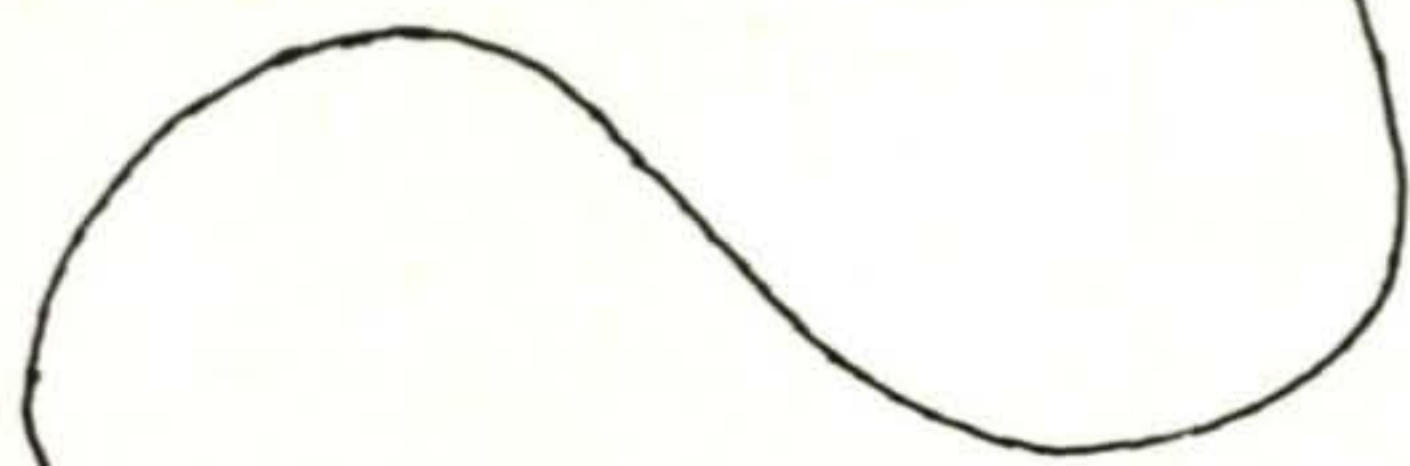
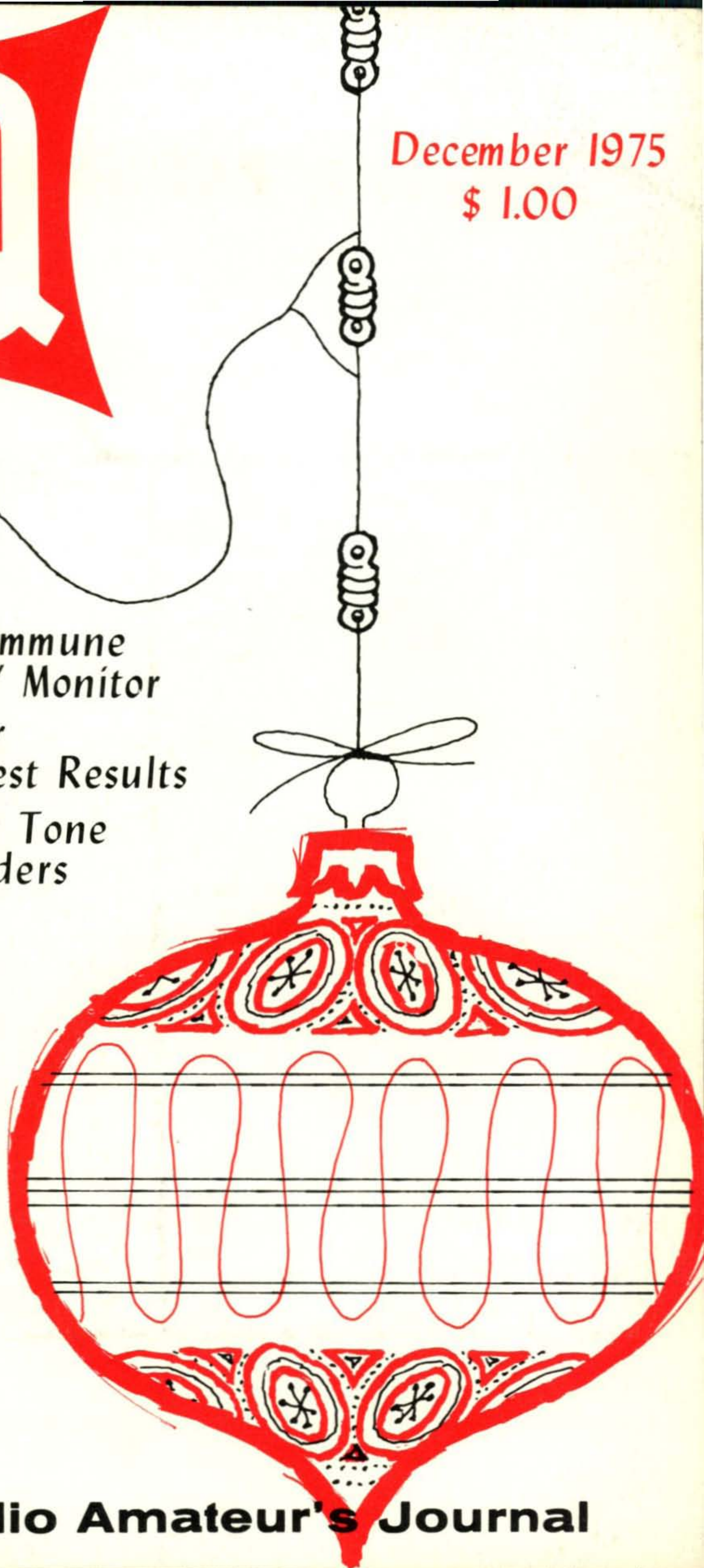




December 1975
\$ 1.00



A Noise-Immune
SSTV Monitor
160 Meter
Contest Results
All About Tone
Encoders



The Radio Amateur's Journal

Three new reasons why Heath is the leader in amateur radio.



New 5-Band SSB/CW
New 2-Meter Synthesized
New 2-Meter Hand-Held

NEW HW-104 5-Band SSB/CW Transceiver — the latest in broadband technology at lower cost... only 539.95

In keeping with the tradition of the famous Heathkit HW-series, the new HW-104 is the inheritor of the advanced technology of the SB-104 and the high value concept of the HW-101.

Completely solid-state. Frp, receiver front end to transmitter output. Cool and quiet.

Totally broadbanded. Instant QSY. Just choose the band, frequency and mode. Move anywhere in any band without preselector, load, or tune controls.

Clean transmissions. 100 watts out or 1 watt. Low harmonic and spurious radiation. At 100 watts, third order distortion is down 30 dB and carrier and unwanted sideband suppression are down 55 dB. Broadband design keeps it that way.

Clear reception. Broadband design minimizes cross-modulation and intermodulation so signals stand-out from a quiet background. Active devices are minimized ahead of the 4-pole crystal filter. Adjacent signal overload is minimized yet sensitivity is less than 1 μ V. Convenient 15 MHz WWV receive position on the band switch with a "pull-to-calibrate" position on the RF gain control.

Easy-to-read circular dial. Covers from 3.5 MHz to 29.0 MHz. The dial spinner covers about 15 MHz per turn. Built-in 100 kHz and 25 kHz calibrator insures accuracy with 2 kHz (dial markings are 5 kHz). Backlash less than 50 kHz. The VFO is the same basic circuitry as in the SB-104 with less than 100 Hz/hour drift after warmup. To cover the top end of the 10-meter band, order the HWA-104-1 accessory.

Easy to build and align. Phenolic plug-in circuit boards and 2 wiring harnesses. Aligns with just a dummy load, mic. and VTVM.

Super operating, super value. You get both in the HW-104.

- Kit HW-104, 31 lbs., mailable 539.95
- Kit HP-1144 AC power supply, 28 lbs. .. 89.95
- Kit HS-1661 Matching speaker, 5 lbs. ... 19.95
- Kit HWA-104-1, Ten-meter accessory, 1 lb. 16.95
- SBA-104-1, Noise blanker, 1 lb. 26.95
- SBA-104-2, Mobile mount, 6 lbs. 36.95
- SBA-104-3, 400 Hz CW crystal filter, 1 lb. 39.95

See them in the FREE Heathkit Catalog

HEATHKIT ELECTRONIC CENTERS —
Units of Schlumberger Products Corporation
Retail prices slightly higher.

ARIZ.: Phoenix; CALIF.: Anaheim, El Cerrito, Los Angeles, Pomona, Redwood City, San Diego (La Mesa), Woodland Hills; COLO.: Denver; CONN.: Hartford (Avon); FLA.: Miami (Hialeah), Tampa; GA.: Atlanta; ILL.: Chicago, Downers Grove; IND.: Indianapolis; KANSAS: Kansas City (Mission); KY.: Louisville; LA.: New Orleans (Kenner); MD.: Baltimore, Rockville; MASS.: Boston (Wellesley), Boston (Peabody); MICH.: Detroit; MINN.: Minneapolis (Hopkins); MO.: St. Louis (Bridgeton); NEB.: Omaha; N.J.: Fair Lawn; N.Y.: Buffalo (Amherst), New York City, Jericho (L.I.), Rochester, White Plains; OHIO: Cincinnati (Woodlawn), Cleveland, Columbus, Toledo; PA.: Philadelphia, Pittsburgh; R.I.: Providence (Warwick); TEXAS: Dallas, Houston; VA.: Norfolk (Va. Beach); WASH.: Seattle; WIS.: Milwaukee.

NEW HW-2026 gets you on 2 with synthesis for 50% less... only 289.95

True digital frequency synthesizer. No crystals to buy, no channel limitations. Digital technology with a voltage controlled oscillator and crystal time base whose outputs are divided down and phase-detector compared. You control the divisor and therefore the frequency from the front panel lever switches.

Lever-switched channel selection with digital readout. Just flip the levers to any frequency in any 2 MHz segment of 144 to 147.995 MHz. 5 MHz steps open all channels to you.

Automatic repeater offset plus built-in tone encoder. Burst and continuous. Simplex or offset. **10 watts minimum output;** infinite VSWR without failure. True FM for great audio, too.

Hot receiver; 0.5 μ V sensitivity; dual conversion; 8-pole crystal filter; linear audio; built-in speaker. Best value going in synthesized 2-M.

- Kit HW-2026, 12 lbs., mailable 289.95
- Kit HWA-202-1, AC supply, 7 lbs. 32.95

NEW HW-2021 2-M 1-watt Hand-Held with 5 receive & 10 transmit channel capability, batteries & charger for only 169.95

One crystal does the work of two — gives both receive and transmit frequencies. Works offset, too, so each crystal gets you one receive and two transmit channels. Buy just four crystals (not pairs); we include 146.94 MHz and -600 kHz to get you started.

One watt minimum output — 0.005% stability. And frequency modulation plus built-in separate mic. for better audio.

Optional "Auto-Patch" Encoder accesses land-lines through repeaters with touch-tone input. 12 digit keyboard & circuit board fits HW-2021.

Built-in Battery Saver, rechargeable Battery Pack & Battery Charger — all included.

Compact, rugged. High-impact, black plastic case; glass epoxy circuit board; wt. 2 lbs. w. batteries. Not recommended for beginner kit builders due to compactness.

It's the best value in go-anywhere 2-M rigs.

- Kit HW-2021, 5 lbs. mailable 169.95
- Kit HWA-2021-2, carrying case, 1 lb. 12.95
- Kit HWA-2021-3, Auto-patch, 2 lbs. 39.95



HEATH Schlumberger	Heath Company Dept. 12-12 Benton Harbor, MI 49022
<input type="checkbox"/> Enclosed is \$_____. Please send models_____.	
<input type="checkbox"/> Please send my free Heathkit Catalog.	
Name _____	
Address _____	
City _____	State _____ Zip _____
Prices & specs. subject to change without notice. Mail order prices, FOB factory. AM-318	

Morse and RTTY from one keyboard?



Meet the two and only.

The HAL DKB-2010 Dual Mode keyboard is one of the most sophisticated products ever offered to the radio amateur. It's an all solid state keyboard that allows you to send either RTTY or CW — with more ease, more versatility than anything you've ever seen before.

In the RTTY mode, you can transmit at standard data rates of 60, 66, 75 or 100 WPM, as well as an optional 132 WPM, 100 baud. In addition to the complete alphanumeric keys, you get 17 punctuation marks, 3 carriage control keys, 2 shift keys, a break key, 2 three-character function keys, a "DE-call letters" key and a "Quick brown fox . . ." test key.

In the CW mode, you can send at speeds anywhere between 8 WPM and 60 WPM. You can also adjust dot-to-space weight ratios to your liking. For CW, you have all alphanumeric keys, plus 11 punctuation marks, 5 standard double-character keys, 2 shift keys, a break-for-tuning key, error key, "DE-call letters" key, plus

2 three-character function keys. Output interfacing is compatible with cathode keying or grid-block keying. A side tone oscillator and built-in speaker allow you to monitor your signal — with adjustable volume and pitch controls.

The DKB-2010 also has a three-character memory buffer which operates in either the RTTY or CW mode, allowing you to burst type ahead without losing characters. A 64-character memory buffer is also available as an option. Key function logic in either mode is governed by LSI/MOS circuitry. All key switches are computer grade.

The DKB-2010 is available assembled or in kit form. Should you choose the kit, you'll find construction easy — the unit consists of three assemblies: power supply board, logic PC board, keyswitch PC board, and pre-assembled wiring harness.

Any way you look at it — as an easy-to-build kit, a complete assembly, as a CW keyboard, or an RTTY keyboard, the HAL

DKB-2010 is a real breakthrough for every amateur. It adds a whole new dimension to the exciting world of amateur radio. Once you've used the DKB-2010, you'll wonder how you ever got along without it!

Prices: \$425 Assembled;
\$325 Kit



HAL Communications Corp.
Box 365, Urbana, Ill. 61801
Telephone: (217) 367-7373

- Enclosed is \$ _____ (Assembled)
\$ _____ (Kit)
Call letters _____
- Charge Master Charge # _____
- Charge BankAmericard # _____
M/C Interbank # _____
Card Exp. date _____
- Please send me the HAL catalog.

Name _____

Address _____

City/State/Zip _____

All prices include U.S.A. shipping.
Add \$10 for air shipment.
Illinois res. add 5% sales tax. C



The Radio Amateur's Journal

FEATURES

THE DCX/CLG SSTV MONITOR
Stephen A. McKeown, WA2CLG 17

JUST HAMS
Charlene Babb Knadle, WB2HJD 26

ANTENNAS: 160 METER ANTENNAS
William I. Orr, W6SAI 29

RESULTS OF THE 16TH ANNUAL CQ 160 METER
DX CONTEST
Donald McClenon, W3IN 32

MATH'S NOTES: 3-1500 MHZ 10 DB AMPLIFIER
Irwin Math, WA2NDM 35

A NEW TWIST TO AN OLD ANTENNA
Arthur R. Nott, K5YNR 37

A PHONE PATCH LEVEL INDICATOR WITH A DIFFERENCE
R. H. Fransen, VE6RF 40

MINIATURE SOLID STATE TONE ENCODERS TO REPLACE
REEDS
Dennis Dauben, WB6WYR 42

CQ REVIEWS: THE HEATHKIT HD-1250 SOLID STATE
DIP METER
Irwin Math, WA2NDM 46

NOW WHAT HAVE I DONE?
Peter Walton, VE3FEZ 47

NOVICE: NEW PREFIXES FOR 1976
Herbert S. Brier, W9EGQ 48

QRP: GETTING WHAT YOU BUILT TO WORK
Adrian Weiss, K8EEG/Ø 50

IN FOCUS: FIRST SSTV CONVENTION
Bill DeWitt, W2DD 52

DEPARTMENTS

DX: SINGLE BAND WAZ AWARD FOR 15 PHONE AND
C.W. AUTHORIZED
John A. Attaway, K4IIF 56

PROPAGATION: DX CHARTS FOR DEC. 15 THROUGH
FEB. 15
George Jacobs, W3ASK 63

CONTEST CALENDAR: CONTESTS FOR DEC. AND
EARLY JAN.
Frank Anzalone, W1WY 67

AWARDS: STORY OF THE MONTH—GERALD J. COLLINS,
W3FNT
A. Edward Hopper, W2GT 70

SURPLUS SIDELIGHTS: MORE ON THE COLLINS 651S-1
RECEIVER
Gordon Eliot White 73

ANNOUNCEMENTS 8 OUR READERS SAY 7

HAM SHOP92 ZERO BIAS 5

Offices: 14 Vanderventer Avenue, Port Washington, L.I., N.Y. 11050. Telephone: 516-883-6200.

CQ (Title registered U.S. Post Office) is published monthly by Cowan Publishing Corp. Second Class Postage paid at Port Washington, N.Y. and Miami, Florida. Subscription Prices one year, \$7.50; two years \$13.00. Entire contents copyrighted by Cowan Publishing Corp. CQ does not assume responsibility for unsolicited manuscripts. Allow six weeks for change of address. Printed in the United States of America.

Postmaster: Please send form 3579 to CQ Magazine, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050

STAFF

EDITORIAL

RICHARD A. ROSS, K2MGA
Editor

ALAN M. DORHOFFER, K2EEK
Managing Editor

WILFRED M. SCHERER, W2AEF
Technical Consultant

KIM SMITH
Editorial Assistant

CONTRIBUTORS

FRANK ANZALONE, W1WY
Contest Chairman

JOHN A. ATTAWAY, K4IIF
DX Editor

FRED CAPOSSELA, K6SSS
W.W. Contest Director

WILLIAM DE WITT, W2DD
SSTV Editor

HUGH CASSIDY, WA6AUD
Assistant DX Editor

A. EDWARD HOPPER, W2GT
USA-CA Director

GEORGE JACOBS, W3ASK
Propagation Editor

IRWIN MATH, WA2NDM
Math's Notes

GORDON ELIOT WHITE
Surplus Sidelights

BUSINESS

SANFORD R. COWAN
President

RICHARD A. COWAN, WA2LRO
Publisher & Advertising Director

GLORIA FORSYTH
Circulation Manager

PRODUCTION

ALAN M. DORHOFFER, K2EEK
Production Manager

WILLIAM H. TRAVIS
Art Director

K & S GRAPHICS
Illustrations

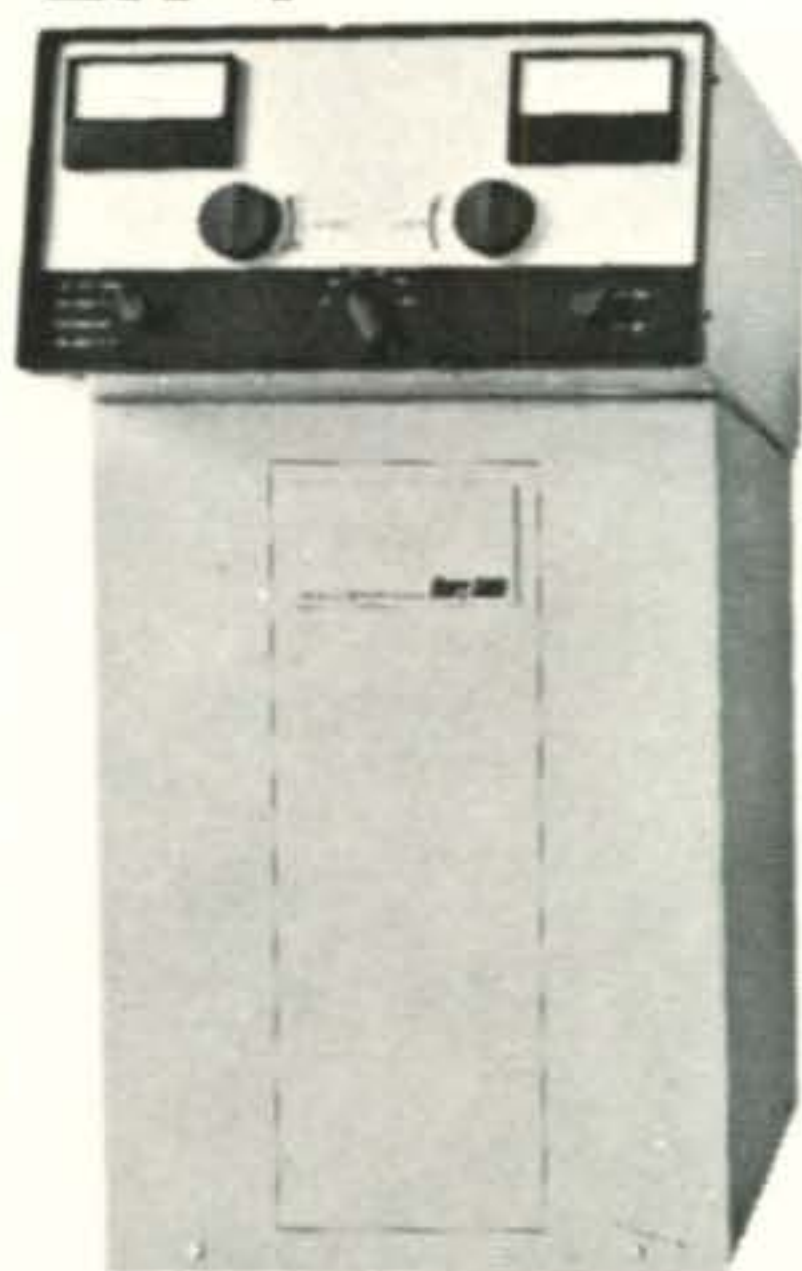
Henry Radio's
KENWOOD



TS-520 go every place . . . do everything transceiver

"The trend setter..the hottest little rig on the air." You have heard it on every band.. Kenwood's go-every-place/do-everything transceiver. SSB & CW on 80 thru 10 meters, built-in AC & 12VDC power supply, VOX, RIT, noise blanker and all the other features you want. The 520's low price...\$629. Write for full description on the 520 as well as Kenwood's R-599D/T599D "twins" and the new 2 meter, all mode transceiver the TS-700A.

Henry Radio's
2K-4



The 2K-4 linear amplifier embodies all of the famous features of the 2K-3 ... rugged construction, reliable performance and heavy duty components, plus unique modern styling. The tilted RF deck faces up for easy visibility and convenient operation. If you are one of the more than 3000 happy 2K

owners, trade up to the new 2K-4. If you are not one of the group, now is the time to join. The 2K-4 (console or desk model) . . . \$995.00
The K-2000 (Smaller Size... a giant performer) \$795.00



TEMPO/CL 146A

. . . a VHF/FM mobile transceiver for the 2 meter amateur band. It is compact, ruggedly built and completely solid state. One channel supplied plus two channels of your choice

144 to 148 MHz coverage Multifrequency spread of 2 MHz 12 channel possible Metering of output and receive Internal speaker, dynamic microphone, mounting bracket and power cord supplied. A Tempo "best buy" at \$239.00.



TEMPO
VHF/UHF AMPLIFIERS

Solid state power amplifiers for use in most land mobile applications. Increase the range, clarity, reliability and speed of two-way communications.

Now, meet Henry Radio . . .



Walt Henry
W6ZN
ANAHEIM



Ted Henry
W6UOU
LOS ANGELES



Bob Henry
W0ARA
BUTLER

Plus a large staff of highly qualified sales and service personnel pledged to serve you. Henry Radio carries large stocks of all major brands. We take trade-ins, sell used equipment and offer better terms because we carry our own financing. Our reconditioned equipment carries a 15 day trial, 90 day warranty and may be traded back within 90 days for full credit toward the purchase of new equipment. Export inquiries solicited. Also, military, commercial, industrial, and scientific users . . . please write for information on our custom line of high power linear amplifiers and RF power generators.

Henry Radio stores can now supply the complete line of Yaesu equipment.

Henry Radio

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
Butler, Missouri 64730 816/679-3127

"World's Largest Distributor of Amateur Radio Equipment"

Prices subject to change without notice



ZERO BIAS

As another year draws to a close it seems appropriate to express a few words of gratitude to some of the fine people who work to bring you *CQ* each month. Among them are a sprinkling of newcomers to Amateur Radio, but by and large they represent an experienced group of dedicated old timers who labor at modest wages to write and edit and collate the copy that fills much our thousand-odd pages during the year.

If we were to begin an alphabetical trek through our contributors we would have to start with "A" and that stands for Anzalone - Frank Anzalone, W1WY, who under the heading of Contest Calendar and as Chairman of the *CQ* Contest Committee, has put in over 20 years of unselfish service to the Amateur Radio contest world through the pages of *CQ*. A dear friend and associate, Frank was forced by other priorities to step down this year from his two-decade tenure as Manager of the contest he and his crew of volunteers helped nurture into the world's largest and best Amateur Radio contest: The *CQ* World Wide DX Contest. Frank, of course continues to author his world-acclaimed column, Contest Calendar, and to oversee all *CQ* contest activities. *Grazie*, Frank.

A relative newcomer is our design mavin, Irwin Math, WA2NDM, who's only been writing his monthly Math's Notes column for 5 years now, but who has managed to generate a following of fans ranging from the newest Novice to the most advanced Extra, with his feet-on-the-ground practical approach to so many of the everyday technical problems in Amateur Radio. Irv never seems to lose sight of the fact that most Amateurs are not engineers as he is, but *are* intelligent, curious individuals who sometimes need only to have the seed of an idea planted to produce many satisfying hours in the Ham workshop. Thanks, Irv.

How about that guy Ed Hopper, W2GT? Is there a soul alive who *doesn't* like him? Ed's been on the job for *CQ* for a decade now, and going strong as Editor of *CQ*'s Awards Column and USA-CA Manager. You know, in over 10 years we've *never* heard the slightest negative comment about Ed's work. How can one guy be so conscientious! Thank you Mr. Hopper.

Two years ago we were fortunate to return a familiar name from an earlier era of *CQ* to our pages. Few writers have compiled such a record of service to the newcomers to Amateur Radio as has Herb Brier, W9EGQ, our Novice Editor. A seasoned pro in the writing game, Herb has now tallied about ten years with *CQ* all told, and we look forward to at least that much more to come. His patient, understanding guidance has helped un-

counted thousands of newcomers over the jagged rocks of their early Amateur Radio careers. Well done, Herb.

Where would Pendergast be without W6SAI, and how much poorer would we all be were it not for the enriching writing of Bill Orr? He's one of those living legends who seems to do well all that he dares to do, whether it's write the only exclusive antenna column in the Amateur Radio literature or peel back the lid from the confusing caldron of regulatory politics or tease us with his marvelously colorful "Golden Years of Radio" specials. It's a privilege to number you among our regulars, Bill.

There are two other "Bills" who must take their turns in the spotlight: Bill DeWitt, W2DD, who joined us as a staffer earlier this year, and Bill Scherer, W2AEF, our Technical Consultant and long-time friend. Although miles apart in their interests, they share several qualities without knowing it. Both are maddening perfectionists who will labor over the construction of a single sentence or thought until the last trace of inaccuracy has been wrung from it, and until no literate human being could dare to misunderstand the meaning. They are both craftsmen of the very highest caliber, and both have helped teach this editor the meaning of the word excellence. Thank you both, gentlemen.

One can't begin to speak of excellence without speaking of the quality which John Attaway, K4IIF has brought to the *CQ* DX Department over the past 10 years. As DX Editor and for a two-year period as Assistant DX Editor, John has elevated the standard of DX writing to an all time high, by providing an intelligent alternative to the "who worked what?" school of DX reporting. The professionalism of John has also been largely responsible for the smooth transitions the *CQ* DX Department experienced when the DX Editorship shifted to Jerry Hagen a few years ago, and then back to John himself this year. And as an international good will ambassador for Amateur Radio, he can't be beat. I thank you, John.

A veritable bundle of enthusiasm and energy is our new *CQ* World Wide DX Contest Director Fred Capossela, K6SSS who has somehow whipped his volunteers on the *CQ* Contest Committee into an efficient, smoothly-functioning force in the short period of one year. What weapon he uses to intimidate his troops into cooperation is a deep and dark secret, but whatever it is, it seems to work as well as W1WY's Retysnitch did when the Contest work was focused on Stamford, Conn. Hopefully, K6SSS will continue as W.W. DX Contest Director for years to come. Well done, Fred and crew.

A recent newcomera to the *CQ* Contributing staff is Hugh (Cass) Cassidy, WA6AUD, our almost-brand-new Assistant DX Editor. Cass comes well recommended by his excellent work on the West Coast DX Bulletin for over seven years, where he runs a pretty amazing one man show: writing, editing, typing, printing and mailing a multi-page weekly DX newsletter - alone! You embarrass me with your competence, Cass!
(Over)

There's a unit of DRAKE gear just right for any ham...

Season's Greetings

from your friends and fellow hams at R. L. Drake Co.

If your XYL needs a hint, circle your choice(s) and leave this ad where she will be sure to find it!



TR-22C



TR-72



AC-10
AA-10



R-4C



L-4B



T-4XC



C-4



TR-4C



MS-4



SSR-1



RV-4C



SPR-4



7075



W-4 WV-4



MN-4



MN-2000



TV-3300-LP



TV-1000-LP



TV-42-LP



7072



DSR-2



TV-300-HP

R. L. DRAKE COMPANY

540 Richard Street
Miamisburg, Ohio 45342



DRAKE

Phone (513) 866-2421
Telex 288-017

See us at SAROC in Las Vegas

No rundown of *CQ* staffers would be complete without mentioning the man with the crystal ball, George Jacobs, W3ASK. After 25 years of continuous writing for *CQ*, you'd think a person would tire, but like clockwork, George's Propagation column arrives every month, laden with the most complete and accurate forecasts of radio activity to be found anywhere in the world's Amateur Radio press. We're grateful to have the services of this professional among professional forecasters.

Now there's an elf out there in the wilds of the Dakota's who has almost single-handedly made QRP a way of life for thousands of Amateurs. His name is Ade Weiss, K8EEG/0, and a more gung-ho QRPer you're unlikely to find. Between his writing for *CQ* and editing the QRP journal "*The Milliwatt*", Ade somehow finds time to be an Associate Professor of English at the University of South Dakota. Not bad for a guy who looks like Rip Van Winkle as a boy. Congratulations, Ade, on the new Asst. Professorship, and for making QRP what it is today.

Running two of our other contests are two more hardworking and enthusiastic Amateurs: Bernie Welch, W8IMZ, Manager of the *CQ*

WPX/SSB Contest, and the newest addition to *CQ*'s Contributing Staff. Don McClenon, W3IN, who is now handling the *CQ* 160 Meter DX Contest. (The results of the 1975 160 Test are on page 32; the 1975 WPX/SSB contest results appeared on p. 39 last issue.) Thanks for another fine job Bernie, and welcome aboard Don.

Rounding out our roster of regulars is Gordon White, Surplus Editor who spends so much time writing that he never has gotten around to getting an Amateur license, but that doesn't stop him from being one of the most popular of all *CQ*'s writers. He's the man with the answers, when it comes to Surplus radio equipment; his information sources seem bottomless, as does his fascination for Command Sets. Gordon, our thanks for taking the brunt of our Surplus correspondence, now I have this old Navy receiver, but I need a schematic

Well, those are the people who make *CQ*. They're pro's; they're experienced; they're enthusiastic. And, getting back to the original premise of this year-end Editorial, they're very much appreciated by me, as Editor, and I'm sure by all of you, as readers. The best of season's greetings to you all.

73, Dick, K2MGA

OUR READERS SAY

Alice In Basic Land

Editor, *CQ*:

I read with great interest the article by Irving M. Gottlieb, W6HDM entitled "Alice in Basic-Land." I wish to congratulate the author on an article which I thought was long over due. However, I do have one fault to find with one of the items in his article.

I am by no means a mathematician, but something seems wrong with the formulas, in fig. 2 and on page 35, for finding the voltage on a capacitor after it has been discharged through a resistance for a specified time. I realize this was not the main point of his article, (which I find no fault with) but I have been searching long and hard for this formula and thought I had found it only to be disappointed when it didn't work. Here is why it won't work.

The formula in question is $V = Ee^{-t/RC}$. if we choose the simplest case where time t is the same as the RC time constant, then RC will be equal to t . Therefore, forgetting the minus sign, t/RC is equal to t/t or $1/1$ or 1 . Now we plug this back into the formula and we get $V = Ee^{-1}$. Now Algebra tells us that $Ee^{-1} = 1/Ee^{(1)}$ and it also tells us that any number to the first power is equal to itself, so $Ee^{(1)} = Ee$ and therefore $V = 1/Ee$.

So we must conclude that in the period of one time constant, the capacitor should discharge to a value equal to the reciprocal of the initial voltage. Let us try a value. Ee equals .9 volts. Therefore since $V = 1/Ee$, V should equal $1/.9$ or 1.111 volts. This is impossible since the capacitor must discharge to a voltage lower than the initial voltage.

Therefore I must assume the formula to be wrong.

I would be very grateful to anyone who can come up with the correct formula for this

Roger C. Galbraith, WA3TCO
Guys Mills, PA

Dear Mr. Galbraith:

When Alice peered into the looking glass, this topsy-turvy world became turvy-topsy. Whether this is a true reciprocal relationship, I am not sure. However, what you state that algebra tells us about reciprocals is not what I hear tell from several antiquated and musty old texts I have managed to lug with me for more years than I care to tell.

Specifically, OM, notion that $Ee^{-1} = 1/Ee$ is for the birds! And, this writer should know, for just such assumptions rewarded me with those glaring "D" grades in algebra I, II, and III!

Abiding now by the suggested guidance offered in these algebra primers, we find that $Ee^{-1} = E/e$. A slight change, to be sure, but one fraught with much significance. For now we find that re-plugging into the original formula yields, $V = E/e$. A little contemplation of this yield reveals that a single item constant results in approximately 37% of the initial voltage, E . ($e = 2.7183$, and $1/e = 1/2.7183 = 0.37$ or 37%.) By definition, a discharge process obeying the exponential law involved here should be depleted to 37% of its starting value. (Indeed, for each succeeding time constant, a further depletion by the factor $1/e$, or 37% occurs. Thus the value of V for three time constants is $E \times 37\% \times 37\% \times 37\%$, which becomes small fast! Perhaps, OM, you may have some stocks which have obeyed this "Law of decay" during the past couple of years.

Irv Gottlieb, W6HDM
Menlo Park, CA

The Millen 2 KW Transmatch

Super Heavy-Duty

- ① Matches 10-300 ohm unbalanced loads to 50 ohm transmitter output, 80 through 10 meters (1300 ohms on 80 and 40).
- ② Handles the amateur legal power limit.
- ③ Built-in sensitive trough-line Reflectometer.
- ④ Tight-fitting copper plated enclosure, shielded meter, minimizes stray radiation.
- ⑤ Double-wiping dual break heavy duty band switch.
- ⑥ Low-level coax output for scope sampling.
- ⑦ Compact: 14" w. x 7" h. x 13 5/8" d.

\$199.



TEL. (617) 324-4108

JAMES MILLEN

MANUFACTURING COMPANY, INC.

150 EXCHANGE ST., MALDEN, MASS. 02148



Announcements

● Pittsburgh, PA - The Carnegie Tech Radio Club, W3VC, will hold its first Annual Hamfest and Flea Market at Carnegie-Mellon University, Skibo Hall, on Forbes Ave., Pittsburgh, PA. It will be held on December 7, 1975. Table rentals are \$2.50 and Talk-ins are .52. For more information contact John R. Rose, WA2ZUL/3. ● Milan Italy - The Associazione Radiotecnica Italiana, A.R.I., member of the International Amateur Radio Union, I.A.R.U., announces the constitution of the Italian Amateur Radio Teleprinter Group. For further information contact Lamberto Rossi, 15 ROL, RTTY Manager of A.R.I., P.O. Box 50, 56021 Cascina, Italy. ● Colorado Springs, CO - Stolen Radio Equipment. A model HR2MS Transcan, serial number 11-01590, with a regency 2 meter transceiver was stolen on September 25, 1975 from the automobile of Jerry Haberer, WA0WSY. If you have information please notify any law enforcement agency or Jerry Haberer, WA0WSY, 7165 Tilden Ave., Colorado Springs, CO 80911. Phone 303-392-7518. ● Colorado Spings, CO - A model W5570 Sn. 010124 with Beltek 2 meter FM transceiver was stolen on or about August 5 from Ronald Ridenour's, W0CNK, car. If you have information please notify any law enforcement agency or Ronald Ridenour, W0CNK, 3700 Richard Rd., Denver, CO 80229, Phone 303-288-8696. ● Mankato, MI - Stolen from my car was a KDK 144 - 10SX Serial no. 5446 in the Chicago area on 10/25/75. If you have any information contact Nick

Kalafice, W0OZZ, 117 West Glencrest Dr., Mankato, MI 56001. Phone 507-387-2279.

Spread The Word

An eye-catching bumper sticker encouraging the man in the street to "Talk to the World—Become A Ham Operator" is available from CQ for 25¢ plus a legal-size s.a.s.e. Quantity prices upon request. Write to: CQ, 14 Vanderverter Av., Port Washington, NY 11050.

Forecast of Things to Come

Want the finest in long-range forecasts of radio propagation conditions? Want to know what band to use and when? Want to set a sked to any place in the world? CQ's Propagation Column can give you all the answers with hard-to-beat accuracy. It'll even tell you what sort of signal strength to expect! Months in advance!

But if you're looking for super-accurate short term forecasts, you can get them for the price of a phone call to CQ's exclusive Dial-A-Prop service. Just dial 516 883-6223 any time day or night for a 2-minute pre-recorded forecast covering the eight-day period from Tuesday through Tuesday, revised every Tuesday... more often if necessary. Remember: 516 883-6223. Available only through CQ.

Amperex has what it takes to be Number One in RF Power Semiconductors...

The Line · The Book · The Boards

The line has been expanded with the addition of all the popular 2N types to the standard in-house types that have been available all along; there are new supplements to the book, available at no charge of course, to every recipient of the original edition... and our applications assistance has kept pace by the addition of many more prototype sample boards

Yes, we are still going all out to support our state-of-the-art line with a state-of-the-art program of applications engineering assistance.

Today, there's an Amperex RF power transistor for virtually every fixed or mobile transmitter application from 1.6 MHz to 2300 MHz, from ¼ watt to 150 watts, in 25 different packages and operating at any standard voltage from 6V to 50V.

As new RF transistors are added to our product line, we publish supplements that keep the application manual right up to date. But the engineering assistance doesn't end with the manual — it only starts there. You won't even have to build the prototypes to get these circuits into production! We will supply sample boards, built for you, here in the Amperex applications laboratory. Use them to test, to evaluate, to demonstrate your system. Typical of the sample boards now being made available to Amperex customers is a 100 watt, 1.6 to 18 MHz, 12.5 volt Marine Radio Amplifier (illustrated below).

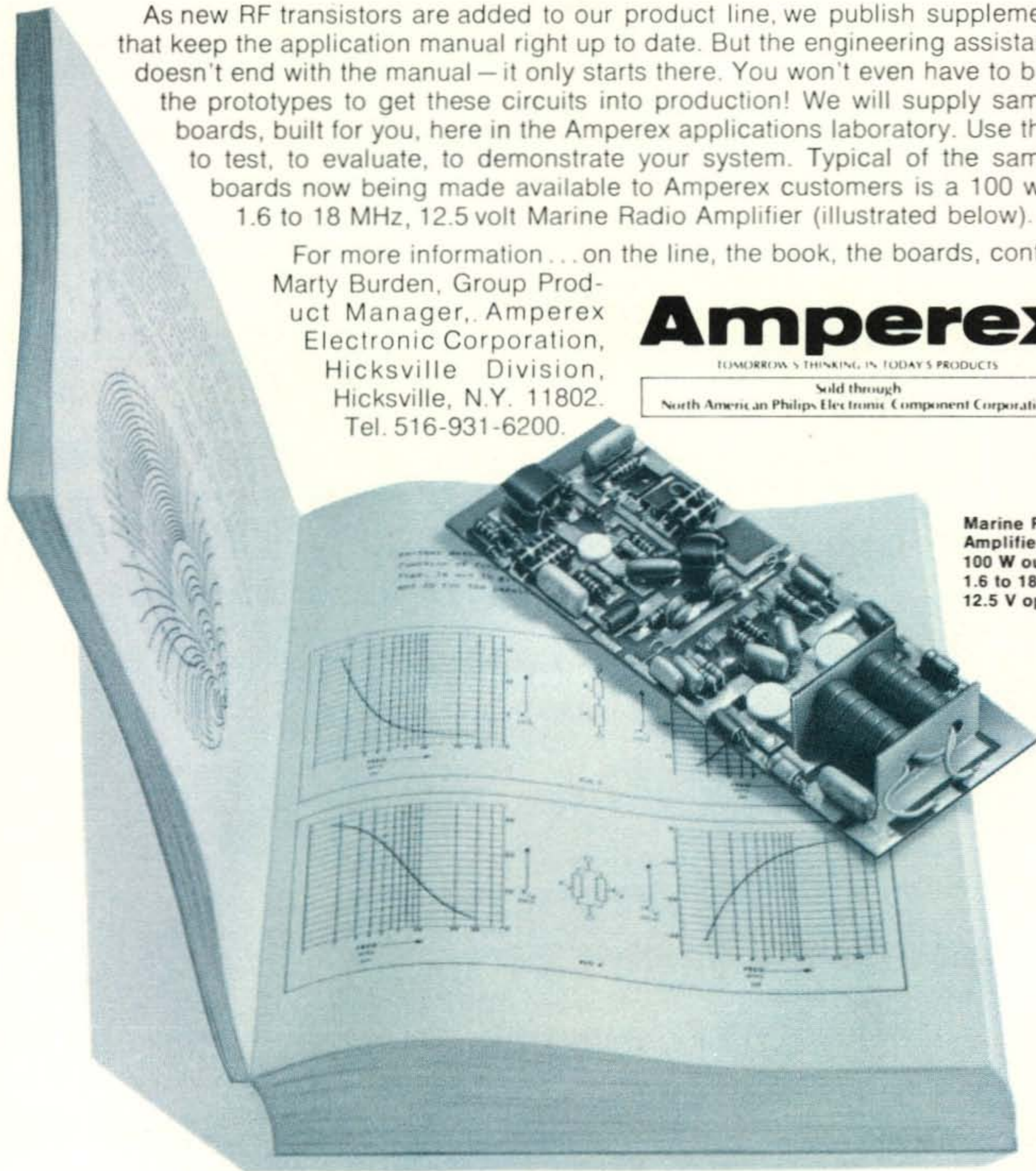
For more information... on the line, the book, the boards, contact Marty Burden, Group Product Manager, Amperex Electronic Corporation, Hicksville Division, Hicksville, N.Y. 11802. Tel. 516-931-6200.

Amperex®

TOMORROW'S THINKING IN TODAY'S PRODUCTS

Sold through
North American Philips Electronic Component Corporation

Marine Radio
Amplifier
100 W output,
1.6 to 18 MHz,
12.5 V operation



TALK IT EASY

Get the most out of your rig
with **LEADER** test equipment

Proper modulation means better results when you're out to make longer lasting contacts. What's more, you can get maximum power output and super radiation when you work your rig with the help of Leader Test Instruments. You also achieve optimum operating capability, proper impedance matching and minimum TVI problems. Easy to operate, Leader gear is priced to give you the best value for your communications dollar. It is the ideal "performance - test center".

(A) LPM-885 SWR Watt Meter

A sensitive, in-line type power meter which measures SWR of transmission lines and power output from 1.8 to 54MHz. Facilitates adjustment of transmitter and antenna systems for highest efficiency. May be left in circuit for continuous power output monitoring in the 1-1000W range. SWR Power Detector circuit assembly separates for remote measurements. Forward-to-Reverse power ratio is used for accurate SWR readings.

\$99.95

(B) LBO-310Ham Oscilloscope with Built-in LA-31 RF Monitor Adapter. Observe IF circuit waveforms and monitor SSB and AM transmitter signals. The built-in LA-31 Adapter helps provide continuous monitor of RF output (to 500W). This versatile scope will also indicate tuned condition for RRTY operation. The internal 2-tone generator checks SSB. Vert. sensitivity is 20mVp-p/div; DC-4MHz b'width. It's sensitive general purpose scope, too!

LBO-310Ham 3" Scope \$269.95

LA-31 adapter for use with our LBO-310A or any scope with deflection plate conn. \$ 22.95

(C) LPM-880 RF Watt Meter

Measure RF transmitter power output in the 0.5 to 120W range from 1.8 to 500MHz. Features pushbutton range selection with 50Ω load impedance. Also measures power losses in low pass filters and coaxial cables. Complete with sturdy tilt stand.

\$149.95

"Performance Test Center"

LEADER
Instruments Corp.
Communications Division

LEADER INSTRUMENTS CORP. 151 Dupont Street Plainview, N.Y. 11803 (516) 822-9300

Stability.



That's what you get from Sentry crystals. The best frequency stability you'll find anywhere. Because Sentry crystals are made of the finest quartz to the latest state-of-the-art specifications.

And since Sentry has the largest semi-processed crystal bank in the world, we can custom-make crystals for any rig. And frequency. Faster than anyone else in the business.

Sentry gold-plated crystals are for long term reliability. Our order processing is quick and efficient. And we stand behind our work. With solid guarantees.

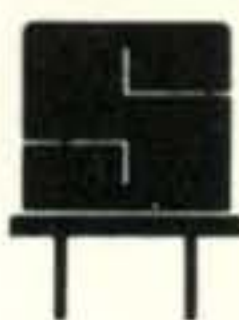
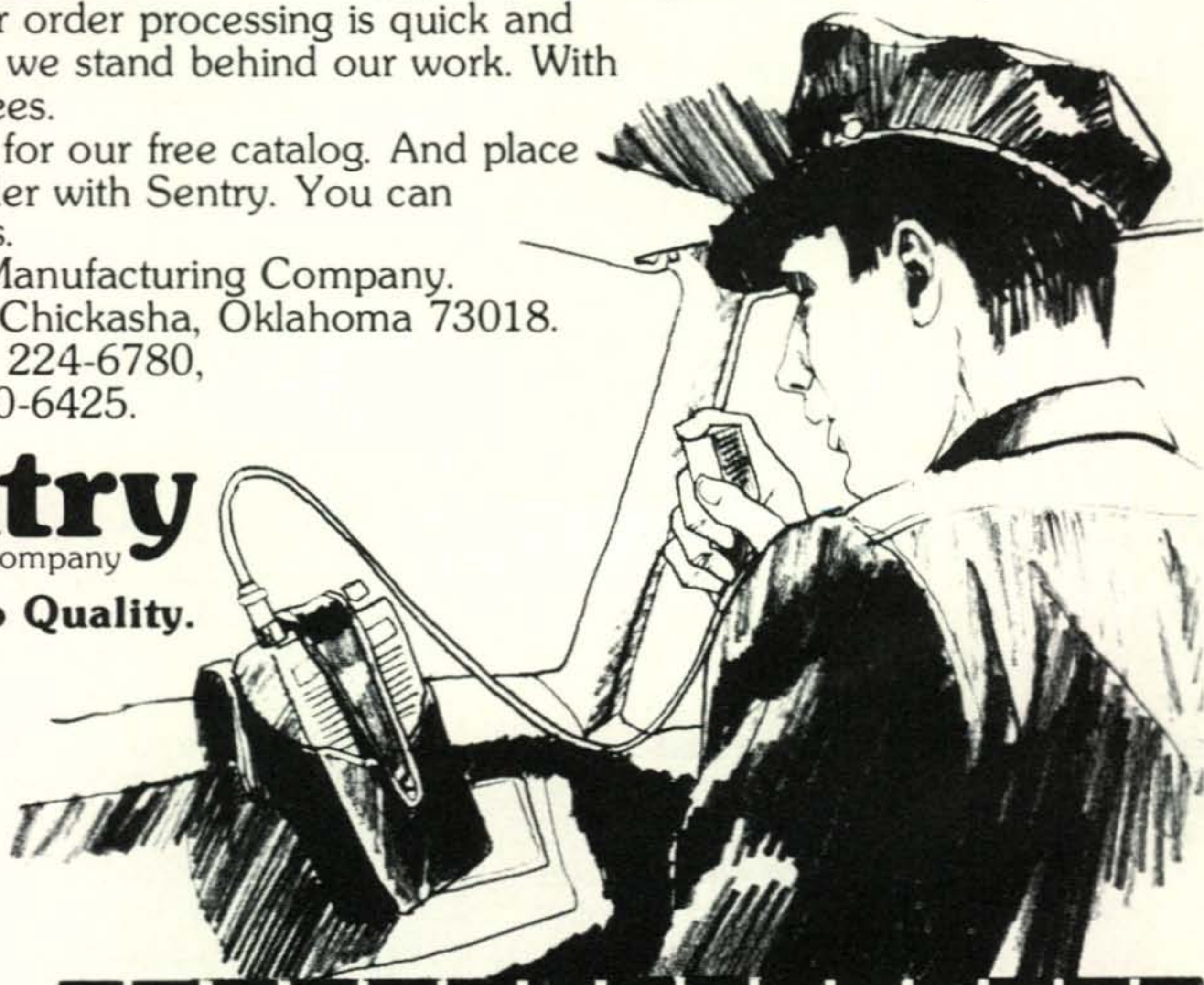
So send for our free catalog. And place your next order with Sentry. You can depend on us.

Sentry Manufacturing Company.
Crystal Park, Chickasha, Oklahoma 73018.
Phone: (405) 224-6780,
TWX-910-830-6425.

Sentry

Manufacturing Company

Tuned-In to Quality.



Sentry Manufacturing Co.
Crystal Park
Chickasha, Okla. 73018

CQ:1

Please send me your Free 1976 Sentry Catalog.
RIGHT AWAY!

Name _____

Street _____

City _____ State _____ Zip _____

Send for
Sentry's
FREE 1976
Catalog!

the hottest pair on the air

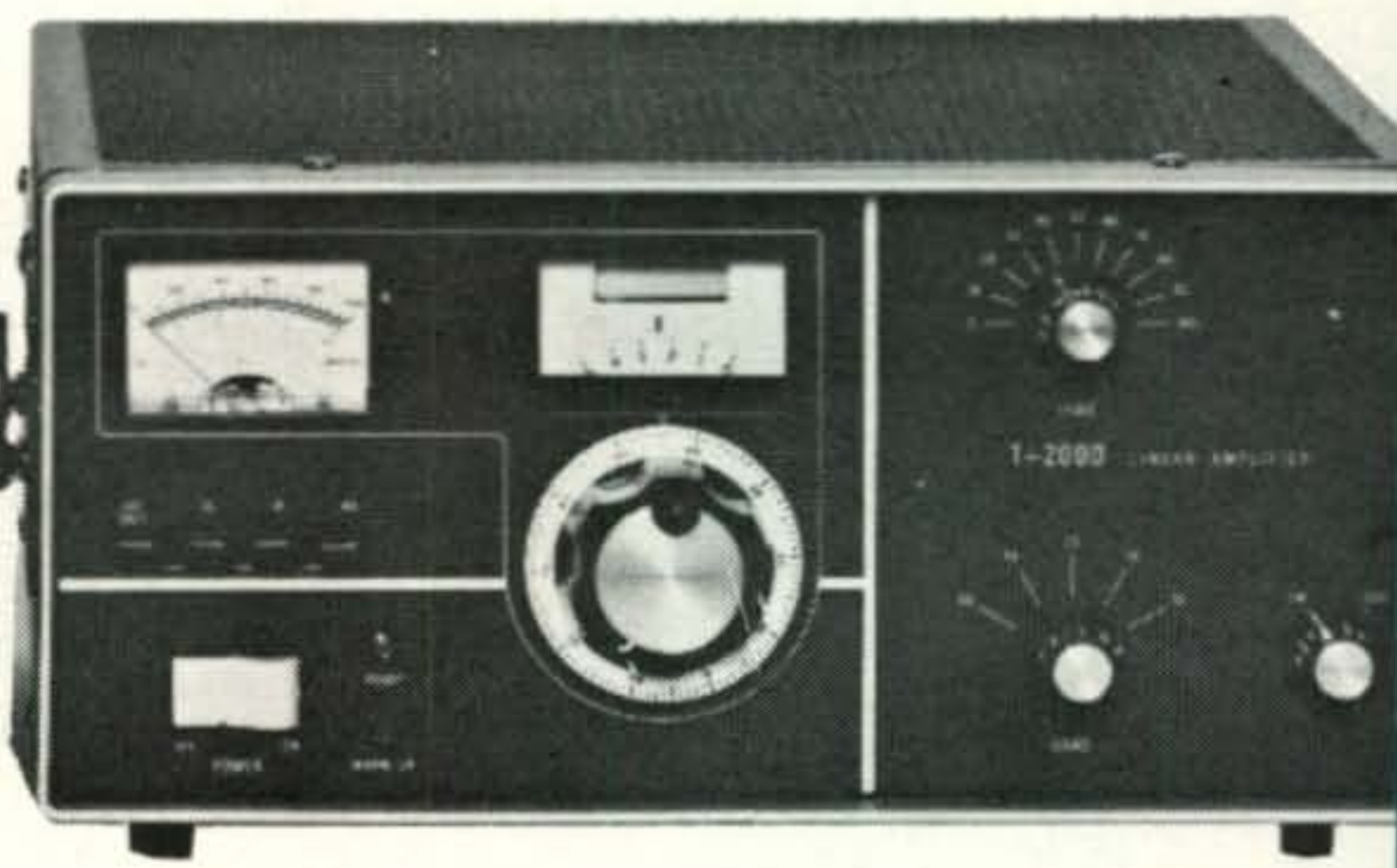


The Tempo ONE *DIGITAL* SSB TRANSCEIVER

The Tempo ONE has been the "best value" in SSB transceivers for several years. Now Tempo has outdone itself. The brand new Tempo ONE DIGITAL offers all of the proven features of the "ONE" combined with the advantages of a digital readout. Actual transmit and receive frequencies are displayed as fast as the transceiver is tuned. There is no chance of confusion, no chance of operating out of the band. The Tempo ONE DIGITAL, at only \$498, is the most inexpensive digital transceiver available.

The famous Tempo ONE, without digital readout, is still available at only \$399.00 AC/ONE power supply \$99.00. DC/1-A power supply \$120.00

The Tempo ONE is available at Tempo dealers throughout the U.S.. Also available is the Tempo CL-146A, CL-220, DFD/ONE, DFD/K, FMH, RBF-1 and TDC. Please call or write for specifications and prices.



The Tempo T-2000 LINEAR AMPLIFIER

The brand new T-2000 linear is the perfect companion for the Tempo ONE. It is compact, reliable, and priced right. Uses two Eimac 8873 grounded grid triodes cooled through a large heat sink. The T-2000 offers a full 2 KW PEP input for SSB operation and provides amateur band coverage from 80—10 meters. Provides a built-in solid state power supply, built-in antenna relay, a relative RF power indicator, and built-in quality to match much more expensive amplifiers. Completely wired and ready for operation . . . only \$795.00

Henry Radio

11240 W. Olympic Blvd., Los Angeles, Calif. 90064
213/477-6
931 N. Euclid, Anaheim, Calif. 92801 714/772-9
Butler, Missouri 64730 816/679-3

Hy-Gain 270

2-meter antenna

A great mobile that's also a great base.

The same state-of-the-art qualities that make the Hy-Gain 270 antenna a great 2 meter mobile, make it a great 2 meter base.

Hy-Gain design has eliminated hard tuning, high VSWR and poor pattern due to irregular ground plane. The 270's slim mobile configuration makes it ideal for apartment or urban installations where space is at a premium.

Fiberglass 270 develops gain through the use of 2 stacked 5/8 wave radiators with a self-contained 1/4 wave decoupling system. Gain that helps reach distant repeaters.

Since the antenna and feedpoint are sealed in fiberglass, the Hy-Gain 270 delivers top performance year after year without corrosion loss.

Get all the 2 meter base you need, for the price of a 2 meter mobile. The great Hy-Gain 270.

- 6 db gain
- 250 watt rated
- 144-148 MHz
- VSWR less than 1.5:1 at resonance, 6 MHz bandwidth
- 96" high
- Completely factory tuned
- 50 ohm input impedance
- Complete with 18' coax and PL-259

For information on Hy-Gain 2 meter and other amateur products contact your Hy-Gain distributor or write.

Hy-Gain Electronics Corporation: 8601 Northeast Highway Six; Lincoln, NE 68505; 402/464-9151; Telex 48-6424 • Main Office and Warehouse; 6100 Sepulveda Blvd., #322; Van Nuys, CA 91401; 213/785-4532; Telex 65-1359 • Distributed in Canada by Lectron Radio Sales, Ltd.; 211 Hunter Street West; Peterborough, Ontario

 **hy-gain**®

KENWOOD

*...Why settle
for less!*

There are several good transceivers on the market today. But if you compare them carefully . . . study the specifications, note the important features, and finally talk to some Kenwood owners, you will have to come to the same conclusion that thousands of others have come to . . . you can't buy a better rig for the money than a Kenwood. Every unit is built with pride and designed to give top performance year after year. Join the switch to Kenwood.



The TS-520 shown
with the VFO-520 and SP-520

The TS-520 is the final word in SSB transceivers . . . the "hottest little rig on the air." It is a compact, mostly solid state, all-in-one transceiver with built-in AC/DC power supply and speaker. It operates SSB and CW on 80 thru 10 meters. Features include 2-position ALC and double split frequency controlled operation.

Available at select Kenwood dealers throughout the U.S.

Distributed by



**TRIO-KENWOOD
COMMUNICATIONS INC.**

116 East Alondra / Gardena, California 90248

new



the real performer! specifically for repeater

...or any TWO-METER FIXED STATION OPERATION

With **6** db—
db—

- Gain compared to 1/2 wave dipole
- FCC accepted for repeater application

mechanical

- Vertical element—117" long, 1-1/8" telescopic to 3/8" OD high strength aluminum
- Radials—four, 21" x 3/16" OD aluminum rod
- Connector—SO-239
- Wind load—26 pounds at 100 mph.
- Wind survival—100 mph.
- Completely self-supporting
- Mounting—fits vertical pipe up to 1-3/4" OD

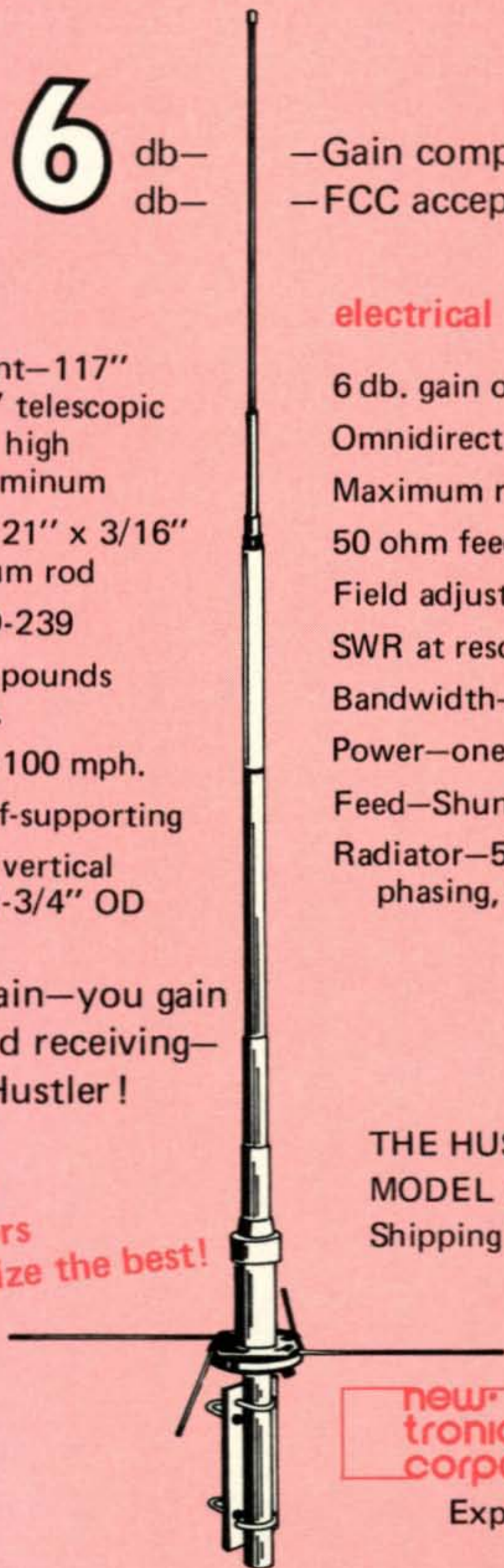
electrical

- 6 db. gain over 1/2 wave dipole
- Omnidirectional radiation pattern
- Maximum radiation—at horizon
- 50 ohm feed impedance
- Field adjustable—140-150 MHz
- SWR at resonance—1.2:1 measured at antenna
- Bandwidth—6 MHz for 2:1 or better SWR
- Power—one kilowatt FM
- Feed—Shunt with D.C. grounding
- Radiator—5/8 wave lower section, 1/4 wave phasing, 5/8 wave upper section

The gain you gain—you gain transmitting and receiving—get both with Hustler!

Available from all distributors who recognize the best!

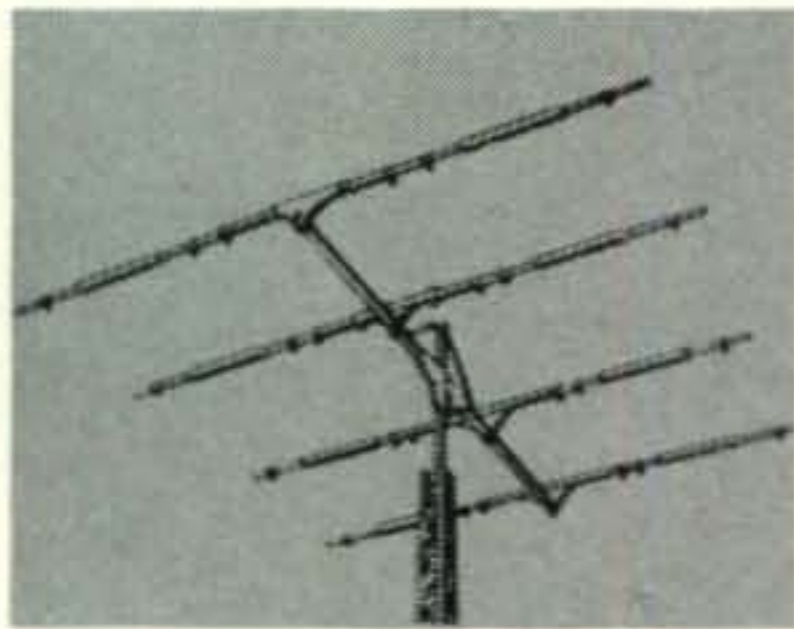
THE HUSTLER MASTER GAINER
MODEL G6-144-A
Shipping Wt.: 6.8 lbs.



