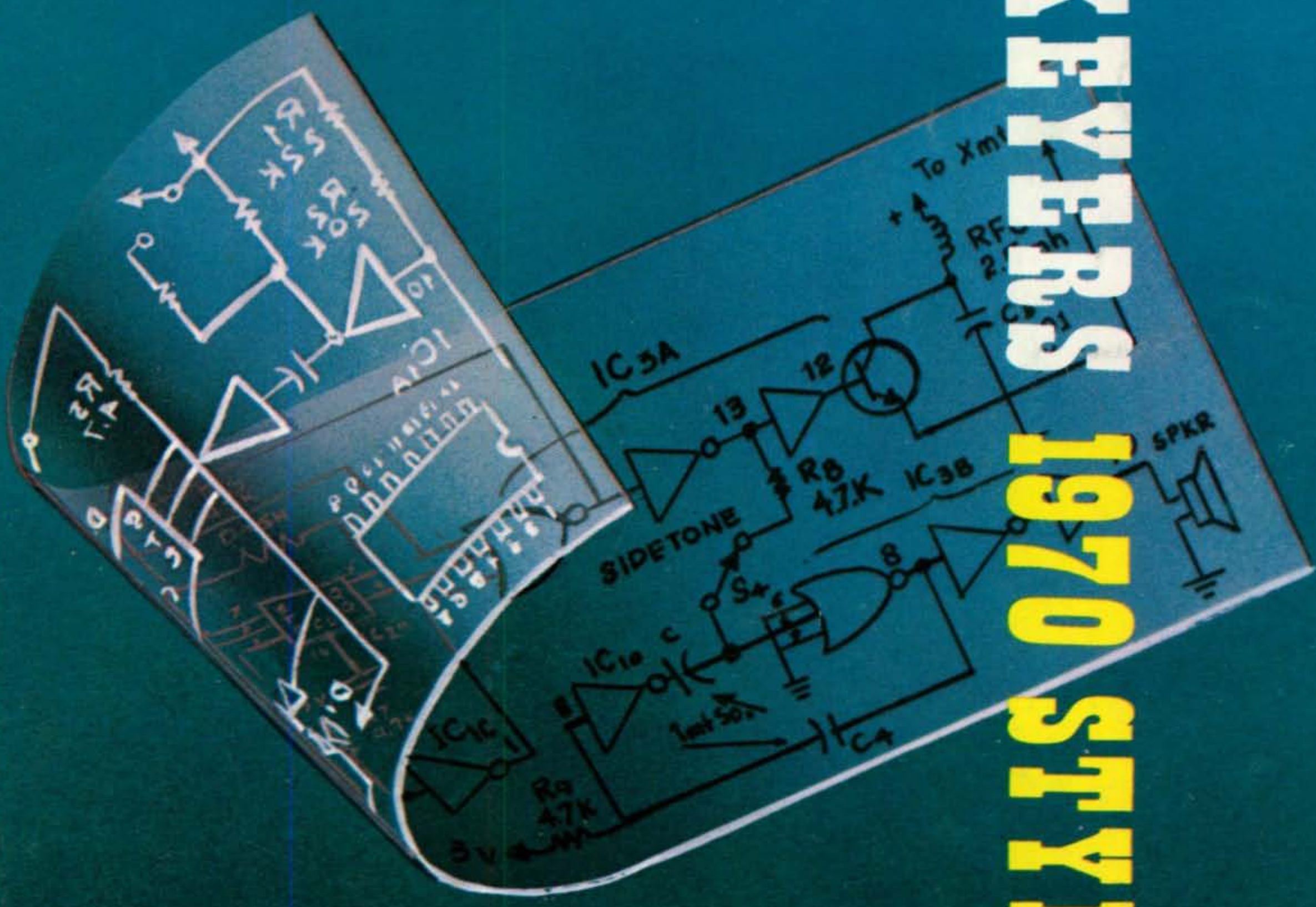
CQ

November 1970
75¢

ELECTRONIC KEYERS

1970 STYLE



The Radio Amateur's Journal

Introducing the New Heathkit® SB-303

the "303"... the new standard of performance in receivers

■ State-of-the-art solid-state circuit using 27 silicon transistors including 4 dual-gate, diode protected MOSFET's, plus 1 IC ■ Heath factory assembled solid-state Linear Master Oscillator for instant warmup, improved stability & more accurate tracking ■ A unique Heath design using 9 modular plug-in circuit boards ■ Receives USB, LSB, AM, CW & RTTY ■ Complete 80-10 M coverage plus 15 MHz WWV for exact calibration ■ 25 kHz & 100 kHz calibration markers ■ Front panel selection of antenna & power connections for up to two VHF converters with rear panel jacks built-in ■ Fast & Slow AGC selectable from front panel ■ Front panel selection of built-in 2.1 kHz SSB crystal filter or optional AM & CW crystal filters ■ Built-in, extremely stable solid-state power supply with circuit breaker protection ■ Speaker and/or headphone selection from front panel ■ Handsome SB-Series styling in a smaller package than the famed SB-301 ■ Easy, enjoyable assembly with the famous Heathkit manual.

The New Heathkit SB-303 . . . another hot performer in the world-famous SB-Series. The "300" and "301" were the choice of thousands because of their obvious performance superiority and value... and the new "303" delivers even more of both.

Advanced Design. A dual-gate MOSFET front end provides greater dynamic range and large signal handling capabilities with low distortion . . . new RF attenuator allows adjustment of receiver sensitivity to copy weak signals without danger of overloading on strong ones. An all solid-state circuit employing the latest in techniques and devices gives instant warmup, 100 Hz stability in 10 minutes and superior tracking. The exclusive Heath solid-state LMO with 1 kHz dial readout is factory assembled and aligned to assure peak performance and provide the smooth, linear tuning that's become a hallmark of all SB-Series gear.

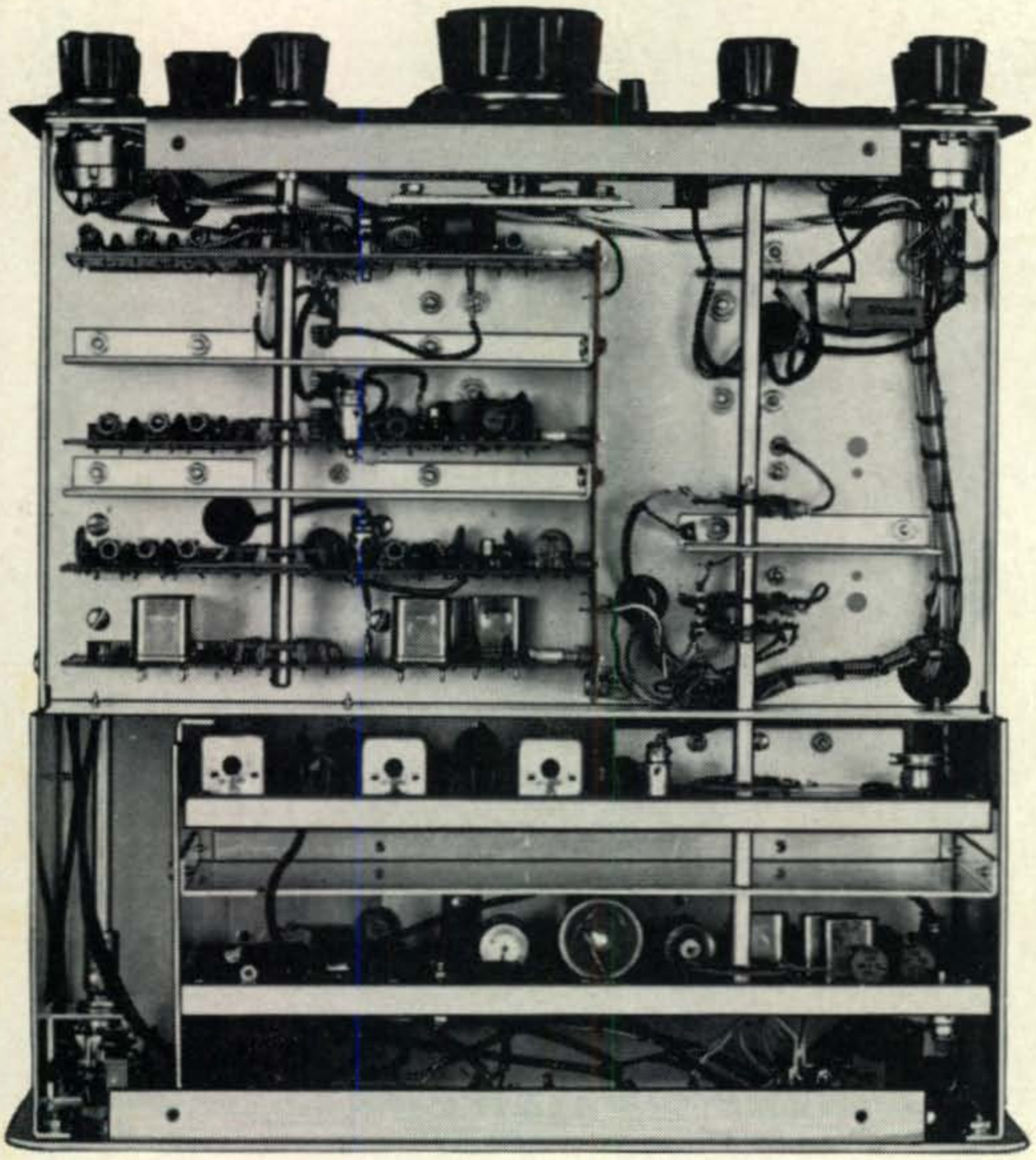
Compare The Performance Features. The new SB-303 offers all the features required for today's operations . . . and they're built-in, not added on later as costly options. The "303" gives complete SSB/CW transceive compatability with the famous "400" or "401". Three position AGC gives the versatility needed for different conditions: Slow limits the amount of background noise present between words and syllables for 5/9 copy . . . Fast position allows scanning large portions of the band without the AGC interruption that slow AGC would cause under this condition. To spot the new subband allocations quickly and simply, just turn the crystal calibrator to the 25 kHz position. Work the high bands? The "303" has antenna & power connections already installed for up to two VHF converters, and front panel switching eliminates cable changing. Spare sockets on the rear panel allow the "303" to be used with a wide range of famous Heath Station Accessories.

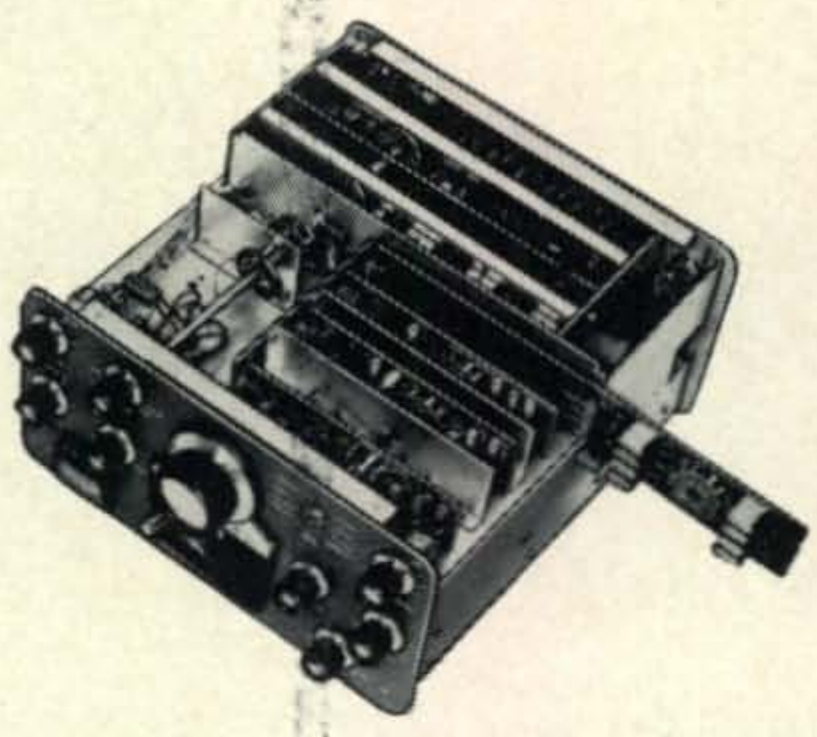
Compare the Specs. Most any receiver will do the job when the bands are hot... but you need good specs when the bands start to go — and the "303" delivers. Sensitivity: less than a quarter of a microvolt for 10 dB S+N/N. Selectivity: 2.1 kHz with the standard SSB crystal filter, and low cost optional filters for CW & AM can be selected from the front panel. Image Rejection: 60 dB or more. IF Rejection: 50 dB or better. Spurious Response . . . Dial Accuracy . . . AGC Characteristics . . . check *all* the specs. You'll see the SB-303 delivers more for a lot less than others.

New Construction Techniques mean faster assembly, less chance for error. Wiring harnesses and nine plug-in circuit boards combine to practically eliminate point-to-point wiring . . . and the special extender boards (see photo opposite) enable you to bring any board out of the compact chassis to check voltage and resistance readings without probing into tight spaces. And, of course, the famous Heath manual guides you a step at a time, with clear, concise instructions and giant fold-out pictorials.

Check Out The New "303". . . send for a free spec sheet and see how other receivers stack up for performance, value & price. Then order your new "303"... another FB piece of gear — from the Hams at Heath, of course.

Solid-State Amateur Receiver... $319.95*





Inside The New "303". When the Hams at Heath design gear, it not only looks good . . . it's easy to work on should you ever have to. Because of the compact design, we've innovated a special technique to make service and adjustment easy — extender boards. These special boards allow you to bring any board out away from the chassis . . . and patchcables supplied mean you can make checks and adjustments while the "303" is operating. Note the liberal use of shielding between circuit boards that contributes to greater stability and more rugged mechanical design.

Kit SB-303, 19 lbs. **$319.95***
SBA-301-1, optional 3.75 kHz AM crystal filter, 1 lb. ..**$20.95***
SBA-301-2, optional 400 Hz CW crystal filter, 1 lb. **$21.95***

SB-303 SPECIFICATIONS: Frequency Range (MHz): 3.5 to 4.0, 7.0 to 7.3, 14.0 to 14.5, 15.0 to 15.3, 21.0 to 21.5, 28.0 to 30. **Intermediate Frequency** (IF): 3.395 MHz. **Frequency Stability:** Less than 100 Hz drift per hour after 10 minutes warmup under normal ambient conditions. Less than 100 Hz drift for ±10% line voltage variation. **Frequency Selection:** Built-in Linear Master Oscillator. **Modes Of Operation:** SSB — Single sideband (suppressed carrier, with selectable upper or lower sideband). CW — Keyed continuous wave. AM — Amplitude modulated continuous wave. RTTY — Radio teletype (frequency-shift keyed continuous wave). **Sensitivity:** Less than 0.25 uV for 10 dB S+N/N for SSB operation. **Overall gain:** Less than 1.5 uV input for 0.5 audio output (single tone SSB). **AGC characteristics:** Blocking — Greater than 3.0 V CW/SSB/RTTY. Dynamic Range — Greater than 150 dB CW/SSB. **RF Attenuator:** Variable 0-40 db. nominal. **Selectivity:** SSB — 2.1 kHz @ 6 dB down, 5.0 kHz maximum at 60 dB down (crystal filter supplied). CW — 400 Hz at 6 dB down, 2.0 kHz maximum at 60 dB down (crystal filter available as an accessory). AM — 3.75 kHz at 6 dB down, 10 kHz maximum at 60 dB down (Crystal filter available as an accessory. RTTY — 2.1 kHz at 6 dB down, 5.0 kHz maximum at 60 dB down (uses SSB crystal filter). **Image rejection:** 60 dB or better. **If Rejection:** 3.395 — greater than 55 dB. 8.595 — greater than 50 dB. **Spurious Response:** All below 1 uV equivalent signal input. **Temperature Range:** 10°C ambient. **Dial Accuracy:** Electrical — Within 400 Hz after calibration at nearest 100 kHz or 25 kHz point. Visual — Within 200 Hz. **Calibration:** Every 100 kHz or 25 kHz. **Dial Backlash:** No more than 50 Hz. **Antenna Input Impedance:** 50 ohm nominal unbalanced. **Audio Response:** SSB — 350 to 2450 Hz nominal at 6 dB. CW (with accessory filter) — 800 to 1200 Hz nominal at 6 dB. AM (with accessory filter) — 200 to 3500 Hz nominal at 6 dB. RTTY — 1840 to 3940 Hz nominal at 6 dB. **Audio Output Impedance:** Matching Speaker — 8 ohm. Matching Headphones — Low impedance. **Audio Output Power:** 4 watts at less than 10% distortion. **Muting:** Open external ground at Mute socket. **Power Requirements:** 105 to 125 or 210 to 250 VAC, 40 watts maximum. **Front Panel Controls:** Main tuning dial; function switch; mode switch; band switch; AGC switch; converter switch; AF gain/power on-off; RF gain/speaker disable; preselector; noise blanker/off-on-threshold. **Circuit Board Controls:** IF/Audio — Bias adjust; meter zero; meter full scale. Power Supply/BFO — + 15 V adjust; 100 kHz adjust. RTTY — Wide Shift; narrow shift; CW shift. **Connections:** Rear Panel — Phones; HF antenna; VHF antenna #1, VHF antenna #2; mute; anti-vox; speaker; HFO out; LMO out; VFO out; CW shift; four spare sockets; 3-wire line cord socket; accessory socket: VHF Converter, + 15 VDC @ 25 mA, switched. RTTY Keyboard. **Cabinet Dimensions:** 12¼" W x 6⅝" H x 13" D. **Overall Dimensions** (with knobs & feet installed): 12¼" W x 7 1/16" H x 14" D. **Net Weight:** 15¾ lbs. **Note:** specifications measured with 120 VAC line voltage at 25°C.

NEW
FREE 1971 CATALOG!
Now with more kits, more color. Fully describes these along with over 300 kits for stereo/hi-fi, color TV, electronic organs, guitar amplifiers, amateur radio, marine, educational, CB, home & hobby. Mail coupon or write Heath Company, Benton Harbor, Michigan 49022.

HEATHKIT®
a Schlumberger company

HEATH COMPANY, Dept. 9-10
Benton Harbor, Michigan 49022

☐ Enclosed is $_____, plus shipping.
Please send model (s) _____
☐ Please send FREE Heathkit Catalog. ☐ Please send Credit Application.

Name _____
Address _____
City _____ State _____ Zip _____

*Mail order prices; F.O.B. factory.
Prices & specifications subject to change without notice. AM-236R

The new SWAN 270B transceiver has the same....

- **UNEXCELLED PERFORMANCE**
- **RUGGED RELIABILITY**
- **PORTABILITY**
- **260 WATT P.E.P. RATING**
- **5 BAND COVERAGE**
- **FINEST CRYSTAL FILTER**
- **CRYSTAL CALIBRATOR**
- **BUILT-IN SPEAKER**
- **AND AC POWER SUPPLY**

...as the Swan 270

BUT IT'S NEW LOW PRICE IS ONLY $499

This price reduction has been achieved by making 12 volt DC operation an optional plug-in accessory. The DC components are now contained in a 1½ x 3 x 4 inch box which plugs in back of the 270 B, in place of the AC connector. Servicing and maintenance are made easier, and we are able to pass the savings in cost on to those of you who do not require 12 volt operation. The DC converter, model 14A, may be purchased at any time. Except for this difference, the 270 B is identical to the 270. It is truly a top notch performer and an even better value. See the new 270 B at your SWAN dealer today.

Model 270 B **$499**
Model 14A, 12 volt DC converter .. **$39.50**

SWAN
ELECTRONICS

305 Airport Road
Oceanside, California 92054
A Subsidiary of Cubic Corporation

CQ

NOVEMBER, 1970 VOL. 26, NO. 10

The Radio Amateur's Journal

TABLE OF CONTENTS

ELECTRONIC KEYERS — 1970 STYLE
Edward B. Beach, W4MXK 16

THE LSD DISCONE ANTENNA
Paul H. Bock, Jr., K4MSG 22

CQ REVIEWS: THE DRAKE SPR-4 COMMUNICATIONS RECEIVER
Wilfred M. Scherer, W2AEF 26

A SIMPLE D.C. VOLTAGE DROPPER
W. Edmond Hood, W2FEZ 30

EVOLUTION OF THE DECIBEL, PART II
James M. Bruning, K2BZ 32

IT WASN'T MUCH, BUT IT WORKED
Russell Sansom, K4SOD/6 37

IMPROVING THE EICO 753 TRANSCEIVER
John H. Ruhlmann, W3CWV 40

11th ANNUAL *CQ* 160 METER CONTEST RESULTS
Charles M. O'Brien, W2EQS 45

LATE OSCAR SATELLITE NEWS
George Jacobs, W3ASK 49

WHAT'S IN A QSL CARD?
George Pataki, exYO2BO 50

ASSEMBLY OF RG-8/U TO TYPE UHF CONNECTORS
David T. Geiser, WA2ANU 52

MEDICAL AMATEUR RADIO COUNCIL MEETS IN CHICAGO 53

DEPARTMENTS

ANNOUNCEMENTS 8
CONTEST CALENDAR 60
DX 55
OUR READERS SAY .. 7
PROPAGATION 62
Q&A 67
SCRATCHI 10
SURPLUS SIDELIGHTS 70
USA-CA 64
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 and Miami, Florida. Subscription Prices: one year, $6.00; two years, $11.00; three years, $15.00. 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

STEP UP TO TELREX

Professionally Engineered Antenna Systems

Single transmission line "TRI-BAND® ARRAY"

By the only test that means anything . . . on the air comparison . . . this array continues to outperform all competition . . . and has for two decades. Here's why . . . Telrex uses a unique trap design employing 20 HiQ 7500V ceramic condensers per antenna. Telrex uses 3 optimum-spaced, optimum-tuned reflectors to provide maximum gain and true F/B Tri-band performance.

ONLY TELREX GIVES YOU ALL THESE FEATURES . . .

- Power rating 4 KW PEP . . . rain or shine
- Wind rating survival 110 MPH
- Patented broad-band coaxial Balun
- Heavy-duty steel gusset mounting plate
- Aluminum boom 2 in., 2½ in. O.D. x 18 ft.
- Large diameter, .058 wall taper-swaged dural elements for minimum weight and exceptional strength to weight ratio
- Stainless steel electrical hardware

With a Telrex Tri-band Array you get 49 lbs. of educated aluminum engineered and built to provide many, many years of performance unmatched around the world by any other make. Longest element 36 ft. Turning radius 20 ft. Shipping weight 65 lbs. Shipping container 13 in. x 5 in. x 13 ft.

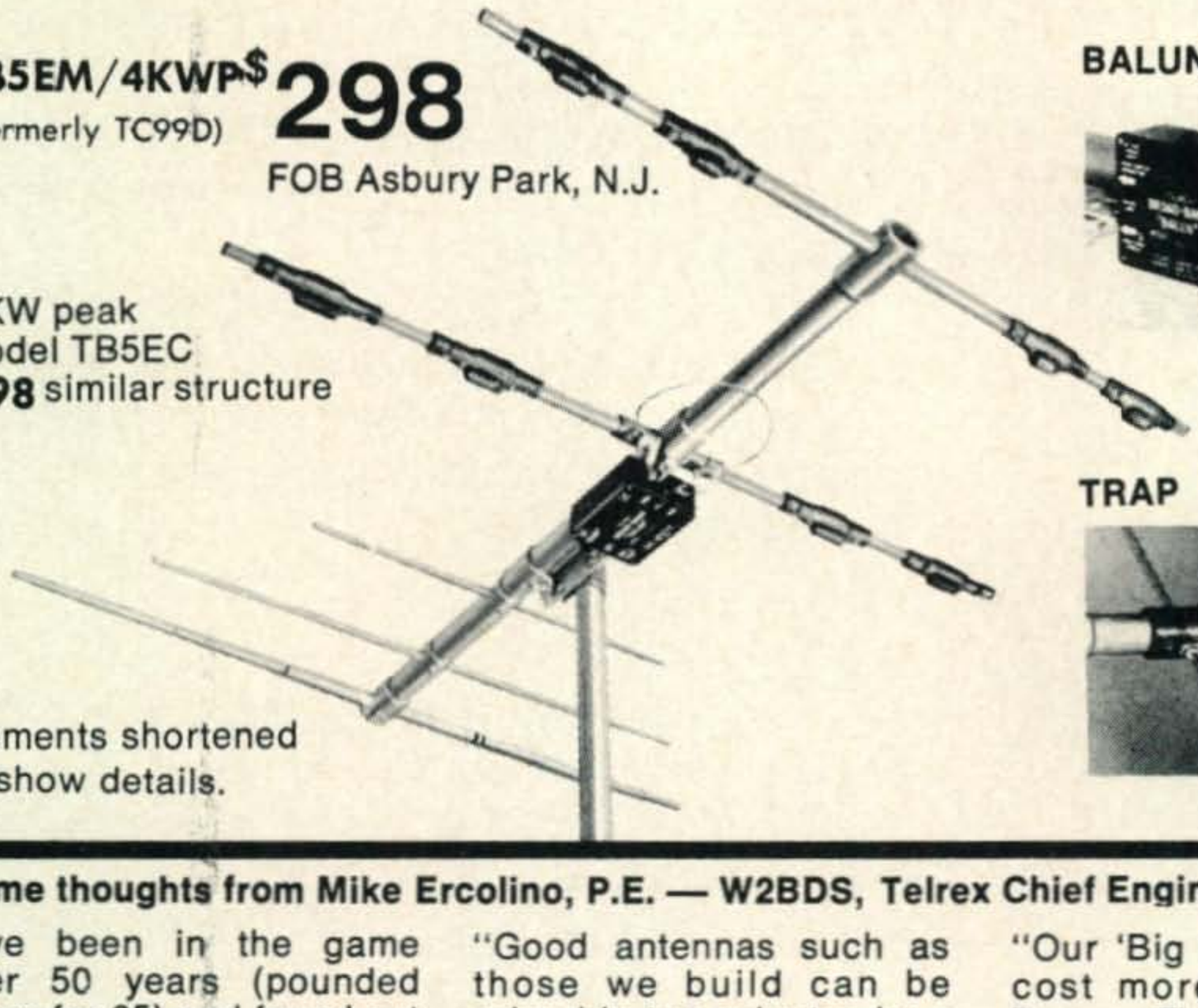
Note: If not available from your dealer, order direct. You'll get fast, personal service.

Telrex Labs are design engineers, innovators and manufacturers of the world's finest ¾ to 160 meter communication systems and accessories priced from $25 to $25,000.

For technical data and prices on complete Telrex line, write for Catalog PL 70.

TB5EM/4KWP (Formerly TC99D) **$298**
FOB Asbury Park, N.J.

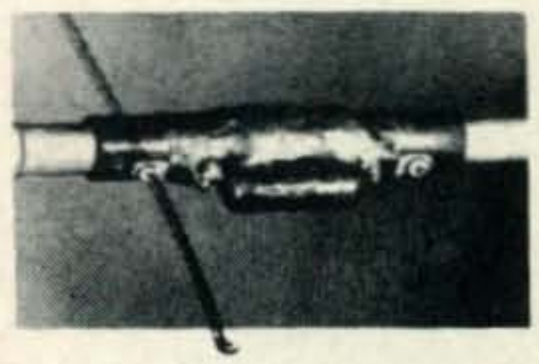
1 KW peak
Model TB5EC
$198 similar structure



Elements shortened to show details.

BALUN

TRAP



Some thoughts from Mike Ercolino, P.E. — W2BDS, Telrex Chief Engineer . . .

"I've been in the game over 50 years (pounded brass for 25) and found out a long time ago that antennas were the weak link. We changed all that."

"Good antennas such as those we build can be ruined in two minutes by a tinker. So put 'em up and leave 'em up the way we make 'em."

"Our 'Big Bertha' systems cost more than a Rolls Royce. Three of our customers have bought two of them . . . that's living."

telrex COMMUNICATION ENGINEERING LABORATORIES
TV And Communications Antennas Since 1921
Asbury Park, New Jersey 07712 201-775-7252

ZERO BIAS

We note with great interest that Wayne Green has officially petitioned the FCC to make most of the 220 mc amateur band a code-free hobby service. This petition, specifically requesting 220.5 to 224.5 mc, utilizing narrow band f.m. with a 100 watt power limitation has been docketed by the FCC as RM 1633.

Basically, the proposal is a modified takeoff of the original proposals made by both *CQ* and *Popular Electronics* several years ago to allow code-free ham operation in the v.h.f. and u.h.f. spectrums, with the ultimate purpose being that of bringing more new amateurs into the service, many of whom would eventually improve both operating and technical skills to rise within the amateur ranks. Unfortunately, Mr. Green has permitted his commercial interest to cast a shadow of doubt on what might have been a sound proposal. We refer specifically to Page 10 of *Radio Today Magazine*, edited and published by Mr. Green primarily for the CB audience. The caption on the article referring to RM 1633 reads, "NEW HOBBY BAND PROPOSED," but the sub-heading which follows immediately reads, "Proposal: A completely new Citizens Band!" To make things worse, Mr. Green's front cover carries this headline: "Proposed–RM 1633: Hundreds of New Channels for LEGAL Hobby use... A CB Bonanza."

The editors and publisher of *CQ* have long recognized the need for a code-free ham license in the v.h.f. or u.h.f. area as an incentive to lure would-be radio hobbyists into the amateur service where they rightfully belong. We've felt that under the guidance, leadership, and yes, even policing of well-trained licensed hams, these newcomers would, for the most part, become a welcome addition to the ham ranks. Many would very likely progress to higher grades of amateur licensing, once having gotten their feet wet *in the right direction.* But therein lies the key to an effective code-free service: the right direction. The amateur ranks do not need tens of thousands of wilful lawbreakers who have no respect for FCC regulation, no respect for other operators, and in the long run, little respect for the service whose *privileges* they use. Telling CBers that there's a new code-free CB SERVICE at their command is inviting new chaos in both the amateur and CB ranks. And this is what Mr. Green, in essence, has done.

We feel that the original intent behind RM 1633 was based on sound reasoning. We also feel that the ultimate passage of RM 1633 would have been a vital shot in the arm for both ham radio and the CB service as well. But we feel very cheated that

[continued on page 74]

Separately they're great!

R. L. Drake quality-built R-4B Receiver is versatile, accurate, dependable, as is the Drake T-4XB Transmitter. They stand on their own merits used independently, but . . .

TOGETHER they're incomparable!

Ideal for transceiving, 160 and MARS

T-4XB TRANSMITTER

• **Covers ham bands** 80, 40, 20, 15 meters completely and 28.5 to 29.0 Mc of 10 meters with crystals furnished; **MARS and other frequencies with accessory crystals, except 2.3-3, 5-6, 10.5-12 Mc.** • **Upper and Lower Sideband** on all frequencies • **Automatic Transmit Receive Switching on CW** (semi break-in) • **Controlled Carrier Modulation for AM** is completely compatible with SSB linear amplifiers • **VOX or PTT** on SSB and AM built-in • **Adjustable Pi-Network Output** • **Two 8-pole Crystal-Lattice Filters** for sideband selection, 2.4 kc bandwidth • **Transmitting AGC** prevents flat topping • **Shaped Grid Block Keying** with side tone output • **200 Watts PEP Input on SSB**— 200 watts input CW • **Meter indicates plate current and relative output** • **Compact size; rugged construction** • **Solid State Permeability Tuned VFO** with 1 kc divisions • **Solid State HF Crystal Oscillator** • **11 Tubes, 3 Transistors and 12 diodes** • **Dimensions:** 5½"H, 10¾"W, 12¼"D. **Wt.:** 14 lbs. **$495.00** Amateur Net.

R-4B RECEIVER

• **Linear permeability tuned VFO** with 1 kc dial divisions. VFO and crystal frequencies pre-mixed for all-band stability • **Covers ham bands** 80, 40, 20, 15 meters completely and 28.5 to 29.0 Mc of 10 meters with crystals furnished • **Any ten 500 kc ranges between 1.5 and 30 Mc** can be covered with accessory crystals for 160 meters, MARS, etc. (5.0-6.0 Mc not recommended) • **Four bandwidths of selectivity,** 0.4 kc, 1.2 kc, 2.4 kc and 4.8 kc • **Passband tuning** gives sideband selection, without retuning • **Noise blanker that works on CW, SSB, and AM** is built-in • **Notch filter and 25 Kc crystal calibrator** are built-in • **Product detector** for SSB/CW, **diode detector** for AM • **Crystal Lattice Filter** gives superior cross modulation and overload characteristics • **Solid State Permeability Tuned VFO** • 10 tubes, 10 transistors, 17 diodes and 2 integrated circuits • **AVC** for SSB or high-speed break-in CW • **Excellent Overload and Cross Modulation characteristics** • **Dimensions:** 5½"H, 10¾"W, 12¼"D. **Wt.:** 16 lbs. **$475.00** Amateur Net.

$495.00 + $475.00

Togetherness...it's wonderful!

Get together with your distributor,
or write for free brochure . . .

R. L. DRAKE COMPANY **540 Richard Street, Miamisburg, Ohio 45342**

OUR READERS SAY

Costly Lesson

Editor, *CQ:*

Here is a recounting of my experiences with Trigger Electronics for the benefit of you and your readers.

I wrote to them in regard to their advertised buying of used gear for cash. I stated that I had a DX-60, a HG-10 and a Drake 2-B with speaker and crystal calibrator, that were in fair condition and requested an offer. Within a short time I received an offer of $200 upon "inspection." This sounded fine to me. I packed the equipment very carefully, included the manuals for all pieces and sent it off to them via the Continental Bus Co., at a cost of $11.

Shortly thereafter, I got a letter from them stating that they were very sorry BUT - upon inspection they had found:

DX-60 - low power output

HG-10 - Dial broken, no output

2B - Chassis corroded, blown fuses, noted there was a 10 amp fuse in place of the norm 1/4 amp, excessive backlash in tuning and pass-band switch intermittent.

Due to this, they could only offer me $100 and they had deducted $5.80 which it had cost them to go the 15 miles from their store to the bus depot. Well, I was very distressed. The only things I had known about previously were the broken dial (actually only a piece missing from the glass cylinder with the frequency markings on it) and the corrosion on the chassis (which I thought insignificant enough to not be worthy of mention). I called them on the phone and could not get satisfaction. I told them that some of the supposed damage or malfunctions had apparently occured during shipment and that they should make claim with the insurance company. They stated correctly that until I cashed the check it was still my equipment and that if anybody had to file claim, it was me. The last thing I said on the phone was that they would be hearing from me again.

That same day I wrote to them, spelling out inexactly so many words that I was extremely dissatisfied and that they should 1) make no modifications at all to the equipment; 2(not remove it from their store; 3) not repack it and 4) save the original packing (shipping) containers. I also said that I would be in Chicago before the end of the month to make personal inspection of the equipment and circumstances. This letter was sent to them airmail special delivery, registered, return receipt requested and their check was enclosed.

The letter was mailed on Monday afternoon and by Thursday Trigger had sent the equipment back to me by UPS and it had cost me another $15.00. Apparently my letter had scared them off. As soon as they had their check back they packed up my gear and sent it back to me before I could get to them.

I made personal inspection of the equipment as I received it. The DX-60 had a bent place in the cabinet, but power output was still 60 watts out for 90 in. as good as you'll get from any transmitter of this kind. The HG-10 had normal output, AS SOON AS I INSTALLED THE TUBES. They had been insulated and stored inside the cabinet and Trigger had never even had it off to look at the insides! The glass cylinder was off the spindles, but I put it back with little effort. The Drake 2B did indeed have a 10 amp. fuse (why I don't know - How often do you check the fuse on a piece of gear if you never have any trouble with it??) but did *not* blow fuses when I inserted a 1/4 amp. There was *no* backlash either mechanical or electrical in the tuning, and no intermittent in the band-pass switch.

I understand now how they can offer "like-new equipment at money-saving prices." Once they have you "over-the-barrel", so to speak, they suddenly find all kinds of things that they are very sorry about, but will make all kinds of money for them when they resell your equipment. This experience cost me $26.00, but I guess the lesson was worth it if you will publish my letter and save someone else from being suckered. Please do our fellow amateurs a service, and help save them from Trigger Electronic's great disservice. Thank you.

John D. Tidball, WA5ZCE/2
Long Branch, N. J.

Quote, Unquote

Editor, *CQ:*

I wish to discontinue my subscription to *CQ* magazine for the following reason: It is my understanding that Mr. Dick Cowan, Editor of *CB Magazine,* has contacted and discussed with FCC officials the matter regarding reallocation of part of the two-meter ham band to the citizens and/or a special hobbyist radio service.

I am sure you must have your reasons for so doing and I have mine for my action – nuf sed!

H. P. Chandler, K4BZZ
Lake Placid, Fla.

It would appear to us that the "reliable sources" referred to are the comments made in *QST,* August 1970, page 6, in League Lines. The facts are these:

In a conversation with the editor of *CB Magazine, CQ*'s publisher stated that the FCC could not and would not consider a code-free license below 144 mc because of international frequency agreements. He added that above 144 mc, such proposals might be considered. That's *all* that was implied. Unfortunately, these statements were misinterpreted and incorrectly quoted in *CB Magazine. QST* eagerly grabbed them for requote, realizing that *CQ* might be embarrassed, while *QST* would be free from legal action since it would merely be reprinting a statement from another publication.

We feel that an apology is in order. - *Ed.*

"Our Readers Say" welcomes letters about nearly anything of interest to amateurs, whether about *CQ* itself, the state of the hobby, or whatever else you have on your mind. The most interesting letters will be selected for publication each month. Drop us a line.

Announcements

Windsor, Ontario

The Windsor Amateur Radio Club will be hosting the annual Radio Society of Ontario (RSO) Convention on Oct. 23-24. It will be held at the Holiday Inn on Riverside Drive in Windsor just across the river from Detroit, Mich. There will be talk-in stations on 75 and 2 meter f.m. Exhibits, door prizes and plenty of activities are planned. Registration is $4.00 (OM) and $3.00 (YL) plus a student rate of $2.00. For complete information contact: Mike Turik, VE3BJK, 3745 Rockwell Ave., Windsor 21, Ontario, Canada.

Battle Creek, Michigan

The sixteenth annual VHF Conference at Western Michigan University will be held on Oct. 24, 1970. A full day of activities are planned from 8:00 A.M. to a 6:30 P.M. dinner. To get reservations or more information write: VHF Conference, P.O. Box 243, Battle Creek, Michigan 49016.

Raleigh, North Carolina

The 1970 Roanoke Division ARRL Convention will be held Saturday and Sunday, Oct. 31-Nov. 1st in Raleigh, North Carolina. Convention headquarters and all activities will be at the Hilton Inn, 1707 Hillsborough St. in Raleigh. Numerous activities are scheduled. For tickets and information write to: John Fried, W4WWD, 3606 Winton Road, Raleigh, N.C. 27604.

Kingston, Oklahoma

The Texoma Hamarama will have their annual hamfest at Lake Texoma Lodge on Lake Texoma near Kingston. It will be held on Nov. 13-15, 1970. There will be technical discussions, displays, swapshop and other activities for all. For complete details write to: Ray Bryan, W5IQ, P.O. Box 246, Kingston, Oklahoma 73439.

Stolen Equipment

The following list of Collins equipment has been stolen from the Civil Defense Agency Offices at Baton Rouge, Louisiana:

1 ea. 75S-3C Receiver	S# 13753
1 ea. 32S-3 Transmitter	S# 101254
1 ea. 516F-2 Power supply	S# 23194
1 ea. 312B-4 Speaker Console	S# 60133
1 ea. 30L-1 Linear amplifier	S# 28517
1 ea. SM-1 Microphone	S# 2740
1 ea. Complete interconnecting cable set	

Anyone having information that will assist in locating this equipment is asked to contact: Fred McMurray, Communications Officer, City of Baton Rouge, P.O. Box 1471, Baton Rouge, Louisiana 70821.

The Most Powerful Signals Under the Sun!

hy-gain/galaxy

FM-210 Transceiver

TOP FM PERFORMANCE FIXED STATION OR MOBILE

Capability...that's the word for the Galaxy FM-210 2 meter FM Transceiver. Top performance either fixed station or mobile, direct or repeater. There's a full 5 watts of power or 10 watts with the optional AC-DC Power Booster. American-made, solid state construction. Match the FM-210 with any of the suggested top performance Hy-Gain antennas and see what we mean by *capability!*

FM-210 Order No. 813 Price $229.50

SPECIFICATIONS:

Frequency range: 143-149 MHz. Antenna Impedance: 50 Ohms Nominal Power Req'mts: 12-14 VDC (or optional power booster).

Transmitter: Power Input: 5 watts (10 W. with pow. booster) • Freq. Control: 3 Chan.* crystal controlled • Microphone: High Impedance req'd. • Deviation: Adj. narrow or wideband with clipper filter also adj. for optimum clipping level.

Receiver: Sensitivity: SINAD .5uv for 12 db, luv provides 20 db quieting • Adjustable squelch • Modulation Acceptance: FM wideband (narrow band available) • Type: Dual Conversion, FET front end for minimum cross modulation and overload • IF Frequencies: 10.7 MHz and 455 KHz • Freq. Control: 3 chan.* crystal controlled • Audio Output: 3 watts (intr'nl 3.2 spkr.).

* Furnished with 146.94 crystal for transmit and receive.

Power Booster: Provides high power operation from either 12-14VDC or 117 VAC. Makes an ideal fixed station accessory. Order No. 814. Price $49.00.

Hy-Gain Fixed Station Antennas

No. 28, eight-element, 2 meter beam. Order No. 341. Price $19.95.
No. SJ2S4, four stacked, 2 meter J-pole. Order No. 362. Price $74.95.

Hy-Gain Mobile Antennas

130 to 174 MHz, 5/8 wave, 3 db gain, roof or deck Claw Mounted, 22' coax. Order No. 764. Price $28.50.
108 to 174 MHz, ¼ wave whip, Claw base. Order No. 786. Price $4.00.

Stop by the best dealer under the sun—the one who stocks Hy-Gain Antennas and Hy-Gain's Galaxy Line.

GALAXY ELECTRONICS DIVISION

HY-GAIN ELECTRONICS CORPORATION

P.O. Box 5407-FJ Lincoln, Nebraska 68505

SCRATCHI

Deer Hon. Ed:

I known you being accustomed to having me rite you each month with humorous aneckdotes and musings about amchoors. I thinking, howsumever, that maybe there too much of this levity and firvolity in amchoor radio.

We amchoors can't keeping our nose buried in our keys and our mikes—we must facing up to changing world environments—we must keep abreast of things going on outside the door of our shack—we must recognize there's more to life than QSO's and QSL's.

In short, it being high time we amchoors doing some pioneering in human engineering like we used to doing in electronic engineering. It's a changing world and some of the changes not being for the better. To quoting my hippy cousin Icky Ito—"like man, if you wanta go, you gotta groove, WOW!"

Loosely translated, that meening that if you wanting to contribute to the future, you have to plan to help alleviate the woes of the world (that WOW! meening Woes Of the World, Hon. Ed.).

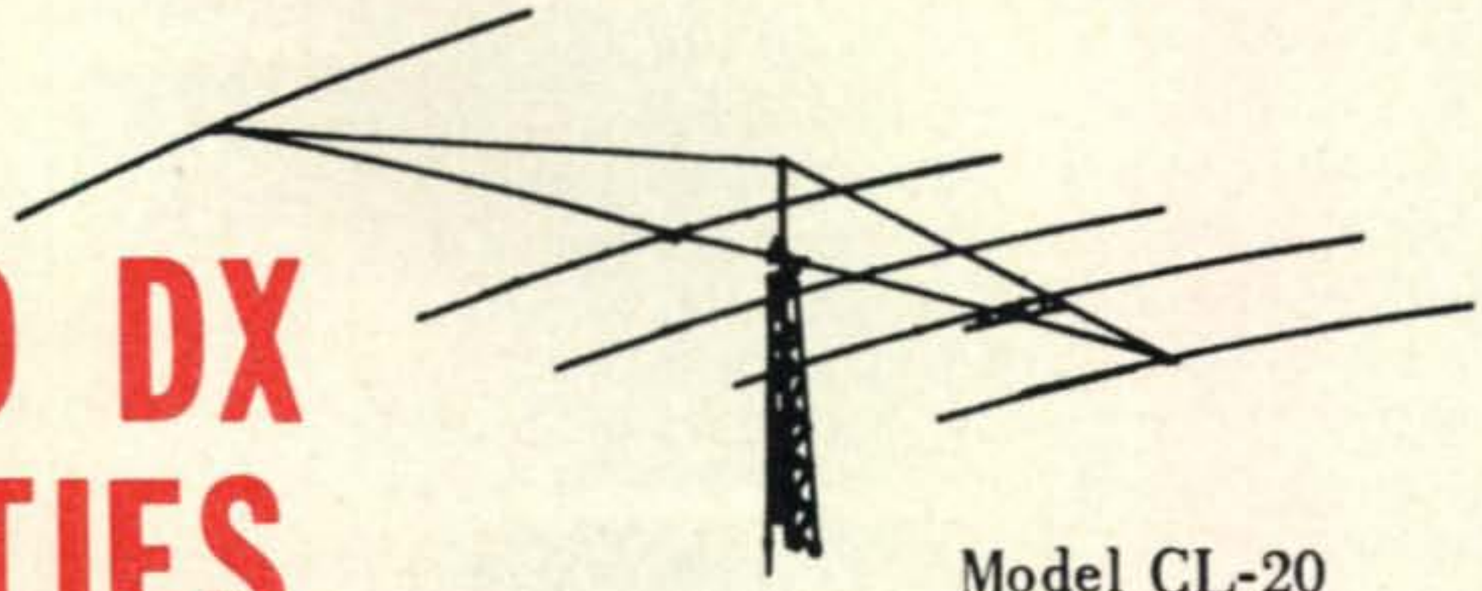
I not knowing how it affecting you, Hon. Ed., but I talking to other amchoors in your neck of the woods and they having reel sad tales to telling about power shortage. One feller telling me the more QRP he going, the better DX he getting. When he trying to run high power, voltage regulayshun so bad he getting less power than if he running less inputs and dropping line voltage less so power outputs being higher than if he running higher power.

Another amchoor I talking to sending see-w slow I thinking he just new on air. But no—he telling me he sending slow so he can pausing between dots and dashes to letting power bild back up after his ten-what crusher going on line.

NEW SINGLE-BAND BEAM
FROM MOSLEY

The Classic 20

WITH EXPANDED DX CAPABILITIES



Model CL-20

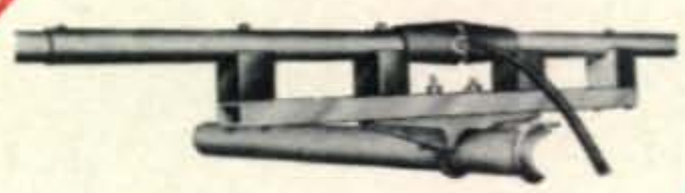
ON 20 METERS

DON'T LIMIT YOURSELF!

When you install a 20 meter beam, there is only one antenna investment you can afford . . . The NEW CLASSIC 20 with expanded DX capabilities, thanks to the new Classic Feed System, "Balanced Capacitive Matching." This new array promises to be the most universally accepted amateur beam ever developed for 20 meters.

TAKE A LOOK AT THE VITAL STATISTICS!

- FORWARD GAIN: 9.8 db compared to reference dipole; 11.9 db over isotropic source.
- POWER RATED: 1 KW AM/CW; 2 KW P.E.P. SSB input to the final.
- SWR: 1.5/1 or better.
- MATCHING SYSTEM: Balanced Capacitive.
- FEED POINT IMPEDANCE: 52 ohms.
- NUMBER OF ELEMENTS: 5. Aluminum tubing; 6063-T832.
- MAXIMUM ELEMENT LENGTH: 38 ft. 1½ in.
- BOOM LENGTH: 46 ft.
- RECOMMENDED MAST SIZE: 3 in. OD.
- TURNING RADIUS: 28 ft.
- WIND SURFACE: 18.7 sq. ft.
- WIND LOAD (EIA Std. 80 MPH): 364.45 lbs.
- ASSEMBLED WEIGHT: Approx. 139 lbs.
- SHIPPING WEIGHT: Approx. 145 lbs. via truck.



U. S. PAT. NO. 3419872

For detailed brochure write . . . Dept. 198G

Manufacturing TV Antenna-Accessories
for nearly a Quarter of a Century.
Write for the Free Booklet,
"How to Improve Your TV Picture"
Department 198TV

Mosley Electronics Inc. 4610 N. LINDBERGH BLVD., BRIDGETON, MO. 63044

Hon. Ed., it not doing any good to muttering in your beard that we amchoors not having to solving power shortage on acct. all power companies having to do is bilding more power plants. Don't you seeing, El Stupido, that all that doing is adding to another WOW? Air pollushun! Every power plant huffing and puffing out tons of air pollushun for each millyun kilowhats they generating.

No indeedy that not being the answer and yes indeedy there can be an answer. You ever heering of solar power? That the kind we need to harnessing—good old power from the Hon. Sun.

And, I thinking we better not wateing for power companies to use solar power—we got to get an energy source independent of the a-c line. Besides, power companies have problems getting big kinds of power from the sun directly—but individuals finding it easy.

For examplelike – you can roofing your house with solar cells. Connecking them together, feeding a battery, and you having power source for your own home. Not only can you running ham rig from solar power, but also other things around house that not needing a-c.

We can even do it with mobile rigs. There no reason why top of car can't be made of material which are solar cells. From them we can either charging car battery of having separate battery installed just to running mobile rig.

Like I said, there being no end to possibilities. Howsumever there are fast end to solar power unless we hurrying. You see, the sooner we using solar energy, the more sunlight we having to generate solar power, whereas if delaying use of solar power, we getting so much air pollushun from generating regular power than the Hon. Sun having trubble peeking thru pollushun and powering solar panels!

Don't sitting there with your mouth open, Hon. Ed. Getting to work on this solar energy thing rite away. It not being the only problem we amchoors having.

Net month I riting you about another Woe Of the World—overpopulayshun. Subject of my letter next month will be "Overpopulayshun—the XYL and YOU". Rated GP.

Happy Amchoor Day, and

Respectively yours,
Hashafisti Scratchi

The Yaesu FTdx 560 Transceiver.
560 watts PEP SSB. 500 watts CW.
$450 complete.
All you add is mike, speaker and antenna.

Incredible.

At $450 the Yaesu FTdx 560 is an incredible buy. It would be impossible if it weren't for a couple of facts. One, the Yaesu is made in Japan; two, it's sold direct to you—eliminating the big dealer's profit.

These days, when you think of Japanese-built products, think of Nikon, or Sony, or Toyota. And Yaesu. Our transceivers are state-of-the-art engineered and carefully hand-assembled. They're so solid, stable and reliable we guarantee them for one year. Yaesu is quite likely the best transceiver made anywhere in the world today.

The complete Yaesu story is a long one. So we've compiled a comprehensive information packet that gives you the complete picture. Including things like comparative detail photos, a schematic, and a comparison chart that shows you the FTdx 560's superiority over rigs you're more familiar with. Once you've looked over the FTdx 560 literature we think you'll agree that the amateur operator's impossible dream has become an incredible fact.

