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Dxpedition to St. Paul Island–XJ3 ZZ/1...p. 16

World Administrative Radio Conference (WARC)-79 ...p. 24

CQ Reviews: The MFJ-16010 Antenna Tuner...p. 90

CQ Reviews: The MFJ-8043 Electronic Keyer...p. 41

All time CQ WW DX Contest Records...p. 28

An RTTY Primer, Part II ...p. 67

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This NEW MFJ Super Antenna Tuner . . .

matches <u>everything</u> from 160 thru 10 Meters: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balance lines, coax lines. Up to 200 watts RF <u>OUTPUT</u>. Built-in balun, too!

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With the NEW MFJ Super Antenna Tuner you can run your full transceiver power output — up to 200 watts RF power output — and match your transmitter to **any** feedline from 160 thru 10 Meters whether you have coax cable, balance line, or random wire.

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You can even operate all bands with just one existing antenna. No need to put up separate antennas for each band.

Increase the usable bandwidth of your mobile whip by tuning out the SWR **from inside your car.** Works great with all solid state rigs (like the Atlas) and with all tube type rigs.

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The secret of this tiny, powerful tuner is a wide range 12 position variable inductor made from two stacked toroid cores and high quality capacitors manufactured especially for MFJ. For balanced lines a 1:4 (unbalanced to balanced) balun is built-in. Made in U.S.A. by MFJ Enterprises.

This beautiful little tuner is housed in a deluxe eggshell white Ten-Tec enclosure with walnut grain sides.

SO-239 coax connectors are provided for transmitter input and coax fed antennas. Quality five way binding posts are used for the balance line inputs (2), random wire input (1), and ground (1).

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Don't wait any longer to tune out that SWR and enjoy solid QSO's. Order today.

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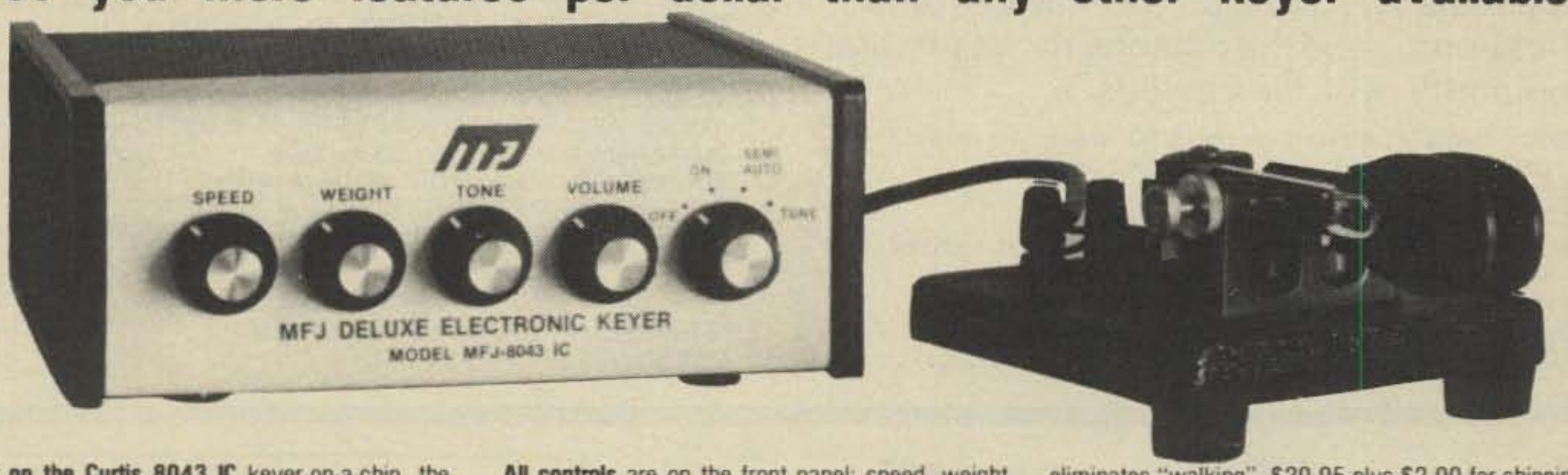
This NEW MFJ Deluxe Keyer at $69.95 . . .

gives you more features per dollar than any other keyer available.



Based on the Curtis 8043 IC keyer-on-a-chip, the new MFJ Deluxe Keyer gives you more features per dollar than any other keyer available.

Sends iambic, automatic, semi-automatic, manual. Use squeeze, single lever or straight key.

Iambic squeeze key operation with dot and dash insertion lets you form characters with minimal wrist movement for comfortable, fatique-free sending.

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Don't wait any longer to enjoy the pleasures of the new MFJ Deluxe Keyer. Order today.

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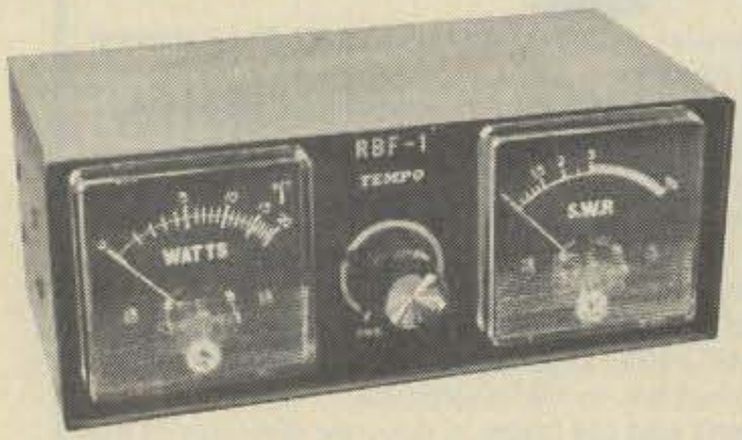

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Allows selection of wattmeter scales of 0-200 watts or 0-2000 watts. Insures consistent, efficient transmitter operation.

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NOVEMBER, 1977 **VOL. 33, NO. 11**

The Radio Amateur's Journal

FEATURES

XJ3ZZ/1 ST. PAUL ISLAND DXPEDITION
Yuri Blanarovich, VE3BMV (exOK3BU) 16

MACHINE ARTITHMÉTIQUE DE PASCAL
Alan M. Dorhoffer, K2EEK 23

WORLD ADMINISTRATIVE RADIO CONFERENCE (WARC)-79
Theodore J. Cohen, N4XX (exW4UMF) 24

CQ WORLD-WIDE DX CONTEST ALL-TIME C.W. AND USA RECORDS *Frederick Capossela, K6XX/K6SSS* 28

THE "MULTI-V", A MULTI-BAND ANTENNA
George Galloway, WB5LDE 40

CQ REVIEWS: THE MFJ-8043 ELECTRONIC KEYER
Hugh R. Paul, W6POK 41

THE LI'L ZAPPER—A VERSATILE LOW VOLTAGE SUPPLY
Jim Huffman, WA7SCB 44

CQ REVIEWS: THE MFJ-16010 ST SUPER ANTENNA TUNER
Hugh R. Paul, W6POK 45

QRP: A SOLID STATE V.F.O. TRANSMITTER FOR 7-14 MHZ, PART I *Adrian Weiss, K8EEG/Ø* 54

ANTENNAS: QUADS AND MULTI-ELEMENT QUADS
William I. Orr, W6SAI 60

NEW AMATEUR PRODUCTS 62

IN FOCUS: STEVEN SHAFFER WINS "IN FOCUS" CONTEST
Bill DeWitt, W2DD 65

AN RTTY PRIMER, PART II—HOW RTTY CHARACTERS ARE GENERATED AND RECEIVED *Irwin Schwartz, K2VGU* 67

MATH'S NOTES: SILICON CONTROLLED RECTIFIERS (SCR)
Irwin Math, WA2NDM 70

NOVICE: AMATEUR RADIO STATION INSTALLATION TIPS, PART I *Bill Welsh, W6DDB* 71

DEPARTMENTS

DX: THE NUMBER ONE HAWAIIAN, KATASHI NOSE, KH6IJ
Rod Linkous, W70M 73

AWARDS: STORY OF THE MONTH—PAULINE F. COURSE, WA9CNV *A. Edward Hopper, W2GT* 78

PROPAGATION: C.W. CONTEST TIPS, SHORT SKIP CHARTS FOR NOVEMBER AND DECEMBER *George Jacobs, W3ASK* 80

CONTEST CALENDAR: CONTESTS FOR NOVEMBER AND EARLY DECEMBER, RESULTS OF THE 1976 CZECH. CONTEST *Frank Anzalone, W1WY* 82

ANNOUNCEMENTS 11
OUR READERS SAY 9
HAM SHOP 92
ZERO BIAS 4

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Zero Bias

an editorial

It is a heartening experience to realize that people do indeed read Editorials and respond to them. I have received information that many of you have written to the OMB (Office of Management and Budget) in response to my open letter to the President ("Who's Got The 20½ Million Dollars?", August CQ, page 16). The OMB has in turn contacted the FCC. This "contact" I am led to believe is in the form of numerous queries as to what the whole thing is about and the main question — How did the "civilians" find out who and where we are? It seems as though the members of the OMB would like to keep their anonymity and they are slightly annoyed at their members receiving this mail, especially the mail sent to their homes.

As you can see from the letter on the next page, I did receive a round-about answer to my letter to the President from a Mr. Thaler. Mr. Thaler works for the OTP (Office of Telecommunication Policy) in an "acting" capacity. The OTP is described in an article by Ted Cohen elsewhere in this issue. Well, I guess Mr. Thaler has to do something with his time as the future of the OTP is in question at the moment and he may be out of a job soon. Their work or function is to be taken over by the Department of Commerce soon, according to rumor.

I seriously doubt that the President even read the initial article or saw the letter that Mr. Thaler sent out on his behalf. This letter has to be one of the most inane pieces of dribble ever to come out of Washington. I found it at first amazing to think that Mr. Thaler could even consider this an "answer" or even that it was indeed a letter. What it looks like is a re-statement of what I said in my letter. If I wanted to find out what I said I could have read my own writing.

On the surface, this letter could actually be funny. It fits the unfortunate image of Washington bureaucracy that is often stereotyped into a do-nothing attitude. It is peopled with the ilk of Mr. Thaler, who seem to justify their high paying jobs by the amount of confusion they generate. I don't find it amusing to complain about not getting something we've paid for, then to find further insult in getting this reply from someone else we've "paid for" through our taxes.

Mr. Thaler's closing paragraph is a masterpiece. He makes it seem so simple and logical that there is no reasonable need for concern. Well, as facts bear out, there is a great deal to be concerned with. What we have been getting for our money is more and more Mr. Thalers', not the goods and services contracted for. The important thing is that we have been lied to.

The simple question raised in my letter is when are we going to get what we paid for? This year alone there will be about a 20% growth in the number of amateurs. There will be a growth of about 60% in the number of new Novice amateurs alone. Who will pay for the handling of this growth? Will this growth be cut off for lack of funds and manpower? Should we actively seek ways to discourage this growth just to make things easier for the government? Should we, or could we, in clear conscience see both sides of the issue? NO!

There is no other side to this issue! As long as Mr. Thaler draws a paycheck (that you pay for) and writes letters such as this . . . you are being ripped off. The newcomer is being ripped off and thousands upon thousands of people who express an interest in amateur radio will be ripped off in turn unless this fundamental waste and unmitigated thievery is curbed right now.

It is obvious that we cannot get any of this money back in hard cash. What we are entitled to and what we should be demanding is monies to pay for the future. Money to pay for an FCC that is capable of doing the job that it is assigned. Money to enforce regulations, to issue licenses and to do the job that we are led to believe they do. For even the FCC has lived on a reputation or aura of competency and authority that recent facts do not bear out. They cannot physically do all the things we think they should or thought that they were doing. These are the very same services, mandated by law, that we all believed we paid for in our fees.

I'm not trying to "beat a dead horse" or to get practice in raising my threshold of frustration. I am trying to get the kind of FCC that we all thought we had. I am trying to keep some semblance of order to Amateur Radio as our numbers grow. I am trying to increase those numbers to all time highs, while at the same time encouraging constructive controls in the form of an effective FCC. The last thing we as amateurs need, and that includes all the new amateurs and would-be amateurs, is the chaos and anarchy already to be found on 27 MHz.

So, if Mr. Thaler can answer my letter to the President thusly, I will again try to reach President Carter with both a copy of this Editorial and another copy of the August letter and we'll see if we can get an intellegent reply this time. I'll let you know what happens.

73, Alan, K2EEK

OFFICE OF TELECOMMUNICATIONS POLICY
EXECUTIVE OFFICE OF THE PRESIDENT
WASHINGTON, D.C. 20504

July 26, 1977

DIRECTOR

Mr. Alan M. Dorhoffer, K2EEK
Editor, CQ
The Radio Amateur's Journal
14 Vanderventer Avenue
Port Washington, L.I., New York 11050

Dear Mr. Dorhoffer:

The President has asked that I respond to your letter of July 1, 1977, pointing out your article, "Who's Got the 20.5 Million Dollars?" in the August issue of CQ.

As you mentioned, the money went into the General Fund. It did not go to the CB licensing department nor to the Federal Communications Commission. All monies collected by any federal agency, whether by taxes, levees, or fees are spent at the direction of Congress. They are not set aside or earmarked for any specific purpose. Each fiscal year, Congress sets the annual budget for every federal agency and program. By controlling the money Congress controls the federal government. Congress will dispense the extra $20.5 million to provide non-revenue producing services. For example, the CB licensing service is now a non-revenue producing service since fees have been suspended.

The FCC requested $6.8 million to fund personnel, enforcement, and research. Congress approved $3.4 million and turned down most of the enforcement and research funds. Most of the $3.4 million was designated for licensing. Accordingly, thirty-one permanent positions were allocated to the FCC for licensing. This amount of money and of personnel maintains the existing level of service.

The FCC has done an efficient and responsive job handling the CB licenses. As further need arises, Congress will support them as appropriate.

Sincerely,

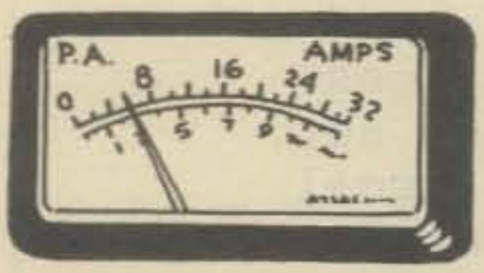
William J. Thaler

William J. Thaler
Acting

THE ALL SOLID STATE

ATLAS 350-XL

Its face has many interesting features:



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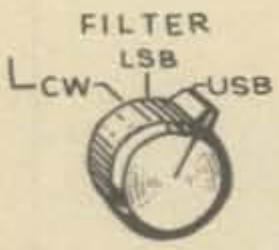
P.E.P. and CW input.

SSB/CW TRANSCEIVER

SSB with PTT or VOX operation and full break-in CW operation.

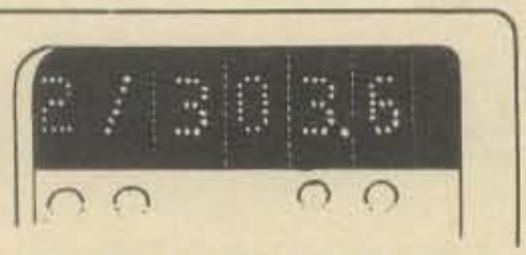


CW-LSB-USB FILTER

Selection of upper or lower sideband with 2700 Hz bandwidth, 1.6 to 1 shape factor, or 500 Hz CW bandwidth with 2.5 to 1 shape factor.

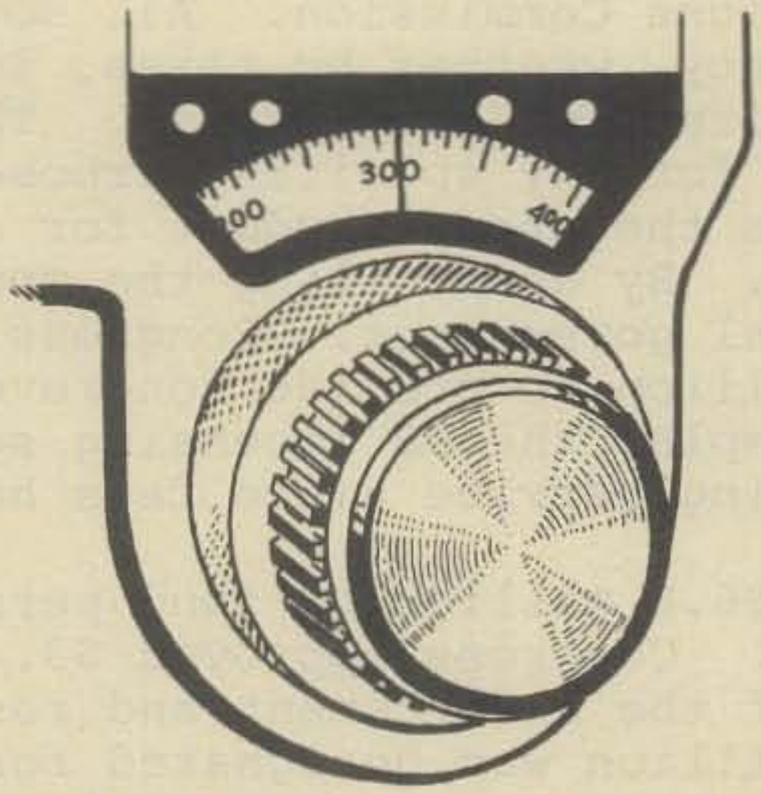
AF NOTCH FILTER

Provides better than 40 dB rejection of an audio frequency, adjustable from 300 to 3000 Hz.



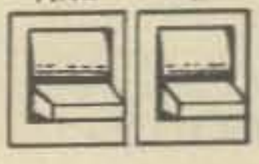
DIGITAL DIAL READOUT (Optional)

Provides precise frequency readout within 50 Hz. All L.E.D. Dot Matrix 6 digit display.



ANALOG DIAL SCALE

0 to 500 kHz dial scale in 5 kHz increments. Velvet smooth dual speed tuning, with 18 kHz per revolution of fine tuning control.



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Automatic Noise Limiter reduces hash type noise interference which is not intermittent pulse type. Blanker effectively reduces or eliminates pulse type noises.

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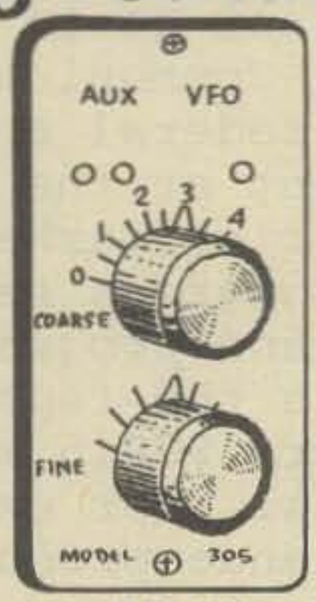
Permits receiving up to 5 kHz above or below your transmitting frequency. Especially useful for CW operation or in a net of SSB stations that are on different frequencies.



PLUG-IN AUXILIARY VFO (Optional)

Can be either a tunable VFO with the same 500 kHz tuning range as primary VFO or a crystal controlled fixed channel oscillator with choice of up to 11 crystal controlled channels.

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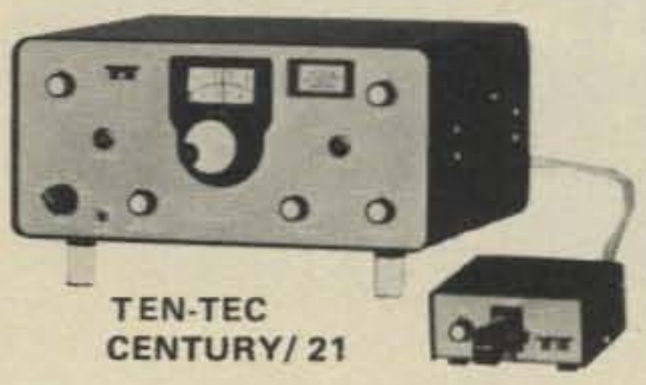
VFO 3855

HY-GAIN SSB/CW Transceiver 3750



TEN-TEC CENTURY/ 21

YAESU FT-101E

What we have here is Big John Capone. He's the head honcho at CW Electronics. As you can see, John keeps pretty busy guarding the tremendous stock of beautiful ham gear that CW is famous for.

John carries just about every major brand a ham could ask for. That includes Yaesu, Kenwood, Swan, Drake, Icom, Dentron, Atlas, Ten-Tec, Regency, Hy-Gain, and many others. You see, old John's got a pretty good rapport with the manufacturers, 'cause he orders so many radios. They see to it that he gets what he needs. In healthy quantities.

That's why the service at CW is so great. And why the prices are so fantastic. You never heard of a better combination from any other ham dealer anywhere.

So, when you're ready to add that next little goody to your shack, pick up the phone and call CW. Ask for John or Allan. Either way you're gonna come away with an offer you won't want to refuse.

ATLAS 350-XL

DENTRON MLA 2500

SWAN 700-CX

DRAKE TR-4CW

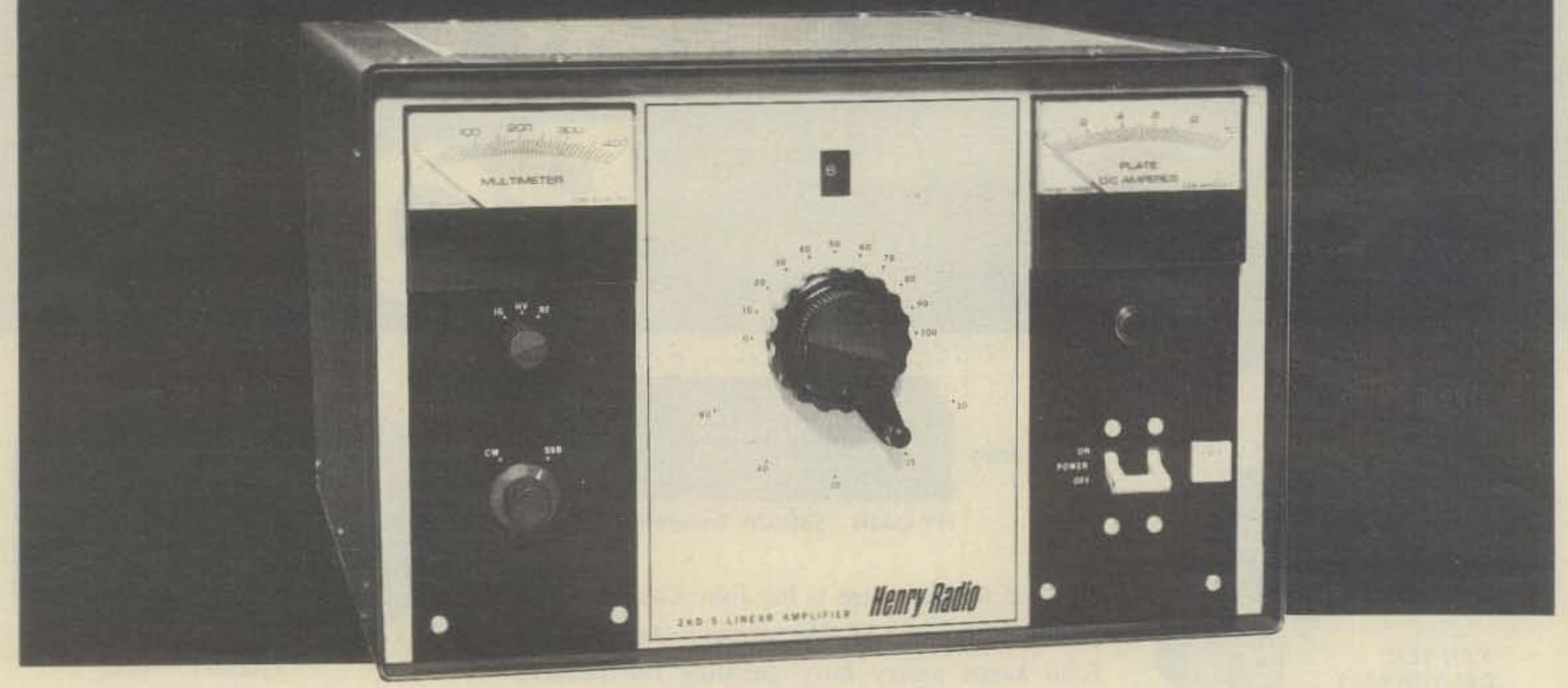
KENWOOD TS-820S

REGENCY HR-312

CW ELECTRONIC SALES COMPANY

1401 Blake Street Denver, Colorado 80202 (303) 893-5525

This is the amplifier you have been waiting for



The new 2KD-5 linear amplifier...a one piece desk model with the power and reliability of a console

At Henry Radio, we know how to build only one kind of amplifier . . . the best. We want you to compare the 2KD-5 with any other desk model at any price.

Remember, the 2KD-5 is only one model in the world's broadest line of amplifiers . . . both vacuum tube and solid state . . . for HF, VHF and UHF . . . fixed station and mobile . . . low power and high power.

Never before has any one company offered such a cornucopia of high power RF amplifiers.

Remember also that Henry Radio offers a broad line of commercial and FCC type accepted amplifiers covering the range of 3 MHz to 500 MHz. Henry amplifiers are in use all around the world. Commercial and export inquiries are invited.

- The 2KD-5 is a 2000 watt PEP input (1200 watt PEP nominal output) RF linear amplifier, covering the 80, 40, 20, 15 and 10 meter amateur bands.
- Two Eimac 3-500Z glass envelope triodes operating in a grounded grid circuit.
- Pi-L plate circuit with a rotary silver plated tank coil for greatest efficiency and maximum attenuation of unwanted harmonics.
- Full legal input in all modes. 2000 watts PEP input for SSB. 1000 watts DC input for CW, RTTY and AM.
- Jumper for 115 or 230 VAC, 3 wire single phase.
- 10.5" high x 15" wide x17.5" deep
- Price . . . $895.00

2K-4...LINEAR AMPLIFIER. Offers engineering, construction and features second to none. Provides a long life of reliable service, while its heavy duty components allow it to loaf along even at full legal power. Operates on all amateur bands, 80 thru 10 meters. If you want to put that strong clear signal on the air that you've probably heard from other 2K users, now is the time. Move up to the 2K-4. Floor console...$995.00

TEMPO 6N2 brings the same high standards to the 6 and 2 meter bands. A pair of advanced design Eimac 8874 tubes provide 2,000 watts PEP input on SSB or 1,000 watts on FM or CW. Complete with self-contained solid state power supply, blower and RF relative power indicator. ...$895.00

TEMPO 2002. The same fine specs and features as the 6N2, but for 2 meter operation only. ...$745.00

TEMPO 2006. Like the 2002, but for 6 meter operation. ...$795.00

TEMPO VHF/UHF AMPLIFIERS. Solid state power amplifiers for use in most land mobile applications. Increases the range, clarity, reliability and speed of two-way communications. FCC type accepted also.

Model	Drive Power	Output Power	Price
LOW BAND VHF AMPLIFIERS (35 to 75 MHz)			
Tempo 100C30	30W	100W	$159.
Tempo 100C02	2W	100W	$179.
Tempo 100C10	10W	100W	$149.
HIGH BAND VHF AMPLIFIERS (135 to 175 MHz)			
Tempo 130A30	30W	130W	$189.
Tempo 130A10	10W	130W	$179.
Tempo 130A02	2W	130W	$199.
Tempo 80A30	30W	80W	$149.
Tempo 80A10	10W	80W	$139.
Tempo 80A02	2W	80W	$159.
Tempo 50A10	10W	50W	$ 99.
Tempo 50A02	2W	50W	$119.
Tempo 30A10	10W	30W	$ 69.
Tempo 30A02	2W	30W	$ 89.
UHF AMPLIFIERS (400 to 512 MHz)			
Tempo 70D30	30W	70W	$210.
Tempo 70D10	10W	70W	$240.
Tempo 70D02	2W	70W	$270.
Tempo 40D10	10W	40W	$145.
Tempo 40D02	2W	40W	$165.
Tempo 40D01	1W	40W	$185.
Tempo 25D02	2W	25W	$125.
Tempo 10D02	2W	10W	$ 85.
Tempo 10D01	1W	10W	$125.

TEMPO 100AL10 VHF LINEAR AMPLIFIER. Completely solid state, 144-148 MHz. Power output of 100 watts (nom.) with only 10 watts (nom.) in. Reliable and compact ...$199.00

TEMPO 100AL10/B BASE AMPLIFIER ...$349.00

Tempo solid state amplifiers are available at Tempo dealers throughout the U.S.

please call or write for complete information.

Henry Radio

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931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
Butler, Missouri 64730 816/679-3127

Prices subject to change without notice.

Our Readers Say

23 on 10?

Editor, CQ:

With the two-way radio market being flooded with 23 ch. C.B. rigs, (S.S.B. for $99.95 and A.M. for as low as $39.95), why aren't the amateurs out there in radio land buying these rigs and converting them for 10 meter use? You can't beat the price, and if it was done in mass, 10 meters would become a "hot" LOW BUDGET band for local and some DX QSOs. If 10 meters became more active, there would be less fear of ever losing 10 meters to the 11 meter crowd, for future C.B. use! CQ, let's get some articles on converting C.B. rigs for 10 meters and get the band hot!

Russ Hobby, WA3LGG
Bethlehem, PA

"Hear Hear"

Editor, CQ:

After a long wait, I must finally send my hearty congratulations to you and the magazine on a job well done. I read in your Sept. 1977 issue the letter from Terry Anderson, WB0WNG. I can only add a very rousing "hear hear" to his comments about CQ combining together with QST for the best of amateur radio.

As a long standing subscriber of CQ, I have been through the thick and thin of it when there was difficulty getting your excellent propagation forecasts one month late. I bit my tounge and sat on my hands to keep from deserting CQ. But with your wonderful Bill Orr, W6SAI, antenna articles and the propagation forecasts by George Jacobs, W3ASK, perserverence has seen me through.

Your magazine might not be the thickest, but then, by golly, you have the best in quality and everything else. My faith in you has been completely restored and I offer you once again hearty congratulations.

Would that all of amateur radio would have a re-success story as CQ now has.

I remain a faithful subscriber.

Richard M. McGarry, W4CXH,
G5AWU, VK2BWU, W4CXH/ZL4

Amateur Radio's Future

Editor, CQ:

Many of us are concerned about the future of amateur radio, what with the FCC comtemplating dropping the

novice ticket and giving the CBers ham privileges with a no code requirement in a new ticket called communicator. Although I am a tech., with these new contemplations, I think ham radio will take a tremendous turn for the worst. I don't think ham radio can survive much more bureaucratic meddling. I've had experience with CB, as I imagine most of you have, and I realize that only earned privileges are worthwhile. After months of studying and finally passing the tests, you feel proud that you accomplished something and you've earned your way on the air. CB is good for it's intended purpose, but without responsibility, it's not lasting enjoyment regardless of the service it was to perform. If driver's licenses were harder to qualify for, there would be fewer cars on the road and more so, fewer accidents.

I was pleased in reading "Who's Got The 20.5 Million Dollars? in the August issue. I am also wondering what happened to my money. I hope President Carter gives a reply soon.

Mark Oberman, WD9ADH
Niles, IL

To Whom It May Concern

Editor, CQ:

In mid-November 1974, I ordered $17.80 worth of material from the Cortlandt Electronics, Inc. They cancelled my check but I received no merchandise. I wrote them in January 1975 and again in March but they did not have the courtesy to answer my letters. I had the Chicago Tribune Action Line contact them in April 1975 and again in June 1975. Still no reply. The U.S. Postal Inspector in New York wrote me in July 1975 that he was contacting the company after receiving notice of my complaint through the Chicago Tribune. Since the company still had not replied, I assumed that they must have gone out of business; but in February 1976, they had the gall to send me another of their catalogs. I sent one more letter then, enclosing a self-addressed stamped envelope for their reply. Since they still refuse to answer, I feel something of an obligation to warn other experimenters and radio amateurs against this company.

G. Windolph, W9IEA
Quincy, IL

Heathkit SB200 Linear Amplifier CW Modification

Editor, CQ:

Improved CQ operation of the SB200 linear can be obtained by reducing the "key-up" plate current to 0 (class B operation instead of AB). The simple modification will retain the same amplifier output, and substantially increase tube life by reducing the "key-up" idling power from about 200 watts to 0. It can be accomplished by adding a 250 ohm, 10 watt resistor in series with the ANTENNA RELAY lead, external to the linear. When SSB operation is desired, the 250 ohm resistor is simply shorted out. The resistor can also be mounted internally, with a small SPST toggle switch mounted on the front panel between the meter selector switch and the REL. PWR. SENS. control. By adding the resistor, the grid bias voltage, which is normally taken across a 33 ohm resistor, is increased. Fortunately, the resulting reduced current is still adequate to operate the antenna relay, which is in series with the negative grid bias supply output.

John Abbott, K6YB
Newhall, CA

CQ's Ham Shop is a good source of antique and hard to get items. It's a free service for CQ subscribers. Why not start collecting now?

Announcing

Touch Control Keyer Article, July 1977

We can accept (if necessary) a few typographical mistakes such as "grid" for "grind" (pg. 18, col. 2, last sentence under "Circuit Board") and the heading which says "Assembly and Writing" instead of "Wiring" (pg. 19, col. 1, bottom) even checking the keyer in the "position" output mode rather than the meaningful "positive" one (pg. 20, col. 2, end paragraph, 4 under "Final Adjustment").

Schematic discrepancies are another matter, obviously requiring correction as soon as possible. This will be doubly important once the Q Key article is published, since it refers to the same drawing.

Here are the corrections which all refer to fig. 5:

On the DOT side, the line from the 1K resistor and the Q2 emitter should be disconnected from the output line (to N on the Curtis circuit board) and carried through to the 9 v. supply lead just below it.

JU1 should be JU2 and vice-a-versa. JU3 should be JU4 and vice-a-versa. The present marking upsets the positioning of fig. 4, and the instructions under "Final Adjustment" where the object is to isolate the touch section from the Curtis keyer during set-up procedures.

The cable shield really should show a connection to ground, but it probably makes little difference that my C1, C2 rotor connections are opposite to those shown.

Hope we can somehow cut our error count on the next piece!

Albert H. Jackson, VE3QQ
Ontario, Canada

Awards, June 1977

I have been a reader of CQ Magazine for many years now and have always noted that you seem to get by with a minimum of errors. However, in the June 1977 Awards column there was a slight mistake. Referring to page 65 and the list of Canadian Provinces you state that VE9 is the prefix for Northwest Territories. VE9 is a prefix for Experimental no-radiating commercial use. The VE8 prefix is used jointly by Yukon and NWT stations with the two letter suffixes AA to BZ being allocated to the Yukon. There are several exceptions to this in use by older licensed stations.

The Yukon Amateur Radio Association has applied to the DOC for the issue of a distinctive prefix however, it is hoped that a change will be made before long.

Frank V. Greenleaves, VE8AM
General Secretary,
Yukon Amateur Radio Association

QRP, September 1977

In our Septmeber column, fig. 1 is incorrect. The correct diagram and caption are as follows:

- **McLean, VA** — The QCWA has announced the establishment of a scholarship in honor of its "Silent Keys." For further info, write QCWA Headquarters, Box 47382, Dalls, TX 75247.

- **Ellicott City, MD** — The CARA Hamfest Ellicott City Armory will be held on Nov. 27th, 1977. There will be Exhibits, Flea Market, Prizes, and Refreshments. All indoors. No tailgating. Talk-in on 147.99/39, 146.76/16, and 146.52/52. Info contact: CARA, P.O. Box 850, Columbia, MD 21044.

- **Pittsburgh, PA** — The Twenty-fifth Annual 10 Meter Ground Wave Contest will be held on November 26th, 1977, (9 p.m. to 1 a.m. local time). The contest is sponsored by the Breeze Shooters, Inc., of PA. Separate category for Novice/Technician. Revised rules this year. Send s.a.s.e. to Richard Evanuik, WA3LUM, 311 Evergreen Ave., Pittsburgh, PA 15209, for logs and new rules.

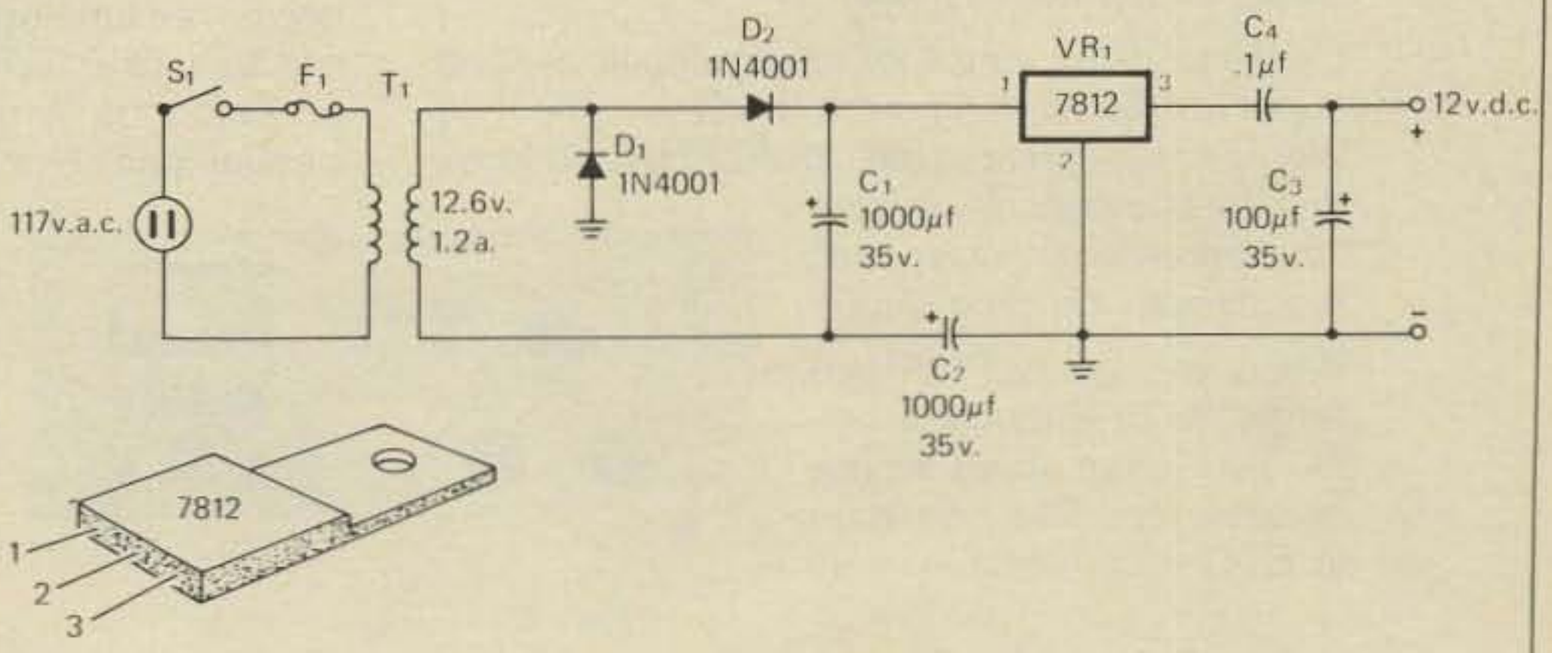


Fig. 1—The K4COR 12 v.d.c. 1 amp regulated power supply.

D1, D2—Diode 1N4001, Radio Shack #276-1101
F1—Fuse, ½ amp, Radio Shack #270-1271
S1—Switch, SPST, Radio Shack #275-324
Fuse Holder—Radio Shack #270-739
AC Line Cord—6' Long, Radio Shack #278-1255
Output Posts—Radio Shack #274-661
Cabinet—3¼" x 2⅜" x 4", Radio Shack #270-251
T1—Transformer, Standard, 12.6v CT, 1.2a. Radio Shack #273-1505
VR1—Voltage Regulator IC, 12v., 1 amp. Radio Shack #276-1771
C1, C2—Capacitor 1000 µf, 35v., Radio Shack #272-1032
C3—Capacitor, 100 µf, 35v. Radio Shack #272-1028
C4—Capacitor, .1 µf Disc Ceramic, Radio Shack #272-135

TEST REPORT

ALPHA 374

It's a no tune-up power house . . . and the fine print is on your side

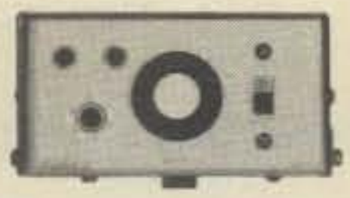
You *could* safely load your ALPHA 374 to a full KW, lay a brick on the key, and leave town for the weekend. It's built to take it. Every ALPHA linear amplifier, from the moderately priced ALPHA 76 rock-crusher to the most deluxe models, is engineered and built for continuous "brick on the key" service.

Contests, dxing, and lots of rag chews are just about as demanding as a brick on the key. Wouldn't it be great to own an ALPHA and know that the fine print clearly says "maximum legal power in all modes with no time limit?"

When you go ALPHA you forget about duty cycle limits. You forget about service hassles, too. The fine print in ETO's 18 month factory warranty protects you six times as long as most guarantees!

Flip the bandswitch and instantly your ALPHA 374 is ready to deliver QRM—piercing maximum legal power—even on RTTY and SSTV—10 thru 80 meters. The ultra-convenient ALPHA 374 needs no tune-up in normal amateur service, and it's quickly set up for MARS or other special operation by simply switching to the auxiliary manual tune controls. Put your signal on top with ALPHA POWER. Contact your dealer, or Ray Heaton at ETO for literature on all ALPHA's. And ask for a copy of "Everything You Always Wanted to Know About (Comparing) Linears . . . But Didn't Know Whom to Ask."

Regardless of what transmitter you're using, for an even bigger signal the new ALPHA/VOMAX split band speech processor can boost your SSB talk power as much as ten times when you need it most, for just $179.50. Like the ALPHA linears, VOMAX is exceptionally low in distortion, compatible with all popular exciters, and easy to install and use.



ALPHA: Sure you can buy a cheaper linear . . . But is that *really* what you want?

ETO Ehrhorn Technological Operations, Inc.

P.O. Box 708 Industrial Park · Canon City, Colorado 81212 · (303) 275-1613

think of yourself as an antenna expert!

—you select your components!

1. Get optimum performance band for band. Choose from medium or high power resonators for your favorite bands.

2. Fold over, 360° swivel mast for quick band change or easy garaging. Select from two versions, fender/deck or bumper mount location.

3. Stainless steel ball mount, 180° adjustable, commercial duty for superior mechanical and electrical performance.

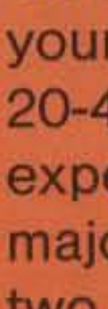
4. Get exceptional reports, broadest bandwidth, lowest SWR. Use with any convenient length 50 ohm coax. Matching devices not required.

5. For convenience, use the Hustler stainless steel resonator spring, and special design quick disconnect.

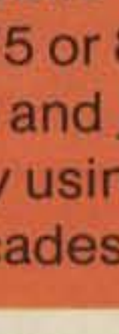
...and you'll mobile with the experts' foremost choice... HUSTLER®

Get fixed station reports from your mobile—operate 6-10-15-20-40-75 or 80 meters with the experts and join the vast majority using Hustler for nearly two decades.

Model SSM-2 Ball Mount



Model QD-1
Quick Disconnect



Model RSS-2
Resonator Spring

Model BM-1
Bumper Mount

Model L-14-240
Mil Spec
50 Ohm Feedline

Model MO-1
For Deck or
Fender
Location

Model MO-2
For Bumper
Mount
Location

Super
Resonators
RM(S)
2 KW PEP
Greatest Coverage

Standard
Resonators
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400 Watts PEP

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for the experimenter!

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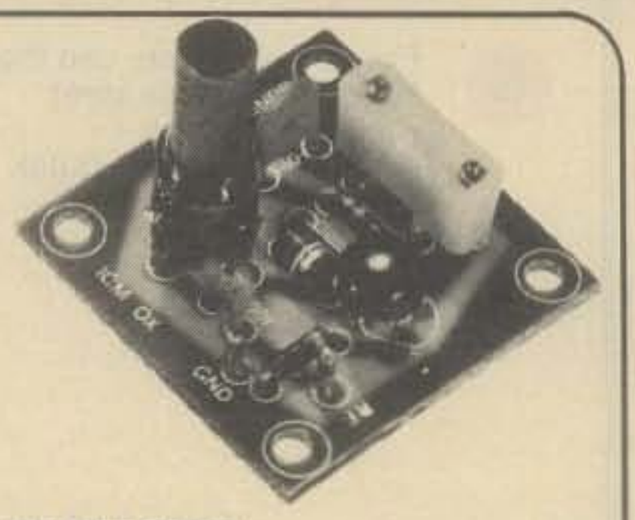
OSCILLATORS • RF MIXER • RF AMPLIFIER • POWER AMPLIFIER

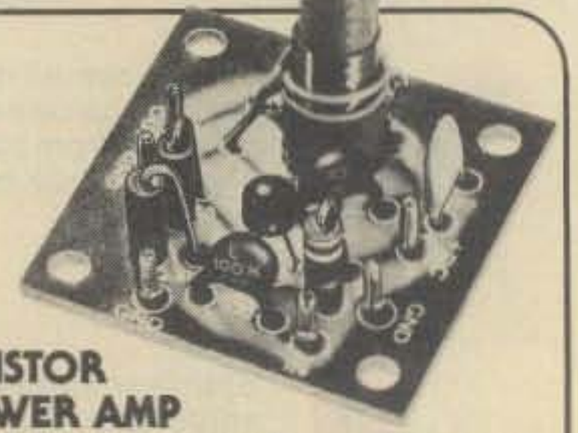


OX OSCILLATOR
Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101
Specify when ordering.

$3.95 ea.

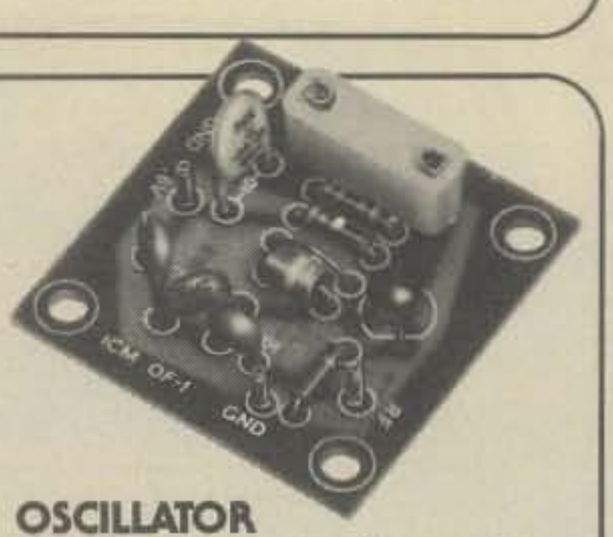
MXX-1 TRANSISTOR RF MIXER
A single tuned circuit intended for signal conversion in the 30 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106
Specify when ordering.

$4.50 ea.



PAX-1 TRANSISTOR RF POWER AMP
A single tuned output amplifier designed to follow the OX or OF-1 oscillator. Outputs up to 200 mw, depending on frequency and voltage. Amplifier can be amplitude modulated. 3 to 30 MHz, Cat. No. 035104
Specify when ordering.

$4.75 ea.

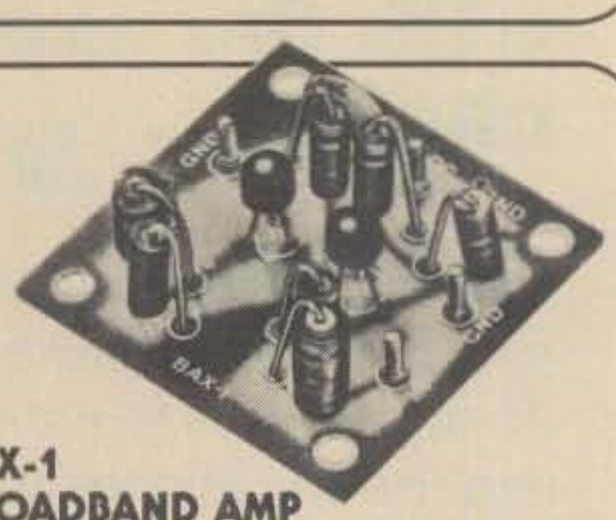


OF-1 OSCILLATOR
Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO, Cat. No. 035108. 18 to 60 MHz, OF-1 HI, Cat. No. 035109
Specify when ordering.

$3.25 ea.

SAX-1 TRANSISTOR RF AMP
A small signal amplifier to drive the MXX-1 Mixer. Single tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 035102. 20 to 170 MHz, Hi Kit, Cat. No. 035103.
Specify when ordering.

$4.50 ea.



BAX-1 BROADBAND AMP
General purpose amplifier which may be used as a tuned or untuned unit in RF and audio applications. 20 Hz to 150 MHz with 6 to 30 db gain. Cat No. 035107
Specify when ordering

$4.75 ea.

.02% Calibration Tolerance
EXPERIMENTER CRYSTALS
(HC 6/U Holder)

Cat. No.	Specifications	
031080	3 to 20 MHz — for use in OX OSC Lo *Specify when ordering*	$4.95 ea.
031081	20 to 60 MHz — For use in OX OSC Hi *Specify when ordering*	$4.95 ea.
031300	3 to 20 MHz — For use in OF-1L OSC *Specify when ordering*	$4.25 ea.
031310	20 to 60 MHz — For use in OF-1H OSC *Specify when ordering.*	$4.25 ea.

Shipping and postage (inside U.S., Canada and Mexico only) will be prepaid by International. Prices quoted for U.S., Canada and Mexico orders only. Orders for shipment to other countries will be quoted on request. Address orders to:
M/S Dept., P.O. Box 32497,
Oklahoma City, Oklahoma 73132.

ICM

International Crystal Mfg. Co., Inc.
10 North Lee
Oklahoma City, Oklahoma 73102

Now there are two MLA amplifiers.
DenTron announces the NEW! MLA-1200

The MLA-1200 linear amplifier was designed to give you a choice. We know that not all amateurs want to run 2000 watts PEP, but we also feel the demand for a luxury styled amplifier. Hence the MLA-1200.

Basically it's built on success. The MLA-1200 incorporates the same sleek styling of the famous MLA-2500, but employs a single Eimac 8875 triode, yielding 1200 watts PEP SSB and 1000 watts DC CW with as little as 70 watts of drive.

There are many features common to both MLA's, like forced air cooling, and a plug-in PC board containing ALC and metering circuitry. The MLA-1200 covers 10-80 and MARS frequencies. Be assured that all DenTron amplifiers far exceed the FCC harmonic emissions standards.

It's a different kind of luxury. The MLA-1200 is a compact dynamo only 10"W x 6¼"H x 10"D and weighs only 10 pounds! Twin outboard power supplies are available for AC or DC mobile operation. Picture that on your home, boat or car!

MLA-1200 $399.50. AC-1200 $159.50. DC-1200 $199.50.

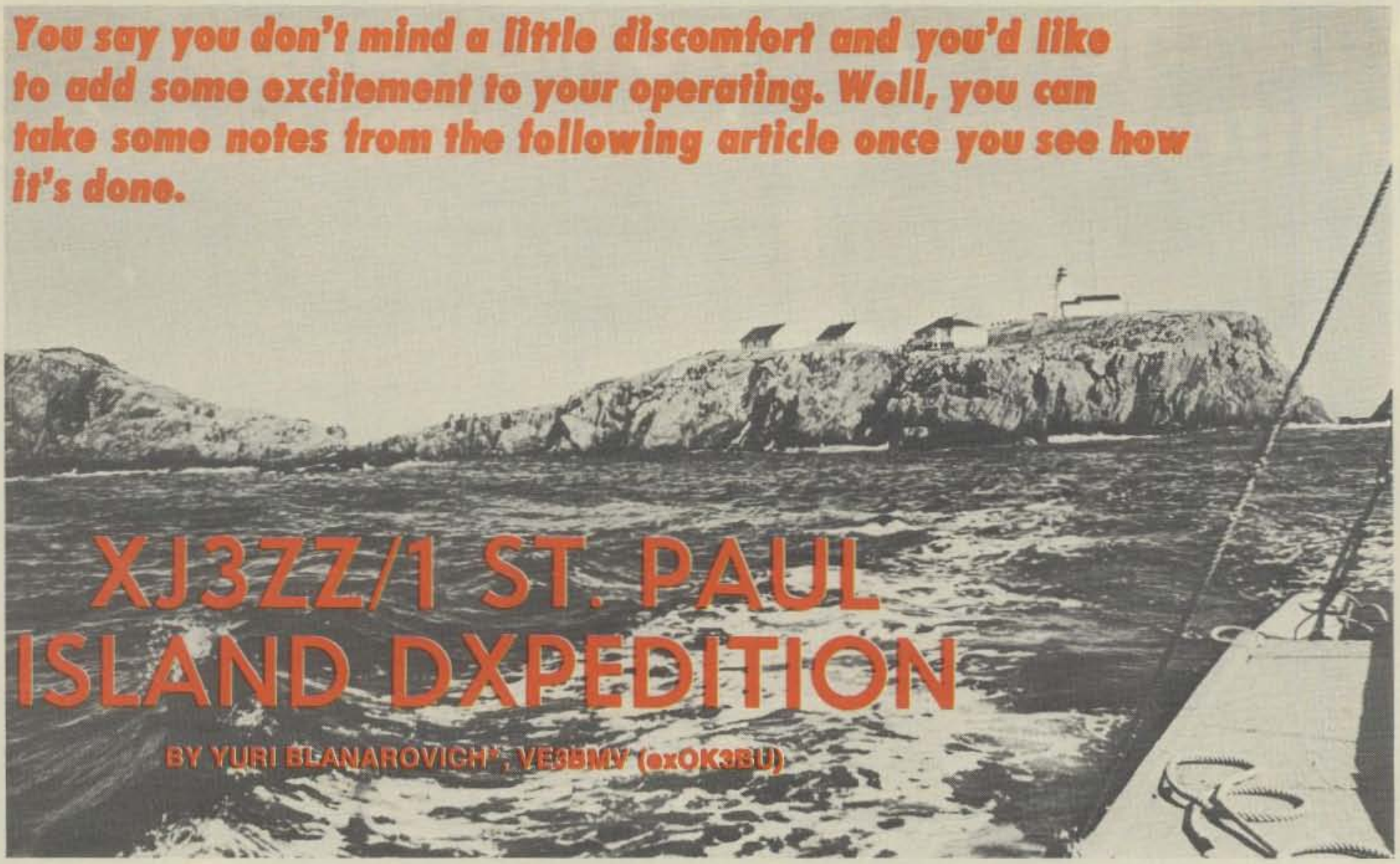
I'll bet you knew DenTron would give you a choice.

DenTron
Radio Co., Inc.

arma

2100 Enterprise Parkway
Twinsburg, Ohio 44087
(216)425-3173

You say you don't mind a little discomfort and you'd like to add some excitement to your operating. Well, you can take some notes from the following article once you see how it's done.



XJ3ZZ/1 ST. PAUL ISLAND DXPEDITION

BY YURI BLANAROVICH*, VE3BMV (exOK3BU)

During one of the monthly Canada meetings in early '75 VE3MJ, VE3MR, VE3GMT and VE3IAA, announced that they had "discovered" two new DXCC countries, St. Paul, and Sable Islands. Because they did not want to take any "luggage carriers" along, another group of four i.e., VE3BBH, VE3BMV, VE3DU, and VE3KZ, thought to ourselves, let's go and wait for them on the island. Well as it turned out we didn't do that but it was the start of serious thinking about our own expedition anyway.

Here is some of the history and justification of these new countries. In June of 1974, Jack, VE3GMT, went to Halifax N.S., on business. While there he inquired at some of the local federal government offices to see what could be found out about Sable Island. Finally he was directed to the right office and met with a high official who was in charge of Sable Island, and knew all about it.

The Administration of Sable Island was established by an Act of the Canadian Parliament, known as the Canadian Shipping Act. The Federal Department of Transport, was empowered to administer and govern Sable Island. Jack felt that this would give the island "new country status" under criteria point #1 of the ARRL standards for new countries.

On the basis of Jack's research, Mort, VE3MJ then decided to do further research into this Act and discovered that St. Paul Island, was also included in this Act. Upon checking several maps he found that Sable Island, was about 150 miles southeast off the coast of the province of Nova Scotia, and St. Paul, was about 25 miles north west off the coast of Cape Breton Island, N.S. So it followed that if Sable, was approved by the ARRL, then Cape Breton Island would be considered a foreign land mass, and St. Paul then would count as another country, criteria #3.