**new
tronics
corporation**

15800 commerce park drive,
brook park, ohio 44142

Exporter: Roburn Agencies, Inc.,
New York, N.Y.



HOT



COMBO

Element for element, our rugged High-Q beam antennas are designed to give you the biggest signal your transmitter is capable of.

Now when you install one of these Swan antennas you can make sure you're running full bore all the time by hooking our new SWR/RF Power meter in the coax.

Heavy duty 4-element Tribander
Four elements work on 10, 15 and 20 meters. Optimum spacing for maximum performance. Precision tuned, weatherproof traps. 100-mph winds. TB-4HA. \$249.95

Heavy duty 3-element Tribander
Three elements work on 10, 15 and 20 meter bands. Rugged construction. Precision tuned, weatherproof traps. Excellent performance on lighter tower. TB-3HA. \$189.95

Economy 2-element Tribander Light enough for standard TV rotator but

withstands 80 mph winds. Two working elements on 10, 15 and 20 meters. TB-2A. \$129.95

Heavy duty 2-element 40-meter Beam
Two elements on steel beam. Maximum performance for 40-meter CW or phone. Big, weatherproof high-Q loading coils. Easily takes 100 mph winds. MB-40H. \$199.95

SWR/RF Power meter Combination meter measures standing wave ratio and antenna power. Low insertion loss lets you leave it in circuit. 3.5 to 150 MHz. \$21.95

All Swan Beam Antennas are Rated for 2000 Watts and designed to use 52 Ohm coaxial feedlines.

SWAN BEAM ANTENNA SPECIFICATIONS									
Antenna Model Number	Average Forward Gain	Front to Back Ratio	Boom Length & Diameter	Longest Element	Turning Radius	Maximum Wind Survival	Wind Load @ 80 mph	Wind Surface Area	Net Weight
TB-4HA	9 dB	24-26 dB	24' x 1.5"	28'-10"	18'-6"	100 mph	148 lbs.	6 sq. ft.	54 lbs.
TB-3HA	8 dB	20-22 dB	16' x 1.5"	28'-2"	16'	100 mph	110 lbs.	4 sq. ft.	44 lbs.
TB-2A	5 dB	16-18 dB	6.5' x 1.5"	27'-8"	14'-3"	80 mph	60 lbs.	1.8 sq. ft.	18 lbs.
MB-40H	4 dB	16-18 dB	15.75' x 1.5"	30'-4"	17'-6"	100 mph	80 lbs.	2.5 sq. ft.	40 lbs.



SWAN[®]
ELECTRONICS

A subsidiary of Cubic Corporation

305 Airport Road, Oceanside, Calif. 92054

While not the most compact SSTV monitor that could be built, the DCX/CLG monitor provides exceptional resistance to loss of sync due to noise on the signal.



The DCX/CLG SSTV Monitor

BY STEPHEN A. McKEOWN,* WA2CLG

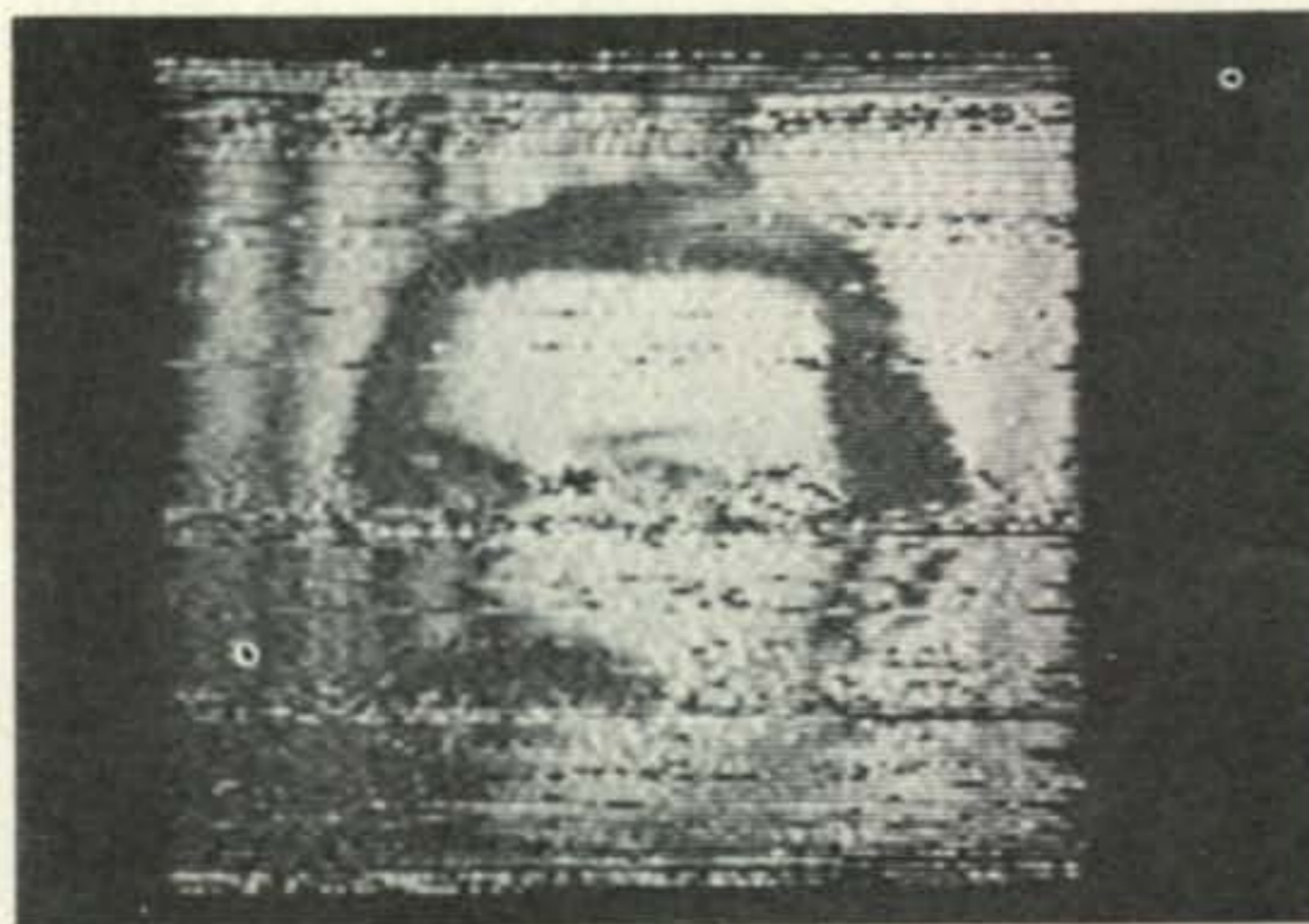
THE monitor described here features magnetic deflection, solid state circuitry, and some novel methods of achieving sync noise immunity. From previous experience with SSTV monitors it was found that under noisy conditions sync was generally lost before video. This phenomenon produces a very objectionable "line-tearing" and false vertical resetting. With this monitor the video information is lost before sync, resulting in a noisy picture with no line-tearing. Recognizable SSTV pictures were received with no S-meter deflection as shown in the photograph. The monitor is relatively straightforward in both construction and operation, and produces good quality pictures.

Video Circuitry

The video circuitry is more or less standard, and is similar to that used in the WB9-LVI scan converter.¹ The SSTV signal is fed into U_1 which is an operational amplifier acting as a limiter. A portion of the limited signal is fed into the sync circuitry, which will be discussed later. The remaining portion of the limited signal is fed through clamping diodes to TTL inverters and a TTL monostable multivibrator. The monostable multivibrator

is triggered on each zero crossing of the input signal so that a signal at 2400 Hz produces a d.c. level twice that of a signal at 200 Hz.² Integrated circuits U_{4A} , U_5 and U_{4B} form a 6-pole Butterworth low-pass filter with a cut off frequency of about 900 Hz. This filters off most of the a.c. component of the monostable multivibrator output pulses. The net result is a d.c. level proportional to the input frequency at pin 7 of U_4 . The contrast control varies the drive to the video amplifier (U_{6B})

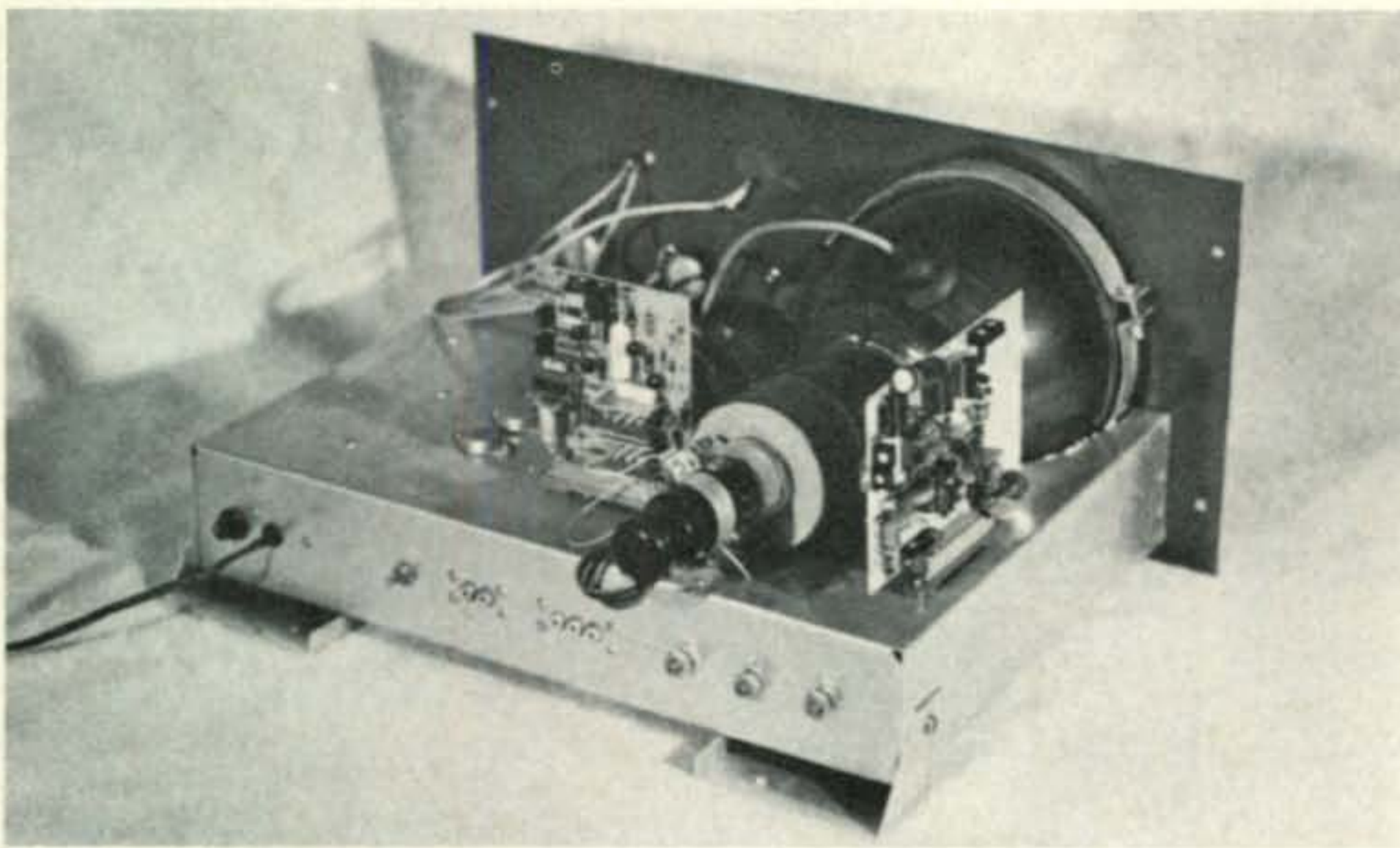
² Miller & Taggart; *Slow Scan Television Handbook*, page 55. Copyright 1973 by 73 inc.



Photograph of SSTV picture received off the air for which there was no S-meter deflection. The conditions were so poor that the station could not be identified.

* 17 Seneca St., Sidney, N.Y. 13838.

¹ Steber, Dr. George R.; "Slow Scan to Fast Scan TV Converter," *QST*, May 1975, page 29.



Interior view of the monitor showing placement of the CRT with relation to the circuit boards. At the right of the CRT is the deflection board; the video/sync board is to the left. All power supply circuitry is located below chassis to prevent distortion caused by stray magnetic fields from the power transformers.

and the brightness control varies the offset of the amplified signal. The 2N5058 transistor (Q_1) is a high voltage device which modulates the CRT cathode.

Sync Circuitry

The sync circuitry is slightly different than used on previous monitors. Existing convention uses sufficient bandwidth on the sync filter to pass the 5 millisecond horizontal sync pulses without distortion. In this monitor, a considerably narrower bandwidth is used and the sync pulse is digitally re-constructed.

In this processing, the limited signal is passed through a 56K resistor to a bandpass filter with a bandwidth of 100 Hz centered around the 1200 Hz sync frequency (the accepted bandwidth for the horizontal sync pulse filter is 400 Hz.³ The center frequency is set by R_2 and the sync frequency control mounted on the front panel, this allows com-

penensation for off-frequency tapes. The output from the sync filter is fed to a string of four 1N914's forming a threshold detector, which enhances the noise immunity. An emitter follower with a light emitting diode forms a sync indicator to simplify tuning of incoming signals. The detected signal across the 820-ohm resistor appears as half-wave 1200 Hz pulses with peaks of about 5 volts. This signal is fed through transistor Q_3 to a TTL inverter that squares the rectified pulses. The output from the inverter is fed to a retriggerable monostable multivibrator (U_{7A}) with a duration of about 1 milli-

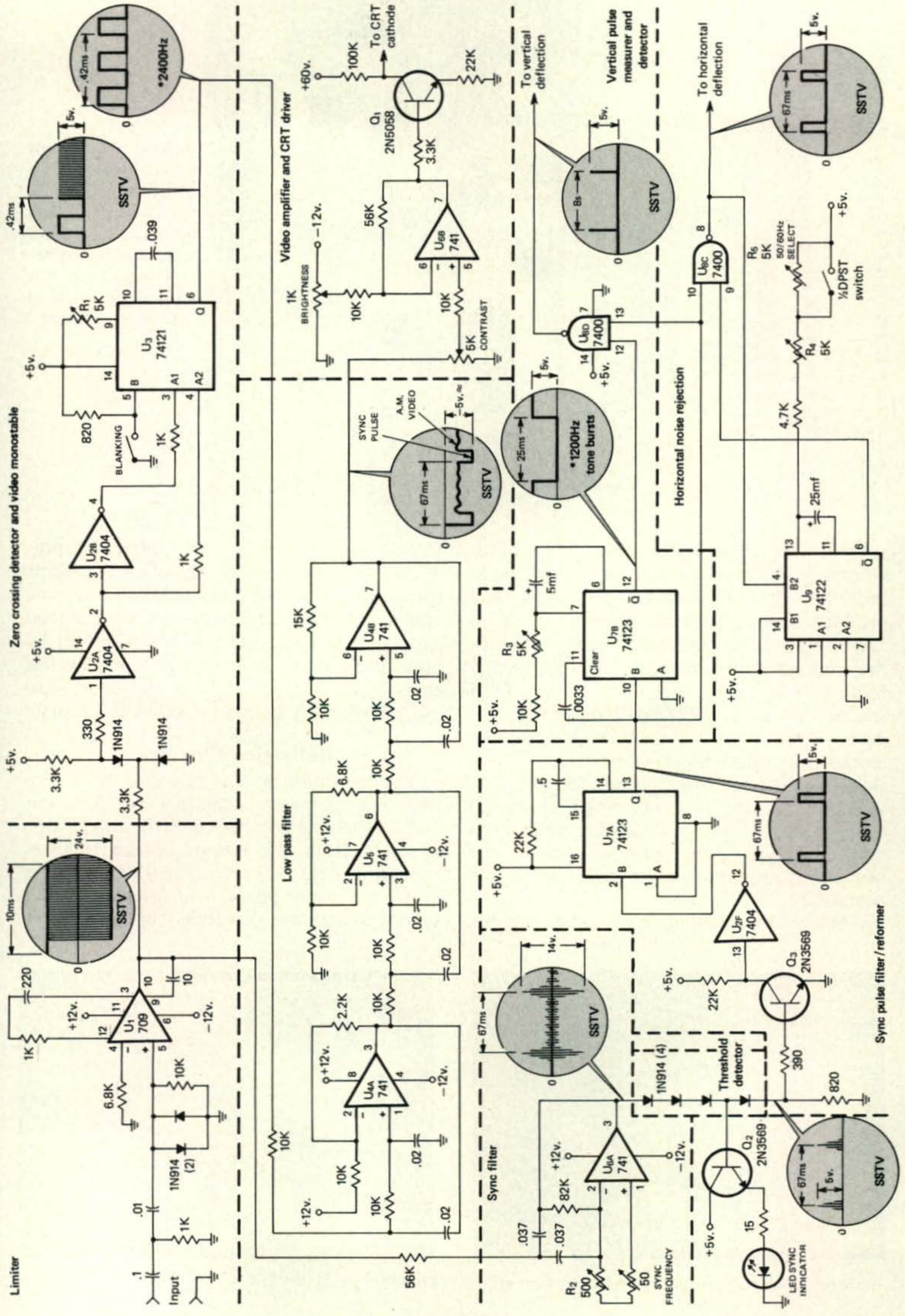
Fig. 1—Video circuits of the noise rejecting SSTV monitor. Waveforms in circles are as seen on a triggered sweep oscilloscope with input noted in circle. Times and voltages are approximate. Waveforms indicated with an asterisk (*) are part of the alignment procedure. Except as indicated, decimal values of capacitance are in mf; others are in pf. Resistances are in ohms, k = 1000, M = million.

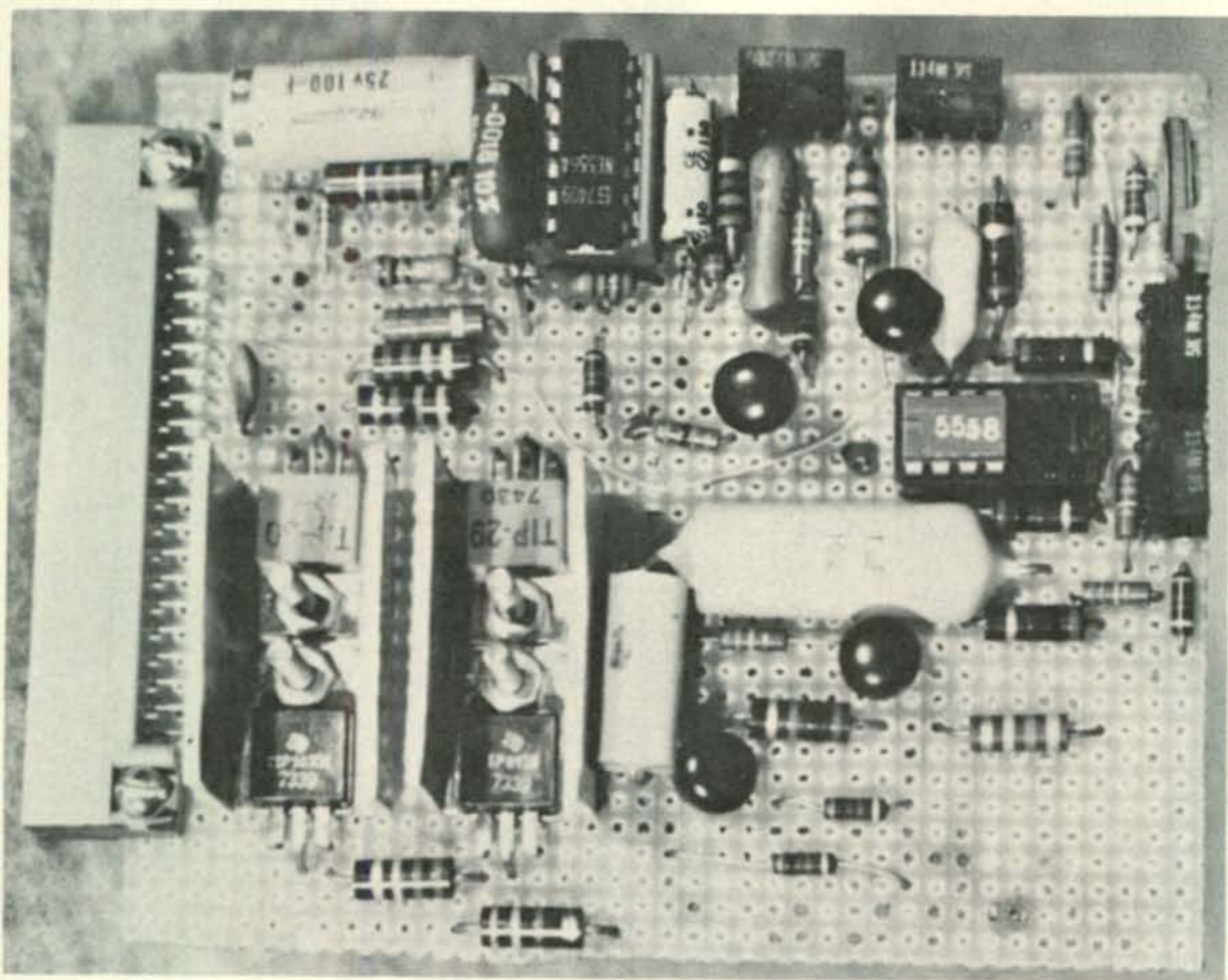


Photo of picture received from WØLMD under noisy conditions. Notice that sync is not lost.



Picture received from W8ATK under moderate conditions.





Deflection circuit board. Notice the output transistors at the lower left. One heat sink is at +12 volts and the other is at -12 volts thus eliminating the need for mica washers.

second. The retriggerable monostable multivibrator has a dual purpose in that it fills in the 1200 Hz half wave rectified signal and produces a square output pulse that is TTL compatible. With an SSTV signal input to the monitor, the monostable output is a 5 millisecond pulse repeated every 1/15 second and a 30 millisecond pulse repeated every 8 seconds. U_{7B} , another retriggerable monostable multivibrator recovers the vertical sync. The sync signal triggers U_{7B} which is set for a duration of about 20 milliseconds; if a 5 millisecond pulse or a short duration noise pulse is present, the negative-going edge of the pulse resets the monostable. If the monostable time runs out before the termination of the sync pulse,

the NAND gate (U_{8D}) is activated, producing a vertical sync signal. U_9 inhibits the resetting of the horizontal during line sweep. At sweep initiation, U_9 is triggered and the horizontal cannot be retriggered by noise until about 95% of the line time has elapsed. This is similar to the noise immunity used on numerous other monitors.

Deflection Circuitry

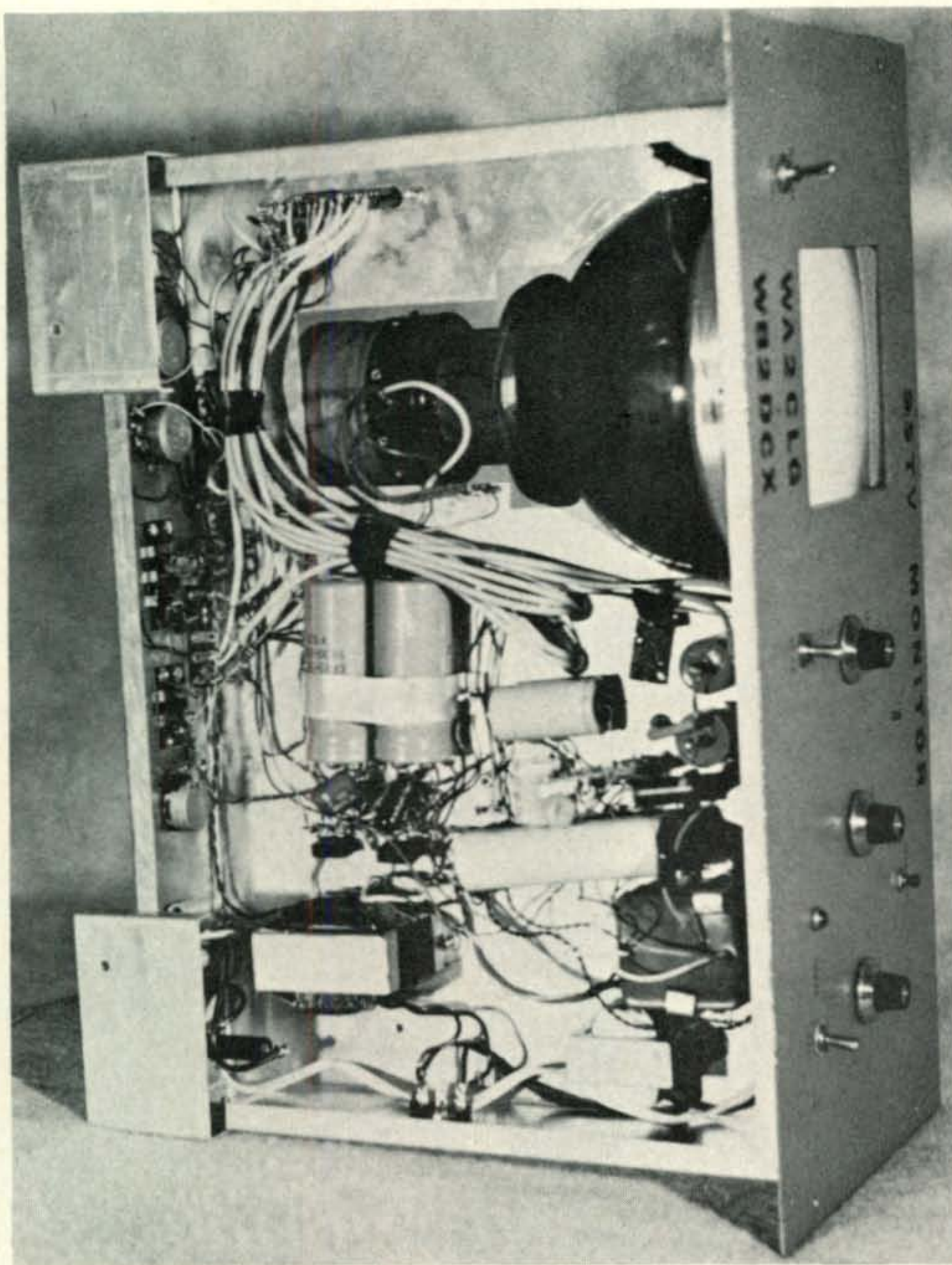
The deflection is accomplished by an integrating operational amplifier and follower. Notice that the feedback for the integration is taken from the output of the follower transistors (Q_6 , Q_7 , Q_{10} , Q_{11}) eliminating crossover distortion. Q_5 and Q_9 reset the integrators and are controlled by a NE 556



Picture received from W8ATK under good conditions.



Photograph of WB2DCX taken with a Plumbicon SSTV camera.



Underside of the monitor showing power supply circuitry.

dual timer (U_{11}) which is reset by the sync pulses. The dual timer produces a raster at all times which simplifies the tuning of very weak signals. The deflection circuitry is similar to that used in the W7ABW/ ϕ Plumbicon camera.⁴

High Voltage Power Supply

The high voltage power supply acts as a basic ringing choke converter. The transformer winding polarity between the primary and secondary permits energy to be transferred during the "off" time of transistor Q_{12} . Using this technique, voltages far in excess of that seen by the primary to secondary ratio can be generated due to the inductive "ring" of the primary at the time of transistor switch-off.

The network containing transistors Q_{13} and Q_{14} is used as an output voltage control circuit. The resistive chain across the output is used to provide a sample of the out-

put is used to provide a sample of the output voltage at the base of follower transistor Q_{13} , potentiometer R_9 adjusts the sampled voltage, thus adjusting the output voltage. Q_{13} drives Q_{14} which "shunts" the base drive to Q_{12} . As the output voltage increases, less energy is input to the transformer primary thus reducing the output voltage. The control thus obtained is adequate to maintain anode voltage on the CRT and to supply the accelerator grid with correct bias.

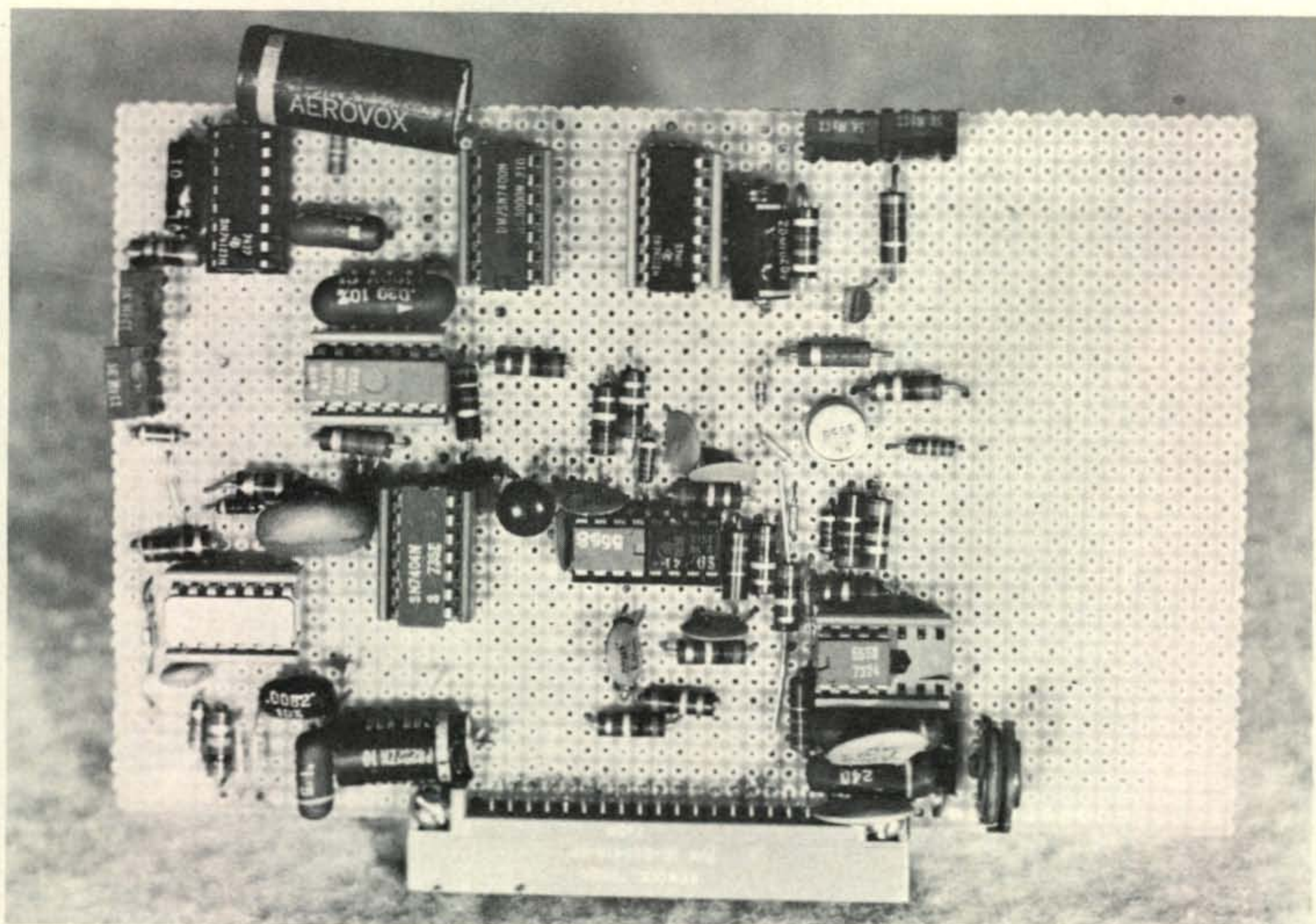
Low Voltage Power Supply

The low voltage power supply is standard; using bridge rectified, capacitive input filters, and integrated circuit 3-terminal regulators. The voltage required are 6.3 v.a.c. for the CRT filament, +5v for the TTL circuitry, and plus and minus 12 v. for the remainder of the circuitry.

Construction

The monitor was assembled in a cabinet 9 inches high by 19 inches wide by 13 inches deep. This is much larger than necessary but it allows ample room and therefore makes construction easier. The power supply is mounted on the underside of the chassis using point to point wiring. Some care must be used in the positioning of the high voltage wiring, but in general wiring is not critical. The signal, sync, and deflection circuits are mounted on Vectorboards on the upper side of the chassis, effectively using the chassis as an electrostatic shield. The power transistor for the high voltage power supply and the voltage regulators are heat sunked to the chassis. The deflection

⁴Page 125, Ibid.



The video/sync circuit board.

transistors are fastened to heat sinks on the vectorboard (see photographs). The signal wiring on the underside of the chassis makes liberal use of shielded cable, and capacitors are used to decouple all input leads. No difficulty with r.f. getting into the monitor has been experienced.

The horizontal and vertical size controls, and the focus control are mounted on the rear of the chassis. The controls on the front panel include brightness, sync frequency, and contrast. There are three switches on the front panel; power, 50/60 Hz standard select, and CRT blanking. A push button is provided for vertical reset.

Most of the parts used in this monitor were purchased from Radio Shack stores including the deflection transistors, which are sold as complementary pair audio outputs. Some scrounging is required for the CRT; a 7BP7 is used in this monitor, but a 5FP7 also produced excellent results. The deflection yoke is from an old TV set, the resistance of the vertical coil is 40 ohms and the resistance of the horizontal coil is 30 ohms. The focus coil consists of 2000 turns of 25 gauge wire on a 1½ inch diameter form 1½ inches long. The outside

diameter of the coil is 3 inches. Approximately 10 volts is required across this coil of 40 ohms resistance to produce the desired focus.

Alignment

The alignment of this monitor is quite straightforward, but a triggered sweep oscilloscope is virtually a necessity. The alignment instructions should be followed in sequence for best results.

Before turning the monitor on; set R_1 through R_6 , the vertical and horizontal centering controls, the focus control, and the sync frequency control to midrange. Also set the vertical and horizontal size controls, the brightness, and the contrast controls fully counter clockwise. The blanking switch should be set to normal.

1. Turn the monitor on and allow to warm up for 10 minutes.
2. Adjust R_6 to produce 5 to 6 kv at the anode (A2) of the CRT.
3. Turn the brightness up until a trace is observed, and adjust the focus control for the best focus. Do not allow the brightness to get too high.
4. With a 2400 Hz signal at the input of

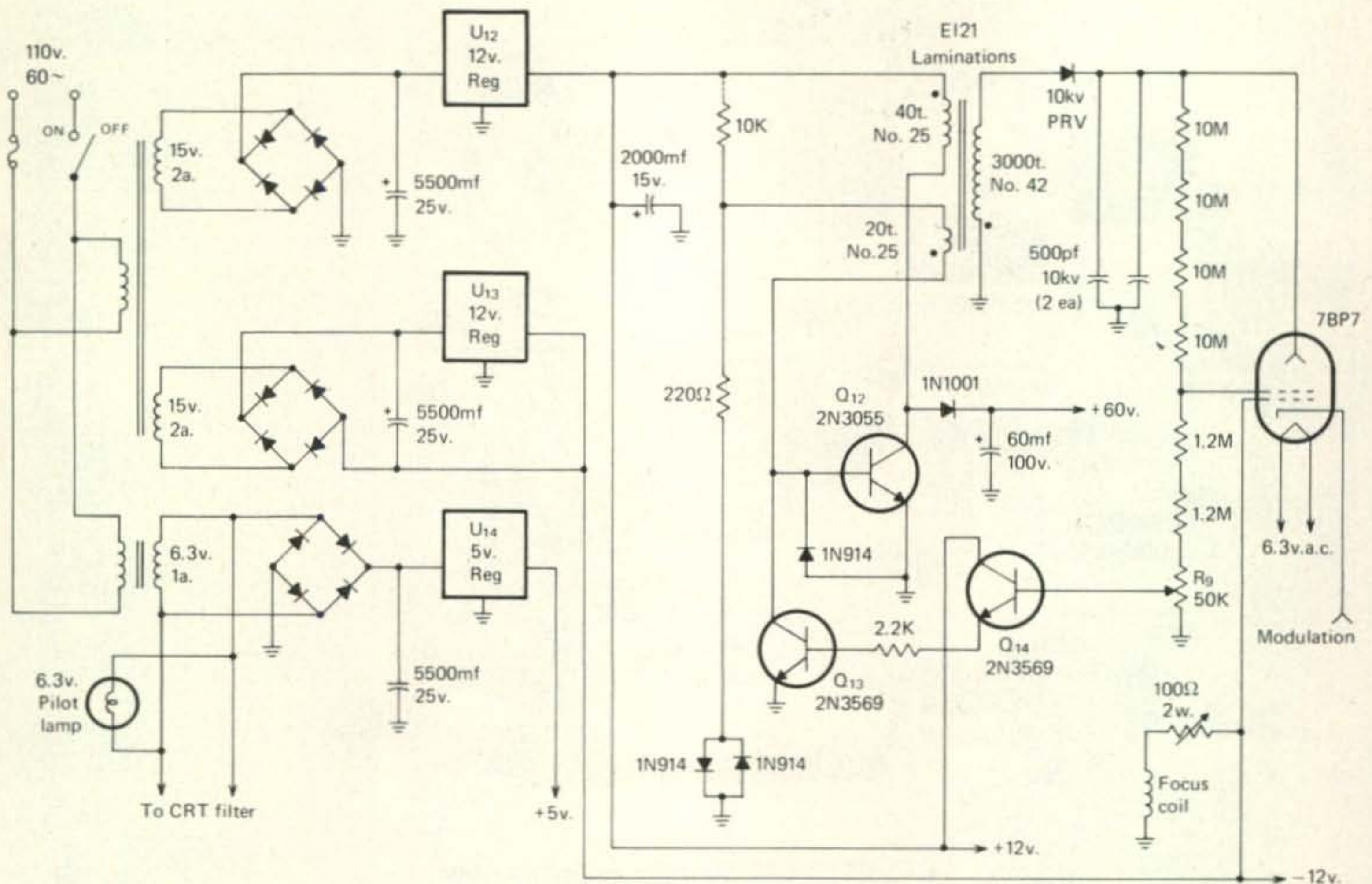


Fig. 3—Power supply and CRT circuitry. All resistors except high voltage divider network are 1/2 watt, divider network is made up of 1 watt resistors.

the monitor, adjust R_1 so that the waveform at pin 6 of U_8 has a 50% duty cycle.

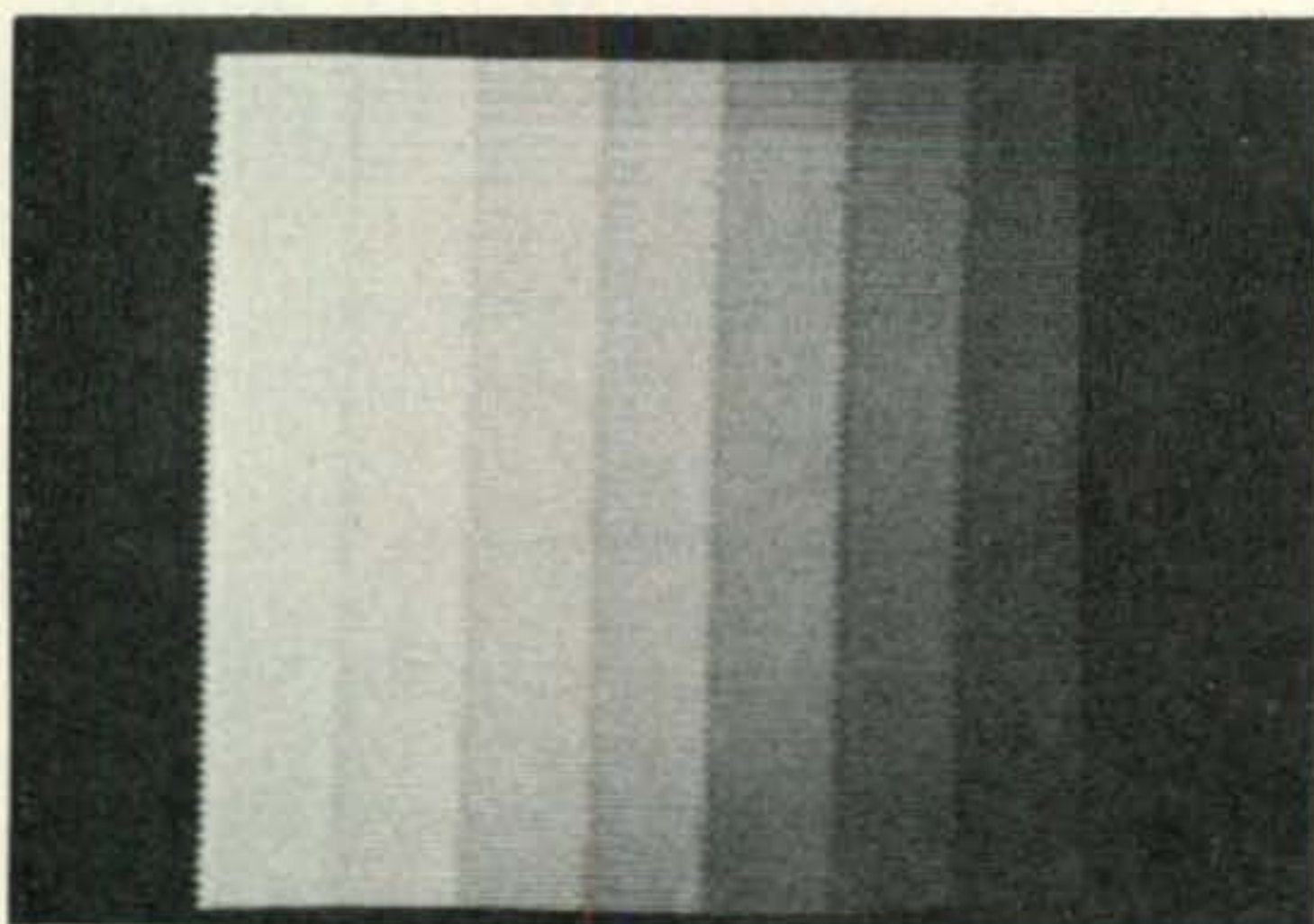
5. With the 50 ohm sync frequency control at midrange, apply a 1200. Hz tone and adjust R_2 so that the sync indicator LED is at maximum brightness.
6. With the selector switch set at 50 Hz and an SSTV signal at the input, adjust R_1 to provide a pulse duration of 50 milliseconds at pin 8 of U_9 .
7. With the selector switch set at 60 Hz and an SSTV signal at the input, adjust R_5

to provide a pulse duration of 58 milliseconds at pin 8 of U_9 .

8. With the selector switch set at 50 Hz and with no input to the monitor, adjust R_7 to provide a 60 millisecond repetition rate for the pulse on the collector of Q_4 .
9. With the selector switch set at 60 Hz and

Semiconductor Parts List

- U_1 —709 Operational amplifier.
- U_2 —7404 Hex Inverter.
- U_3 —76121 Monostable multivibrator.
- U_4, U_6, U_{11} —5558 Dual 741 op. amp.
- U_5 —741 Op. amp.
- U_7 —74123 Dual retriggerable monostable MV.
- U_8 —7400 Quad 2-input NAND gate.
- U_9 —74122 Retriggerable monostable multivibrator.
- U_{10} —556 Dual 555 timer.
- U_{12}, U_{13} —7812 12 volt regulator.
- U_{14} —7805 5 volt regulator.
- Q_1 —2N5058.
- $Q_2, Q_3, Q_4, Q_5, Q_8, Q_9, Q_{13}, Q_{14}$ —2N3569.
- Q_6, Q_7, Q_{10}, Q_{11} —Radio Shack complementary pair.
- Q_{12} —2N3055.



A seven-bar grey scale as viewed on the monitor.

- with no input to the monitor, adjust R_6 to provide a 68 millisecond repetition rate for the pulse on the collector of Q_4 .
10. With a series of 1200 Hz pulses 50 milliseconds in duration at the input of the monitor, adjust R_8 to provide a 20 millisecond negative going pulse at pin 12 of U_7 .
 11. With no input to the monitor, adjust R_8 to provide a 9 second repetition rate for the pulse on the collector of Q_8 .
 12. With a 60 Hz standard SSTV signal at the input of the monitor, adjust the vertical and horizontal size and centering controls for proper centering and filling of the screen.

This completes the alignment of the monitor.

Operation

The monitor is quite easy to operate. It is recommended that the brightness and contrast controls be set on a standard grey scale. Proficiency in the operation of this monitor is gained through practice. The blanking switch is used to turn the brightness off during times of no video, the 50/60 Hz select switch avoids the necessity of a horizontal hold control and is usually used in the 60 Hz position. The sync frequency control is used to compensate for off frequency tapes. This control should be at mid-range when receiving off the air. The vertical reset is used in case of a short or missed vertical sync pulse.

Conclusion

This monitor has produced excellent pictures under many different conditions. I would like to extend my thanks to Bob McMillen, W3ATV, Ed Sommerfield, W2FJT; Bill DeWitt, W2DD; and many of the other slow-scanners on the air for their useful suggestions leading to its development. ■

SUBSCRIBE TODAY

Spread The Word

An eye-catching bumper sticker encouraging the man in the street to "Talk to the World—Become a Ham Operator" is available from *CQ* for 25¢ plus a legal-size s.a.s.e. Quantity prices upon request. Write to: *CQ*, 14 Vanderventer Av., Port Washington, NY 11050.



Free Classified Ads

in the Electronic Fleamarket

If you subscribe to *CQ* you're eligible to run free classified ads every month in the new ELECTRONIC FLEAMARKET. This offer is good for all *CQ* subscribers every month. Please limit ads to 30 words or 6 lines, and no more than two ads per month. Buy, swap or sell. Your ad should be tied in somehow to electronics...ham gear, CB gear, test equipment, stereo gear...anything of interest to the electronic hobbyist. Remember, the ELECTRONIC FLEAMARKET is read by thousands of eager buyers.

And while you're at it, subscribe today to receive your own copy of the ELECTRONIC FLEAMARKET every month. It's mailed by First Class Mail, and costs only \$8.00 per year.

Use the coupon below.

ELECTRONIC FLEAMARKET

14 Vanderventer Ave.,
Port Washington, NY 11050

Here's my free ad for the Fleamarket:

Here's my order for a 1 year subscription to the Electronic Fleamarket. Enclosed is \$8.00. Start my sub with the next available issue.

No sub this time...just run my free ad.

Name.....

Address.....

City.....State.....Zip.....

...Just Hams

BY CHARLENE BABB KNADLE, WB2HJD

JEAN touched her cup to its saucer to allow the little trickle of coffee on its side to flow off. "Guess I'd better be getting home if you've got people coming over," she said, glancing at the pile of unfolded clean laundry in a nearby chair. She also couldn't help noticing the spots and cookie crumbs on the carpet and the thin layer of dust on the table near her.

"Oh, no; stay," Barbara answered. "It's not anybody important. Just some hams. I'm not going to do anything."

So Jean stayed, because she understood. Barbara had often complained to her about her husband's hobby. She didn't like the open pieces of "gear" that sat on Jack's desk with their tubes and wires showing for as long as several months sometimes, in the process of being "fixed." Nor did she like the "finds" that Jack spent small amounts or large sums of money on periodically. They arrived home sometimes dusty or grime-covered and seemed to merely disappear into the mass of "junk" that cluttered Jack's part of the storage areas. Jack's ham friends came now and then, usually in sports shirts and old jackets, and followed Jack straight to the "shack." There they would stay, happily talking the special jargon that hams use until Barbara would wonder what could possibly interest them for so long. Jean had felt Barbara's resentment of these friendships, whenever they were mentioned.

Jean and Barbara had been friends for years. They had gone to school together and had remained in the same town after their marriages. The two couples had seen each other occasionally, but it was not until Jean's husband had died in the car accident that Jean and Barbara had become close. Today Jean had allowed herself to be persuaded away from the painting she was doing to come for coffee. There had been a quality in Barbara's voice on the phone that made her feel that Barbara needed her. Now she knew why.

As if Barbara had read Jean's thoughts, she suddenly exclaimed, "Hey, why don't

you stay for dinner! Afterwards we can keep each other company while Jack is off in the shack with his ham friends. There will be several of them tonight, and they always keep Jack tied up a long time."

Jean agreed.

Five men rang the doorbell that evening, and five cars cluttered the driveway and the street. Barbara directed each to the shack, after a brief hello and in some cases an introduction. "Jack has a lot of friends," Jean commented.

"Anyone who's a ham is his friend, Barbara said, grimacing.

"Shouldn't we offer the men some coffee or something?" Jean asked.

"I guess we could," Barbara said. "I usually don't bother, though; they're usually too engrossed in what they're doing to be interested."

"Maybe the ring modulator is improperly balanced; it might have a bad diode," someone was saying as Jean and Barbara entered the hamshack. The sight of six men squeezed into the small, equipment-crowded room and huddled over a single mass of transistors and assorted components intrigued Jean.

"We'll be serving coffee in the dining room in a few minutes if you want some," Barbara said.

The visitors, to a man, turned to look at Jean and Barbara before answering. "I'd like some, yes, thank you," answered one; and the others chimed their agreement.

To Barbara's surprise, they all appeared in fifteen minutes, without further coaxing. One of them was saying something about 4CX250B's in the push-pull mode. When he had finished, Jack introduced everyone. Barbara had met some of the men, but Jean had met none of them previously. "Are all of you electronics technicians?" Jean asked. Jack was a technician, and it was an easy assumption to make.

One man guffawed but stopped quickly, realizing he was alone in his reaction. The others were silent, as if they hadn't heard the question. Jack smiled. "Terry and I are

*316 Vanderbilt Parkway, Dix Hills, N.Y. 11746

the only technicians, I think—unless you are Floyd.” Terry was the one who had been first to agree to coffee.

“Oh, no,” Floyd responded. “I’m an engineer.” Barbara was listening intently. It was Floyd who had laughed.

“Well, at least you’re all technical people,” Jean said quickly.

“I don’t know whether you could call my profession a technical one—I guess you could, in a way. But it doesn’t have much to do with electronics,” volunteered Sam.

“Profession?” Barbara asked, incredulous.

Sam felt a little self-conscious, and wondered why. “I’m a dentist, he answered matter-of-factly. And then to avoid center stage he turned to another fellow. “Ron, do you consider your work technical?”

“Anesthesiology gets technical at times,” Ron answered. “You have to learn to use some pretty complicated medical equipment. And in an emergency situation it might possibly be a little helpful to understand how the machines work. I get some clues about that from my interest in amateur radio.

Barbara was gaping now.

“And Tom here is a violin maker and musical instrument repair man,” explained Jack.

“Oh, is that so, Tom? I didn’t know that. How did you get interested in radio?” Sam asked.

Tom’s story stirred imaginations and elicited questions and comments from the other hams. But presently the subject lost its appeal. Terry, who had remained quiet, apparently had been considering whatever problem had been being discussed in the hamroom. “Say, Jack,” he said, “I wonder if you should try solving the drive problem with your final by replacing the exciter tube.”

Jack said that he had already tried that with no success, and the subject was dropped.

“By the way,” interjected Barbara. I must apologize for the messiness of the shack. Jack never quite gets things done in there, and I leave it alone.” She was secretly relieved that the living room with its dust and laundry wasn’t visible from the dining room.

“Messy?” Floyd laughed. “If you think Jack’s shack is messy, you should see mine.

“Actually,” responded Ron, “It’s kind of you not to disturb Jack’s things. I have my setup in the cellar, since with my three kids

and my mother-in-law there’s no extra space upstairs. But even so, my mother-in-law keeps cleaning it and I can’t find anything afterwards. She lives with us now that she’s a widow.”

“She cleans the cellar?” Barbara egged him on. “Then it must be a finished basement.”

“Oh, no; it’s unfinished. But I sort of spread things out and eventually they pile up pretty badly, and I guess it gets to her.”

So it was true. All hams were messy. Jack wasn’t the only one. Barbara was in a state of subliminal confusion. Was she to assume these professionals were below par, or change her concept that hams were second-class citizens?

“Your shack is a real show place, though, Sam,” Jack interposed, knowing what his wife was probably thinking. “Do you still have that picture you used to carry?”

“I don’t know if I’d go so far as to call it a showplace, but I’m pretty happy with it,” Sam answered, producing the picture from his wallet. Jack handed the picture around the table and Barbara saw that Sam owned the shiny array of her imagination. “But I have to keep the garage cluttered with my spare parts and tools. The XYL doesn’t like anything she thinks is ugly in the house, and I’m in trouble if she isn’t happy.”

Barbara knew that “XYL” meant “wife,” and suddenly she saw herself as that nagging, termagant wife that she had always hoped to avoid becoming. The mingled pride and defeat on Sam’s face and the sympathy and scorn registered on the others’ set her thinking. Was this the price of a clean, attractive hamshack—loss of face and a crippled marriage? If so, it was too much to pay, Barbara decided. True, Jack’s shack was never “presentable,” but it was only one room.

Sam, Ron, Floyd and Tom said their goodbyes and left, and Jack and Terry returned to the hamshack. Jean remembered her painting and left, promising to call in the morning. Momentarily, Terry left too.

“Jack . . .”

“Hmm?”

“How come you never told me about your friends before? I didn’t know they were engineers and doctors.”

“You never seemed interested. You give me the cold shoulder if I try to talk ham radio around you.”

“Well, that’s because every time I’ve ever

been around them they were talking about things like 'diode' and 'mixer' and 'sporadic-E' and other things that don't make any sense. I didn't know they were real people."

Jack was laughing.

"Seriously, I might feel differently about them if I knew about their other side."

"You're welcome into the hamshack any time."

"I'm not comfortable in there and you know it. When I bring coffee there for you and somebody I get the feeling I'm expected to speak that jargon. That's why I prefer to let you get beer or soda for yourself."

"But the reason they come is to see my shack or use my equipment to test something of theirs. We can't very well do that in the living room."

"You prefer their company to mine."

"That's not what I said and you know it."

"No. But if I was made of scrap iron and squeaked and honked you'd like me a lot better."

Jack laughed again. "You talk as if I spent every night in the shack with somebody. I'll bet I spend less time with hams than you do with your friend Jean."

"Not if you count the time you spend on the air, when you're in there alone, talking."

"Well, we hams help each other. I get a lot of good ideas when I talk on the rig. That's more than you and Jean can say. You don't have anything in common."

"We have a *lot* in common. We're both widows."

He looked at her levelly. "You mean you'd *like* to be a widow. You'd like the swinging single life like she's got. No telling what you two do when I'm not around."

"No. I mean I'm a ham-radio widow. And I don't like it at all. As for your other accusations, that's ridiculous."

"It it?" He glared at her.

"Yes. And mister, there's more than one kind of affair."

Jack grinned and took her hand. "Come in and meet my lover."

She allowed herself to be led to the ham room. He sat her on his desk chair and stood beside her. "Turn that knob," he said masterfully. She did, and several voices and a burst of static greeted her. Quickly he turned two other knobs, squelching the noise and clearly tuning in only one of the voices. "Now listen."

The voice was low and modulated, and

the ham was giving his views on the state of the nation. "He's talking politics!"

"Yes. Now let's see what else we can find." Jack turned a knob and the voice went away. Static noise appeared. Then a clear voice saying, "CQ, CQ."

"That means 'I'll talk to anybody who answers'," Jack explained, tuning him in. "Let's talk to him."

Before she could protest, Jack had his microphone in hand and was talking. The voice heard, and answered.

". . . and the XYL is here in the shack with me," Barbara heard Jack saying.

"Oh, then let me call my wife. I've been trying to get her on the air, but she's mike shy. Maybe she'll talk to another woman."

"But I . . ." Barbara started.

"She's more scared than you, probably. You heard what he said."

Barbara talked. The other woman talked. A half hour later, she yielded up the trembling microphone and Jack turned off the rig. She sat back, exhausted, and they smiled at each other.

"What kind of problem do you have, Jack?"

"Problem?"

"With your equipment. You were discussing it with those men tonight."

"Oh. The transmitter final isn't getting enough drive, and . . ." He saw her blank look and stopped. Grinning, he started again. He explained by equivalent examples what a final was, what drive meant, and what frustrations he had been through to try to correct the problem. To Barbara's amazement she found herself becoming interested.

Two weeks later, Jean called for a special reason: she was planning a party. "Saturday the eighteenth," she said.

Barbara looked at her calendar. "Oh, I'm sorry, Jean. I'm busy that weekend." She gave a little laugh. "You won't believe with what."

Jean was interested.

"I almost don't believe it myself. I'm going with Jack to an amateur radio convention. We'll have a room in the hotel where the convention is being held. And Jack says there are even special activities planned for the XYL's . . ."

Jean, who had lots of friends, accepted the "no" cheerfully. Hanging up the phone, she reflected momentarily. "XYL's, huh," she said aloud, smiling. Then suddenly she felt very good. ■

antennas

BY WILLIAM I. ORR,* W6SAI

"Holiday Greetings to you!" I exclaimed. Pendergast struggled up the walk carrying a large box. His eyes were bright and his cheeks were rosy and his breath made a cloud of smoke about his head in the frosty air. Puffing, he struggled the box through the door and dropped it with a thump on the operating table.

"Thank you. And the same to you! Look what I found under the Christmas tree," he exclaimed. Taking a screwdriver from the table, he expertly slit the tape on the box top, opening the carton like a flower.

"It's a transceiver," I said, peering into the box. "Right off the boat from Japan."

"A *Kamikaze 1000*," said Pendergast proudly, as he pulled it out of the box and ripped off the plastic cover. "It will work all bands from 160 meters to 10 meters."

"Does it cover 11 meters?" I inquired.

Pendergast peered at the bandswitch. "Yes," he admitted. "It has an 11 meter position on the switch."

"Well, Ten-Four, old Buddy, and have a lot of fun. May all your reports be wall-to-wall and tree-top-tall."

"What kind of gibberish is that?" demanded my friend. "The reason I got this transceiver is that it has the 160 meter band on it. And now the question is: can we have a discussion about 160 meter antennas without reference to the 11 meter position on the bandswitch?"

"Of course," I replied. "I was only pulling your leg."

Pendergast quickly leafed through the instruction manual. "It says in here that a nominal 50 ohm load is required on all bands."

"That can be accomplished," I replied. "However, a few facts about 160 meter an-

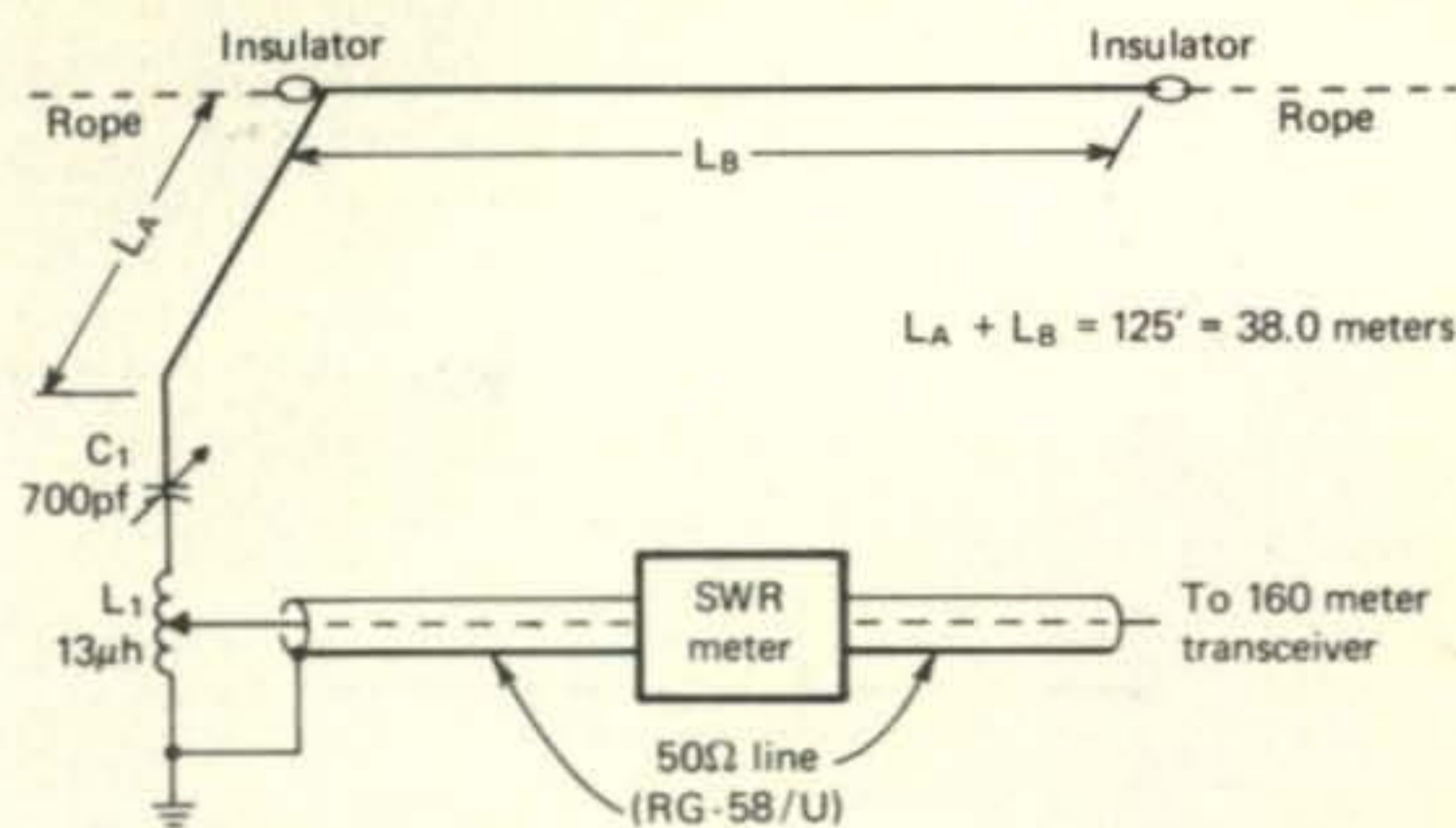


Fig. 1—Typical Marconi antenna for 160 meter band. Capacitor C_1 is a two section broadcast type. Coil L_1 is 20 turns of #20 tinned wire, 2" diameter, spaced to 2" long. Adjust capacitor for maximum loading and tap on the coil for minimum s.w.r. See text for information on ground connection.

tennas in general are not amiss. As you know, the band is divided into segments, the most-used one being the 1800-1900 kHz segment, in which amateur operation is authorized in most of the United States. Some areas are allowed to operate in 1900-2000 kHz, and various foreign countries restrict 160 meter operation to skinny, 10 kHz slices of the band. All this is done because the 160 meter band is shared with Loran in most of the world, and is also used for the Maritime Mobile Service in other areas of the world".