SPECTRONICS WEST
Box 338, Lakewood, Calif. 90714 / Telephone: (213) 421-6167

SPECTRONICS EAST
Box 1457, Stow, Ohio 44224 / Telephone: (216) 923-4567

Please send me your free Yaesu FTdx 560 information packet:

Name_____

Street_____

City & State_____ Zip Code_____

Call_____

ELECTRONIC KEYERS—1970

BY EDWARD B. BEACH,* W4MXK

THERE has been much written in the various periodicals in the past several years about electronic keyers[1-6], and in quite recent publications[7,8]. I have read all of them with a great deal of interest, but have not seen one circuit that was really all it claimed to be. This is not to say that the keyers described were not good, rather that, while they all had something to offer, they also had drawbacks. Ever since the first disclosure of the W9TO keyer circuit[5] it was apparent that the only approach to take with electronic keyers was the strictly digital approach. But tubes were out. What was needed was a unit that would be at home in the shack or at a field day site or, yes, even in the car. But there certainly were a lot of transistors and parts in a keyer[1]. And what sort of battery drain would be involved?

Then along came ICs[6]. When Motorola announced their MC700P series of low cost RTL ICs, our bank account went down several dollars—I just *had* to play with some of these almost magical devices. After much experimentation and finding out how rugged these ICs were, came the guidelines of the keyer design. These were:

1) Make it low cost.
2) All solid state, no relays.
3) Grid block *or* cathode keying of the transmitter without modification.
4) Battery operation with reasonable life for the batteries.
5) Self completing, correctly spaced characters.
6) Built-in sidetone including loudspeaker.

*3800-18th Street North, Arlington, Va. 22207.

Basic Keyer

The first keyer that resulted used three ICs and one transistor, and drew 120 ma from a pair of D cells (360 mw power consumption).

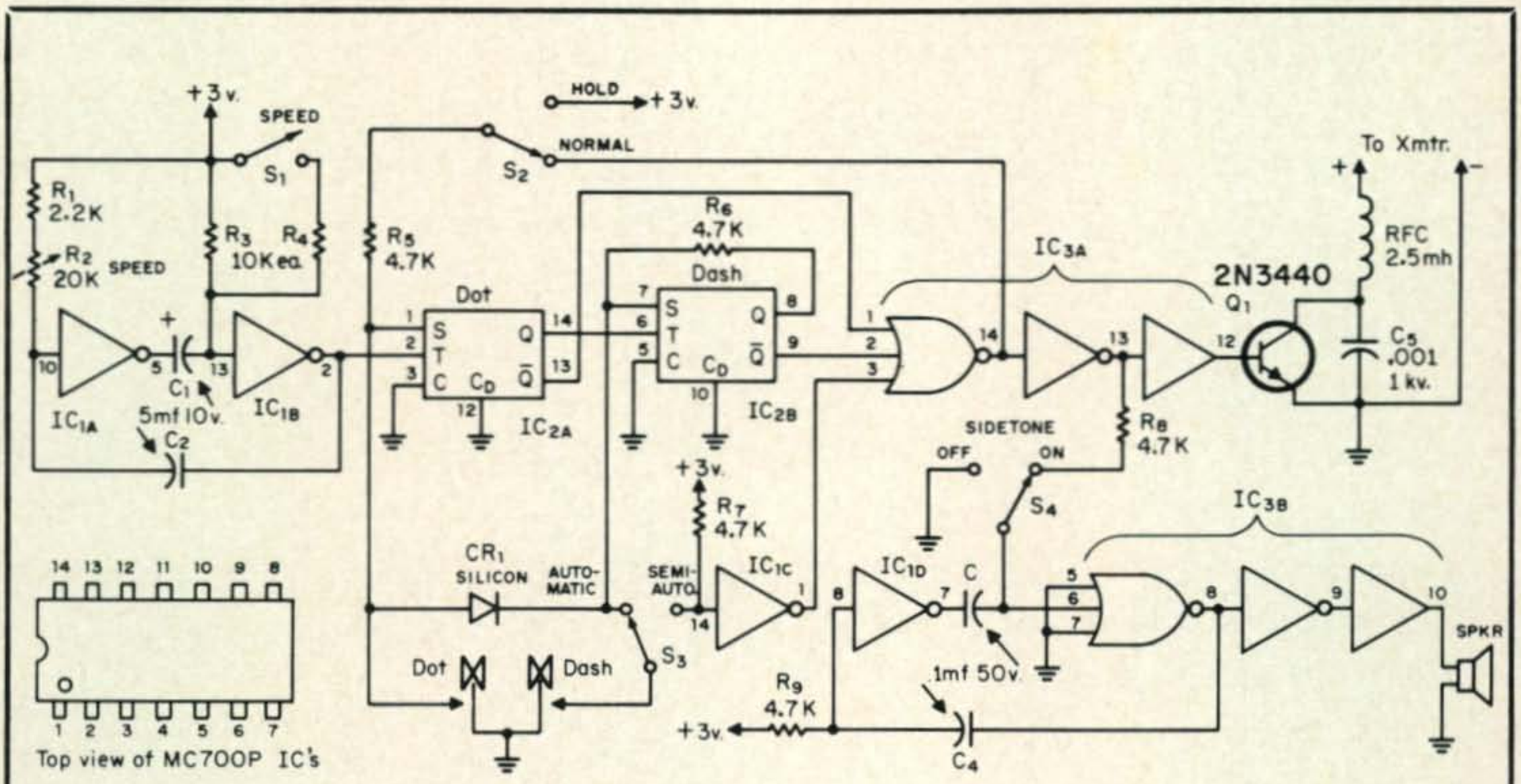


Fig. 1—Circuit of the basic electronic keyer. All resistors are 1/2 watt and all capacitors are in mf. Pins #4 of all ICs are grounded and all pins #11 are connected to +3 volts. Diode CR_1 is any type of silicon rectifier.

IC_1—MC789P hex inverter.
IC_2—MC790P dual J-K flip flop.
IC_3—MC788P dual noninverting buffer.
Sp—3 to 40 ohm voice coil speaker.

The circuit is shown in fig. 1 and contains all of the originally specified features, as well as a couple more. There are two speed ranges (S_1) which allow operation from about 8 w.p.m. to much faster than I can copy or send, about 65 w.p.m. at a guess.

For those used to a mechanical bug, there is provision for semiautomatic operation—self completing and untired "dits" and do-it-yourself "dahs." Using the dash side, you can also key manually. With certain settings of the two mode switches, S_2 and S_3, you can tap the dash paddle and get a "hold" condition, continuous keying of the transmitter. Another tap on either the dot or the dash paddle releases the hold condition and turns the transmitter off. If a dual lever keying switch is used, this circuit provides a "dash override" feature allowing easy generation of many code characters. This takes a bit of getting used to, however, and is recommended only after some experience is gained in the semiautomatic and automatic modes.

The three ICs used are an MC789P hex inverter (only four inverters of which are used in this version), an MC790P dual JK flip-flop and an MC788P dual noninverting buffer. The dual JK flip-flop is the actual code generator. One half of the dual buffer feeds the flip-flop outputs to the keying transistor and the other half of the buffer, along with one of the inverters, generates the sidetone—directly driving a 3 ohm to 40 ohm loudspeaker.

The time base is a free running multivibrator made up of two of the inverters. The speed is controlled in two ranges by R_2 and S_1. Switch S_1 parallels R_3 with R_4 to increase the speed.

The reason for using a free running multivibrator time base instead of a keyed time base is simply that this allows precise spacing between dots and dashes. With a free running time base, the space between dots and dashes will always be one dot (or longer if you happen to be going *very* slowly and are sending erratically). At the speeds normally used, 18-20 w.p.m. it is quite possible to squeeze dots and dashes together when using a keyed time base, if your sending "rhythm" is not too good.

Some people argue that with a free running time base you may have to "wait" after pushing the dot or dash paddles. This simply is not so. At a rate of 10 w.p.m. the dots occur every 0.24 seconds. It takes two pulses from the time base for every dot so the timing

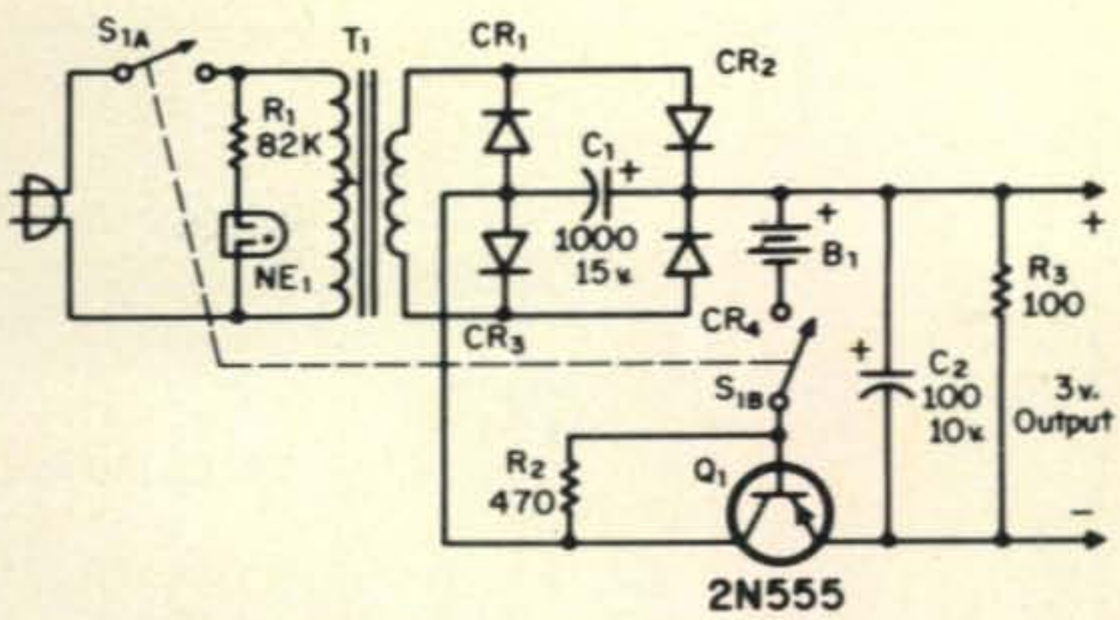


Fig. 2—Power supply used to operate the keyer from a power line. All resistors are 1/2 watt and all capacitors are in mf. The supply can also serve as a regulated 3 volt source for other purposes.
B_1—2 D cells.
CR_1 to CR_4—1 amp, 50 p.i.v. surplus diodes.
T—117 v to 6.3 v at 1 amp.

pulses occur every 0.12 seconds at 10 w.p.m. Assuming the *worst case* condition, paddle closure just after a timing pulse, you would have to wait a whole 120 milliseconds for your character to begin. Remember, this is the *maximum* wait at 10 w.p.m.; the average latency, or wait, is only 60 milliseconds, and most times would be less than this. Is that too long to wait? When you blink your eyes, they remain closed for about 1/20 of a second or 50 milliseconds, so judge this for yourself. Besides, who is going to operate an electronic keyer at 10 w.p.m.?

Circuit Operation

Operation of the keyer of fig. 1 is quite simple and is very much like other keyers previously described. With S_2 and S_3 in the positions shown, pin 14 of IC_{3A} is positive, pin 13 is zero and pin 12 is zero so Q_1 is off under quiescent conditions. The positive voltage at pin 14 of IC_{3A} is applied through S_2 and R_5 to hold the dot flip-flop, IC_{2A}, in the set condition, with pin 14 positive and pin 13 zero. The dash flip-flop IC_{2B}, is also held set with pin 8 positive and pin 9 zero. Connecting resistor R_7 to +3 volts holds IC_{1C} "on" so that pin 1 is zero. The three "zeros" from IC_{2A}, IC_{2B} and IC_{1C} are applied to pins 1, 2 and 3 of IC_{3A} and this is why pin 14 is positive.

Grounding the dot key terminal will ground the set input of the dot flip-flop and allow the timing pulse stream at pin 2 to toggle the dot flip-flop, producing an output at Q_1. This flip-flop will continue to generate dots as long as the key is held at ground. If the key is opened before the completion of a character,

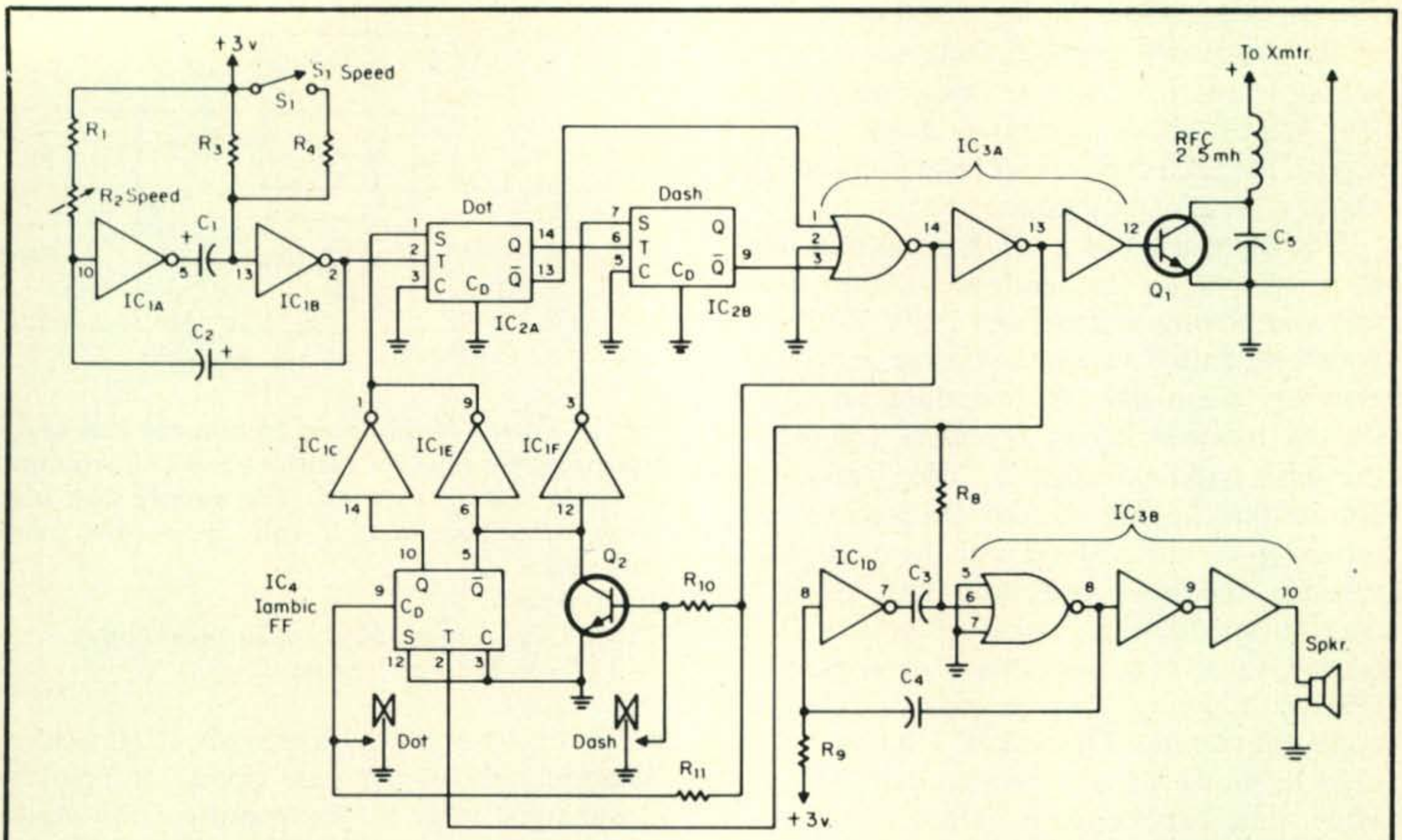


Fig. 3—Circuit of the lambic electronic keyer. All components are the same as those shown in fig. 1 except for those listed below:

IC_4—MC723P. Q_2—2N706, MP53391, etc. R_{10}, R_{11}—10K 1/2 watt.

the character will be completed anyway because the voltage at pin 14 of IC_{3A} will be zero as long as a character is being generated. This will allow the dot flip-flop to toggle once more (at least) until pin 14 of IC_{3A} goes positive to hold the dot flip-flop set once more.

Grounding the dash key terminal directly grounds the set input of the dash flip-flop, IC_{2B}, and also grounds the set input of the dot flip-flop through the diode, CR_1. As the dot flip-flop starts a dot, pin 14 of IC_{2A} goes to zero and causes the dash flip-flop to change state. The first dot will be completed, and because pin 9 of the dash flip-flop is now positive, pin 14 of IC_{3A} will remain at zero volts and cause another dot to start. The beginning of the second dot toggles the dash flip-flop again, putting it back in the set condition. The dash is completed when the second dot terminates.

If S_2 is placed in its other position, we can get some interesting results from the keyer. To begin with, the dot generation is unaffected; you will still get self completing dots. Dashes, however, are another story. Holding the dash paddle closed will generate a string of normal dashes, but they may or may not stop when you let go of the key! This is our "hold" function. Tap the dash key and the flip-flop toggles just once since the dot flip-flop will generate only one dot instead of two. Another tap on either dot or the dash key will generate a second dot which will toggle the dash flip-flop once more and clear the hold condition.

With S_2 connecting R_5 to +3 volts, slide switch S_3 to its other position. Now the dash key terminal connects to pin 14 of IC_{1C} and is used to generate manual dashes. Dots are still automatic and self completing. This is the semiautomatic mode, or the manual mode if you prefer to key both dots and dashes on the dash key.

Switch S_4 is used to mute the sidetone generated by IC_{1D} and IC_{3B}. The IC_{1D} and IC_{3B} combination is simply a keyed multivibrator. Tone can be vared by changng C_3, C_4, R_8 or R_9 to suit individual taste. You can remove the loudspeaker from the output of the sidetone generator and couple the sidetone, via a capacitor, to your receiver audio if you wish.

The keying transistor, Q_1, is a fairly new type and was designed as an audio output amplifier in line operated rados. Table I lists some suitable types for use at Q_1 in order of increasing list price. Transistor Q_1 has some very useful parameters. The two of most

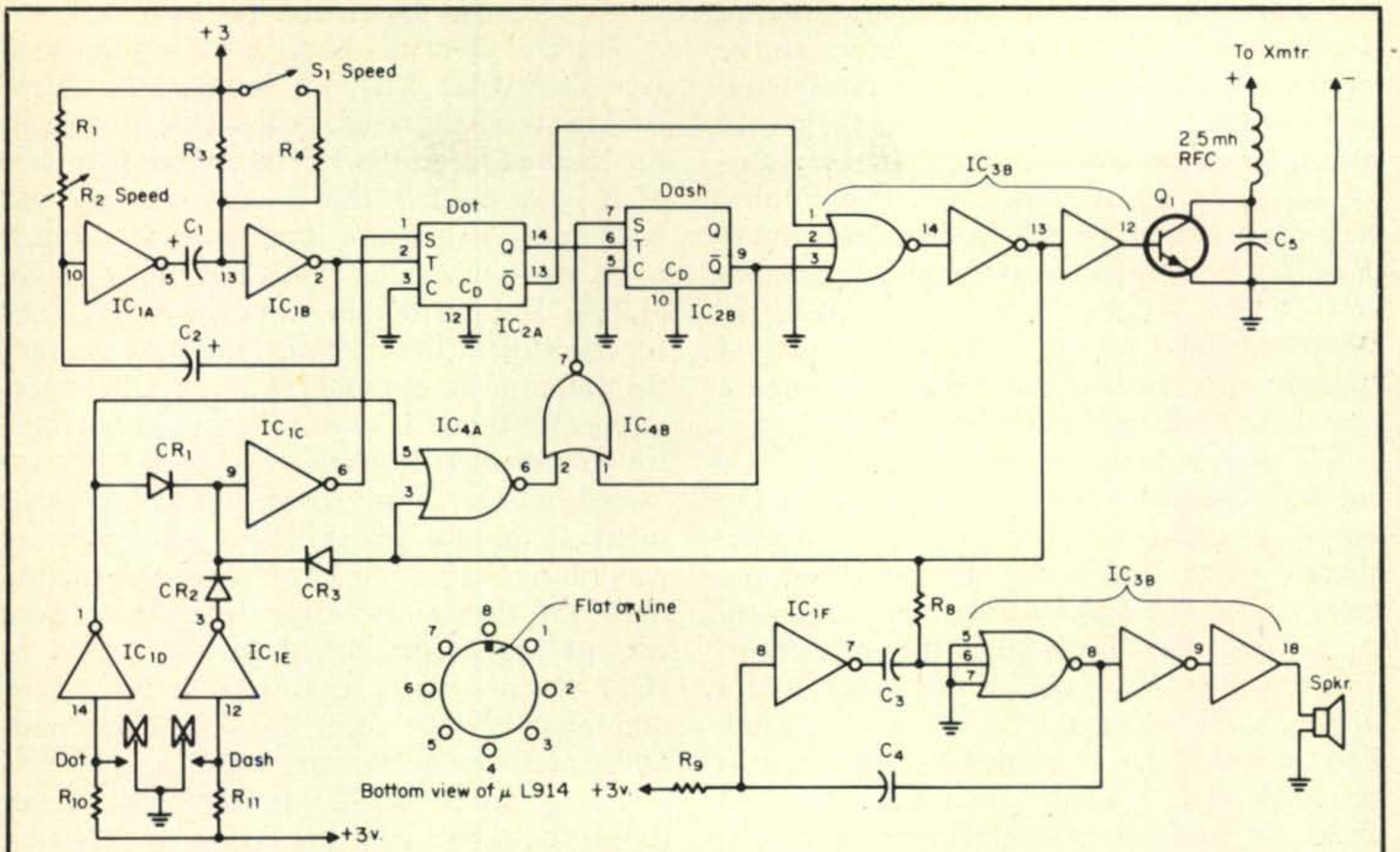


Fig. 4—Circuit of the dot override electronic keyer. All parts are the same as those in fig. 1 except for those listed below. Pin #8 of IC_4 is +3 volts and pin #4 is grounded. While the μL914 is shown above. 1/2 of an MC724P may be used.

CR_1, CR_2, CR_3—Surplus silicon diodes. See text. R_{10}, R_{11}—10K 1/2 watt.
IC_4—μL914

interest are its high *V*ce rating, 300 volts, and its large collector current rating, 150 ma. These two factors allow the transistor to be used to key, directly, cathode currents up to 150 ma or grid voltages of up to 300 volts. The one small fly in the ointment is that when keying a grid block transmitter, the emitter, and thus the ground circuit of the key, will be below the transmitter ground by the amount of the keying voltage. This really is no worse than directly keying the blocking bias as the large negative voltage is present at the key terminals in this situation also.

Power Supply

As mentioned previously, the primary power source for the keyer is a pair of D cells. For shack use only, it would be nice to have an a.c. operated supply as well. The power supply in fig. 2 satisfies both requirements, it can serve as a stabilized a.c. operated supply, or, by simple unplugging it and turning the switch "on" it will operate as a battery supply at slightly reduced voltage. With the values given in fig. 2, you have also a handy bench supply for IC expermentation since it will deliver a good steady 3 volts at one ampere.

Iambic Keyer

After a number of years using this "basic" keyer, I am quite satisfied with its operation, and have never felt the need for the "frills" of the so called ultimate keyers with their dot

Type	Mfg.	Case	Price
MJE340	Mot.	plst.	$1.06
40412	RCA	TO5	1.06
40321	RCA	TO5	1.25
40327	RCA	TO5	1.25
MJ400	Mot.	TO66	1.65
2N3440	RCA/Mot.	TO5	1.82
MJ421	Mot.	TO5	1.85
MJ3202	Mot.	TO66	1.87
MJ2252	Mot.	TO66	2.02
40318	RCA	TO66	2.10
40322	RCA	TO66	2.15
40328	RCA	TO66	2.19
40313	RCA	TO66	2.23
2N4240	RCA	TO66	2.89

Table I—A list of suitable keying transistors, Q_1, in the circuits of figs. 1, 3 and 4.

and dash anticipators of the squeeze keyed iambic keyer.[4] Anything that is added to the basic keyer adds to its complexity (and therefore its unreliability) and increases the power consumption. However, being an incurable experimenter, I played around with a number of circuits, most of which used too many parts in the complex control logic, and finally decided that without too much increase in complexity and power consumption I could make an iambic keyer, and perhaps even more useful, a Dot Override keyer.

The iambic keyer is shown in fig. 3. Basic dot and dash generation is the same as in the keyer just described. The time base, sidetone and keying are also exactly the same as in the basic keyer. The differences are in the control logic. The unused inverters of the basic keyer, shown in fig. 1, are used in this keyer, and a single JK flip-flop and a transistor are added. The transistor, Q_2, is needed because there is no single JK flip-flop available with both direct set and direct clear input terminals. (The MC726P has, but the outputs are buffered and inverted and are not usable in this application.)

In the quiescent state, the positive voltage at pin 14 of IC_{3A} is applied to the transistor base and the direct clear input of the iambic flip-flop, IC_4. Simultaneous direct set and clear inputs cause the flip-flop to "double invert" and *both* outputs are zero, an unusual condition for a JK flip-flop. The zeros into the three inverters above the flip-flop cause their outputs to be positive, holding the dot and dash flip-flops set.

Grounding the dot key terminal alone eliminates the double invert condition from the iambic flip-flop and pin 10 goes to a positive voltage, allowing the dot flip-flop to operate as before. Grounding the dash key terminal alone causes pin 5 of the iambic flip-flop to go to a positive voltage which allows both the dot and dash flip-flops to operate and generate dashes.

Grounding either the dot or the dash key terminal and then immediately grounding the other key terminal will produce alternating dots and dashes. The code output from pin 13 of IC_{3A} is applied as a toggle input to the iambic flip-flop and since both direct inputs are grounded the flip-flop will toggle at the end of each code character generated, producing the alternating dots and dashes.

Two D cells or the power supply of fig. 2 will also power this keyer, although the current drain will be up about 80 ma.

Dot Override Keyer

The Dot Override keyer is shown in fig. 4. Again, the time base, dot and dash flip-flops, keying and sidetone are exactly the same as in the basic keyer of fig. 1. The unused inverters of IC_1 are used in this keyer and there has been added a dual two input gate, IC_4, which is either half of an MC724P or a single μL914. The pin numbers shown in fig. 4 are for the μL914. In this keyer, grounding either the dot or dash terminals causes normal operation. (We'll let the reader figure out the logic for this one.) If *both* dot and dash keys are closed simultaneously, only *dots* will be generated. If the dot key is closed while you are generating dashes, the keyer will complete the dash and then start to generate dots. These actions are accomplished by the action of IC_{4A} which inhibits IC_{4B} from going to zero and enabling the dash flip-flop when both keys are closed at the same time.

The addition of IC_4 to the basic keyer jumps the power consumption to a whopping 130 ma (390 mw).

Diodes CR_1, CR_2 and CR_3 (as well as all other figures) are surplus silicon rectifiers of unknown origin available for about a nickle each from any of a number of the various mail order houses advertising in this and other magazines. Buy the cheapest you can get; 50 p.i.v. at one ampere is the five cent type.

Any of these keyers can be built using any number of construction methods. In fact, each keyer was built using different techniques: etched circuit, Veroboard and perforated unclad board. Without a great deal of thought and planning, the etched circuit approach with ICs invariably ends up with a large number of jumper wires, and if you are going to use jumpers you might as well use the Veroboard with a 0.1″ × 0.1″ grid of holes and pre-etched foil strips. It is possibly just as easy to use a perforated unclad board with a 0.1″ × 0.1″ grid of holes and then poke the hookup wire through the holes.

Conclusion

Well, that's about it. While this has not been a complete discussion of electronic keyers, the three models described have been more than satisfactory to a number of hams, and until my code speed gets up to the 40-60 w.p.m. range I think I will be perfectly happy with my basic keyer. (I've tried them all!) Maybe by that time I will have my haywired all IC Code Typewriter scraped off of the

[*Continued on page 82*]

For The Experimenter!

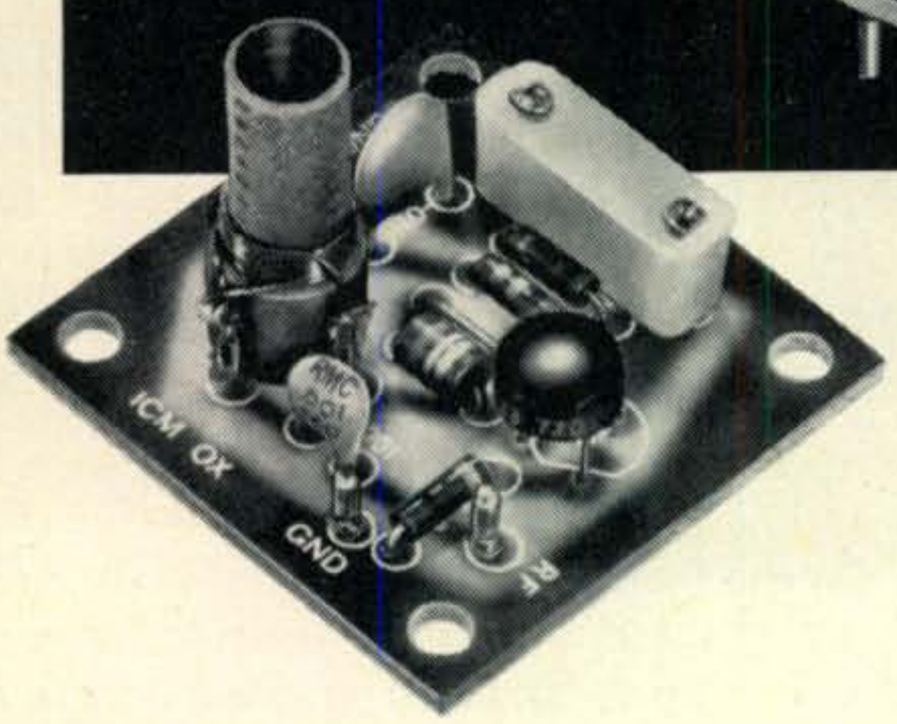
International EX Crystal & EX Kits

OSCILLATOR / RF MIXER / RF AMPLIFIER / POWER AMPLIFIER

Type EX Crystal

Available from 3,000 KHz to 60,000 KHz. Supplied only in HC 6/U holder. Calibration is ±.02% when operated in International OX circuit or its equivalent. (Specify frequency)

$3.95



OX OSCILLATOR

Crystal controlled transistor type.
Lo Kit 3,000 to 19,999 KHz
Hi Kit 20,000 to 60,000 KHz
(Specify when ordering)

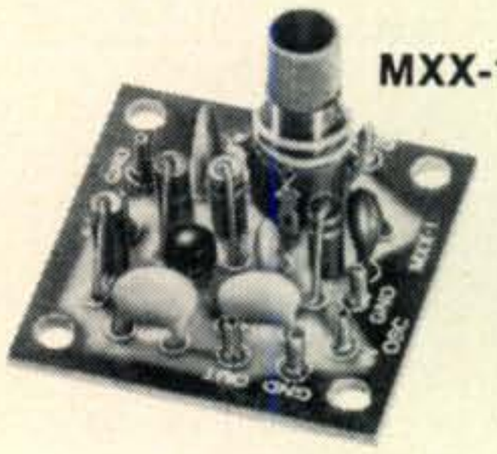
$2.95

MXX-1 Transistor RF Mixer **$3.50**
A single tuned circuit intended for signal conversion in the 3 to 170 MHz range. Harmonics of the OX oscillator are used for injection in the 60 to 170 MHz range.
Lo Kit 3 to 20 MHz
Hi Kit 20 to 170 MHz
(Specify when ordering)

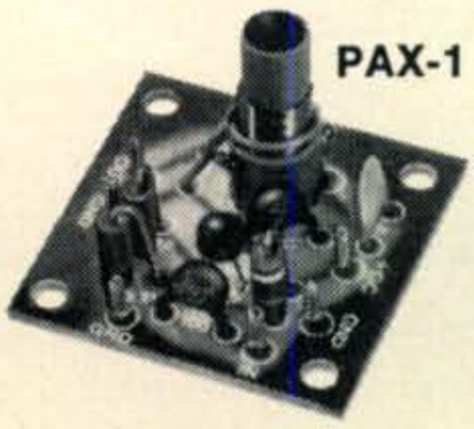
SAX-1 Transistor RF Amplifier **$3.50**
A small signal amplifier to drive MXX-1 mixer. Single tuned input and link output.
Lo Kit 3 to 20 MHz
Hi Kit 20 to 170 MHz
(Specify when ordering)

PAX-1 Transistor RF Power Amplifier **$3.75**
A single tuned output amplifier designed to follow the OX oscillator. Outputs up to 200 mw can be obtained depending on the frequency and voltage. Amplifier can be amplitude modulated for low power communication. Frequency range 3,000 to 30,000 KHz.

BAX-1 Broadband Amplifier **$3.75**
General purpose unit which may be used as a tuned or untuned amplifier in RF and audio applications 20 Hz to 150 MHz. Provides 6 to 30 db gain. Ideal for SWL, Experimenter or Amateur.


MXX-1


SAX-1


PAX-1


BAX-1

Write for complete catalog.

INTERNATIONAL

CRYSTAL MFG. CO., INC.
10 NO. LEE • OKLA. CITY, OKLA. 73102

The LSD

(Lightweight, Sturdy Discone)

An Omnidirectional Multiband VHF/UHF Antenna

BY PAUL H. BOCK, JR., K4MSG

THE average v.h.f. operator desiring omnidirectional coverage for equipment testing or local net operation has a variety of antenna types from which to choose. Unfortunately, the more common types, such as the ground plane, whip, coaxial vertical, halo, etc., are relatively narrowband devices; hence, the multiband operator must erect an antenna for each band on which omnidirectional coverage is desired. Despite the fact that these antennas are relatively small, and therefore do not usually create space problems, the amount of feedline required can become excessive unless the antennas are remotely switched with a suitable coaxial relay. While less expensive than multiple cables, this solution also costs money, and the end result may not justify the expense if the antennas are only put to use occasionally.

The Discone

One method of solving this problem is to erect a broadband omnidirectional radiator capable of covering several bands. The LSD (*L*ightweight *S*turdy *D*iscone) is such a radiator. It is relatively small, lightweight, omnidirectional, vertically polarized, and has a 50-ohm feedpoint impedance. As shown in fig. 1, the discone is nothing more than a disc mounted on (and insulated from) the apex of an upright cone. The slant height of the cone, D, is equal to a free-space quarter wavelength at the lowest operating frequency; this frequency is referred to as the *design* frequency, f_0. The base diameter is also equal to D, while the diameter of the disc is somewhat smaller, being equal to $0.7D$.

At a point approximately 20% below the design frequency, termed the *cutoff* frequency, the v.s.w.r. of a discone will rise very sharply to a high value. At frequencies above the design frequency the v.s.w.r. will generally remain below 1.6 until the upper bandwidth limit of the antenna is reached, the theoretical limit being $8f_0$. Thus, the discone appears to the feedline to be a properly terminated high-pass filter over its theoretical bandwidth. Although it is possible that the theoretical bandwidth may not be reached in practice, a bandwidth of $6f_0$ should be easily

*Box 40, USNCS, FPO, N.Y., N.Y. 09544.

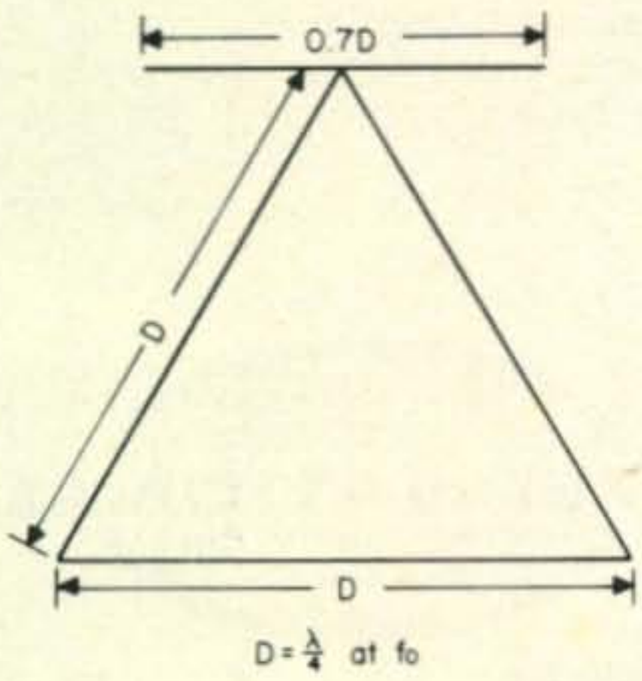


Fig. 1—Basic discone configuration.

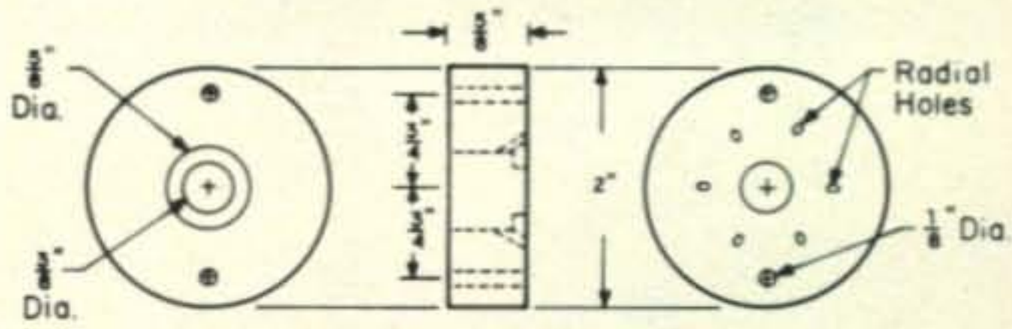
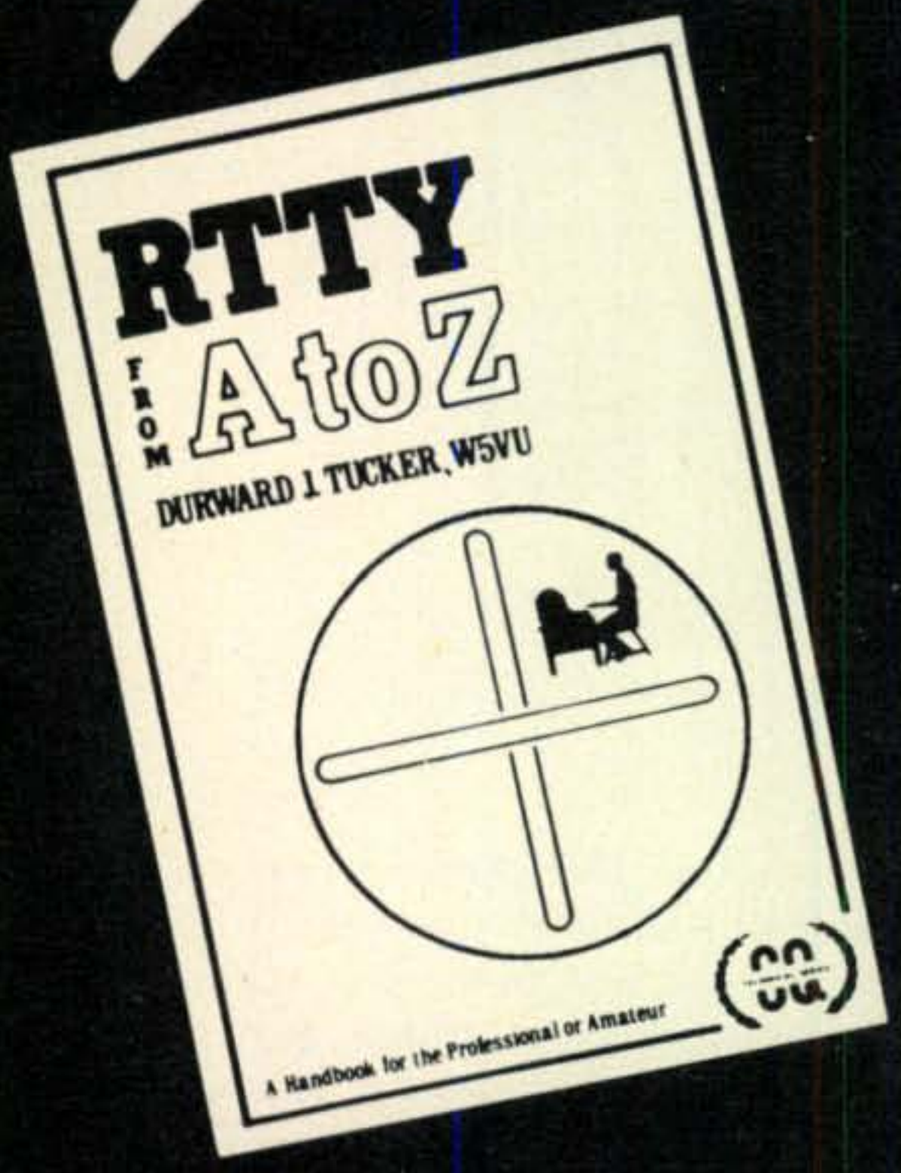


Fig. 2 — Main base mounting plate. Holes for radials are spaced 60 degrees apart on a 1" dia. circle, and tapped 6-32. Holes are drilled at an angle of 60 degrees to the surface of the plate (30 degrees to the vertical axis).

years in the making



RTTY FROM AtoZ

DURWARD J. TUCKER, W5VU

Drawn partly from the pages of **CQ**, and partly from previously unpublished material, this new RTTY classic has been produced to fill the void in RTTY knowledge among amateurs and professionals alike.

Written to round out the amateurs' RTTY bookshelf which up to now has relied solely on another **CQ** classic: "The New RTTY Handbook," the combination of the two is unbeatable. To properly describe the scope of this volume would demand a volume in itself, but the chapter headings below tell the story:

Chapter 1—**RTTY Basics.** Chapter 2—**The Teletypewriter.** Chapter 3—**Teletype and Radio Reception.** Chapter 4—**Converter (Terminal Unit) Basics.** Chapter 5—**Polar Relays and Distortion.** Chapter 6—**Special RTTY Circuits.** Chapter 7—**Test Sets.** Chapter 8—**Machine Adjustments.** Chapter 9—**Tape Printers.** Chapter 10—**Kleinschmidt Machines, Tape Readers, Teletype Models 28 and 32.** Chapter 11—**Codes, Data Processing & Advanced Machines.** Chapter 12—**Distortion Producing Test Sets.** Chapter 13—**Regenerative Repeaters and Frequency Shift Monitors.** Chapter 14—**Terminal Units.** Chapter 15—**The RTTY Station.** Chapter 16—**FCC Rules, Operating Procedures.**

This 224 page volume is finely printed on high quality paper with rugged card-stock cover for years of regular hard use. Hundreds of line illustrations and call-out type photographs. Detailed and complete index of U.S. Government Technical Manuals relating to RTTY; Glossary of RTTY Terms; and a 258 entry Index.

Your technical library won't be complete until it includes a copy of **RTTY FROM AtoZ**

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

RTTY FROM AtoZ **DURWARD J. TUCKER, W5VU** **$5.00 each, Postpaid**

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

Street ..... Enclosed is $ _____

City ..... State ..... Zip ..... for _____ copy(ies)

New York City and State residents add applicable sales tax

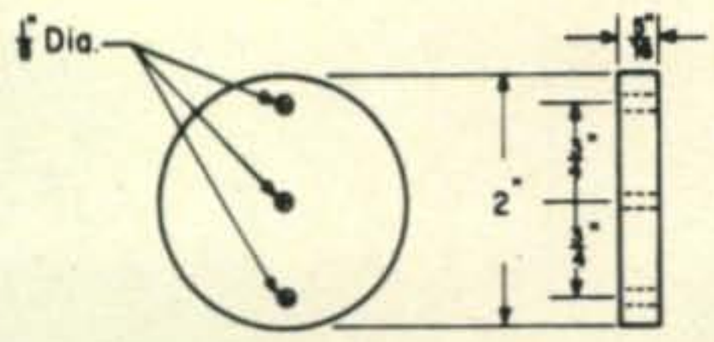


Fig. 3—Insulating disc. For low power operation most insulating materials are adequate, including even wood boiled in paraffin, at lower frequencies. At higher power and frequencies, materials such as Teflon or Nylon are recommended.

achieved using any reasonable amount of care in construction. Single discones could then be constructed for 50/144/220, 144/220/432, 220/432/1296, or 432/1296/2300.

Construction

The basic construction of the component parts is shown in fig. 2, 3, and 4, with the complete structure shown in fig. 5. The author has attempted to include sufficient information to permit duplication; in addition, there are a few basic points which must be observed if the antenna is to operate "as advertised":

(1) Both the disc and the cone can be constructed of sheet metal, or formed with a skeleton of rods. If rods are used, the minimum number for effective operation is 6, with 8 or more being preferable.

(2) The sides of the cone must form an angle of 30° with the *vertical centerline.*

(3) The apex of the cone should be located precisely at the center of the disc.

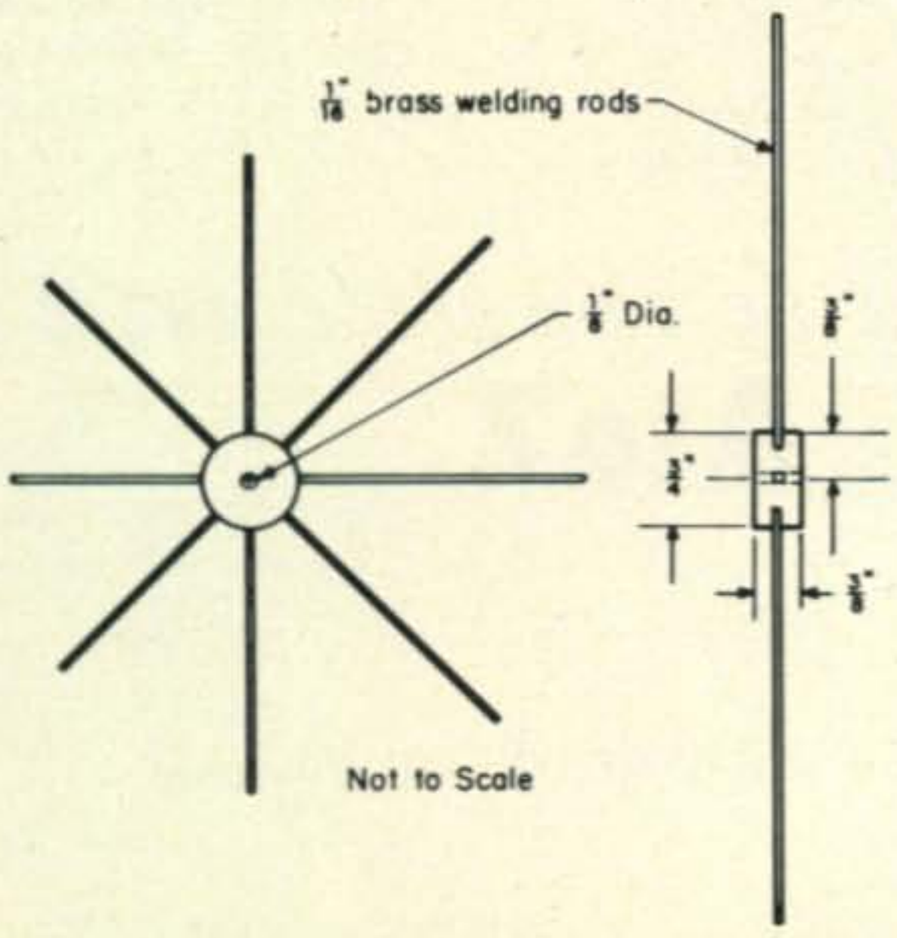


Fig. 4—Disc element. The disc hub is made from a 1/4" section of 3/4" dia. brass rod. Radials are 1/16" brass welding rod soldered to the hub. At the higher bands, a solid brass or aluminum sheet disc element would be more convenient to construct.

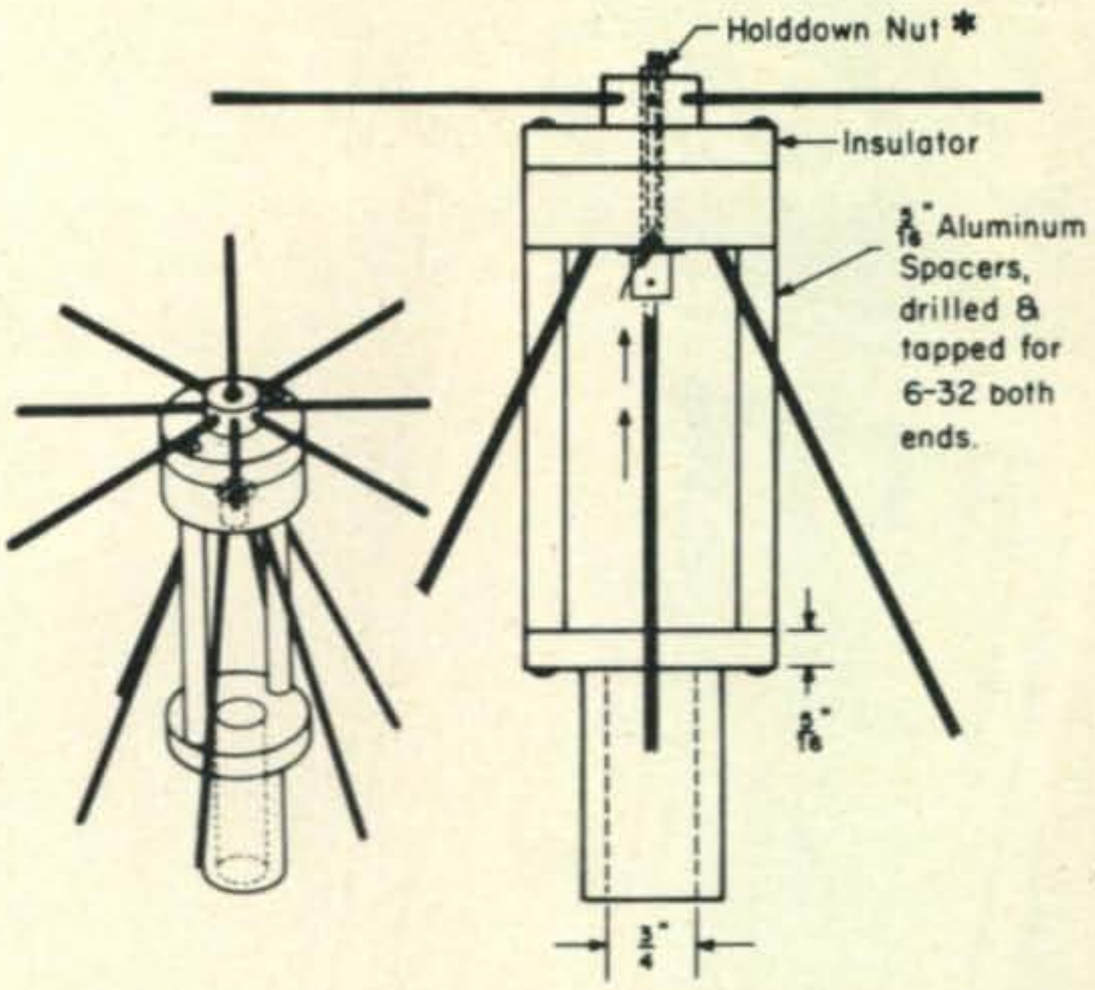


Fig. 5—The complete LSD discone assembly. An aluminum pedestal mounted on two 5/16" dia. spacers fits inside 1 1/8" aluminum tubing used as a mast. The coaxial feedline may be run inside the mast. The holddown nut fastening the disc element to the cone threads onto a 6-32 brass screw soldered to the center terminal of the BNC connector.

Actual construction is not too difficult. The author used a lathe to form some of the metal parts, but substitutions can be made readily and all holes drilled with a hand drill. The cone radials were made from 1/8-inch aluminum welding rod and threaded with a 6-32 die. The base holes were drilled by hand, using a carpenter's protracter to line up the drill at a 30° angle "by eye," and the holes were then tapped to accept the rods. The rods could just as easily be inserted vertically and then bent outward to the proper angle.

