKQQ	867
W3JYZ	119	W3JZY	176	SM5BHW	868
W0AYL	120	WØAYL	177	W3JZY	869
				W7BBX	870
				G2BJY	871
				VK4SS	872
				WØAYL	873

HAPPY NEW YEAR TO ALL! This column starts my eighth year with *CQ*, and it has been made possible by the complete cooperation and help from *all of you*, thanks!

The January, "Story of The Month" is:

Lee R. Brooks, K8BHG
All Counties #24, 3-25-70

Lee was first licensed in 1955 and became interested in the County Hunting Program shortly after it started, but waited until August 1962 before applying for the basic 500 Award.

He soon worked up to 1000 on c.w. and a.m. but did not apply for it and shortly lost interest as the counties seemed almost impossible to get.

In 1965 an s.s.b. transceiver was obtained and he soon ran across the County Hunters Net and his interest was revived and he made up his mind to work hard at it and get them all.

Lee insists it has been a most rewarding experience. In addition to meeting so many nice people without whose help All Counties would have been impossible, he sure had fun refreshing his memory about the good old U.S.A. and its geography. Like most who have participated in County Hunting, Lee says a nicer bunch of fellows and gals would be impossible to find, and now he hopes to make them All on 14 MHz s.s.b.

Lee was born December 15, 1917 and has spent most of his life in Bluefield, W. Va., except for 5 years in the Air Force during WWII.

He first became interested in amateur radio at age 15 through a ham neighbor, but did not

*P.O. Box 73, Rochelle Park, N.J. 07662.

Independent County Hunters Convention Kansas City—July 4, 1971.

Minnesota Twin's Certificate.

get his license until leaving the Air Force.

Although he has over 100 awards, the USA-CA is the one most prized, and he is pleased to see how the USA-CA Program has really caught on and grown from the comparative few to the large group now chasing the counties.

Lee has been employed by the local post office for 21 years. Amateur radio is his main hobby and although happily married, has no children.

He has had the pleasure of meeting some of the County Hunters as they passed through W. Va., like Eddie, K4LSP; Otts, K8CIR and Al, K5HKG.

The present equipment includes a Galaxy V Mk II and a TA-33 beam. Lee promises to continue his mobiling and is happy to give out needed counties in his area.

I've tried for many months to get a foto from him, but had no success.

Awards Issued

As per the Special Honor Roll, two more qualified for All Counties.

Andy Abraham, W3JZY was issued USA-CA 500 Award endorsed All 14; All 7; All 3.9; and All S.S.B. 1000 and 1500 endorsed All S.S.B. 2000 endorsed All S.S.B. and the rest through All Counties, endorsed Mixed. Andy waited until he had them all before sending his application.

Ella Koons, WØAYL qualified for USA-CA 500 Award endorsed All 3.9; All 14 MHz; All S.S.B. 1000 and 1500 endorsed All 14 MHz S.S.B. 2000, 2500 and 3000 endorsed All Phone and All Counties endorsed Mixed. Ella also waited for them all before sending her application.

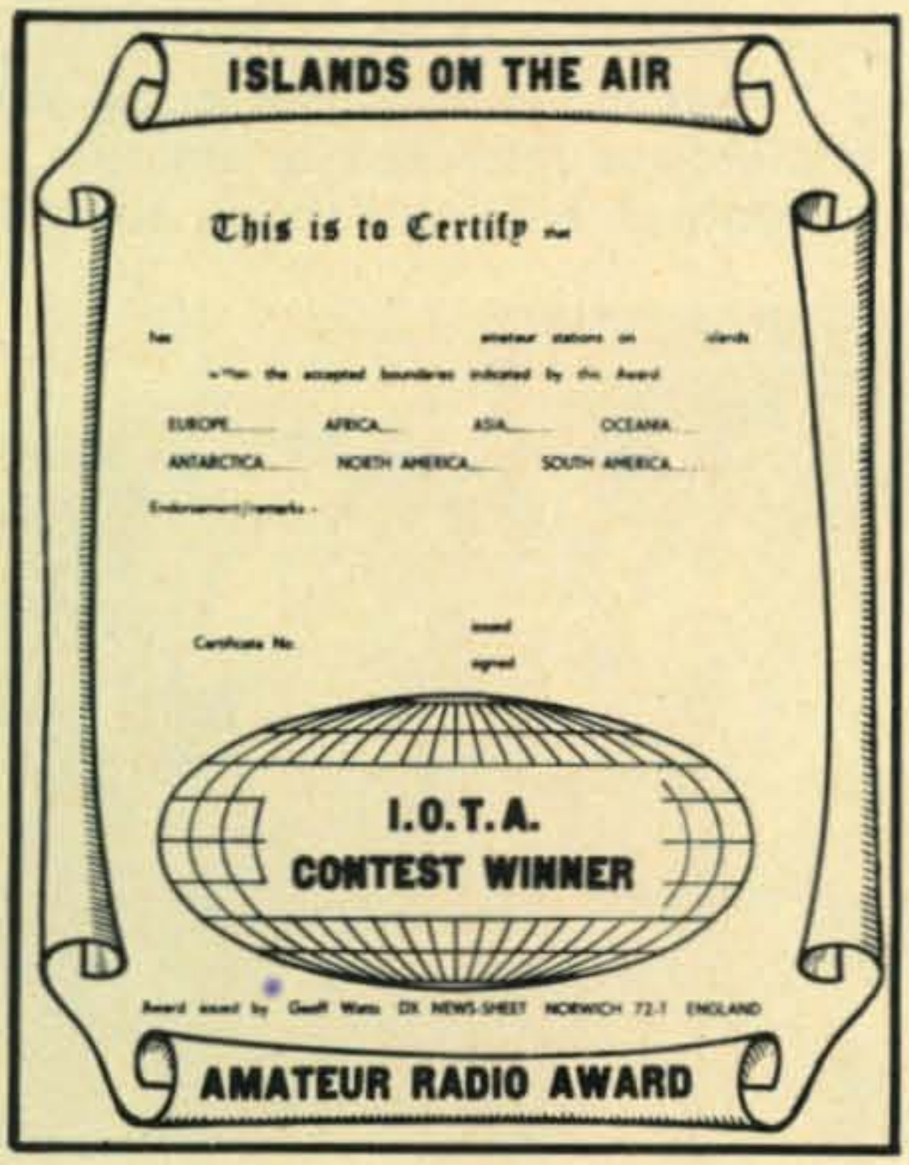
Mike Baustian, WAØKQQ was issued USA-CA-3000 endorsed Mixed and USA-CA-500 through USA-CA-2500 endorsed All 14 MHz S.S.B.

John Robertson, W5OB (exW5BUK) acquired USA-CA-2000.

Doug Bowles, VE4QZ was issued USA-CA-1000.

USA-CA-500 Awards endorsed Mixed went to: Hakan Ekdahl, SM5BHW; Howard Batie, W7BBX/4; and Jeff Johnson, G2BJY.

Yes, his application finally arrived and Al Shawsmith, VK4SS qualified for USA-CA-500 Award endorsed All A-1; first award to a VK4.



Islands On The Air.

Awards

The Islands-On-The-Air Award (IOTA): Issued by Geoff Watts, *DX News-Sheet,* of England. IOTA Awards are available to licensed amateurs (and short-wave listeners) for confirmation of QSOs with amateur stations located on islands throughout the world.

IOTA Africa Award	IOTA-AF
IOTA Antarctica Award	IOTA-AN
IOTA Asia Award	IOTA-AS
IOTA Europe Award	IOTA-EU
IOTA North America Award	IOTA-NA
IOTA Oceania Award	IOTA-OC
IOTA South America Award	IOTA-SA
IOTA Arctic Islands Award	IOTA-AI
IOTA British Isles Award	IOTA-BI
IOTA West Indies Award	IOTA-WI
IOTA World Diploma	IOTA-WW
IOTA Century Club Award	IOTA-CC-100
	IOTA-CC-200, *etc.*

IOTA Silver Cup for gaining all 12 IOTA Awards

IOTA Yearly Contest & Silver Cup. The top-scoring station and top-scoring short wave listener in each continent receives a special award, (also the U.K. Champion & s.w.l.). The World Champion station & s.w.l. will have their Award endorsed accordingly, and will receive the IOTA Cup. The IOTA Contest runs from 0000 GMT January 1st to 2400 GMT December 31st each year.

The 18-page *Directory-Of-Islands* lists all the islands and island groups which count for IOTA, and also contains information on all the Awards mentioned and full details of the IOTA Contest. Cost of IOTA Directory is 4 IRCs, or air-mail 6 IRCs. Geoff Watts, *DX News-Sheet,* 62 Belmore Road, Norwich, NOR 72T, England.

Geoff issues a weekly News-Sheet read by most of the top DX-men in Europe and U.S.A. and also about 70 other countries. The *DX News-Sheet* is mailed on Tuesday around 2400 GMT and current commemorative postage-stamps are used, when available. Due to change in price of IRCs and value of U.S. Dollars, I might make error on air mail cost to Asia, Africa, and America but I am rather sure the present cost for 55 issues is $9.50 and can be paid by postal order, Check, Banknote or IRCs ($1.00 = 8 IRCs).

Minnesota Twin's Certificate: Issued free for having QSOs with WØQXA and her twin sister, WØQXF. One twin must be worked on phone and the other on c.w. and it does not matter which is which.

Notes

Yes, the fine photograph of the group at the Independent County Hunters Convention in Kansas City July 4th came. Unfortunately a couple were not identified and perhaps there could be some identification errors, but I think they are few, and I'll be happy to make any additions/corrections in a future issue of *CQ*. Although the identifications are listed in 5 rows, the rows are not very straight and to help you follow them across, I will identify each member of the opposite sex with (F) for female after their call. Members of MARAC received a special sheet with their photograph to help with their identification, unfortunately I can not reproduce it. Back row: WB6AUA; WN6BGM(F); K9GTQ; WA9LNW; W3RWJ; W4KA; K4ZLE; W9DRL; K9DCJ; WA9SKB; W2EQQ; WAØJRZ; W3FVU; KØQIX; WB8DRR; WA4ULL; K6HZI; KØTVY; WAØLPA.
Row 2: KØARS; K8DCR; K7ZJP; K4KA; SM5EAC; K9KYF; K9LUI(F); W9SOM; W9CNG; WØGV; W4IGW; W4HA; WBØCQE; WA5SKI(F); W9ZHD; VE6AYU; WAØCSL(F); WAØVDO(F); KØPFV; W2BLM; K9CSL; WB4GGA; ??; W1AQE; K3LXN; VE3GCO; s.w.l.; K8RNH; W5HDK; KØIFL; ??.
Row 3: W7OK; W7CDH(F); K6BEP; WB2CUI; KØYGP; WØAYL(F); WØAGZA; WAØLRC; W4NUL; WAØZCQ; WAØPJX; WAØTDQ; W4JVN; W7HVH; WA4LSU; W6LWM; W8OA; VE3CBY; WB6UYV; WB6EXT; WA8YPZ; WAØCQO; WA9GOH.
Row 4: WØKYG; WAØSLG; K9HRC; K9QGR(F); W4IZR; K2PFC; WA9EZP(F); WAØKGD; WAØSBR; WAØDCQ; WAØSHE(F); WA7IRD-

[*Continued on page 98*]

The most powerful signals under the sun!

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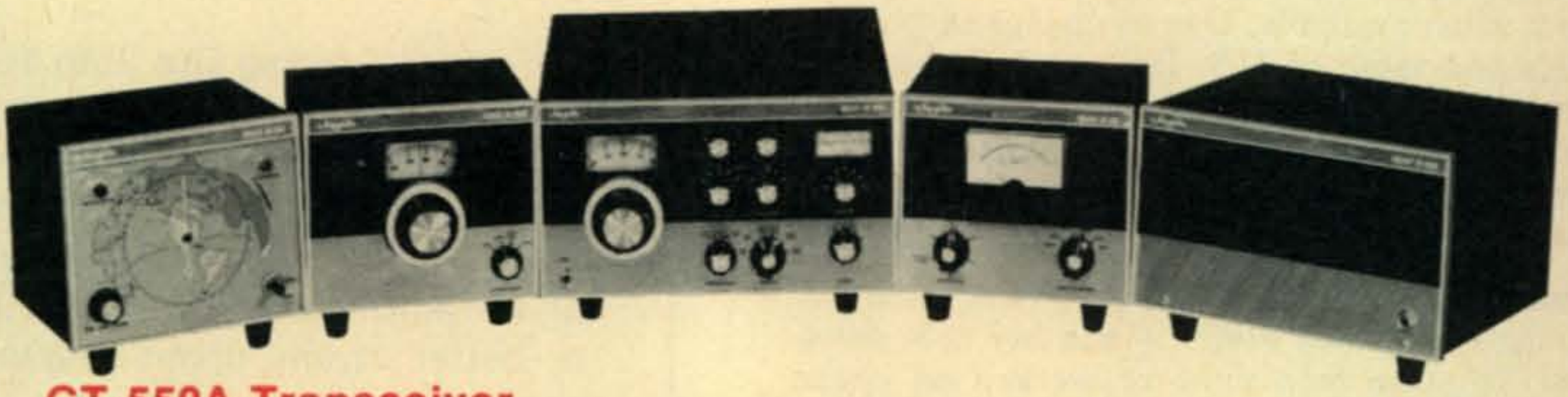

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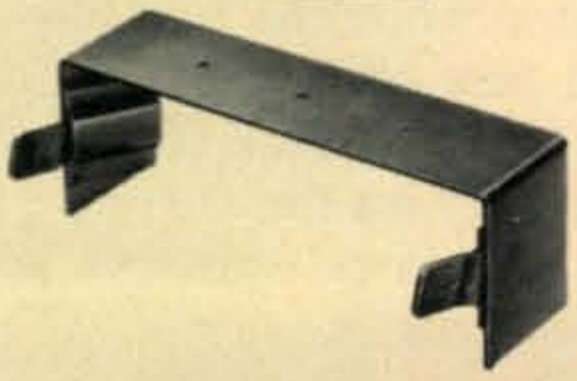

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Q AND A

BY WILFRED M. SCHERER,* W2AEF

HFO and BFO Drift

QUESTION: Can you suggest how to cure a b.f.o. frequency shift in my NC-155? The shift occurs when my central air-conditioning system goes on and drops the a.c. voltage to the receiver by about 3 volts. The frequency shift is downward. The receiver returns to the original frequency when the air conditioner shuts off. The regulated voltage to the b.f.o. seems stable; however, the 6.3 v.a.c. to the filaments and the unregulated d.c. voltages suffer a drop when the air conditioner kicks in.

ANSWER: First we suggest that the problem might lie with the h.f. local oscillator and not with the b.f.o.; nevertheless, whichever the case may be and since the plate voltage for the oscillators is regulated, the probable cause of frequency shift with line-voltage variations is change in heater voltage at the tube. This may also be regulated using the scheme described in *CQ*, November 1968, under the title "Simple Heater-Voltage Regulation." A practical application also will be found in *CQ*, December 1968, under the title "More On Updated Improvements For The 51J Receiver."

Fuse Ratings

QUESTION: If one takes a 250-volt 2-ampere fuse, can it be used at 125 volts at 4 amperes? In other words, are the voltage and current ratings of fuses indirectly proportional?

ANSWER: The answer is no. The voltage rating relates to voltage breakdown or the arc created when the fuse blows. A 2-ampere 250-volt fuse will still carry only 2 amperes on a 120-volt circuit. The carrying capacity depends only on the current which when excessive, generates sufficient heat to melt the fusing element.

Apache TX-1 on 1815 kc

QUESTION: I should like to add coils to the Heath Apache TX-1 to cover the 160-meter band for spot frequency only, such as 1815 kHz. Do not desire full coverage on v.f.o.—can use crystal. Have you published any such data?

ANSWER: We have not published any data on modifying the Apache TX-1 for operation on 1815 kHz. What would be required is quadrupling the total inductance at L_{11}-L_{12} and at L_{17}-L_{18}. You can also use the alternative of doubling the above inductance values while also doubling the capacitance values at C_{37} and C_{52}. Increasing the capacitance at C_{53} also may be needed to sufficiently unload the p.a., depending on the impedance of the transmission line.

Since for 80-meter operation, the v.f.o. functions on the 160-meter band, either v.f.o. or crystal-controlled operation may be used for 160 by engaging the 80-meter position for this and the above suggested changes.

Hy Gain Model 400 Rotator Installation

Chek Titcomb, W1SD, has forwarded the following comments which should be worth noting:

"The review of the Hy Gain Model 400 Antenna Rotator in the August 1971 issue of *CQ* was read with interest. It is complete in all respects from my experience with the Model 400, except for one important point which makes it unsuitable for some installations.

The review touched upon the problem associated with the Model 400 as it pertains to the off-set of the antenna drive shaft. But it needs to be emphasized that popular heavy-duty towers, such as the Tri-Ex Model LM-470, cannot be completely retracted with the Model 400 mounted on the top section, although the top section of this tower has the leg spacing of approximately 14". The off-set mentioned in the review is the cause.

This will not become an important factor, unless the user has purchased the Tri-Ex TA-70L tilt-over accessory to facilitate antenna installation, adjustment and experimentation. It becomes impractical to attempt to tilt the tower when not fully retracted with a sizeable array mounted above the top. After all, why go to the expense of a heavy-duty rotator such

[*Continued on page 88*]

*Technical Director, *CQ*.

Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

Dec.	26	Hungarian Contest
Jan.	8-9	ARRL VHF Sweepstakes
Jan.	8-9	HARC Operation's Day
Jan.	15-16	Louisiana QSO Party
Jan.	22-24	Arkansas QSO Party
Jan.	**28-30**	**CQ WW 160 C.W. Contest**
Jan.	29-30	French C.W. Contest
Feb.	5-6	ARRL DX Phone Contest
Feb.	11-13	QCWA QSO Party
Feb.	12	CCHSRC Operation's Day
Feb.	19-20	ARRL DX C.W. Contest
Feb.	19-28	IARC Propagation CW/RTTY
Feb.	26-27	French Phone Contest
Feb.	26-27	YL-OM Phone Contest
Mar.	4-5	ARRL DX Phone Contest
Mar.	11-12	YL-OM C.W. Contest
Mar.	14-16	Old, Old Timers QSO Party
Mar.	18-19	ARRL DX C.W. Contest
Mar.	**25-26**	**CQ WW WPX SSB Contest**
Mar. 25-Apr.	2	IARC Propagation Phone
Apr.	29-30	WAE RTTY Contest

Hungarian Contest

Starts: 0000 GMT Sunday, December 26
Ends: 2400 GMT Sunday, December 26

This is a world wide type contest with operation permitted on all bands, both phone and c.w. There are three categories, single operator, multi-operator and s.w.l.

Exchange: RS/RST and your ITU Zone number.

Scoring: Contacts between stations on the same continent 1 point, on different continents 3 points. If it's with an HA/HG5 it's worth 4 points and 5 points if it's an HA5.

The multiplier is determined by the number of different ITU Zones worked.

Final Score: Total QSO points multiplied by the sum of ITU Zones worked.

Awards: The world leaders in each of the three categories will receive the Budapest Memorial Plaque. And certificates to the top stations in each country in each category.

A summary sheet with the scoring and all the necessary data, and a signed declaration is also requested.

Mailing deadline is January 15th to: BRAL Contest Committee, P.O. Box 2, Budapest 134, Hungary.

HARC "Operation's Day"

Starts: 1700 GMT Saturday, January 8
Ends: 2300 GMT Sunday, January 9

The Hollywood ARC announces its first "Operations Day." The Club will have its station WB4TON active during the full 30 hour period.

Exchange: Signal report, state, province or country and operators name.

Awards: Special QSL card to everyone working WB4TON, a certificate if you work him on both c.w. and s.s.b., and a special certificate if its on all 5 bands.

On c.w. look for them 70 kHz in from the bottom end of each band. On phone 3930, 7230, 14330, 21430, 28530.

Send your QSL and list of contacts you had with WB4TON, along with a s.a.s.e. to: Robert Patten, W4OZF, 2311 West Nassau Drive, Miramar, Florida 33023.

Louisiana QSO Party

Starts: 1800 GMT Saturday, January 15
Ends: 2200 GMT Sunday, January 16

This is the 7th annual party sponsored by the

Ellen White, W1YL, Deputy Communications Mgr. of ARRL, presenting Rick Niswander, WA8VRB the North America continental Plaque. Rick was the operator at HR2GK in the 1971 ARRL DX C.W. Contest.

*14 Sherwood Road, Stamford, Conn. 06905.

John Lawrence, K1KTH holding the Potomac Valley Radio Club Phone Trophy, highest United States all band award in the 1969 CQ WW Contest. John did it again in 1970 on C.W. this time. I'm minding the Frankford Radio Club Trophy for him.

Lafayette ARC. The same station may be worked on each band and mode for QSO points. Louisiana may work other La. for QSO points.

Exchange: QSO nr., RS (T) and QTH. Parish for La., ARRL sections for others.

Scoring: Each QSO counts 1 point. La. multiply total by number of ARRL sections worked, (max. of 75) Others use La. parishes for their multiplier. (max. of 64).

Frequencies: 3600, 7075, 14075, 21075, 28100. on c.w. and 3915, 7260, 14300, 21400, 28700 on phone.

Awards: Certificates to winners in each ARRL section, VE8 and each country. There are 1st, 2nd and 3rd place awards in Louisiana. The W5-PM Trophy goes to the top winner in La. and the W5DDL Trophy to the highest scoring portable station. There are additional awards for portables operating from rare parishes.

A minimum score of 50 points for U.S. and 25 points for DX is required for an award.

Mailing deadline is Feb. 5th to: Lafayette ARC, c/o Danny Griffith, K5ARH, 123 Normandy Road, Lafayette, Louisiana 70501. Include a large s.a.s.e. for copy of results.

Herb Schoenbohm, KV4FZ came all the way from St. Croix, V.I. to attend the "Round-up." and pick-up the two Trophies he won in the 1970 CQ WW Contest. I'm holding the Bill Leonard, W2SKE Trophy, world champion on all band phone. Herb is diplaying the Earl Lucas, W2JT Memorial Trophy, donated by the North Jersey DX Assoc. for the highest c.w. score on a single band, (14 MHz) in the world.

Arkansas QSO Party

Starts: 2200 GMT Saturday, January 22
Ends: 0400 GMT Monday, January 24

This is the 7th annual party for the North Arkansas ARS. The same station may be worked on each band and mode for QSO points.

Exchange: QSO nr., RS(T) and QTH. County for Ark., state, province or country for others.

Scoring: Ark. stations score 1 point per QSO and multiply total by the number of states, VE provinces and DX countries worked. Outside stations score 5 points for each Ark. station worked and multiply total by Ark. counties. (max. 75)

Frequencies: C.W.—3560, 7060, 14060, 21060, 28060. Phone—3960, 7260, 14300, 21360, 28560. Novice—3735, 7175, 21110.

Awards: Certificates to the top scoring station in each state, VE province and DX country with 100 points or more.

Mailing deadline Feb. 21st to: North Arkansas ARS, c/o Don Banta, WA5ZKE, Route 1, Green Forest, Arkansas 72638.

CQ WW DX 160 Contest

Starts: 2200 GMT Friday, January 28
Ends: 1500 GMT Sunday, January 30

Starting time has been made two hours earlier to take advantage of possible European openings, otherwise rules remain same as last year, except for modified QSO exchange. This is a c.w. **only** contest. No c.w. to phone or cross band contacts allowed.

Exchange: QSO nr., RST and your state or province. It is not necessary for DX to send their QTH, the prefix will identify them.

Scoring: For W/VE/VO, 2 points per QSO with other W/VE/VO stations. Contacts with all DX, 10 points for each QSO.

For all other countries: 2 points per QSO with stations in the same country, 5 points with stations in other countries. Except contacts with W/VE/VO which count 10 points.

Multiplier: For all stations, a multiplier of one (1) for each US state, Canadian province and DX country worked.

Final score: The total QSO points multiplied by the sum of the multiplier.

Disqualification: Violation of the rules and regulations pertaining to amateur radio in the country of the contestant, or the rules of this contest, or unsportsmanship conduct, or taking credit for duplicate contacts in excess of 3 per-

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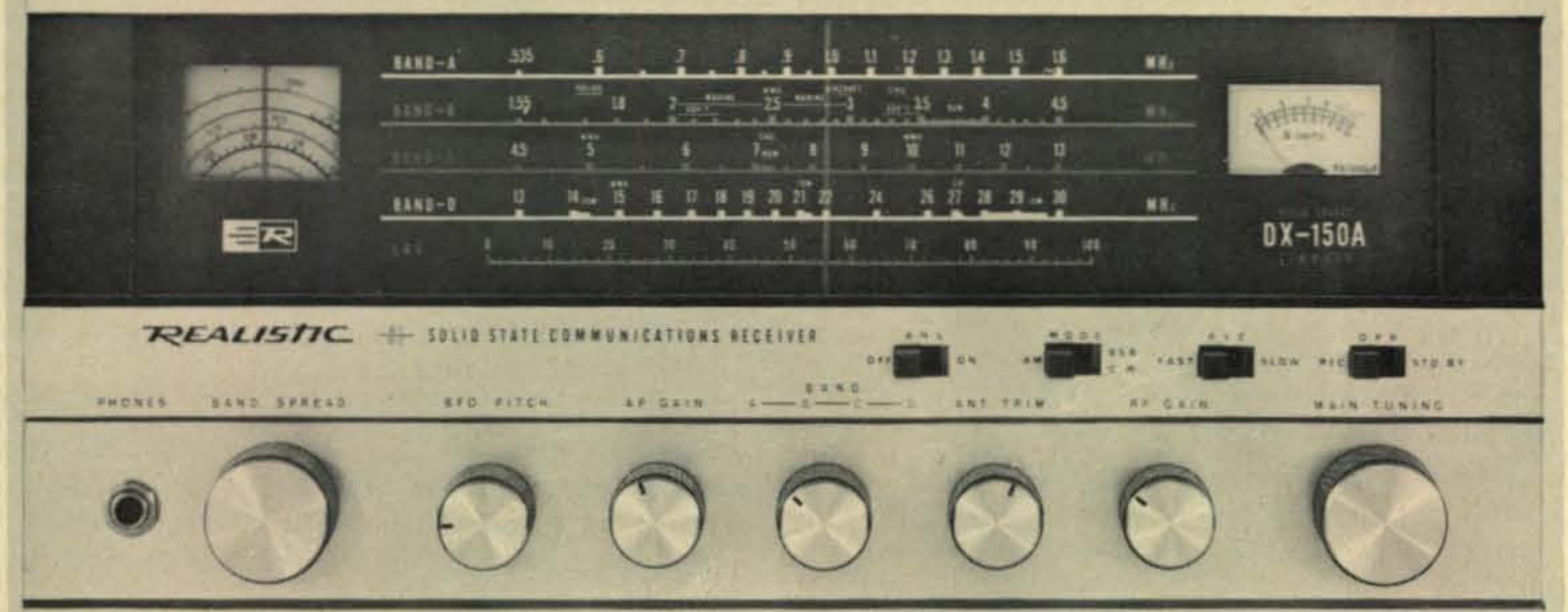

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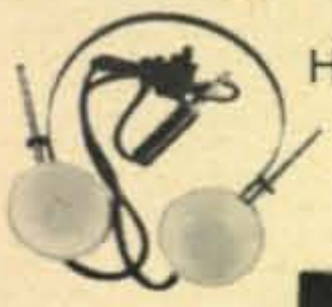

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Walter Skudlarek, DJ6QT the 1970 European Phone Champion, being presented the W4BVV Operators' Trophy by our own John Attaway, K4IIF, during a visit to Germany last September.

cent of the total made, will be deemed sufficient cause for disqualification.

Awards: Certificates to the top scorer in each state, Canadian province and DX country. Additional awards if the score or participation warrants.

A Plaque will be awarded by *CQ* to the single operator station having the highest score.

Hawaii and Alaska will be considered as "DX countries" for QSO and multiplier credit. The District of Columbia counts as Maryland. And keep in mind that VE1 is divided into three provinces, Nova Scotia, New Brunswick and Prince Edward Island.

Log sheets and United States Regulations for 160 may be obtained from *CQ*, include a large s.a.s.e. with sufficient postage with your request. (See last month's CALENDAR for regulations).

Mailing deadline is February 29th to: *CQ* 160 Contest, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050.

French DX Contest

C.W.—Jan. 29-30 **Phone**—Feb. 26-27

Starts: 1400 GMT Saturday

Ends: 2200 GMT Sunday

You may work French stations, stations in French territorial areas (9Q, 9U, 9X and etc.) and ON, LX and HB stations also in this one.

Exchange: The RS/RST report plus a progressive QSO number starting with 001.

Scoring: Each QSO counts 3 points. You earn a multiplier of 1 for each French department (95), each DUF country, each Belgium province (9), each Swiss canton (22) and LX worked on each band. (French stations will indicate their dept. by 2 figures after their call.)

Final Score: Total QSO points from all bands times the sum of the multiplier from each band.

Awards: Certificates to the top scorers in each country and US call areas. Contest contacts may also be applied for the many French awards: DUF, DPF, DDFM and DTA.

This year contest logs go to: The REF Traffic Manager: Lucien Aubry, F8TM, rue Marceau 53, 91 Palaiseau, France.

Editors Notes

The DX Department of *CQ* were busy little bees last September and October. Our DX Editor took three Trophies with him on his trip to Germany, and I had four to present at the DXCC meeting near Boston.

There were probably more contest awards handed out at the Northeast DXCC Round-up in Waltham, Mass. than in any other event in these parts for some years. Besides the usual certificates, of which there were many, three of the fellows hit the jack pot and were awarded Plaques and Trophies. The photos on these pages give a more detailed description.

You will note that we have switched to a new type Trophy, pewter bowls for the Phone Contest, and pewer trays for the c.w. section. It was our feeling that the old "loving cup" we have been giving for the past 14 years had outlived its appeal. We think you will like the new image. (The foreign donors however present trophies of their own design.)

I was going to announce that we had finally caught up with the back-log and that all certificates were on the way to you, only to be stymied by a dock strike that has placed an embargo on all overseas surface mail at this writing. You just can't win,

73 for now, Frank W1WY

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SURPLUS sidelights

BY GORDON ELIOT WHITE*

THE march to solid-state receivers with fantastic stability, continues. This month I want to describe a general coverage unit built by RF Communications Inc., Rochester, New York, that has been bought by several federal agencies, and prematurely surplused in a few cases.

The RF-505 receiver is not yet common in surplus, but it should be a real beauty when numbers begin to appear. It rivals such standby sets as the Collins' 51J4, R-390 and R-390-A, with considerably less bulk, and with super-accurate tuning.

As the front-panel layout indicates the 505 is digitally-tuned. The accuracy of the voltage-controlled, phase-locked oscillators makes a dial unnecessary, or other readout devices usually found on general-coverage receivers. On this unit you merely set in the desired frequency on six knobs, the first calibrated in three ten-megahertz steps, and the other five marked from zero to nine, for 1 MHz, 100 kHz, 10 kHz, 1 kHz and 100 Hertz digits.

The 1 kHz dial may be pulled out to activate a variable-frequency oscillator to allow interpolation between 100 Hertz points.

Accuracy of tuning is specified within five parts in 10^8 using a high-stability oven for the oscillator. "Ordinary" accuracy is one part in 10^6.

While the digital tuning and phase-locked oscillator system provides great accuracy and fast setting to a particular channel, it does offer some inconvenience in scanning across the bands. The bandspread, I calculate, is roughly 2 miles for the 30 megahertz coverage of the 505. If this seems unbelievable, consider that the 100 Hertz knob has to turn about three inches at its circumference to cover 1 kHz, or 90,000 inches to cover 30 MHz . . . I find that the R-390 receivers cause wrist fatigue, compared to slightly faster tuning sets such as the Hammarlund SP-600, but the RF-505 would be a beast to tune around with, except over a very narrow range. For net work it would be beautiful, I'm sure.

Fig. 1 shows the rather complex block-diagram of the 505, indicating its dual-conversion design, with unique up-conversion to a 156 MHz first intermediate frequency, and subsequent down-conversion to a 500 kHz second i.f.

The receiver is rated to cover 1.6 MHz to 30 MHz, but will receive signals down to 100 kHz with reduced sensitivity. Reception is of course upper or lower sideband, independent sideband, a.m., or c.w. The receiver does very well in almost every mode—audio, RTTY, FAX, etc., when equipped with the proper demodulator units.

The oscillator is fully synthesized and the entire set is solid-state throughout. Coverage, without interpolation is of 284,000 channels in the above-mentioned 100 Hertz steps. Sensitivity is rated at ½ microvolt for 10 db signal plus noise to noise ratio. Audio output, on two separate lines, is 600 ohms, up to 3 watts.

Power may be a.c., 100 to 260 volts, 48 to 1000 Hertz. D.c. input of from 10-40 volts may also be used. Power drain is a maximum of 60 watts.

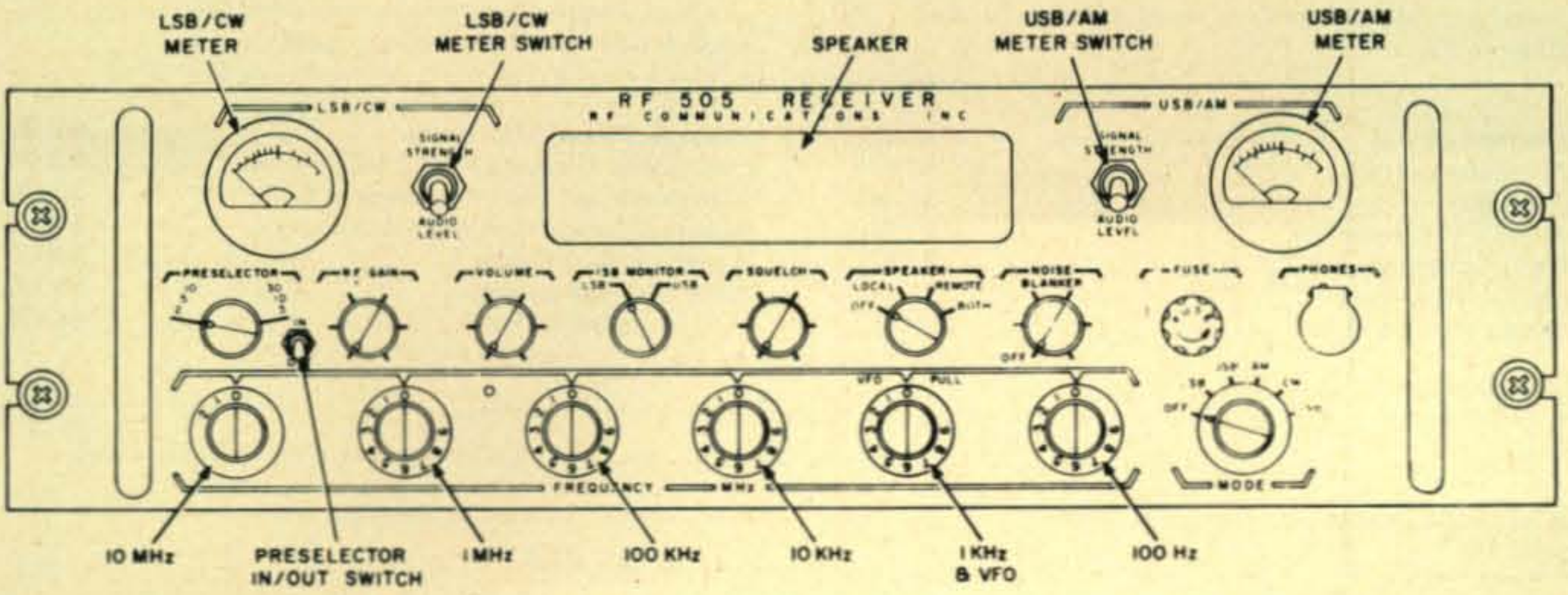
The unit is divided into five major modules, in addition to the main chassis: receiver, synthesizer, power supply, frequency standard, and preselector.