"Let's talk about the 1800-1900 kHz assignment," said Pendergast.

"Very well," I replied. "To start with, a dipole antenna cut to the center of this assignment, or 1850 kHz, is about 253 feet long. If it is mounted at a reasonable height above ground, say, 30 to 50 feet, the radiation resistance will fall in the range of 15 to 30 ohms. Most amateurs don't have the

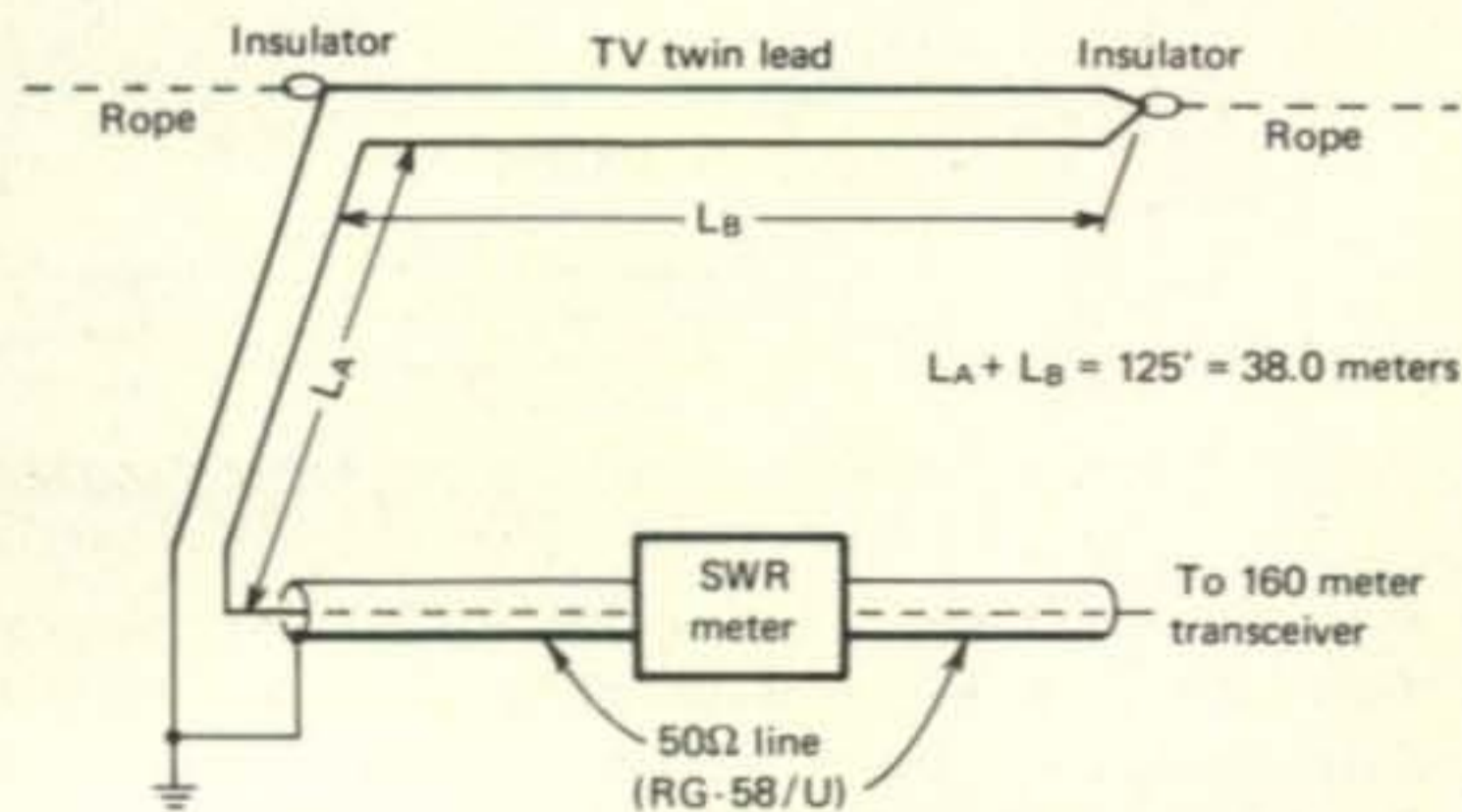


Fig. 2—Folded Marconi antenna for 160 meters. Antenna is made of TV-type twin lead. Antenna leads are joined at far insulator. At the input end, one wire is grounded the other is fed by a 50 ohm coaxial line.

*48 Campbell Lane, Menlo Park, CA 94025.

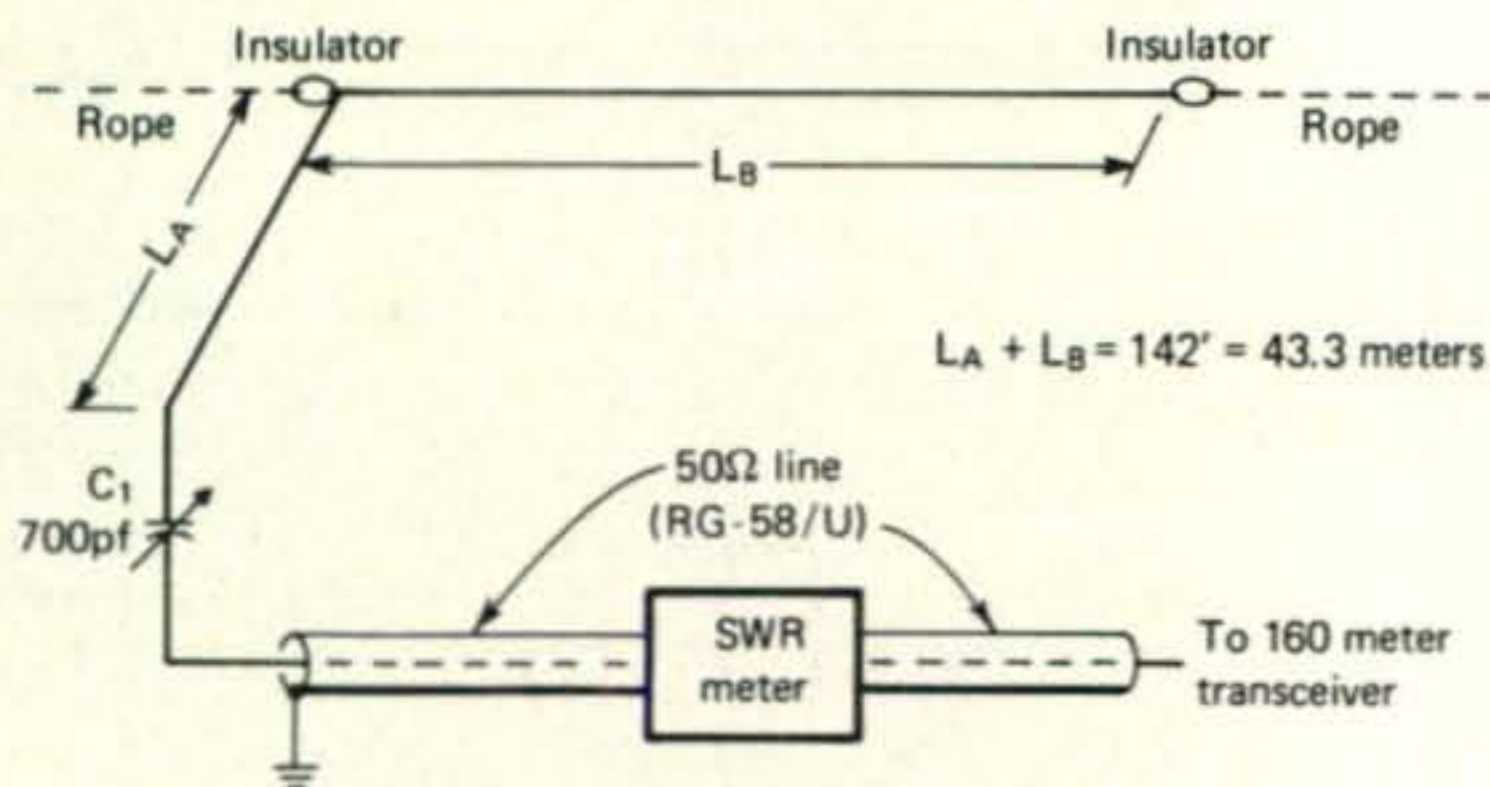


Fig. 3—Extended Marconi antenna for 160 meters. Antenna length is extended beyond quarter wavelength so as to raise input impedance. Antenna reactance tuned out by capacitor C_1 .

acreage to put up an antenna of this size, so they start thinking about either a Marconi antenna or a vertical antenna of some sort."

"Right!" exclaimed Pendergast. "How about a simple, wire antenna running from the house to a nearby, convenient tree?"

"You can do it," I replied. "Look at fig. 1. This is just about the simplest 160 meter antenna you can build. It is a Marconi antenna designed for coaxial feed from a 50 ohm line. The flat-top, or antenna wire, is about 125 feet long and is series-tuned to resonance against ground. The coaxial line is tapped on at an appropriate point on the coil to make a good impedance match. The

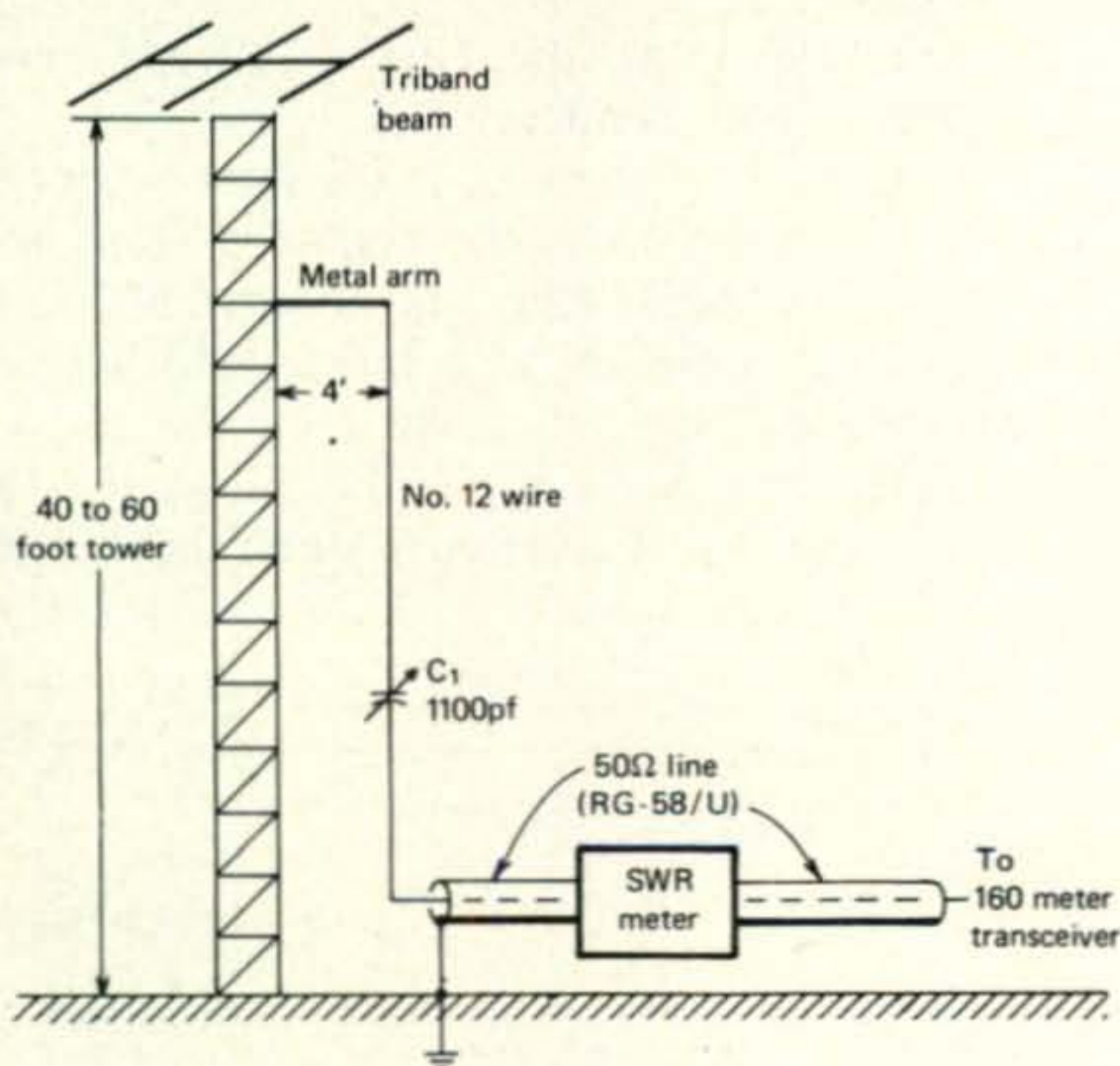


Fig. 4—Gamma-fed tower for 160 meter operation. Place metal arm at 80% of tower height. Capacitor C_1 is three-section broadcast type. Adjust placement of arm and length of gamma wire for lowest s.w.r. on transmission line. Control leads to rotor and indicating device should be brought to ground level and each lead bypassed to ground with a .01 mf disc capacitor before being led away from the tower.

capacitor is adjusted for maximum loading and the tap is adjusted for the lowest value of s.w.r. on the line."

"What about the ground system?" asked Pendergast as he scribbled in his notebook.

"The ground is an important part of the antenna," I admitted. "The radiation resistance of the Marconi antenna runs close to 10 ohms when the flat-top runs parallel to the ground at a height of about 35 feet. If the antenna is vertical, the radiation resistance runs close to 35 ohms. Most hams can't put up a vertical antenna that tall, so they settle for one that is mostly horizontal. All ground losses and circuit losses are in series with the antenna circuit, and they usually total up to more than 10 ohms. For best results, the best ground possible must be used."

"What do you use for a ground with this antenna?" asked my friend.

"I use a very short connection to the cold water system in the house, which is copper pipe. In addition, I have a second, heavy wire running to the lawn sprinkler pipes, plus two ground rods each about 5 feet long driven into the soil outside the shack window . . ."

"That sounds like a pretty good ground to me," objected Pendergast, drawing a multiplicity of little ground symbols in the margin of his notebook.

"Yes, pretty good. But I improved it by adding two quarter-wavelength radial wires at the common ground point. They were each 125 feet long and looped through the yard, through the hedges and bushes and along the house, about a foot or two clear of the ground. The radials cut my ground resistance in half. It is about 15 ohms now."

"That means you are still losing over half your output power in your ground connection," shouted Pendergast.

"Right. Ground losses are one of the big problems with short antennas, or antennas located close to the ground. Run-of-the-mill ground connections exhibit resistance values as high as several hundred ohms, and a ground loss resistance of only 15 ohms is not so bad."

"Isn't there anything you can do about that? It still sounds wasteful of power to me," objected Pendergast.

"One stunt that can be done is to increase the radiation resistance value of the antenna," I replied. "Look at fig. 2. This is half of a folded dipole, working as a Mar-

coni antenna. Since equal, in-phase currents flow in each wire, a step-up in impedance is obtained, just as in a folded dipole. For a Marconi antenna of this type, in close proximity to the ground, the input resistance is about 40 to 50 ohms. That provides a good match without auxiliary networks to modern s.s.b. equipment and at the same time, reduces the ground loss by a factor of four."

"You could make the flat-top out of 300 ohm TV ribbon line," observed Pendergast.

"A lot of fellows do just that," I replied. "And there's still another way to raise the input resistance of a simple Marconi antenna. Just make it longer than a quarter-wavelength. As you increase the length beyond quarter-wave resonance, the input resistance climbs quickly . . . as does the antenna reactance. The length is increased to about 142 feet (fig. 3) and a series capacitor is used to tune out the inductive reactance of the antenna. No loading coil, or other matching device is needed. The length of the antenna can be trimmed, or lengthened, a bit at a time so as to produce a 50 ohm load when the series capacitor is adjusted for the lowest s.w.r. on the transmission line to the equipment. If you don't want to fiddle around with antenna length, a very small series coil placed between the capacitor and the antenna will suffice. Just adjust the number of turns on the coil while maintaining resonance with the capacitor and shoot for lowest s.w.r. on the feedline to the transmitter."

"What about a good vertical antenna for 160 meters?" asked Pendergast. "I understand that some of the best top-band DX operators use vertical antennas."

"That's right. It has been pretty well proven in the 160 meter Trans-Atlantic tests and during contests that the vertical antenna has a distinct DX advantage over the low, horizontal antenna. Most 160 meter verticals, by the way, are compromise antennas as very few amateurs can erect a full, quarter-wavelength vertical antenna. One popular scheme is to use the h.f. regular tower and beam as a top-loaded vertical antenna. A forty to sixty foot high tower, loaded at the top by a tri-band beam makes a very effective vertical antenna for 160 meters. The tower is fed by a gamma match wire (fig. 4). This is a good scheme and works well, *provided* you keep the r.f. out of the control wires to the beam rotor and direction indicator. There's a good article

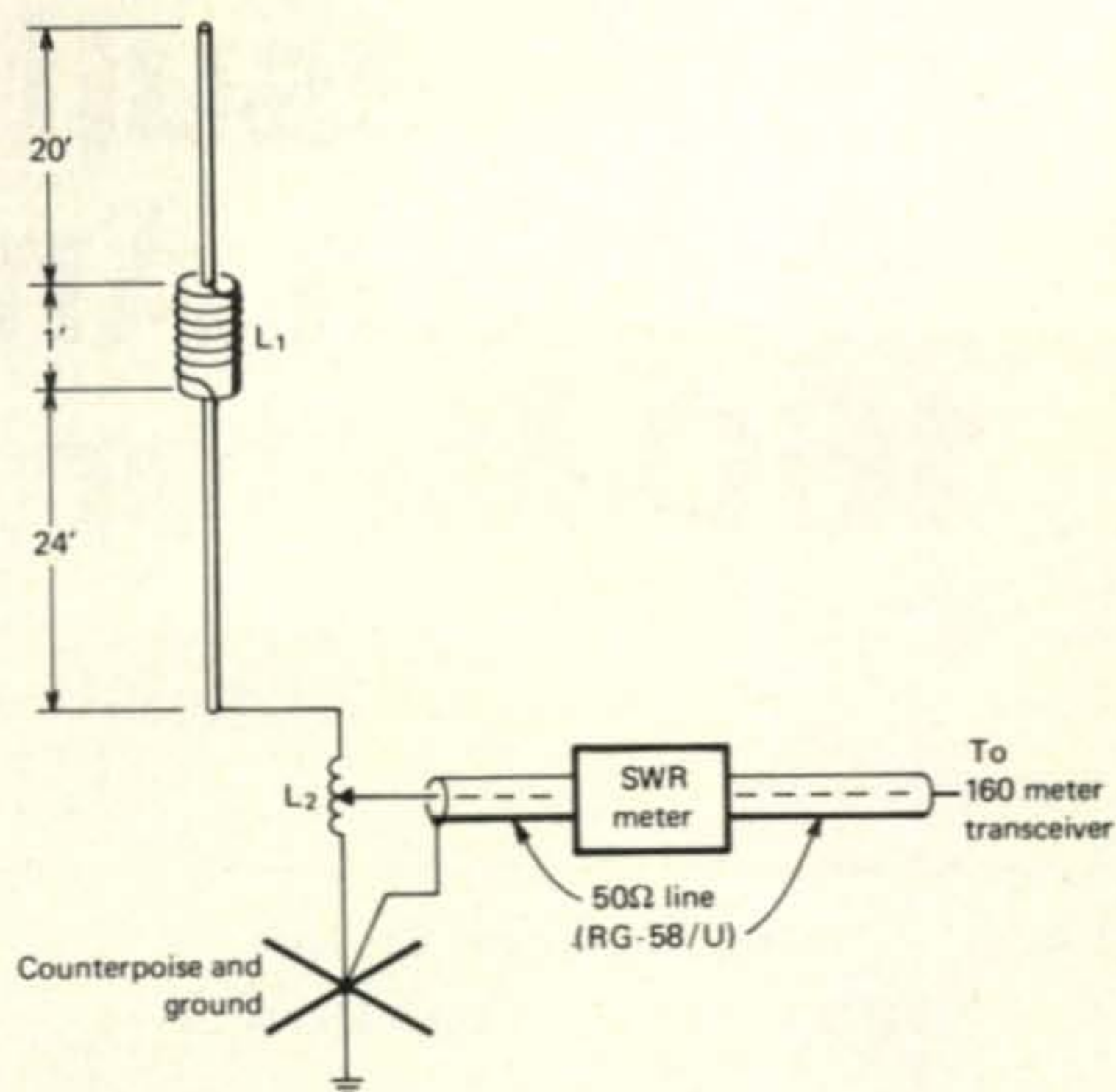


Fig. 5—Compact vertical antenna for 160 meters. The "whip" is made of sections of aluminum TV mast. Loading coil L_1 is 160 microhenries. It is wound on a form 3" diameter and one foot long. Plastic PVC pipe may be used, with the ends plugged with wood. The winding is 9" long and consists of 90 turns of #12 enamel coated wire. The ground connection consists of a water pipe ground, one or two ground rods and several 125 foot, insulated radial wires, run about a foot above the earth. The matching coil, L_2 , is 20 turns #12 tinned wire spacewound, 1½" diameter, 2" long. Antenna bandwidth is quite narrow, so antenna should be dipped to preferred operating frequency in the band.

about all of this in the October, 1975 issue of *QST* by W5RTQ.

"What about the fellows that either don't have a tower, or want to use a separate vertical antenna for 160 meters?" asked my friend.

"Well, here's some information on a simple 160 meter vertical antenna that I have used for some time. It is only 45 feet high (fig. 5). The vertical section is made of aluminum TV mast sections bolted together. The loading coil is wound on a wood form, 3 inches in diameter and a foot long. The antenna is guyed just below the loading coil at the 24 foot level with three lengths of plastic clothesline. At the bottom of the antenna is a small matching coil which has a tap on it for the 50 ohm coaxial line."

"How do you adjust the antenna to frequency?" queried Pendergast, making a sketch of the antenna in his notebook.

[Continued on page 78]

Results of the 16th Annual CQ 160 Meter DX Contest

BY DONALD McCLENON,* W3IN

Top 20 World Scores

KV4FZ	192,552	GM4DNM/A ¹	
K1PBW	130,248		67,298
YV1OB	99,720	W3JSX	64,200
KZ5AA	94,640	G3SZA	62,671
WA2SPL ¹	91,352	W1BB	62,400
HC1XG	87,752	VE3BMV	61,880
W3IN	86,240	K8CCV/8	60,208
GC3ZEM/P ¹	83,468	W5RTQ	59,780
VP9BO	72,239	W4YWX	55,944
W2DXL	67,536	W5LUJ	55,860
		WØAIH	54,806

THIS has truly become a *Worldwide* 160 meter contest. Several Asian and South American logs indicate over 100 contacts, and many Europeans worked over 200. There were nearly as many DX logs submitted as from W/VE. In effect, there were simultaneous contests in each of these continents. The well-equipped stations could tap into all of them, and the others worked mostly within their own continent. W/VE DX conditions were only fair the first night, and good to

*11310 Cedar Lane, Beltsville, MD 20705.

¹Multi-op. stations. Operators listed elsewhere in this report.



VE3BMV, the only Canadian in the W/VE Top Ten, on his way to 363 QSO's.

excellent the second, as also seemed the case for Europe.

Eleven Canadian Provinces, all 50 States, All Continents, and 48 Countries participated, so there was a maximum possible multiplier of 105 (Students figure this out). The more exotic participating prefixes included CP, CX, DU, EP, HI, HK0, HS, I, JDI, JY, OHØ, OJØ, ST, VK6, VP8, VS6, ZE, 4X4. K1PBW had the highest multiplier of 81, followed by W3IN 77, WA2SPL 76, W1BB 75, and W3JSX 75. Top QSO leaders were K1PBW 400, W3IN 392, WA2SPL 373, and VE3B-



W7IWU shows that the whole thing can, indeed, be a lot of fun!

MV 363. Eleven others topped 300. K1PBW led the total countries worked list with 29. He was followed by KV4FZ 28, DJ5PN 27, and G3SZA, OK3ØATP, OK3ØMMW, W1BB, and W3IN, all 26.

World high scorer KV4FZ with 192,552 points is shown at the head of the Top 20 score box. This is a little higher than last year's record, as are all the previously-quoted statistics. Second worldwide, and highest W/VE is K1PBW, also higher than his last year score. In following down the box, those interested can skip the multiops, DX, or W/VE's, to make their own special lists. It is interesting to note that the top 16 scores

consist of 8 DX calls and 8 W/VE's.

This year, a new statistic has been added to the detailed score listings. The total number of 10-point QSOs made by each station is shown. (DX QSOs for W/VE, and W/VE QSOs for DX stations). This is of interest to many, and helps to indicate the best strategy for obtaining a higher score.

Some scores were increased and others were decreased from the claimed values. Most common errors were for DX participants not taking credit for their own country, for not counting Guernsey and Jersey as separate countries, for counting PJ2 and PJ9 as separate countries, and for counting W and VE as multipliers in addition to the States and Provinces worked. Most participants showed outstanding honesty in multiplier count and in duplicate QSO identifica-



OA8V caused worldwide excitement with this gear driving a 60' base loaded vertical outside.

tion. 160 meters attracts the best kind of operators!

This year, there were very few complaints about W/VE operation in the 1825-1830 kHz DX Window. Apparently the word has been well spread, and we don't have a list of "bad guys."

Special arrangements used by some of the high scorers will be of interest. GC3ZEM/P on Jersey Island used two homemade transceivers plus another receiver. The antennas were supported by balloons, kites, and a fixed 50 foot high support. They are looking forward to next year. K1PBW has a 1500 foot European Beverage and a diversity combining scheme with other antennas. WA2SPL uses separate 1000 foot Beverages on Europe, South America, and Hawaii. He transmits on a 135 foot vertical or an inverted V up to 170 feet. OK3ØATP used the 2 element wire beam described in Oct. '75 *QST*. Arrangements used by several other high scorers have been previously described.



K4QMQ, smiling assistant to K4DBV, and "John Barleycorn," busy making the most contacts in Georgia.

Certificates for the 15th Annual Contest State, Province, and Country Winners are finally being processed. It is unlikely the winners of this 16th Annual Contest will have to wait so long for theirs.

Plan to be in the 17th Annual 160 Meter Contest, with the same rules, on January 23, 24, 25 1976. Invite all your friends and potential 160 meter men to join us. Send SASE for log and summary sheets.

73, Don, W3IN

Soapbox

DX—Contest had its usual surprises, and I eagerly await next year... *EP2BQ*. Quite an endurance test. Thanks for a real good time... *KZ5AA*. First 160 Contest experience, and it was fun... *HKØBKK*. All Europe is calling when you are a rare DX station; it was a crazy situation!... *OH3XZ/Ø*. Condition was no good, so I got low points... *JA2UEO*. Never before worked Europe in this contest. Now I get six of them plus Iran... *PJ2VD*. Very good conditions and remarkable EU activity... *OH2BO*. My multiop companion, HC1CW caught a cold, so I had to solo but interesting weekend... *HC1-XG*. I wish to thank all connected with this contest for making it so enjoyable... *G2BJY*. Second night fantastic conditions... *EI9J*. It was a very nice contest with a lot of DX... *DJ5PN*. Receiving antenna erected one hour after contest start. Keyer come from USA two hours after start... *YV1OB*. (Then he makes third world high score-*ED*.)

W/VE—Fine operating; a great group!... *W1-BB*. This contest is one of the highlights of the year... *WØAW*. A bitter-sweet contest; bitter missing 4X4NJ and VP8NP, and sweet working ZE7JX... *W4QCW*. Never in 3 years have I heard so many Europeans so loud for so long... *K4IRQ*. You can't beat being so close to the salt water... *K1PBW*. Will be back from PEI next year... *W6BYB/VE1*. Always enjoy this



DJ6TK says it was a great pleasure to work in the Contest. He was second highest in Germany.

contest, as I meet many old friends and Top Band people... W7ZC. No EU heard Friday night, but Saturday, WOW!... W9LT. Didn't

work first G until well into second night. "Invisible" fine wire Beverage over road and thru 3 neighbors' yards pulled in weak EU... W3IN. How long has this been going on? Didn't know so much activity was on 160... W3CDZ. Horizontal doesn't compete on long-haul, and everything is long-haul from Western Washington... K3MNT/7. Great contest with a maximum of courtesy... W7HZZL/5. 160 is still the most interesting band, especially in a contest... VE1-CD. First c.w. contest ever; most enjoyable... WA4GQJ. Keep up the contest!... VE5XU. Heard Europe and Japan, but pileups were fantastic... W0NFL. I had a ball and am looking forward to the next contest... W6PLH. Great band, no TVI. Sat. night condx to EU best heard in this contest... VE3BMV. Only needed KL7 for WAS... W0AIH. As always, a most enjoyable contest... W4TMR. First contest in a long while which I fully enjoyed. The operators were unbelievably courteous... K4DJC.

Calls are followed by score, total QSOs, DX QSOs for W/VE; W/VE QSOs for DX, Multiplier, and DXCC countries worked.

Connecticut				
K1PBW	130,248	400	101	81 29
W1WY	32,922	199	20	59 17
W1BIH	19,364	170	9	47 9
Massachusetts				
W1BB	62,400	188	57	75 26
W1PL	36,208	180	28	62 18
W1MX	9,984	76	8	39 8
(Opr. W2QHQ)				
New Hampshire				
W1GBP	29,736	172	20	59 17
W1GJE	15,752	167	3	44 4
W1HDI	11,360	130	3	40 5
W6MZW/1	11,234	121	4	41 6
Vermont				
K1IHK	13,776	132	8	42 9
New Jersey				
WB2JYM	42,640	220	27	65 19
W2KHT	16,426	147	11	43 10
W2HUG	9,492	81	8	42 10
W2NYU	6,468	78	5	33 6
W2BP	3,154	27	14	19 14
W2BAY	1,280	40	0	16 2
W2MPP	910	35	0	13 2
New York				
WA2SPL ¹	91,352	373	57	76 25
W2DXL	67,536	321	37	72 22
K2BQO	25,122	173	16	53 13
W2HXI	12,168	148	2	39 4
WA2YJN	9,594	103	5	39 6
Delaware				
W3GL	22,464	180	9	52 10
Maryland				
W3IN	86,240	392	42	77 26
W3CDZ	24,966	175	11	57 11
Pennsylvania				
W3JSX	64,200	312	29	75 23
W3QOR	32,828	231	13	58 14
WA3HMM	21,216	176	8	51 8
W3UHP	13,760	160	3	40 5
Alabama				
K4BHG	39,556	259	15	62 13
Florida				
K4IRQ	53,676	242	34	71 24
W4OZF	16,800	143	8	48 8
Georgia				
W4YWX	55,944	274	26	74 22
W4MCM	50,400	262	22	72 20
K4QMQ ¹	50,126	277	19	71 19
K4DJC	32,116	215	11	62 12
WA4APG	19,398	151	8	53 9
WA4GQJ	8,510	103	3	37 5
K4KZP	4,740	75	1	30 3
K4LRO	4,402	63	2	31 4
Kentucky				
W4KFB	6,336	96	0	33 2

North Carolina				
W4TMR	28,560	223	8	56 9
K4YFH	4,212	81	0	26 2
South Carolina				
WA4YZC	23,544	174	11	54 11
Tennessee				
K4KIU	39,904	316	7	58 8
K4PUZ	38,940	318	9	54 9
W4HYY	19,764	155	7	54 9
Virginia				
W4QCW	9,536	41	27	32 22
W4ZM	9,184	100	3	41 4
W4KFC	9,044	101	2	38 4
W4WSF	7,722	75	6	41 8
Arkansas				
WA5RTG	52,496	306	20	68 17
W5KL	12,640	158	0	40 2
W5MYZ	1,628	37	0	22 2
Louisiana				
W5WMU/5	5,280	76	1	33 3
Mississippi				
W5RUB	27,540	227	7	54 8
W5AO	20,020	126	14	55 14
New Mexico				
W7HZZL/5	5,984	84	1	35 3
Oklahoma				
K5JVF	22,936	136	13	61 14
Texas				
W5RTQ	59,780	315	28	70 21
W5LUJ	55,860	311	22	70 17
WA5RXT ¹	45,890	289	16	65 15
WB5CKM/5 ¹	29,150	237	7	55 9
W5QF	9,102	107	1	41 3
W5SBX ¹	7,992	95	4	36 6
K5VTA	4,408	72	1	29 2
W5FIX	2,756	41	3	26 5
California				
W6RW ¹	42,408	234	27	62 16
WA6LXN/6 ¹	40,208	283	19	56 9
W6PLH	29,362	201	19	53 14
W6AJJ	15,738	147	9	43 8
W6AMO	12,218	125	6	41 6
W6GWQ/6	7,684	85	7	34 5
WA6VNR	4,088	65	2	28 4
W6DGH	868	27	1	14 3
W6GBY	120	12	0	5 2
Idaho				
W7DY	7,052	66	5	41 7
W7IWU	868	31	0	14 2
Montana				
WA7OBH	1,000	25	0	20 2
Nevada				
W7ABX	6,272	104	2	28 4
Utah				
WA70AU	6,808	88	1	37 3
W7ZC	5,600	76	1	35 3
Washington				
W7SFA ¹	34,800	248	13	58 12
WA7OFH	9,348	106	2	41 4
W7SBC ¹	5,280	84	1	30 3
K3MNT/7	3,784	82	1	22 3

K7IDX	460	11	3	10 4
Michigan				
W8KAZ	20,304	200	4	47 6
W8MOA	18,816	180	3	49 5
W8MAI/8 ¹	5,346	77	1	33 3
Ohio				
K8CCV/8	60,208	300	31	71 21
K8KAS ¹	35,392	296	5	54 7
WA8YEE ¹	29,526	223	9	57 10
K8SJU	28,296	230	8	54 8
W8PCS	8,284	101	2	38 4
W8EX	7,560	76	8	35 9
Illinois				
W9MTT	49,140	302	19	65 16
W9YYG	42,840	268	18	63 16
W9PNE	41,202	259	17	63 14
W9CH	24,860	202	6	55 8
K9UKM	13,806	173	1	39 3
W9ABA	5,376	80	1	32 3
W9UDK	1,368	34	1	18 3
Indiana				
W9NFC	37,942	275	9	61 10
WA9BWY	27,324	233	5	54 7
W9LT	15,050	143	8	43 9
W9SFR	9,250	117	2	37 4
Wisconsin				
K9DAF/9	26,334	199	8	57 9
W9GIL	2,808	46	2	26 4
Colorado				
WA0CVS	31,436	231	10	58 10
WA2WMT/0	24,852	190	7	57 8
WB0LLR	15,048	151	5	44 4
Iowa				
W0NFL	28,188	195	12	58 12
WA0VDX	2,550	47	1	25 3
Kansas				
WB0EYS	1,344	32	0	21 2
Minnesota				
W0AW	42,462	285	13	63 13
W0RHI	3,348	62	0	27 2
MISSOURI				
K0JPL	3,120	60	0	26 2
W0BV	2,900	54	1	26 3
Nebraska				
W0AIH	54,806	345	61	67 14
Canada				
Newfoundland				
VO1KE	28,140	119	54	42 18
New Brunswick				
VE1AXT ¹	15,752	143	9	44 10
Nova Scotia				
VE1CD	31,270	197	17	59 14
Prince Edward Isle				
W6BYB/VE1	40,080	166	42	60 21
Quebec				
VE2WA	1,188	29	1	18 3
VE3BMV	61,880	363	23	68 19
VE3ECP	14,190	157	2	43 4
VE3BBH	2,992	60	2	22 4

[Continued on page 77]

MATH'S NOTES

BY IRWIN MATH,* WA2NDM

EVERY once in a while articles are published in various magazines that are concerned with wide range amplifiers to be used as receiver pre-amps. Most of these circuits are useful at frequencies from a few MHz to a few tens of MHz and occasionally to a hundred MHz or so.

This month, we felt the need to add our 2¢ so to speak, and are therefore presenting a circuit, published by Motorola Semiconductors, that should meet almost all amateur needs. This wide band amplifier exhibits a nominal gain of 10db (about 3-3½) over a frequency range of 3 MHz to 1500 MHz and a noise figure of 2.5 db maximum at 1000 MHz! It has been designed for 50 ohm input and output impedances and should be perfect as a front-end

*5 Melville Lane, Great Neck, N.Y. 11023.

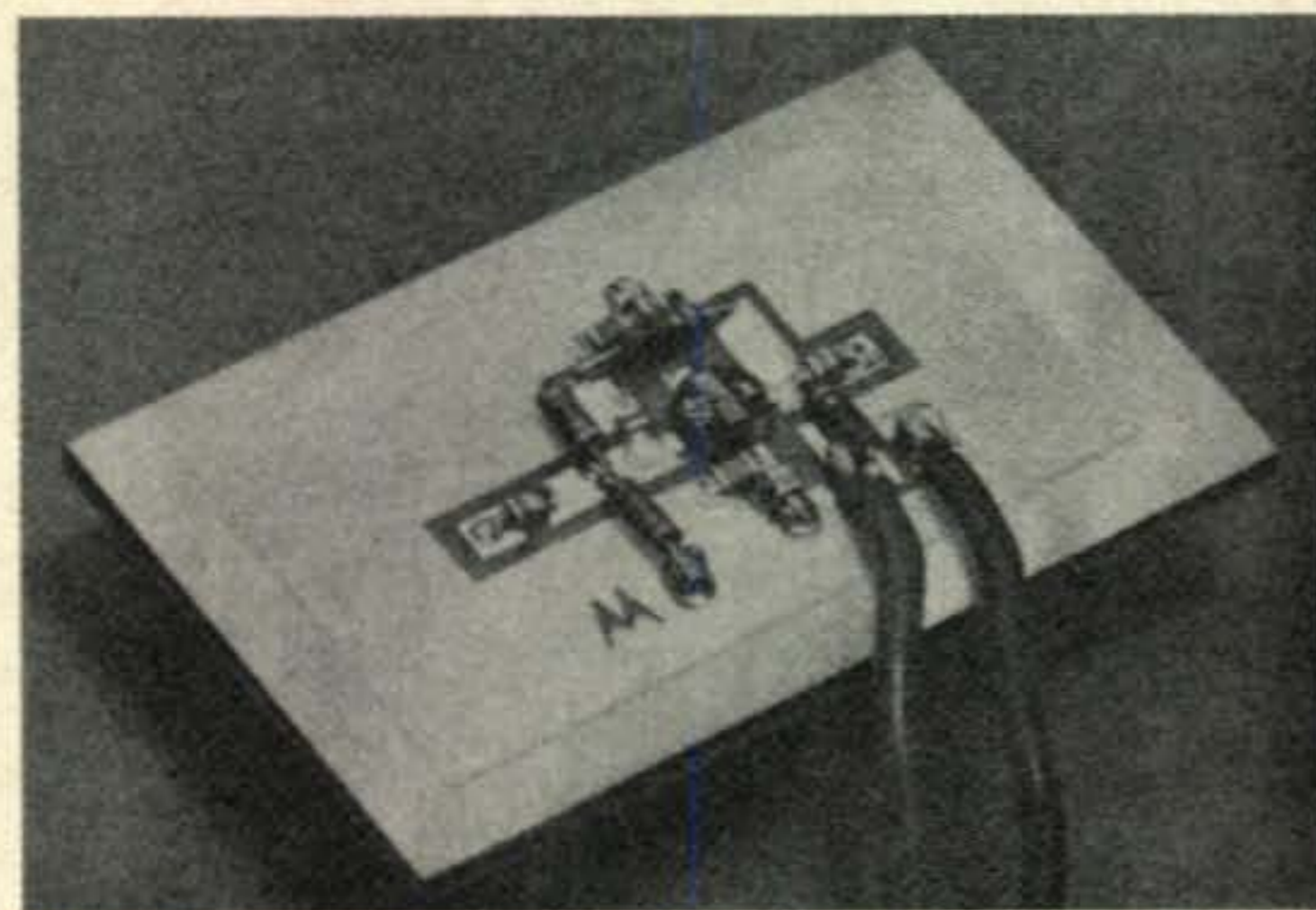
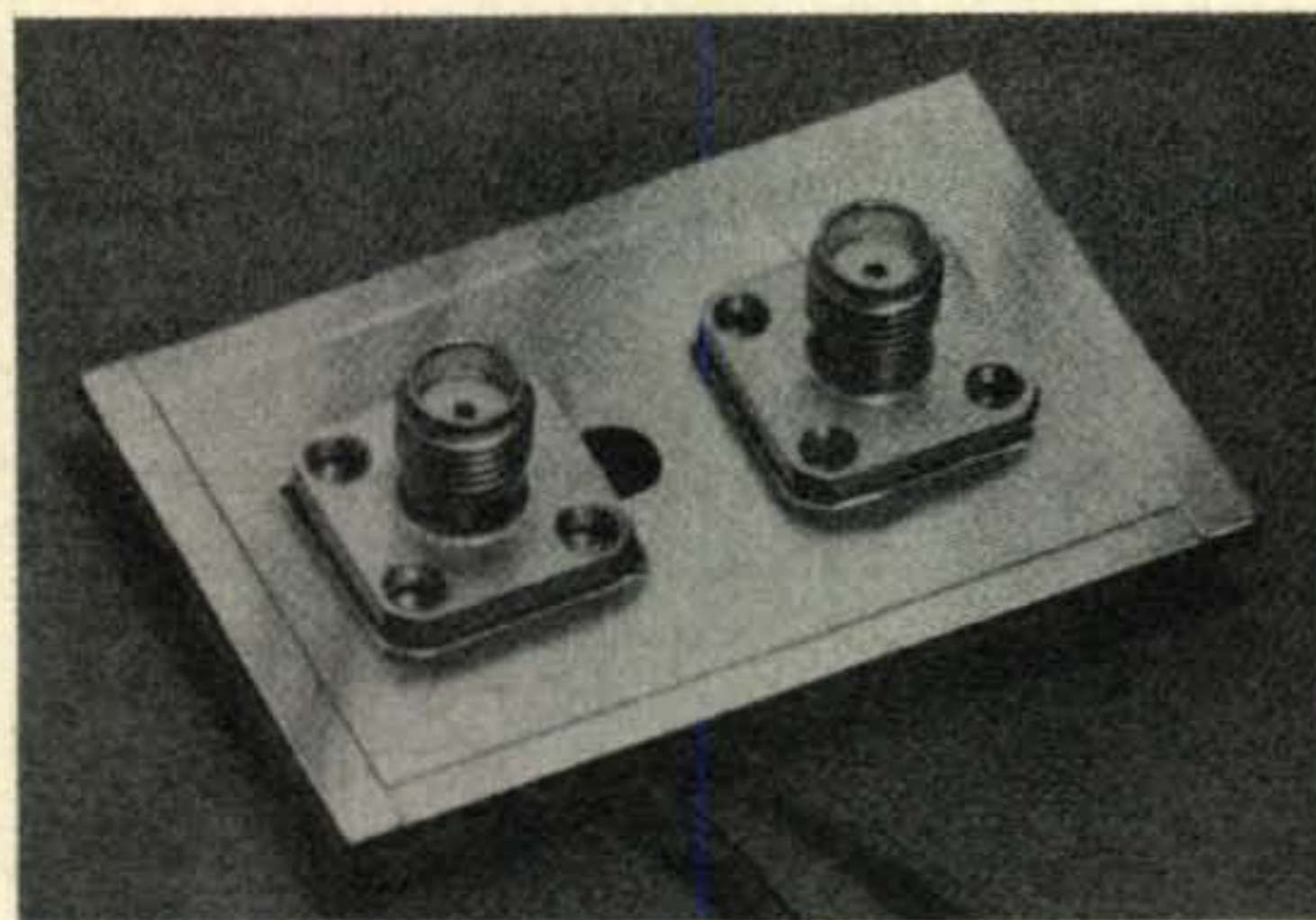


Fig. 1—Top and bottom views of the completed 10 db amplifier.

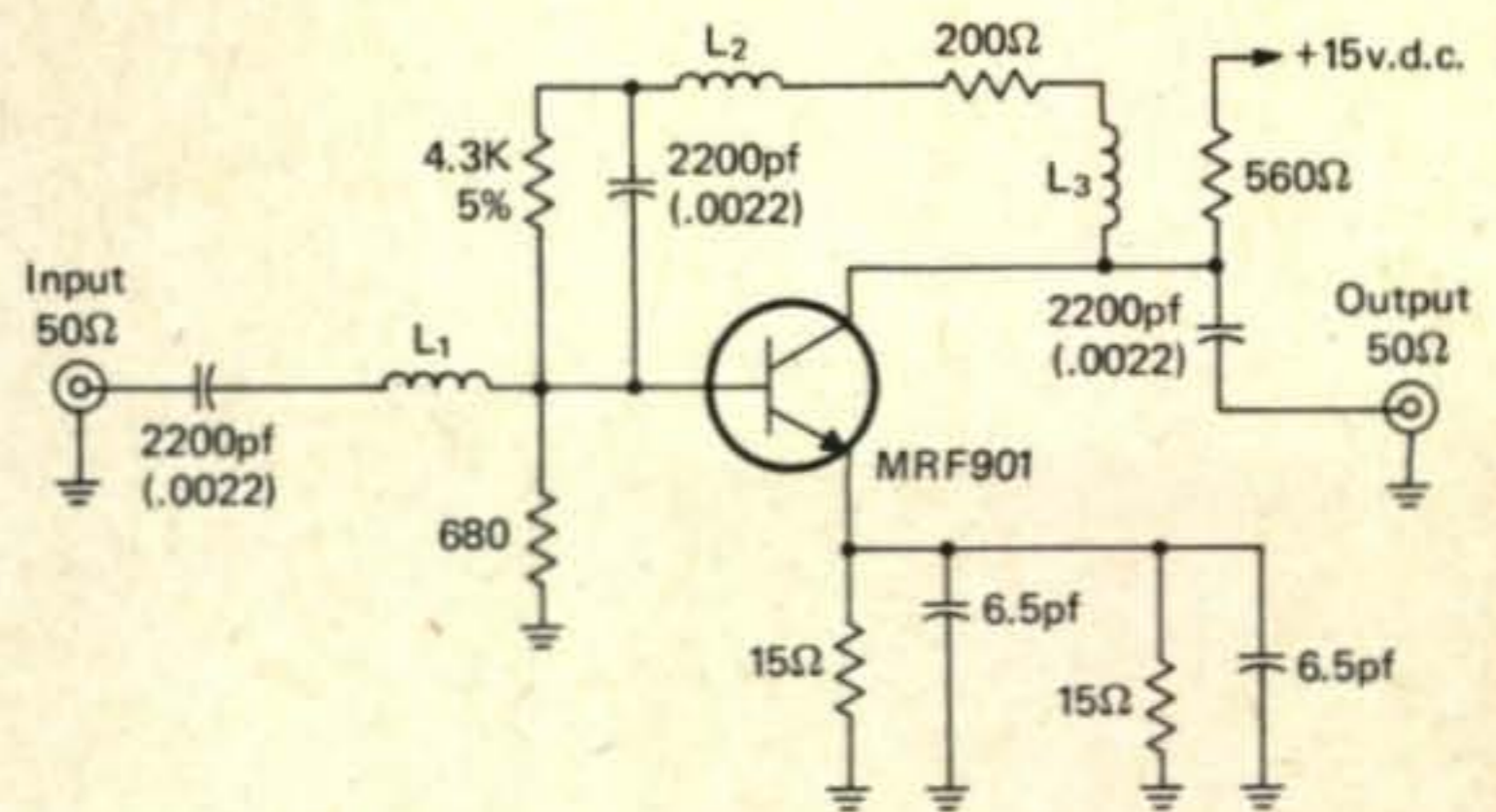


Fig. 2—Schematic of the wideband r.f. amplifier. L_1 , L_2 , and L_3 are part of the p/c board.

pre-amp to overcome the losses incurred when using a stripline filter or resonator in v.h.f. and u.h.f. service.

The amplifier is very small, only 1¾" × 1¼" or less, foolproof since all construction details are given, and other than the transistor, which costs \$9.00 in 1-99 quantities, will only cost an additional 2-3 dollars. At a total cost of 12-13 dollars, you can't really beat it.

Fig. 1 is a top and bottom photo of the completed amplifier. Screw type BNC connectors were used by Motorola although standard BNC's would work just as well. Fig. 2 is the schematic of the amplifier. A MRF901 transistor (with an f_t of 4.5 GHz by the way) is used in a non-neutralized class A common emitter amplifier. A.c. and d.c. feed back from collector to base is employed to assure stability, wide bandwidth, and an input and output s.w.r. figure of less than 2.5:1 over the entire frequency range. I might indicate, at this point, that to assure a low noise figure and good weak signal response, s.w.r. considerations for a receiver matching an antenna become quite significant as the operating frequency is raised.

The entire amplifier is constructed on a 1/16" thick double-sided P/C board made of teflon although G-10 should perform comparably. A 1:1 template is shown in fig. 3 and a 2:1 parts layout in fig. 4. Note that by reducing the amount of ground plane area, an even smaller amplifier could be built.

For those who do not have access to the necessary supplies to etch the boards the 1:1 template and very, very careful work with an

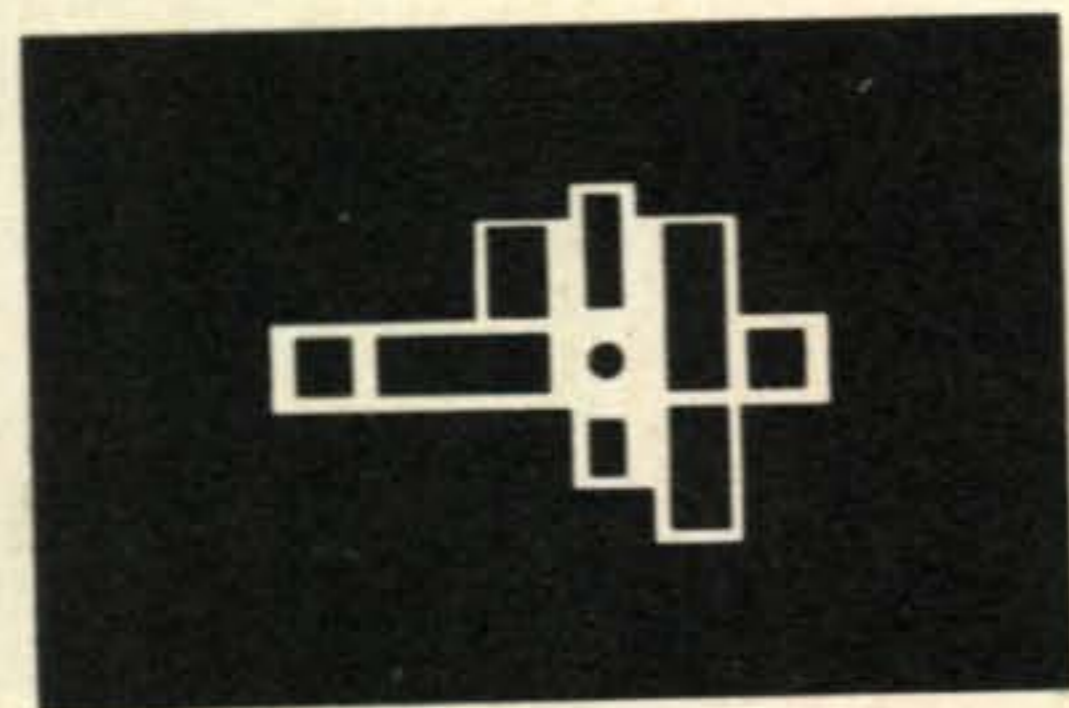


Fig. 3—A 1:1 template for the amplifier.

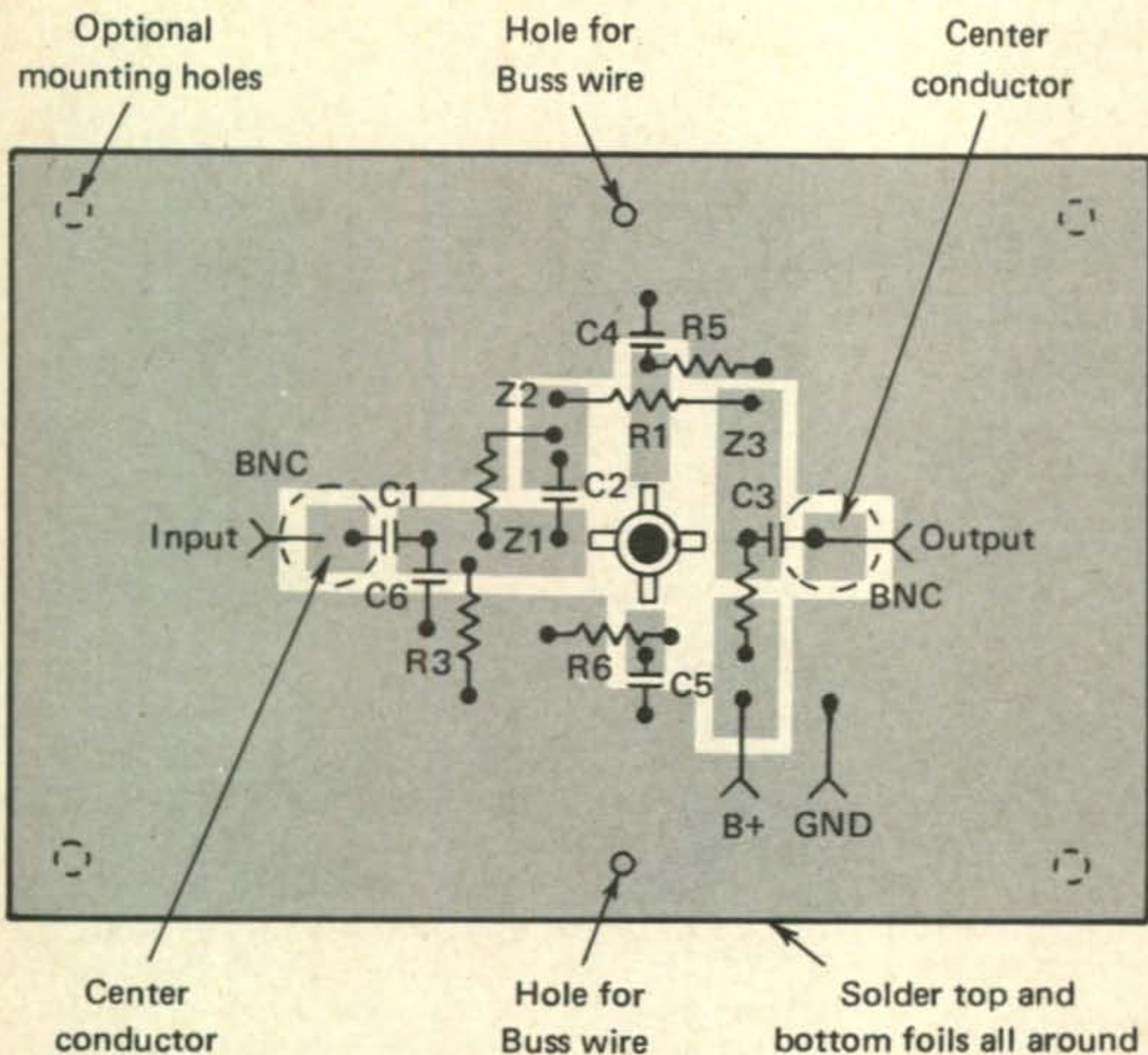


Fig. 4—A 2:1 parts layout for the amplifier. The BNC connector flanges should be soldered to the copper on the other side of the foil.

X-Acto knife and patience could probably yield satisfactory results.

All resistors are $\frac{1}{8}$ watt 5% carbon's (obtainable from all major electronic parts distributors) and capacitors are subminiature ceramic types such as the Centralab CN/CY series, or other devices that can be made to fit within the available space on the P/C board. In any case, all resistors and capacitors must be soldered directly to the foil with as close to zero lead length as possible.

The edges of the P/C board should be soldered to maintain a good ground connection between top and bottom foil layers and, a small hole should be drilled near each emitter lead of the MRF901 to allow a short length of buss wire to connect top and bottom foils at these points.

Performance specifications of the amplifier

are given in fig. 5 and will indicate that the unit should be excellent for use at 50, 144, 220, 420 and even 1215 MHz although it will really begin to "shine" at 2 meters and above.

For any additional information we would suggest obtaining engineering bulletin EB-37 and data sheets for the MRF901 from Motorola Semiconductor Products, P.O. Box 20912, Phoenix, Arizona 85036 or any local Motorola rep.

We would be most interested in hearing from readers duplicating this circuit and will be glad to inform others of your success or suggestions.

My sincere best wishes for a very Merry Christmas and a healthy, happy and prosperous New Year.

73', Irv, WA2NDM

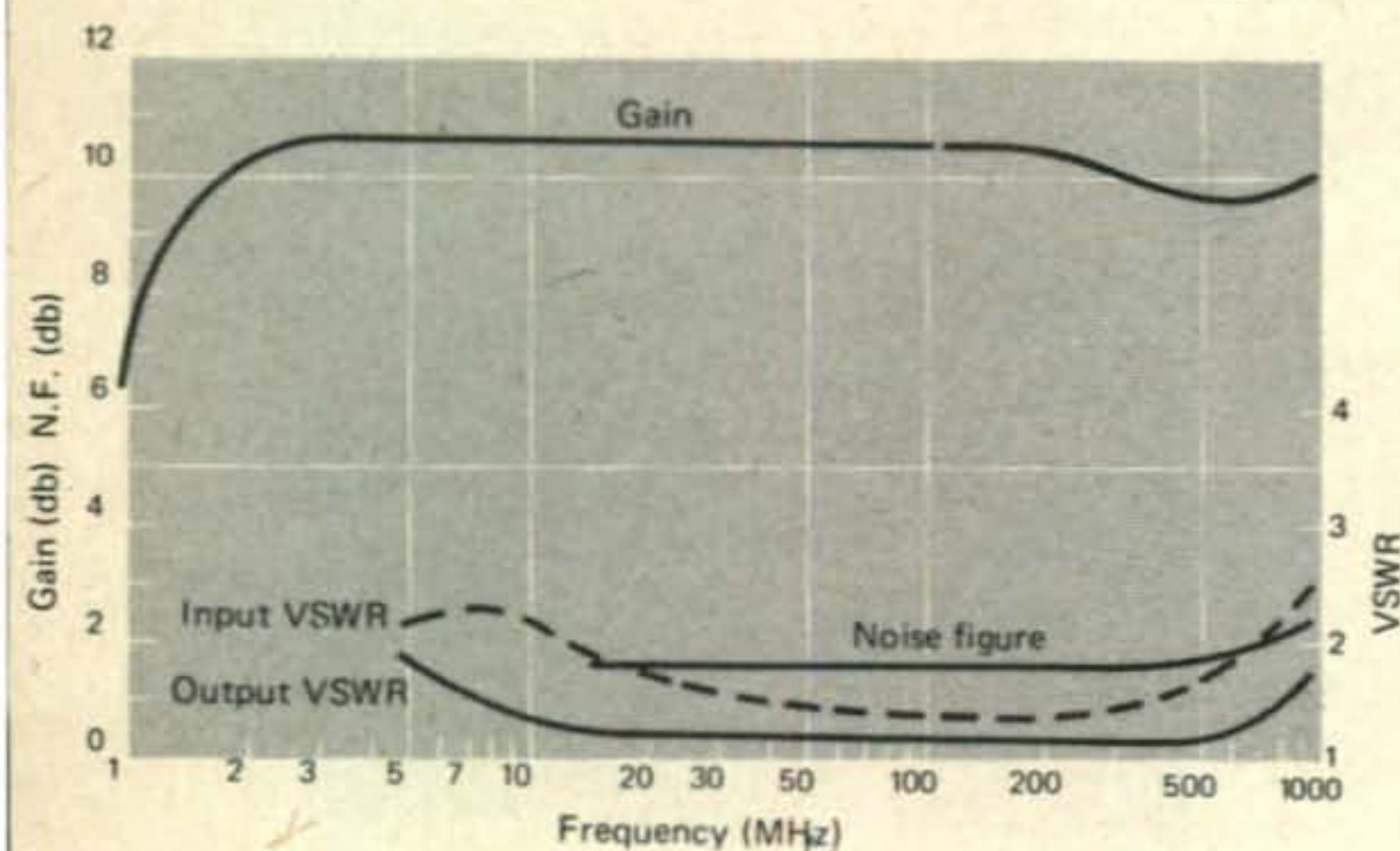


Fig. 5—Performance specifications for the amplifier.

For \$7.50 you can get 7½ issues of CQ at your newsstand when they're not sold out, and if the dealer wants to rip an issue in half. The trouble is which half will you wind up with, the beginning of an article or the end, the top half or the bottom? In any event you are still missing 4½ great issues of CQ.

For the same \$7.50 you can subscribe to CQ and get twelve complete issues with every page intact. Now we ask . . . which is better?