The author's version of the disc element consisted of 1/16-inch brass welding rod soldered radially to a quarter-inch length of 3/4" dia. brass rod, as shown in fig. 4. On the higher bands (220 and above), a solid disc cut from aluminum or brass sheet is simpler and more effective.

A type BNC connector was used in the version described, but if power levels over 100 watts are contemplated a type N connector should be substituted. In this case, the base should be a bit larger and the height of the disc adjusted to put it at the proper point. In the event that high power is used, it might be well to fill the hole around the connector with a good potting compound to make it weatherproof and prevent arc-over. The disc

[*Continued on page 76*]

The Henry 2K-3 Linear Amplifier

LISTEN TO IT SPEAK

Five years ago the first 2K started speaking for itself. The entire amateur world has gotten the message. The BIG, SHARP, CLEAN 2K signals have been passing the message of quality since that day. This is the way an SSB signal should sound. Now after two model changes and as we approach the three thousand mark in the 2K series, the message is even louder and clearer. Let us help you produce that same strong, clean signal that you hear coming in from 2K owners the world over. Come in, call, or write for literature describing the superb 2K-3 in detail. And then let us work out terms that will fit your budget.
The 2K-3 (console or desk model) $745.00

EASY FINANCING • 10% DOWN OR TRADE-IN DOWN • NO FINANCE CHARGE IF PAID IN 90 DAYS • GOOD RECONDITIONED EQUIPMENT • Nearly all makes and models. 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. Write for bulletin. Export inquiries invited.

TED HENRY (W6UOU) **BOB HENRY** (WØARA) **WALT HENRY** (W6ZN)

Henry Radio

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
931 N. Euclid, Anaheim, Calif. 92801 714/722-9200
Butler, Missouri 64730 816/679-3127

Henry Radio has representatives in different areas of the U.S. to simplify ordering for those living near one. Or you can order direct and we will ship . . . across the street or around the world. Call or write for specifications and terms.

New York area: John Richardt, W2WIY (201) 637-4107
Chicago area: Bill Reynolds, K9ZXD (312) 259-2828
Houston area: Jan Carman W5SBX (713) 464-0419

Attention: Military and commercial users. The new 3K amplifier is now available for continuous duty high power RTTY and extra power SSB operation. $895.00 F.O.B. Los Angeles, Calif.

CQ Reviews:

The Drake SPR-4 Communications Receiver

BY WILFRED M. SCHERER,* W2AEF

THE Drake SPR-4 Communications Receiver is a versatile solid-state job for operation with a.m., s.s.b. (upper or lower), c.w. and RTTY on 24 selected 500 kc segments within the 150 kc-30 mc range. An identical linear-tuning rate with calibrations at 1 kc increments is provided for all segments.

The receiver is normally supplied with coverage on the following segments: 150-500 kc; 0.5-1.0 mc; 1.0-1.6 mc; 6.0-6.5 mc; 7.0-7.5 mc; 9.5-10.0 mc; 11.5-12.0 mc, 15.0-15.5 mc; 17.5-18.0 mc and 21.5-22.0 mc. These ranges thus take in the l.f., standard and short-wave broadcast bands, making the receiver initially set up for the b.c.l. or s.w.l.; however, the SPR-4's usefulness by no means ends here, since there are 14 additional segments that may be covered with the installation of appropriate extra crystals. Where the initial segments are not desired, these too may be altered with the substitution of other crystals. Crystals may be obtained individually or in kits made up for the various communications services such as Amateur, Marine Ship-to-Shore, Aeronautical Overseas, Time and Frequency Standard (WWV), Tropical Broadcast, MARS, Commercial Teletype/Press/Weather.

*Technical Director, *CQ*.

The Drake SPR-4 Communications Receiver.

Other features that make the SPR-4 suitable for a wide range of applications include: a high order of frequency stability; high sensitivity; excellent signal-handling capabilities; automatically-switched selectivity of 0.4 kc for c.w., 2.4 kc for s.s.b., 4.8 kc for a.m.; very flat a.g.c. with time constants automatically selected for each mode; pre-selector tuning; variable-notch filter; muting facility; provisions for accessory 100 kc crystal calibrator, RTTY adapter, transceive adapter and Drake's exceptional noise blanker; [1] tuner or phono input to a.f. amplifier; instant operation from a 120/240 v.a.c. or a 12 v.d.c. source.

Another accessory is a loop antenna for a direction finder in the 150-1600 kc range. There is also a mobile mount available as well as a battery pack for field operation. An added convenience is a built-in speaker.

Lineup

Dual conversion is employed using a 1st i.f. of 5645 kc and a 2nd i.f. of 50 kc as shown at fig. 1. For the 150-500 kc range the oscillator-injection signal at the 1st mixer is obtained directly from the v.f.o. which is then tuned from 5495 to 5145 kc. The sum frequencies produce the 5645 kc i.f. For all the other ranges the v.f.o. tunes 5495-4995 kc and the heterodyning signals are obtained by pre-mixing the v.f.o. output with that from a crystal-controlled oscillator. The crystal frequency is 11,090 kc (5645 kc i.f. + 5445 kc v.f.o.) plus the frequency at the low end of the desired 500 kc segment (the v.f.o. can be tuned 50 kc each side its fundamental range, extending each band segment an additional 50 kc at each end). The pre-mixer output is the crystal frequency minus that of the v.f.o.

[1] See "*CQ* Reviews the Drake TR-6 Transceiver," *CQ*, February 1970, p. 61.

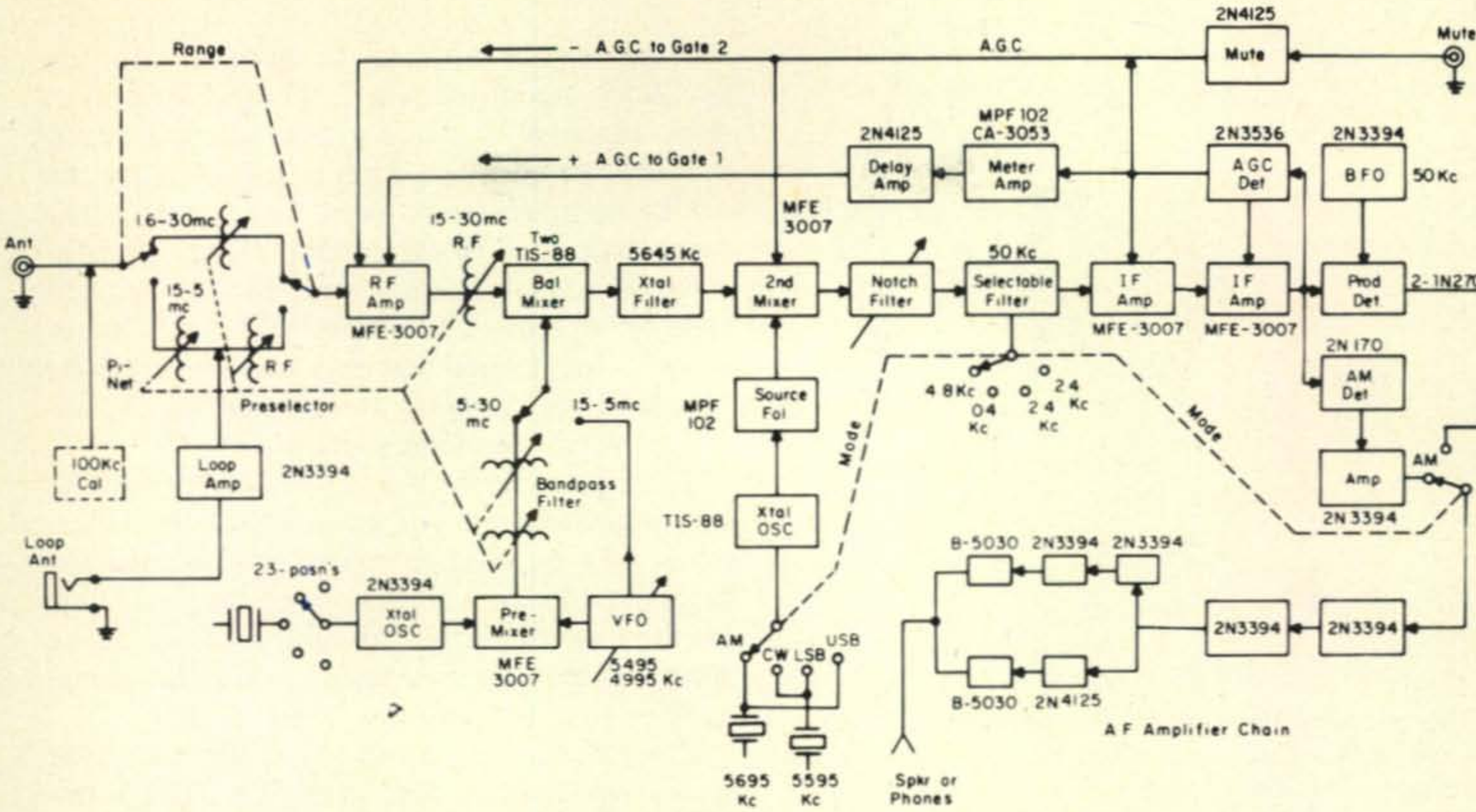


Fig. 1—Block diagram for the SPR-4. Details are given in text.

Oscillator injection at the 2nd mixer is brom a crystal-controlled source using either a 5695 or a 5595 kc crystal to produce the 50 kc i.f. U.s.b. or l s.b. operation may thus be selected without the need for retuning the v.f.o. or b.f.o. in order to remain on frequency. The b.f.o. is self-excited and fix-tuned to 50 kc.

Details

One of the factors responsible for the success of the SPR-4 is the wide use of fet's, many of which are the dual-gate mosfet's that not only feature the high input impedance, low noise and wide dynamic range of single-gate fet's, but which also have beter a.g.c. and cross-modulation characteristics plus significantly lower feedback capacitance, all of which, augmented by well-designed associated circuitry, adds up to superior performance.

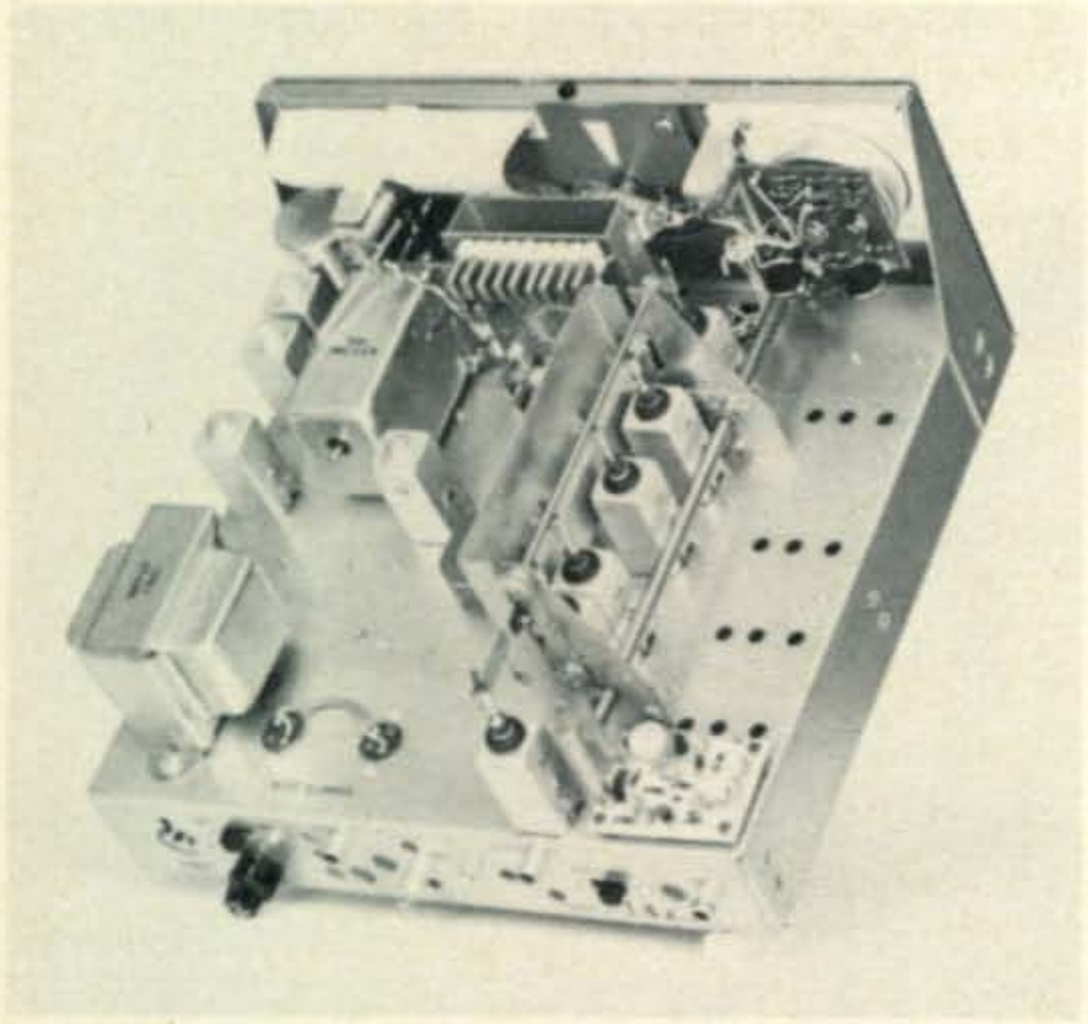
The r.f. input stage utilizes a dual-gate mosfet with premeability-tuned circuits at the input and output that provide pre-selector tuning. On the three ranges between 150 and 1600 kc the antenna is coupled to the high end of the r.f. input inductor through a Pi-network that provides antenna matching and functions as a low-pass filter. This minimizes inter-station beats or other adverse effects from very strong standard-broadcast signals above the cutoff frequency which is varied with the network inductor that is gang-tuned along with the pre-selector tuning of the other r.f. circuits. This optimizes the network performance for the particular area of operation. A transistor amplifier is bridged to the input for use with a loop antenna.

On all the other bands, a different r.f. input inductor is switched in and the antenna is connected to a low-impedance primary winding at the inductor. The same inductor is used on all these ranges with the required resonance obtained by the position of the core provided by the permeability-tuning control for the preselector, plus the needed shunt capacitors that are switched in or out. The output circuit for the r.f. stage is similarly set up.

Burn-out protection for the input mosfet from large r.f. voltages is provided by the usual, expedient of two reversed diodes shunted across the signal-input circuit. A simple wrinkle here, which should be of particular interest to the "do-it-yourselfer," is that the diodes are reverse-biased so that they do not conduct until a dangerously-high r.f. voltage, such as that from a nearby transmitter, is encountered.

This avoids cross-modulation or intermodulation responses from being produced by premature diode conduction that might otherwise occur when strong received, but potentially non-damaging, signals are encountered under normal conditions. The set-up is shown at fig. 2.

The 1st mixer is a balanced type using two single-gate fet's. The r.f. signal is fed to the



Top view of the SPR-4. The permeability-tuning rack and the six controlled inductors are in the foreground. Easily accessible crystals are near the center by the panel.

gate of one fet and to the source of the other. The oscillator-injection signal is fed to the source of the first fet and to the gate of the latter. The 5645 kc output is obtained from both drains which are connected in parallel to the tuned output circuit. Precise balance is obained by a potentiometer with its arm grounded and the ends connected between the sources. Use of this type mixer minimizes signal and oscillator feedthrough and improves i.f.- signal rejection.

The output of the mixer goes to a 4-pole 6 kc-bandwidth 5645 kc crystal filter that minimizes spurious signals outside the i.f. passband and contributes to the overall i.f. selectivity.

The 2nd mixer is a dual-gate mosfet with

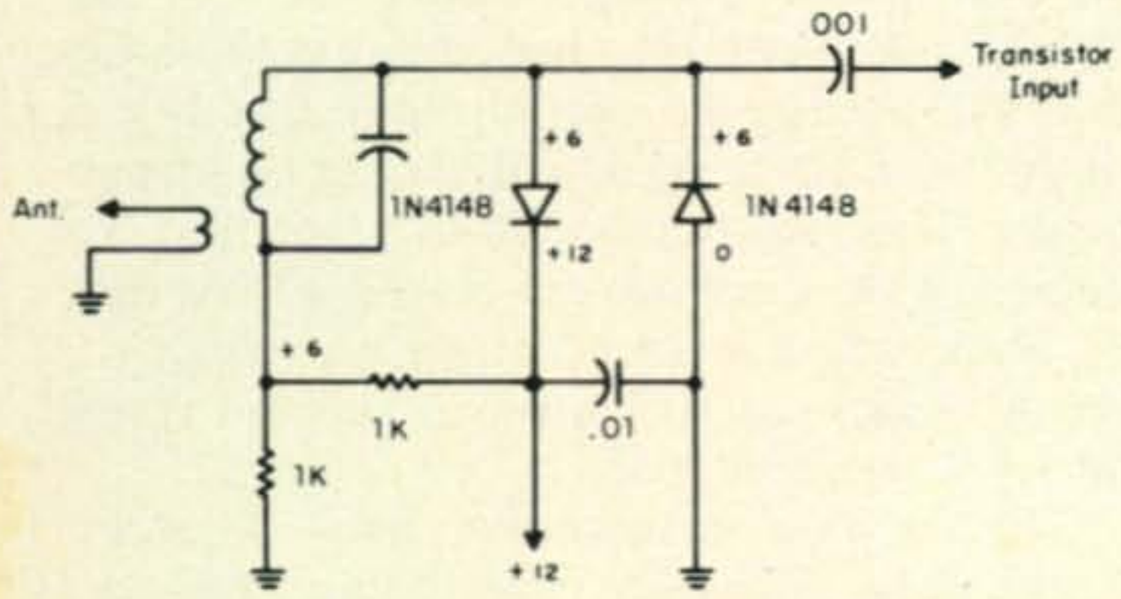


Fig. 2—Protective setup for input mosfet as used in the SPR-4. The diode anodes are at a negative potential of 6 v. in respect to the cathodes. Conduction therefore cannot occur until a forward bias is produced by r.f. levels slightly exceeding 6 v. Diode clipping then occurs and prevents any increase in input voltage.

the r.f. signal applied to gate 1 and the oscillator signal to gate 2. The 50 kc output goes through a passive permeability-tuned variable-notch filter. This is followed by the 50 kc selectable-passband filter that is the same type used in other Drake gear. It consists of four high-*Q* tuned circuits capacitively-coupled. The three different bandpasses, mentioned earlier, are selected by changing the coupling and resonating capacitances with the mode switch.

Dual-gate mosfet's are used in both 50 kc i.f. stages where their good a.g.c. characteristics may be used to advantage, as may the high impedance at the input to the first stage be for ease of proper matching to the 50 kc filter. These stages operate with the signal applied to gate 1 and a.g.c. to gate 2.

Two diodes in a ring-type demodulator make up the product detector. The a.m.-detection system consists of a diode envelope detector followed by a bipolar-transistor amplifier.

Any vestige of the 50 kc component from the detectors is eliminated by a low-pass filter at the input to the a.f. system that employs seven bipolar transistors. Two cascaded stages and a phase inverter drive four stages in a push-pull Darlington configuration with the a.f. obtained directly from the two output transistors without the need for a transformer.

Oscillators and Pre-Mixer

The v.f.o. is a permeability-tuned affair in a Hartley-type circuit and is similar to that used in other Drake gear, except that a single-gate fet is used in the oscillator itself. A bipolar-transistor buffer amplifier is included in the v.f.o. unit.

The crystal oscillator for premixing with the v.f.o. is a bipolar transistor with a tuned-collector. An 8-position switch selects various combinations of inductance and capacitance for the different crystal ranges.

The pre-mixer is a dual-gate mosfet with the v.f.o. signal applied to gate 2, the oscillator to gate 1. The output goes through a double-tuned capacitance-coupled circuit before being injected to the 1st mixer. Different shunt capacitors and inductors in series with a permeability-tuned inductor in each leg are switched in or out with the range switch.

These two inductors are ganged to the preselector tuning, so that the passband is always optimized for the minization of spurious

signals due to oscillator harmonics and unwanted mixing products that otherwise might be accentuated at the frequency to which the preselector is tuned.

The crystal oscillator for the 2nd mixer is a single-gate fet in a Pierce circuit with a similar fet used as a source-follower output. The b.f.o. is a Hartley type with a bipolar transistor.

The crystal-selector for the 2nd-mixer oscillator is ganged with the filter-bandwidth and a.f. amplifier-input switches for correlation with the required mode of operation; that is, a.m. with 4.8 kc filter, c.w. with 0.4 kc and l.s.b. or u.s.b. with the 2.4 kc filter.

A.G.C.

A negative-voltage a.g.c. is applied to gate 2 of the r.f., 2nd-mixer and i.f. stages. In addition, a positive-voltage loop goes to gate 1 of the r.f. stage. The latter voltage (derived from the S-meter which is operated by an amplifier using an I.C. and and fet driven by the negative a.g.c. loop) is delayed until a large signal is received. A flat a.g.c. characteristic with a wide dynamic range is obtained, while minimizing the susceptability to front-end overload.

Optimized attack and release times are obtained, using combinations of resistors, capacitors and steering diodes, that are automatically seleced by the mode switch.

Muting is obtained with a bipolar transistor the collector of which provides a cutoff voltage to the main a.g.c. line when the base current of the transistor is cut off by open relay contacts at the transmitter.

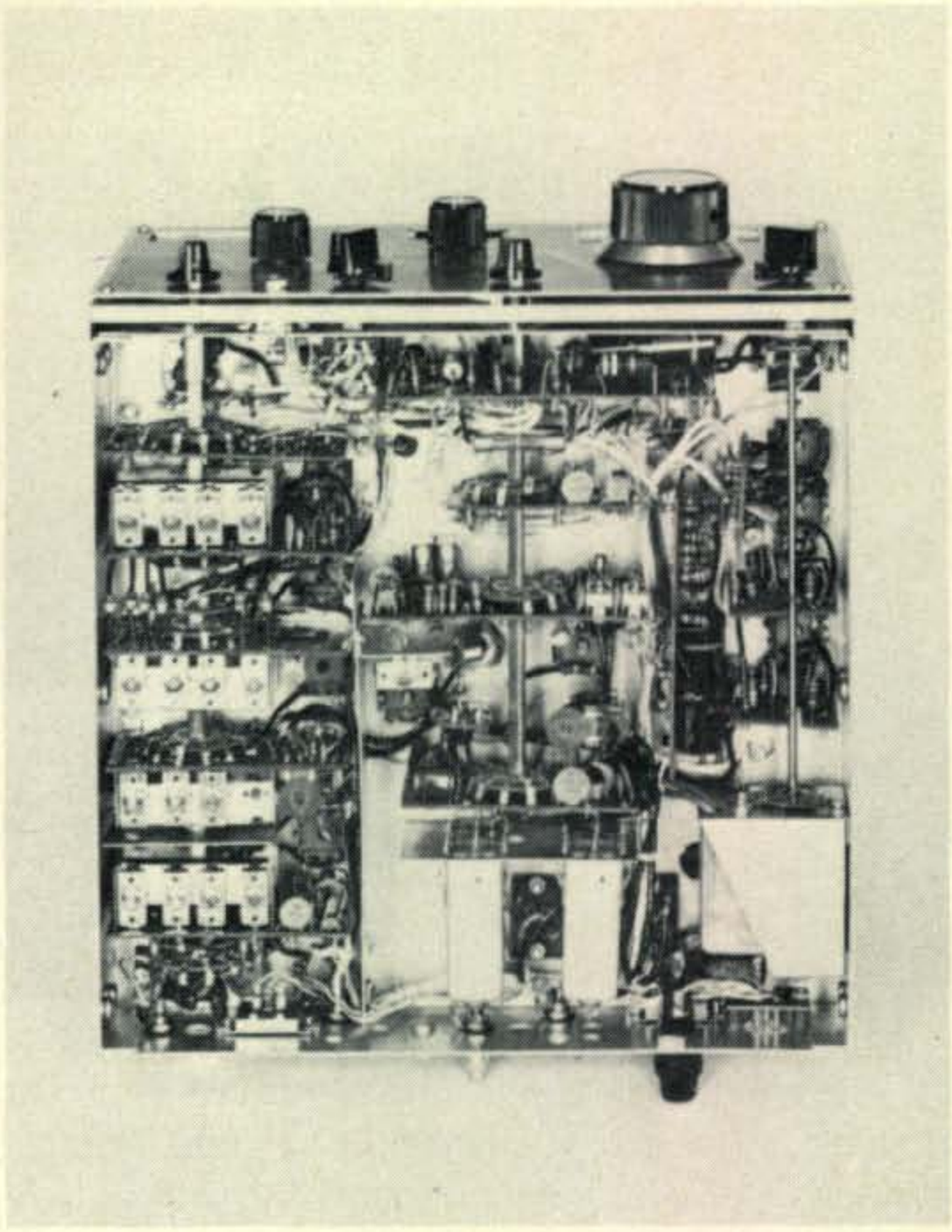
A unique twist is that a small negative biasing voltage for the a.g.c. and muting set-up is obtained by rectifying the r.f. output from the 2nd-mixer oscillator and regulating it with a zener diode.

Power Supply

Power is obtained from an a.c.-operated supply with a full-wave silicon-diode rectifier. 12 v.d.c. output is stabilized by a regulator using a biopolar transistor and a zener reference, plus a zener regulator for a 10 v. tap.

Two separate transformer-primary windings may be switched for 120 or 240 v.a.c. use. The switch is a slide type on the rear apron and may be locked in place as needed.

For use with a 12 v.d.c. source, a different power cord is plugged in that circumvents the transformer and routes the d.c. input through a steering diode that provides reverse-polarity protection. The dial lamps may be turned off during a.c. or d.c. operation.



Bottom view of the SPR-4. It is a neat layout with the various sections of the receiver built on individual vertically-mounted circuit boards.

Operation

The receiver is set up forany range by rotating the crystal-selector dial to the position that indicates the low-frequency end (in mc) of the desired 500 kc segment. A numeral beneath the frequency-range number indicates the preselector setting for that range. Under this numeral is a letter that denotes the required range-switch position. When crystals are added or substituted for other ranges, labels are provided for application to the correlated dial position.

The v.f.o. is tuned with a high-ratio drive that covers a 20 kc spread with one revolution of the knob. Two transparent dials rotate concentrically at different rates. One, with 1 kc calibrations spaced 1/8", covers 100 kc per revolution with numerals 10 kc apart from 0 to 100. The other rotates five-times slower over a 500 kc spread and has only numerals at 10 kc intervals from 0 to 500. The frequency readout is the sum of the megacycles indicated at the crystal selector, the nearest 100 kc numeral at the left of the hairline, and the 1 kc dial reading. The 1 kc

[*Continued on page 76*]

A Simple D.C. Voltage Dropper

BY W. EDMUND HOOD,* W2FEZ

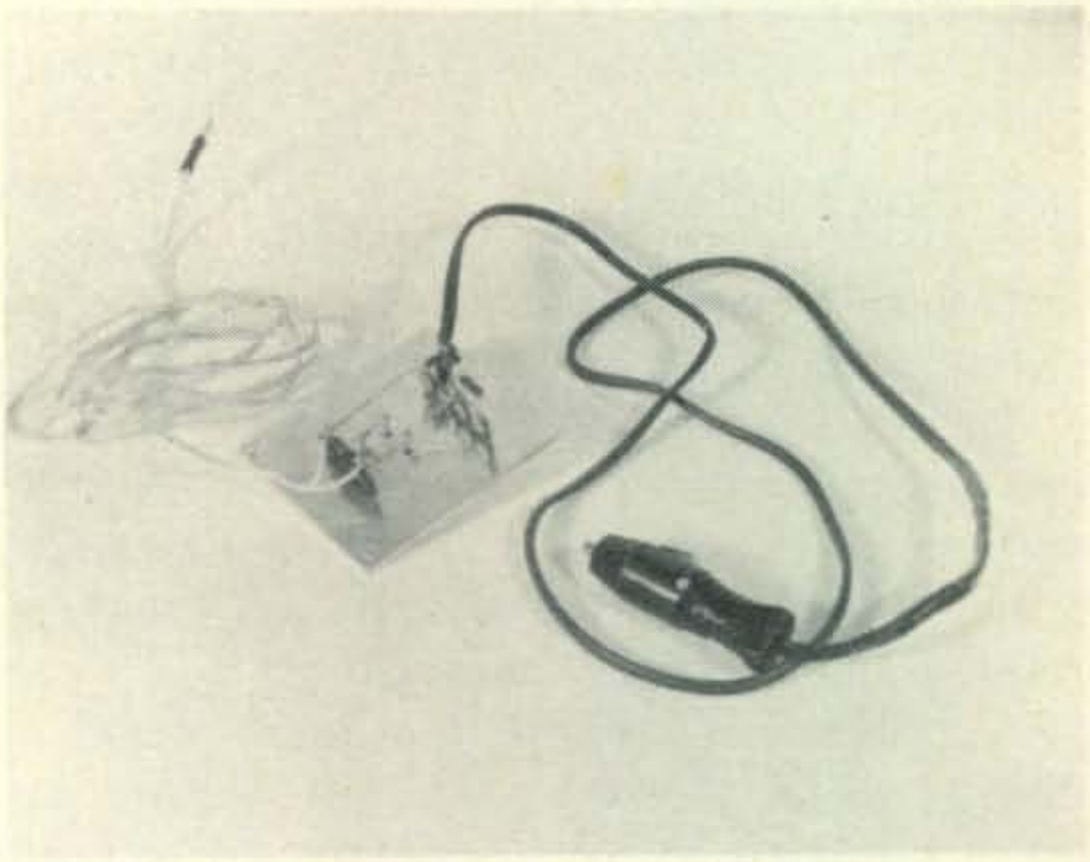
THE problem arose simply enough. It seems the Japanese engineer who designed my portable tape recorder never stopped to ponder the possibilities of its being used in a car. Either that, or his specifications on American cars are sadly outdated. The recorder is designed to run on six volts.

I use the machine often when on long trips to provide background music, avoiding the annoyance of passing in and out of the range of numerous stations, and also avoiding the cost of a cartridge player. The only thing I needed was a means of operating the instrument from the car's battery. The answer turned out to be a rectangular lump of plastic about the size of a pack of cigarettes with an uncluttered array of components sealed up inside it. I plug it into the lighter socket of the car and, from its output, I get a neatly regulated six volts over a range of loads from a few milliamps to one or two amps.

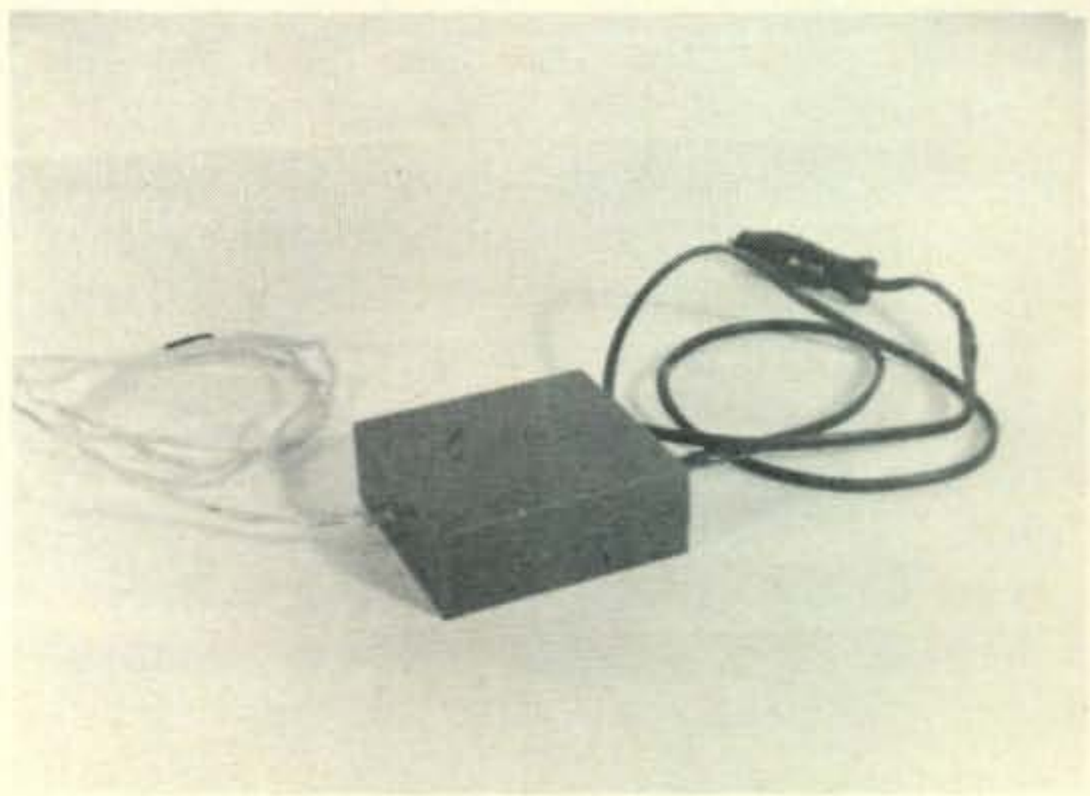
The internal circuit is quite simple—a zener diode, a transistor, and two resistors. The theory of its operation is equally simple; the zener diode controls the voltage, and the transistor acts as an electronic potentiometer, automatically adjusting its internal resistance to compensate for varying loads.

When a zener diode is reverse biased, its junction breaks down whenever the applied voltage exceeds a certain critical value. Then, if the applied voltage is further increased, the current drawn by the junction varies with the applied voltage, regulating the junction voltage at the breakdown level. If a current-limiting resistance is connected in series with the diode and a load connected in parallel with the diode, the diode voltage is held constant over a wide range of source and load variations.

A transistor is needed to regulate heavy loads. The collector is connected to the source, the base to the zener diode, and the emitter to the load. The experienced reader will quickly recognize this as an emitter follower circuit, so named because the emitter voltage with respect to ground follows that



Above, the author built his unit on a 4 × 4 inch aluminum plate, which was then encapsulated, below.



*116 W. Park St., Albion, N.Y. 14411

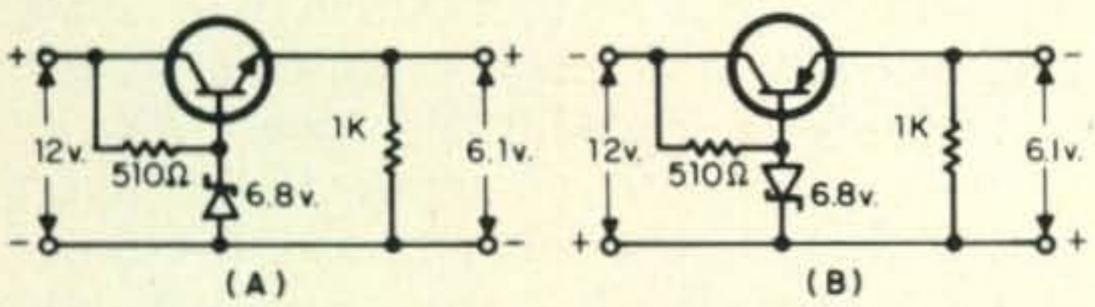


Fig. 1—(A) Voltage dropper, as wired to have common negative. Transistor is d.c. power regulator, replacement type. Note that zener diode is chosen to include transistor base-to-emitter drop. (B) For a common positive, use a PNP transistor and turn the diode around. Other values are the same.

of the base less a 0.7 volt base-to-emitter drop.

Current in such a circuit is limited by the beta of the transistor, maximum being determined by multiplying the beta by the base current. For example, if the beta of the transistor were 25, and the base current 40 ma, the circuit could deliver no more than 1 amp.

Base current is determined by dividing the difference between the supply voltage and the zener voltage by the value of the zener's series resistor. In the circuit shown, $Er = 12.0 - 6.8$ volts, which is 5.2 volts. The base current is $Er \div R$, or $5.2 \div 510$ amps, which is 0.0104 amperes, 10.4 ma. If the beta of the transistor is 50, the maximum current available is $50 \times .0104$ amperes, which is 0.52 amperes. (My tape recorder draws 300 ma, so these values are more than adequate. I have drawn test currents in excess of 1 amp, so it looks like I have a fairly hot transistor.)

The transistor is a power regulator type. Since it drops a certain amount of voltage while passing current, it dissipates power, and that must be taken into consideration when buying your transistor. I used one of the universal replacement power regulator types. That's why the type is not specified.

In choosing the zener diode, remember that a silicon transistor has a base-to-emitter voltage drop of 0.7 volts. Choose one rated 0.7 volts higher than the desired voltage. (Zeners are presently supplied in standard RETMA values, 5.6, 6.8, 8.2, 9.1, 10.0, etc. volts.)

The value of the resistor in series with the zener is calculated by dividing the needed voltage *drop* ($Es - Ez$) by the maximum base current you intend to draw, plus about 20% for a safety margin.

I was fortunate enough to have access to the proper facilities to encapsulate my unit in plastic. The reader may prefer to build his in a metal box. If so, it's not advisable to use the box as the transistor's heat sink. Keep the box connected to the car's ground. You can use a 3×3 inch aluminum plate or a commercial heat sink if you wish, but I've been told that a silicon transistor can get hot enough to burn your fingers without damaging it (the transistor, not your finger!). There is nothing unique about this circuit. It is widely used in regulated power supplies, and applications such as this. ■

Evolution of the Decibel

BY JAMES M. BRUNING,* K2BZ

PART II

This is the conclusion of a two-part article describing an everyday approach to understanding and using the decible.

IN Part 1 we learned that a decibel measures *efficiency*, meaning "output divided by input." If output is 4 and input is 8, the ratio is 1/2 or 50%, and we say there has been a −3 db "loss." If these figures are reversed, the ratio become 2/1 which is 200%, and we say there has been a +3 db "gain." In using the decibel, we think of it as just a "ratio" between two quantities. That is the fundamental meaning of the decibel.

Expressing DB's as "Ratios"

Let's compare two familiar quantities, a quart and a gallon. If we divide a gallon by a quart, we get the ratio 4.0, but if we divide a quart by a gallon, we obtain the decimal ratio 0.25. In comparing two different quantities, we *always* end up with *two* ratios, one being *greater* than unity, and the other *less* than unity.

Now compare two amounts of power, 3 watts and 30 watts. The ratio 30/3 is 10, which is greater than unity, and we have learned to express it as +10 db. The opposite ratio 3/30 is 0.1, which is less than unity, and we have learned to express it as −10 db.

*14 Noel Drive, North Arlington, N.J. 07032

GAIN		LOSS	
db	*Ratio* $\frac{P\ out}{P\ in}$	*db*	*Ratio* $\frac{P\ out}{P\ in}$
0	1.0	0	1.0
+1	1.25	−1	0.8
+2	1.6	−2	0.63
+3	2	−3	0.5
+4	2.5	−4	0.4
+5	3.2	−5	0.32
+6	4	−6	0.25
+7	5	−7	0.2
+8	6.3	−8	0.16
+9	8	−9	0.125
+10	10	−10	0.1

Table I—Decibel table for power ratios.

The plus and minus signs show the *direction* we are moving. In going from a smaller to larger quantity, the db number is prefixed by a "+" signs, and in going from a larger to a smaller quantity, the db number is prefixed by a "−" sign.

Decibel Table for Power Ratios

Table 1 lists the *power* ratios for + db and − db values from 0 to 10. These values have been "smoothed out," but are sufficiently accurate for all practical work.

Gain Problems Using Table I

(a) Four watts of power are fed to an amplifier having +9 db gain.
Find the output power in watts.
ANSWER: In the Table, +9 db equals the ratio 8. 8 × 4 = 32 watts.

(b) An amplifier input is 3 watts and output is 18.9 watts.
Find power gain in db.
ANSWER: Po/Pi = 18.9/3 = 6.3, and this ratio is a GAIN of +8 db.

Loss Problems Using Table I

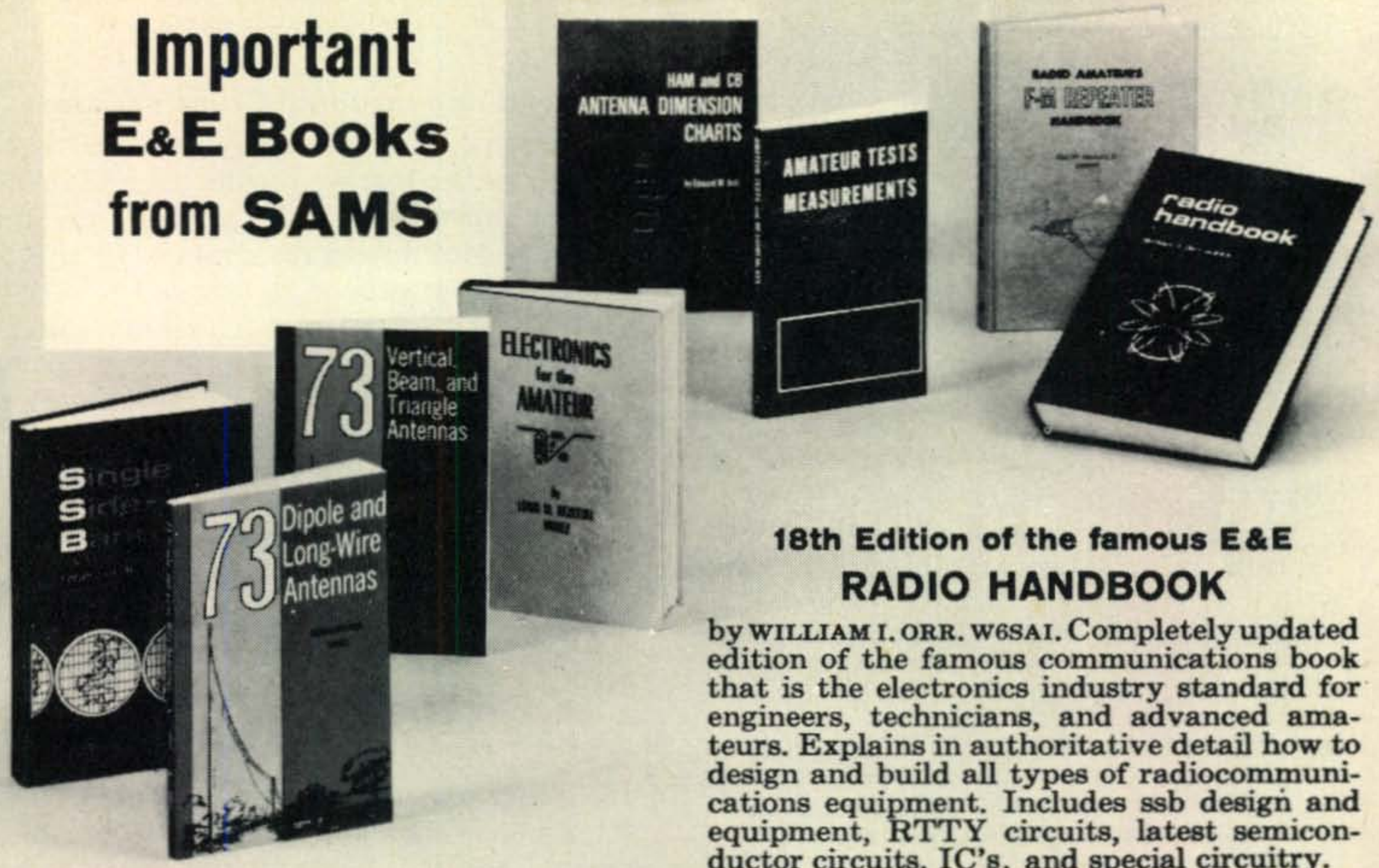
(a) 1000 watts of r.f. power enter a coax line which has a 2 db loss.
What is the output power?
ANSWER: A 2 db loss (−2 db) corresponds to an output ratio of 0.63, so 1000 × 0.63 = 630 watts output.

(b) Two watts of power enter a filter. The output is 0.32 watts.
How much loss, in db's, occurred in the filter?
ANSWER: Po/Pi = 0.32/2 = 0.16 ratio. Filter loss is −8 db.

Splitting DB Ratios

Many problems introduce ratios that do not fall squarely on values listed in any db table. It is reasonable to "estimate" fractional db's. Remember that the decibel is an

Important E&E Books from SAMS



18th Edition of the famous E&E RADIO HANDBOOK

by WILLIAM I. ORR, W6SAI. Completely updated edition of the famous communications book that is the electronics industry standard for engineers, technicians, and advanced amateurs. Explains in authoritative detail how to design and build all types of radiocommunications equipment. Includes ssb design and equipment, RTTY circuits, latest semiconductor circuits, IC's, and special circuitry.
Order **24020,** *only* **$13.50**

Single Sideband: Theory and Practice

by HARRY D. HOOTON, W6TYH. This one-source guide emphasizes basic principles and circuitry of ssb. Covers the origin of ssb, the derivation of ssb signals, carrier-suppression techniques, sideband selection, and a complete analysis of all types of ssb equipment.
Order **24014,** *only* **$6.95**

73 Dipole and Long-Wire Antennas

by EDWARD M. NOLL, W3FQJ. The first compendium of virtually every type of wire antenna used by amateurs. Includes dimensions, configurations, and detailed construction data for 73 different types. Appendices describe construction of noise bridges, line tuners, and data on measuring resonant frequency, velocity factor, and SWR.
Order **24006,** *only* **$4.50**

73 Vertical, Beam, and Triangle Antennas

by EDWARD M. NOLL, W3FQJ. Describes the design and construction of 73 different antennas used by amateurs. Each has actually been built and air-tested by the author. Appendices cover construction of noise bridges and antenna line tuners, as well as measurement methods. Order **24021,** *only* **$4.95**

Electronics for the Amateur

by LOUIS M. DEZETTEL, W5REZ. This is one of the few books on the theory of electronics and radio that programs the material for the amateur. Discusses radio-wave propagation as it applies to amateur band frequencies, reception and transmission pertaining to ham equipment, and the special field of antennas and how to feed them. Contains all the information required to pass the theory section of the General License exam.
Order **24022,** *only* **$7.95**

Radio Amateur's F-M Repeater Handbook

by KEN SESSIONS, JR., K6MVH. The definitive work on the vital and virtually undocumented subject of amateur f-m repeaters. Chapters include: Preparing and obtaining sites for repeaters; How to build a repeater; and Repeater applications. Includes an f-m repeater directory. Order **24008,** *only* **$6.95**

Amateur Tests and Measurements

by LOUIS M. DEZETTEL, W5REZ. Shows how to accomplish virtually all performance tests on amateur transmitters, receivers, and antennas, and how to make required adjustments.
Order **24007,** *only* **$5.50**

Ham and CB Antenna Dimension Charts

by EDWARD M. NOLL, W3FQJ. Tabulates dimension data in feet and inches for all the popular antenna configurations. Charts are so subdivided that an antenna can be dimensioned for a specific frequency range according to license class and mode of operation.
Order **24023,** *only* **$1.95**

HOWARD W. SAMS & CO., INC.

Order from any Electronics Parts Distributor, or mail to Howard W. Sams & Co., Inc., Dept. CQ-110
4300 W. 62nd St., Indianapolis, Ind. 46268.

Send me the following books: Nos. _____

_____ $ _____ encl.

☐ Send Free 1970 Sams Book Catalog

Name _____
PLEASE PRINT

Address _____

City _____ State _____ Zip _____

amount of power change "just barely noticeable to an average listener." One or two "tenths" of a decibel, up or down, have very little meaning in everyday work. With this qualification in mind, let's work some "fractional" problems, using Table 1.

(a) Three amplifiers have power gain ratios of 3, 7 and 9 times.
Estimate the number of db's for each power gain ratio.
ANSWER: By inspection, +4.8 db, +8.5 db, +9.5 db.

(b) The power outputs from three transmission lines are respectively 70%, 45%, and 18% of their inputs. Estimate the amount of db loss in each case.
ANSWER: 70% = 0.70 = −1.5 db
45% = 0.45 = −3.5 db
18% = 0.18 = −7.5 db

Extending the DB Table

Table I contains all the basic information needed to work with any number of decibels. It might be a good idea to copy this table on a small card which you can keep available for quick use.

Suppose you wish to extend this table to cover db quantities and ratios that are not listed. In most cases you can do this "in your head." Just remember from Part 1 that db's are *always* added or subtracted, but ratios are *always* multiplied or divided. Now let's try a few "extensions" of the table to see how it is done.

Extending the DB "Gain" Column

(a) What is the Power Ratio for +16 db?
ANSWER: Add enough db's in the Table to equal +16. Let's say +10 and +6. Their ratios are 10 and 4. Multiply their ratios (10 × 4) to get 40, which is the Power Ratio.

(b) What is the power ratio for +33 db?
ANSWER: Add db's in Table 1 to equal +33. This could be +10, +10, +10, and +3. Multiply their ratios, 10 × 10 × 10 × 2 for the power ratio which is 2000.

Extending the DB "Loss" Column

(a) What is the power ratio for −18 db?
ANSWER: Under the "loss" column of Table I, add −10 db and −8 db to get −18 db. Multiply their ratios, 0.1 × 0.16 to get 0.016.

(b) What is the power ratio for −37 db?
ANSWER: Add −10, −10, −10, and −7 to total −37 db. Multiply their ratios (0.1 × 0.1 × 0.2) for the answer 0.0002.

Extending Fractional Gains or Losses

The same principles apply for "intermediate" quantities that we "estimate" in Table I. For example, +15.5 db = +10 db and +5.5 db. Multiplying their ratios (10 × 3.6) shows a power *gain* of 36 times.

Similarly, a loss of −11.5 db is made up by the sum of −8 db and −3.5 db. Multiplying their ratios (0.16 × 0.45) gives the power output ratio of 0.072.

The Zero Reference Level

Note that in Table I, the *ratio* for 0 db is 1. If we multiply an input power by "1", the output is the *same* as the input. If 10 watts enter an amplifier, and 10 watts leave, there has been no gain and no loss. The amount of *change*, expressed in db's is therefore "Zero db."

However, there is another kind of "Zero db" which is *not* a power ratio, it is *not* "zero power", and it is *not* equal to the number "1." It is called he "Zero Reference Level." It would be nice if the word "zero" had been left out originally. There might be less confusion today! Latch on to the words "Reference Level." because that is what we are talking about. The word "Zero" is prefixed to remind us that whatever level we use for a "reference" is equivalent to 0 db in a db table.

Different industries have their own idea as to what constitutes a suitable "reference level" for their own use. In each case, their amount

"Zero Level" is a very low but definite amount of power, to which they compare other amounts of power. All powers greater than reference are designated as plus, and all powers smaller than reference are designated as minus quantities.

Some of the many "Zero Levels" that you may encounter are:

(a) 12.5 milliwatts into a 600 ohm load
(b) 6.0 milliwatts into a 600 ohm load
(c) 6.0 milliwatts into a 500 ohm load
(d) 2.4 milliwatts into a 600 ohm load
(e) 1.0 milliwatts into a 600 ohm load
(f) 1.0 milliwatt into a 150 ohm load

The big advantage in the Zero Reference system is that one doesn't have to calculate outputs and inputs. Instead, db's are used to express voltage magnitude at a point being measured. Thus, using reference level (c), a power of 3 watts is expressed simply as +27 db. But be careful! If you were using refer-

GAIN		LOSS	
db's	*Ratio* $\frac{Out}{In}$	*db's*	*Ratio* $\frac{Out}{In}$
0	1.0	0	1.0
+2	1.25	−2	0.8
+4	1.6	−4	0.63
+6	2.0	−6	0.5
+8	2.5	−8	0.4
+10	3.2	−10	0.32
+12	4.0	−12	0.25
+14	5.0	−14	0.2
+16	6.3	−16	0.16
+18	8.0	−18	0.125
+20	10.0	−20	0.10

Table II—Decibel table for voltage or current ratios.

ence level (e), a power of 3 watts would be +34.8 db.