Optional accessories include a noise blanker and c.w. filters.

The set weighs 29 pounds and may be mounted in a 19 inch rack or used in a desktop configuration.

R.f. input is via a BNC connector, and is nominally 50 ohms. ■

*1502 Stonewall Rd., Alexandria, Va., 22302.



Front panel design for the RF Communications RF-505 receiver.

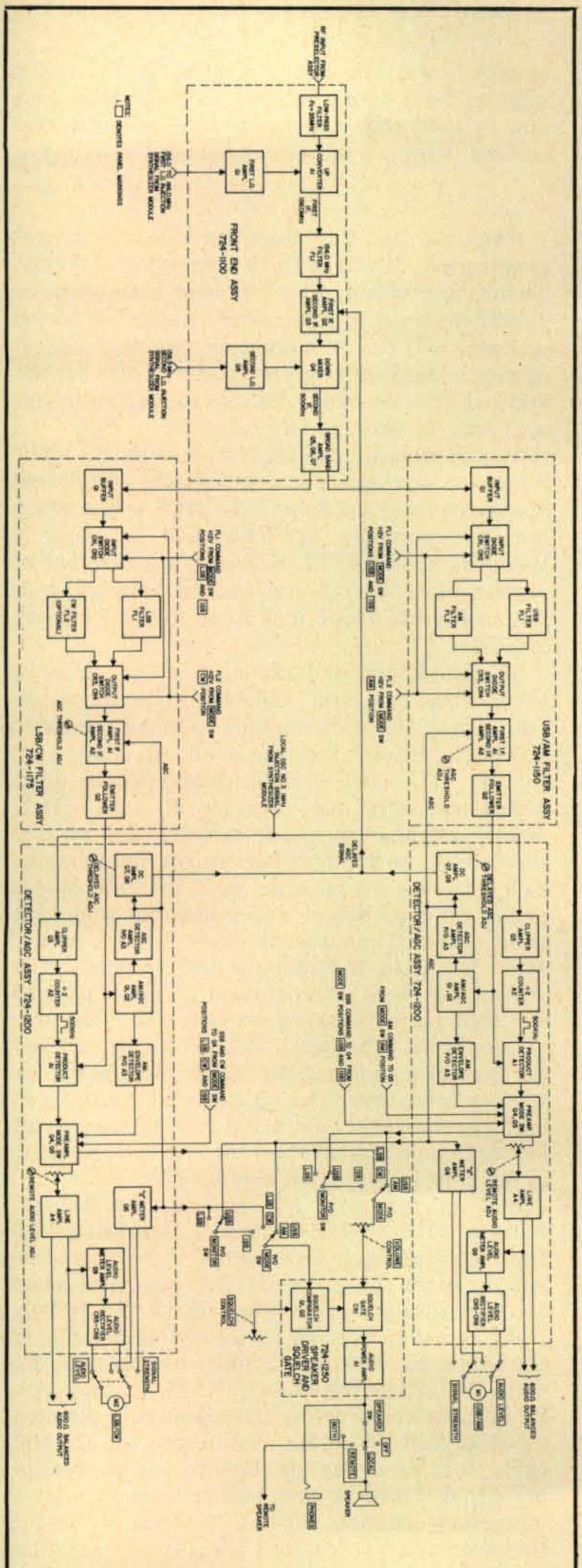


Fig. 1—Block diagram for the RF-505 receiver.

F.M. [*from page 48*]

Solid State COR

K5FOG (Arlington, Texas), better known as "Foggy Joe" has been using a solid-state COR for several months with considerable success. Although Joe is using it primarily with Motorola receivers and power supplies the circuit can be adapted by adding resistance at point X to work with virtually any other type of equipment. The circuit is simplicity. The large value of capacitance from the 6 v.d.c. line is needed when used with the Motorola power supplies because the 6 v.d.c. line is normally used only to power relays and has little filtering. When used with other supplies this may not be needed. Again this is for the builder, but it should appeal as a first project for the new f.m'er.

Corrections

The caption under the photograph of the La Porte, Indiana, .22-.82 repeater in the November issue should indicate that it is on the property of the Conrad Corporation, not Concord. Jim Conrad, K9LHC, and his father have been friends of this columnist since high-school, and I know what the company name is. Just one of those type-setting errors. Sorry Jim.

Also, while looking back at the crystal frequencies on page 52 of the April, 1971, issue, a group of errors were discovered. The column headed Fc-8 is 10 kHz low from the 146.88 frequency down. The last two digits should be the same as those of the columns to either side. This one is definitely my fault, for I copied that column from my records and copied it wrong.

News

Response to the Repeater Directory was simply great. It will be forth coming very shortly. Thanks to everyone who sent back their cards or passed them on to the proper people. Since the updating will be continuous, anyone who did not receive a card or any new group please let me know. There are plenty left, (in the second printing) and the postage bill is footed by *CQ*.

The Southeastern Repeater Association (SERA) recently elected new officers. The new Spokesman is Ken Kopp, WA4HAA; Secretary is C. F. Stromberg, W4WLX; and Treasurer is Walt Terrie, WA4FBI. Ken and Walt are active supporters of this column, and are very active in f.m. in Florida. Good luck to all the new officers of SERA.

The Indianapolis, Indiana, repeater has been going great guns on 146.34/146.76 for some time. Plans are in the making to move the input down to 146.16 for the standard 600 kHz spacing. The Indianapolis Radio Club, Inc., which sponsors the repeater has an HR2, mobile antenna (magnetic mount), and an a.c. supply to loan for short periods of time to members. This lets the member see if he really wants to get on f.m. before expending the time and effort. W9PSE related the plans for this loaner when I was in Indianapolis last summer. The project has been in operation about 6 months and seems to be working out very well. This type of project may be just what the doctor ordered for general amateur clubs which also operate or sponsor a repeater. The rig doesn't have to be as fancy as the HR-2, but some type of short-term loaner f.m. unit could show the non-f.m. amateur in the club what it is all about.

Still in the state of Indiana, the Central Indiana UHF-VHF Club held a Hamfest on 19 September at Eagle Creek Park in Indianapolis. Among other things, an HR-2A was given away as the main door prize. The winner K9SUW!

As an aid in stirring up 220 MHz activity in the Dallas-Ft. Worth area, this columnist, along with W5URH, WA5TKU, K5FOG, and K9PYB/5, are constructing a repeater with planned input of 220.500 MHz and output of 221.500 MHz. It is hoped that by the time this appears in print that it will be operational from at least a temporary location. Since 220 seems to be the forgotten band, it is only logical to control it on another forgotten band, namely 1296 MHz. Although early control functions will probably be on 450 MHz, the long term plans are for 1296 control.

Amateurs in the United Kingdom are doing

their best to get repeaters legalized. Kris Partridge, G8AUU, recently telephoned the author (boy am I glad I don't have to pay his phone bill, it took three calls to catch me), with information and requests for information. Their first step is convincing the RSGB about repeaters. A meeting was scheduled with the RSGB late in October. Sure hope that everything went OK. Their next step is the British Post Office (which controls like our FCC). Kris passed along some information on f.m. in Germany and on operation in the 4 meter band. The frequencies now primarily in use on the continent are 144.150/145.850 and 144.200/145.900 (1.7 MHz input/output spacing). The frequencies to look for activity on the British 4 meter band (all modes) are 70.260 MHz mobile operation and 70.350 MHz emergency channel.

Several repeater groups have been getting very good newspaper publicity by helping provide communications for parades, charity drives, and other civic projects. If your group helps out, see that the local newspapers know about it. Amateurs need all the good publicity obtainable.

Q & A

Q. Where can I obtain information on my Link model _____ unit?

A. Several requests on various pieces of the older Link equipment have been received. Unfortunately this columnist's library is blank in Link category. Do any readers know of any good sources for information on Link equipment? Motorola and G.E. are pretty well represented, but not so with Link.

Q. A group of local f.m. operators are planning a repeater. What is the best way of finding out the frequencies we can use and avoid interference with others?

A. There are several possible sources of information about frequencies in use in your area. The best way is to contract the officers of the operating repeater(s) to see if there is a coordinating committee in the area. If so, this committee can steer you towards primary and control frequencies. If not, you may want to consider formation of such a committee (comprised of members from each repeater operating or planned). If there are no known repeaters in the immediate locale, look at the various repeater directories (*73* and *QST's* have been published, and *CQ's* will be out shortly). See what frequency combinations are used in cities within a 150 to 200 mile radius. Then pick a standard pair (60 kHz input/output spacing on a 30 kHz channel spacing) which have been agreed upon nationally. If you cannot find any repeaters within the 200 mile radius then use .34/.94 or .34/.76 (depending on trend in your part of the country), or, .16/.76 as some areas are going to. Stay off 146.10/146.70 MHz unless the repeater is going to be for RTTY, for this is the gentlemen's agreed national f.m. AFSK RTTY combination.

Finale'

Well, so ends the beginning of the second year of FM in *CQ*. Suggestions, comments, news items, reader circuits, and, especially, photographs are always needed. Keep up the support and happy f.m'ing, and Happy Holidays. ■

Q & A [*from page 78*]

as this unless one is going to use a sizeable array?

Except for the unsuitability of the Model 400 for use with the tilt-over tower described above, it appears to be a rugged, well-built heavy-duty antenna rotator."

Many thanks, Chek. We had not encountered this difficulty, since our installation was on a tower of a different nature; however, your experiences with the rotator should be a helpful guide for others.

Cross Reference for Transistors

QUESTION: I am searching for a publication that will identify the equivalent transistor designations of the many various transistor manufacturing companies. Can you advise where such a publication may be obtained?

ANSWER: Allied Radio's Industrial Electronics Catalog lists the manufacturers of transistors of a given numerical identification. A cross reference to Motorola HEP types is "Semiconductor Cross-Reference Guide and Catalog," obtainable for 35¢ from Motorola Semiconductors, Box 2953, Phoenix, Arizona 85036.

Bill, W2AEF

QRP Rig [*from page 42*]

set on the sidetone board, not adjustable with the front panel volume pot, yet more than loud enough.

On all of the units a polarity protection series diode is used in the power lead (leaving it out on one of the transmitters allowed the authors to check several types of final transistors after one late evening mistake). The *Handbook* power supply[3] works well for the transmitter, and introduces only minor hum into the receiver.

Construction

Several variations on the same theme were used for the final product as the pictures show, although the bread board for the first versions were in fact a wood board and an

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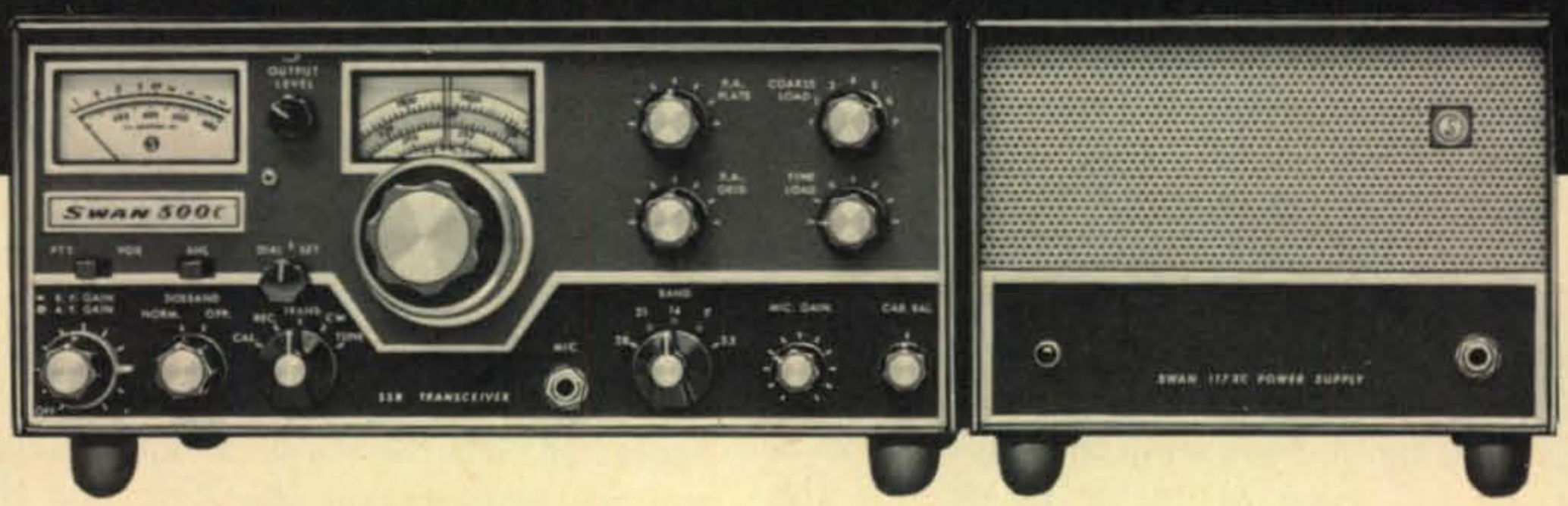

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old chassis, used many times for bread boards. All that is needed is a tray to set modules on, either flat or on edge, a front panel to hold the controls, and a back lip for the outputs. The v.f.o. boards as now supplied are in a configuration that must be set flat and broadside to the panel, but this could easily be remedied.[4] For best mechanical stability, the v.f.o. board and the Jackson vernier dial must be mounted to the same platform, but separate from the front panel. This way, the only time mechanical changes affect the v.f.o. is when the v.f.o. knob itself is manipulated. Two types of read-outs for the dial mechanism were used. The turning disk and stationary fiducial mark used in both transmitters is probably best. The National dial excutchion and pointer used on the receiver, although very nice looking, was much harder to get properly centered and does not seem as stable. A calibrated "disk" is given in fig. 5. Mounting the tuning capacitors caused some problem. In one of the transmitters the bottom mounting holes were tapped (4-40) and standoffs from the bottom plate used. This is not the most compact arrangement, although perhaps the most stable. In the other transmitter, and for the receiver "preselector," the already tapped front mounting holes were used, the capacitors being mounted directly to the front panel on quarter inch stand-offs.

One of the transmitters and the receiver were made on a 5 by 7 inch bottom plate, the other transmitter on a 5 by 9 plate, both with 4-inch high front panels and a 1-inch rear lip. Placement of the audio power module and the speaker on a back panel would have been preferable for the receiver, and in fact the back panel in the larger transmitter was an after-thought to accommodate the AC-6 and AC-7 modules. If any of the jacks could be mistaken for each other (if you use RCA phono jacks for power and other functions, as an example), they should be arranged so the power jacks and receiver signal jack (on the transmitter) are clearly separated and marked.

The boxes were made with "cookie sheet" aluminum and small angle aluminum. The angle aluminum was drilled and tapped (4-40), but sheet metal screws would have worked as well. Those not having access to "cookie sheet" cutters and vises to bend the material might use a Bud-type aluminum utility box. The 9 x 6 x 5 or 10 x 8 x 7 units would have room for the complete transmitter and receiver.

Several finishing methods were used. The easiest and probably the most scuff resistant was with "contact" paper, available in a variety of colors — even wood grain. The front panels were washed free of finger prints and machine grease, wiped with vinegar, and sprayed first with zinc chromate and then flat black. Embossed tape labels and transfer letters were used to identify control functions and jacks.

QRP Operation

Without a doubt, this is one of the most fun rigs to operate you can imagine when you think of the combination of QSO's per watt and per dollar. Using an Ultimate Transmatch[5] and a 3/8 wavelength antenna on 80 meters which works well on the other bands, and a sensitive "power meter"[6,7] portable operation on 20-80 is a ball. The home antenna farm makes checking into the local and state nets a cinch. Contacts over the whole country are possible, and occasionally a real DX thrill occurs.

Care must be taken when using a direct conversion receiver to make sure you are on the correct sideband. If you tune up from the bottom of the band with the receiver, then tune down from the top with the transmitter, or vice versa, you will be on the correct sideband, and not 2 kHz or so away. It is generally best to answer CQ's, but calling CQ QRPP also results in a fair percentage of contacts. Remember, the guy at the other end must work just a little bit harder to hear you, especially if there is any QRM.

Fun? You bet! And completely within the FCC dictum on power usage.