A New Twist To An Old Antenna

A New Twist To An Old Antenna

BY ARTHUR R. NOTT,* K5YNR

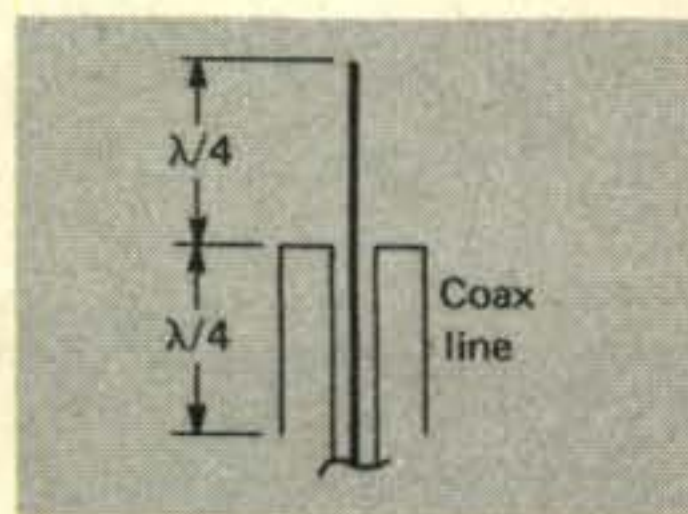
THE arguments of using a balun with a dipole versus just tying the coax on directly to the center will go on and on. Either way, you wind up with a big sag in the middle from the weight of the coax or coax and balun. Or you turn the sag upside down, using a pole, and call it an inverted vee. There is always the problem of supporting it at each end and feeding it in the middle, which sometimes proves inconvenient according to the physical layout of the QTH.

Having had a QTH with a long, narrow lot and the house at one end, I pondered the possibilities of end feeding a half wave antenna on 75 or 40 meters. The old classic method is to use open wire feeders and a tuner, which leads to all kinds of problems. Then I thought about the old sleeve type vertical. This is the one where the radiator is a quarter wave high and there is a sleeve or skirt a quarter wave long below, through which the coax runs (fig. 1). All the standard texts recommend it as a good v.h.f. antenna.

However, there is nothing that restricts it to v.h.f. and no reason why it has to be vertically polarized. It's just that it hasn't been mechanically feasible to build a horizontal h.f. antenna on this principle.

*1248 Glorieta St., N.E., Albuquerque, New Mexico 87112.

Fig. 1—Sleeve-type vertical antenna (also called "hypodermic antenna"). Impedance is 74 ohms. (*Radio Engineers Handbook*, F. E. Terman, p. 857, fig. 97e.)



Eight or nine years ago someone figured you could make one from a piece of coax a half wave long by peeling off the outer insulation for a quarter wave and turning back the exposed braid so that it formed the sleeve while the exposed center conductor formed the radiator. One important aspect was ignored, however, leading to the demise of this apparently good idea, and that is that the sleeve has to be of relatively large diameter in relation to the coax. It has to have space to reduce the capacitive coupling between the sleeve and the coax outer conductor. If you ever hooked a v.s.w.r. bridge to the input of one of these, the results were extremely disappointing.

It still seemed like a good idea, so a version using beer cans (sound familiar?) was considered, using the cans for the sleeve, styrofoam for spacers to center the coax through the cans and some kind of copper braid soldered between the cans for flexibility. A light nylon rope was to be used as a messenger cable to support the whole works. It would be very inexpensive and would probably function well but it sounded like too much work and too much wind loading.

Some broadcast stations use a variation of the sleeve antenna when they want to use a tall tower (TV or f.m.) for their a.m.

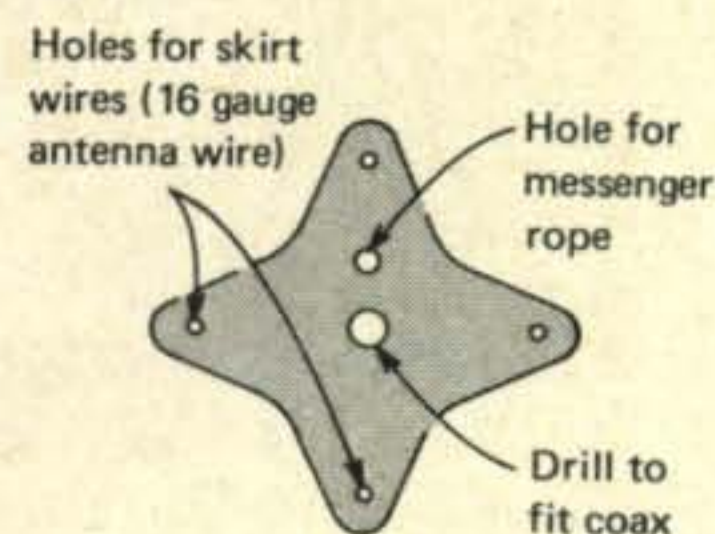


Fig. 2—Spacer for modified sleeve dipole.

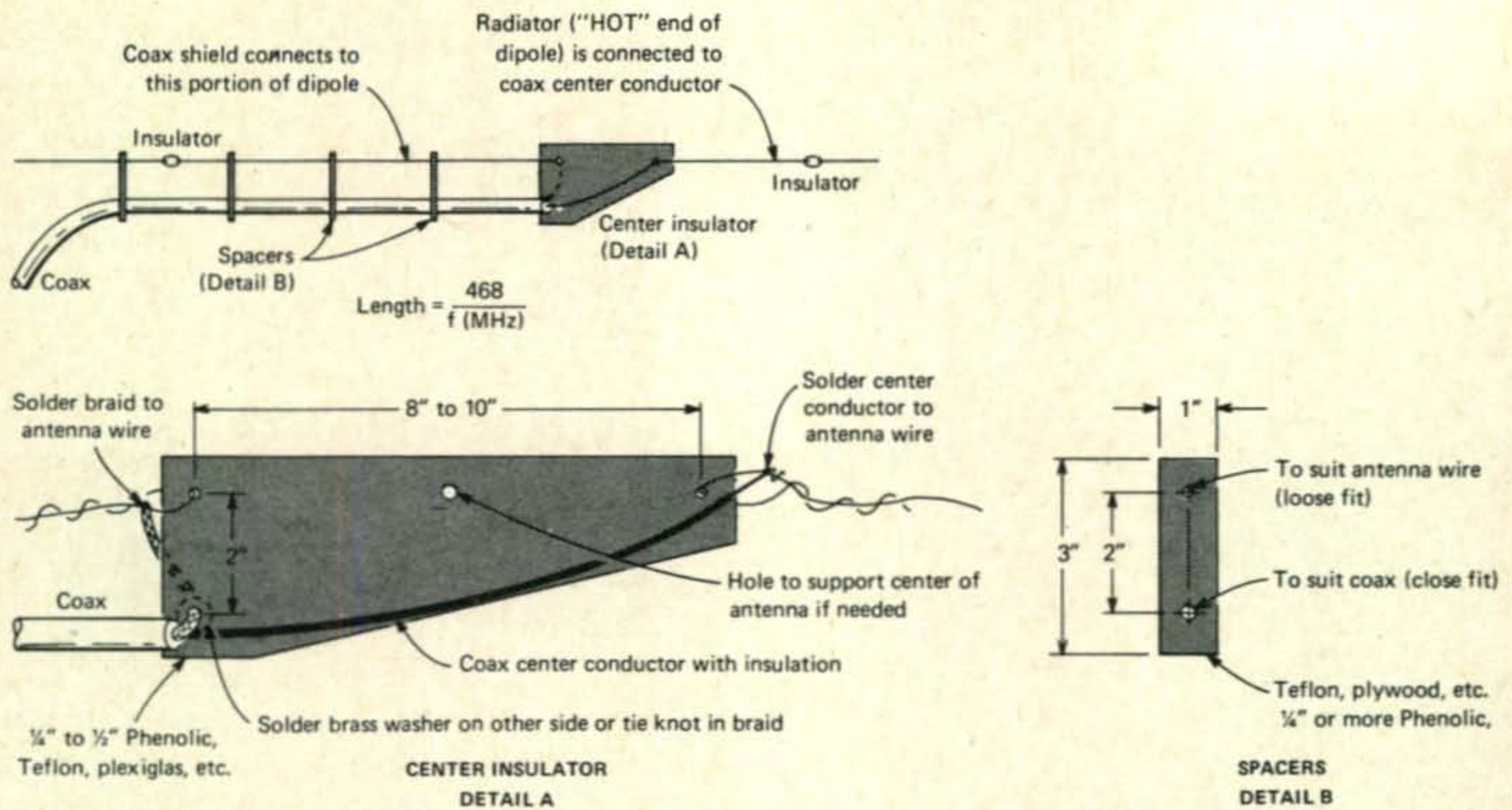


Fig. 3—Simplest version of the horizontal sleeve dipole. Details show construction of special center insulator and spacers.

radiator. They put an insulator in the tower a quarter wave down from the top. Then they put outriggers on just below the insulator and again about a quarter wave down and use four (usually) or more wires between the outriggers to form the sleeve or skirt. It's similar to the more familiar ground plane antenna with its drooping radials. Why do the radials droop? Well, if they stuck straight out, the feedpoint impedance would be about 36 ohms. By selecting the proper angle of "droop," the impedance can be 50 ohms, presenting a better match to 50 ohm coax. If you allowed the radials to "droop" straight down, the impedance would be about 72 ohms, which gets us right back to the old sleeve antenna again. Effectively, that is. So again I thought, "why can't this idea be used for a horizontal h.f. antenna?"

In this case, all that's needed are some spacers (phenolic, teflon, plywood, etc.) such as in fig. 2. Slip them on the coax at 4 to 6 foot intervals with some heavy nylon

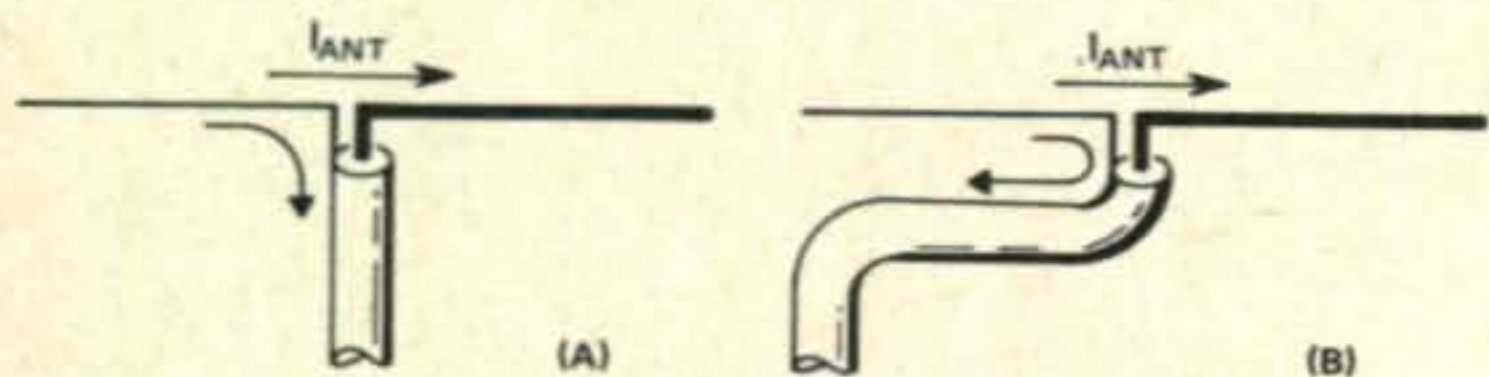


Fig. 4—(A) Current flow into shield causes shield to radiate. (B) Current flow from antenna to shield is out of phase, effectively cancelling the shield's radiation.

cord or light rope for messenger, run four strands of light antenna wire through the small holes fastening them to the coax braid at the center insulator and you're all fixed. Simpler yet and gets away from soldering all those beer cans.

But then again . . . hams have been getting away with tying coax directly to the center of dipoles for some years now. The old timers said it wouldn't work when it was first tried and the purists still say you gotta have a balun. But the fact remains, there must be thousands in use every day. Combining this with the last method above evolves into the ultimate in simplicity. Just use spacers between the coax and the shield-connected half of the dipole (fig. 3). Thus only two support points have to be considered, since one of them combines with the coax feedline. Keep in mind that the radiation from the shield connected side of a dipole connected directly to the coax is an unknown quantity. Supposedly, some current is induced into it from the center conductor side which then causes current flow in the shield of the coax which then radiates, etc., etc. This antenna is merely a directly-connected dipole with the coax swung over to the shield connected half. Any current induced into this half *must* be in phase with any current induced into the coax shield, which will effectively eliminate the coax radiation problem. Furthermore, the theory that the shield-connected half causes current

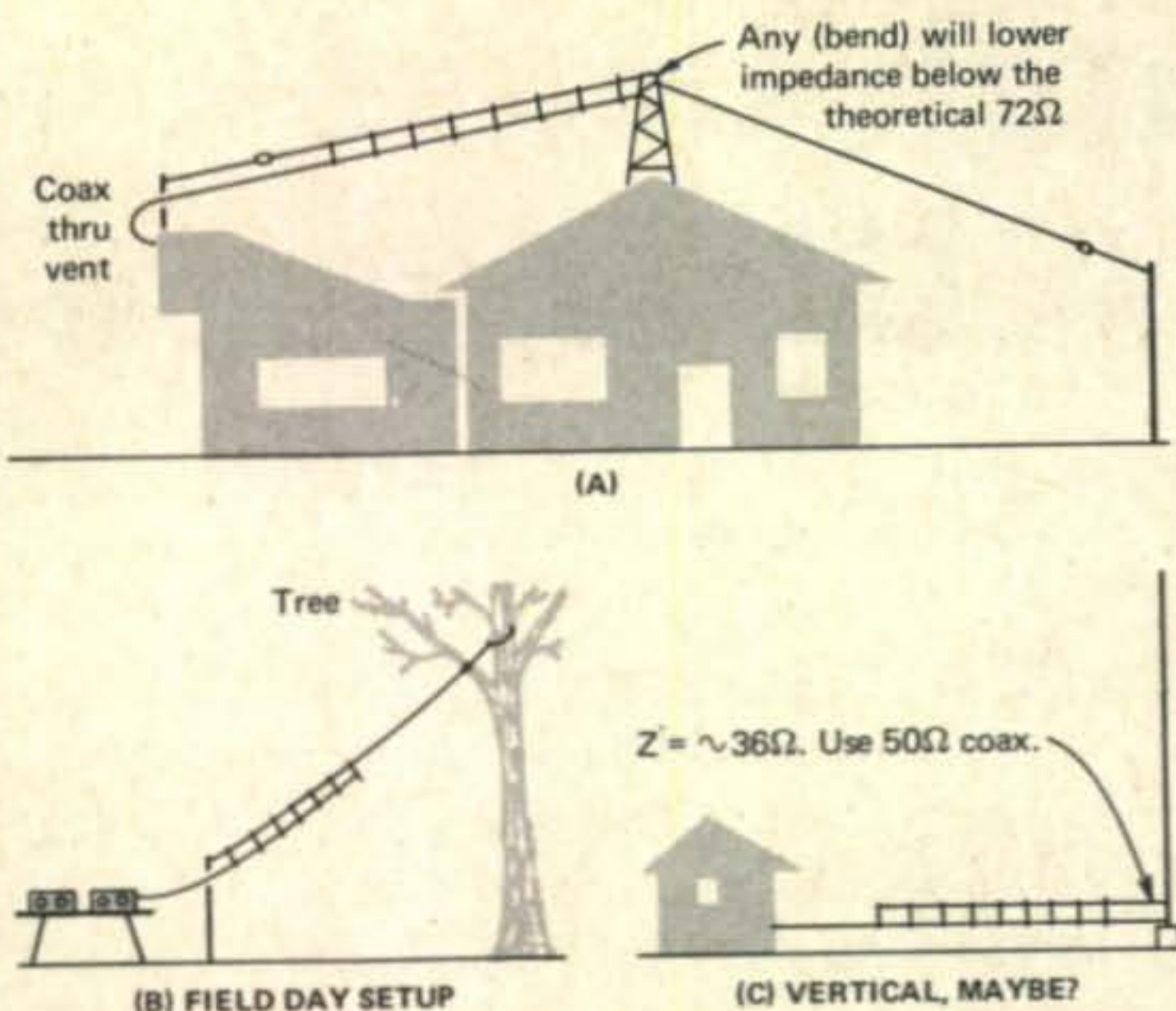


Fig. 5—(A) Present K5YNR QTH with 40 meter antenna. (B) Possible Field Day setup. (C) Use it as a vertical, maybe? This setup will probably be directional towards the house.

flow in the shield is illustrated in fig. 4(A). Some current flows from the left half to the dipole into the shield which would cause it to radiate. Positioning the coax alongside the left half, as in fig. 4(B), has the effect of placing the currents in the antenna and the coax shield out-of-phase cancelling each other and thereby eliminating radiation from the coax shield out of phase, cancelling each other directly connected dipole with the coax trailing off at more or less a right angle? That remains to be seen. Either way, you have an "unbalanced" antenna as opposed to a true "balanced" dipole. They will all work.

Possibilities

Think of the possibilities. If you have a tree, pole, or tower a half wave or more away, you can put a pulley on top, haul up the end of the antenna and pull it tight as a fiddlestring. You could come out of one end of the house with the coax, put a pole upon the middle of the roof to support the center and still have an inverted vee. The point of maximum radiation is the portion of the radiator adjacent to the center point, of course, so you can control the location, polarization, orientation etc., better than if the coax had to dangle off here as is normally the case. (The radiator is the half of the dipole fed by the center conductor). Some possible variations are shown in fig. 5.

[Continued on page 76]

Seasons Greetings

Why not invest part of Aunt Martha's Xmas check in a whole years total enjoyment by subscribing to *CQ*. Each and every month you can thank her (and us) for bringing you the latest in Propagation conditions, Award and Contest info, DX news, SSTV happenings, Technical and Novice features, QRP and Antenna developments, Surplus discussions plus many feature articles on all the interesting aspects of our hobby.

Even if you have to be "your own" Aunt Martha this year, indulge yourself . . . you're worth it.



14 Vanderventer Ave.
Port Washington, L.I.
N.Y. 11050

Dear OM:
Enclosed please find \$..... for 12 issues of
CQ, The Radio Amateur's Journal.

NEW: Start with.....issue
 RENEWAL

Name..... Call.....

Address.....

City..... State..... Zip.....

RATES:

Domestic Foreign
One Year (12 issues) \$7.50 \$8.50

A Phone Patch Level Indicator With A Difference

BY R. H. FRANSEN,* VE6RF

OF the many phone patch level meter circuits I have seen over the years they all have, in my view, unwanted or missing features. They are either too difficult to calibrate or use exotic parts like op-amps available nowhere commercially. Added to this is that the more simple circuits are not "foolproof." By foolproof I mean that the meter will not be destroyed by the bell ringing voltage if not disconnected from the line and somebody phones you. It is doubtful also or the average amateur is really interested or needs to know the exact level of his patch at every moment he uses it. As long as he operates within the limits set by the telephone company he should be OK. The speech waveform is not a steady or regular phenomenon, only the speech peaks are really important, and there are other things to keep an eye on in the shack including the final plate current.

When I use the patch level meter I am only interested in a few points on the meter and they are: The absolute maximum level point of 0 dbm, the -6 dbm and the -10 dbm points. The voltages at these levels into 600 Ω are respectively 0.775 v.a.c., 0.39 v.a.c. and 0.245 v.a.c. To me it does not make sense to recommend, say, a patch of -8 dbm using a meter with doubtful ballistic characteristics and/or accuracy. Many of the meters used by the amateur are aged surplus or of Oriental origin and should not be taken too seriously without additional calibration. All together it adds up that a level meter should be economical, simple, and foolproof in the sense that it can take any voltage the telephone lines could possibly carry.

Circuit Details

The circuit diagram shows a rather simple arrangement but with one extra feature: the meter cannot be damaged by any possible

phone line voltage including the full 20 Hz bell ringing voltage. The various parts values are a compromise between the different circuit requirements, e.g., C_1 should be as big as possible for flat frequency response and maximum peak readings, but small enough for maximum reactance at the 20 Hz ringing voltage. R_1 should be maximum for flat frequency response, the limiting of rectifier currents and to keep possible rectifier distortion off the line, it should be not too high so as to get maximum voltage on the speech rectifiers CR_1 and CR_2 . C_2 should be big for the best speech peak indication but small enough so as not to slow down the meter pointer too much. R_2 is the meter calibration resistor and C_3 an r.f. bypass, of course.

The combination of C_1 - C_2 - CR_1 - CR_2 operates as a modified cascade full wave voltage doubler with the output clamped down above a set level by the rectifier string CR_3 - CR_4 acting as an adjustable element in the circuit to match the various types of meters available. This arrangement has a frequency response of 5% or better over the 300-3000 Hz range and will not put a d.c. load on the phone line. With the values as shown it can stand up to 60 v.a.c. @ 60 Hz without damage and does not really need calibration to be useful.

Construction

The circuit may be built every which way, it makes no difference in performance. Just don't make the leads too long because it is rather sensitive and could pick up stray r.f. A small metal box would be best. Anyone running high power should include the r.f. filter L_1 - L_2 - C_4 - C_5 if the existing phone patch does not have it. R_2 may be an adjustable resistor, but if a pot is available, it makes it easier to calibrate.

Calibration

Feed 0.775 v.a.c. @ 1 kHz from an a.f. signal generator into the circuit and adjust

*227 Cottonwood Ave., Sherwood Park, Alberta, Canada T8A 1Y3.

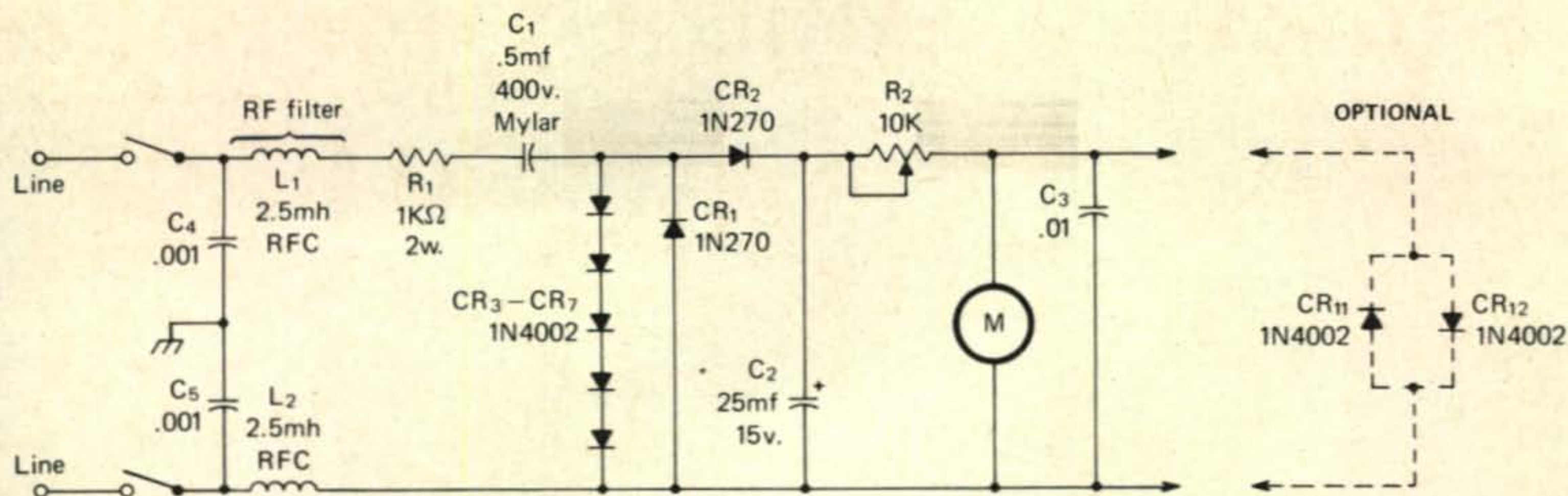


Fig. 1—Schematic diagram of a meter-saving phone patch level indicator. The meter is a 100 μ a type with an internal resistance of 900 ohms. The equivalents of the diode types shown may be used. CR₁ and CR₂ are Germanium; all others are Silicon.

resistor R_2 for a reading of 77.5 on the 100 μ a meter. If R_2 is a fixed resistor try different resistors or series/parallel combinations, whatever works is good. The standard 10 k Ω may be just a bit too big in most cases. After adjustment the 77.5 indication is your 0 dbm level. This voltage level should never be exceeded when feeding into the line. Next feed in a voltage of 0.39 v.a.c. @ 1kHz, this is your -6 dbm point. Then feed in a voltage of 0.245 v.a.c. @ 1kHz, this is your -10 dbm point. The -6 dbm and -10 dbm points do not necessarily coincide with the meter dial markings so write them down for future reference if you don't mark the meter itself.

The meter indications are not linear due to the 1N270 rectifier characteristics.

No Calibration

To use the meter without further calibration connect it to the line and dial any one number (except zero) to remove the dial tone, speak into the mouth piece with a firm solid voice (don't yell) with the lips just touching the mouth piece. Watch the meter indications for the highest peak reading, e.g., 80. Never use more than a 40 peak reading to feed audio into the line. This should keep you well below the maximum level and out of trouble.

Substitutions and Changes

For best results stick to the values on the diagram, certainly if no further calibration is intended. An additional adjustment is needed if an 100 μ a meter with a different coil resistance is used. With a meter having a coil resistance of 1500 ohms, you would need 150 mv for full scale deflection and the

CR₃-CR₇ rectifier string must be changed. Proceed as follows. Apply 0.775 v.a.c. @ 1 kHz to the circuit and adjust R_2 for a meter reading of 77.5. Next increase the voltage just enough to get a full scale reading on the meter (watch it, don't overload the meter, it is not protected yet). Now connect diode string CR₃-CR₇ and the meter reading will drop, say, to 60.

Add some diodes to the series string CR₃-CR₇ and try again. The intention of this procedure is to have enough diodes in the string that at full scale the meter reading should drop just a little.

When the series string of diodes is right and the meter is reading full scale you will see a just-perceptible drop in meter indication, but when the meter is reading 77.5 and the diode string is connected, no drop will be visible. In other words, 0 dbm is still 0 dbm and only past this point is the meter reading affected and limiting of the meter coil voltage beginning. With the circuit adjusted this way the maximum voltage across the meter terminals is never more than 3 times the full scale voltage and any good meter should be able to stand this permanently. With the circuit shown and using the 90 mv full scale meter the maximum voltage across the meter is never more than 245 mv. If no audio generator is available, the station receiver can be used by taking audio from the speaker terminals and tuning the receiver to the crystal calibrator. The audio frequency is not all that critical, anything between 1000 and 1500 Hz will do. The only thing really needed is an a.c. voltmeter of reasonable accuracy.

[Continued on page 76]

Miniature Solid State Tone Encoders to Replace Reeds

BY DENNIS DAUBEN,* WB6WYR

HAM f.m. repeater systems have long used tone encoders to protect their inputs from adjacent community interference on commonly shared channels and add security to the input frequency. Commercial repeaters have found tone encoding necessary to avoid annoying non-selective message monitoring and low band skip.

This type of encoding system is known as CTCSS, continuous tone coded subaudible squelch. Each manufacturer in the commercial service has registered trademarks for CTCSS: Motorola's Private Line, RCA's Quiet Channel, and General Electric's Channel Guard.

Commercial and amateur f.m. repeater CTCSS systems have traditionally used resonant reed circuits to provide the stable, low frequency tone.

The reed circuits were selected because:

1. The resonant reed is mechanically stable, thereby providing good frequency stability.

2. The physical structure lends itself to ultra low frequency operation.

3. Significant cost advantages before the advent of low priced integrated circuits.

The resonant reed disadvantages are:

1. The reeds are expensive when purchased new and somewhat difficult to obtain used.

2. The reed is physically large, not to mention the associated suggested oscillator circuit.

3. The reed frequency can not be varied without a complete replacement, which is sometimes necessary when uninvited operators appear on a private repeater.

Some communities have considered it more convenient to incorporate tone burst. This system, which requires a short audible beep at the beginning of each transmission has been used to some degree of success in Southern California. Three distinct advantages of the PL system immediately become apparent.

1. The restricted repeater receiver audio bandpass prevents the low frequency tone from being heard.

2. When mobiling in a weak signal area, it is not necessary to be concerned that the repeater has interpreted you as dropping carrier.

3. It is not necessary to disable the beep at the beginning of each transmission when operating simplex. The PL tone may be heard in the background but it does not become irritating.

The following designs have been incorporated in a number of tube and solid state rigs and have proven very successful.

The design objective was to construct a ultra frequency stable 100 Hz circuit, using easily available commercial parts, and a minimum of components for compact construction.

These circuits may also be used for tone burst encoders by modifying the frequency determining components.

*Project Engineer, Cubic Corporation, San Diego, CA 92123.

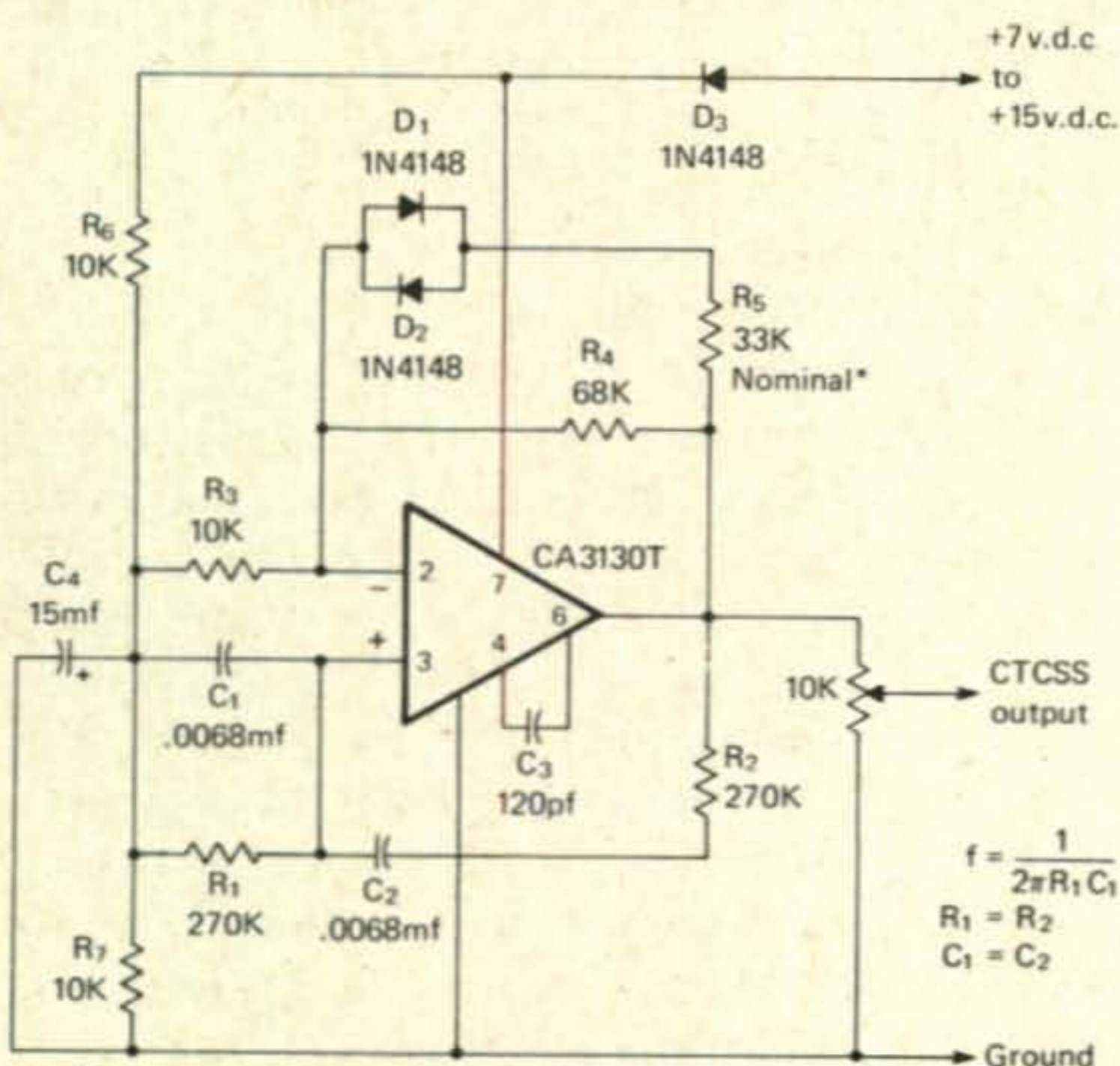


Fig. 1—Wein bridge oscillator circuit for generating CTCSS output for repeater access. The IC is an RCA hobby type costing \$1.30.

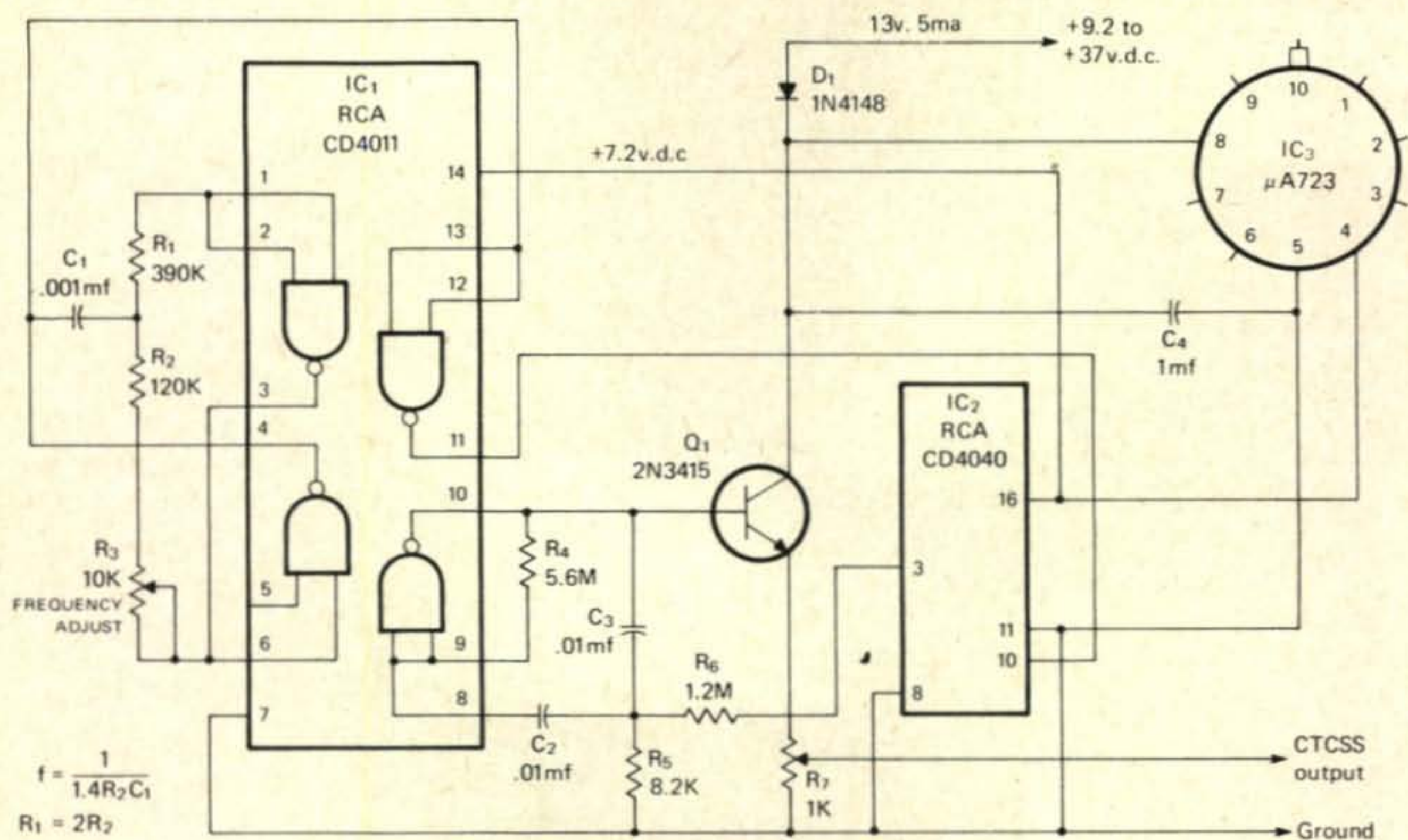


Fig 2—Digital oscillator for CTCSS use.

Wein Bridge Oscillator

The first circuit (fig. 1) consists of a traditional Wein bridge oscillator. This design lends itself to this application in that it is compact, generates a relatively low distortion sine wave (less than 4%) and requires a minimum of components.

It is necessary to use quality components in the frequency determining network to achieve frequency stability comparable to that of reed circuits.

Film resistors such as Corning RN55C or RN65C should be used for R_1 and R_2 . C_1 and C_2 must be polystyrene, polycarbonate, Teflon or silver mica. Olson Electronics currently has a selection of inexpensive but somewhat large polystyrene capacitors. Much smaller units are available, but be prepared to spend \$4.00 to \$7.00 each.

R_6 , R_7 and C_4 are used to provide the operational amplifier pseudo ground.

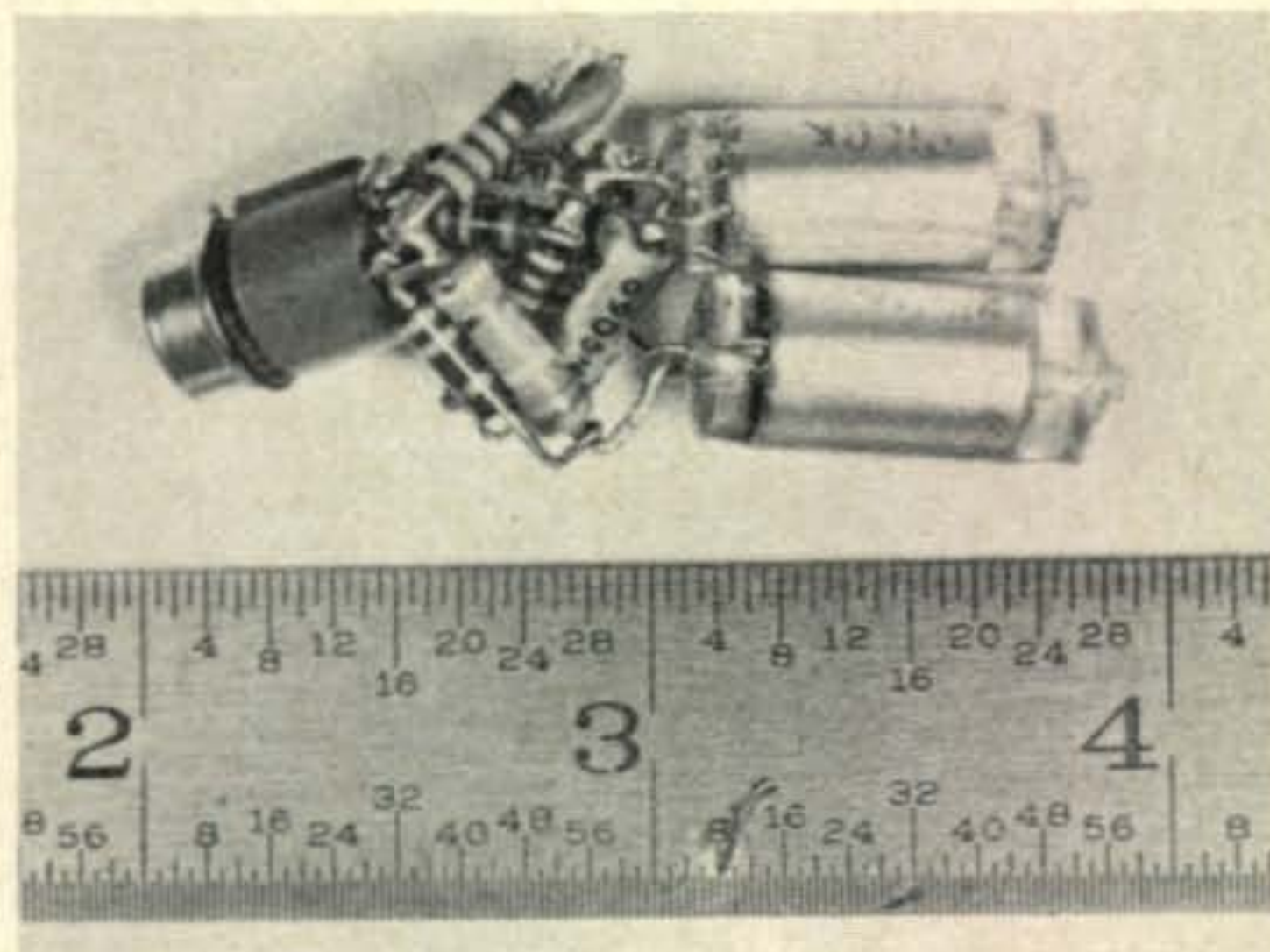
R_3 , R_4 , R_5 , D_1 and D_2 provide the feedback network used to establish the sine wave amplitude. R_5 should be hand selected to produce an 8 to 10 volt peak-to-peak sine wave when operating from a 12 volt power supply. R_1 , R_5 , D_1 and D_2 are used to stabilize the amplifier sine wave output amplitude with temperature variations.

The RCA CA3130T operational amplifier was selected as a result of its ability to operate at low supply voltages, extremely high input impedance, large peak-to-peak

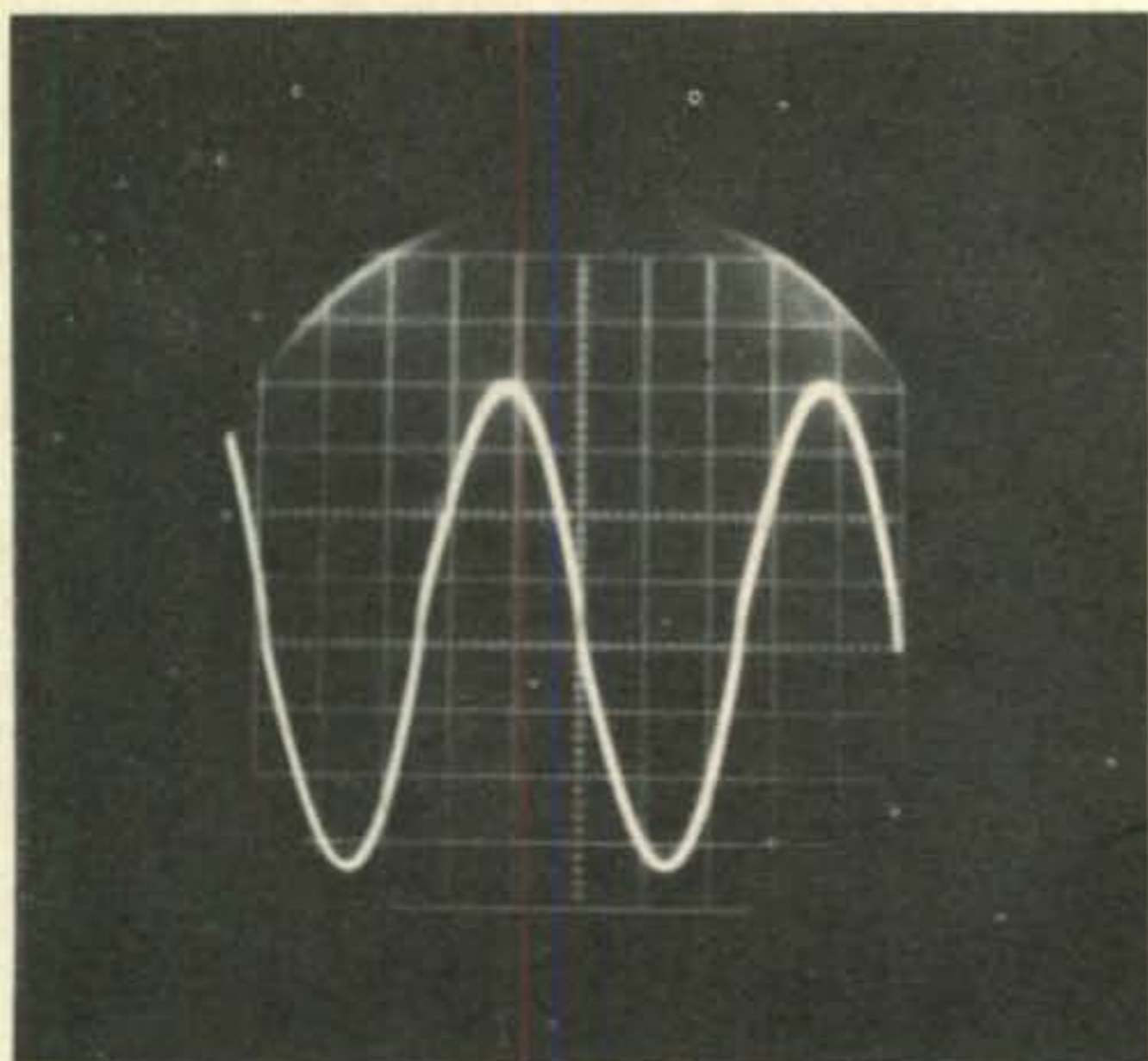
output swing and adversity to self destruction. A 741 operational amplifier can be substituted for the CA3130T if C_3 is removed and the supply voltage set above 11.5 v.d.c.

Tuning

R_1 and R_2 may be varied slightly to adjust the frequency. A very slight degradation in distortion will result from the resistor unbalances. A good rule of thumb is not to mismatch the resistance values by more than 20%. R_1 and R_7 are the same value and derived from the formula:



The Wein bridge CTCSS oscillator completely assembled and ready for "potting" in "Clear-Cast." Oscillator is shown actual size.



Output waveform of Wein bridge oscillator.

$$R = \frac{1}{2\pi fc}$$

where:

f = frequency of oscillation

c = capacitance = $C_1 = C_2$

R = resistance = R_1 and R_2

Resistance values should not compute above 300K for practical stability considerations.

COSMOS Oscillator

IC_1 is a COSMOS quad nand gate with two gates used as an oscillator, one gate used as buffer and one arranged in an amplifier configuration to serve as an active bandpass filter. See fig. 2.

A cost advantage is realized in this circuit by the use of only one precision capacitor and standard carbon resistors in the frequency determining network.

C_1 must again be a Polystyrene, polycarbonate, Teflon or silver mica capacitor. R_1 and R_2 need only have the same temperature

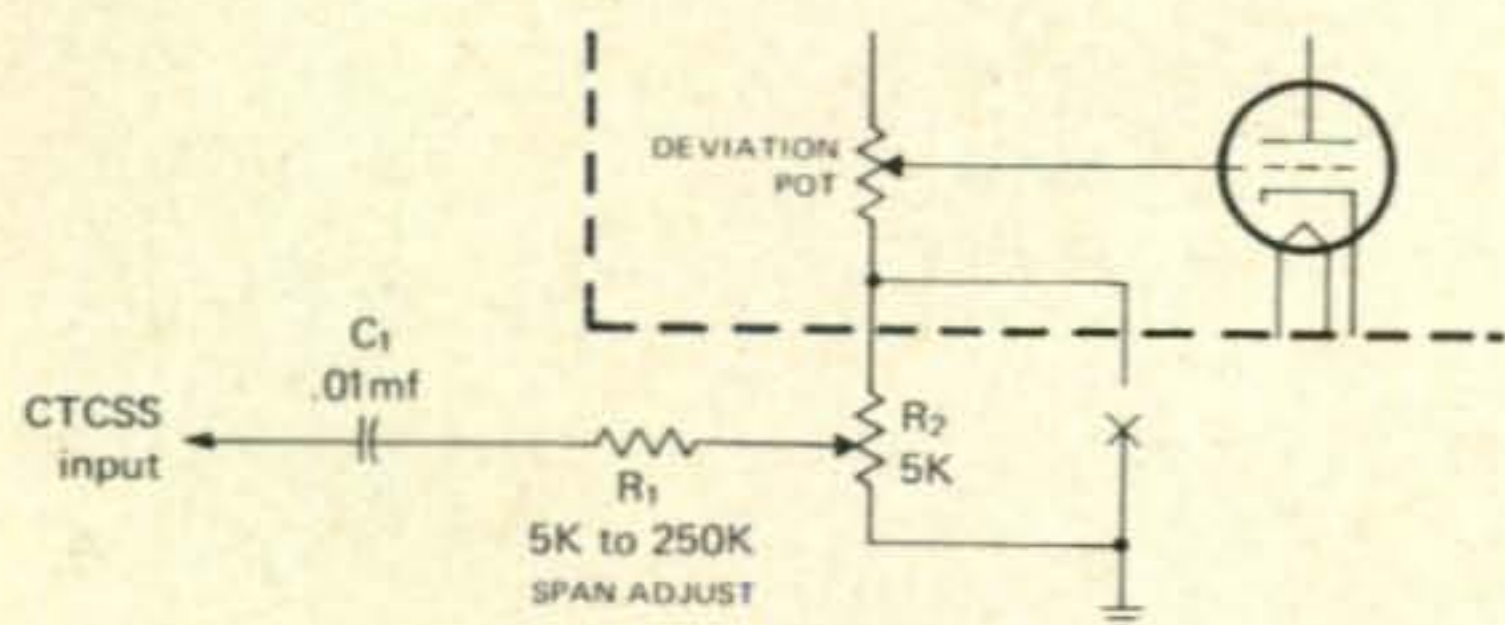


Fig. 3—Interface for use between CTCSS oscillator and modulator in a phase-modulated f.m. transceiver. R_2 must be added between ground and the bottom end of the rig's Deviation pot to enable level adjustment of CTCSS tone without altering deviation of rig for voice.

coefficient. R_3 , the frequency trimming potentiometer should be at least a factor of 10 lower in value than R_2 .

Tuning

The frequency can be set with most amateur counters since the oscillator operates at 3.2 kHz. It is recommended that the output be taken at pin 11 to prevent loading on the oscillator which would pull the frequency.

IC_2 divides the oscillator frequency by a binary multiple. The output is fed back to IC_1 gate to convert the square wave into a sine by filtering out the high frequency harmonics. An operational amplifier may be substituted for the amplifier gate to improve the harmonic distortion at the sacrifice of additional space. The gate has a measured open loop gain of only 75 and is, therefore,

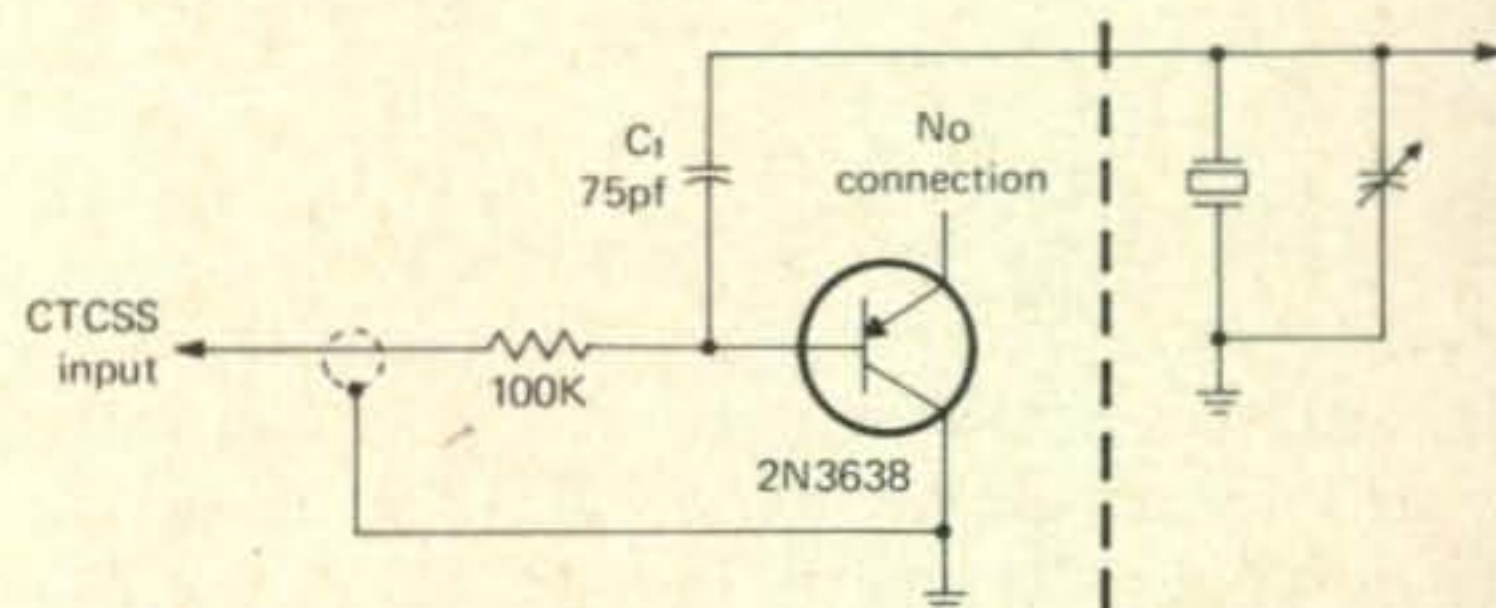


Fig. 4—Interface for use between CTCSS oscillator and true frequency modulated transmitter. The base-collector junction of an inexpensive transistor is used as a Varactor in parallel with the transmitter crystal, modulating the crystal oscillator's output frequency.

not capable of producing a perfect sine wave from a square wave input. The circuit has proven more than adequate for repeater use with no noticeable harmonics lying within the modulation bandwidth.

C_3 and C_4 are not critical and may be ceramic discs. R_4 , R_5 and R_6 are carbon resistors. R_5 is used to adjust the sine wave for the least distorted output. Q_1 is an emitter follower to provide a low impedance output and prevent any loading upon the filter amplifier.

IC_3 is an inexpensive voltage regulator which in most cases can be replaced by a zener regulator. The integrated circuit does provide superior protection from battery line transients and possible damage as a result of a malfunctioning automotive regulator.

The oscillator frequency shift without any voltage regulation is approximately 1% per volt.

From ambient temperature to 40°F the measured frequency shift was $-.07\%$. From ambient temperature to +140°F (for you surplus f.m. tube transceiver fans) a $+0.07\%$ shift in frequency was measured.

Interface Circuits

The majority of older and some recent f.m. transmitters incorporate phase instead of frequency modulation. Phase modulators have a characteristic 6 db per octave amplitude slope with respect to the modulating frequency. It would, therefore, require approximately 8 times more amplitude at 100 Hz to produce the same modulation amplitude at 1,000 Hz. As a result, most phase modulators are not capable of undistorted audio modulation in the presence of the required high level of CTCSS tone. Also, to prevent the CTCSS tone from being severely attenuated by the passband characteristics of the filter, caution must be taken to insert the tone after the transmitter modulation filter.

Phase Modulator Interface

The circuit shows a means of coupling into some types of phase modulators. As is stated previously, it is not always applicable to all transceivers. If in doubt, use the f.m. modulator interface, fig. 3.

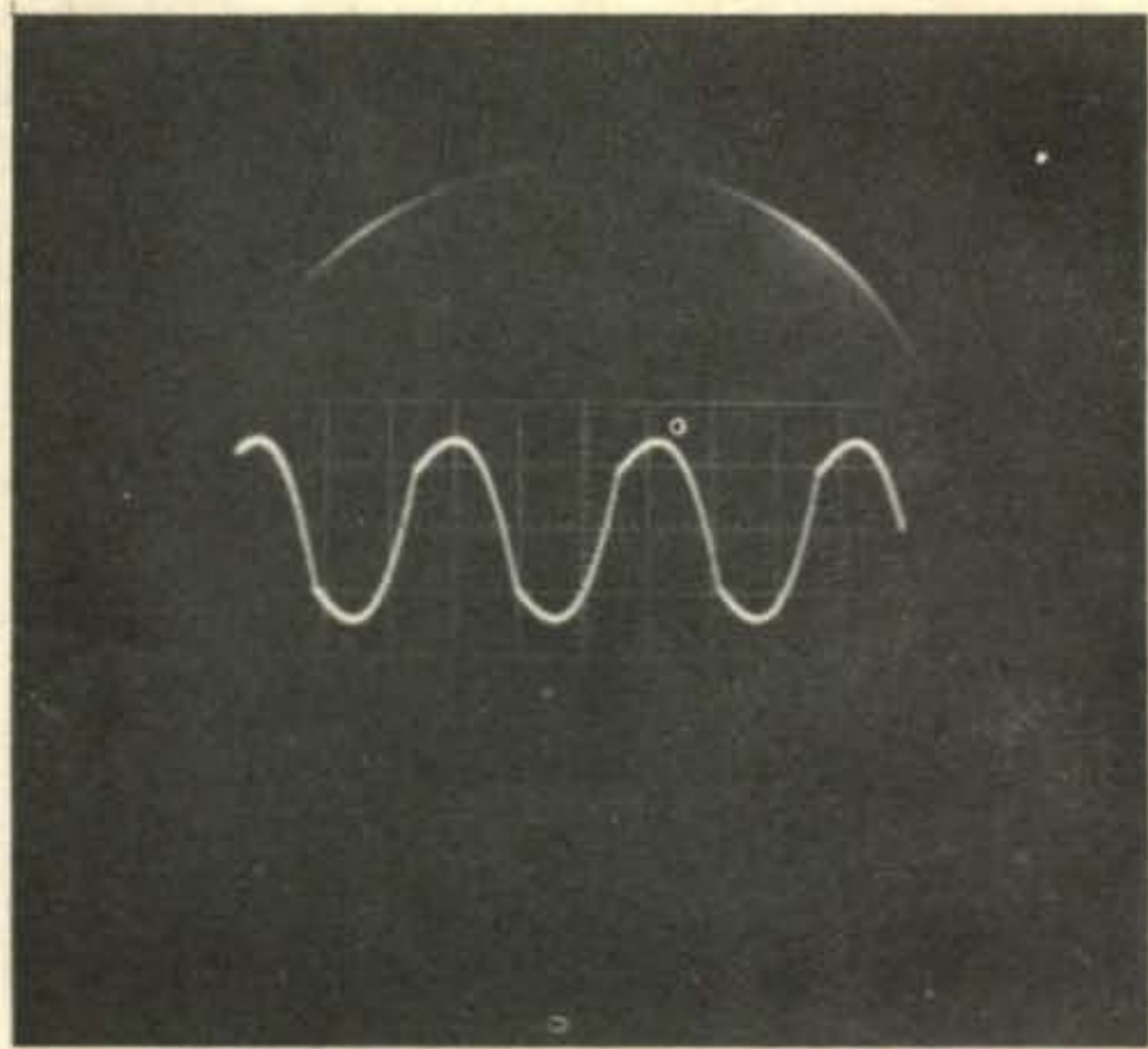
The ground must be removed from the deviation pot and a 5.0 K pot installed to ground. R_1 is selected to provide an adequate modulation span with R_2 . This circuit should be physically incorporated immediately at the modulator.

Frequency Modulation Interface

The circuit of fig. 4 shows a true f.m. system which is not costly but does require the recalibration of the transmitter frequency. This circuit is regarded reliable as far as repeatability between transceivers. The 2N3638 is a very inexpensive epoxy PNP transistor which is used as a Varactor diode. Standard Varactors may be used but are generally more expensive and more difficult to obtain. This network should be tacked into the circuit immediately at the oscillator.

Construction

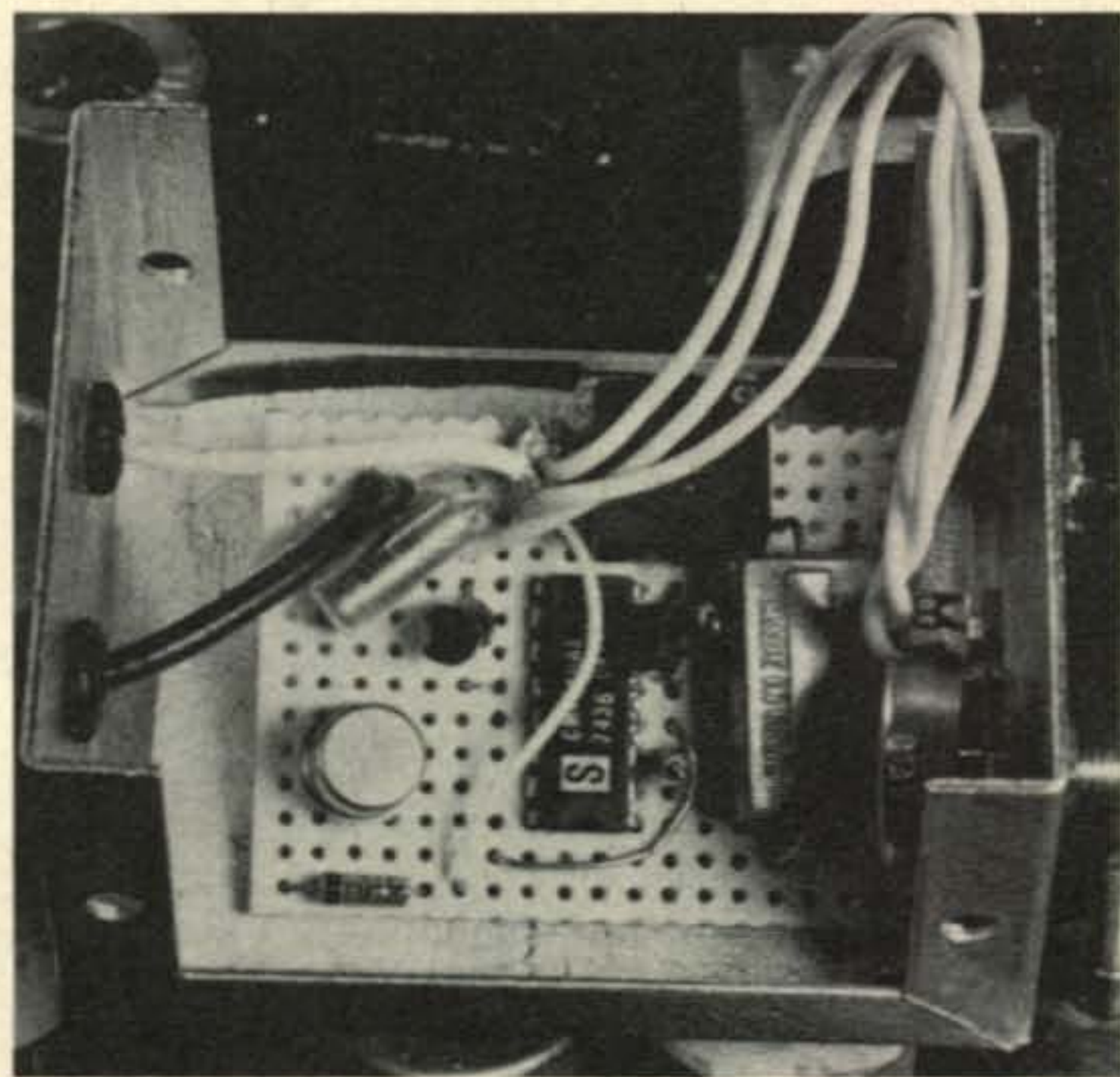
Care should be taken handling the COS/MOS operational amplifier and digital integrated circuits since they are somewhat sensitive to static discharge.