All necessary documentations were submitted to ARRL, who confirmed that both islands met their criteria and that as soon as any operations took place, they would be accepted as new countries on their DXCC list.

Once the approval was received in writing, plans were then formulated by the group to proceed with the DXpedition. Considering the weather condition and the upcoming CQ WW DX contest it was decided to go to Sable Island for the CQ contest weekend for a total of 5 days, then proceed to St. Paul Island, for a similar period.

Special call signs were issued, VX9A for Sable and VY0A for St. Paul. (Lucky them!) The expedition to Sable was very successful with over 11,000 QSO's, thanks to bad weather that trapped them on Sable for another eleven days. Dirty and tired the group almost quit at this point but their ham spirit pushed them to go to St. Paul, and activate it for the first time. (There were previous operations from Sable that also count).

St. Paul, was practically unknown and very little information about the island was available. But after a dangerous landing and operation during bad weather, over 5,000 QSO's were made from VYØA.

*P.O. Box 292, Don Mills, Ont., Canada M3C 2S2

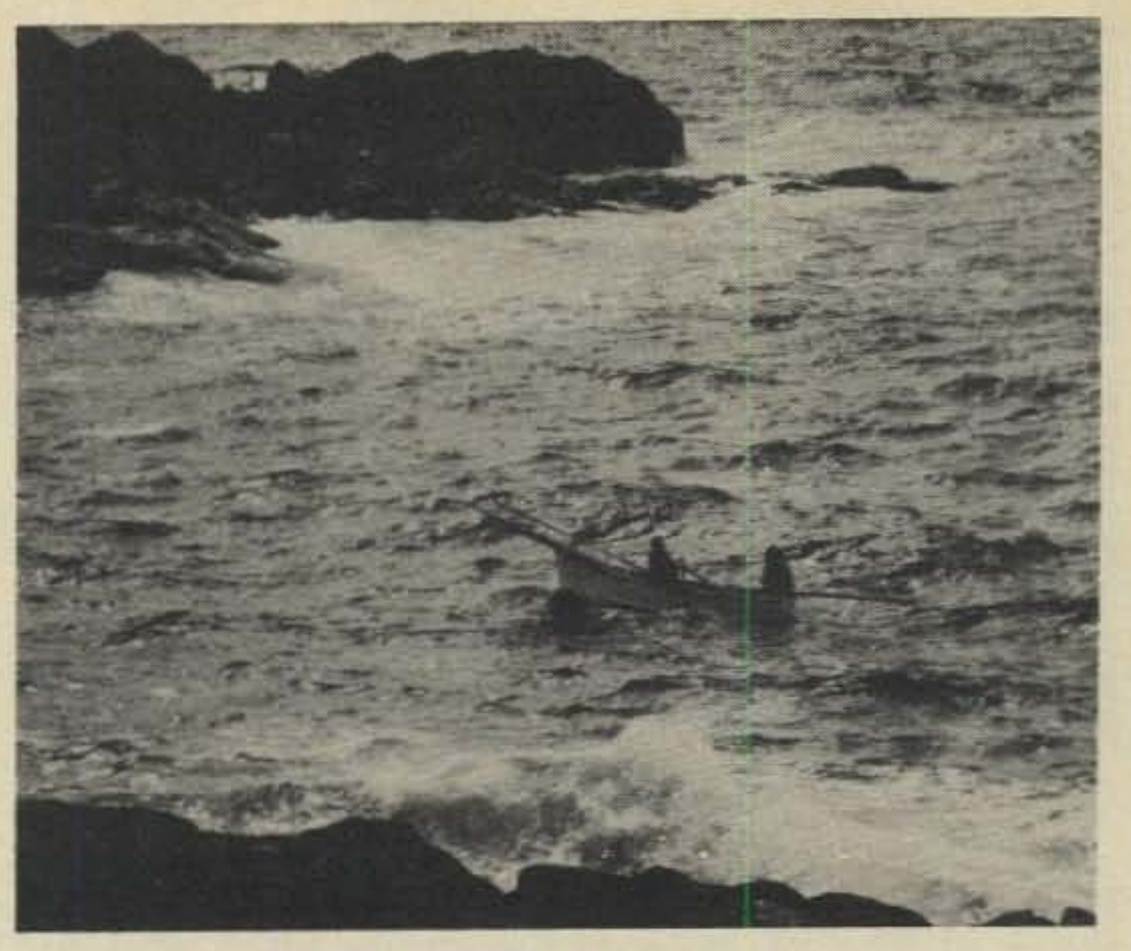
When the group returned to Toronto and showed us the photos of the expedition, it was obvious it was not a suitcase-rig-swim suit-hotel-expedition. We knew it would be dangerous and our XYLs were apprehensive, but with careful planning we could avoid the hazards. At least we knew what to expect and would be ready for it.

We decided to reactivate St. Paul Island, mainly because: (1) it was impossible to obtain permission to land on Sable at that time, (2) propagation was bad during the VYØA operation and many DX stations missed it especially on c.w., (3) we had only about one week available, (4) cost of transportation (Sable is charter air).

From talking to our friends and studying available maps and slides we found that St. Paul, lies 18 miles northeast of the northern end of Cape Breton Island. It is small, rocky and practically desolate. The northern point is a detached pinnacle, which appears from seaward to be joined to the main island, but it is separated by a narrow channel, about 100 ft. wide from the peninsula. The main part of the island rises in two parallel ranges of hills, the southeast being the higher with a summit of 485 feet. The water deepens rapidly one half mile off shore so that soundings give little warning in approaching the island in foggy weather. Although it is bold and high it has been the site for numerous marine disasters. The variable tidal streams and currents add to the danger arising from the fogs, which prevail in the southeast and move often southwest.

There are two lighthouses on St. Paul, one on the detached rock forming its northern extreme, and another on it's southern point. The north point light is exhibited from a white light house 50 feet high. An automated light is exhibited from a red circular tower 40 feet high on the south point. The island holds three houses, a boat house and generator house with tanks that hold the fuel for the island. Three people live on the island full time. Wilf, the lighthouse keeper with his wife and assistant lighthouse keeper Paul. There is also one dog and occassional birds. On the large island there are two abandoned life-saving station buildings. The area is rich with lobster traps during the season. The only access to the small island is through the channel separating both islands and only by small boat. Wooden platforms and walkways abound over the island. It is very difficult to walk on the island during bad weather as the rocks are slippery and dangerous, but walkways connect all buildings on the island. One thing was clear, the expedition was not what you would call a pleasure trip, but hard work and a good team with a variety of skills, would ensure success.

Our team consisted of Paul Hicks, VE3BBH, salesmen, Yuri Blanarovich, VE3BMV, engineer, Cy Lewis, VE3DU, businessman, and Bob Nash, VE3KZ, professor. We all expressed serious interest and



On the way to the landing ramp.

committed ourselves to the trip. Then the work and the preparation started.

Cy, took care of all the paper work, started inquires about the landing permits, license and transportation arrangements. Phone calls were made, letters exchanged and as a result we had permission to land, but could not obtain a special call sign (such as VYØB or VYØ). We made our calculations, which included the feelings in our bones, and we planned for a 15th of May assault. Propagation looked better than average. Permission was issued to land on the island on May 6th to 17th. We planned to be operational for about 4 to 5 days. We were watching propagation conditions 56 and 28 days before that time period. We were still in the waiting mode, discussing equipment selection and of course food and other important things.

Cy, VE3DU, was checking the situation in Nova Scotia, and we were pleased to find out that the ice had moved away the northern Cape Breton coastline and we could use the fishing boat from L. Cook of Dingwall. Permission to land on the island was already secured but a special license was not avail-

Loading the last load, tower sections, into the small dinghy.

VE3DU keeping balance with the tower sections.

able. Cy, tried every possible channel to obtain VY0 call sign or at least the prefix for a portable operation. We could not obtain support from our Canadian ARRL, director Ron Hessler, VE1SH, neither did he recommend or support our application to the Department of Communication. It seemed to us very strange that a case like this with a new, or different country for DXCC would not qualify for a special prefix when it seemed that a 25th anniversary of a local fire hall could obtain a special prefix. We were all hoping until our departure that we would be allowed to use VY0 again after the first expedition.

The dates for the expedition were set for May 13 to 17 and final transportation was arranged including the fishing boat from Dingwall N.S., to St. Paul Island.

Bob, VE3KZ and I took care of the antennas and equipment selection and their preparation and testing. Antenna selection and design was critical for a successful St. Paul DXpedition with it's gale force winds and rocky surface. Our situation was analyzed and selections were made. Antenna #1. Cubical quad, two elements, for 20 meter band. Because of poor ground on the island, pure rock, the quad seemed to be the best solution in that it provided

VE3BBH guarding a portion of our "liquor store", the boxes with our rigs and other important stuff. Wooden walkways connect the landing ramp and all the buildings on the Island.

a lower angle of radiation and more gain than a three element yagi at lower heights. The quad was tested in our backyard on a 20 foot tower. Feeding the loop was the VE3BMV special, i.e., fed in the bottom corner of the driven element in a square configuration. The antenna was tuned for the middle of the 20 meter band, and the test showed surprising results. It was about the same as a TH6 at 70 feet. The important discovery was that the signal was more stable and indicated no QSB, which was very noticable on the TH6. This was very encouraging. (Spacing was 8 ft. no balun was used, s.w.r. at resonant frequency 1, 2:1. The braid of the coax was connected to the bottom horizontal side, and center conductor to the vertical side.) The quad was disassembled, marked and carefully packaged. Antenna #2 was a TH3 back-up for 20, 15 and 10 meters, in case of good band openings. Antenna #3, a 18AVT/WB vertical mainly for 40 meters and as a back up for all bands and to be the first antenna to be installed upon our arrival. The vertical was tested and adjusted in our backyard using 12 radials for 20, 15, and 10 meters. Settings were marked and this antenna was disassembled and packed. Antenna #4 inverted Vee's for 80 and 160 meters, good old performers, tested many times in contests were just packed. Antenna #5 assorted LW and a matchbox. We also had a mobile which was used for our mobile operation on the way to and from the island. To support the antennas we included a 50 ft. heavy TV tower, 2 10 ft. masts, and a Ham-m rotator and assorted guy wires, ropes and cables.

For equipment we decided to use two sets of reliable Drake B lines. They would be used as main stations with their split frequency and c.w. capabilities. We expected a minimum of two stations at all times. Also two SB200s were selected to give us added punch. Two Atlas 210 transceivers were chosen to be back-up rigs and for operation on the lower bands. An Atlas was also used as a mobile rig. Matchbox, keyers, s.w.r. bridge and a tape recorder were complimenting the rigs. Spare tubes and limited spare parts (very limited) were added with tools and other necessary things. Two of each would guarantee a parts supply in case of rig failure. Two generators, one 1200 watt and one 1500 watt were chosen to supply the power and we had canisters to hold about 50 gallons of gasoline.

Tuesday night was set as the departure date and the last weekend before our departure saw all the stuff carefully wrapped in plastic (mostly garbage type) bags and packed in the boxes. Paul, VE3BBH, took care of the packaging operation, transportation and food. One more meeting with Martin and Truus, VE3MR, and VE3IAA, (now VE3MRS) was arranged so as to give us a FINAL look at St. Paul from their slides. They also gave us valuable advice and lifted our spirits. The special prefix or call sign was not

coming and it did not look like it will ever come. Martin offered us the VE3ZZ and we decided to use it as XJ3ZZ/1, in order to make it at least a little bit different and more attractive. I also prepared log sheet with 120 QSO's per page and we had enough sheets for over 10K QSO's. Separate logs were also kept for each band and mode.

We decided to drive to N.S. in Bob's station wagon with a U-haul trailer. Cy would fly to Sydney N.S. where we were supposed to pick him up at the airport. Everything looked good and promising. On Tuesday afternoon, Toronto was hit by a bad storm and heavy rain, which did not stop. All the stuff was loaded in the pouring rain. Rigs were in the station wagon, other equipment was in the trailer, antennas and towers on the top of the station wagon. Mobile antennas for h.f. and v.h.f. were installed on the top of the 50 foot tower. Last check and we were saying good-bye to our XYLs and kids. We left Toronto around 10 p.m. in the pouring rain. Best wishes from the members of our Toronto DX Cub were with us when we got out of range of VE3TDX repeater.

We planned to drive to Sydney, 1500 miles non stop. Bob, was the first at the wheel, driving was very dangerous with the heavy rains and high winds. We were hoping that the storm would eventually stop and leave us alone, but there was no indication that this would happen. When we talked to stations behind us and ahead of us, they were saying that the weather was good and even sunny. So it looked like the storm was travelling with us.

A flat tire near Montreal didn't help us much either and the worst part of the drive was in VE1 land. We interpreted the weather as a warning for us to return home. The storm delayed us 24 hrs. and instead of being in Sydney N.S., we were still in N.B., fighting heavy rain and fog. In some spots we could not see the front of the car, we were driving about ten miles per hour. Thanks to help from friends on local repeaters we managed to find our way out of the fog and detours. We were very nearly exhausted but after midnight we finally entered Nova Scotia. We found that the easiest way to travel at reasonable speeds was to tail gate the truckers who seemed to see better than we could. Otherwise we could average no more than 30 m.p.h. in the fog and darkness of the winding roads.

Lucky Cy, was at this time already in Sydney enjoying hospitality of our friend Bud, VE1VR and his XYL Anna, VE1WF. Bud, was very kind and helpful to us. He stayed up and when we finally got into range of the Sydney repeater, he gave us instructions on how to find his QTH, and our fourth partner who missed all the 'excitement' of our torturous trip.

Finally we arrived at our first stop on the trip, VE1VR's QTH. Was it ever good to stretch our bones and enjoy Bud's hospitality. What a time for visitors

The 18AVT being assembled and installed by VE3BMV and VE3BBH.

to arrive 4 o'clock in the morning. It was still dark and the rain was pouring continuously. We had some delicious refreshments and some 'fire water' which brought us back to life. At this point the good old question—"why are we doing all this?" came back to our mind. Bad weather was not helping either. If it continues like this, we could be stuck here for a few days and blow our holiday.

Bud, gave us a tour of his radio shack where we had the first opportunity to hear how 20 sounds in N.S. To us it was like being next door to Europe. The band was alive and Europeans were boiling in

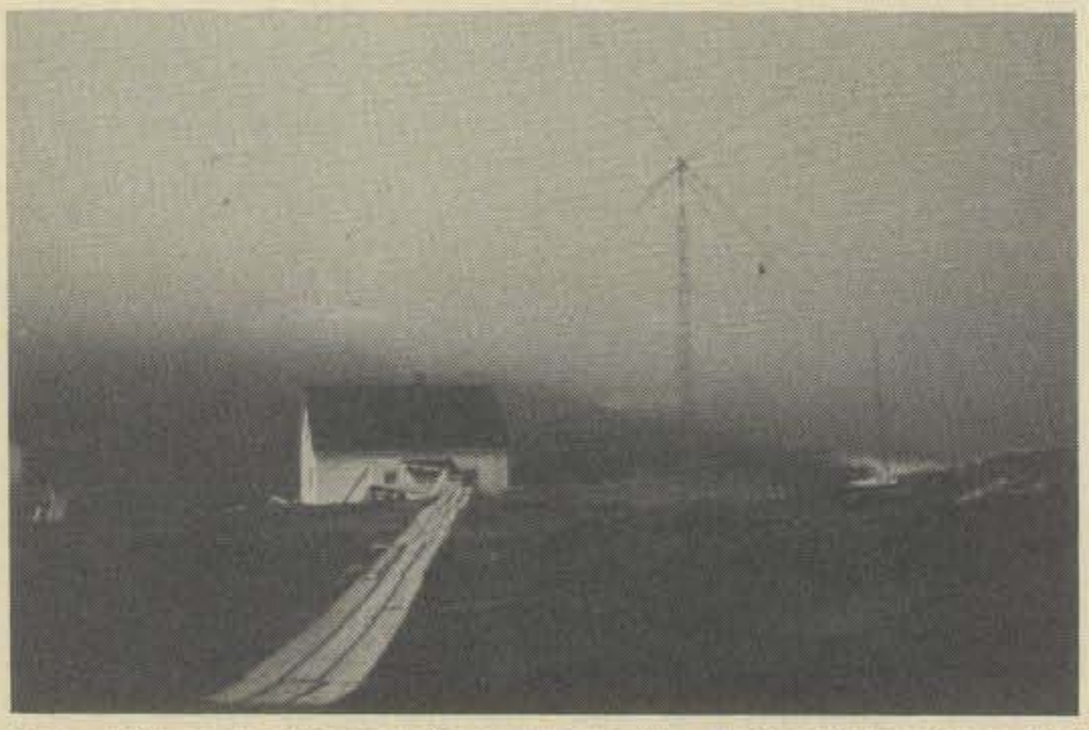
VE3BMV installing the "tail" on the Quad, while VE3DU is trying to shake him off. The rotator had to be replaced with piece of pipe and rope.

VE3BBH is either sleeping or listening ". . . two hundred and up".

at 5 a.m. It looked like we were getting the 'ordered' propagation, and here we are, maybe chained in at Cape Breton, just some 20 miles from our destination.—St. Paul.

As daylight broke so did our hopes brighten. The rain and winds started to abate and we could even see some blue spots in the low hanging clouds. This improved our mood a little bit and we decided to give it a try. There was another torturous 3 hr. drive to Dingwall, through winding roads up and down in and out of the heavy fog. As time progressed the weather became more friendly and more blue spots appeared in the sky. The winds were dying off and our hopes were getting higher.

When we arrived at Dingwall, which is a little cute fishing village, our boat captain was not there. Fortunately he was not too far and when he appeared he didn't have much encouragement that we should try to go. But it looked like the heavens were trying to reward us for all the suffering, and the sky became clear and the winds were almost gone. So after a short discussion, Lance, decided to give it a try and see how the open sea will treat us. Loading started. It looked to the natives like we were going on a binge with an entire liquor store. Boxes of whisky, rum and exotic wines, looked impressive but actually they contained our precious black boxes and other important items necessary for our stay on the isolated island. Gasoline was pumped into our containers, tower sections and antennas tied to the boat and finally the four musketeers with various expressions on their faces boarded the fishing boat. The passage in the bay was so peaceful and everything looked encouraging until we hit the open sea.



Fog, rain and strong winds were the typical weather during our stay.

I was punished for trying to stay away from the wonders of modern medicine and emptied my already empty stomach in the sea. Cy, was sleeping, Bob and Paul, were having fun watching me go through changes in color. It was getting rough but according to Lance, not bad enough to turn back.

So we kept on going. Finally there was St. Paul, in it's full beauty. A clear sky broke and a cloud of fog shrouded the top of the large island, it looked like Mt. Fuji. We were passing by the large island towards the channel separating it from the small island—our destination. The sea was very rough and the waves foamed and cracked, and it didn't look like it would improve. As we were approaching the channel, waves were smashing against the rocks. Lance, decided that we try to attempt a landing. It took him a while to anchor the boat. A little dingy was lowered on the water. It was scarey to see the little dingy go up and down like a nut shell. The first "crew" was Lance's helper who was doing the rowing, Paul, BBH and myself. With the help of others we managed not to miss the boat. When I sat down a wave came from behind and splashed against the boat, my back, and the rear part of my pants. There it was St. Paul's, welcome. It seemed like ages while we managed to make it to the landing strip. The wooden platform came right down to the water. Paul got out and was holding the boat. When I was getting out I slipped on a rock which was covered by a wave and promptly filled my boots with water. Fortunately, it was not raining, so I was only wet from the hips down.

It took about 9 trips to unload all the stuff. On the last trip our friend said he was glad we didn't bring the kitchen sink with us. So there we were with all the cargo. Slavery was just about to start. We had to carry everything up hill on the wooden walkways. Terribly tired, with help from Wilf, the lighthouse keeper and his assistant Paul, we moved the most important things.

Then according to our plan we were trying to install the tower and quad. We abandoned that quickly in order to avoid any accidents. Bob, was so tired he could not even check the rotor cable after the failure to get the rotor working. Next thing was to install the 18AVT vertical and one of the rigs to let our families and friends know that we were on the island safe and sound. The Drake line was installed, antenna hooked up, a generator started and what a relief, it worked. Paul, called "CQ Toronto" with a VE3BBH/1 call, and who comes back — Martin,

VE3MR. It was a nice feeling to hear voices from down there. Phone calls were made to our XYLs and it was quite a relief for them too.

The bands started to boil, stations were breaking in. We announced that we would start a little later on c.w. Our last hope to get VY0 prefix was gone after Martin told that all efforts were unsuccessful. In order to make the call sign stand out better, we used the call of the club station. The Olympic prefix was added and as a result we came up with XJ3ZZ/1.

We had to get the important boxes and gear inside. We were allowed to use one of the unused houses for a shack and Paul was very kind to let us sleep and cook in his house.

Another station and antenna was installed. It was the second Drake line, SB200, matchbox and about a 600 ft. long wire. While I was loading up on 40 meters, the smell of burning wood was coming from behind the rig. A closer look and there it was, the window frame was ignited by the long wire. We went to lower power, but it did not work too well. Later, after trying more long wires we came to the conclusion, that they needed a good ground and the same with 18AVT on 40 and 80 meters. We had 12 radials for 20, 15 and 10, but none for 40. After four radials were installed the vertical behaved the same way as in our backyard back home, during the tests and presetting. So we confirmed that rocks are a very poor ground. So much for the long wire too.

After we had the two stations ready, we all went to the "sleeping" house to have something to eat. Cy and Bob, decided to take over the sleeping bags on the floor. Paul and I returned to the operating house and fired up on c.w. The first c.w. contact made was with WB8EUN on 20. Propagation was very good, log pages were being filled very quickly. It was nice to hear old friends and some of the 'big guns' that you normally don't hear. We operated until 0400Z and then gave up. We went to our "sleeping house" and just folded on the floor. No sleeping bags or mattresses, just our coats and jackets. It did not matter. We slept like stones.

We woke up at 0900Z, and it was cold! Bob, fired up one rig, while the rest of us were unpacking the things and getting them ready for installation. The most important thing was the quad and the 40 foot tower to be assembled. Help was secured and up it went. The tower was up, so was the quad. It was very windy and a big relief seeing the octopus up and hearing signals boiling in. The rest of the rigs and antennas were installed. Two stations were operating simultaneously and the rest of the installation was being completed. After a while rigs were set up as follows: (1) Drake B-line, SB200, quad for 20, inverted vee's for 80 and 160 and 4 keyers. (2) Drake B line, SB200 and an 18AVT. (3) Two Atlas 210Xs, matchbox and longwire.

We were capable of running four stations simultaneously, but found that it was not necessary. Propagation was so good on 20 that everybody was there. There were almost no takers on the other bands. Most of the time two rigs were run, one or 20 c.w. the other on 20 phone.

VE3BBH, BMV and DU celebrating BMV's birthday.

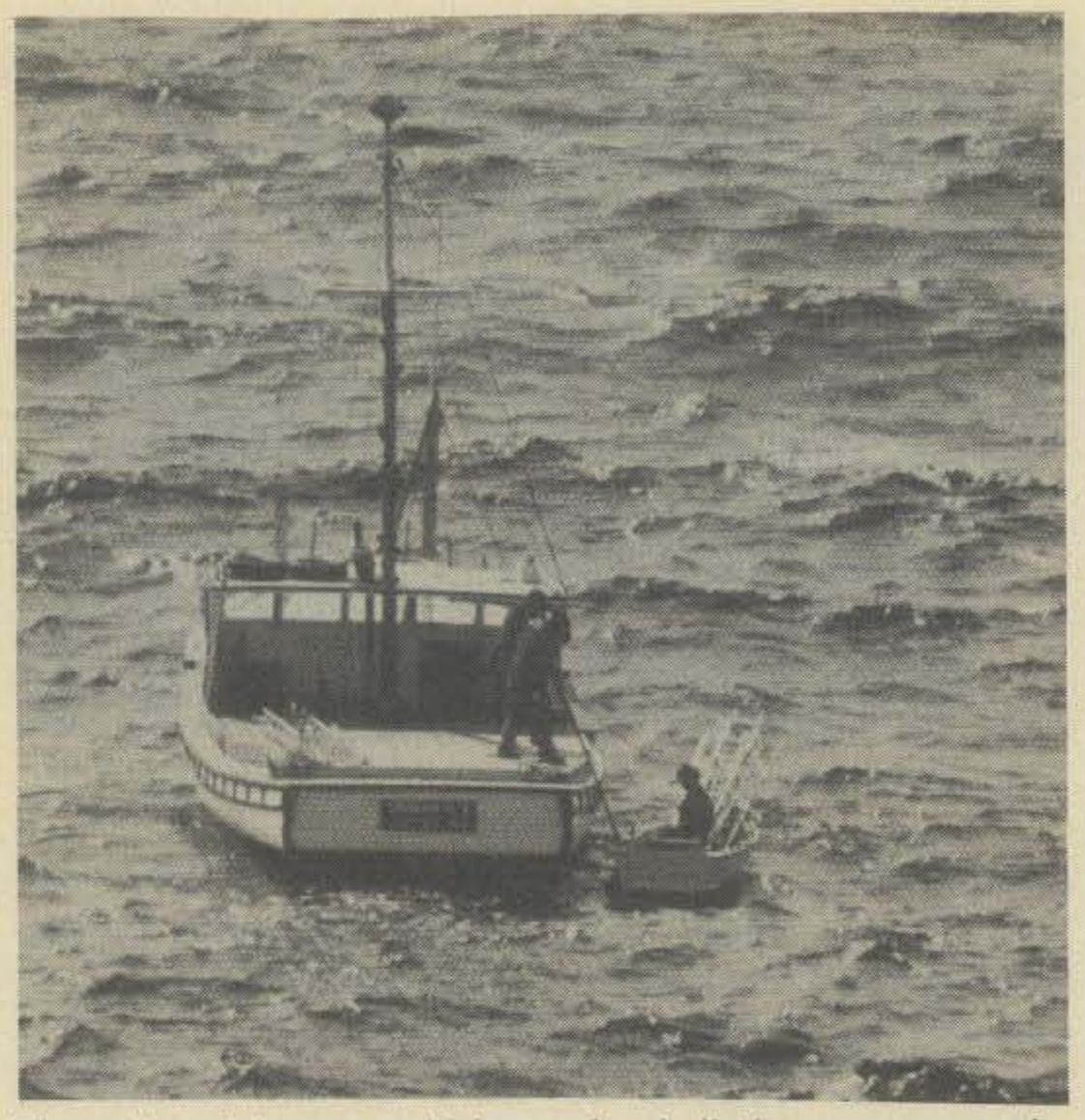
Our rotor refused to work so the armstrong method was used to turn the quad with a piece of tubing and rope. At times we let the quad loose and the wind did the turning. It did not matter much, all corners of the world were coming in. When it opened to JA it sounded like everybody from there was on. What a pile up!

I found, it was much faster and easier to work c.w. than phone. On c.w. one can better separate the stations, less QRM (no splatter), and c.w. operators are better operators than some of those with big mouths and no ears, on phone.

Trying to stick to the rule, work them faster than they are coming, it was possible to operate split by only 3 kHz and eventually on our own frequency. During good hours we were logging 150 contacts an hour on c.w.

On phone it was a pleasure to work the JA's with their disciplined pile-up. The opposite was experienced from our "I" friends. They were trying to prove that our hearing was not working, that it was not DJ9 or G3 but—I8 . . . So what do you do? Work

QRX pile-ups, we have to take the XJ3ZZ/1 family picture. l. to r. VE3BMV, VE3BBH, VE3DU, VE3KZ. The shack and antenna farm are in the background.



The return trip was a "piece of cake" the sea was calm and the boat was bigger with an outboard motor so that loading was very easy.

them first, or QSY to c.w.

Things were going along just fine, we were getting some rest and taking turns operating. The weather was miserable, rain, fog and wind. Then came our first BCI (or CBI?) complaint from Wilf. We were getting into his CB set. TV was clean, we were using low pass filters. One of the group was trying to convince Wilf how poorly designed his CB set was. It almost ended with broken diplomatic relations. Two of us went over to investigate the complaint. We had a tuning unit and coax stubs. We managed to reopen the embassies and after filtering on the CB set was installed, we were clean! What a relief. The weather was getting worse and the winds were up to 60 mph, a heavy fog rolled in and Wilf, came rushing in with the news . . . that a fishing boat and it's crew were lost and there was an emergency. We had to stop transmitting for about 10 hours until the "clowns", as Wilf called them, were found.

Another surprise was when the automatic fog warning horn came on. Beside the proper tone it was also announcing our call sign. R.f. was getting into the tone generator and we were modulating it. We had to operate barefoot and beam away from the crazy fog horn. What next? Well, the next was the quad spreader, it broke. After "fighting" for the privilege to go up the tower in the freezing rain and 40 m.p.h. wind, I was the "lucky" one. The others hung onto the guy wires. With shaking knees we managed to succeed. The operation was successful and the patient (quad survived. Back to the pile-ups.

Cooking was no problem. Almost everybody had their specialties along. Cy, was with his Chinese kitchen in the can, Bob and Paul, with regular Canadian food, and I was well equipped with sausages and good kobassa. My theory was that I can survive on sausage, pickles and vodka. But because there was no Vodka, sausages were out of the menu very quickly and I still can't stand them. I managed to save a bottle of wine and we celebrated my birthday. It was so nice to hear my XYL and my 2 year old junior operator wish me a happy birthday over a phone patch.

Udo, VE3FFA was our link with our families and thanks to his phone patch we were in constant contact with them during our stay on the island and the trip.

As far as equipment goes, we were trying to have two of each, in case one goes, there is the other one. In case both go, you can always make one work out of the two that aren't. Cy is known to have a black cloud hanging over him and rumors are that anything he touches goes wrong or burns. By sheer coincidence the T4XB did not take the loading procedure and burned resistors in the cathode and meter shunt while Cy was operating. Next thing Cy touched was the SB200 on the last day of our stay. Several resistors went up in smoke. This one we did not bother fixing.

Our compliments to our quad. It was a terrific performer, and it felt just like sitting at home with the big antennas and tower. We were getting very good reports from all over the world even barefoot. The problem with installation was overcome by having the spider in two pieces. Each loop was installed separately and it was easy to handle it. A problem with the feed line halted us for a while. Apparently the salt air and water got into one of the splices. Insulation in the female to female connector up on the tower were burned out and caused almost a dead short. What fun it was to fix this one in 50 m.p.h. winds.

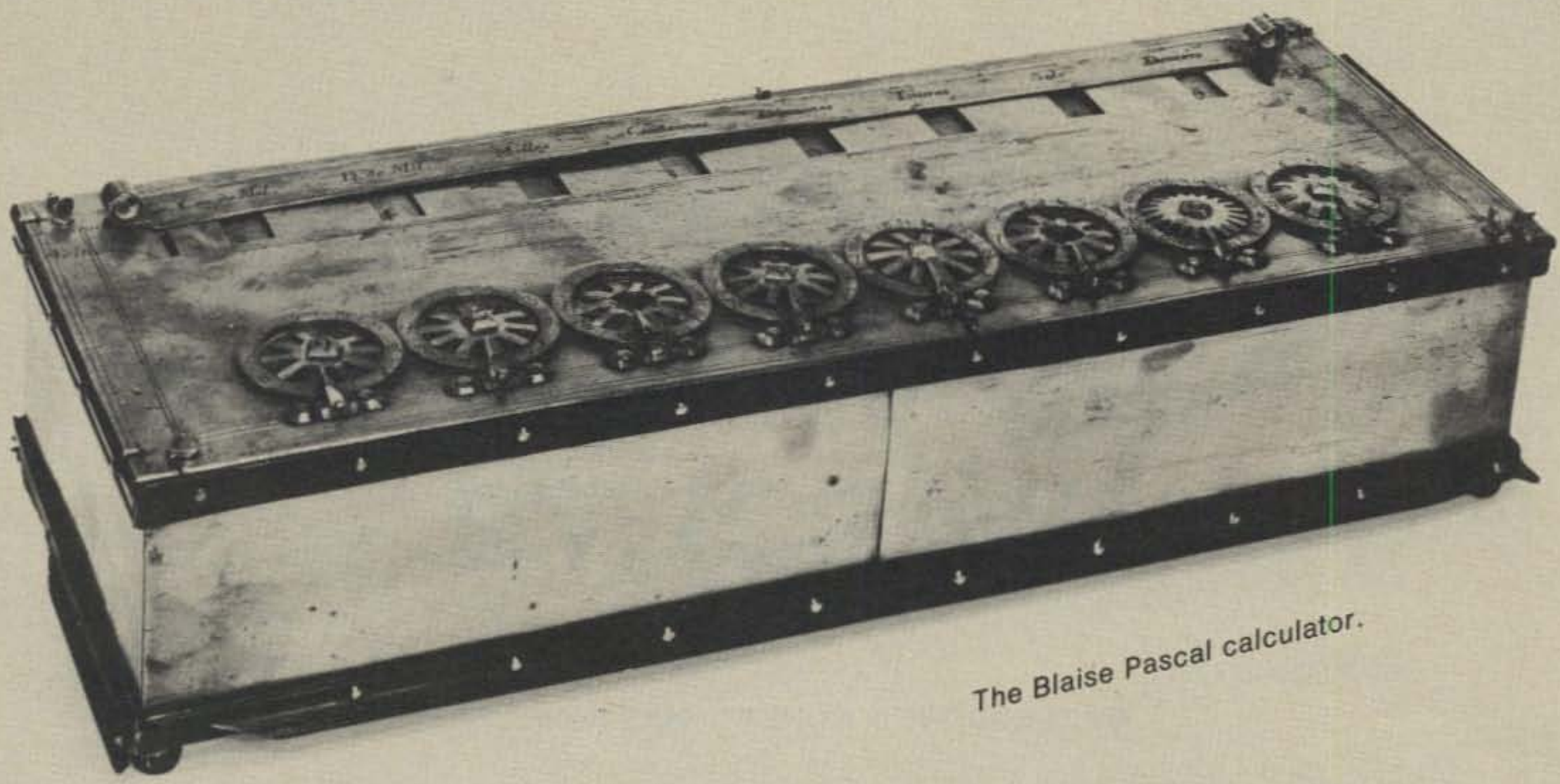
Over the last night of our stay, the 160 meter antenna was erected and we spent about 4 hours of calling with the results being 9 contacts and the only DX was HB9RM.

All together we made 1822 QSOs on s.s.b. and 2478 on c.w. Considering the amount of operating time we had available we consider our efforts successful. Many comments and compliments were received regarding our operation were ample reward for us.

Early Monday morning the boat was supposed to come and pick us up. The weather did not look too promising and it looked like we would have to stay for a few more days. But just in case we started to take all the antennas down, except the 20 meter quad. Rigs and all other things were packed and we were getting ready for our departure. I bet that the local population was glad that the "interferers" that invaded their peaceful island, were going to leave.

(Continued on page 96)

No liquid crystal indicators, no LEDs, no batteries, just plain old fashioned digital readout.



The Blaise Pascal calculator.

Machine Arithmétique de Pascal

BY ALAN M. DORHOFFER*, K2EEK

Every month we at *CQ* receive numerous foreign publications involved with electronics and especially amateur radio. In fact we encourage this practice by "swapping" subscriptions in order that we might share the happenings and developments within the world of amateur radio. It's often helpful and informative to know what the other fellow is doing and for him to know what's going on over here. Besides that it's also fun.

One problem that does arise is one of language. Most of these publications are naturally written and published in the language (or languages) of that country. Somehow pictures and schematics transcend this barrier and are universal in their appeal. We all like to look at things, examine circuits and mechanical diagrams and in general we can fill in the gaps where there is no clear understanding of the language. It would be nice and extremely satisfying to be able to actually read and understand all of the various publications we receive but that unfortunately is not possible. Here at CQ for example, we have people who can read a little French, a little Spanish and a little German . . . the emphasis is on the *little.* With regard to oriental language publications that's a whole other story. If any of you have seen a copy of Japanese magazine called *CQ* you'll know what I mean. I can recognize that there are two forms of Japanese being used, one a formal or traditional lettering and the other seems to be more concise or for lack of a better word—modern. Anyway I do enjoy looking at, if not reading all, of the magazines that come each month.

From time to time something pops up in one of these magazines that sparks my interest to delve into it a little deeper. It's not always the latest state-of-the-art whatever or an interesting solution to a problem, but often something simple that strikes the right chord in my imagination. It's anything and everything at the right time.

One thing I would like to share with you came via a foreign publication the other month. The cover photo for the March-April 1977 issue of *Ondes courtes—Informations*, a French periodical, seemed

(Continued on page 96)

*Editor, CQ

WARC in a nutshell. Ted Cohen takes the mystery and governmentese out of what is about to happen and in simple language explains what it's all about.

World Administrative Radio Conference (WARC)-79

BY THEODORE J. COHEN*, N4XX (exW4UMF)

Almost all of you are aware that a World Administrative Radio Conference (WARC) will be held in 1979. Yet, some may still be wondering why such a Conference is being held, and how the United States is preparing for this Conference. Further, few readers may realize that the electronic industries' proposal for use of the 220 MHz band (the "Class E" proposal) hinges, in part, on the outcome of WARC 79. In this fast-paced article, Author Cohen briefly discusses WARC 79, the reasons for the Conference, the impact the Conference will have on worldwide communications through the year 2000, and the reasons why a 220 MHz CB allocation is not good frequency management policy. Instead, the FCC is encouraged to allocate portions of the 900 MHz band for CB use. —K2EEK

"WARC 79" is an acronym which stands for "World Administrative Radio Conference-1979," and it represents a most important event in the field of international telecommunications. The reason for this is that the participants in this Conference will review all frequency allocations, and all radio regulations which now govern the use of the entire radio frequency spectrum . . . the first such review in the last 20 years.

In this article we will provide some background material on WARC 79, and on the International Telecommunication Union (ITU), which is convening the Conference. We will also touch briefly on the impact this Conference will have on worldwide communications through the year 2000. A discussion of U.S. preparations for the Conference is also included, and we will conclude with a discussion of one WARC 79 issue which is of special interest to Radio Amateurs.

*8603 Conover Place, Alexandria, VA 22308

The International Telecommunications Union (ITU)

In the middle 1800's, long-distance telecommunications were effected through the use of the telegraph. At that time, however, telegrams could not be transmitted across an international border. More specifically, telegrams were stopped at each international boundary line, were walked across the border, and were then retransmitted on the other country's telegraph system. Needless to say, the confusion and delays generated by this type of operation often outweighed any advantage to be gained through use of the telegraph!

Recognizing that the transmission of international telegrams could be made more efficient, Napoleon III, in 1865, convened the first conference of the International Telegraph Union in Paris, France. The purpose of this Union was to establish procedures for handling international telegraph messages. This organization, the International Telegraph Union, was to be the parent organization of the International Telecommunication Union.

Today, the ITU has over 150 member countries, and it makes its home in Geneva, Switzerland. The purpose of the Union is to provide a common meeting ground for administrations to discuss telecommunication matters of mutual interest, and to seek acceptable solutions to problems which may arise in the use of the radio frequency spectrum.

It should be noted that the deliberations of the ITU take place in an atmosphere which does not impinge on the national sovereignty of the member nations. That is, no nation can be forced to accept the regulations, resolutions, recommendations, or even the draft treaties which may result from international conferences such as WARC 79 **unless it agrees to do so.** In the case of the United States, for example, the output of the ITU must have the advice

and consent of the Senate, as well as final ratification of the President, before the U.S. will abide by the Conference's decisions. Further, once the modified Radio Regulations have been ratified, they are considered a "treaty obligation," and as such, our adherence to the Regulations is expected under international agreement.

Why 1979?

You may be wondering why the ITU has resolved to convene a World Administrative Radio Conference in 1979. There are, basically, three reasons for this action:

1. Almost 20 years have elapsed since a major conference was held to review the entire body of the Radio Regulations and the Table of Frequency Allocations, and to approve changes to the Regulations and Allocations;

2. Rapid technical advances have been made in the telecommunications art during the past 20 years, particularly with respect to certain communication services (for example, the satellite services), and so, the Radio Regulations and the Table of Frequency Allocations must be updated to meet today's—and tomorrow's—needs;

3. Eight ITU-sponsored special service and regional conferences on telecommunication matters have been held during the past 20 years. Thus, it is necessary to incorporate the decisions made at these "limited agenda" conferences into the larger body of the Radio Regulations.

Impact On Worldwide Communications

We will all be affected by the changes which result from the 1979 Conference. As noted by J. E. Weatherford of the Office of Telecommunications Policy (OTP), Executive Office of the President:

> "The 1979 WARC has the potential to provide the guidance to the development and use of the next generation of communication-electronic equipments and the operation and international telecommunication systems into the year 2000. The dependence of the United States on the use of telecommunications in every facet of government and in the normal day-to-day life of every citizen makes it reasonable that unusual efforts should be expended toward preparation for this conference."
>
> (*SIGNAL*, April, 1976, p. 17)

At the WARC, new bands will probably be designed for domestic and international radio broadcasting, allocations will be established for communications between satellites, new bands in the high-frequency portion of the spectrum may be allocated to the Amateur Service, and the possibility even exists that two new bands of frequencies in the v.h.f. and u.h.f. portions of the spectrum will be allocated to the Mobile Service (which includes the Personal Radio Service (PRS), previously known as the Citizens Radio Service).

In short, WARC 79 and the decisions which result from the deliberations in Geneva are of importance to all of us, for these deliberations will effectively determine the course of telecommunications technology for the next 20 years.

U.S. Preparations For WARC 79

Figure 1 is a simplified organizational diagram for the U.S. WARC 79 preparation efforts. As seen, the State Department provides the official U.S. contact with the ITU. The reason for this is that the Secretary of State is responsible for conducting our foreign affairs. With specific reference to telecommunication matters, the Secretary is supported by two organizations: the *OTP* and the *FCC*. The OTP is charged with preparing the Federal Government's position on telecommunications, and it does so through an organization called the **Interdepartment Radio Advisory Committee (IRAC).** The IRAC is made up of representatives from all Federal agencies and departments

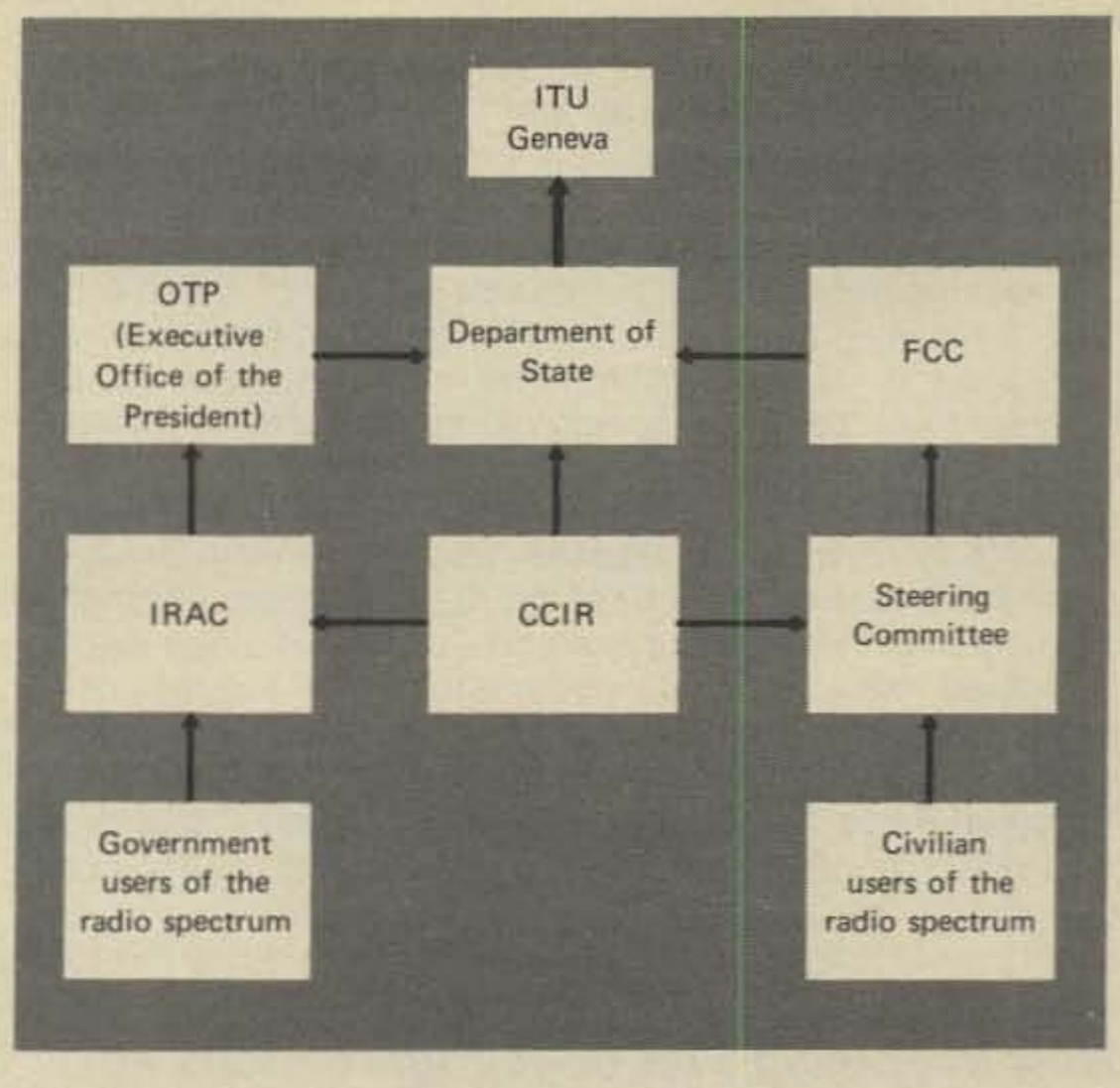


Fig. 1—Organizations which are participating in the U.S. WARC—79 preparation efforts.

which have telecommunication requirements (for example, the Army, Navy, Air Force, Federal Aviation Administration, Department of Commerce, etc.).

Civilian users of the radio spectrum, on the other hand, are represented by the Federal Communications Commission. Further, with particular attention to WARC 79 preparations, the FCC has created a steering Committee which is tasked with coordinating the positions of civil radio groups (for example, radio and television broadcasters, land mobile users, Radio Amateurs, Citizens Band operators, etc.). The FCC also participates as a non-voting member of the IRAC so as to insure that Government and civilian positions on telecommunication matters are fully known to all parties.

Finally, the State Department, the IRAC, and the FCC Steering Committee are supported by the **U.S. International Radio Consultative Committee** (which is known worldwide as the **CCIR**). It is this organization which provides the technical recommendations which are used as a basis for developing, among other things, the Table of Frequency Allocations. The CCIR, for example, would review the technical material one service might submit to substantiate its claim that it could share a given band of frequencies with another service, and would pass judgement on the technical merits of the material. It may be noted, in passing, that the National CCIR is similar in structure to the International CCIR, the latter being a permanent organization within the ITU.

Notices Of Inquiry

In order to provide an opportunity for the Public to participate in the preparations for WARC 79, the FCC has issued several **Notices of Inquiry (NOI's),** the purpose of which was to present *proposed* International Frequency Allocations Tables, and to solicit comments on these proposals. In each case, proposals were accompanied by discussions which provided the rationale behind the proposals, and which identified those issues which had to be resolved before the U.S. positions became "final." It was the stated intent of the Commission, through the NOI process, to develop U.S. proposals ". . . *which effectively promote that combination of telecommunication uses which offers*

the maximum social and economic contribution to the national welfare and which also contain the flexibility necessary to accommodate important new applications of this dynamic technology as well as the unique requirements of our international partners in the ITU" (Fifth NOI, FCC, 23 May 1977).

You can be sure that the Amateur Service was well represented in the FCC's Notices of Inquiry, of which there have been five at the time this is written. Intense interest developed in the possibility that some portions of the Amateur high-frequency bands will be allocated exclusively to the Amateur Service, that new bands may be created at 10, 18, and 24 MHz, and that new bands in the region above 1 GHZ will be allocated for Amateur satellite use. All of these issues, and many more, have been thoroughly discussed in the Amateur literature, and they need not be discussed here. One issue which does require further comment, however, involves the FCC's current proposal to allocate portions of the Amateur 220-225 MHz band to the **Personal Radio Service** (the so-called "Class E" proposal). In addition, the FCC has raised the possibility of allocating a portion of the band 890-947 MHz to the *PRS*.

Let's examine the FCC's proposed allocations to the PRS in more detail.

New Proposed Frequency Allocations For The Personal Radio Service

Portions of the following two radio frequency bands may someday be allocated to the Personal Radio Service:

- 220-225 MHz
- 890-947 MHz

These allocations are being proposed for the **Mobile Service** so as to provide the FCC with the flexibility it desires to plan for the future needs of the Personal Radio Service and other services within the **Mobile Service.**

The 220-225 MHz band, currently allocated to the Amateur Service (and shared with the **Government Radio Positioning Service,** which has priority) lies near the upper end of the v.h.f. spectrum 4 MHz above television channel 13 (210-216 MHz). Communications at these frequencies are primarily along line-of-sight paths, though occasionally, "ducts" occur in the lower atmosphere which permit the transmission of signals over larger distances. Line-of-sight propagation would impose no significant limitation on PRS operations, however, since with few exceptions, most CB contacts involve stations which are separated by two to three miles, or so. Note that this limit in the separation of stations is not due to frequency or power limitations; rather, it results from the CBer's need to communicate primarily with those operators who are close to his or her station. After all, few drivers need a Smokey report from 20 miles down the road, or even from another city, if the skip is "in" on the 27 MHz band!

Given the above, the electronics industry in this country has long argued that the 220 MHz band is ideally suited for use by the PRS. However, careful consideration of the matter suggests otherwise. For one thing, since this band lies just above Ch. 13, there is the possibility that widespread use of equipment in this band by the non-technical Public will result in serious interference to television receivers in Ch. 13 service areas. Then too, the 220 MHz band is already allocated to the Government Radio Positioning Service **(GRPS),** and as such, unless the GRPS is displaced, restrictions would have to be placed on a CBer's use of the band in certain parts of the country. Regardless, use of the 220 MHz band by Canada and Mexico suggests that restrictions on 220 MHz PRS operations would almost certainly have to be imposed near our international borders.

Of course, a PRS allocation in the 220 MHz band would displace Amateur operations in certain portions of this band, hardly an acceptable move in light of the increasingly heavy use of this band by Amateur Service. And if the FCC eventually provides a 220 MHz allocation to the PRS following WARC 79, it would once again find itself in a situation with adjacent Amateur and PRS allocations. One has only to ponder the many instances when high-power Amateur equipment was used by CBers in the 27 MHz band, or when "sliders" were observed in the 28 MHz Amateur band and between the 27 and 28 MHz bands, to envision the potential for abuse of the 220 MHz band by some operators in the PRS. Given the perennially low level of FCC manpower and funding, it doesn't take much insight to see that the Commission can ill afford to create new enforcement problems for itself of the type that would result from a PRS allocation in the 220 MHz band.

In short, allocation of a portion of the 220 MHz band to the Personal Radio Service would not be a good demonstration of responsible frequency management principles.

The Commission has apparently recognized the problems inherent in a 220 MHz Class E allocation, and as such, has wisely provided for the possibility of allocating a portion of the so-called "900 MHz" band to the PRS. This band (890-947 MHz) lies in the u.h.f. portion of the spectrum, and like the 220 MHz band, it permits communication over line-of-sight paths. However, at 900 MHz, considerably more channels could conceivably be made available than in the 220 MHz band, interference to electronic home-entertainment equipment would be minimal, and there would be little temptation to use (illegal) amplifiers. Best of all, no existing services would be displaced by such an allocation.

What additional frequency bands, if any, are actually allocated to the PRS will depend on the outcome of the 1979 Conference in Geneva, and on domestic allocation proceedings which will probably be held following WARC 79. But assuming that the need for a new PRS band can be demonstrated, there is little question that the 900 MHz band offers the best opportunity for the development of a personal radio service which would truly serve the Public's needs.

1979—A Year Of Decisions

What new frequency bands are made available to the Amateur Radio Service and to other radio services will be decided at the World Administrative Radio Conference in 1979. So, too, will the regulations under which these services operate be modified at that time, so as to insure efficient use of the radio spectrum through the year 2000.

Yes, WARC 79 *is* an important event in the field of telecommunications, and one which will have an impact on all of us. ■

We have been informed that on August 4th, U.S. CCIR Study Group 8 met and that they agreed to accept interum responsibility in the U.S. for the non-Space Amateur Radio Service subject to approval of the U.S. CCIR National Committee (the Amateur Satellite Service is already covered in CCIR Study Group 2-Space Research). Study Group 8 established an ad hoc committee (E) to handle Amateur Radio Service matters. The committee is chaired by John J. Kelleher, W4ZC, assisted by Richard L. Baldwin, W1RU and E. Merle Blunt of A.R.R.L., Lee Garlock, WB3FZA from the DOD Electromagnetic Compatability Center in Annapolis, Lt. Col. Peter Hurd, N1SS, Executive Secretary of the FCC Advisory Committee for Amateur Radio (WARC-1979), Raymond E. Simonds, K4BZF, Director of the RCA Frequency Bureau in Washington D.C., Joseph J. Gatti, W4TRJ, Dr. Theodore J. Cohen, N4XX, of Tracor Sciences and Systems, James C. McCoy Jr., W3FIA, U.S. Dept. of Commerce, and Frank L. Rose, W3RO, of the FCC. —K2EEK

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FOR 20, 15 and 10 METERS
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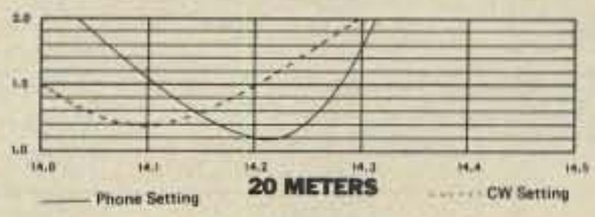
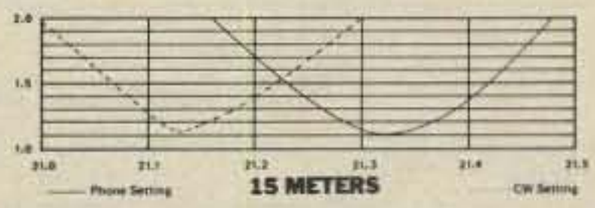
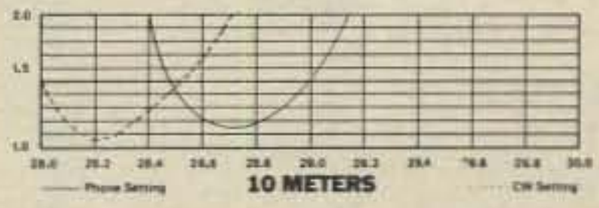
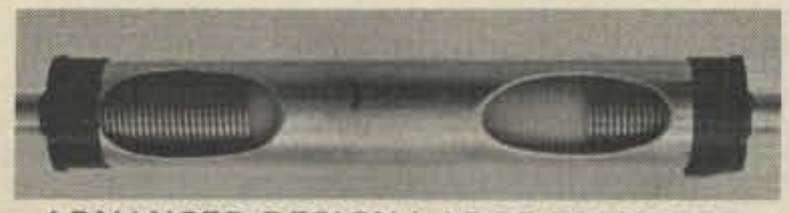
MODEL SY-1 SPECIFICATIONS:

Matching Method:	Beta	F/B Ratio	20-25 dB	Mast Diameter	2" O.D.
Band MHz:	14-21-28	Boom Length	26' (2" O.D.)	Boom Diameter	2" O.D.
Maximum Power Input:	Legal Limit			Surface Area	7.3 sq. ft.
Gain	10 dB	No. of Elements	5	Windload Area	146 lbs.
VSWR (at Resonance)	1.5 to 1	Longest Element	26' 7"	Shipping Weight	50 lbs.
Impedance	50 ohms	Turning Radius	18' 6"		









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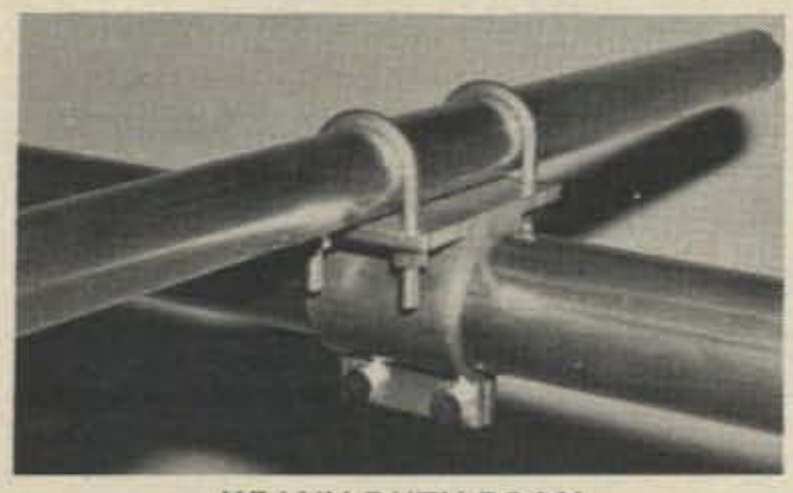

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CQ World-Wide DX Contest
All-Time U.S.A. Records

BY FREDERICK CAPOSSELA, K6XX/K6SSS

Tabulated below are the record-high scores achieved by U.S. contesters in the CQ World Wide DX Contest. All-Time World-High scores are shown on pages 40 and 41. Number groups following calls and bands are: year of operation, total score, contacts, zones, and countries.