Expressing power levels in db is meaningless unless one also specifies which reference he is using. Unfortunately, this is rarely done!

The DB and the DBM

To overcome this situation, current practice is to assume that when db's are mentioned without further qualification, the level implied is "6.0 milliwatts into a 500 ohm load." To use the reference "1.0 milliwatt into a 600 ohm load", the letter "m" is added to db, making it "dbm." Thus, when you see the term "dbm," the "m" reminds you that the "intended" reference is "1 mw into 600 ohms.'

Working "Zero Reference Level" Problems

(a) An amplifier has 3 watts output. Express this in both db and dbm's. ANSWER IN db's: Po/Pi = 3/.006 = 500. Using Table I we can build up this ratio by multiplying 10 × 10 × 5 = 500. Adding the db equivalents, we have +10 +10 +7.0 for a total of +27 db. ANSWER IN dbm's: Po/Pi = 3/.001 = 3000. We can build up this ratio by multiplying 10 × 10 × 10 + 3 = 3000. Adding equivalent dbm's we have +10 +10 +10 +4.8 = +34.8 dbm.

(b) Two different microphones have power outputs of −7 db and −3 dbm. Express these outputs in watts.
ANSWER: −7 db has an output ratio of 0.2. The zero level in the db system (without any indication to the contrary) is 0.006 watts. The first mike output is thus 0.2 × 0.006 = 0.0012 watts. For the second mike, we are referred by "dbm" to the 1 mw level. So −3 dbm = 0.5 × 0.001 watt = 0.0005 watts.

DB Ratios for Voltage and Current

If the impedances of two power sources are the same, the formula for "power change in decibels" reduces to a "voltage or current change in db's." Therefore, decibels can be used to express voltage or current ratios, as well as "power" ratios.

Any user of Ohm's Law remembers that power is proportional to the *square* of either voltage or current. An extension of this arithmetic sets up a relationship such that if we *double* the number of db's shown in a db power table, the table is automatically converted into a voltage or current ratio table. To eliminate the need for "doubling," Table II is provided. It might be well to copy this on the back of the card you made for Table I. It will get lot's of use!

If desired, Table II can be extended as we did before. Thus, +26 db equals the sum of +20 and +6 db. Multiplying their respective ratios (10 × 2) gives a voltage or current ratio of 20.

To Find the "Number of DB's" for Voltage or Current Ratios

(a) An input of 2 volts is amplified to 8 volts. What is the voltage gain in db's?
ANSWER: Vo/Vi = 8/2 = 4. In Table II the ratio 4 = +12 db again.

(b) A 100 volt signal enters a filter, but only 50 volts come out.
What is the voltage loss in db?
ANSWER: Vo/Vi = 50/100 = 0.5. Table II shows this ratio as a 6 db loss (−6 db).

To Find the "Voltage or Current Ratio" for a Given Number of DB's

(a) An amplifier has a voltage gain of +13 db. What is the gain?
ANSWER: Estimating from Table II shows +13 db = gain of 4.5.

(b) A transmission line has a voltage output of −8 db. What is the output voltage ratio?
ANSWER: Table II shows −8 db equal to an output ratio of 0.4, meaning the output is 40% of the input.

DB's and DBM's Expressed as "Volts"

There is a growing tendency to specify db's and dbm's instead of the "voltage" across circuit points. The service manual for one

Above Zero Reference Level			Below Zero Reference Level		
db or dbm	*db Volts*	*dbm Volts*	*db or dbm*	*db Volts*	*dbm Volts*
0	1.732	.7745	0	1.732	.7745
+1	1.94	.869	−1	1.54	.6885
+2	2.18	.975	−2	1.38	.6169
+3	2.45	1.094	−3	1.23	.5499
+4	2.75	1.227	−4	1.09	.4873
+5	3.08	1.377	−5	.974	.4355
+6	3.46	1.545	−6	.868	.3881
+7	3.88	1.734	−7	.774	.3461
+8	4.35	1.945	−8	.690	.3085
+9	4.88	2.183	−9	.615	.2749
+10	4.48	2.449	−10	.548	.2450
+11	6.15	2.748	−11	.488	.2182
+12	6.90	3.083	−12	.435	.1945
+13	7.74	3.460	−13	.388	.1735
+14	8.68	3.882	−14	.346	.1547
+15	9.74	4.355	−15	.308	.1377
+16	10.93	4.887	−16	.275	.1230
+17	12.26	5.483	−17	.245	.1095
+18	13.76	6.152	−18	.218	.0975
+19	15.44	6.903	−19	.194	.0867
+20	17.32	7.745	−20	.173	.0774
+21	19.4	8.69	−21	.154	.0688
+22	21.8	9.75	−22	.138	.0616

Table III—Db and dbm voltage magnitudes.

medium size organ shows 249 "outputs" to be measured. It gives the number of *db's* one should find at each output. Another organ book in my "collection" lists 185 outputs, and gives the *dbm* value of each output. The word "voltage" is not mentioned!

The db scale on most volt-ohmmeters is totally inadequate for this kind of work, but one doesn't like to purchase a special db meter for occasional use.

However, the a.c. voltage scales on most shop v.t.v.m.'s are sufficiently accurate for these measurements. All that is needed is a "conversion table" to change db's or dbm's to "voltage", and to convert "voltage" back into db's or dbm's as required. Table III provides this conversion.

It is easy to use this kind of table. If you want to find what voltage is meant by "+11 db", the table shows it as 6.15 volts. Going in the other direction, the "voltage" for −15 db is 0.308 volts. The "dbm" equivalent" for 0.487 volts is −4 dbm. And so on. Just be sure to use the right column!

The Volume Unit "VU"

Speech power is not steady, like that from a test oscillator, but rapidly varies from moment to moment. An unusual technique and a special meter are needed for measuring speech power, which is expressed in terms of the "VU' or Volume Unit.

The instrument is called a "VI" or Volume Indicator. It consists of the indicating meter and certain extra controls provided for changing meter sensitivity. It has fairly high impedance (around 7500 ohms) to permit bridging across voice circuits with negligible loss. Its frequency characteristic is essentially flat from about 25 to 16,000 c.p.s. The VU meter-element is arranged to have a dynamic characteristic, or speed of response to a suddenly applied voltage, which closed approximates the performance of the human ear.

Characteristics of speech are such that the pointer will follow a general pattern having many peaks and valleys in the defiection. The *average* of the *three* highest peaks per 10 seconds, disregarding occasional extreme peaks, is taken as the 'indication" of the meter.

The "scale" of the VU system is the familiar "db" scale. A "sine-wave testing power" of 1 milliwatt at 1000 c.p.s. (0 dbm will read 0 VU on the Volume Indicator. Other volume numbers, plus or minus, follow the usual db table. Thus, +3 VU=0.002 watts.

A VU meter *must* be tied to a 600 ohm termination, because that is one of the specifications for the meter. It must be calibrated at 1000 c.p.s. and "adjusted" so that a power

[*Continued on page 77*]

IT WASN'T MUCH, BUT IT WORKED

BY RUSSELL SANSOM*, K4SOD/6

It was a Friday evening near the end of the semester. My wife and I were crowded around the kitchen table trying to finish that week's homework. It was the end of our fourth year and the homework was beset with distractions; we had collected a lot of day dreams, like maybe we'd get a car or maybe we'd go out to eat in a restaurant after we both started teaching. Anyway, I was struck by a sudden thought: "1970. That's the year my good old ham license expires!"

"I thought you said ham radio was dead," she mumbled from behind her Linguistics Reader.

"Yeah, well we can't afford it or anything," I said from behind my Jack London novel. "I mean, I can hardly throw together a single sideband transceiver with things from the kitchen."

"Whatever that is," she said a little ambiguously.

But by Monday the bug had me bad. It was the same one that had got me when I was eleven on our farm in Kentucky. The memories rolled in. There I was in a corner of our old smokehouse, huddled over the power supply on a frozen winter day trying to coax from my three-tube rig just one QSO. Just one. How could I have known that 300 ohm open line tacked up a Catalpa tree with fence staples wouldn't match the impedance of my dipole? (I did brush off the snow, though!) How could I have known that my ancient electrolytics were radiating more power than my 6V6 ever would?

And I remembered riding up to Washington, D.C. on a free pass (my father worked for the railroad) to take my General. My face hurt for a week from grinning on the way home. It was a battle and I had won, and there was a piece of paper to prove it.

All this ran through me for a couple days. I caught myself sending CQ with my pencil instead of taking notes with it in a lecture. What was a lecture compared to those wonderful old victories! No! I couldn't give up my license!

That evening I said to my wife, "You know, I kind of hate to lose my call—after fifteen years." And she said, "Oh, yeah," knowing that my enthusiasm meant certain death for the sixty dollars in our savings account.

But I hounded her and myself until we decided that I could have five dollars to get on the air. After a long search of the bottom of my tool chest for old components and after looking at prices at a local ham store, I developed the hypothesis that I would have to get on the air with skill rather than with money. If I could do it, ham radio wasn't dead at all.

After three days in the library things looked pretty glum. Not a "Five Dollar Super Receiver" in the bunch was remotely possible for less than fifteen, so even though I'd ruled out larceny and treachery in the beginning, I sacrificed the little six-transistor receiver we took to school for moon shots and the world series. I kept its audio section, but decided to use the rest for regenerative 40-meter detector. It wasn't much, but after a month of frustration and forsaken homework it worked.

Despite its earlier disservice, the library yielded a nice one-transistor transmitter designed to feed 300 ohm twin-lead. It cost a dollar excluding the crystal and transistor. I put an ad in the community newspaper for a free crystal, and found one, meanwhile, at a local store for ninty-nine cents. At this point I decided I could save a bit more by switching

*744 Rose Lane, Los Altos, California 94022.

the receiver's transistor to the transmitter, using re-bent paperclips for lead clamps. I felt like the arm of a great, intricate relay, transporting the little aluminum spider from receiver to transmitter in ten seconds. But by the same time I discovered the instability this caused in the receiver, I crossed a couple of its legs and ended up having to buy two replacements at the tune of fifty cents each.

The transmitter ate a second month, but the bug was gnawing my insides. A galvanometer made from a ten-cent compass and some spare wire seemed to indicate that there was some a.c. somewhere. Then I faced the third and the greatest problem: the antenna. The 300 ohm output of the transmitter meant that I had to have a folded dipole, and there was plenty of twin-lead on top our house, leading from the TV antenna to our landlady's little apartment back in the converted garage. I bought a dollar's worth of twin-lead for a transmission line, and with some careful clipping and twisting our landlady's twin-lead became a folded dipole, cut to the eighth-inch for my 40-meter Novice crystal. The switch-over, again using paper clips, took three minutes.

When everything was finally assembled and disassembled, I got up early and took the day off from school—how could I have sat through a lecture? I threw together a key from a tin can and a few thumb tacks and with a large colored map of the world pinned

[*Continued on page 72*]

FOR THE BEST DEAL CALL

on

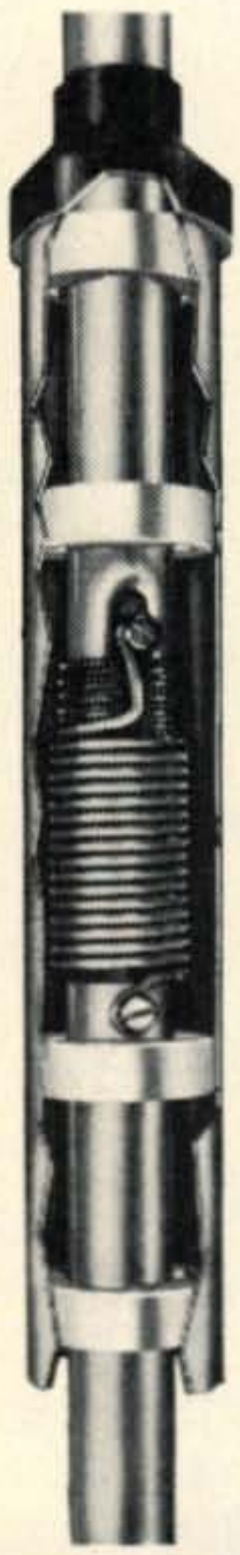
HY-GAIN'S

THUNDERBIRD

10-15-20

AMRAD

TOP TRADE & TOP DEALS FROM THE FASTEST GROWING DEALER IN THE WEST



Here's why Thunderbirds outperform all other tri-banders:

- **Thunderbird's "Hy-Q" traps** provide separate traps for each band. "Hy-Q" traps are electronically tuned at the factory to perform better at any frequency in the band—either phone or CW. **And** you can tune the antenna, using charts supplied in the manual, to **substantially** outperform any other antennas made.
- **Thunderbird's superior construction** includes a new, cast aluminum, tilt-head universal boom-to-mast bracket that accommodates masts from 1¼" x 2½". Allows easy tilting for installation, maintenance and tuning and provides mast feed-thru for beam stacking.

  Taper swaged, slotted tubing on all elements allows easy adjustment and readjustment. Taper swaged to permit larger diameter tubing where it counts! And less wind loading. Full circumference compression clamps are mechanically and electrically superior to self-tapping metal screws.
- **Thunderbird's exclusive Beta Match** achieves balanced input, optimum matching on all 3 bands and provides DC ground to eliminate precipitation static.
- Up to 9.5 db forward gain.
- 25 db front-to-back ratio.
- SWR less than 1.5 to 1 on all bands.
- 24-foot boom...none longer in the industry.
- Extra heavy gauge, machine formed, element to boom brackets, with plastic sleeves used only for insulation. Bracket design allows full mechanical support.
- Interlaced, optimum spaced elements for higher gain and better pattern control.
- 3 active elements on 20 and 15 meters. 4 active elements on 10 meters.

New 6-Element Super Thunderbird
Model 389
price, **$179.95**

Improved 3-Element Thunderbird
Model 388
price, **$144.95**

Fabulous 3-Element Thunderbird, Jr.
Model 221
Suggested retail price, **$99.95**

Popular 2-Element Thunderbird
Model 390
price, **$99.95**

AMRAD SUPPLY

Central California's Most Complete Amateur Radio Shop. See AMRAD for the Finest in Service, Equipment and Supplies.

1025 Harrison St. Oakland, California 94607 Phone 415/451-7755

IMPROVING THE EICO 753 TRANSCEIVER

BY JOHN H. RUHLMANN,* W3CWV

AFTER purchasing an Eico Model 753 transceiver and putting it on the air, it was found that it had several characteristics which could be improved. The signal was slightly rough and too high-pitched and a small amount of frequency modulation was noted on the carrier.

Audio Modifications

Because the high-pitched signal seemed to be the easiest job to tackle, work proceeded in this area first. The calculated value of the low frequency half power point of the audio amplifier V_{1B} is around 1.5 kc. The coupling capacitor, C_7, as shown in fig. 1, was increased from 0.001 mf to 0.1 mf so that the lower halfpower point frequency would be around 150 c.p.s. The bypass capacitor, C_8, was increased from 0.005 mf tc 0.05 mf in order to provide a better a.c ground at the bottom end of the grid resistor, R_9.

*3201 Jeffland Road, Baltimore, Md. 21207.

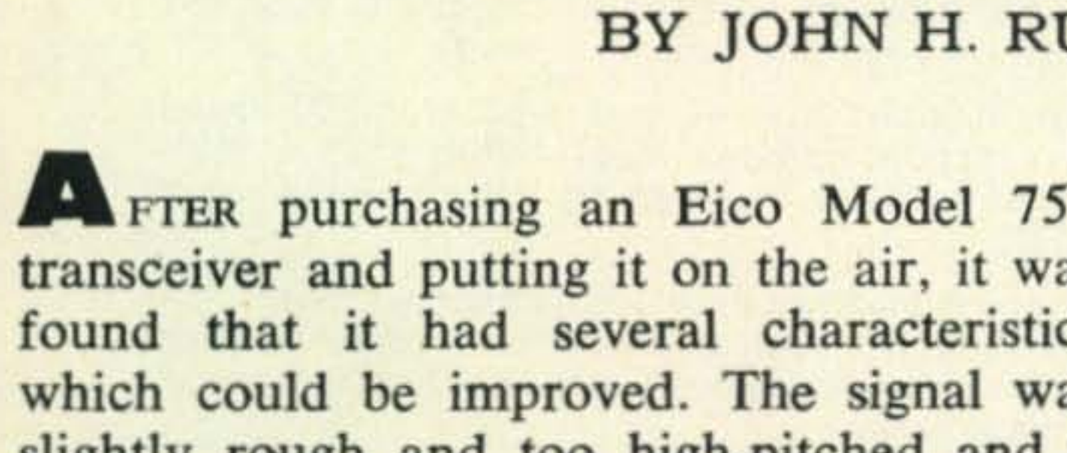


Fig. 1—Circuit of a portion of the speech amplifier of the Eico 753 transceiver showing the modification, in black, to improve the low frequency response. Original circuitry is shown in grey tone.

Frequency Modulating

Before putting the 753 back on the air, a cathode follower was added between the v.f.o. and mixer. It was hoped that the additional buffer action would prevent the signal from being frequency modulated. On-the-air reports verified that the signal had improved with respect to the high-pitch characteristic. The slight amount of roughness and frequency modulation, however, were still present on the signal. The cathode follower was removed and the circuit restored to its original configuration.

A Hewlett Packard Model 410B v.t.v.m.

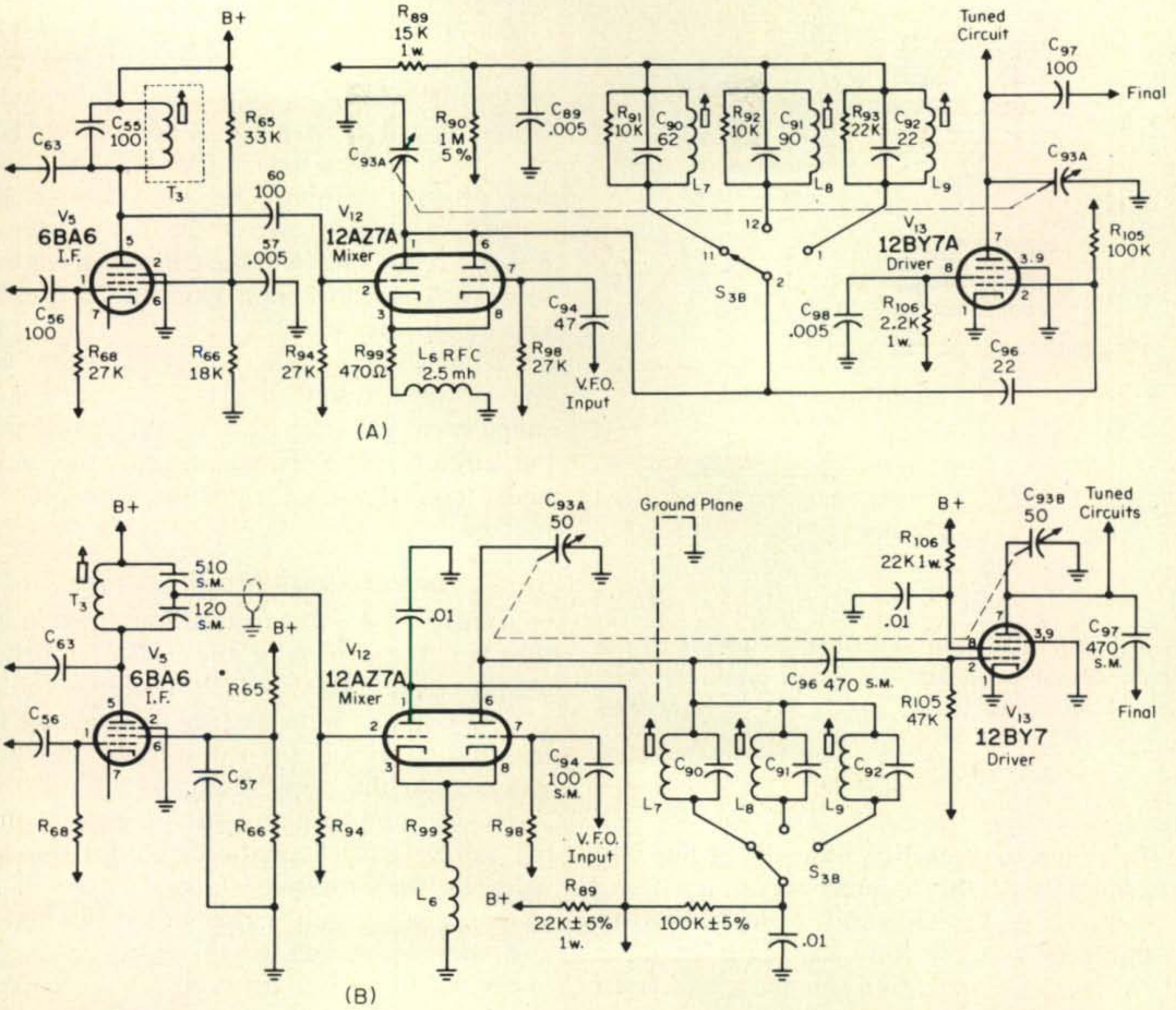


Fig. 2(A)—Original circuits of the i.f., mixer and driver stage of the Eico 753 transceiver before modification. (B)—Modified circuit of the i.f., mixer and driver stages, Components with part number but no value remain unchanged. Components with part numbers and a value indicate that the original part was changed to the value given. Components with only a value given are added. Component C_{93A} is a Hammarlund APC-100-B modified as described in the text and C_{93B} can be an APC-50-B. All capacitors with values greater than one are in mmf. Capacitors with values less than one are in mf. All resistors are 1/2 watt except where otherwise noted.

was used to check signal levels and gains of different stages in the transmitter section. It was discovered that the mixer, $V_{12A, B}$, was operating at a gain of less than unity and that the v.f.o. signal at the grid of the mixer was around 800 mv on 40 meters. When the final was driven to 250 ma, the magnitude of the s.s.b. signal into the mixer exceeded, by a factor of 2 or 3, the magnitude of the injected v.f.o. signal. It was felt that this type of mixing was the reason for the frequency modulation and roughness of the signal.

The injection oscillator (v.f.o.) should be about 10 db greater in amplitude than the s.s.b. signal in order to keep intermodulation distortion and spurious frequency generation to a minimum. From the above, the proposed operating conditions were established. Two volts r.m.s. would be required for the grid of the 12BY7A driver. Since the mixer should have a conversion gain of 2 to 3, between 0.7 to 1 v.r.m.s. s.s.b. signal is the maximum input to the mixer. Since the s.s.b. signal is 10 db down from the v.f.o., the v.f.o. input should be around 4 volts r.m.s.

In order to increase the v.f.o. signal into the mixer, the coupling capacitor, C_{94}, was increased from 47 mmf to 100 mmf as shown in fig. 2.

An improvement in gain for the mixer was attempted by removing the swamping resistors, R_{91}, R_{92} and R_{93} from coils L_7, L_8 and

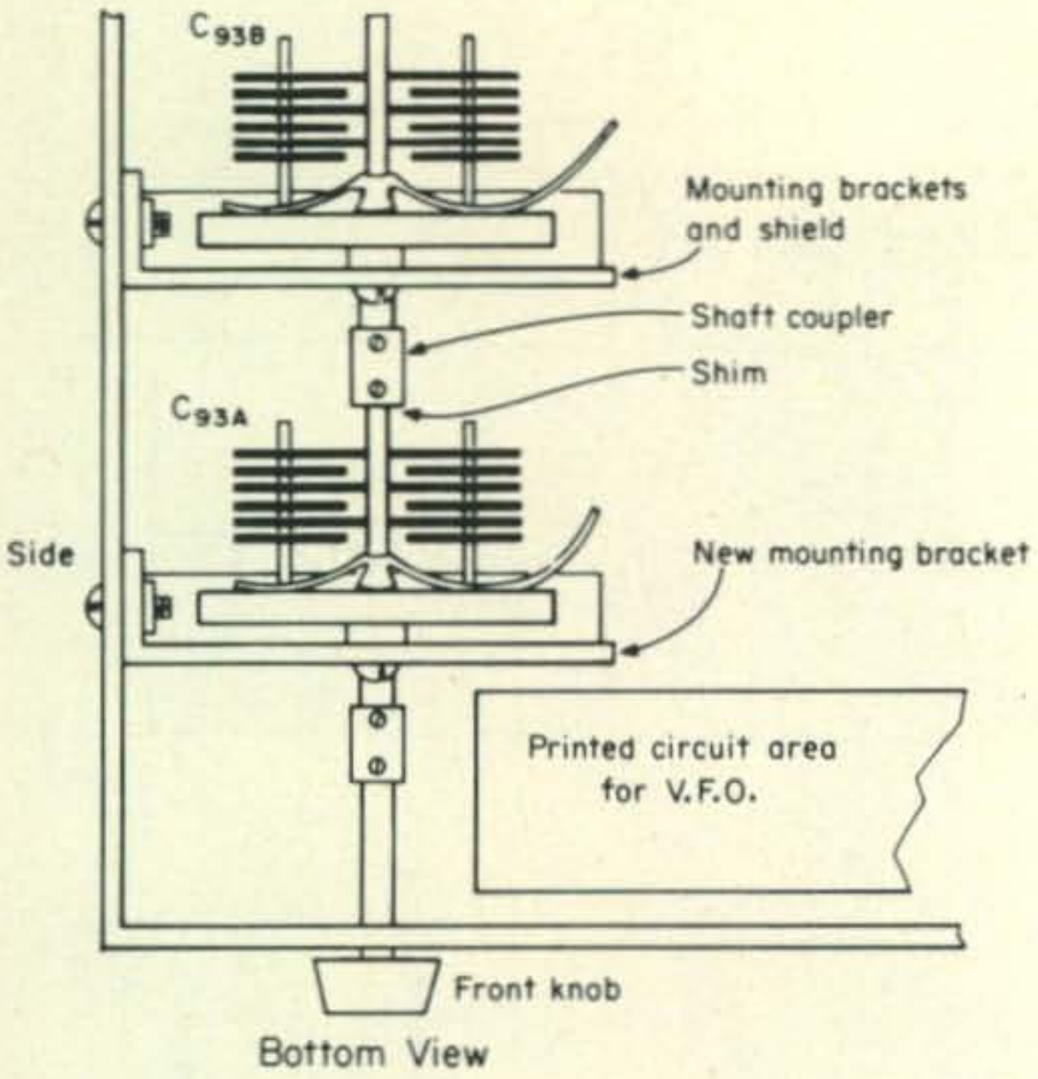


Fig. 3—Location and construction details of the replacement capacitor for C_{93B}. Since the rear shaft protruding from C_{93A} is not 1/4" it must be shimmed out to accept the coupler.

L_9 as illustrated in fig. 2.

In order to prevent phase distortion and attenuation of the wanted signal, coupling capacitor C_{96} was increased from 22 mmf to 470 mmf. The coupling capacitor between the driver and final, C_{97}, was increased from 100 mmf to 470 mmf for the same reasons C_{96} was changed.

Driver Instability

When the transceiver was turned on, the 12BY7A driver was unstable and oscillated. The problem was traced to the coupling between C_{93A} and C_{93B} stators introducing enough feedback for oscillation. The solution to this problem was found by inserting a ground plane or shield between C_{93A} and C_{93B} by removing the capacitor and building a tandem replacement with a shield as shown in the drawing of fig. 3. The junk box produced two 150 mmf variable capacitors with front shafts. Rotor and stator plates were removed until the value was down to 50 mmf each and there was now a rear shaft so that a coupler could be installed. The excess shaft was then cut off from C_{93B}. Shield plates were bent up and the two capacitors installed. (See fig. 3.) Care should be exercised in aligning the capacitors to prevent binding. When the transceiver was turned on, the 12BY7A driver was stable and did not show any tendency toward oscillation.

The gain of the mixer was checked with the swamping resistors removed. The conversion gain on 40 meters was 1.3. Since the design objective was for a conversion gain of 2 to 3, it was decided to try a different type of mixer circuit. The original mixer circuit ($V_{12A, B}$) is shown in fig. 2. A modified mixer circuit, shown in fig. 2B, was tried with success. The conversion gain on 75 was 2.8 and on 40 meters, 2.2. The conversion gain on 20 was inadequate so a replacement coil for L_9 was wound on a 1/2" ceramic slug-tuned form in order to raise the loaded Q of the circuit. With the larger coil the mixer had a conversion gain greater than 2 on 20 meters.

Driver Stage Modifications

According to the instruction manual for the 753, the screen of the 12BY7A driver, V_{13}, is run at 240 v.d.c. If the supply voltage is 250 volts as indicated in the manual the screen dissipation in just outside the limit specified in the tube manuals, 1.1 watts. If the power supply output runs slightly higher, the screen grid dissipation excedes the safe value by more than 2 watts.

In order to reduce the screen dissipation and the screen voltage to within allowable limits and to operate the tube in a more linear region, the screen resistor, R_{106}, was increased from 2.2K to 22K, 1 watt ±10%. The screen is now operating at 170 volts and dissipating 0.77 watts which is well within its maximum dissipation rating of 1.1 watts.

Further changes in the 753 are listed below. The grid resistor of the 12BY7A driver, R_{105}, was reduced from 100K to 47K ohms. The bottom end of R_{110} (junction of R_{110} and the arm of BIAS pot, R_{108}) was bypassed to ground with 0.01 mf disc ceramic capacitor to prevent r.f. from floating around on the bias lines.

In order to restore the ratio between maximum s.s.b. output from the transceiver to the suppressed carrier, it is necessary to reduce the level of the signal *and* suppressed carrier somewhere in front of the mixer. About the only place that this can be accomplished is in the common i.f. stage. As shown in fig 2B, capacitor C_{55} was removed, the resonating capacitor for T_3, and replaced with 120 mmf and 510 mmf silver mica capacitors in series. The coax wire going to C_{60} was removed and connected to the junc-

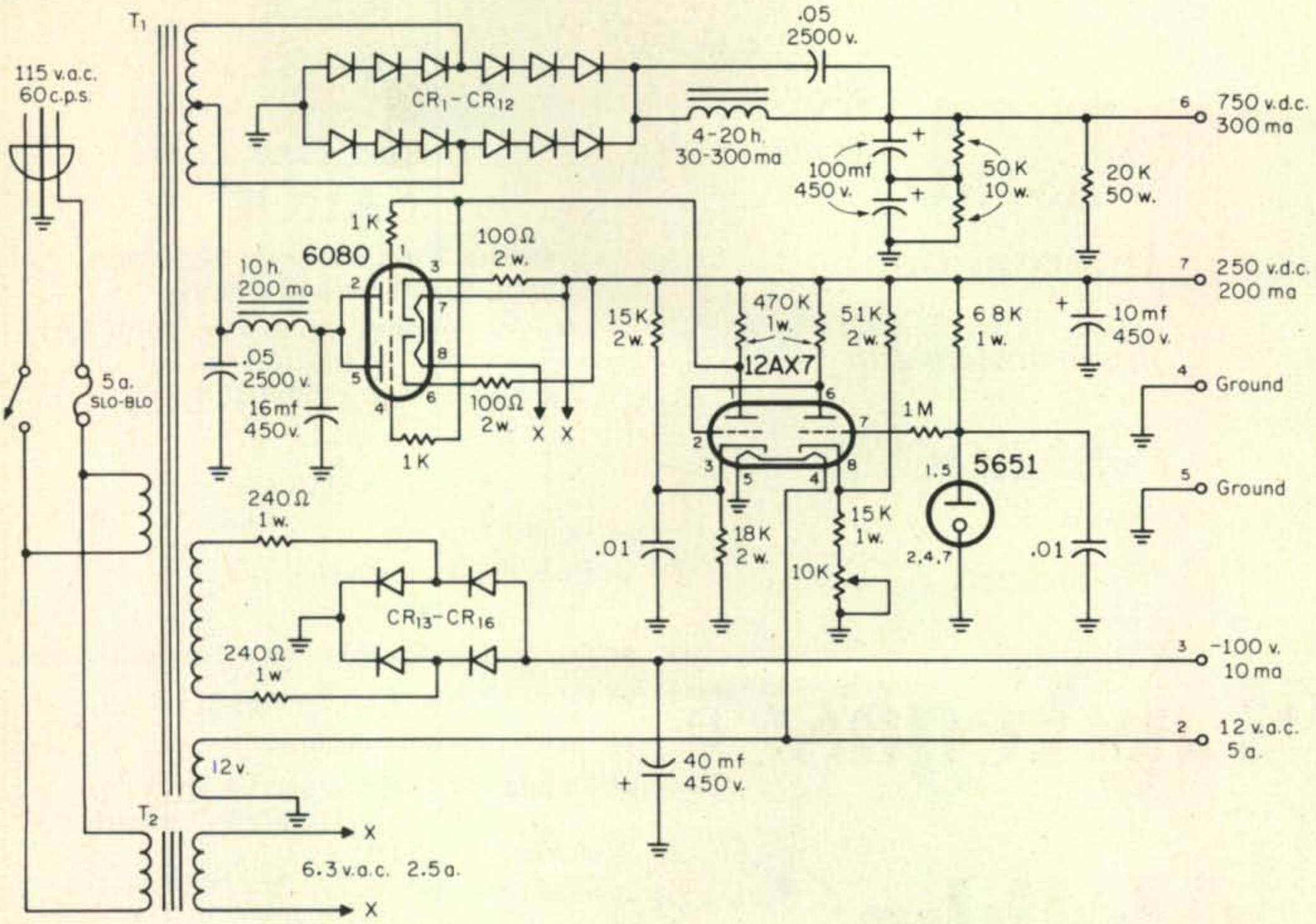


Fig. 4—Circuit of a universal power supply designed to handle the Eico 753 transceiver or any other transceiver in the 200 to 300 watts class.

CR_1 to CR_{12}—1 amp, 800 p.i.v. Sarkes Tarzian F-8 or equiv.
CR_{13} to CR_{16}—600 ma, 400 p.i.v., IN1695.
T_1—425-0-425 v.a.c. at 650 ma, 70 v.a.c. at 30 ma, 12.6 v.a.c. at 5 amp. See text.
T_2—6.3 v.a.c. at 2.5 amps.

tion of the 120 and 510 mmf capacitors. The signal from V_5 to the mixer was about 1/5 of its previous value, and the ratio between s.s.b. and suppressed carrier was restored.

Utmost care should be exercised while working on the printed circuit board to prevent damage. After the amplifier had been modified, the board was placed back into position and transformer T_3 tuned for maximum output.

About 250 mv r.m.s. of audio is required at the deflector plate of the balanced modulator for a final plate current of 300 ma and with about 6db of a.l.c., the audio requirements increase to about 500 mv. The r.f. voltage to the balanced modulator is 1.5v. r.m.s. The balanced modulator, therefore, is operating at an acceptable level.

Results

After checking with several stations and receiving good reports it was concluded that the objectives had been met, no frequency modulation of the signal and good overall quality.

Power Supply

The Eico power supply was not used to operate the 753. A universal type that could meet the requirements of most small transceivers in the 200 to 300 watt class, was homebrewed. The circuit and parts list is shown in fig. 4. The unit is rugged and built to take it; all ratings are based on a 100% duty cycle. The outputs are as follows:

1. 750 v.d.c. at 300 ma.
2. 230 to 290 v.d.c. at 200 ma electronically regulated.
3. 12.6 v.a.c. at 5 amps.
4. −100 v.d.c. at 10 ma.

The power transformer was designed and wound at this QTH. After a day's operations, it is only slightly warm to the touch which indicates more power could be drawn from the supply if necessary. ■

ASTRO International

in conjunction with

SAROC

presents a

Las Vegas Holiday

From NEW YORK only **$229.00** per person
Tax & Gratuity Included

From CHICAGO only **$199.00** per person
Tax & Gratuity Included

FLIGHT DEPARTS JOHN F. KENNEDY — NEW YORK — 10 AM EST
JANUARY 7, 1971

FLIGHT DEPARTS O'HARE — CHICAGO — 12 NOON CST
JANUARY 7, 1971

SAROC

Sixth National Convention for Amateur Radio Operators
January 7 - 10, 1971

sponsored by

Southern Nevada Amateur Radio Club, Inc.
P.O. Box 73, Boulder City, Nevada 89005

at

FLAMINGO HOTEL CONVENTION CENTER
LAS VEGAS, NEVADA 89109

Another First From SAROC

Round Trip Charter Jet Flight from New York and Chicago

Mail your deposit in now to confirm your reservation for a fun trip and convention to the entertainment capital of the world.

~

INCLUDES

- ✔ Round Trip Jet.
- ✔ Complimentary In Flight Meal and Beverage Service.
- ✔ Round-Trip Transfers from Airport to Hotel.
- ✔ Complete Baggage Handling.
- ✔ Pre-Registration at Hotel.
- ✔ Deluxe Air-Conditioned Room at the Exciting Flamingo Hotel for 3 nights double occupancy. Single occupancy $10.00 additional.
- ✔ Drink and Keno Ticket.
- ✔ SAROC Advance Registration.
- ✔ SAROC Ladies Program Saturday.
- ✔ SAROC-Ham Radio Magazine Cocktail Party Thursday.
- ✔ SAROC Fabulous Dinner Show Flamingo Hotel Thursday.
- ✔ SAROC-SWAN Electronics Cocktail Party Friday.
- ✔ SAROC Midnight Show with Two Drinks Desert Inn Hotel Friday in Main Showroom.
- ✔ SAROC No-host Cocktail Party Saturday.
- ✔ SAROC Admission to Exhibits, Display Area, Technical Seminars and Meetings.
- ✔ Tickets for Drawings.
- ✔ SAROC Saturday Buffet Luncheon Flamingo Hotel.
- ✔ SAROC Hunt Buffet Breakfast Sunday, Flamingo Hotel.
- ✔ Tax and Gratuity.

This is a pay now fly later, flight, so why not plan now for a little fling after the holidays to take advantage of this low cost SAROC package for three glorious days and nights in Las Vegas, at the fabulous Flamingo Hotel.

METHOD OF PAYMENT

Deposit $60.00 now per person to confirm reservation. $60.00 per person due October 15, 1970, $60.00 per person due November 1, 1970. Balance due before November 25, 1970.

11th Annual CQ 160 Meter Contest Results

BY CHARLES M. O'BRIEN,* W2EQS

ALL season long on 160 there were practically no European signals heard at my QTH during our sunset period, but just four days prior to the start of the "rat-race" the Observatory advised that condiions were in our favor, and that everything was A-OK and to start our count-down. Well, the Europeans were rolling in with fantastic signals as the Contest commenced at 0001 GMT Saturday, the 24th (7:00 P.M., EST Friday, the 23rd), and continued throughout the evening to well past 0800 GMT. The same happened again Saturday evening/Sunday morning but signals were much stronger the previous night.

Many of us must have been wondering if conditions were going to be poor, fair or good, but I'd dare say none of us expected them to be so terrific. Did any of you listen to the band the following week-end? DX conditions were very poor and continued to deteriorate for the balance of the season. Yes, we were fortunate, indeed.

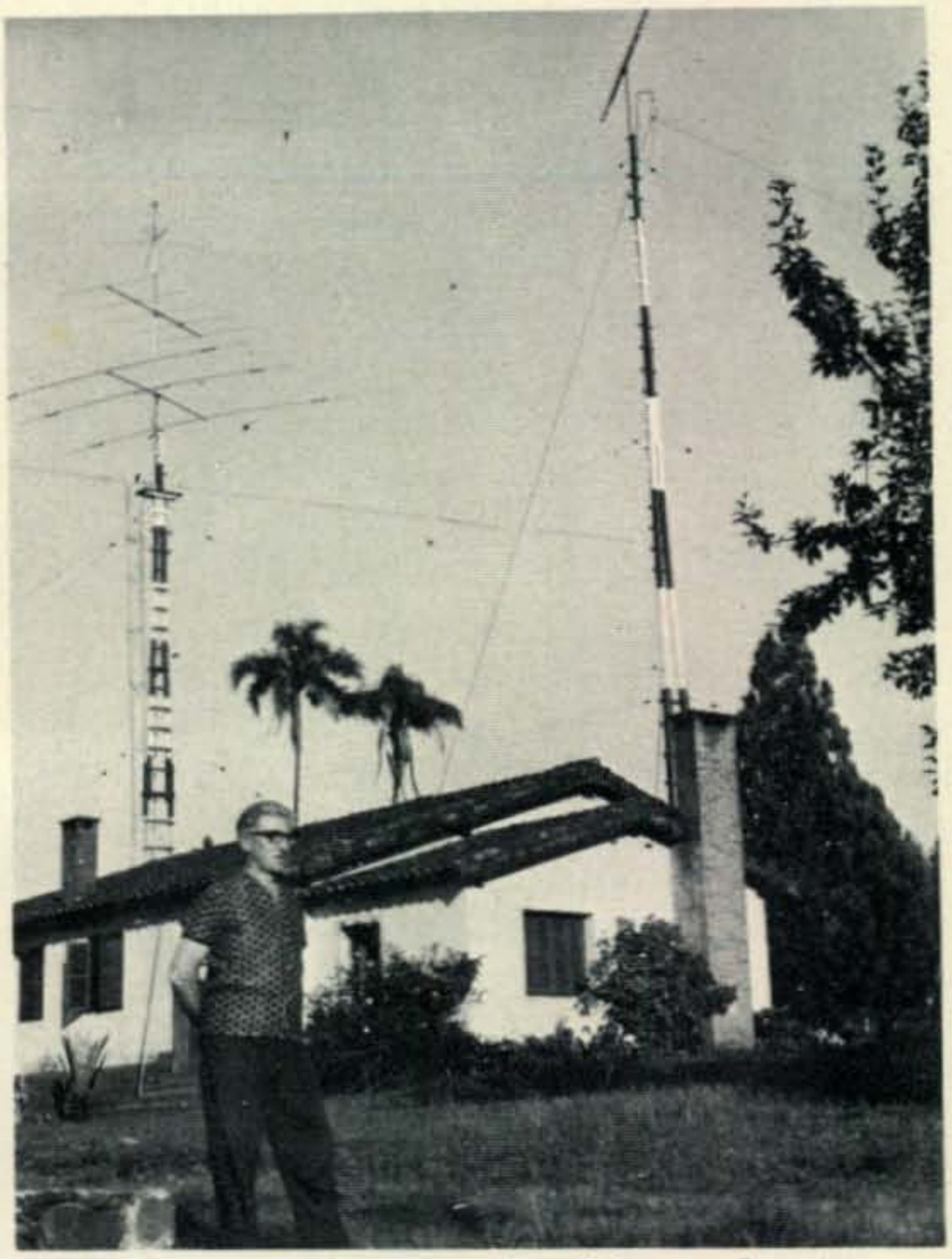
49 States were on this year. Where, oh where were you, Wyoming? The call W7CYM showed up in a few logs but when a log was requested he advised he has never worked 160. For a while I thought we had finally gotten all 50 on for the first time. Who wants to operate from that rare QTH next Contest?

The greatest score ever racked up by anyone in the eleven years of this Contest's existence goes to Herb, KV4FZ (who also did it in 1968 as XEØVXO). Note his score as well as Gene's, W4BRB/VP7. On the other hand, in all fairness to everyone else, both of them were only a hop, skip and a jump from the United States and Canada and all those contacts were worth 10 points each. In my book, a salute must go to Ernie, K1PBW, who ran up the absolutely amazing score of 74,112.

Those old die-hards who operated continuously for the entire 27 hours made it rough on we who decided to take a 3 or 4 hour snooze during the mid-day hours when we thought nothing would be on. Even though one might hear the same calls over and over again or call CQ over and over again they were there when some "poor unsuspecting soul" came on the air and snagged him.

Rules, regulations and logs were sent to stations in 60 different countries that are permitted the use of 160 meters. Too bad that no more than 36 on but at that, 36 is good representation.

This year every conceivable record was broken. For instance, the highest number of



ZP9AY poses against a backdrop of antennas for all bands from 160 m. to 432 mc. From the front tower (85' of hardwood) are strung dipoles for 160-40 and 15-20 m. The rear tower (also 85' of hardwood) sports a 160 m. dipole at 60' as well as the more obvious beams.

*190 Knickerbocker Road, Apt. 9, Englewood, N.J. 07631

W4BRB/VP7 had the good fortune of selecting his operating position; chose the dockmaster's private office at the marina of the Jack Tar Hotel on Grand Bahama Island.

QSOs ever made was 315 and shared by two. Compare this to last year's 266 which many broke. Highest multiplier was 65, compared to 55 last year, which many broke. Highest total number of countries worked this year was 21 compared to 18 last year. Never before were so many States worked. W9UCW QSOed 46 of the 49 and K8EEG/ϕ was right behind with 45 as were W3JXS/5 and K9YWO with a similar number. Those who worked 44 included: K1PBW, W3IN, K4GSU, W5RTQ, WϕNFL, WϕAIH and KϕJPL.

There are many hams who still don't realize the DX potential that 160 holds. Many of them will be reading this story so let us take a peek into the countries that were on: CO, DL, EI, G, GC, GD, GI, GM, GW, HB, HR, JA, HS, KH6, KL7, KP4, KV4, OE, OH, OHϕ, OK, PA, PJ, PY, TA, VE, VK/AX, VP2V, VP7, VP9, W/K, XE, ZB2, ZL, ZP, 4S7.

Great conditions? Some Europeans were still hearing W's well into daylight. Here, on the east coast, Iowa was still blasting in as late as 1400 GMT as were the W8's until Contest end at 1500 GMT.

May we request that the 6s, 7s and western VE's who operate at the 2 mc end tune 1.8 mc more often as Pennsylvania, New Jersey, New York and all of New England are not permitted operations in the high end. We get awfully stymied and frustrated here, fellows.

A suggestion. Let's stay away from reports such as 5NNTT9 as it makes for confusion and tough copy. Make it the conventional 599TT9, etc.

There were a number of complaints that ARRLs SET falls on the same weekend as our Contest thereby cutting short the amount of operating in our affair. Could ARRL possibly change the January date of their SET so as not to interfere with ours which is a fixture for the last full week-end of January every year?

Phone vs. cw...for nearly as many years as hams have been on the air controversy develops. Certain ones like c.w. – others phone – others both c.w. and phone. This doesn't single out 160 alone but all bands as well. We're all in this hobby of amateur radio for fun and relaxation—not to cut each other's throats, may we again request that the phone boys on 160 give the c.w. gang a break on this one week-end out of the 52? There was so much phone QRM—and some of it very deliberate – between 1825/1835 that it made it impossible for mid-western and central state c.w. ops to hear or work Europe. May we ask that if you do operate that you do so between, say, 1835 and 1850 kc for this one week-end? Phone men: Would you like to have a 160 meter contest run along the same lines as the c.w. one? Let me know.

One change was made this year in the listing of results due to the requests of many operators over the past years. A separate listing has been initiated for multi-op stations.

In this 1970 Contest 1338 stations from 36 countries participated. Of these, 667 were in the US, 24 (disappointing) in Canada and 647 DX. A total of 261 logs were received.

An important point for the DX boys to note. A QSO to each separate State and

[*Text continued on page 48*]

The operators at G3KAC. L. to R.: Nigel, G3TXF, SWL Brian, and Ian ,GW3WUG.

The first column indicates the number of contacts, second is the multiplier, third is the number of different countries worked and the last column is the final score.