Output waveform of digital oscillator for CTCSS use.

It is necessary to house both these circuits in a small Minibox attached to the transceiver cabinet especially in the higher power rigs. Excellent results have been achieved by using RG-196 miniature coax for both the power supply input and modulation output. The oscillator itself should not be grounded to the Minibox, but used only as an r.f. shield. The power supply and modulation coax grounds should be connected as close as possible to the deviation pot ground to prevent possible ground loops. The layout of the circuit board is not critical.

[Continued on page 76]



Since COSMOS IC's are often susceptible to r.f. interference, the digital CTCSS oscillator is housed in a small Minibox for shielding.

CQ Reviews: The Heathkit HD-1250 Solid State Dip Meter

BY IRWIN MATH,* WA2NDM

THE Heath Company recently introduced a new version of an old favorite, the grid-dip meter. This instrument, one of the most versatile pieces of test equipment used by amateurs and professionals alike, has been thoroughly modernized by Heath. The unit is fully solid state containing a MOSFET, u.h.f. junction transistor and two hot-carrier diodes in a unique dip meter circuit.

The HD-1250 Solid State Dip Meter, as it is called, is capable of determining the resonant or operating frequency of energized or de-energized circuits between 1.6 MHz and 250 MHz in seven easy to read, color coded ranges. It is also battery powered, employing a standard 9 volt transistor radio type battery, which makes it ideal for mobile or portable work away from a.c. line.

Figure 1 is a simplified schematic of the HD-1250. Q_1 is connected in a Colpitts oscillator with feed back occurring between collector and base through the tuned circuit.

*5 Melville Lane, Great Neck, N.Y. 11023.



The Heathkit HD-1250 Solid State Dip Meter.

A portion of the oscillator signal is sampled by Q_2 , a MOSFET. The high input impedance of the MOSFET does not appreciably load the tuned circuit even at very high frequencies and thus the choice of this device.

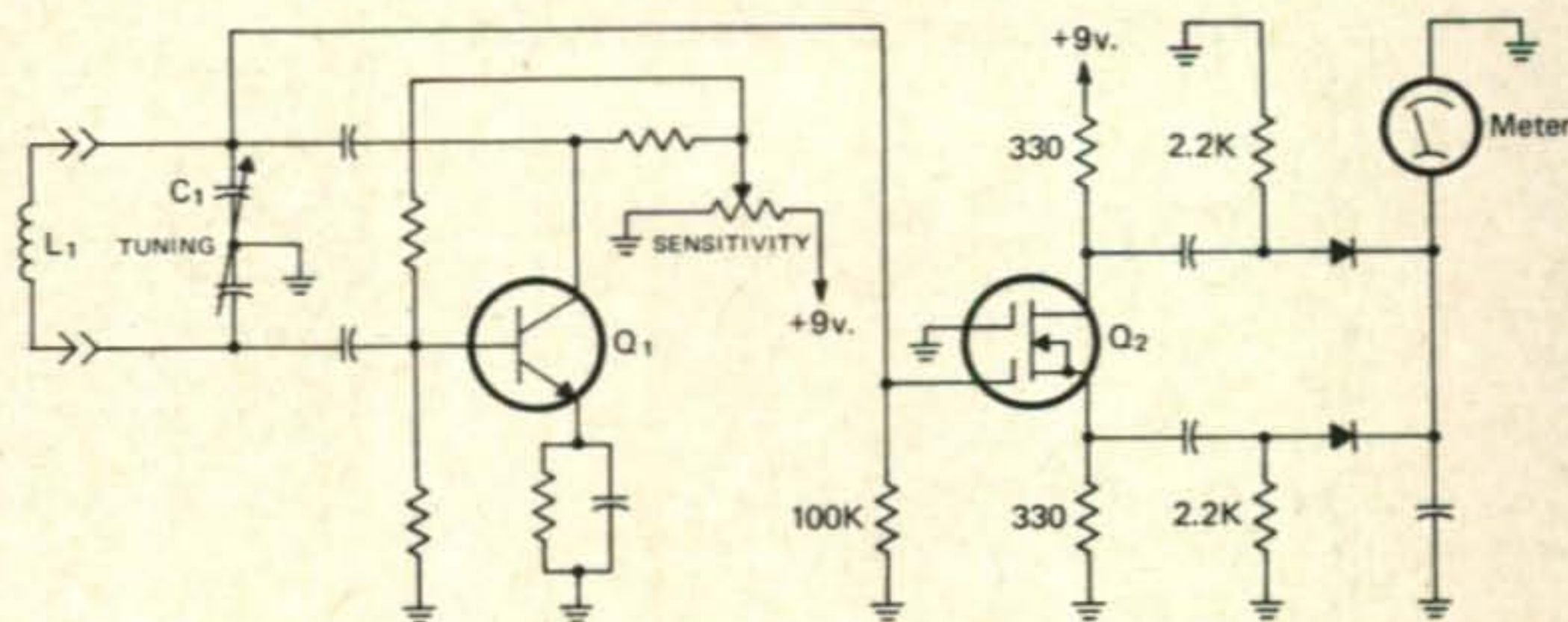
Q_2 acts as a high input impedance phase splitter producing equal but opposite (in phase) outputs at its drain and source. These outputs are rectified by two hot carrier diodes and applied to a sensitive, 150 microampere meter as an indication of the amount of r.f. present at the input of Q_2 .

A potentiometer is connected to the oscillator B+ supply and serves to vary the amount of r.f. produced by Q_1 .

Operation of the circuit is quite straightforward. With Q_1 oscillating, the meter indicates the amount of r.f. across the tuned circuit L_1, C_1 . When another tuned circuit is placed in close proximity to L_1, C_1 , it absorbs energy causing the r.f. level to decrease. The meter immediately shows this as a dip. If the oscillator potentiometer is turned so that Q_1 just stops oscillating, the circuit becomes a sensitive wavemeter. Now, Q_1 acts as an

[Continued on page 46]

Fig. 1—Simplified schematic of the Heath HD-1250 solid state dip meter.



Now What Have I Done?

BY PETE WALTON,* VE3FEZ

HERE is a simple circuit that makes an excellent one evening project and can result in lots of fun. It relies on the fact that man is of a very curious nature and doesn't believe everything that he reads. The circuit is mounted in a small Minibox $4 \times 2 \times 1\frac{1}{2}$ inches deep. The pushbutton is labelled "DO NOT TOUCH" in plain writing and very visible. Now any time you label something "do not touch" somebody is sure to touch it. It never fails. That's human nature. The person whose curiosity has gotten the best of him, however, will get very red faced and embarrassed when he finds there is no way to turn off the noisy thing that he has just started.

How does it work? Very simple: the power to the two-transistor oscillator is controlled by an SCR (Silicon Controlled Rectifier). When you push the button you gate the SCR, causing it to conduct and causing the audio oscillator to run. Once an SCR has been gated and is conducting there is no way to shut it off except to disconnect the power or reverse the polarity on the diode. It is at this point that the poor fellow who pushed the button says, "What have I done now?"

In this circuit we disconnect the power and stop the noisy oscillator by means of a magnetically controlled normally closed reed switch. I made the reed switch normally closed by glueing a small magnet to it with epoxy. The small magnet causes the switch contacts to be closed all the time. However, if you place a slightly larger magnet near the already closed reed switch it will oppose the magnet that is glued to the switch, and the points will open as long as the larger magnet is held in close proximity. Mount the reed switch against the inside edge of a plastic or aluminum box. (Don't use a steel box or the magnet will not work.) When you want to shut off the

oscillator simply rub the magnet against the outside edge of the box where the switch is mounted. The magnet will open the points, and the unit will shut off. Unless the unsuspecting victim carries a magnet with him there is no way he can shut it off.

I built mine in one evening completely out of junk box parts. Almost any two transistors will work as long as one is npn and the other pnp. Parts layout is not at all critical. The SCR that I used came out of a bag of 10 assorted untested SCR'S that I bought for \$1.69. Out of this assortment several worked with no difficulty so the SCR is not very critical.

You could replace the pushbutton with a mercury switch if you wanted to be real nasty. The oscillator would then start as soon as the box was picked up... an excellent portable burglar alarm. After you build it just leave it on your desk and it won't be long before some poor soul gets just a little too curious. I leave mine in the shack on the bench and everytime I get a visitor he picks it up, looks it over and pushes the button. Never fails! ■

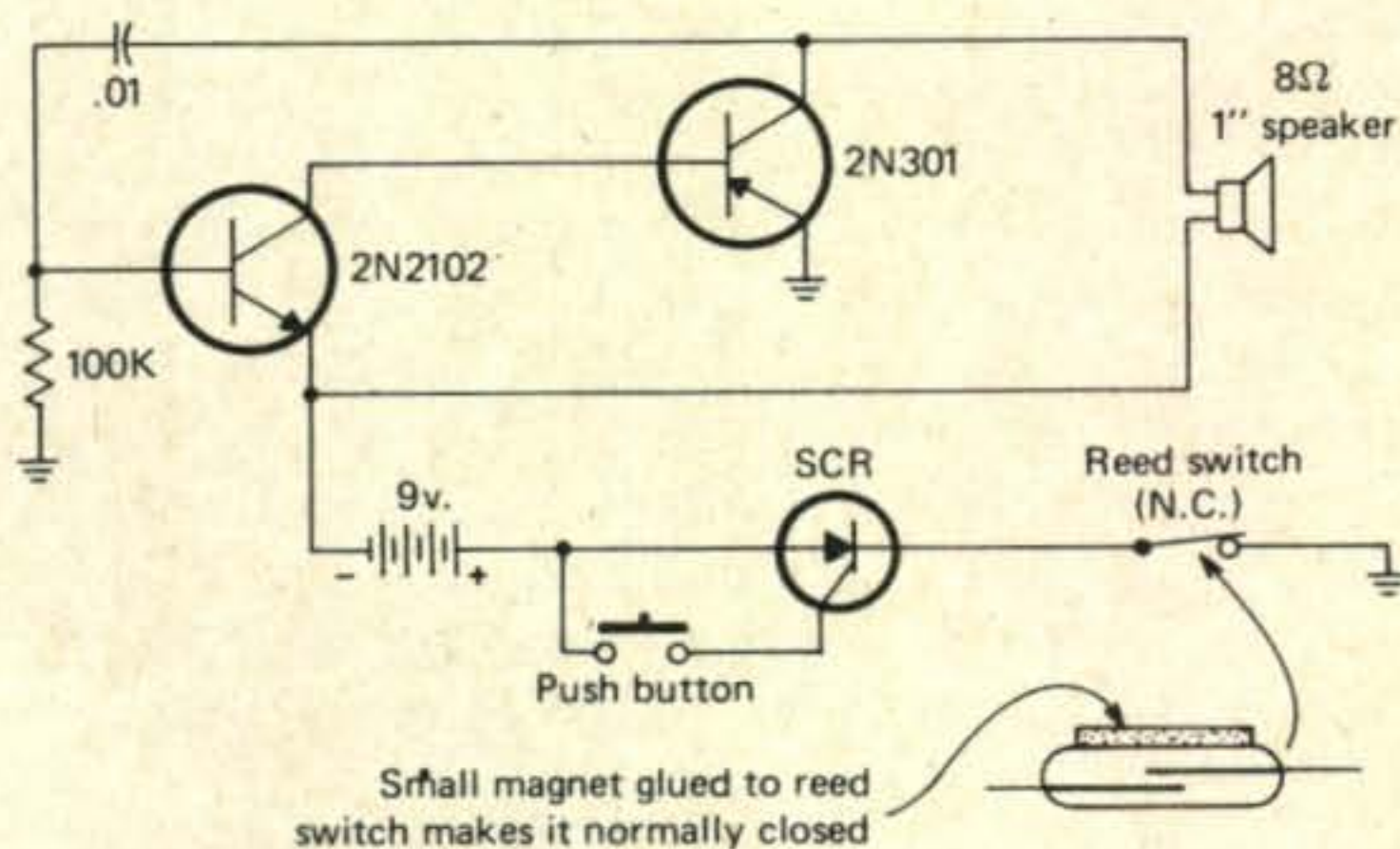


Fig. 1—Circuit of the... uhh... well, let's call it a curiosity satisfier. Pushing the push button switch labeled "DO NOT TOUCH" gates the SCR, setting the simple audio oscillator in operation. It can only be shut off by opening the reed switch, with a magnet. An alternative would be to replace the push button switch with a mercury switch.

*421 Lodor St., Ancaster, Ontario, Canada.

NOVICE SHACK

BY HERBERT S. BRIER,* W9EGQ

New Call Signs For You in '76

Tired of your old call letters? If you are, you can do something about that tired feeling in 1976. In recognition of the United States Bicentennial, the Federal Communications Commission has authorized U.S. amateurs to substitute the alternate prefixes listed below for the regular prefixes in their call signs between 0500, GMT, (0000, EST), January 1, 1976, and 0500, GMT, January 1, 1977, (Midnight EST, December 31, 1976), without fuss or bother. W9EGQ, for example, may sign AC9EGQ; WN1XXX may sign AK1XXX; and Novice WH6XYZ, Hawaii may sign AH1XYZ. Furthermore, a Novice who upgrades his license in 1976 will have the option of using four different prefixes during the year.

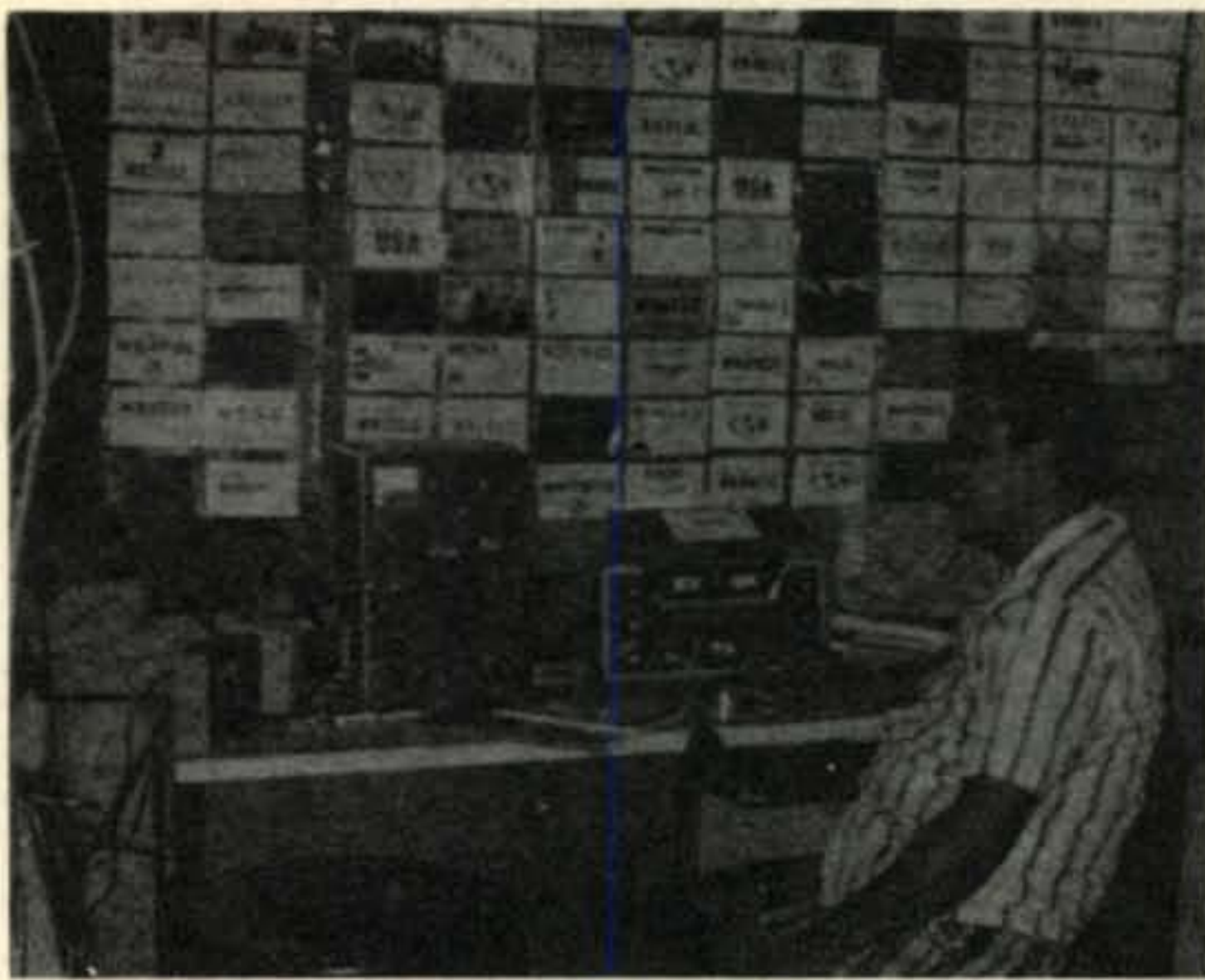
Using the alternate prefixes is entirely voluntary. If you are happy with your present call sign, continue to use it unchanged. Or you may use the alternate prefix exclusively all year or change prefixes as often as every other contact, if you wish. Some amateurs will use the new prefixes in honor of the Bicentennial, and others will use them temporarily for the novelty of it. But "prefix chasers" will be the most enthusiastic about the program. They collect prefixes like other people collect beer cans or postage stamps. They display them on a separate wall of their radio shacks or in albums. Also CQ sponsors a WPX Program for amateurs who work specified numbers of prefixes on c.w., s.s.b., or mixed modes. Separate Novice, WPNX, SWL, and single-band and single-continent awards are available. You can get a complete set of rules and official entry forms by addressing a request for them to WPX Manager, P.O. Box 3388, San Rafael, Calif. 94902. Include a "business size," return envelope with first-class postage affixed.

An advantage of chasing WPX awards over trying for an award such as WAS (Worked All States) or WAC (Worked All Continents) is, paradoxically, that you soon reach your goal with these closed-end awards or reach the point where new ones come so seldom that you get bored between contacts. As an example of this

*409 South 14th St., Chesterton, IN 46304



Glenn E. Means, WNØMUU, 2913 Castle Dr., Blue Springs, Mo. 64015, is partial to vertical antennas. He has worked 47 states with his Heathkit SB-102 driving a Hy-Gain 18-AVQ ground-mounted vertical antenna. The other picture shows what he uses for mobile operation with a Hy-Gain 18-AVT/WB mounted to a 7-foot mast on the rear bumper. He thanks the PHD Radio Club, North Kansas City, Mo., Novice Course and help from individual members, especially from Charles, KØMAT, for assisting him to get his license. We are sending WNØMUU a 1-year subscription to CQ for his winning entry in our Monthly Novice Shack Photo Contest. You are invited to enter the contest by sending a clear picture (preferably "black and white") of you at the controls of your station and some details of your amateur career to: Novice Shack Photo Contest, c/o Herbert S. Brier, W9EGQ, 409 So. 14th St., Chesterton, IN 46304. Even if you do not win, suitable pictures are published as space permits.



"Angie" Luiz Dias Lebron, WP4EBJ, Jancos, Puerto Rico, and a few of the cards that prove that you can really make contacts as a Novice with a 15-watt transmitter—especially from Puerto Rico.

syndrome, big DX men who can work practically any station they can hear work a new country only when some amateur group organizes a DXpedition to an uninhabited island or a country with no DX-minded amateurs in it, or a new country breaks off from the old one. DXpeditions create bedlam on the DX bands by working thousands of amateurs throughout the world in a few days of operation. And operators who cannot spend hours of time fighting the mob often do not make the contact, anyway.

The likelihood of ever running out of prefixes to work is remote. Practically all licensing authorities assign different prefixes to their amateurs located in different parts of their countries as a means of identifying Geographical location or to identify different classes of licenses. Furthermore, new prefixes are issued when all call signs in a series are used up. Also, temporary prefixes are issued to stations set up in conventions, hamfests, and even world's fairs. In addition, prefix chasers strike real bonanzas when licensing authorities temporarily or permanently change all their amateur prefixes for any reason. Some changes are well publicized; and other times, they take place with little advance notice.

Novice Roundup

The 1976 edition of the "Novice Roundup" is scheduled for between 0100, GMT, January 31, and 2359, GMT, February 8, 1976. Operating a maximum of 30 hours during this period, Novice work all comers, and others work only Novices. U.S. and Canadian stations exchange RST signal reports and the names of their ARRL "sections." Others substitute country for section. A complete 2-way exchange earns one point. Total score equals contest points (after duplicates are deleted) plus the highest speed

shown on your ARRL Code-Proficiency certificate multiplied by sum of the sections and other countries worked. Complete rules and score sheets are available on request accompanied by the usual postpaid return envelope from American Radio Relay League, Inc., 225 Main St., Newington, CN 06111.

1976 Bicentennial Prefixes

In the following, the permanent prefix is followed by the optional Bicentennial prefix. Mainland prefixes: WA-AA. WA-AB. W-AC. K-AD. WD-AE. WR-AF. WN-AK. In the following, non-mainland prefixes, the Novice pair (when they exist) is listed second in each group. **Baker, Canton, Enderbury, Howland:** KB6-AG2. WB6-AG3. **Navassa:** KC4-AL4. **Guam:** KG6-AG6. WG6-AG5. **Hawaii:** KH6-AH6. WH6-AH1. **Johnston:** KJ6-AI7. WJ6-AI1. **Alaska:** KL7-AL7. WL7-AL1. **Midway:** KM6-AH7. WM6-AH2. **Puerto Rico:** KP4-AI4. WP4-AI8. **Palmyra, Jarvis:** KP6-AIO. **Serrana, Roncador:** KS4-AH4. **Samoa:** KS6-AH3. WS6-AH5. **Virgin Islands:** KV4-AJ3. WV4-AI2. **Wake:** KW6-AG7. WW6-AG1. Even if you do not change your call-letter prefix in 1976, we suggest that you keep this list handy to keep track of the stations that do.

Amateur Radio License Classes

After concluding their latest Novice courses, both the Indianapolis American Red Cross Amateur Radio Club, 10th and Central Aves., Indianapolis, Ind., and The LERC Amateur Radio Club, 2814 Empire Ave., Burbank, Calif. 91505, will sponsor General class license courses beginning January 12, 1976. Everyone 16 years or older or who holds a Novice license is eligible to enroll in the Indianapolis course, which will meet from 7:30 to 10:00 P.M. for 20 Mondays. The instructor is John Jacobs, Jr., WB9KSZ, assisted by Robert Foot, K9KGJ. We do not know whether the IERC course, which is taught by Bill Welsh, W6DDB, has any age limits, but Bill's classes always have more applicants than can be accommodated. John and Bob also play before full houses; so apply as early as possible for either class.

Postage Increases

Effective December 28, postal card (QSL's) rates will increase from the recent seven cents to nine cents. First-class rates go to 13 cents an ounce; airmail to 17 cents, but it's a waste of money, because practically all domestic mail goes by air, anyway. Parcel post is approximately 10 per cent higher. Overseas cards to foreign countries 11 cents by boat, 18 cents by air. Letters, 18 and 26 cents, respectively.

[Continued on page 74]

QRPP

LOW-LOW POWER OPERATING

BY ADRIAN WEISS,* K8EEG/Ø

Getting The @#!\$%? Thing To Work!

Building your own rig from scratch or from a published design and actually using it to make QRPP contacts on the air is one of the most satisfying experiences in amateur radio. I suppose that this is due to the fact that man has been driven by the urge to communicate beyond the range of his voice from the first time that he realized that others like himself were beyond the next ridge.

Perhaps the most frustrating experience in amateur radio is designing a rig, etching the boards, and assembling it in anticipation of the exhilaration of that first QSO with it—only to have the blamed thing not work! Argh! This writer can now publicly admit to having hurled more than one project against the nearest, hardest wall in anger and desperation in such a situation! But I can also reveal that I picked them all up and eventually put most of them on the air. Perseverance is the secret. And a few tricks. And sometimes many false-start "cut and try" efforts. In this column and subsequent ones, I'd like to share what I've learned from my humble experience.

"You Can't Hit What You Can't See"

There are various schools of thought on what those mysterious little electrons look like that make radio possible. So far no one has seen one—directly, that is. All we have to go on are secondary indicators—that is, test gear—which tell us something about what the electrons are doing in a circuit. Actually, one doesn't need the equivalent of a Motorola or Tektronix test lab to get a decent idea of what is going on in a circuit. Test gear of some sort is necessary for trouble-shooting and working a circuit into shape. The more sophisticated the test gear the better—but remember that highly sophisticated gear such as a spectrum analyzer or 500 MHz scope only provide a more precise indication of phenomena that really simple indicators can detect and display. The following paragraphs cover the purposes and types of gear that the typical amateur can accumulate.

1.) **Measuring R.F. Voltage Levels to Determine Gain.** A transmitter consists basically of a series

of amplifiers which are supposed to boost the input power a certain amount and pass it on to the next stage. The simplest method of determining whether this is happening is by checking input r.f. voltage against output r.f. voltage by means of a v.t.v.m. or f.e.t.v.m. equipped with a high impedance r.f. probe (the high impedance eliminates loading of the circuit under test by the probe—impedances above one megohm are satisfactory.) See the *ARRL Handbook* (any edition) for construction of such a probe; Heath markets an r.f. probe kit for under \$5.00 that can be used with any v.t.v.m. which exhibits a 10-11 megohm input impedance, and the voltage divider resistor of this probe can be changed to provide proper readout for instruments exhibiting different impedances than above.¹

In working with an individual amplifier stage, one can do preliminary power gain adjustments by using the simple r.f. indicator (used in conjunction with a microammeter or "cheapie" v.o.m.) shown in the QRPP COLUMN of December, 1973, p. 38, if v.t.v.m. and r.f. probe are unavailable. The peaked output can be checked against "rule of thumb" expectations for gain: for example, a Class A stage driven directly by a v.f.o. (0.5 V_{rms} or so) can be expected to develop somewhere in the vicinity of 10-35 milliwatts output. This can be stepped up in the next stage (Class A or B) to about 120-300 milliwatts; a third stage (Class C pre-driver/driver) can boost this to about 600 milliwatts—1.2 watts or so; and then the final (Class C) can push this to 20 watts or so output, depending upon final amplifier design and final transistor type and gain figure. Bear in mind that the above are merely rough estimates based upon numerous experiments by this writer. In any event, stability and signal purity are often more important concerns than brute power gain, which at times must be sacrificed in their stead.

2.) **Determining Signal Purity.** Signal impurities consist of harmonics which are normally generated in every amplifier and parasitics which are the result of self-oscillation. Parasitics can fall anywhere in the spectrum—below, above, and on the operating frequency. Several common instruments will indicate the presence of these impurities.

The simple r.f. wavemeter shown in the

¹For example, the Heath IM-1202 digital voltmeter shows an input impedance of 1 megohm. The Heath probe will provide reasonably accurate direct readout in Volts_{rms} if a 410K ohm resistor is substituted for the supplied 4.7 megohm original probe divider resistor. This experimenter has had excellent results with the combination, although the plot of readings shows that this meter reads just a bit high on the high end and a bit low on the low end, but hardly enough inaccuracy to matter.

*213 Forest Ave., Vermillion, SD 57069.

ARRL Handbook is adequate for the task. Perhaps the easiest approach is the purchase of one of those "cheapie" miniature commercial units shown in most catalogues (*C.B. section, God forbid!*) and supplied by Radio Shack and other CB distributors. This instrument includes a meter indicator and is tuneable from about 1 MHz up into the u.h.f. region. Actually these are quite handy units for the price, and with the addition of a sensitivity control, become quite versatile as field strength indicators for antenna tuning work. I've found mine indispensable in cleaning up circuits.

Likewise, a general coverage receiver with S-meter covering the h.f. spectrum is very helpful in scanning for harmonics in that region, as well as finding unwanted parasitics. With respect to parasitics, the receiver usually reproduces them as "white noise" or "hash" or a very "wiggly" oscillation. Parasitics can occur right at the frequency of operation and very near to it, and just about the only way of detecting these close-by culprits is through the use of a scope or receiver. With respect to harmonics, the receiver is only as useful as the linearity of its S-meter across the h.f. spectrum. If a calibrated r.f. generator is available, the actual sensitivity of the receiver S-meter can be graphed and then the receiver will be useful in determining the relative strength of fundamental vs. harmonic signals.

Finally, the typical "boob-tube" is an ever-present and very sensitive indicator of harmonics and parasitics in the u.h.f. region. It is a piece of test gear that is too often overlooked by amateur experimenters. When placed next to a circuit, it will let you know whether anything is happening up there that shouldn't be!

In a sense, the above "instruments" can provide the typical amateur with the crude equivalent of a \$4000 spectrum analyzer—almost, that is! There's really nothing like looking at a signal on one of those little Hewlett-Packard beauties—but who has four grand just for beauty's sake?

3.) Determining Optimum Power Transfer Between Stages. Perhaps the single most important objective in any amplifier string is the efficient transfer of power between stages. This depends upon matching the output impedance of the first stage to the input impedance of the next stage.

In the typical small-signal Class A amplifier, simple link coupling usually suffices. However, in driver and final stages, where maximum power transfer and gain is the prime consideration, the simple link is inferior to an adjustable interstage matching network such as the "T" or "L" (see the *RCA Power Transistor Manual*—any edition—for typical interstage and output matching networks and formulas) or other versions. One point should be mentioned: the cal-

culated values for these networks rarely are optimum in an actual circuit, and considerable peaking for best match is usually necessary. This peaking is facilitated through the use of an impedance bridge such as that shown by Hayward (*QST*, May, 1972, p. 19). The instrument is quite simple and very valuable, especially if the variable impedance feature is incorporated.

A simple technique used by this experimenter that aids in the pre-adjustment of interstage networks is what I call "r.f. feedthrough peaking." A v.t.v.m. with r.f. probe, or other type of r.f. indicator, is coupled to the output of the driven stage, and B+ removed from the stage. When drive power is applied, some indication of r.f. feedthrough appears at the output port. The interstage network is adjusted for peak r.f. feedthrough indication. If there is no indication, the drive power is not being transferred to the driven stage. Once peaking is completed, B+ can then be applied and the stage turned on; don't forget to provide a load for it though. Usually some final fine tuning of the interstage network is necessary at this point. Also, parasitics may turn up once the stage is turned on, and the next step is to clean these up. I have followed this approach in just about all experiments with very good success: if the power is getting through, the stage will amplify it.

4.) Determining Power Input, Output, and Efficiency. Power input measurements are simple and consist of monitoring the d.c. voltage and current to the final collector. The instruments needed are an ammeter and voltmeter (v.t.v.m. etc). In solid state finals, the high d.c. current drawn by the collector can cause a significant voltage drop if any type of resistance is in the circuit feeding the collector. Hence it is wise to monitor the B+ voltage at the collector by using an r.f. choke in the meter lead for isolation. Similarly, the insertion of the meter directly in the d.c. current lead will inevitably cause a large voltage drop because of the internal resistance of the meter. In any large-signal amplifier drawing over 300 ma current, it is wise to measure the voltage drop across a small resistor (2-5 ohms) inserted in the B+ lead and figure the current according to Ohms Law.

Power output measurements have been discussed in the QRPP COLUMN of December, 1973, and employ either the v.t.v.m. and r.f. probe to measure the r.f. voltage across a known resistance, or employ a calibrated wattmeter such as that described by this writer (*ham radio*, October, 1973, p. 26). Efficiency is calculated by dividing output power by input power (to the final amplifier). Generally speaking, a well-designed rig operating properly will exhibit on the order of 45-65% efficiency, al-

[Continued on page 74]



DeWitt

In Focus

BY BILL DeWITT,* W2DD

It's that time of year again! Holiday Greetings are showing up on slow scan monitors 'round the World. I'd like to add my cordial wishes for happy holidays and a productive 1976 to all who read this column. This happens to be the sixth round of IN FOCUS, and I'm very grateful to cooperative slow scanners who have generously sent in photos and stories, they make the column, I just glue it all together!

The U.S. Scene

By this time most SSTV-oriented amateurs are aware that a devastating fire ruined a good share of Sumner Electronics and Engineering's manufacturing facilities. Dr. Jim Thomas, WB4HCV, notified me by letter that all of his equipment warranties will be honored. However, as a result of the fire, the HCV-2CS scan converter has not appeared on the market. I'm sure that all users of Sumner gear and other SSTVers join me in hoping that the holocaust that wiped out Jim's plant will not also signal the demise of the HCV-2CS. After a flood in the Spring, and a fire in the Fall, it's about

*2112 Turks Hill Road, Fairport, NY 11450.

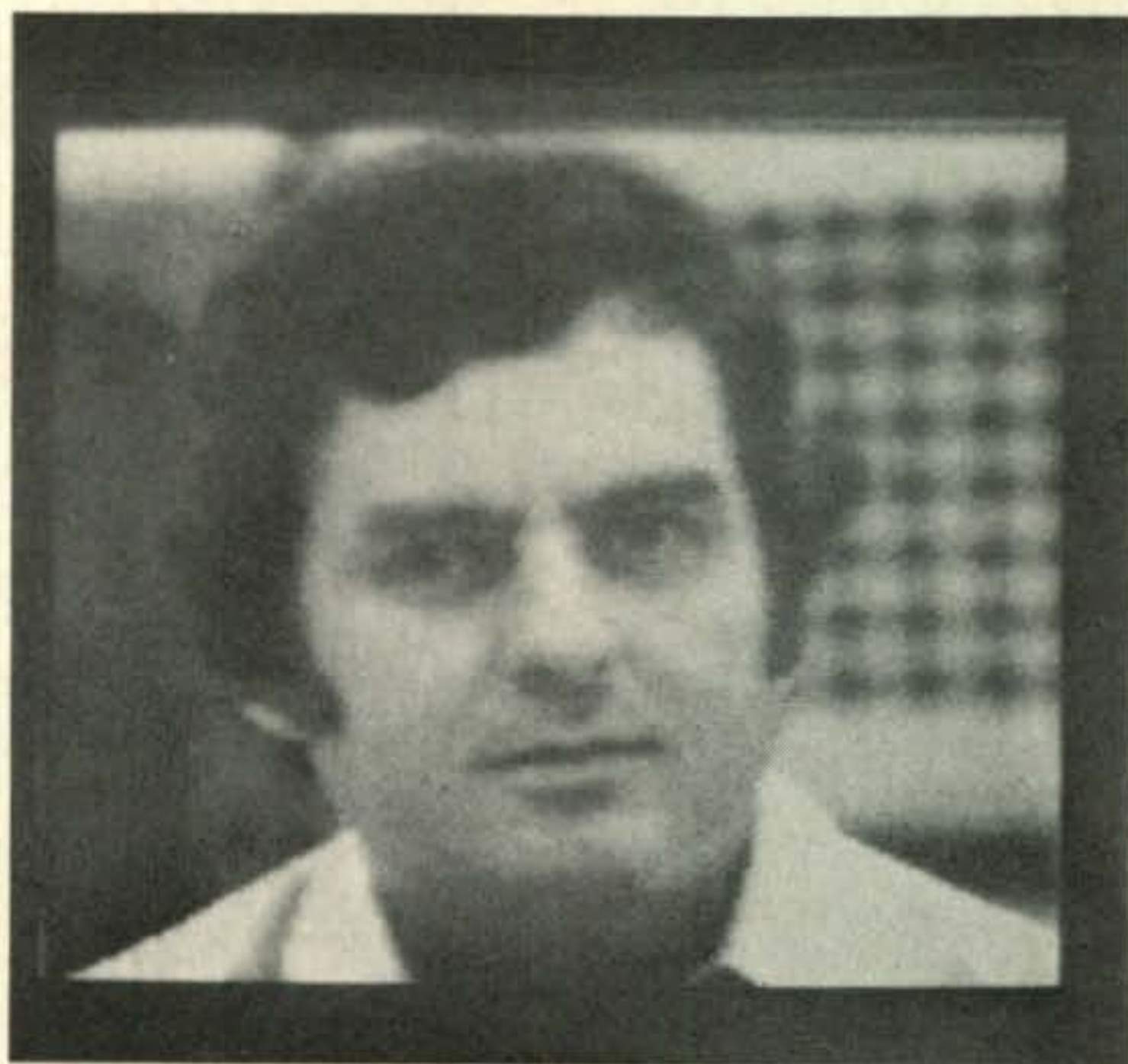


Richard Thurlow, G3WW, shown at his well equipped station. A new addition not shown is the LMD keyboard which was being built by Howard Watson, G3GGJ when this photo was taken.

time for something good to happen!

Robot's Model 300 Scan Converters are showing up in quantity on all the bands. The appearance of bright-complete pictures coupled with the ability to hold or freeze a frame when desired is creating a shock wave of enthusiasm for SSTV. This is not to say that the Model 300 is the only scan converter, but rather a re-statement of a comment I made in the November issue. It is the sheer number of commercially built units that will have the big impact on the growth of scan conversion. Pictures and further comment on the Robot later in this column.

At this writing, the circuit boards for the WB9LVI-designed scan converter made in limited quantity by Tony Pessiki, W3GKW, for a group of hams are reported to be pretty well de-bugged. By late December there will no



Closed circuit photo of Dr. George Steber, WB9LVI using his image processing technique.

doubt be more of these slow to fast scan converters in operation.

Dr. George Steber, WB9LVI, has created quite a stir in SSTV circles with his image processing techniques (and there's more coming!). The fine quality slow scan pictures derived by his techniques is well illustrated by the (closed circuit) photo of George himself. Sorry NBC/CBS, he's sticking to his chosen field, Education! Right Gloria?

First SSTV Convention

Congratulations to the British Amateur Television Club for arranging the first SSTV Convention, EVER!

A big hit at the Aston University gathering was the scan converter built by Volker Wraase, DL2RZ. Richard Thurlow, G3WW, reports that those viewing Volker's equipment in operation were in general agreement that "This is the way

Larry Pryor, WA9MFF now has the boards for the WØLMD designed P-7 monitor. Details in the text.

to go!" Those bright black and white pictures coming up on a "regular TV set" are enough to sell almost anyone on SSTV.

The design of DL2RZ's converter is reported to be different than those of WB9-LVI and WØLMD. I understand however, that it does use the same 1404 memory ICs. If there's an ample supply of 1404s in Germany I'll bet Bob Zimmerman, W8D-PW, will be DL-bound. He's still scrounging for them.

DL2RZ is make boards for his scan converter available. For additional details I would suggest sending a self addressed envelope and an IRC to him at Postbox 6622, 23 Kiel 14, Germany.

At this point I don't know whether Volker has a 60 Hz modification for his design or not.

Another well-received feature of the Aston convention was the reading of Dr. Steber's paper on image processing. Arrangements for this presentation were made by—you guessed it—G3WW!

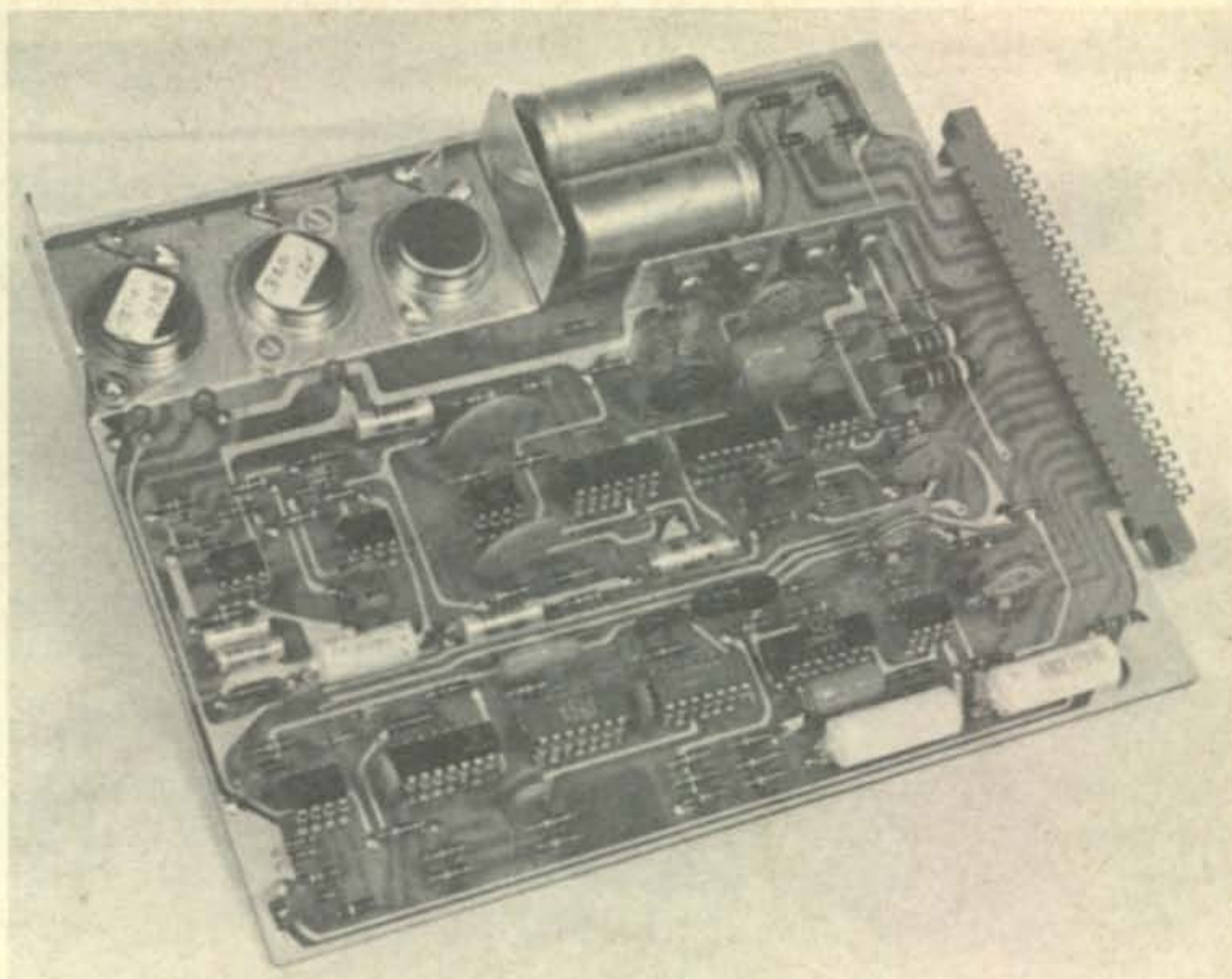
Future Shock

Dr. Robert Suding, WØLMD, a prime mover in the Digital Group of Denver, is now devoting all of his time to that organization. Robert has a real "goodie" in the works. It's called "The WØLMD Super System". There will be a public announcement of WHAT IT IS and WHAT IT DOES in early '76. I have Robert's OK to say that it will be priced "Under \$800", but you will have to draw your own conclusions as to what IT will do. I'm willing to bet a used sync pulse or two that the hardware will include a micro-processor and a keyboard—but I have NO INFORMATION other than name and the price range. (Don't miss Dayton in the Spring!)

A New P-7 Monitor

Meantime, back at the ranch, Little Mean Dog has been busy on something else, a new P-7 monitor. The design features high resolution and an unusual (but good!) sync detection system with three active band pass filters.

Larry Pryor, WA9MFF is making the PC board for the new WØLMD designed monitor. All parts (except power transformer, CRT,



H.V. supply and controls) mount on a single board that is roughly 6" x 7 3/4". The board is tin-plated, pre-drilled, uses a 22 pin edge connector. There are no jumper wires. To keep costs down, the holes are not plated through. Both Larry and Phil Howlett, WA9UHV, say that this monitor is really sharp. If you are interested, twenty bucks postpaid will get you the board from WA9MFF at 5940 Carrollton, Indianapolis, Ind. 46220. For more information, send a self addressed envelope with two stamps to Larry.

New, Non-Amateur, But V-E-R-Y Interesting!

The Alden Electronic and Impulse Recording Equipment Co. of Westborough, MA. have re-



The image obtained using the Robot Model 300 and a resolution chart at W2DD.



The Alden TV Frame Grabber. Grabbed frames are recorded on demand in 40 seconds using an Alden "Push to Print" Recorder interfaced to a scan converter.

cently announced a new product called the Alden TV Frame Grabber. When they say GRAB, they mean it. Grabbed frames are photographically printed on demand in 40 seconds using an Alden "Push to Print" Recorder interfaced to a scan converter. The scan converter converts standard 525 TV line frames into slow TV frames suitable for transmission over voice grade telephone lines and/or direct to graphic printout on the Alden recorder. (*W2DD comment—the frequency range used probably corresponds to our SSTV range as does the Xerox Telecopier system.*)

The apparatus line-up is shown in the accompanying photograph. That slim-line scan converter with the zoom joy stick (at the left of the monitor) is made by the Hughes Aircraft Co. I believe it's a Model 639. If your application justifies an outlay of \$800 to \$2500 (and there are many that will), the Alden TV Frame Grabber may be just what you need.



Eddie Collins, W4MS, is shown via a 1973 tape using an HCV keyboard to "write-in" the title on the Model 300.

The scan converter is not included in the price quoted.

Robot Rides Again!

About three months ago, I acquired a Robot Model 300 Scan Converter. Am I satisfied? Yes! How about performance? Great! If this sounds like a commercial for Robot, let me say that having used the Hughes Model MSC-1 Storage Tube Scan Converter for over two years, I have a basis for comparison—and the Robot really does a job. Furthermore, I bought the Robot unit after selling my 70A, 80A, and 61, so I am telling it "like it is". If I find any problems that Robot can't correct as time goes on, they'll be enumerated along with the virtues in a forthcoming column.

The picture of Eddie Collins, W4MS, referred to later in this column and the resolution chart photo demonstrate the image quality obtainable with the Model 300.

The W4MS picture is from a 1973 tape using an HCV keyboard to "write-in" the title after the picture was "frozen" on the storage tube target. The Model 300 offers many interesting possibilities for those who want to combine two or more pictures, or pictures and graphics. Indications are that an image size and positioning control will be available from Robot in the future. This will obviate the need for keyboard mods for those who want those BIG letters.

The resolution chart picture was made with the Model 300 in the 256 line mode. I'll have a close-up view of the chart along with other photographs illustrating the performance of the 300 in a future article. However, I can tell you now that the resolution chart does clearly demonstrate the added detail obtainable with the 256 line scan. A really solid signal is needed to claim this advantage.

One final comment: The Model 300 in my opinion is well designed and engineered. It is a flexible, versatile piece of equipment. Since it is a combined fast-to-slow and slow-to-fast converter, it does have many controls (16 plus On-Off switch). They do have to be set correctly, so if you get a Model 300, DO read the Instruction Book—FIRST, not if all else fails! (I realize that this is against all Amateur Tradition.)

News And Pictures From Around The World

"Typewriters Rampant" is the lead item in a feature column by Pat Hawker, G3VA in *Wireless World Magazine* for October, '75. In Pat's column, called WORLD OF AMATEUR RADIO, he tells how keyboards are being used by amateurs for c.w., RTTY, and SSTV. Of particular interest to slow scan types is the mention of an LMD designed unit constructed by Howard Watson, G3GGJ for Richard Thurlow, G3WW.

The just-mentioned keyboard is missing in the accompanying photo of G3WW's well equipped station at Wimblington, England. In addition to the SB-220, Collins, and Robot gear shown in the picture, Richard's collection includes an SB-303, SB-401E, and a Withers Phase 2 ten to two meter transverter. All three outfits are used to transmit and receive SSTV by switching. When Richard gets his WB9LVI scan converter and a fast scan monitor working he'll need one of those "fish-eye" lenses to capture all of his gear for our next G3WW photograph!

Bulletin-Bulletin! Attention Nebraska! Neville Jackson, G3IAD, is desperately in need of a Nebraska SSTV contact. With Neville's "pipeline" signal into the USA he should have no problem attaining his goal of First G-WAS-SSTV—but, you can't work 'em if you can't find 'em! Neville's country score on SSTV stands at 93. With no beam, that's an accomplishment!

Slow scan activity in South America seems to grow at a moderate pace compared to Europe and North America. For example, Brazil has only about fifteen SSTV stations on the air. The most active Brazilian station is that of Gerson Rissin, PY7AFS/1 in Rio de Janeiro.

A recent picture of Gerson relaxing in his "shack" shows a formidable array of gear. He uses a Collins S Line, KWM-2, and a 30L-1 to pump a kilowatt into his tri-bander yagi beam. A Heath line is also used. Gerson's SSTV equipment includes a Venus monitor.

An amateur since 1965, Gerson is a 31 year old Civil Engineer. He hit the DXCC Honor Roll in 1974 and is now nearing 50 countries on SSTV.

Since there are no special requirements for SSTV operation by Brazilian amateurs, perhaps slow scan will grow a little faster than it has so far in that great country as more and more amateurs view and understand its present day capabilities.

Among those determined builders "scratching gravel" to get started on the WB9LVI converter is Eddie Collins, W4MS, in Pensacola, Florida. Eddie operates another one of those wall-to-wall collections of slow scan and h.f. equipment. Having seen a picture of Eddie's well equipped shack, I predict that his scan converter will be ceiling mounted. As mentioned above, the picture of Eddie is from an old tape, but then, Eddie doesn't change, he's 14230's answer to WWV!

Thought You'd Like To Know Department

Cop MacDonald, WØORX/VE1 has taken a new job and moved to Prince Edward Island. His complete address is 99 Fitzroy St., Charlottetown, P.E. Island, Canada.

Sam Laine, W2BKU has moved to Florida.



Gerson Rissin, PY7AFS, of Rio de Janeiro, has worked 48 countries on SSTV since February 1975.

W4MS says that Sam's new call is W4MDP, location Tamarack, near Ft. Lauderdale.

A Correction For The October Issue

Due to an unfortunate typographical error, Figures 1 and 2 in my October column were improperly labelled. Although the error was obvious from the text, I hope that it did not create any confusion. Just switch the titles and it comes out right.

[Continued on page 74]



Here's a shot taken at the Aston University SSTV Convention by Martin Brooks a British s.w.l. who passed it onto G3WW who sent it to me. The photo shows 12 and 16 inch TV set displays derived from DL2RZ's scan converter.



BY JOHN A. ATTAWAY,* K4IIF

DESPITE poor propagation conditions associated with the declining sunspot cycle, both plaques for Single Band WAZ on 15 meters were authorized during the past month. Number 1 on 21 MHz phone was won by Franz Langner, DJ9ZB, of Freiburg, West Germany, while the first plaque for 21 MHz c.w. was taken by Charles Jackson, SVØWTT, operating from Nea Makri, Greece.

DJ9ZB used a Drake transmitter and receiver (see photo) in racking up his phone award. The last zone to be worked and confirmed was Zone 29. Franz has been an active DXer for many years and can be heard from either end of the pileups. Some of the DX calls he has used include: FØZN, JY8ZB, 4W1ZB, C31LY, and HBØXJV.

The final zone to be scored by SVØWTT in earning his c.w. award was our North American toughie, Zone 2, which can be hard to work from distances to east or west. Charles used an NCX-1000, which he usually ran at 600-650 watts, to a TH6DXX triband yagi at 50 feet. He holds regular WAZ number 198 from KH6PY, his 1948-50 call, number 3691 from SVØWTT and WPX C.W. number 1308 also from SVØWTT.

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



Congratulations to two more top flight DXers, who have reduced the number of plaques outstanding for first band/mode winners in the Single Band WAZ Program to only 4. The plaques remaining to be won are for 80 meter c.w., 40 meter c.w., 10 meter c.w. and 10 meter phone.

EA8CR is zeroing in on 5-band WAZ on phone. He already has his 80, 40 and 20 meter awards in the fold and lacks only one zone on 15 meters. Will Fernando be the first to make it on all 5 bands? We don't have a 5-band WAZ award as such because it seemed such a formidable objective. Maybe we should initiate this award. Another possibility is a Single Band Award for 160 meters, but this is a very, very formidable objective indeed. How about it W1BB, KV4FZ, W2EQS, and company? Can it be done?

The CQ DX Award's Advisory Committee

Eight years ago CQ pioneered the concept of a DX Advisory Committee composed of interested DXers representing clubs from all areas of the country. The Committee was given considerable latitude regarding improvements to the CQ DX Program with outstanding results for the world's DX Award chasers. Among the Committee's innovations have been the DX Hall of Fame, the introduction of separate c.w. and s.s.b. certificates into the CQ DX Awards (the CQ awards for working countries), WPNX, the first major DX award for novices only, VPX for the shortwave listener, and more recently the Single Band WAZ Program with separate awards for the c.w. and s.s.b. DXer plus the brand new Bicentennial WPX Program.

Although the original Committee had only 5 members, the group has expanded over the years as more and more DX clubs became interested in representation. Normally the Committee has representation from all 10 U.S.



Two super DXers have won the plaques for #1 on 15 meter phone and 15 meter c.w. in the Single Band WAZ program. On the left is Franz Langner, DJ9ZB, the first winner on 21 MHz phone, and on the right is Charles Jackson, SVØWTT, first winner on 21 MHz c.w.

call areas plus VE, but at present the W1 slot is vacant as a result of the resignation earlier this year of the Committeeman from Murphy's Marauders. The 1975 Committee is composed of the following:

Jack Reed, VE3GMT (Canadian DX Association), 82 Acton Avenue, Downview, Ontario, Canada.

Ed Hopper, W2GT (North Jersey DX Association), P.O. Box 73, Rochelle Park, N.J. 07667.

Jack Heisey, K2FL (Frankford Radio Club), 616 Chestnut Street, Palmyra, N.J. 08065.

John Kanode, W4WSF (Potomac Valley Radio Club), RFD #1, Box 73A, Boyce, VA 23454.

Tava Franklin, K4AEB (North Alabama DX Club), 711 Pinecrest Road, Huntsville, AL 35802.

Russ Guidry, K5YMY (Delta DX Association), 163 Evangeline Street, Donaldsonville, LA 70346.

David Busick, WA5ZNY (Texas DX Society), 12301 Zavalla Street, Houston, TX 77045.

Jay A. Holladay, W6EJJ (Southern California DX Club), 5128 Jessen Drive, La Canada, California 91011.

Bob Ferrero, K6AHV (Northern California DX Club), 999 Howard Ave., Burlingame, CA 94010.

Rod Linkous, W7YBX (Western Washington DX Club), 5632 47th Avenue, S.W., Seattle, WA 98116.

John C. Kroll, WA8TDY (Michigan DX Association), 3528 Craig Drive, Flint, MI 48506.

Ed Goodbout, W9DWQ (Northern Illinois DX Association), P.O. Box 519, Elmhurst, IL 60126.

Bob Parlin, W0SFU (Twin City DX Association), 1507 Kaltern Lane, Minneapolis, MN 55416.

The above members of the DX Committee also have rule sheets and application blanks for the CQ DX Awards, and are authorized to verify cards for WAZ and the CQ C.W. and S.S.B. DX Awards.

It has been several months since a nomination has been submitted for the DX Hall of Fame. If you have a deserving amateur in mind for this honor, please advise the DX Committeeman nearest to your QTH, or write directly to DX Editor K4IIF or Assistant DX Editor WA6AUD.

Recommended Operating Practices for the DXpedition

The November DX column presented information from the *Long Island DX Association* on good operating practices for amateurs making contacts with a DXpedition. The following information, from the same source, regards good practices for those planning the DXpedition itself. This is good, solid material



Here is a good example of what can be done with low power. Pat, F6ACD, in earning WAZ confirmed 20 of his 40 zones using the 5 watt transmitter shown above. Of the remaining zones, 9 were made with less than 50 watts and the other 11 using 100 watts. The zones worked with the 5 watt rig were: 3, 4, 5, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 18, 20, 21, 30, 32, 33, and 38. Zones 30 and 32 are very tough from Europe with low power.

and should be studied carefully by anyone planning to operate from a rare location.

1. If possible, plan at least 5 days of operation to insure that low power and transceive—only stations will have an opportunity for a QSO. Announce your DXpedition plans as far in advance as is practicable, and after the operation has begun announce the following information at regular intervals, usually every hour on the hour:

- a. QSL Manager.
- b. Band times, modes and frequencies.
- c. Times and frequencies of operation outside U.S. sub-bands.

THE WAZ PROGRAM

Single Band WAZ

15 Meter Phone

1.....DJ9ZB

15 Meter C.W.

1.....SVØWTT

20 Meter C.W.

8.....EA8BK

S.S.B. WAZ

1280.....K8SQE
1281.....WA2OAU/4

1282.....DU1REX
1283.....G5ACW

C.W.—Phone WAZ

3874.....OH2BMG
3875.....I6BQI
3876.....IT9RAN
3877.....UB5UAL
3878.....K4TBN

3879.....K4SGL
3880.....JA1GC
3881.....K5TSR
3882.....OZ3FU
3883.....YV4AGP

Complete rules for the Single Band WAZ Program appear on pgs. 57-58 of the December, 1972 issue of CQ. Complete rules for regular WAZ are found beginning on pg. 46 of the April, 1975 issue. Application blanks and reprints of the rules for all WAZ awards may be obtained by sending a self-addressed, stamped envelope to the DX Editor, P.O. Box 205, Winter Haven, FL 33880.



A WAZ certificate just joined the collection on the wall of Jan Jezdik, OK1ATZ, in Prague. Jan has been on the air since 1967 and in concentrating on DX for the past 4 years he has accumulated 45 awards. His rig includes a 300 watt, all-band c.w. transmitter, a ground plane antenna and a BC-348 receiver.

d. Times for tuning General Class band segments.

2. If the operation is for more than 2 days, reserve some time for transceive operation in the General Class bands and limit contacts to transceive only stations and General Class stations.
3. On a short 1 or 2 day DXpedition request contacts only from stations needing the card for award credit.
4. Take equipment for both c.w. and s.s.b. op-

The WPX Program

Mixed

497.....WA8TDY 499.....F6BFH
498.....K5TSR 500.....W1CHA

C.W.

1414.....JA6EQ 1417.....W3TVB
1415.....K7CPC 1418.....W1CHA
1416.....JH3AIU

SSB

867.....WB4NXR 869.....YO9HT
868.....W1CHA 870.....I6VDB

Endorsements

Mixed: W4BQY 1100, WA5VDH, W9WCE 900, K5TSR, K3EH 750, W1CHA 700, W6KYA 650, WA8TDY, 550, WA8TDY, W2FBB 500, WA8TDY 450.

C.W.: W6TCQ 850, K8MFO 800, W3TVB 750, WA5DVH, W9WCE, W4WSF 700, K9UIY 600, WA1JMP, WB4KZG 550, W1CHA, I6BQI 500, DJ1YH, WA5-TPO, K9UQN 400.

SSB: W4NJF 1300, W4WSF 1000, ZL3NS 950/WB4-KZG 750, WA5VDH, WA2HZR 700, LU1BAR 650, WA1JMP, W1CHA 550, WA8TDY 500/YO9HT 400.

80 Meters: LU1BAR

20 Meters: LU1BAR

Africa: W1CHA

Asia: K3EH, YO9HT

Europe: I6VDB, JA6EQ, K9UIY, LU1BAR, W1CHA, YO9HT

North America: LU1BAR, W1CHA, WA8TDY, K9-UIY, K7CPC

South America: LU1BAR, W1CHA

Complete WPX Rules may be found on page 67 of the February 1972 issue of *CQ*. Application forms and prints of the rules may be issued by sending a business sized, #10 envelope, self-addressed and stamped, to *CQ* DX/WPX Awards, Box 3388, San Rafael, Calif. 94902.

eration on all bands. Have enough operators for 24 hour operation as this will help overcome poor propagation conditions.

5. Take beam(s) and amplifiers to insure good signals at most receiving locations.

6. Simultaneous operation on 2 different bands is recommended, with one on c.w. and the other on s.s.b. If possible, transmit outside the U.S. bands and listen up, frequently announcing your listening frequency range. Keep the listening frequency 25-30 kHz from the transmitting frequency and restrict the listening range to 20-25 kHz as wider ranges contribute to QRM for other amateurs.

7. If on s.s.b., do *not* accept c.w. calls and vice versa.

8. Tune by continent, country or call area if necessary to thin out QRM. Don't favor certain areas such as the U.S. east or west coast which frequently have more favorable propagation.

8. Permit no more than 2 contacts per band/mode for any station. (The 2nd contact can be allowed for log insurance.)

9. When QRM is heavy, request those not needing the contact for WAZ, WPX or DXCC to refrain from calling. Announce "free for all" times if any are to be given.

10. Follow your announced operating rules and schedules strictly.

11. Work all bands if possible, but remember that 20/15 s.s.b./c.w. covers most of the world's DXers. It is better to work many stations on 2 bands than to work only a few on 5 bands.

12. If you announce that you are tuning only for the station with certain letters in his call, stick by your guns. Do not work other stations who persist in calling despite your instructions.

Thanks again to the *Long Island DX Association* for these timely and useful DXpedition hints.