CW
Single Operator/Single Band

1.8	K1PBW ('76) 22,626	157	15	39
3.5	W1MX ('76) .....108,288 (Opr. WA8WNU)	403	21	75
7.0	W5WZQ ('76) 322,383	907	33	90
14	W4AXE ('68) .....396,414 (Opr. WA4PXP)	836	39	123
21	WA8LYF ('70) .....286,767 (Opr. K8HLR)	756	35	94
28	K1JGD ('68) 158,510	520	28	82

Single Operator/All Band

Station	Band	OSOS	Zones	Countries
	1.8	20	8	17
	3.5	111	18	58
W3LPL	7.0	273	27	70
(1976)	14	475	30	108
1,538,784	21	248	23	81
	28	22	11	17
	Total	1149	117	351

Multi-Operator/Single Xmtr

Station	Band	OSOS	Zones	Countries
	1.8	20	9	20
	3.5	130	19	50
AA5LES	7.0	633	30	80
(1976)	14	566	30	96
2,246,989	21	292	27	75
	28	29	15	28
	Total	1670	130	349

Multi-Operator/Multi-Xmtr

Station	Band	OSOS	Zones	Countries
	1.8	14	4	5
	3.5	173	25	56
W4BVV	7.0	665	33	86
(1970)	14	810	38	122
5,552,362	21	909	37	107
	28	485	31	80
	Total	3056	168	456

PHONE
Single Operator/Single Band

1.8	K1PBW ('76) 7,280	100	10	30
3.5	W1EBC ('75) 77,420	330	22	76
7.0	W3PHL ('75) 110,799	337	29	88
14	W4AXE ('70) .....595,725 (Opr. WA4PXP)	1068	39	156
21	W2AH ('72) 485,605	1129	34	111
28	W2SKE ('68) 429,976	1030	34	108

Single Operator/All Band

Station	Band	OSOS	Zones	Countries
	1.8	—	—	—
	3.5	50	18	28
W6RR	7.0	164	22	33
(1972)	14	297	32	87
2,350,964	21	949	31	86
	28	360	31	81
	Total	1820	134	315

Multi-Operator/Single Xmtr

Station	Band	OSOS	Zones	Countries
	1.8	—	—	—
	3.6	192	20	66
W3WJD	7.0	84	24	58
(1974)	14	794	36	132
2,440,167	21	414	29	109
	28	85	18	55
	Total	1569	127	420

Multi-Operator/Multi-Xmtr

Station	Band	OSOS	Zones	Countries
	1.8	4	3	3
	3.5	127	19	46
WA2ZAA	7.0	228	29	78
(1969)	14	936	39	138
6,743,880	21	1183	38	126
	28	1012	33	103
	Total	3490	161	494

Club Record: Potomac Valley Radio Club ('76) 58,759,204

CQ World-Wide DX Contest All-Time C.W. Records

Single Operator/Single Band WORLD RECORD HOLDERS

1.8	**KV4FZ ('76)**	**42,800**	**390**	**13**	**37**
3.5	**KV4FZ ('75)**	**190,082**	**789**	**24**	**77**
7.0	**KP4AST ('73)**	**447,421**	**1479**	**32**	**95**
	(Opr. WA4PXP)				
14	**CX4CR ('75)**	**935,025**	**2303**	**34**	**103**
	(Opr. CX9BT)				
21	**CW9BT ('72)**	**696,133**	**2068**	**31**	**82**
28	**CX1AAC ('70)**	**681,636**	**1711**	**36**	**93**

AFRICA

1.8	EA8CR ('76)	7,696	100	8	18
3.5	CN8DW ('70)	15,759	153	9	26
7.0	5A1TW ('64)	227,814	918	22	64
14	CR6IK ('74)	925,386	2021	38	116
21	TJ1AW ('70)	549,888	1447	35	93
28	CR6IK ('69)	498,800	1439	36	80

ASIA

1.8	4X4NJ ('74)	4,818	76	6	16
3.5	4X4NJ ('75)	103,572	584	14	49
7.0	4X4FA ('64)	174,505	781	25	60
14	UA9DN ('76)	344,520	1176	26	82
21	KA6AY ('72)	264,688	920	30	78
28	HZ1AB ('68)	132,390	578	21	55

EUROPE

1.8	PAØHIP ('76)	14,105	311	9	26
3.5	YU3DBC ('74)	135,408	853	22	69
7.0	UA6LO ('76)	205,082	854	31	91
14	DJ6RX ('76)	420,512	1240	32	104
21	G3HCT ('70)	317,312	924	38	96
28	DL4AAP ('57)	253,680	728	36	84

NORTH AMERICA

1.8	**KV4FZ ('76)**	**42,800**	**390**	**13**	**37**
3.5	**KV4FZ ('75)**	**190,082**	**789**	**24**	**77**
7.0	**KP4AST ('73)**	**447,421**	**1479**	**32**	**95**
	(Opr. WA4PXP)				
14	KV4FZ ('70)	908,514	2315	36	117
21	WA8LYF ('70)	286,767	756	35	94
	(Opr. K8HLR)				
28	K1JGD ('68)	158,510	520	28	82

OCEANIA

1.8	KH6CHC ('76)	3,630	82	7	8
3.5	VR3AH ('76)	178,560	956	24	40
7.0	VK6HD ('76)	266,750	934	29	68
14	VK6HD ('75)	469,320	1325	32	8
21	VK6HD ('71)	531,354	1576	32	82
28	VK8UG ('67)	320,008	1048	32	72

SOUTH AMERICA

1.8	YV1OB ('75)	10,860	127	10	20
3.5	YV5AW ('73)	74,144	445	17	39
7.0	CV4DL ('75)	230,040	1020	24	57
	(Opr. CX1BBL)				
14	CX4CR ('75)	935,025	2303	34	103
21	**CW9BT ('72)**	**696,133**	**2068**	**31**	**82**
28	**CX1AAC ('70)**	**681,636**	**1711**	**36**	**93**

Single Operator/All Band

AF	C5AZ ('76)	3,580,980	3084	100	290
	(Opr. OH2MM)				
AS	UK9ABA ('70)	1,719,663	1366	124	327
EU	CT4AT ('76)	2,809,421	2881	97	312
	(Opr. WA3HRV)				
NA	**KP4AST ('76)**	**3,725,836**	**3348**	**118**	**334**
	(Opr. K7VPF)				
O	KH6RS ('72)	2,748,307	2990	121	190
	(Opr. W6MAR)				
SA	9Y4VT ('76)	3,438,644	3400	93	248
	(Opr. N6AA)				

WORLD RECORD

Station	Band	Contacts	Zones	Countries
KP4AST	1.8	66	11	21
Opr.	3.5	331	16	59
K7VPF	7.0	814	27	75
(1976)	14	1083	27	81
3,725,836	21	981	23	77
	28	70	14	21
	Total	3348	118	334

Multi-Operator/Single Xmtr

AF	ZD8W ('76)	3,652,143	3385	103	260
AS	OD5IQ ('74)	3,970,912	2966	120	344
EU	GC4DAA ('76)	2,300,942	2760	89	282
NA	KP4EAJ ('74)	2,683,525	3343	109	250
O	5W1AZ ('76)	2,534,416	3043	108	176
SA	**FY7AK ('75)**	**4,197,364**	**3670**	**98**	**288**

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	2	2	2
	3.5	248	17	51
FY7AK	7.0	825	18	56
(1975)	14	992	24	73
4,197,364	21	1382	22	73
	28	221	15	33
	Total	3670	98	288

Multi-Operator/Multi Xmtr

AF	ET3FMA ('67)	1,387,680	1476	106	231
AS	UK9AAN ('76)	4,859,348	3995	122	356
EU	OH2AM ('68)	4,118,688	3277	155	412
NA	W4BVV ('70)	5,552,352	3056	168	456
O	KS6ER ('73)	1,415,650	2136	102	123
SA	**PJØFC ('70)**	**11,586,428**	**7080**	**150**	**401**

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	92	8	8
	3.5	668	17	46
PJØFC	7.0	1338	26	75
(1970)	14	1974	34	109
11,586,428	21	1641	34	64
	28	1377	31	79
	Total	7090	150	401

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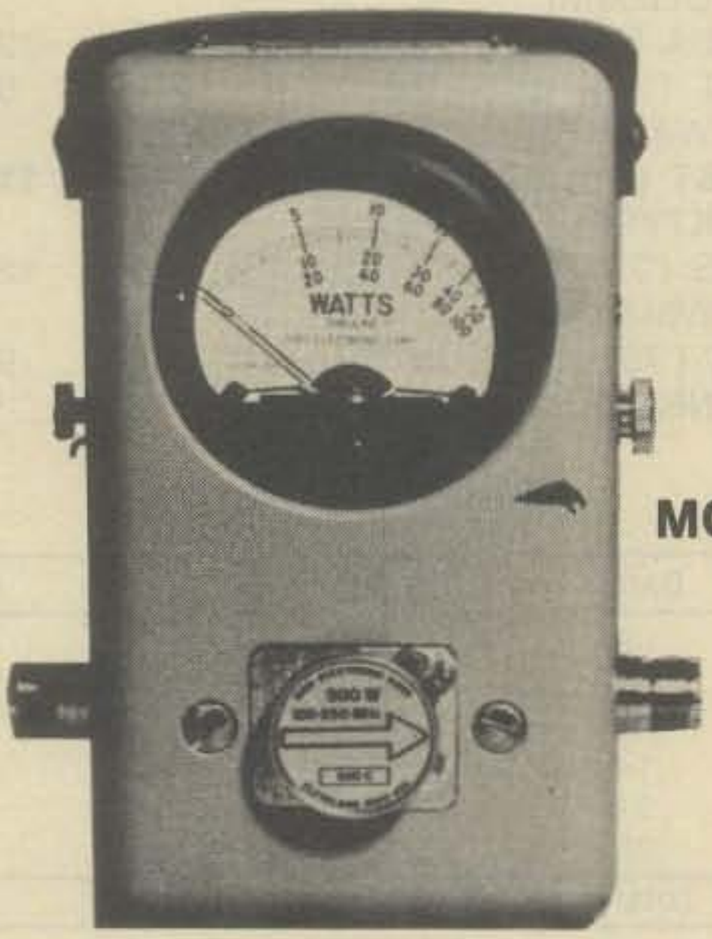

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- **BUY ONLY THE ELEMENTS YOU NEED AND ADD EXTRA RANGES AT ANY TIME**
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Table 1
STANDARD ELEMENTS

Power Range	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
5 watts	—	5A	5B	5C	5D	5E
10 watts	—	10A	10B	10C	10D	10E
25 watts	—	25A	25B	25C	25D	25E
50 watts	50H	50A	50B	50C	50D	50E
100 watts	100H	100A	100B	100C	100D	100E
250 watts	250H	250A	250B	250C	250D	250E
500 watts	500H	500A	500B	500C	500D	500E
1000 watts	1000H	1000A	1000B	1000C	1000D	1000E
2500 watts	2500H					
5000 watts	5000H					

Table 2
LOW-POWER ELEMENTS

1 watt	Cat. No.	2.5 watts	Cat. No.
60-80 MHz	060-1	60-80 MHz	060-2
80-95 MHz	080-1	80-95 MHz	080-2
95-125 MHz	095-1	95-150 MHz	095-2
110-160 MHz	110-1	150-250 MHz	150-2
150-250 MHz	150-1	200-300 MHz	200-2
200-300 MHz	200-1	250-450 MHz	250-2
275-450 MHz	275-1	400-850 MHz	400-2
425-850 MHz	425-1	800-950 MHz	800-2
800-950 MHz	800-1		

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NATIONAL RADIO COMPANY, INC.
NRCI

NCX-1000

The only 1000 watt, "single package" transceiver. Heavy duty design . . . results of 50 years of design leadership in amateur equipment. State of the art speech processing, linear amplifier, power supply, all in one package. Nothing extra to buy. Covers all amateur bands in the HF spectrum . . . AM, SS' CW' **$1,600**

NCL-2000

Linear Amplifier. A full 10 dB gain. 20 watts in 2000 watts out. Can be driven with one watt. Continuous duty design utilizes two 8122 ceramic tetrode output tubes, designed for both AM and SSB operation. The industry standard for 12 years. Thousands in use all over the world.

$1,200

HRO-500

The ultimate short wave receiver. This synthesized (phase lock loop) receiver incorporates all facilities for AM, Single Side Band (SSB), and CW receiption in all frequencies from the bottom of the very low frequency band (VLF) to the top of the high frequency band (HF). National's "dead accurate" dial means no searching for transmissions. Dial up the frequency and it's there: aeronautical, marine, CB, amateur, military, etc. Continuous coverage.

$3,000

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ICOM

VHF/UHF AMATUER & MARINE EQUIPMENT

VHF/UHF AMATEUR & MARINE EQUIPMENT

IC-245. 146 MHz FM 10W XCVR. LSI synthesizer with 4 digit LED readout. Xmit & Rcv frequencies independently programmable. 60 dB spurious attenuation.
$499.00

IC-215. 2 METER FM PORTABLE. Three narrow filters for superb performance. 3W or 400 mW. 15 CH. capacity. MOS FET RF Amp & 5 tuned ckts. S-meter front panel.
$229.00

$249.00

IC-502. 6 METER SSB & CW PORTABLE.XCVR. Includes antenna & battery pack. 3W PEP & stable VFO for fun & FB QSO's. Covers first 800 KHz of 6M band, where most activity is.

IC-211. 4 MEG, MULTI-MODE 2M XCVR. 144-145 MHz on SSB & CW, plus 146-147 MHz on FM. Work AMAT OSCAR six or seven. LSI synthesizer with 7 digit LED. MOS FET RF Amp, 5 helical cavities, FET mixer & 3 I.F. filters.
$749.00

$299.00

IC-22S. 145 MHz FM 10W XCVR. CMOS synthesizer can be set to any 15 KHz ch. between 146 & 148 MHz by diode matrix board. Spurious attenuation far better than FCC spec. 10W or 1W. IDC modulation control.

IC-21A. 146 MHz FM 10W XCVR. MOS FET RF Amp & 5 helical resonator filter, plus 3 I.F. filters. IDC modulation control. Variable output pwr: 500 MW to 10W Front panel discriminator meter. SWR bridge. 117 VAC and 13.6 VDC pwr supplies.
$399.00

DV-21. DIGITAL VFO. Use with IC-21A to complete 2M band.
$299.00

IC-202. 2 METER SSB PORTABLE XCVR. Puts sideband in your hand! Internal C batteries or external 12 VDC. 3W PEP. True I.F. noise blanker. 144.0, 144.2 on two other 200 KHz bands, selectable. Hamtronics stocks 145.2 and 145.8 - 146.0 MHz for calling frequency & satellite band.
$259.00

IC-30A. 450 MHz FM LOW XCVR. 1W or 10W. Low noise MOS-FET RF Amp & 5 section helical filter. 22 CH. capacity. S-meter & relative power output meter. IDC modulation control.
$399.00

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DenTron 3 Kilowatt Tuner Matches Everything From 160 to 10

160-10 MAT

Built-In Wattmeter

Front Panel Antenna Selector for Coax, Balanced Line and Random Wire.

only $299.95

1000 to 1200 WATTS OUTPUT TO YOUR ANTENNA

DenTron SUPER AMP

$499.50

If the amplifier you're thinking of buying doesn't deliver at least 1000 to 1200 watts output, to the antenna, you're buying the wrong amplifier.'

Our New Super Amp is sweeping the country because hams have realized that the DenTron Amplifier will deliver to the antenna, (output power), what other manufacturers rate as input power.

The Super Amp runs a full 2000 watts P.E.P. input on SSB, and 1000 watts DC on CW, RTTY or SSTV 160-10 meters, the maximum legal power.

The Super Amp is compact, low profile, has a solid one-piece cabinet assuring maximum TVI sheilding.

The heart of our amplifier, the power supply, is a continuous duty, self-contained supply built for contest performance.

We mounted the 4 - 811 A's, industrial workhorse tubes, in a cooling chamber featuring the on-demand variable cooling system.

The hams at DenTron pride themselves on quality work, and we fight to keep prices down. That's why the dynamic DenTron Linear Amplifier beats them all at $499.50.

NOW AVAILABLE WITH 572 B's FOR **$574.50**

DenTron Super Tuner

160-10 Meters
Balanced Line,
Coax, Random
or Long Wire

Maximum Power Transfer, Xmitter to Antenna.

1 KW Model $129.50 3 KW Model $229.50

DenTron ANTENNAS

The Sky Openers

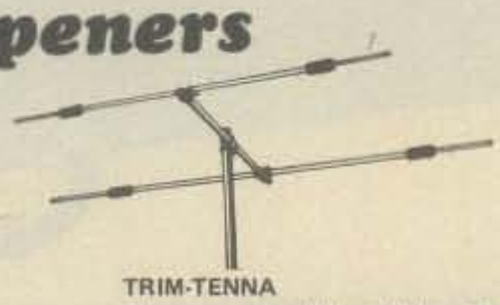
SKYMASTER

A fully developed and tested 27 foot vertical antenna covers entire 10, 15, 20, and 40 meter bands using only one cleverly applied wave trap. A full 1/4 wave antenna on 20 meters. Constructed of heavy seamless aluminum with a factory tuned and sealed HQ Trap, SKYMASTER is weatherproof and withstands winds up to 80 mph. Handles 2 KW power level and is for ground, roof or tower mounting. Radials included in our low price of

$84.50

Also 80 m resonator for top mounting on SKYMASTER.

$29.50



TRIM-TENNA

The antenna your neighbors will love. The new DenTron Trim-Tenna with 20 meter beam is designed for the discriminating amateur who wants fantastic performance in an environmentally appealing beam. It's really loaded! Up front there's a 13 foot 6 inch director with precision Hy-Q coils. And, 7 feet behind is a 16 foot driven element fed directly with 52 ohm coax. The Trim-Tenna mounts easily and what a difference in on-the-air performance between the Trim-Tenna and that dipole, long wire or inverted Vee you've been using. 4 & 5 Forward Gain Over Dipole.

$129.50

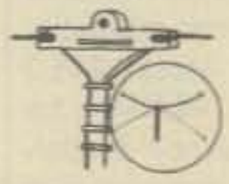
SKYCLAW

A tunable monoband high performance vertical antenna, designed for 40, 80, 160 meter operation. SKYCLAW gives you the following spectrum coverage:

BAND (Meters)	BANDWIDTH (kHz)
160	50
80	200
40	entire band

Tuning is easy and reliable. Rugged construction assures that this self-supporting unit is weatherproof and survives nicely in 100 mph winds.. Handles full legal power limit.

$79.50



ALL BAND DOUBLET

This All Band Doublet or inverted Type Antenna covers 160 thru 10 meters. Has total length of 130 feet (14 ga. stranded copper) although it may be made shorter if necessary. This tuned Doublet is center fed through 100 feet of 450 ohm PVC covered balanced transmission line. The assembly is complete. Add rope to the ends and pull up into position. Tune with the DenTron Super Tuner and you're on 10 through 160 meters with one antenna! Now just for the DenTron All Band Doublet.

$24.50

EX-1

The DenTron EX-1 Vertical Antenna is designed for the performance minded antenna experimenter. The EX-1 is a full 40 meter, ¼ wave, 33', self-supporting vertical. The EX-1 is the ideal vertical for phasing.

$59.50

DenTron ANTENNA TUNER

The 80-10 Skymatcher

Here's an antenna tuner for 80 through 10 meters, handles 500 w P.E.P. and matches your 52 ohm transceiver to a random wire antenna.

- Continuous tuning 3.2 - 30 mc
- "L" network
- Ceramic 12 position rotary switch
- SO—239 receptional to transmitter
- Random wire tuner
- 3000 volt capacitor spacing
- Tapped inductor
- Ceramic antenna feed thru
- 7" W. 5" H. 8" D., Weight: 5 lbs.

$59.50

DenTron W-2 PAD INLINE WATTMASTER

Read forward and reflected watts at the same time

Tired of constant switching and guesswork?

Every serious ham knows he must read both forward and reverse wattage simultaneously for that perfect match. So upgrade with the DenTron W-2 Dual in line Wattmeter.

$99.50

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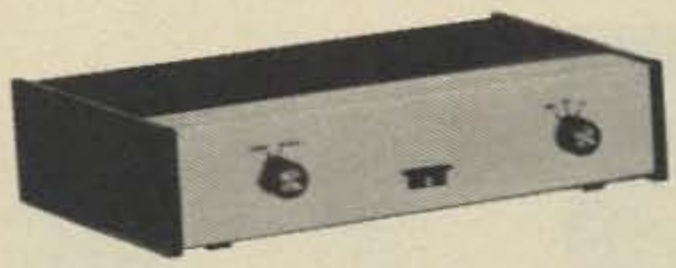
TRITON IV EQUIPMENT

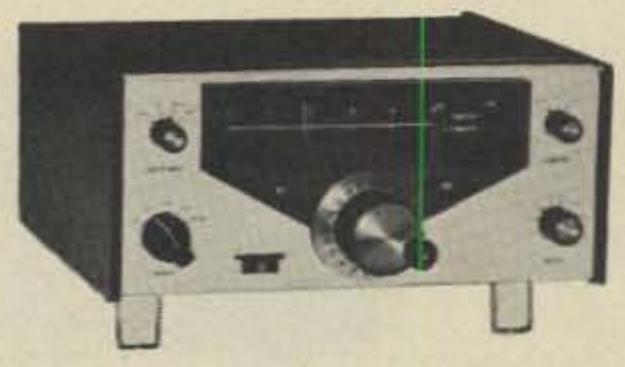
TRANSCEIVERS

MODEL 540-200W, SSB/CW
3.5 - 30 MHz $699.00

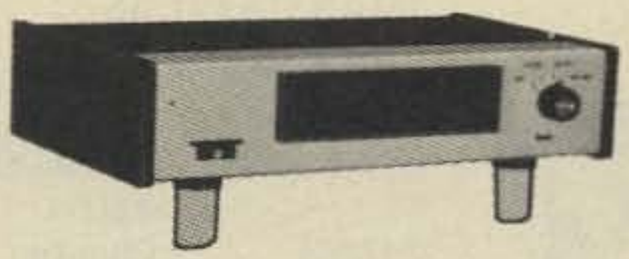
MODEL 544- DIGITAL, 200W
SSB/CW, 3.5 - 30 MHz
$869.00



MODEL 240 $97.00
ONE - SIXTY CONVERTER



MODEL 242 $169.00
REMOTE VFO



MODEL 244 $197.00
DIGITAL READ OUT/COUNTER

MODEL 262-G $139.00
DELUXE POWER SUPPLY

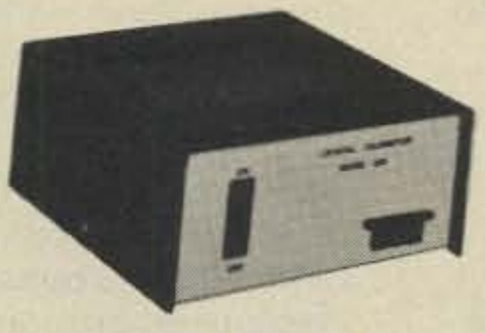
ARGONAUT

MODEL 509 $359.00
SW, SSB/CW, 3.5-30 MHz

LINEAR AMPLIFIER

MODEL 405 $159.00
100W, 3.5 - 30 MHz

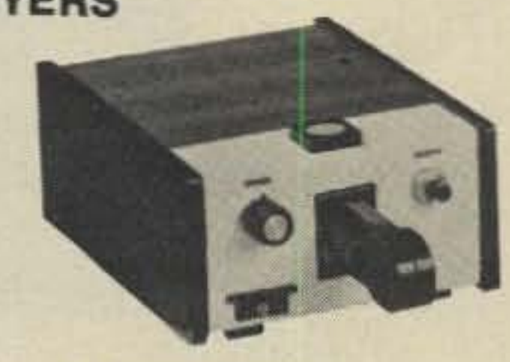
AMMETER
207 $14.00



XTAL CALIBRATOR
206 $29.00

KEYERS

ELECTRONIC KR-50
$110.00



ELECTRONIC
KR20-A $69.50

ELECTRONIC KR-5A
$39.50

KR-2A $17.00

KR1-A $35.00

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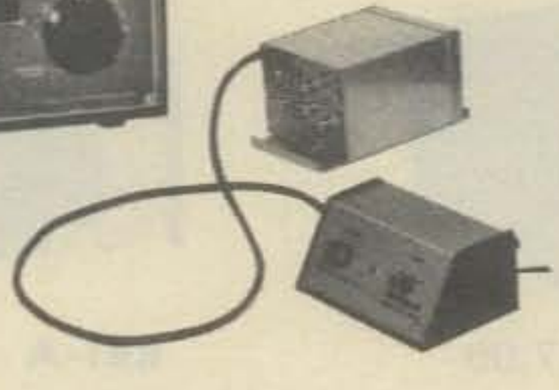

RECEIVERS

SSR-1	General Coverage, .5 to 300 MHz	$350.00
SPR-4	Programmable, Solid State	$629.00
DSR-2	VLF-HF Digital Synthesized SSB, AM, CW, ISB, RTTY	$2950.00
R-4C	C-Line. HF. 160-10M	$599.00
4NB	Noise Blanker for R-4C	$70.00
5NB	Noise Blanker for SPR-4	$70.00

TRANSMITTER

T-4XC	C-Line. HF. 160-10M	$599.00

TRANSCEIVERS

TR-4CW	80-10M. SSB, AM, CW	$699.00
TR-33C	2M, FM, 12 CH. Portable	$229.95
MMK-33	Mobile/Dash/Desk Mount for TR-33C	$12.95
34PNB	Plug-In Noise Blanker for TR-4 Series	$100.00
MMK-3	Mobile Mount for TR-4	$7.00
RV-4C	Remote VFO for TR-4 CW	$120.00
FF-1	Crystal Control for TR-4	$46.95

SYNTHESIZER

FS-4	General Coverage for 4-Line and SPR-4	$250.00

LINEAR AMPLIFIER

L-4B	Linear and w/power supply & tubes	$895.00

MATCHING NETWORKS

MN-4	Antenna Matching Network. 200W	$120.00
MN-2000	Antenna Matching Network. 1000W	$240.00
RCS-4	Remote Control Antenna Switch	$120.00
W-4	RF Wattmeter, 1.8 to 54 MHz	$72.00
WV-4	RF Wattmeter, 20 to 200 MHz	$84.00
7072	Hand Held Microphone	$19.00
7075	Desk Top Microphone	$39.00
1525EM	Pushbutton Encoding Microphone	$49.95
HS-1	Head Phones	$10.00
AA-10	10W, 2M Amplifier	$49.95
TV-300-HP	300 ohm High Pass TV Set Filter	$10.60
TV-75-HP	75 ohm High Pass TV Set Filter	$13.25
TV-42-LP	Transmitter Low Pass Filter. 100W	$14.60
TV-3300-LP	Transmitter Low Pass Filter. 1000W	$26.60
TV-5200-LP	Transmitter Low Pass Filter. 1000W. 100W, 6M	$26.60

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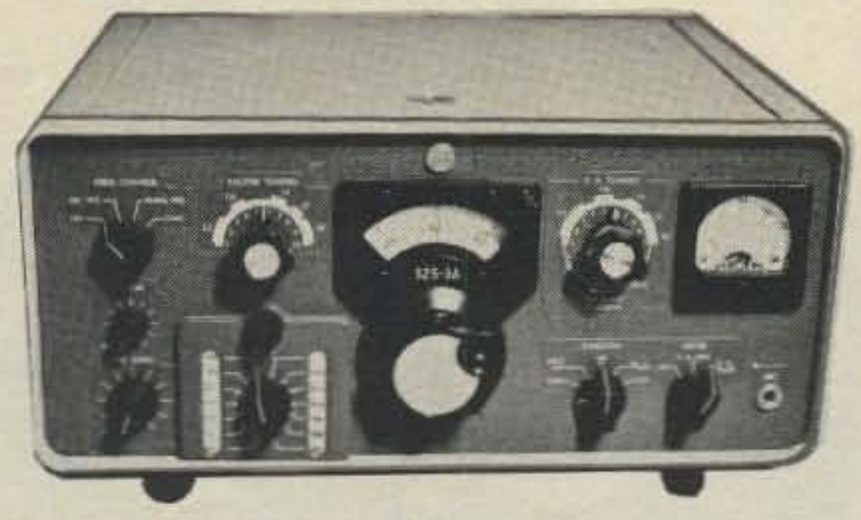
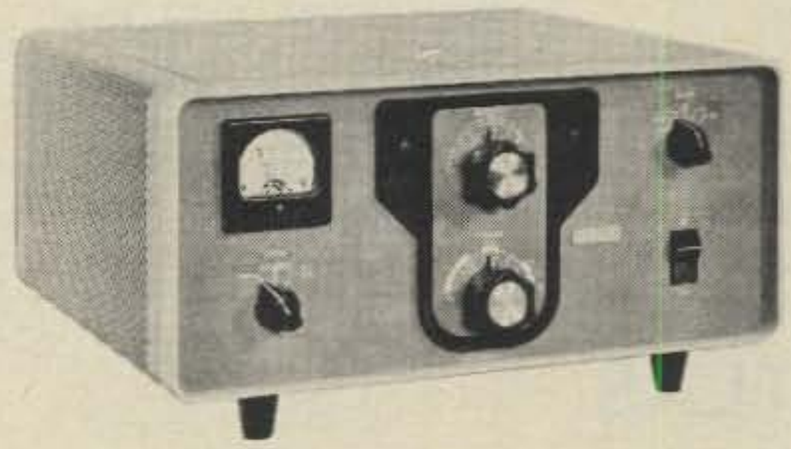
KWM-2A TRANSCEIVER **$3533.00**
Unmatched for mobile and fixed station applications. 175W on SSB, 160W on CW. Switch select up to 14 optional Xtals. Can be used for RTTY. Filter type SSB generation. Automatic load control. Inverse RF feedback. Reimeability-tuned variable oscillator.

75S-3C RECEIVER **$2504.00**
Sharp selectivity. SSB, CW and RTTY. Single control rejection tuning. Variable BFO. Optional mechanical filters for CW, RTTY and AM. 2.1 KHz mechanical filter. Zener regulated oscillators. 3-position AGC.

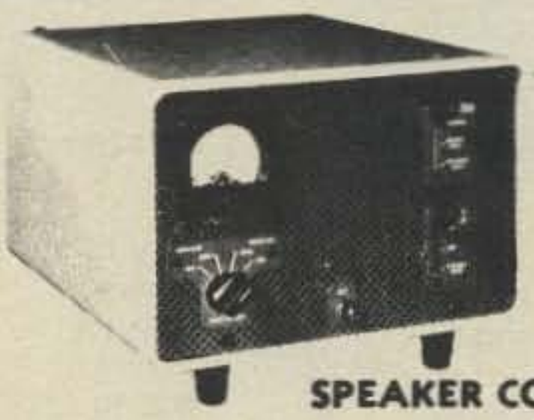


32S-3A TRANSMITTER **$2597.00**
Covers all ham bands between 3.4 MHz and 30 MHz. Nominal output of 100W. 175W, SSB and 160W CW. Dual conversion. Automatic load control. RF inverse feedback. CW spotting control. Collins mechanical filter.



30L-1 LINEAR AMPLIFIER **$1536.00**
1000 watts PEP on SSB and 1000 Average on CW. Single control rejection tuning (50 dB). Variable BFO. 2.1 kHz Mechanical filter. Zener regulated oscillators. 3 position AGC. Exclusive comparator circuit.

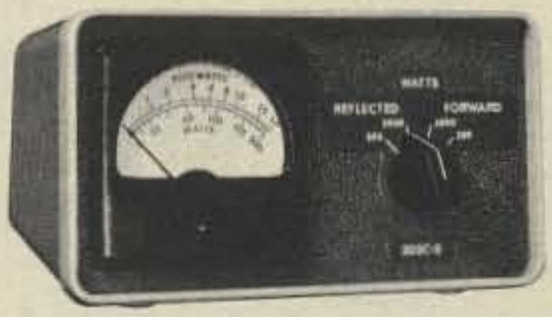
312B-3 SPEAKER
$80.00



312B-4
SPEAKER CONSOLE
$546.00

312B-5 VFO CONSOLE
$1212.00

516F-2 AC POWER SUPPLY
$440.00



302C-3 DIRECTIONAL WATT METER
$360.00

DL-1 DUMMY LOAD
$270.00

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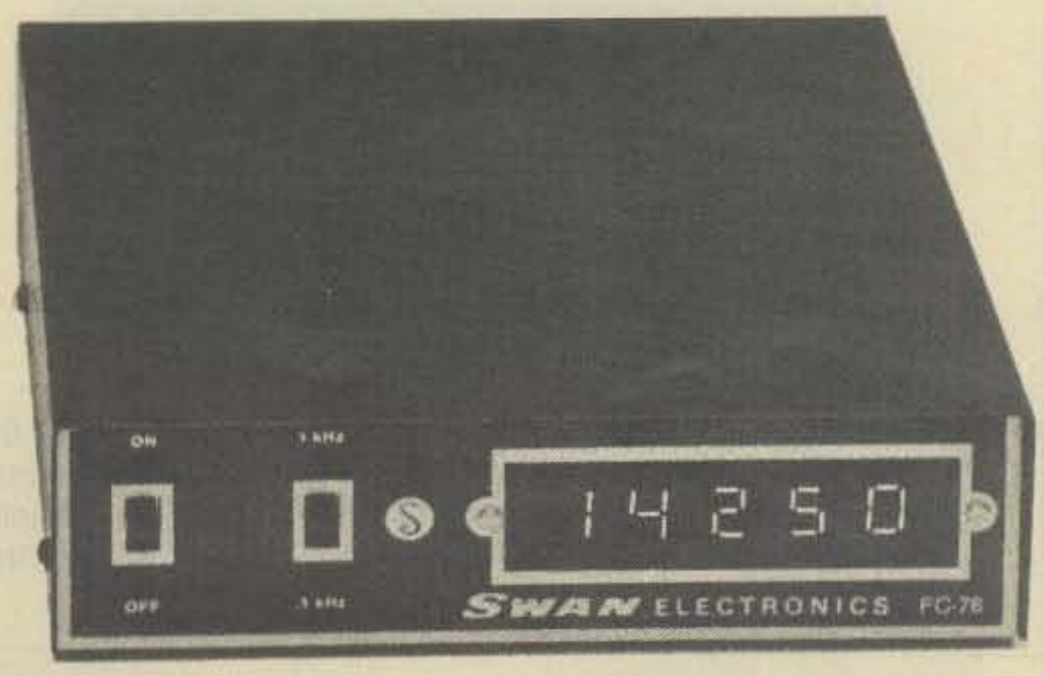
TEMPO ONE	HF Transceiver. 80-10M. USB, CW & AM	399.00
AC/ONE	Power Supply for TEMPO ONE	99.00
VF/ONE	External VFO for TEMPO ONE	109.00
TEMPO VHF/ONE	Transceiver. 2M. 144 yo 148 MHz. PLL	399.00
TEMPO SSB/ONE	SSB Adapter for TEMPO VHF/ONE	199.00
TEMPO 2020	Transceiver. 80-10M. USB, LSB, CW and AM. PLL. Digital	759.00
FMH	2W, VHF/FM, 6 Ch. Hand Held. 144-148 MHz	199.00
RBF-1	Wattmeter & SWR Bridge	42.95
DM-20	Desk Mike. 600 or 50K ohm. PTT & Lock Switches	39.00
MS-2	4 Ch. Pocket Scanning Rcvr.	99.00

ATLAS

210X	Transceiver. 10-80M. 200W	679.00
215X	Transceiver. 15-160M. 200W	679.00
OMK	Deluxe Mtg. Kit for 210X & 215X	48.00
220CS	AC Console for 210X & 215X	149.00
350-XL	Transceiver. SSB. Solid State. 10-160M. 350W.	995.00
DD6-XL	Digital Dial Readout for 350-XL	195.00
305	Plug-In Auxiliary VFO. For 350-XL	155.00
311	Plug-In Auxiliary Crystal Oscillator for 350-XL	135.00
350-PS	AC Pwr Supply w/Spkr & Phone Jack for 350-XL	195.00
DMK-XL	Mobile Mounting Bracket for 350-XL. Easy Plug-In	65.00

SWAN

700 CX	Transceiver. 700W PEP. SSB. 80-10M. USB, LSB or CW	649.95
VX-2	Plug-In VOX for 700 CX	44.95
SS-16B	Super Selective IF Filter for 700 CX	99.95
MARK II	Linear Amplifiere Full Legal Power. W/100W input. 80-10 M.	849.95
1200 X	Portable Linear Amplifier. 1200W PEP. SSB. 700W, Ch. 300W, AM. 80-10M.	349.95
FP-1	Hybrid Telephone Patch. Connect Rcvr/Xmitter to Phone lines	64.95



FC-76	Frequency Counter. 5 Digit LED	169.95
WM6200	In-Line Presicion Wattmater for 2M. 2 Scales to 200W. Reads SWR.	59.95
FS-2	SWR & Field Strength Meter	15.95
SWR-3	Pocket SWR Meter	12.95
SWR-1A	Relative Power Meter & SWR Bridge	25.95
W2000	In-Line Wattmeter. 3 Scales to 2000W. 3.5 to 30 MHz	59.95
WM-3000	Peak/RMS Wattmeter. Tells The Truth About SSB	79.95
FS-1	Pocket Field Strength Meter	10.95
WM1500	In-Line Wattmeter. 4 Scales to 1500W. 2 to 50 MHz	74.95
MARK II	Linear Amplifier. Full Legal Power. W/100W input. 80-10 M.	849.95
1200 X	Portable Linear Amplifier. 1200W PEP. SSB. 700W, CW. 300W, AM. 80-10M.	349.95

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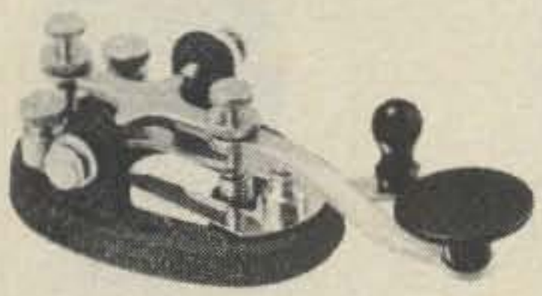
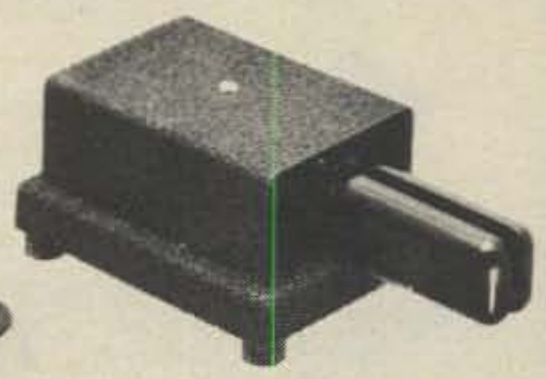


No. 114-310-003 $8.25

No. 114-310-004GP $50.00

No. 114-404-002 $18.50



No. SSK-1 $23.95

No. 250-46-1 $36.50

No. 250-46-3 $44.50

No. 250-20-1 $19.95

No. 250-0025-003 $212

NPC

2.5 AMP

12CB4 29.95

4 AMP

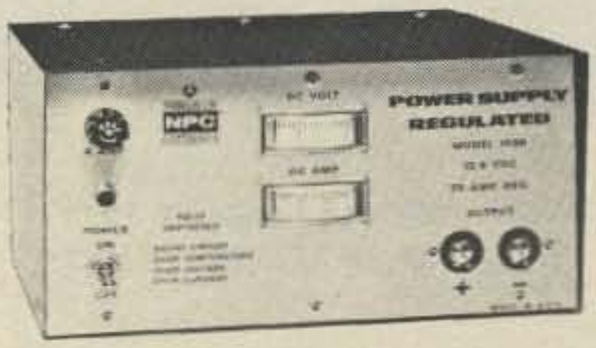
103R 39.95

6 AMP

104R 49.95

12 AMP

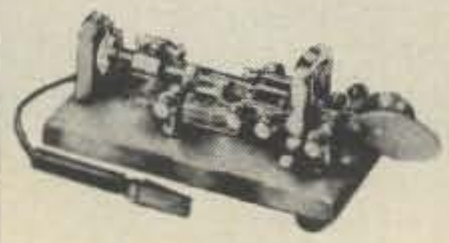
108 RM
99.95



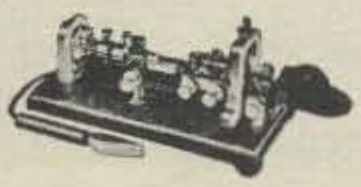
25 AMP

109R 149.95

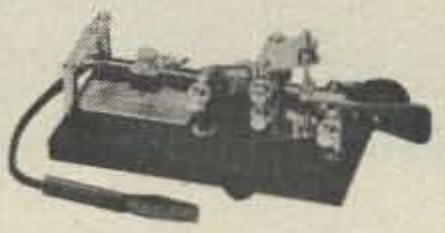
VIBROPLEX



"PRESENTATION"
66.00

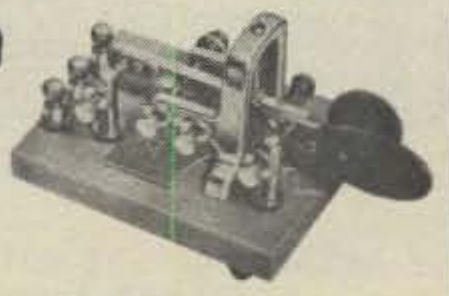


"ORIGINAL"
39.95



"LIGHTNING BUG"
39.95

"CHAMPION"
31.50



VIBRO-KEYER
33.00

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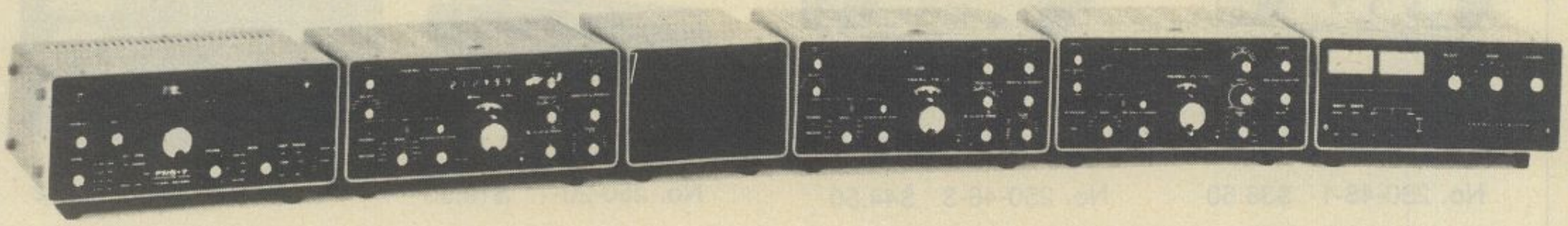
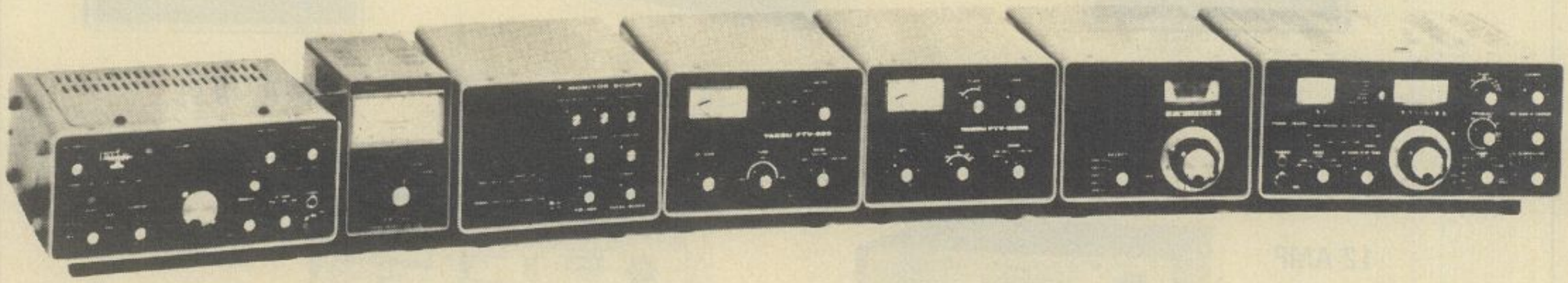
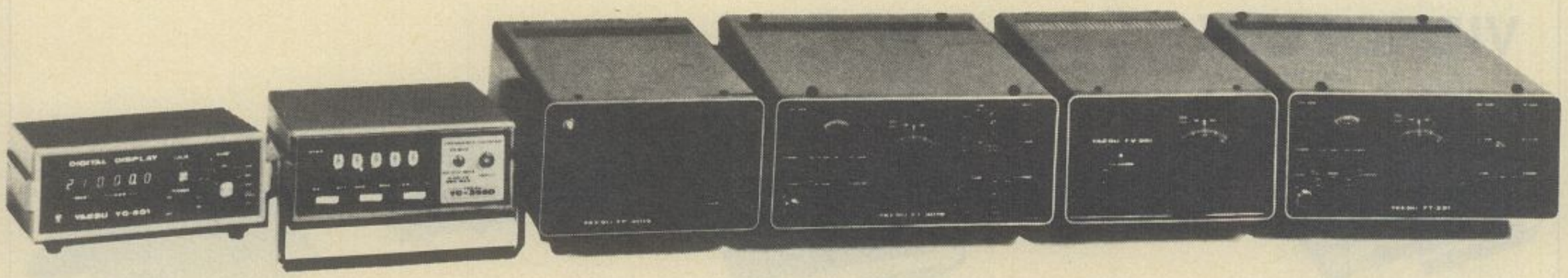
World Clock



Left to right – FRG-7, Solid State Synthesized Communications Receiver • FR-101 Digital, Solid State Receiver • SP-101B, Speaker • FR-101, Digital Solid State Receiver • FL-101, 100 W Transmitter • FL-2100B, 1200 W PEP Input Linear Amplifier



Left to right – FT-620B, 6 Meter Transceiver • YP-150, Dummy Load Wattmeter • YO-100, Monitor Scope • FTV-250, 2 Meter Transverter • FTV-650, 6 Meter Transverter • FV-101B, External VFO • FT-101E 160-10 M Transceiver



Left to right – YC-601, Digital Frequency Display • YC-355D, Frequency Counter • FP-301, AC Power Supply • FT-301S Digital, All Solid State Transceiver • FV-301, External VFO • FT-221, 144-148 All Solid State All Mode Transceiver

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TS-700A **$599.00**

2M ALL MODE BASE/MOBILE TRANSCEIVER. SSB (upper and lower), FM, AM and CW. AC and DC. 4 MHz band coverage (144 to 148 MHz). Dial in receiver frequency and TS-700A automatically switches xmitter freq. 600 KHz for repeater operation. Xmit, Rcv capability on 44 Ch. with 11 xtals.

TR-7400A **$399.00**

2M MOBILE TRANSCEIVER. Synthesized PLL. Selectable output, 25 watts or 10 watts. 6 Digit LED freq. display. 144-148 MHz, 800 CH. in 5 KHz steps. 600 KHz repeater offset. Continuous tone-coded squelch (CTSC). Tone Burst.

TS-820 **$869.00**

SSB TRANSCEIVER. PLL RF Monitor Noise Blanker. Digital hold locks counter & display at any frequency, but allows VFO to tune normally. True RF compressor adjustable speech processor. IF shift control. RF attenuator. VOX, GAIN, ANTIVOX and VOX delay controls. RF negative feedback. Optional digital readout. DRS Dial. High stability FET VFO.

TS-520S **$649.00**

SSB TRANSCEIVER. Proven in the shacks of thousands of discriminating hams, field day sites, DX and contest stations and mobile installations. Superb engineering and styling.

SP-520 **$28.00**

Optional external speaker for better readability.

TV-502 **$249.00**

TRANSVERTER. Puts you on 2M the easy way. 144-145.7 MHz or optional 145-146 MHz.

Power Supply.
PS-5 $79.95

TR-7200A **$229.00**

2M MOBILE/BASE FM TRANSCEIVER. Ignition interference control. 2 pole Xtal filter in IF rcvr. Protection for final stage transistor & reverse polarity connections. Priority Ch. switch. Quick release mount. LED CH. indicators. Switchable 10W or 1W output.

MC-50 **$39.50**

Dynamic microphone designed expressly for amateur radio operation. Complete with PTT and LOCK switches, and a microphone plug. (600 or 50k ohm)

COMMUNICATIONS RECEIVER. 1.8 to 29.7 MHz, WWV and CB band. 50 MHz, 144 MHz converter optional. Stable VFO & oscillator for 5 fixed channels. 1 KHz dial readout. Xtal filters (SSB/8 pole, CW/8 pole, AM/6 pole). Squelch. S meter. Noise blanker.

S599D-$25.00 R599D-$499.00 T599D-$499.00

SSB TRANSMITTER. 3.5 to 29.7 MHz. Stable VFO. 1 KHz dial readout. 8 pole Xtal filter. AM Xmission available. Built-in AC pwr supply. Split frequency control available.

VFO-820 **$145.00**

Designed exclusively for use with TS-820. RIT circuit and control switch. Fully compatible with optional digital display.

VFO-520 **(Not Shown)** **$119.00**

Solid State Remote VFO. RIT circuit with LED indicator.

TR-2200A **$229.00**

PORTABLE 2M FM TRANSCEIVER. 12 Ch. capacity. Removable telescoping antenna. External 12 VDC or internal NI-CAD batteries. 146-148 MHz. 6 CH. supplied. Switchable 2W or 400mW output.

R-300 **$239.00**

ALL BAND COMMUNICATIONS RECEIVER. AC, batteries or external DC. 170 KHz to 30 MHz in 6 bands. Foreign broadcasts or ham radio in AM, SSB and CW. Dual gate MOS/FET transistors & double conversion. Band spread dial. 500 KHz marker.

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It's cheap and simple. With a minimal amount of time and the price of a movie ticket you can put a multi-band antenna together.

THE "MULTI-V"

A Simple Multi-band Antenna Design

BY GEORGE GALLOWAY*, WB5LDE

Have you ever tried to find a design for a simple multi-band antenna? Better yet, have you ever tried to find an inexpensive multi-band antenna on the commercial market? Prices today are staggering and one often thinks that there must be a better way, or at least a cheaper one. Multi-band antenna designs today often employ tuned traps to perform bandswitching. Traps tend to be difficult to work with, are very vulnerable to weather effects, and they often require re-tuning and repair. Using a transmatch is not much better either, because a transmatch, like a trap, loses power that could have been radiated from the antenna. Lost power is never desired and is often detrimental to QRP operation. The antenna described in this article has no lossy traps and costs less than the coax it takes to run from the antenna to your rig. If you need a high performance multi-band antenna, but do not want to buy one at today's high prices, then this article is for you.

The "Multi-V" antenna is basically an inverted vee using alligator clips to change bands. Fig. 1 shows the basic design and physical dimensions of the antenna. From the feedpoint of the antenna, the legs of the antenna extend to the proper length to resonate at the frequency of the shortest wavelength to be used. The legs are then tied to an insulator and another length of wire is added so that when it is added to the first length of wire, they together resonate at the next highest frequency to be used. Lengths of wire are added in this same manner to provide operation on all desired bands. The legs are then tied to a support using any conventional method. Alligator clips then provide connections between the leg segments to give the antenna the desired resonate length. Antennas do not have to be expensive to work well. Small pieces of plexiglass make good insulators between the leg segments and at the feedpoint. The use of alligator clips to change bands makes this antenna painfully simple, delightfully cheap, amazingly efficient, and there are no troublesome traps.

The "Multi-V" may be mounted in any usual fashion. The antenna in this article was mounted on the eave of the author's house using TV type stand-offs at the apex and the ends of the antenna. Most houses have eaves suitable for mounting "Multi-V" antennas covering from 10 to 20 meters. This method of mounting an inverted vee may be useful for people lacking trees or other convenient center supports, and it is also a good way to hide your antenna if you live in a residential area. However, the "Multi-V" may certainly be mounted in the clear using any suitable center support. If this is done, you must provide some means of lowering the antenna in order to change bands. This should be no problem as a simple pulley or a rope over a tree limb will work fine.

Operation of the "Multi-V" antenna is very simple. Arrange the alligator clips to give the proper leg length for the band to be used. When using a higher band such as 10 or 15 meters, be sure to clip the

*P.O. Box 2488, College Station, Texas 77840

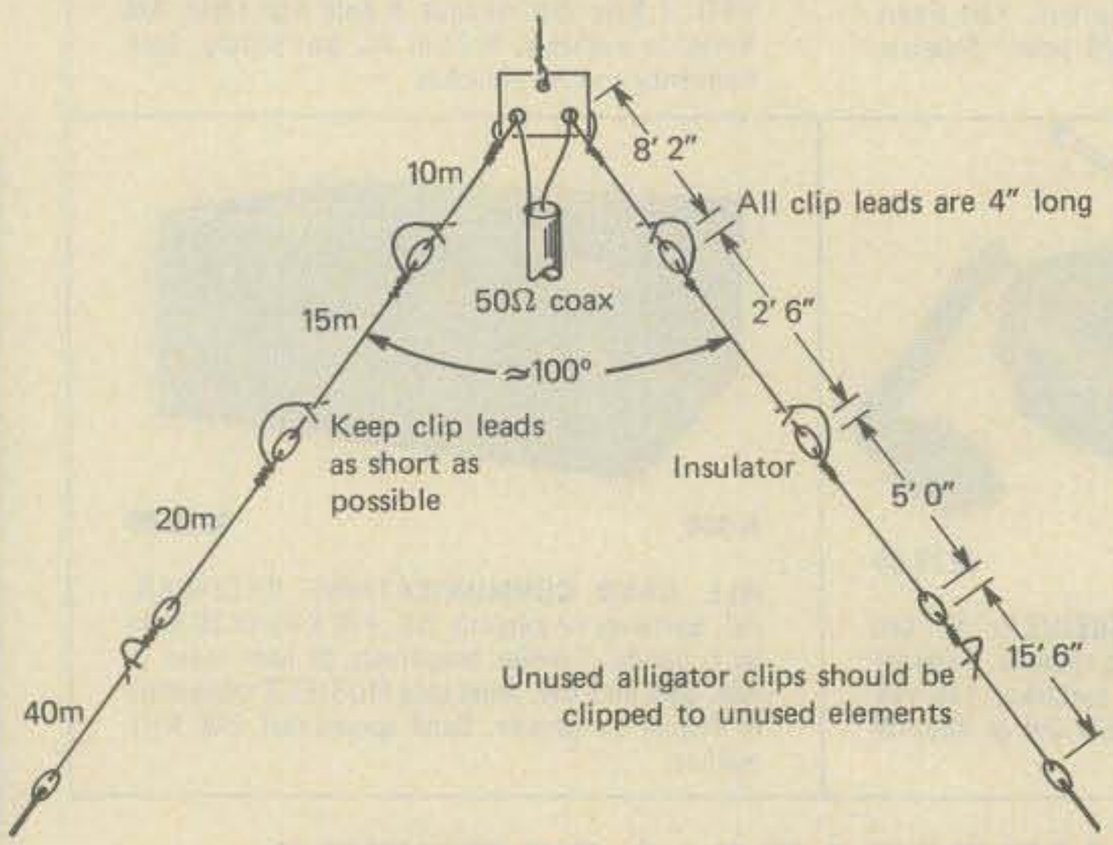


Fig. 1—The multi-V antenna set for 20 meter operation, with 40 and 10 meter capability.

alligator clip onto its own wire as shown in fig. 1. A ladder may be used to change bands if your antenna is mounted on the eave of a house. If you choose to use a center support such as a tree, simply lower the antenna to the ground and make the necessary changes. Be sure to always turn your transmitter off when changing bands!