CONNECTICUT

K1PBW	315	64	15	74,112
W1WY	179	49	12	22,246
WA1FDV	151	37	4	11,766
W1TX	23	14	12	2,772

MAINE

W2BXS/1	61	31	6	3,286

MASSACHUSETTS

WA1FHU	143	40	10	14,240
W1AX	54	27	7	3,996
W1CVO	50	16	2	1,600
W1HGT	160	(check log only)		
*W1BB/1	220	55	11	43,120

NEW HAMPSHIRE

K1OQ	1	1	1	2

RHODE ISLAND

W1HLY	55	21	2	2,310
W1QLD	13	7	1	182

VERMONT

W1TH	94	30	3	5,880

NEW JERSEY

W2FJ	229	56	13	33,264
W2EQS	230	55	13	32,780
W2TA	229	55	12	30,470
W2IL	180	52	10	22,048
WB2OZW	135	38	7	11,780
W2KHT	134	34	7	10,744
W2AZQ	142	36	3	10,512
W2HUG	117	35	7	9,590
W2CVW	109	30	4	7,140
W2MNK	112	28	2	6,272
W2EM	62	19	2	2,356
W2BP	25	17	7	1,666
W2DEN	46	15	1	1,380
W2MPP	46	10	2	920
WA2HPB	33	10	1	660

NEW YORK

K2GNC	196	57	13	29,982
W2SN	150	38	5	12,312
W2HXI	109	34	3	7,548
WB2SIH	65	22	3	3,036
W2IP	14	5	1	140

DELAWARE

W3NNK	184	52	10	23,296
W3MK	51	25	4	2,950
K3NYG	40	10	2	1,520
K3JLY	42	15	1	1,260

MARYLAND

W3IN	285	60	11	39,000
W3BQN	194	43	6	17,716
W3GN	171	37	7	14,134
W3RFA	100	43	7	10,320

PENNSYLVANIA

W3GM	233	59	15	36,816
W3AJS	153	36	5	11,880
W3UHP	156	35	3	11,280
W3WGH	105	41	6	9,922
W3CNS	47	27	4	2,970
W3NQV	7	5	1	70

ALABAMA

W4FKG	17	12	2	408

FLORIDA

W4BGO	225	58	12	32,248
WA4LCO	65	32	6	5,184
WB4JSV	58	33	5	4,620
K8HBR/4	31	19	1	1,175

GEORGIA

W4YWK	166	48	6	17,472
K4BAI	32	19	4	1,584

KENTUCKY

K4GSU	265	54	6	30,348
W4GSH	222	50	6	23,800
WB4FPK/4	131	38	3	10,260

NORTH CAROLINA

W4TMR	170	44	5	16,016
K4RDV	65	23	1	2,990
W4OMW	43	23	2	2,162

SOUTH CAROLINA

WA4LDM	173	50	7	19,200
K4DBV	93	29	3	5,626
W4IWB	55	26	3	3,068

TENNESSEE

W4UD	72	29	2	4,408
W4ZZ	38	24	2	1,824

VIRGINIA

K4PQL	244	53	7	17,808
W4KXV	169	44	5	15,928
WB4KZT	145	41	5	12,792
WA4RGH	132	40	5	11,520
W4DM	158	25	3	3,950

ARKANSAS

W5HOT	26	15	2	780

LOUISIANA

K5TFG	117	43	6	11,438
W5TTB	103	33	2	6,798

MISSISSIPPI

W5RUB	130	99	4	10,764
K5MZU	125	32	5	9,768

NEW MEXICO

W5SOT	55	26	3	3,068
K5MAT	34	30	4	2,520
W5RE	25	17	1	850

OKLAHOMA

W5KC	120	43	5	11,352

TEXAS

W3JXS/5	246	56	8	30,240
W5RTQ	245	55	9	30,030
W5RVT	193	50	5	20,500
W5FIX	86	34	2	6,392
W5ONL	76	27	5	4,266
W5AB	54	24	3	2,784

CALIFORNIA

W6WKE	140	43	8	17,200
W6JTB	157	40	7	16,720
W6WX	131	39	6	11,310
W6AMO	102	38	6	8,968
WB6NRK	107	34	4	8,092
W6RW	81	29	2	4,698
W6GWQ	64	26	4	3,744
**WA6JPQ	129	43	4	12,040

ARIZONA

W7CFJ	191	50	9	22,900

IDAHO

W7DY	83	39	5	7,410
W7IW	21	10	2	420

MONTANA

W7GBL	66	35	2	7,000

NEVADA

W7DIM	7	3	1	42

OREGON

W7AVV	104	36	5	8,928

UTAH

W7ZC	151	48	5	15,648
W7CYH	54	25	2	2,700

WASHINGTON

W7RM	238	51	8	32,028
WA7ILC	79	28	5	4,760
W7RGL	38	15	2	570
W7FIM	9	8	2	144

MICHIGAN

K8VQP	240	49	5	24,696
K8HWW	120	34	3	8,432
W8WVU	70	28	2	3,920
K8IHR	42	23	2	1,932
WA8KNJ	29	15	2	740
WA8USU	9	5	1	90

OHIO

K8CCV	225	50	4	23,300
W8QHW	210	50	5	22,200
K8IUA	100	35	3	7,280
K8ATQ	76	31	3	4,960
W8EX	36	23	4	2,024

WEST VIRGINIA

W8HZA	37	21	2	1,546

ILLINOIS

W9YYG	237	51	6	25,806
W9DL	209	51	6	22,950
K9IFO	208	47	4	20,304
W9ABA	158	44	3	14,256
W9PNE	139	46	5	13,892
WA9NKT	54	25	1	2,700
K9KEP	41	16	1	1,312

INDIANA

K9YWO	280	54	6	31,969
W9DPL	75	33	3	5,214

WISCONSIN

W9EWC	228	51	8	25,194
W9GF	54	21	2	2,268

COLORADO

WAØCVS	198	49	5	20,580
WØLRW	131	38	4	10,564

IOWA

WØNFL	215	50	5	22,600
WAØTVD	183	48	5	18,720
WØKUS	177	47	4	17,390
WAØUBB	81	30	2	4,860
WØRFT	64	21	2	2,688

KANSAS

WØPSF	132	47	5	13,536

MINNESOTA

WØAIH	291	55	8	34,650
WØYCR	190	49	5	19,796
WØRHI	97	36	3	7,272
WAØWBG	79	33	3	5,544
WAØUPD	80	30	2	4,800

MISSOURI

KØJPL	205	53	5	23,002
WØAV	101	39	4	8,502
WØBV	75	30	4	4,980

NEBRASKA

WØVEA	51	28	2	1,876

NORTH DAKOTA

WØSDN	162	46	3	14,996

SOUTH DAKOTA

K8EEG/Ø	235	55	8	28,490
WAØMWN	120	42	2	10,080
WØIT	113	32	2	7,237

NEWFOUNDLAND

VO1FB	84	34	12	13,600
VO1HN	89	31	13	13,082

NOVA SCOTIA

VE1ZZ	72	28	14	7,952

ONTARIO

VE3QU	181	46	6	18,124
VE3DU	135	42	4	12,012
VE3AMJ	50	27	3	2,916
VE3LU	50	23	2	2,300

MANITOBA

VE4JB	154	45	3	14,220

SASKATCHEWAN

VE5UJ	121	42	2	10,164
VE5QB	15	9	2	270
VE5TA	2	1	1	4

ALBERTA

VE6AKQ				

BRITISH COLUMBIA

VE7AKI	104	37	6	9,250

ALAND ISLANDS

OHØNI	23	3	3	330

ALASKA

KL7AEQ	3	1	1	6

AUSTRALIA

AX3APN	18	3	3	126
VK3ACA	11	3	3	84
VK6NK	9	3	3	72
VK3QI	14	2	2	62
AX3XB	11	2	2	50
AX3RJ	13	1	1	26

AUSTRIA

OE1KU	55	10	10	2,720

BAHAMA ISLANDS

W4BRB/VP7	189	45	8	83,250

BERMUDA

VP9FW	2	2	2	30

BRAZIL

PY2BJH	6	3	3	54
PY2CSS	4	3	3	42
PY2BKO	5	2	2	26

BRITISH VIRGIN ISLANDS

VP2VL	2	2	2	20

CUBA

CO2QR	7	4	1	280

CURACAO

PJ2VD	81	29	5	22,185

CZECHOSLOVAKIA

OK2BOB	175	22	17	16,280
OK1ATP	169	19	15	13,452
OK1AWQ	146	17	17	10,217
OK2HZ	134	19	16	10,146
OL5ALY	117	16	16	6,896
OK1WT	126	14	14	6,692
OK1MG	101	15	15	6,060
OK1DVK	123	14	14	6,048
OK2ZU	101	17	16	6,035
OK1DIM	104	15	15	5,535
OK1KRS	107	13	13	5,161
OK3CDO	102	13	13	4,901
OL5AMT	107	11	11	4,202
OL4AMU	85	13	13	3,419
OK2HI	72	12	12	2,940
OK2BEC	65	12	11	2,724
OK2BMR	70	11	11	2,431
OK1AIA	63	11	11	2,112
OK3TOA	50	12	12	1,980
OK1AIA	63	10	10	1,920
OK3TAO	63	10	10	1,860
OK1AYY	41	10	10	1,430
OK1JJB	41	9	9	1,143
OK2BOT	53	8	8	1,120
OK1AWN	42	8	8	1,112
OL6AMB	48	8	8	1,048
OK1KZ	23	11	11	902
OK1AIJ	46	7	7	812
OK1AAZ	36	7	7	693
OK2BCI	13	10	10	620
OK2BNZ	23	8	8	520
OK2LN	30	5	5	375
OK1MAA	17	5	5	230
OK3TOM	25	3	3	168
OK1KWP	10	4	4	136
OK1AFN	11	3	3	102
OL5AJU	16	2	2	70
OK1KEO	13	2	2	58
OK1HAR	2	2	2	20
OK2PDC	9	1	1	18
OL6AMG	8	1	1	16

EIRE

EI9J	140	29	16	25,810

ENGLAND

G3VIP	132	16	15	7,744
G2DC	136	16	15	7,376
G3WPO	141	12	12	5,160
G3YPK	72	9	9	2,295
G3NT	62	9	9	1,944
G3YPM	61	9	9	1,881
G3XTT	57	10	10	1,860
G3YGS	28	5	5	370

FINLAND

OH9NV	40	11	11	2,134
OH2VO	35	8	8	1,336

GERMANY

DL9KRA	274	30	16	46,560

GIBRALTAR

ZB2BO	11	6	6	330

HAWAII

KH6IJ	35	15	4	4,740
KH6FF	10	4	2	336

HONDURAS

HR2HH	70	31	5	21,235

ISLE OF MAN

GD3SVK	275	23	16	33,212

JAPAN

JA2CLI	37	10	6	2,220
JA1RQA	32	7	5	1,162
JA7AO	20	5	4	540
JA1YAC	10	3	2	108

NETHERLANDS

PAØPN	104	13	13	6,708
PAØMIR	63	12	12	3,768
PAØLOU	12	4	4	228

NEW ZEALAND

ZL1MQ	7	2	2	64

NORTH IRELAND

GI3WSS	51	9	9	2,241

PARAGUAY

ZP9AY	4	2	2	40

PUERTO RICO

KP4ES	1	1	1	5

SCOTLAND

GM3YOR	27	7	7	120

SWITZERLAND

HB9NL	127	16	13	10,544
HB9QA	102	12	12	5,148
HB9CM	47	15	9	4,795
HB9UD	5	4	4	100

THAILAND

HS5ABD	10	5	5	300

TURKEY

TA2E	22	4	4	380

VIRGIN ISLANDS

KV4FZ	238	65	21	139,555

WALES

GW3UPK	272	24	16	34,536
GW3GWX	51	11	11	2,849
GW3HGL	39	9	9	1,789

MULTI-OPERATOR

North America

MAINE

W1KVK/1	146	42	11	15,960

NEW YORK

K2IXJ	109	34	8	9,860

PENNSYLVANIA

W3BUR	175	47	7	17,860

CALIFORNIA

K6STI/6	136	44	6	14,432
W6YY	120	42	6	12,432

NEVADA

K7ZQV	125	49	3	12,647

UTAH

W7OHR	146	44	4	13,552

MICHIGAN

K8UDJ	315	57	7	38,190
W8TJQ	232	52	5	25,376
K8BYI	230	47	5	23,688

OHIO

W8ELC	270	54	9	33,048
K8SJU	231	50	6	24,700
W8MAI/8	207	46	4	19,780
W8LT	197	44	3	17,688

WEST VIRGINIA

W8VVE/8	162	42	6	14,952

ILLINOIS

W9UCW	313	56	7	36,996

WISCONSIN

K9GZK	283	52	5	31,096

INDIANA

W9YB	216	47	4	21,056

MULTI-OPERATOR

Europe

ENGLAND

G3KAC	218	15	14	10,575

SCOTLAND

GM3IGW/A	282	30	18	46,530
GM3OXX/A	217	21	14	23,331
GM3YCB	224	16	14	17,744

*Log received late. Not recognized for winning score for Massachusetts.

**Log received late. Not recognized for 3d place score in California.

Canadian Province gives you an extra multiplier plus the 10 points you obtain for such a contact. But, on top of this, you cannot count the United States and Canada/Newfoundland as separate multipliers, too, as some did. And KV4 is not a State. Some counted it as 10 points whereas it was a 5 pointer. Same applies to KP4.

For the entire gang to make note of...this is a c.w. to c.w. Contest only. c.w. to phone QSOs are not permitted nor are any cross-band contacts allowed.

Remember that this Contest is a yearly event that is scheduled to run over the last full week-end of January from 0001 GMT Saturday to 1500 GMT Sunday.

A most attractive certificate shall be sent the winners in each State, Province and DX country and in cases where scores are close a certificate shall also be sent to second and third place contestants.

Comments? Oftentimes this makes for the most interesting part of the story. What contest would be complete without them!

Top Ten Scores

KV4FZ	139,555	W3IN	39,000
W4BRB/VP7	83,250	K8UDJ*	38,190
K1PBW	74,112	W9UCW*	36,996
DL9KRA	46,560	W3GM	36,816
GM3IGW*	46,530	WØAIH	34,650

*indicates multi-op.

1st District

W1BB/1: Again it was a *Grand* do!!!

K1PBW: The Contest was great, the best ever, with conditions peaking to Europe spectacularly Saturday morning with the following morning not far behind. Was surprised at the lack of activity from South America. Hope you don't live to regret that this contest buried you in a mountain of log sheets. *W1WY:* Overall condx good but high QRN level Friday night. EU and West Coast coming thru but difficult to work EU due to static. West Coast guys were just not listening down at 1.8 mc. Present allocation of frequencies on 160 certainly does not make for contest operation, especially to the west coast. We in the northeast sector are at a big disadvantage. *WA1FDV:* Observation of the "DX Window" by a certain group of phone stations left a lot to be desired. And a few "meatheads" are still around who call EU DX on frequency. *W1TX:* Right arm trouble limited operation so concentrated on DX. Condx here were very good except for line noise which always seems to occur on contest weekends! (Roy, the gremlins are after you—*ed.*).

HB9NL did his part to add Switzerland to many logs.

2nd District

W2FJ: Condx were good and you had a fine turn-out. I had more trouble with the guys chasing the fones out of the 'DX Window' than I had with the fones themselves. *W2EQS:* Wait till next year! (Whoops, W2TA sez that, too). W2TA: Wait till next year! *WB2OZW:* Greatest surprise was when I was working around 1817 kc and both G3RPB and HB9NJ came right on freq. to get me. A GW and GM also tried but the QRM was too great on freq. by then to make a QSO. I feel it was one of the best openings we've had in a long time on contest operations. (That's putting it mildly, Paul—*ed.*). *W2KHT:* Enjoyed another FB 160 meter contest. My slight gain this year projects me as a possible runner-up in 1990—hi! *W2CVW:* This was my best 160 Contest yet. Mediocre score but I did get VP7 and KV4. I seem to do okay up to about 1000 miles. *W2BP:* My heart wasn't in the contest this year. My Drake gear had been stolen. Just before our departure for the Holy Land, I sent the tx and rx to Drake for reconditioning. We got back home Jan. 4. On the front steps were two empty boxes! Back in the late 50s I bought a Heath DX-35 and added 160 meters while putting it together. That is what I used during the contest plus W2IU's Johnson v.f.o. and a borrowed HRO. It was rough but I did get 4 new countries and 4 new western states. Am now up to 26 countries and 37 States. *W2DEN:* Used a Globe Scout at 50 watts and an NC-98 and BC-453 receivers. Antenna 200 feet long, 30 feet high. Hope to have better equipment next year.

3rd District

W3MK: Seemed like quite a lot more activity than last year and also lots of "Big" signals. Pretty rough trying to find a spot where there were less than 10 stations all calling CQ. Looks like we need a bit more c.w. activity on the low end before the phone boys move in to stay. *W3IN:* I had been looking forward to the Contest and preparing for it ever since the last one. All seemed to begin normally and I was reasonably satisfied with 48 contacts in the first 1½ hours of which some time was spent checking for DX. At this point my father had to be rushed to the hospital in a deep insulin shock. I stayed with him until they let me take him to his home. *CQ* WW 160 is still a great contest. (Don, we all hope your father is once again back in good health. Don is ex-W3EIS and many of you may remember him as HC1AGI in 1962 and HC1DC in 1963 on 160—*ed.*). *W3BQN:* My first time on 160. Your contest very unique and extremely interesting. Hope score rates a third place! (Better than that, Bill!...2nd place—*ed.*). *W3GN:* Enjoyed working some DX for a change. Too sleepy to continue operation all through the night! Seemed to be more activity this year.

4th District

W4FKG: I didn't work many stations as I had not been on 160 since pre-war. Just got some kind of antenna to load late Saturday night of contest period and was so worn out from working with it that I didn't feel like operating very late. I will give them hell during next Test on 160 and will be looking forward to it.

[*Continued on page 74*]

Late OSCAR Satellite News

BY GEORGE JACOBS,* W3ASK

THE saga of the AUSTRALIS-OSCAR 5 satellite is now complete. Hundreds of reports submitted by observers from almost every corner of the world have been punched into a computer, an attractive QSL card has been sent to each observer officially submitting a report, and a report summarizing the technological, scientific and operational highlights of the project has been submitted to the National Aeronautics and Space Administration by AMSAT, the Radio Amateur Satellite Corporation.

A summary of the general characteristics of the AUSTRALIS-OSCAR 5 amateur satellite is given below. The entire summary report will be printed in an early issue of *CQ*.

LAUNCH: Jan. 23, 1970 at 1131 GMT on a Thor-Delta rocket.
ORBIT: 910 miles apogee, 880 miles perigee, 102 degrees inclination.
V.H.F. BEACON TRANSMITTER: 50 mw at 144.05 mc, amplitude modulated.
H.F. BEACON TRANSMITTER: 180 mw at 29.450 mc, operated on command.
ANTENNAS: Quarter-wave monopole for v.h.f., dipole for h.f.
STABILIZATION: Magnetic Attitude Stabilization System.
POWER SOURCE: 28 type G manganese-alkaline battery cells.
OPERATING LIFE: 23 days for v.h.f. 46 days for h.f.
NUMBER OF ORBITS DURING OPERATION: 281 for v.h.f., 562 for h.f.
SIZE: 17 × 12 × 6 inches, rectangular box.
WEIGHT: 39 pounds.
TELEMETRY SYSTEM: 7 channels, a.m. tones, decoded by measuring frequency of each tone. Readings included voltage, current, internal and external temperature and three horizon sensors.

The satellite was built by Australian radio amateurs and space enthusiasts and was prepared for launch by members of the Radio Amateur Satellite Corporation (AMSAT) in the Washington, D.C. area.

With the exception of a loss of modulation

[*Continued on page 76*]

*11307 Clara Street, Silver Spring, Md. 20902

Here's the official AUSTRALIS-OSCAR 5 QSL card. If you submitted an official reception report to AMSAT you should have your card by now. It's printed on white stock with blue lettering, and with the AO-5 satellite outlined in the background in gold ink.

During early July, Michael Owen, VK3KI, President of the Wireless Institute of Australia spent a day in Washington, D.C. Here Michael (center) is shown seriously discussing amateur satellites with Bob Denniston (left), W0DX, President of the American Radio Relay League and Perry Klein (right), K3JTE, President of the Radio Amateur Satellite Corp.

WHAT'S IN A QSL CARD?

BY GEORGE PATAKI,* exYO2BO

MANY years ago in my native Roumania I held the call YO2BO. I also was the chief operator of YO2KAC, the club station of the Pioneers' Palace in the city of Timisoara.

One day we received a QSL from a station in Bermuda and this started us all thinking seriously about the island as a beautiful place to visit. The full color card depicted a map of the Bermuda Islands showing the harbour, beaches, docks for small sailboats, the lighthouse and other facilities and sights available. With our interest raised we read all the available literature, very little at that time, and displayed the QSL card on the rig. Everyone visiting the club noticed the card and we all talked about it and as though it was a symbol of something we had to achieve or get to.

Five years ago I left Roumania and immigrated to the United States. What many Americans don't realize is that his is the country of unlimited possibilities and what in other parts of the world is an "impossible dream" belongs to every day life here.

Never having forgotten that QSL card, I was finally able to realize the dream of Bermuda this past summer. My travel agent arranged for tickets and hotel reservations for my wife and myself.

Let me tell you, Bermuda .is beautiful indeed. I cannot adequately described it but it was better than I had dreamed it. It was impressed by all the homes with white roofs, the rich tropical vegetation, the clear water and the white sand beaches but most of all the friendliness of the Bermudians.

We met with several local amateurs: Reggie, VP9AX, and his son Ted, VP9EP, Cy, VP9L and Bill, VP9BN. We spent a very pleasant evening at Bill's home located on one of the highest points on the island.

You would think that the VP9s would be content to sit on their beautiful island and give out thousands of VP9 contacts to the rest of he world. Wrong. They are often engaged in going on DXpeditions to other islands. Reggie, Bill, and Cy have operated from Anguilla, the British Virgin Islands and Dominica.

It is also good to know that a visiting amateur can easily get authorization to operate in Bermuda. The Radio Inspector is Reggie, VP9AX.

As a traveler and as an amateur I was very pleased with what I found in Bermuda. All the years of waiting and dreaming were worth it in that it was more than I could imagine from a QSL card. An old dream came true. ■

*34-24 76th Street, Jackson Heights, N.Y. 11372

Bill, VP9BN's QSL card is similar to the one that first started me thinking about a trip to Bermuda.

George, exYO2BO, Reggie, VP9AX, and Bill, VP9BN, in Bill's shack.

There are just 2 ways to sell the HAM RADIO market . . .

the hard way is one . . .

the CQ way is the other !

CQ makes selling your product or service to fellow hams easy, because CQ reaches more active ham readers each month than all the others. And CQ's ad rates are surprisingly lower than our major competitor, because CQ wants our advertisers to show a profit for their investment.

And what's more, CQ ads now reach the ham fraternity a full month earlier than ads in the other magazines. We've advanced our closing, printing and mailing dates, so that this issue of CQ will be in the hands of our readers at the same time they're getting last month's issue of Brands X, Y & Z. That's one of the reasons that dozens of advertisers have made CQ Number One on their ad program.

If you have a product or service to sell, why not get in touch with our publisher right away. You won't get a hard time, and you won't get a lot of fancy promises that can't be kept. Just the straight facts about what results you should get from your sales program.

We have a complete art staff on hand, and can also handle all your type-setting needs.

So don't put off, call 516 883-6200 and ask for Dick Cowan. That's all it takes to get your business growing.

Advertising Rates — Cost Per Insertion

Rate earned based on total space used within one year — 12 issues.

	1 time	3 times	6 times	12 times
1 Page	$525	$470	$430	$385
1/2 Page	275	255	235	215
3/8 Page	220	205	195	180
1/4 Page	150	140	130	120
3/16 Page	106	101	97	93
1/8 Page	80	75	70	65
1/16 Page	40	38	35	33

ASSEMBLY OF RG-8/U TO TYPE UHF CONNECTORS

BY DAVID T. GEISER,* WA2ANU

THE average amateur at one time or another has had a great deal of difficulty in assembling RG-8/U coaxial cable to the type UHF connector such as the PL-259. I did too, until I worked out a few kinks from the procedure.

The "Standard" Way

The ordinary instructions for the assembly of coax and u.h.f. connector is shown in figure 1[1]. This way will work if the constructor combines luck with perfect workmanship. There are a couple of minor modifications to the procedure that make assembly much easier.

The most common difficulty is that the braid will loosen before tinning, so that the tinned braid will not enter the back of the connector easily, if at all. One way to minimize this difficulty is to strip the jacket as shown in figure 2, making the crosswise cut of the jacket first, the lengthwise second, and carefully unwrap the jacket without pulling. Then tin the whole length of the braid, or at least that portion that is not to be trimmed off. With any luck at all, the portion of the braid (that is to be left on the cable) will hug the dielectric closely.

My own personal preference is to bind a couple of turns of #22 to #28 wire around the portion of the braid that is to be removed, before I start tinning. That way if I really massage the braid with the soldering iron, the braid is positively held in place. It is best if the wire is insulated with some enamel or other insulation that soldering heat will not cut through. After tinning the braid the wire can simply be unwrapped.

Refinements

In tinning the braid, a very hot iron should be used to *drain* the excess solder out of the braid. This minimizes pinpoints of solder showing where you removed the iron.

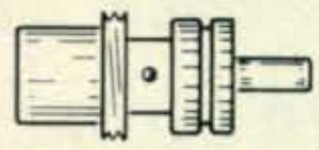
Of course, no one can do a perfect job of draining the solder out of the braid every time. Perhaps the easiest cure for this is to have a small flat file, and just file the solder blobs or points off.

*Snowden Hill Road, New Hartford, New York 13413.

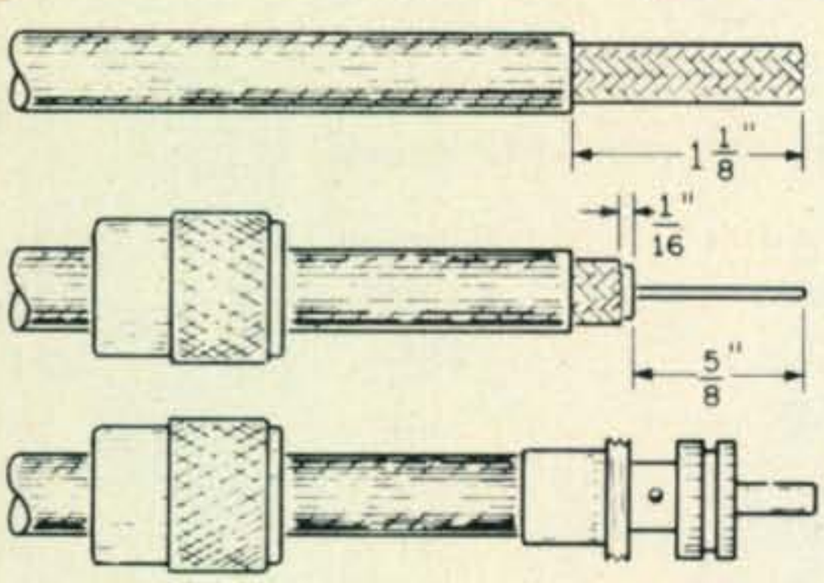
[1]This description is from the Jan. 4, 1962 edition of MIL-HDBK-216, which is no longer in print. However, it is typical of instructions commonly found.


Coupling Ring

ASSEMBLY INSTRUCTIONS
FOR SERIES UHF CONNECTORS


Plug Sub-Assembly

Assembly of Cables to PL-259 (NT49190) Plug



Cut end of cable even. Remove vinyl jacket 1 1/8".

Bare 5/8" of center conductor. Trim braided shield. Slide coupling ring on cable. Tin exposed center conductor and braid.

Screw the plug sub-assembly on cable. Solder assembly to braid through solder holes. Use enough heat to create bond of braid to shell. Solder center conductor to contact. For final assembly, screw coupling ring on plug assembly.

Fig. 1—Details of preparing and connecting RG-8/U to PL-259 u.h.f. connectors.

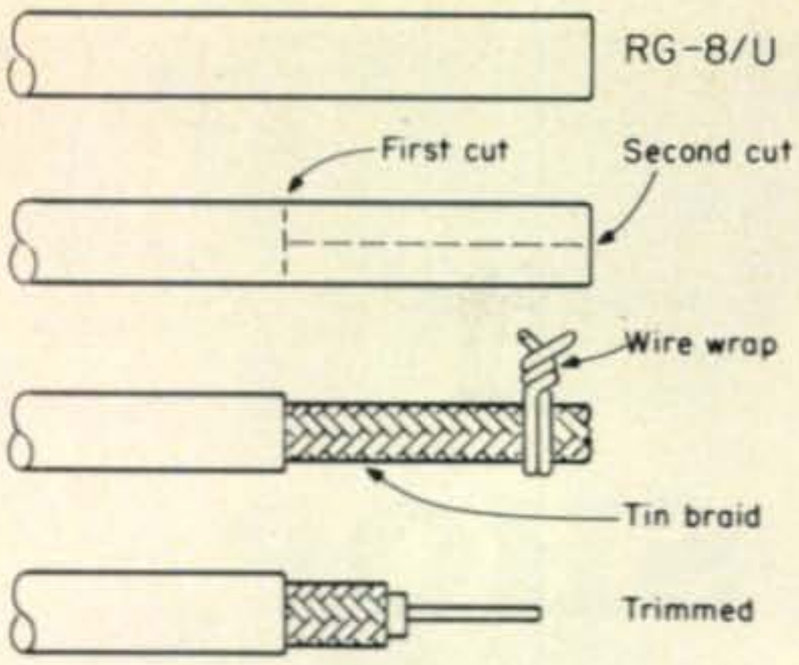


Fig. 2—Tinning the entire braid first lessens the chance of distorting or fraying. Wire or string is used to secure the end of the braid. Care should be used in trimming the tinned braid.

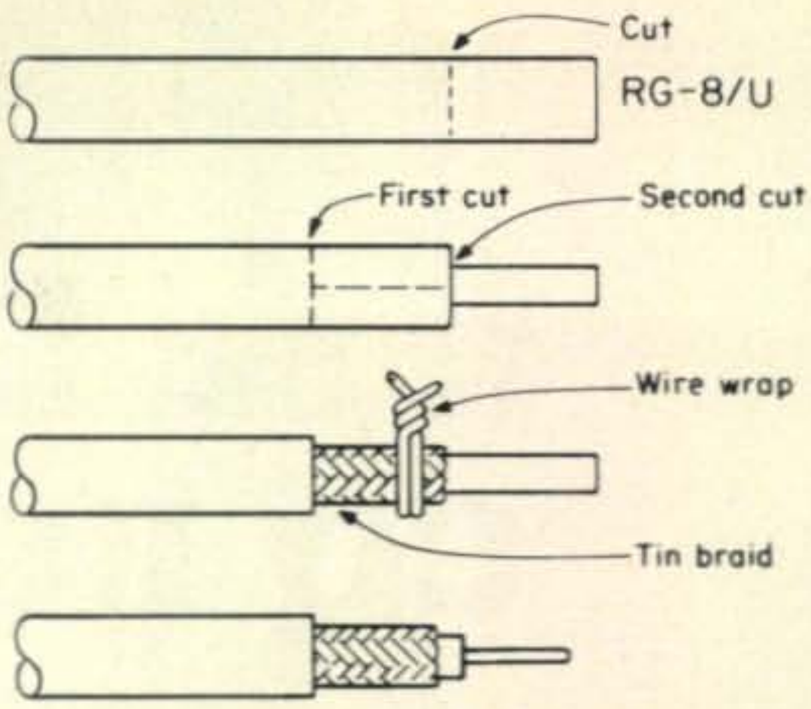


Fig. 3—If the braid is trimmed to size first, wire or string should also be used to secure the end of the braid. In all these methods of preparing cable, care should be exercised to avoid melting or distorting the dielectric.

Sometimes when too much force has been used with the soldering iron, the tinned braid is out-of-round. This is usually caused by some slight softening of the dielectric during the tinning. Judicious squeezing with smooth-jawed pliers can round the surface again.

Variaitons

It isn't too easy to cut tinned braid, so if you have this problem, follow the procedure shown in figure 3. This allows you to cut the braid to length before tinning, but does have the disadvantage that the braid is more likely to loosen before you wrap the wire around for the braid-tinning step.

Some folks prefer to use string instead of wire to wrap the braid before tinning. String doesn't stick to the solder, but it can burn. Also it is a good idea to make sure the string isn't waxed, as the wax can melt into the braid and prevent tinning.

Often a small wedge-shaped or triangular file is useful as a cutting tool for tinned braid. When this method is used there is less chance for individual wires to be left as a possible cause of future shorts. ■

Medical Amateur Radio Council Meets in Chicago

RECENTLY over 10,000 doctors met in Chicago to attend the annual American Medical Association (AMA) Convention. Between some of the weightier medical topics discussed, a group of doctors belonging to the Medical Amateur Radio Council (MARCO) met and operated a station donated by Hallicrafters for the occasion. The MARCO members talked to fellow doctors in the earthquake disaster area near Lima, Peru, and also handled vital medical messages between doctors from all parts of the world including those attending the Convention.

MARCO has over 400 members engaged or associated with the medical profession throughout the world. Further information about MARCO can be had by writing to: MARCO, P.O. Box 229, Manchester, Conn. 06040.

MARCO members gather around the Convention station in Chicago. From left to right: Dr. Earle E. Weston, W8BXO; Bud Drobish, W9QVA, Assistant Sales Manager of Hallicrafters; Dr. Maurice N. Richter, K7UWP; Dr. William L. Sprague, WA6CRN; Dr. Walter Shriner, W9CBG; Dr. Edward A. Holyoke, WAØVSR; Dr. Orin Q. Flint, WA2WAU. Sitting is Dr. J. Stanley Carp, K1EEG and directly behind him is Joseph G. Boris, Executive Secretary of MARCO.

CQ BOOK SHOP

Ham's Interpreter

This valuable book is imported from Germany and written by DL1CU. It contains a collection of phrases and expressions designed to assist those amateurs who wish to enlarge their knowledge of various languages for use on amateur radio. It is a must for every DX'er. $1.50

CQ Binders

Convenient and economical are the words for CQ's beautiful maroon and gold binders. Individual issues can be removed quickly and easily without damage to the magazine. Save precious time as reference copies are within immediate reach in this handy binder. $5.00

The New RTTY Handbook

A treasury of vital and "hard-to-get" information, this book is loaded with valuable equipment schematics, adjustment procedures, etc. A boon to beginner and pro. A special section on getting started, written by Byron Kretzman, W2JTP, a well-known authority in the field. $3.95

Surplus Schematics

Ken Grayson has loaded this book with schematics for currently popular pieces of conversion gear, making it invaluable to amateurs as a guide to surplus gear. $2.50

Antenna Roundup I

Edited by Art Seidman, a 160 page mass of antenna information directed at answering a multitude of questions surrounding the mysterious antenna. $3.00

Antenna Roundup II

Ten big theory articles backed up by 82 detailed and illustrated construction projects from VLF to microwave, long wires to 17 element beams and Sterba Curtain arrays. $4.00

Shop & Shack Shortcuts

A volume packed with hundreds of hints & shortcuts collected by Don Stoner, this will help anyone to dress up his shack, improve shop techniques and increase efficiency and equipment. $3.95

CQ Anthology II

1952-1959 250 pages of more recent but still hard-to-get important articles from glorious yesteryear. $3.00

Electronic Circuit Handbook I

Written by Tom Kneitel, WB2AAI, this details 150 of the most often needed circuits in 11 great chapters. Invaluable for beginners and old-timers alike. $3.00

Electronic Circuit Handbook II

Tom Kneitel's own sequel to Vol 1, this volume delivers 159 additional circuits that will appeal to all amateurs. Each circuit is fully described in text with complete schematics. $3.00

Surplus Conversion Handbook

Compiled by Tom Kneitel, WB2AAI, this contains 192 pages of conversion articles, covering almost every piece of surplus gear worth the effort to convert to ham use. $3.00

Antenna Handbook I

All new information on transmission line theory, Attenuation, Impedance, Standing waves, Resonant and nonresonant lines, current distribution, free space 3 dimensional patterns of long wires of all practical length and much, much more by Ken Glanzer. $4.00

The New DX Handbook

Don Miller's 200 pages of valuable technical information and operating aids, most of which has never been published before and can be found in no other volume contains Great Circle Bearing Charts. $5.00

RTTY From A To Z

This new RTTY Classic has been produced to fill the gaps in RTTY knowledge among amateurs and professionals alike. 16 chapters and 224 pages. This book is a must in your technical library. $5.00

103 - Simple Transistor Projects

The aim of this book is to familiarize the beginner and advanced experimenter with the handy source of reference circuits. $2.95

- ☐ CQ Anthology II $3.00
- ☐ Ham's Interpreter $1.50
- ☐ CQ Binders $5.00
- ☐ New RTTY Handbook $3.95
- ☐ Surplus Schematics $2.50
- ☐ Antenna Roundup I $3.00
- ☐ Antenna Roundup II $4.00
- ☐ Shop & Shack Shortcuts $3.95
- ☐ Electronic Circuits Handbook I $3.00
- ☐ Electronic Circuits Handbook II $3.00
- ☐ Surplus Conversion Handbook $3.00
- ☐ Antenna Handbook I $4.00
- ☐ New DX Handbook $5.00
- ☐ RTTY From A To Z $5.00
- ☐ 103 - Simple Transistor Projects ... $3.45

NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

New York City and State residents must add sales tax applicable to your area.

COWAN PUBLISHING CORP. Book Div.
14 Vanderventer Avenue • Port Washington, L.I., N.Y. 11050

DX

BY JOHN A. ATTAWAY,* K4IIF

THOSE who enjoy chasing DX with certificates in mind will be pleased to know that your *CQ* DX Awards Advisory Committee is presently restructuring the *CQ* award for working countries, now known as the *CQ* SSB DX Award. It is our plan to bring it more into line with present day needs and desires. Although we haven't yet finished discussing all details of the new award, we will mention some of the ideas we plan to use and then follow up next month with the complete details. The kickoff date is to be Jan. 1, 1971, and Jerry Hagen, WA6GLD, will be award manager.

First of all, we are abandoning our s.s.b.-only position. The old award was started back when sideband was a curiosity and required extensive promotion. This is no longer true, so the new award will be available in two modes—2-way c.w. and 2-way s.s.b. At the present time the only major U.S. DX award available as c.w.-only is our WPX. Other awards offer the c.w. man only a c.w.-phone option. We feel that the strictly c.w. man would prefer a countries award which is c.w. only, so we will give it to him. We plan to maintain separate c.w. and s.s.b. honor rolls, probably listing them in alternate months. QSL cards for contacts after Nov. 15, 1945 will be eligible for credit toward both certificates and honor rolls.

The new certificate will be a dandy, of equal quality to that we award WAZ. It will have space for endorsement stickers for 150, 200, 250, 275, 300, 310, 320, and possibly 330 countries. To promote multi-band usage, two special endorsement stickers will be available. These are a Low Band Endorsement to be issued to stations contacting 100 or more countries using any combination of the 40 and 80 meter bands, and a 28 mc endorsement for stations working 100 or more countries on 10 meters.

Our present plan is to use the ARRL DXCC Countries List as the basis for the new award. However, I would be less than honest if I failed to indicate that the Committee is badly split on this point. One Committeeman sent a letter, endorsed by 37 members of his club, strongly urging that a designated "idiot group" of countries be removed from the list. Their words were that "all atolls, reefs, rocks, mountain peaks, submerged islands, and all other forms of non-inhabited or uninhabitable geography not ordinarily forming a place for human domecile be stricken from the list."

Our reason for sticking with the present list is the conviction that a universal list accepted everywhere is highly desirable. Perhaps if the 37 state their ideas to ARRL's DX Advisory Committee as forcefully as they stated them to this department, some changes could be made.

Be sure to check *CQ* next month for the complete rules and application procedure for the new award.

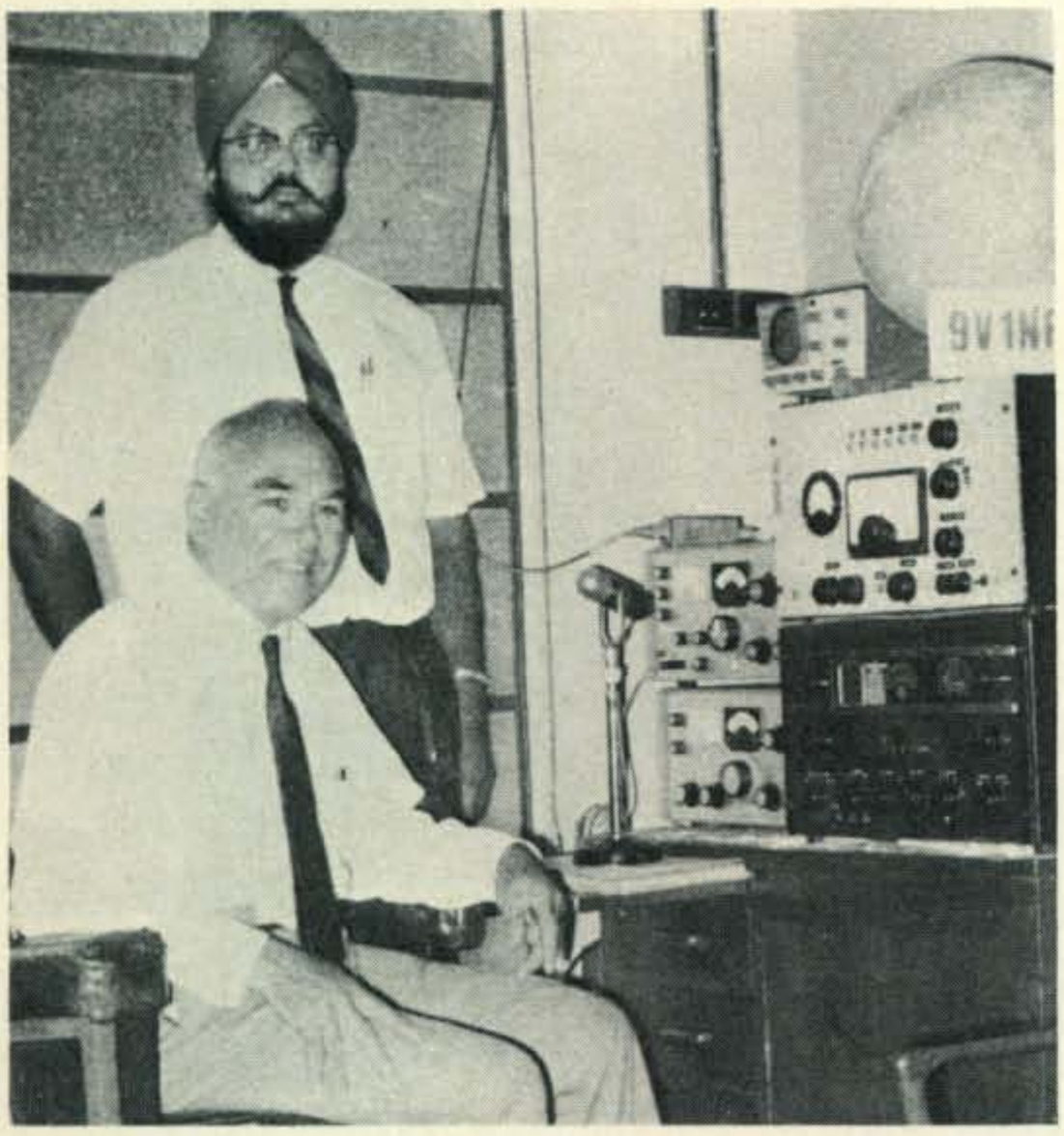
Amateur Radio in Great Britain

The following information was provided by John Allaway, G3FKM, DX Editor of *Radio Communication*, the Journal of the Radio Society of Great Britain.

The first "experimental wireless telegraphy" license was issued in London in 1905, and rapidly increasing interest resulted in the formation of the London Wireless Club in 1913. Operations were suspended during World War I, and the present day Radio

Jinny Beyer, 9NIRA, is the prettiest lady on the other side of a DX pile-up in many years (like during recorded history) according to the Twin City DX Association (TCDXA) who honored her with a testimonial luncheon on July 31. Jinny plans to be on the air from India as VU2IRA. *(Photo via W0YDB.)*

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



Want to trade places and operate from 9V1? The lucky guy sitting at the rig is Alberto, XE1NE who visited 9V1NR during his recent round the world trip. He also operated AC3PN at the Royal Palace in Sikkim where he made many AC3 QSO's in Spanish.

Society of Great Britain did not come into being until 1922. The first transatlantic signals were received by an American, Paul Godley, 2ZE, in December, 1921 using a wavelength of 230 meters and a Beverage antenna. However, the first U.S./G.B. QSO did not take place until Dec. 8, 1923 when G2KF and U1MO made contact on 100 meters.

Recent figures show that there were 13,413 Class A and 1,879 Class B license holders in October, 1969—these figures covering all the British Isles with the exception of Eire. The basic difference between the license requirements is that for the Class B license no code test is required, only the 3 hour written exam, and holders are restricted to the bands 144 Mc and higher and may only use phone. They have 3 letter G8 calls. Class A license holders have passed a code test at 12 w.p.m. as well as the written exam on the theory of radic and license conditions. They are allowed full use of the v.h.f. bands plus the following: 1.800-2.000 mc, 3.500-3.800 mc, 7.000-7.100 mc, 14.000-14.350 mc, 21.000-21.350 mc, 28.000-29.700 mc, and 70.025-70.700 mc. Power input is limited to 150 watts on all bands except 160 meters, where it is 10 watts, and on 70 mc where it is 25 watts. The minimum age for U.K. amateurs is 14. The cost of both classes of license is $7.20/year and there is no time limit on the "B" license.

The WPX Program

S.S.B. WPX

532.....W4DVG
533.....K8BGZ
534.....PAØMIR
535.....EA8GK
536.....K3TVE

C.W. WPX

1043.....K8TVO
1044.....JA6HKC
1045.....HA5DJ
1046.....W5KFN
1047.....K1PRB

Phone WPX

195.....ZS4RN
196.....HA5DG
197.....F3EA
198.....DK2UN

Mixed WPX

242.....WA3GNW
243.....DL9TJ
244.....JA1NDO
245.....K8UDJ
246.....W8NNR
247.....3Z9AI

WPX Endorsements

S.S.B.: W4OPM–950, WA5LOB–650, DK2-BY–450, W2LEJ–400, WØYDB–400, and WA9SUJ–350.

C.W.: W8KPL–900, W8LY–850, W2HO–800, KØARS–500, W2GA–500, OK3JV–400, K8TVO–400, HA5DJ–400, OK3BT–400, WA3GNW–350, and W7VSE–350.

Mixed: W4LRN–1000, WA5LOB–650, K6-SDR–600, K8UDJ–500, 3Z9AI–500, DL9-TJ–450, and W1EQU–450.

Phone: F2VX–450, F5JA–400, W2LEJ–400, and DK2UN–350.

80 Meters: DK2BI.

20 Meters: DK2BI and WØYDB.

15 Meters: JA1NDO.

Africa: W2HO.

Asia: W2HO.

Europe: WØYDB, JA1NDO, and OK3JU.

North America: W2HO.

Oceania: W2HO.

Complete rules for WPX, WPNX, and VPX are listed on page 66-67 of the June, 1970 issue of CQ. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to WPX Manager, P.O. Box 1271, Covina, Cal. 91722, or to DX Editor, P.O. Box 205, Winter Haven, Florida 33880.

The CQ S.S.B. DX Award Program

100 Countries	200 Countries
648.....K1DRN	206.....WA0CPX
649.....WAØCPX	
650.....F3VN/W2	
651.....DL6TZ	
652.....VK3SM	

The British system of callsign allocation is very confusing to overseas amateurs as the number in the prefix does not have any geographical significance. All G2, G3, G4, G5, G6, and G8 callsigns followed by a 2-leter suffix were licensed before World War

WPX HONOR ROLL

The WPX Honor Roll is based on confirmed *current* prefixes submitted in accordance with the master prefix list. The total shown is the current net regardless of an operators all-time gross prefix count.

MIXED

W4OPM	Joe Hiller	1000
W9WHM	John R. Leary	811
W8LY	Michael A. Bakos	785
G3DO	D.A.G. Edwards	721
K1SHN	Chuck Banta	714
I1SF	Serafino Franchi	690
W3PVZ	Joseph M. Olnick	680
WA5LOB	James Edwards	680
W4IC	George Mack	676
DL1MD	Heribert Rechl	646
W8ROC	Frederick Riecks	645
WA6EPQ	Larry Brockman	617
YU1AG	Djura Borosic	614
W8KSR	Jon Hodgin	609
W4BQY	G. B. Fisher	595
W8GMK	John Marhefka	592
WA0CPX	Edward Gray	550

SSB

W4OPM	Joe Hiller	875
W4NJF	Gay E. Milius	802
DL9OH	Karl Muller	690
WA5LOB	James Edwards	673
HP1JC	Juan G. Chen	644
K2POA	Arthur Johnson	624
G3DO	D.A.G. Edwards	622
W3DJZ	Arden Hopple	620
I1AMU	Alfonso Porretta	619
K1SHN	Chuck Banta	604
F2MO	Michel Dort	581
W4IC	George Mack	562

CW

W4OPM	Joe Hiller	850
W8LY	Michael A. Bakos	786
W2AIW	Charles Rogers	776
VK3AHQ	Henry Denver	753
W8KPL	William W. Simpson	750
DL1QT	Helmut Baumert	744
W2HO	W. Vollkommer	720
ON4QX	Bob Berge	682
W9FD	W. W. Johler	680
G2GM	F. D. Cawley	598
K1SHN	Chuck Banta	588
VE4OX	D. E. McVittie	579
I1SF	Serafino Franchi	571
YU1AG	Djura Borosic	569
W8GMK	Wendell Boyden	550
K1LWI	John Marhefka	562

PHONE

W9WHM	John R. Leary	795
G3DO	D.A.G. Edwards	708
W3DJZ	Arden Hopple	654
CX2CN	Samuel Barreiro	574
I1SF	Serafino Franchi	568

II. G2's and 3-letter suffixes were "artificial antenna" permit holders in September, 1939, and all G3, 3-letter suffix holders are post war issues. British amateurs moving from one

"Hell's Angels??" Not hardly. Just ZD8H, ZD8AB, and ZD8CS taking their morning constitutional down Ascension Island way. *(Photo courtesy ZD8CS.)*

British "country" to another keep the same number and suffix letters. They merely change prefixes. For example, G3AAA in Wales would become GW3AAA. The G3 series is almost exhausted and G4, 3-letter calls will soon be heard. G5, 3-letter calls are for reciprocal licenses which are becoming available to an increasingly large number of overseas visitors.

The RSGB has over one half the licensed British amateurs in it's membership and currently charges an annual membership fee of $6.00. Overseas members are welcome and are entitled to receive the Society's monthly publication *Radio Communication* as well as make full use of it's free, 2-way QSL bureau. The Society believes in a strong IARU and in cooperation between the world's amateurs. A revised program of awards was recently announced and full details of these may be obtained from RSGB Headquarters, 35 Doughty St., London WC1N 2AE, England. Other amateur radio organizations include the International Short Wave League which also produces a monthly bulletin, offers free

A well known trio on 160: Left to right, Rolf Rasp, PY1SWL, "Uncle Vern" Howard, W6ERS, and Tom Gallagher, W6KWE, ex-W3DPJ. All are looking forward to a vfb season ahead on 160 meters. *(Photo via W1BB.)*

Here is CQ's DX advisor for Brazil, Manoel Borio, PY1MB, who checks QSLs for PY amateurs applying for CQ awards. His XYL is Mag, PY1OK.

QSL services, and has an award's program. Their membership fee is $4.20 and the Secretary is Bernard Brown, 60 White St., Derby, DE3 IHA, England.

QSL Manager of the Month

The first winner of the monthly QSL Manager award being given by Scott's QSL service is George Studd, ZL2AFZ, of Napier, New Zealand. George is now handling the cards for VR1Q, ZL2AFZ/C, ZM1IBN/A, ZM3PO/C, AXØLD, ZM1AAT/K, and ZL2ANX. He was previously the manager for ZLIDS/C, ZL1TU/C, and ZL1IL/C.

George has over 30 years of radio experience including service as wireless operator to the General commanding the New Zealand Expeditionary Forces in North Africa during World War II. He is a keen DXer holding many awards and has participated in a number of DXpeditions in the South Pacific area. Presently he is DX Editor of the monthly publication of the New Zealand national society, *NZART*.

The QSL Manager of the Month award given by Scott's QSL Service consists of a trophy in the form of a golden microphone on a walnut base with engraving on a plate attached to the base. Future nominations for this award should be sent to WA5UHR, 1510 Lynnview, Houston, Texas 77055.

QRPp—New DX Record?

In January, 1970, KL7YU, Fairbanks, Alaska, completed a QSO with W7BVV, Portland, Oregon, a path of 1650 miles using 1 microwatt of output. This QSO took place on 28760 kc at 2120 GMT, and represents 1.6 billion miles per watt. KL7YU's microwatt was RST 539 while W7BVV's 50 milliwatts a.m. was RS 56 in Fairbanks. For receiving, a Beverage antenna was used which consisted of a wire of several wavelengths, 3-8 feet above the ground, terminated at the far end by the proper resistance. For transmitting, vee-beams and a rhombic were used. The rhombic was surveyed and erected for the Fairbanks-Portland path. The June, 1970 issue of the *Milliwatt* describes this feat in detail. Extra copies may possibly be available from Mike Czuhajewski, WA8MCQ, Rt. 3, Paw Paw, Michigan 49079.

In an earlier issue we failed to distinguish adequately between the QRP club and the QRPp group. The QRP Amateur Radio Club is devoted to low power operation, 100 watts or less, while QRPp is an overlapping but separate group interested in *very* low power, 5 watts or less. The QRP newsletter is published by K7ZVA, QRPp's the *Milliwatt* by WA8MCQ.

ZL2AFZ is reported to be monitoring 14075 kc specifically for stateside QRPp stations on Thursdays and Saturdays at 0330 GMT.

New and Rare Prefixes on the Air

FMØ–FMØXF has been reported on 15 and 20 meter c.w. QSL to DL5RI.
HP8–HP8C was a DXpedition to Contadora Island. (Not a new country.) QSL to HP1AA.
LI2–The call LI2B was used for the 2nd consecutive year by Thor Heyerdahl's reed boat the *Ra*. QSL via W4ETO.
OB – Used by Peruvian amateurs during the week of July 28 to celebrate the 149th anniver-

The WAZ Program

S.S.B. WAZ

804.....VK2KM
805.....DL7OD
806.....W6HFL
807.....JA1NDO
808.....JAØAZE
809.....ZL4BO
810.....WA2HSX

C.W.—Phone WAZ

2959.....DL2BW
2960.....UT5KDP
2961.....UB5FL
2962.....UI8IZ
2963.....UA3UJ
2964.....UB5RR
2965.....UA3AA
2966.....K5LIW
2967.....WØIBZ
2968.....KØIEA
2969.....W7EKM
2970.....W4WHK
2971.....WB2IEC
2972.....W4HSJ
2973.....W8BQV
2974.....G3TZU
2975.....G3KAA
2976.....OK2BBJ
2977.....W2YT
2978.....WB6QJD
2979.....I1FOS
2980.....K6TZX

Phone WAZ

None Issued

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

sary of Peru's independence. The Peruvian club has indicated that several new prefixes will be used next year to celebrate the 150th anniversary.
TGØ–TGØAA was heard on 14190 kc at 2200 GMT.
TY7–TY7ATF is the call of 5VZWT for use in Dahomey.
VP1–VP1WMU was W5WMU's call during the contest.
ZA–OH2BH/ZA on July 10 was a good operation. QSL c/o OH2BH.
3B6–3B6CP was Gus Browning on Agalega. QSL to W2MVZ.
3B7–This is the new prefix for St. Brandon. 3B7DA is on 14030 c.w. and 14330 s.s.b. from 1200 GMT. QSL to Alouis, Box 467, Curepipe, Mauritius.
3B8–The new Mauritius prefix. 3B8CZ is active and cards may be sent to 43 Hillcrest, Curepipe.
3B9–The new Rodriguez Island prefix.
4MØ–A special Venezuelan prefix.
4N2–A group of Yugoslav hams operated from several Adriatic islands using 4N2 calls, including 4N2CI, 4N2BR, 4N2M, 4N2HV, 4N2KR, 4N2LO, 4N2KO, and 4N2ML. QSL all these calls c/o YU2NEG.
5J3–5J3CC was a special Columbian station commemorating Columbian independence during their contest on July 19.