And If You Are Looking For A Place To Go,

Geoff Watts of the *DX News-Sheet*, England's weekly DX bulletin, has just released his 1975 poll showing the rare countrys most needed by 149 of the world's foremost DXers. The figure following the prefix shows the number of DXers listing the particular country on their need list. To provide up-to-date information for those planning DXpeditions, Geoff revises this list annually:

1. Clipperton Island (FO8) — 138
2. Bouvet Island (3Y) — 132
3. South Sandwich Island (VP8) — 124
4. China (BY) — 119
5. Iraq (YI) — 104
6. Iraq Neutral Zone (8Z4) — 100
7. Burma (XZ) — 99
8. Kamaran Island (70) — 81
9. Bajo Nuevo (HK0) — 80

10. Mellish Reef (VK9) — 78
11. Spratly Island (1S) — 76
12. Geyser Bank (1M?) — 74
13. Heard Island (VK0) — 73
14. Malpelo Island (HK0) — 67
15. South Yemen Republic (70) — 67
16. Kingman Reef (KP6) — 65
17. Albania (ZA) — 63
18. San Felix Island (CE0X) — 61
19. South Georgia Island (VP8) — 58
20. Annobon Island (3C0) — 51
21. Kermadec Island (ZL/K) — 48
22. Fanning Island (VR3) — 45
23. Palmyra Island (KP6) — 44
24. Revilla Gigedo (XF4) — 42
25. St. Peter & Paul Rocks (PY0) — 41
26. Tokelau Islands (ZM7) — 40
27. Juan Fernandez Island (CE0Z) — 39
28. Glorieuses Islands (FR7/G) — 39
29. Willis Island (VK9Z) — 38
30. Manihiki Island (ZK1) — 38
31. Abu Ail (ET) — 37
32. Wallis Island (FW8) — 36
33. Taiwan (BV) — 35
34. Campbell Island (ZL/A) — 35
35. Farquhar Island (VQ9/F) — 35
36. Niue Island (ZK2) — 35
37. British Phoenix Islands (VR1P) — 33
38. Republic of Guinea (3X) — 32
39. Aves Island (YV0) — 31
40. Crozet Island (FB8W) — 30
41. Juan de Nova (FR7J) — 29
42. Mount Athos (SV/A) — 28
43. Navassa Island (KC4) — 26
44. Khmer Republic (XU) — 26
45. Bhutan (A5) — 26
46. Cocos Island (TI9) — 24
47. Bangladesh (S2) — 24
48. Central African Republic (TL) — 24
49. Somali Republic (60) — 21
50. Laccadive Islands (VU) — 18
51. South Shetland Islands (VI8) — 14

While it's likely that many contributors to the *DX News-Sheet* poll are North American amateurs, the results have a European flavor, or a better way to express it might be an *international* flavor. The rankings would probably be different if based solely on the "need list" of a typical U.S. DXer. Thanks to the great job done by K6AHV and the Northern California DX Foundation gang, a W/K DXer would probably not rank Kingman Reef as high as 16 nor Palmyra Island as high as 23. These two were much harder to work for the Europeans who must work the Pacific Ocean countries straight over the pole. A similar case could be made for Bajo Nuevo, ranked ninth in the poll, which has been worked by most U.S. amateurs with several years of DXing under their belts. On the other hand, an XE, W/K6, W/K7 or VE7 would probably rank Mount Athos much

Medical uses for DX operation are always of great interest. Dr. Fred Kasten, W5NVU, above, of the L.S.U. Medical School in New Orleans recently collaborated in the successful treatment of a ship accident victim 6000 miles away off the coast of Samoa. Fred used a Swan 350 to a 2-element quad for relay of the patient's treatment.



higher on his want list than 42, and Abu Ail higher than 37.

For you newcomers to the DX chase, some extremely rare countries have very common prefixes. For example, an F08 is much more likely to be in Tahiti than Clipperton, and a VP8 in the Falklands rather than South Sandwich, South Georgia or the South Shetlands. However, to quote the bard, "Work them first and ask questions later."

YASME Rides Again

The YASME Foundation has been reactivated to sponsor a new world-wide DXpedition by Lloyd (W6KG) and Iris (W6DOD) Colvin. The Colvins have already operated under 50 different calls and are now trying for 100. The first stop will be VR1Z, Dec. 15, 1975, followed by VR8B, Jan. 1, 1976. The latter will count as a new country for the CQ DX Awards and also for DXCC. Transmitting frequencies on c.w. are 3505, 7005, 14050, 21050, and 28050 listening up 5 kHz or just inside the General Band. On phone the frequencies are 3795, 7095, 14195, 21255, and 28550 listening up 5 or just inside the General Class Band. Donations to YASME will be appreciated but are not required.

[Continued on page 76]

The CQ DX Award Program

SSB

410.....K4JPD
409.....K2GI

C.W.

183.....G3TMA
184.....GI3JEX

Endorsements

250.....WA2CCF

Complete rules and application forms for the CQ DX Award program may be obtained by sending a business size, #10, self-addressed envelope to: CQ DX/WPX Awards, Box 3388, San Rafael, Calif. 94902.

NEW!



This New Unit meets the best spec of all: Its Low Price! The GTX-1 is NOT a "cheap" import. It IS identical to Genave's Land Mobile and Aircraft units for high quality and reliability. Compare performance to Motorola, GE, RCA or any other hand-helds that sell for \$700 or more . . .

GTX-1 HAND-HELD 2-Meter FM Transceiver

NOW CHECK THESE FEATURES:

- All Metal Case
- American Made
- Accepts standard plug-in crystals
- Features 10.7 MHz crystal filter
- Trimmer caps on TX and RX crystals
- 3.5 watts output
- Battery holder accepts AA regular, alkaline or nicad cells
- Mini Handheld measures 8" high x 2.625" wide x 1.281" deep
- Rubber ducky antenna, Wrist safety-carrying-strap included
- 6 Channels
- Factory-direct to You

Accessories Available:

- Nicad Battery Pack
- Charger for GTX-1 battery pack
- Leather carrying case
- TE III Tone Encoder for auto patch

**SPECIAL
INTRODUCTORY
OFFER**



GTX-1

2 Meter 6 channel
Hand-Held
(without encoder)

\$ 249⁹⁵
(Reg. \$299.95)

GTX-1T

with Built-In
Tone Encoder

\$ 299⁹⁵
(Reg. \$349.95)

**HURRAY STILL TIME
FOR CHRISTMAS DELIVERY**

**Use This
Handy Order Form**

**USUAL IMMEDIATE SERVICE
ON ALL OTHER GENAVE FACTORY-TO-YOU EQUIPMENT**

CLIP OUT AND ORDER NOW

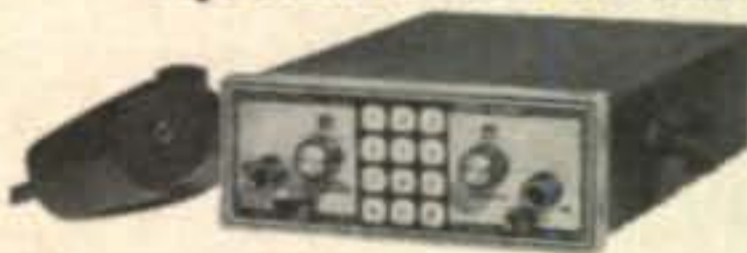
THIS PAGE IS YOUR ORDER BLANK! ORDER NOW AND SAVE! Specials at Unbeatable Prices



GENAVE, 4141 Kingman Dr., Indianapolis, IN 46226 (317+546-1111)

HEY, GENAVE! Thanks for the nice prices! Please send me:

Operate Auto-Patch



GTX-200-T
2-meter FM, 100 channels, 30 watts (incl. 146.94 MHz)

Special Price
\$249⁹⁵



GTX-200
2-meter FM, 100 channels, 30 watts was \$299.95 (Incl. 146.94 MHz)

NOW
\$199⁹⁵



GTX-100
1 1/4-meter FM, 100 channels, 12 watts was \$309.95 (Incl. 223.5 MHz)

VERY SPECIAL
\$199⁹⁵



GTX-10
2-meter FM, 10 channels, 10 watts

~~\$169⁹⁵~~
WOW! \$139⁹⁵



GTX-2
2-meter FM, 10 channels, 30 watts was \$299.95 (Incl. 146.94 MHz)

NOW
\$189⁹⁵



GTX-600
6-meter FM, 100 channels, 35 watts was \$309.95 (Incl. 52.525 MHz)

SPECIAL NOW
\$199⁹⁵

NEW!
For Christmas Delivery



GTX-I
Special Price **\$249⁹⁵**

GTX-IT
Operate Auto Patch
Special Price **\$299⁹⁵**

PSI-11 Battery Pack (with charger) @ \$109.95 \$ _____

ARX-2 2-M Base Antenna @ \$29.95 \$ _____

Lambda/4 2-M Trunk Antenna @ \$29.95 \$ _____

TE-I Tone Encoder Pad @ \$59.95 \$ _____

TE-II Tone Encoder Pad @ \$49.95 \$ _____

PSI-9 Port. Power Package (less batteries) @ \$29.95 \$ _____

PS-1 AC Power Supply @ \$69.95 \$ _____

and the following **standard** crystals @ \$4.50 each: _____ \$ _____

Non-standard crystals @ \$6.50 each: _____ \$ _____

(allow 8 weeks delivery.)

For factory crystal installation add \$8.50 per transceiver.

Sub-Total: \$ _____

IN residents add 4% sales tax:

TOTAL: \$ _____

CA residents add 6% sales tax:

(minimum order \$12.00)

All orders shipped post-paid within continental U.S.

PHONE _____

NAME _____ AMATEUR CALL _____

ADDRESS _____ CITY _____ STATE & ZIP _____

Payment by: Certified Check/Money Order Personal Check C.O.D. Include 20% Down.

Note: Orders accompanied by personal checks will require about two weeks to process.

20% Down Payment Enclosed. Charge Balance To:

BankAmericard # _____ Expires _____

Master Charge # _____ Expires _____ Interbank # _____

Prices and specifications subject to change without notice.

An invitation to join
The
“Argonaut
Club”



Argonaut 509

Tired of push-button QSOs? Then the excitement of Argonauting is for you! A challenge?

Of course. The test of an operator? Perhaps. But above all it is the thrill of working the world with five watts.

The club is exclusive but if you enjoy the spirit of conquering distance with lower power, you are “in”. There are no dues — just \$329.00, the price of an Argonaut. Join more than two thousand fellow members with Argo fun. Your membership awaits you at most ham dealers.

Argonaut 509 \$329.00

SPECIFICATIONS:

Five bands, 3.5-30 MHz.
 SSB and CW modes. Fully solid state. Permeability tuning.
 Instant break-in. Instant band change. Built-in SWR bridge.
 S-Meter. WWV. Internal speaker.
 Direct frequency readout.
 Receiver offset tuning. Five watts input. Automatic sideband selection. Plug-in circuit boards.
 1/2 uV receiver sensitivity.
 12-14 VDC or AC pack power.
 Weight 6 pounds. Size HWD:
 4 1/2" x 13" x 7".

ACCESSORIES:

Model 205—Antenna Tuner	\$ 9.95
Model 206—100 kHz Crystal Calibrator	\$26.95
Model 208—CW Filter	\$29.00
Model 210—One Ampere Power Supply	\$27.50
Model 215P—Ceramic Microphone	\$29.50
Model KR5-A—Keyer	\$38.50

For further information, write:



SEVIERVILLE, TENNESSEE 37862
 EXPORT: 5715 LINCOLN AVE.
 CHICAGO, ILLINOIS, 60646



BY GEORGE JACOBS,* W3ASK

TWENTY METERS should continue to be the best band for worldwide DX during December. The band should open just after sunrise, and remain open for at least an hour or two after sunset. Signals should peak towards Europe and the east about Noon; towards Africa during the early afternoon; towards South America during the late afternoon and early evening; towards the Pacific area and Australasia during the early evening and towards Antarctica a bit later in the evening. When conditions are HIGH or ABOVE NORMAL, the band may remain open almost to Midnight, and possibly later. Even though we're at the bottom of the present sunspot cycle, look for some fairly good DX openings on 15 meters when conditions are HIGH or ABOVE NORMAL. Check for openings towards Europe, Africa and the east before Noon; towards South America during the early afternoon and towards the Pacific and Australasia during the late afternoon. Although not likely to happen very often, look for some 10 meter DX openings when conditions are HIGH or ABOVE NORMAL. Best bet is for openings towards South America during the early afternoon, although the band may also open towards Africa from the eastern half of the country and towards the Pacific and Australasia from the western half.

With static levels at seasonally low values, the hours of darkness at a maximum in the northern hemisphere, and solar activity near a minimum, a considerable improvement is expected in DX propagation during the hours of darkness on the 40, 80 and 160 meter bands. Forty should open for DX during the early afternoon, with the first signals coming from Europe. After sundown the band should open to Africa and to South America. Signals from the Pacific area, the Far East and Australasia should peak just before sunrise, but the band may remain open for an hour or two later. Fairly good DX is expected on 80 meters between sundown and sunrise. Signals from Europe, Africa and the east should peak before Midnight; signals from South America should be in for most of the hours of darkness; and

*11307 Clara St., Silver Spring, MD 20902.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected For Dec. 1975

Propagation Index	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Date				
Above Normal: 10, 16	A	A	B	C
High Normal: 8-9, 13, 15, 17-18, 23-24	B	B	C	D
Low Normal: 6-7, 11-12, 14, 19, 21-22, 25-28	B	C	D	E
Below Normal: 1, 4-5, 20, 29, 31	C	D	E	E
Disturbed: 2-3, 30	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) on Dec. 1, probably not open at all on the 2nd and 3rd (E), and poor again on the 4th and 5th, etc. For updated information dial Area Code 516-883-6223 for DIAL-A-PROP, subscribe to bi-weekly MAIL-A-PROP, P.O. Box 86, Northport, NY 11768, or check WWV at 14 minutes past each hour.

signals from Australasia and the Pacific area should peak just before sunrise.

December should be quite an active month for 160 meter DXers. Check the CONTEST CALENDAR in this issue of CQ for the dates of the ARRL 160 Meter DX Test and the annual Trans-Atlantic DX Tests. Expect fairly good conditions on this band, possibly better than they have been during the past ten years, or so. Look for openings towards Europe and the east as early as 8 P.M. in the EST time zone, with the band open to 2 A.M. Check for European openings between 8 P.M. and 1 A.M. in CST zone; to Midnight in MST zone and to 11 P.M. in PST zone. Some openings towards the south, especially to the Caribbean area, should be possible from about 10 P.M. to 2 A.M., in all time zones, and possibly right up until sunrise. Openings towards the Pacific and Australasia favor west coast stations, but it may be worth looking for these openings in all time zones between 4 A.M. and sunrise. A good rule to remember about 160 meter DX openings is that conditions tend to peak about the time the sun rises at the easternmost terminal of a DX path, or during the night-to-day "greyline" period.

For short-skip openings during December of less than 250 miles, try 80 meters during the day and 160 meters at night. For openings between 250 and 750 miles, use 40 meters during the day, 80 meters during the early evening and 160 meters from late evening through the hours

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (15 through 80 Meters) for a particular DX region, 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.

3. The *propagation index* is the number that appears in () after the time of each predicted opening. 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 Propagation 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.

4. Time 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. Appropriate *standard* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate Chart 8 hours in PST Zone, 7 hours in MST Zone, 6 hours in CST Zone, and 5 hours in EST Zone. For example, 14 in Washington, D.C. is 19 GMT. When it is 20 in Los Angeles it is 04 GMT, etc.

5. The charts are based upon a transmitter power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 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 10 db loss, it will lower by one level.

6. 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.

of darkness. For openings between 750 and 1300 miles try *20 meters* during the day, *40* during the early evening and *80* later in the evening and until sunrise. For openings between 1300 and 2300 miles, *20 meters* looks best during the day, but check *15* when conditions are **HIGH** or **ABOVE NORMAL**. Try *40* meters during the evening to about Midnight and *80* for the remainder of the night to sunrise. When conditions are **HIGH** or **ABOVE NORMAL**, an occasional opening between 1500 and 2300 miles may also be possible on *10* meters during the afternoon hours.

V.H.F. Ionospheric Openings

Quite a bit of meteor shower activity is expected during the month. *Geminids*, a major meteor shower, should begin on December 13 and last for about three days. Maximum intensity is expected at about 10 A.M. EST on December 14, with a meteor rate of about *one a minute*. This should permit fairly good meteor-type openings on both *6* and *2* meters. A second, but considerably less intense shower period is expected later in the month, called *Ursids*. This should take place on December 22 and 23, peaking at 2 A.M. EST on the 23rd, with

a meteor rate of about 15 an hour.

A secondary seasonal peak in sporadic-E propagation usually occurs during December (the major peak is during the summer months). This should result in occasional short-skip openings on *6* meters, between distances of approximately 800 and 1400 miles. Some auroral-type v.h.f. ionospheric openings are also likely to occur during December, especially when ionospheric conditions on the h.f. bands are **BELOW NORMAL** or **DISTURBED**. Be sure to check the "Last Minute Forecast" at the beginning of this column for those days that are forecast to be in these categories during the month.

Sunspot Cycle

The present sunspot cycle continues its slow decline towards a minimum value, which is very likely to be reached during the New Year. A smoothed sunspot number of approximately 12 is forecast for this month.

10 Meter Beacons

During the present low period of solar activity, it is very unlikely that the *10 meter* band will open for DX on a regular basis, although it will open from time-to-time, often for very brief periods. The following h.f. beacon transmitters will probably be operating this winter, to serve as an indication of when the band may be open and in what direction. Be sure to check the beacon frequencies, especially when conditions are expected to be **HIGH** or **ABOVE NORMAL**. If you hear the beacons, you know that the band is open, and you can let out with a CQ.

Callsign	Freq. (MHz)	Location	Reception Reports To:
DLØIGI	28.195 and 28.2 switches to 28.2 MHz between 15-20 and 45-50 minutes past each hour.	Bavaria, Germany	DJ5DT, Kollwitzweg 1, D-6100, Darmstadt, Germany
GB3SX	28.185	Sussex, England	G3DME
VE3TEN	28.175	Ottawa, Canada	G3DME
ZC4CY	28.180	Cyprus	Box 216, Fama-gusta, Cyprus
3B8MS	28.190	Mauritius	G3DME
VP9BA	28.165	Bermuda	P.O. Box 73 Devon-shire, Bermuda

Reports of beacon reception should be sent to the addresses shown in the above listing, as part of a worldwide propagation study being made during this period of low solar activity.

This month's column contains DX Propagation Charts valid through February 15, 1976. Short-Skip Propagation Charts for use during December appeared in last month's column.

The Editor of this column would like to take this opportunity to extend his warmest wishes to everyone, everywhere during this holiday season.

73, George, W3ASK

December 15, 1975-February 15, 1976

Time Zone: EST (24-Hour Time)

EASTERN USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Central Europe & North Africa	09-11 (1)** 08-09 (1) 09-11 (2) 11-13 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (4) 12-13 (3) 13-14 (2) 14-16 (1)	15-16 (1) 16-17 (2) 17-19 (3) 19-01 (2) 01-03 (3) 03-04 (2) 04-05 (1)	17-19 (1) 19-20 (2) 20-02 (3) 02-03 (2) 03-04 (1) 20-00 (1)* 00-02 (2)* 02-03 (1)*
Northern Europe & European USSR	08-11 (1)	06-07 (1) 07-11 (2) 11-13 (1)	15-17 (1) 17-19 (2) 19-01 (1) 01-02 (2) 02-03 (1)	17-19 (1) 19-02 (2) 02-03 (1) 21-02 (1)*
Eastern Mediterranean & Middle East	09-10 (1)** 08-09 (1) 09-11 (2) 11-12 (1)	07-08 (1) 08-10 (2) 10-12 (3) 12-14 (2) 14-15 (1)	17-19 (1) 19-21 (2) 21-00 (1) 00-01 (2) 01-02 (1)	18-20 (1) 20-22 (2) 22-00 (1) 20-22 (1)*
Western Africa	10-12 (1)** 08-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (3) 17-18 (1)	18-20 (1) 20-23 (2) 23-01 (1) 01-03 (2) 03-04 (1)	19-22 (1) 22-01 (2) 01-03 (1) 22-01 (1)*
Eastern & Central Africa	10-12 (1)** 08-11 (1) 11-13 (2) 13-14 (1)	07-13 (1) 13-16 (2) 16-18 (1)	18-20 (1) 20-23 (2) 23-01 (1)	19-00 (1)
Southern Africa	10-13 (1)** 08-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-09 (1) 12-14 (1) 14-15 (2) 15-16 (3) 16-17 (2) 17-19 (1)	18-20 (1) 20-22 (1) 22-00 (1)	19-22 (1)
Central & South Asia	16-18 (1)	07-10 (1) 19-21 (1)	06-08 (1) 18-22 (1)	06-07 (1) 18-20 (1)
South-east Asia	16-18 (1)	07-10 (1) 17-20 (1)	06-08 (1) 18-21 (1)	06-07 (1) 18-20 (1)
Far East	16-18 (1)	06-07 (1) 07-09 (2) 09-11 (1) 15-17 (1) 17-19 (2) 19-21 (1)	05-08 (1) 17-18 (1)	05-08 (1) 17-18 (1)
South Pacific & New Zealand	13-15 (1)** 12-14 (1) 14-17 (2) 17-18 (1)	05-07 (1) 07-10 (2) 10-18 (1) 18-20 (2) 20-22 (1)	01-02 (1) 02-04 (2) 04-07 (3) 07-08 (2) 08-09 (1)	04-05 (1) 05-07 (2) 07-08 (1) 04-07 (1)*
Australasia	14-16 (1)** 12-15 (1) 15-17 (2) 17-18 (1)	06-07 (1) 07-10 (2) 10-12 (1) 15-16 (1) 16-19 (2) 19-21 (1)	03-05 (1) 05-08 (2) 08-09 (1) 17-19 (1)	05-06 (1) 06-07 (2) 07-08 (1) 17-18 (1) 05-07 (1)*

* Indicates Best Time For 160 Meter Openings
** Indicates Best Time for 10 Meter Openings

Caribbean, Central America & Northern Countries of South America	10-15 (1)** 08-09 (1) 09-12 (2) 12-16 (3) 16-17 (2) 17-18 (1)	05-07 (1) 07-08 (3) 08-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-18 (4) 18-19 (3) 19-20 (2) 20-02 (1)	17-18 (1) 18-19 (2) 19-21 (3) 21-03 (2) 03-06 (3) 06-07 (2) 07-08 (1)	18-20 (1) 20-21 (2) 21-04 (3) 04-06 (2) 06-07 (1) 21-03 (1)* 03-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina and Uruguay	11-15 (1)** 08-09 (1) 09-11 (2) 11-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-10 (1) 12-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2) 00-02 (1)	19-21 (1) 21-02 (2) 02-05 (1) 05-06 (2) 06-07 (1)	21-03 (1) 03-05 (2) 05-06 (1) 03-05 (1)*
McMurdo Sound, Antarctica	15-17 (1)	07-09 (1) 17-18 (1) 18-20 (2) 20-22 (1) 22-00 (2) 00-02 (1)	22-00 (1) 00-02 (2) 02-06 (1)	Nil

Time Zones:

CST & MST (24-HOUR TIME)

CST & MST (24-Hour Time)

CENTRAL USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Southern Europe & North Africa	08-09 (1) 09-11 (2) 11-12 (1)	06-08 (1) 08-10 (2) 10-12 (3) 12-13 (2) 13-15 (1)	15-17 (1) 17-19 (2) 19-12 (3) 23-01 (2) 01-02 (1)	17-19 (1) 19-00 (2) 00-01 (1) 20-01 (1)*
Northern & Central Europe & European USSR	08-11 (1)	07-08 (1) 08-11 (2) 11-12 (1)	16-18 (1) 18-19 (2) 19-22 (1) 22-00 (2) 00-01 (1)	18-00 (1) 20-00 (1)*
Eastern Mediterranean & Middle East	08-11 (1)	07-09 (1) 09-12 (2) 12-14 (1) 22-00 (1)	17-19 (1) 19-22 (2) 22-23 (1)	19-22 (1)
Western Africa	09-12 (1)** 08-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-18 (1) 22-00 (1)	17-20 (1) 20-23 (2) 23-01 (1)	19-22 (1) 22-23 (2) 23-00 (1) 21-23 (1)*
Eastern & Central Africa	10-12 (1)** 08-11 (1) 11-13 (2) 13-14 (1)	06-12 (1) 12-14 (2) 14-16 (3) 16-17 (1)	18-19 (1) 19-21 (2) 21-23 (1)	19-22 (1)
Southern Africa	10-12 (1)** 08-10 (1) 10-13 (2) 13-14 (1)	07-13 (1) 13-15 (2) 15-16 (3) 16-17 (2) 17-18 (1) 22-00 (1)	18-19 (1) 19-21 (2) 21-23 (1)	19-22 (1)
Central & South Asia	17-19 (1)	07-10 (1) 19-22 (1)	06-08 (1) 18-21 (1)	06-07 (1) 18-20 (1)
Southeast Asia	17-19 (1)	06-07 (1) 07-09 (2) 09-12 (1) 17-20 (1)	06-08 (1) 17-19 (1)	06-07 (1) 17-19 (1)
Far East	17-19 (1)	06-07 (1) 07-09 (2) 09-11 (1) 15-17 (1) 17-19 (2) 19-20 (1)	01-03 (1) 03-07 (2) 07-08 (1)	02-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*

South Pacific & New Zealand	12-16 (1)**	06-07 (1)	23-01 (1)	00-01 (1)
	11-13 (1)	07-11 (2)	01-02 (2)	01-06 (2)
	13-15 (2)	11-16 (1)	02-06 (3)	06-08 (1)
	15-17 (3)	16-17 (2)	06-07 (2)	03-07 (1)*
	17-18 (2)	17-19 (3)	07-09 (1)	
	18-19 (1)	19-20 (2)		
		20-22 (1)		
Australasia	14-17 (1)**	06-07 (1)	01-03 (1)	03-05 (1)
	11-15 (1)	07-11 (2)	03-07 (3)	05-07 (2)
	15-18 (2)	11-18 (1)	07-08 (2)	07-08 (1)
	18-19 (1)	18-21 (2)	08-09 (1)	04-07 (1)*
		21-22 (1)		
Caribbean, Central America & Northern Countries of South America	10-15 (1)**	04-06 (1)	18-20 (1)	19-21 (1)
	07-08 (1)	06-07 (2)	20-22 (2)	21-05 (2)
	08-10 (2)	07-10 (3)	22-00 (3)	05-06 (1)
	10-13 (3)	10-14 (2)	00-04 (2)	23-05 (1)*
	13-15 (4)	14-16 (3)	04-06 (3)	
	15-16 (3)	16-18 (4)	06-07 (1)	
	16-18 (1)	18-19 (3)		
		19-20 (2)		
		20-22 (1)		
		22-00 (2)		
	00-02 (1)			
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	11-15 (1)*	06-07 (1)	19-21 (1)	21-05 (1)
	07-09 (1)	07-09 (2)	21-02 (2)	00-04 (1)*
	09-11 (2)	09-13 (1)	02-04 (1)	
	11-13 (1)	13-14 (2)	04-06 (2)	
	13-14 (2)	14-15 (3)	06-07 (1)	
	14-16 (3)	15-17 (4)		
	16-17 (2)	17-18 (3)		
	17-18 (1)	18-19 (2)		
		19-21 (1)		
		21-23 (2)		
	23-00 (1)			
McMurdo Sound, Antarctica	15-17 (1)	06-07 (1)	22-00 (1)	Nil
		07-09 (2)	00-02 (2)	
		09-11 (1)	02-06 (1)	
		17-18 (1)		
		18-20 (2)		
		20-22 (1)		
		22-00 (2)		
		00-02 (1)		

Far East	14-15 (1)	08-10 (1)	22-00 (1)	23-01 (1)
	15-17 (2)	13-14 (1)	00-02 (2)	01-06 (2)
	17-19 (1)	14-15 (2)	02-06 (3)	06-08 (1)
		15-17 (3)	06-08 (2)	01-06 (1)*
		17-18 (2)	08-10 (1)	
		18-19 (1)		
South Pacific & New Zealand	14-16 (1)**	07-08 (1)	20-22 (1)	00-03 (1)
	11-13 (1)	08-13 (2)	22-00 (2)	03-06 (2)
	13-14 (2)	13-15 (1)	00-07 (3)	06-08 (1)
	14-16 (3)	15-16 (2)	07-08 (2)	03-06 (1)*
	16-18 (2)	16-18 (4)	08-09 (1)	
	18-19 (1)	18-19 (2)		
		19-21 (1)		
Australasia	14-16 (1)**	07-08 (1)	01-03 (1)	03-05 (1)
	10-13 (1)	08-11 (2)	03-05 (2)	05-06 (2)
	13-15 (2)	11-17 (1)	05-07 (3)	06-08 (1)
	15-17 (3)	17-18 (2)	07-08 (2)	04-07 (1)*
	17-18 (1)	18-19 (3)	08-09 (1)	
		19-20 (2)		
		20-22 (1)		
Caribbean, Central America & Northern Countries of South America	10-14 (1)**	04-06 (1)	18-20 (1)	19-21 (1)
	07-08 (1)	06-07 (2)	20-21 (2)	21-03 (2)
	08-10 (2)	07-09 (3)	21-23 (3)	03-04 (1)
	10-12 (3)	09-13 (2)	23-01 (2)	21-03 (1)*
	12-14 (4)	13-15 (3)	01-03 (3)	
	14-15 (3)	15-17 (4)	03-04 (2)	
	15-16 (2)	17-18 (3)	04-05 (1)	
	16-17 (1)	18-19 (2)		
		19-21 (1)		
		21-23 (2)		
	23-01 (1)			
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina and Uruguay	11-14 (1)**	05-07 (1)	19-21 (1)	22-05 (1)
	08-10 (1)	07-09 (2)	21-00 (2)	00-04 (1)*
	10-12 (2)	09-13 (1)	00-02 (1)	
	12-14 (3)	13-15 (2)	02-04 (2)	
	14-16 (2)	15-16 (3)	04-06 (1)	
	16-17 (1)	16-17 (4)		
		17-18 (3)		
		18-19 (2)		
		19-20 (1)		
		22-00 (1)		
McMurdo Sound, Antarctica	14-16(1)	06-07 (1)	21-00 (1)	Nil
		07-09 (2)	00-02 (2)	
		09-11 (1)	02-05 (1)	
		15-17 (1)		
		17-19 (2)		
		19-21 (1)		
		21-23 (2)		
		23-01 (1)		

Time Zone: PST (24-Hour Time)
WESTERN USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Southern Europe & North Africa	08-10 (1)	06-07 (1) 07-11 (2) 11-13 (1) 23-01 (1)	17-21 (1) 21-23 (2) 23-01 (1)	18-20 (1) 20-22 (2) 22-23 (1) 19-22 (1)*
Northern & Central Europe & USSR	08-10 (1)	06-07 (1) 07-10 (2) 10-12 (1) 23-01 (1)	17-00 (1)	19-22 (1) 19-21 (1)*
Eastern Mediteranean & Middle East	08-10 (1)	07-10 (1) 10-12 (2) 12-13 (1) 21-23 (1)	06-08 (1) 18-22 (1)	06-08 (1) 18-21 (1)
Western Africa	09-11 (1)**	07-10 (1) 10-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	18-23 (1)	19-22 (1)
Eastern & Central Africa	09-11 (1)	08-10 (1) 13-16 (1) 21-23 (1)	06-08 (1) 18-22 (1)	06-08 (1) 18-21 (1)
Southern Africa	08-10 (1) 10-12 (2) 12-14 (1)	09-13 (1) 13-16 (2) 16-18 (1) 23-01 (1)	18-21 (1)	18-20 (1)
Central & South Asia	17-19 (1)	08-10 (1) 17-18 (1) 18-19 (2) 19-20 (1)	05-08 (1) 17-19 (1)	05-07 (1)
Southeast Asia	14-16 (1)**	08-09 (1) 09-11 (2) 11-16 (1) 16-19 (2) 19-20 (1)	01-04 (1) 04-07 (2) 07-09 (1)	04-07 (1)

Spread The Word

An eye-catching bumper sticker encouraging the man in the street to "Talk to the World—Become A Ham Operator" is available from *CQ* for 25¢ plus a legal-size s.a.s.e. Quantity prices upon request. Write to: *CQ*, 14 Vanderventer Av., Port Washington, NY 11050.

Forecast of Things to Come

Want the finest in long-range forecasts of radio propagation conditions? Want to know what band to use and when? Want to set a sked to any place in the world? *CQ's* Propagation Column can give you all the answers with hard-to-beat accuracy. It'll even tell you what sort of signal strength to expect! Months in advance!

But if your looking for super-accurate short term forecasts, you can get them for the price of a phone call to *CQ's* exclusive Dial-A-Prop service. Just dial 516 883-6223 any time day or night for a 2-minute pre-recorded forecast covering the eight-day period from Tuesday through Tuesday, revised every Tuesday... more often if necessary. Remember: 516 883-6223. Available only through *CQ*.



Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

*Dec.	6-7	Telephone Pioneers Party
*Dec.	6-7	Delaware QSO Party
*Dec.	6-7	Tops 3.5 MHz C.W. Contest
Dec.	6-7	ARRL 160 Meter Contest
*Dec.	13-14	Spanish C.W. Contest
Dec.	13-14	ARRL 10 Meter Contest
Dec.	28	Hungarian Contest
Jan.	3	Pacific Net Party
Jan.	3-4	ARRL VHF Sweepstakes
Jan.	3-4	Nostalgia Radio Exchange
Jan.	10-11	YU 80 Meter C.W. Contest
Jan.	14-15	YLRL DX C.W. Contest
Jan.	23-25	CQ WW 160 C.W. Contest
Jan.	28-29	YLRL DX Phone Contest
Jan.	31-	
Feb.	1	French C.W. Contest
Feb.	7-8	ARRL DX Phone Contest
Feb.	21-22	ARRL DX C.W. Contest
Feb.	28-29	French Phone Contest
Mar.	6-7	ARRL DX Phone Contest
Mar.	20-21	ARRL DX C.W. Contest
Mar.	27-28	CQ WW WPX SSB Contest

* Covered last month

Hungarian Contest

0000 to 2400 GMT Sunday, December 28

Use all bands, 10 thru 80, both phone and c.w. There are 3 categories, single operator, multi-operator and s.w.l.

Exchange: RS(T) and your ITU Zone number.

Scoring: Contacts between stations on same continent 1 point, outside own continent 3 points. Contacts with HA stations 4 points, and 5 points if its HA5 prefix. The multiplier is determined by number of ITU Zones worked.

Awards: Certificates to the 3 highest scores in each country and category.

A summary sheet showing the scoring and other pertinent information, and a signed declaration that rules and regulations have been observed is also requested.

Mailing deadline is January 15th to: Budapest Radio Amateur Society, P.O. Box 2, H-1553 Budapest, Hungary.

Pacific DX Net Party

0000 to 2359 GMT Saturday, January 3

The International Pacific DX Net organized

*14 Sherwood Road, Stamford, Conn. 06905.

this one to celebrate their 8th birthday.

Use all bands 10 thru 80 but on s.s.b. The same station may be worked once on a band for QSO and multiplier credit.

Exchange: RS, Net no. and name for member stations. RS, state, province or country and name for others.

Scoring: Members—One point per contact, 2 points if its with a Pacific Net member. Others—Two points for each member worked.

DX stations multiply total QSO points by sum of states, provinces and countries worked for their final score. W/K and VE use countries worked for their multiplier.

Frequencies: 3665, 3865, 7065, 7265, 14165, 14265, 21265, 28565.

Awards: Achievement Award for entrants working 25 or more Full Net Members in 10 different countries.

Certificates to the top 3 world-wide scores, both to members and non-members. And top score in each country with more than one entry.

DX logs go to Ed de Young, VK4ABA, P.O. Box 98, Newstead, Queensland 4006, Australia.

W/K and VE logs to Dennis Scannell, WB-6IXC, 4201 Mt. Hukee Ave., San Diego, Calif. 92117.

And must be received by March 1st 1976.

Nostalgia Radio Exchange

Two Periods (GMT)

1900 Sat. Jan. 3 to 0500 Sun. Jan. 4

1900 Sun. Jan. 4 to 0500 Mon. Jan. 5

This is a new and interesting fun activity organized by the Southeast A.R.C. of Cleveland, Ohio, and will require a bit of planning.

The object is to work stations using old rigs with your nostalgic old rig. A Nostalgia Rig will be defined as any gear built since 1945, but must be at least 10 years old. Not required in the exchange, you can participate with your present equipment.

(Ed: Make sure your signal meets the present day standards.)

The same station may be worked on each band and mode, but no a.m. Phone below 28 MHz.

Exchange: Name, RS(T), state or DX country and transmitter type. (i.e.: home brew using 807 P.A. tube and etc.)

Scoring: Multiply total number of QSOs by number of different transmitters and state and countries worked on each band Multiply that total by the "Nostalgia Multiplier." Age of your transmitter and receiver. Double the age if its a transceiver.

Different transmitters and receivers may be used by one station. Figure scores separately for each and combine for total score.

Frequencies: C.W.—1810 and 70 kHz from low edge of each band. Phone—3910, 7280,

14280, 21380, 28580. Novice—3720, 7120, 21120, 28120.

Awards: Certificates to stations scoring 150,000 points or more, plus Special Citations determined by the Committee.

Send logs, comments, anecdotes, equipment description and large s.a.s.e. to: Southeast A.R.C., c/o W8KAJ, 2386 Queenston Road, Cleveland Heights, Ohio 44118.

YL—DX to North America Contest

C.W.: Jan. 14-15 Phone: Jan. 28-29

Starts: 1800 GMT Wednesday

Ends: 1800 GMT Thursday

YL's on the North American continent, US states and Canadian provinces, will be working the DX YL's (inc. KH6 and KL7) in this one. Alaska however is limited to working the Eastern Canadian provinces and may not contact station in VE5 thru VE8, but may work Hawaii. (*Gets rather complicated. Ed.*)

Phone and c.w. are separate contests and require separate logs. The same station may be worked on each band for QSO credit, net contacts are not permitted and only QSO's with other YL's are valid.

Exchange: QSO no., RS(T) and QTH. State for W/K, province for VE and country for DX.

Scoring: One point for each QSO. North American stations will count DX countries as their multiplier. DX stations, US states and VE provinces. There is a power multiplier of 1.25 if power input is 150 watts or less. (300 p.e.p. on s.s.b.)

Final Score: QSO points \times multiplier \times power multiplier if any.

Awards: Trophies to 1st place c.w. and phone winners, both DX and North America. Plaques to highest combined scores for both and certificates to second and third place winners.

Submit separate logs for each section and a signed declaration no later than February 6th. They must be received before Feb. 21st so overseas entries should use air mail.

To: Beth Newlin, WA7FFG, 826 W. Prince Rd. — 06, Tucson, Ariz. 85705.

YU 80 Meter C.W. DX Contest

Starts: 2100 GMT Saturday, January 10

Ends: 2100 GMT Sunday, January 11

The object of this contest is to stimulate more activity on 80 meter c.w. Both single and multi-operator stations permitted.

Exchange: RST plus QSO no. (001 etc.)

Scoring: Contacts between stations in the same country 1 point. With other countries on the same continent 2 points. With countries on other continents 5 points. Contacts with YU stations 10 points.

Multiplier: One for each DXCC country, including own, and each YU prefix worked.

Final Score: Multiply total QSO points by

the sum of DX countries and YU prefixes.

Awards: Certificates to top scorers in each country, with 2nd and 3rd place awards where justified. (Call areas in W/K, VE, PY, VK, ZL, JA, UA9 & UA0 will be considered as separate areas for awards.) There are also Trophies for continental leaders.

Include a summary sheet and the usual signed declaration. Check log for duplicate contacts, taking credit for dupes in excess of 3% of the total means disqualification.

Mailing deadline is March 15th to: YU DX Club of SRJ, P.O. Box 48, 11001 Belgrade, Yugoslavia.

French DX Contest

C.W.: Jan. 31-Feb. 1 Phone: Feb. 27-28

Starts: 1400 GMT Saturday

Ends: 2200 GMT Sunday

Contest exchange is not confined to the French continental stations only, you can also work DUF countries and the following prefixes. ON, HB, LX, VE2, OD, HH, 3B, 9U, 9Q, 9X. The same station can be worked on each band for QSO and multiplier credit.

Exchange: French stations—RS(T) plus the department number. (French stations will include 2 figures to identify their department. Others—RS(T) plus QSO number. (HB and ON will indicate their Canton and Province with a two letter abbreviation.)

Points: Each QSO counts 3 points. A contact with F8REF is worth 10 points. (Dept. 00)

Multiplier: One point for each French department, (95), Swiss canton, (22) Belgium province (10) and each DUF country. Plus LX, VE2, OD, HH, 3B, 9U-Q-K.

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

Awards: Certificates to the top scorers in each country and USA call areas. Contest contacts may also be applied for the many French awards, DUF, DPF, DDFM, DTA, DNF. Can be added to QSLs for other contacts during past 2 years.

Logs go to: REF Traffic Mgr., Lucien Aubry, F8TM, rue Marceau 53, 91120 Palaiseau, France.

CQ WW DX 160 Contest

Starts: 2200 GMT Friday, January 23

Ends: 1600 GMT Sunday, January 25

Rules same as in previous years. This is a c.w. only contest, no c.w. to phone or cross bands contacts will be allowed.

Exchange: RST plus a three figure QSO number starting with 001, and your state or VE province. It is not necessary for DX to send their QTH, the prefix will identify them.

Scoring: For W/VE/VO, 2 points per QSO with other W/VE/VO stations. All DX contacts are worth 10 QSO points. (DXCC country list)

MIDLAND[®] INTERNATIONAL

Communications Division

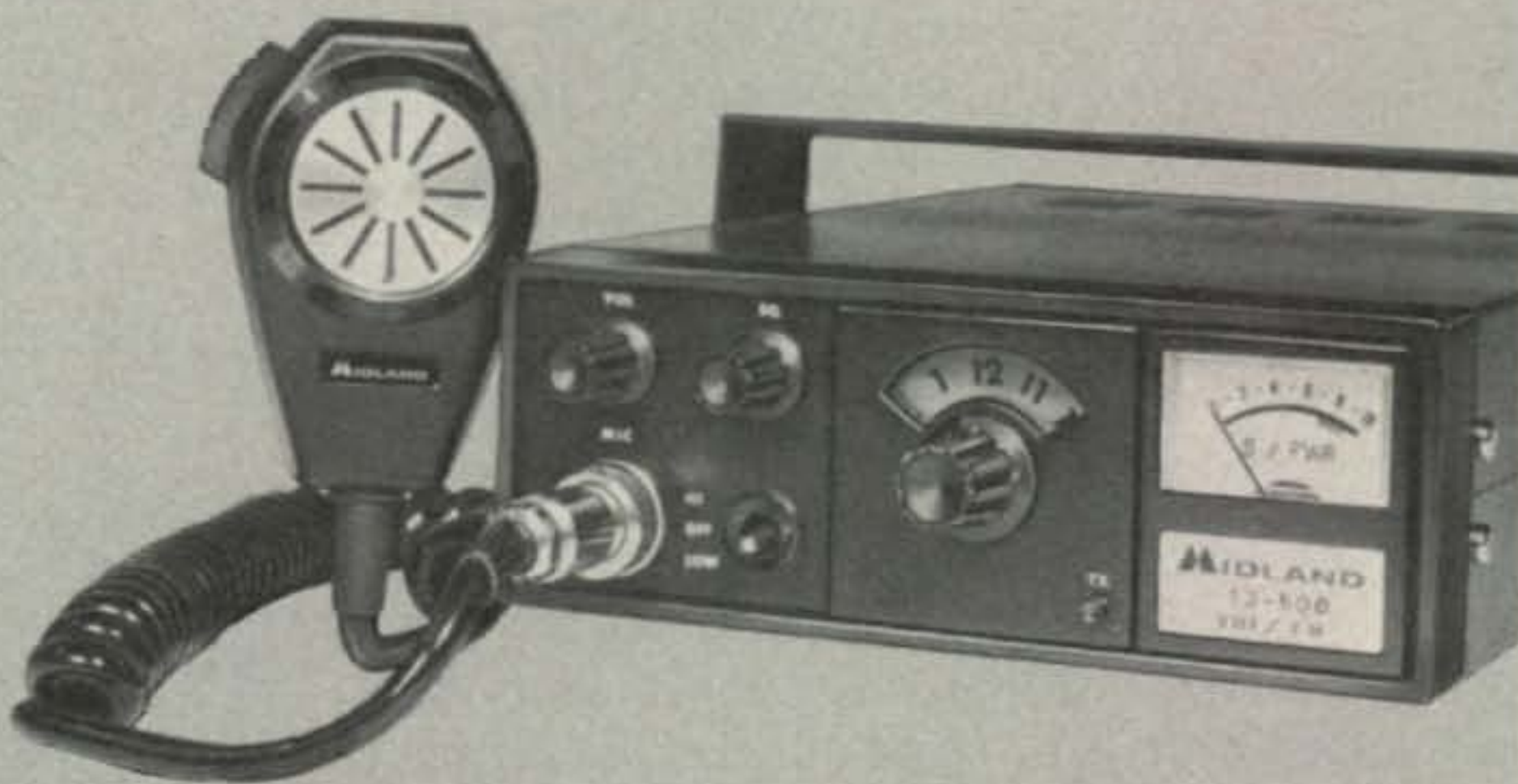
2-Meter Mobile: 15 Watts, 12 Channels

Dual conversion receiver with complete multiple FET front end, high-Q helicalized cavity resonators, zener regulated oscillators.

15-watt/1-watt transmitter with zener regulated crystal oscillator, high-Q and shielded stages, encased low-pass filter, instant automatic VSWR protection system.

External speaker, toneburst/discriminator meter jacks.

...and Midland's RSVP. See your dealer for details.



Write for FREE Midland Amateur Radio Brochure
P.O. Box 19032, Kansas City, MO 64141

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

Multiplier: For all stations. A multiplier of one (1) for each US state, Canadian province and DX country worked. (KH6 and KL7 are considered DX, the District of Columbia same as Maryland. And remember that VE1 is divided into 3 provinces, New Brunswick, Nova Scotia and Prince Edward Island. VO1 and VO2 are separate.)

Final Score: Total QSO points multiplied by the sum of the multiplier.

Disqualification: Violation of the rules and regulations pertaining to amateur radio in the country of the contestant, or the rules of the contest, or unsportsmanship conduct, or taking credit for excessive duplicate contacts will be deemed sufficient cause for disqualification. Decision of the Committee is final.

Awards: Certificates to top scorers in each state, VE province and DX country, additional awards if score or participation warrants.

Log sheets and United States Regulations for 160 may be obtained from CQ by sending a large s.a.s.e. with sufficient postage to cover your needs.

Mailing deadline for contest logs is February 28th to: CQ 160 Contest, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050.

Editor's Notes

You will find the results of our 1975 160 Contest on page 32. We regret the long delay in their publication but we ran into some unfortunate problems.

However we are happy to announce that Don McClenon W3IN, well known to all 160 contesters, has taken over the job of running our Top Band contest. Don with an assist from John Kanode W4WSF, has done an excellent job in getting these results out in record time once the material was available to him.

You should also be receiving your certificate about the time you read this Column.

The deadline for sending your Phone log has passed but if undue circumstances has prevented you from mailing it send it anyway, we will accept it. We hate to see your efforts go to waste. You have until January 15th to send you c.w. entry.

And don't include other material in the same envelope as your contest log. They do not get opened right away and you may experience a long delay in having your request processed. Especially if its a request for more log forms log forms or a subscription to CQ.

Its hard to realize that another Christmas Season is upon us. May you have a Blessed one and may the New Year hold many good things for you and yours.

73 for now, Frank, W1WY



THE
awards
PROGRAM



BY ED HOPPER,* W2GT

**Special Honor Roll
All Counties**

- #134—Erwin B. Beckman, W7SUY 8-14-75.
- #135—Kenneth L. Frank, WB5AKI 9-2-75.
- #136—Henry A. Sobb, W9CRN 9-3-75.

The "Story of The Month", for December, as told by Doc, is:

Gerald J. Collins, W3FNT

All Counties #94, 1-23-73

"I was born in Uniontown, Pa., 69 years ago, graduated from the University of Pittsburgh Dental School in 1930 and entered practice in Altoona, Pa.

"Helen, W3ERE, and I were married in July 1931. We have two daughters and nine grandchildren. My first license was Class B in 1934 with the call of W8MQJ, as western Pennsylvania was in the 8th call area at that time. Got Class A license in 1936 and when Pennsylvania was changed to the third call area, I received W3FNT.

"I entered the U.S. Army Dental Corps during WW II and made the Army a career as a Regular Dental Officer. Under the advanced Dental Program the Army sent me to the University of Pittsburgh where I received the Masters Degree in Oral Surgery in 1948. After

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



The well equipped shack of Doc, W3FNT.

leaving the university, I was assigned to Tripler Army Hospital, Honolulu, Hawaii and was Chief of Oral Surgery 1948-1950, and U.S. Army Pacific Dental Surgeon 1950-1952. Had the call KH6WS while in Hawaii. From 1952 until retirement October 1, 1961, had various hospital assignments, and retired with the rank of Colonel. After retirement from the Army, I returned to private practice until October 1, 1972 and am now enjoying complete retirement.

"Have been a Mason since 1927 and Life Member of Ontario Lodge #376, F. & A.M., Wilson, N.Y., Consistory-Harrisburg, Pa., and Jaffa Shrine, Altoona, Pa. Other memberships include ARRL, WAS, WAC, YLISSB #5367, OGS #233, Ky. Col. #443, MARAC R-185, B&O/C&O #179, QCWA #2281 and others.



Doc, W3FNT ready for mobiling.

"Other hobbies include coin and stamp collecting. Had a private pilot license, but gave up flying several years ago.

"Present equipment two-KWM2s, two-30L1s and Yaesu FT 101-B for mobile work. TA-33 beam, an all band vertical and inverted vees on 75 and 40 meters.

"I first became interested in County Hunting on the CHC net with Valerie, K2KQC, Jerry, W2KXL, and Walt WA2HGL who gave me most of the New Jersey counties. After about 300 counties I changed to the CQ Awards Program, checking into the County Hunters nets and other nets where I could get a new county. Contacted K6UNT/KL7, 2nd District of Alaska December 21, 1972 for my last county.

"Enjoyed meeting some of the County Hunters at the MARAC Mini-Convention, Laurel, Md. in October 1973.

"It would be impossible to name *all* the fine amateurs who helped me accomplish All Counties, but I do *thank* them all. Hope I can help others in the future".

Awards Issued

As noted in the *Special Honor Roll*, three more made them *All*, and all three waited until they had them *All* before sending in applications.

Bud Beckman, W7SUY got USA-CA-500 through USA-CA-3000 endorsed All S.S.B.

Ken Frank, WB5AKI won USA-CA-500 through USA-CA-2500 endorsed All S.S.B.; All Mobiles; All 14. Then USA-CA-3000 and *All* were endorsed All S.S.B.

Hank Sobb, W9CRN received USA-CA-500 through USA-CA-1500 endorsed All S.S.B.; All Mobiles; All 14, then USA-CA-2000 All S.S.B., and USA-CA-2500 All Fone and the rest Mixed.

Carl Prochaska, W9ABM did his paper work for: USA-CA-500 through USA-CA-3000 endorsed All S.S.B.; All Mobiles.

Frank McJannet, K7LQI added to his collection, USA-CA-2500.

Jim Lucht, WA7VGA was issued USA-CA-500, 1000, and 1500.

USA-CA HONOR ROLL

3000	1500	500
W7SUY156	W7SUY277	W7SUY1064
WB5AKI157	WA7VGA278	W0CJG1065
W9CRN158	WB5AKI279	WB5HIG1066
W9ABM159	W9CRN280	VP2LAW1067
	W9ABM281	W4MCM1068
		WA7VGA1069
2500	1000	WB5AKI1070
W7SUY196	W7SUY370	W9CRN1071
K7LQI197	WA7NEV371	W9ABM1072
WB5AKI198	K7CPC372	
W9CRN199	W4MCM373	
W9ABM200	WA7VGA374	
	WB5AKI375	
2000	W9CRN376	
W7SUY232	W9ABM377	
WB5AKI233		
W9CRN234		
W9ABM235		

Rod Hallen, WA7NEV had me send him USA-CA-1000 and added All S.S.B. endorsement to his USA-CA-500.

Mike Irwin, K7CPC acquired USA-CA-1000 endorsed All 2X-C.W. and upped the endorsement to his USA-CA-500 to include All 14, All 2X-C.W.

Bob Hudson, W4MCM obtained USA-CA-500 and 1000.

Mixed USA-CA-500 Awards collected by:

Dean Cowdin, W0CJG.

Tom Hoot, WB5HIG.

John Loader, VP2LAW (First Award to any VP2).

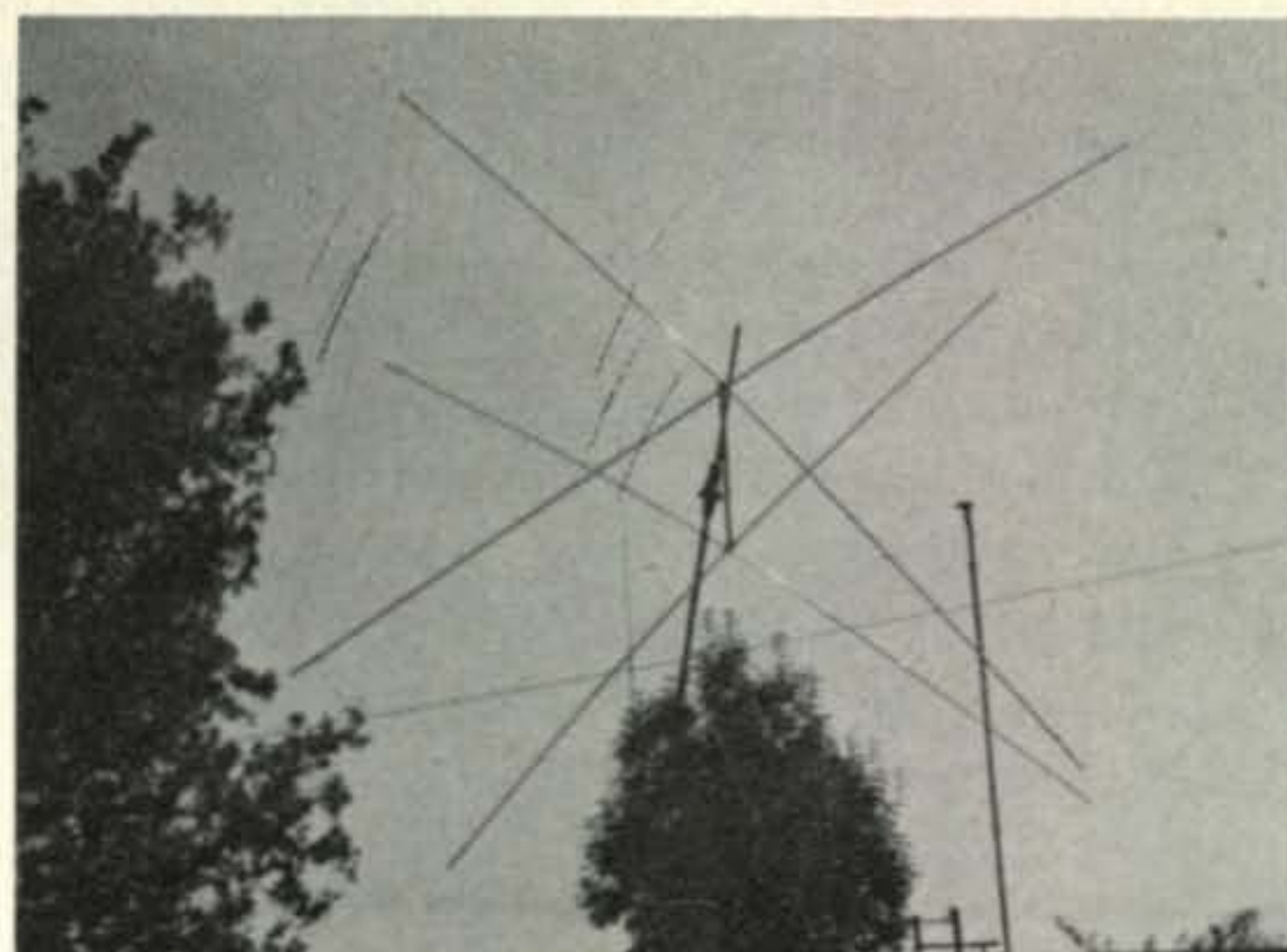
Awards

New Custodian For:

Worked All Plymouth County: Rules and foto page 61 March '74 *CQ*.

Portable Operators Award: Rules and foto Page 60 November '74 *CQ*.

New Custodian for those two *Awards* which are issued by Boy Scout Troop #94, Scituate, Mass. is Lambert J. Larsen, 87 Maple Street,



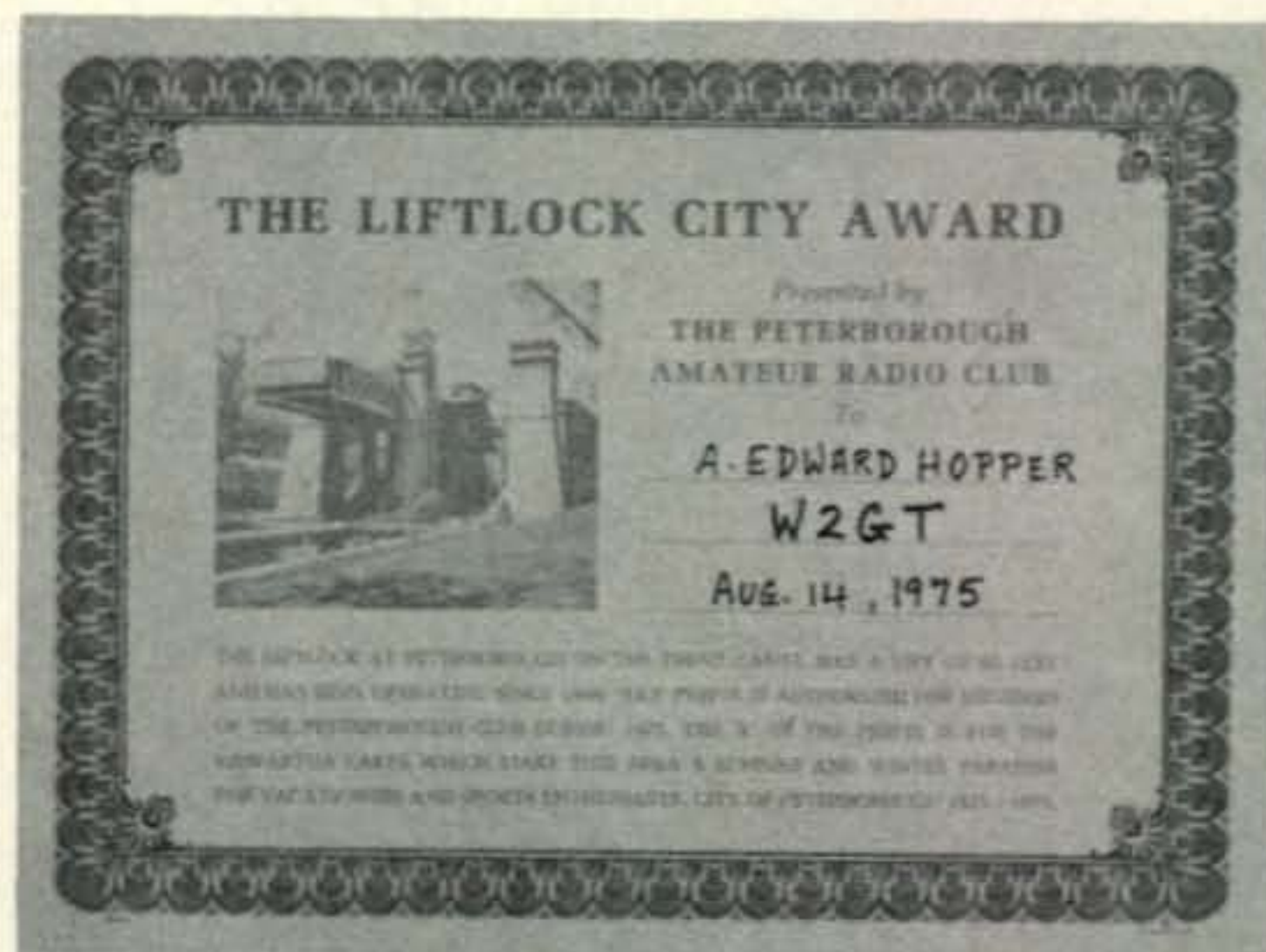
Antennas at Vic, W7VSE. (Courtesy Larry, W6ANB).

Scituate, Mass. 02066. (Thanks for data from Bob, W1DKD).

YZ-30 Award: For contacting 30 YZ stations between 2301 8 May and 2300 November 29, 1975. Send GCR (Certified list/data) and 3 IRCs before 21 January 1976 to: YZ-30 Award, P.O. Box 48- 11000 Beograd, Yugoslavia.

G-QRP-C Awards: This G-QRP Club is so called as it is based in the United Kingdom and they define QRP as 5 watts or less. It is devoted to low power radio communication and they have a fine Awards Program to promote this. Such as: *The G2NJ Trophy*, *Worked G-QRP-C Award*, *Heard G-QRP Award*, *QRP Countries Award* and *QRP Listener Award*. For full data/rules on these Awards, may I suggest you send an s.a.s.e. to: Robert A. Curtis, W1EXZ, 17 Cobbleview Drive, Colchester, Vermont 05446. The Awards are actually issued by Mr. A. D. Taylor, G8PG/GW8PG and I must thank Rev. G. C. Dobbs, G3RJV for all the information. All Awards are free but they would like 5 IRCs to cover postage, etc. . . .

The Liftlock City Awards: Sponsored by the Peterborough Amateur Radio Club, Ontario, Canada. The Peterborough amateurs have been authorized to use the prefix XK3 during 1975



The Liftlock City Award.

Govt. SURPLUS ELECTRONIC EQUIPMENT CATALOG

New ITEMS... New BARGAINS!

FREE UPON REQUEST!

If you haven't received our new Catalog, write for free copy today. Address: Dept. CQ

FAIR RADIO SALES

1016 E. EUREKA • Box 1105 • LIMA, OHIO • 45802

MILITARY SURPLUS WANTED

Space buys more and pays more. Highest prices ever on U.S. Military surplus, especially on Collins equipment or parts. We pay freight. Call collect **now** for our high offer. 201 440-8787.

NEW ADDRESS

SPACE ELECTRONICS CO.
div. of Military Electronics Corp.
35 Ruta Court
S. Hackensack, N.J. 07606

PROTECT
your
SHACK

SALE
\$49.95

Patents Pending

EARLY WARNING IONIZATION FIRE ALARM INSTALLS
IN MINUTES. PROTECT YOUR LOVED ONES, YOUR
HOME, YOUR RADIO EQUIPMENT.

- Early warning ionization fire detector senses a fire before it produces visible smoke or flame, or noticeable heat.
- Loud, piercing intermittent warning alarm sounds at 85 db level at 10 feet. • Powered by a single 12.6 v. long-life battery. • Reliable solid-state circuitry. • Installs with two screws to wall or ceiling (preferred). • Alarm sounds when its time to replace the battery (once a minute for 7 days). • Measures only 6" dia. by 1 9/16" deep. • Shipped post paid anywhere in the USA for only \$49.95

You can't afford to be without this protection! Additional batteries \$8.00 each.