Many are skeptical as to the performance of this antenna due to the fact that alligator clips are used to join the individual leg segments. The use of these clips makes the antenna very inexpensive and simple to use. The author has never experienced any problems with poor connections and this antenna has done a superb job on all bands using from two to two hundred watts of input power. Better clamping devices may be desired if higher power is to be used with this antenna. A balun might also improve antenna performance.

One last possibility may be mentioned at this time. Some operators may frown on having to go outside to change bands. An arrangement of relays and switches could be used to provide bandswitching from inside the shack. In this case, the relays would replace the alligator clips. This would require more wires running into the shack, a voltage supply to drive the relays, a switching array, and a little more expense. Unfortunately, many amateur radio operators cannot afford elaborate multi-band antenna arrays, and the inconvenience of making a trip outside to change bands is well worth the simplicity, performance, and extremely low cost of the "Multi-V" antenna. ■

CQ Reviews: The MFJ-8043 Electronic Keyer

BY HUGH R. PAUL*, W6POK

Electronic keyers continue to gain in popularity as amateurs discover c.w. can be fun once they have mastered the use of such a device. MFJ Enterprises has a new electronic keyer called the MFJ-8043. Designed around the popular Curtis 8043 IC keyer on a chip, the unit offers all we have come to expect in performance from this chip, plus attractive packaging and convenient control.

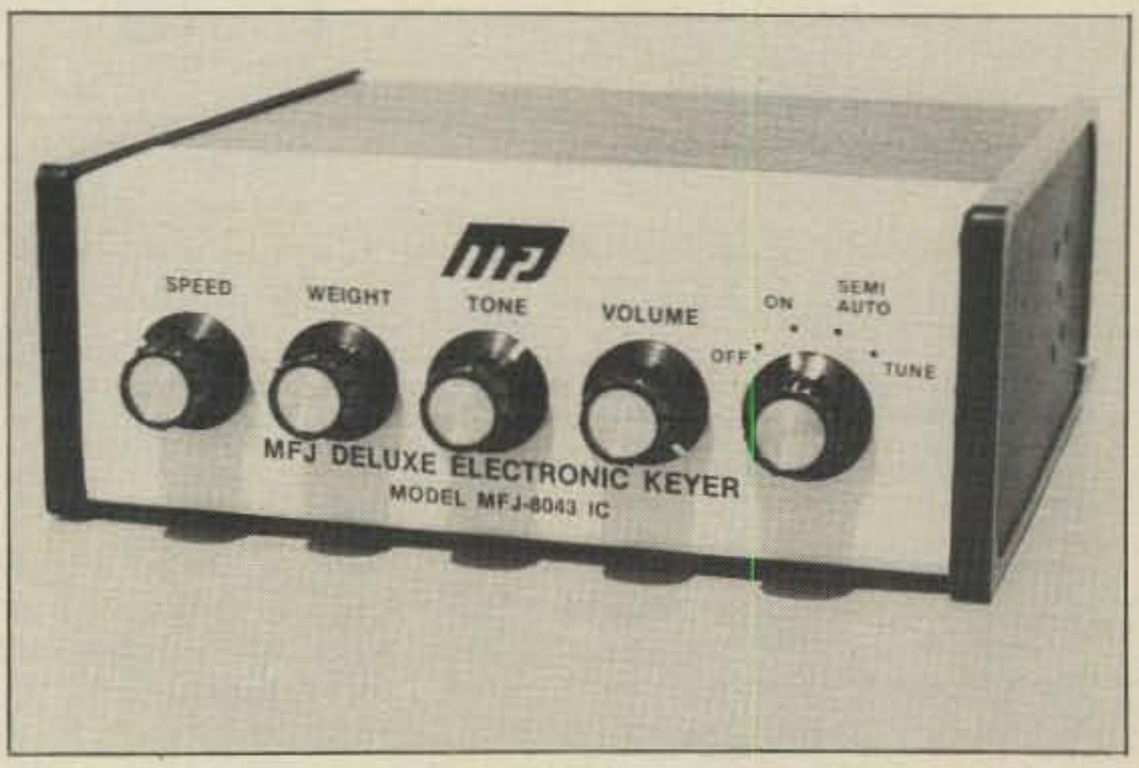
As you can see in the photograph, the unit is designed for use with an external key. MFJ offers a squeeze key with this unit at a cost of $29.95. Front panel controls adjust speed, dot-dash space ratio, monitor tone, volume level of monitor and automatic, semi-automatic and tune.

In the automatic position a squeeze key will give you iambic operation, which greatly simplifies the c.w. process but takes a bit of practice to master. In the semi-automatic position the keyer will produce automatic dots and manual dashes. The tune position does just that—it keys your transmitter continuously for tuning purposes.

Other manufacturers are using the Curtis chip in their keyer designs. Some use a keying relay, but MFJ uses a 2N3904 to drive either a PNP or an NPN output transistor. The PNP is used for keying grid block networks with a maximum negative voltage of 300 v.d.c. at 10 ma. The NPN is used for keying a maximum positive voltage of 300 v.d.c. at up to 200 ma. This will do nicely for any of the newer transceivers and transmitters, but if you are using an older transmitter with cathode keying, you may want to measure the keying voltage and current. If you have any doubt, I am sure MFJ will assist you if you call their toll free number.

Power for the MFJ-8043 may be supplied by an external d.c. supply of 6 v.d.c. to 15 v.d.c. or four 1.5 v.d.c. "C" cells can be inserted in the cabinet. I would personally recommend the use of "C" cells, since they afford portability of the keyer and eliminate a possible source of

(Continued on page 88)



Front view of the MFJ-8043 Electronic Keyer

*291 Macalester Drive, Walnut, CA 91789

This Antenna is guaranteed clearer than any other

K40 no other antenna can claim all these features!

1 RADIUSED 180° TIP provides static dissipation without requiring ball. No ball loss—ever!

2 CRITICAL ASSEMBLY, material and specifications adhere to U.S. Government Spec's for mobile antennas (MIL-A-55288B-EL).

So unique—77 new patent claims pending or issued including U.S. Patent 3,626,051.

3 FULL LENGTH 56" WHIP ground from 17-7PH Stainless Steel for 300% increase in signal-transmitting surface over 36" and 42" whips.

4 WHIP ADJUSTABLE OVER 2" for fine-tuning SWR—NO cutting!

5 METL-PLAS construction combines metal and plastic into one heterogeneous coil for highest permanent tolerances—less than 2% variance from antenna to antenna!

6 COMPUTER DESIGNED ISOLATION CHAMBER dampens static, provides clearer reception than ordinary solid inductance cores.

7 QUARTER-TURN QUICK RELEASE removes antenna from mount.

8 30° ROTATING BASE permits vertical adjustment on any angled surface.

9 FULLY ASSEMBLED with 18' of co-ax with in-line connectors for trouble-free mounting!

10 Optional UNIVERSAL MOUNT adapts for mounting anywhere you want it: mirror, luggage rack, gutter, etc.

Available direct from the manufacturer to dealer!

RUST PREVENTION—all metal components plated to MIL-SPEC QQ-C-320B, MIL-STD 868 and 870.

*DOUBLE GUARANTEE

GUARANTEE I: The K-40 will transmit farther and receive more clearly than the antenna it replaces or the customer will receive a prompt and full refund from the Registered K-40 Dealer who installed and tuned it.

GUARANTEE II: Materials and workmanship are guaranteed for a full 12 months. Any part that fails to perform satisfactorily will be replaced absolutely free.

to transmit farther and mobile CB Antenna made!*

$38.50 buys all this performance...

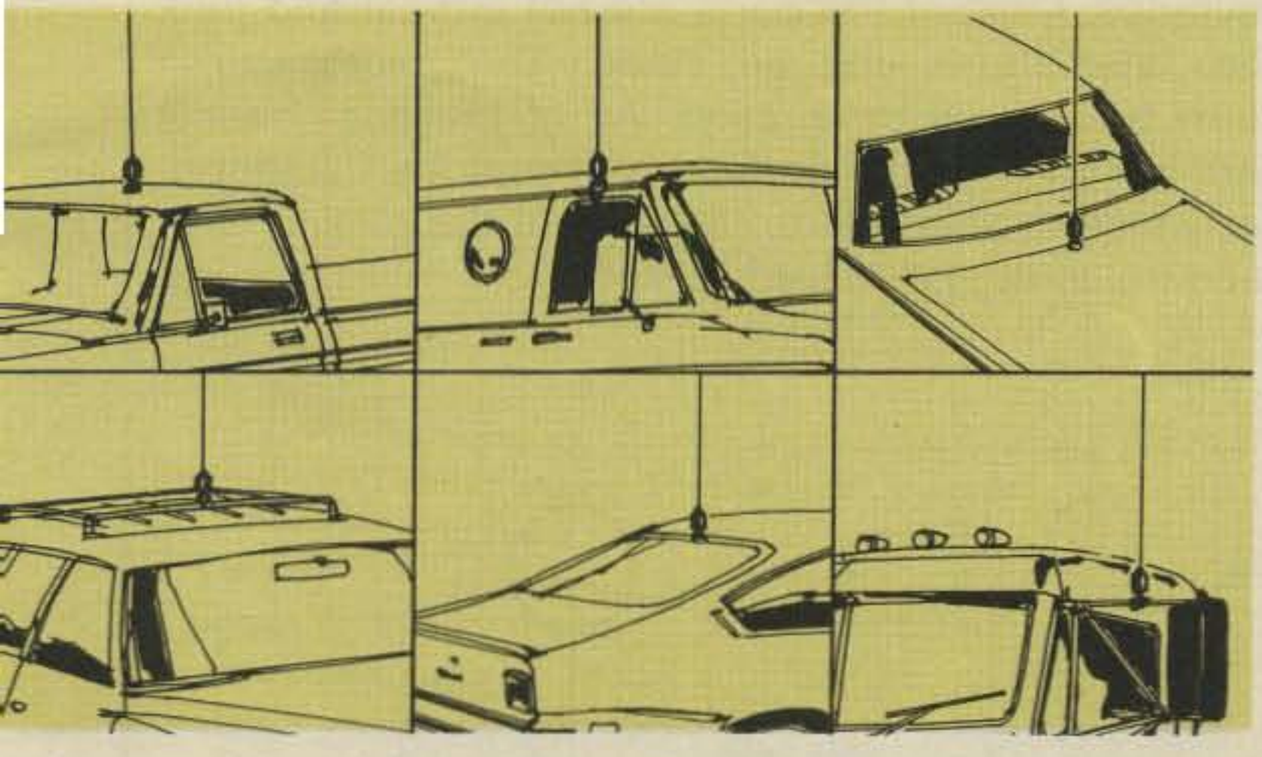
and wait'll you see it transmit!

Guaranteed more power! *This claim is made because we've tested it with hundreds of CB'ers in all fifty states for over one year! The K-40 was *conceived* in the Research Department of one of America's most innovative engineering companies... then *perfected* in the research labs of one of America's most respected universities and *proved* in actual use by 771 experienced CB'ers with 23 & 40 channel radios.

30% increase! *Average performance rated (VSWR and Efficiency combined) 30.5% better than all other brands tested, including Antenna Specialists, Avanti, Hy-Gain, Shakespeare, Turner, Newtronics, etc.

Equals full-length whip! The all-new K-40 was designed to equal or exceed the performance of a full-length whip—guaranteed to out-perform all other mobile antennas!

American Antenna, 1945 South Street, Elgin, Illinois 60120



See your Registered K40 Dealer for a demonstration.

Here is what those CB'ers actually said:

K-40 vs. ANTENNA SPECIALISTS
"I'm a truck driver and I've been a CB'er for ten years. Compared to my Model M-410, "Big Momma," I recorded a 40% to 50% increase in transmission distance, clearer reception and a lower SWR by 20%. Frankly, the K-40 is the best antenna I've tried so far—over Antenna Specialists, Francis, Shakespeare, Hustler, Avanti—I tried them all."
John H. Collett, 207 McFee, Bastrop, Louisiana

K-40 vs. NEWTRONICS
"Compared to my XBLT-4, the K-40 can consistently transmit 40% further and the reception was better. I compared the two antennas using my Cobra Model #138 which has 69 channels. Quality is very good. I'd say the K-40 is the perfect way to complete any CB system."
Jerome R. Browne, 7800 S. Linder, Burbank, Illinois

K-40 vs. HY-GAIN
"I own a Volkswagen dealership and I've been a CB'er for over 12 years. I operate a TRAM XL5 with a Hy-Gain HELL CAT antenna that I've owned for over a year. The K-40 was better in reception with a measured SWR of 1.2. The K-40 was 20% better than the HELL CAT and transmitted 50% further."
Dale A. Dayden, 14 Barbara Dale Lane, Annapolis, Maryland

K-40 vs. FIBERGLASS
"I replaced my Francis with the K-40 and greatly improved my reception. The transmission was excellent, about a 30% improvement over my Francis. I talked well over 45 miles to an Astro Beam base. K-40's SWR of 1.1 was 10 to 20% better than my Francis!"
H. Ganse, 1964 Mt. Zion Road, York, Pennsylvania

K-40 vs. DUAL-ANTENNA
"My twin Hustlers do not perform as well as the K-40. I got an improved performance on reception and about a 30% increase in transmit distance using the K-40. I've been a CB'er for 17 years, and I'd say it's superior to any other antennas."
James L. Andrews, P.O. Box 1509, Titusville, Florida

K-40 vs. WHIP
"I'd rate the K-40 superior, although the transmission and reception of the K-40, compared to my 102" Antenna Specialist whip, was just about identical. I was able to tune the K-40 lower than my 102" whip. I think the K-40 is one of the best looking antennas on the market and overall, I'd rate the performance about as good as my 102" whip."
Daniel A. Rohlf, R.R. #2, Box 88, Binford, North Dakota

K40 American Antenna, 1945 South Street, Elgin, Illinois 60120

An All American Product from an All-American Company

Here's a regulated half amp power supply good for 6 to 30 volts . . . and it's cheap and easy to build!

The Li'l Zapper— a versatile low voltage supply

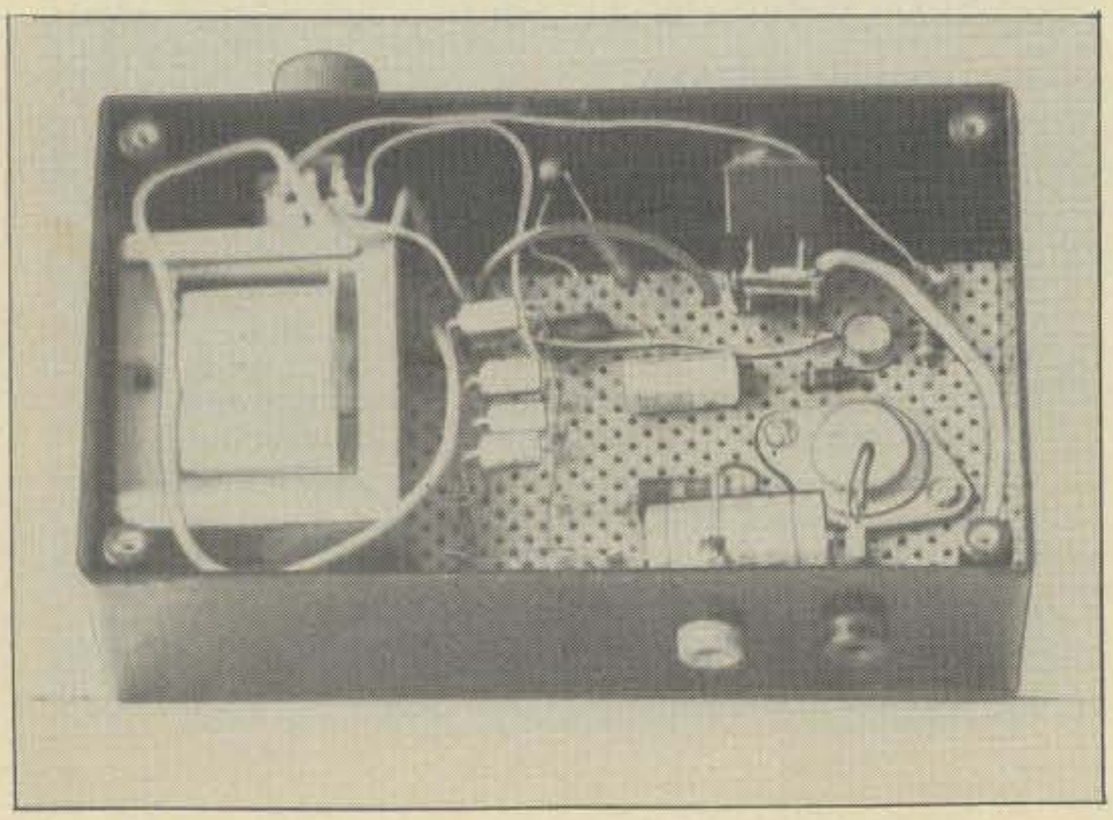
BY JIM HUFFMAN*, WA7SCB

The Li'l Zapper is an interesting and useful power supply that is virtually short-circuit proof, handy and cheap; mostly cheap. This unit supplies a regulated output of up to 500 mA between 6 and 30 volts and current limits itself at about 1 amp. It can supply lower voltages (down to about 2.5 volts) if the proper zener diode is selected. To determine the proper zener voltage rating subtract one volt from the desired minimum voltage. Thus, for a 6 volt bottom limit Vz would be 5 volts.

To improve regulation at low current levels, R1 (4.7K, 1 watt) should be added to the circuit as shown in figure 1. This is optional.

As you can see from figure 1, it would probably take an extremely uncoordinated person about half an hour to assemble this unit. The average amateur should be able to put it together using his right foot only (while sending with his left) in about 15 minutes. Most of the parts are not critical and junk box substitutes can be made. The photo shows how the unit is assembled. All of the components are mounted on the perfboard except the transformer which is attached to the side of the plastic case and holds the perfboard down. ■

*1572 South 400 East, Orem, UT 84057



Simple construction of the Li'l Zapper is shown in this view. Power transformer is mounted at correct height to hold perfboard in place by its pressure. To right of transformer are the four diodes that form the bridge circuit. The series pass regulator is in lower right corner, next to Q1.

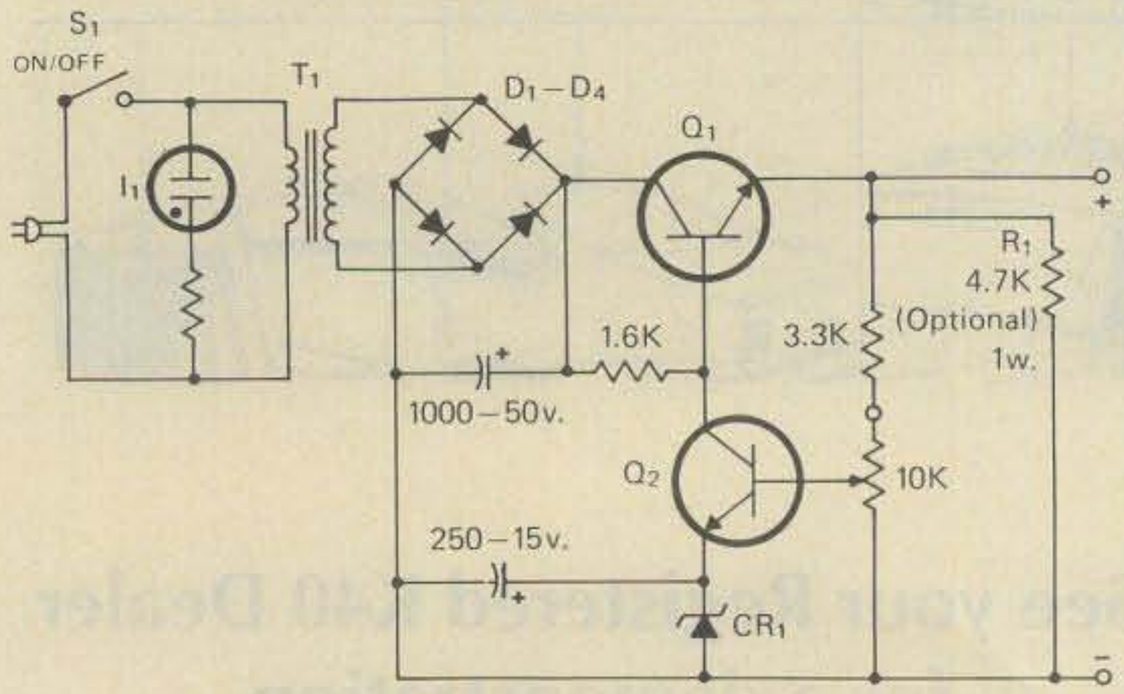


Fig. 1—Circuit of the Li'l Zapper regulated power supply.

CR1—Zener diode, 300 mW. See text for voltage rating.
D1-D4—Silicon diode, 1 amp., 50 p.i.v.
I1—117 volt neon lamp and mounting assembly.
Q1—Any NPN power transistor, 15 watts or more.
Q2—2N697 or equivalent.
S1—SPST toggle switch.
T1—24 volts at 0.5 amp.

CQ Reviews: The MFJ-16010 ST Super Antenna Tuner

BY HUGH R. PAUL*, W6POK

MFJ Enterprises seems to keep coming up with interesting accessory items for the amateur station. One of their latest offerings has to be the cutest design of its type on the market.

The MFJ-16010 ST Super Antenna Tuner is small, measuring only 5" wide, 2¼" high and 7" deep overall and is housed in a very attractive white enameled and wood grain cabinet. Rated at 200 watts of power the unit is useful for matching antennas on all bands from 160 meters to 10 meters. It is not just a random wire tuner.

Constructed with a dual toroid coil offering twelve positions of stepped inductance and a 1:4 step up balun the Super Tuner can effectively match the unbalanced coaxial output of your transceiver to an unbalanced coax feedline with high s.w.r. It will also match a balanced feedline or a random wire. This is the only small, low priced tuner on the market that I am aware of, that offers such versatility.

Mobile operators will find this tuner extremely useful for extending the operating band width of the average loaded mobile whip. It is capable of tuning out large amounts of reactance. S.W.R. values of over 3:1 were readily matched on coax feedlines.

Tuning procedure is straightforward: set the input and output capacitors at the mid-point of their tuning range and then rotate the inductor for maximum received signal strength or noise on your transceiver. Assuming that you have inserted an s.w.r. bridge in series with the tuner, you can now apply transmitter power in the tune position. Turn the inductance control for minimum s.w.r., then alternately adjust the input capacitor and output capacitor on the tuner for minimum s.w.r. If a satisfactory s.w.r. value is not achieved, increase or decrease the inductance control one position and repeat the tuning procedure just outlined. It is not difficult to achieve low s.w.r. and good power out, but you must remember to not apply full power until the tuner has been properly adjusted or you will hear the variable capacitors arc over. This is common on a small tuner such as this. The 200 watt power rating of the unit is valid once the tuner has been properly adjusted.

A real plus factor of the Super Tuner is the ability to feed a balanced line. For portable use a folded dipole is

(Continued on page 90)

Front view of the MFJ-16010 ST Super Antenna Tuner.

*291 Macalester Drive, Walnut, CA 91789

KENWOOD

...pacesetter in amateur radio

TS-520S

AND DG-5 DIGITAL FREQUENCY DISPLAY

The TS-520S combines all of the fine, field-proven characteristics of the original TS-520 together with many of the ideas and suggestions for improvement from amateurs worldwide.

FULL COVERAGE TRANSCEIVER

The TS-520S provides full coverage on all amateur bands from 1.8 to 29.7 MHz. Kenwood gives you 160 meter capability, WWV on 15.000 MHz., and an auxiliary band position for maximum flexibility. And with the addition of the TV-506 transverter, your TS-520S can cover 160 meters to 6 meters on SSB and CW.

DIGITAL DISPLAY DG-5 (option)

The Kenwood DG-5 provides easy, accurate readout of your operating frequency while transmitting *and* receiving.

OUTSTANDING RECEIVER SENSITIVITY AND MINIMUM CROSS MODULATION

The TS-520S incorporates a 3SK35 dual gate MOSFET for outstanding cross modulation and spurious response characteristics. The 3SK35 has a low noise figure (3.5 dB typ.) and high gain (18 dB typ.) for excellent sensitivity.

NEW IMPROVED SPEECH PROCESSOR

An audio compression amplifier gives you extra punch in the pile ups and when the going gets rough.

VERNIER TUNING FOR FINAL PLATE CONTROL

A vernier tuning mechanism allows easy and accurate adjustment of the plate control during tune-up.

FINAL AMPLIFIER

The TS-520S is completely solid state except for the driver (12B-Y7A) and the final tubes. Rather than subsitute TV sweep tubes as final amplifier tubes in a state of the art amateur transceiver.

Kenwood has employed two husky S-2001A (equivalent to 6146B) tubes. These rugged, time-proven tubes are known for their long life and superb linearity.

HIGHLY EFFECTIVE NOISE BLANKER

An effective noise blanking cricuit developed by Kenwood that virtually eliminates ignition noise is built into the TS-520S.

RF ATTENUATOR

The TS-520S has a built-in 20 dB attentuator that can be activated by a push button swich conveniently located on the front panel.

PROVISION FOR EXTERNAL RECEIVER

A special jack on the rear panel of the TS-520S provides receiver signals to an external receiver for increased station versitility. A switch on the rear panel determines the signal path . . . the receiver in the TS-820 or any external receiver.

VFO-520 — NEW REMOTE VFO

The VFO-520 remote VFO matches the styling of the TS-520S and provides maximum operating flexibility on the band selected on your TS-520S.

AC POWER SUPPLY

The TS-520S is completely self-contained with a rugged AC power supply built-in. The addition of the DS-1A DC-DC converter (optional) allows for mobile operation of the TS-520S.

EASY PHONE PATCH CONNECTION

The TS-520S has 2 convenient RCA phono jacks on the rear panel for PHONE PATCH IN and PHONE PATCH OUT.

CW-520 — CW FILTER (OPTION)

The CW-520-500 Hz filter can be easilly installed and will provide improved operation on CW.

AMPLIFIED TYPE AGC CIRCUIT

The AGC circuit has 3 positions (OFF, FAST, SLOW) to enable the TS-520S to be operated in the optimum condition at all times whether operating CW or SSB.

The TS-520S retains all of the features of the original TS-520 that made it tops in its class: RIT control • 8-pole crystal filter • Built-in 25 KHz calibrator • Front panel carrier level control • Semi-break-in CW with sidetone • VOX/PTT/MOX • TUNE position for low power tune up • Built-in speaker • Built-in Cooling Fan • Provisions for 4 fixed frequency channels • Heater switch.

TS-520 Specifications

Amateur Bands: 160-10 meters plus WWV (receive only)
Modes: USB, LSB, CW
Antenna Impedance: 50-75 Ohms
Frequency Stability: Within ±1 kHz during one hour after one minute of warm-up, and within 100 Hz during any 30 minute period thereafter
Tubes & Semiconductors:
- Tubes ..... 3 (S2001A x 2, 12BY7A)
- Transistors 52
- FETs 19
- Diodes 101

Power Requirements: 120/220 V AC, 50/60 Hz, 13.8 V DC (with optional DS-1A)
Power Consumption: Transmit: 280 Watts Receive: 26 Watts (with heater off)
Dimension: 333(13⅛) W x 153 (6-0) H x 335(13 (13-3/16) D mm(inch)
Weight: 16.0 kg(35.2 lbs)

TRANSMITTER

RF Input Power: SSB: 200 Watts PEP CW: 160 Watts DC
Carrier Suppression: Better than -40 dB
Sideband Suppression: Better than -50 dB
Spurious Radiation: Better than -40 dB
Microphone Impedance: 50k Ohms
AF Response: 400 to 2,600 Hz

RECEIVER

Sensitivity: 0.25 uV for 10 dB (S+N)/N
Selectivity: SSB:2.4 kHz/-6 dB, 4.4 kHz/-60 dB
Selectivity: CW: 0.5 kHz/-6 dB, 1.5 kHz/-60 dB (with optional CW-520 filter)
Image Ratio: Better than 50 dB
IF Rejection: Better than 50 dB
AF Output Power: 1.0 Watt (8 Ohm load, with less than 10% distortion)
AF Output Impedance: 4 to 16 Ohms

DG-5

SPECIFICATIONS

Measuring Range: 100 Hz to 40 MHz
Input Impedance: 5 k Ohms
Gate Time: 0.1 Sec.
Input Sensitivity: 100 Hz to 40 MHz . . . 200 mV rms or over, 10 kHz to 10 MHz . . 50 mV or over
Measuring Accuracy: Internal time base accuracy ±0.1 count
Time Base: 10 MHz
Operating Temperature: -10° to 50° C/14° 122° F
Power Requirement: Supplied from TS-520S or 12 to 16 VDC (nominal 13.8 VDC)
Dimensions: 167(6-9/16) W x 43(1-11/16) H x 268(10-9/16) D mm(inch)
Weight: 1.3 kg(2.9 lbs)

DG-5

The luxury of digital readout is available on the TS-520S by connecting the DG-5 readout (option). More than just the average readout circuit, this counter mixes the carrier, VFO, and heterodyne frequencies to give you your exact frequency. This handsomely-styled accessory can be set almost anyplace in your shack for easy to read operation . . . or set it on the dash-board during mobile operation for safety and convenience. Six bold digits display your operating frequency while you transmit and receive. Complete with DH (display hold) switch for frequency memory and 2 position intensity selector. The DG-5 can also be used as a normal frequency counter up to 40 MHz at the touch of a switch. (Input cable provided.)
NOTE: TS-520 owners can use the DG-5 with a DK-520 adapter kit.

KENWOOD

...pacesetter in amateur radio

TS-820S

WITH DIGITAL FREQUENCY DISPLAY

We told you that the TS-820 would be best. In little more than a year our promise has become a fact. Now, in response to hundreds of requests from amateurs, Kenwood offers the TS-820S* . . . the same superb transceiver, but with the digital readout factory installed. As an owner of this beautiful rig, you will have at your fingertips the combination of controls and features that even under the toughest operating conditions make *the TS-820S the Pacesetter that it is.*

Following are a few of the TS-820S' many exciting features.

PLL • The TS-820S employs the latest phase lock loop circuitry. The single conversion receiver section performance offers superb protection against unwanted cross-modulation. And now PLL allows the frequency to remain the same when switching sidebands (USB, LSB, CW) and eliminates having to recalibrate each time.

DIGITAL READOUT • The digital counter display is employed as an integral part of the VFO readout system. Counter mixes the carrier VFO, and first heterodyne frequencies to give *exact* frequency. Figures the frequency down to 10 Hz and digital display reads out to 100 Hz. Both receive and transmit frequencies are displayed in easy to read, Kenwood Blue digits.

SPEECH PROCESSOR • An RF circuit provides quick time constant compression using a true RF compressor as opposed to an AF clipper. Amount of compression is adjustable to the desired level by a convenient front panel control.

IF SHIFT • The IF SHIFT control varies the IF passband without changing the receive frequency. Enables the operator to eliminate unwanted signals by moving them out of the passband of the receiver. This feature alone makes the TS-820S a pacesetter.

*The TS-820 and DG-1 are still available separately.

TS-600

Experience the excitement of 6 meters. The TS-600 all mode transceiver lets you experience the fun of 6 meter band openings.

This 10 watt, solid state rig covers 50.0-54.0 MHz. The VFO tunes the band in 1 MHz segments. It also has provisions for fixed frequency operation on NETS or to listen for beacons. State of the art features such as an effective noise blanker and the RIT (Receiver Incremental Tuning) circuit make the TS-600 another Kenwood "Pacesetter".

TV-506

An easy way to get on the 6 meter band with your TS-520/520S, TS-820/820S and most other transceivers. Simply plug it in and you're on . . . full band coverage with 10 watts output on SSB and CW.

TR-8300

Experience the luxury of 450 MHz at an economical price.

The TR-8300 offers high quality and superb performance as a result of many years of improving VHF/UHF design techniques. The transceiver is capable of F_3 emission on 23 crystal-controlled channels (3 supplied). The transmitter output is 10 watts.

The TR-8300 incorporates a 5 section helical resonator and a two-pole crystal filter in the IF section of the receiver for improved intermodulation characteristics. Receiver sensitivity, spurious response, and temperature characteristics are excellent.

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TS-700S

WITH DIGITAL FREQUENCY DISPLAY

Check out the new "built-ins": digital readout, receiver pre-amp, VOX, semi-break in, and CW sidetone! Of course, it's still all mode, 144-148 MHz and VFO controlled.

Features: Digital readout with "Kenwood Blue" digits • High gain receiver pre-amp • 1 watt lower power switch • Built in VOX • Semi-break in on CW • CW sidetone • Operates all modes: SSB (upper & lower), FM, AM and CW • Completely solid state circuitry provides stable, long lasting, trouble-free operation • AC and DC capability (operate from your car, boat, or as a base station through its built-in power supply) • 4 MHz band coverage (144 to 148 MHz) • Automatically switches transmit frequency 600 KHz for repeater operation. Simply dial in your receive frequency and the radio does the rest . . . simplex, repeater, reverse • Or accomplish the same by plugging a single crystal into one of the 11 crystal positions for your favorite channel • Transmit/Receive capability on 44 channels with 11 crystals.

VFO-700S

Handsomely styled and a perfect companion to the TS-700S. This unit provides you with the extra versatility and the luxury of having a second VFO in your shack. Great for split frequency operation and for tuning off frequency to check the band. The function switch on the VFO-700S selects the VFO in use and the appropriate frequency is displayed on the digital readout in the TS-700S. In addition a momentary contact "frequency check" switch allows you to spot check the frequency of the VFO not in use.

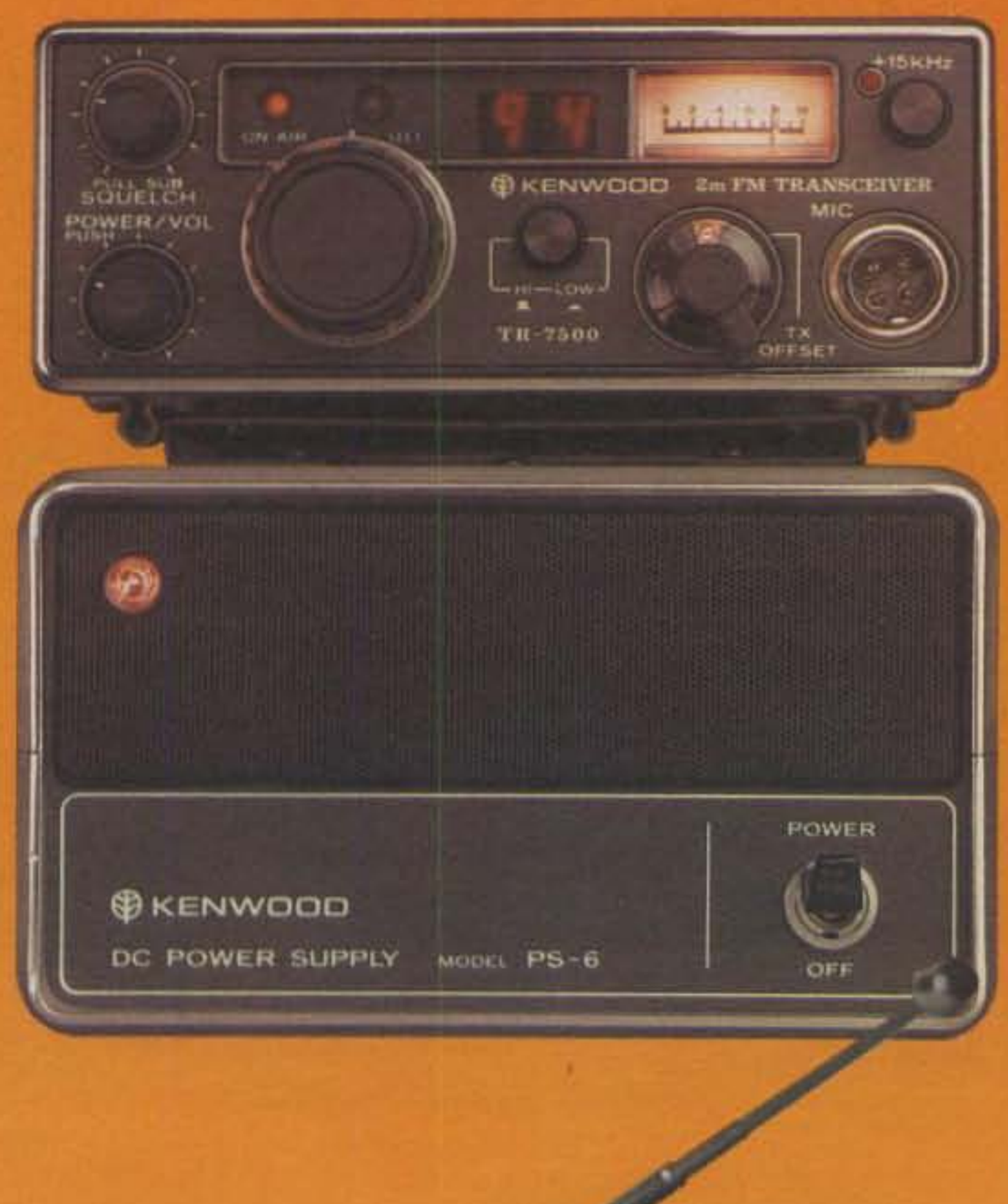
TR-7400A

Features Kenwood's unique Continuous Tone Coded Squelch system, 4 MHz band coverage, 25 watt output and fully synthesized 800 channel operation. This compact package gives you the kind of performance specifications you've always wanted in a 2-meter amateur rig.

Outstanding sensitivity, large-sized helical resonators with High Q to minimize undesirable out-of-band interferance, and give a 2-pole 10.7 MHz monolithic crystal filter combine to give your TR-7400A outstanding receiver performance. Intermodulation characteristics (Better than 66dB), spurious (Better than −60dB), image rejection (Better than −70dB), and a versatile squelch system make the TR-7400A tops in its class.

Shown with the PS-8 power supply

(Active filters and Tone Burst Modules optional)



TR-7500

This 100 channel PLL synthesized 146-148 MHz transceiver comes with 88 pre-programmed channels for use on all standard repeater frequencies (as per ARRL Band Plan) and most simplex channels. For added flexibility, there are 6 diode-programmable switch positions. The 15 KHz shift function makes these 6 positions into 12 channels. 10 watt output, ±600 KHz offset and LED digital frequency display are just a few of the many fine features of the TR-7500. The PS-6 is the handsomely styled, matching power supply for the TR-7500. Its 3.5 amp current capacity and built-in speaker make it the perfect companion for home use of the TR-7500.

TR-2200A

The high performance portable 2-meter FM transceiver. 146-148 MHz, 12 channels (6 supplied), 2 watts or 400 mW RF output. Everything you need is included: Ni-Cad battery pack, charger, carrying case and microphone.

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Kenwood developed the T-599D transmitter and R-599D receiver for the most discriminating amateur.

The R-599D is the most complete receiver ever offered. It is entirely solid-state, superbly reliable and compact. It covers the full amateur band, 10 through 160 meters, CW, LSB, USB, AM and FM.

The T-599D is solid-state with the exception of only three tubes, has built-in power supply and full metering. It operates CW, LSB, USB and AM and, of course, is a perfect match to the R-599D receiver.

If you have never considered the advantages of operating a receiver/transmitter combination . . .maybe you should. Because of the larger number of controls and dual VFOs the combination offers flexibility impossible to duplicate with a transceiver.

Compare the specs of the R-599D and the T-599D with any other brand. Remember, the R-599D is all solid state (and includes four filters). Your choice will obviously be the Kenwood.

R-599D T-599D

R-300

Dependable operation, superior specifications and excellent features make the R-300 an unexcelled value for the shortwave listener. It offers full band coverage with a frequency range of 170 KHz to 30.0 MHz • Receives AM, SSB and CW • Features large, easy to read drum dials with fast smooth dial action • Band spread is calibrated for the 10 foreign broadcast bands, easily tuned with the use of a built-in 500 KHz calibrator • Automatic noise limiter • 3-way power supply system (AC/Batteries/External DC) . . . take it anyplace • Automatically switches to battery power in the event of AC power failure.

Fine equipment that belongs in every well equipped station

HF LINES

820 Series

TS-820S . . TS-820 with Digital Installed
TS-820 . . . . 10-160 M Deluxe Transceiver
DG-1 . . . . . Digital Frequency Display for TS-820
VFO-820 . . . Deluxe Remote VFO for for TS-820/820S
CW-820 . . . 500 Hz CW Filter for TS-820/820S
DS-1A . . . . . DC-DC Converter for 520/820 Series

520 Series

TS-520S . . . 160-10 M Transceiver
DG-5 . . . . . Digital Frequency Display for TS-520 Series
VFO-520 . . . Remote VFO for TS-520 and TS-520S
SP-520 . . . . External Speaker for 520/820 Series
CW-520 . . . 500 Hz CW Filter for TS-520/520S
DK-520 . . . Digital Adaptor Kit for TS-520

599D Series

R-599D . . . . 160-10 M Solid State Receiver
T-599D . . . . 80-10 M Matching Transmitter
S-599 . . . . . External Speaker for 599D Series
CC-29A . . . . 2 Meter Converter for R-599D
CC-69 . . . . . 6 Meter Converter for R-599D
FM-599A . . FM Filter for R-599D

SHORT WAVE LISTENING

R-300 General Coverage SWL Receiver

VHF LINES

TS-600 . . . . 6 M All Mode Transceiver
TS-700S . . . 2 M All Mode Digital Transceiver
VFO-700S . . Remote VFO for TS-700S
SP-70 . . . . . Matching Speaker for TS-600/700 Series
TR-2200A . 2 M Portable FM Transceiver
TR-7400A . 2 M Synthesized Deluxe FM Transceiver
TR-7500 . . . 100 Channel Synthesized 2 M FM Transceiver
TR-8300 . . . 70 CM FM Transceiver (450 MHz)
TV-506 . . . . 6 M Transverter for 520/820/599 Series

POPULAR STATION ACCESSORIES

HS-4 . . . . . Headphone Set
MB-1A . . . . . Mounting Bracket for TR-2200A
MC-50 . . . . Desk Microphone
PS-5 . . . . . Power Supply for TR-8300
PS-6 . . . . . Power Supply for TR-7500
PS-8 . . . . . Power Supply for TR-7400A
VOX-3 . . . . VOX for TS-600/700A

Trio-Kenwood stocks a complete line of replacement parts, accessories, and manuals for all Kenwood models.

MORE ACCESSORIES

Description	Model #	For use with
Rubber Helical Antenna	RA-1	TR-2200A
Telescoping Whip Antenna	T90-0082-05	TR-2200A
Ni-Cad Battery Pack (set)	PB-15	TR-2200A
4 Pin Mic. Connector	E07-0403-05	All Models
Active Filter Elements	See Service Manual	TR-7400A
Tone Burst Modules	See Service Manual	TS-700A, TR-7400A
AC Cables	Specify Model	All Models
DC Cables	Specify Model	All Models

The Kenwood HS-4 headphone set adds versatility to any Kenwood station. For extended periods of wear, the HS-4 is comfortably padded and is completely adjustable. The frequency response of the HS-4 is tailored specifically for amateur communication use. (300 to 3000 Hz, 8 ohms).

The MC-50 dynamic microphone has been designed expressly for amateur radio operation as a splendid addition to any Kenwood shack. Complete with PTT and LOCK switches, and a microphone plug for instant hook-up to any Kenwood rig. Easily converted to high or low impedance. (600 or 50k ohm).

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

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a monthly feature by

ADRIAN WEISS, K8EEG

QRP

The art of very low power operating

Solid State V.F.O. Transmitter for 7-14 MHz: Part I, 1 Watt Exciter

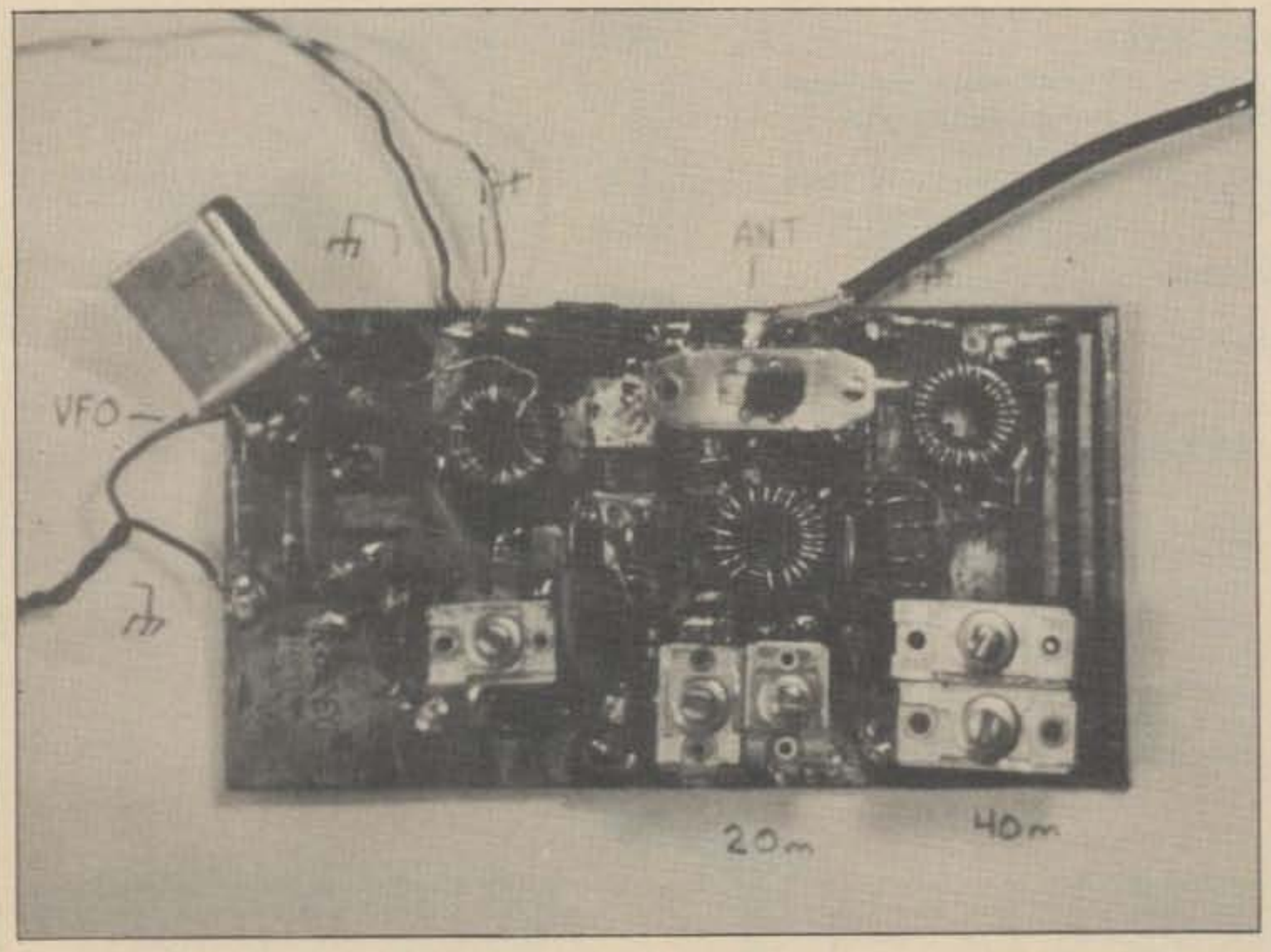
There has been a constant stream of requests for a simple solid state v.f.o. transmitter circuit covering 40, and 20 meters, the two most popular QRPp bands. The present design is a response to these requests and should satisfy the demand for a good two-band QRPp rig that is relatively straight-forward and within the reach of the beginner. In this part of the three part series, we will provide construction information on the 1 watt exciter/transmitter module, and in the remaining parts, the v.f.o., and then the optional final amplifier, will be discussed. Specific details on installation of the entire unit in an appropriate cabinet will be delayed until the final part, although the individual builder can follow his personal preferences in this respect and probably will, since most homebrewers choose a box and layout to suit their needs.

*83 Suburban Estates, Vermillion, SD 57069

1 Watt Exciter Circuit

The circuit of the 1 watt exciter is shown in fig. 1. Adequate drive can be provided by any 7 MHz v.f.o. which develops 0.45 Vrms across a 1000 ohm load. The circuit is a straight-forward design consisting of a Class A buffer/amplifier (Q1) and keying switch (Q2), and a Class C frequency multiplier (Q3). The base resistors of Q1 establish the proper bias level. The 0.1 and .01 capacitors across the emitter resistor and Q2 provide the a.c. current path for the stage. Q1 is tuned to resonance at 7 MHz by means of the parallel-tuned tank (L2-C1). Rather than matching the collector impedance to the resonant tank by tapping down on the coil itself, a link is used to provide impedance matching. The collector link L1 begins at the high-impedance end of L2 and is spread out over about one-half the toroid. The L2 impedance at the point where L1 ends is roughly equivalent to the collector impedance, and provides an adjustable "inductive tap." L3 is a conventional link for matching the parallel tank to the typically low impedance at the base of Q3. Full details for winding this toroid and the others in the circuit are given in fig. 2. RFC1 is wound on an Amidon FB-73-801 "jumbo bead" and isolates Q1 and Q3, thereby eliminating any unwanted signal feedback that could cause instabilities and excessive v.f.o. "pulling."

Q3 functions as a Class C amplifier on 7 MHz, and frequency doubler on 14 MHz. The circuit is tailored for maximum efficiency in the 14 MHz mode, and 14 MHz output is about 2 dB below 7 MHz output. The 56 ohm base resistor establishes the reverse bias on the Q3 base and its conduction angle. It is selected to provide rich harmonic output without instability. The 2.7 ohm resistor provides emitter degeneration, and its associated by-pass capacitors provide an a.c. path for the Q3 major current loop. Switch SW1 selects either the 7MHz or 14 MHz output tank circuit. These tank circuits utilize a double-tuned approach and are equivalent to cascaded separate tanks. L4 performs the same collector impedance matching function as noted for L1, and L7 and L3 are similar. L5 and L6 resonate at the desired frequency with their associated capacitors, and different L/C ratios are used to minimize interaction. The toroid core establishes the coupling between the two tanks.



Top view of assembled transmitter board. Major parts: (top, l-r) 7 MHz xtal soldered into place for testing and alignment; L1-2-3 toroid; RFC1 on FB-73-801 jumbo bead; SW1; output coax; 40 meter L4-5-6-7. MPS-U31 just southwest of SW1; L4-5-6-7 for 20 meters just under SW1, with L8/750pf 40m trap to right of 20m L4-5-6-7. (Bottom, l-r) L2 trimmer capacitor; 20 meter trimmer capacitors and micas; 40 meter trimmer capacitors. Leads are identified in the picture. The top end of the crystal is soldered to a barely visible 220 pf mica capacitor, which then is soldered to the Q1 collector pad. The unit may be tested out either with a v.f.o. or with the crystal. It likewise can be put on the air on both bands with either v.f.o. or crystal control.

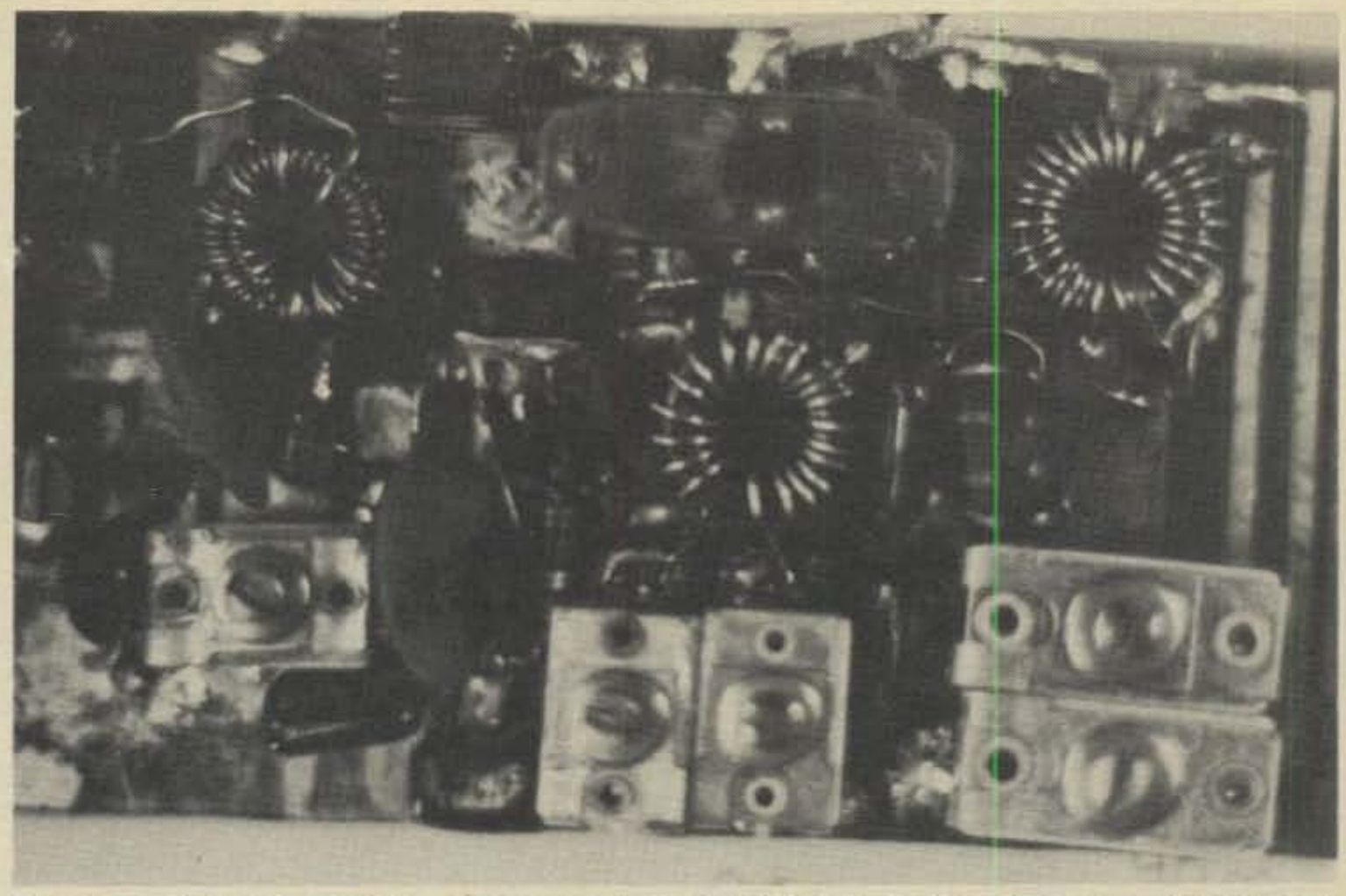
On 14 MHz, a parallel-tuned trap is placed in the output lead to enhance rejection of some 7 MHz energy that feeds through L5 and L6. Selectivity of L5-L6 on 7 MHz is adequate and no trap was required.