Activity from the More Difficult Zones

The Zones which are most troublesome to North American DXers are Numbers 19, 23, and 34. The latter joined this select group when the formerly prolific 5A group left Libya. For your guidance here are the few reports of activity from those zones during recent weeks.

Zone 19 – UWØLQ on 14082 kc, UAØJW on 14013 kc. and UVØIP on 14004 kc.

Zone 23–JT1AH on 14011 kc at 1500 GMT, JT1KAA on 14081 kc at 1340 GMT, and UAØYD on 14036 kc.

Zone 34–ST2SA, Sid, on 21035 kc at 1800-2000 GMT, and 14021, 14040, and and 14075 kc during the intervals 0300–0400 and 1300-1500 GMT. SU1IM, Ibrihim in Cairo, on 21026 kc, 14056 kc at 0329 GMT, and 14041 kc at 0210 GMT. SU1MA, Moty. 14131 kc at 0507 GMT. QSL Moty to Box 840, Cairo. 5A3TB operates on s.s.b. about 14200 kc. QSL via P.O. Box 2325, Tripoli, Libya. 5A3TH is also active. His QSL address is P.O. Box 506, Tripoli, Libya.

QSL Information

The following would like to be QSL Managers. Any DX stations interested?:
K4ZDT, 222 Vincenne Rd., Columbia, S.C. 29210
DJ9ZB, 7800 FREIBURG, Carl Kistner Str. 19, Germany
AX3BGB–Via K4II.
AX3BM–To W2GHK, P.O. Box 7388, Newark, N.J. 07107.
AX9XI–c/o W2GHK, NOT W2CTN.
C31CX–Via W2GHK.
CN8GE–To W2GHK.
CN8HD–c/o W2GHK.
CR5SP–Via W2GHK.
CR8AJ – To Horacio G. Torres, Rua Luis Camoes, Vila Sobral 10, Laranjeiro, Portugal.

Frank Cuevas, W6AOA, General Chairman of the 1970 Fresno DX Meeting, relaxes momentarily before plunging into the 120 minute Happy Hour. Don't forget the next Fresno meeting coming up in January.
(Photo Courtesy West Coast DX Bulletin)

CX1GY–c/o WA6YLZ, 1619 Altivo Way, Los Angeles, CA 90026.
CWØAA–Via W2GHK, P.O. Box 7388, Newark, N.J. 07107.
DJ6QT/CT3–To W2GHK.
DL4QQ–c/o WA6PMK.
GD6UW–Via W2GHK.
HP1XOD – To K40D, 9304 Hamilton Drive, Fairfax, Virginia.
I1DFL–6917 SCTY GP., Amateur Radio Club, APO New York, N.Y. 09240.
I1FTU – c/o WN7OLT, 1877 Willamette St., Eugene, Oregon 97401.
JW1EE–Via W2GHK, P.O. Box 7388, Newark, N.J. 07107.
K1OTA/LX–To W2GHK.
K4II/KH6–c/o K4II.
K4II/KS6–Via K4II.
KV4FZ–To W2GHK
KX6DC–c/o WA5UCT, 707 Cottonwood, Richardson, TX 75080.
KX6DR–Via WA5UCT.
OD5LX–To K4TSJ.
ON8CT–c/o W2GHK.
VP1WMU–Via W5WMU, 904 General Mouton, Lafayette, Louisiana 70501.
VP2DAE–To VE3GCO, Garry V. Hammond, Atwood, Ontario.
VP2DAJ–c/o VE3EWY.
VP2LC/p–Via VE3GCO.
VP2LY–To VE3EWY.
VP2SM–c/o VE3GCO.
VP2SN–Via VE3EWY.
VS9MB –To G3KDB, 28 Scotch Orchard, Lichfield, Staffs WS13 6DE, England.
WØVXO/KV4–c/o W2GHK.
WS6DI–Box 788, Pago Pago, American Samoa.
YVØAI–Via W2GHK, P.O. Box 7388, Newark, N.J. 07107.
ZP9AC – DJ4NI handles cards for European stations.
3B8CF–S. Mandary, City Kennedy, Q. Bornes, Mauritius.
3V8MOL–To W2GHK.
4M1A (Oct. 25-26, 1969)–c/o W2GHK.
9Q5RD–Via W9AES, 2134 W. Ridgeview Ave., Decatur, Ill. 62521.
9V1QA–To W6HRE.
9Y4RK–c/o VE3EWY.
9Y4VE–Via VE3GCO.

73, John, K4IIF

Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

Oct.	16-18	RTTY Plaque Sweepstakes
Oct.	17-18	Boy Scouts Jamboree
Oct.	17-18	WADM C.W. Contest
Oct.	17-18	Zero District QSO Party
Oct.	21-22	YL C.W. Anniv. Party
Oct.	**24-25**	**CQ WW DX Phone Contest**
Oct.	24-25	RSGB 7 mc C.W. Contest
Nov.	4-5	YL Phone Anniv. Party
Nov.	6-8	Delaware QSO Party
Nov.	7-8	RSGB 7 mc Phone Contest
Nov.	8	Czechoslovakian Contest
Nov.	6-9	CHC/FHC/HTH QSO Party
Nov.	14-15	ARRL SS Phone Contest
Nov.	21-22	ARRL SS C.W. Contest
Nov.	20-21	Trillium Week-end
Nov.	**28-29**	**CQ WW DX C.W. Contest**
Dec.	5-6	Indiana QSO Party
Jan.	**30-31**	**CQ WW 160 Contest**

WADM C.W. Contest

Starts: 1500 GMT Saturday, October 17
Ends: 1500 GMT Sunday, October 18

This is a c.w. only contest, all bands 3.5 thru 28 mc. There are three classifications, single operator, multi-operator and s.w.l.

Exchange: RST plus QSO nr., starting 001.

Scoring: Three points for each DM contact, multiplied by total DM districts worked on each band. (A district is identified by the last letter in the call, *not* by the number.)

Awards: Will be in the form of a contest flag to top scorers in each country.

Logs go to: Radio Club of the DDR, Att: DM2ATL, P.O. Box 30, Berlin 1055, German Democratic Republic.

Boy Scouts Jamboree

Starts: 0001 GMT Saturday, October 17
Ends: 2359 GMT Sunday, October 18

This is the 13th Jamboree-on-the-Air and has been given extensive coverage in many languages in Scout magazines around the world.

Official Frequencies: C.W.—3590, 7030, 14090, 21140, 28190. Phone—3740, 3940, 7090, 7290, 14290, 21360, 28990.

This is not a contest but participating certificates will be issued to all reporting.

They may be sent to: Boy Scouts World Bureau, Att: L. F. Jarrett, 1211 Geneva 4, Switzerland.

Zero District QSO Party

Two Periods: (GMT)
0000-0400 Saturday, October 17
0000-2359 Sunday, October 18

This is the 5th annual party sponsored by the Roosevelt High School ARC. The same station may be worked on each band and mode, and Zero stations may work other Zero stations.

Exchange: QSO nr., RS/RST and ARRL section. (plus county for Zero stations)

Scoring: For Zero's, total QSOs X (ARRL sections + Zero counties) For others, QSOs X (Zero sections + Zero counties)

Frequencies: C. W. – 3580, 7080, 14080, 21080, 28080. Phone—3980, 7280, 14300, 21380, 28580.

Awards: Certificates to top stations in each ARRL section and Zero district county. (min. of 20 QSOs)

Mailing deadline Nov. 17th to: Roosevelt High School ARC, 45th and Chamberlain, Des Moines, Iowa 50312. Include large s.a.s.e. for copy of results.

YLRL Anniversary Party

C.W.—Oct. 21-22 *Phone*—Nov. 4-5
Starts: 1800 GMT Wednesday
Ends: 1800 GMT Thursday

This the 31st annual party is open to all YLs around the world. OMs keep out.

All bands may be used, but avoid contacts on net frequencies. Phone and c.w. are separate contests with separate scoring and awards.

Exchange: QSO nr., RS/RST, ARRL section or country.

Scoring: One point per QSO between stations within an ARRL section, or between DX stations outside ARRL territory. However, contacts between DX and ARRL sections count 2 points.

Multiply total QSO points by sum of ARRL sections and countries worked for final score.

There is a low power multiplier of 1.25 if input power is 150 watts or less on c.w. or a.m., 350 watts p.e.p. on s.s.b.

Awards: 1st, 2nd, and 3rd place certificates to winners in each district and DX country. And two Gold Cups, c.w. and phone, to the top

*14 Sherwood Road, Stamford, Conn. 06905.

YLRL member in the world. There are two special awards, the Corcoran to the YLRL member with the highest combined c.w./phone score in a ARRL area, and the W4HLF award to the highest combined score from the North and Central America areas and from the rest of the world.

Compute your score, sign your log and mail no later than Nov. 21st to: Audrey Beyer, K5PFF, 6202 Reed Rd., Houston, Texas 77017.

RSGB 7 mc Contest

C.W.—Oct. 24-25 *Phone*—Nov. 7-8
Starts: 1800 GMT Saturday
Ends: 1800 GMT Sunday

Its the world working the British Isles on 7 mc in this one. (G, GC, GD, GI, GM, GW) C.W. and phone are separate contests, and only single operator entries are acceptable.

Following rules are for overseas stations.

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

Scoring: Contacts with British Isles stations vary in point value according to the location of the DX station. If in Europe, 5 points; North America, 15 points, Africa, Asia and South America, 25 points; Oceania, 50 points.

In addition, a bonus of 50 points may be claimed for the first contact with each B.I. country/number prefix. (i.e. G2, GC3, GD4 and etc. max. of 36 possible.) GB stations have no bonus value. There is no multiplier.

Awards: 1st, 2nd and 3rd place certificates to the three leading overseas stations.

There is a s.w.l. section. Only British Isles stations may be logged, scoring same as above.

Mailing deadline is Nov. 23rd and all logs go to: The HF Contest Committee, c/o R. S. Biggs, G2FLG, 29 Lord Avenue, Clayhall, Ilford Essex, England.

Delaware QSO Party

Starts: 2300 GMT Friday, November 6
Ends: 0500 GMT Sunday, November 8

This is the 15th Party sponsored by the Delaware ARC. The same station may be worked on each band but only one mode for QSO points.

Exchange: QSO nr., RS/RST and QTH. County for Del., state, province or country for others.

Scoring: Del. stations score 1 point per QSO and multiply total by states, VE provinces and DX countries worked. Others score 5 points per QSO and multiply total by Del. counties worked. (There are only three)

Frequencies: C. W. – 3560, 7060, 14060, 21060, 28060. Phone – 3975, 7275, 14325, 21425, 28650. vhf—50, 50.4, 144. mc

Awards: Certificates to the top station in each state, VE province and DX country. (3 or more contacts) And each Del. county. The W-Del. certificate, working all 3 counties, may be requested for Party contacts, Include a s.a.s.e. with your request.

Mailing deadline Dec. 1st to: Delaware A.R.C. c/o Ray Belair, W3NX, 415 Brighton Road, Wilmington, Del. 19809.

Czechoslovakian Contest

Starts: 0000 GMT Sunday, November 8
Ends: 2400 GMT Sunday, November 8

The OK's came up with a new set of rules this year, both c.w. and phone may now be used and I.T.U. Zones are the multiplier.

This is a world wide type contest so do not concentrate on OKs only.

Catagories: Single operator, single band and all band. Multi-operator, all band only.

Exchange: RS/RST report plus two figures indicating the I.T.U. Zone.

Scoring: One point per QSO, 3 points if its a OK station. Multiply total by sum of I.T.U. Zones from each band.

Awards: Certificates to top scoring station in each catagory in each country. (USA?)

Use a separate log for each band and indicate the Zone only the first time it is worked. A summary sheet and a signed declaration is also requested.

The "100 OK" and "S6S" awards are available for contest contacts upon a written application with your log. Two IRCs to the C.R.C. will get you a I.T.U. Zone map.

Mailing deadline is Dec. 31st to: Central Radio Club, Box 69, Prague 1, Czechoslovakia.

CHC/FHC/HTH QSO Party

Starts: 2300 GMT Friday, November 6
Ends: 0600 GMT Monday, November 9

The County Hunters International is now sponsoring two annual parties on the first weekends of June and November. Rules will be the same for both sections.

It is highly recommended that you send a s.a.s.e. to K6BX for log sheets and rules in details, since scoring is rather complicated.

Following are rules in brief:

Exchange: QSO nr., report, name, CHC/FHC nr., state and county. (or similar subdivision) Non members omit nr., and send HTH instead.

Scoring: For CHCers: 1 point for contacts with other CHCers, 2 points if its a HTHer, and 1 additional point if its a YL, B/P, FHC, Novice, CHC-200, Merit or Club station. Double above points if QSO is out of own country. For HTHers: Contacts with other HTHers 1 point, with CHCers 3 points, otherwise same as above. S.w.l. use same scoring system. The same station may be worked on different bands and modes.

Multiplier: Each continent, country, ITU Zone and US state. (counted only once)

Final Score: Total QSO points X the sum of

[*Continued on page 84*]

Propagation

BY GEORGE JACOBS,* W3ASK

LAST month's column contained special DX Propagation Charts for use during the c.w. section of the 1970 *CQ* World Wide DX Contest, which will be held over the weekend of November 28-29. If you plan to participate in the Contest be sure to check the band opening predictions, work plans, and other propagation data appearing in last month's column; they could be helpful in piling up contacts and points. For a day-to-day forecast of propagation "weather" expected during November, including the contest period, see the "Last Minute Forecast" appearing at the beginning of this column.

Here are some propagation rules of thumb that should be helpful in working DX during the c.w. contest period:

During and shortly after *sunrise*, excellent DX conditions are forecast for 20 meters, in practically all directions. Also check reception at this time from the south and west on 40, 80 and 160 meters.

From a few hours *after sunrise* until *late afternoon*, 15 meters is expected to be the optimum band for world-wide DX, with 10 meters a close runner-up. Excellent conditions are expected on 15 meters, with good-to-excellent conditions on 10 meters.

During the *late afternoon* and *early evening* hours, check 15 meters for signals arriving from the south, west and north, while 20 meters is expected to be optimum for reception from an easterly direction. Fairly good DX reception from the east and south should also be possible on 40 meters during the early evening hours.

During the *late evening* and *early morning* hours, 20 meters should open for DX to the south, west, and northwest, with strong signals. Good openings to almost all areas of the world are also forecast for 40 meters during this time period. Some 80 and 160 meter DX openings should also be possible during the hours of darkness.

*11307 Clara Street, Silver Spring, Md. 20902.

LAST MINUTE FORECAST

Day-to-Day Conditions and Quality for November, 1970

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

How To Use These Charts

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

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

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

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

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

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

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

6—These Propagation Charts are valid through Jan. 15, 1971. These Charts are prepared from basic propagation, data published monthly by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado.

Signal levels on most DX openings should be noticeably stronger than during the summer and early fall months, as a result of a seasonal decrease in static and solar absorption that is expected to take place during November.

Sunspot Cycle

The Swiss Federal Observatory reports a monthly mean sunspot number of 112.5 for July, 1970. This results in a 12-month running smoothed sunspot number of 106 centered on January, 1971. The plateau in solar

activity continues, with the cycle remaining practically constant throughout the entire period between April 1970 and January, 1971.

A smoother sunspot number of 90 is now forecast for November, 1971. There is approximately the same level of solar activity last observed during November, 1968.

V.H.F. Ionospheric Openings

Solar activity is still high enough that an occasional F-2 layer opening may be possible across the United States, between Hawaii and the mainland, and between the USA and Latin America. The best time to check for 6 meter F-2 layer openings is from just before noon, through the late afternoon hours.

November should be a good month for trans-equatorial, or TE scatter openings between the USA and Latin America. The evening hours are the best time to check for TE openings, between approximately 8 and 11 P.M., local standard time at the path mid-point.

Leonids, a major meteor shower, should take place between November 14 and 18. Some meteor-type openings on the v.h.f. bands should be possible during this shower, especially during the evening hours of November 17, when a peak intensity of approximately 40 meteors per hour is expected. Taurids, a minor shower, is expected to peak on November 1 with a maximum of 14 meteors per hour, and continue through the first two weeks of November with diminish intensity.

Some auroral-type v.h.f. ionospheric openings are likely to occur during the month, especially when ionospheric conditions on the h.f. bands are below normal or disturbed. Check the "Last Minute Forecast" at the beginning of this column for the days that are most likely to be in these categories during November.

Short-Skip Charts

This month's column contains a Short-Skip Propagation Chart for use in the continental United States for predicting one-hop openings between distances of approximately 50 and 2300 miles. Special propagation Charts centered on Hawaii and Alaska are also included. These Charts are valid through January 15, 1971.

The following are two typical examples illustrating the use of these Short-Skip Charts:

Example 1: What is the best *time* to work between New York City and Denver on 15 meters?

a. Determine the great circle distance between both points from a map or globe. In this case, the distance is approximately 1600 miles.

b. Enter the Short-Skip Chart at the line marked "15", under the Band (Meter) heading. Go to the right until you intersect the "1300-2300" column under the Distance From Transmitter (Miles) heading. The highest quality rating (the numbers between 1 and 4 shown in the parenthesis after the time of opening) indicates the time that signals will be the strongest and most reliable. In this case, the highest rating is a (4), between 11 and 16 local standard time at the path mid-point.

c. New York City is in the Eastern Time Zone and Denver is in the Mountain Zone. The mid-point of the path is approximately 800 miles from either end of the circuit, and falls in the Central Time Zone. The 11-16 time period found in (b), should be expressed in CST. This corresponds to 11 A.M. to 4 P.M. CST, which is the same as 12 NOON to 5 P.M. in NYC, or 10 A.M. to 3 P.M. in Denver. Arranging a schedule anytime within this period should result in an excellent 15 meter opening between NYC and Denver.

Example 2: What is the best *band* to use on a schedule between Seattle and Los Angeles, at 4 P.M. Seattle time?

a. The great circle distance is found from a map to be approximately 1,100 miles.

b. Seattle is in the Pacific Standard Time Zone, and so is Los Angels. The mid-point of the path must also fall in the Pacific Zone. Times in the Chart are given in the 24-hour system, and 4 P.M. corresponds to 16. No further time correction is required.

c. Enter the Chart under the column marked "750-1300 Miles". Check the quality ratings for each band at 16 hours. Since the distance between both points is nearer to 1300 than 750 miles, the second of the two quality figures appearing in the parenthesis will apply.

d. At 16 hours a quality figure of (2) is found for 10 meters; (4) for 15 meters; (4) for 20 meters; (2) for 40 meters; (1) for 80 meters and (0) for 160 meters. Either 15 or 20 meters would be the best band to use between Seattle and Los Angeles at 4 P.M. PST.

Good luck in the c.w. Contest, and please let me know how the DX Propagation forecast for the Contest turns out.

73, George, W3ASK

[*Continued on page 78*]

THE awards PROGRAM

BY ED HOPPER,* W2GT

THE November, "Story of The Month" about the Knoxville Convention by our man on the spot, Bill Todd, K4ISE after some data.

Leo Haijsman, W4KA was issued a 3000 award endorsed All Fone.

Marg Woodley, VE3-12172 (XYL of Fred, VE3-9301) hit the jack pot and was issued a 2500 award endorsed All SSB and, endorsed All 14 mc SSB Mobiles USA-CA-500, 1000, 1500 and 2000. Marg is the first YL/XYL s.w.l. to apply for any USA-CA.

All Fone 2500 awards were sent to Al Lane, K5MWV and Harry Okey, WPE6ETT.

A USA-CA-2500 endorsed All A3A went to that aquarium man, Jim Farris, WA4-MGC, and Tom O'Brien, WA6UZG won a mixed 2500 award.

David Klimaj, W4JVN kept me busy by qualifying for a Mixed 2000; and All 14 mc SSB Mobiles 500, 1000, and 1500.

And Cliff Taylor, WB4FBS not to be out done, sent for USA-CA-2000 endorsed All A3A; 1500 and 1000 endorsed All A3A Mobiles; and USA-CA-500 endorsed All 14 mc A3A Mobiles.

*103 Whittman St., Rochelle Park, N.J. 07662.

Special Honor Roll
All 3079 Counties!

#34—Marvin L. Hagan, WB2SJQ 6-29-70
#35—K. D. Wilson, W7GKN/W6DIX 7-23-70
#36—Juls Pflum, K7ZJP 7-26-70

"Ukie" Urquiza, W4SWW obtained a USA-CA-2000.

Bruce Gibson, WA3GNW, won a Mixed USA-CA-1000 and a USA-CA-500 endorsed All 14 mc A3A.

Ray Gomes, K9KKX applied for USA-CA-500 and 1000 endorsed All 14 mc A3A.

Bill Winnegar, W6CLM was issued a USA-CA-1000 award.

Mixed USA-CA-500 awards were sent to Jan Kucera, OK1NR; and David Kurtz, K4BBK.

USA-CA-500 awards endorsed All A-1 were issued to Ake Sundvik, SM5BNX and Art Phillips, WB2BBD.

Ed DeYoung, KH6GLU finally found time to apply for USA-CA-500 All A3A. Ed has a new QTH: 95213 Waimeli Place, Waipio, Hawaii 96786.

Field Day with Paul Kollar, W8CXS.

Independent County Hunter Convention—1970

The annual Independent County Hunter Networks Convention, held in Knoxville, Tenn. 3-5 July, was an outstanding success. Seventy county hunters representing all U.S. call areas and 31 states, four from Canada (VE3CBY, VE3DTO, VE3DXZ, and VE3-DQG), and Gerard, HB9AW, were registered. An equal number of XYLs and harmonics enjoyed the fine hospitality of Knoxville and the efforts of our host Bill Nash, K4FSJ. One of the highlights of the conven-

You say your taxes were raised?

You missed three payments on your Jaguar XK-E?

You had to turn in your Playboy Club Key?

Your salary was cut?

You say the F.C.C. has expressed interest in your four different calls?

You say food is so expensive it's cheaper to eat money?

You say you invited your boss to dinner and during the soup course the finance company repossessed your furniture?

You say your XYL backed the family car out of the garage after you backed it in the night before, and now you can't get to the Newsstand to get your monthly copy of CQ?

HOLD IT!!

While we are in no position to alter the tax structure, give you a raise, or sway the F.C.C., We can save you a pile of cash on CQ! So drop that anchor, pick up a pen and dash off a CQ subscription right away!

1 yr. ..... I PAY ONLY $ 6.00 ..... a savings of $ 3.00
2 yrs..... I PAY ONLY $11.00 ..... a savings of $ 7.00
3 yrs..... I PAY ONLY $15.00 ..... a savings of $12.00

And now with all this newfound money at your disposal, you can begin to really live again!

CQ • 14 Vanderventer Avenue • Port Washington, N.Y. 11050

Dear OM:

Enclosed please fine $..... for ..... Year(s) Subscription to CQ, The Radio Amateur's Journal.

☐ NEW: Start with.....issue.
☐ RENEWAL

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

Address . . . . . .

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

RATES: 1 Year.....$6 ☐ 2 Years.....$11 ☐ 3 Years.....$15 ☐

Maritime Mobile Certificate

tion was the excellent banquet at the Ramada Inn Saturday night; Bill, K4ISE was Master of Ceremonies. Bill, WA3IXL, and Skip, WAØWOB, addressed the gathering on the subjects: Responsibilities of the Net Control Station and The Integrity of Mobile Operators respectively. Both topics were timely and generated much discussion among the attendees. The final results will appear in improved operation of the various nets.

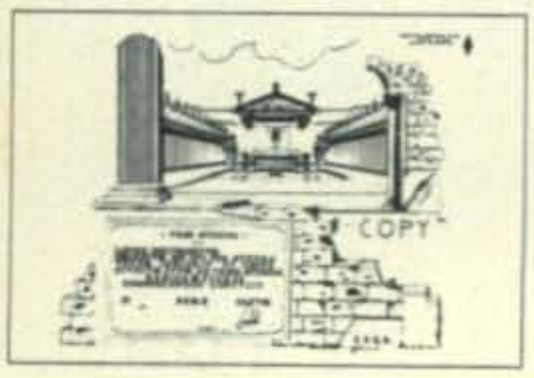
Duane H. Harris, K2PFC, was selected as the Outstanding County Hunter—1969-70 by a committee composed of Charley, WØBL, and nine other 3079 Award winners attending. A suitably inscribed plaque has been presented to Duane. In addition to Charley this illustrious group included Leo, WA5-AEB; Phil, WAØEVO; Eddie, K4LSP; Paul, W4YWX; Bud, K4AUL; Duane, K2PFC; George, W1EQ; Jack, WØSJE, and Dick, WAØDCQ.

The convention in 1971 will be held in Kansas City and will be under the guidance of Skip, WAØWOB, with the help from the gang in that area. The Rocky Mountain group with Bing, WØGV, as spokesman has asked that the 1972 convention be held in Denver, Colorado; the location will be established during the 1971 convention.

A special vote of thanks was extended to Ed Hopper, W2GT, and *CQ* Magazine. Ed being "Mr. USA-CA" while *CQ* is firmly associated with the USA-CA program in the minds of amateurs throughout the world. It was agreed that the various county hunting nets could not adequately function without either.

Of the thirty-seven that attended the 1969 convention in Mountain Home, Arkansas twenty-three were registered at Knoxville.

County Hunters in addition to those already mentioned, who attended the convention were: K2CPR, W2EQK, K3LXN, W3JZY, K4ARF, W4BPC, K4BXU, WB4-FBS, WB4GGA, W4HA, W4IGW, W4IZR, K4LRX, WA4LSU, WA4ULL, K4ZA, K5AFJ, W5HDK, K5KDG, WA5OCG, W5OYG, K5YWX, K6BEP, K7NHV, K8DCR, WA8NDL, K8RNH, WA8TQD, K8VSL, WA8YPZ, W9CNG, K9CSL, W9-CTA, WA9GAM, K9GTO, K9KKX, WA9-NKN, W9SOM, K9WSL, W9ZHD, WØAYL, WØEWH, WAØGZA, KØIFL, WAØKGD, WAØKQQ, WAØLRC, KØQIX, WAØSHE, and WØYLN.



Urbs Aeternal Award

USA-CA-HONOR ROLL

3000
W4KA 51

2500
WA4MGC 81
WPE6ETT 82
K5MWV 83
VE3-12172 .. 84
WA6UZG 85

2000
W4JVN 112
WB4FBS 113
VE3-12172 ..114
W4SWW 115

1500
W4JVN 143
WB4FBS 144
VE3-12172 ..145

1000
W4JVN 208
WA3GNW 209
WB4FBS 210
K9KKX 211
VE3-12172 ..212
W6CLM 213

500
W4JVN 796
WA3GNW 797
WB4FBS 798
OK1NR 799
K9KKX 800
SM5BNX 801
K4BBK 802
VE3-12172 ..803
WB2BBD/
WA7NXL ..804
KH6GLU 805

Awards

Maritime Mobile Membership Certificate: The Maritime Mobile Amateur Radio Club was formed back in the early 1950s and has continued active since that time. It is unique in that there has never been a club meeting, as a group. It's members cover the world and are constantly on the move. It is made up of sea going amateurs who sail the seas and take their hobby of amateur radio with them.

This club offers shore bound amateurs an opportunity to become associate members of the MMARC, through a number of contacts between ships and shore stations. Associate membership is open to any licensed radio amateur who submits confirmation of thirty (30) contacts with maritime mobile stations with which he has communicated. All contacts should be in excess of ground wave distance. Any 30 maritime mobile cards should be sent to the Secretary for confirmation. Associate members receive the beautiful certificate of the Maritime Mobile Club.

Besides associate members, the club has active members that consist of amateur radio operators who are engaged in an active seagoing capacity and who have a radio station available while at sea. Active members pay dues and receive copies of the Maritime

[*Continued on page 82*]

Q AND A

BY WILFRED M. SCHERER,* W2AEF

Power Ratings of Equipment

QUESTION: With my Swan 270 connected to the antenna through a Drake MN-4 coupler and using the TUNE/C.W. position of the transceiver, I get only 60-90 watts output. The drop-off is at the higher-frequency bands. I don't know how to determine the s.s.b. output. I also hooked up a Drake TR-4 to a Swan 1200 W linear and got only 300 watts output on c.w. and 500 watts on s.s.b. I have a friend who has a Swan 500-C and the best output he can get is 200 watts on 40 meters.

Just what are the proper readings I should get from these rigs? Are the manufacturers telling us that their rigs have more power than their competitors (on paper only)?

ANSWER: The power output of the Swan 270 is lower in the C.W./TUNE position than with s.s.b. This was pointed out in our review on the Model 260 which also applies to the 270 (see 3rd complete paragraph from top of page 69, *CQ*, November 1969). In addition, there is about a 10-percent power loss through the antenna coupler, which is a normal condition with most couplers.

In respect to manufacturers' power ratings, the amateur gear usually is rated at watts-*input* power, *not* output power. For the Model 270 this is 260 watts p.e.p. *input*. The Swan 500C rating is 500 watts p.e.p. *input*. On tuneup and c.w. this rig will deliver an average output of 250 watts *output* and about 300 watts p.e.p. *output* with s.s.b. (See page 55 at 500C Review in *CQ*, April 1969.) Similarly, the Swan 1200 is rated at 1200 watts p.e.p. *input* with s.s.b. in which case 500-600 watts p.e.p. *output* (depending on band) should be obtainable with s.s.b.

The way to check the p.e.p. output is to use an oscilloscope at the r.f. output. Note the amplitude of the display during c.w. or tuneup. Also note the power-meter reading at this time. Then voice modulate the transmitter using s.s.b. and note the percentage increase of the peak amplitude on the scope over that of the c.w. output. The peak power is then a little more than *twice* the percentage by which the peak output rises above the C.W./TUNE output.

KWM-2/2A Modifications for Improved Performance

The following three modifications for the KWM-2/2A, obtained from Collins Radio, will greatly improve the a.g.c. and strong-signal performance of the KWM-2/2A, allowing the r.f. gain to be kept full on without distortion on any signals.

The first, (Part A), is applicable to KWM-2/2A units manufactured prior to March 1964. It provides a dual time constant that eliminates a.g.c. overshoot and hang-up on noise pulses. The revised circuit is shown at fig. 1. It is suggested that the unit be circuit-traced to determine if this modification has already been included.

The second (Part B) changes the source of delay bias to the a.g.c. rectifier. A divider consisting of the 1st a.f. tube, V_{16}, and a resistor, R_{95}, formerly provided the required 2.8 volts. This has been changed to a resistive divider, as it was found that the low-frequency a.f. from s.s.b. envelopes was not fully eliminated by the 100 mf capacitor, C_{102}. The revision is shown at fig. 2.

The third, (Part C), adds delay-decay (hang) a.g.c. to the r.f. amplifier. This aids in reducing the effect of strong adjacent-channel s.s.b. signals on weaker desired signals. This addition is shown at fig. 3.

The step-by-step modification procedure

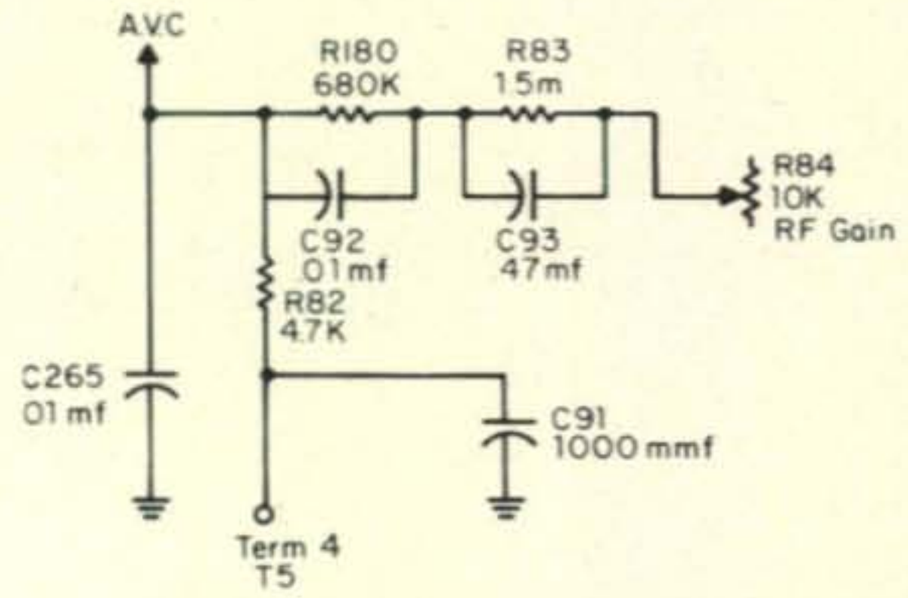


Fig. 1—Part A modification for KWM-2/2A. The a.g.c. circuit from the arm of R_{84} is rearranged using original components, except at R_{180} and R_{183} which should be changed to the values shown here.

*Technical Director, *CQ*.

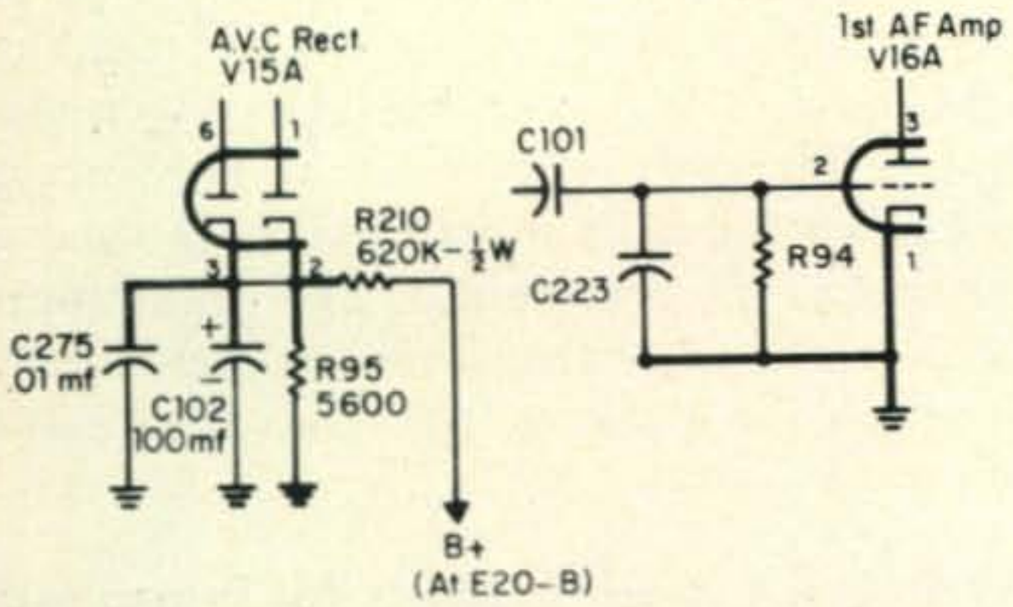


Fig. 2 — Part B modification. A.v.c. rectifier, V_{15A}, and 1st a.f. amplifier, V_{16A}, cathodes are rewired as shown by heavy lines using original components C_{102} and R_{95} plus new components C_{275} and R_{210}. Procedure is as follows: Disconnect bus wire from XV_{15-2}. Remove sleeving and route to center shield on XV_{16}. Shorten as necessary and solder. Add R_{210}, from E_{20-B} to XV_{15-2}. Add C_{275} from XV_{15-3} to nearest ground.

for Part B is given at fig. 2 which is the most significant change in units where Part A has already been included. Unfortunately our limited space does not permit giving the procedures for Parts A & C. All these are given in the KWM-2/2A Service Bulletin No. 8 which is obtainable from Amateur Product Office, Collins Radio Company, Cedar Rapids, Iowa 52406.

Collins 32S-3 With Hammarlund HQ-215 Receiver

QUESTION: The manual for the Hammarlund HQ-215 receiver states it will transceive with a "matching' transmitter. Other than having outputs for the h.f.o. and v.f.o. from the receiver, what other factors are involved? Specifically, will the HQ-215 transceive with the Collins 32S-3, the Heath SB-401 or the Drake T-4XB without modification to the transmitting units?

ANSWER: Use of the HQ-215 for transceive with the 32S-3 should be possible, as both units have the same conversion scheme; however, several factors must be taken into consideration. The r.f. output voltage from the h.f.o. and v.f.o. of the HQ-215 is quite low, so it may be necessary to amplify these signals. A solid-state unit for each could be rigged up to do the job, including the proper matching required. The other consideration is that the HQ-215 b.f.o. must be adjusted (by the panel control) so that its frequency coincides exactly with that of the 32S-3 carrier generator, in order to obtain proper tracking between transmit and receive. This need presents no special problem.

Transceive operation with the SB-401 or T-4XB would not work out, because these rigs have different conversion schemes.

Coil Data for C.E. 10A/10B S.S.B. Exciters

We are indebted to J. McMechan, WØPFP, Route 4, Ames, Iowa for answering our appeal for coil data on the C.E. 10A/10B s.s.b. exciters by forwarding the information to us and to the party requesting it. Should others desire such data, drop us a line and we shall forward a copy of WØPFP's specifications. Your interest is much appreciated, Jim. Thanks

SB-110A A.M. Conversion

Some readers have had difficulty in obtaining proper operation with the a.m. conversion for the SB-110/110A as described in *CQ*, November 1966 and August 1967. They evidently missed the correction for the error at the schematic diagram in the 1966 article, as later explained in the 1967 article. Should future difficulties arise, please refer to the latter article for the necessary correction.

Correction

At fig. 1 on page 26 of the Collins 30L-1 Linear-Amplifier review in the October *CQ*, the polarity of the left-hand diode should be reversed.

Amplifier with 4-125A's

In respect to our suggestion in the July/August Q & A Column as to where data may be found on the design of a linear amplifier using 4-125A's, Al Venning, VE7LL has informed us that an excellent setup he has used with these tubes is the G2DAF configuration originally published in the *RSGB Bulletin*. A

[*Continued on page 74*]

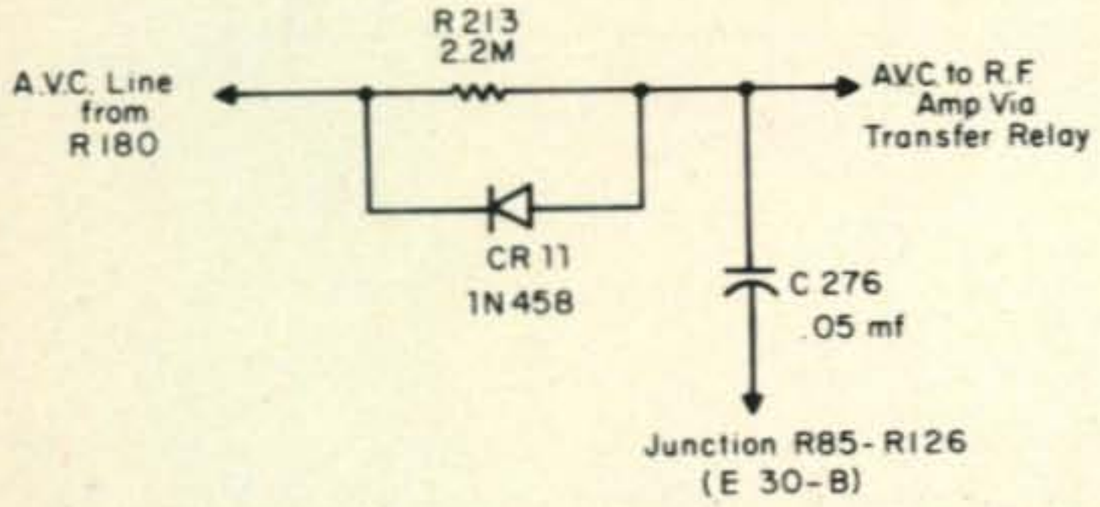


Fig. 3—Part C modification. New components C_{276}, R_{213}, CR_{11} are added at a.v.c. line that goes to the r.f. amplifier via the transfer relay.

AMATEUR RADIO IS OUR BUSINESS (215) OL 9-5900

"Ham" Bueger, Inc.

80 N YORK ROAD WILLOW GROVE, PENN 19090

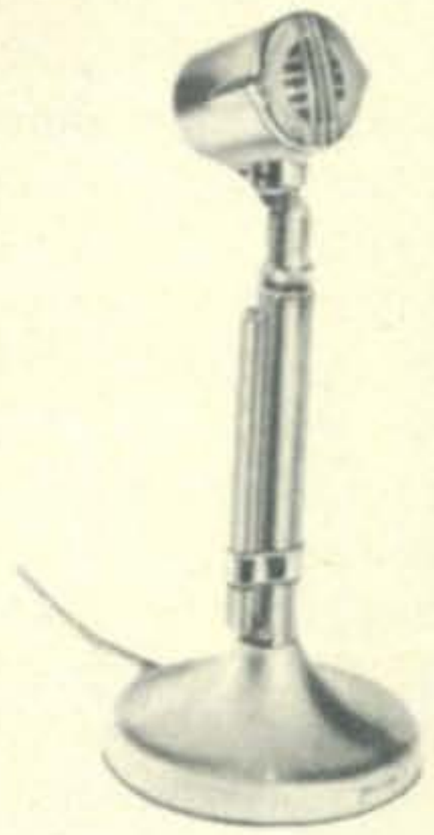
GD104

$25.00

ASTATIC GD104 CRYSTAL MICROPHONE WITH "G" GRIP TO TALK STAND. REGULAR PRICE, 51.20, HAM NET 25.00.

G10 D

$29.95



ASTATIC G 10 D DYNAMIC SSB MICROPHONE WITH "G" GRIP TO TALK STAND. REGULAR PRICE, 59.90, HAM NET 29.95.

ASTATIC

JT30

$9.95

ASTATIC JT 30 CRYSTAL MICROPHONE WITH STAND FOR AMATEUR AND GENERAL PURPOSE, REGULAR PRICE, 18.40, HAM NET 9.95.

531

$6.99

ASTATIC 531 CERAMIC MOBILE MICROPHONE WITH RETRACTABLE CORD AND SUPER TALK POWER FOR AM AND SSB. REGULAR PRICE, 12.75, HAM NET 6.99.

ASTATIC "G" GRIP TO TALK STAND ONLY	12.95
ASTATIC D 104 MICROPHONE ONLY	15.50
ASTATIC 10 D DYNAMIC MICROPHONE ONLY	19.95
ASTATIC D 104 REPLACEMENT CARTRIDGE	4.80

PENNA. RESIDENTS ADD 6% SALES TAX
ADD 1.25 FOR SHIPPING AND INS.
SEND CHECK OR MONEY ORDER. . . NO C.O.D.

SURPLUS sidelights

BY GORDON ELIOT WHITE*

JUST when I was wondering last summer where all the surplus nuts had gone, my mail box was flooded with queries on all sorts of military and civilian goodies. It turned out that another electronics magazine had dropped my name as one who could help their readers with surplus problems that they were unable to solve themselves.

This was mildly flattering, but the pile of mail grew and grew. Some of it was remarkably ignorant. Questions such as "I have an Army radio. Can you get me a schematic for it" are not readily answered. A great many of the questions could be handled by refering the writer to a recent SURPLUS SIDELIGHTS column. I guess the moral is that *CQ*, in this column and elsewhere in the magazine, is providing more surplus information than anyone else.

I will be glad to do what I can for *CQ* readers, but for the best service, when writing me please be as specific as possible about the numbers on the unit involved. The military nomenclature, particularly type numbers, is absolutely necessary in a search for information.

Civilian sets are far harder to track down than military, unless you can obtain *SAMS* data books or diagrams, as on television sets or other mass-produced items. Classified military gear, even after it is downgraded, is hard too, because the books are often destroyed, or they keep their secret classification after the sets have been declassified.

All you *CQ* readers might suggest to readers of Brand X that they subscribe here, and really keep up with surplus.

AN/URC-4

The set I am dissecting this month is the AN/URC-4, a rescue transceiver carried by Navy and Air Force pilots since early in the Korean War to help them communicate with search planes if they are shot down.

This is not a new arrival on the surplus scene. It has been around for a dozen years or so, but to my knowledge these little a.m. handie-talkies have never been widely available before. Now they are being replaced with more modern, solid-state rescue sets like one I saw at a recent Armed Forces Communications and Electronics show here in Washington. Built with large-scale integrated circuits, the set was smaller than a pack of cigarettes, put out a healthy f.m. signal, and cost the Pentagon "only" $500 each.

The URC-4 is a tube type set, using subminiature tubes. It had an external battery pack, and weighed about four pounds, total. A slightly updated rescue set, the URC-11, superseded the URC-4, and although it too used tubes as well as transistors, it was hardly larger than a pack of 100 millimeter smokes, I will get to a description of the URC-11 in a later column.

But I digress. The URC-4 (fig. 1) is a dual channel unit, transmitting or receiving on 121.5 mc or 243.0 mc, the two aeronautical emergency frequencies. It converts easily to 2-meters for ham purposes, or could be used on 220 mc. Modulation is a.m., and power is roughly a watt. (The Air Force rated them as good for 30 miles range)

(The World War II version of the rescue transmitter, by the way, was the CRC-7, still found in a few back corners of surplus stores.)

All there is to putting the URC-4 on 2-meters is to procure a battery and realign the frequency-determining circuits. While the military battery is probably unobtainable, you can use an RCA VS-064 battery pack which puts out 1.4 volts for filaments and 90 volts B+.

I recommend making a brief test of the set 121.5 mc, but since this is still a rescue channel, *the test should be made in the shack, and kept very short.* Just see if the thing is working before you tear into it.

The standard URC-4 uses a military barrel type CR-24/U crystal, ground to 10.125 mc, in third-overtone mode, followed by two or three doubler circuits.

Since the military crystals are costly and hard to find, I suggest buying a commercial miniature crystal in a more common type holder and soldering it in place. International or Texas Crystals should be able to supply the proper "rock," ground for 36 mc to hit 144 mc output, for example, or whatever you fancy in the 2-meter band.

The oscillator coil, L_1, must be raised to resonate at 36 mc by removing three turns

*5716 N. King's Hgwy., Alexandria, Vir. 22303.

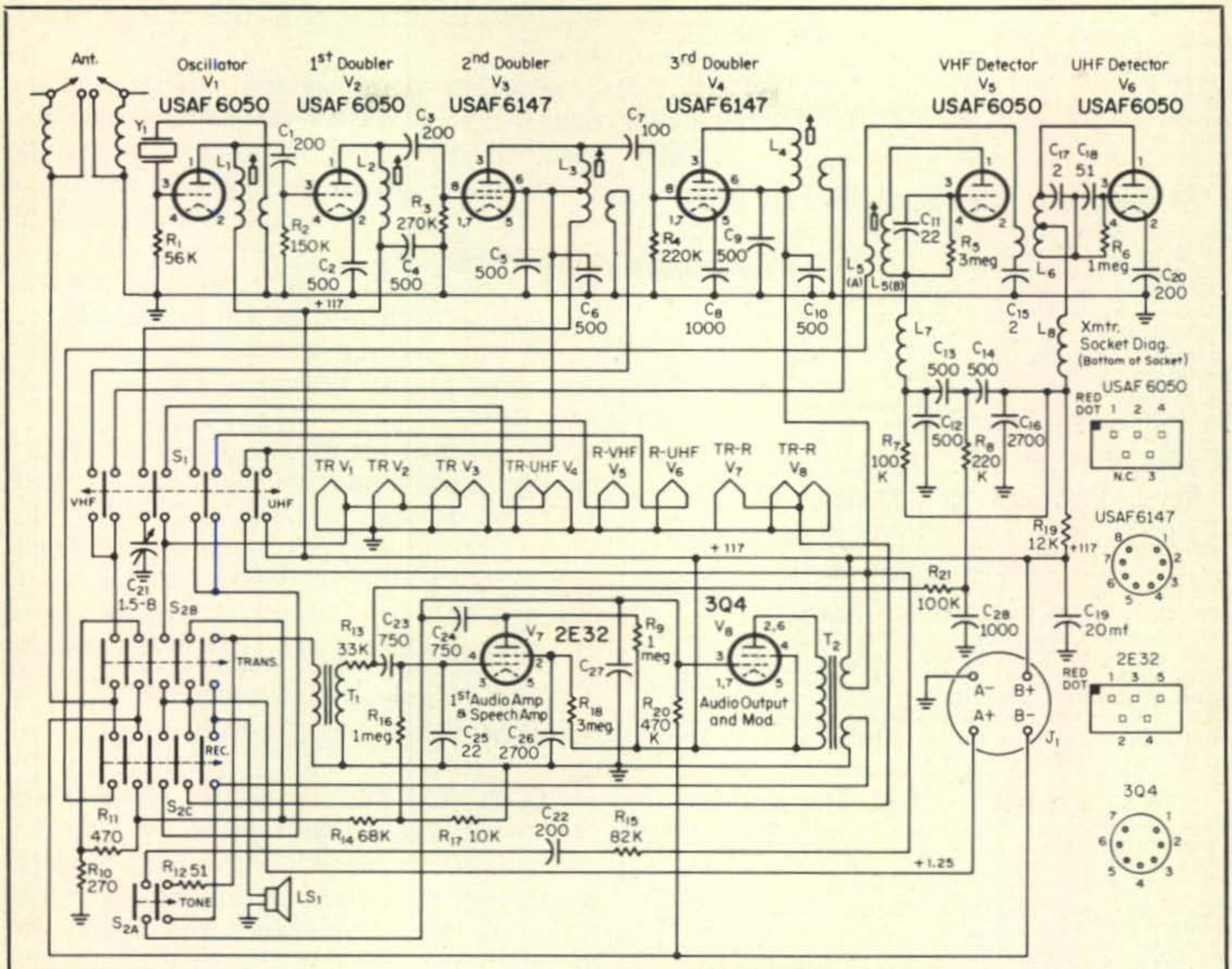


Fig. 1—Schematic of the AN/URC-4 transceiver.

from the plate end of the coil. (pin 1 of V_1) and first doubler coil L_2 should have two turns removed to reach 72 mc. L_3 may resonate by adjusting the tuning slug; if not, take off one turn.

That's all there is to the transmitter changes. The u.h.f. doubler V_4 may be removed to save filament battery power and kept as a spare tube. The UHF-VHF switch selects the output of V_3 to be fed to the antenna in the VHF position, so no lead changes are necessary.

You wall note that the people who selected emergency channels rather craftily made it possible to use a single crystal for two bands by setting the u.h.f. frequency at the second harmonic of the v.h.f. frequency.

The antenna itself must be tuned to 144 mc, either by adjusting the spread of the dipole arms to resonate on the 2-meter frequency, or by pruning the loading coils in the antenna cap to resonate appropriately with the antenna fully extended.