The authors wish to thank their many friends in the Richmond area for comments and suggestions on these little rigs. ■

Footnotes

4. Al Kahn of Ten-Tec! indicates that the VO-1 module can be supplied with the tuning capacitor unmounted.

1. DeMaw, "Once More with QRP," *QST*, August 1970.
2. DeMaw, "The D.C. 80-10 Receiver," *QST*, May 1969.
3. *Radio Amateurs Handbook*, 1969 and later—also see ref. 1.
5. McCoy, "The Ultimate Transmatch," *QST*, June 1970.
6. DeMaw, "The QRP 80-40 C.W. Transmitter," *QST*, June 1967.
7. *Radio Amateurs Handbook*, 1970 and later.

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Sunspot Story [*from page 32*]

expected to be at their best during the upcoming period of low solar activity. Some fairly good DX openings should be possible to some areas of the world during the hours of darkness and the pre-dawn period of the early spring, late fall and winter months. An occasional DX opening may also be possible during the nighttime hours of the rest of the year as well.

In spite of lower solar activity, solar absorption will still rule out the possibility of daytime DX openings on 40, 80 and 160 meters.

In summary, low solar activity is expected to prevail throughout most of 1972. It should be a fairly good year for DX propagation on 15 and 20 meters during the daylight hours, and on 40 and perhaps 80 meters during the hours of darkness. ■

Curtis Keyer [*from page 35*]

grams. These occur in the sequences shown.

Each quadrant in the memory system stores only *one* piece of information. The data in each and the sequences of the quadrants cannot be interchanged between programs. Figure 2 shows where the only variations may be had between program material (that at X and Y).

Program Writing

The programs are written in the following way:

Referring to fig. 3, with the switches set at appropriate positions the first section (quadrant X) of program A is written by initiating the start and operating the keyer during the first period between when the quadrant lamp extinguishes and re-lights. For example: at fig. 2 CQ CQ would be sent during this period. Further writing of this program is not needed until the program cycle is completed (as indicated when the CYCLE-COMPLETE lamp goes on). The last section of program A does not have to be written at this time, as it will be recorded automatically during the writing of program B. Instead of waiting until the cycle is automatically completed, the STOP button may be depressed to do so manually.

Program B is made with the PROGRAM switch set accordingly and initiating the start. As before, the quadrant lamp goes out at the start, but this time the keyer is not operated until the lamp comes on again, indicating the start of the second quadrant Y. The data for Y may then be keyed until just before the lamp extinguishes, indicating the end of the quadrant which in the example contains CQ TEST. When the lamp then goes out, the keying must be resumed to supply the data for quadrant Z which for the case in point will be DE W2XXX K. The data for quadrant Z must be completed before the program cycle is completed as indicated by the CYCLE-COMPLETE lamp.

When the programs are subsequently played back, the data at quadrant Z automatically appears at the end of programs A and B and as the only section of program C. Program C therefore does not have to be written independently. The data in quadrant Y appears as the first *two* sections of program B and that in quadrant X appears only as the first section of A. The data from the different quadrants of the memory setup thus appears on each program as shown at fig. 2.

When a program is written, the clock is free-running, requiring that the operator more precisely times his keying to synchronize it with the clock; however, timing of the memory program is such that a dot or dash is properly entered even if split by late timing. If the key is depressed at *any time* during a bit window, the entry is made properly. This also applies to spaces. The memory thus is quite forgiving of improper timing and will always provide a more nearly perfect playback than the original.

Since the programs are made up of individual sections, it also is necessary to get the data into each quadrant timed so that too much or too little spacing does not occur between sections after they are put together in a program. The timing requirements thus necessitate a bit of practice and can be best accomplished by writing the programs at a speed of 5-10 w.p.m. This we did not find difficult to be carried out.

The EK-402, like its predecessors, is built on printed-circuit boards contained in a neat metal cabinet. Phono-type jacks are provided for all connections, except for the detachable power cord. The size of the unit is 5″ × 10¼″ × 3¾″ (H.W.D.) and it weighs 4¾ lbs.

For those who would like to "go all out," the EK-402 Programmable Electronic Keyer will well meet the task. It is priced at $289.95, with interconnecting cables, but less keying paddles. It is a product of Curtis Electro Devices, Box 4090, Mountain View, California 94040. —W2AEF

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Signal Generator [*from page 28*]

the power supply with two single-section 150 mf. electrolytics of the same voltage rating (150 v.d.c.). In addition, the microphone connector originally installed as the r.f. output jack was replaced with a BNC connector to make the generator compatible with other equipment used by the author.

Figure 2 is a drift-rate chart covering a ninety minute period, commencing with a cold start. The left-hand vertical axis is the frequency ordinate for the 220 MHz curve, and the right axis is the corresponding ordinate for the 14 MHz curve. The chart is intended to indicate only the magnitude and rate of drift with respect to time; the actual direction of drift was downward in frequency. It is obvious from the chart that the equipment is quite unstable when first energized; however, after a sixty minute warm-up, stability is sufficiently good to allow the equipment to be used. It is interesting to note that although the drift rate at 220 MHz is almost zero after ninety minutes, at 14 MHz the equipment is still drifting slowly (about 1 to 2 kHz every 10 minutes). The only explanation the author can offer for this is that the slug-tuned coil used on the lower band (Band E) is gradually changing inductance as the tuning slug and winding heat up. Since the tubes don't generate much heat, temperature stabilization of the coil could take several hours, assuming that ambient room temperature didn't change. At v.h.f. (Band F) this problem doesn't exist because the inductor is a solid copper strip. Proof of this theory can be demonstrated by touching the brass adjusting screw of the Band E coil with a hot soldering iron; the change in frequency is quite drastic. When the iron is removed, the generator will gradually drift back up in frequency as the slug cools down.

The modification described should be well worth the effort for the v.h.f. amateur who can't afford a new signal generator, but needs some sort of signal source for occasional testing. ■

Sonar FM-3601 [*from page 24*]

distortion. The modifications made are not known to the author, but they seem to have improved the receiver audio very much. All spurious responses were well within the 60 db down category except for the second i.f. image 910 kHz above the desired frequency. This response was only 56 db down before and after modification. Fortunately this response is in the little used portion of the 2 meter band. However, it could cause problems in some areas. Adjacent channel rejection was in the neighborhood of 62 db (30 and 60 kHz) when the 20 db quieting method was used.

Construction

Construction of the Sonar FM-3601 is excellent, with epoxy printed circuit boards and excellent workmanship. Disassembly for service is somewhat cumbersome, for the unit splits into two separate but interconnected portions. However there is plenty of uncrowded working space on the boards.

General Comments

The Sonar FM-3601 has many favorable points. Like any other unit it is not perfect. First of all, the channel selectors are not presently set up for strapping. Therefore a separate crystal must be used in each position, adding to expense. The unit comes with 2 146.94 MHz receive crystals which are paired with the 146.34 and 146.94 MHz transmit crystals. The spurious response at F_c + 910 kHz could be a problem at locations with high fm activity. Finally, the lack of a shutdown circuit to protect the final transistor could also cause problems under circumstances. Also, the need to disassemble the unit to replace and zero the crystals is a disadvantage.

Now, on the positive side, the Sonar FM-3601 is one of the best looking units on the market. The styling is quite attractive, and thus wife pleasing. Next, the construction and workmanship are among the best units seen by the author. The unit is quite easy to remove from the vehicle and use in the house as a base station with the optional a.c. supply unit. The instruction manual is one of the best seen to date. It includes complete alignment instructions, parts lists, and test hints. An easy-to-read schematic with voltage readings is also included. A complete set of pictorial drawings are all that is needed to make the Sonar manual complete.

The Sonar FM-3601 sells for $299.95 with microphone, d.c. power cable, installation hardware, mounting bracket, and crystals for 146.34/146.94 MHz repeater operation and 146.94 MHz simplex. The optional a.c. power supply model PS-2923 is $39.95. Information is available from Sonar Radio Corporation, 73 Wortman Avenue., Brooklyn, N.Y. 11207. —*K9STH/5*

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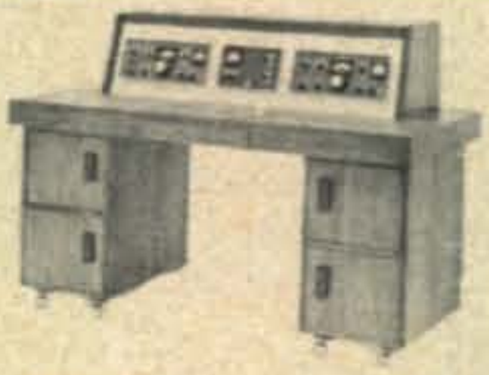

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USA-CA [*from page 75*]

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Front Row: WAØWOB; WA7GTK; WA9FBK; WØQWS; W8MJG; WØYLN; WB2SJQ; W8HMB; K5KDG; W4YWX; W1EQ; WØSJE; KØGSI; HB9AW.

Finally the application from Al, VK4SS arrived, No, it had not been sent via air mail and apparently was badly delayed by the (U.S.) West coast strike that lasted at least 3 months. In the past 7 years, to my knowledge, only one application failed to arrive and that one was apparently destroyed by fire in the mail box at the point of origin (and it was for All Counties).

To repeat for the new County Hunters, yes I am the custodian for the *CQ*, United States of America Counties Award (USA-CA) and your *first* application must be made using the USA-CA Record Book which you obtain direct from *CQ* for 1.25 (postage paid). To save time, all other mail regarding the USA-CA Program should be addressed to my home QTH.

A reminder to all County Hunters about the two QSL Bureaus—for complete data send s.a.-s.e. to ICHM QSL Agency (W6CCM) P.O. Box 146, Lakeside, California 92040 and/or to The QSL Clearing-House for County Hunters (WA2AEA) 4 Pinewood Circle, Corning, N.Y. 14830.

Happy New Year for You & Yours! How was your month? 73, Ed., W2GT.

Annobon [*from page 20*]

as of the friendly people of Guinea and its splendid President. We set course towards old Europe, Madrid, Paris, Amsterdam and finally to Helsinki. We had experienced the DX-pedition of the century with all its amusing memories and warm receptions. 15,000 radio amateurs were sharing the four weeks with us—and will receive a QSL card each.

We would like to express our sincere gratitude to PY2PE, DJØKQ, F9RM, K6LOM, W6AOA, EA4JL, EA4LH, TY1ABE and INDXA for showing outstanding ham spirit and contributing to making "the dream of Annobón" come true.

This story seemed to follow the rule: if the end is well, all is well. But not alltogether. Out of the four types of African malaria we got three—struggled four days through 110° F fever, spent four long weeks in hospital and still have the malaria organisms in us. We were also taken aback by the news of the violent murder of the American diplomat whom we had met and of the nervous breakdown of Mr. Erdos whom I mentioned in the story. There are many DX-stories being told —here we are with one of them... ■

Ham Shop

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oin QRP ARC Int.: Send SASE for info. Corres-onding Secretary, Earl R. Lawler, W5JLY, Rt. 2, ox 24K, Burnet, Texas. 78611.

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AMPKIN Type 105-B micrometer. Frequency me-r with engineering data sheets, like new —hard-used, in orig. carton, $150. Hallicrafters HT-37—int condx, $200. Hallicrafters SX-111, $145. E FM business-band transceiver with 27.390 MHz rystals installed, good condx. $60. Marine Elec-onics, 76 New York Avenue, Halesite, L. I., N. Y. 1743. (516) 427-7199.

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NTIRE RIG: TR-4, AC-4, SB-200, HQ-170A, 3-610, TA-33 plus extras. All mint. $1,000. Will ll complete station only. Shipping not included. ed Willis, 3641 Warder St. N.W., Wash., D. C. 010.

OR SALE: Knight-Kit KG-640 20K-Per-Volt aut-Band VOM, $30.00. W2AEF, CQ Magazine Vanderventer Ave., Port Washington, N. Y. 11050.

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meter FM IC-20 Brand New, solid state, 12 chan-l, Xtaled for four, 1&10 watts, module construc-on, with mike, m-mount, & cables. $225. K7-HE, 15112 SE 44th, Bellevue, Wash. 98006.

OR SALE: Collins R390 Digital Receiver, $500. wan 500 transceiver, factory updated $350. Globe luxe VFO, $15. Vibroplex original $15. Approx. n years CQ & QST, best offer. L.E. Nichols, W2-XT, 254-17 Morgan St., Little Neck, N. Y. 11363. hone: (212) 229-2962.

OR SALE: 40' Rohn Tower $125; triband fiber-ass quad, $75; RCA Senior Voltohmist $20; ickock VOM $30; Triplett tube tester $30; 1966 eMans, superb condition, wired and shielded for wan XCVR $1200. J. Williams, APT 202, 1404 erson St., Oxon Hill, Maryland. 20021.

OCHESTER, N. Y. is again Hamfest, VHF meet id flea market headquarters for the largest event the northeast, May 13th. Write WNY Hamfest, ox 1388, Rochester, N. Y. 14603.

OR SALE: Heath IP-32 Variable-Voltage D.C. egulated Power Supply. $45.00. W2AEF, CQ agazine, 14 Vanderventer Ave., Port Washington, Y. 11050.

WANTED: Dictaphone Dictet recorder OK or for parts; Also someone to service one. Douglas, 2254 Pepper Drive, Concord, California. 94520.

HOOSIER ELECTRONICS Your Ham Headquarters in the heart of the Midwest where only the finest amateur equipment is sold. Authorized dealers for Drake, Hy-Gain, Regency, Ten-Tec, Galaxy, Electro-Voice, and Shure. All equipment new and fully guaranteed. Write today for our low quote and try our personal friendly Hoosier Servie. Hoosier Electronics, Dept. E. R. R. 25, Box 403, Terre Haute, Indiana. 47802.

QSLS. Second to None. Same Day Service. Samples 25 cents. Ray, K7HLR, Box 331, Clearfield, Utah. 84015.

SWAN TV-2 Xverter. 14 MHz I.F. Brand new. $199. W2ERV, 14 Bernice Fr., Freehold, N.J. (201) 431-2367.

MOHAWK RECEIVER $150, KAAR FM40A Receiver, $25. 2 KAAR FM-177 X'X mtrs, $30. BC348H receiver. $45. W7INR/6, 360 Sharry Lane, Santa Maria, Calif. 93454.

SELL: GR Distortion Meter 732B; DC PS 24v50A reg., German DL-QTC magazines; Conrac 14" TV Monitor; Beckman DCU's 705&707; IEEE Digital readouts. K. Paquee, 53 Jerome Ave., Turmbull, Ct. 06611.

GENERAL-TECHNICIAN CLASS EXAMINATION TEXTS-ANSWERS. You can't lose. $2.00 postpaid. CRD Associates, Post Office Box 29., Western Springs, Illinois 60558.

FOR SALE: SB-34 Mint condx. With car antenna mount—$150. Ralph Garcia, 52-14 39th Avenue Woodside, N.Y. 11377.

SALE: Heathkit SB-102 and HW-32A with AC-DC supplies. Bob, WB4ORP, 715 Ridgelawn Pl., Tullahoma, Tenn. 37388.

MAGAZINES FOR SALE: Send list of Ham (only) issues needed, money (10 cents each), and postage costs to Lockheed Amateur Radio Club, 2814 Empire Ave., Burbank, Calif. 91504. Your issues (and any refund due) will be sent promptly.

SELLING EXCESS HAM GEAR: Gonset G-66 and G-77 mobile receiver and transmitter. AN/URA-7 dual diversity teletype converter. Vibroplex key. B&W plug-in coils. ATR DC/AC inverter. Send SASE for details. Baul Boivin, K2SKK, 319 S. Orange Ave., Livingston, N.J. 07039.

HELP! Need Manual for Knight Model C-27 CB Transceiver. Buy, rent or make a copy. All return guarantee. Write A. P. Worbis, Box 8916, Mexico 1, D. F., Mexico.

NORTH DAKOTA STATE SCHOOL OF SCIENCE has just started an Amateur Radio Club. We have no funds for equipment and funds cannot be appropriated for us, so we must turn to the public, the Amateur who has an old piece of equipment just lying around in the shack — this would get us on the air, parts and pieces of any kind that you would like to donate to the club. The postage will be paid for by us. Send all letters to WB0BIN, Tiny Dablow, Box 1073, North Dakota State School of Science, Wahpeton, N. Dak. 58075.

FCC "TESTS-ANSWERS" ... Original exam manual for F.C.C. First and Second Class License —plus— "Self-Study Ability Test." Proven! $9.95. Satisfaction Guaranteed. Command, Box 26348—H, San Francisco, Calif. 94126.

FOR SALE: Earphones FOB. 5 sets Branded Superior; 1 set Trimm lightweight; 1 set WE509W; 2 sets WE lightweight; any of above $5 a set; 4 Cannon Cheifs, $4 a set. Douglas, 2254 Pepper Drive, Concord, Calif. 94520.

WANTED: QST Magazines, 1928 or older. Give price. W3QII, 5899 Barnes Ave., Bethel Park, Pa. 15102.

COLLEGE RADIO CLUB needs donation. Will be appreciated. Surface postage refunded. Larry E. Price, W4DQD, P. O. Box 2067, Georgia Southern, Statesboro, Ga. 30458.

ALMOST FREE. Taped code lessons for beginners to 5WPM. TCRC, 3637 West Grandview, Tacoma, Wash. 98466.

WORKED SOUTH AMERICA CERTIFICATE: Work all 13 countries. Send $1 and confirmation list to: HC1TH, 4050 Drummond, Houston, Texas. 77025.

Munston "Nassau" marine radio telephone with 5 marine channels installed, manual included. $60. Western Electric push-to-talk telephone-type handsets, brand new, original price, $35 ea — asking $15 ea. Marine Electronics, 76 New York Ave., Halesite, L. I., N. Y. 11743. (516) 427-7199.