P. C. Board

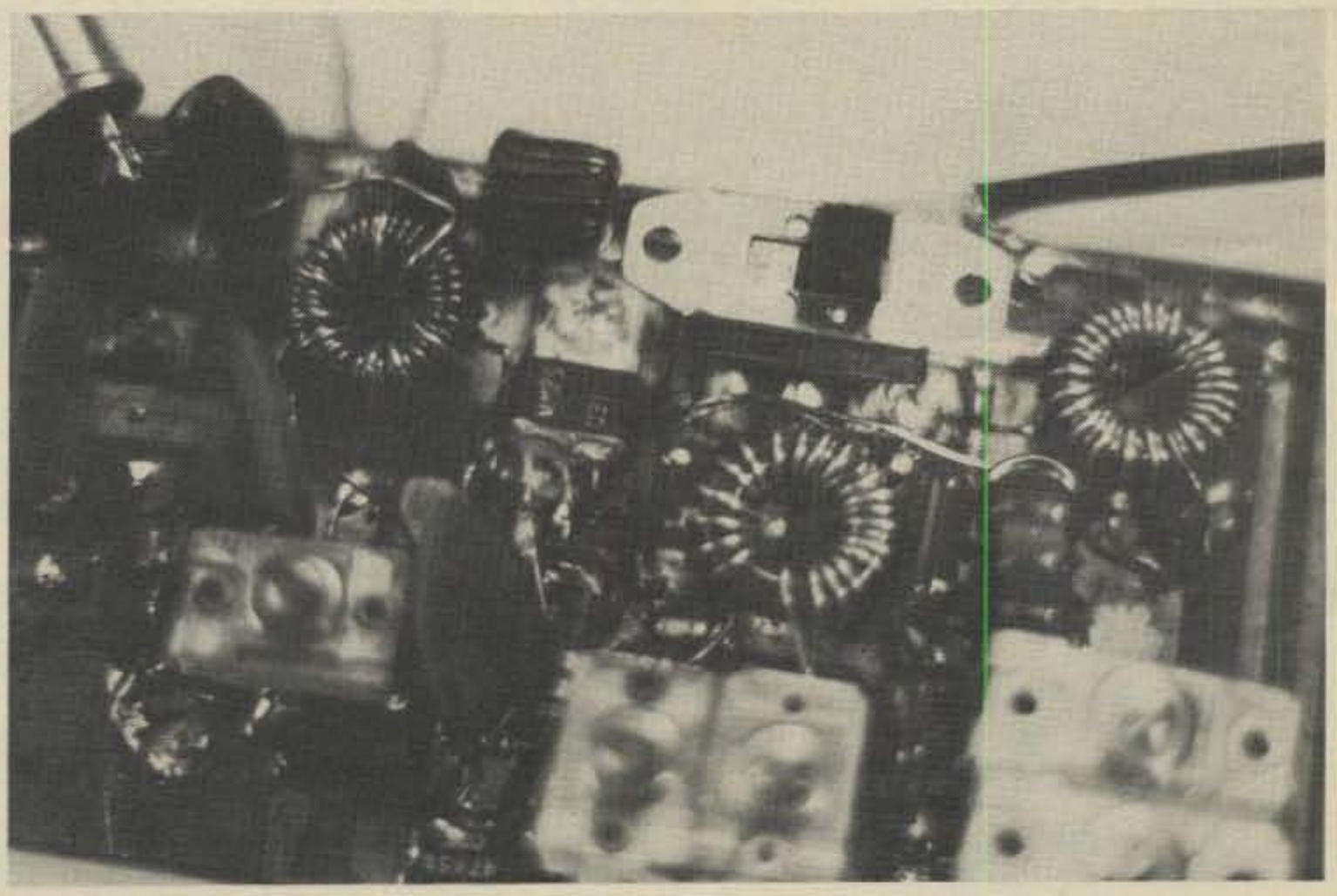
The exciter is wired on a 2.25 × 4 inch p.c. board with copper foils on both sides (double-sided p.c. board). The use of this type of board rather than single-sided board is highly recommended for r.f. circuits. The board shown in fig. 3 follows the "isolated pad" approach, which eliminates the need for accurately spaced lead-holes and renders parts-substitution and adjustment quite easy. The board design shown requires reasonable accuracy in the Q3 area, for some compression of parts was needed there. Certain lead soldering spots are accompanied with an "X"—these spots are drilled through, and the specified lead soldered to both sides of the p.c. board. The bottom-side foil then becomes a ground-foil and establishes the shortest ground-path between leads connected to it.

Preparation of the board can follow two approaches. First, a permanent ink pen can be used to ink in the pad areas. In this approach, either cut out the p.c. board template, or better yet, do a tracing of it on white paper, and tape this firmly to the proper size piece of board. Then use the sharp tip of a penknife or razor blade to mark the corners of pads on the foil. This is done by placing the tip on the corner, and applying pressure while giving the tip a slight twist—a few trial marks will show how much pressure and twist is necessary to make a mark on the copper foil. Once all corners are thus marked, remove the paper, and proceed to draw the edges of the pads, using a straight-edge, and then ink in the pads and ground foil. Masking tape or electrical tape is then used to entirely cover the unused underside foil. Proceed to etch the board, and when all unwanted copper foil is etched away, remove the ink and shine with a piece of steel wool.

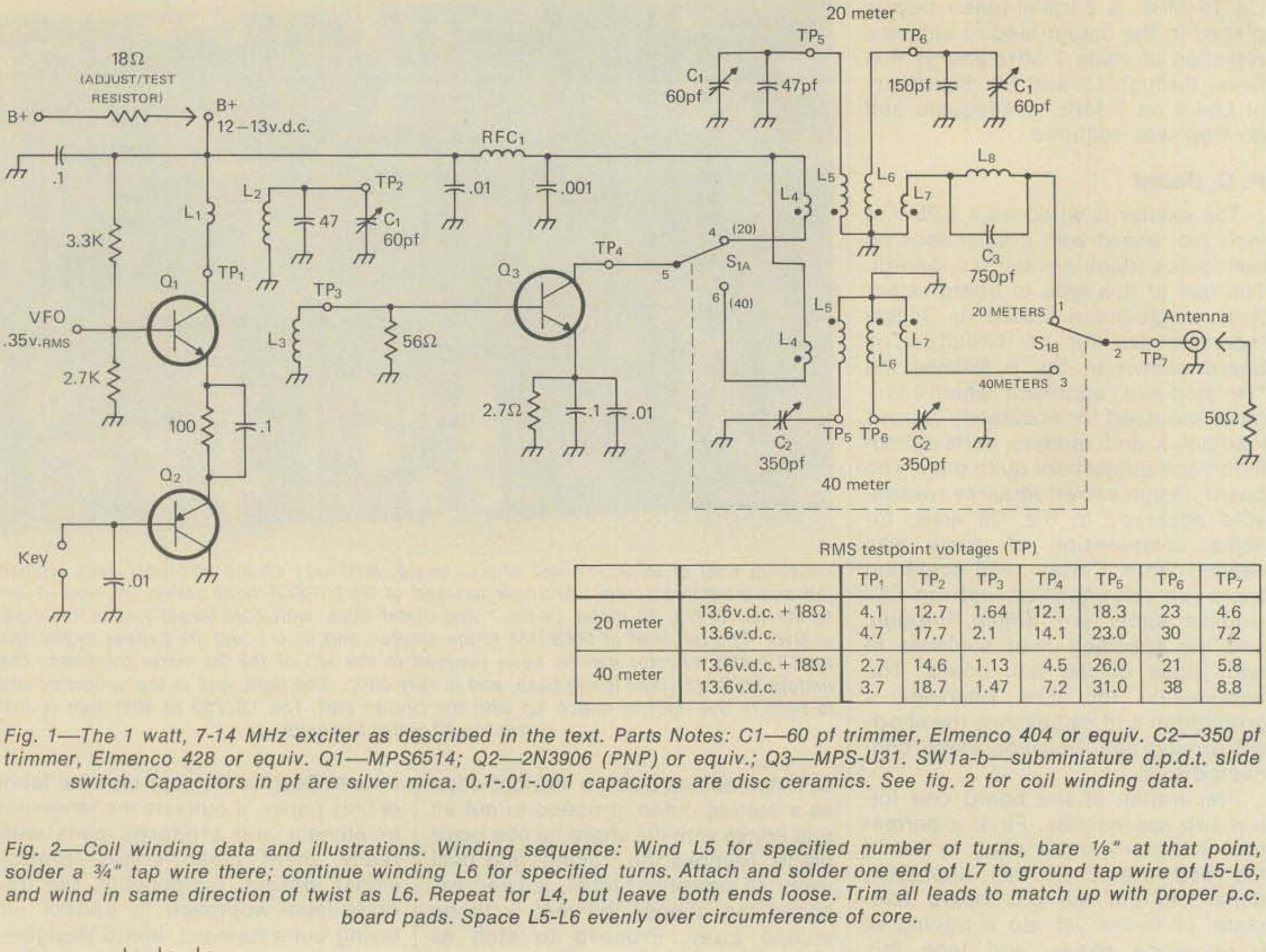
The second approach makes use of adhesive-backed paper address labels (such as Avery Self-Adhesive Address Labels) which are available in most office-supply stores and other places. Use large labels to avoid seams, since seams often can etch through. Firmly attach the label to the p.c. board by running a finger across the board in one direction. Then tape on the tracing of the board as noted above. Using a straight-edge as a cutting guide, proceed to cut all pad edges with the sharp tip of a razor blade. Remove the tracing, and peel away all unwanted label, leaving exposed the copper foil that is to be etched away. Proceed to etch as above. Despite the fact that the label is only paper, it outlasts the emersion in etchant and produces pads with really sharp clean edges—professional looking. Incidentally, the address-label approach is perfect for laying out a new p.c. board design—



Close-up shot of MPS-U31 end of p.c. board. MPS-U31 visible at center, with whitish tab and mounting screw just under left end of SW1. RFC1 right above Q2, and L1-2-3 to the left of Q2. 20 meter L4-5-6-7 just under SW1, with 40m toroid just to the right of SW1. The left lead of MPS-U31 is the emitter, and its 0.1 and .01 bypass capacitors and 2.7 ohm resistor can be seen jammed to the left of the 20 meter trimmers. The middle MPS-U31 lead is the base, and is very short. The right lead is the collector, and is bent to the right to match up with the proper pad. The L8/750 pf 40m trap is just above the 40 meter trimmers.



Another close-up showing details of SW1 mounting and both L4-5-6-7 toroid mountings. Note that the B+ end of the 40 meter L4 reaches across about 1 inch of board to get to the B+ pad beside the MPS-U31. The B+ end of the 20 meter L4 can be seen going to the same spot. This angle gives a clearer picture of the way in which the MPS-U31 leads are lined up for the proper pads. Visible in the upper left is the crystal and coupling capacitor soldered to the Q1 collector pad. Also, the collector end of L1 can be seen leaving the core and reaching over to the same collector pad. L2 is grounded right at the 6 o'clock point of the toroid. The trimmer capacitor ends of the 20 meter L5-6 can be seen leaving the toroid and reaching to the top ends of the trimmers. RFC1 is to the left of SW1.

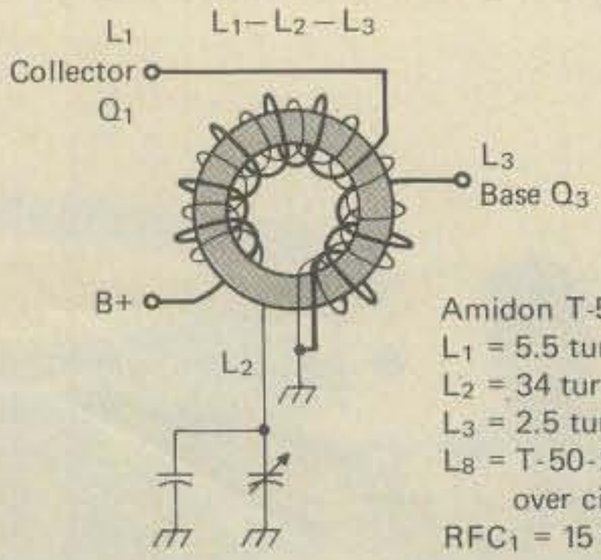


RMS testpoint voltages (TP)

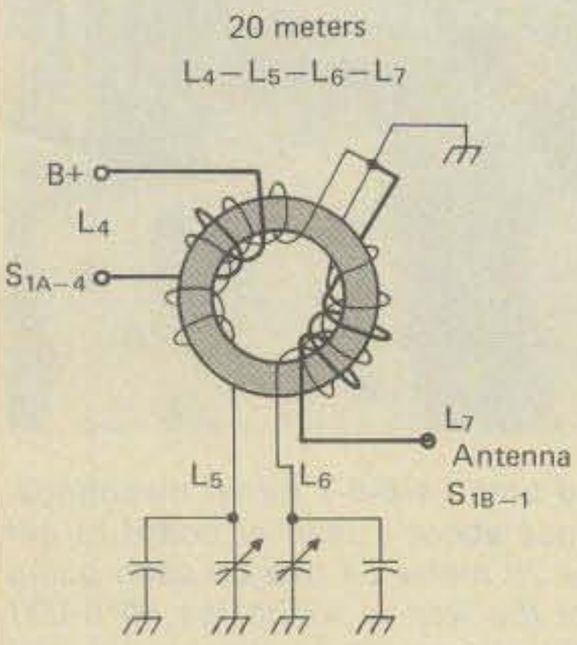
		TP_1	TP_2	TP_3	TP_4	TP_5	TP_6	TP_7
20 meter	13.6v.d.c. + 18Ω	4.1	12.7	1.64	12.1	18.3	23	4.6
	13.6v.d.c.	4.7	17.7	2.1	14.1	23.0	30	7.2
40 meter	13.6v.d.c. + 18Ω	2.7	14.6	1.13	4.5	26.0	21	5.8
	13.6v.d.c.	3.7	18.7	1.47	7.2	31.0	38	8.8

Fig. 1—The 1 watt, 7-14 MHz exciter as described in the text. Parts Notes: C1—60 pf trimmer, Elmenco 404 or equiv. C2—350 pf trimmer, Elmenco 428 or equiv. Q1—MPS6514; Q2—2N3906 (PNP) or equiv.; Q3—MPS-U31. SW1a-b—subminiature d.p.d.t. slide switch. Capacitors in pf are silver mica. 0.1-.01-.001 capacitors are disc ceramics. See fig. 2 for coil winding data.

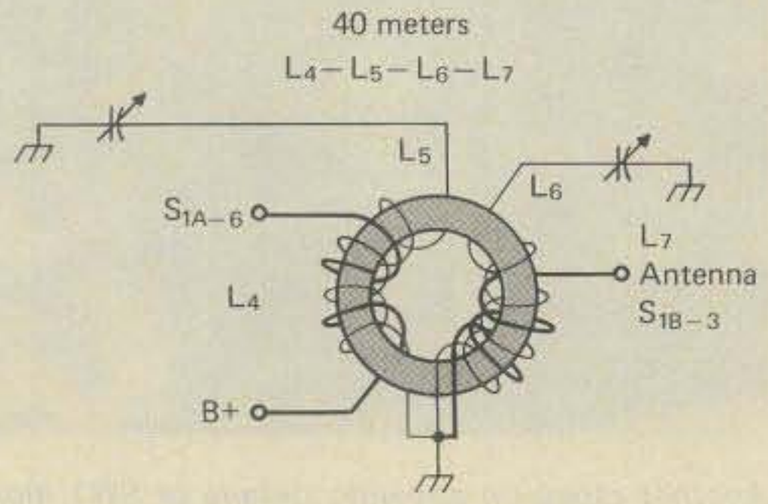
Fig. 2—Coil winding data and illustrations. Winding sequence: Wind L5 for specified number of turns, bare 1/8" at that point, solder a 3/4" tap wire there; continue winding L6 for specified turns. Attach and solder one end of L7 to ground tap wire of L5-L6, and wind in same direction of twist as L6. Repeat for L4, but leave both ends loose. Trim all leads to match up with proper p.c. board pads. Space L5-L6 evenly over circumference of core.



Amidon T-50-2 core, enameled copper wire
L_1 = 5.5 turns, No. 22 over ½ core circumference
L_2 = 34 turns, No. 24
L_3 = 2.5 turns, No. 22 over ¼ core circumference
L_8 = T-50-2 core, 9 turns, No. 22 spaced evenly over circumference of core
RFC_1 = 15 turns, No. 28, Amidon FB-73-801 jumbo bead



Amidon T-50-2 cores, enameled copper wire
L_4 = 1.5 turns, No. 24
L_5 = 10 turns, No. 22
L_6 = 7 turns, No. 22
L_7 = 2 turns, No. 24



L_4 = 2 turns, No. 24
L_5 = 14 turns, No.22
L_6 = 11 turns, No. 22
L_2 = 2 turns, No. 24

NOTE:
Proper orientation with respect to PC board shown.

parts layout and pad size/placement can be penciled in on the label paper as layout proceeds, and then once initial layout is completed, the straight-edge and razor can cut away unwanted paper and etching can proceed. In either approach, once etching is completed, carefully check for foil continuity—even a minute scratch in the inking can etch away!

Assembly

In mounting parts on the pads, leads are bent slightly downward toward the pad. With regard to part-leads that are mounted vertically, bend an eighth of an inch or so back 90 degrees from the vertical lead. Solder each lead in place as you go. Assembly can proceed stage by stage.

Mount the parts associated with the Q1-Q2 part of the circuit. Refer to fig. 2 and prepare L1-L2-L3 as shown, and mount in place. Mount the 56 ohm Q3 base resistor. Before proceeding, the proper operation of this section can be verified. Temporarily connect a small resistor (18 ohm shown) to the B+ strip, and short the key pad to ground. Connect a 7 MHz vfo to the input marked v.f.o. on fig. 1. If no v.f.o. is available,

NOTES:

1. Connections marked X represent a hole: The lead specified is placed thru the hole and soldered to both sides of the double sided PC board to connect the ground foil.
2. For configuration of S_{1A} and S_{1B} on pads 1, 2, 3, 4, 5, 6 see layout on schematic.

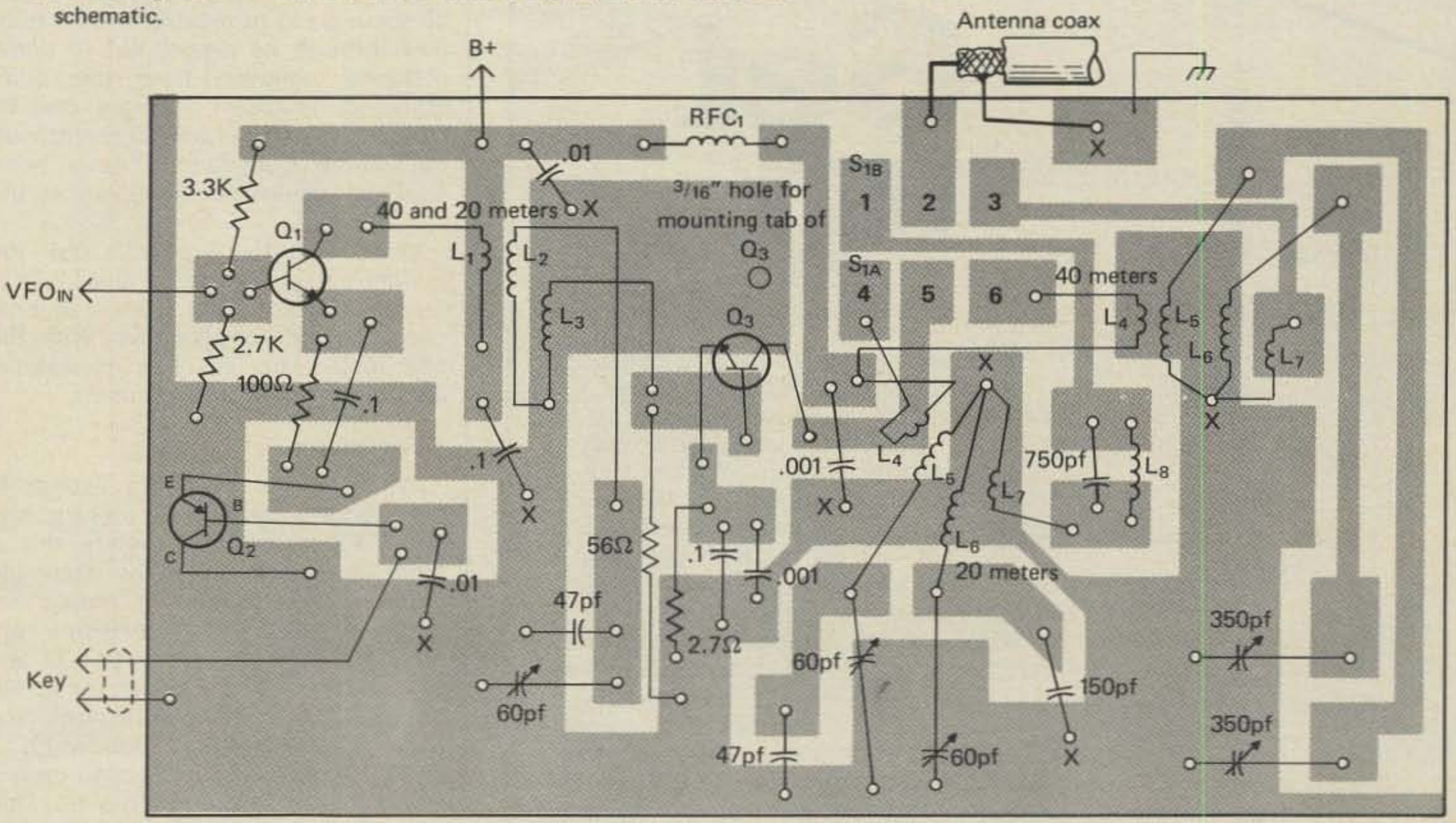


Fig. 3—Full size, top view of the p.c. board (A) parts placement on the p.c. board.

testing of the exciter is possible using crystal control One side of the crystal is connected to the Q1 base, the other side to a 220 pf mica, which is then soldered to the collector of Q1 where L1 is connected. The 220 pf capacitor is in series with the crystal. A metal encased HC-5 type 7 MHz crystal works well in the circuit. With a r.f. probe connected to TP3, apply power and adjust the L2 trimmer capacitor until indication of output is peaked on a v.t.v.m. or other voltmeter. About 1.5 Vrms should appear across the Q3 base resistor. If it is not possible to peak L2, substitute a larger capacitor for the 47 pf mica that is shown. If no output is indicated, recheck the winding of the coil, and parts connections. Once the stage is operating, proceed with the assembly of the next stage.

The base and emitter parts for Q3 are a tight fit, so mount them first, leaving adequate space for the 60 p.f. trimmer and fixed capacitor. Q3 is then mounted. Drill the proper size hole at the spot indicated on the parts layout template. The edges of two small insulating grommets should fit into this hole. Apply some thermal grease to the hole and grommets, and mount Q3 with a small 4-40 screw/nut. Apply thermal grease from the nut to the underside of the board to establish an efficient thermal path. Finally, place a two-inch piece of electrical tape across the exposed nut and onto the foil, since the tab of the MPS-U31 carries the B+ and must be insulated both from the p.c. board copper foils and external metal. The leads of Q3 have a tendency of snapping off at the case, so very carefully bend the collector and base leads to match with the foil strips shown, taking care to avoid putting any stress on the point where the lead leaves the case. Solder in place. Next, the 0.001 bypass for B+/L4 bridges the collector foil strip, with the ground lead placed through a hole and soldered to both sides of the board. SW1 is mounted simply by soldering the unbent leads directly to the proper pads. Be sure not to bridge solder from any of the pads to the foil strip running between the SW1 pads. Solder the trimmer capacitors in place with unbent leads. Refer to fig. 2 and prepare L4-L5-L6-L7. Carefully trim each of the leads to match up with the proper pad. Note that the B+ end of the 40 meter L4 reaches across the leads of the 20 meter toroid, and beside SW1 at about ½ inch above the board. Solder the two toroids in place, mounting them about ⅛th inch above the board. Check for solder-bridges and lead-shorts. Note that the ground ends of L5-L6-L7 are placed through a p.c. board hole and soldered to both foils. Once all parts are mounted, check for continuity through SW1. With SW1 in the 40 meter, and then 20 meter, position, verify that the B+ line reaches the Q3 collector, and that the antenna output point shows zero ohms to ground. Once continuity is checked, temporarily solder a 47 ohm load resistance (or connect a dummy-load/wattmeter) across the output terminals.

Testing/Adjustment

For adjustment purposes, a wavemeter and station receiver, in addition to the v.t.v.m. and r.f. probe, will be useful. 40 meters should be attempted first. A table of RMS Test-point Voltages is shown elsewhere, and will be helpful in measuring the performance of your unit with the one discussed here. Initial adjustments are performed with the small resistance (18 ohm or so) in the B+ lead.

With SW1 in the 40 meter position, apply B+ and tune the .L5-L6 trimmers for an indication of output. Peak

both and repeat till a final peak is reached. Check the r.f. output monitored across the dummy load against the above table: a 20% variation will be acceptable for the moment. Next, listen to the signal on the station receiver while tuning across the band. Parasitics will be indicated by a "hash" noise. None were encountered with the two versions tested here. Switch to the 20 meter position and repeat the above procedure. If it is not possible to peak the 20 meter inductances with the trimmers screwed in tightly, substitute larger capacitors for the 47pf and 150pf indicated in fig. 1. Peaking should be moderately narrow, and only one peak should be noted with the trimmers near their tight end of adjustment. It may be possible to reach 15 meters (3rd harmonic) with the trimmers all the way toward the loose end. Check for 20 meter output with the wavemeter and station receiver; check for absence of 15 meter output similarly. Check for "hash" across the band. V.f.o. "pull" should be less than about 150 Hz on 20 meters. Check for 40 meter fundamental feedthrough. On a typical diode wavemeter, no 40 meter energy should appear, and despite lack of sensitivity linearity in most station receivers, 20 meter output should be far in excess of that detected on 40 meters[1]. You many encounter hash at some point in moving the L5 trimmer through its range, but at some distance removed from the point adjusted, testpoint voltages can be which gives maximum 20 meter output. Once both bands have been checked against those given in the table.

Once everything checks out, the builder can prune the L4 and L7 links for best output if he wishes. A final check is for possible TVI. With the unit tested, no TVI was noticeable, including two fringe-channels.

Conclusion

While output from the exciter is just about 1 watt on 20 meters, and about 1.5 watts on 40 meters, this is quite adequate for many stateside contacts with a decent dipole antenna, and will yield consistent contacts with a beam or quad. DX will be difficult. Since the exciter is fixtuned with no provision for retuning from the front panel, bandwidth is limited to about 60 kHz on 40 meters and about 75 kHz on 20 meters. Output will remain nearly constant across these ranges, but will begin to drop off at the edges. It was not considered worthwhile to add front-panel tuning of the circuits, since the power decrease, even on 100-150 kHz excursions, is negligible. However, the builder may choose to add front-panel tuning capability, and if he does, care should be taken to keep lead length to a minimum. In the final version with v.f.o. and final amplifier, the bandswitches for exciter and final amplifier are actuated from the front panel by means of an aluminum push-pull bracket. All parts for the unit, with the exception of the toroid cores, are available in Radio Shack stores. See sources note elsewhere for details. Next month we'll add the v.f.o. unit to the transmitter. For now,

73, Ade, K8EEG

Parts Notes:

The T-50-2 toroid ($0.55 ea.) and FB-73-801 jumbo bead ($3.00 per dozen, perfect for homebrew r.f. chokes) available from Amidon Associates, 12033 Otsego St., No. Holly-

(Continued on page 88)

[1] With the unit tested, 40 meter feedthrough was on the order of 40dB below 20 meter output. When hooked to a resonant antenna, further rejection of 40 meter output can be expected.

TEN-TEC 544 DIGITAL. Another ahead-of-its-time achievement from the pioneers in solid-state HF amateur radio technology. The 544 Digital joins its successful companion, Triton IV, to chart new paths in engineering.

THE RECEIVER. Deserving of all superlatives. Range: 3.5-30 MHz (plus "160" with option). MOSFET RF Amplifier with Resonate Control for a sensitivity of 0.3 μV for 10 dB S+N/N. And overload minimized. Noise Blanker option: remarkably effective against impulse noise, functions in the IF, controls from the front panel. Hetrodyne crystal mixed VFO: steady as a rock. 8-pole 9 MHz Crystal-Lattice IF filter for a selectivity curve straight out of the text books: steep skirts, flat top, and narrow (2.5 kHz bandwidth, 1.8 shape factor at 6/60 dB points). Offset Tuning, with LED indicator, permits independent tuning of the receiver through a 10 kHz range (approx.). As one owner put it, "it makes SSB nets a breeze." And that beautiful Digital readout: six 0.43" LED digits, 5 in red and the least significant 6th in green, reading to 100 Hz with an accuracy of ± 50 Hz, settable to WWV. (Who needs a calibrator? And, indeed, it has none). WWV reception at 10 & 15 MHz. The sound? So beautifully clean and clear, it wins raves from all. Less than 2% distortion. Built-in speaker to clear the operating position. And External Speaker/Phone jack. CW Filter option, 2-position, 150 Hz width. Zero-Beat Switch for right-on CW. Whether you operate SSB or CW or both, you'll agree the 544 has a truly superior receiver section.

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TRITON GOES DIGITAL

a monthly feature by

WILLIAM I. ORR, W6SAI

Antennas

Design, construction, fact, and even some fiction

Pendergast carefully folded the letter and placed it in the drawer of his operating desk. He sighed heavily and said, "I wish I was rich instead of good looking."

"What's wrong?", I inquired. "Did you get beaten-out in a pile-up?"

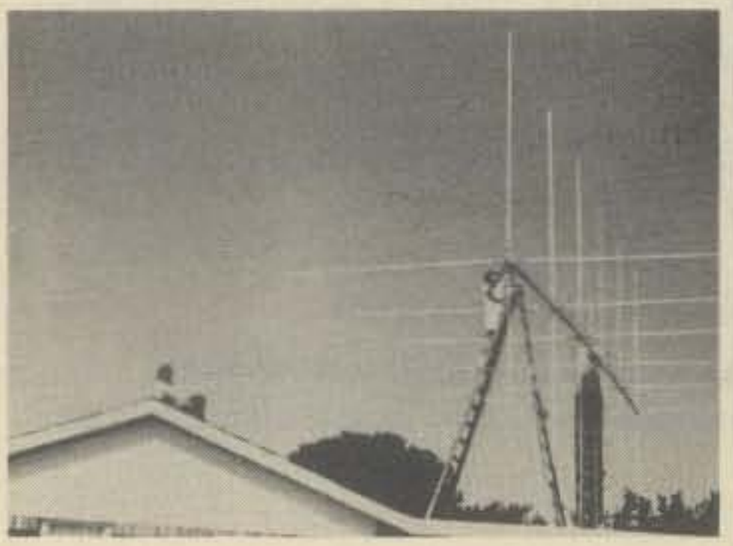


Fig. 1—The six element, three-band Quad of W5VGE. A 52 foot boom is used and the array is mounted on a 72 foot, heavy-duty crank-up tower. WB5NJK at left supervises antenna adjustments, which are made from the top of a step ladder on the roof.

"No," he replied. "But I just got a letter from Don, K5DUT, that just spoiled my whole day. To make matters worse, he sent me a bunch of pictures that are positively demoralizing."

"I didn't know you could send obscene material through the mail. There are laws . . ."

My friend tossed a small stack of photographs across the desk.

"Obscene, indeed. That's a good word for it. These are pictures of some of the big antennas in Cow Town—Fort Worth, Texas to you.

"About three years ago Don put up a five element Quad on a 50 foot boom. It worked so well he went to a six element job."

Pendergast opened the desk drawer and removed the letter. "Listen to this," he said. He put on his glasses and started reading.

"Don's Quad has six elements on a 50 foot boom. The boom is three inches outside diameter at the center, with a quarter-inch wall. The tip sections are two inches outside diameter, with an eighth-inch wall. The material is T6 aluminum alloy and the boom has a single top-guy to remove any sag. The spreaders are fiberglass, spiders are home-made from aluminum angle and muffler clamps. There are six elements on 10, 15 and 20 meters.

"K5DUT feeds the array with RG-8/U coaxial line up the tower to a relay that feeds each driven element separately. The antenna is at the 80 foot level atop a Rohn type 55 tower. To top it off, Don has a custom-designed, home-built elevator that allows the whole antenna and rotor mast assembly to ride up and down the side of the tower at the flip of a switch!

"Don goes on to say that this Monster Quad has been up for almost three years and has survived winds up to 70 miles per hour with no broken wires. He uses "motor-rewinding" copper wire, size 12 or 14 that has been pre-stretched before use. The spreaders are Calcutta bamboo which is very strong and much better than regular bamboo. A prop-pitch motor is used to turn the Quad, as a heavy-duty amateur-style rotor won't stand up under the torque created by the antenna in a heavy wind."

Pendergast paused for breath and pushed a photograph under my nose.

"This is a shot of Luke, W5VGE, working on his Quad with WB5NJK supervising (fig. 1). The antenna is on a 72 foot heavy-duty crank-up tower. The array is composed of six elements on a 52 foot boom. The boom is only two inches in diameter, but is braced with aircraft cable at four points. This proved to be impractical as the boom broke last winter in the wind and ice. The W5VGE design, however, is very

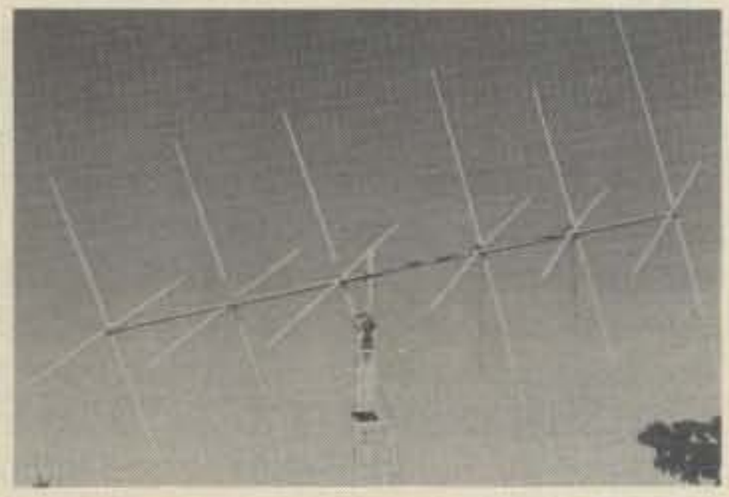


Fig. 3—The Monster Quad at WB5NJK. The boom is 48 feet long. Separate frame is used for 10 and 15 meter driven elements (at right). The antenna is 55 feet in the air.

interesting as it uses *two* reflectors, a driven element and three directors. The front-to-back ratio is very good—over 40 decibels, and the front-to-side ratio is equally good—over 60 decibels. Unlike the K5DUT Quad (which is square), this one has a diamond configuration for ease of assembly. Element spacing, from back to front, is 11 feet, 10 feet, 10 feet, 10 feet and 11½ feet."

I looked at the photograph. "The idea of using two reflectors is very refreshing," I replied. "A little while ago I spoke to Clarence Moore, W9LZX, the inventor of the Quad. He's tried mul-

*48 Campbell Lane, Menlo Park, CA 94025

Fig. 2—The six element Quad of W5MOK is mounted on a 50 foot boom. The boom is mounted in a sleeve that permits the antenna to rotate along its axis for ease of maintenance and tuning. Antennas are fed with separate coaxial lines.

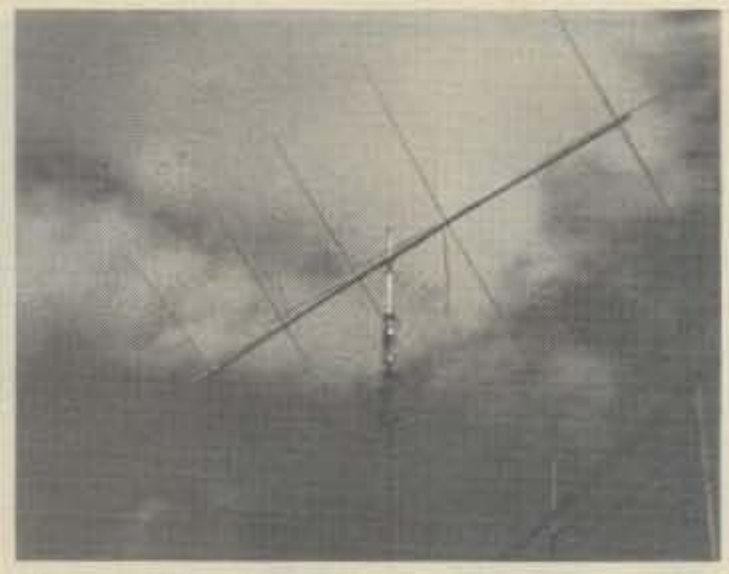


Fig. 4—The five element Quad of K5YYH. The boom is 46 feet long and separate feedlines are used. The antenna is 65 feet in the air.

tiple reflectors and spoke very highly of them. Really improves the front-to-back ratio."

Pendergast passed me another picture. "Here's the antenna of Bob, W5-MOK (fig. 2). Six elements on a 50 foot boom. The boom is three inch diameter irrigation tubing reinforced by a 20 foot slip-in section of T6 aluminum tubing having an 0.09" wall thickness. The boom is guyed af four points along the length. The boom itself is mounted inside a sleeve that allows the boom to rotate about its axis for maintenance and tuning. Spreaders are Calcutta bamboo. Spiders are aluminum angle and muffler clamps. The antenna is installed on a Rohn fold-over tower that has been reinforced and well guyed. Antenna height is 82 feet. The antennas are fed with separate RG-8/U lines that run up the tower."

"I like the idea of the boom rotating in the collar," I said. "When you get a monster like this up in the air, it is very unhandy to work on."

"Don't go away," said my friend. "I have more." He handed me another picture. "This is the Monster Quad at WB5NJK (fig. 3). Pierce has five elements on 20 meters and six elements on 15 and 10 meters. The boom is 48 feet long, and is made of three inch outside diameter T6 aluminum pipe with a 0.09" wall. The boom is guyed at two points each side of center. Separate X-frames are used for the 10 and 15 meter driven elements and separate RG-8/U lines run to each element."

"What about the element spacing?", I inquired.

Pendergast looked at the information on the back of the photograph.

"According to this, spacing for the 20 meter elements is 14 feet, 12 feet, 11 feet and 11 feet. And for 15 and 10 meters, spacing is 7 feet, 7 feet, 12 feet, 11 feet and 11 feet. That's from back to front."

Pendergast looked again at the letter from K5OUT. "W5MOK's antenna is at the 55 foot level on a Rohn type 25 tower that is rigged to lay over at the base for maintenance. Calcutta bamboo is used for the arms."

"I wish I knew what Calcutta bamboo is," I said to myself.

"Ready for the next one?", asked Pendergast. "Here's the Quad of K5-YYH, Steve (fig. 4). This has five elements on a 46 foot boom. The boom is three inch diameter irrigation tubjng guyed at four points along its length. Much the same construction as the other Quads, and separate feedlines for each driven element with a remote relay on the antenna to switch to main feedline. The antenna is at 65 feet on a Rohn type 25G fold-over tower that has been reinforced."

"Well, the amateurs in Cow Town certainly know their business," I said. "I've heard and worked these fellows and they are *very* loud."

"Here's a final note from Don," remarked Pendergast as he carefully gathered up the pictures. "Don says that all Quads have been installed in such a fashion that allows access to the elements from the ground, from the roof or from a ladder (fig. 5). This is a necessity for an antenna of this size if you want to do any tuning or adjustment. He also says that all of the hard work that went into building these antennas has really paid off in performance and that the Quads have consistently beaten out large monoband Yagis that were up to 125 feet in the air. They seem to do better on both long and short skip that an Yagi, even if the Yagi has the edge in height! He can't explain the superior performance as compared to a Yagi, but all of the owners of these "Six-gun Quads" are convinced that they will beat out anything on the air!"

"They certainly do things in a big way in Texas, don't they?", I replied.

"Remember the Alamo," said Pendergast.

"Let's come back down to earth and look at some simpler antennas. The July, 1977 issue of *Radio Communication*, the great publication of the Radio Society of Great Britain, has a good article by GI3XZM on loop antennas for the 80 meter band. First of all, a summary of the radiation resistance of various loop antennas is given from a computer calculation. Using this data, GI3XZM has estimated that typical Quad loop radiation resistances are about one ohm for a 0.375 wavelength loop, 3.5 ohms for a half-wave loop, 12 ohms for a 0.75 wavelength loop and 150 ohms for a full wavelength loop. This tells us some very interesting information about small loop antennas. A regular Quad loop, thus, has a radiation resistance of about 150 ohms since it is a full wavelength in circumference. A 40 meter loop, therefore, can be operated on 80 meters provided the point opposite the feed point is opened. Bandwidth will be quite narrow on 80 meters, but antenna losses will still be quite low, even if the loop is made out of wire. A smaller loop than this clearly calls for low-loss construction because of the low radiation resistance and high circulating current.

"Some of the experimental loops tried by GI3XZM are shown in the drawing (fig. 6). Antenna (a) has 140 feet of wire arranged in a triangle. It is voltage-fed at the center of the bottom

(Continued on page 90)

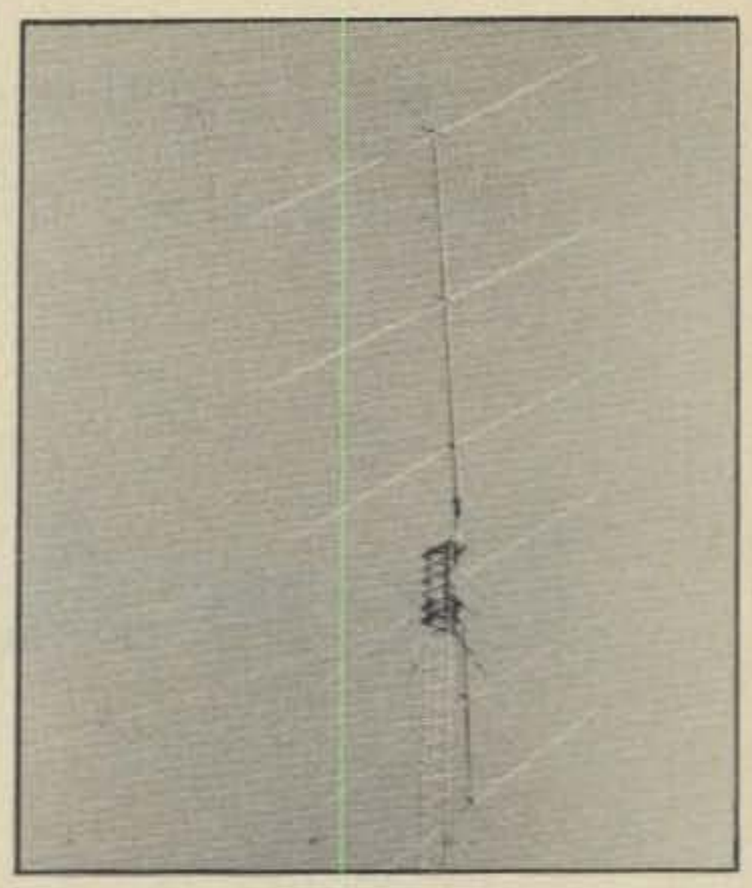


Fig. 5—The six element Quad of K5DUT that started the whole thing. The boom is 50 feet long and antenna is 80 feet in the air. The relay at antenna switches feedline to individual driven element.

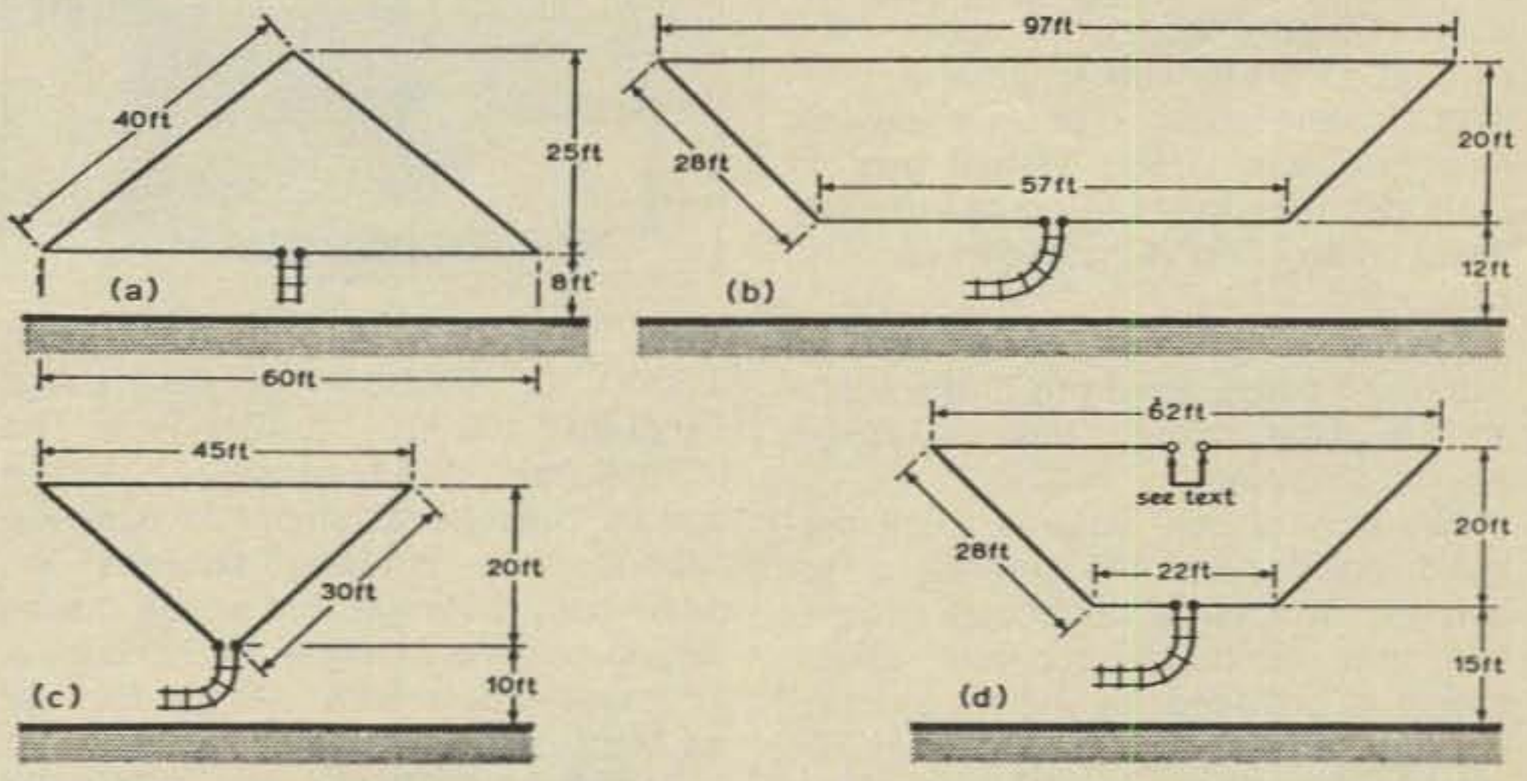


Fig. 6—The experimental loop antennas at GI3XZM. At (a) is half-wave loop for 3.5 MHz, fed with open wire line and antenna tuner. Shown in (b) is a 210 foot loop to provide ¾ wavelength on 80 meters. Open wire feedline and antenna tuner are used. At (c) is 105 foot loop. Antenna (d) provides operation of 80, 40 and 15 meters with link shorted and on 20 and 10 meters with link open. Drawing courtesy of "Radio Communication" magazine.

CQ looks at some of the latest equipment and accessories of interest to amateurs.

New Amateur Products

New Heavy Duty Rotor From CDE

Cornell-Dubilier Electric Company has introduced a new heavy-duty rotor, the Tail Twister, to handle antennas with up to 28 square feet of wind load area. A completely new control box was designed for the rotor to complete the system.

The rotor incorporates the highly successful HAM II design with a new thicker cast aluminum bell housing. Wider reinforced webs of the housing permit easy support of the largest antenna. On this model the upper mast support is pre-drilled to have a bolt-through installation for positive locking. Also new is a three-ring ball bearing assembly to provide increased side thrust control and vertical load-carrying capacities.

The motor is a new design with an automatic coast-down pre-brake action and a metal pinion gear to guard against stripping.

The control box features a full metered indication of the antenna direction with front panel control for calibration and brake. A separate on/off switch is provided for instant antenna location and brake operation. LEDs provide a positive signal for rotational power and brake operation. The unit is attractively housed in a black satin anodized case.

The Tail Twister system is designed for tower mounting as required for most "super" communications antennas. Weighing slightly over 18 pounds, the rotor is 14 1/16 inches high and has a diameter of 9 5/16 inches. The unit is secured with six 5/16 inch bolts provided for the purpose. The mast diameter is a hefty 2 inches.

For further information, please contact Mr. W. Carlson, Cornell-Dubilier Electric Co., Dept. CQ, 150 Avenue L, Newark, NJ 07101 or circle no. 37 on Reader Service Card.

Kantronics 8040-A Receiver

The Kantronics 8040-A receiver offers a great way to monitor cw transmissions on 80 and 40 meters. This compact, battery operated unit is perfect for code practice at home or

away. Frequency coverage is from 3,650 to 3,750 kHz on 80 meters and 7,050 to 7,150 kHz on 40 meters. The 8040-A has good sensitivity and a special preselector circuit to peak reception with differing antenna impedances. A vernier dial action makes station selection smooth and accurate. The unit works with headphones or an eight-ohm speaker.

Priced at $59.00 plus $1.00 for postage and handling, the 8040-A is available from Kantronics, Inc., 1202 East 23rd Street, Lawrence, KS 66044 or circle no. 38 on Reader Service Card.

Heath Low-Distortion Audio Frequency Oscillator

The Heath Company's IG-1272 provides a low-distortion sine wave output over a frequency range from less than 5 Hz to 100 kHz. Pushbuttons select the first three significant digits of the desired frequency and also control the frequency multiplier and output attenuator. The IG-1272 can also be operated in a continuously-variable frequency mode. A level meter on the front panel allows accurate monitoring of the output.

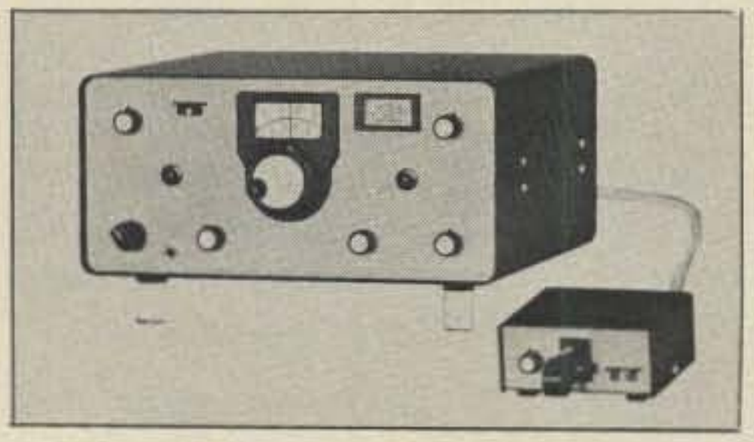
A BNC output connector helps keep noise level approximately 70 dB below signal output level. A buffered sync signal, for use with an oscilloscope or frequency counter, is available at the rear panel BNC.

The IG-1272 is an easy-to-build kit. Most components, including pushbutton switches, mount directly to the printed circuit board, greatly reducing point-to-point wiring. The unit measures 5.5 x 11 x 12.3 inches and weighs 9.5 pounds. Power requirement is 120 or 240 VAC, 50 or 60 Hz.

In kit form the IG-1272 is priced at $129.95. A factory assembled version, the SG-1272, sells for $190.00. For further information on the IG-1272 and a copy of the latest Heath catalog, write to Heath Company, Benton Harbor, MI 49022 or circle no. 39 on Reader Service Card.

Century/21 CW Transceiver

Ten-Tec's new Century/21 is the ideal beginner's HF transceiver, priced so that the initial investment necessary to enter into the exciting hobby of amateur radio is modest. But this low price does not prevent the newcomer from enjoying all of the desirable operating features normally found in transceivers priced three or four times as high. Features such as instant band change, full break-in. sufficient power to work the world, built-in power supply, sidetone and speaker, and excellent receiver performance. And all solid-state, too.



The receiver section of Century/21 is designed around a unique double-direct-conversion circuit that performs as well as the conventional superhet. No receiver tuning adjustments are necessary other than dialing in the desired frequency and setting the audio level. All tuned circuits are broad-banded. Crossmod characteristics are excellent and offset tuning allows receiving the incoming station on either side of zero beat, a feature that eliminates QRM in many cases. A front panel control selects one of three selectivity curves available, from the broad 2.5 kHz position that is used for SSB reception to the 500 Hz position when adjacent frequency interference is a problem. Separate audio and RF controls, a headphone jack and built-in speaker complete the receiving section.

The 70-watt transmitting section is all solid-state and features a class AB push-pull final amplifier for minimum TVI. Individual low pass filters are switched into the antenna line with the band switch so that harmonic and unwanted radiations are reduced further. No tune-up whatsoever is required of the transmitter when changing frequency or band, and the instant break-in feature which allows incoming signals to be heard between transmitted characters is a luxury enjoyed by only a few CW operators, but desired by all.

The built-in power supply monitors the current being drawn and if the drive is advanced too far, or the antenna mismatch is enough to present too high a current demand for the output transistors, the supply will automatically shut down.

Both receiver and transmitter are controlled by the common VFO. This oscillator is permeability tuned and presents a linear frequency scale. Crystals are provided with Century/21 to cover the 80, 40 and 20 meter bands. Plug-in crystals for the 15 meter band and the 28.0 to 29.0 segment of the 10 meter band are available as accessories.

A full line of matching accessories will be available to those who want all the conveniences of a complete station, but Century/21 only requires a key or keyer and an antenna to put it into operation. Model 670 keyer is designed to work specifically with the transceiver at the lowest possible cost. Power for the keyer is taken from the Century/21 supply. Model 276 calibrator plugs directly into a rear panel socket and provides markers at either 100 or 25 kHz intervals. Other accessories including an antenna kit, SWR meter and antenna tuner will be announced in the near future.

Century/21 is priced at $289.00; Century keyer (model 670) $29.00; and Century calibrator (model 276) $29.00. See the Century/21 and accessories at Ten-Tec dealers nationwide.

New 2-Meter Rig From Yaesu

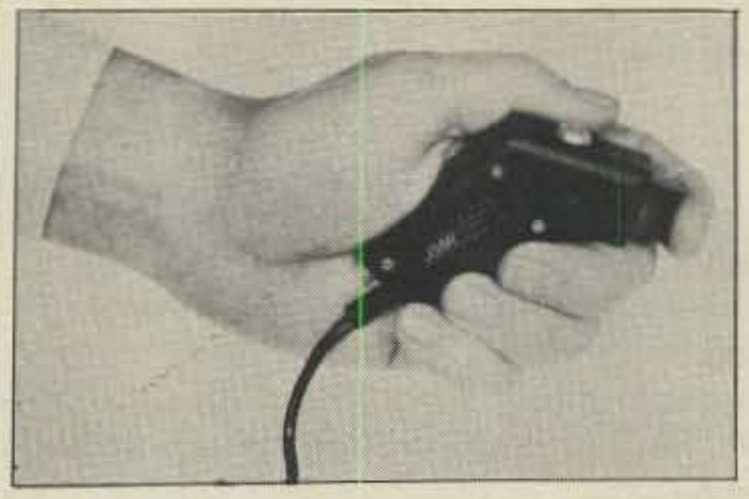
A solid state, fully synthesized 800 channel 144-148 MHz two meter FM transceiver, Model FT-227R, featuring a photo optic sensor, has been announced by Yaesu Electronics Corporation of Paramount, California. This new Yaesu product has a memory circuit to put you on any preset channel with a flip of the memory switch, and has been designated the Yaesu "Memorizer."

Frequency readout is by means of four large LEDs. Optical sensing eliminates switch problems in frequency selection. PLL techniques are used for fully synthesized frequency control in 5 kHz steps and a special memory circuit allows instant return to any preselected frequency within the two meter band. Plus or minus 600 kHz offsets, plus any odd split within the two meter band can be achieved using the memory circuit.

The new FT-227R has automatic final protection, PLL unlock protection and a busy channel indicator. It provides built-in tone burst, plus optional tone squelch-decoder and selectable ten watt or one watt output. It exceeds the latest FCC requirements with spurious well below the minus 60 dB down requirement with superior cross modulation, overload and image rejection. Compact (180 mm. x 60 mm. x 220 mm.), lightweight (2.7 kg.), the FT-227R requires 800 MA. on receive and 2.5 amps on transmit at 13.8 VDC plus or minus ten percent. And best of all, it is priced at under $300! Available from all authorized Yaesu dealers or circle no. 40 on Reader Service Card.

Electret-Capacitor Mobile Mike

The JMR Mobil-Ear Clear-1 Model 40 mobile microphone combines the broadcast quality of an electret-capacitor element with a compact pistol-grip case that tucks neatly into the palm. It's especially engineered to be held at the steering wheel while transmitting, allowing you to talk, switch, and still use both hands for driving. The built-in Velcro pad lets you mount the unit anywhere. Just attach the mating Velcro pad to steering post, dash, or any other handy surface.



JMR's tiny electret-capacitor microphone, developed originally for advanced technology aerospace communications, picks up your voice anywhere within arm's reach with exceptional fidelity. There's no need to hold the microphone up to your mouth when transmitting.

The specially designed freqency response plus the clear, distortion-free reproduction of the electret-capacitor microphone combine to create an on-the-air sound that punches through noise and interference. Microphone response minimizes pickup of environmental noise, further enhancing transmission quality. Variable microphone gain lets you adjust the level for optimum modulation under varying conditions.

Suggested retail price is $39.95. Available through dealers. For further information, contact JMR Systems Corporation, 168 Lawrence Road, Salem, NH 03079 or circle no. 41 on Reader Service Card.