Send check or money order to:



HOUSE OF POWER

P. O. Box 306, Merrick, N. Y. 11566

to commemorate the 150th anniversary of the founding of the city of Peterborough. Two or more Peterborough amateurs must be contacted on any amateur frequency. Send two XK3 QSLs and one dollar for North American amateurs or three IRCs for foreign amateurs to the AWARDS Manager: John Fisher, VE3ALQ, 645 Weller St., Peterborough, Ont., Canada K9J 4X1. Your XK3 QSLs will be returned to you with your certificate.

California Bi-Centennial Award: The Northern California DX Club Inc., will offer this Award during the year 1976. Available to all licensed amateurs *outside* the contiguous 48 states of the U.S.A. upon receipt of proof of contact with seventy-six (76) California stations plus thirteen (13) contacts with NCDXC member stations. Thus a total of 89 QSOs. Full details of rules and procedures for this Award will be announced later. Jim M. Ruys, W6UZX will be the Award Manager. NCDXC, Menlo Park, California 94025. (P.O. Box 608).

National Capitol DX Ass'n U.S.A. Bicentennial Award: This Award will be issued to any licensed radio amateur in the world for contacting ten (10) different members of the NCDXA using their special Bicentennial call signs during the 1976 Bicentennial year. Requirements: Two way QSO with ten different NCDXA members using their special call sigus during 1976 on any band or mode 1.8 MHz to 29.7 MHz. No endorsements for band or mode or for more than ten. Send log information, no QSLs required. U.S. stations send 50¢, DX is free. Send to: NCDXA Awards Manager, Raymond E. Spence, W4QAW, 10013 Coach Road, Vienna, Virginia 22180. NCDXA Members: AC3AFM, 3AFQ, 3AZD, 3BQV, 3BWZ, AD3-CHP, AC3COR, 3CRE, 3DBT, 3EZT, AA3-HRV, AC3KA, AA3KSQ, 3MBQ, 3NHG, 3NGS, AC3NL, 3QW, 3RX, 3SW, AD3EH, AC3ZNH, AD3ZAW, AC3ZSR, AD4CFB, 4CTY, 4DXO, 4EBY, AD4EKJ, 4GKD, AC4-IDG, 4KFC, AD4KQB, 4OMR, AC4QAW, 4UMF, 4WSF, AD4WVT, AC4WWG, 4DPS, AA4HPF, AB2EXK, AC2GHK, AC9SZR.

Notes

Although I live very near New York City and Staten Island, I never saw any mention in the newspapers nor on T.V. or radio about it but thanks to Pete, WN9PIC who got the data from a WN2 whose call I have misplaced—Richmond County N.Y. has been renamed Staten Island County—yes, I did verify this.

Again looking through my foto albums of my *many county hunter friends* makes me wish it was possible to drop each and every one of you a beautiful thank-you note and Christmas card, but I will have to settle for wishing you *all the Healthiest and most Merry Christmas of ALL!* Write and tell me, How was your month (Year)?

73, Ed., W2GT.

SURPLUS sidelights SURPLUS

BY GORDON ELIOT WHITE*

SOME time back I mentioned the Collins 651S-1 communications receiver in this column. It was only a rather cursory treatment, for not all of the data I wanted was then available.

Collins has more recently made available the full manual on the 651S-1, through David J. Maughn, in the Cedar Rapids Radio Group, and this is a follow-up to the earlier effort.

The 651S-1 is the current production Collins general-purpose receiver, in the line which goes back through the 51S-1, the R-390, and the 51J-4. Although its lineage is Collins, its design and construction are not in any way similar to the Collins receivers most of us know and love. This is a really spaceage receiver, and it is priced in space too, in the \$4,000 range.

Whether any of these will ever show up in surplus is purely guesswork. It would be nice to hope so, some day.

Basically, the 651S-1 covers 250 kHz to 29.9999 MHz in 297,500 channels.

It is digitally tuned from a spinner knob, and the frequency is read out on a Nixie-type frequency counter. It is completely solid-state, and features state-of-the-art synthesized frequency generation.

Operating modes are a.m., sideband, and c.w., with intermediate frequency filters of 6 and 16 kHz, 2.7 kHz upper sideband and 2.7 kHz lower sideband. Independent sideband and f.m. are optional modes.

Frequency coverage down to 12 kHz is possible, using an optional very low frequency converter, which plugs in in place of the standard r.f. module. Automatic frequency scanning, and other special features like computer control, operation with secure vocoder and RTTY systems is also offered.

The 651S-1 can be mounted as a desk-top unit, or in a 19 inch rack, with optional rack mounting plates. Power is 115 or 230 v.a.c., 60 Hz.

Controls include a variable b.f.o., useful for interpolating between 100 Hz channels, (and which is *not* provided on the earlier 51S-1 receiver); a line and r.f. meter, fast and slow automatic gain control, r.f. and a.f. gain, mode, bandwidth, and 1 MHz and .1 MHz tuning controls.

Tuning is accomplished in a highly stable



The Collins 651S-1 general purpose h.f. receiver.

oscillator, which is synthesized to provide the necessary local oscillator signal. The Collins' circuit reportedly stabilizes the final frequency in a few milliseconds, thus minimizing one of the problems of synthesized oscillators in a fast-tuning general coverage receiver, that of slow oscillator stabilization.

Synthesized oscillators are accurate, once tuned to a discrete channel, but normally they have a noticeable stabilization time which makes "tuning around the band" frustrating.

In operation, the 1 MHz and .1 MHz knobs are used to select the desired band, and final tuning over a 100 Hz segment is done with the spinner knob. The 100 Hz tuning control is an infra-red tuning switch that produces two square wave outputs when the knob is rotated. A computer-like circuit card determines the direction of rotation from the pulses, and sends up or down pulses to the synthesizer. Two infra-red emitters generate light that is interrupted by opaque lines screened on a transparent disc.

An option is an internal battery-powered power supply to "keep alive" the master oscillator in case of power failure, and prevent loss of frequency stability.

Frequency stability is rated at five parts in 10 to the 7th power. That should be good enough for most amateur purposes. Sensitivity is rated at from 1 microvolt in the 2-29.999 MHz area, (narrow band f.m.) to 35 uv in the 250-400 kHz area, sideband.

I.f. output is 450 kHz, 50 mv, into a 50 ohm load. ■

Spread The Word

An eye-catching bumper sticker encouraging the man in the street to "Talk to the World—Become A Ham Operator" is available from CQ for 25¢ plus a legal-size s.a.s.e. Quantity prices upon request. Write to: CQ, 14 Vanderventer Av., Port Washington, NY 11050.

SUBSCRIBE TODAY

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

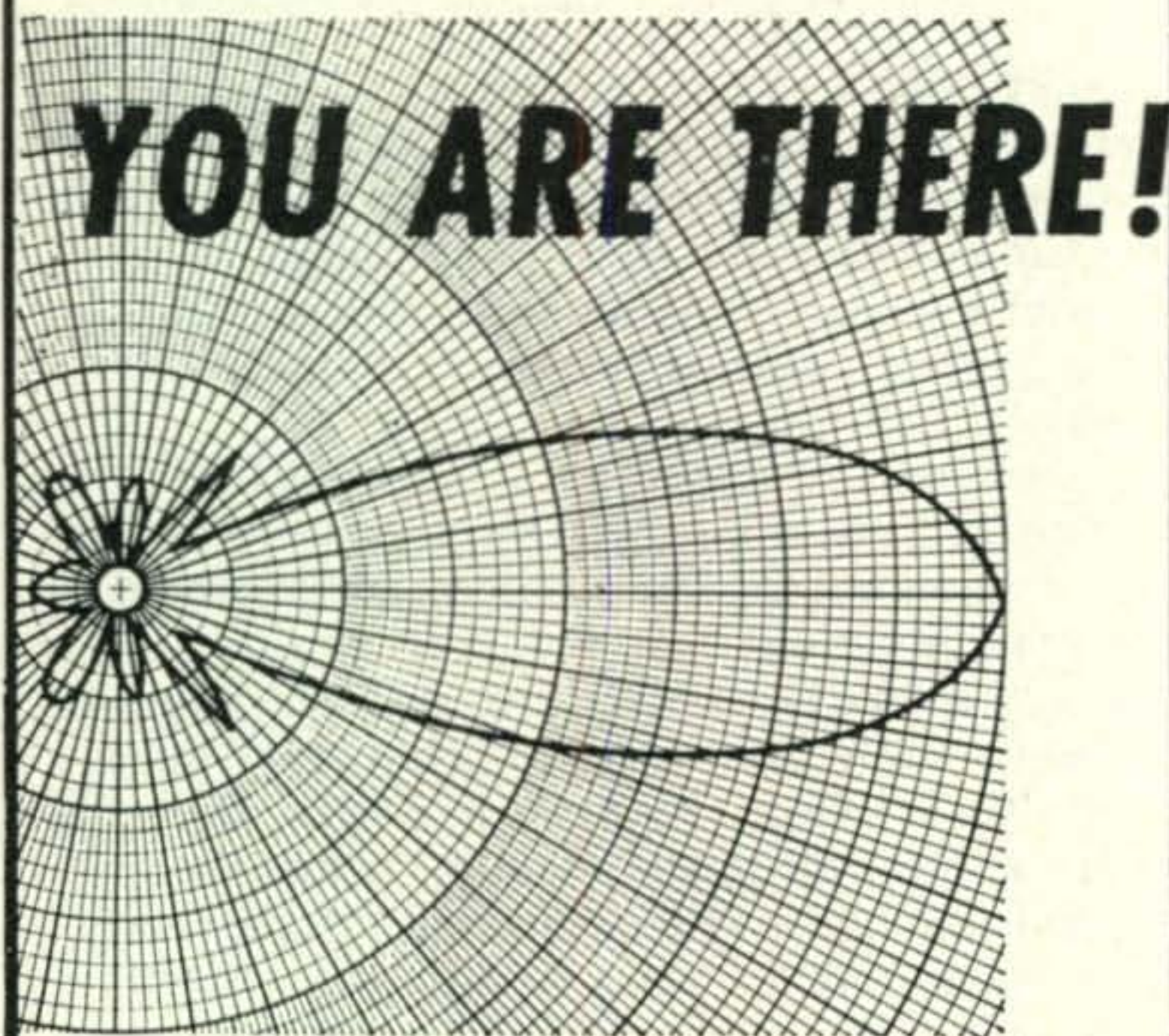
with **TELREX** Professionally Engineered

"BEAMED-POWER"

"BALANCED-PATTERN"

"PERFECT-MATCH"

Antenna Systems



YOU ARE THERE!

The design, craftsmanship and technical excellence of Telrex —

Communication Antennas.

have made them the standard of comparison throughout the world! Every Telrex antenna model is engineered, precision machined, tuned and matched, then calibrated for easy and correct assembly at your site for repetition of our specifications without 'cut and try' and endless experimentation.

"the-performance-line"
with a "MATERIAL" difference!

Also: Rotator-Selsyn-Indicator Systems, Inverted-V-Kits, "Baluns," Towers, "Bertha" Masts, 12-Conductor Control Cable and Co-ax. SEND FOR PL-73

COMMUNICATION

SYSTEMS
SINCE 1921

telrex

Laboratories

ASBURY PARK, NEW JERSEY 07712, U.S.A.

In Focus [from page 59]

Final-Final

Please keep those letters and pictures coming in! And speaking of pictures don't forget to send one today—on your SSTV. Graphics certainly have their place, but nothing is more boring than to watch one billboard sign after another. You can SAY "Five nine plus" in nothing flat, but a picture of your home, your family, or a local scene is worth those eight-second frames. Pictures convey so much more information than words. We have the PICTURE transmission capability, let's not convert our system to SLOW-RTTY.

73, Bill, W2DD

QRP [from page 51]

though higher levels can be realized in optimized designs.

The preceding paragraphs should serve as an introduction to working with solid state transmitter circuits on the bench. As long as you know what you are trying to find out about a circuit and how that relates to its proper operation, some fairly simple instruments will suffice as test gear. In the ultimate analysis, patience is important. We'll return to this subject later. For now,

73, Ade, K8EEG

Novice [from page 49]

News And Views

The air time of 9-year-old **Kurt Kirkey, WN9QMJ**, 327 So. Lincoln Ave., Mundelein, Ill. 60060, is directly dependent on his school grades. He has worked four Canadians and 17 states in all U.S. call areas using a Heathkit HW-16 transceiver driven by an HG-10 v.f.o. exciting an 80, 40, 15-meter, inverted-V antenna. Kurt and his "Mom," **WN9QLC**, put the kits together under the supervision of his Dad, **WN9QGX**. In turn, Kurt is working on his Dad's code speed. Kurt has a 10-w.p.m. ARRL code-proficiency certificate and is working on 15 w.p.m. He has his 2-year-old sister calling their Dad "Dah-dit-dit dit-dah dah-dit-dit!" We do not have any information on Dad's and Mom's records, but the equipment does not cool off much between operators. Kurt is an active member of the Libertyville-Mundelein Amateur Radio Society, is a cub scout, plays football and baseball, and he plays the piano. . . . Some of this information was extracted from the club bulletin . . . A couple of months ago we ran the comments of an amateur who had just been in the new FCC offices in Chicago and about the difficulties of taking a code test in competition with the piped-in music and other noise. Our informant reports the music is now gone, and the Chicago office is generally quieter . . . **Janet S. Davis, WN8TAN**,

Rd. #1, Box 160, Waterford, Ohio 45786, says that "It is not just a man's world." In a little over a year, she has worked all states and is a county hunter using a Heathkit HW-16, an HG-10B v.f.o., and a 66-foot inverted V antenna. Her minister, **Ed Seeger, WB8LSD**, now in Houston, Texas, helped her get her license. Janet is married and has two teen-age sons, but she is the only one in her family interested in radio or electronics. Janet has a bad back, which limits her activities. She encourages other women to join the fun of amateur radio. From experience, she attests that it is much more fun than "Brand X." By the time you read this, Janet hopes to have her Conditional or General class license.

"Kropy," **C. Kropinak, VE6UP**, 513-19 St., North, Lethbridge, Alta., Canada, TIH3K6, tells us that the Canadian license fee was upped from \$10.00 a year to \$13.00 this spring! Also, that Canadian amateurs are authorized to use the prefix **XJ** until next August in celebration of Canada's Bicentennial . . . **Tom Taylor, WB8RUO**, 6482 Westover Circle, Cincinnati, Ohio 45236, was enticed into amateur radio by his brother **John, WN8RFH**. John is still a Novice with not much time to operate at home but is active in the High School Amateur Radio Club and in Field Day this summer. Tom is an Advanced class licensee after being a Novice for a year. They used a Drake 2-C receiver and 2-NT transmitter as Novices, but were lucky enough to be allowed to use the school R-4B and T-4X during the summer. Their antennas include a homebrew 3-element, 15-meter beam, dipoles for 10, 20, and 40 meters, and a 40/80-meter inverted V. Tom's "brag list" includes WAS, WAC, WPNX, 80 countries and "millions" of the 10-meter certificates that seem to be the "thing on 10" these days.

Down to the bottom of the page, already! Remember. Your column depends on your suggestions, "News and Views," pictures, and clippings. You do not have to be a Novice to contribute—just young at heart. Mail all contributions to the address on the first page of the column.

73, Herb, W9EGQ

CQ Reviews: Heath G.D.O. [from page 46] amplifier with positive feedback from output to input but not quite enough to oscillate as in the popular *Q* multiplier circuit. Any r.f. coupled into L_1 , C_1 therefore is amplified and indicated on the meter.

Construction is quite easy and, as with just about all Heath instruction manuals, very well explained. It took us about 1 evening to build the HD-1250 and with one slight problem, it worked as soon as we turned it on. Our problem was bent plates

causing a short in the main tuning capacitor. This was obvious, however, as the unit rubbed or scraped when turned. A little manipulation of our long-nose pliers solved this problem rather simply.

We checked the accuracy of the dip meter with a frequency counter and found that when calibrated according to the instructions (to WWV) the readings on all ranges were within $\pm 7\%$ of that shown on the dial. Whether this was because our capacitor was initially bent or this is normal I don't know, but four readings on each of the seven bands, from 1.6 MHz to 250 MHz yielded this accuracy. Quite possibly better accuracy would be obtained with a good original capacitor.

The meter reading was amazingly stable over each band and very little "touching" up of the sensitivity dial was necessary—a very desirable asset. Also, there were no false dips anywhere within the range except with the highest frequency coil at about 230 MHz. This might have been the internal connecting leads resonating, however, it was a very minor dip, only about $\frac{1}{2}$ division. A typical dip produced by a slug tuned coil shunted by a mica capacitor was a solid $\frac{1}{2}$ to $\frac{3}{4}$ of the whole scale (from 10 to 2.5) so this minor fluctuation is negligible. You can't mistake any true dip.

We have only two negative comments: First of these is the wish that a better tuning capacitor had been chosen to enable an accuracy of 2-3% over the entire range. When dipping 2 meter coils, for example, it would be nice to be able to get a bit closer than 10 MHz. Second, we wonder about the long-term reliability of the phono plugs used as coil connectors. After a few hundred coil changes, these connectors, which were not originally designed for frequent use, may become intermittant.

Our general impression however, is that the HD-1250 is one of the best units we have seen short of commercial laboratory dip meters and would be a valuable asset to anyone doing any type of r.f. experimental work. In addition, the instruction manual is excellent giving good explanations of most of the typical measurements that can be made with this instrument. The HD-1250 is a product of Heath Company, Benton Harbor, Mich. 49022. The price of the kit is \$59.95, less battery (9 v. transistor type).

—WA2NDM

QSL Information

A2CBW—Via DK3KD
 A4XFV—To DJ7OM
 A4XVE—c/o G4AJJ
 A9XBD—Via G.R. Smith,
 P.O. Box 14, Manama,
 Bahrain
 C31IL—To WA9INK
 CR6CA—c/o WB6QAS
 CT2BP—Via WA6GKJ
 DK7PF/HK0—To
 DJ7OM
 EP2OD—c/o K4OD
 EP2SR—Via W3FYT
 FB8XL—To F2MO
 FBSYC—c/o F9MD
 FG7AN—Via WA3EDS
 FM7AV—To F6BFH
 FP8DH—c/o K9OTB
 FW0LP—Via WB5ERR
 GD5BLG/P—To DJ5UA
 HB0NL—c/o HB9NL
 IL0FUD—Via P.O. Box
 4073, Milan, Italy
 KB6CU—To P.O. Box
 1158, Canton Island
 96736
 KC4AAC—c/o K7ODK
 KC6CG—Via WA2MPE
 KC6MW—To K7DDY
 KJ6CF—c/o WA6QFO
 KM6EA—Via Box 19,
 FPO, San Francisco,
 CA 96614
 KR6LP—To WA0FLD
 KS6FF—c/o W6LKI
 PA9RR—Via W6ZMM
 TA1HY—To W5QPX
 TU2GA—c/o K9KXA
 VP2AYL—Via P.O. Box
 550, Anguilla,
 West Indies

VP2EQ—To WB2ZMT
 VP2MCT—c/o W6KXT
 VP2MB—Via WA8TDY
 VP2MIR—To W7FCD,
 4602 North 75th Way,
 Scottsdale, AZ 85251
 VP2LL—c/o W2MIG,
 47 Palisade Road,
 Elizabeth, N.J. 07208
 VP8HZ—Via G3WCQ
 VQ9SS/C—To G4DII
 VR1AA—c/o JA0CUV/1
 or I.S.W.L. or J.A.R.L.
 VS6DO—Via K4CIA
 VU2ANI—To K6TWT
 WG4NEP—c/o W4LRN
 XJ2AOD—Via VE2DSM
 XJ0NEH—To H.M.C.S.
 Iroquois A.R.C., c/o
 Forces Mail Office,
 Halifax, N.S., Canada
 ZP5AO—c/o P.O. Box
 504, Asuncion,
 Paraguay
 ZS2MI—Via ZS6BBF,
 Box 3656, Pretoria,
 Republic of South
 Africa
 3D2AJ—To W6SC
 5V7WT—c/o F9GL
 6W8MW—Via P.O. Box
 1646, Dakar, Senegal
 7P8AC—To Keith
 Younger, P.O. Box 829,
 Maseru, Lesotho
 9N1MM—c/o W2KV
 9Q5SW—Via JA8JN

73, John, K4IIF

S.S. Tone Encoder [from page 45]

As shown in the photograph, components may be soldered to each other, calibrated, and potted in clear plastic casting resin.

Acknowledgements

I wish to thank Kerry Banke for the COS/MOS oscillator design idea, Gordon Schlessinger for the CTCSS historical background and Cubic Corporation for providing the encouragement and photography. ■

Bibliography

"Astable and Monostable Oscillators Using RCA COS/MOS Digital Integrated Circuits," by J. A. Dean and J. P. Rupley, RCA Application Note ICAN-6304.

"Timekeeping Advances through COS/MOS Technology," by S. S. Eaton, RCA Application Note ICAN-6086.

"Power Supplies for COS-MOS," by D. Blandford and A. Bishop, RCA Application Note ICAN-6304.

"The LM3900—A New Current-Differencing Quad of \pm Input Amplifiers," by T. M. Frederiksen, W. M. Howard and R. S. Sleeth, Application Note AN72 Paragraph 6.4, National Linear Applications.

"MC35031 Specifications and Application Information," Motorola Semiconductor Products Inc.

Conclusion

Keep in mind that most speech levels on the phone line float around -10 dbm or even less and this level is perfectly adequate for all patch purposes. Just don't ever exceed the 0 dbm level. There is no need for it under any condition and you may save yourself a lot of trouble. Due to the circuit restrictions the meter does not really indicate the exact rectified full wave peak speech level but it is fully sufficient for most purposes except the most exact. It certainly is much better than no meter at all after you burned out the one you had by forgetting to disconnect it! The man who wants the ultimate in meter protection could add two back-to-back diodes across the meter terminals, CR_{11} - CR_{12} , this would give additional protection to the meter but not to the rectifiers CR_1 and CR_2 .

The prices of the diodes used in this circuit are very low and easily available from CQ advertisers. ■

New Look/Old Antenna [from page 39]

Construction Hints

Using a standard ceramic center insulator is not too good. When you take the slack out of the coax, the short insulator tends to tip. The insulator in fig. 3 eliminates this problem and also provides the space between the antenna and the coax. Include the exposed center conductor in the dimension for the right half of the dipole.

The spacers are also shown in fig. 3. They can also be $\frac{1}{4}$ " to $\frac{1}{2}$ " phenolic, Teflon or even varnished plywood. Space them at 3 to 4 foot intervals and wrap several turns of tape on each side around the coax to keep them from sliding. They should be free to slide on the antenna wire. The two inch spacing is an arbitrary figure. It could be more or less. Don't get it too close or the purpose is defeated.

The feed point impedance and dimensions are about the same as any half wave dipole. Of course the impedance is not necessarily the theoretical 72 ohms. Height above ground, proximity to house wiring, power lines, etc., all get into the act. Unless you can keep the antenna real taut (straight) and pretty much above the ground, 50 ohm coax (RG-58 or RG-8) would probably be better matched than 72 ohm stuff (RG-59

or RG-11). Since RG-58 and RG-59 will handle the legal limit on 75 and 40 meters with insignificant attenuation for typical amateur applications, there is no point in using the heavier coax.

What Is It?

Well, it's nothing really new, nothing really special. Just a different application of

old principles, and it works. What do you call it? I guess just the "Nott Special." Although the examples used are 75 and 40 meters, the antenna is not limited to these bands by any means. The same principles apply from 160 meters up into the v.h.f. bands. It's very simple and inexpensive, so pick a band and give it a try. ■

16th Annual CQ 160 Meter Contest Results [from page 34]

Saskatchewan				OK30CCG	2,904	90	0	11	11	KH6IJ	24,288	85	68	32	5
VE5XU	28,600	240	5 55 5	OL30CCH	2,728	82	0	11	11	KH6CHC	7,378	46	42	17	4
British Columbia				OL30ARR	2,497	73	0	11	11	KH6HSW	248	8	5	4	3
VE7UZ	24,852	162	14 57 13	OK30CCZ	2,270	79	0	10	10	Hong Kong					
VE7WJ	7,548	95	4 34 5	OK30KHD	2,236	55	1	13	13	VS6DO	1,840	43	3	8	8
VE7AZG	1,764	38	1 21 3	OK30AIJ	2,230	77	0	10	10	Iran					
Aland Island				OK30CCC	1,820	59	0	10	10	EP2BQ	5,076	57	0	18	18
OH3XZ/Ø	28,913	188	12 29 23	OK30ZAR	1,683	82	0	11	11	Ireland					
Austria				OK30FRF	1,500	45	0	10	10	EI9J	27,392	137	36	32	18
OE1KU	1,897	56	0 7 7	OL30CCK	1,494	57	9	9	9	EI1AA¹	16,233	149	8	21	17
Bermuda				OK30KIX	1,431	60	0	9	9	Isle of Man					
VP9BO	72,239	159	150 47 10	OK30JLJ	1,352	65	0	8	8	GD4BEG	21,336	175	4	24	22
Bolivia				OL30ARZ	1,169	61	0	7	7	Israel					
CP1EU	900	11	9 9 3	OL30CDZ	1,029	57	0	7	7	4X4NJ	7,100	67	4	20	18
Brazil				OK30TOA	963	36	0	9	9	Japan					
PY2FUS	2,414	18	11 17 7	OK30JER	959	52	0	7	7	JA3ONB	3,546	128	15	9	6
Canal Zone				OL30CDF	852	56	0	6	6	JA6WGE	2,710	101	6	10	10
KZ5AA	94,640	181	157 56 18	OK30BEC	486	27	2	6	6	JA3AA	1,536	107	3	6	6
Channel Is.—Jersey				OK30SLL	455	38	0	5	5	JA7NI	1,164	84	1	6	6
GC3EM/P	83,468	324	58 44 24	OK30KUB	336	19	0	6	6	JA1MCU	1,070	98	0	5	5
Czechoslovakia				OL30ASQ	315	12	0	7	7	JA2UEO	748	72	4	4	4
OK30ATP	40,638	226	25 39 26	OL30CEU	285	21	0	5	5	JA3JF	462	74	0	3	3
OK30BOB	26,202	192	13 33 24	OL30ASU	202	49	0	2	2	JA9BOH	134	67	0	1	1
OK30MMW	23,374	201	7 29 26	Ecuador						JA1LB	118	28	0	2	2
OK30KSO	20,650	205	4 25 23	HC1XG	87,752	166	148	56	16	JH2IRH	54	27	0	1	1
OK30FCW	16,320	182	2 24 24	England						Market Reef					
OK30AXD	13,530	160	2 22 21	G3SZA	62,671	225	59	49	26	OJØMA	1,300	13	0	4	4
OK30MIX	13,272	148	4 24 22	G3KMI¹	22,852	202	18	29	19	Netherlands Antilles					
OK30BFN	12,350	131	6 25 21	G4DAA¹	20,928	230	10	24	18	PJ2VD	53,222	124	108	46	16
OK30KPU	11,684	136	2 23 23	G4AR	10,940	150	5	20	18	Northern Ireland					
OK30PGF	11,550	154	4 21 19	G3TXF	7,398	106	2	18	17	GI3JEX	7,756	112	0	14	14
OK30KFF	9,438	122	1 22 22	G3YMC	5,614	139	0	14	14	Peru					
OK30SLS	8,560	126	1 20 20	G2FNK	5,068	112	0	14	14	OA8V	32,800	86	78	40	10
OK2PGU	8,262	134	1 18 18	G2DMR¹	4,719	102	0	13	13	San Andres Is.					
OK30PEG	6,225	122	0 15 15	G4BUO	4,485	74	1	15	15	HKØBKX	36,465	100	93	39	8
OK30CWQ	6,131	113	0 17 17	G2BJY	2,400	66	0	10	10	Scotland					
OK30KFO	6,032	112	0 16 16	G2CIL	2,343	65	1	11	11	GM4DNM/A¹	67,298	264	46	46	25
OL30AQP	6,000	117	0 16 16	Finland						Sudan					
OK30KAP	5,808	108	0 16 16	OH2BO	10,010	92	2	22	21	ST2AY	6,195	55	4	21	19
OK30KKF	5,670	98	1 18 18	OH2KA	4,103	77	0	11	11	Switzerland					
OL30ARK	5,265	108	0 15 15	OH1IJ	3,012	52	0	12	12	HB9NL	8,862	77	8	21	16
OL30CDQ	5,120	99	1 16 16	Germany						HB9QA	1,199	21	2	11	10
OK30DJK	4,872	105	0 14 14	DJ5PN	43,428	186	31	42	27	Thailand					
OK30QX	4,688	91	0 16 16	DJ6TK	16,968	150	4	24	21	HS2AIG	5	1	0	1	1
OK30BKT	4,185	87	0 15 15	DLOAA	10,472	128	3	17	16	U.N. Geneva					
OK30CCR	4,080	92	2 15 14	(Opr. DL6KB)						4UIITU	8,640	107	1	16	16
OK30TAO	4,030	96	0 13 13	DJØUP	10,298	115	2	19	18	(Opr. OH2BH)					
OK30JEN	3,722	96	0 13 13	DJ2ZS	8,880	120	0	16	16	Venezuela					
OK30KRY	3,718	92	0 13 13	DK7LN	6,305	106	0	13	13	YV10B	99,720	177	156	60	20
OK30PGS	3,627	93	0 13 13	DJ1ZB	2,260	50	0	10	10	YV5CKR	10,416	42	33	28	10
OK30FON	3,598	88	0 14 14	DL1YA	1,460	30	0	10	10	Virgin Islands					
OL30CDD	3,264	88	0 12 12	Hawaii						KV4FZ	192,552	305	238	71	28
OL30AQM	3,216	86	0 12 12	KH6RS	42,264	125	111	36	4	Check logs are gratefully acknowledged from the following: W1HGT, WA3UDS, G3RWL, OL30CBJ, OK30MCW, OK30SBJ.					
OK30BNY	3,096	90	0 12 12	(Opr. K2SIL)											

Multi-Op Station Crews

WA2SPL: WA2SPL, WB2OEU. K4QMQ: K4QMQ, K4D-BV. W5SBX: W5SBX, WA5WQF. WA5RXT: WA5RXT, WA5FTP, WB5JJE. WB5CKM/5: WB5CKM, K5SOR, K5LZJ, WB2DXC. WA6LXN/6: WB6VZI, WB6ZVC. W6RW: W6RW, W2IWC. W7SBC: W7DZO, K7HTZ, K7IDX. W7SFA: W7SFA, W7EXM, K7JCA. WA7OTT. K8KAS: K8KAS, WB8NHO, WB8NNO, WB8OGC, WB8OWY. W8MAI/8: K8BYX, K8SLE, W8OFG, WA8ZVO, WB8NSF. WA8YEE: WA8YEE, WB2FGA. VE1AXT: VE1AXT, VE1-BCZ (Dad & Son). EI1AA: EI2BB, EI2CA, EI2CL, EI7CC, EI8CC. G2DMR: G3LCH, G4ADM, G4BFJ, G4CWH. G3KMI: G3WIE, G3ZBU, G3ZER, G4AMI, G4CBQ, G4CIG. G4DAA: G3FXB, G4BUE. GC3ZEM/P: G3ZEM, G3XVY. GM4DNM/A: GM3OLK, GM3PFQ, GM3YOR, GM4ALK, GM4DFF.

SEND IN EARLY FOR ALL CQ CONTEST

LOG AND SUMMARY SHEETS

include an s.a.s.e. or sufficient IRCs

for prompt delivery

Antennas [from page 31]

"The best way is to disconnect the coaxial line and couple a grid-dip meter to the base matching coil, L_2 . The antenna and radial system should resonate to your operating frequency. If it does not, the length of the antenna above the coil, or the number of turns in the loading coil, L_1 , are adjusted until resonance is accomplished. The operational bandwidth of the antenna is about 20 kHz between the 2-to-1 s.w.r. points, so it is essential that resonance at the desired frequency is achieved. For c.w. work, the antenna is resonated at 1810 kHz, and for s.s.b. it can be resonated about 1825 kHz. That's for the areas that have the low frequency portion of the band," I added as an afterthought.

"Once antenna resonance is established, the coaxial line is tapped on matching coil L_2 near the mid-point. The tap is adjusted up or down until the lowest s.w.r. is achieved. If it is not low enough, the total number of turns in L_2 may be changed, a turn at a time. This may sound like a time-consuming task, but it is not. The whole thing can be done in an hour, or less."

I paused and looked at Pendergast. "Before you run home and start winding a loading coil, there are a few things to be said about the radials and grounding system. While radials and ground connection do not look important on the antenna diagram, they are *very important* when it comes to antenna performance. This is especially so when a short antenna of this type is used. The radiation resistance of this antenna is about 4 ohms. You can't overcome the loss resistance in the two coils, but you can make them as low-loss as is possible. The last important source of loss over which you have any control is the ground loss. This is something that you can control, if you have the time and fortitude. And it will make the difference between a mediocre antenna and a good antenna."

Pendergast said nothing, so I continued. "The real earth ground about us is a poor imitation of an infinite copper ground screen. Measurements made by the Bureau of Standards established ground conductivity running from 340 ohms per cubic centimeter to as high as 450,000 ohms per cubic centimeter. Conductivity varies with the type of soil, temperature and the degree of moisture content in the soil. Ground resis-

tance is the highest in cold, dry weather and the lowest in hot, humid weather. A gravelly, sandy soil, according to the Bureau of Standards *Technical Report 108*, has a resistivity so high it is practically a good insulator.

"The chief effect of high resistivity soil is to absorb the useful, low angle radiation from a vertical antenna. In addition, the ohmic loss of the soil eats up valuable r.f.

Pendergast thought a minute, then asked, "Does the ground rod show any resistance to the soil, that is, apart from the soil conductivity?"

"Well, according to studies footnoted in the Report, ground rod resistance to the soil can run several hundred ohms in extremely dry, rocky soil, but usually runs in the region of 2 to 20 ohms.

"It is practical to treat the soil in the vicinity of the ground rod by mixing it with salt (sodium chloride), about one part of salt (sodium chloride), about one part of rock salt will work—is mixed in to a depth of several feet and the mixture thoroughly watered. A ground rod at least 5 feet long is recommended, and two connected in parallel a few feet apart are even better.

"Since the salt eventually dissolves away, it is necessary to repeat the treatment at about six month intervals. If the ground current is monitored, it will be found to start dropping off when the salt leaches out of the soil".

Pendergast sighed and closed his notebook. "Isn't there an easier way of doing things than to run around salting the earth?"

"Yes, and now you are back to the use of quarter-wave radial wires, which act as an artificial ground system," I replied. "As to the number, two wires are better than one, and four are better than two. And so on. After sixty or so wires, the improvements starts to level off. Broadcast stations use 120 radials, laid out like the spokes of a wheel, every 3 degrees around the tower. Not many hams can do this, so they settle for three or four radials, run out haphazardly through the bushes and around the yard."

My friend rose and picked up his *Kamikaze 1000 transceiver*. "I think, for my location, I'll use the Marconi antenna made out of twin-lead," he stated. "I can put up three, quarter-wavelength radials . . . and that's it. I've run out of room."

"Good show," I answered. "I had a set-

GIANT 1/2 ALBATROSS SALE CONTINUES



(Marc Home For Christmas)

This week St. Bernards and a crack team of imported Austrian Spelunkers reached the beleaguered Marc Gilman (CQ's Mailboy) trapped for weeks behind boxes and crates of CQ Binders. CQ's readers have jumped into the fray and have been buying Binders (at a ridiculously low price) to help clear a path to the entombed Marc.

Jack Lewis aided by Kurt Fenner (CQ's new Mailboy) rushed in to help Marc to his feet and bring him into the light. A joyous reunion party was held at the office for Marc and his co-workers who took a break from packing and shipping all of the Binders (labor of love).

In gratitude for Marc's safe recovery we will extend our sale to all those who helped in thought and deed. Help share our joy by buying

Binders for the low price of \$3.00 each or 3 for \$8.50 postpaid. While the supply lasts, you can build up your own Marc Gilman Library by quickly taking advantage of our sale. The Binders are also good for keeping some of your other magazines intact. Feel proud, stand tall, you've done the right thing. At the same time you can also add a few bound volumes to your collection at a tremendous saving. We still have the following years available at only \$10.00 each:

1974, 73, 70, 68, 67, 64, 60
1956, 53, 51, 50

After a short rest at home Marc will return in a new capacity for CQ, a promotion for his personal ordeal and self sacrifice for CQ. Special Commemorative lederhosen and dirndls were awarded the Spelunkers.

CQ Magazine, 14 Vanderventer Ave., Port Washington, N.Y. 11050

I'll take ___ binders and ___ (yrs) bound volumes too. While I'm writing I might as well take out a sub to CQ at the same time. 1 year \$7.50, 2 years \$13.00. GO GET'EM MARC.

Name _____ call _____

Address _____ State _____ Zip _____

up like that for several years. It enabled me to work all over the United States on c.w., and as far east as Tennessee on s.s.b. That's not bad for low power and such a simple antenna. I suggest you go ahead. You'll have a lot of fun with an antenna like that."

Pendergast walked toward the door. "I'm looking forward to 160 meters," he said. "I want to work Mr. one-sixty himself, W1BB."

"A coincidence," I replied. "I just got a letter from Stew and he asked when Pendergast was getting on 160 meters. You'll make him happy, I'm sure. It isn't every day when a fellow can QSO a straight-arrow like Pendergast".

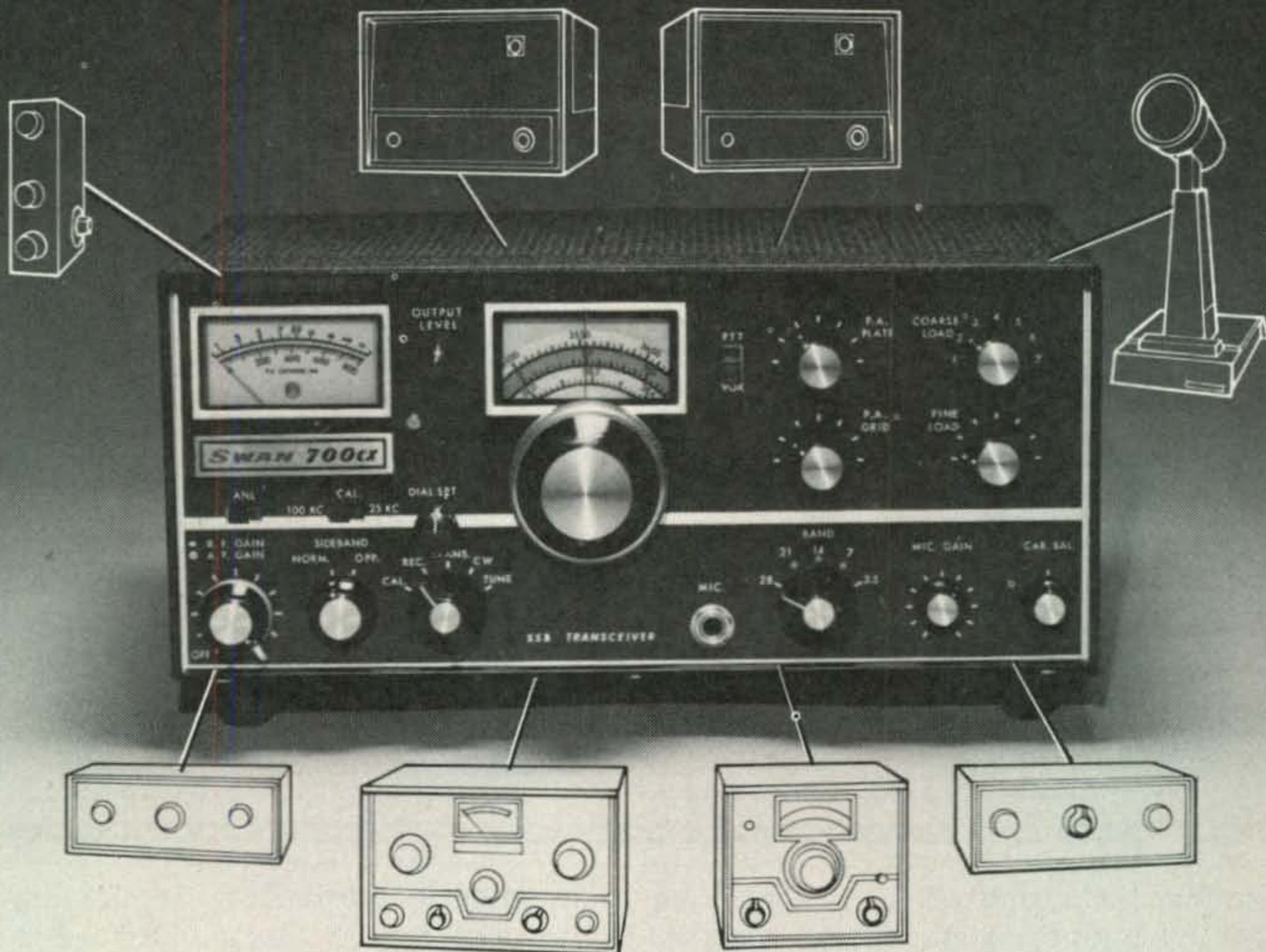
Pendergast turned a little red at the remark, then said, "Are you still offering a freebie for good antenna dope?"

"Yes," I replied. "I am always on the lookout for good information on antennas that will be of general interest to the readers of my column. Interesting antenna experiences, in terms of operation; unusual antennas; comparisons between various antennas; and so forth. I would like to hear from fellows working DX on 80 and 160 meters as to the antennas they use. In fact, any antenna information of import will be

interesting to the readers. So, for any material used in the column, I'll send a copy of one of my antenna handbooks". ■

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION (Act of October 23, 1962; Section 4369, Title 39, United States Code) (1) Date of Filing - October 1, 1975; (2) Title of Publication - CQ/THE RADIO AMATEUR'S JOURNAL; (3) Frequency of Issue - Monthly; (4) Location of Known Office of Publication - 14 Vanderventer Avenue, Port Washington, New York 11050; (5) Location of the Headquarters or General Business Offices of the Publishers - 14 Vanderventer Avenue, Port Washington, New York 11050; (6) Names and Addresses of Publisher, Editor and Managing Editor - Publisher, Richard A. Cowan, 32 Burham Dr., Smithtown, New York 11787; Editor, Richard A. Ross, 95 Norwood Ave., Northport, New York 11768; Managing Editor, Alan M. Dorhoffer, 20 Kaywood Rd., Port Washington, New York 11050; (7) Owner - (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given). Sanford R. Cowan, 500 Bayview Dr., North Miami Beach, Florida 33160; (8) Known Bondholders, Mortgagees, and other Security Holders Owning or Holding 1 per cent or more of total amount of Bonds, Mortgages or other Securities (if there are none, so state) - NONE; (9) Paragraphs 7 and 8 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, also the statements in the two paragraphs shows the affiant's full knowledge and belief as to the circumstances and conditions under which the stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than of a bona fide owner. Names and addresses of individuals who are stockholders of a corporation which itself is a stockholder or holder of bonds, mortgages or other securities of the publishing corporation have been included in Paragraphs 7 and 8 when the interests of such individuals are equivalent to 1 per cent or more of the total amount of the stock or securities of the publishing corporation. (10) Extent and Nature of Circulation - Average No. Copies Each Issue During Preceding 12 months, (A) Total No. Copies printed (net press run) 77,427; (B) Paid Circulation Item 1 (Sales through dealers and carriers, street vendors and counter sales), 18,031; Item 2, (Mail Subscriptions), 42,073; (C) Total Paid Circulation, 60,104; (D) Free distribution by mail, carrier or other means, Samples, complimentary, and other free copies, 3,811; (E) Total Distribution (Sum of C and D), 63,915; (F) Copies not distributed, Item 1 - Office use, left-over, unaccounted, spoiled after printing, 514; Item 2, Returns from news agents, 12,998; (G) Total (Sum of E & F - should equal net press run shown in A), 77,427. Actual Number of Copies of Single Issue Published Nearest to Filing Date: (A) Total No. Copies Printed (Net Press Run), 78,026; (B) Paid Circulation, Item 1, Sales through dealers and carriers, street vendors and counter sales, 17,960; Item 2, Mail subscriptions, 42,612; (C) Total Paid Circulation, 60,572; (D) Free distribution by mail, carrier or other means, Samples, complimentary, and other free copies, 3,940; (E) Total Distribution (Sum of C and D), 64,512; (F) Copies not Distributed, Item 1, Office use, left-over, unaccounted, spoiled after printing, 1,275; Item 2, Returns from news agents, 12,239; (G) Total (Sum of E & F - should equal net press run shown in A), 78,026. I certify that the statements made by me above are correct and complete. (Signed) Richard A. Cowan, Publisher.

When you start your top-performance ham station, start with our 700CX.



It's the way to grow.

Everybody wants the ultimate ham station, but the only way most of us are going to get it is to start now and grow into it.

And the best way to start is with our 700CX.

Then you'll have an excellent transceiver with 700 solid watts P.E.P. input of SSB power at the lowest cost per watt—about a buck—of any comparable equipment.

And when you're ready to add capability and features, plug in or hook up Swan accessory equipment for easy expandability.

For instance, just plug in our 510-X crystal oscillator when you want extra frequency coverage. If your kind of traffic calls for separate transmit and receive frequencies, our 508 VFO is made for your station. Want VOX? Plug in the Swan VX-2 and start talking. Or hook up our FP-1 telephone patch in minutes.

And when you're ready for that big jump to all-the-law-allows, our 2000-watt P.E.P. input Mark II linear amp is waiting in the wings.

Add our complete selection of power supplies, microphones and other options and you've got everything you need for a full-house rig in matching specs and matching decor.

So your ham station will look and per-

form like it belongs together.

With the 700CX you'll never be troubled by things like cross-modulation and front-end overload because the design is excellent. All bands from 10 to 80 meters with selectable upper or lower sideband, AM, or CW with sidetone.

Get started on your dream rig today. See the 700CX at your nearest Swan dealer or order direct from our factory.

- 700CX Champion Transceiver \$649.95**
- 117-XC 110V AC Power Supply \$159.95**
(includes Speaker and Cabinet)
- 117-X 110V AC Power Supply \$114.95**
(less Speaker and Cabinet)
- 510-X Crystal Oscillator \$ 67.95**
- 508 External VFO \$269.95**
- VX-2 Plug-In VOX \$ 44.95**
- FP-1 Telephone Patch \$ 64.95**
- Mark II Linear Amplifier \$849.95**
(complete with 110/220 VAC power supply and tubes)

Dealers throughout the world
or order direct from



A subsidiary of Cubic Corporation

Home Office: 305 Airport Road • Oceanside, CA 92054
Telephone: (714) 757-7525

SEVEN UP

ON THE COMPETITION

The Clegg FM-DX has many advantages over competitive 2-meter transceivers. Here's seven reasons why you should look to Clegg's FM-DX before you invest in any FM rig.

1. **FULL** 2-meter coverage from 143.5 to 148.5 . . . includes most MARS frequencies.
2. **CLEAN**, beautiful 35-watts transmitter output . . . enough for good simplex range when you want to escape the repeater crowd.
3. **SIMPLICITY** of operation . . . stability and accuracy of the Clegg synthesizer.
4. **RUGGED** modular construction . . . will outlast most of the lesser quality radios in today's marketplace.
5. **UNPRECEDENTED IMMUNITY** from intermod . . . thanks to a super single-conversion receiver. Forget about those police, taxi cab, and other spurious response problems you may have encountered in the past.
6. **PRECISE** large LED frequency read-out . . . just like having a frequency counter.
7. **ACCEPTANCE** . . . tells the gang that you own the very best in a dependable American-made transceiver.

For complete info, Call Clegg TOLL FREE now... (800) 233-0250.
In Pennsylvania, Call COLLECT (717) 299-7221.



Amateur Net \$645.00
Factory Direct Only

BANKAMERICARD

Richard E. Heltzer

Clegg DIVISION

208 CENTERVILLE ROAD LANCASTER, PA. 17603

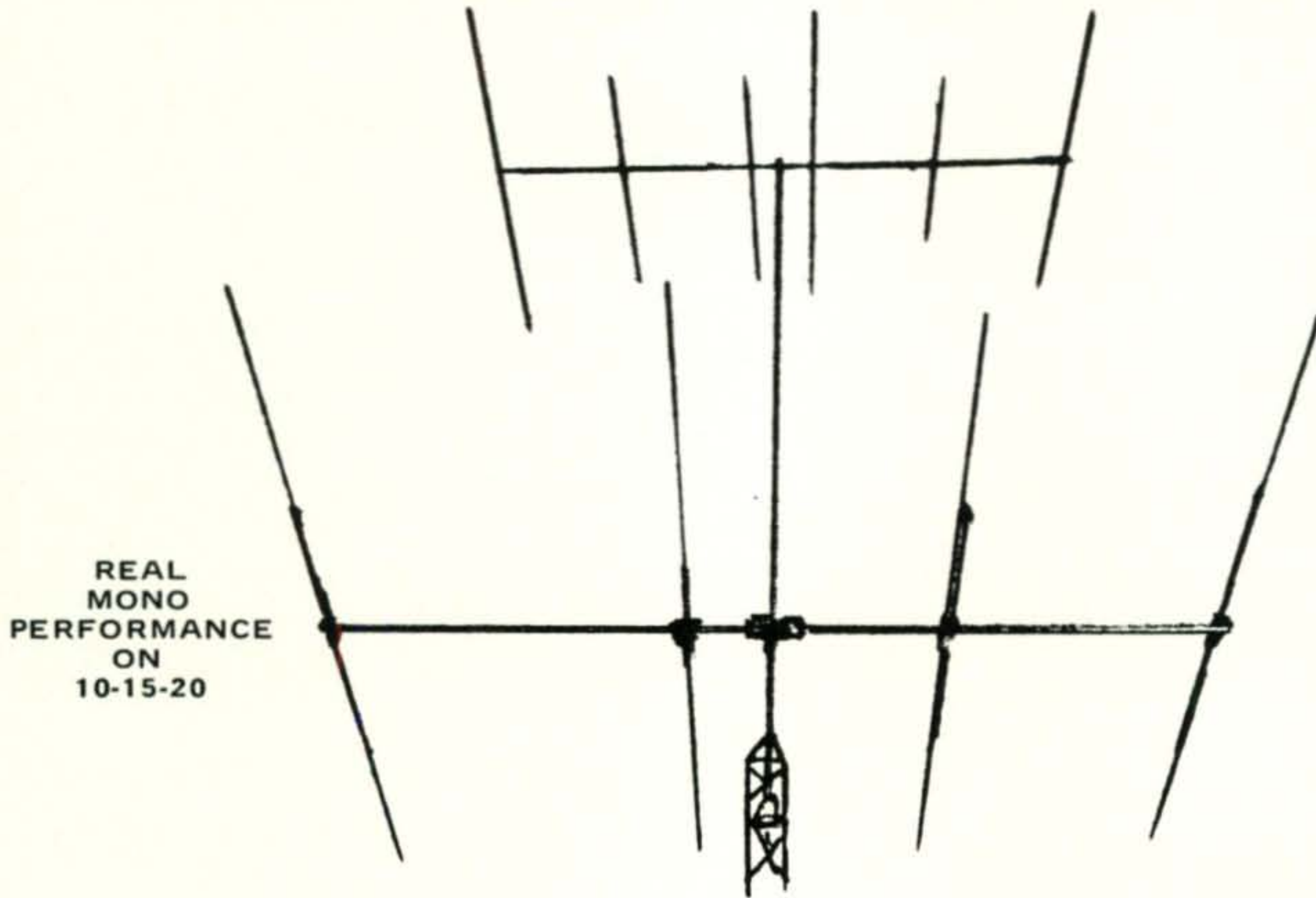
December, 1975 • CQ • 81



Wilson Electronics Corp.



WILSON 204 MONOBANDER PLUS DB33



The Wilson 204 is the best and most economical antenna of its type on the market. Four elements on a 26' boom with Gamma Match (No balun required) make for high performance on CW & phone across the entire 20 meter band.

The 204 Monobander is built rugged at the high stress points yet using taper swaged slotted tubing permits larger diameter tubing where it counts, for maximum strength with minimum wind loading. Wind load 99.8 lbs. at 80 MPH. Surface area 3.9 sq. ft., Weight 50 lbs., Boom 2" OD.

All Wilson Monoband and Duoband beams have the following common features:

- Taper Swaged Tubing
- Full Compression Clamps
- No Holes Drilled in Elements
- 2" or 3" Aluminum Booms
- Adjustable Gamma Match 52Ω
- Quality Aluminum
- Handle 4kw
- Heavy Extruded Element to Boom Mounts

- M204 4 ele. 20, 26' 2" OD \$139.00
- M155 5 ele. 15, 26' 2" OD \$139.00
- M154 4 ele. 15, 20', 2" OD \$ 89.00
- M106 6 ele. 10, 26', 2" OD \$ 99.00
- M104 4 ele. 10, 17', 2" OD \$ 64.95
- M240 2 ele. 40, 16', 3" OD \$299.00
- M520 5 ele. 20, 40', 3" OD \$269.00
- DB54 5 ele. 20, 4 ele. 15, 40', 3" OD \$299.00
- DB43 4 ele. 15, 3 ele. 10, 20', 2" OD \$119.00
- DB33 3 ele. 15, 3 ele. 10, 16', 2" OD \$ 89.00

All Wilson Antennas are FACTORY DIRECT ONLY! The low prices are possible by eliminating the dealer's discount. Most antennas in stock. If you order any antenna, you may purchase a CDR Ham II for \$124.95 or a CDR CD44 for \$85.95. Send check or money order, or phone in BankAmericard or Master Charge. All 2" Boom antennas shipped UPS, 3" by truck.

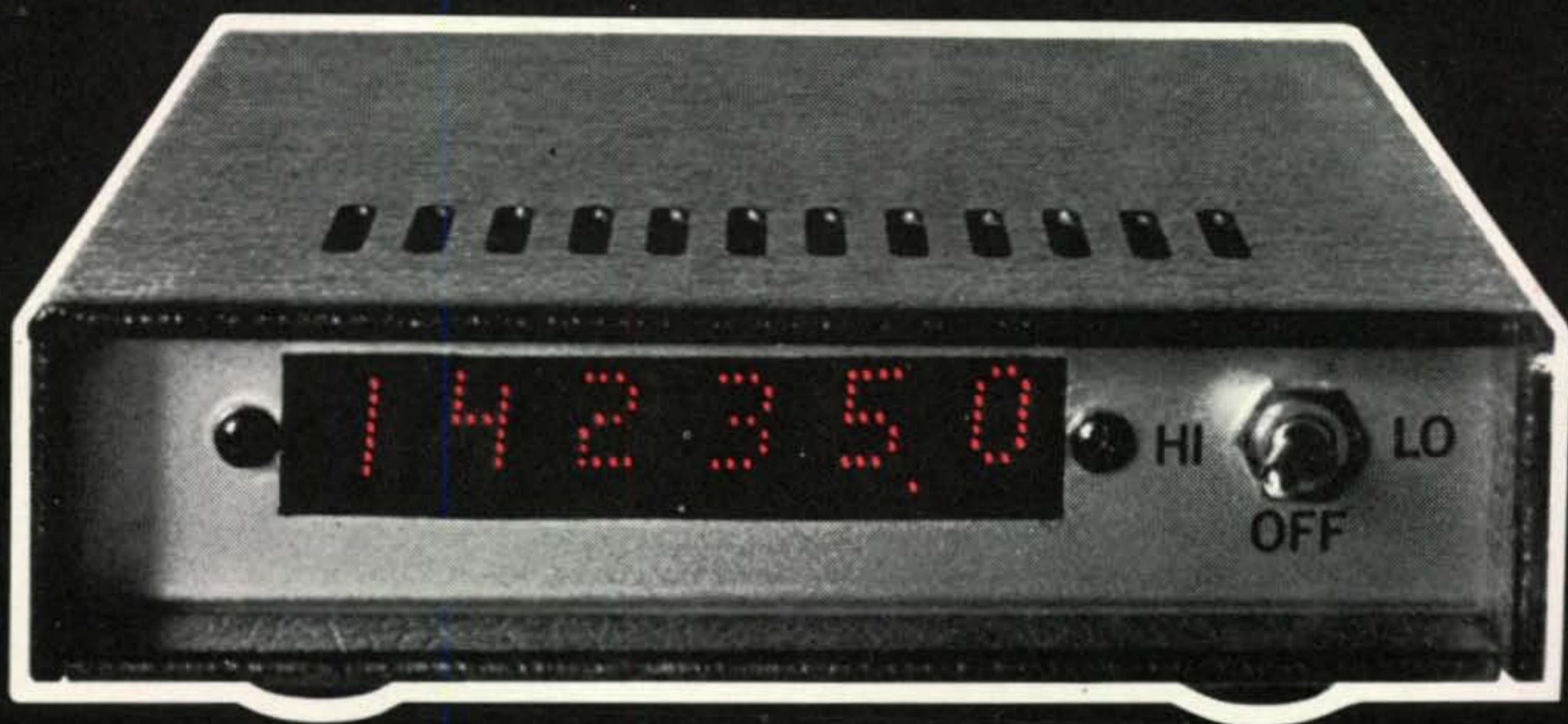
Call for special Tower, Antenna & Rotor package.

Wilson Electronics Corporation

4288 S. Polaris Avenue, Las Vegas, Nevada 89103

702-739-1931

DIGITAL



NEW FROM ATLAS

All L.E.D. Dot Matrix Display



- Plugs into any Atlas transceiver.
- Six digit display reads to 100 Hz.
- Bright display clearly visible under high ambient light.
- Reads on both Receive and Transmit.
- Measures 1 1/8" x 4 1/2" x 5"

MODEL DD6 **\$199.**

Available now at your Atlas dealer.



THE ATLAS 210x/215x

- Solid state SSB/CW transceivers
- 200 watts P.E.P. input
- No transmitter tuning
- The ultimate in sensitivity, selectivity, and overload immunity.
- Plus extended frequency coverage for MARS operation when used with 10x crystal oscillator.

210x or 215x	\$ 649.
AC Console 110/220V	\$ 139.
Portable AC Supply 110/220V	\$ 95.
Plug-in Mobile kit	\$ 44.
10x Osc. less crystals	\$ 55.



ATLAS RADIO INC.

417 Via Del Monte
Oceanside, CA 92054
Phone (714) 433-1983

For complete details see your Atlas dealer, or drop us a card and we'll mail you a brochure with dealer list.

"SEE YOU AT SAROC '76!"

Season's Greetings from the gang at Atlas

Wilson Electronics Corp.
CHRISTMAS SUPER SPECIAL

1402SM HAND HELD
2.5 WATT
TRANSCEIVER

SPECIAL INCLUDES:
RUBBER FLEX ANTENNA
52-52 CRYSTAL

\$164⁹⁵



1405SM HAND HELD
5 WATT
TRANSCEIVER

SPECIAL INCLUDES:
RUBBER FLEX ANTENNA
52-52 CRYSTAL

\$239⁹⁵



90 DAY
WARRANTY

10 DAY
MONEY
BACK
GUARANTEE

OPTIONAL
TOUCH-
TONE
PAD
SHOWN

CAN BE
MODIFIED
FOR
MARS
OR
CAP

ORDER EARLY FOR CHRISTMAS DELIVERY

Wilson Electronics Corp.

FACTORY DIRECT

CHRISTMAS SUPER SPECIAL

FEATURES

1402 SM

- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In.
- 12 KHz Ceramic Filter
- 10.7 IF and 455 KC IF
- .3 Microvolt
- Sensitivity for 20 dB Quieting
- Weight: 1 lb. 14 oz. less Battery
- S-Meter/Battery Indicator
- Size: 8 7/8 x 1 7/8 x 2 7/8
- 2.5 Watts Minimum Output @ 12 VDC
- Current Drain RX 14 MA TX 500 MA
- Microswitch Mike Button

1405 SM

- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 and 455 KC IF
- .3 Microvolt
- Sensitivity for 20 dB Quieting
- Weight: 1 lb. 14 oz. less Battery
- Battery Indicator
- Size: 8 7/8 x 1 3/4 x 2 7/8
- Switchable 1 & 5 Watts Minimum Output @ 12 VDC
- Current Drain: RX 14 MA TX 400 MA (1w) 900 MA (5W)
- Microswitch Mike Button
- Unbreakable Lexan® Case

ACCESSORY SPECIALS

DESCRIPTION	REGULAR SPECIAL PRICE	CHRISTMAS SUPER SPECIAL
BC1 - BATTERY CHARGER FOR 1402 AND 1405	\$36.95	\$29.95
BP - NI-CAD BATTERY PACK	15.00	10.95
LC1 - 1402 LEATHER CASE	14.00	8.50
LC2 - 1405 LEATHER CASE	14.00	8.50
SM2 - SPEAKER MIKE FOR 1402 AND 1405	29.95	24.95
TE1 - SUB-AUDIBLE TONE ENCODER INSTALLED	39.95	34.95
TTP - TOUCH TONE PAD INSTALLED	\$59.95	44.95
XF1 - 10.7 MONOLITHIC IF XTAL FILTER INST.	\$10.00	8.95
CRYSTALS: TX OR RX (Common Freq. Only)	4.50	3.00

Add \$7.50 per Transceiver for Factory Crystal Installation



BC-1 NI-CAD BATTERY CHARGER

ACCESSORY SPECIAL VALID ONLY WITH RADIO PURCHASE

OVER 1,000 UNITS IN STOCK FOR CHRISTMAS SPECIAL
ORDER EARLY TO INSURE DELIVERY BY CHRISTMAS

TO: WILSON ELECTRONICS CORP., 4288 S. POLARIS AVE., LAS VEGAS, NEVADA 89103 (702) 739-1931

CHRISTMAS SUPER SALE ORDER BLANK

_____ 1402 SM @ \$164.95. _____ 1405 SM @ \$239.95. _____ FACTORY XTALS INSTALLED @ \$7.50.

ACCESSORY SPECIAL VALID ONLY WITH RADIO PURCHASE

_____ BC1 @ \$29.95. _____ BP @ \$10.95. _____ LC1 @ \$8.50. _____ LC2 @ \$8.50.

_____ SM2 @ \$24.95. _____ TE1 @ \$34.95 (SPECIFY FREQUENCY _____)

_____ TTP @ \$44.95. _____ XF1 @ \$8.95. _____ TX XTALS @ \$3.00 ea. _____ RX XTALS @ \$3.00 ea.

EQUIP TRANSCEIVER AS FOLLOWS: XTALS A. _____ 146.52/52 B. _____

C. _____ D. _____ E. _____ F. _____

ENCLOSED IS _____ CHECK MONEY ORDER MC BAC

CARD # _____ EXPIRATION DATE _____

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

SIGNATURE _____

SHIPPING AND HANDLING PREPAID FOR CHRISTMAS SPECIAL

SALE VALID DECEMBER 1 - 31, 1975

CQ

NEVADA RESIDENTS ADD SALES TAX

Regency brings you the best
in 220 MHz transceivers

MODEL HR-220



American Made Quality at Import Price

Full 12 Channels with 10 Watts Power Out

Compactly designed for dash mount, this little transceiver gives you big signal power on the go . . . at low current drain. 3 watts audio equipped with a noise operated squelch system provides clear reception and excellent sensitivity of 0.4 μ v. High-Low power switch. American Made and Regency reliable, the HR-220's solid state design brings you tough, top quality circuitry at the low price of only

\$239⁰⁰

Amateur Net

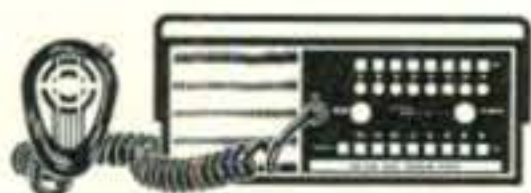
Regency **ELECTRONICS, INC.**

7707 RECORDS STREET
INDIANAPOLIS, INDIANA 46226

An FM Model For Every Purpose . . .
Every Purse



HRT-2
5 Channel Hand-Held
2 Meter FM Transceiver



HR-2MS
8 Channel Transcan
2 Meter FM Transceiver



AR-2
2 Meter FM
Power Amplifier

ALUMA TOWERS

LOW PRICED

Made in Aluminum

- ★ TELESCOPING
- ★ WALL MOUNTED
- ★ GUYED

FOR:

TV — CB — HAM
MARINE — MOBILE
RADIO TELEPHONE
COMMERCIAL

Towers to 100 feet. Specials
designed & made. See dealer
or call.