TELREX beams, new, orig. pkg. 6el. 20m, 10el. 10m 3el. 40m all for $1000. New cost $2000. E. Flinn, Jr., Box 100, Carrollton, Ga. 30117. (404) 834-2000.

WANTED: R390, R390A, R389, R220, 51S1, Racal, SWRC, P. O. Box 10048, Kansas City, MO. 64111.

MARINE ELECTRONICS of HALESITE, Sales & Service, Pearce-Simpson, Konel, Sonar Citizens Band. 76 New York Avenue, Halesite, L. I., New York. 11743. (516) 427-7199.

NU SIGMA ALPHA International Amateur Radio Fraternity. Memberships now available. Includes wallcertificate. ID card, newsletter, and more. Send for free brochure. Box 310, Dept. C, Boston, Mass. 02101.

LMV41 motors for Mdl 28 & 35. Teletype, Universal voltage, series governed with RF filter. New $26.00. 200V6A triac80 cents. SASE for list. Doug Craton, 5625 Balfrey Dr., W. Palm Bch., Fla. 33406.

VALTEC: VS-II Speech Integrators. Immediate delivery from factory. The price— $44.50, complete. The results: fabulous. Send QSL card for free brochure or orders direct; guaranteed. Valley Technics, Inc., 2901 Sonora, Kalamazoo, Mi. 49004.

WANTED QSLs for my QSOs between 1955 and 1965. Lost all cards while in Army. Will pay postage. K4EVY.

RUBBER ADDRESS STAMPS, $2.00. Signature $3.50. Free catalog. Jackson's, Box 443F, Franklin Park, Illinois. 60131.

TRAVEL-PAK QSL KIT — Send Call and 10 cents; Receive your call sample kit in return. -Samco Box 203, Wynantskill, N. Y. 12198.

HIGH SERIAL TR-4 with MS-4, AC-4. Like new appearance and operation. $475.00. Ed Heubach, 216 Edgewood, Morton, Illinois. 61550. W9AO.

FOR SALE: Knight-Kit KG-625 Deluxe 6" V.T.V.M. $30.00. W2AEF, CQ Magazine, 14 Vanderventer Avenue, Port Washington, N. Y. 11050.

ELEXCO Largest exclusive ham dealer in the Gulf South. All major product lines in stock. New and re-conditioned equipment. Before you buy, sell or trade, check our high trades and low prices. ELEXCO, 608 Papworth Avenue, Metairie, Louisiana. 70005. (504) 834-9000.

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FOR SALE Standard Com. SR-C 826M with A.C. Power supply. MINT CONDX. $260.00. I. Jacobson, 21010 Anza Ave., Torrance, Calif. 90503.

WANTED: Solid State TV Camera. Bob White, 116 Liberty Street, Morris, Illinois. 60450.

SELL: Late Model Collins 75A4. Vernier knob. Excellent condition. S/N 4546. $325. W7ADS, Ph. 509-GL3-3674.

KWM-2, AC & DC PS, 30L-1, Manuals, $850.00. WA6GZZ (916) 331-2185.

HEATH SB-301 and SB-401. Very clean and perfect. Sell both only. $385 firm. Fred Gallas, W2LSN, 147-37 Roosevelt Ave., Flushing, N. Y. 11354.

160 METER HELP NEEDED — Skeds wanted for 160-M. WAS Award — Pse write for AM, SSB, or CW help from WIS. WB9DWG, Box 314, Whitewater, Wisconsin. 53190.

MAKE OFFER: CQ & QST 1955-65 *plus* K6JEJ, P. O. Box 481, Wofford Heights, Calif. 93285.

CQ NOVICES: Complete station in FB shape. Hallicrafters SX-117 Rcvr and Heathkit DX-60B Xmtr. 12 xtals for 80, 15, and 40 meters. $250. Also Realistic DX-120 sw Rcvr., $40. J. Ludwig, WB4SXV, 3185 Pin Oak Way, Doraville, Ga. 30340.

WANTED: Mod./Power Supply No. 3117 for Gonset G.77 Xmtr. J. Nelson, 9614 N.E. 3rd St., Vancouver, Wn. 98664.

FOR SALE: 28ASR fine condition, $500, 32 ASR near new, $500. R. W. Emerson, W7NQI, 1075 W. Hilliard Ln., Eugene, Ore. 97402.

SELL: Plate transformer, 2400 V. at 1 amp., use bridge rectifier for 2kw P.E.P., $15.00. Heath fm tuner, model FM3A, mint, $15. B. Nastoff, 320 W. 56th Place, Gary, Indiana. 46410.

SB-301, with CW filter and manual for sale. Perfect, expertly wired. $225. B. Malt, WA1HUH, 10 Woodridge Rd., Wellesley, Mass. 02181.

FOR SALE: Any R.F. Transformer or Variable I.F. Transformer from R-390A/URR Receiver postpaid for $4.00. Duncan Covington, K5CMY, 505 Hwy. 30, Apt. 28, College Sta., Tex. 77840.

WANTED: To buy or borrow for copying. A Northern Radio Company type 152, model 2, RTTY converter, manual. Chas. Baum, WB8IRB, 6225 Ridge Ave., Cincinnati, Ohio. 45213.

EDISON PHONOGRAPHS wanted. Will trade for ham equipment. Stan Schreier, WA2VFC, 1560 Selwyn Ave., N. Y., N. Y. 10457.

FOR SALE: Heath SB400, $245; SB300, $195; or both plus SB-600 spkr, and connecting cables only $400. Steve Snyder, WA9HXX, 718 South Park, Monticello, Illinois. 61856.

SELL: 2M. Communicator I, also matching linear. 6M. communicator III, 6M. HE45-B, Heath Two'er W3MFT, 118 Mill Creek Ave., Pottsville, Pa. 17901.

FOR SALE: Lampkin 105B Freq. Meter $75.00. Ameco R5 Receiver Brand New $35.00. W2JU, 100 Bulson Rd., Rockville Centre, N. Y. 11570.

SELL: TEK 516 CRO, DC-15 MHz. overhauled new crt $450 FOB. L. C. Pochop, W6LBH, 828 W. Harvard Pl., Ontario, Calif. 91762.

WANTED: Model WR64A or WR64B RCA color generator at reasonable cost. G. Pope, WN9HCG, 101 Wyngate Dr., Barrington, Ill. 60010.

FOR SALE: HP343A VHF Noise Sourcer. $12 postpaid. WB6KKI, 217 Santa Mariana, La Puente, Calif. 91746.

BC-342 xclnt 1.5-18 mhz rcvr with manual and matching LS-3 spkr. AC power. $95. S. N. Silbert, White Sulphur Spgs., N. Y. 12787.

T11A, R19—118 to 148 MC. Cables, Connectors, and cal/cont. head. Details: CQ Mar 67, Sept. 68, $39. W3NCX, 1005 Wyoming, Allentown, Pa. 18103.

WANT: Small 2 meter FM transceiver. Please state make, model, condition and price. F.M. Strickhausen, WA0NLR, 715 Tyler, Apt. 36, Topeka, Kansas. 66603.

RT-647/SRC-22 two meter solid state FM repeater or base station, brand new. Ronald Ott, 2320 C Parker Street, Berkeley, California. 94704.

CANADIANS: Complete amateur equipment service, fully-equipped lic'd technician, kits wired-serviced. Bob Fransen, VE6TW, 227 Cottonwood, Sherwood Park, Alberta.

SHOWPIECE FINAL steel panel, copper chassis, sides-top copper framed/screened. Pair r-250s. Internal blower, filament supply. 7000v butterfly; Vacuum on 80. Bud coil 80-10, B&W tuned input. W/3 4-250s, Radio Handbook. Best offer, prefer pick-up. WA0MNK, (816) 646-4114.

WANTED: Pre-1930 Radios. Give model, price & condition. M. H. Traylor, Jr., 105 Dairy Pond Rd., Norris, Tennessee. 37828.

FOR SALE, HEADPHONES. 4 sets Trimm bakelite regulars. 1 Murdock lightweight 3 Telephonics TH37. $5 each FOB; Trimm Acme and Dictagraph 39/U $3 each. FOB. Douglas, 2254 Pepper Drive, Concord, Calif. 94520.

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WANTED: Webster Band Spanner, Heath Mobile Linear. Details to: A. Thomson, WN8GJE, Box 326, Blackman Hgts., Parsons, W. V. 26287.

TELETYPE MODEL 32ASR. Orig. owner 60-75-100 wpm. perfect $400. TT268 Ultra-high speed perf. T. D. Perera, K2DCY, 410 Riverside Dr., New York, N. Y. 10025.

SELL: Hallicrafters HT-32A $290; HA-1 keyer and deluxe Vibro-key $75. All in like new condx. R. Smith, 12 Eagle Hts. Dr., Orchard Park, N. Y. 14127.

CRYSTALS: HC-6 Holders, 1.845, 1.848, 7.011, 7.038, 7.061, 7.069, 8.107, 8.064, 8.025, etc. 55 cents each or 10 for $5.00. K8LJQ, 351 Mower Rd., Pinckney, Mich. 48169.

SELL: TS-174/U 20-250 MHz w/bk $50.00. TS-175/U 80-1000 Mhz w/bk $50.00. BC-1158/A 6 meter xmtr. Converted per CQ $20.00. BC-453 $4.00 each, have 2. Offers considered. WA8QBJ, 6305 Redbird Terr., Clinton, Ohio. 44216.

NCX-3 W/HP-2 P.S. $175.00. AN/URC-7 complete. 2 to 7MC. Never used. $200.00. Manuals for both. Ray Anderson, 4200 San Bernardino Ave., Las Vegas, Nev. 89102.

WANTED: Lge. numbers of 80/40 cw or 6/2/1 and one quarter phone band FT-243 type crystals and/or blanks. W6DOR, 4100 Worthington Dr., No. Highlands, California. 95660.

WANTED: HRO-60 Plug-in coils Sets E, F, AC. W7IFZ, 607 Sierra Lane, Henderson, Nev. 89015.

HELP: I need a Ranger One Manual. Will pay $5.00 W2IXT, 447 So. Ocean Ave., Patchogue, L. I. 117-72.

CE200V — Factory overhauled. Excellent. All modes including FSK. Original owner. Packing Crate. No modifications. Make offer. W8EMZ, Dr. F. P. Potylicki, 2223 Chestnut Rd., Seven Hills, Ohio. 44131.

WANTED: Lafayette PB-150 VHF FM Monitor Receiver. Phil Borisevich, K6PKH, 1618 Berkeley Way, Berkeley, Ca. 94703.

DB-23 Preselector, $25. Heath HD-20 Calibrator $7. Want: Cantenna and Tunnel Dipper. A. S. Gillespie, W4VON, 618 Hillcrest Ave., Gastonia, N. C. 28052.

HAM TRANSFORMERS rewound. Jess Price, W4-CLJ, 507 Raehn Street, Orlando, Fla. 32806.

FOR SALE: Lafayette 100KC Freq. Stand, $5.00 and 2 new 4X150A, $10.00 each. Postpaid. T. Isaacson, 1015 Lake Drive, Branson, Mo. 65616.

SELL: National Geographic Magazines from 1941. By the volume only (6 issues) $2.80. Add shipping. Ken Maas, Burlington, Wisconsin. 53105.

ATTENTION: New Heath Counter and Scaler, new Motorola HT220 with all accessories 2 batteries, charger and case. HT200 completely reconditioned by Motorola inside and out, new case, charger leather case with 3 batteries. Trade all or part on Collins S-Line, and linear. Write WA0SMR, Box 107, Overbrook, Ks. 66524.

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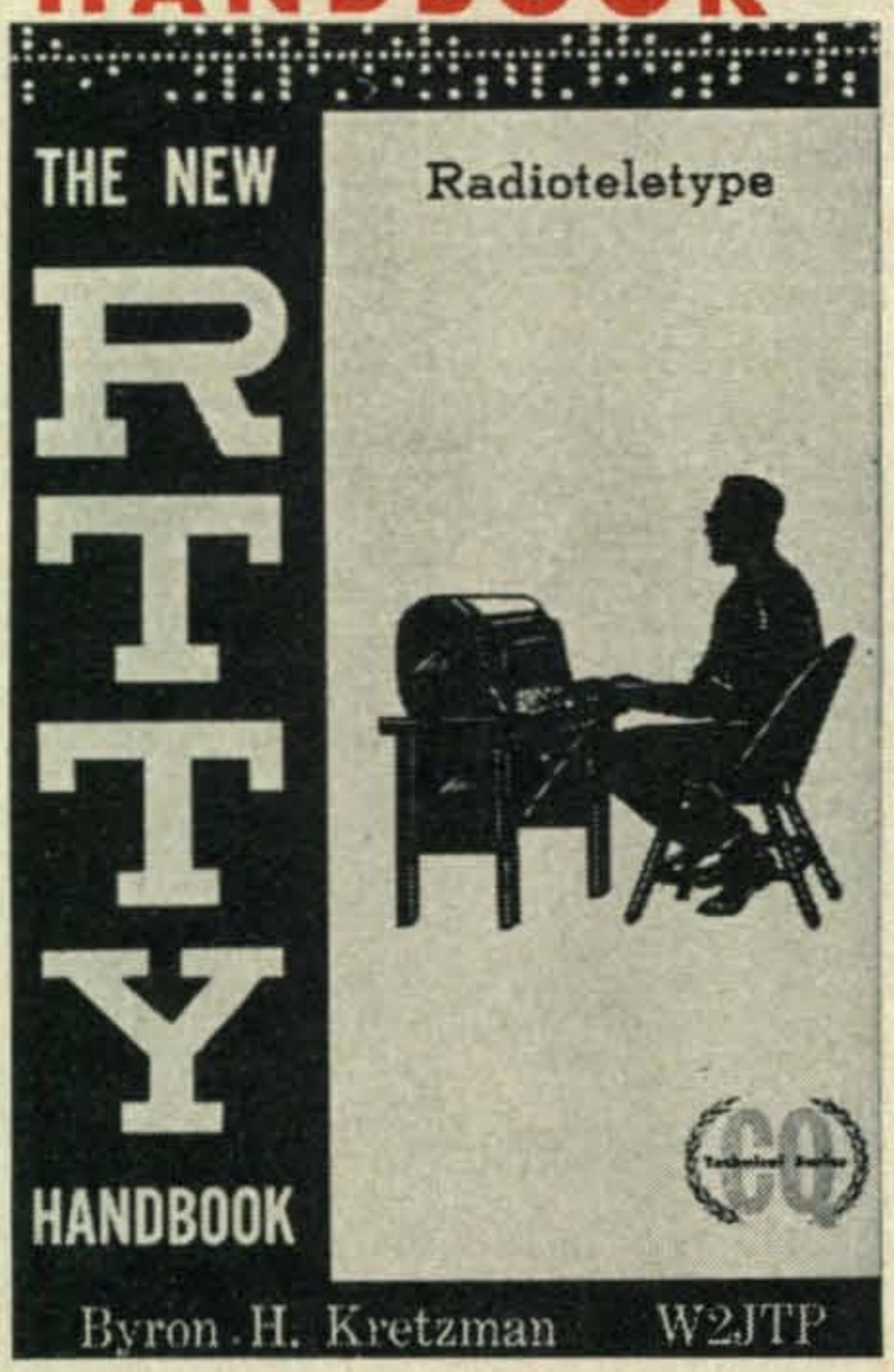

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HAM GEAR, VHF, Teletype, mobile, T.V., Cameras, test gear. Cleaning house. Free list. T. Perera, K2DCY, 410 Riverside Dr., N. Y. C., N. Y. 11025.

WANT: Lightweight tower, aluminum preferred. W1DL, J. M. Hoffer, 24 Cherry Road, Framingham, Mass. 01701. (617) 872-5084.

QRP XCVR PM-3A, $55. Gen. Cvg. Rcvr Allied A-2515, $50. Both like new. Check or MO to Smith, 12 Dale St., W. Hartford, Ct. 06107.

NEW: Hallet-Johnson shield kit for V8 motor Original sealed package. never opened. Make offer. Les Basham, Cave Junction, Ore. 97523.

FOR SALE: 2KW Millen Transmatch with meter, $90. Galaxy 2000 with Pwr Supply, $150; HQ-150 Hammarlund General Coverage Receiver, $125. Ralph R. Metheny, 232 E. Poplar St., Sidney, Ohio. 45365.

SALE: Galaxy 300 SSB Transceiver with 110V. Power Supply. One owner, mint condition. $150. W5JMH, 2328 Ave. N1/2, Huntsville, Tx. 77340.

FOR SALE: Pick up only. Hammarlund HQ-110 80 thru 6 mtr. Dual conversion Rcvr, perfect condx, $85; Heath DX-100B xmtr, 80 thru 11 mtrs AM/CW. 180 W. As is, $45. 3904 San Juan St., Tampa, Fla. AC 813-837-4155.

WANTED: Other hams to buy stainless steel ground rods and share freight cost with me. Sase for details. Locals only. K2MFY, 2 Nutley Ct., Plainview, N. Y. 11803.

HT-32: Excellent condition, $175.00. Tel. (614) 471-0669, R. Bryant, W8KVV, 2638 Perdue Ave., Columbus, Ohio. 43211.

WANTED: National SW-3, FB7A, W0KC, 10 Taylor Estates, Kirkwood, Mo. 63122.

ANTENNA TUNER WANTED: Johnson, Harvey Wells, etc. Art Prutzman, K3DTL, 31 Maplewood, Dallas, Pa. 18612.

EICO 710 GDM (new) $30.00 ... KNIGHT 5" Scope KG635 ex cond $75.00 ... EICO Code Osc No. 706, $10.00 ... EICO XCVR 753 w/751 DC Supply like new in orig cartons, $225.00. Will ship all or any partCOD. Rich, WA6LBA, 518 Sutter St., Salinas, Calif. 93901. Tel: (408) 449-3395 after 6 p.m.