Radio Shack TRS-80 Microcomputer System

Radio Shack has introduced their TRS-80 Microcomputer System. Not a kit, the TRS-80 comes completely wired and tested, ready to plug in and use.

The TRS-80 System consists of a 53-key professional-type keyboard and microcomputer plus regulated power supply, a data cassette recorder which is computer-controlled through an interface, and a 12-inch video display monitor.

A comprehensive owner's manual will be supplied with the TRS-80 that will explain everything necessary for its operation from plugging it in through programming.

Radio Shack will also supply prerecorded cassette programs for such applications as a small business payroll, general ledger accounting, accounts receivable and inventory control.

For educational purposes the microcomputer can be used to teach mathematics, music theory and virtually any subject through programmed teaching methods.

Just for fun, a variety of game programs will be available, including blackjack and backgammon. Other uses around the home would be personal finance management, storage of recipes, menu planning and even as a message center.

Hardware

Microprocessor: Advanced Z-80 8-bit processor.
Keyboard: Integrated ASCII, 53-key professional-type.
Video Display: Memory mapped, all graphics and alphanumerics controlled by BASIC® commands. Cursor control. Automatic scrolling.
Text: 16 lines of 64 characters, also software selectable to 32 characters per line.
Graphics: 128 horizontal by 48 vertical. Graphics and text can be interspersed in any manner by software.
Memory: Includes 4K Read-Only-Memory (ROM), 4K dynamic Read/Write Memory (RAM). Internally expandable to 12 ROM and 16K RAM. Total memory capability of 62K.
Input/Output: Computer-controlled cassette interface. Expansion port for additional memory and peripherals. Keyboard built-in.
Electrical: U.L. listed for 120 volts AC, 60 Hz.
Dimensions: Keyboard, 16½x8x3½". CRT display, 16½x13½x12".

Software

Radio Shack Level I BASIC in ROM.
Level I Features: standard BASIC statements; floating point arithmetic; numeric, array, and string variables; video graphics commands; cassette save and load commands.
Commands: NEW, LIST, RUN, CONTinue, REMark, LET, FOR-NEXT-STEP, GOSUB-RETURN, STOP, END, GOTO, IF-THEN, INPUT, ON . . . GOTO, ON . . . GOSUB, PRINT, CSAVE, CLOAD, DATA, READ, RESTORE.
Functions: MEM, TAB, INT, ABS, RND, +, −, *(multiply), /(divide, <, >, =.
Special Commands (Including graphics): CLS (clear screen), SET (x,y), RESET (x,y), POINT (x,y), formatted PRINT. Array and string capability. Data storage and retrieval.

Options

CRT Display: 12" diagonal screen.
CTR-41 Data Cassette

Provisions have been made in the TRS-80 for later addition of accessory, or "peripheral" items such as an additional tape recorder, "disc" programming and a printer which would create a permanent, typed record of the computer output.

Amateurs will find the TRS-80 useful in such applications as logging, calculating beam headings, determining the optimum time to work through the OSCAR satellites and duping contest logs. Actually, the possibilities are limited only by one's imagination.

At the heart of the Radio Shack TRS-80 Microcomputer System is a Z-80 microprocessor chip that serves as the central processing unit, or "brain," of the microcomputer. This remarkable device, about the size of a watermelon seed, is one of the most advanced microprocessor chips available today.

The Radio Shack TRS-80 Microprocessor System is priced at $599.95, complete with video display monitor and data cassette recorder. The microcomputer alone will sell for $399.95 or circle no. 42 on Reader Service Card.

Ameco Model PT-2 Preamplifier

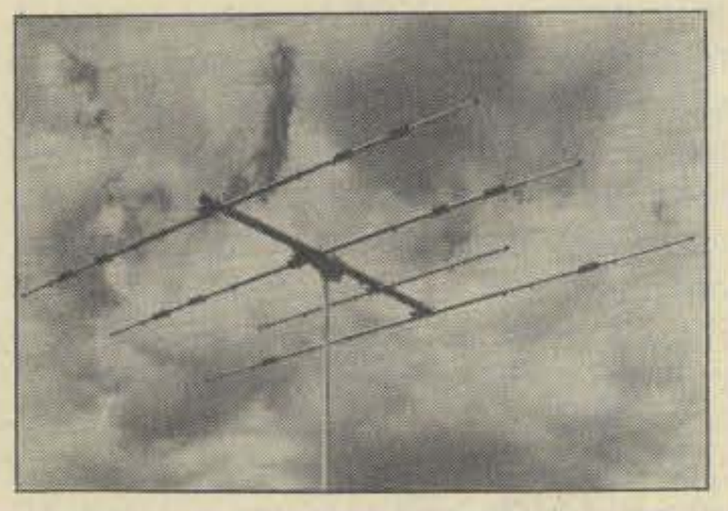
The model PT-2 by Ameco is a continuous tuning preamplifier covering the 1.8-54 MHz range. Specially designed for use with transceivers, the PT-2 features a built-in RF sensing circuit that actuates a relay, allowing the transmitted signal to bypass the

preamplifier. A release delay switch on the rear of the unit, permits selection of either fast release time for AM and contest use or slow release time for SSB operation. Other features include a FET amplifier for cross-modulation protection and an attenuator to eliminate or reduce front end overload. A built-in power supply and two AC outlets on the rear panel provide master power control for station equipment.

The PT-2 is priced at $69.95. For further information, contact the Ameco Equipment Company, 275 Hillside Ave., Williston Park, NY 11596 or circle no. 43 on reader service card.

Cushcraft 4-Element Tribander

With four active elements, Cushcraft's new ATB-34 covers the 10, 15 and 20 meter amateur bands. The ATB-34 features Hy-Q power rated traps, excellent forward gain and 30 dB front to back ratio.



The ATB-34 is constructed of high quality, heavy wall seamless aluminum tubing. Element and mast mounts are ¼ inch aluminum with zinc plated steel u-bolts. All feed point fasteners are stainless steel. Elements are fully adjustable through circular telescope clamps. The complete instructions make step by step assembly and installation very simple. All components are factory machined and element sections are marked for proper dimensions. The package includes a 1:1 balun at no extra charge.

For more information on this newest Cushcraft antenna see your local radio store or write directly to Cushcraft Corporation, P.O. Box 4680, Manchester, NH 03108 or circle no. 44 on Reader Service Card.

a monthly feature by

BILL DEWITT, W2DD

In Focus

Television on the Amateur bands

The Winner!

In the July issue of "In Focus" a three years' subscription to *CQ* was offered for the best letter regarding possible practical uses for SSTV. Winner of this mini-contest is Steven Shaffer of Hammond, Ind. His idea is to use SSTV as an aid in directing medical assistance by radio.

Fig. 1—Jean Wegimont, FG7XT made this concentric circle pattern famous.

As Steve points out in his letter, there are a number of commercial radio stations that provide medical information and emergency help to ships at sea. (An example would be station CIRM, Centro Internazionale Radio Medico, of Rome, Italy.) These stations are equipped for voice communication only. Steve's suggestion is that such stations be equipped also with slow scan television and that ships add SSTV to their equipment array.

The value of picture exchanges related to medical problems encountered on shipboard is beyond question. Admittedly, all such problems do not require the use of picture information to adequately describe the problem or its treatment—but in those cases where a verbal description is difficult, a series of pictures could be invaluable.

Fig. 3—Ko Sasaki, JA7FS uses many artistic station IDs of his own design. Remember this one?

Thanks to Steve Shaffer for his practical suggestion on how to make use of SSTV. While some may question the usefulness of 128 line SSTV pictures in this application, it should be remembered that 256 line pictures at a 34 second frame time (or other frame/line rates) could be used.

Fig. 5—Franz Acklin, HB9NL, used a half-frame contest CQ to save time and QRM (!). This double-decker shot was made by "cheating" a little with a scan converter!

Note from W2DD: Many SSTVers may be aware that medical test results have been sent by SSTV using special equipment designed by Robot Research especially for this purpose.

Piggy-backing on Steve's idea a bit, I wonder who will be the first amateur SSTV operator to transmit medical information or other REAL emergency pictures. So far, I don't believe that

*2112 Turk Hill Road, Fairport, N.Y. 14450

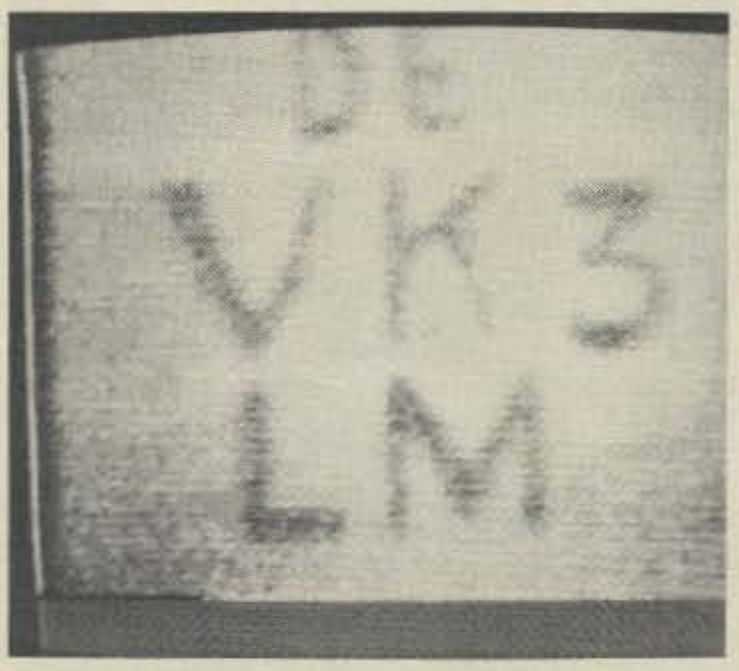


Fig. 2—Simple station ID used by John Wilson, VK3LM.

Fig. 4—IØPCB made this simple contest pattern a familiar sight to slow scanners in the last Albatross contest.

Fig. 6—A little QRM seems to have added a beard to Willie Pettersen, YV1AQE in this picture!

Fig. 7—A well-known medallion type station ID used by YV1AQE when he was still active on slow scan. How about rejoining the clan Willie?

SSTV has shown up as a communications mode under flood, fire, or other disaster conditions.

Thanks to all who submitted suggestions for the practical uses of SSTV. Sorry fellows, the *CQ* subscription goes to Steve Shaffer!

More Frequencies For General Class SSTV Ops?

A letter from Floyd Hollenbeck, WB8SGD, of Flint, Mich. raises some interesting points. It's Floyd's contention that General Class operators should be given SSTV privileges in the 15, 20, 40, and 80 meter bands as well as 10, 6, 2, etc. I know of no FCC or other proposal to extend the use of SSTV to the General Class segments of the lower bands, but I am inclined to favor this idea. It certainly would give great impetus to the growth of SSTV. In addition, I believe that such a move would enhance the long-term possibility of getting some specific frequencies for SSTV operation. Please note that I said that I am in favor of General Class ops being able to use SSTV in THE GENERAL CLASS SEGMENT of the bands mentioned.

If you have feelings on this subject pro or con, please let me hear from you. We'll "air" your views in this column.

Fig. 8—This is as close as I've come to seeing a real Polar bear on SSTV. SSTV activity in Greenland now appears to be at a low level.

SSTV Calling Frequency For 2 Meters

WB8SGD raised another good question. "What calling frequency is used for 2 meter SSTV contacts?"

With Oscar links, repeater frequencies, c.w. only allocations, Technician Class segment, RTTY nets, etc., Floyd has reason to wonder where to plunk down his SSTV signal without getting into someone's hair!

I suggest that 147.42 MHz. be used as a National F.M. calling frequency for SSTV in the 2 meter band. Here's why.

Fig. 9—A nice addition to anyone's DX list. Jcse Farizo brightened the hearts of many a slow scanner with his friendly QSOs. This picture is from a contest contact.

There are six regular simplex channels above 147.0 MHz. that are not in conflict with any repeater frequencies listed in the *ARRL Repeater Directory* They are: 147.42, 147.45, 147.48, 147.51, 147.54, and 147.57 MHz. In the Rochester, NY area, those operators with f.m. transceivers have been using 147.42 as an SSTV calling frequency. Any reason for not going National on this?

Operators using s.s.b. gear on 2 meters will certainly wish to use a lower frequency. For s.s.b. operation, my suggestion would be 145.2 MHz. This frequency is well away from the satellite frequencies which start around 145.85 and within the Tech class segment.

Suggestions—Emphasize—Suggestions!!!

Please understand that the suggestions just made are made in good faith with no knowledge of what local SSTV (or other) nets may be in operation.

Fig. 10—Neville of Nottingham! The best-known SSTV DXer in the UK transmits some beautiful pictures of his home and family. He was on a DX kick when I recorded this simple graphic shot.

My suggestions are based on the idea that it would be desirable to have some plan for SSTV on 2 meters. They are SUGGESTIONS, and if you have some that you think are better, please write and your suggestions will be published for comment.

I think that it is important that we get SSTV established on the v.h.f. bands. In some areas, activity has been appreciable, but it is ironical that so many SSTVers who own excellent 2 meter f.m. gear have been reluctant to put it to use with their SSTV equipment.

Reception is great, picture quality is terrific, DX QRM doesn't exist, and that 75 meter ding-a-ling RTTY in the background is gone when you operate SSTV on 2 meters. Try it, you'll like it!

(Continued on page 86)

Fig. 11—W2DD mixes things up a bit as described in the text. Screen at the upper right is displaying portions of three separate taped station IDs.

In Part II of An RTTY Primer, Irwin Schwartz goes into how RTTY characters are generated and received.

AN RTTY PRIMER

Part II

BY IRWIN SCHWARTZ*, K2VGU

The primary concern of communications engineers is improvement of reliability. In this regard the most significant problems encountered by designers of receivers are those related to increasing the sensitivity and selectivity while simultaneously increasing the signal-to-noise ratio.

It is possible, however, to improve reliability of communications by means other than tampering with receiver design. Such improvement can be realized by changing the *mode of transmission* of the signal. To illustrate this point, consider the problems encountered while copying a c.w. signal off the air. If a c.w. signal fades into the mud or if another c.w. signal zero-beats the one being read, copying is, at best, difficult and, very often, impossible.

Fig. 1—The Murray encodement of the letter "F".

Under marginal conditions frequency shift keying (FSK) has advantages over c.w. With FSK two tones are transmitted rather than one. In a sense, FSK may be thought of as two separate and distinct c.w. signals transmitted on two separate and distinct frequencies (the difference between which frequencies is the *frequency shift).* Independent of receiving conditions, signal-to-noise ratio notwithstanding, the demodulator will get a double dose of information, so to speak.

To illustrate the point recall that the Murray encodement for the letter "F" can be diagrammed as in fig. 1:

Translated into audio tones the letter "F" would sound like "high tone/low tone/high tone/high tone/low tone."

However, the same information may be transmitted in two other ways:

(1) high tone/no tone/high tone/high tone/no tone (Figure 2).

(2) no tone/low tone /no tone/no tone/low tone (Figure 3).

The above two ways of sending the letter "F" may sound

Fig. 2—The letter "F"—mark only.

like c.w. but are not, of course, Murray-encoded. The signal may be thought of as being sent in "abbreviated Murray," that is, high tone (mark) only or low tone (space) only.

There are then three ways an FSK signal can be sent and/or received—mark only, space only, and both tones. If a converter is designed which would react to any one of the three possibilities we could compensate for some of the effects of QRM (for example, a c.w. signal zero-beat with one of the tones, in which case the converter copies the other tone), and in theory, improve the signal-to-noise ratio at the receiver output.

All state-of-the art demodulators have the capability of performing under the three possible FSK tone configurations.

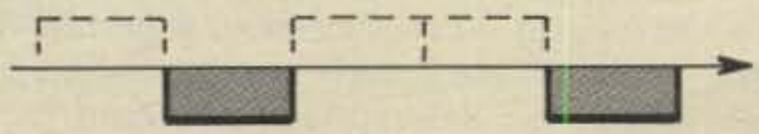


Fig. 3—The letter "F"—space only.

A demodulator (converter, terminal unit, TU) has one major function: to change the incoming RTTY signal into d.c. pulses. The d.c. pulses, in turn, activate ("key") the selector magnets housed in the teleprinter which then move the corresponding typing hammers to give printed copy.

The converter must respond only to the mark and space audio tones at the receiver's output and to *nothing else*—not c.w., not a.m., not s.s.b., not noise pulses—*nothing else.* Specifically, the tones to which we want the TU to respond are the standard amateur RTTY tones of 2125 Hz for space and 2295 Hz for mark (this is 170 Hz shift); if 850 Hz shift is used (it is virtually obsolete on the amateur bands) the audio tones would be 2125 Hz for space and 2975 Hz for mark. The converter, then, must discriminate

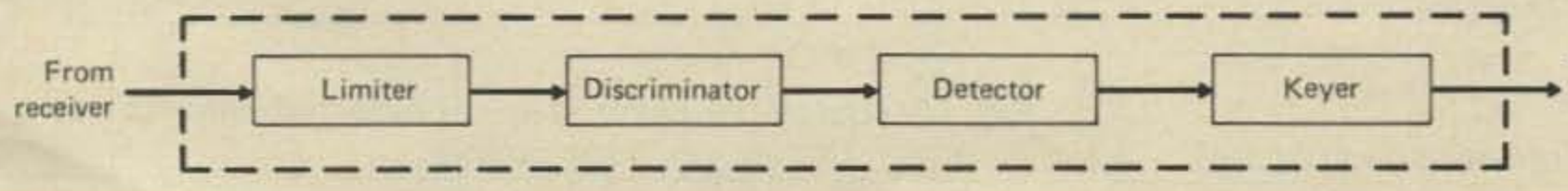


Fig. 4—Block diagram of a basic Demodulator.

*260 65th St., Brooklyn, N.Y. 11220

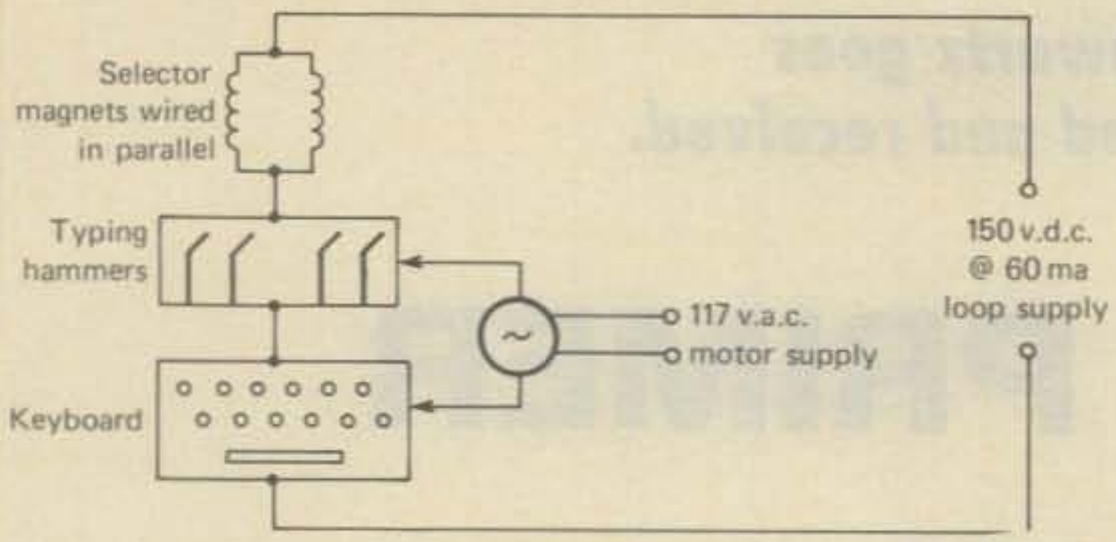


Fig. 5—Supplying power to a Teleprinter.

in favor of 2125 Hz and 2295 Hz (or 2975 Hz) and disregard everything else. The stage of the TU which performs the function of tone discrimination is called, not surprisingly, the **discriminator.**

Control of the amplitude ("loudness") of the two tones as they go through the demodulator is also desirable, whereby (1) they always have the same amplitude and (2) the amplitudes neither exceed nor fall below a predetermined level. This function offsets the effects of the "selective fading" problem where one of the tones QSB's out independently of the other. The stage which performs the task of amplitude control is called a **limiter.** If the amplitude falls below a certain level, the signal is amplified; if the amplitude exceeds a certain level, the signal is clipped or attenuated. In a properly balanced limiter the mark voltage is always equal to the space voltage and the selective fading problem is thereby overcome.

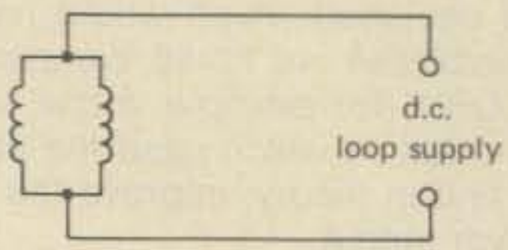


Fig. 6—Selector magnets wired in parallel (60 ma).

A **detector** (rectifier) stage is needed to change the input signal into d.c. pulses for keying the selector magnets. The detector can be as simple as a germanium diode or as complex as those used in sophisticated f.m. receivers. Of course the detector's d.c. output will have to be filtered to eliminate any residual ripple.

Fig. 4 shows a block diagram of a basic demodulator.

The only stage of the converter not yet touched on is the **keyer.** A description of the keyer's function will be instructive in understanding the relationship between the demodulator and the teleprinter.

The keyer of a converter serves as a switch, activating the selector magnets of the printer with the right voltages at the right time. A keyer can be a relay, a vacuum tube or solid state. Relays and tubes present well known problems, i.e., relays develop dirty contacts and tubes get hot.

The keyer is the connecting link between the electronics of the demodulator and the mechanics of the teleprinter.

A teleprinter incorporates two machines run by a common motor. The typing and printing mechanisms are not connected physically but are tied together through an electrical circuit called a **loop.** There are thus *two* supplies needed to power a teleprinter: an a.c. supply for the motor and a d.c. loop supply for the printing and keyboard selector magnets. The motor supply is rated for 117 volts a.c.; the d.c. supply for about 150 volts d.c. Both are usually built into the teleprinter case. See fig. 5.

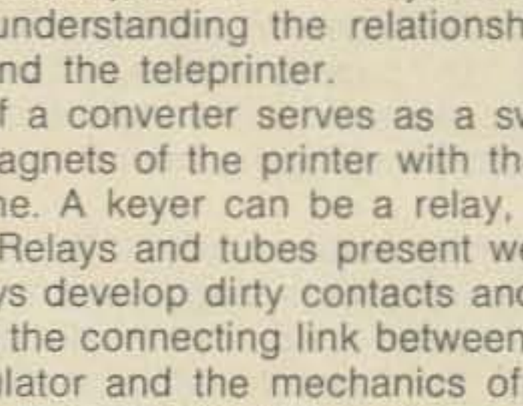


Fig. 7—Selector magnets wired in series (20 ma).

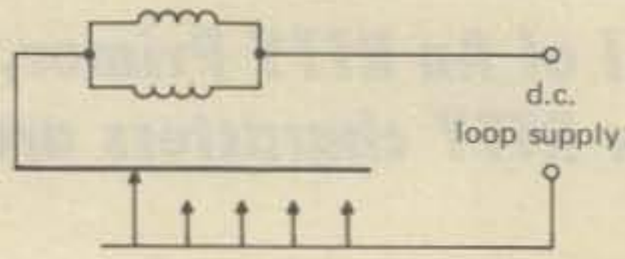


Fig. 8—Mark hold.

In most cases the selector magnets are wired in series with the keyboard, both being powered by the loop supply.

All machines have a pair of selector magnets. If the two selector magnets are wired in parallel (fig. 6) the current drain on the loop supply will be about 60 ma. If the magnets are wired in series (fig. 7) the drain is about 20 ma. The usual practice is to wire them in parallel.

Notice that in fig. 8 the schematic symbol for the keyboard has five arrows pointing upward, only one of which is in contact with the loop supply circuit. Electrically this means that in "rest" position the keyboard keeps the loop circuit closed and current is drawn from the supply. This condition is called **mark hold.**

By moving the five keyboard contacts in an appropriately timed sequence it is easy to see how characters can be Murray encoded (or decoded) by making and breaking (marking and spacing) the contacts, thereby impulsing the selector magnets and pulling the corresponding characters' hammers.

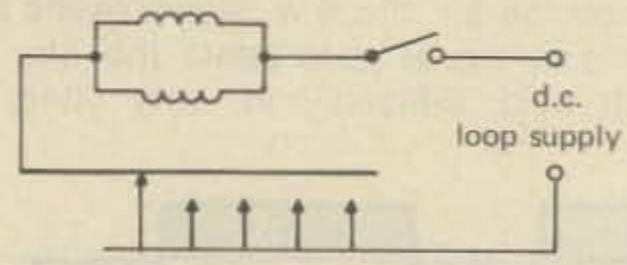


Fig. 9—Using a s.p.s.t. switch to key a loop supply.

In lieu of the keyboard a single pole-single throw switch can be interposed, realizing the same effect. See fig. 9.

Since the keyboard is already in mark hold, the switch can assume the make-and-break function. If the switch is opened and closed vis-a-vis the Murray code for time durations in accord with the speed of the machine (say 60 words per minute) the printer will function as if it were being activated by the keyboard.

The keyer stage of the demodulator *is* that switch. It should now be clear how the receiver, the converter and the teleprinter are interconnected. Fig. 10 illustrates the point.

Special consideration must be given to the station's

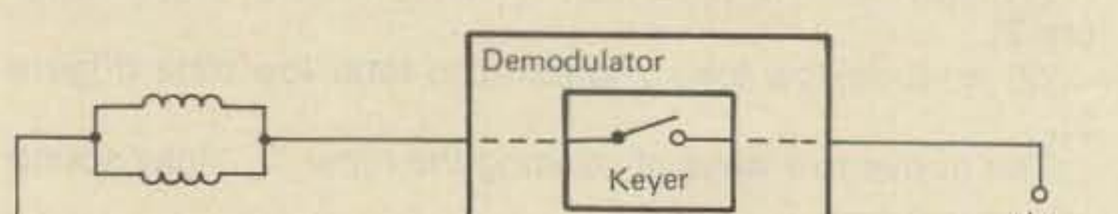


Fig. 10—Using the keyer stage of a demodulator to key a loop supply.

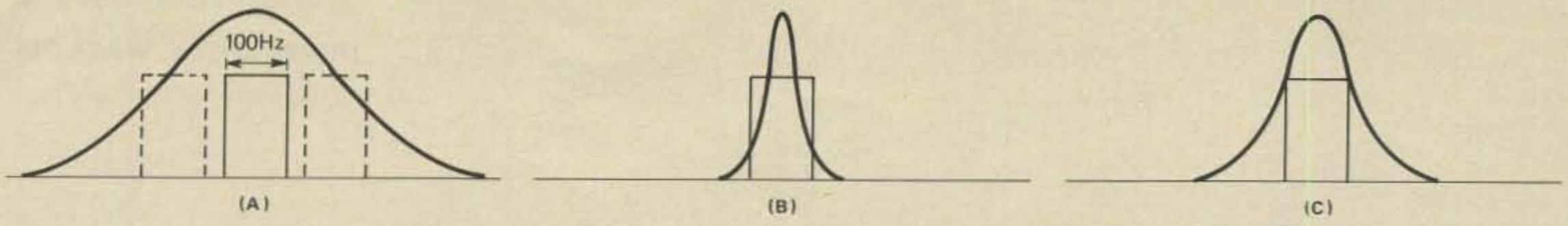


Fig. 11—(A) A filter response that is too wide. (B) a filter response that is too narrow. (C) A filter response that is just right.

receiver since, as will soon become obvious, the nature of an RTTY signal dictates a bit more specialization in reception technique than is required for c.w. or single sideband. We can get a glimpse into the problems by looking at how a receiver reacts to signals in general.

Consider a continuous key-down c.w. signal. In order for this signal to be processed by the receiver it must go through a "door" called a bandpass filter. If the response of the filter is too narrow, the signal will not pass through; if the response of the filter is too wide the signal will pass through but so will other, generally undesired, signals. The most effective bandpass filters, then, for a c.w. signal are those whose bandwidths are exactly the same as the bandwidth of the c.w. signal itself. (The existence of such filters is, of course, an exaggeration. A filter can never fit a signal exactly).

Consider now a c.w. signal whose bandwidth is 100 Hz. Fig. 11 shows the effects on such a signal for a filter too narrow, a filter too wide, and a filter that "fits" the signal.

In the case where the bandpass of the filter is too wide (fig. 11(A)) it can be seen that other c.w. signals (shown by broken lines) will be able to squeeze through the "door" along with the desired signal. This is an illustration of QRM, i.e., other signals interfering with the one being read. As every amateur knows, this can ruin a QSO.

In the next case (fig. 11(B)) the filter is too narrow. Not enough of the signal gets into the receiver and copy likewise becomes difficult (c.w. men pay the price for a super-narrow filter by listening to it "ring"). Choice (B) is therefore undesirable.

Choice (C) solves each of the aforementioned problems. The filter passband is wide enough to pass the complete bandwidth of the signal, yet narrow enough to reject all signals on either side of its passband.

In single sideband the signal passes most effectively through a filter whose bandwidth is in the order of 2400 Hz —much wider than that for a c.w. signal. To discover the role a bandpass filter plays listen to c.w. with the receiver in its single sideband position. If the band is crowded quite a few signals will be heard; then switch to the c.w. position. The number of signals heard will be dramatically reduced.

RTTY signals have unique reception problems. Two considerations are necessary for understanding the situation. In addition to the filter bandwidth (which must allow the signal to pass) it is also important that as the signals pass through they appear at the receiver's output at frequencies of 2125 Hz and 2295 Hz (or 2975 Hz). This may not always happen.

Consider a 170 Hz shift RTTY signal. Two tones of 2125 Hz and 2295 Hz must pass through a filter in the receiver. If the center frequency of the filter's bandpass lies exactly at the center of the two RTTY tones, i.e., at 2210 Hz, *and* the filter's bandwidth is 170 Hz (fig. 12), then the receiver will perform optimally. Both tones will pass and the TU will respond. If, however, the center frequency of the filter is not 2210 Hz. but, say 2500 Hz, one of the RTTY tones will not pass, even if the filter's bandwidth is still 170 Hz. This condition appears in fig. 13.

If the dial on the receiver is moved to compensate for a misplaced center filter frequency the frequencies of the RTTY audio tones will change and copy will be lost.

A variable b.f.o. (beat frequency oscillator) in the receiver can solve the problem to some degree since it allows the tones to be changed without affecting the center passband frequency. The idea is to vary the b.f.o. until both tones are passed through the filter.

Unfortunately, some receivers do not have a variable b.f.o. To rectify this situation a slight modification will have to be made on the receiver. I made such a change in my TS-520 (one 1" wire was added) and it works like a charm. Since every receiver will require its own particular modification (not all receivers have passband filters with the same center frequency characteristics) it will be necessary to obtain information for your particular one. I suggest that you write (and subscribe) to *RTTY Journal*, P.O. Box 837, Royal Oak, MI 48068 for specific data. Incidentally, some receivers, for example, the Drake R4-B, need no changes at all.

The next article will discuss demodulator operation in a bit more detail and will describe the construction of a simple converter. ■

(To be Continued)

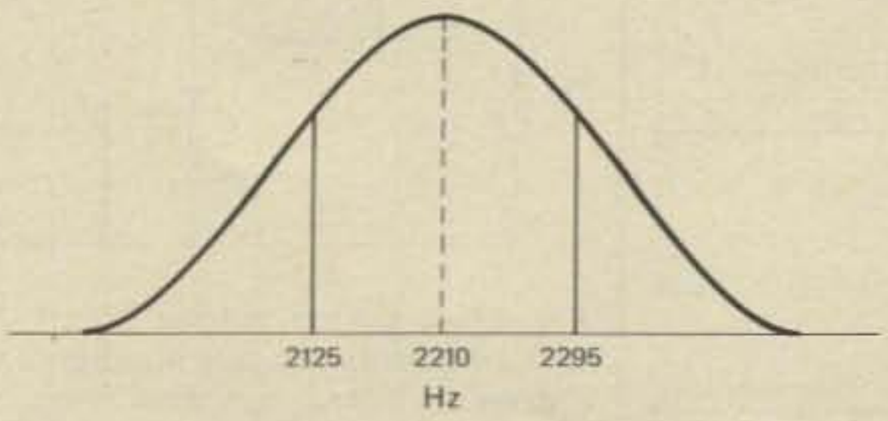


Fig. 12—Center filter bandpass frequency satisfactory for reception of 170 Hz RTTY. Both tones will pass.

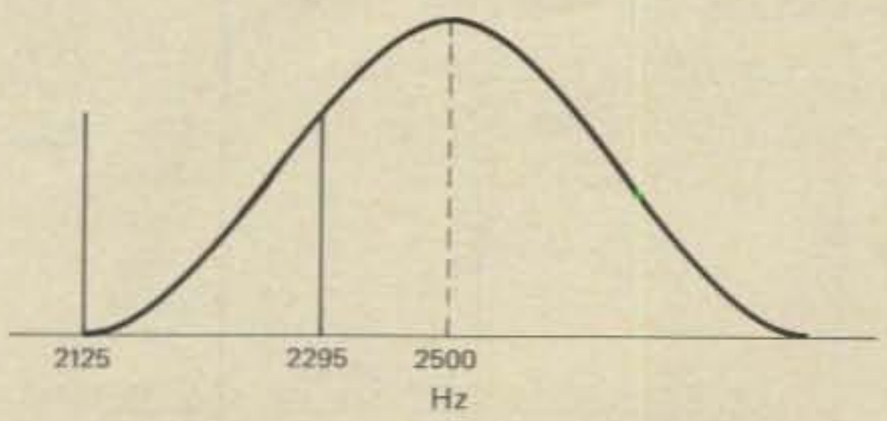


Fig. 13—Center filter bandpass frequency not satisfactory for reception of 170 Hz RTTY. Only one tone passes.

a monthly feature by

IRWIN MATH, WA2NDM

Math's Notes

A look at the technical side of things

Last month we took a look at Triacs and their a.c. applications. This month, we will examine the SCR and how it may be employed in d.c. circuits.

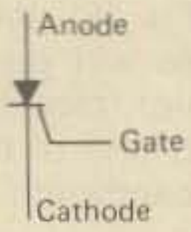


Fig. 1—Schematic for a SCR.

Fig. 1 is a schematic representation of the **silicon controlled rectifier (SCR)**. Note the similarity of the symbol to that of a conventional rectifier. When reversed biased (— on the anode) it operates the same way as a rectifier, no current flows. When the SCR is forward biased however, the difference is apparent. Initially, no current flows either. When a positive pulse or voltage is applied to the gate element however, the SCR conducts and becomes, in essence, a forward conducting diode. Furthermore, it remains conducting even when the gate voltage is removed. To revert back to the non-conducting state requires momentary removal or interruption of the initial supply voltage.

The basic SCR d.c. circuit is shown in fig. 2. When power is first applied, the load is not energized as the SCR is cut off. When S_1, a normally open switch, is depressed, even momentarily, the SCR conducts and full power is applied to the load. To turn off the power, S_2, a normally closed switch is activated. This removes power from the SCR, cutting it off. When S_2 is released, the SCR remains cut off.

*5 Melville Lane, Great Neck, NY 11020

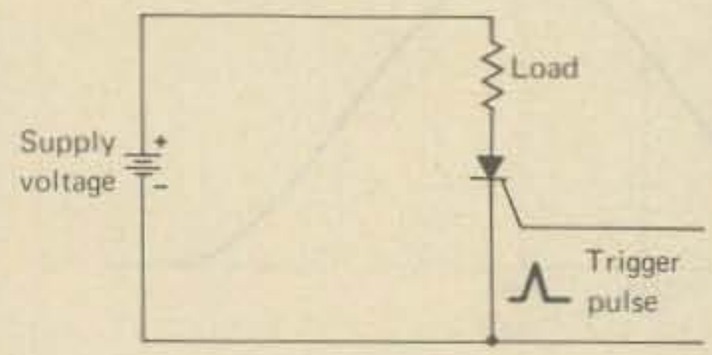


Fig. 2—The basic SCR circuit described in the text.

This simple circuit is usable as is, for achieving a latching type operation

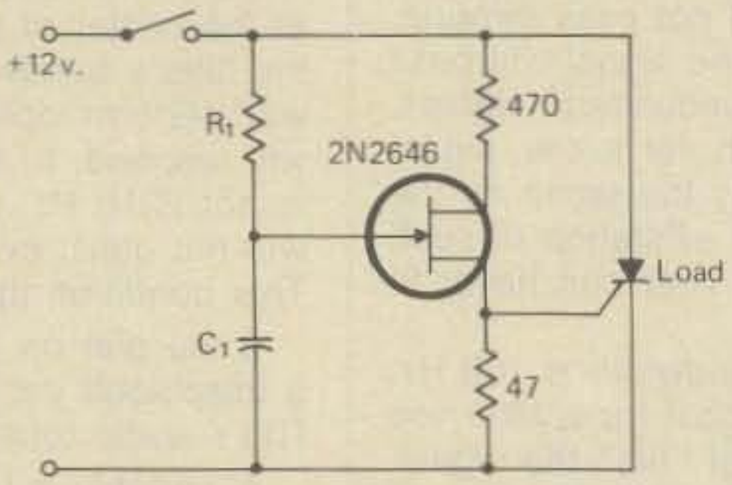


Fig. 3—A simple SCR/UJT timer circuit. The time delay is approximately equal to RC.

with, for example, an "ON" button and an "OFF" button. The load can be a lamp, relay coil, or other d.c. device as needed. The only requirement is that the SCR current not be interrupted as might be the case with a d.c. motor. Even this problem could be solved however, by shunting the motor with a suitable resistor that would always allow a minimum amount of current to flow.

Because of the ability of the SCR to be triggered into conduction by a pulse, a wide range of interesting timing circuits, utilizing **unijunction transistors (UJT)** has been developed. The basic schematic for this type of circuit is shown in fig. 3. When power is applied to this circuit by closing S_1, capacitor C begins to charge through resistor R_1. At some point in time, approximately equal to the product of R (in ohms) and C (in farads) the unijunction transistor fires. This produces a positive pulse across the 47 ohm resistor and turns on the SCR which applied power to the load. Opening S_1 cuts off the

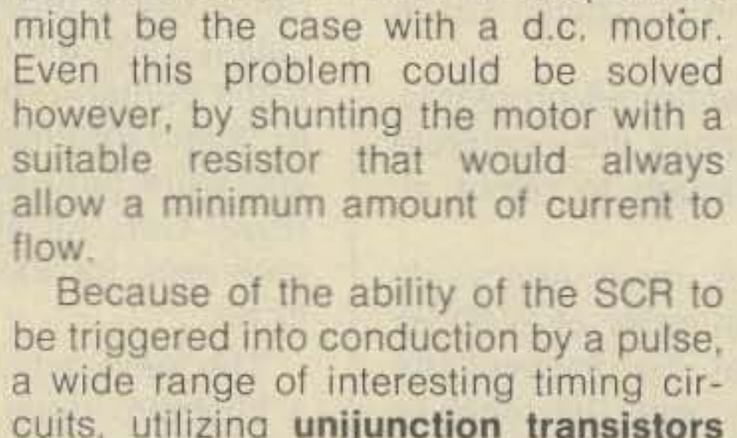


Fig. 4—A simple SCR crowbar protection circuit.

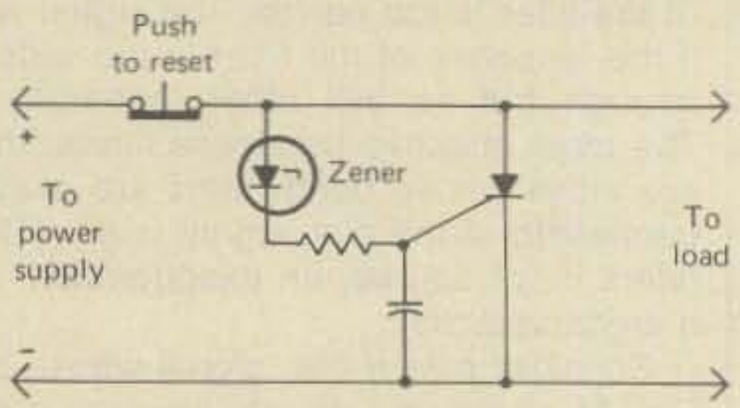


Fig. 5—Another SCR crowbar circuit for use with fixed supplies.

SCR and resets the entire circuit. With a 2N2646 or 2N2647, the value of R_1 can range from about 3.3K to 3.3 megohm and the value of C_1 from about 0.1μF to 10μF or even 100μF if low loss electrolytic units are used.

The load in this example is usually a relay coil and this allows a.c. power to be switched (through the relay contacts) by a d.c. signal. Other d.c. loads, however, such as previously mentioned, could also be employed. In addition, making R_1 a potentiometer results in a variable time delay unit.

A third application of the SCR is as a voltage sensing switch. This type of circuit makes use of the fact that a small positive voltage on the gate of an SCR will not trigger it on. A certain threshold level must be reached. As

(Continued on page 86)

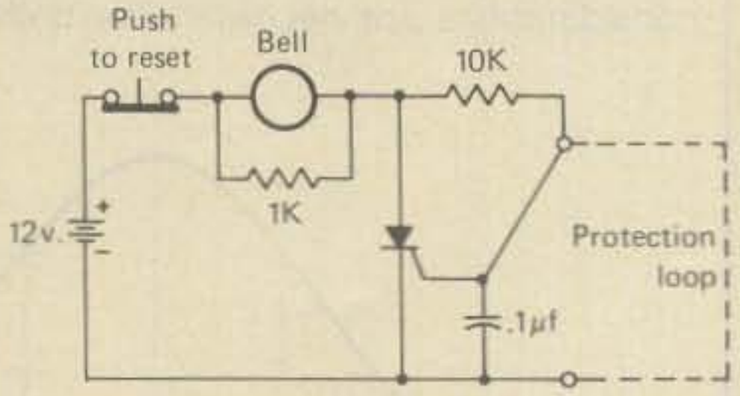


Fig. 6—A simple burglar alarm. The protection loop can be any number of normally closed switches, contacts, metallic tape, etc. The 1K bell shunting resistor prevents false turnoff of the SCR by the interrupter in the bell.

a monthly feature by

HERBERT S. BRIER, W9EGQ

Novice

"How to" for the newcomer to Amateur radio

Novice—Amateur Radio Station Installation Tips Part 1 Of 5

Introduction

It is important to establish a good station and failure to do so can significantly contribute to a Novice failing to upgrade to a renewable FCC amateur license. You should get your initial station installed and have it ready to operate before your Novice license arrives. Equipment and accessories will be discussed in detail in this five part article but one piece of advice applies throughout, and that is to avoid junk. An experienced amateur can achieve remarkable results with relatively poor equipment but the Novice will not be capable of this for a long while. Beginning Novices have enough trouble communicating, even when using excellent gear. There is no advantage to adding the burden of poor equipment to the woes of the beginner.

Guidance

I have helped several thousand Novices set up their first stations and this article contains many tips that can help you avoid time-consuming, expensive mistakes. Headings and sub-headings are used to make it easier to find desired information. You should read the entire article and then go back thru it to pick out specific portions of particular interest. It is much simpler and cheaper to avoid mistakes than it is to correct them, so plan every step and know exactly what you are going to do before you make your first move.

Selecting equipment and accessories presents a tough challenge to the new amateur. The truth is that even the most experienced amateurs do a lot of reading, talking, and evaluating to help them arrive at good decisions. Even if you are fortunate enough to have a friend who is an active amateur, you may still find that you must make your own decisions. It is reasonable to assume that other amateurs will base their opinions and advice on the situation that existed when they last evaluated amateur equipment and/or accessories. It is quite possible that a well-intentioned amateur might give you bad advice, due to lack of knowledge about present equipment and accessories.

The major amateur radio publications can be used to obtain an introduction to the items you want to know about. I hope you will follow the direction presented in the October 1977 CQ Novice column, which advises you to use amateur radio magazines as a major source for all kinds of help in solving your amateur radio problems.

It is my opinion that almost all equipment and accessory reviews printed in amateur magazines are not critical enough to be useful. You can extract basic equipment facts from such articles, but that is about the full extent of their usefulness.

If you have an active amateur radio club in your area, attend its meetings to pick the brains of its members. You will have to evaluate what you are told, but you should be able to get some useful information from those amateurs who recently had occasion to investigate items presently being sold.

It can be disastrous to blindly accept the advice of a salesman at a local electronic outlet; this is particularly true in regard to used equipment. I believe that the used amateur equipment dealer of today must be related to the conniving horse dealers of yesteryear. If nothing else, at least consider that the store probably could not afford to hire a person who is fully qualified in all areas to help you solve your problems. There just isn't enough profit in amateur sales to allow a store to provide that much free competent technical advice.

Station Location

The first thing you should do is to decide the best location for your amateur station. You will be almost completely motionless for long periods of time as you operate, which makes it very important to select an area that is warmed in the winter and is cooled in the summer. Do not set up your station in a garage, cellar, or attic. If you can possibly avoid it, don't locate your station in someone else's room because this would limit your operating opportunities.

Try to select a comfortable and readily accessible area in your home as your station location. Your operating position must be as close as possible to where your r.f. ground will be established and it should be reasonably close to where your antenna transmission lines will enter your home.

Build Or Buy?

Another decision you must make is whether you should build your station equipment or buy commercially made units. If you decide to build, you must choose between constructing kits, building from schematics, or modifying surplus gear. The decision has to be yours and these paragraphs are just intended to help choose the best one for you.

Building Kits

If you like to build, and have the required tools and test equipment, kits are the way you should go. If you are not an experienced kit builder, I advise you not to build

Kenn Rothman (WD8ILB) of University Heights, Ohio has worked 43 states with his Kenwood TS-520, plus Argentina and Yugoslavia.

*2814 Empire Ave., Burbank, CA 91520

your initial station. I have found that most new amateurs should not build their first station from kits because they are not experienced enough to properly construct, test, and troubleshoot this relatively complex equipment. I like to build and I have done a lot of building, but I advise inexperienced Novices against building. There is plenty of time to build gear after you upgrade to a renewable FCC license. The completed kit usually reflects the experience and capability of its builder. It is very important for a Novice to start with equipment which operates very well. The popular notion that one saves a lot of money by building a kit is not supported by a factual comparison between the costs of kits and comparable commercially made units. The kit builder gains building and troubleshooting experience. He/she becomes familiar with components, color codes, proper use of tools and test equipment, and circuit symbology. If you assemble your station from kits, you are much less hesitant to do your own troubleshooting and you justifiably have a bit more pride in the performance of your station.

The arguments in favor of building your station from kits are strong, but there are also some disadvantages to be considered. Equipment built from a kit has a lower resale value and is harder to sell than its commercial equivalent. Also, most stores will not directly accept assembled kits as trade-ins on other equipment. Amateurs commonly change their station equipment, therefore resale considerations are important. You "swallow the anchor" when you go the kit route, so be very sure of yourself before you make that decision.

If you are going to build a kit, it is wise to locate other amateurs who have built (and are using) the same equipment you plan to build. You can benefit from their experience and they may demonstrate equipment performance on the air.

Building from Schematics

Building equipment from circuit designs printed in magazines and books is usually less desirable than building a kit. If you have to purchase all of the parts, your cost can be several times the price of a comparable kit. If you do not build from a proven circuit design (such as in the *ARRL Handbook),* you may be using circuit design and test data that are incomplete or incorrect. Completed kits at least have a known designed performance capability and this helps sell them. Homebrew equipment is almost impossible to sell, no matter how well it is built or functions. Homebrew gear has the lowest possible resale value and you are fortunate to get a dime back for each dollar invested in parts.

Modifying Surplus

If you don't want to build a kit and have decided against building homebrew gear, you can satisfy your urge to get your hands dirty by modifying surplus communication gear to suit your Novice station needs. There are many good articles in amateur magazines about modifying surplus gear. There are also surplus conversion manuals to help you do the job well. Many good surplus sets simply require an a.c. power supply and they are ready for use.

Some military gear is well suited to amateur use but a lot of it is not very useful, so one must take the time to evaluate what is available. A lot of surplus communication gear has separate control panels and it usually isn't as eye-appealing as regular amateur equipment.

There are several good outlets for surplus equipment and some advertise in amateur magazines. If you are thinking about modifying surplus equipment for amateur use, get all the dealer catalogs and read the conversion articles before you make a decision.

Commercial Equipment

It would be nice to climb up on a pedestal and tell you to build your station but I'll be honest and advise you to be an "appliance operator" until you have learned enough to be useful instead of dangerous. The primary purpose of the Novice license is to provide newcomers with an easy introduction to amateur radio. The Novice code bands provide a pleasant opportunity to increase code proficiency to the 13 w.p.m. General/Advanced code requirement while enjoying on-the-air contacts. Commercially made amateur equipment provides the easiest and fastest ways for the Novice to get a dependable initial station on the air. Poor operating results quickly discourage a Novice and can cause one to give up without really giving amateur radio a decent try. If you are a typical Novice, this electronics stuff is probably still a mess of partially understood theory to you. For what it is worth, I have seldom seen a Novice with a really good station fail to keep his/her interest alive long enough to upgrade. However, I have known many good Novices who quit amateur radio due to discouraging operating results.

Whether you build kits, build homebrew, modify surplus, or buy commercial gear, get it done and have your station operable before your Novice license arrives. You don't need a license to build and you should operate once you are licensed.

New Versus Used Equipment

Before the rules were changed to permit Novices to use a variable frequency oscillator (v.f.o.) and to operate as much as 250 watts d.c. input to the final, it was advisable for Novices to set up a station strictly to meet their Novice needs and to plan on establishing a different station after upgrading to the General (or higher) license. The present situation allows the Novice to install a beginning station that will meet all Novice needs but will also provide satisfactory operation after license upgrade is attained.

Used equipment usually provides more communication capability at lower cost than new gear. The safest way to buy used equipment is to buy it from an active amateur, preferably another member of your local amateur radio club. Purchasing equipment advertised in amateur magazines has proven to be surprisingly safe, but it is best to purchase from nearby amateurs. If you buy used gear from a store, you should deal with stores that permit equipment to be turned in at your full purchase price towards other gear, if it is not satisfactory. There is usually a 10 to 15 day time limit on this type of turn-in offer, but that is enough time to permit equipment to be evaluated.

If your financial situation is better than most of us enjoy, there is nothing wrong with buying top quality new communications equipment right at the start. Much of the modern gear is superb.

Solid State Versus Tube Equipment

Although there is still much more tube type equipment than solid state gear on the used equipment market, it is possible to locate solid state units at reasonable cost.

Solid state gear is usually smaller, runs cooler, uses less electric power, requires less frequent servicing, and is better suited to emergency use with battery power. Transistors are not as subject as tubes to damage caused by mechanical shock. However, transistors are more likely to be damaged than tubes when operated in a high heat environment.

Equivalent tube equipment is more

(Continued on page 86)

This month by
ROD LINKOUS, W7OM

DX

News of communications around the world

In a previous column I promised to introduce you to some of the world's top DXers. It turns out that they really need no introduction. Many of us think we know a little about the DXer we talk to occasionally. With a second look, it is a rare case when we really get to know one of our own. This month I want to give you some background on a friend to us all.

I first met him in the early fifties when the bands were less crowded and rag chewing was common place. Over the last few years the rag chewing QSO's have become shorter and less frequent. For those who have never had the pleasure of really knowing the man, it is my pleasure to introduce:

The Number One Hawaiian

Ask any newcomer to DX or any old timer for that matter, what Hawaiian stations he has worked and one call is prominent—KH6IJ. Katashi Nose, or Nosey, to his many friends, is not only a famous Hawaiian amateur but probably one of the top ten DXer/contesters in the world.

Nose was first licensed in Hawaii as K6CGK in 1932. In april, 1952 he received Extra Class license number 4. He holds Radiotelegraph and Radiotelephone licenses with radar and aircraft endorsements. Nose has held several calls: K1PND (1959); AP2IJ (1962); KA2IJ (1963); 3D2IJ (1972); KG6SZ,1973); JH1YZT (1974); and KS6GJ (1976).

Known for his tremendous efforts during DX and Sweepstakes contests, Nose has few peers. A common DX contest joke among the KH6's: "I wonder who will be second this time?" Every KH6 contester's goal is to beat KH6IJ. About six years ago an inventory of Nose's shack indicated he had over 200 contest certificates, medals, cups, pins and plaques; some dating back to as early as 1932.

His c.w. skill won the Hawaiian Open c.w. copying contest. Yet, he has the time and patience for the slower crew; so don't let the speed fool you into moving on.

Being first in Hawaii is nothing new for Nose. He won the first non-continental U.S.A. W.A.S. in 1936 (number 32). Again in 1948 he was the first KH6 to win WAZ (number 62). He also holds the first DXCC membership issued to a KH6. Working DX, whether on the low bands or via satellite, has netted him 340 countries over the years.

The physics professor from the University of Hawaii Manoa has made immeasurable contributions to our hobby. In Hawaii he is best known for his newspaper column "With Hawaii's Radio Amateurs" which appears in Honolulu's *Star Bulletin*. The column first appeared in 1936 and has the distinction of being the oldest newspaper column in Hawaii including the syndicated columns.

His writing gift has lead to his being a contributing writer for *QST* since 1947. He won the coveted *QST* Cover plaque in 1974. Many technical articles in amateur magazines and handbooks bear his name.

The Institute of Electrical and Elec-

*5632 47th Ave. S.W., Seattle, Washington 98136

Katashi Nose, KH6IJ, the consistent top DXer/contester from Oahu. Since his first license in 1932 he has provided the world the opportunity to work Hawaii for a new one or another multiplier. His contribution to our hobby ranges from the technical to his personal inspiration. (Photo KH6IEC)

The CQ DX Awards Program

S.S.B.	C.W.
513....G8PX	271....N4OT
514....JA5PUL	272....W4DZZ

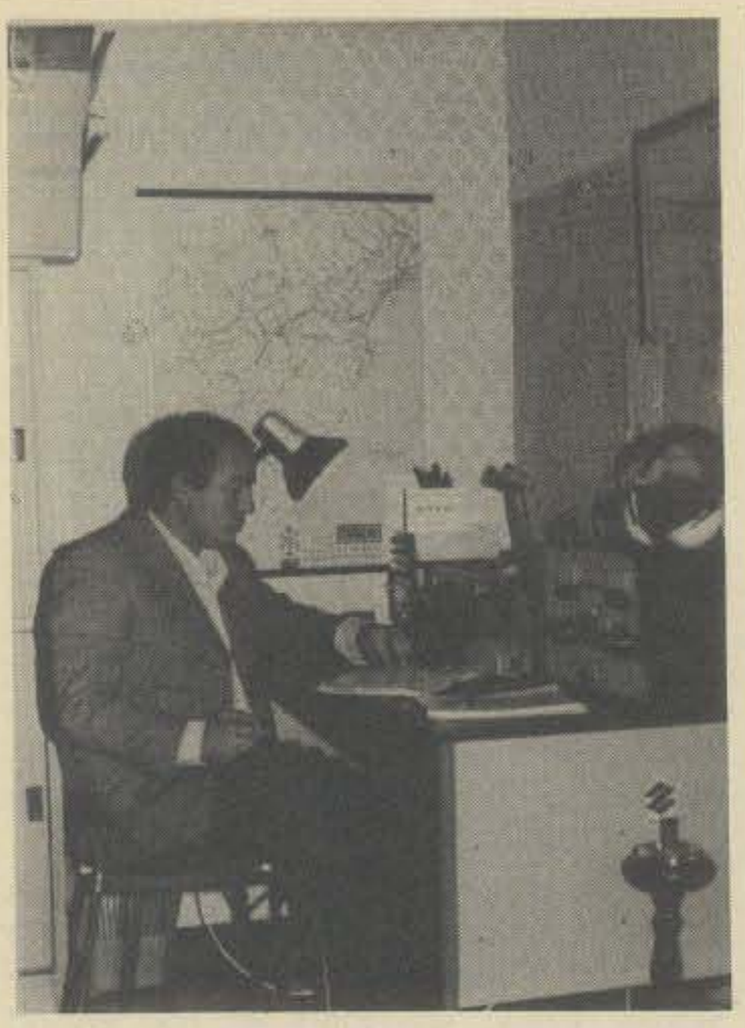
S.S.B. Endorsements

310....I0ZV	300....VE3GCO
300....I4ZSQ	150....JA5PUL

Complete rules and application forms for the CQ DX awards program can be obtained by sending a business size, No. 10, envelope, self-addressed and stamped to: "CQ DX Awards", 5632 47th Avenue S.W., Seattle, Washington 98136 U.S.A.