The latter will give better efficiency.

The receiving portion of the URC-4 uses super-regenerative detectors, one 121.5 and the other for 243.0 mc. For 2-meters, discard the u.h.f. detector V_6. Remove one turn from r.f. coil L_5a, which runs from the transmit-receive switch. Remove a similar turn from L_5b, which is attached to pin 1 of V_5. Minor trimming may be required to hit your frequency precisely.

That's all there is to it.

Odds And Ends

A couple of notes: to replace the cabinet lights in model 28 Teletype sets, most auto stores can supply 6.3 volt bulbs #82, for about 19¢ each. Teletype lists these at $.54 each. Nuff said.

For some of the real collectors who have actual antiques, or at least rarities in the surplus or radio field, it might be worthwhile to consider making a gift to any recognized museum and claiming the value of the equip-

ment as a charitable deduction at income tax time.

Museums of science and industries, naval or maritime museums, aeronautical exhibits, even the Smithsonian Institution, are usually interested in acquiring bona fide electronic artifacts. They will not accept junk, nor will they usually take more than one item of a kind, but if you have something that is meaningful to them they will be grateful for it and will give you a nice receipt that you can show to the Internal Revenue people next April.

The value of the item may be hard to set, but the curator may be able to help you arrive at an appraisal the tax people will accept. An early Kodak camera was valued at $200.00, and some World War I aircraft radios at $1,000.00 recently. It may be worth more as a gift than it was when it was new. ■

It Wasn't Much... [*from page 38*]

behind it on the wall I settled down to my rig.

CQ CQ CQ DE K4SOD/6, I sent, then over to the receiver with the battery and the antenna: no answer. Well, I hadn't really counted on an answer my first call anyway. I sent again. Then again. And again, on through lunch and into the early afternoon. It was nearly time for my wife to come home from classes and my landlady would be turning on her TV to catch the first of the soap operas and I'd have to return her lead in. I sent CQ like I'd never sent before (and I'd had a good deal of practice back in Kentucky). And it happened. Out of the regenerative mush oozed a slow, faint reply. By that time I had imagined hearing a reply so many times that I wasn't sure until my call came around again a minute later. It was a Novice fifteen miles up the road.

I let out a YAHOOOO! that shook the room just as my wife came in the door. "What in the world was that?" she asked.

"Oh, I'm just hamming," I said, trying to keep from grinning too much. "There's seventy-six cents left, let's go out and celebrate."

When we came back I stopped at the threshold. I thought I heard something. "Did you hear that!" I shouted at my wife.

"No," she said, "what what it?"

"Oh, nothing." But I heard it. She wouldn't understand. It was my yell, still bouncing around the walls. I had the feeling it would be echoing around the house for a long, long time. ■

Zero Bias *[from page 5]*

Mr. Green, overcome by his greed to make his new Citizens Band magazine an overnight success, and his obvious lack of knowledge of CB problems, has completely negated the intrinsic potential of RM 1633 with his irresponsible cover story in *Radio Today*. Once again, in his haste to bring change untempered by necessary patience, Mr. Green has dealt amateur radio another step backwards.

Q & A [*from page 68*]

version of the G2DAF amplifier also may be found in *CQ*, March 1966, page 26.

Slow-Scan TV Data

QUESTION: Do you have any data on an adapter for slow-scan TV?

ANSWER: We have no specific data on a slow-scan TV adapter; however, there is a good article on the subject in *QST*, June 1970, page 46. You might also stir up such data from the bibliography of Slow-Scan TV articles found on page 18 of the July 1970 issue of *73*.

73, Bill, W2AEF

160 Meter Contest [*from page 48*]

W4BGO: Your new crystal ball works fine. Condx good first night and excellent the second. Never heard better signals from Eu but Pacific area one big void. All in all, a fine contest. *K8HBR/4:* Here's a really hot one. Of all the States I worked, I didn't work one Floridian. How about that? And I'm in mid-Florida. Great contest as usual. *K4BAI:* Sorry I couldn't give Paul (W4YWX) more competition this year. Was great to work Joeke, PJ2VD. *K4GSU:* Enjoyed my first experience on 160 and sure will be back next year.

5th District:

W5HOT: Here's my log. Didn't think this small amont of contacts would be missed. Believe me, though, 100 watts to a 60 foot vertical won't cut it especially in a 160 meter c.w. contest. (Sez you. You should see what some of the boys did with a 33 foot vertical and 100 watts. Check your method of loading, Paul, and particularly be sure to have a good round radial system —*ed.*) Lots of fun, though. *K5TFG:* My most enjoyable contest yet. The band sounded like 20 meters on any Sunday afternoon. Condx were fabulous DX-wise. Heard EI9J 559 and DL 9KRA but too many East Coast stations down at the bottom made it impossible for me to get through. Called you many times but just couldn't make it through. (Oh, no! Had we hooked up, Tony, W2FJ, would have had to take the runner-up spot. That's how close a race it was here in N.J.—*ed.*). *K5MZU:* The contest was great. Just couldn't stay with it all night. Condx were excellent and heard the Gs for my first time.

6th District

W6KWE (ex-W3DPJ): I have many observations, this being my first contest from the West Coast. It's amazing how few W1/W2/W3 signals make it thru out here. Ah, but the poor condx to the East Coast (which seem typical of any weekend since I've been here) were compensated for by the incredibly good opening to Asia on Saturday morning. The JA's started rolling in 2½ hours before sunrise and were unbelievably loud. And, working Fred Laun, HS5ABD (ex-HS3AL, HI8XAL, W9SZR), was a big thrill. I believe this was

the 1st W to HS QSO on Top Band. (Yes, Tom, it was and our congratulations. A remarkable feat—*Ed.*). *W6JTB:* Soap Box: Competition getting better every year. *W6WX:* Gee, it was fun! I suppose, now that the spots are disappearing again, that this band will have quite heavy play over the next 4 or 5 years. *W6AMO:* It was a good test this year. At least the first night was best opening I've heard in years to the East Coast. But some locals with broad signals and clicks didn't add much to the fun. Oh well, if we wanted it to be easy we woudn't be on 160, would we? Made my first ever W1 contacts. Great fun! Thanks to you and to *CQ*.

7th District

W7CFJ: I missed a couple of good ones...KL7 and HS5...because I slept thru the first morning. Also missed a flock of JA's. I'm trying to get my XE license renewal so maybe next year I'll operate from across the border. (Dale is ex-W6GEN and XE0GEN—*ed.*). *W7DY:* Condx superb making up for last year. KV4FZ finally bagged! I noticed very little cross-band work between East and West Coasts. Increased 160 activity on the East Coast now is making it very difficult for a weak signal to get through on the low end. *W7GBL:* Best contest yet for me. Most stations and highest score but still none of the three I need for WAS on the band. *W7AVV:* Thanks for another fine Contest. Condx weren't the best but much better than last year. *W7CYH:* Anyone staying off 160 due to antenna problems? Whereas I am fortunate in having a half wave off center fed dipole, it is only 10 feet high.

8th District

K8VQP: Sure wish I could work California. *WA8-KNJ:* Had a hard time hearing DX from Michigan. Too much local QRM on the DX frequencies so I gave up and went to bed. May put up a more directional listening antenna next year. Maybe a Beverage or small loaded beam. *K8CCV:* It was an enjoyable test although I think W8ELC beat me into the ground for highest Ohio score. (He did, Dick, but he was multi-op and comes under a separate listing—*ed.*). *K8IUA:* 1st time I worked the Contest since the first one! Too much QRM from a.m. to listen on "27" but heard a few. Have a 37′ vertical. Had to replace electrolytics and diodes in power supply Saturday night. Oh, those 598 reports! *W8QHW:* Had to start late—damnit! No receiver for 160. Fed r.f. into i.f. strip of 75A-1. Next year will have lots more antennas (two towers plus lots of wire)!

9th District

W9YYG: Antenna 80′ top and base loaded vertical switchable to high or low segments with relay at base. Also used 260′ inverted Vee up 60′ at center with 6″ open wire line. *W9DL:* Good Contest—my first. Hope to spend more time next year. *K9IFO:* Enjoyed this Contest more than any other I've ever been in. Contacts sure got slow near the end. All I heard were those I had already QSOed. Antenna was off center fed dipole 245′ long and just up for Contest. *W9PNE:* Condx were excellent. The DX was wiped out by QRN Friday but W/VE sigs were extraordinary. Saturday night was clear as a bell and re band condx but no En until 0730 GMT when E191 came thru briefly. Health not been good and haven't been on since June. (Gosh, Bruce, sorry to hear that. Hope it hasn't been anything too serious—*ed.*). *WA9NKT:* Enjoyed the contest very much. This is the first time I've been in this contest. Am rather new on the 160 meter band.

10th District

W0LRW: In 1968 I modified an AT-1 the night before to get on. In 1969 I built a tuner during the test. This year I put up a Hi-Tower vertical and finished it the day before! What a difference! For the first time it was more fun than work and I broke the 10K level. *W0NFL:* Condx better this year but WOW! QRM rough. Also troublesome fone QRM. I fell asleep and missed some good ones but still had much fun. *WA0TVD:* Age 15. Ham 2 years. 7th grade, Novice; 8th grade, General; 9th grade, Advanced (That's great, Tim—*ed.*). *WA0UBB:* Here is the log for the uncontested boobie prize for Iowa. Enjoyed the Contest. Only disappointment was lack of contacts with the kilowatt in daytime. Guess being rock bound was big disadvantage.

CANADA

VO1FB: Another FB contest with best ever condx to the west which produced my highest multiplier ever and second best score since started entering this contest in 1962. Usual high standard of operating was again evident which always makes this contest a pleasure to operate. Congrats on the tenth anniversary (it's the 11th, Joe—*ed.*) of the 160 meter contest. May the next 10 years be even better. *VO1HN:* Was very pleased to receive the log sheets a few days before the contest which got me stirred up enough to get the old DX-100 and 270′ antenna hooked together and get on the air. One sheet of my log book covers 2½ years of operating which looks sad indeed. Scuba diving has been my great love recently but must admit radio is a much warmer hobby this time of year. (Never did scuba diving, Hector, but last November when working PJ0CW in the *CQ* WW CW Contest I got in my first ever snorkelling and what was seen was beautiful beyond description—*ed.*). *VE3QU:* Heard KH6IJ but he did not appear to be in contest. Western VE's—4-5-6-7—don't seem to listen in the 1800 segment where a lot of stations can only work. Some W's also do this. Except for DL9KRA, European signals didn't get up over noise enough to work, darn it. Where were VP9 and KP4? Nevertheless, a lot of fun. *VE3DU:* Guess everyone enjoyed themselves. Sure sounded like it by the QRM. Didn't hear too much Eu due to fone QRM on the DX segment and some of the "once a year boys" QSYing up there and gumming up reception. Got Arizona for State #48. Friday night was the coldest in 35 years here. It got down to 25 degrees below!! Br-r-r-r.

DX DX DX DX DX DX

KL7AEQ: The enclosed log and list of stations heard represent the total results obtained by me during this contest. (Whereas Al had only 3 other KL7 QSOs, you should see his list of those heard and called. It totalled 30 including W3, W5, W6, W7, KH6, VE7, JA, VK—*ed.*). During the two weeks prior to the starting time we here in interior Alaska had been in the throes of an auroral blackout which seemed to affect 160 more than any other band. Condx were only slightly improved by 0000 GMT, the 24th. Signals didn't start coming in until about 0330 on either day and, considering that darkness here at this time of the year comes about 0100, this seems rather late. Essentially the low end of the band never did open for use and my feeling was that this segment didn't open to the west coast either in any notable fashion. The only stations heard on this segment were the two W5s and the KL7s. *AX3APN:* Although the going was rather rough owing to the relative isolation of Australia, everyone seemed to enjoy themselves. Biggest thrills were: 1. Working my 1st JA. 2. hearing my first European — DL9KRA. *VK6NK:* Many thanks for entry forms and it's a pity I couldn't make it to any W's but that's how it goes here in VK6. Activity in VK6 is very poor. I am the only one on regularly. Still I hope I can get one or two more on in the near future. Running 150 watts to a 50′ top loaded vertical which I hope to raise another 20′ before long. *VK3QI:* 150 watts to top loaded vertical 55′ high. QRN was lousy (!) on the first night. QRN was lousie (!) on the second night. *AX3XB:* Heard DL9KRA calling and working other Europeans at 25 w.p.m. His strength 569. Also heard W0AIH working other W stations who were uncopiable here. Could not find the JA's. Still don't know their frequency band. Have three different versions of it here...all apart. (Ivor, believe it to be 1907.5 to 1912.5. Not much of a "band" but that's where you will find 'em—*ed.*). *AX3RJ:* Sorry for such a poor effort but January is an unsuitable month on 160 for VK. On the 24th QRN S7 and S8 on the 25th. Another unfortunate circumstance is that the only VK3 stations seriously interested all live within 1/2 to 1 mile from each other and, as a result, over loaded front

ends of RX's and all in each other's hair. DX heard: W0AIH (several times), ZM1MQ, DJ6I?? GM3IGW/A and HS5ABD supposed to be on with elaborate antennae weren't heard. *W4BRB/VP7:* Oh! That big, fat 10 points for every W. It's better'n being on relief! (You sure did surprise us from getting on from the Bahamas, Gene. Reciprocal licensing between W/VP7 went into effect just a day before the contest. Gene made several hurried phone calls to VP7 officials, was given permission, hopped a plane, set up an antenna and gear and there we were with a VP7 in the contest – *ed.*). *PY2BJH:* Condx were horrible during the test... S9 plus 10 db noise level. Heard W0AIH, W8ANO and W9EWC. Called them but no results. Unfortunately there's only negligible activity on 160 in South America. (Congrats in getting those other PY's on, Hercilio—*ed.*). *PJ2VD:* It was a pleasure to take part in the contest. Think I made a better score than you did at PJ0CW. QRN wasn't like you experienced at Coral Cliff. Think I should be fully satisfied with this result but I am not ...mainly because I couldn't reach Europe in spite of the fact that I heard and called PA0PN for more than an hour, DL9KRA, OK2BOB, EI9J, lots of G's and a GD, GW and HB. Think the solution would be another antenna but the present one (inverted Vee half wave) is the best possible I can make. Anyway, the Rx, a 75A-4 which I just recently got hold of, proved to be a good one. Now making things ready for the coming ARRL c.w. Contest. *OL4AMU:* I send you my results of the *CQ* 160 Meter Contest. I please you excuse me. I send you not the summary calculation because I have not the regulations of this calculation. I am YL and I am 16 years. With sincere amateur greetings, 73! Your Nana. (Of all the Czech logs received this one was the only one to list any comment.—*ed.*). *EI9J:* Skip didn't move beyond W8 while I was on except for W9UCW and W5RTQ. W QRM was fierce at times. Old age creeping up meant that I slept for a considerable time while band was open to W. Worked all the countries I heard. Don't know how I missed out hearing PJ2VD. VP9GJ was missed. Worked him with his G call of G3PQA. *G2DC:* Finally hooked OE1KU after three previous attempts had been wrecked by QRM. *G3XTT:* Enjoyed the contest very much and look forward to future 160 meter WW contests. *OH9NV:* Sorry I couldn't get up a dipole for the contest. Just changing QTH so all ham gear was packed. *DL9KRA:* Thanks for another big event. Everything went smoothly – spares, tubes, tools and soldering guns spread out all over shack but not needed. Condx first morning excellent although HR2HH and PJ2VD not heard. Heard W4BRB/VP7 but no go. Missed out on OH0. Pity that QRL kept 9X5SP from coming on. (If he had been able to show up, Jan, we'd have had all continents on for the test for the first time ever—*ed.*). Big thing was working W5RTQ in Texas. No W6/7 heard. Second morning rather disappointing. Am sitting in Anchorage, Alaska (Jan is a Navigator for Lufthansa). Mailing deadline today.

LSD Discone [*from page 24*]

insulator should be made of Nylon or Teflon unless you plan to run very low power (50 watts or less), in which case anything can be used, even wood boiled in paraffin.

Performance

Although comprehensive gain testing was not conducted, a few measurements were made on a 220-1296 mc model using a remote signal source and a vertical dipole for comparison. Due to the very low-angle radiation characterists of the LSD, some improvement over the dipole was noted, and the degree of improvement was virtually constant for the 220 and 432 mc bands (separate dipoles were used for each band). This is indicative of the flat response a discone provides.

The low-angle radiation characteristics, wide frequency response, and ease of construction should make the discone an inexpensive and useful adjunct to any v.h.f. station. ■

Oscar News [*from page 49*]

on the 10-meter beacon after the second orbit, the mission was entirely satisfactory. The correct orbit was achieved, the stabilization system performed outstandingly, accurate telemetry data was received, the command system operated reliably, useful scientific data has been obtained, and perhaps most important, amateur radio has again demonstrated that it is seriously in the space age.

Future OSCAR Satellites

The door is still wide open for the next satellite in the OSCAR series, which will be called A-O-B until launch, and OSCAR 6 once it is successfully in orbit.

AMSAT is giving serious consideration to a single satellite containing both an f.m. channelized repeater and a linear repeater. Plans call for the f.m. repeater to use a group of uplink channels near 146 mc and a group of downlink channels in the vicinity of 432 mc. The linear amplifier would use an uplink band near 432 mc and a downlink band just below 146 mc.

The satellite would also contain telemetry transmitters operating in the 144 and 432 mc bands.

British, German and Australian radio amateurs are also giving serious thought to various versions of what may become future OSCAR satellites.

In the meantime, AMSAT emphasizes that new ideas are still being considered for OSCAR 6, and prospective participants are encouraged to submit technical proposals for consideration directly to AMSAT, P.O. Box 27, Washington, D.C. 20044. ■

Drake SPR-4 [*from page 29*]

dial may be indexed for calibration by slipping the skirt at the knob.

Performance

Measurements on an SPR-4 equipped with extra crystals for the amateur bands indicated an average sensitivity (above 1.6 mc) for 10 db s + n/n of 0.5 μv on a.m., 0.22 μv on s.s.b. and 0.11 μv on c.w. with 5-10 μv on a.m. for the lower bands. Band-to-band gain was ±3 db with about 50 μv needed for an S-9 meter reading.

Other results – SELECTIVITY (6 & 60 db points respectively: 530 c.p.s. & 3.4 kc for c.w.; 2.4 & 7.25 kc for s.s.b.; 4.8 & 10 kc for a.m. UNWANTED-SIDEBAND AND SUPPRESSION: 42 db at 1 kc. REJECTION NOTCH: –46 db at 1 kc. A.G.C.: On a.m. 6 db and on s.s.b. 4 db a.f. output change with 100 db r.f. input change (1-100,000 μv). The larger a.m. change is due to slight departure from linearity of the diode detector with signals below 10 μv.

IMAGE REJECTION: 80-90 db on low bands, 76 db on 3.5 mc to 50 db on 28 mc. I.F.–SIGNAL REJECTION: 70-97 db on h.f. bands, except 41 db on 6 mc. INTERNAL SPURIOUS: A few strong tweets on some of the s.w. broadcast bands with the most notable ones on the amateur bands at 3887, 7042, 14,322, 21,054, 21156, 28475, 28,920 kc.

FREQUENCY STABILITY (average under various environmental conditions): 15-minute warmup drift of 130 c.p.s.; 120 c.p.s. drift the following hour; 50 c.p.s. or less per hour thereafter; with ±20% line-voltage change, shift of less than 2 c.p.s.; no adverse effects under mechanical vibration. DIAL-CALIBRATION ACCURACY: within 0.25 kc when indexed at nearest 100 kc point.

The SPR-4 handled comfortably. The a.f. quality was clean and crisp on s.s.b. On a.m. the a.f. response was somewhat tubby, tending to impair speech inteligibility on s.w. broadcast signals; however, this can be overcome using an external speaker with a l.f. dropoff. Although not as sharply peaked as a crystal c.w. filter, the c.w. selectivity appeared to be adequate for most cases. A.g.c. action was extremely smooth and pleasant. The notch-filter tuning was quite critical. A slower travel of its core would be more desirable.

The crowning glory of the SPR-4 is its fine signal-handling capabilities (cross modulation, r.f. intermodulation, desensitization, overload and blocking).[2] Here is a solid-state receiver that in these respects, by measurement and on-the-air tests, significantly exceeds the performance of other solid-state gear we've checked and which measures up to or betters these characteristics of the two vacuum-tube jobs we've found best in this regard!

The size of the SPR-4 is 5½" × 10¾" × 12¼" (H.W.D. and) it weighs 18 lbs. Power consumption is 18 watts with 120 v.a.c., 6 watts with 12 v.d.c. (2.5 w. with dial lamps off).

The SPR-4 Communications Receiver is priced at $449. Data on crystal kits for additional ranges and/or other accessories may be obtained from the manufacturer: R. L. Drake Company, 540 Richard Street, Miamisburg, Ohio 45342. *–W2AEF*

[2]See "Receiver Signal-Handling Capabilities," *CQ*, Jan. & Feb. 1970, pages 39 & 51 respectively.

Decibels [*from page 36*]

of 1 mw across the 600 ohms will indicate "Zero VU." After this calibration, the meter is then used exclusively for "audio programs."

Note that the VU meter is NOT a "peak reading' voltmeter. Its meter element can not possibly follow sharp audio peaks, and it is not intended to do so.

If a 1000 c.p.s. sine wave is used, 0 dbm and 0 VU express the same power level. However, the dbm is used only with sine wave a.c. signals, and never with audio programs. The VU meter is *calibrated* with sine waves (for uniformity in calibration by different people), but it is used *only* with audio program material. In short, a "dbm" meter is essentially an a.c. voltmeter, but a vu meter is an "audio program" power meter.

Remember this, the next time you "cut a program" on your favorite Tape Recorder. The "peaks" that hit the 100% mark are really about 10 or 12 db *higher* than you might think, and so they have a voltage 3 to 4 times higher than the voltage that would cause the pointer to "sit" on the 100% mark, if you were using a 1000 c.p.s. pure tone signal.

Conclusion

We have come to the end of this article, but not to the end of the subject. We have traced the evolution of the decibel from the earliest "mile of standard cable." The author hopes that in following this article, the reader will have gained a healthy understanding, and a desire to learn more.

With this material as a guide and ready

reference, it should be fairly easy to make the transition into the mathematical calculation of decibels, using logarithms. After that, you will be ready, and we hope eager, to explore the mysteries of "zero at +8", and the fascinating subject of "headroom."

Meanwhile, if you have followed the article carefully, and have worked out the examples given, you should be more than able to hold your own with your friends, when the subject turns to decibels. ■

Propagation [*from page 63*]

CQ Short-Skip Propagation Chart
November 15, 1970–January 15, 1971
Local Standard Time at Path Mid-Point

(24-Hour Time System)

Distance From Transmitter (Miles)

Band (Meters)	*50-250*	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	*Nil*	07-09 (0-1) 09-11 (0-2) 11-15 (0-3) 15-16 (0-2) 16-18 (0-1)	07-08 (1) 08-09 (1-2) 09-11 (2-3) 11-15 (3-4) 15-16 (2-3) 16-17 (1-3) 17-18 (1-2) 18-20 (0-1)
15	*Nil*	08-10 (0-1) 10-16 (0-2) 16-18 (0-1)	07-68 (0-1) 08-09 (1-2) 09-10 (1-3) 10-11 (2-3) 11-16 (2-4) 16-18 (1-2) 18-20 (0-1)	07-08 (1) 08-09 (2) 09-11 (3) 11-16 (4) 16-18 (2-3) 18-20 (1-2) 20-22 (0-1)
20	09-11 (0-1) 11-15 (1-2) 15-17 (0-1)	07-09 (0-2) 09-11 (1-3) 11-15 (2-4) 15-17 (1-4) 17-18 (0-3) 18-20 (0-2) 20-07 (0-1)	07-09 (2-3) 09-11 (3-4) 11-17 (4) 17-18 (3-4) 18-20 (2-3) 20-22 (1-2) 22-07 (1)	07-09 (3) 09-15 (4-3) 15-18 (4) 18-19 (3-4) 19-20 (3) 20-21 (2-3) 21-22 (2) 22-00 (1-2) 00-06 (1) 06-07 (1-2)
40	07-08 (0-2) 08-09 (1-3) 09-17 (4) 17-19 (2-3) 19-21 (1-2) 21-07 (0-1)	07-08 (2-3) 08-09 (3) 09-15 (4-3) 15-17 (4) 17-19 (3-4) 19-20 (2-4) 20-21 (2-3) 21-06 (1-2) 06-07 (1-3)	06-08 (3) 08-09 (3-2) 09-15 (3-1) 15-17 (4-2) 17-20 (4) 20-21 (3-4) 21-03 (2-4) 03-06 (2-3)	06-08 (3-2) 08-09 (2-1) 09-15 (1-0) 15-17 (2-0) 17-19 (4-3) 19-03 (4) 03-06 (3)
80	08-21 (4) 21-00 (3-4) 00-04 (2-3) 04-07 (2) 07-08 (3-4)	08-09 (4-2) 09-16 (4-1) 16-18 (4-3) 18-00 (4) 00-04 (3-4) 04-07 (2-3) 07-08 (4-3)	08-09 (2-1) 09-16 (1-0) 16-18 (3-1) 18-20 (4-3) 20-04 (4-3) 04-07 (3) 07-08 (3-1)	08-09 (1-0) 09-16 (0) 16-18 (1-0) 18-20 (3-1) 20-04 (4) 04-06 (3-2) 06-07 (3-1) 07-08 (1)
160	07-09 (3-2) 09-11 (2-0) 11-17 (1-0) 09-11 (2-0) 11-17 (1-0) 17-19 (3-2) 19-07 (4)	07-09 (2-1) 09-17 (0) 17-19 (2-1) 09-17 (0) 17-19 (2-1) 19-04 (4) 04-07 (3-2)	07-09 (1-0) 09-17 (0) 17-19 (1-0) 09-17 (0) 17-19 (1-0) 19-21 (4-2) 21-04 (4) 04-06 (2) 06-07 (2-1)	07-19 (0) 19-21 (2-1) 21-04 (4-3) 19-21 (2-1) 21-04 (4-3) 04-06 (2-1) 06-07 (1-0)

[*Continued on page 80*]

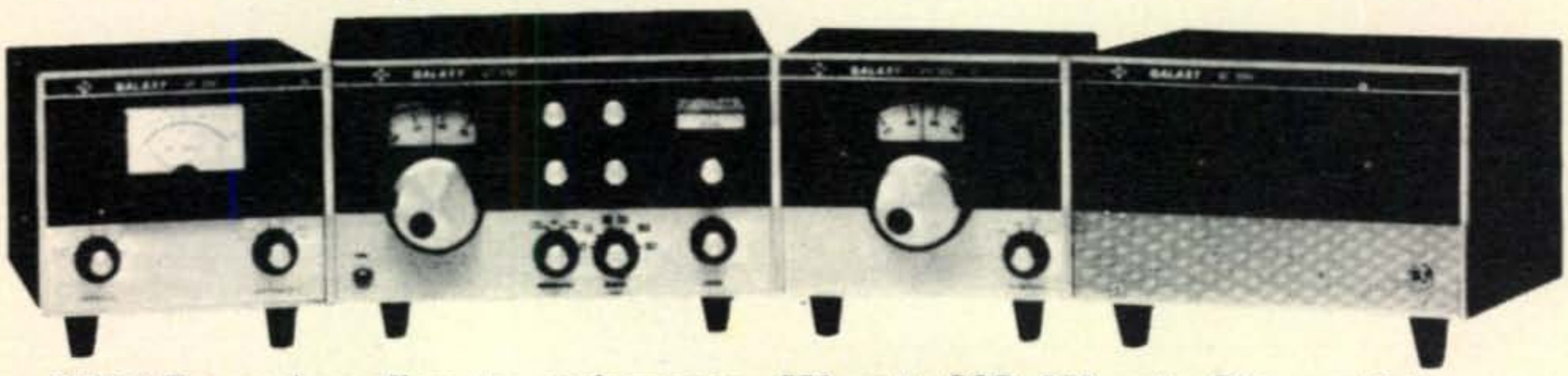
A GREAT BUY FROM ARROW —

HY-GAIN'S GALAXY LINE

A Complete Amateur Radio Line of Transceivers and Accessories

In order to provide a complete range of equipment for discriminating Amateurs, Hy-Gain Electronics Corporation has acquired all stocks and production facilities of Galaxy Electronics. Now *all* the best distributors under the sun can offer you Hy-Gain's complete line of antennas *plus* Hy-Gain's Galaxy Line of transceivers and accessories. And, now that traditional Hy-Gain and Galaxy quality have been combined, you can look forward to even more outstanding products in the future!

Hy-Gain's Galaxy GT550 Transceiver and Matched Accessories



GT550 Transceiver offers *top* performance—550 watts SSB, 360 watts CW; sensitivity better than ½ uv for 10 db S+N/N ratio. Stable—45 db carrier suppression.
Order No. 800 Price **$550.00**

RF550 contains high accuracy watt meter; calibrated scales; switch for forward or selected power; switch to select 5 antennas or dummy load.
Order No. 805 Price **$ 75.00**

RV550 is a solid state VFO. Function switch selects the remote unit to control Receive-Transceive-Transmit frequency independently.
Order No. 804 Price **$ 95.00**

SC550 Speaker Console with headphone jack for GT550 transceiver. AC400 power supply will mount inside console.
Order No. 803 Price **$ 29.95**

AC400 Power Supply is a heavy duty solid state supply to operate the GT550 at full power, on SSB or CW, and with switch selection of 115/230 VAC, 50/60 Hz input voltages. Wires cable/plug for the GT550.
Order No. 801 Price **$ 99.95**

Hy-Gain's
Galaxy FM-210 2 Meter FM Transceiver

This American-made, solid state, FET front end wide band FM transceiver offers no compromise performance for direct or repeater communications...a full 10 watts of power.
Order No. 813 Price **$229.50**

Many more accessories are available.

ARROW ELECTRONICS, INC.

Dept. D

18 Isaac St., Norwalk, Conn.
203 838-4877

225 Rte. 46, Totowa, N.J.
201 256 8555

97 Chambers St. N.Y. N.Y.
212 DIgby 9-4411

525 Jericho Tpke., Mineola, N.Y.
516 Ploneer 2-2290

900 Rte. 110, Farmingdale, N.Y.
516 MYrtle 4-6822

Propagation [*from page 78*]

ALASKA

Openings Given In GMT†

TO:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	16-18 (1) 18-23 (2) 23-01 (1)	15-17 (1) 17-20 (2) 20-23 (3) 23-00 (2) 00-02 (1)	12-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-01 (3) 01-03 (2) 03-05 (1)	06-12 (1) 07-11 (1)*
Central USA	18-20 (1) 20-23 (2) 23-01 (1)	16-18 (1) 18-20 (2) 20-00 (3) 00-02 (2) 02-03 (1)	12-17 (1) 17-18 (2) 18-21 (1) 21-23 (2) 23-03 (3) 03-04 (2) 04-06 (1)	06-08 (1) 08-13 (2) 13-14 (1) 07-12 (1)*
Western USA	18-20 (1) 20-21 (2) 21-22 (3) 22-00 (2) 00-02 (1)	17-19 (1) 19-21 (2) 21-22 (3) 22-00 (4) 00-02 (3) 02-03 (2) 03-04 (1)	12-17 (1) 17-20 (2) 20-22 (3) 22-01 (4) 01-03 (3) 03-05 (2) 05-07 (1)	02-03 (1) 03-05 (2) 05-14 (3) 14-15 (2) 15-16 (1) 04-06 (1)* 06-14 (2)* 14-16 (1)*

HAWAII

Openings Given In Hawaiian Standard Time‡

TO:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	06-07 (1) 07-10 (2) 10-11 (3) 11-13 (4) 13-14 (3) 14-15 (2) 15-16 (1)	06-07 (1) 07-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	13-15 (1) 15-17 (4) 17-21 (3) 21-00 (2) 00-06 (1) 06-08 (2) 08-13 (1)	18-19 (1) 19-20 (1) 20-01 (3) 01-02 (2) 02-04 (1) 19-20 (1)* 20-01 (2)* 01-03 (1)*
Central USA	06-07 (1) 07-09 (2) 09-10 (3) 10-14 (4) 14-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (2) 11-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-09 (3) 09-14 (2) 14-16 (3) 16-18 (4) 18-22 (3) 22-00 (2) 00-06 (1) 06-07 (2)	18-19 (1) 19-20 (2) 20-02 (3) 02-03 (2) 03-05 (1) 19-21 (1)* 21-02 (2)* 02-04 (1)*
Western USA	07-08 (1) 08-09 (2) 09-10 (3) 10-12 (4) 12-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-08 (2) 08-13 (3) 13-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	08-10 (4) 10-16 (3) 16-22 (4) 22-00 (3) 00-03 (2) 03-06 (1) 06-08 (2)	18-19 (1) 19-20 (2) 20-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 19-20 (1)* 20-21 (2)* 21-04 (3)* 04-05 (2)* 05-06 (1)*

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

†To covert to Local Standard Time in Alaska, *subtract* 8 hours in the Pacific Standard Time Zone: 9 hours in the Yukon Zone and 10 hours in the Alaskan Standard Time Zone, from the GMT times shown in the Chart. GMT is 5 hours *ahead* of EST: 6 hours *ahead* of CST: 7 hours *ahead* of MST and 8 hours *ahead* of PST. For example, when it is 18 GMT it is 13 or 1 P.M. EST in New York City.

‡Hawaiian Standard Time is 5 hours *behind* EST: 4 hours *behind* CST: 3 hours *behind* MST: 2 hours *behind* PST and 10 hours *behind* GMT or Z time. For example, when it is Noon in Honolulu, it is 17 or 5 P.M. EST, in New York City.

The DRAKE 4 LINE

Neat . . Compact . . Versatile !

Ray Grenier, K9KHW, Mail Order Sales Manager at
AMATEUR ELECTRONIC SUPPLY, says:

"Operating all bands (160 thru 2 Meters) is a real pleasure with my DRAKE 4 LINE setup. You, too, can eliminate all of that extra gear and mess usually needed for that much frequency coverage. Let me help you go the same route. . . . . .all the way, as I have done - or just one unit at a time.

Visit our store or write me at AMATEUR ELECTRONIC SUPPLY for the best Trade or No-Trade Deal on new DRAKE equipment. You will be surprised how little per month it would cost you to own new DRAKE equipment when you use our convenient Revolving Charge Plan.

Remember, too! When trading with AMATEUR ELECTRONIC SUPPLY you can use our STAY-ON-THE-AIR PLAN, which means you can keep your trade-ins until your new equipment arrives. – Lose no operating time! CU on the air!"

The BIGGEST – The BEST – In the MIDWEST

AMATEUR ELECTRONIC SUPPLY

4828 West Fond du Lac Ave. Milwaukee, Wis. 53216

Phone (414) 442–4200

STORE HOURS: Mon & Fri 9-9; Tues, Wed & Thurs 9–5:30; Sat 9-3

Electronic Keyers [*from page 20*]

workbench, packaged neatly and ready to tell you about. It too is all RTL with only one keying transistor and can be put together for about $30. But that's another story for another time. ■

[1]Old, M. M., "Transistorized Electronic Key and Monitor," *QST*, May 1959, p. 38.

[2]Muir, D., "The Penultimate Electronic Key," *QST*, March 1962, p. 15.

[3]Boelke, G. L., "The Bugless Bug," *QST*, September 1963, p. 23.

[4]Fensler, H.., "The Iambimatic Concept," *QST*, January 1967, p. 18.

[5]Lutz, A. F., "The 9TO Mark II Keyer," *QST*, June 1967, p. 15.

[6]Opal, C., "The Micro-TO Keyer," *QST*, August 1967, p. 17.

[7]Jahn, M., "Microcircuit Electronic Key," *QST*, September 1969, p. 32.

[8]Bibby, M. M., "The Integrated Circuit Electronic Keyer," *CQ*, September 1969, p. 48.

USA-CA [*from page 8*]

Mobile Radio Club newsletter which is published every three months.

The latest membership, a new one, is that of Active (Retired) membership. This membership consists of sea-going amateurs, who still maintain an interest in maritime mobile activities, but who have retired from active sea duty. These members have the same rights of the active membership, pay dues and have voting privileges.

There are many amateurs at sea now and they invite your interest in the club. Give them a call and make your contact with an M/M any time you hear one.

Send applications or any questions to the club secretary: Phyllis Riblet, W5CXM, 5627 Tiffany Drive, Houston, Texas 77045.

URBS AETERNA Award: Issued by Associazione Radiotechnica Italiana (A.R.I.) to any amateur or s.w.l. who since January 1, 1968 has worked or heard the required number of amateurs in Rome.

Italians need 25 QSOs.
Europeans need 15 QSOs.
All others need 10 QSOs.

Send log data and 8 IRCs to ARI, Sezione di Roma, Urbs Aeterna Award, P.O. Box 361, Rome, Italy.

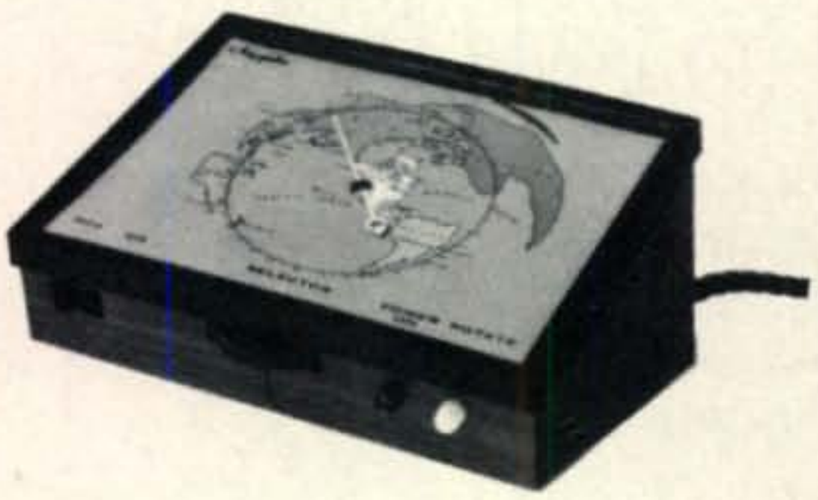
Centenary Award: A special award celebrating Rome Capital 1st Centenary 1870-1970. Issued by the ARI Rome club to any amateur or s.w.l. for working or hearing amateurs living in Rome between January 1st and December 31, 1970. During this

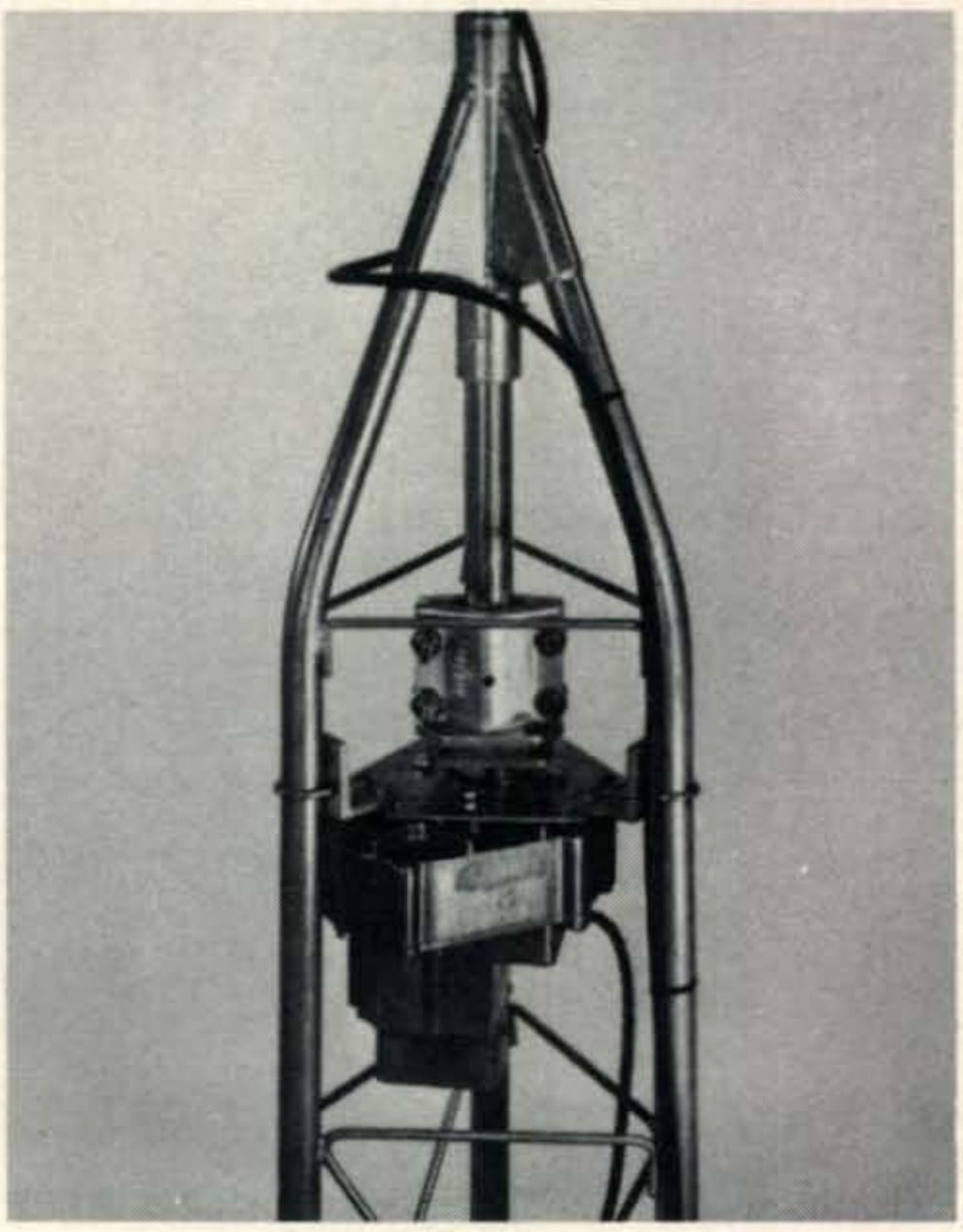
the most powerful signals under the sun!

hy-gain

400 ROTO-BRAKE

Up to 10 Times the mechanical and braking capability of any rotator on the market!





- Handles large beams and stacked arrays with ease
- Delivers over 4,000 IN/LBS of starting and rotating torque
- Gear train protected by husky cast aluminum housing
- Solenoid operator brake adjusted to slip at 5,000 IN/LBS to prevent damage
- Extra heavy duty machined steel gears for maximum strength
- Handsome control unit features sweep pointer over choice of three great circle maps or compass rose
- Select desired position and rotator's logic circuit brings into desired position
- Capacitor start for high torque
- Operates off 110VAC 60 cycle power source
- No blind spots—moves 380°
- Antenna automatically moves to position when control is activated
- Heavy duty mast clamp takes up to 3" O.D. mast
- Mounts to standard tower plate with min. of 10" tower leg spacing
- Mounting kits available for poles or small towers
- Universal tower mount available
- Temperature range—30° F to 120° F
- Permanently lubricated
- Requires one 5 wire cable
- Cable available from Hy-Gain 412

Buy a 400 ROTO-BRAKE from the best distributor under the sun—the one who stocks Hy-Gain!

Model No. 400 Suggested retail price **$189.95**

HY-GAIN ELECTRONICS CORPORATION

P.O. Box 5407-FJ, Lincoln, Nebraska 68505

period Rome amateurs will use the call IRØ.

Italians need 25 points.
Europeans need 12 points.
All others need 8 points.

Each QSO will count 1 point but contacts on September 20th, Centenary Day, will count 3 points. Send log data and 8 IRCs before March 31, 1971 to ARI, Sezione di Roma, Centenary of Roma Award, P. O. Box 361, Rome, Italy.

Notes

I'm sorry that the photograph of the County Hunters at Knoxville did not arrive by my deadline—perhaps next month. This did give me the desired opportunity to use the foto of Paul Kollar, W8CXS who has done a fine job of handing out many counties by his portable operations during many QSO Parties plus his mobile trips—thus helping County Hunters who operate CW as well as those who use SSB.

I'm overwhelmed by the fast and complete backing (flood of mail) by ALL COUNTY HUNTERS when it appeared that this column might not continue. Many many thanks to you *ALL!*

I had hoped to tell you all about the Mobile Amateur Radio Club, Inc., their fine newsletter and their awards. If you can't wait until next month, send an s.a.s.e. to WØYLN requesting all data. I do have room to mention that at their meeting at the Ramada Inn in Knoxville, Floyd Markham, K7WQJ was selected as the number one Mobile Operator, and Ray Phillips, K5RPC was selected as the number one Net Control. Both were presented with special plaques, congratulations! How was your month, 73, Ed., W2GT.

Contest Calendar [*from page 61*]

the multiplier. Multi-operator stations divide score by number of operators used.

Frequencies: 3575, 3710, 7070, 7160, 14075, 21075, 21090, 21140, 28090 on c.w. and 3770, 3775, 3790, 3943, 3960, 7070, 7090, 7210, 7260, 7275, 14320, 14340, 21360, 21440, 28620, 28690 on phone, for US and DX.

Awards: To numerous to mention, get list.

Logs go to Chapter 88, c/o WA2BNF, 105 Carpenter St., Belleville, N.J. 07109 or to CHC HQ. Clif Evans, K6BX, 3212 Mesa Verde Rd., Bonita, Calif. 92002.

CQ WW DX Contest

Complete rules and a list of 27 Trophies and Plaques in last months issue. No changes in the rules of previous years.

the NEW ONE

TEMPO one

AN OLD FRIEND (HENRY RADIO) INTRODUCES A NEW NAME . . . A NEW VALUE . . . A NEW TRANSCEIVER. THE TEMPO *'ONE'* SSB TRANSCEIVER REPRESENTS THE CULMINATING ACHIEVEMENT OF MANY YEARS OF EXPERIENCE IN THE AMATEUR RADIO FIELD. MODERN DESIGN, SUPERB PERFORMANCE, HIGH STYLING, STURDY CONSTRUCTION, OUTSTANDING RELIABILITY, EXCEPTIONAL VALUE — ALL THESE FACTORS COMBINED FOR THE FIRST TIME IN AN AMATEUR SSB TRANSCEIVER MAKE THE TEMPO *'ONE'* THE OBVIOUS CHOICE IN TODAY'S AMATEUR MARKET.

Five Band Coverage: 80 thru 10 meters • Power Input: 300 watts PEP • Selectable Upper and Lower Sideband • Built-in VOX • Built-in Calibrator • ALC • AGC • ½ Microvolt Receive Sensitivity • Receiver Off-set Tuning • All the features you want at an unbelievably low price . . . only **$298.00**

AC/one, 110-220 volt 50/60 cycle power supply . . . $99.00 DC/one, 12 volt DC power supply . . . $107.00

TED HENRY (W6UOU) **BOB HENRY** (WØARA) **WALT HENRY** (W6ZN)

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"

Keep in mind that we use the ARRL country list or the WAE list for European contacts. The WAE list can be found on page 78 of the July/August issue.

You are expected to score your log and check it for duplicate contacts and correct multipliers. Re-copied logs must be in their original form with duplicates included but crossed out and scoring corrections made. Also indicate total QSOs made but less the duplicates.

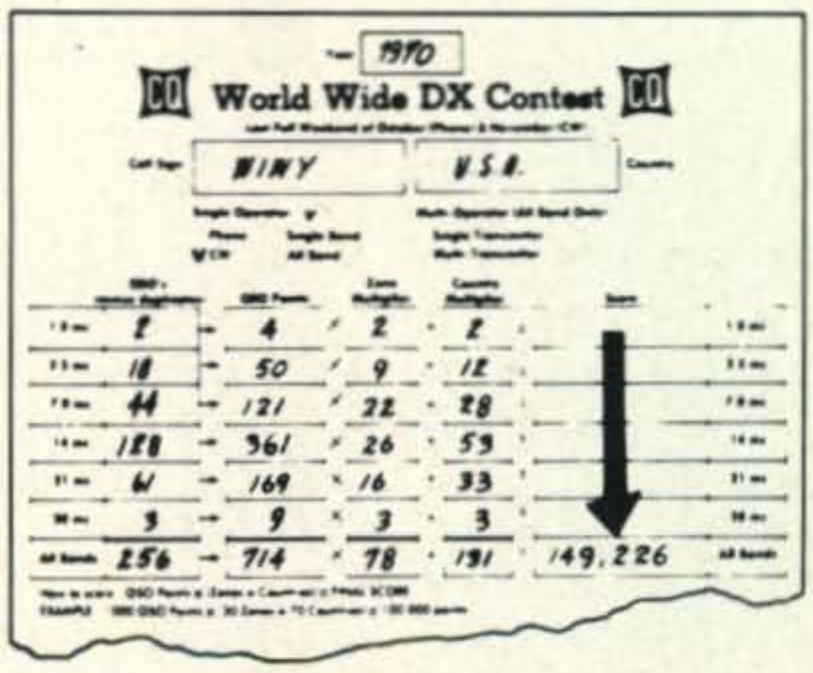
Official log and summary sheets are available from *CQ*. (a large s.a.s.e. please) Or you can make up your own log sheets, 40 contacts to the page. Use a separate sheet for each band, and enter the Zone and Country multiplier only the first time it is worked. We do insist on a summary sheet showing all the scoring, name and address in BLOCK LETTERS, and a signed declaration.

A reminder to multi-operator stations. If your score is to be credited to your Club the station must be completely manned by members.

Corrections

In the rules for the upcoming 1970 *CQ* World Wide DX Contest which appeared last month on pages 33 and 34, a few gremlins crept in to cause embarrassment. In section IX. Trophies and Plaques, trophy #4 should read: Carib./C.A.–Phone (Gus Kuether, HR2GK). Trophy #5 (ommitted): South America – Phone (Brazil DXers). Trophy #20, Oceania–C.W. has been donated by the Maui ARC, Hawaii.

The sample summary sheet shown on page 34 was erroneously used instead of the correct sample shown below.



1970
CQ World Wide DX Contest CQ

160	2	4	2	2		160
80	18	50	9	12		80
40	44	121	22	28		40
20	188	561	26	59		20
15	61	169	16	33		15
10	3	9	3	3		10
All Bands	256	714	78	191	149,226	All Bands

WIWY — USA

Editor's Notes

Be sure to check W3ASK's special contest forecast. If George predicts a good week-end you had better believe it, he has only missed 3 predictions in the last 20 years.

The K4IIF Trophy for the Ohio Valley and Florida DX clubs is still up for grabs. The W4's have won the first leg, two more wins and they retire it for keeps.