MORROW TWINS: Sell in mint condition. Mechanically linked as transceiver. MBR5/MB560. Cliff, W6HDO, 275 Chiquita Ave., Mt. View, Ca. 94040. $100.00.

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SELL: 75A3 with 2 mech. filters and plug-in Product Detector. K6SVL, 28403 Covecrest, Palos Verdes, Calif. 90274.

SELL: Two Drake LC receivers, with 2cs, log and lac. Also Drake 2nt and Hammarlund HX-50 xmtrs. Make offer. Rich Levy, WB2MAN, 30A Arleigh Rd., Great Neck, N. Y. 11021.

KWM-2, 516F-2, DC PS, Speaker, Manual, 30L-1, all good. $850.00. WA6GZZ, (916) 331-2185.

FOR SALE: High Gain TH3 Jr. Beam, $45. Newtronics Hustler 4BTV vertical $15. Both are in very good condition. WA5WRC, Tulsa, Okla.

MINT— SWAP HW12A, Hustler 75 meter Resonator. W9HJM, 2113 Lantern Hill, Urbana, Ill. 61801.

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32S-3, 516F-2, $550; SB-102, HP-23, $380; New BN-86 Balun, $10; Muffin Fan $9; K1VTM/1, 23 Sunrise, Saybrook, Ct. 06475.

WANTED: Ham in Phila. area willing to test a 3-1000 in his rig for me. Call Ed, 215-DI3-2982.

HEATH SB-100, SB-300, Halli SK-71 Rcvr. ExInt condition. W0FGB/6, 4453 Via Pinzon, Palos Verdes Est., Calif. 90274.

WANTED: Old battery-operated radios of the early 1920's. Need not be working condition. Also want old iron toys. McKenzie, 1200 W. Euclid, Indianola, Iowa. 50125.

HW-16 $95. HG-10, $35. Instructograph with extra tapes, $30. All FB. WB6LYA, 4211 Beresford Way, Pasadena, Calif. 91103.

WANTED: SB-401 or other TX, transceiver any condx, give age, condx, price. Victor Schorn, W4RAL, Rt. 11, Box 168, Florence, Ala. 35630.

SELL: Gonset G-76 Six Band Transceiver with cal., and P.S./spkr matching unit $100.00. Cash and carry. R. Randall, 1263 Lakehurst Rd., Livermore, Ca. 94550.

SELL OR TRADE: 200 V xmtr. Want VHF gear or SSB xcvr with built in P.S. W2CVW, 13 Robert Cir., So. Amboy, N.J. 08879.

FOR SALE: Johnson Matchbox Model 250-23-3 w/ directional coupler, $65 FOB. WB6QYO, 2231 S.E. Mesa Dr., Santa Ana, CA. 92707.

NOVICE STATION — Want to buy. Art Prutzman, K3DTL, 31 Maplewood Avenue, Dallas, Pa. 18612.

WANTED: Squires-Sanders Rcvr SS-1R. Also manuals for SS-1R Rcvr; SS-1V Band Scanner; SS-1S noise blanker and BSSG-1 Spectrum Generator. Tried CO. No response. Bill Moran, W4MIB, 109 Mill St. NE, Vienna, Va. 22180 Ph. 703-938-6924.

WANT: Navy SRT-15 units and Antenna units ofr same. W4AIS, 300 Thornwood Dr., Taylors, S. C. 29687.

SELL: Good working DX-40, $30.00. FOB. Jim Fleming, 7528 W. Bryn Mawr, Chicago, Ill. 60631. 775-8179.

WANTED: CQ and QST Binders. Also want early battery-radios of the 1920's. Need not be in working condx. State price. McKenzie, 1200 W. Euclid, Indianola, Iowa 50125.

CLEANING SHACK: Bug 10.00 ART 13 w/ps complete $100.00 ARC 3 xmtr-rcvr w/ps 60.00— new xfmrs, caps, diodes, trans. SASE for list. WB4PTK, Rt. 1, Box 244, Troutville, Va. 24175.

HE45A/HE61 and HA750 6m xcvrs. Best offer. R. T. Liddy, K8CVJ, 45C Court D Laurel Brook, Brick Town, N. J. 08723.

NEED INFORMATION to where I can locate lge. numbers of FT-243, CR-6 and similar surplus crystals. Write: W6DOR, 4100 Worthington Dr., North Highlands, Ca. 95660.

WANTED: Heath SB-640 and HW17A in good condition. W4PRU, Box 492, APO New York. 09305.

WANTED: 50' fold-over or telescoping tower Ham-M Rotator. Eico 753 Transceiver. VE3BBN, Peter Pasnikoff, RR1, Port Hope, Ontario, Canada.

FOR SALE OR TRADE: Xtal-control 6 mtr Lettine xtm: AC&DC built-in power supply: approx 30 watts. Looking for 2m comparable rig. Jerry, WA2KDB, 29 Carriage Dr., Kings Park, N. Y. 11754.

FOR SALE: Swan 510X with 3 novice xtals, $25 ppd. Collins 516E1 12VDC supply. $55.00. John R. Kersten, 717 Crest Ave., Fort Dodge, Iowa. 50501.

SELL: Heath SB-310 Deluxe SWL Rcvr. Perfect, w/15 meter option installed. 9 mos. old, $200 or make offer. George, WA3QER, 116 Crestwood, Irwin, Penna. 15642.

FOR SALE: One HW-16 xcvr, $95.00. One HG10-B VFO, $35.00. Both for $125.00. Excellent condition. D. VonCannon, 324 Lawrence St., Greensboro, N. C. 27406.

4-1000A Wanted. New or new condition, Only! At good price. Will you guarantee? J. L. Best, Jr., W4KUV, 610 N. Madison Ave., Goldsboro, N. C. 27530.

SWAP FOR 2M TRANSCEIVER, have TX62, VFO-621, Trio Jr-60, same as HE80, Ameco convtr. 621 nuvtr i.f. 14M, homebrew 10-15-20 convt i.f. 2M feeding into rcvr at 2M. N.Y.C. area preferred. for pickup. WA2DWZ.

WANTED: 1873 Phillips Bottle, Pint Size. Stan Head, Jr., 151 Edgewood, Perrysburg, Ohio. 43551.

BOLEX 8mm Camera, zoom & norm lenses, editor splicer, Eumig Sound proj. $125 or trade. WA-9ANW, 4N180 Ridgewood, Bensenville, Il. 60106.

NC183 Receiver with 19 inch rack mounting. $65. Johnson 6N2 Transmitter in FB shape $55. Pete Butler, W1BPW, 3 Elizabeth Dr., Merrimack, N. H. 03054. (603) 424-7373.

2MTR Motorola P33BAM 2 Freq 5 watt, transistorized Rcvr, walkie talkie. Tuned to 34-94 no xtals. This unit has AC supply. Also included spare single freq. 5 watt head complete with case and D.C. supply (not checked). Package deal $155.00. WB5-BLX, 3728 Wilkie Way, Ft. Worth, Tx. 76133.

WANTED: Johnson Navigator or Ranger I in working condx. Must be reasonable price. M. E. Knowles, 9 Brown St., No. Billerica, Ma. 01862.

NEED: The manual/schematic of TMC model FFR 3 receiver with FFRD-6A tuning drawer. Buy or swap with current Greek stamps. George Kapsokavadis, 23 Kolokotroni St., Corfu, GREECE.

SALE: Heath Apache, $75; Heath HG-10 VFO, brand new $35. BC-348 w/AC $30; Craig Rutledge, 1600 Janrick Ave., Sacramento, Ca. 95832.

SELL: Mint condition. NCX-500, AC-500, $285. W2GCW, 192-15A 69th Ave., Flushing, N. Y. 113-65. (212) 454-2775.

HEATH SCOPE, VTVM, ham scan, 2M lunch box, keyer, etc. SASE Jurow, Box 183, Olympia Fields, Illinois. 60461.

SALE: Dual HC-6/U XTAL oven with Octal Socket, 12.6 volt heater, $2 each. WA7QJL, 2531 N. 600 E. Ogden, Utah. 84404.

FOR SALE: GEMA33, MOT T43G, 2-MOT T4-3GGV, 150Mc FM gear. Write. WA7HJR, 4819 So. Fife, Tacoma, Washington, 98409.

DOCTORS DIRECTORY — Lists over 1500 M.D., D.D.S., D.O., D.V.M. who are also hams. Published by CHC Chapter Number 24. Send $2.00 to: Sec./Treas. Dr. Wm. Fulcher, 105 Freshrun Dr., Hendersonville, Tenn. 37075. For this invaluable reference directory.

THE NOVICE MAGAZINE: A new publication for novices. DX, Nets, construction projects, and much more! $3 per year (10 issues), 40 cents single copy. 1240- 21st St., Hermosa Beach, Calif. 90254.

SELL: Complete Novice Rig, Collins 75A-2 Rcvr, Heath HD-11 Q-Multiplier, Heath DX-60 xmtr, with monimatch, transmatch, ant relay. 4 xtals Good to excellent cond. $200.00. DeLorenzo, WN-2ANB, 16 Laurel Dr., Pt. Jefferson, N. Y. 11777. (516) 473-2957.

SALE: Poly-Comm 2 AM 2 mtr xcvr AC/12v DC supply. FB condx. $150. or best offer. W2DEW, 70 Basswood Tr., Wayne, N. J. 07470.

MILLEN 90651 Dipper $50, Heath HO-10 Monitorscope $50. Waters KW Model 334 Dummy-Load-watt meter, $85. Walter Wiaduck, W92WH, 4926 Hawthorne, Hillside, Ill. 60162.

FOR SALE: SB34, mike, mobile mtg, manual. You repair rcvr. $100.00 FOB. W3MSN, 5108 Boulder, Oxon Hill, Md. 20021.

HAMMARLUND MC-35-S CAPACITOR 6-35 pf .70 R. C. Co. Dual 11-260pf, 1600 v dc 1.15 25" RG-8A/U with SO-239 & PL-259A. .55 Add Postage. Ken Maas, Burlington, Wisconsin. 53105.

WANTED: Commercial FM instruction manuals (MOT, GE, Etc.) WA3PQV, 1510 Jupp Rd., Glen Burnie, Md. 21061.

SALE OR TRADE: SR-46A, no mike, $85; TR-108 and V-107, $75; Want transistorized FMZ meter rig. WA5TDC, 2925 Del Monte Ave., Bay City, Texas. 77414.

FOR SALE: FDFM-2 2m transistorized transceiver, 10w, 6 channels, 12vdc w/AC pwr supply, $185. Mint NCL2000 Linear, $375. W7YHS, 319 N. 26th St., Billings, Mt. 59101.

WANTED: Radio News, RADIO, Electrical experimenter, modern electrics, Electrician & Mechanic, Popular Electricity, Popular Radio, Radio Broadcast, Old Amateur call books, Radio catalogs Radio Books. Erv Rasmussen, 164 Lowell St., Redwood City, Ca. 94062.

CQ, 73, RADIO, QST, HANDBOOKS BACK TO 1931. Over 600 copies, make offer, SASE for list W8EYU, 1455 Rochingham, Rochester, Mi. 48063.

FOR SALE: Car tape player, SX-101A, Test equipment, 3" refractor telescope. WA8CKT, 662 W. Lincoln, Caro, Mi. 48723.

DRAKE MN-4 Matching Network, $55; Drake RV-4 Remote VFO, $75; Bud Variable Lo-Pass Filter LF-601, $10. Linear Systems (Hvy duty d.c. converter, model 400-12M for $70. H. F. Cushing, W6LXZ, 5224 Bobbie Ave., San Jose, Ca. 95130.

FOR SALE: Vibroplex Presentation model bug. Excellent condx. Shipped prepaid, insured upon receipt of a check for $15.00. Gerard A. Baldauf, 175 Wernersville Blvd., Wernersville, Pa. 19565.

WANTED: Pwr supply: 2000v/300ma., 500v/300 ma., 15v/3a., 10v/10a. Homebrew O.K. if fb condx w/schematic. C. D. Trotman, 247 W. Maple, York, Pennsylvania. 17403.

OIL CAPACITORS: 175 MFD 6KV. Weight 140 lbs., 22" H x 13" wide x 6" D. $60 each FOB–Marty WB6NWW, Phone 213-597-2631.

MECHANICAL FILTERS: 455 Khz. 2.1 Khz. $18.95. 300 Hz. $22.95. J. A. Fredricks, 314 So. 13th Ave., Yakima, Washington. 98902.

TRAM TITAN II SSB: Still in box. $482.00. Ed Harter, Route 1, Box 129, Show Low, Az. 85901.

TUBES new and used, receiving and transmitting. 10 cents to $1.00. W4BEX, 1828 Highland Ave., Eau Gallie, Fla. 32935.

BERKELEY COUNTERS: One 43 MHz, one 2 MHz. Both working 100%. Models 5571 and 7160. 7 digits on each. Offers accepted. R. Mendelson, 27 Somerset Pl., Murray Hill, N. J. 07974.

WANTED: Heath HD-10 Keyer, IT-28 Cap. Checker, MP-10 Converter and Hustler 20M tip. Tom Coddington, WB6AWC, 7825 Scotts Valley Rd., Lakeport, California. 95453.

SALE: Model 15 Printer/table/P.S., W2JRV De-Mod. Cheap, Wanted info; Breting, 40-Rcvr. WB-6HEZ, P. O. Box 1422, Romoland, Ca. 92380.

RCA COMPUTER Tape Drive working. Second generation $300.00. WB9HWS, 408. — 51st St., Western Springs, Ill. 60558.

WANTED: Cabinet for 51J3 or 75A-3-4 to fit: (W6RQZ) 1330 Curtis St., Berkeley, Ca. 94702. (415) 526-7345.

WANTED: Cont. Cov. Rcvr(s). 180 KC — 23 Mhz or part. AM, SSB, and CW. 12VDC (pref) or 110 VAC PWR. Will trade Swan 350 with 14-117 pwr. New 1971. Adams, 263 Silva St., Hilo, Hawaii. 96720.

TC RADIO CLUB offers code tapes for beginners. CBers welcome. 3637 W. Grandview, Tacoma, Wa. 98466.

COLLECTORS ITEM, Riders Manuals 1 thru 18. You select the price tag. W3FGE, Crownsville, Md. 21032.

FOR SALE: 32S3, No. 10307, 516F-2, $600 75S3-B No. 15695, $500. Certified check or M.O. very clean. F.O.B. St. Anthony. A. H. Schnurle, W7DUP, RFD 1, Box 216, St. Anthony, Idaho.

FREQ METERS FOR SALE: FR4, FR5, and FR6 U covers .1 to 500 mcs — Three units, like new. Lab checked, guaranteed. K2VHW, Marv, 1504 New Durham Rd., South Plainfield, N. J. 07080.

WESTERN UNION Battery-operated clock, $50. Goodman, 5826 S. Western Ave., Chicago, Il. 60636.

FACTORY CLOSE-OUT. Pre-Amps list $15.95— Going for $8.00 prepaid. W8GV, 11820 Engleside, Detroit, Michigan. 48205.

SELL: 4-1000A's, new, $65, used excellent $35. SB-33, DCP/S and mike, $135. 28-pt strip chart recorders—Bristol. SASE for list. Trammell, 1507 White Oak Ct., Martinsville, Va. 24112.

RTTY INFORMATION: For the Amateur interested in RTTY. F. DeMotte, P. O. Box 6047, Daytona Beach, Florida. 32022.

SELL: DX-60 $50; HR-10B $60; HG-10 VFO $30. All for $125. Make offer. A. M. Fox, Box 895, Greeley, Co. 80631.

SELL: Lafayette HA-600 receiver and headset, excellent condition. $50.00. WB4FJO, Sherman Harrison, 1045 Wateree St., Kingsport, Tn. 37660.

SELL: Gud APR-5A Rcvr — 110V/60cy PS built-in — Tunes 1000-6200mc — you pay shipping. $75.00 or what have you to trade? K4GDI, 661 NW 75th Terr., Plantation, Fla. 33313.

I QUIT: Galaxy V Mk2. AC/DC speaker, mikes, TA-33 Jr, TR-44, Hustler 10-80. All $600. Separate, write. W0MXE, 1105 Birch, Vanderberg AFB, Calif. 93437.

FOR SALE: Mike Stand Astatic Table, $3.00 PP— Transistorized Vibrator Negative Grd. $5.00 PP— Lafayette PA77 Pto T Mike. $3.00 PP. W3MSN, 5108 Boulder, Oxon Hill, Md. 20021.

MINT BC610 w/039 FSKVFO w/many spares 5KW Lin. Amp 833's final w/spares made by B&W. Make offer. Phil, WA2IMX, 19 Alder Ln., Liverpool, N. Y. 13088.

FOR SALE: 1 Johnson Valiant Transmitter, $100; 1 S496 Hallicrafters Receiver, $100. Both in good shape. You pay shipping. K0UDF, 1100 No. Duluth Avenue, Sioux Falls, South Dakota. 57104.

FOR SALE: Goodies — RTTY, 14 page printer, TD, TU, Reperf, etc. Lots of others too. Call: WB2NVJ, (914) SC3-7598.

FOR SALE: Drake TR-6 with CW and LSB filters, Shure 444 mic and AC PS with Spkr, $795. Mint, used 5 hrs. Lampkin 105B and PPM. Excellent, w/ manuals and computer printout of freqs. Andrew Mueller, WB9GAC, Germantown, Wis. 53022.