One of the most consistent 40 meter CW signals from South Africa is ZSIXR. Roy Dalton, ZS1XR, is active on the other bands from Capetown, but spends a great deal of time on the low end of forty. The latest station lineup is all Heath. (Photo W7VRO)

Ludwig Mentschel, DM2CHM, is the proud owner of this neat layout. Running a kw from his Leipzig QTH, he is one of the more active German Democratic Republic DXers. The station covers the five low bands plus 144 and 432 MHz.



Ettore Pastore, I5EPM, is very active on both 20 SSB and cw from his Prato, Italy home. (Photo K8PYD)

tronic Engineers paid Nose their highest respect with his nomination as the Hawaiian Section "Engineer of the Year." Yet he says his "biggest thrill is to see youngsters I taught radio to (1940-62) become established in commercial radio and government service." Many of his students are amateurs as a direct result of his own enthusiastic interest in amateur radio.

The appointment to the WARC-79 FCC Advisory Committee as a charter member comes as no surprise. He has been the president of the Honolulu Amateur Radio Club and a member of the ARRL Contest Advisory Committee. He served for two terms in each assignment.

About the big signal from Oahu: the shack sports a Collins S-Line and two FT-101's to a homebrew 3-1000Z kw linear. The antenna system is a TH6-DXX just above the roof top with random wire antennas and a 160 meter loop. His homemade transverters get him onto 430 MHz, 144 MHz, 50 MHz and 1.9 MHz.

Haru, JF1PJK, operates 8J1ITU at the Telecommunications Museum in Tokyo in commemoration of the 1977 ITU week. This was the fifth 7J/8J station following 8J1RL, 8J1WJ, 7J1RL and 8J2HAM. Haru, who recently received CW-Phone WAZ, is very active from his Tokyo home, especially on 20 meters using a Drake line. (Photo by JH1VRQ)

His interest in amateur satellites led to the task of being the AMSAT Area Coordinator. This added to the other appointments mentioned plus being the advisor to the University of Hawaii IEEE Amateur Radio Club. He is also a member of the Harvard Wireless Club alumni and the Frankfort Radio Club.

It is tough to summarize the life and activities of one of the great DXers in a few column inches. This is especially true in Nose's case. He is truly a man of all seasons whose contribution to our hobby is monumental. I have worked Nose so many times, it's hard to count; yet, I look forward to another QSO with hopes of getting more time to chat before the rest of the world calls him. I really miss those long chats we had when the band was dead to the U.S. and Nose turned the beam to Japan. Those were some of the finer hours shared with a great DXer and contester, Katashi 'Nose' Nose, KH6IJ.

Our deepest appreciation to Frank Buffalano, KH6IEC, for the background research on Nose.

Consistently Inconsistent

Watch the January 1978 DX column for the latest comments from Japan.

DX Hot Spot

Without question the DXpedition to Kingman Reef (KP6BD) and to Palmyra (KP6AL) was a success par excellence. Preliminary reports indicates they made about 16,284 QSO's; 5,392 from Palmyra and 10,892 from Kingman. The first contact from Kingman was at 0528Z on June 18, and the last at 2120Z on the 22nd. The Kingman contacts included: 2,900 JA's, 416 Europeans, 210 Central and South Americans and about 1,500 W6's. JA1-ELY made it on all six bands to Palmyra. Over 6,000 QSO's were made on twenty meters alone from Kingman. The c.w. effort was dampened by a malfunctioning keyer, but not until after almost 6,000 QSO's.

	KP6AL PALMYRA		KP6BD KINGMAN	
BAND	CW	SSB	CW	SSB
160	13	3	20	—
80	10	290	71	356
40	795	9	1,290	304
20	935	2,146	1,193	5,105
15	302	835	1,093	1,155
10	—	54	78	227
	2,055	3,337	3,745	7,147
Totals	5,392		10,892	
	16,284			

The whiz kids on this DXpedition were Norm Meyers, N9MM; Barry Fairfax, WB9KTA; Stewart Woodward, K4SMX; and Glen Rattman, K6NA. Their effort has surely dropped Kingman Reef and Palmyra further down the most wanted list.

The WPX Honor Roll

The WPX Honor Roll is based on current confirmed prefixes which are submitted by separate application in strict conformance with CQ Master prefix list. Scores are based on the current prefix total, regardless of an operator's all time count.

Mixed

W4WV 1675	N4MM 1290	W6ISQ 1028	YU2OB 882	YU4EBL 782
K6JG 1552	W4BQY 1271	WAØKDI ...1019	DL1CF 872	K8UDJ 750
K6XP 1502	WB2FMK ..1270	K6ZDL 1007	W4BYU 859	CT1LN 749
F9RM 1497	WB4KZG ...1230	DL1MD 993	G3DO 849	WA5LOB 749
YU2DX 1407	PAØSNG ...1229	I6SF 988	I3ANE 848	PY4AP 735
W9DWQ 1365	WA2EAH ...1200	K4KQB 960	WØSD 844	KØBLT 733
W2NUT 1363	W9FD 1184	W4IC 950	YU1ODS 836	WA2AUB 733
VE3GCO ...1340	W8ROC 1181	WA1JMP 948	JA1AG 831	K8LJG 750
W3GJY 1336	WA5VDH ...1160	SM6DHU 940	YU3EY 811	K7NHG 719
W3PVZ 1333	N6AV 1150	WA6JVD 940	W9WHM 811	WA6EPQ 713
YU1BCD ...1327	WØAUB 1107	K5DB 923	W6NJU 811	PAØVB 706
ON4QX 1322	WB4SIJ 1102	WØSFU 908	W9ZTD 807	UA3FT 705
W8LY 1319	N6CW 1092	SM7TV 905	IØJX 803	OE6RP 622
W4CRW 1308	YU1AG 1075	WA6TAX 899	IT9AGA 791	
DJ7CX 1297	N2AC 1033	W3YHR 893	K2ZRO 782	

S.S.B.

W4UG 1433	HP1JC 1086	WA5VDH 912	OE2EGL 839	CX2CN 702
F9RM 1418	YU1BCD ...1063	F2MO 904	W6RKP 822	WB2FMK 700
IØAMU 1329	PAØSNG ...1034	DL1MD 903	W3DJZ 818	I4LCK 653
K6JG 1277	DL9OH 1033	WB4KZG 900	OK1MP 817	YU1ODS 648
K6XP 1273	DK2BI 1003	WØYDB 884	PY3BXW 808	N2AC 630
I8KDB 1188	WB4SIJ 964	K2POA 883	W4IC 800	CR7IK 613
IØZV 1181	WA2EAH 950	ZL3NS 874	YU1AG 785	
N4MM 1149	WB2NYM ...941	W3YHR 868	G3DO 765	
I8YRK 1108	WA6TAX 925	DJ7CX 852	WA5LOB 747	
I4ZSQ 1102	CT1PK 923	N2SS 850	W6YMV 720	
W9DWQ 1089	IT9JT 916	W4CRW 840	WB6DXU 708	

C.W.

W8KPL 1301	YU1BCD ...1086	WA2HZR ...895	WA2EAH 800	K2ZRO 649
W8LY 1300	W4CRW ...1041	WA6JVD 895	VO1KE 787	YU1ODS 639
K6JG 1191	DJ7CX 988	WA5VDH 882	I6SF 771	K1LWI 629
DL1QT 1156	W2AIW 972	N2AC 876	W4BYU 768	KH6HC 620
ON4QX 1133	G2GM 959	YU1AG 870	W4IC 754	OK2QX 600
W2HO 1126	VO1AW 932	IT9AGA 825	SM5BNX 706	VE4OX 600
WB2FMK ...1120	W3ARK 910	W6ISQ 824	OK2BLG 698	
K6XP 1095	N4MM 905	K7ABV 812	OK2DB 693	
W9FD 1091	K6ZDL 899	VK3AHQ 809	WB4KZG 680	

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more countries for the mode indicated. The top SSTV DXers are also listed. The ARRL DXCC Country List, LESS DELETED COUNTRIES, is used as the country standard. Total number of current countries on the DXCC list as of this listing is 319. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be submitted anytime.

CW

W6PT 319	W4YWX 308	W4IC 301	K6JG 297	W6NJU 284
K6EC 316	W2GT 307	W6ISQ 301	N6FX 297	WA6EPQ 282
ON4QX 314	W8LY 305	K6LFB 298	W4BQY 296	K9MM 279
W6ID 314	W9DWQ 304	WØAUB 298	VKAHQ 292	DJ7CX 276
W8KPL 309	N6AV 302	DL3RK 297	WA8DXA 287	

2XSSB

W2TP 318	F9RM 311	W4IC 305	F9MS 297	DK2BI 287
DL9OH 316	I8AA 311	K6WR 304	G3DO 296	W6FET 287
IØAMU 316	IØZV 310	K6YRA 303	G3TJW 296	G3RWQ 286
K2FL 316	IT9JT 310	VE2WY 303	HP1JC 296	K1KNQ 286
WA2RAU 316	K4RTA 310	VE3GMT 303	N6AV 296	W6HUR 286
TI2HP 315	W3DJZ 310	WA3IKK 303	OZ3SK 296	DJ7CX 285
W4EEE 315	W6KTE 310	K4MQG 302	WØSFU 296	OE3WWB ...285
G3FKM 314	K6JG 309	ZL1AGO 302	W2CNQ 295	G3KYF 284
W3CWG 314	K8DYZ 309	K9LKA 301	N4MM 294	N6FX 284
W3NKM 314	SM6CKS 309	OE2EGL 301	DJ9ZB 293	N6AW 282
W6RKP 314	SM6CWK ...309	W6NJU 301	VE7WJ 293	WB2RLK 282
W9DWQ 314	WA2EOQ 309	XE1KS 301	K6AQV 292	YV1LA 282
XE1AE 314	F2MO 308	ZS6LW 301	K8PYD 292	WA4WTG 281
VE3MJ 313	K6EC 308	K6XP 300	WA2HSX 292	WAØKDI 281
VE3MR 313	W4DPS 308	VE3GCO 300	VE7CE 291	XE2YP 281
W3AZD 313	W6YMV 308	W3GG 300	WØYDB 291	N2SS 280
W6EL 313	WA6AHF 308	I5WT 299	W9YRA 290	W9QQ 280
W9ILW 313	I8YRK 307	W6KZS 299	DL6KG 289	DL1MD 279
W9JT 313	K9WEH 307	W9OHH 299	G3WW 289	K4SB 279
I8KDB 312	ZL3NS 307	WB6DXU 299	OE1FF 289	OK1MP 279
W2QK 312	I6FLD 306	YV1KZ 299	W6FW 289	WB4SIJ 279
W4SSU 312	SM5SB 306	EA4LH 298	K4HJE 288	W7OM 278
W4UG 312	W9KRU 306	W9QLD 298	SP5BSV 288	VE7HP 277
W6EUF 312	I4ZSQ 305	WØSD 298	YS1O 288	K8LJQ 275
W6REH 312	KH6BB 305			

SSTV

W8YEK 108

The DXer who is no stranger to a mike is Juan Chen, HP1JC. The mike here is used to address close to 200 Panamanian amateurs and CBers at Seminario Nacional de Radiooficionado, sponsored by the Minister of Government and Justice in an effort to unite all the radio amateurs of Panama. The meeting drew the largest amateur crowd ever. Juan's mike ability is attested by his 320 countries.

One Busy QSL Manager's Lament

Recently I received a welcome QSL card from one of the prominent QSL managers. That seems normal; yet, in return for my brief note making a plea for the rare card, was a long letter which included some insight into QSL managing. It covered the chore of being the QSL manager for one of the most active, rare stations. I'd like to share some of his comments in hopes of improving our QSL habits. Hope you don't recognize yourself.

DE K2BT: BT The following list of QSL manager complaints may not apply universally. For instance, to the manager of a non-rare semi-active station, the QSL card with the call sign on one side and the QSO data on the other may not even be noticed.

Regarding date and time problems:
1. Wrong date or time given (sometimes as much as 10% of the cards).
2. Local time given (think of it, there are 24 different possible hours and a possible day's difference).
3. Date given is ambiguous. e.g. 1/4/77. Is it 1 April or 4 January? (ed—It is supposed to be 1 April 1977).
4. No date and/or time given.

About those handling problems:
1. Airmail envelopes are provided with surface postage. U.S. Post Offices do not appreciate that combination. Some managers mail them without a return address and hope.
2. QSL arrives as a postcard and then the QSLer follows up with another postcard wondering why he didn't receive the QSL via return mail.
3. Self-addressed envelope flap won't seal.
4. Self-addressed envelope flap arrives sealed.
5. Multiple QSO's spaced out over several months with one SASE.
6. No SAE but IRC's provided. What happened to the SAE?
7. QSL call sign on one side with QSO information on the other side. After doing a 100 cards at a single sitting, I either have forgotten the call I was looking up or I've written the wrong call on the outgoing QSL. This happens often when the log had the prefix entered incorrectly. e.g. WB instead of WA.
8. Attached note to a bonafide QSO made in November: "PSE QSL also my QSO last June." No QSO data and the June log had over 3,000 QSO's.
9. QSL manager invisibility. The QSL card has a nice note to the QSO operator but nothing to the manager.

Some of these may provide you with a smile and some may make you wonder why *that* could be a problem. For instance, multiple QSO's, one SASE: Actually that isn't a problem to me per se. It becomes one only when the guy writes again or gets hold of me on the air with "I sent you a card on so-and-so and I haven't gotten anything back." It happens that with my system of filing, this guy's request falls into, say January, as his first QSO. When I get that QSO on the card it goes into the file for his next QSO, which may be July. (The July logs may not be in yet.) In other words, when he sent me one SASE, he locked himself into my filing system. I have found that the fastest way to do a lot of cards is to do them for a sequential period of time, say a certain month. This way I don't have to get out all the logs. As before, this may only be a problem to the QSL manager dealing with a station running up several hundred QSO's (sometimes thousands in a single contest) per month.

One thing should be said about all this. After each session of filling out cards, no matter how frustrating, the Japanese amateurs always make me think again before tossing the whole kit and kaboodle into the trash can. These

Dick Moen, W7VRO, in the dark of night chasing another country for a multiplier. Dick is also one of the more active QSL managers. He has handled ZS1XR duties with dispatch for over ten years. Part of the W7VRO signal success is in the 5 elements on 20 and 2 elements on 40 at 110 feet. (Photo W7EKM)

Al Nielson, G4CVZ, at the controls of the station heard on all bands. Al chases U.S. counties between new countries. Not shown in the photo is RTTY and SSTV capabilities. Collecting QSL cards for awards is Al's reason for 100% QSLing; but he admits only a 40% return.

fellows invariably are polite, they provide more than enough postage, and they recognize who it is they are asking for a QSL. Often they toss in a photo of themselves or their shack for me, or mint stamps for the XYL. BT

Thanks Forrest Gehrke, K2BT, for sharing your comments on QSLing via the QSL manager. On behalf of the thousands who have received cards for QSO's with VR3AH and WB4SKE/KW6—THANKS!

Forrest also passed along: Doug, VR3AH, is now KX6LA. VR3AH QSL cards via the bureau to K2BT will NOT be answered by K2BT (SASE or SAE + IRC's only). There are several gaps in the VR3AH log data, so be patient.

DX Extras

DE OX5AP: Harry Leggans, K6EL, is back at Thule, Greenland as OX5AP. Harry got his old call back as he held it from 1966 until 1971. There are currently three OX5's: AC, AD, and AP. XP1AA is no longer in business. Harry will be active on 160 through 10. He is to be there for at least two years as a

A big signal that will be missed from Guatemala City but not for long. J. Robert St-Germain, VE2AQS/TG9, closed down after over 24,000 QSO's for a move to Lima, Peru. By now he should be active on six bands and Oscar. VE2AQS/OA4 will soon fill those 5BDXCC voids as he is very active in most DX contests.

digital technician on the Ballistic Missile Early Warning System. When not working twelve hours a day, he will schedule low bands via Box 1179, APO NY 09023.

The 80 Meter Sport

The fall season brings lower noise levels and hopes for those last few for 5BDXCC. It is also time for the U.S. amateurs to make another trip to the Caribbean for vacation and the low band DXpedition sport. Regardless of how many times the Caribbean islands are put on the air, they are still rare to many on 75 and 80.

It is truly amazing to hear a pileup on a KP4 considering the tremendous effort of KP4AST last year in the CQ WW CW contest and the many years before. So if you want to be chased and you're tired of chasing, take a DXpedition to a not so rare country and work the low bands. It pays extra dividends in rarity while providing escape from the winter chills.

This month's kudos for helping his fellow DXers goes to Bob Tanner, ZL2BT, of Longburn, New Zealand. Bob is the 75 meter beacon from the south Pacific. If Bob is not around 3800, the band is not open. The assistance given to the Tokelaus DXpedition of ZM7AT and ZM7MM by Bob got many through who would not otherwise have made it. This is the role Bob likes—helping others work a new one.

The Alligator Award of the Month (mostly mouth and tiny ears) goes to the stations who insisted on ignoring the Kingman Reef, KP6BD, operation, moved onto the frequency and executed a long-winded QSO. Too bad they can't listen first. It is impossible to believe they couldn't hear that pileup.

DX Operation—List Style

Working DX from a list isn't everyone's cup of tea. Yet, there is a time and a place for the list system. Listening to the operation from Chad, TT8-SM, brings a situation to note. The operator at TT8SM prefers to operate from a list generated at the other end. When it came to the free-for-all style of the DX pileup, he just pulled the big switch. This is definitely an either his way situation or not at all. It is his ball game and he makes the rules. This may often be the case when a DX station has limited experience and/or a language barrier. The point is, there sometimes is no choice. Yet, the dissenters of the TT8SM operation chose to ignore the repeated warnings of both TT8SM and the mcees. Jamming and heckling were often the outlets for the dissenters, thus denying to many others one of Africa's rarest countries. It is indeed unfortunate that a few penalized so many others. So, bear with the list system as it often is the only means of working some countries.

A note to the list mcees: keep in mind that the DX station needs the most help working those hardest for him to sort out of the pileups, i.e. a 3D2 needs the mcee's help to work the W1's, not the W6's. Being a list mcee is not an easy job, often with more problems than rewards. It is definitely a task requiring firm control and strict consistency. Most applaud the hard nosed mcee with "only those who need him for a new one call." Remember the mcee is doing us a favor! Don't make his job any harder than it already is.

The WAZ Program

Single Band WAZ

20 Meter Phone

54...W9RXC

20 Meter C.W.

23...K6VY
24...K4LRO

S.S.B. WAZ

1387...WA2EJS
1388...JA7PL

C.W.—Phone WAZ

4121...YU2ACD
4122...KØCMF
4123...JA1CKE
4124...JA1JQY
4125...JA8FBH
4126...JA7JWF
4127...K7RSC
4128...K4HLJ
4129...VU2ABC

Phone WAZ

531...WA7GVM

The complete rules for all WAZ awards are found in the May, 1976 issue of *CQ*. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to the DX Editor, P.O. Box 205, Winter Haven, FL 33880.

The CQ WPX Program

Mixed

588...OE1KJW
589...OK3KFF
590...W4QCU
591...W1GD
592...N4OT

SSB

986...I2OMF
987...WA4QMQ
988...W9NO
989...DA2KD
990...DL7AA
991...YB2SV
992...F9LM

CW

1611...OE1KJW
1612...OK2KHD
1613...CX2AQ
1614...DL7AA
1615...DM2DCN
1616...HA2RM

Endorsements

Mixed: 1065 DL7AA, 748 OK3KFF, 517 W4QCU, 429 N4OT, 401 W1GD, 400 OE1KJW.
SSB: 803 DL7AA, 550 VK3SM, 350 WA4QMQ, 302 F9LM, 301 I8KCI, 300 I2OMF, W9NO.
CW: 1200 DL1QT, 1057 G2GM, 1000 W3ARK, 922 DL7AA, 951 N6JV, 854 W3TVB, 850 YU1SF, 649 KH6HC, 503 WB4SIJ, DJ2IW, 400 F5DE, 366 OK2-KHD, 354 CX2AQ, 322 DM2DCN, 308 HA2RM, 304 DM2ABL, 300 OK1KJW.
10 Mtrs: DL7AA
15 Mtrs: W4QCU, DL7AA.
20 Mtrs: DL7AA.
40 Mtrs: DL7AA.
80 Mtrs: OK2KHD, WB4SIJ, DL7AA.
160 Mtrs: OK2KHD, DL7AA.
Europe: OK2KHD, W4QCU, W1GD.
No. America: WA4QMQ, W4QCU.
Oceania: N4MM.

Complete rules for WPX can be found in the May, 1976 issue of *CQ* Magazine. Application forms may be obtained by sending a business size, self-addressed envelope to "CQ WPX AWARDS" 5014 Mindora Dr., Torrance, CA 90505, U.S.A.

At the time of this writing, 9U5CA in Burundi has permanently closed down operation over this single point. It is reported that Terry repeatedly asked to operate from a list and the minority would not comply. So he shut down for good with a year or more to be in Burundi. Let us hope that he will return to a more receptive climate soon.

Tricks of the DX Trade

The hints and rules of the DX trade are growing thanks to your inputs. With some exceptions, bad DXing is the result of lack of knowledge. These tricks are given in the hope of improving DX for us all. Those who submit hints and rules that are used will receive a copy of all the past tricks of the DX trade.

Rule 22. Use the International phonetic alphabet on your call for the initial contact. Although your home spun phonetics make sense and work well when signals are S9 and there is no QRM, they cause confusion when the pileup is rough going. Those cute phonetics are great until you try to explain "blueberries are red when they're green" to someone who speaks limited English.

Hint 22.1 Use consistent phonetics. Do not change the phonetics midway. Just when you get two out of three letters of your call through, switching to a new phonetic tends to confuse the other station into thinking there may be more than one station on the other end or he got one or more letters in your call wrong.

Rule 31.5. Operate at your own speed in the face of the high speed c.w. operator. Speeding up to match his mastery only slows the exchanges down. The rule of c.w. road is "operate at the speed of the slowest operator." The higher speed operator thinks your increase in speed to match his is an indication of your copying ability. Maintain your speed. He will be thankful for less repeats. Remember, a message sent once at 13 wpm takes less time than twice at 30 wpm with a request for repeat. (Thanks WA7JCB)

Rule 31.6. Do not be scared of speed. Spend some time listening to either the high speed DX station or the lower speed callers until you are sure of the DX station's call. Then using *your* speed, call him. After making the contact, maintain *your* speed. (See Rule 31.5.) If he asks a question and you miss part of the question repeat your complete exchange in an abbreviated form. Don't forget QRS means send slower. (Thanks WA7JCB)

Rule 101. A requirement of effective c.w. operating is selectivity, preferably controllable in increments. Hearing the station, especially in pileups, is a key to success. Primarily this means an I.F. Q-multiplier and an outboard audio filter. There a number of good (inexpensive) solid-state audio filters. They give flexibility in the use of just as much selectivity as needed to read the station without interference from strong stations. You can crank in the amount of selectivity needed slowly; this is especially important with weak and/or drifting signals so you won't lose them in the QRM. (Thanks W4WHK)

Hint 120.7 Keep track of that rare DX QSL card outstanding. Knowing what countries you have worked and you are awaiting cards from is easy using paper clips. Use a paper clip on the log page opposite the log entry of the station worked. When the QSL card comes in. remove the paper clip.

Clarence Green, WB5LBJ/DU6, relaxes between contacts at his Iloilo, Phillipines QTH. The station sports both a Swan and Yaseu line-up on the five low bands. The antenna system includes a tribander at 60 feet and yagis for six and two. (Photo W7PHO)

At a glance you can tell how many are out and where the QSO data is if you want to send another card.

Rule 127. Keep envelopes at the incoming QSL bureau. The rare QSL card coming to you has an impossible route if it arrives at your bureau when you're out of envelopes.

Hint 127.1. Keep track of how many envelopes you have at the QSL bureau. One easy method is to number the envelopes when you send the next SASE's to the bureau. Keep a record of the envelope numbers versus the date sent in and returned. This technique will allow you to know when you are about out and the consumption rate. Also it gives you the necessary information to include in an inquiry to the bureau.

If you want a challenge, try to keep up with Ron Moorefield, W8ILC. Running a calibrated 1.0 watt maximum, he has worked 139 countries. Ron has both CQ DX awards. Here he proudly displays his accomplishments along with the Argonaut 509. I heard him in the pileup for Kingman Reef, KP6BD, and he made it! The photo shows Ron straining for TU2EF. (Photo by W8IMZ)

Hint 128. Envelope pilferage is a severe problem in some countries. It is a good practice when addressing the envelope to a foreign DXer to *not* include his call in the address on the envelope. Also, do not include your call in the return address. These are red flags for the IRC and green stamp thief.

DX Club—1977 Style

How many times in the last few years have you read about "Man Electrocuted"? Then you read on to find out it was about an amateur or CBer who accidently came in contact with the power line while raising an antenna. Sound familiar?

One DX club has done something about this in two areas: 1) a periodical program of cardio-pulmonary resuscitation (CPR), and 2) antenna construction safety. These are two great activities worthy of implementation by *all* amateur clubs.

The CPR training is an easy program well within every amateur club's

(Continued on page 84)

Nagashima "Nag" Takayoshi, JA7GAX, is active from his Miyagi shack on CW and SSB. He is an avid DX contester and outstanding/high speed QSLer.

a monthly feature by

A. EDWARD HOPPER, W2GT

Awards

News of certificate and award collecting

Here is the November "Story of The Month", as related by Pauline:

Pauline F. Course, WA9CNV
All Counties #161 12-4-76

"My interest in amateur radio was born when I worked for Allied Radio in Chicago. My job was showing people how to build Knight Kits. The ham shack was directly across the hall from where I worked. I did know that Allied had Novice classes, but I really did not know what a ham was. The fellows in the ham shack thought I would make a good ham because I like people and get along very well with them. I joined the Novice class and got my ticket in 1960.

"My husband is not a ham but he has been very generous with me as I have gone in and out of many hobbies, and they all cost money!

"I was into photography, picture tiling, collecting books, lapidary, music and many others. He bought me a piano, organ, 4 guitars, and a set of drums. When I was in lapidary, I had more rocks than the Rocky Mountains. I tiled everything from floors to pictures and furniture. When I was in photography, you were not safe *anywhere* in the house.

"When I asked him if I could become a ham, he wanted to know how much it would cost him, I told him I could be a ham for $150.00. I did, I built a Knight Kit R55 receiver and my first transmitter was a T60. But since then, he bought me seven different receivers and four different transmitters, and a teletype station.

"There was a time when I had six antennas on my roof and on the garage, and I had wall to wall gear. Since then I have settled down to a Drake R4 and a T4K. You know how it is when you first get into amateur radio you have to have one of everything.

"We have 3 grown children, two girls and a boy, and we are Grandparents twice.

"When I am on the air I am working, I am a quilter and in one year have turned out 14 quilts. My older daughter owns a drapery shop in Ohio and my quilts are in great demand.

"My husband is retired, his health is not as good as we would like, but we cannot do anything about it, but we do have a lot of fun together.

"He never had any interest in getting a ham ticket but he knows what it is all about. His office was only ten minutes from home, but he used to get tickets for speeding and he claimed he was hurrying home to see what I had worked.

"I did my share of traffic handling and got my BPL bracelet, and at one time I was active in Navy Mars. Hunting for the Counties was the most fun, I used to stay up all night on 75, make a pot of coffee and be on 20 all day. It took me 15 years to make ALL COUNTIES.

"I am a member, #6402, of the YL system. I still check into the mobile net as I need about 130 Counties mobile, so you will hear me trying to get those needed mobiles.

"George, K9CSL got me my last Counties in Tennessee. He was not going that way but was kind enough to do this to help me finish, that was wonderful of George and his wife!

"Some day I hope to go mobile and help others like I was helped, and thus start some new and exciting adventure."

*P.O. Box 73, Rochell Park, NJ 07662

Pauline, WA9CNV really at work.

Special Honor Roll
All Counties
#170 Lyle Taylor,
WB7QXV/Ø 7-21-77
#171 Charles M Miller,
W2QKJ 7-26-77

Awards Issued

Lyle Taylor, WB7QXV/0 waited until he had them All and thus received USA-CA-500 through All Counties endorsed All SSB. His new QTH is Rt. 1, Cabool, Mo. 65689 and by the time you read this his new call will be WDØEHB.

Chas Miller, W2QKJ also waited until he had them All before sending for USA-CA-500 through USA-CA-2500 endorsed All SSB, All Mobiles, All 14. USA-CA-3000 endorsed All SSB, All Mobiles. All Counties endorsed All SSB.

Paul Valentino, K4FPF acquired USA-CA-2500 and raised his endorsements of 500 through 1500 to All SSB, All 14; and USA-CA-2000 to All SSB. Paul is now back at 7912 Pinelake Road, Columbia, S.C. 29204.

Larry Sitton, WB7AYN added USA-CA-2000 to his collection.

Ray Teeter, N2RT (ex W2NCI) got his new call (congrats) and USA-CA-2000 endorsed All A-1.

Howard Gifford, WA2WCW was sent USA-CA-1000 endorsed All SSB, All Mobiles, All 14. USA-CA-1500 endorsed All SSB, All Mobiles. USA-CA-2000 endorsed All SSB.

Chuck Henry, W9LMT obtained USA-CA-500 through USA-CA-2000 endorsed All 2×SSB.

Mike Gilmore, K7CLO did a lot of checking and re-checking and came up with USA-CA-2000.

USA-CA Honor Roll

3000
WB7QXV/0 189
W2QKJ ..190
2500
WB7QXV/0 238
K4FPF ..239
W2QKJ ..240
2000
WB7AYN 275
N2RT ...276
WA2WCW 277
W9LMT ..278
WB7QXV/0 279
W2QKJ ..280
K7CLO ..281
1500
WA2WCW 326
WØLRH ..327
W9LMT ..328
WB7QXV/Ø 329
W2QKJ ..330
1000
WA2WCW 441
WØLRH ..442
W9LMT ..443
WB7QXV/Ø 444
W2QKJ ..445
500
CT1QZ .1182
W9LMT .1183
WB7QXV/Ø 1184
W2QKJ .1185
K9BQL .1186
WB9NUL 1187
WB4AIL 1188

Tom Duderstadt, WØLRH stayed out of his car long enough to get USA-CA-1000 endorsed All SSB, All 14, All Mobiles and USA-CA-1500 endorsed All SSB, All 14.

Alberto Louzada Borges Pinto (better known as Bert), CT1QZ obtained USA-CA-500 endorsed All SSB, this is #8 Award to Portugal.

Jack Ekstrom, K9BQL made USA-CA-500.

Joyce Lauterback, WB9NUL won USA-CA-500 endorsed All 2×SSB, All 14. Her husband, Jim, WA9BHH has USA-CA-500 #1021.

Leo McGranaghan, WB4AIL gained USA-CA-500 endorsed All A-1, All 21, All Fixed Stations, All 50 States.

Awards

Diploma Guglielmo Marconi: The A.R.I. (Associazione Radiotecnica Italiana) institutes this Award to commemorate the work of the great scientist. This Diploma is to celebrate the experiments carried out by Marconi in various parts of the world and bring them once again to the attention of radio amateurs. The Award will be issued to those who have made contact with (or listened to) the locations in which Marconi conducted his experiments. It is issued by the A.R.I. and is free. To obtain the Diploma it is necessary to send to the A.R.I. a log containing all the details of contacts or listenings made, and:

a. 40 QSLs from the localities listed later or:
b. 35 QSLs from the chosen localities listed later, plus the QSL from the official commemorative station II4-FGM and one from any other Guglielmo Marconi Memorial station (a total of 37 QSLs).

When required (to explain/example: G = London, 14 = Bologna, EA7 = Cadice, etc.), the QSLs must indicate the city, or region or the locality well specified. Be sure to enclose IRCs or necessary postage to cover cost of returning the QSLs.

The Award can be obtained in AM, SSB, CW, RTTY, SSTV and Mixed.

There is no limitation to the band (with respect, obviously, to normal regulations).

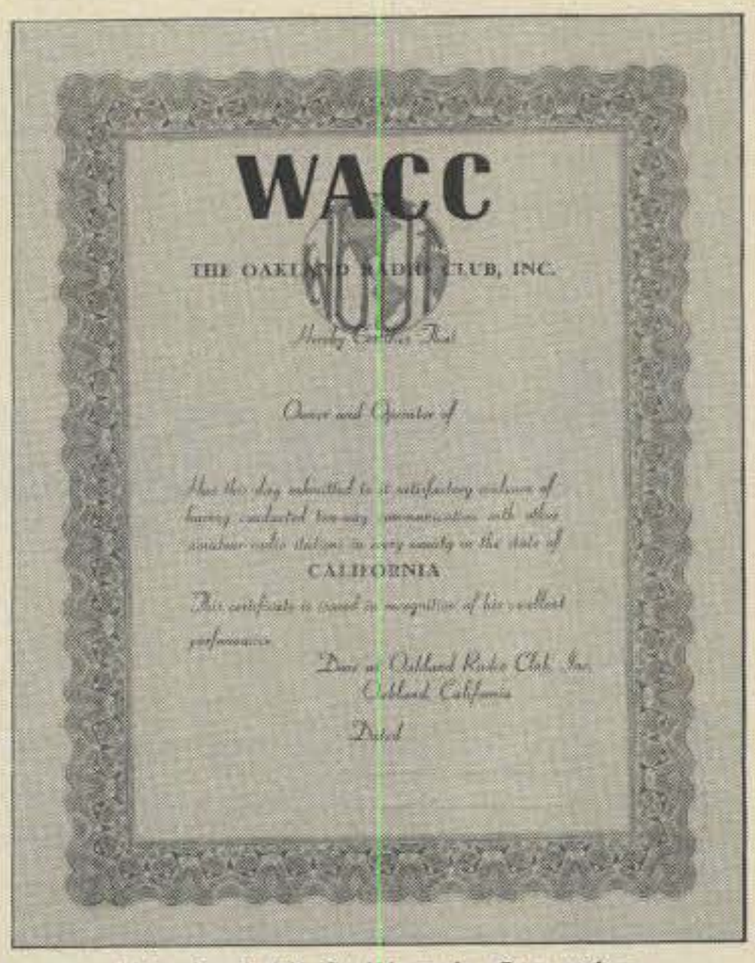
Starting date for the Diploma is January 1st, 1973, a list of those issued will be published in the official journal of the A.R.I.

The application/QSLs must be sent to: A.R.I.—V. Scarlatti 31, Milano, Italy. The locations to be contacted or listened to are:

Country	Region or City	Prefix
Cape Verde Is.		CR4
Portugal	Lisbon	CT1
Madeira Is.		CT3
Morocco		CN8
Rep. of Ireland		EI
France		F
England	London	G
England	Flatholm Is.	GB.
England	Wight Is.	G
Northern Island		GI
Scotland		GM
Switzerland		HB
Vatican		HV
Italy	Bologna	I4
Italy		I5
Italy	Rome	IØ
Italy	Fondaz. G. Marconi Villa Grifone	II4FGM
Italy	Torre Tiguillo Marconi (GE)	IP1TTM
Italy	Sicily	IT9
Italy	Sardenia	ISØ
Japan		JA
Argentina	Buenos Aires	LU-A-D
Belgium		ON
Brazil	Rio de Janeiro	PY
Sweden	Stockholm	SM
Sweden	Gotland Is.	SM1
U.S.S.R.	Leningrad	UA1
Canada		VE1
Newfoundland		VO1
Labrador		VO2
Australia	Sydney	VK2
Bermuda		VP9
U.S.A.	Mass.	W1
U.S.A.	N.Y. & N.J.	W2
U.S.A.	Missouri	WØ
U.S.A.	Illinois	W9
India		VU
Gibraltar		ZB2
Yugoslavia		YU2
Libya	Tripoli	5A
———	Memorial Stations	———

Worked All California Counties Certificate: Sponsored by the Oakland Radio Club, Inc., W6OT. The rules are:

1. Contacts may be made on any amateur radio band.
2. There is no time limit (Look through your old cards)
3. A QSL card must be presented for each of the 58 Counties. Any mode of operation.
4. All your contacts must be made *from* the same county.
5. Portable and Mobile units may be worked.
6. Mobile units will not receive a certificate.
7. You do not have to be a member of the Oakland Radio Club.
8. Each QSL card must have the claimed county, printed or written, on the card, by the person issuing the card.
9. No more than two counties may be claimed with a single card.
10. For any further information contact Charles W. Dumm, K6OXK, 6102 Hillmont Drive, Oakland, California 94605. Mail QSLs to K6OXK, with list, with return registered postage enclosed.



Worked All California Counties

Worked Kansas Awards: Five different diplomas are offered. No beginning dates for QSOs, QSL cards not required. Have your log data checked and QSO information certified by two amateurs or one radio club officer. Diplomas endorsed for band or mode at no extra charge. Offered to SWLs also. Fee: 50 cents U.S. or 4 IRCs. Apply to: Kansas Radio Club, 1629 Pleasantview, Wichita, Kansas 67203, U.S.A. The following Awards are offered:

Worked Kansas—General Diploma
—U.S. work 30, DX work 10
Worked Kansas YL—U.S work 6, DX work 2
Worked Kansas Novice (WN0)—U.S. work 7, DX work 2
Worked Kansas Mobile—U.S. work 7, DX work 2
Worked Kansas VHF (30 MHz up)—U.S. work 7, DX work 2

Notes

From *All* reports, the 1977 County Hunters Convention was a *Great* success. The three big prizes were won by: Moby Dick, K8ODY, (Pre-Registration) a Kenwood TS-520. Jim,

(Continued on page 84)

Worked All Kansas

a monthly feature by

GEORGE JACOBS, W3ASK

Propagation

The science of predicting radio conditions

The CW section of the 1977 *CQ* World Wide DX Contest will take place on the weekend of November 26-27. Check the "Last Minute Forecast" of this column for an up-to-date forecast for this Contest weekend.

Special DX Propagation Charts for use during the contest period appeared in last month's column. Be sure to check these Charts for band openings forecast for the CW section.

Contest Tips

Here are some tips that could be helpful in working DX during November, particularly during the CW section of the Contest, as long as conditions are at least Low Normal:

Midnight to Sunrise: — Best band should be *40* meters. Look for openings towards Europe, the Middle East and parts of Africa until 3 a.m. in EST and 2 a.m. in CST zones. Check for long-path openings in PST zone between 6 and 8 a.m. Good openings from all time zones towards South America should be possible, with signals strongest to Caribbean, Central America and northern countries of South America between Midnight and 5 a.m. in EST and CST zones, and 4 a.m. in MST and PST zones. Openings towards the South Pacific look good from the PST and MST zones between Midnight and sunrise, with openings possible from CST and EST zones between 2 a.m. and sunrise. Weakish openings to the Far East and Asia should be possible from the PST zone between Midnight and sunrise. There's also a possibility for a *40* meter opening to Antarctica from the PST and MST zones between Midnight and 5 a.m. Look for *80* meter openings from EST and CST zones to Europe, parts of Africa and the Middle East until 2 a.m., possibly an hour or so longer in EST zone. Band looks good from PST and MST zones to the South Pacific from Midnight to just before sunrise, and from the CST and EST zones from 3 a.m. to about sunrise. Check for good *80* meter openings to the Caribbean, Central America and the northern tier countries of South America between Midnight and 5 a.m., and until 3 a.m. for deeper openings into South America. The band could also open to the Far East and Asia from the PST zone between 1 and 3 a.m. Openings on *160* meters should be possible to Europe between Midnight and 2 a.m. from the EST and CST zones. In PST zone check band for openings towards the South Pacific between 2 a.m. and sunrise. Openings towards the Caribbean, Central America and northern countries of South America should be possible from all time zones from about 2 to 4 a.m. Not much DX expected on other bands during this time period, but check *20* meters for occasional openings towards South Pacific, deep South America and Antarctica.

Sunrise to Sunset:—Check for *10* meter openings to Europe between 9 and 11 a.m. in EST and CST zones. Openings to Africa look possible between 10 a.m. and Noon from all zones, and may extend for an hour or two longer in EST and CST zones. Good *10* meter openings into South America should be possible between 9 a.m. and 4 p.m., with a peak between 10 a.m. and 2 p.m. Check for openings towards the South Pacific between 10 a.m. and 5 p.m., with a signal peak expected between 1 and 4 p.m. Look for openings to the Far East and Asia from PST zone between 2 and 4 p.m., and to Antartica between 1 and 3 p.m. DX conditions on *15* meters should hold up well during the entire daylight period. Check for openings towards South America as early as 8 a.m., with the band peaking in this direction between Noon and 4 p.m. Openings to Africa should be best from the EST and CST zones between 10 a.m. and 2 p.m., and until Noon in MST and PST zones. *Fifteen* meters should open to Europe between 8 a.m. and Noon from EST and CST zones, and until 10 a.m. in MST and PST zones. Check for openings towards South Pacific between 2 and 6 p.m., with the band open an hour or so longer in PST zone. Band may also open towards the Far East and Asia between 4 p.m. and sunset. *Twenty* meters should open to just about all areas of the world just after sunrise, and remain open to about 10 a.m., with strong signals. From 10 a.m. through the early afternoon signals should weaken considerably, with the band remaining open to Europe, northern Africa, the Caribbean, Central America, and the northern countries of South America. Some openings may also be possible towards the South Pacific, particularly from the PST zone. Signals should begin to increase in strength

LAST MINUTE FORECAST

Day-to-Day Conditions Expected For Nov. 1977

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Day				
Above Normal: 9, 12	A	A	B	C
High Normal: 8, 10, 13, 17, 19	B	B	C	D
Low Normal: 4-5, 7, 11, 14, 18, 20, 24-26, 30	B	C	D	E
Below Normal: 1-3, 6, 15-16, 21, 23, 27, 29	C	D	E	E
Disturbed: 22, 28	D-E	E	E	E

Where *expected signal quality is:*

A—Excellent opening, exceptionally strong, steady signals greater than S9+30 dB.

B—Good opening, moderately strong signals varying between S9 and S9+30 dB, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of (3) will be poor (D) Nov. 1-3, fair (C) Nov. 4-5, poor (D) again on Nov. 6th. For the CQ WW DX Contest low normal conditions are expected on Nov. 26th. Below normal on the 27th.

For updated information dial Area Code 516-883-6223 for DIAL-A-PROP, subscribe to bi-weekly MAIL-A-PROP, 11307 Clara St., Silver Spring, MD 20902.

*11307 Clara St., Silver Spring, MD 20902.

again after 2 p.m., remaining strong towards Europe, Africa, and the Middle East to about 3 p.m. in the PST and MST time zones and as late as 5 p.m. in the EST and CST zones. Check for long-path openings to Australasia between 3 and 5 p.m. in EST and CST zones, and short-path openings from the PST zone between 4 p.m. and sunset. Look for strong signals to all areas of South America from about 4 p.m. onwards from all time zones. *Forty* meters should begin to open towards Europe and the Caribbean, Central America and the northern tier countries of South America about an hour or so before sunset.

Sunset to Midnight:—*Twenty* meters could remain open to southern Europe and parts of Africa for an hour or so after sunset in the EST and CST time zones. Check for long-path openings to Europe and Africa from PST zone beginning about 10 p.m. Band should remain open to most of South America to about 7 p.m., with some openings deep into South America and to Antarctica right up to Midnight. Twenty should remain open to South Pacific to Midnight and to the Fast East and Asia until 10 p.m., perhaps an hour or so later in MST and PST zones. Check *40* meters throughout the entire time period for openings to Europe and parts of Africa, and to most of South America. In PST zone check for openings towards the South Pacific beginning about 10 p.m. *Eighty* should open towards Europe, Africa, the Caribbean, Central America and the northern countries of South America during most of this time period from all time zones. Check for *160* meter openings towards the Caribbean, Central America and into the northern tier countries of South America between 10 p.m. and Midnight, and to Europe from the EST and CST zones after 10 p.m.

Remember, The Contest Period Starts At 7 P.M. EST, Friday Night, November 25, So Be Sure To Use The Sunset To Midnight Forecast To Get Started.

Short-Skip Charts

This month's column contains Short-Skip propagation data for use between distances of approximately 50 and 2300 miles, and between the states of Alaska and Hawaii and the Continental area of the USA. Instructions for using this information is given elsewhere in this column.

Sunspot Cycle

The Swiss Federal Observatory at Zurich reports a monthly mean sunspot number of 21.2 for July, 1977. This results in a smoothed sunspot number of 16.6, centered on January, 1977, as the new cycle continues to increase, but slowly. A smoothed sunspot number of approximately 30 is forecast for this November.

V.h.f. Ionospheric Openings

Two short, but significant meteor showers are expected during November, which should make possible some meteor-scatter type openings on the v.h.f. bands. The *Taurids* shower, lasting for a day or two, should peak on November 4 with an expected count of about 15 meteors an hour. A second shower of about the same duration and intensity, called the *Leonids*, should peak at about 11 p.m. EST on November 16.

Good luck in the c.w. section of the *CQ* World Wide DX Contest, and please let me know how the special Contest propagation forecasts work out.

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular Meter band (10 through 160 Meters), as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (15 through 80 Meters) for a particular geographical region of the continental USA, as shown in the left hand column of the Charts. A ** indicates the best time to listen for 10 meter openings; * best times for 160 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. 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. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) " " " between 14 and 22 days
(2) " " " between 7 and 13 days
(1) " " " on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. On the Short-Skip Chart appropriate *daylight* time is used at the *path midpoint*. For example, on a circuit between Maine and Florida, the time shown would be EDT; on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to daylight time in other USA time zones, *add* 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in CDT zone, and 6 hours in the EDT zone. *Add* 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA, *subtract* 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; The Alaska and Hawaii Charts are based upon a transmitter power of 250 watts cw or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level; for each 10db loss, it will lower by one level.

5. Propagation data contained in the Charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

CQ Short-Skip Propagation Chart
November & December, 1977
Local Standard Time At Path Mid-Point

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

ALASKA
November & December, 1977
Openings Given In GMT

	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	*Nil*	18-20 (1) 20-22 (2) 22-23 (1)	12-14 (1) 17-20 (1) 20-23 (2) 23-01 (1)	00-11 (1) 11-13 (2) 13-14 (1) 07-12 (1)*
Central USA	*Nil*	18-20 (1) 20-23 (2) 23-00 (1)	13-15 (1) 18-20 (1) 20-21 (2) 21-23 (3) 23-01 (2) 01-02 (1)	01-12 (1) 12-14 (2) 14-15 (1) 07-13 (1)*
Western USA	*Nil*	19-20 (1) 20-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	17-19 (1) 19-20 (2) 20-21 (3) 21-23 (4) 23-00 (3) 00-02 (2) 02-03 (1)	00-01 (1) 01-02 (2) 02-03 (3) 03-14 (2) 14-16 (3) 16-17 (1) 04-09 (1)* 09-12 (2)* 12-14 (1)*

HAWAII
November & December, 1977
Openings Given in Hawaiian Standard Time

	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	09-12 (1)	07-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	16-18 (1) 18-21 (2) 21-02 (3) 02-03 (2) 03-04 (1) 18-20 (1)* 20-02 (2)* 02-03 (1)*

(Continued on page 84)

a monthly feature by

FRANK ANZALONE, W1WY

Contest Calendar

News/views of on-the-air competition

A new Trophy in a new and exciting category has been added to our 1977 World Wide DX Contest. For the first time an award will be given for the highest combined phone and c.w. score by a Single Operator station in the world.

This is being donated by the Associazione Radiotecnica Italiana, Bologna Section, to commemorate the 50th anniversary of the A.R.I., and in memory of Guglielmo Marconi.

Unfortunately the final decision for this award was not given in time to make the rules announcement issue, but this information has been forwarded to all major bulletins and magazines and should be circulated in time for the c.w. section of the contest. So if you made a good score in the phone section you might consider giving c.w. an all out effort.

An added note: If you contact IY4-FGM you will have worked the special memorial station permanently located and operated in the same house where Marconi conducted his first wireless experiments.

At this writing, early August, several Contest Expeditions for our Fall Classic have been reported in the planning stages. Check your favorite DX Bulletin and Club News Sheets for more details. A good source of DX information is the *West Coast DX Bulletin*.

Rules modifications and all other information about our World Wide DX Contest have been thoroughly covered in the past two issues and therefore would serve no useful purpose to repeat them again.

Just a reminder to get your Phone log mailed by December 1st and your C.W. by January 15th.

See you in the pile-ups, 73 for now.

Frank, W1WY

Calendar of Events

*	Nov.	3-4	YLRL Anniv. Phone Party
	Nov.	4-7	CHC/FHC/HTH Party
*	Nov.	5-6	RSGB 7 MHz C.W. Contest
	Nov.	5-7	ARRL C.W. Sweepstakes
	Nov.	12-13	European RTTY Contest
	Nov.	12-13	Int. Police Assoc. Party
	Nov.	12-13	Delaware QSO Party
	Nov.	13	Czechoslovakian Contest
	Nov.	12-13	Missouri QSO Party
†	Nov.	19-20	Austrian 160 Contest
	Nov.	19-21	WWDXA C.W. Contest
	Nov.	19-21	ARRL Phone Sweepstakes
	Nov.	**26-27**	**CQ WW DX C.W. Contest**
	Dec.	2-4	ARRL 160 Contest
	Dec.	3-4	Spanish Phone Contest
	Dec.	10-11	Spanish C.W. Contest
	Dec.	10-11	ARRL 10 Meter Contest
	Dec.	10-11	Hungarian C.W. Contest
	Dec.	17-18	S.O.W.P. QSO Party
	Jan.	**27-29**	**CQ WW 160 C.W. Contest**

* Covered last month.
† Not official.

IARS/CHC/FHC/HTH QSO Party

Starts: 2300 GMT Fri., November 4
Ends: 0600 GMT Mon., November 7

A s.a.s.e. to K6BX will get you detailed information. Essentially rules are as follows:

Exchange: QSO no., RS(T), name, CHC/FHC no., state, county or similar division. Non-members send HTH instead of membership no.

Scoring: *For CHC*—1 point per QSO with other CHCers, 2 points if its a HTHer, 1 additional point if its a YL, B/P, FHC, Novice, CHC-200, Merit or Club station, or if its on vhf/uhf. Double above QSO points if QSO is out of own country.

For HTH—Contacts with other HTHers 1 point, with CHCers 3 points. Rest same as above. S.w.l. use same scoring as HTHers.

Multiplier: Each continent, country, ITU zone and each U.S. state. (Counted only once.)

Final Score: Total QSO points from all bands times the sum of the multiplier. Multi-operator stations divide score by number of operators. The same station may be worked on each band and mode for QSO points but not multiplier.

Frequencies: C.W.—3575, 3710, 7070, 7125, 14075, 21075, 21090, 21140, 28090, 28125. Phone— 3770, 3790, 3943, 3960, 7090, 7210, 7275, 14320, 14340, 21360, 21440, 28620, 28690. And 50.1—50.5,145—147. For U.S. and DX as allowed.

Awards: The Party supports hundreds of certificates and Trophies in all categories and divisions. A s.a.s.e. will get you a list, include extra postage for ITU, IARU, IARC, IARS country, prefix and zone lists.

Send all requests and your log to: International Amateur Radio Society, K6BX, P.O. Box 385, Bonita, Calif. 92002.

ARRL Sweepstakes

C.W.: Nov. 5-7 Phone: Nov. 19-21
Starts: 2100 GMT Saturday
Ends: 0300 GMT Monday

There is plenty of activity in this one, especially on the c.w. week-end, between stations in ARRL sections.

In order to minimize QRM to non-contestors it is recommended that operation be confined to certain portions of the bands. It is suggested that you check *QST* for this and other information.

Operating time is limited to 24 out of the 30 hour contest period. And cross-check sheets are required if you make 200 or more contacts. There are several more other operating regulations therefore it is recommended that you send for the "SS package" which includes log and summary sheets and Operating Aid No. 6. A large s.a.s.e. will get you enough forms for 300 contacts. (13¢ stamp, make it 24¢ if you expect to make more.)

Requests and logs go to: ARRL Communications Dept. 225 Main Street, Newington, CT 06111.

European RTTY Contest

Starts: 0000 GMT Sat. November 12
Ends: 2400 GMT Sun. November 13

Rules for the RTTY contest are the same as the DARC phone and c.w. contest held in August and September, and since they are quite lengthy they will not be repeated here. They were given in detail with a WAE country list in the July Calendar.

There is one exception. In the RTTY contest contacts are also permitted between all continents as well as one's own continent, and count 1 point per QSO. They have no multiplier value other than the countries as listed in the rules. (ARRL and DARC country lists.) QTC traffic exchange is also

*Sherwood Rd., Stamford, Conn. 06905

allowed between all stations, but not between stations in the same country. Everything else remains the same.

North American stations may get copies of the rules, log and summary sheets by sending a large s.a.s.e. with sufficient postage to: H. E. Weiss, WA3KWD, 323 North Street, Millersburg, PA 17061. They are also available from the WAEDC Committee.

Mailing deadline for your contest entry is December 1st and go to: WAEDC Committee, Postbox 262, D-895 Kaufbeuren, Germany.

Int. Police Assoc. Contest

Sat., Nov. 12 and Sun., Nov. 13
0800-1000 & 1400-1700 GMT each day

This contest has been organized by the International Police Assoc. Radio Club (German Sect.) to enable participants to get credits for the Sherlock Holmes Award. It's open to non-members as well as members, and to s.w.l.s too.

Exchange: RS(T) and QSO no. Members will identify by sending IPA before their report (IPA58(9)001).

Scoring: Contacts on 80 and 40 count 2 points, and 4 points on 20, 15 and 10. The number of DXCC countries worked on each band determine the multiplier. Final score, total QSO points from all bands times the sum of the country multiplier from each band. (The same station may be worked once on each band for QSO and multiplier credit.)

Frequencies: C.W.—3575, 7025, 14075, 21075, 28075. S.S.B.—3650, 7075, 14295, 21295, 28650.

Awards: Certificates to the top three scorers.

A large s.a.s.e. to WB4QJO, Vince Gambino, 7606 Kingsbury Road, Alexandria, VA 22310 will get you log forms and information about the Sherlock Holmes Award, application sheet, membership list and etc.

Logs however go to: DL3SZ, Adolf Vogel, Rittervon-Eyb-Strasse 2, D-8800 Ansbach, Germany.

Delaware QSO Party

(4 periods—GMT)
0001-0600 & 1600-2200 Sat. Nov. 12
0001-0600 & 1600-2200 Sun. Nov. 13

The Delaware A.R.C. is again sponsoring this year's party. Stations may be worked once per band, per mode for QSO points.

Exchange: QSO no., RS(T) and QTH. County for Delaware, ARRL section or country for others.

Scoring: Del. stations score 1 point for each QSO. Multiply total by number of ARRL sections and DX countries worked.

Others get 5 points for each Del. station worked. Multiply total by 1 if one Del. county is worked, by 3 if two counties, and 5 if all three counties are worked. (New Castle, Kent and Sussex.)

Frequencies: C.W.—3560, 7060, 14060, 21060, 28160. Phone—3975, 7275, 14325, 21425, 28650. Novice—3710, 7120, 21120, 28160.

Appropriate awards will be given to top scorers. In addition a certificate to all stations working all three Delaware counties.

Mailing deadline is December 31st to: John R. Low, K3YHR, 11 Scottfield Drive, Newark, Del. 19713. Include a large s.a.s.e. for copy of results or if you are applying for the W-DEL Certificate.

The G4DAA gang representing the Midlands group presented the 1975 W.W. G2LB Memorial C.W. Trophy to Mario, YU1PCF on his visit to England last summer. L. to R.—G4EHF Kevin, G4BUE Chris, G3XBN Frank, G3FXB Al. Mario with the Trophy, G3ZQW Brian and G4BVH/A4XVK Peter.

Missouri QSO Party

Starts: 1800 GMT Saturday, Nov. 12
Ends: 2300 GMT Sunday, Nov. 13

This is the 14th annual party sponsored by the St. Louis ARC. Activity will be between Missouri and out-of-state stations.

The same station may be worked *once only* in each different Missouri county regardless of band or mode. Missouri mobiles however may be worked and count separate from each county change.

Exchange: QSO no., RS(T) and QTH. County for Missouri; state, province or country for others. (Mo. mobiles will start with no. 1 from each new county.)

Scoring: One point per QSO. Missouri stations multiply total QSOs by sum of states, provinces and DX countries worked. Others will use Mo. counties for their multiplier (max. of 115). Missouri mobiles total separate score for each county activated.