ALUMA DIVISION

FRED FRANKE, INC.

Box 2806Q
Vero Beach, Florida 32960 U.S.A.
Phone (305)-567-3415
Cable: FREDFRANKE VEROBEACH FL.
Some Territories Available

We're Fighting Inflation No Price Rise for '76

FOR FREQUENCY STABILITY

Depend on JAN Crystals. Our large stock of quartz crystal materials and components assures Fast Delivery from us!

TWO METER Crystals for **CITIZENS BAND**
MONITOR RECEIVERS **MARINE RADIO**

CRYSTAL SPECIALS

Frequency Standards	
100 KHz (HC 13/U)	\$4.50
1000 KHz (HC 6/U)	4.50
Almost all CB sets, TR or Rec	\$2.50
(CB Synthesizer Crystal on request)	
Amateur Band in FT-243	ea. \$1.50
	4/\$5.00
80-Meter	\$3.00 (160-meter not avail.)

For 1st class mail, add 20¢ per crystal. For Airmail, add 25¢. Send check or money order. No dealers, please.

JAN
CRYSTALS

Div. of Bob Whan & Son Electronics, Inc.
2400 Crystal Dr., Ft. Myers, Fla. 33901
All Phones: (813) 936-2397
Send 10¢ for new catalog

THE BIG SIGNAL

THE APPROVED LEADING HAM AND COMMERCIAL BALUN IN THE WORLD TODAY.

"W2AU" BALUN \$12.95

The proven balun



WITH BUILT-IN LIGHTNING ARRESTER

IT'S WHAT'S INSIDE THAT COUNTS!

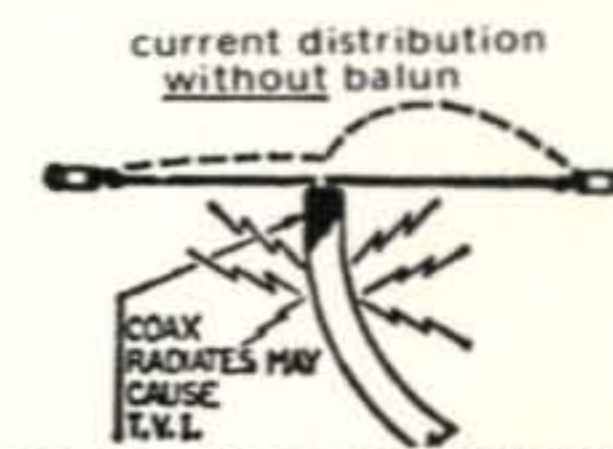
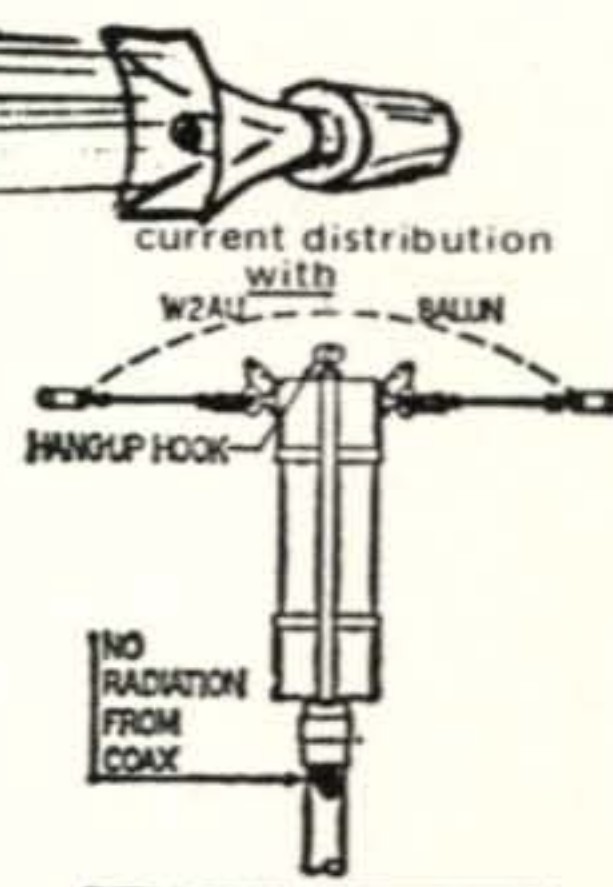
1. HANDLES FULL 2 KW PEP AND THEN SOME. Broad-Banded 3 to 40 Mc.
2. HELPS TVI PROBLEMS By Reducing Coax Line Radiation
3. NOW ALL STAINLESS STEEL HARDWARE. SO239 Double Silver Plated
4. IMPROVES F/B RATIO By Reducing Coax Line Pick-Up
5. REPLACES CENTER INSULATOR. Withstands Antenna Pull of Over 600 Lbs.
6. BUILT-IN LIGHTNING ARRESTER. Protects Balun —Could Also Save Your Valuable Gear
7. BUILT-IN HANG-UP HOOK. Ideal For Inverted Vees, Multi-Band Antennas, Dipoles, Beam and Quads

NOW BEING USED EXTENSIVELY BY ALL BRANCHES OF THE U.S. ARMED FORCES, FAA, RCA, CIA, CANADIAN DEFENSE DEPT. PLUS THOUSANDS OF HAMS THE WORLD OVER

They're built to last
**BIG SIGNALS DON'T JUST HAPPEN—
GIVE YOUR ANTENNA A BREAK**

Comes in 2 models. 1:1 matches 50 or 75 ohm unbalanced (coax line) to 50 or 75 ohm balanced load. 4:1 model matches 50 or 75 ohm unbalanced (coax line) to 200 or 300 ohm balanced load.

AVAILABLE AT ALL LEADING DEALERS. IF NOT, ORDER DIRECT



We'll GUARANTEE no other balun, at any price, has all these features.

UNADILLA RADIATION PRODUCTS

MFRS. OF BALUNS
Tel: 607-369-2985

Dept. CQ UNADILLA, N.Y. 13849

SST T-1 RANDOM WIRE ANTENNA TUNER



All band operation (80-10 meters) with most any random length wire. 200 watt power capability. Ideal for portable or home operation. A must for Field Day. Size: 2 x 4 1/4 x 2-3/8. Built-in neon tune-up indicator. Guaranteed for 90 days. Compact - easy to use. . . . only 24.95 postpaid. (Add Sales Tax in Calif.)

SST ELECTRONICS, P.O. BOX 1, LAWDALE, CA. 90260

CQ Check-In

If you bought it through CQ tell us. We are interested in your reaction to our advertisers; what did you buy; from whom; which ad or review prompted the purchase? Please send us a QSL and let us know.

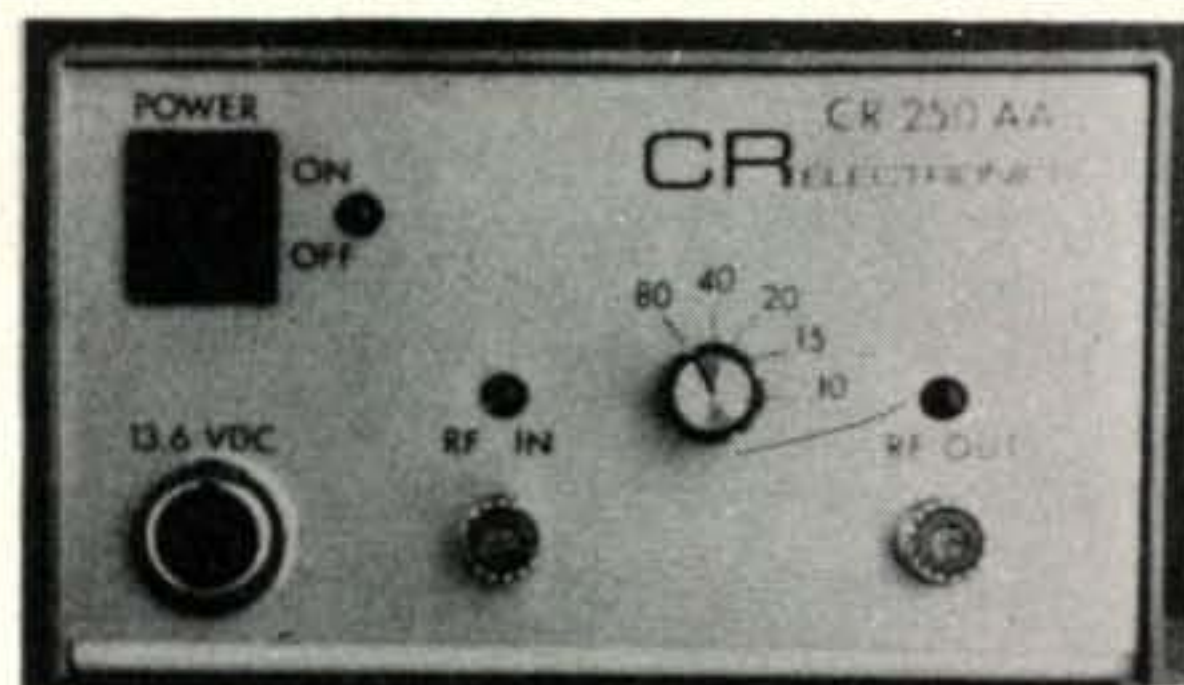
NOVICES!!!

NOW - A QSL BUREAU FOR YOU!

For only \$2 per year the novice QSL Bureau will handle all your QSL cards to other novices. Save \$4 on 100, \$10 on 200 cards a year sent through us. Saves time, money and ends trying to exchange addresses through the QRM. Just put your cards in an envelope and mail to us we do the rest. All novices may keep a S.A.S.E. on file with us.

NOVICE QSL BUREAU

Box 1111 Benton Harbor, MI 49022



NOW the amateur can buy commercial quality SSB EQUIPMENT

(Present users include foreign government agencies)

Solid State 2-30 Mhz Linear Power Amplifiers

1. CR250AA: 250 to 400 watts PEP output power with as little as 2 to 5 watts drive. 12 VDC. \$299.00
2. CR500AA: 500 to 700 watts PEP output power with as little as 4 to 10 watts drive. 115/230 VAC. \$599.00

Also 20 watts P.E.P. Walkie Talkie, 400 to 600 watt monobanders, receivers and multiband transceivers, VHF-FM Mobile base and repeaters. We accept Master Charge, Bank Americard or certified check on mail orders. Please include charge cards account number and expiration date.

CR ELECTRONICS

1169 Chess Drive, Unit G, Foster City, CA 94404

Index to CQ Vol. 31-1975

ANTENNAS, TOWERS, TRANSMISSION LINES

- Accuracy and Calibration of SWR Meters
(Williamson, K4HVI and Faulkner, Jr.,
W4DO)35, July
- Antenna Performance Vs. Height
(QRPP)46, Jan.
- AZ—Special—88 Foot 80-15 M. Antenna
(Aurick, K3AZ)35, Sept.
- Balun Application and Construction
(ANTENNAS)44, Feb.
- Building a Tower from Steel Shelving
(MATH'S NOTES)52, Oct.
- Disappearing Antenna System at WA3HDU
(ANTENNAS)30, July
- G3PHO Mini Quad for 20 Meters
(ANTENNAS)31, Apr.
- Impedance Matching A Dipole With Center
Inductor (ANTENNAS)29, July
- Inconspicuous Antenna Installation
(QRPP)34, Feb.
- KLM Wideband Antenna
(ANTENNAS)20, March
- Multi-Band Loaded Dipole Antenna of
W4JRW (ANTENNAS)24, Oct.
- Radiation Patterns of Loop Antennas
(ANTENNAS)36, Aug.
- Reflections On Maxwell's Reflections
(Parker, W6ZWK)23, Aug.
- RF Impedance Measuring Instruments
(Nagle, K4KJ)17, June
- Shoulder-Mounted V.H.F. Loop Antenna
(ANTENNAS)23, Oct.
- Sleeve Antenna—New Twist to An Old
Antenna (Nott, K5YNR)37, Dec.
- Vee Beams and Lazy H's for QRPP
(QRPP)44, June
- Why We Use 50 ohm Coax—Plumbers
Delight (Guccione, W3GVP)37, Sept.
- 2 Element 20 Meter Beam of VO1KE
(ANTENNAS)43, Jan.
- 20 and 40 Meter Duo Band Yagi of JA8JL
and JA8AJS (ANTENNAS)43, Sept.
- 40 Meter Vertical of W6ZWK
(ANTENNAS)43, Jan.
- 40-20 Meter Trapped Dipole
(ANTENNAS)29, July
- 80 Meter Quad Loop of WA7GSM
(ANTENNAS)29, April
- 80 Meter Slopers (ANTENNAS)41, Sept.
- 80, 40 and 15 M. Inverted Vee Systems
of W5TNX (ANTENNAS)30, April
- 80, 40 and 20 Meter Indoor Trap Dipole
(ANTENNAS)40, June
- 160 Meter Antennas (ANTENNAS)29, Dec.

AUDIO AMPLIFIERS, MODULATION

- Audio Filter for Direct-Conversion Received,
An (Gottlieb, W6HDM)20, Feb.

- Introduction to Active Filters, An (Kesner,
W7EIJ)32, April
- Phone Patch Level Indicator With A
Difference (Fransen, VE6RF)40, Dec.
- Reducing Cassette Recorder Wow and Flutter
(COP'S COLUMN)34, Jan.
- Tone Encoders, Miniature Solid State, To
Replace Reeds (Dauben, WB6WYR) 42, Dec.

CIRCUITS AND DESIGN

- Audio Filter for Direct-Conversion
Receivers, An (Gottlieb, W6HDM) .20, Feb.
- Driver, Final Design Notes (QRPP) ...45, May
- FET RF Amplifier Design for 50 MHZ
(MATH'S NOTES)50, Jan., 27, Feb.
- Introduction to Active Filters, An
(Kesner, W7EIJ)32, Apr.
- Mixers and Oscillators for VHF Converters
(MATH'S NOTES)34, March
- Solid State VFO Design (QRPP) ...43, March
- Transistor Final Techniques (Brizendine,
W4ATE)29, Jan.
- VFO Design for QRP Transmitters
(QRPP)39, April

COMMERCIAL EQUIPMENT— MODIFIED

- Adding Gain to Older Receivers
(MATH'S NOTES)37, Apr.
- Cheap Selectivity for the Hammarlund
HQ-215 and Other 455 KHz I.F.
Receivers (Wine, KH6GMM)46, July
- FM Detector Using One IC
(MATH'S NOTES)38, Apr.
- Heath HW-202 2-Meter FM Transceiver,
Modification of the (Duschenchuk,
WA2KHK)24, July
- Improved Stability for Older Receivers
(MATH'S NOTES)26, Aug.
- Upgrading Inexpensive Frequency Counters
(Laidman, W6MFK)16, Aug.

COMMERCIAL EQUIPMENT— REVIEWS

- Atlas 210 and 215 SSB Transceivers, CQ
Reviews: The (Schultz, W2EEY) ..22, May
- Curtis 8043 Keyer Chip, A Close Look
At The39, Feb.
- EBC-144 Jr. 2 Meter FM Transceiver,
CQ Reviews: The (Sternberg,
W2JUP)33, June
- Hal Communications Dual Mode Keyboard,
Video RTTY Display, and RTTY
Demodulator, CQ Reviews: The
(Robinson, W2SR)48, Jan.
- Heathkit HA-201 and HA-202 2 meter
Power Amplifiers (MATH'S NOTES) ..51, July
- Heathkit HD-1250 Solid State Dip Meter, CQ
Reviews: The (Math, WA2NDM) ..46, Dec.
- Heathkit SB-104 SSB/CW Transceiver Kit,
CQ Reviews: The (Ross, K2MGA) .28, Aug.

CW FILTER



- New! Stereo enhancement.
- 8 pole IC filter.
- 80 Hz bandwidth.
- Steep skirts. No ringing.
- Simulated-stereo technique filters out QRM but lets you hear off-frequency answers to your CQ's. Great for contest ops, CW nets.
- 800 Hz center frequency. (Stereo headphones, 9-v battery not included.)
- Send for free brochure.
- Order direct. \$39.95 PPD U.S. and Canada. (Add sales tax in Calif.)

PALOMAR ENGINEERS

BOX 455, ESCONDIDO, CA 92025

WHY WASTE WATTS?



SWR-1 guards against power loss for \$21.95

If you're not pumping out all the power you're paying for, our little SWR-1 combination power meter and SWR bridge will tell you so. You read forward and reflected power simultaneously, up to 1000 watts RF and 1:1 to infinity VSWR at 3.5 to 150 MHz.

Got it all tuned up? Keep it that way with SWR-1. You can leave it right in your antenna circuit.



305 Airport Road Oceanside, CA 92054 (714) 757-7525

Isn't it time you had another choice in electronic kits?

Introducing... the other choices:

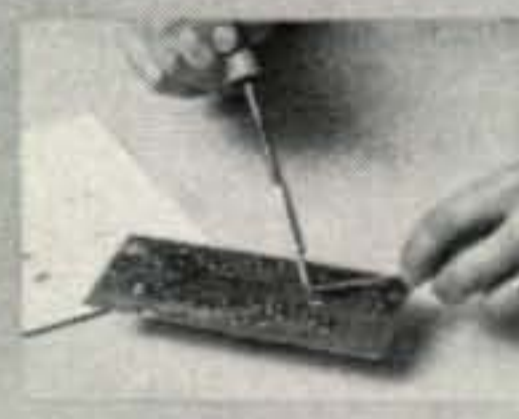
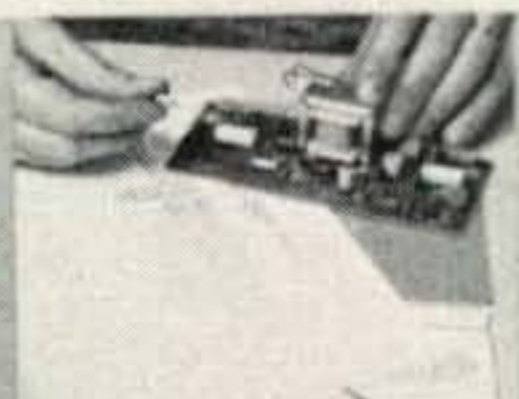


ELECTRONIC KITS

Over 150 easy-to-build, high-quality electronic kits for the hobbyist, experimenter, technician and engineer.



Hi-fi, automotive, CB, amateur radio, security alarms, logic devices, test equipment, musical instrument accessories, equipment cabinets.



164 kits offering better value, greater choice than any other kits available today. For free catalog, write:



Amtroncraft Kits Ltd.
1 West 13th St.,
New York, N.Y. 10011
(212) 255-2362

Kenwood TS-900 SSB/CW Transceiver, *CQ*
 Reviews: The (Ross, K2MGA) 24, Feb.
 Swan SS-200 Solid-State Transceiver, *CQ*
 Reviews: The (MacDonald,
 WØORX) 36, March
 Venus Scientific Slow-Scan TV Equipment,
CQ Reviews: The (MacDonald,
 (WØORX) 25, April

CONTESTS

All Asian Contest, 1974 North American Results
 (CONTEST CALENDAR)
 Phone 54, May
 C. W. 57, June
 All Time Records, *CQ* WW DX Contest
 World 38, Sept.
 USA 40, Sept.
 BARTG 1975 RTTY Contest North American
 Results (CONTEST CALENDAR) 70, Sept.
CQ WPX SSB Contest (Welch, W8IMZ)
 1975 Rules 36, Feb.
 1975 Results 39, Nov.
CQ W.W. DX C.W. Contest
 Claimed Scores 38, Feb.
 Results 22, June
 USSR Addendum 35, Nov.
CQ W.W. DX (Phone) Contest
 Claimed Scores 38, Feb.
 Results 28, May
 USSR Addendum 35, Nov.
CQ W.W. DX Contest, 1975 Rules . . . 48, Sept.
CQ 160 Meter DX Contest
 1974 Results (McClenon, W3IN) . . . 32, Dec.
 1975 Rules (CONTEST CALENDAR) . . . 67, Dec.
 WAEDC 1974 Contest (CONTEST
 (CALENDAR) 57, March

DX AND OPERATING

DXing from New Hibrides (DX) . . . 48, March
 Israel—And How to Get an Israeli QSL Card
 (Pataki, WB2AQC) 45, Nov.
 Sasa Story, The (Margolis, G3UML) . . 43, Oct.
 USA—WPX-76 Award—Announcing
 the 27, Oct.
 WAZ Award Rules (DX) 46, April
 ISIA—Spratly Island Expedition—1973
 (Riebhoff, K9CBZ/XU1DX) 22, Jan.
 80 Meter Phone WAZ #1 to EA8CR . . 58, Sept.

HISTORICAL

HRO Receiver, The Wonderful
 (Orr, W6SAI) 17, May
 Hum! The Story of the AC-Heated Tube
 (Bach) 33, Sept.
 National AGS Receiver, The (Orr,
 W6SAI) 25, Nov.

KEYING AND KEYERS

CW and SSB Break-In With A Vacuum
 Relay (Hertzberg, K3JH) 17, Sept.
 Low Power Cosmos Electronic Keyer In Two
 Versions, A (Crawford, WB2COE) . . 17, Nov.
 Programmable Keyer for the Contest Operator,
 A (Venaskey, K8YQW) 16, Oct.

Curtis 8043 Keyer Chip, A Close Look At
 The 39, Feb.

LEGAL

Amateur Radio—The Invisible Man, A
 Discussion of FCC Docket 20282
 (Orr, W6SAI) 20 Apr.
 White House Agency Rips Off Amateur
 Radio! (Orr, W6SAI) 24, March

MISCELLANEOUS—GENERAL

Audio Transducer for the Blind (Sabonaitis,
 WA1OPN) 19, Apr.
 Don't Build A Repeater (Cole,
 WB8BGQ) 37, Oct.
 Electronic Hidden Word Puzzle, An
 (Petrikas, WA9TUI) 34, July
 Fire in the Hamshack (Smith,
 WA2TAQ) 34, Nov.
 How to Pass A Multiple Choice Test When
 You Don't Know the Answers
 (Orr, W6SAI) 45, Apr.
 Just Hams (Knadle, WB2HJD) 26, Dec.
 Opticon, The, Optical to Tactile Converter
 for the Blind (Sabonaitis, WA1OPN) 48, Oct.
 Some Ideas on Code Practice (Kupferman,
 W2GVT) 37, Nov.
 SSTV on the 14th World Scout Jamboree
 (Liven, G2CKB) 60, Nov.
 True Essence of Homebrewing, The
 (DeWitt, W2DD) 21, July
 Using The E-Model Pathsounder (Sabonaitis,
 WA1OPN) 55, July
 What's Your Amateur Radio Marriage
 Quotient? (Knadle, WB2HJD) 46, Feb.

MISCELLANEOUS—TECHNICAL

Alice in Basic-Land (Gottlieb,
 W6HDM) 32, Oct.
 Alternate Primary Power Sources
 (COP'S COLUMN) 28, March
 Introduction to Active Filters, An (Kesner,
 W7EIJ) 32, Apr.
 Iron Powder/Ferrite Torroids and Beads
 (QRPP) 58, Nov.
 Microprocessor In the Hamshack, The
 (Suding, WØLMD) 17, July
 Now What Have I Done? An Audible
 Alarm (Walton, VE3FEZ) 47, Dec.
 Ohms Law of the Universe (Gottlieb,
 W6HDM) 30, Nov.
 Peak Envelope Power—What It Is (Swafford,
 W7FF) 41, Oct.
 Proposed Method for the Establishment of
 New Amateur Radio Power Limits, A
 (Quinn, W6MZ) 38, June
 Pseudo-Synthesis Transceiver Control
 (MATH'S NOTES) 45, Sept.
 Using Epoxy Cement In Electronic
 Projects (Nose, KH6IJ) 39, Oct.
 VFO Switching With PIN Diodes
 (QRPP) 39, Aug.
 Why We Use 50 ohm Coax—Plumbers
 Delight (Guccione, W3GVP) 37, Sept.

POWER SUPPLY

- A.C. Power Supply for The AN/ARC—
2 Transceiver (SURPLUS SIDELIGHTS) 61, Feb.
Alternate Primary Power Sources
(COP'S COLUMN)28, March
Regulated 200 Watt 12 Volt D.C. Power
Supply (Clarke, K4JYM)28, Oct.

PROPAGATION

- "Gray Line" Method of DXing, The (Hoppe,
K6UA and Dalton, W6NLZ)27, Sept.
Simplifying Ionospheric Propagation
Forecasts, A Breakthrough In (Jacobs,
W3ASK and Cohen, W4UMF) ...16, March

RECEIVERS AND RECEIVING

- Adding Gain to Older Receivers (MATH'S
NOTES)37, April
Audio Filter for Direct—Conversion
Receivers, An (Gottlieb, W6HDM) .20, Feb.
Cheap Selectivity for the Hammarlund
HQ-215 and other 455 kHz I.F. Receivers
(Wine, KH6GMM)46, July
FET RF Amplifier Design for 50 MHz
(MATH'S NOTES)50, Jan., 29, Feb.
FM Detector Using One IC
(MATH'S NOTES)38, April
Improved Stability for Older Receivers
(MATH'S NOTES)26, Aug.
Mixers and Oscillators for VHF Converters
(MATH'S NOTES)34, March
6 Meter Converter—State of the Art
(MATH'S NOTES)49, Nov.
10 db Gain 3 to 1500 MHz Preamp
(MATH'S NOTES)35, Dec.

SLOW SCAN TELEVISION

- DCX/CLG Noise Immune SSTV Monitor,
The (McKeown, WA2CLG)17, Dec.
Reducing Cassette Recorder Wow and
Flutter (COP'S COLUMN)34, Jan.
SSTV At the 14th World Scout Jamboree
(Liven, G2CKB)60, Nov.
SSTV Resolution Charts (IN FOCUS) ..33, Aug.

SURPLUS

- AN/ARC—2.2-9 MHz AM/CW
Transceiver (SURPLUS SIDELIGHTS) .61, Feb.
AN/ARC—44 24-52 MHz FM Transceiver
(SURPLUS SIDELIGHTS)61, May
Collins 51S-1 Receiver (SURPLUS
(SIDELIGHTS)76, Oct.
Command Receiver Nomenclature and
Coverage (SURPLUS SIDELIGHTS) ..60, March
Command Receiver Pin Connection
(SURPLUS SIDELIGHTS)64, Aug.
Hammarlund SP-600 Receiver (SURPLUS
(SIDELIGHTS)64, Jan.
RF Communications RF-1100 250 W.
Transceiver (SURPLUS SIDELIGHTS) ..69, July
RT-70/GRC 47-58.4 MHz Transceiver
(MATH'S NOTES)47, June
RT-70 Receiver Power Supply
(MATH'S NOTES)46, Sept.

- SCR-274-N and ARC-5 Transmitter Pin
Connections (SURPLUS SIDELIGHTS) .59, Apr.
T-195/GRC-19 1.5 20 MHz Transmitter
(SURPLUS SIDELIGHTS)74, Sept.
160/80 Meter VFO Controlled C.W.
Transmitter Inexpensive Surplus
(Weeks, W6FNG)17, Apr.

TEST EQUIPMENT AND MEASUREMENTS

- Accuracy and Calibration of SWR Meters
(Williamson, K4HV1 and
Faulkner, Jr., W4DO)35, July
Capacitance Measurement Using High
Impedance VTVM (Moynahan,
W6AXT)33, July
Function Generator, The
(Olsen, W6GXN)26, July
Proposed Method for the Establishment of
New Amateur Radio Limits, A
(Quinn W6MZ)38, June
RF Impedance Measuring Instruments
(Nagle, K4KJ)17, June
RF Transistor Testor, An
(Brown, W6HPH)35, Apr.
Secondary Frequency Standard, A Versatile
(Spadoni, W1RHN)31, Sept.
Upgrading Inexpensive Frequency Counters
(Laidman, W6MFK)16, Aug.
300 MHz Frequency Counter Pre-Scaler
(MATH'S NOTES)42, May

TRANSMITTERS AND TRANSMITTING

- "Giant Flea" 2.5 W. 7 MHz Transmitter
(QRPP)47, July
Putting the MFJ Transmitter Modules on
80 Meters (QRPP)49, Oct.
Transistor Final Techniques (Brizendine,
W4ATE)29, Jan.
VFO Design for QRP Transmitters
(QRPP)39, Apr.
VFO Switching With PIN Diodes
(QRPP)39, Aug.
160/80 Meter VFO Controlled CW
Transmitter, Inexpensive Surplus
(Weeks, W6FNG)17, Apr.

VHF, VHF AND FM

- FET RF Amplifier Design for 50 MHz
(MATH'S NOTES)50, Jan., 29, Feb.
FM Detector Using One IC (MATH'S
NOTES)38, Apr.
Mixers and Oscillators for VHF Converters
(MATH'S NOTES)34, March
RTTY on 2 M. FM Repeater
(JUP On FM)36, Jan., 36, May
Tone Encoders, Miniature Solid State, to
Replace Reeds (Dauben, WB6WYR) 42, Dec.
6 Meter Converter—State of the Art
(MATH'S NOTES)49, Nov.
10 db Gain 3 to 1500 MHz Preamp
(MATH'S NOTES)35, Dec.

HAM SHOP

Advertising Rates: Non-Commercial ads are 10 cents per word including abbreviations and addresses. Commercial and organization ads are 35 cents per word. Minimum charge \$1.00. No ad will be printed unless accompanied by full remittance.

Closing Date: The 15th day of the second month preceding publication.

Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of CQ cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: **CQ Ham Shop, 14 Vanderventer Ave., Port Washington, New York 11050.**

MERRY XMAS and HAPPY NEW YEAR from W0CVU. On the air since 1913. The World's Finest Hobby.

Medical: Any Licensed amateur radio operator in the medical or paramedical field should join MARCO (Medical Radio Council). Contact: Stan Carp, MD., K1EEG, 44 Main St., Saugus, MA 01906, (617) 233-1234.

FREE: 8 Extra Crystals of your choice with the purchase of a new ICOM IC-22A at \$249. With the 10 Crystals that come factory-installed in the radio, this gives you a total of 18 crystals! For equally good deals on Drake, Collins, Kenwood, Tempo, Ten-Tec, Regency, Swan, Atlas, Midland, Alpha, CDE, Standard, Genave, Hy-Gain, Antenna Specialists, Cush-Craft, Mosley, Hustler, and others, write or call Hoosier Electronics, Your ham headquarters in the heart of the Midwest and become one of our many happy and satisfied customers. HOOSIER ELECTRONICS, P.O. Box 2001, Terre Haute, IN 47802. NOTE OUR NEW PHONE NUMBER: (812) 238-1456.

Modern 60 min code cassettes. Novices 0-5 wpm, progressing 5-13 wpm, general 13-15 extra 20-25 wpm. \$3. ea. 4 for \$10. ROYAL, Box 2174, Sandusky, OH 44870.

Did you know that supplements to the book, "CQ YL," are available? They bring the book up to date with YLRL Officers through 1973 and the 6th YLRL Convention, held at Long Beach in May '72. If you have a copy of "CQ YL" and would like to add the new supplements (the pages are "slotted" so they fit directly into the "CQ YL" spiral backbone, Drop a not with your request to author/publisher, W5RZJ, Louisa Sando, 4417 - 11th St., NW, Albuquerque, NM 87107. Please enclose two 10 cent stamps to cover cost of mailing. The one and only book about YLs in ham radio, "CQ YL," contains 21 chapters, over 600 photographs. Order your autographed copy, or a gift copy, from W5RZJ, \$3.00 postpaid.

ROCHESTER HAMFEST 1976 is Saturday, May 22. Your name added to mailing list or information write: Rochester Hamfest, Box 1388, Rochester NY 14603.

MAGAZINES FOR SALE: CQ/73/QST/HAM RADIO issues at 10 cents each (plus shipping) from Lockheed Ham Club, 2814 Empire, Burbank, CA 91504. Sent list and check. Available issues and any refund due will be sent promptly.

WANTED FOR \$\$\$ CASH: Back in 1957 the Lionel Train Company made a small set of toy trains specifically designed for girls. It had a pink locomotive and several other cars, all in pastel shades. The set wasn't very popular, hence not too may sold. However, I need this set for my collection, and am willing to pay up to \$400 cash for a complete set in mint condition. If you have this item please write: Dick Cowan, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

WYOMING RANCH LAND. Wild horses, antelope, deer, elk. 10 acres \$30 down, \$30 month. Free maps-photos-info. Owner - K6ICS, Michael Gauthier, 9550 Gallatin, Downey, CA 90240.

LOOKING FOR old Lionel trains. Interested only in "O" gauge excellent to like-new condition. Primary interest is locomotives prior to 1952, but will consider complete sets or more recent models. Am willing to buy outright for cash or swap radio gear to meet your needs. Write Dick Cowan, WA2LRO, c/o CQ Magazine, or call 516/883 6200.

TELEVISION repair course. Learn how to service television from master technicians. Send \$6.00 for first lesson & details to Guardian, 20 E. Main, Ramsey, NJ 07446

SELL: Heath DX 60 xmtr, \$55.00; Hammarlund HQ 100AC rcvr, \$110.00. Contact F. Kurz, W9VTQ, 2711 W. 29, Zion, IL 60099.

Want to buy used motorola FM Signal Generator, model no. T1034C and motorola test set model no. S-1059A or other motorola equipment: Write to Jerry Gray 908 Fleet St., Chillicothe, OH 45601.

FOR SALE: SBE-SB-144 2 meter FM transceiver. Has xtrals for 94/94, 34/94, 16/76, 25/85, and 52/52. \$150.00 shipping included. Contact Dr. R. R. Gobel, W0UJK, 1500 H Street, Fairbury, NE 68352.

SELL: 4-1000A used, \$30. 1000 pf loading cap. \$7. Raytrack kw plate tank coil for 80 & 40, plus kw bandswitch \$16. UTC S-50 kv c.t. 300 ma, new, pick-up only, \$75 v.c.t. 1 a. 115/230 v. pri. \$35. Pick-up only. OZ-PAKS: Large (several kw) \$30; small (2 kw) \$20. R. Ross, 95 Norwood Ave., Northport, NY 11768.

FREE CATALOG: Tubes for transmitters, radio, television. Huge discount to hams. Coax, wire, condensers parts, schematics. Contact Guardian Electronics, 20 E. Maint St., Ramsey, NJ 07446.

SAROC Eleventh Las Vegas National Convention, January 8-11, 1976, Hotel Sahara Space Convention Center. Advance Registration \$12.00 per person; with midnight show \$22.00; with dinner show \$29.00. Special Hotel Sahara Safair airfare packages from selected cities with scheduled airlines serving Las Vegas. SAROC special room rate extended only to those who advance register or register at the door. Send for details, SAROC, P.O. Box 945, Boulder City, Nevada 89005.

Unscramble Police Code with Decoders. Works on all scanners and receivers. For prices and brochure write: Don Nobles, Box 275, Hot Springs, Ark. 71901 501-623-6027 (Dealers wanted).

QSL CARDS - Something COMPLETELY different. Nothing even close to it on the market! Samples: 25 cents. Contact W5UTT, Box 1171E, Garland, TX 75040.

MICRO-TO MK II deluxe epoxy-glass drilled circuit boards. \$4.00 postpaid; with semicons \$11.80. Contact K3CUW, 1304D Mass. Ave., S.E., Washington, DC 20003.

TECH MANUALS for Govt. surplus gear—\$6.50 each: R-220/URR, SP-600JX, URM-25D, SG-3/U, TS-173/UR, TS-174/U, LM-21, OS-8B/U. Thousands more available. Send 50 cent (coin) for 22 page list. Contact W3IHD, 7218 Roanne Dr., Washington, DC 20021.

We pay 10% above on any cash or trade-in deal on any of your equipment. We also pay shipping. We purchase items such as, Receivers, Transmitters, Tranceivers, Test Equipment, Vacuum Variables, etc., etc. We are buyers not talkers. For details write Ocean Electronics Co., P.O. Box 103, Rockville Centre, NY 11570.

FREE CATALOG. Leds, microphones, headsets, IC's, relays, ultrasonic devices, precision trimmer capacitors, unique components. Low Prices. Chaney's, Box 15431, Lakewood, Colo. 80215.

WANTED: Heathkit GW-14A CB transceiver and GWA-14-1 AC power supply. Contact Patrick Carmody, 120 Rambling Road, Apt 31A, Battle Creek, MI 49015.

Your call, club, hamfest, etc., printed on white cotton tee shirt. \$4.00. Limit 30 letters. Print, give sizes. Darco-CQ, Box 5553, Cleveland, OH 44101.

CONTESTERS: Announcing the W7BBX programmable contest keyer - four 512-bit memories, paddle programming, no-fail power supply, high rf immunity, designed for smooth synchronous operation, 10-60 wpm. SASE to HFB Enterprises, 12002 Cheviot Dr., Herndon, VA 22070.

BUY-SELL-TRADE: Write for free mailer. Give name, address, call letters. Complete stock of major brands. New and reconditioned equipment. Call us for best deals. buy Collins, Drake, Swan, etc., SSB & FM. Contact Associated Radio, 8012 Conser, Overland Park, KS 66204. 913-381-5901.

QST QST QST DE K6QX. The World QSL Bureau has moved to a new address! Form now on, please send your cards to: 111 Farm Hill Way, Los Gatos CA 95030. We promise the same dedicated service that W6KG has given you these many years. 73 ORM, K6QX. (P.S. We'll still forward your Cards to anywhere in the world for 6 cents each.)

TRANSFORMERS (All Primaries are 115 V/60 cy). (No. 1) 2000 VCT at 135 ma and 1050 VCT at 30 ma, \$10 each. (No 2) 2000 VCT at 700 ma, \$20 each. (No. 3) 6.3 V at 12 amps, \$10 each. (No. 4) 6.3 V at 2, 9, 10, 11 and 18 amps. \$15 each (No. 5) 5.4 V at 15 amp, 4 pin tube socket, on top, \$15 each. Bill Williams, P.O. Box 7057, Norfolk, VA 23509.

FOR SALE: 2 Jennings Vacuum switches type R8, peak test voltage 85 KV, rms amps 100, insulated peak voltage 60 KV, Solenoid voltage 24 v.d.c. model BO4E. \$100 each. Contact A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

WANTED: Tower Heavy Duty Motorized Crank-up 80' or more. Contact W0PDI, Route 2, Box 218 Buffalo, MO 65622.

Sell CQ's from forth-five, QSTs from twenty, government callbooks from 1920. Any quantity. Ery Rasmussen, 164 Lowell, Redwood City, CA 94062

Q.S.L., Q.S.L., Q.S.L. King P.V. Send Q.S.L. cards to Philip Steven Kurland, 3000 Valentine Ave., Apt. 1A, Bronx, NY 10458.

FOR SALE: Fifth Edition (Jan. 1935) of The Radio Amateur's License Manual \$10.00. Contact A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

WANTED: R-390A Parts. Contact W6ME, 4178 Chasin St., Oceanside, CA 92054.

Police and Fire Scanner Sale - Regency ACT - R - 10 H/L/U 10 Channel 3 bands combined AC/DC 10 free crystals included. \$169.00 prepaid Dealer Inquiries Invited Four Wheeler Communications, 10-A New Scotland Avenue, Albany, NY 12208.

FOR SALE: 24 pcs. computer grade capacitors, 1000 mfd. at 450 v. \$60.00. B&W FC-30A filament choke (used) \$10.00, 4-1000 filament transformer, \$12.00. Large capacitor start blower for 4-1000 or equiv. \$12.00. Other high power parts and hardware available. Send a list of your needs. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

WANTED: Early issues of ARRL Handbooks plus The Radio Boys With the Air Patrol by Breckenridge. Contact R. W. Randall, 1263 Lakehurst Rd., Livermore, CA 94550.

WANTED TO BUY: Lafayette Priva-Com 10, encoder decoder. Good condition. Contact: React, RFD no. 1 Pound Hill Road, Woonsocket, RI 02985.

FOR SALE: Swan T600 transmitter \$350.00, new condition; B&W 1500 trans \$50.00; Drake 2A Rec \$75.00; all for \$40.00. Pick up only. Contact John H. Hopper, 74 Maple St., Addison, NY 14801.

WANTED: Manuals for Johnson Viking Messenger 1 and 2. Send name, price, cond. To; A. H. Brodhead, Jr. RFD5 Box 16-2, Kingston, NY 12401.

FOR SALE: \$150.00. SRT-14 XMRT AU-CW-RTTY, FAX, Operational, with manual. 250 W. of exceptional clean signal. With manual and spare XTAL for frequency synthesizer. Pick up only. K2YPR, 821 Rutgers RD., Franklin SQ., NY 11010. Phone (516) IV6-0809.

Employment Wanted

Desire Sales/Marketing position in Radio Communications or related Industry. Bachelor of Science Electrical Engineering, Masters in Business Administration, Amateur Extra, EIT, midwest location, age 29. Reply to CQ box 100.

ELECTRONIC TECH REP. in Sacramento area. Buyer connections with U. Cal. University and military. Prefer Bio-Med or test gear. Over 40 years in electronics. For resume reply to CQ box 125.

Highly experienced HF/VHF graduate engineer desires position in USA. His wife is Montessori teacher. Write to CQ Box 150.

Spread The Word

An eye-catching bumper sticker encouraging the man in the street to "Talk to the World—Become A Ham Operator" is available from CQ for 25¢ plus a legal-size s.a.s.e. Quantity prices upon request. Write to: CQ, 14 Vanderventer Av., Port Washington, NY 11050.



BACK ISSUES FOR ONLY

\$ 1.00 per copy

Fill in the gaps in your CQ files. Many back issues available from CQ. Only \$1.00 per copy, post paid. No issues prior to 1951 are currently available, but let us know your needs since we occasionally come across odd lots of lots of oldies. No extra charge.

- 1951 - All issues except May, Oct., Nov.
- 1952 - All issues except Jan., May Aug.
- 1953 - All issues except May, July, Nov., Dec.
- 1954 - All issues except Feb., Apr., May
- 1955 - All issues except Nov.
- 1956 - All issues except Apr., July, Aug.
- 1957 - All issues except Jan., Feb., Nov., Dec.
- 1958 - All issues except Jan., June, July, Oct.
- 1959 - All issues except Jan. June, May Oct., Feb.
- 1960 - All issues except May, Nov.
- 1961 - All issues except Jan., Apr.
- 1962 - All issues except Jan., Feb., Nov.
- 1963 - All issues except June, Sept., Oct., Nov.
- 1964 - All issues except Nov., Dec.
- 1965 - All issues except Jan., July, Oct.
- 1966 - All issues available.
- 1967 - All issues except Nov.
- 1968 - All issues except Jan.
- 1969 - All issues except May, Sept.
- 1970 - All issues available.
- 1971 - All issues except Dec.
- 1972 - All issues except Feb., Mar., Aug.
- 1973 - All issues except March.
- 1974 - All issues available.

Order by mail only....no phone orders accepted. All orders must be accompanied by cash, check or money order at the rate of \$1.00 for each issue desired. Refund will be made in the event that an issue is sold out at the time of receipt of your order. No substitutions will be made. Order from: Back Issues Dept.

CQ, The Radio Amateurs Journal

14 Vanderventer Avenue
Port Washington, New York 11050

READER SERVICE

To obtain literature from advertisers, simply check the number next to the name of each advertiser listed below whose product or service is of interest to you.

DECEMBER, 1975

- 1 Amperex Elec. Corp.
- 2 Amtroncraft Kits, Ltd.
- 3 Atlas Radio, Inc.
- 4 CR Electronics
- 5 Clegg, Div. of ISC
- 6 Drake, R. L., Co.
- 7 Eimac, Div. of Varian
- 8 Fair Radio Sales
- 9 Franke, Fred, Inc.
- 10 Genave
- 11 Heath Company
- 12 Henry Radio
- 13 Hy-Gain Electronics
- 14 International Crystal Mfg. Co.
- 15 Jan Crystals
- 16 Kenwood
- 17 Leader Instruments Corp.
- 18 Midland Int.
- 19 Millen, James, Mfg. Co., Inc.
- 20 New-Tronics Corp.
- 21 Novice QSL Bureau
- 22 Palomar Engineers
- 23 Regency Electronics, Inc.
- 24 Sentry Manufacturing Co.
- 25 Space Electronics Co.
- 26 SST Electronics
- 27 Swan Electronics
- 28 Telrex Communication Engineering Laboratories
- 29 Unadilla Radiation Products
- 30 Wilson Electronics Corp.
- 31 Yaesu Museum USA Inc.

CQ Reader Service
14 Vanderventer Ave.
Port Washington, N.Y. 11050

Name Call

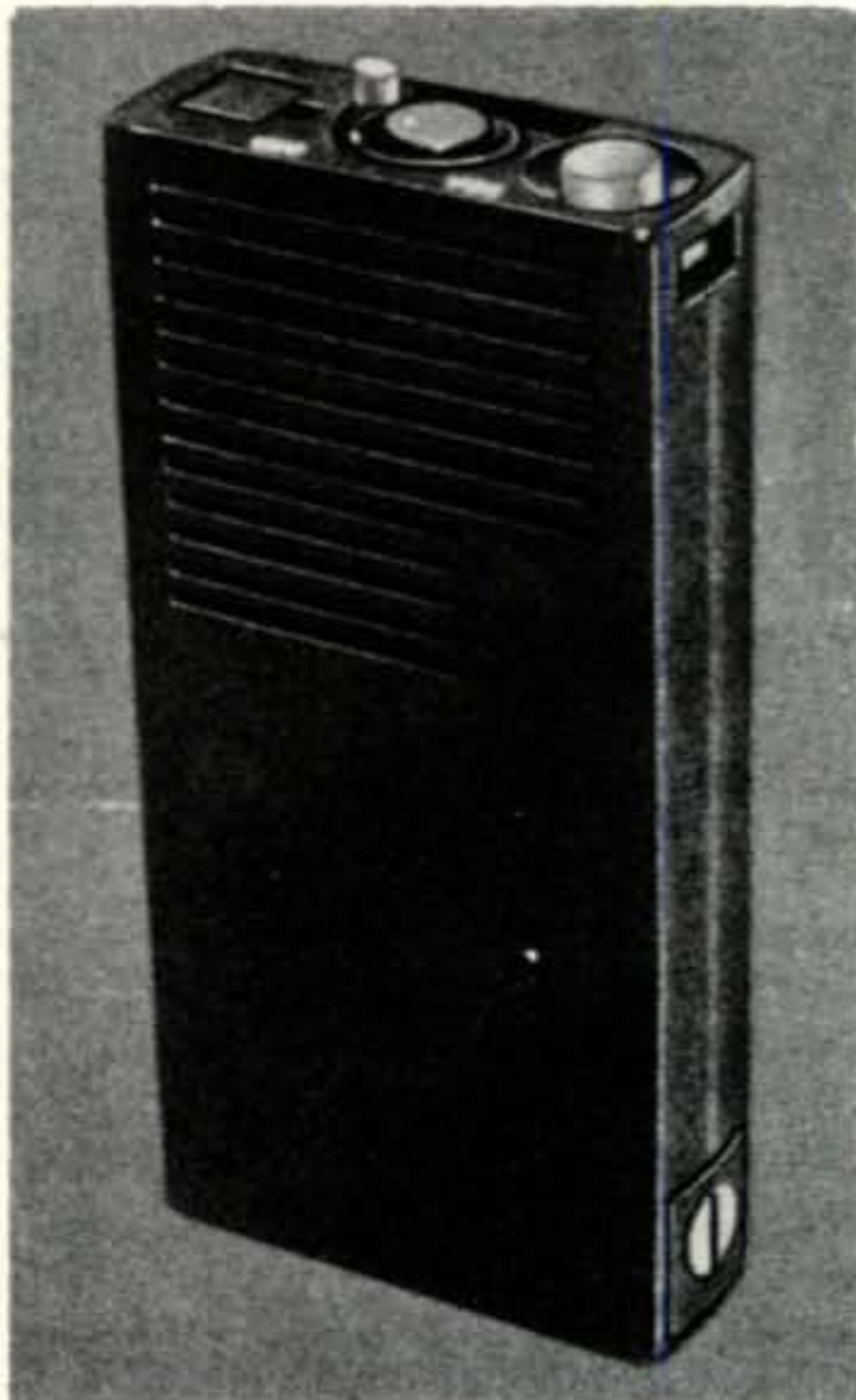
Street Address

City State Zip

ADVERTISER'S INDEX

Amperex Elec. Corp.	9
Amtroncraft Kits, Ltd.	89
Atlas Radio, Inc.	83
CR Electronics	87
Clegg, Div. of ISC	81
Drake, R. L., Co.	6
Eimac, Div. of Varian	Cov. IV
Fair Radio Sales	72
Franke, Fred, Inc.	86
Genave	60, 61
Gregory Electronics Corp.	95
Hal Communications Corp.	2
Heath Company	Cov. II, Insert, 1
Henry Radio	4, 12
Hy-Gain Electronics	13
International Crystal Mfg. Co.	96
Jan Crystals	86
Kenwood	14
Leader Instruments Corp.	10
Midland Int.	69
Millen, James, Mfg. Co., Inc.	8
New-Tronics Corp.	15
Novice QSL Bureau	87
Palomar Engineers	89
Regency Electronics, Inc.	86
Sentry Manufacturing Co.	11
Space Electronics Co.	72
SST Electronics	87
Swan Electronics	16, 80, 89
Telrex Communication Engineering Laboratories	74
Ten-Tec	62
Unadilla Radiation Products	87
Wilson Electronics Corp.	82, 84, 85
Yaesu Musen USA Inc.	Cov. III

Send for Gregory Electronics
Fabulous NEW 1976 CATALOG!



The GENERAL ELECTRIC
Personal Pager

FM SINGLE FREQUENCY RECEIVER

PC06 150.8-174 MHz. **\$88**
any model
PC05 450-470 MHz. **\$98**
any model

W. 2 $\frac{3}{8}$ " , H. 5" , D. 1" Weight - 9 oz.

Both ranges available in 2 models.

(Prices include Ni-Cad battery and charger).

Deduct \$15. less charger; deduct \$10. less batteries.

- **Tone only** (no audio).
 - **Tone and Voice** (tone followed by message).
(Tone models for use with one or two selective frequencies from 517.5 Hz to 967.5 Hz).
 - Rugged LEXAN case • Light weight - pocket size • Spring clip mounting • Can be used with Ni-Cad, Mercury, or Dry batteries.
 - Reeds if available — \$5.00 each
- Call for more information.

Motorola TLD-1000
11 Channel Mobile Telephone

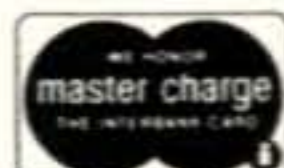
For manual operation only. Less accessories, elements and case (chassis only).

\$250



GREGORY ELECTRONICS CORP.
The FM Used Equipment People.

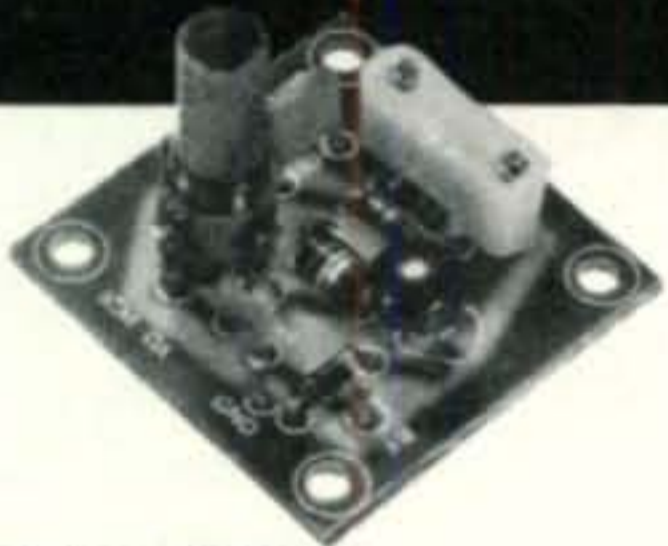
249 Route 46, Saddle Brook, N. J. 07662
Phone: (201) 489-9000



for the experimenter!

INTERNATIONAL CRYSTALS & KITS

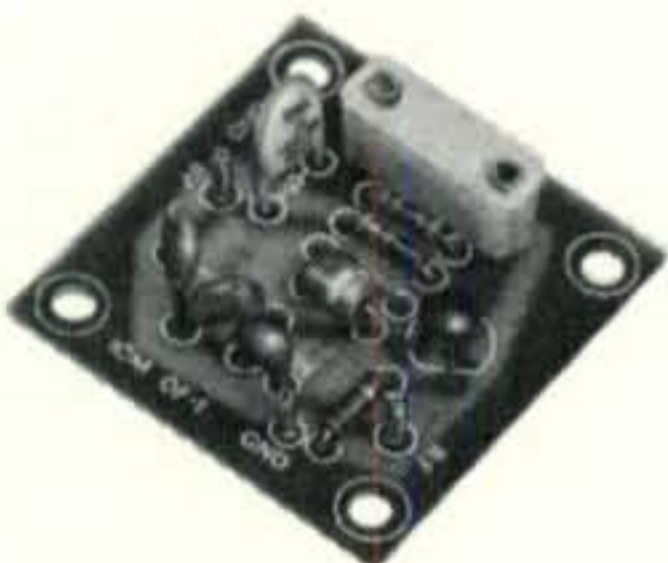
OSCILLATORS • RF MIXER • RF AMPLIFIER • POWER AMPLIFIER



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.

Price \$3.95 ea.



OF-1 OSCILLATOR

Crystal controlled transistor type. 3 to 20 MHz, OF-1, Lo, Cat. No. 035108. 20 to 60 MHz, OF-1, Hi, Cat. No. 035109
Specify when ordering.

Price \$3.25 ea.

EX CRYSTALS (HC 6/U HOLDER)

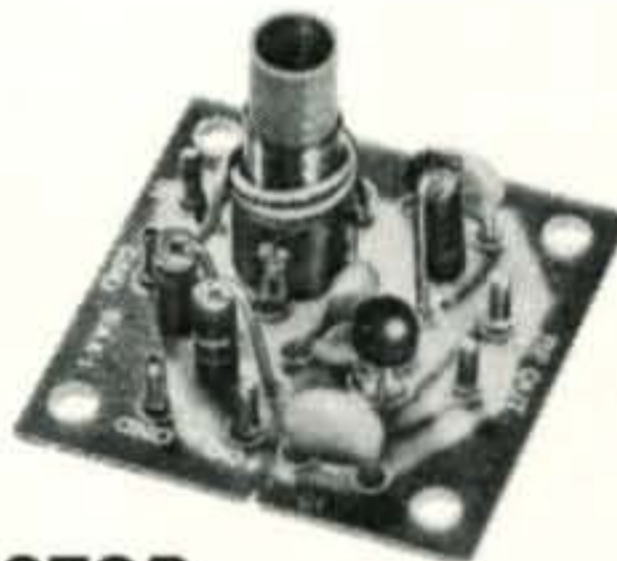
Cat. No.	Specifications
031080	3 to 20 MHz — For use in OX OSC Lo Specify when ordering \$4.95 ea.
031081	20 to 60 MHz — For use in OX OSC Hi Specify when ordering \$4.95 ea.
031300	3 to 20 MHz — For use in OF-1L OSC Specify when ordering \$4.25 ea.
031310	20 to 60 MHz — For use in OF-1H OSC Specify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



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.

Price. \$4.50 ea.



SAX-1 TRANSISTOR RF AMP

A small signal amplifier to drive the MXX-1 Mixer. Signal 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.

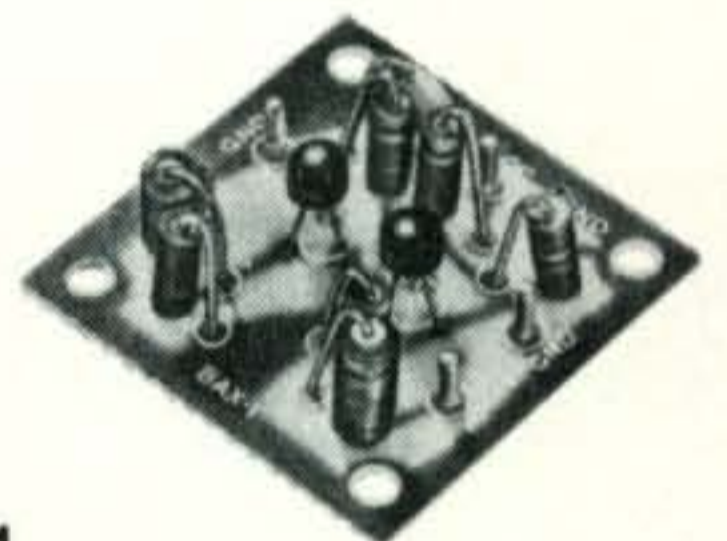
Price \$4.50 ea.



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.

Price \$4.75 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

Price \$4.75 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.



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

Yaesu. Known for the worlds best rigs...and the test equipment to prove it.

Worldwide, you'd be hard put to find an amateur who didn't recognize Yaesu as a name that spells top quality in amateur radio communications. The same holds true in test equipment. Because the same high standards of quality that have made Yaesu known as The Radio Company — apply to the test gear we make.

You can choose from a variety of components, such as the YC-355D 200 MHz frequency counter — every amateur station should have one. And our frequency counter has some extra pluses: like an easily-affordable price. Also advanced IC circuitry, rugged epoxy PC boards, operation on AC or DC, super-accurate readout from 1.8 to 200 MHz, and a design that promises stable and accurate measurements for years to come.

The YO-100 monitor scope helps you maintain the cleanest sounding signal on the air. It's compatible with virtually all rigs, and accepts a wide range of inputs for all-mode monitoring — even RTTY. A built-in 1500/1900 Hz tone generator adds to the YO-100's versatility. What's more, all the controls you need in a professional scope are to be found here. It's a must for any shack.

The Yaesu YP-150 Dummy Load/Power Meter has a frequency range

to suit all amateur needs — from 1800 KHz to 200 MHz at wattages up to 150. The meter operates on three switch-selected scales to assure accuracy. A built-in fan cools the unit for stable, reliable measurements. And its price is attractively low.

For accurate digital display of transmit and receive frequencies on all amateur bands, the YC-601 is the ideal instrument. Designed for use with Yaesu rigs in the 101 or 401 series, the YC-601 features six-digit readout with accuracy to 100 Hz. The unit also has a built-in power supply, calibrator, and a band switch that includes 80 through 160 meters, plus WWV/JJY position. For razor-sharp tuning, the YC-601 is your answer.

These four Yaesu products are built to the same high-quality standards as are Yaesu amateur radio components. And they're just as much the value. So see your dealer or write today for more information on Yaesu measurement/test gear, plus a catalog of Yaesu amateur radio equipment. Yaesu Musen 7625 E. Rosecrans Ave., Unit 29, Paramount, Ca. 90723 Tel: (213) 633-4007.

YAESU

The radio.



YO-100 MONITOR SCOPE



YP-150 DUMMY
LOAD-WATTMETER



YC-355D FREQUENCY COUNTER



YC-601 DIGITAL DISPLAY

The "no tune-up" Alpha 374 is powered by EIMAC 8874's.



EIMAC 8874s were the first choice of Ehrhorn Technological Operations, Inc. for their desk-top Alpha 374 bandpass linear amplifier. It's designed to make it easier than ever before to run maximum legal power on all popular modes—it's capable of continuous operation at a kilowatt average power input for CW, RTTY and SSTV—with plenty of reserve for two kilowatts PEP on SSB.

Besides power, the Alpha 374 permits total "no tune-up" operation with modern broadband transceivers. With conventional exciters, it eliminates time, confusion and damage risk previously associated with amplifier tune-up. "Manual" or "Bandpass"—the choice is yours with the 374.

An amplifier like this obviously requires exceptional output tubes. And EIMAC 8874 high-mu, ceramic-metal triodes fill the bill. Three 8874s with axial air-flow cooling fit neatly in a corner of the amplifier—keeping the 374 size down to about one cubic foot and weight below 55 pounds. Yet, the EIMAC 8874s provide 1200 watts plate dissipation,* allowing the 374 to coast along at maximum legal power.



8874-AXIAL COOLED ANODE

For information about the 8874 or other power grid tubes providing the performance, reliability and design flexibility you need, contact EIMAC division of Varian, 301 Industrial Way, San Carlos, CA 94070. Telephone (415) 592-1221.

Eimac
division
varian