FOR SALE: Aircraft Radio Corp. R-19, 118-148 Mhz receiver. Mint condition. $40.00, Selleck 23311 Iris Ave., Torrance, Calif. 90505.

FOR SALE: 75A4 Collins Receiver, late model, $395. Galaxie 5 with AC & DC power supply. $250. Will ship. E. C. Casey, MD. W8DWJ, 500 Norway Ave., Cincinnati, Ohio. 45229.

$1300 KW rig for $550. Mint SR-150, P-150 HT-45, P-45 relay, and cables. Package only. Gordon, 960 10th St., Number 10, Santa Monica, Ca. 90403.

GONSET SB101 Linear Amplifier without plate transformer but in great shape. $95. Peter K. Butler, W1BPW, Elizabeth Drive, Merrimack, N. H. 03054., 603-424-7373.

BUY OR SWAP FOR SIGNAL-ONE, kwm2, Drake Heath, or Yaesu. W0BNF, Box 105, Kearney—Nebraska. 68847.

WANTED: SB-500 used, in good condition. Geo. S. Peck, Jr. 204 N. Boyd, Caldwell, Kans. 67022. WA0RIO.

DESPERATELY NEEDED: Main tuning and bandspread calibration dials for Hammarlund HQ-150. Bob Trout, K3DOW, 5913 Bertram Ave., Balt., Md. Tel: 301-426-5212.

WANT: Hamband crystals and lightweight tower. W1DL, J. M. Hoffer, 24 Cherry Road, Framingham, Mass. 01701. (617) 872-5084.

HP525B 100-220 mc. $75; TS-323 Freq. Meter AC/PS 20-480 m.c. $95. Pat, 50A VHF 5ch xmtr, $10. K6KZT, 4434 Josie Ave., Lakewood, Cal. 90713.

WANTED: Electronic Calculator with Digital readout. Will swap my Model 28ASR Keyboard-base with mounted typing reperf. W9YVP, 8280 S. Tennessee, Claredon Hills, Ill. 60514.

HEATH 20 Meter Singlebander. Excellent condition, $70. 301 S. First Ave., Arcadia, Calif. 91006.

SELL: Heath SG-6 generator $15; O-7 scope $30; A-9C 20W amplifier $20; SS-1 speaker $25; GW-10D CB transceiver $45; DW-2772 CB transceiver $50; Ted Tsucalas, 162-23 96th Street, Howard Beach, N. Y. 11414.

WANTED: Hammarlund HC-10 i.f. unit. Jim Hadlock, K7JRE, 3701 S.W. Morgan St., Seattle, Wash. 98126.

FOR SALE: 16 Novice Band Xtals 80-40-15 meters, $1.00 each or $15.00 for all 16. Rob Schmitt, Number 219 3312 N. Central, Phoenix, Arizona. 85012.

WANTED: Johnson KW Matchbox w/SWR meter in gud op condx. WA1GLY, J. J. Connell, 390 Franklin St., Mansfield, Mass. 02048.

FOR SALE: Pick up only, Hammarlund HQ-110 80 thru 6 mtr dual conversion rcvr, perfect condition, $85; Heath DX-100B Xmtr, 80 thru 11 mtrs. AM/CW, 180 wts, as is, $45. 3904 San Juan St., Tampa, Fla. AC 813-837-4155.

SELL: 4-1000A— new $50, used $30. PL172— new $50, socket $25. UCS-300, $20, UXC500, $20, MASSA/CONV Model BSA250 2 channel Recording Oscillograph, $150. Trammell, 1507 White Oak Court, Martinsville, Va. 24112.

WANTED: Good FM Deviation Meter. Please state type and price. P. Lotzer, Box 1441, Langley— B. C., Canada.

REGENCY IMPERIAL, Range Gain II; KG-635 Scope for sale. WB8EEJ, 125 Gardner St., Caro, Michigan. 48723.

TRIPLETT METER MODEL 320-M. Must have 1 meter regardless of movement or condx. State price. WA9HMY, Des Plaines, Il. 60016.

TELETYPE MODEL 32 ASR, other teletype, ham, test, tv, audio, photo, aircraft, mobile-gear. Free lists: Perera, 410 Riverside Dr., New York, N. Y. 10025.

SELL: Heath Apache, mint condx, $100; SB-10 needs work, $40. MP-10 AC converter, $22; RCA 155A CRO $25. Have manuals for all. K2STV, 30 Eleanor Ln., Plainview, N. Y. 11803.

1934 TRANSMITTER PARTS Send your list of needed parts, I have most. W6RW, 8600 Skyline Drive, Hollywood, California. 90046.

WANTED: Collins 399C1 PTO/Speaker in good condition. Please state condition, age and price. Ted Chartrand, W8PRL, 3504 Snowglen Ln., Lansing, Michigan. 48917. Telephone 517-372-3116, after 2300 Z Hours.

FOR SALE: HQ160 Rec., $125; DX100 Xmitt, $75; 150W Balun, $5; D104 Microphone & stand, $7.50; Waters Clipreamp Model 372, $15; Speaker, $3; FOB. Heard Lowry, K4VFA, 915 Madison St., Manchester, Tenn. 37355.

WANTED: Transtenna Model 101 TR Switch, good condition. Best price in first letter. W4HTJ, D. E. White, 715 W. 32nd St., Richmond, Va. 23225.

FOR SALE: DX-40 Transmitter w/xtals(6), key, antenna relay. $40.00 FOB Live Oak, Fla. W. F. Montgomery, KZ5FN, Box 27, Gatun, Canal Zone.

FOR SALE: Mint Swan 500 CX, 117XC $425.00. New Swan DC $50.00; VX-2 VOX $27.00; 800 cycle CW filter, $22.00. Perfect Heath DX-35, $30; Mint Drake 2-B, $150.00. WA2RJV, Box 2775, Harrisburg, Penna. 17105.

WANTED: R.F. Attenuator Waters/B&W or equiv. W2OZH, 1257 Wildflower Drive, Webster, N. Y. 14580.

WANT: Mod./Pwr Supply Model 3117 for Gonset G77 Xmtr. OR Triad — M-15-A, "Xfmr" J. Nelson, 9614 N.E. 3rd St., Vancouver, Wash. 98664.

WANTED: New-Tronics Resonators: RM-10; RM-15; RM-20; RM-40 and Rm-75. Earl W. Carsner, 6652 Electric Ave., La Jolla, Calif. 92037.

WANTED: Millen Grid Dip Meter without coils Mackey Bug by McElroy K6IIO, P. O. Box 811, Hawthorne, Calif. 90250.

WANTED: CW Xmtrs, any condition. Price, condx first letter. WA2PCL, 101-23 Lefferts Blvd., Richmond Hill, N.Y. 11419.

35 ASR Floor Console Cabinet. Sell or trade for 35 printer and tape equipment. D. C. Harrington, K0SHK, 1620 Gardena Ave., Fridley, Minn. 55432.

WANT: 3—100Z for spare if reasonable. For sale VHF-152A. Bob Shull, 12349 — 36th Ave. NE, Seattle, Washington 98125.

WANTED: Hallicrafter SX-115 and HT-32B. Must be in excellent condition. Jon Hamlet, K4HHG, Box 573, Lexington, Ky. 40501.

HT-46 SSB Xmtr for sale. Excellent, $160. W. Karl, 24 Mill St., Cooperstown, N.Y. 13326.

WANTED: Drill Press, Lath, ARC Welder. State condition and price in first letter. Local area, W6GSF, Box 282, Concord, Calif. 94522.

BUILDERS: Selling out parts and extra eqpt. SASE to Hoffman, Route 1, Mt. Horeb. Wis. 53572

V.H.F. TRANSMITTER. 50 watts A.M. Output. BC-640. For Sale. Very good operating condx with all tuning charts, manual and Waters T.V.I. Trap. Best offer. Pick up only. Ronald A. Walsh, WA1-LZI, P.O. Box 53 Quincy, Mass. 02169

HW-32A &HP-13 /4 Hustler all for $145. Also R-100A for $60. Prefer local so you can inspect. C. Schuler, Box 154, Roscoe, Pa. 15477.

FOR SALE: 304TL, 4CX250B, 4CX300A, 4X-150A. Sockets, tubes and chimney. Best offer. M. E. Knowles, 9 Brown St., No. Billerica, Ma. 01862.

WANTED: Buy, Sell, rent manual for TDQ Xmtr. C. Crist, 25 Winter St., Nahant, Mass. 01908.

LAMPKIN 105B $99.50 Twoer $35.00 HE45B $45.00 3 Freq T43GGV, $200. FOB WA5CMC, Wichita Falls, Tex. 76301.

SELL: 3600-0-3600 Xfmrs 1 Amp, $25; 1.7 Amp $40 with 110/220 primary; MCL-2000 $340. All fob. W0AIH, Paul Bittner, 814 4th St. S, Virginia, Minn. 55792.

WANTED: Double speed key(preferably Bunnell). State price & condx. W0JX, 7765 Fontan, Prairie Village, Kans. 66208

WANTED: to buy or copy instruction manual for PesH HA-400 C linear. WA3LPK, 2300 Louise, Baltimore, Md. 21214.

WANTED: Book "Practical Wireless Telegraphy" by Elmer Bucher (1917). Advice condx and price. W7MKW, 205 S.W. 102nd St., Seatlle, Wa. 98146.

FOR SALE OR TRADE: Mod. 15 w/keyboard tape perforator, transmitter and grinder. Make offer. W0IVW, 706 Lincoln Bondurant, Ia. 50035.

TRADE: Drake L-4B and TR04 for Harley Davidson ElectraGlide. Will Barbain. K2ABQ, (516) 781-3396.

FOR SALE: Good Knight TR-108 2m. transceiver and V107 VFO. Mike and table rack. $50. K7CUY, Box J. Snowflake, Arizona 85937.

LINEAR BUILDERS: 30 Amp Filament Chokes for GG Linears. Perfect for pair 4-400A's, 813's. or single 3-1000Z, 4-1000A, etc. New, Not surplus. $5.00 ea. 2 for $9.50 postpaid USA. V. R. Murrell, K4HHA, 712C Rich Rd., Newport, Tenn. 37821.

QST 1931 to 1971, 40 years for $100. CQ 1948 to 1971 for $50. U haul. W6PYR, 4028 China Ct., Hayward, Ca. 94542.

65 FT. ROHN TOWER 7 yrs. old. First offer of $50.00. WA8MPW, 665 Hillside Rd., Seven Hills, Ohio. 44131.

WANTED: Hickok Model 3200A Digital Main Frame with DP150A 1MH counter. State condition and price, first letter. R. Wendel, WB2YYX, 160-20 Grand Central Pkwy., Jamaica, N. Y. 11432.

WANTED: Collins or Motorola R-390 or R-390A in excellent condition. J. Callan, 65 Beechroft St., Brighton, Mass. 02135.

WANTED: SW-3 and other old rcvrs. Give details first letter. All replies answered. WA4NED, Box 468, Gainesville, Ga. 30501.

SELL OR SWAP: SX-101A, 3" reflector telescope, test gear, want $ or Heath Analog Computer. SESA, WA8CKT, 662 W. Lincoln St., Caro, Mi. 48723.

WANTED: Radio Engineering Handbook by Keith Henney. WA2FFZ, 186 West Ave., Pitman, N. J. 08071.

DEC69 — Jan 71 Pop Electronics $3.69 Amateur Handbook, $2.25 Summer 70 Callbook $4.50 All postpaid U.S.A. WB4OJJ, 1644 Reece Rd., Salem, Va. 24153.

NATIONAL HRO500 for sale new condition less than fifty hours, $1195.00. Dennis Dressler, Rt. 7, Topeka, Kansas. Fone: 913-478-4751.

SELL: Heath "Q" Multiplier, $10.00. Ameco Pol-P Pre-Amp, $18.00, perfect. S. Tyler, 2045 U.S. 19 N. Clearwater, Fla. 33515.

HAMMARLUND HQ-215, like new, with 2 mechanical filters and 24 xtals. (cost over $600). Yours for $300. Pick up only. WA2RYC, D. L. Buda, 25 Meacham St., Belleville, N. J. 07109.

FOR SALE: SB301 and SB401, Factory aligned, $480, firm. WA1MIV, 59 Longview Dr., Ridgefield Conn. 06877.

MERRY CHRISTMAS to my Chicago and N. Carolina friends. "Andy", XW9AEJ and XW4AEF. K5LRY, 2212 Glorieta, N.E., Albq., N. M. 87112.

WANTED: Heavy duty rotator and Collins 302C-3 wattmeter. Mike Ludkiewicz, 143 Richmond Rd., Ludlow, Mass. 01056.

FOR SALE: SX-71 All-Band Receiver, $60.00. Pro 2-B Radio Shack Police Receiver, Latest model, $60.00. (607) 539-7612.

CANADIANS: Heath HX-20, 80-10m SSB H.P.20, $175.00. Drake 2B, 2AC, 2BG, $250. Immaculate condition. VE3COR, 4 Somerdale Sq., Scarborough, Ontario.

SALE: Mosley TA-33 Sr. Beam, $50.00, RCA scope WO-91A, $85. Swan-500 with A.C. P.S., $385.00. W3HQO, 3590 Grant Ave., Philadelphia, Penna. 19114.

LINEAR BUILDERS: Send SASE for low-priced list HiPower Parts. W6RW, 8600 Skyline Drive, Hollywood, Ca. 90046.

COLLINS KWM-2A, 312B-5, PM-2, 516 PS all $1000.00, Drake TR-6, PS, Spk all $450.00; 75-A4 32V3, Mod 15 RTTY w/converter all $450.00. Jess, W6BFO, (213) 340-4411.

WANTED: Ranger I, 1-60, 4-572B's, 100th, 6146B's. Jess Lebow, Jr., K8LJQ, 351 Mower Rd., Pinckney, Michigan. 48169.

AERONAUTICAL MOBILE: Beechcraft 4 passenger 1963 airplane. Instructor-pilot will give instruction for license. S. W. Conn Area (203) 853-9502 evenings.

HQ170 Recvr/Spkr, $160. Apache TX-1 Xmtr $60. Both $200 or best offer. Also 800 WT Linear GG 811A's $100. DAve Solt, Plainville Rd., RD No. 2, Baldwinsville, N. Y. 13027. Tel. 638-1630.

SALE: Radiola III. Circa 1924. 2 tube. Conversation piece. Investment. $35 postpaid. Worcester, R.D. 1, Frankfort, N. Y. 13340.

DX [*from page 68*]

certain score, you receive a badge showing you to be a 'Master of the Radio Sport.' This is technically the exact equivalent of 'Master of Chess', but since chess is so highly regarded in the Soviet Union they are probably not equal in the public eye."

We hope to be able to follow this up with a Part II of Amateur Radio in the U.S.S.R. in a future issue.

160 Meter News

Another great moment in top band DX history took place last *summer* when Herb, KV4FZ, completed WAC, Worked All Continents, on 160 in just one day. Everybody told me that you couldn't work much DX on 160 in the summertime, but here's how it went at KV4FZ on Aug. 16, 1971:

Asia—MP4BJI at 0207 GMT
Europe—GW4AEC at 0209 GMT
Australia—VK6HD at 1001 GMT
Africa—ZD8AY at 2356 GMT
South America—PY1DVG at 2358 GMT
North America—WA4PXP at 2359 GMT

The tough one from KV4 was working John, MP4BJI (ex-VP9GJ). Congratulations Herb.

QSL Information

AC5TY—T. Yonten, Director, Wireless Communications, D/Tshe, Thimphu, Bhutan
CR7FR—Via W7VRO
DU1FH—To WA8TDY
DU7SV—c/o WA6KGP, Box 1251, Imperial Beach, CA 92032
EA8GZ—Via VE7BWG
FM7AA—To WA8TDY
FM7WU—c/o WA5UHR
FMØIX—Via W7VRO
FPØAR—To W2HTI
G3BID DXpeditions—c/o W2GHK, Box 7388, Newark, N.J. 07107
GC5AET—Via DJ1QP
GC5ANX—To WA2MEQ/7, Lou Wilson, North Las Vegas, Nevada 89030
HKØAA—c/o K3RLY
HKØVA—Via W4VPD
HP1IE—To W2GHK
HS2AGF—Via K4FPF
HS3AFB—to WB2AIO
HU2CEN—c/o WA8TDY
HUØA—Via WA8TDY
IF9PVG—To IT1ZGY
JY8BI—c/o DK2BI
KB6DA—Via W6CUF
KC6RS—To WA6AHF
KC6WS and KC6YL—Via P.O. Box 950, Denton, Texas 76201
KS4DX—c/o W9FIU
KWØSCF—Via WØBRB
KZ5JF—To WA8TDY, 3528 Craig Drive, Flint, MI 48506
OB8V—c/o W9GFF
SM6EDG & SM6EDG/MM—Via SM6NT, Olandsgatan 16, S-502 65 Boras, Sweden
SVØWXX—To W3HNK
TJ1AW—c/o K4MPE, 3222 Yanceyville St., Greensboro, N.C. 27405
TR8MR—Via VE2DCY
TU2AZ—To DL7FT
VB1MSA—c/o VO1FX
VK9JK—Via W2GHK, Box 7388, Newark, N.J. 07107
VP2AAA—To W4DSQ
VP2LAM—c/o W7VRO
VP2SBG—Via K3RLY
VP5JA—To K4DSN
VP5RF—P.O. Box 878, Grand Turk, British West Indies
VQ9WES—Via WA3OTV
VR1W—c/o W6CUF
VS5CB—Via WA6AHF
VS9MB—To G3KDB
VS9MF—c/o G3VAO
VU2HLU—Via WØPAH
VU5KV—K. Venkataramanan, 26 Jorbagh, New Delhi 3, India
W7UXP/KH6 (Kure Island)—To KH6BZF
WD6WD—c/o K6VDP
WO6BSA—Via W6ANN
WO8HIO—To W8ERD, 311 E. Kelso Rd., Columbus, Ohio 43202
WS9UCI—c/oW9LVH, 2831 Northampton #304, Rolling Meadows, IL 60008
YS2CEN—Via WA8TDY
ZD3Q—To OZ3PO
ZD8Z—c/o W6CUF
ZF1WF—Via K4CDZ
ZK1CD—To ZL2FA
ZL3PO/C—c/o ZL2AFZ
3AØFP—Via WA6GDS
3B8DA—Alex Mootoo, 39 Brown Sequard Ave., Vacoas, Mauritius
3B9DK—To VE6AKV
3F1IE—c/o W2GHK
3V8ZK—Via F5ZK
4JØBF—To P.O. Box 88, Moscow, USSR
4W1AF—c/o DJ9ZB
5U7AS—Via WA8UHI
5X5NA—To G3LQP
5Z4LW—c/o K8UDJ for W/K, others via Bureau
7Q7AA—Via K4CDZ
7Q7CY—To ZE1CY or to W4JUK, 3237 Landon St., Lynchburg, VA 24503
7Q7LA—c/o K4CDZ
8P6CX—To WA3HGV
9E3USA—Via VE3IG
9G1WW—To W5EGH
9L1RP—c/o GW3AX
9L1WS—Via W4LF
9Q5EL—To W8WBT
9V1QJ—c/o WA5UHR
9Y4AA—Via W6CUF

73, John, K4IIF

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The Power-Mite includes a Synchrodyne direct conversion receiver and solid state CW transmitter. Drift is less than 100 Hz. Adequate receiver sensitivity even for "down under" DX signals. An "M" derived filter provides 2 KHz selectivity. Built-in side-tone, receiver muting. Integral break-in keying with adjustable delay (PM 3A only) makes operating virtually effortless. Keying is clean and wave shaped for easy copy.