Frequencies: 3540, 3910, 7040, 7240, 14040, 14270, 21110, 21360, 28110, 28600, 50-50.5

Awards: Certificates to top scorers in each state, province and DX country, the top ten Missouri entries, and the top 3 Mo. mobiles.

Mailing deadline is December 15th to: St. Louis A.R.C., KØLIR, 842 Tuxedo Blvd., Webster Grove, Missouri 63119. Include a large s.a.s.e. for copy of results.

1976 Czech. Contest Results

All Band		14 MHz	
K4PQL	9,624	WB2GFE	594
WA1STN	2,844	WB3AOP	372
AA2BZX	1,705	AC4WSF	100
AA2ZWH	810	VO1AW	82
W1OPJ	238	**21 MHz**	
		AC3CBF	196

Czechoslovakian Contest

0000 to 2400 GMT Sunday, Nov. 13

This is a world-wide type contest but QSOs with Czech stations have additional point value.

All bands, 1.8 thru 28 MHz may be used, and contacts may be made both on phone and c.w. The same station may be contacted once on each band for QSO and multiplier credit. (On 160 the OKs are only permitted to operate on c.w. Cross-band and cross-mode contacts are not permitted.)

Classifications: Single operator, both single and all band, and multi-operator all band only.

Exchange: RS(T) plus two figures indicating your ITU zone. (List and map are available from the C.R.C., s.a.e. and 3 IRCs. Also check May '77 issue of *QST*.)

Scoring: One point per QSO, 3 points if it's a Czech station. Multiply total QSO points by the sum of ITU zones worked on each band for your final score. Own country may be worked for multiplier credit but no QSO points.

Awards: Certificates to the top scoring station in each class in each country. (The Czechs are looking for more stateside participation before making awards by districts.)

The "100 OK" and "S6S" awards are available for contest contacts upon written application with your contest entry.

Use a separate log for each band, include a summary sheet showing the scoring, and the usual signed declaration that rules and regulations have been observed.

Mailing deadline for your entry is December 31st to: The Central Radio Club, P.O. Box 69, 113 27 Praha 1, Czechoslovakia.

Austrian 160 C.W. Contest

Starts: 1900 GMT Sat., November 19
Ends: 0600 GMT Sun., November 20

Not much has been heard about this Top Band activity but it has been on for the past couple of years. Although geared for Europeans it is possible for stateside stations to work the OE's and other Europeans under favorable conditions.

Exchange: RST plus a QSO number starting with 001.

Scoring: Each completed QSO counts 1 point. Score a multiplier of 1 for each country prefix worked, 2 multiplier points if it's an OE prefix (OE1-OE9). Final score, total QSOs times the sum of multiplier points.

Frequencies: Austrian stations are authorized to use 1823-38, 1854-73, 1879-1900 kHz. Others according to frequencies authorized in their country.

There is also a s.w.l. division with scoring same as above.

Awards: Certificates to top scorers in each country, special awards to over-all winners.

Mailing deadline is December 15th to: Landesverband Salzburg des Oe.V.S.V., c/o Wolfgang Latzenhofer, OE2LOL, Pfeifferhofstrabe 7, A-5020 Salzburg, Austria.

WWDXA C.W. Contest

Starts: 0000 GMT Saturday, Nov. 19
Ends: 2400 GMT Sunday, Nov. 20

This is a new one organized by the World Wide DX Association (W5AT and *DXers Magazine)*. It has been defined as "Unlimited" in that you can use automated devices, recorders, keyers and etc.

Classes: Open to all classes, single operator, single and all bands, multi-operator and s.w.l. (Be sure to indicate class of your entry.)

All amateur assigned frequencies may be used, as well as repeaters and satellite.

Exchange: RST and I.T.U. zone.

Points: One point for contacts between stations in different countries but in the same continent, 3 points between different continents, and 10 points if via satellite or repeater. Own country may be worked but for multiplier credit only.

Multiplier: One for each I.T.U. zone, and 1 for each country worked on each band.

Final Score: Total QSO points from all bands times the sum of I.T.U. zones and DXCC countries worked on each band. (s.w.l. score same as above.)

Awards: Certificates to top scorers in each country and each Zone. There will also be Trophies and other awards. (Land and sea mobiles qualify for Zone awards only.)

It is not necessary to submit your log, only the summary sheet showing the scoring and etc. The Contest Committee however reserves the right to ask for your log to verify your entry.

Mailing deadline is January 1st and go to: Frank Jerome, W5AT, 908 Holoway, Midwest City, Okla. 73110.

Propagation *(from page 81)*

Central USA	09-10 (1) 10-12 (2) 12-13 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (4) 13-14 (3) 14-15 (2) 15-16 (1)	06-07 (1) 07-08 (3) 08-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-05 (1) 18-20 (1)* 20-02 (2)* 02-04 (1)*
Western USA	09-11 (1) 11-13 (2) 13-15 (1)	07-09 (1) 09-10 (2) 10-13 (4) 13-14 (3) 14-15 (2) 15-17 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-15 (4) 15-16 (3) 16-18 (2) 18-20 (1)	15-17 (1) 17-18 (2) 18-20 (3) 20-02 (4) 02-05 (3) 05-06 (2) 06-07 (1) 17-18 (1)* 18-20 (2)* 20-04 (4)* 04-05 (2)* 05-06 (1)*

See explanation in "How To Use Short-Skip Charts" in box at the beginning of this column.
*Indicates best time for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a propagation index of (2), or higher.

Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

Awards *(from page 79)*

WB9OOE, (Main Door Prize) a Kenwood TS-520. Duane, K2PFC, (Door Prize) a Kenwood TS-7200A. And there were some 185 other prizes awarded. Hope to have more data on the convention for you soon.

Through the courtesy of John Ferguson, WØQWS, Contest Chairman, here are the scores for the 6th Annual County Hunters SSB Contest:

Mobile/Portable

Stn.	QSO's	Mult.	Total Score
WAØRJJ	625	227	336,868*
W6ANB	283	236	315,768*
WBØELJ	346	144	101,376*
WBØICP	234	110	69,300*
WB2GFE	185	92	42,688*
W5AWT	162	60	24,540*
WA7KKN	65	64	11,520*
WB9RCY	45	45	10,530*
W1EXZ	51	34	5,338*
W1DIT	40	35	4,865*
W2PDM	36	24	2,016
WØQWS	350	155	150,195 (Check log)
DX			
CT1UA	146	103	43,775*
Fixed W/VE			
W7KWC	1,503	757	3,940,942*
K1GSK	1,263	626	1,683,314*
WB4OGW	659	401	865,358*
W7SUY	307	243	365,472*
W8WT	199	194	249,678*
VE1RQ	276	200	204,200*
W7GHT	219	182	156,520*
W7KOI	177	170	103,360*
WA8ASV	81	97	70,713*
W1LQQ	121	113	66,783*
WB9PUL	111	146	58,830
VE3RN	99	88	47,080
W6CLM	105	91	43,589
W6OUL	99	89	42,453
K9GTQ	70	62	25,730
WB9NOZ	60	57	22,860
VE1MX	83	70	22,820
WAØBMO	50	52	20,384
K9KKX	75	61	16,104
WB2CPV	66	62	13,888
N5QQ/ WA5TPO	34	36	8,028
K9DZG	38	34	8,024
K2EL	24	29	5,133
WA4AOM	24	23	4,692
WB8TVD	22	26	2,552
WØOWY	15	17	2,550
W3AKD	16	20	1,400
W8KOI	16	17	901
WA2EJZ	13	13	871
W9QWM	4	4	52

*Denotes award winners.

Many thanks to all who participated especially the mobile stations who drove many miles to hand out multipliers in the contest. 83 mobiles participated this year.

May I also say, "Thanks for all your help," write and tell me, How was your month? 73, Ed., W2GT

DX *(from page 77)*

ability. It is very interesting and usually a big club event. Simply invite the local fire department paramedic or aid crew to put on a club program at your next

meeting. They will explain the effects of electrical shock and demonstrate its emergency treatment. (Our hobby is an electrical intensive hobby with higher than normal electrical shock hazards.) This is a meeting you should open to the DXer *and his family*. Encourage everyone to attend. Repeat the CPR program every 18 months or so. One club invited the parmedics out for a one hour program and over 30 club members joined the local Red Cross CPR class for detailed instructions. The Red Cross also provides an excellent source for qualified instructors.

Antenna construction safety is a broad area requiring significant effort. The job falls in two areas. The first is training. This can also be done over an extended period by periodically having a club meeting program on antenna construction techniques. The five minute safety item on each club meeting agenda is another effective approach. Have different club members prepare talks on safety, not to exceed five minutes. Safety items can cover other areas than antenna construction.

The second area is equipment. A *club antenna kit* is an excellent project. One method is to establish a single point for the control of club antenna construction equipment. Assemble the necessary equipment—safety belts, hard hats, lines or ropes, gin pole, block and tackle, etc. into one kit. Single point control is important for two reasons: accountability and accessability. The proper equipment to raise an antenna is expensive and seldom used by any one amateur. Consolidation of equipment into a club antenna kit is not only cost effective but allows use of proper equipment in sufficient quantity to do the job right. An example is hard hats. Most amateurs won't buy one for that once-every-four-years use. Yet drop a bolt or wrench from 50 feet up onto someone below, the hard hat becomes priceless. The value of the club antenna kit can pay off in one event.

One point overlooked by most clubs having antenna kits is the periodic inspection of equipment. Ropes wear out. Again, the fire department will gladly inspect the kit. If any item becomes worn, it must be discarded before something happens.

A safety topic for starting a program —an antenna construction crew can have but ONE boss. Talk about it at the next club meeting or in your club bulletin.

DXpedition alert is a club project which reaps large rewards for minimal effort. When DXpeditions are planned and occur, notification can take many forms. Yet the biggest key to success is keeping track of the events leading up to the DXpedition going on the air. One club reports having two members keeping abreast of pending DXpeditions for the club. Their job is to be the focal point for information. If a club member wants to know the status of a specific DXpedition he knows who to ask. If there are any last minute changes, the club knows that they'll be notified.

Recently a DXpedition came off three days early. The DXpedition alerting system was the only way many got notice of the early operation. Had they waited for the original announced schedule of events, they would have missed another one.

Thanks!

The content of this column results from ideas and information supplied by *you* the reader. It is always a pleasure to hear from you. It is not always possible to respond individually to every input but we are grateful for each one. Our special thanks to those mentioned earlier; the WCDX Bulletin (WA6AUD); WWDXC Totem Tabloid (WA7RVA) and NFDXA News (N4UF). KEEP THOSE INPUTS COMING!

73 and good DX, ROD W70M

QSL Information

A4XGP—To DL8CS
A6XN—To DJ9ZB
A6XP—To DK3NK
A9XCC—To WB4QBK
A9XS—To WB2QHQ
A35WL—Via ZL bureau
C31NB—To F9AP
C31NM—To PAØGIN
C31NN—To PAØERA
CT3AGD—To SM3CXS
CT9BK—To CT3BK
DA1UM/LX—To ON5NT
D2ASW—To K4UTE
EA6BH—To DL7FT
EJØA—To EI5BX
EP2SV—To WA6AHF
FGØDDV/FS7—To W2QM
FM7AV—To F6BFH
FM7WO—To K5VT/3*
FOØPJM—To W6FWX
FPØCJ—To W8CJQ
FPØDE—To WB8NBT
FPØMS—To W2HA
FRØDGP—To K5VT/3*
GE4FUC—To G8VG
GU5CBE—To F6DGT
HBØBHA—To DLØKL
HC1RF—To WA3YOP
HC8AA—To WA3YOP
HG6RTT—To HA6NP
HH2MC—To WA4AKU
HL9KW—To WA7DIG
HZ1AB (opr. K8CSG)—To K8PYD*
HZ1AB (opr. W5UJF)—To K8PYD*
IL7DMK—To I2DMK
JA7ZSQ/JD1—To JH7WKQ*
JTØICB—To UB5ICB
KA1S—To KA6US
KG6RE—To K7ZA*
KP6AL—To K9ECE
KP6BD—To K9ECE
OE5GML/YK—To OE5REB
OX5AP—Via WA5ZYF
OY8I—To OY8KH
P29MM—To K4MQJ
P29UC—To WA7ILC
PJ7VL—To W2BBK
PJ8CO—To W8AEB
PJ8UQ—To W1UQ
PJ9YN—To W1YNT
TT8SM—To WB5OOE
TU2GI—To WA2BIH
VK9CCT—To VK5CCT
VP2MBB—To VE3ECP
VP2MVP—To WB4CSK
VP5WW—To WB4EYX
VP8HA—To W3HNK
VP8OY—Via RSGB
VQ9DF—To ON6FN
VQ9R—To G3LQP
VR1X—Via RSGB
WA6EGL/VQ9—To W4FLA
YU1AAO—To WA7JRL
ZF1XW—To WB4XPW
ZF2AN—To W5UFF
ZM7AT—To WB6DXL
ZM7MM—To W6FWX
ZS1XR—To W7VRO
3A2CP—To WA3HUP
5B4CD—To SM5EII
5N2KO—To WØPXO
5R8AL—To F6ACT
5X5NK—To DJ6EA
5Z4OM—To JA1BUY
7P8BC—To WA9SMM
7X2MM—To F6DNN
9U5CA—To WA2QNW
9X5TM—To ON4ER
9Y4XX—To W6DGH
A35CR—Box 147, Nukualofa, Tonga Islands
C21EF—Box 267, Republic of Nauru
FR7ZL—Guy Petit de la Rhodiere, Les Alizes, 97417 La Montague, Department de la Reunion, Africa
J28AN—Box 728, Djibouti
JH7WKQ—Central P.O. Box 49, Sendai, Miyagi 980-91, Japan
K5VT/3—625 East 35th, Baltimore, MD 21218
K7ZA—20711-231st Avenue S.E., Maple Valley, WA 98038
K8PYD—5740 North Meadows Blvd., Columbus, OH 43229
KX5LP—Box 1604, APO SFC 96555
OX5 Bureau—Box 1179, APO NY 09023
VE2AQS/TG9—2655 Curie Place, San Diego, CA 92122
VR4DN—Box 81, Honara, Solomon Islands
VS5PM—Box 969, Brunei
7X7EPM—Box 2, Algiers
9G1JU—Box 1855, Kumasi, Republic of Ghana
9K2DT—Box 13220, Kuwait

Novice *(from page 72)*

plentiful and lower in cost than its solid state counterparts. Another factor to be considered is that new amateurs usually are more at ease trouble-shooting tube type gear.

QRP Or QRO?

New amateurs must also choose between low power (QRP) and high power (QRO) equipment. There are now some excellent low power transceivers available on both the new and used equipment markets. These QRP rigs cost less, require less space, and are usually better suited to emergency use.

It is common to have good results with a QRP rig operated on the 10 or 15 meter Novice bands, as long as it is good equipment and is being used with an excellent antenna. It is not usually satisfactory to operate a QRP rig on the 80 or 40 meter Novice bands, where they are more likely to be buried under much stronger signals from more stations crowded into smaller bands. I personally like low power operation and I frequently use an Argonaut (5 watts) Transceiver belonging to one of my sons. However, I do not advise Novices to get a QRP rig as their only station gear. If you can afford two rigs, a QRP transceiver is an excellent second station to own.

It is best to get a rig that runs 50 to 150 watts input power to the final r.f. amplifier. Neither a low power nor a high power rig is normally the best choice for use by a Novice. Medium power rigs provide good operating results without the problems related to QRP and QRO equipment.

This month's column has provided some general information to help Novices set up their first stations. Subsequent issues will provide more detailed information on this same subject.

The following stations were recently worked on the Novice bands: WB1ACI (Jim at Southington, Conn.), WA2IZL (Cal at Prattsburg, N.Y.), WB3FSI (Bill at Harwood, Md.), WD4-EGA (Eli at Hallandale, Fla.), WB5-RCX (Bill at Sabinal, Tex.), WB6VTP (Ray at Van Nuys, Cal.), WB7CUS (Roger at Portland, Ore.), WD8AQS (Lewis at Fremont, Mich.), WD9FGE (Patti at Braceville, Ill.), WBØYXP (John at Denver, Colo.), KH6JKE (Melissa at Oahu, Hawaii), and KZ5-RUN during his first day on the air.

Remember to send a good black-and-white picture of yourself at your operating position; it might be printed in a future issue. Please enclose SASE if picture must be returned.

73, Bill, W6DDB

Math's Notes *(from page 70)*

can be seen in fig. 4, this fact allows a simple crowbar protection circuit to be easily built. Under normal operation with this circuit, the pot is set so that the gate voltage SCR is just below the triggering point. A slight increase in output voltage is enough to cause the SCR to conduct and when it does, the power supply is effectively short circuited. Of course, the power supply must be able to withstand a short circuit and the SCR, the full power supply load current. But such a circuit is quite handy for providing over voltage protection. Another way to achieve crowbar operation, where only fixed voltage points are required, is shown in fig. 5. Here, the resistance divider is replaced by a zener diode. When the zener voltage is exceeded, it conducts and fires the SCR. The little RC network limits gate current to the SCR and minimizes stray triggering due to pickup.

Still another SCR application is as a switching device in a burglar alarm, effectively replacing 2 relays. The protection loop shown in fig. 6 keeps the gate of the SCR shorted and while it is intact, the bell will not ring. When the loop is broken however, even momentarily, the SCR goes into conduction and the bell rings. The low triggering requirements of the gate of many SCRs allow a very low standby current (in this case 1.2 milliamperes) to be used thereby assuring long battery life.

When choosing an SCR for one of the preceeding applications, it is wise to consult the manufacturers data sheet to determine peak voltages that the device can withstand as well as maximum currents that can be handled.

Two excellent low cost references for potential SCR and Triac experimenters are the *SCR Manual* by G.E. and the General Electric *Electronic Experimenters Circuit Manual*. Both of these are available from most major electronic parts suppliers.

73, Irwin, WA2NDM

Focus *(from page 66)*

SSTV On Repeaters?

Before you operate your SSTV gear through ANY repeater, ask the directors of the local repeater association for permission! Repeaters are intended for the general use and benefit of mobile stations. Don't foul up that operation with SSTV and get all the locals mad at you. There may be times at which the repeater is open for RTTY, SSTV, or other special communication modes, but find out what the rules are FIRST!

Has anyone set up a repeater for SSTV? There was a plan for an SSTV repeater on Long Island a couple of years ago but it apparently died on the vine.

Johnny One-Note—Or 14230.000 kHz Forever!!!

Communications, GOOD COMMUNICATIONS, is what we all enjoy, right? Then why not maximize the possibilities by using more than ONE frequency for SSTV? The pile-up of SSTV stations QRMing each other on 14230 kHz plus or minus zilch is absolute nonsense. The unwillingness of many slow scanners to move up in the band and spread out at least a FEW kHz is incomprehensible to me.

Consider how you would feel if the authorities suddenly decreed that ALL SSTV operation had to be on exactly 14230.000 kHz. The outcry would be heard worldwide without benefit of satellites, transponders, or repeaters! And yet, practically everybody clings to this frequency as if it had some special magic! Is there a good reason why about 90 per cent of all slow scan operation must continue on essentially one frequency?

Any day now, I expect to hear a big voice in the sky declare that "If the Lord had wanted slow scanners to operate on some *other* frequency, he would have eliminated 14230 kHz from the amateur privileges altogether!"

For the past two years (plus) I have been urging readers of this column to try other bands and to spread out beyond 14230 on 20. Apart from a very small group, this just hasn't happened, and the resulting QRM among SSTV stations is cataclysmic!

So, my question is, "Is there ANY way that amateurs can be persuaded to TRY 2, 10, 15, and 40 meters for SSTV operation? If you can answer this question—or think of a good reason why the SSTV action should continue mainly on 14230.000 kHz (plus or minus 0!) please write and tell me all about it.

Sun Spots And Memories

With conditions on 10, 15, and 20 meters showing a just perceptible improvement (at this writing, mid-August), one can hope for more consistent DX openings this Fall and Winter. SSTV DX, like all other DX seems to have its ups and downs. I was reminded of this somewhat obvious fact the other day while reviewing some oid tapes.

Perhaps some of the call signs I viewed on my screen will be showing up again during the Albatross Contest. Meantime, I did get a bit nostalgic watching some old familiar call signs follow each other down the screen.

(Continued on page 88)

In Focus *(from page 86)*

Join me for a jaunt down slow scan's memory lane with film camera, monitor, and tape recorder.

Who can forget that concentric circle pattern of FG7XT? Jean Wegimont used to be on the air about 16 hours a day bringing us the French flavor of beautiful Guadelope. Fig. 1 should bring it all back to you.

John Wilson, VK3LM, of Victoria, Australia used to be a "regular" on both 15 and 20 meters. John pioneered in color slow scan and is a prolific author. See fig. 2 for a look at John's station ID.

JA7FS, operated by Ko Sasaki, of Akita, Japan, was a consistent Asian station here on the East Coast. Ko's artistic station ID is shown in fig. 3.

Among the most active in many SSTV contests were the Italian station, IØPCB, and HB9NL, operated by Franz Acklin of Bueron, Switzerland. See figures 4 and 5.

Mention South America to anyone who's been on slow scan for a few years and he'll say, "What's happened to Willie Pettersen, YV1AQE?" Willie's signal out of Maracaibo covered the world with good pictures and amusing cartoons. I hope that publishing a "mug shot" of Willie will bring him back on the air with an up-to-date photograph! See fig. 6. Willie's famous call sign is shown in fig. 7.

Sorry I don't have OX3LP's name, but his Polar bear insignia was a familiar sight to many slow scanners. Here's hoping that bear will come out to see what's happening during the Albatross contest! See fig. 8.

Does anyone have up-to-date information on what's happened to CR6IS of Benguela? I had the good fortune to tape part of a contact between him and W4MS—as shown in fig. 9. However, I have heard not a peep from Jose Farizo since 'way back when!

To round out our trip through the nostalgic slow scan past I must include the UK's best known DXer, Neville Jackson, G3IAD, of Nottingham, England. Neville has worked just about EVERYONE on SSTV, and that's the truth. See fig. 10.

Fun And Games With A Scan Converter

If you happen to own a scan converter and are blessed with a collection of off the air recordings, you can have some fun making up a tape that may confound some of your SSTV buddies. As shown on the screen at the upper right of fig. 11, you can combine pictures or information from different parts of a tape (or several tapes) by writing in someone's call letters at the bottom of the screen, and then writing in other material above. It takes a bit of practice but after a few tries to get your timing right you'll be surprised to see how easily you can concoct combinations that can be quite amazing.

Final Final

I have received very few pictures of slow scan stations during the past month. Remember that your friends all over the world want to see pictures of you, your gear, and your home—so send them in—PLEASE! I am also anxious to hear from "In Focus" readers as to what type of material you prefer.

If you want more technical information, let's hear from you. And don't forget to urge your friends who have good technical articles to submit them to *CQ* for possible publication. I believe that *CQ* tops all other magazines on quantity of SSTV information published. Please help us keep it that way!

Write to W2DD at 2112 Turk Hill Road, Fairport, N.Y. 14450. Best regards, Bill, W2DD.

QRP *(from page 58)*

wood, CA 91607. I suggest that the builder order about 10 cores and the dozen beads to have a supply on hand for the v.f.o. and final units.

Circuit Specialists Co., PO BOX 3047, Scottsdale, AZ 85257, is a good source for the following parts which may be difficult to find: Elmenco 404 trimmers ($0.81 ea.); Elmenco 428 trimmers ($1.26 ea.); MPS-U31 ($1.10 ea.); 2N3906 ($0.53 ea.); MPS-6514 ($0.55 ea.); DPDT sub-min. SW1 ($0.45 ea.)

CQ Reviews: MFJ Keyer
(from page 41)

r.f. getting into the keyer by means of the external power leads. *I do not mean to imply that the unit is prone to r.f. interference—it is not.* But in some high power installations the best of keyers can be affected by high levels of stray r.f.

Performance of the keyer is excellent and exactly as advertised. It comes complete with a 30-day money-back guarantee if not satisfied and an unconditional one-year warranty MFJ is to be commended for its warranty policy, which is not voided if you try to repair a unit yourself. Troubleshooting assistance is also part of their service. Price of the MFJ-8043 is $69.95, plus shipping. For more information contact MFJ Enterprises at P.O. Box 494, Mississippi State, Mississippi 39762 or call them toll free at 800-647-8660. ■

Antennas *(from page 61)*

wire with an open-wire line about 15 feet long and an antenna tuning unit.

"Antenna (b) is a "squashed loop" with 210 feet of wire in it. This is a ¾ wave loop for 3.5 MHz fed with an open-wire line about 80 feet long, with an antenna tuner at the shack.

"Figure 6 (c) shows a 105 foot loop for 3.5 MHz. This works out to be about ⅜ wavelength of wire. Tuning is very sharp as the radiation resistance is very low. The loop is fed with an open-wire line and a tuning unit. This is about the minimum size loop that will work on 80 meters without appreciable loss. Use large size wire to keep the resistance low. And, finally, illustration (d) shows a 140 foot loop for 80 meters. It is also suitable for 7 MHz and 21 MHz as-is and also works on 14 MHz and 28 MHz with the top connection opened. This looks like a very inexpensive multiband antenna. It is fed with a two-wire open line and an antenna tuner at the shack."

"Not bad," agreed Pendergast, sketching the loops in his notebook. "I like the last design. Two supports about 35 to 40 feet high will do the job."

"GI3XZM points out that noncircular loops (triangles, squares, etc.) enclose less area than a circular loop of the same circumference and so further reduce the radiation resistance. Nevertheless his experience indicates that in practice such systems, when fed with open-wire resonant feeders and an antenna tuning unit, can achieve better efficiency than some of the "bent" dipoles and "squashed" Marconi-type systems fed against a ground connection of doubtful efficiency. And I agree with that statement."

Pendergast smiled. "I've always had a lot of luck with full size loop antennas. They are very forgiving. About the only fault I can find with my 80 meter Quad loop is that the signal pickup is so great—with all that wire in the air—that I have overload problems with some of the local signals."

I sprang from my chair and picked up a bound volume of magazines. "That reminds me," I remarked. "Here's something that will interest you. Again, it appeared in the R.S.G.B. magazine. Amazing, the amount of good stuff they have each issue. Well, it is an a.g.c.-controlled r.f. attenuator (fig. 7). The attenuator goes in series with the coaxial line to the receiver and the gain of the attenuator is set by the a.g.c. level of the receiver. Basically, it is a ferrite transformer, whose coupling is determined by a control winding. Transformer response is 1.8 MHz to 30 MHz, so bandwidth is no problem. Coupling between primary and secondary is determined by the bias voltage applied to the control winding. The threshold of action is set by a 10K bias potentiometer and as much as 22 dB of attenuation is afforded by the 40673 JFET. Bias voltage for the gates of the JFET ranges from +2 to +5 volts.

"Insertion loss of the r.f. attenuator runs from 4 dB at 1.8 MHz to 2 dB at 30 MHz. Maximum attenuation runs from 20 dB to 24 dB over the same frequency range. As it stands, the device works from a positive a.g.c. line, but can be modified to work from a negative line. The ferrite bead is described as "tiny" in the original article and the British part number is given (FX-1115), but I imagine any equivalent h.f. ferrite core or bead would work. Note that the control winding is done in a figure-8 configuration."

"Pretty clever," said my friend. "I'll have to haywire that design up and try it out. It should help a lot when some of the local powerhouses come on the air."

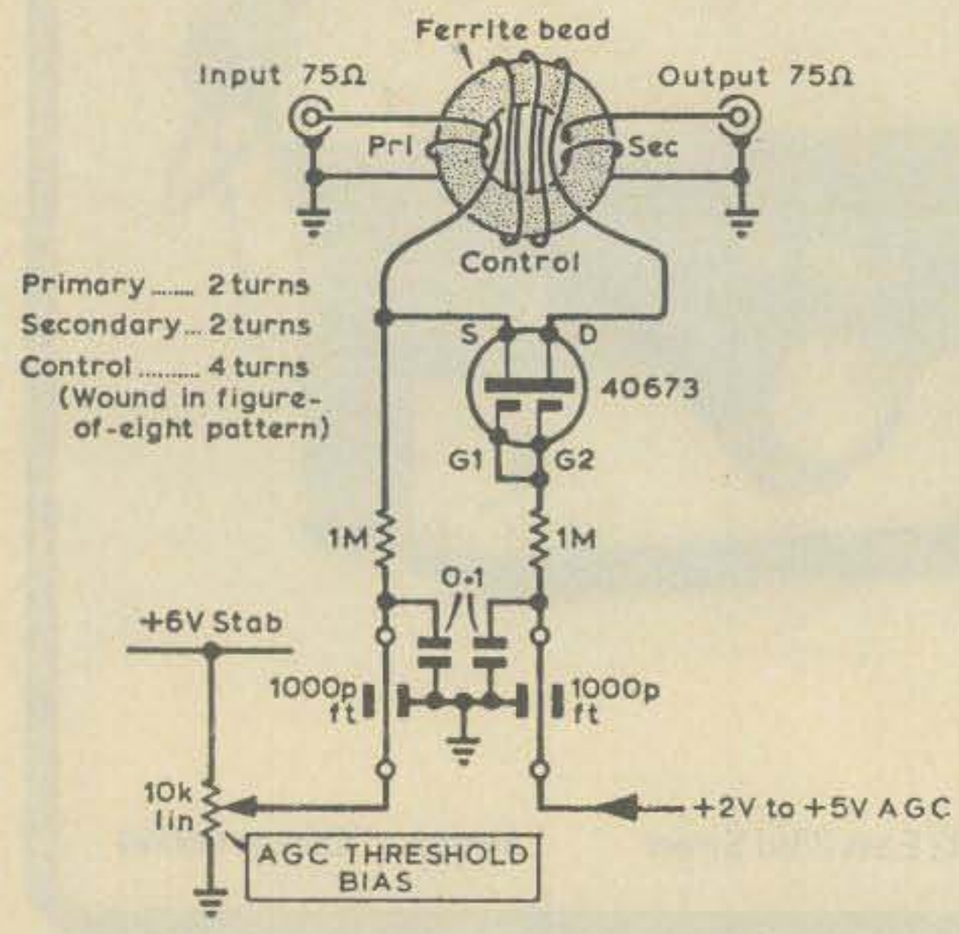


Fig. 7—The automatic "aerial attenuator" of G4AIL provides direct control of input signal by a.g.c. system of the receiver. See text for details. Drawing courtesy of "Radio Communication" magazine.

I started toward the door of Pendergast's shack. "Before I push off, I'd like to read you something from the April, 1926 issue of the *IRE Proceedings*. It is from "The Polarization of Radio Waves," by Greenleaf W. Pickard. He's speaking about high frequency trans-oceanic reception. This is what he says: 'My findings at Seabrook may be summed up as follows: Under night conditions for frequencies above three megacycles, and for distances over 50 kilometers, the electric field at the receiving point is predominantly horizontal. The ratio of the horizontal to the vertical electrical component is determined solely by the transmission frequency and the distance, and is independent of both the direction of transmission and whether the wave left the transmitter horizontally or vertically polarized.

" 'For frequencies above three megacycles, there is a real advantage in horizontal reception. Not only is the electric field and hence the signal stronger, but the signal/stray ratio is markedly improved, because the horizontal component of the static does not increase so rapidly with frequency as does that of the signal.' "

Pendergast replied defensively, "Well, I can still work a lot of DX with my ground plane antenna!"

"Yes, but think of all the good DX you really can't hear!", I replied, as I went out the door.

* * *

Radio Communication is the publication of the Radio Society of Great Britain. Inquiries as to subscriptions or membership in the society should be directed to: Radio Communication, 35 Doughty Street, London WC1N 2AE, England. Design information on multi-element Quad beams and Quad loops can be found in *All About Cubical Quad Antennas*, published by Radio Publications, Inc., Box 149, Wilton, CT 06897. Price: $4.75 plus 35¢ postage and handling.

73, Bill, W6SAI

CQ Reviews: The MFJ Antenna Tuner *(from page 45)*

superior to a random wire, provided you can properly fasten the ends of the dipole up in the air. With this tuner you can use a folded dipole for multiband operation without the usual stray r.f. problems resulting from the use of a random wire.

The price of the Super Tuner is $69.95 plus $2.00 shipping. If you are not satisfied you may return the unit for a refund less shipping, within thirty days. For more information contact MFJ Enterprises, P.O. Box 494, Mississippi State, Mississippi 39762 or call them toll free at 800-647-8660. ■

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SELL: ROBOT 70A monitor, 61 viewfinder, 80A camera with 25mm 1.4 lens, 8 and 15 foot camera cables. Original cartons and instruction books. Recently factory calibrated. $500. Gordon Buckner, W0VZK, Box 721, Marshall, MO 65340.

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AX9901/5867 AMPEREX: Pair new boxed, similiar low MU version 3-500Z. Prepaid UPS $42. Art Ford, 56 Gildare Dr., East Northport, NY 11731.

SELL: NC33, National RX, offer. Heath G1 rig gen., offer. SB200 linear absolutely mint $350. SB610 scope exc. condx. $85. Jack Larson, W6TBA, Rt. 1, Box 105B, Rosamond, CA 93560.

SELL: Venus SSTV system 6 months old, new condx: monitor, fast/slow scan camera, lens, manuals $450. Don Selwyn, W2GFR, Pompton Lakes, NJ 07442.

ESTATE SALE: Antique and current radio equipment. Please send s.a.s.e. for detailed list. Ward Becht, W6IRK, 625 Tufts, Burbank, CA 91504.

WANTED: Early radio and wireless magazines, books, receivers, transmitters, parts old vacuum tubes, handbooks. Erv Rasmussen, W6YPM, 164 Lowells St., Redwood City, CA 94062.

VLF Converter 10-530 kHz. All parts except cabinet $20. Heinlein, 107 Wyoming St., Boulder City, NV 89005.

ANTIQUE: Have one RCA Brunswick-Radiola Super-Heterodyne by RCA in a walnut wood cabinet with six UV-199 tubes. Make oofer. A.A. Polityka, 248 Western, Allegan, MI 49010.

SELL: Drake T4X transmitter and AC supply. Regency HRT-2 hand-held. Heath HM-102 wattmetter. Wanted: Kenwood TS-600. Heath SB-610. Swan TB-4H beam and VHF PS-15C. F.H. Kauppi, Rt. 1, Gilbert, MN 55741, (218) 865-6541.

SP600 JX with TMC sideband converter in cabinet, $450 or trade for radios, guns, cameras, boats, etc. L.G. Basham, 735 Caves Hwy., Cave Junction, OR 97523.

NEED: Schematic for TO-5 keyer, will return, will pay postage both ways. Bruce Terrell, WB1AGO, Bldg. 6, Unit 1, R.H., Lenox, MA 01240.

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WANTED: DPDT coax relays, SPDT switches with 'N' type connectors. Charles T. Huth, 1233 1/2 W. State, Fremont, OH 43420.

SELL: Multiband Hybrid quad HQ-1 exc. condx, used 6 months, $75. 813 tube, new $15. Pierre Lelong, N6GO, 5408 Simpson Ave., No. Hollywood, CA 91607.

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WANTED: Heath DX-60B transmitter and HR-10B receiver. State price and condx. Mark Osinski, 21230 Lakeland, St. Clair, MI 48088.

SELL: Collins 32V3 with manual, excellent for novice or tech. Pick-up only. Irwin Schwartz, K2VGU, 260 65th St., Brooklyn, NY 11220, (212) 745-4228.

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FOR SALE: Yaesu FT-101B transceiver. Excellent condition. Has 160 meter crystal and cooling fan. $525. M. Godwin, W4WFL, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

WANTED: Antique Glass, looking for old milkglass, purple, slag, carmel, and greentown. Tell me what you have. I pay the highest prices. Write: Jack Schneider, c/o Cowan Publishing Corp., 14 Vanderventer Ave., Port Washington, NY 11050.

The book "CQ YL" has been updated again with a new supplement bringing the YLRL Officers section up to date through 1977, plus a report on the 7th International YLRL Convention held in Houston in June '76. If you have a copy of "CQ YL.. and would like to add the new supplement (the pages are "slotted" so they can be inserted directly into the book's spiral backbone), drop a note with your request to author/publisher W5RZJ, Louisa Sando, 9412 Rio Grande Blvd., N.W., Albuquerque, NM 87114. Please enclose $1.00 to cover cost of printing and mailing. The one and only book about YLs in ham radio, "CQ YL" contains 23 chapters, over 600 photographs. Order your autographed copy, or a gift copy, from W5RZJ, $3.50, postpaid.

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SALE: Atlas 210B complete with 100/200 V AC Console. Excellent condition. $550 PP. With mods (R.I.T., etc.) as per my Feb CQ article and latest factory updates. Great rig. Only reason for sale is that am now in CN8 and CN8 will not issue license. Schultz, K3EZ, Box "L", FPO, NY 09544.

WANTED: Extra coils for SW-3 receiver. I have odd-ball coils and need your single extras to make up complete set. Buy or trade. Bill Orr, W6SAI, c/o Eimac, 301 Industrial Way, San Carlos, CA 94070.

WANTED: Schematics or any info on Dumont FM basic no. BA-101C and BA-105B for 6 meters. Jim Harkins, WB5ZRH, Rt. 2, Box 255A, Taylor, TX 76574.

TRADE OR SELL: Teaberry Model-T tube base 40 ch., Courier Renegode, 40 ch. mobile, Johnson 4140 40 ch. mobile. Want GTX 200, GTX-2 etc. Bobby L. Benningfield, Rt. 1, Elkhorn, KY 42733.

SELL: Precision Signal Generator Series E200C $25. Precision Vacuum Tube Master Series EV-10 $25, RCA-W088A Osc. $50. William Louden, 426 Melanie Lane, Ripon, WI 54971.

SELL: HW 100, 5 band txcvr with HP 20 AC supply and mic. All $250, clean. Harold Tarallo, WB6VNR, 7104 Deveron Ridge, Canoga Park, CA 91307, (213) 346-5871.

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SELL: HA800B Ham Receiver. 80-6 meter coverage w/external speaker, perfect condx, $50. Bill Meredith, Rt. 1, Kensington, GA 30727.

APACHE: SB-10 wanted any condx. A. Eckman, WA2ECI, 11 Fort George, New York, NY 10040.

WANTED: Mobile 80-10 antenna, Patrick F. Crowley, K2UQQ, 6 Tulip Dr., no. 1P, Fords, NJ 08863.

SELL: Vibratrol 10/90 watt out linear for 2 meters any mode, $110 or trade for F.B. and F.B. physical condx DX 100B with SSB adapter. Robert Krueger, 8864 Hillside, Hickory Hills, IL 60457.

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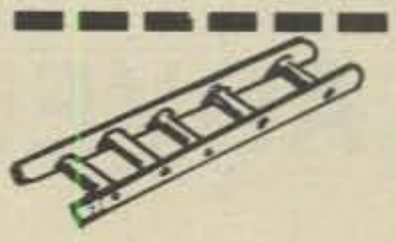

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WANTED: Atlas 215X w/external VFO. WA7LZQ, P.O. Box 6216, Portsmouth, VA 23703.

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MILLEN 90651-A GDO, probe, & tone modulator $75.00; Bell & Howell equipment-no. 34 oscilloscope $65.00; transistorized meter $20.00; two design consoles $20.00 each; RCA Institute signal gen and VOM, both $30.00; RCA WV-98C senior voltohymst $40.00; Sprague TO-6 Tel-Ohmike capacitor analyzer $90.00; Eico equipment-955 in circuit capacitor tester $25.00; 378 Audio Generator $40.00; 565 VOM $15.00; 1030 Regulated Power Supply $50.00; 1064 Battery Eliminator & charger $30.00; 1078 Auto Transformer $40.00; Heath IM-38 AC VTVM $30.00; Heath ID-22 Electronic Switch $15.00; Knight equipment-KG-635 D.C. Oscilloscope $90.00; KG-690 signal tracer $30.00; Clarostat "Power Resistor" decade box $35.00. Everything above mint $600.00. Ralph Conner, WA3OBW, 149 Gladstone St., Philadelphia, PA 19148, 215-HO 2-9293.

TRI-EX 40' tower, 15, 20m monobanders, Ham M rotator, cables, guys, $275. 2m FM Sonar, AC P/S, $175. HW-32A spare tubes $65. WB2AQC, 34-24 76th Street, Jackson Hgts., NY 11372.

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WANTED: SBA-301-2 optional 400 Hz crystal filter and SB-600 speaker/cabinet for Heath SB-303 receiver in new or mint condition. M. Godwin, W4WFL, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

FOR SALE: Old issues of Ham Radio, 73, CQ, QST. Some complete runs. Send s.a.s.e. for lists and prices. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

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FOR SALE: Hammarlund HQ-100 receiver and multi-Eimac trans-citer model AF-67 w/power supply, $150 for all. Robert B. Young, WD4CFK, P.O. Box 329, Hope Mills, NC 28348.

WANTED: Following coil sets for National HRO-5 receiver: sets no. E & G, will purchase either or both of above plus others if available. WA1NLJ, 3467 Park Ave., Fairfield, CT 06432, (203) 367-5545.

WANTED: Pre-1922 QSTs. Individual issues or volumes. Neil Friedman, N3DF, 2301 E. St., N.W., Apt. 701, Washington, DC 20037.

SALE: Hallicrafters SX-101A receiver, Heathkit Apache transmitter, manuals, antenna relays, misc., accessories. Complete package, $250. Call Sundays only (914) 359-3523, Orangeburg, NY.

FEW NEW COAXIAL RELAYS: Costs $16.50, only $5 each; SPDT, 12v DC, go to 500 MHz. Use own terminals or solder in. C. E. Spitz, W4API, Box 4095, Arlington, VA 22204.

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MUSEUM PIECE: Conelrad Radio from World War II. Conalert II like new, $150. Should be in every radio museum. Chas. W. Boegel Jr., W0CVU, 1500 Center Pt Rd., Cedar Rapids, IA 52402.

WANTED: Rig similar to HW101, Tempo 1 etc. Herbert Strobel, 84 Chichester Ave., Center Moriches, NY 11934.

WANTED: Pre-war issues of Short Wave Craft magazine. Bill Orr, W6SAI. Eimac, 301 Industrial Way, San Carlos, CA 94070.

WANTED: Collins 51-R receiver (VHF). Bill Orr, W6SAI. Eimac, 301 Industrial Way, San Carlos, CA 94070.

STOLEN: On July 23rd, 1977, a Heath Model 2021 Handi Talkie with Model 201 Touchtone pad built-in was stolen. Channel switch wired wrong in channels 3, 4, and 5 go to crystal sockets 3, 2, and 1. Crystalled for 146.52 (ch. 3), 146.655 (ch. 4) and 146.94 (ch. 5). S.W. Daskam, K1POK, 38 Settlers Trail, Stamford, CT 06903, (203) 329-0187.

ADVERTISER'S INDEX

New Reader Service System

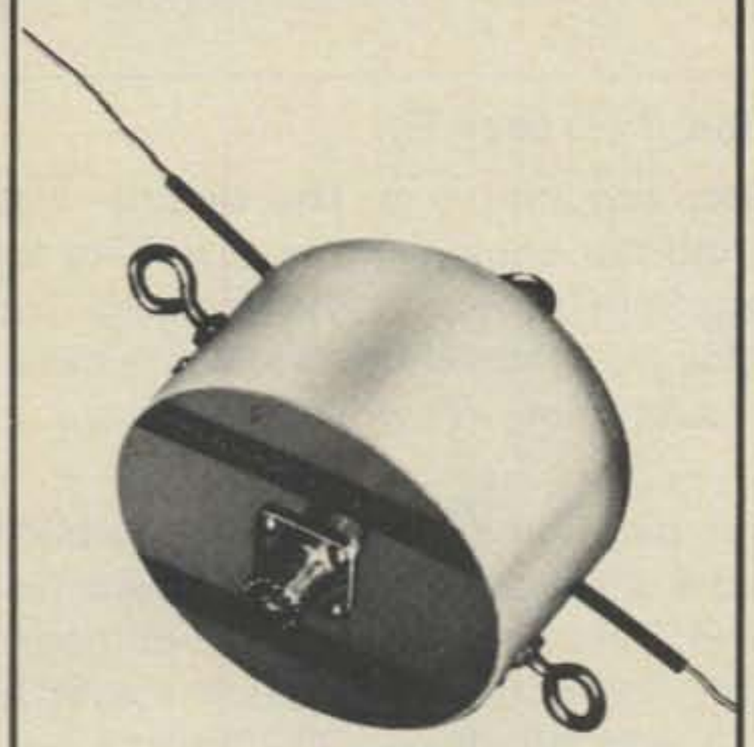
To speed information to you on products shown in CQ advertising, a new computerized Reader Service System has been designed. For additional information on a particular ad in this issue, tear out the Reader Service postcard bound between pages 72 and 73, and circle the numbers on the card which correspond with the Reader Service numbers listed in the advertiser's index below. DON'T CIRCLE THE PAGE NUMBERS! Fill in your name and address, and mail. We'll have your information on the way in short order.

R.S. No.		Page
	Gregory Electronics	87
13	Hamtronics	30-39
14	Henry Radio	2, 8
15	Herrman Co.	87
16	International Crystal Mfg. Co.	14
17	Jan Crystals	91
18	Kantronics Inc.	89
19	Kenwood	46-53
20	MFJ	Cov. II, 1
21	Mor-Gain	45
22	New-Tronics Corp.	13
23	Wm. M. Nye Co., Inc.	91
24	Palomar Engineers	95
25	Redi-Kilowatt	88
26	Rolin Distributors	87
27	Sagal Electronics, Inc.	94
28	Space Electronics	94
29	Telrex	87
30	Ten-Tec, Inc.	59
31	Tri-Ex Tower Corp.	58
32	Tufts Electronics	85
33	Unadilla Radiation Products Div. of Micro Filter	9
34	Unarco-Rohn	95
35	Wilson Electronics	27
36	Yaesu Electronics Corp.	Cov. III

R.S. No.		Page
1	Atlas Radio, Inc.	6
2	Barry Electronics	89
3	C.W. Electronics	7
4	Capsonic American Antenna	42, 43
5	Columbia Electronics	91
6	DGM Industries	95
7	Dentron	15
8	Digitrex	10
9	ETO	12
10	Eimac, Div. of Varian	Cov. IV
11	Electrospace Systems, Inc.	91
12	Greenlee Tool Co. Div. of Ex-cell-o Corp.	96

5 KW PEP INPUT

WITH THIS NEW BALUN



On all bands 160 to 10 meters.

Runs cool as a cucumber at its CCS rating of 2 KW (Continuous output power through the balun at matched load).
4" dia. Wt. 24 oz. $32.50 PPD.

AND FOR FULL LEGAL POWER

the time tested Model 1K balun is still available. Rated at 1 KW CCS (3 KW PEP input).
2¼" dia. Wt. 9 oz. $16.95 PPD.

ONLY PALOMAR BALUNS HAVE ALL THESE FEATURES

- **Toroidal core for highest efficiency.**
- **Teflon insulated wire to prevent arc-over. OK for tuned feeders.**
- **Stainless steel eyebolts take antenna tension. Won't rust, won't pull apart.**
- **Epoxy filled case. Absolutely waterproof.**
- **Lightning protection built-in.**
- **Wideband 1.7 to 30 MHz.**
- **Hang-up hook provided.**
- **Now available in either 1:1 or 4:1 ratio. 1:1 ratio matches 50 or 75 ohm coax to 50 or 75 ohm balanced load (dipoles and inverted Vees). 4:1 ratio matches 50 or 75 ohm coax to 200 to 300 ohm balanced load.**

Free descriptive brochure on request.
Order direct.
Model 2K $32.50 Model 1K $16.95.
Center insulator without balun $7.95
Postpaid U.S. & Canada.
Specify ratio 1:1 or 4:1
California residents add 6% tax.
Send check or money order to:

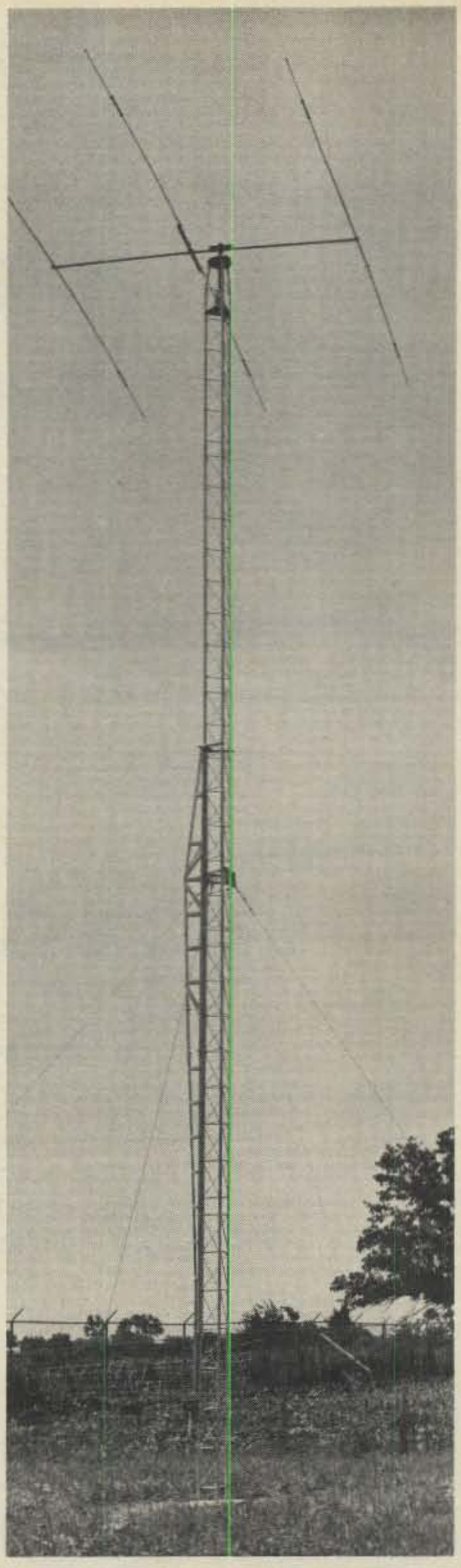
PALOMAR ENGINEERS
BOX 455, ESCONDIDO, CA 92025
Phone: (714) 747-3343

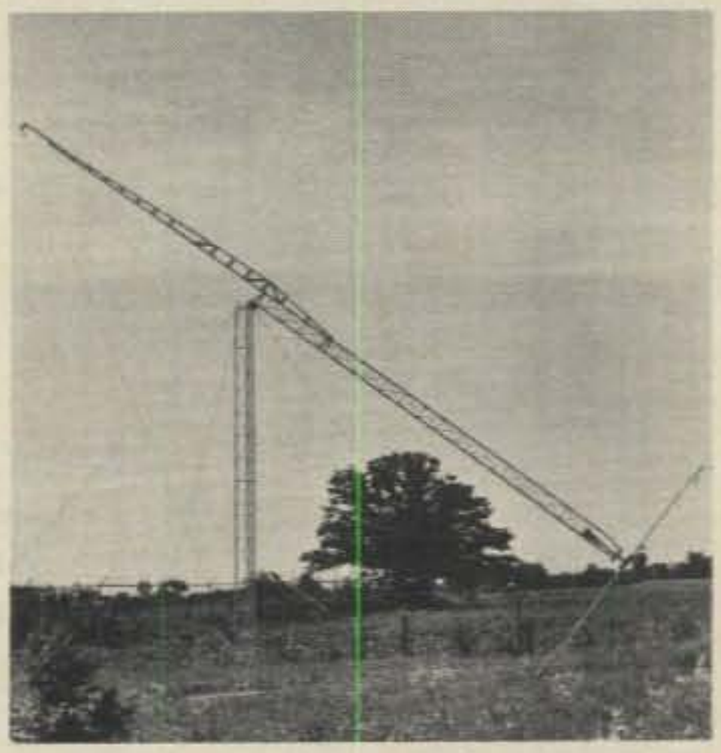
GET TO THE TOP FAST!

NOW YOU CAN CHANGE, ADJUST OR JUST PLAIN WORK ON YOUR ANTENNA AND NEVER LEAVE THE GROUND!

Rohn manufactures towers that are designed and engineered to do specific jobs and that is why we have the FOLD-OVER TOWER . . . designed for the amateur. When you need to "get at" your antenna just turn the handle and there it is. Rohn "fold-over" towers offer unbeatable safety. These towers let you work completely on the ground for antenna and rotator installation and servicing. This eliminates the hazard of climbing the tower and trying to work at heights that could mean serious injury in a fall. So use the tower that reduces the risks of physical danger to an absolute minimum . . . the Rohn "fold-over"!

Like other Rohn big communication towers, they're hot dip galvanized after fabrication to provide a maintenance free, long lived and attractive installation. Rohn towers are known and used throughout the world . . . for almost a quarter century . . . in most every type of operation. You'll be in good company. Why not check with your distributor today?





Unarco-Rohn
Division of Unarco Industries, Inc.
P.O. Box 2000, Peoria, Illinois 61601

Do not attempt to raise antenna or antenna support near power lines—You can be KILLED.

Machine Arithmétique *(from page 23)*

to be a piece of historical machinery. It was attributed to Blaise Pascal who was a French mathematician and philosopher who lived from 1623 to 1661. I was fascinated by this apparatus and could only discern that it was some sort of calculator from the brief description given in the issue. A letter was sent to them asking for more information and perhaps the picture itself for possible use in *CQ*.

The magazine *Ondes courtes—Informations* is a publication put out by the Union Des Radio-Clubs in Paris and their President, F. Raoult, F9AA wrote back to say that the apparatus was indeed a calculator designed and built during the seventeenth century by Blaise Pascal for use by his father who was a tax collector. It made the job of tax collecting easier by simplifying the computations needed to arrive at the proper tax. The calculator pictured now rests at the Conservatoire National Des Arts Et Metiers where it can be viewed along with other machines built by Pascal.

M. Raoult apparently taken by our interest and enthusiasm contacted M. Soulard, Director of the Museum, who in turn sent us a treatise on the calculator and a Museum color post card featuring the calculator plus the photograph used for this article. You never know what a simple request can bring in return.

The next time you pick up your handy-dandy little solid-state calculator remember this one started the whole movement . . . and it didn't even need batteries. ■

St. Paul DXpedition *(from page 22)*

We went to sleep around 2 a.m. The weather was still bad and we did not know what was waiting for us in the morning. Sunrise was very surprising. The sea was dead calm, no winds and the sky was clear. There was no doubt that we would still have to leave.

The last of our belongings and the last station plus the quad were disassembled and packed just as the boat arrived. This time they had an outboard motor and a bigger dinghy. It was much easier to load the cargo, it was all down hill, the sea was calm with low winds. It also took only four trips. It was cold and there was frost on the ground. We said good-bye to our hosts and boarded the boat. The last view of the island, with it's rocks was just beautiful and rewarding for all the suffering, we underwent.

Lance took us around the other side of the large island. We picked some lobster traps and two lobsters joined us on the voyage. One of them did not like Bob's coat and was holding on to it for a while.

We finally arrived back in Dingwall. All the stuff was unloaded from the boat and Lance made some fresh lobsters which were super delicious. On the way back we dropped Cy off in Sydney at the airport, and the three of us continued by car to Toronto. The trip was smooth and after 28 hours we were home safe, tired and happy.

QSL cards were already pouring in. After a special QSL card was printed, we got together and QSL'ed all the contacts we made. All direct QSL's were answered direct, the rest via the bureau and unclaimed card will be sent via the bureau after one year. It was a pleasure to QSL those with accurate data on the QSL, s.a.s.e. and sufficient return postage. Many thanks to all of you. Others gave us some detective exercises to find them. Some people do not hesitate to make insurance contacts up to three on the same band and mode, which is very poor operating practice. They are depriving other stations of contacts and in the future there will be no QSLs for them. If you need insurance, try it on another band or mode. For those who did not get a card they are still available via VE3BMV, Box 292, Don Mills, Ont.

At the end we would like to express our thanks to our wives and families. Our thanks to all those who helped with equipment. VE3GSU, VE3UR, VE3MR, VE3GPO and special thanks to VE3FFA for letting us keep in touch with our families via phone patch.

We hope to see you from another rare spot, and give us a call and points if you hear us in the contests! ■

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THE ALL-NEW YAESU FT-227R 144-148 MHZ 800 CHANNEL 1980's RADIO TODAY! "MEMORIZER"!

UNDER $300!

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EIMAC 8875s Power DenTron's MLA-2500 Linear Amplifier.

Look over DenTron's low profile, stylized MLA-2500 amplifier. Two EIMAC high-mu 8875 power triodes are the heart of the modularized design. The combination of DenTron's cathode-driven circuitry and EIMAC's 8875s provides simplicity, economy and high power all in one compact package.

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