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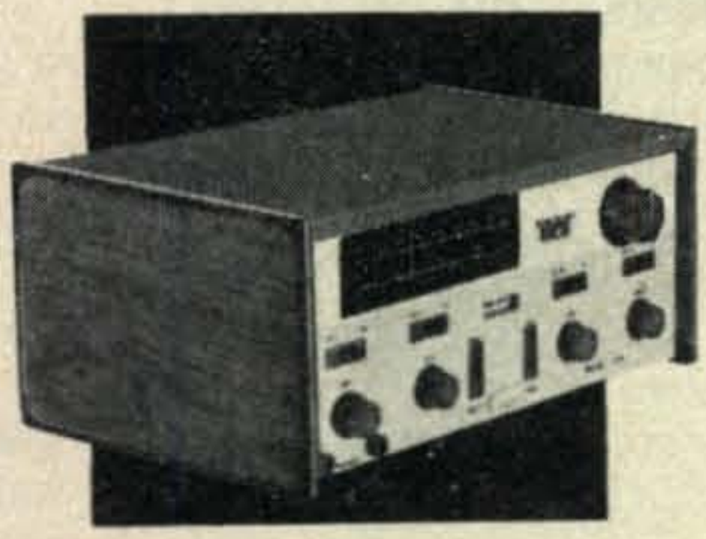

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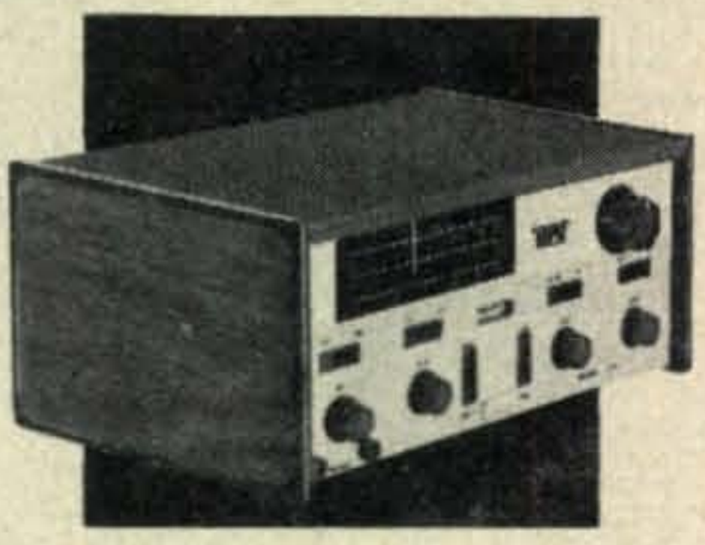

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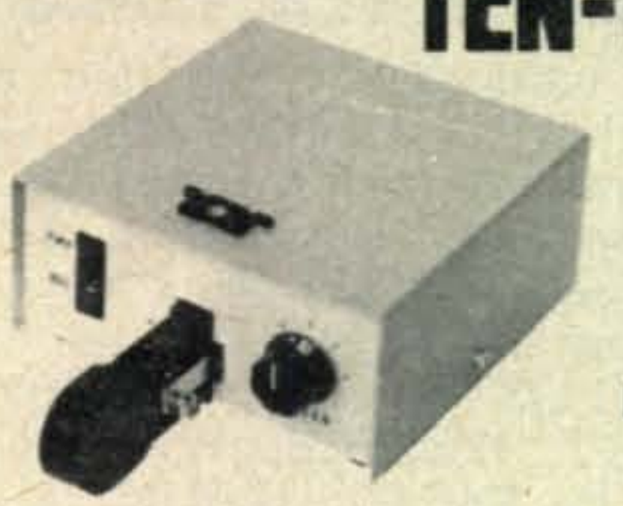
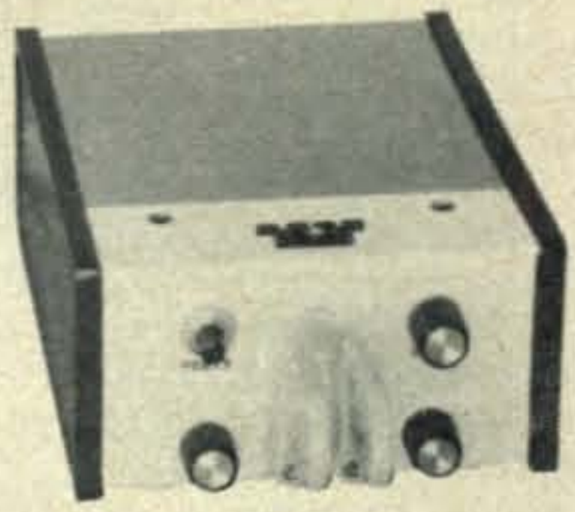


MODEL KR5

The KR5 embodies a new principle in paddle construction. It provides action usually associated with higher priced instruments. Operates from 12 volt DC source. Self-completing characters. Fixed factory adjusted paddle return and weight ratio. Ideal for fixed or mobile station.

KR5 **Price $34.95**



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KR20 **Price $59.95**
Keyer less paddles

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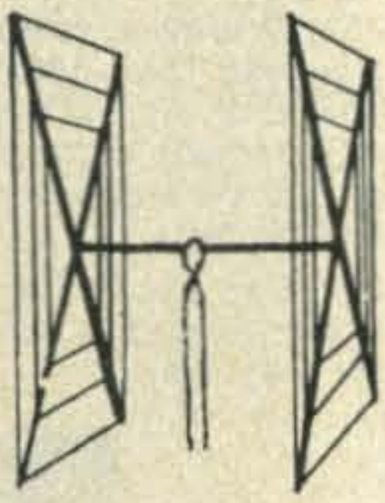
No, not yet, but we are working on it. Right now, the nearest we have come to the ultimate in strength, performance and low price are the antennas listed below. Every one is thoroughly researched as to design; constructed of the finest components; fully tested on the air for maximum performance; repeatedly assembled to arrive at the fool-proof instructions; truthfully advertised; and sold at fantastically low prices.

QUADS

Worked 42 countries in two weeks with my Gotham Quad and only 75 watts...



W3 CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Antenna Designation: 10/15/20 Quad
Number of Elements: Two. A full wavelength driven element and reflector for each band.
Freq. Covered: 14-14.4 Mc. 21-21.45 Mc. 28-29.7 Mc.
Shipping Weight: 28 lbs. Net Weight: 25 lbs.
Dimensions: About 16' square.
Power Rating: 5 KW.
Operation Mode: All
SWR: 1.05:1 at resonance
Gain: 8.1 db. over isotropic
F/B Ratio: A minimum of 17 db. F/B
Boom: 10' long x 1¼" O.D.: 18 gauge steel; double plated; gold color
Beam Mount: Square aluminum alloy plate incorporating four steel U-bolt assemblies. Will easily support 100 lbs. Universal polarization.

Radiating Elements: Steel wire, tempered and plated, .064" diameter.

X Frameworks: Each framework consists of two 12' sections of 1" OD aluminum 'hi-strength' (Revere) tubing, with telescoping ⅞" tubing and short section of dowel. Plated hose clamps tighten down on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings

Feedline (not furnished); 52 ohm coaxial cable

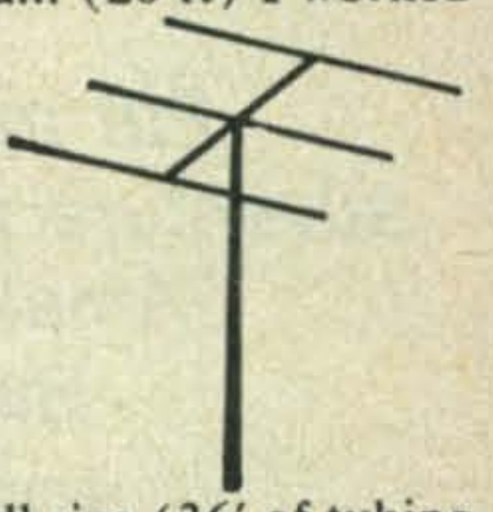
Now check these startling prices—note that they are *much lower* than even the bamboo-type:

10-15-20 CUBICAL QUAD	$37.00
10-15 CUBICAL QUAD	32.00
15-20 CUBICAL QUAD	34.00
TWENTY METER CUBICAL QUAD	27.00
FIFTEEN METER CUBICAL QUAD	26.00
TEN METER CUBICAL QUAD	25.00

(all use single coax feedline)

BEAMS

The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9-ADQ, and 4U1ITU THAT ANTENNA WORKS! WN4DYN Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history!



Each beam is brand new; full size (36' of tubing for *each* 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞" and 1" alumnium alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 EL 20	$21	4 EL 10	20
3 EL 20	27	7 EL 10	34*
4 EL 20	34*	4 EL 6	20
2 EL 15	17	8 EL 6	30*
3 EL 15	21	12 EL 2	27*
4 EL 15	27*		
5 EL 15	30*		

***20' Boom**

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2-ODH, WA3DJT, WB2FCB, W2YHH, VE3-FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1-MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3-KT. Moral: It's the antenna that counts!
FLASH! Switched to 15 c.w. and worked KZ5-1KN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5-CLK. OZ4H. and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters	$14.95
V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters	$16.95
V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters	$18.95

GOTHAM
1805 Purdy, Dept. CQ, Miami Beach, Fla. 33139

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The Yaesu FTdx 560 Transceiver.
560 watts PEP SSB. 500 watts CW.
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ncredible.

At $490 the Yaesu FTdx 560 is an incredible buy. It would be impossible if weren't for a couple of facts. One, the aesu is made in Japan; two, it's sold irect to you—eliminating the big dealr's profit.

These days, when you think of Japnese-built products, think of Nikon, or ony, or Toyota. And Yaesu. Our transeivers are state-of-the-art engineered nd carefully hand-assembled. They're o solid, stable and reliable we guarantee them for one year. Yaesu is quite kely the best transceiver made anyhere in the world today.

The complete Yaesu story is a long ne. So we've compiled a comprehenive information packet that gives you he complete picture. Including things ke comparative detail photos, a schehatic, and a comparison chart that shows you the FTdx 560's superiority over rigs you're more familiar with. Once you've looked over the FTdx 560 literature we think you'll agree that the amateur operator's impossible dream has become an incredible fact.

SPECTRONICS WEST

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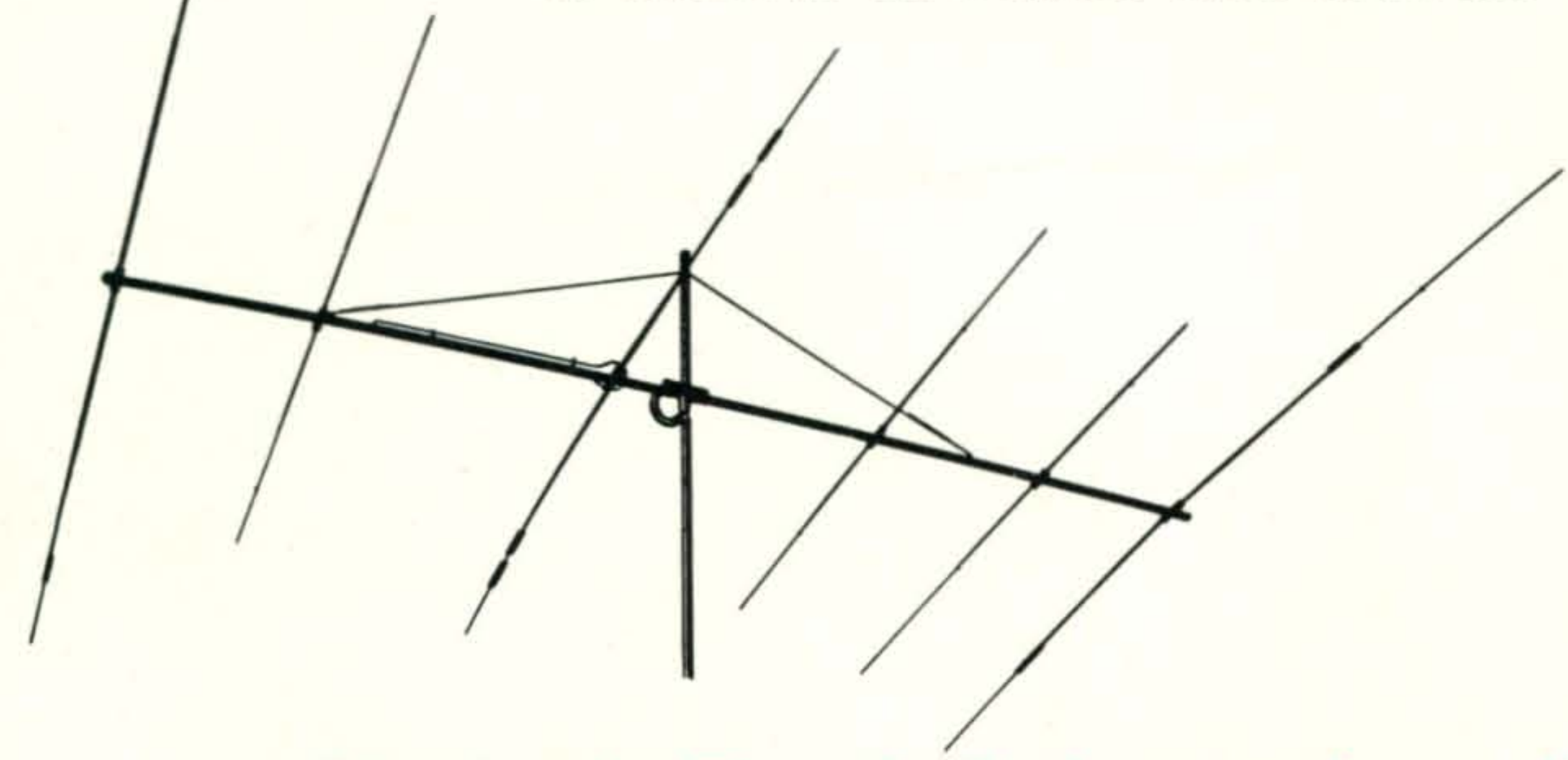
The voice of

HY-GAIN'S THUNDERBIRD 10-15-20

is heard around the world



Here's why Thunderbirds outperform all other tri-banders:

- **Thunderbird's "Hy-Q" traps** provide separate traps for each band. "Hy-Q" traps are electronically tuned at the factory to perform better at any frequency in the band—either phone or CW. **And** you can tune the antenna, using charts supplied in the manual, to **substantially** outperform any other antennas made.
- **Thunderbird's superior construction** includes a new, cast aluminum, tilt-head universal boom-to-mast bracket that accommodates masts from 1¼" x 2½". Allows easy tilting for installation, maintenance and tuning and provides mast feed-thru for beam stacking.

  Taper swaged, slotted tubing on all elements allows easy adjustment and readjustment. Taper swaged to permit larger diameter tubing where it counts! And less wind loading. Full circumference compression clamps are mechanically and electrically superior to self-tapping metal screws.
- **Thunderbird's exclusive Beta Match** achieves balanced input, optimum matching on all 3 bands and provides DC ground to eliminate precipitation static.
- Up to 9.5 db forward gain.
- 25 db front-to-back ratio.
- SWR less than 1.5 to 1 on all bands.
- 24-foot boom...none longer in the industry.
- Extra heavy gauge, machine formed, element to boom brackets, with plastic sleeves used only for insulation. Bracket design allows full mechanical support.
- Interlaced, optimum spaced elements for higher gain and better pattern control.
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New 6-Element Super Thunderbird
Model 389
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