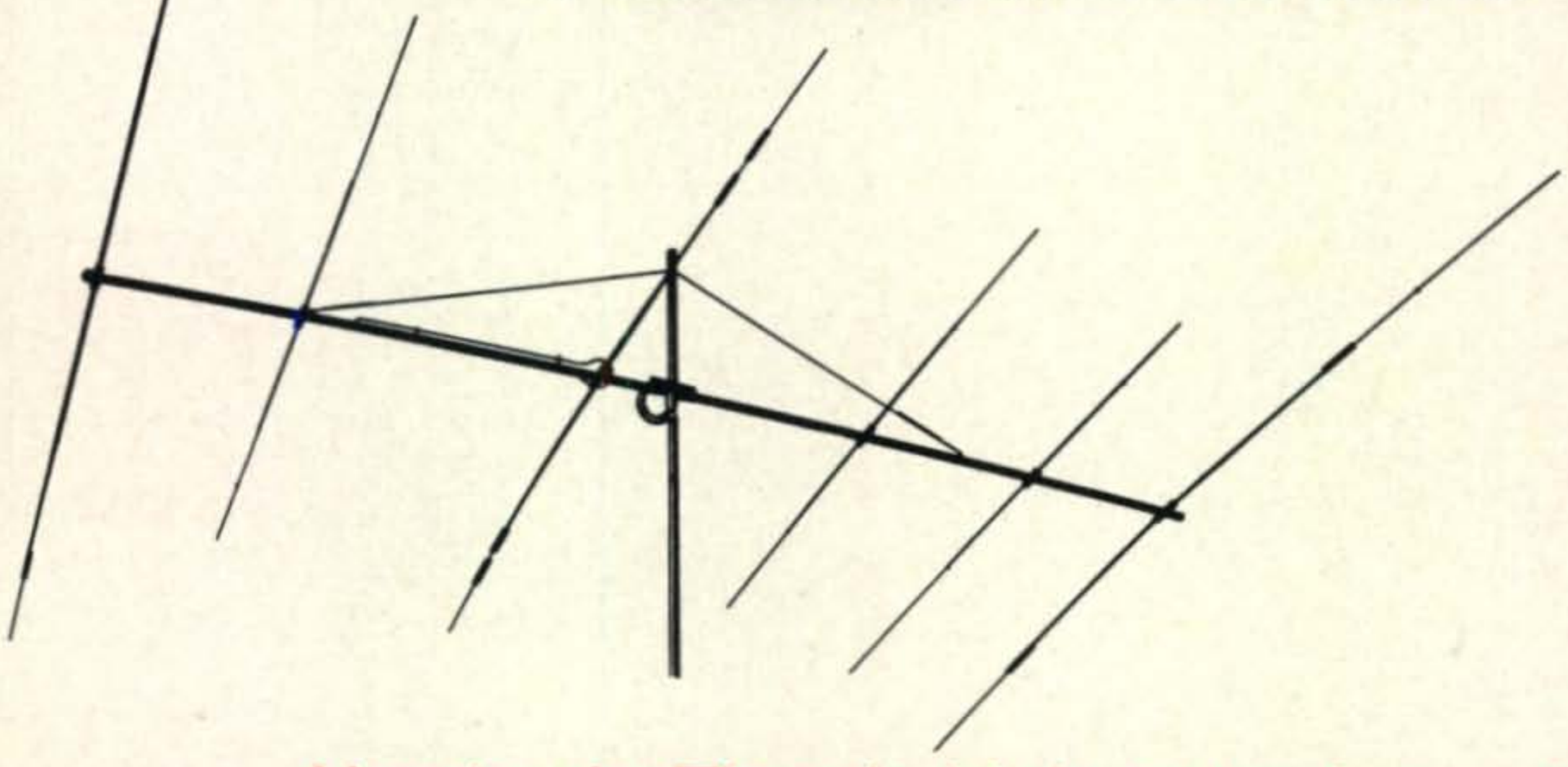
With the addition of 6 more Trophies all continents are now represented, so that should be an incentive for some of the less active areas, we hope. See you in th pile-ups.

73 for now, Frank, W1WY

The voice of

HY-GAIN'S THUNDERBIRD 10-15-20

is heard around the world



Here's why Thunderbirds outperform all other tri-banders:

- **Thunderbird's "Hy-Q" traps** provide separate traps for each band. "Hy-Q" traps are electronically tuned at the factory to perform better at any frequency in the band—either phone or CW. **And** you can tune the antenna, using charts supplied in the manual, to **substantially** outperform any other antennas made.
- **Thunderbird's superior construction** includes a new, cast aluminum, tilt-head universal boom-to-mast bracket that accommodates masts from 1¼" x 2½". Allows easy tilting for installation, maintenance and tuning and provides mast feed-thru for beam stacking.

  Taper swaged, slotted tubing on all elements allows easy adjustment and readjustment. Taper swaged to permit larger diameter tubing where it counts! And less wind loading. Full circumference compression clamps are mechanically and electrically superior to self-tapping metal screws.
- **Thunderbird's exclusive Beta Match** achieves balanced input, optimum matching on all 3 bands and provides DC ground to eliminate precipitation static.
- Up to 9.5 db forward gain.
- 25 db front-to-back ratio.
- SWR less than 1.5 to 1 on all bands.
- 24-foot boom...none longer in the industry.
- Extra heavy gauge, machine formed, element to boom brackets, with plastic sleeves used only for insulation. Bracket design allows full mechanical support.
- Interlaced, optimum spaced elements for higher gain and better pattern control.
- 3 active elements on 20 and 15 meters. 4 active elements on 10 meters.

New 6-Element Super Thunderbird
Model 389
Suggested retail price, **$179.95**

Improved 3-Element Thunderbird
Model 388
Suggested retail price, **$144.95**

Fabulous 3-Element Thunderbird, Jr.
Model 221
Suggested retail price, **$99.95**

Popular 2-Element Thunderbird
Model 390
Suggested retail price, **$99.95**

Buy one today at your favorite Hy-Gain distributor!

HY-GAIN ELECTRONICS CORPORATION

P.O. Box 5407 - FJ, Lincoln, Nebraska 68505

Ham Shop

Advertising Rates: Non-commercial ads 10¢ per word including abbreviations and addresses. Commercial and organization ads, 35¢ per word. **Minimum Charge $1.00**. No ad will be printed unless accompanied by full remittance. **Closing Date:** The 10th day in the second month preceding date of publication.

Because the advertisers and equipment contained in Ham Shop have not been investigated, the publishers of CQ cannot vouch for the merchandise listed therein.

Direct All Correspondence & Copy to: **CQ Ham Shop, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050.**

FOR SALE: Heath SB-600 station speaker and HP-23A power supply combination, $50.00, F.O.B., Port Washington, N. Y. K2EEK, CQ Magazine, 14 Vanderventer Avenue, Port Washington, L. I., New York. 11050.

DON'T BUY QSL cards until you see my FREE samples. Fast service. Economical prices. Little Print Shop, Box 9848, Austin, Texas. 78757.

SAROC, January 7-10, 1971, Flamingo Hotel Convention Center, Las Vegas, Nevada. Sponsored by Southern Nevada ARC, Inc., Box 73, Boulder City, Nevada. Advance registration $14.50 per person accepted until January 4, regular registration at door, includes Flamingo Hotel Late Show and drinks, Sunday Breakfast, Cocktail Parties, technical seminars and meetings, ARRL, DX, FM, MARS, QCWA, WCARS-7255, WPSS-3952 and WSSBA. Ladies Program. Flamingo Hotel, SAROC room rate, $12.00 plus room tax, per night, single or double occupancy January 3 thru 12, 1971. Mail advance registration to SAROC, W7PRM, Club President. W7PBV, SAROC Convention Chairman.

QSL MANAGER. Will volunteer my services. W7HKI, D. G. Larry Larison, Traveler's Lodge, Edmonds, Washington. 98020.

CIRCUITS for 32 electronic projects. R. F., audio and gadgetry, complete plans $1.00. P. M. Electronics, Inc., Box 46204, Seattle, Wn. 98146. Dealer inquiries invited.

POSTAL CHESS: American Postal Chess League, Box 1022, Greeley, Colorado. 80631.

FOR SALE OR SWAP: Laboratory Test Equipment-garage full: Hewlett Packard, U. H. F. Signal Generators, $25.00 each; Oscilloscope-storage type 5" Screen- Similar to Tecktronix, $250.00, etc. Stereo Equipment - Casette Recorder/Playback units - Car and Home types. Cameras, etc. Send for list. Murray Marcus, 11 Eldridge Street, East Northport, New York. 11731.

WANTED: QST before 1920 and amateur radio-teletype publications. Orville Magoon, 1941 Oakdell Drive, Menlo Park, California. 94025.

NOVICE CRYSTALS: 40-15M, $1.38; 80M, $1.83. Free flyer. Nat Stinnette Electronics, Umatilla, Florida. 32784.

RTTY GEAR FOR SALE: List issued monthly. 88 or 44 Mhy torroids, uncased, five for $2.50 postpaid. Elliott Buchanan and Associates, Inc., 1067 Mandana Boulevard, Oakland, Ca. 94610.

Solid-state Stripline Transverter 144-432. AM-FM-CW. Silverplated enclosure. Requires 1.2 watts RF in transmit, 12 VDC in receive. $37.50. SPECTRUM INTERNATIONAL, Box 87A, Topsfield, Massachusetts. 01983.

FET Converter Kits: 50, 144, 220. $10.20. Includes silverplated glass-epoxy p. c. board, crystal, coilforms, trimmers. IF 28-30 MHz. VHF COMMUNICATIONS, Box 87A, Topsfield, Mass. 01983.

SWAN 250, 117XC AC Supply & TV2B (New). SB500 Transverter, Clegg-Venus Xcvr; 416 AC supply. SASE for details. Scotty, 14534 Vaughan, Detroit, Michigan. 48223.

QSL's. Second to none. Same day service. Samples 25 cents. Ray, K7HLR, Box 331, Clearfield, Utah. 84015.

WANTED: 432 Transmitter, good output on ham frequency, AC operation. Object - TV, also vocaline 432 Transceivers. Jefferson Rice, 1302 Canterbury Lane, Colonial Heights, Virginia. 23834.

COLLINS FOR SALE: 75S3B, $400.00; 32S1, $325.00; KWM-2, $750.00; PM-2, $100.00; MP-1, $100.00; 516F2, $100.00. Jack G. Anderson, 64 Hitchcock Ln., Avon, Conn. 06001. Phone: (203) 677-1982. W1FDH.

WANTED: Lampkin Model 111 PPM Meter in good condition. Frank McJannet, 108 University St., Seattle, Washington. 98101.

MINT HW-16 with spkr, crystals, headphone, key. $95.00. WN1KOQ, 14 Smithshire, Andover, Massachusetts. 01810.

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

MICROWAVE EQUIPMENT, Sperry Parabolic Antenna. - All control motors and mount, schematics. Spectrum Analyzer — 6000-9000 Mhz. Bill Goble, 330 Wood St., Clarion, Penna. 16214.

GOING MOBILE? Protect your gear with "AUTO SENTINEL" miniature transistorized alarm. Protects auto and contents from theft. Intrusion triggers pulsating horn blasts. Unique automatic horn shut-off feature saves battery while maintaining protection. Single wire ten minute installation. $14.95 each, quantity prices avail. T. C. Bassett, 169 Linden Road, Wayne, N. J. 07470.

COLLINS KWS-1, Ser. 1411 Inc. 302C-1, 75A4 Ser. 4798, 3.1 Fil., Vernier Dials, Perfect condition. Will ship. Asking $1,250.00. On the air! K0IBH, Waterloo, Iowa. 50702. Phone: (319) 296-2505.

BICO 753 FOR SALE. Factory wired. Excellent condition. $140. WA0QJC. Phone 319-351-6138.

CANADIANS: See QST July, 1970, page 24. Have surplus 0 to 24 uh Roller Inductors, $5 each, 000 to 999 Counters for Roller Inductors or Great for Vacuum Variables, $4 each. Limited supply 337 mmf Variables .185 spacing, $8. Need 3550 Kcs Crystal TF KEIM, P. O. Box 270, Fort Smith, N. W. T., Canada.

SELL: 75S-3, speaker, manual, spare tubes: $400. KWM-1, power supply, speaker, manual, tubes: $300. George Pataki, 34-24 76th Street, Queens, N. Y. 11373. Phone: (212) 639-3195.

GET YOUR FIRST! Memorize, study: "1970 Tests-Answers" for FCC First and Second Class License, plus "Self-Study Ability Test," proven, $5.00. COMMAND, Box 26348-H, San Francisco, California. 94126.

MANUALS--- TS-175/U, SP-600JX, $5.50 each; R-390/URR, R-390A/URR, BC-639A, $6.50 each; R-388/URR, $7.50. W3IHD, 4905 Roanne Dr., Washington, D. C. 20021.

CHARTER JET FLIGHT TO SAROC. Roundtrip New York City, Las Vegas, $229.00; depart JFK 10:00 a.m. January 7th. Roundtrip Chicago, Las Vegas, $199.00; depart O'Hare 12:00 noon January 7th. Return January 10th. Includes Meals and Drinks aloft, Flamingo Hotel, Room three nights double occupancy, Transportation and Baggage in and out of Flamingo Hotel, Dinner Show, Midnight Show, Saturday-Buffet Luncheon, Sunday Buffet Breakfast, SAROC Tickets, Tax and Gratuity, $60.00 will confirm reservation; includes one dollar service fee. Final payment due before November 25th. Flight cancellation or written request for deposit refund will be accepted until December 1st. SAROC, Box 73, Boulder City, Nevada. 89005.

FOR SALE: Heath 2 meter transceiver, Pawnee, $120, Drake 2B, $180. Both for $275. F.O.B. Austin Texas. Mrs. Jean B. Tabor, 2217 S. Lakeshore Blvd., Apt. 109, Austin, Texas. 78741.

WANT: Pre 1920 Wireless equipment and catalogs. Description, price. Dick Sepic, 1945 East Orangegrove Boulevard, Pasadena, California. 91104.

FOR SALE: Best offer for DX100, SX100, DX20, DX40, DX60, Globe 90, TBS50, BC348, RCA88LF, ip501, Marconi LF, Omega 4x5 enlarger, HT40, RCA8506B, AR8503, all in good working condx. Write: Box 8352, Savannah, Ga. 31402.

WANTED: V70-D tubes for Globe 400B. Don Perryman, W5VBH, 5800 N.W. 65th, Oklahoma City, Oklahoma. 73132.

CONTEST OP'S! Murphy's Marauders contest/DX club wants you. If within 175 mi. of Central Conn. write: K1VTM for further information. R. W. Nevers, 2438 Stanley Street, New Britain, Connecticut. 06053.

HAVE 120 CRANK-UP TOWERS, new, complete with anchor rods, guy wires, and plate. Will trade for transmitter and power supply. A. C. James T. Lundy, Box 26, Deming, N. M. 88030.

WANTED: Colin P. Kennedy Receiver, 110 or 220, and two stage amplifier. Give condition and price. W7BIF, 107 Wyoming St., Boulder City, Nev. 89005.

WANTED: Telrex Tri Band Beam — Pick up or shipping OK. Will swap 30L-1 for old coin collection of equal value. W1DGJ, 143 Richmond Rd., Ludlow, Mass. 01056.

FOR SALE: National NC-183 with Speaker, $125; Hammarlund HQ-150 Rcvr with Speaker, $140; Both Mint Condition. Will ship. Stamp for info. K0JHW, C. P. Courtney, 7061 Idlewild Ave., St. Louis, Missouri. 63136.

SELL: Heathkit Electronic Keyer. Mint condition. $25.00 Postpaid. F. Martin, 202 Kenny Street, Fayetteville, New York. 13066.

TRI—STATE COLLEGE NET: 1st Sat. of month, 14.340, 11AM Eastern. TSC Alumni Reunion: October 23/24.

WANTED: 3-element beam for 20-15-10, and Hustler super 75 meter resonator—RM-75-S. State price and condition. W1SCM, 13 Libby Ave., Lewiston, Maine. 04240. L'Heureux.

FOR SALE: TR4, RV4, AC4, SB200, 14AVQ, KW Dummy Load, Heath Tower, Johnson Fone Patch, 440 SL Mike, TA40KR, 40 meter kit for TA33 Beam. Complete run 73 magazine in Red binders. All in mint condition and reasonable. Write: WA6HYB, 224 First Avenue, Chula Vista, California. 92010.

75S-3B No. 16734, Mint, $450.00. WANT: 2k2, 2k3, 20S1 and Ham Band xtals. J. M. Hoffer, W1KL, 24 Cherry Rd., Framingham, Massachusetts. 01701. Phone: (617) 872-5084.

HALLICRAFTERS HT-46 SSB/CW xmtr-Still in orig. carton, $195.00. W6GGT, 1925 Bidwell Way, Sacramento, Calif. 95818.

SELL: Knightkit TR-106. 1 hour operating time. $80.00 plus shipping. L. Van Heuveln, WA0NUX, Box 622, Salem, S. D. 57058.

WANTED: HAM-M Control Unit, only. Must be in good, working condition. Please quote lowest price to: Syl. Connolly, W1MD, 65 Pleasant St., Hingham, Mass. 02043.

FOR SALE: Model 26 Teletype Printer, Keyboard, Cover, and table. $50.00, FOB, W6DOU, 3154 Stony Point Rd., Santa Rosa, Calif. 95401.

NEW YORK CITY TO LAS VEGAS and RETURN Jet Flight to SAROC CONVENTION January 7-10, 1971 Flamingo Hotel. For details, SAROC, Box 73, Boulder City, Nevada. 89005.

WANT: HW-100 w/AC PS-will Swap Ham Goodies or Minolta SRT-101, like new. WA6GZZ, 4133 Stonecutter Way, N. Highlands, Ca. 95660.

LEICA M2 with 90 mm f2.8, 50mm f2,35mm f2.8 lenses, meter, flash, case, $390.00. Write: W5KZ, 3710 Shenandoah, Dallas, Tx. 75205.

FOR SALE: Hew HT-44 SSB Transmitter with matching AC Power Supply. $295.00. WANTED: Webster Bandspander Mobile Antenna (Long Model - Blue) and Double Chain Bumper Mount. J. H. Ashley, W4OSC, Box 254, Ware Shoals, S. Carolina. 29692.

RTTY 14 and 19 Covers, 19 stand and floor console, 28 ASR and KSR floor consoles, trade or sell. D. C. Harrington, K0SHK, 1620 Gardena Ave., Fridley, Minn. 55421.

FOR SALE: Ballantine Model 316 Infrasonic Peak-To-Peak Voltmeter and instruction book, $65.00. D. R. Doerres, Box 676, Wilton Jct., Iowa. 52778.

QSL'S: FREE SAMPLES. 200 cut designs. Catalog 25 cents. Ace Printing Service, 7809 Lorain Ave., Cleveland, Ohio. 44102.

MILITARY SURPLUS POWER SUPPLY PP14420/FST-1 30v 1 amp. New in original packing, $14.95. Trans. 7v 1.3 amp. 96 cents new original pkg. Eico Transceiver with DC supply, new orig. pkg. and factory wired, factory warranteed, $278.00. Hla Oung, XZ2AD, 115 Sudden St., Watsonville, California. 96076. Tel. (408) 724-6201.

DISABLED. Need ham equipment; have only $100. Can make repairs; will pay shipping. Ken Vercoe, P. O. Box 7244, Oakland, Calif. 94601.

MOVING TO 4 LAND - SALE: Apache, K.W. AMP. HQ180 Rcvr recently aligned. All gear in excellent condition. 2 Mtr Home Brew Trans., Comp. Station, $600. Lou Lazarus, K2GQO, 131 Saddle Rock Rd., Valley Stream, L. I., N. Y. (516) PY 1-7354.

COLLEGE SALE: Link Radio 30-50 Mc Xtal, Rcvr (F.M.), w/spkr, head & 6 VDC supply, $45. Hallicrafters S-120 Gen. Cov. $45. Both perfect shape. WA1JQT, 99 Fitchburg Rd., Townsend, Mass. 01469.

SELL OR TRADE: Sony TC355 Stereo Tape Deck. Mint Condx. See 70 Allied, page 120. $145 or Trade, plus cash for SWAN TV-2 or for good Gen. Cov. Rcvr. OX5AP, BMEWS, Box 12, APO New York. 09023.

WANTED: Schematic and/or operating manual for TBA-11 NAVY 1 KW, C.W. Transmitter or photostats of same. Will pay cash to purchase or borrow. C. L. Pennington, 800 First Street, Macon, Georgia. 31201.

HEART OF POCONO MTS. — Winter and summer vacationland. Excellent ham location. Hunting, skiing, fishing, boating. 6 BR Home, HW oil heat, 2 car garage with 2 rooms above, 12 x 14 ft. radio shack and workshop, large stable, 2 other outbuildings, close to stores, schools, churches, beautiful landscaped grounds, appx 1 1/2 acres, adjacent to new golf course, TA33 SR beam, new VHF ant. owner financed, terms 50% down bal. 15 years at 7%, $40,000.00, 100 miles to NYC and 100 miles to Philadelphia. K3YDM ZC 18347, phone 714-646-2930.

NOVICES: Eico 720 Transmitter, A1 condition, $35.00. WA2ACA, 432 Pine Grove Circle, Scotch Plains, N. J. (201) 889-4609.

WANTED: Schematic and/or operating manual for oscilloscope model OS-26/usm-24. No BSR-52205, 1296 - CAGX. Surplus scope. H. Bachmann, 3949 Paladin Drive, San Jose, Ca. 95124.

SELL: CQ's 1945 thru 1959, QST 1927-1959, some years complete in binders. Old issues Radio Mag., Radio & TV Mag., Pop. Sci., Pop. Mech. Send SASE for list. F. Kubias, W6JBM, 4655 Lamont, San Diego, California. 92109.

BRASSPOUNDERS: If you were ever a CW Operator in the military, government or commercially, join the Society of Wireless Pioneers. $5.00 per year brings you historical pictures, Directory and ham list information. Write: P. O. Box 530, Santa Rosa, California. 95402. W6BLZ.

2 LTR CALL: If U hold Amateur Extra & FCC Commercial ticket & U not licensed 25 years but desire 2 LETTER CALL write to: W3BQN, Wm. F. Costello, RFD 2, Box 192-B, Annapolis, Maryland. 21401.

WANTED: One each 10-15-20 Meter Mark Mobile Heliwhips. H. P. Westler, 596 Fletcher Drive, Atherton, California. 94025. W6OKQ.

HEATH IMPEDANCE BRIDGE, $50.00; B & W Grid Dip, $35; B & W No. 426 Lopass filter, $10; BC221-book & p.s., needs work, $20; Philco Sig gen., $25; Gonset Bowtie 20 m. beam, $20. WA6YTR, Box 241, Calimesa, Calif. 92320. Telephone: 714-795-2144.

TRADE: Professional Bell & Howell Filmo 16 mm, magazine loading camera with turret head equipped with wide angle, standard & telephoto lens. Includes leather case. WANT Mobile Rig with CW capability. W6AT, 606 Buckeye St., Vacaville, California. 95688.

FOR SALE: EICO 753 TRI-BANDER transceiver. Factory wired and 752/dc Power Supply. FB mobile rig. Mint cond. $175. takes both. W2ADC, Box 201, Elmont, N. Y. 11003.

SELL: Hewlett-Packard 523CR 1.2 Mhz Counter, $200. Gen. Radio Bridge and Oscillator (650A and 650 pi), $100. Kintel Mod. 204A Solid State Electronic Galvanometer, $140. Dumont Electronic Switch type 185A, $40. Trammell, 1507 White Oak Court, Martinsville, Va. 24112.

SELL: SBE-34 with Xtal Calib. and mike. Late model, manual, original carton, $240. W6DJZ, 3748 Floresta Way, Los Angeles, Ca. 90043.

SB-620: Input freq. - 455 KHz. $85. Finger, 2727 Duke, 1412 Alexandria, Va. 22314. (W4VZR).

WANTED: Aircraft DC Generator at least 200 amp, 24 or 28 volt. WANT TO MAKE ARC WELDER. Send price to: J. D. DeShong, 11847 E. 16, Tulsa, Oklahoma. 74128.

WANT: "RADIO", July 1935 & "R/9", December 1932 to November 1933 to fill gaps in my reference library. A. Herridge, G3IDG, 96 George St., Basingstoke, Hants, England.

S-LINE COPY MADE BY ELDICO. Transmitter, Receiver, Power Supply, Control console and manuals. Transceiver or separate control. $350.00. Rich, WA2CSE, 55 Bulson Rd., Rockville Centre, N. Y. 11570. Phone: (516) 678-1523, evenings.

88 mh TOROIDS, uncased, 5/$1.50, pp 48, E. W. Evans, 220 Mimosa Lane, Paducah, Ky. 42001.

PERSONAL WORLD WAR II HISTORICAL COLLECTION NEEDS: BC-191 and accessories. State price and condition. W7BIF, 107 Wyoming St., Boulder City, Nevada. 89005.

DRAKE R4B, Brand-New, $375.00. DRAKE 2C, Brand-New, $200.00. Factory sealed. G. Sochor, 419 South Euclid, Oak Pk., Illinois. 60302.

TS61/AP, $46.00; TS36, $26; TS33/w inst book, $32; HV cap: 0.02 mF 20KVDC, $6; 0.02mF 15 KVDC, $4; 800 pF 5KVDC, $1; postage incl. M. Bae, Box 9, Kingston, N. J.

FOR SALE OR TRADE: TR Switch, $5.00/ Lafayette Dynamic Mike, $3.00/Transistor Neg. Vibrator, $5.00. W3MSN, 5400 Boulder, Oxon Hill, Maryland. 20021.

COMMAND Xmtrs—i, $25.00 takes four; one of each freq. range. FOB. W2PYB, 72 Rumford St., Depew, N. Y. 14043.

FOR SALE: Misc. T.V., radar, xmtr & rcvr tubes; components, etc. 25% or less/list. Send requirements w/SASE. WN2NGG, 26 Wistar Avenue, Metuchen, New Jersey. 08840.

TRADE: 2 Collins Mech. Filters F455 FA21. NEED: HR20 Rec. or similar. KZ5WH, Box 932, Balboa, Canal Zone.

GERTSCH SIG-GEN/FREQ METER FM-6 20-1000 MHz exceeds FCC specs; $450. FM-4A extender poss. 30GHz 0.00001%; trade for Drake; Dig f meter: Trade HF/VHF/UHF list SASE. W4API, Box 4095, Arlington, Va. 22204.

SWAN VOX VX-2, $25.00 including shipping. Xcell. Gone Drake. H. Di Ivlio, 147-14 45th Ave., Flushing, New York. 11355.

FOR SALE! HQ 145C — Heath DX60-B — Heath H6 10-B. Mint condition. $250.00. A. X. Thomson, WN8GJE, Box 326, Blackman Hgts., Parsons, W. Virginia. 26287.

NOVICE XMTR: Lysco 600-50 watts-w/VFO, $50; CIE First Class course, $150.00; TH3 MK III, $85.00; Heath HD-10 Keyer, $35.00; SB-610 monitor, $70.00; K4RTA, 105 Freshrun Dr., Hendersonville, Tennessee. 37075.

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

WILL PAY $1.00 each for Oct. 60, Jan.—Mar. 61, Jun 63, 73's need conversion of BC733 Rx. for 2M. KL7FSF, 1904 W. 46th Ave., Anchorage, Alaska. 99503.

FOR SALE: New Ham M Rotor with control in factory package, $75.00. 4 cx 1000, $50.00. Dr. H. Leathers, K5LHS, 11 Leathers Ln., Muskogee, Oklahoma. 99503.

SELL: Johnson Courier 500W Linear, Globe Champion 175W, Hammarlund H.Q. 140X, with Q-Multiplier and speaker. W3GEB, 4640 York Rd., Baltimore, Md. 21212.

TA-36 Gud Cond. $75.00. Pick up only. Wilcock Gay, 3 Band rcvr. Vintage? It works. Milo Boz, Rt. 2, Salem, Ohio. 44460.

FOR SALE: Heathkit HR-20 Receiver (with manual) and matching A. C. Supply. Good Cond., Clean. $75.00. M. Kaplan, 23038 Lanark St., Canoga Pk., California. 91304.

FOR SALE: Valiant II, $135.00; TR-44 Rotor, $35.00. Both in mint cond. with manuals. John R. Harmon, WO1VW, 1212 22nd Street, Auburn, Nebraska. 68305.

SSB XMITTER OR XCEIVER: Will buy or barter. Have Lab 80 with cartridge, base, albums; 500w. cw/am Xmitter; 90kc to 24mc communications receiver; tubes, parts, other gear. Reply to Adams, 1208 West Beach Dr., Panama City, Fl. 32401.

FOR SALE: Hallicrafters CRX-2 Mark I 151-174 mc communication receiver, Price $70.00 with antenna FOB N. Y. C. Gud condx. WB2GFB, Sig Grabel, 40 Argyle Rd., Bklyn, N. Y. 11218.

CAN ANYONE SEND ME ANY DATA On the following tubes: SA-10B, CK5783WA, GB-407A and 6280, George Kapsokavadis, 13 Kolokotroni St., Corfu, Greece.

FOR SALE: National NC-270 Receiver, $110. Knight T-150 Transmitter, $50. C. W. Morris, 1542 Scotland Ave., Chambersburg, Pa. 1720I.

SELLING OUT: Ranger, $40.00 (needs work), British KW-2000 Transceiver (160-10 meters SSB/CW), $300.00; Speech Compressor, $6.00; Tentec KR-20 Keyer, $40.00. ANTENNAS — 2 Hy-Gain 18 HT Verticals, $90.00 each; 3 element Triband Beam, $20.00; 2 - New 12 element 2 meter beams with stacking harness, $40.00. Stamp for list. WANT: SB-34. James Shank, 21 Terrace Ln., Elizabethtown, Pa. 17022.

CENTRAL ELECTRONICS 10B SSB Exciter with coils for four bands and Deluxe VFO, $65.00. Ship collect. K4ZQR, 409 Kaelin Dr., Louisville, Ky. 40207.

TRADE: One half acre near Belen, N. M., For Radio Gear. W3MSN, 5400 Boulder Oxon Hill, Maryland. 20021.

SELL: Mint Linear SB200 Pair new spares, $185. K4JK, 3958 Tanglebush Ln., Huntsville, Alabama. 35810.

WANTED: Early Transmitting crystals and crystal holders, also early receiving crystals and holders. Cash or swap. K8IKO, Box 222, Worthington, Ohio. 43085.

WANTED: Cowan Pub. (CQ) sideband handbook, Urgent, sell me yours! Wilson, W0KKQ, Rt. 2, Box 315B, Lajunta, Colorado. 81050.

XmTg. Tubes, New, Taylor Cust. T220, Raytheon 99 (RK44), Gammatron 24g, 815, 812, 2 Jan 8020 Rect.; 1625; Old rcvg tubes. MAKE OFFER! WB2OBO, FL 4-7152. Adr. Call Bk.

WIDE VARIETY BUILDER'S ITEMS: All Bargains. LIST SASE. Ken Maas, W9AZA, Burlington, Wisconsin. 53105.

WILL PAY $200 CASH, for GPR-92 Receiver in good condition. W4AIS, 300 Thornwood, Taylors, S. C. 29687.

FOR SALE: 50 ft. Rohn Tower; AR-22 Rotator, 2 ele 20 mtr. beam, all guys and hookup cables. WA5NYG, Rich, 3407-47th St., Metairie, Louisiana. 70001.

ATV: Panasonic NV8100 Recorder, Video & audio, $200.00. Elgeet, 13 mm C Mount f1.5 lens, $50.00, R. G. Copeland, P. O. Box 126, Somerville, Ma. 02145.

SELL: HQ 170C, 6 to 160M. Mint no scratches. Heathkit SB301 Rcvr/SB 401 Xmtter expertly wired. Will sell separately. Going VHF. F. Colella, 105 18 131st Street, Richmond Hill, L. I., N. Y. 11419.

FOR SALE OR TRADE: Table mike stand, $3,00; /sever coil spark suppressors, $2.00/few 73 — Ham Radio — CQ — QST — RTTY Bulletin. W3MSN, 5400 Boulder, Oxon Hill, Md. 20021.

WANTED: R390A/URR Receiver. Have Tektronix 531 Dual Trace Scope/53C Plug-in (Round Corner case) also dolly; Drake 2-A; VHF Gear. Trade? Offers?? E. F. Lankford, W4HHY, 511 Purnell Drive, Nashville, Tenn. 37211.

2M STATION PKG, $60; clean ARC-3 XMTR/RCVR wired 115 V. ac P. S. Conversion info/varitune RCVR FOB 601 bs QTH W2DXK, 5015 Weeks Lane, Flushing, N. Y. C. 11365.

75A-4 FOR SALE. 3 filters, spinner knob, mint condx. Asking $375. K6QDD, 888 Linda Flora, L. A., California. 90049.

SELL: One Magnavox General Coverage Transistorized AC-DC Receiver covering 135 KHz to 30 MHz plus FM BDCST band. About 3 wks. old.. SELL FOR $75.00. Will ship in U. S. except for Alaska and Hawaii. WA0WHE, G. Ellingson, 423 N. State, Thief River Falls, Minn. 56701.

WANTED: Tower, crank up 55 to 60 ft. Pay to $75.00. Ronald M. Nagata, W6RQZ, 1330 Curtis St., Berkeley, Calif. 94702. Tel: 415-526-7345.

SX-117 Mint w/latest Hallicrafters Mods. $189 or best offer, FOB Dallas. W5RKT, 901A Spring Valley Plaza, Richardson, Tx. 75080.

SELL: Xfmrs Sola Constant volt 110 v 250 watt, $15; HV 3600-0-3600 at 1 amp 110/220 pri; Eico 720 & 722 VFO, $60. W0AIH, 814 4th St. S., Virginia. Mn. 55792.

WANTED: Old radios, old books, and magazines pertaining to radio. Have about 200 CQ, QST, and 73 for sale or trade. SASE for list. W9WGQ, Ken Bauer, Centralia, Illinois. 62801.

WANTED: A junked DX-35 or DX-40. Power Transformer. Must be good. W5HY, Box 4334, Midland, Texas. 79701.

DRAKE 2-NT: Mint condx. Going SSB. Very clean signal, sidetone es relay. $95, you pay shipping. WN6PBJ, B. Latimer, 2531 Sarandi Grande Dr., Hac. Hts., California. 91745.

NEED: 220 to 110 VAC. 2000 VA Step-down Transformer. W0TDH, 4201 Colvin Dr., St. Louis, Mo. 63123.

WANTED: CDE TR-44 Rotator and Cable. Details and price to Grimm, Box BC, Sweet Briar, Va. 24595.

SELL: Instructograph & 11 tapes. Mint. Grantham Electronics Course in 55 lessons. Complete. Both $75 pp. Woods, WA4KCN, 4921 Edenshire Ave., Memphis, Tennessee. 38117.

2 4CX300A, 1 4-250A, 1-4-500A; $13.00 each. Trade any one for SK-400, 600, 760, 712A air-socket or equal. WA1IUR, 51 Maynard, Seekonk, Ma. 02771.

$350 — Like new, Swan-350 W/Xtal Cal. & Opposite SB installed, new set spare finals, 117XC. K5SGH, 11223 Sandstone, Houston, Tex. 77072. Phone: (713) 498-5475.

CQ DELAWARE Wud Vy much like Del. qso. Send letter for sked. 40 thru 10m, cw, fone. QRZ? WB4BUT, 6007 Carmel Drive, Huntsville, Alabama. 35810.

TUBES: 4CX250B's have two unused, with cooling fan and 4 high voltage diodes all new for only $20.00. Pr. 4X150A's unused w. fan and diodes, $12.00. Samkofsky, 201 Eastern Parkway, Brooklyn, New York. 11238.

SALE: New HK101 Desk Mike. Sells for $35; Will sell for $20.00. WB4NMY, 4803 Russell St., Richmond, Va. 23222.

WANTED: Heath Mohegan. Any condition. Send Card. J. MacMurray, 41 Schuyler St., Belmont, New York. 14813.

FOR SALE: Brandes Baldwin, Kellog, Western Electric Head Phones. Offers for each. F.O.B. Douglas, 2254 Pepper, Concord, Cal. 94520.

WANTED: Remote control for Swantenna, 4—5000 VDC Meter. SELL: Heath twoer. W6OHB, Star Route Box 194, Mariposa, Calif. 95338.

SELL: Low Pass Filters. 300 — 2500 cycle. 30 watts audio. 5 lbs. 600 OHM in — out. $8.00. G. Lay, 109 North 32nd Avenue, Yakima, Washington. 98902.

SELL: ARC-21 and cont. head see CQ Feb. 69. MR1, MT1 Heathkit rece. xmit. all with manuals Bill Clinger, 111 Bass St., Liverpool, N. Y. 13088.

CHICAGO TO LAS VEGAS and RETURN Charter Jet Flight to SAROC convention, January 7-10, 1971 Flamingo Hotel. For details, SAROC, Box 73, Boulder City, Nevada. 89005.

WANTED: LM Freq. Meter — Pwr Supply — Cal Book. Excellent condition. Quote price. Curt Foltz, 234 South Richmond, Carson City, Nevada. 89701.

SELL: Globe Scout 680 for $25.00. Knight R-100 Receiver with S Meter. Needs servicing, $25.00. WB6BVR, 1049 N. Holliston Ave., Pasadena, California. 91104. Phone: 798-9345.

FOR SALE: RCA WO-91A Scope $50.00. Swan DC Power Supply 14—117. Want to buy VX-11 Swan Vox. R. Dorough, W5DPN, 117 Pecan St., Terrell, Texas. 75160.

FOR SALE: 11 Band Lafayette Portable. R. F. Gain and B. F. O. added. Am—FM-LW—SW. $30.00. W2CVW, 13 Robert Circle, S. Amboy, New Jersey. 08879. Phone: (201) 721-0755.

SELL: DX-60B and HG-10 VFO. Both excellent with no scratches. $85.00 or offer. Bill Phelan, 1480 Parkchester Rd., Bronx, N. Y. 10462.

EICO 460, $50.00; Hallicrafter SR-75, $35.00; SP-44, $35.00; S-76, $65.00. T. Gosman, 143 Roxton Road, Plainview, N. Y. 11803.

FOR SALE: Heathkit SB 301 for sale OR trade. $230.00. SX96, excellent condition. $80.00 (with shipment). Edmund Casey, W8DWJ, 500 Norway Avenue, Cincinnati, Ohio. 45229.

WANTED: Six Meter Station. Lynn Peterson, Milmine, Illinois. 61855. WA9VFR.

COLLEGE SALE: Hammarlund HQ-110C (as is) for $100.00; Knight T-150, $50; Twoer, $30; HE-45A (as is) for $25; Eico 720, $35; Eico 730 (as is) $20; Dow Key relay, $10; other misc. Entire station complete for $300.00. WANT: Small UHF Xcvr. WB8FAR, R. M. Hajdak, 1045 Ohltown Rd., Youngstown, Ohio. 44515.

HINTS AND KINKS, ARRL, Volumes 1, 2, 3, 6, and 7 wanted. Cash or swap old radio books. K8IKO, Box 222, Worthington, Ohio. 43085.

WANTED: 3 or 5 band Xcvr for second rig. Interested in bargain only for cash. K5ENL, Ed Block, Rt. 4, Box 127, Grandview, Tx. 76050.

PANEL RACK: 19" cabt with doors both sides 23" X 25" X 54", $25.00. Goodman, 5826 South Western, Chicago, Illinois. 60636.

FM LB T-6IGJD 100w output 6/12v, Cables, Cont HD, Schematics, $70. Hams only. K. Schwieker, 1124 Opelika Rd., Auburn, Ala. 36830.

FOR SALE: Model 19 TTY, AN/URA-8A with spare parts, gears, many supplies and manuals. $225.00. Will consider trades. W9BXJ, 4341 Sheridan Road, Racine, Wisconsin. 53403.

SALE: Hallicrafters Model HA-8 Splatter Guard Modulation Indicator for SSB or AM. Never used. $15.00. You pay postage. WA0WRC, 1315 East 108th Street, Kansas City, Mo. 64131.

LINEAR BUILDERS—Send for low priced list of high Power parts. Be delighted. R. D. Mace, 8600 Skyline Drive, Los Angeles, Calif. 90046.

SELLING HQ-145 RECEIVER with clock/spkr/calibrator. $110.00. WB2APX, 118 E. Columbine Rd., Wildwood, N. J. 08260.

SALE: Vanguard Model 300B Converter for 50-51 mc, $9.00; Heath SG—8 Signal Generator, $17.00. F. Strickhausen, WA0NLR, 715 Tyler, Apt. 36, Topeka, Kansas. 66603.

WANTED: Nems-Clarke 1455, 1456, or 1037. Joe McCormick, W4YOI, Box 1335, Lake City, Florida. 32055. Telephone: (904) 752-0628.

WANTED: Swan 250C with manual. Power supply, VFO and mike. MUST BE MINT COND. E. D. Ward, Sr., 219 E. Huff Ave., San Antonio, Tex. 78214.

28KSR: Teletype Model 28KSR wanted at reasonable price. Kermit Slobb, W9BT, 1605 Oakwood Rd., Northbrook, Illinois. 60062.

DRAKE 2—B with Q-Multiplier, Speaker, and crystal calibrator. Excellent condition. $185.00; Howard Hecht, WA1LWD, 96 King Street, Bridgeport, Conn. 06605.

SELL: SX100 rcvr — $150; Ameco SWR bridge, $22; 24 hr. digital clock, $13. All in good condition, with manuals. K2MFY, 2 Nutley Ct., Plainview, New York. 11803.

FOR SALE: Johnson Ranger 1, SX-111, HQ-140X, Carter Dynamotor 6VDC to 400VDC, Ben Blodgett, Jr., 2680 Beaumont St., Green Bay, Wisconsin. 54301. All of this is in A-1 shape!

FOR SALE: Gonset II 117V-12V with companion Gonset VFO (extra audio stage), with microphone, manual, whip, etc. Exc. condx. Best offer. W2ASI, 15 Kensington Oval, New Rochelle, New York, 10805. (914) NE 3-7077.

APACHE XMTR FOR SALE: Novice or general, 75-180 watts, cw, phone, xtal, VFO, only $70. Will ship. Eugene Gascho, Pigeon, Mi. 48755.

SELL: HT-41, Model 15 RTTY, 1250 w. generator, TX62 xmtr, 6 & 2 Ameco conv. w/p.s., NCX3 and DC. Carter, 5 Sterling, Coffeyville, Ks. 67337.

LOOKING FOR: Eico Model 460 Oscilloscope Manual. WN2NRK, 1206 Schuyler Street, Rome, New York. 13440.

DRAKE TR-4 and AC-3 with extras. Factory updated in sealed cartons. $500. W8JXM, M. A. Griswold, P. O. Box 301, Urbana, Ohio. 43078.

MO7 CONVERTED; SCR522 both units converted 6M Lunchbox, oil filled caps 600-1500V; Volt-ohmatic model 7 auto AC Voltmeter — Misc. xfmrs. MAKE OFFER — WB2OBO, J. Miller, 1533 Lowell Ave., New Hyde Pk., N. Y. 11040.

30L-1, $325.00; SX-117, $175; HT-44, PS-150-120, $175.00; HT-32A, $215; HT-37, $175; Don Burns, 4410 Reading Rd., Dayton, Ohio. 45420.

SELL: RME Clipper, $15.00; 1-148-A 250 M.A. R.F. Test Set, $5.00; 510-510-240 MA Xformer, $4.00, 5BPI Tube, $15.00. Joe J. Crowl, P. O. Box 74, Ingram, Texas. 78025. Ingram.

SCOPE — EICO 427 — 5"-D.C. General Purpose, New, $50.00. A. Rabinowitz, 575 E. 79th St., Brooklyn, N. Y. 11236. WA2AOT.

SELL: Galaxy V Mark II, Remote VFO, Xtal Cal., Power Sply (AC); Speaker, Deluxe accessory Console, and Rejector unit. All in good condition. $550.00 FIRM, but no split-ups. Heath kit SB-200, factory assembled in mint cond., $200.00 FIRM; Waters Compreamp, $15.00; Pair of Variaks to control station, both 0-140 VAC, 7 amp for station, 15 amp heavy-duty model for linear, both in cabinette, $60.00 the pair. Entire lot for $750. OR TRADE for 75S-3, and 32S-1 in mind condx. Rick Scielzo, 19 Longview Dr., Waldwick, New Jersey. 07463.

FOR SALE: New condition, Galaxy rejector. Half price for quick sale. $20.00. W0RJZ, Box 466, Creston, Iowa. 50801.

MOTOROLA 45 AMP — 12 Volt Alternator. Mint. $30.00. Heath HM-10A Dipper — $20.00. Never used. have two. A. L. Perkins, P. O. Box 217, Manlius, New York. 13104.

FOR SALE: AN/ART-13 w/out Power Supply. In very good condition. $25.00 or best offer. Heath DX-40: $20; 10-80 meter traps from 1963 Handbooks — $7.00. Steve Garson, 77 Luciani Rd., Woodbridge, Connecticut. 06525. WN1NAC or Phone: (203) 387-5109.

FOR SALE: New 4CX 5000A and pressure socket, and chimney and blower, $480.00; 20 meter 5 element on 56' boom, $200.00; 3 element on 28' boom, $50.00. F.O.B. Winter, 10107 Lev Ave., Pacoima, California. 91331.

FOR SALE: Collins 32S-1 with 516F-2 AC Supply. Excellent condition. $395.00. W2MXN, 248 Upland Drive, Rochester, N. Y. 14617.

FOR SALE: AR22R rotor, control box and 125 ft. control cable. New, never used. $30.00 postpd. Chan Shippy, WA0YAK, Route 2, Colome, S. Dakota. 57528.

CRYSTALS: What do you need? K3DTL, Art Prutzman, 31 Maplewood, Dallas, Pa. 18612.

WORKED SOUTH AMERICA CERTIFICATE: Work all 13 countries. Send $1 and confirmation to HC1TH, Box 583, Quito, Ecuador, S. America.

FOR SALE: 1,000 watt, 115 volt power plant in nearly new condition, $125.00. Cannot ship! Melvin E. Kesner, WA3DWF, Accident, Md. 21520. Telephone: (301) 826-8402.

NEED MANUAL OR SCHEMATIC FOR VIKING II. Jack C. Short, W4UHA, Route 7, Box 275, Oxford, Alabama. 36201.

FOR SALE: 19 inch Cabinet Racks, 6' high with doors. $30.00 each; HQ-145C Receiver, mint condition, $160.00. No shipping. W4JSC, Route 2, Box 952, Odessa, Florida. 33556. Phone: 813-920-5094.

FOR SALE: Collins 75S-3 Rx & 32-S3 w/PS, both in FB condition. Priced for Quick Sale. Jerry Hagen, WA6GLD, 5031 Arroway Ave., Covina, California. 91722.

WANTED: News articles or clippings showing beneficial activities of ham radio. I xerox, return original to you. WA1GHJ. 160 Elm, North Haven, Connecticut. 06473.

MODEL 14 TYPING REPERFORATOR with keyboard, sync motor & 60 speed, $35.00. Teletype Corp, 1/2 amp Loop Supply, $5.00. Keyboard, base for reperforator, $10.00. Richard Greenberg, WA2CSE, (516) 678-1523. Evenings.

HELP! Need manual or schematic diagram for surplus OS-8 B/u oscilloscope. Will buy or borrow. WA4TOJ, 2957 Gaffney Rd., Richmond, Virginia. 23234.

WANT: MOTOROLA wideband Permakay TU-540W, carbon mic. TU341 and Test-set for Mod. D4366B base station. Paul Rockwell, W3AFM, 5800 Hillburne Way, Chevy Chase, Md. 20015.

SELL: QST 65-69, CQ 68-69, $2.50 yr; Two CB Rigs, $100; BC221 Freq Meter, $25; HR-10B, $60; DX-60, $50; HG-10, $25; Box 895, Greeley, Colorado. 80631.

TOROIDS: 88 MH unpotted, 5/$1.75 PP. R. Sanborn, 8800 W. Clovernook Ct., Milwaukee, Wisconsin. 53224.

COMPLETE TCS STATION; ART13; BC221T with pwr; BC645; FRC6; Xfmrs, filament, power, isolation. TRADE OR SELL. L. Basham, 735 Coves Hwy., Cave Junction, Oregon. 97523.

TRADE: "200 meters and down" by DeSoto, 50th Anniversary edition for old catalogs, books. M. Hoshiko, 707 S. James, Carbondale, Ill. 62901.

ANTENNA INSULATORS: Military IN86, small, extremely strong, metal ends. 10 for $3.00, Postage paid. W. R. Hempkins, K5BOM, 100 East Main, Denison, Texas. 75020.

SELL: NC300, xtal cal & FM. Mint. $175.00. Viking 6N2 & VFO, $105.00 P.P.D. Don Galarneau, W7KCK, 7117 N. Seward, Portland, Oregon. 97217. Phone (503) 289-2326.

FREQUENCY METER: TS-174/U, 20-250 Mc., With modulation & A.C. power supply. Like new. $125.00. W4JGO, 643 Diamond Road, Salem, Virginia. 24153.

FOR SALE: HW-100 mint cond. P-2 power Meter, HB Power Supply 350 Turner Mike new Cush Craft 10 meter beam 3 El. $280.00. L. Dockery, 1603-B Randleman Rd., Greensboro, N. C. 27405. WA4IJN.

RECEIVERS: BC-348 $35. S38 $25; KE93 p/s 12V, $4., G.E. 450 MC Transceiver, $25; Solid State Garage Door Sys., new, $18. W. J. Davis, 4434 Josie Avenue, Lakewood, Calif. 90713.

SALE: Johnson Adventurer. Mint condition with Approx 15 ea. 40 mtr and 80 mtr Novice xtals. Best offer over $50.00. WA8VFK, 314 S. Western Ave., Springfield, Ohio. 45506.

XFMR 3500V with Fils. 2 caps 3 vfd at 4000 V. All $20. WB6ZWS, 5113 Arvada, Torrance, California. 90503.

NEW HEW. PACKARD Modified CO4-350D Atten. 0-110db. 1 db step. 600 ohm imp. 0-1 Mhz. 5 W Manual. $19.95 ppd. W0II, 1037 New, Manchester, Ia. 52057.

WATERS Model 361 Automatic Keyer, $40; Collins Crystal Pack, $150; Collins 2kc Mech Filter F45-55N20, $30. K7CPW, 2115 Wolfe Pl. W., Seattle, Wa. 98199.

450 MC. F.M. Motorola T44A-6A complete units with crystals for 449.1 Mcs. $50. WA4ILQ, 11002 N.E. 13th Ave., Miami, Florida. 33161.

FOR SALE: Drake 2B receiver with 2-AC calibrator and instruction book. It looks and performs like brand new. $175.00. B. Nastoff, 320 W. 56th Pl., Gary, Ind. 46410.

WANT: Tower. Any type within 100 mi. Will pick up. WA2FFZ, 186 West Avenue, Pitman, New Jersey. 08071.

SELL: SB301 with AM & CW Filter, $250.00 or best cash offer; Knight T-60 Transmitter, asking $25.00; Collins 32S-1 Transmitter, Asking $325.00; Galaxy III with AC supply, asking $200.00; Heath HW 32, $65.00; HP13 Supply, $50.00, Package $100.00; Swan 260 asking $300.00. John Fearon, 3384 Peachtree Road, N.E., Suite 705, Atlanta, Georgia. W4WKP.

SWAP: EICO 753 & P.S. for 5-band SSB Tx. WANT: Unused tubes, any type. K4EPI, 750 Lily Flagg Road, Huntsville, Ala. 35802.

BUY, RENT, BORROW to Copy: Manual, Clegg Thor 6. Trade Ameco CB-6, CN50, 7-11 I F for equal 2 or 432, any IF. W1AQ, 34 Kelly E. Prov., Rhode Island. 02916.

HEATHKIT 10-18 Laboratory Oscilloscope, $95. Call (713) 781-0380, H. L. Collins, Jr., 759 Tennessee Building, Houston, Texas. 77002.

SELL: Motorola R-394/U, Double Conversion F.M., (152-174MC), Gud Condition, Best offer. WB6-UKH, 569 17th Avenue, San Francisco, California. 94121.

SELL: KWM-2 Mobile Mount & D. C. Power Supply. Mint. $110 p.p. Woods, WA4KCN, 4921 Edenshire Ave., Memphis, Tennessee. 38117.

40 M WN STATION — ARC-5 T-22 Xmtr — BC-455 Rcvr. Xtal Oscillation, converted, AC supply included. You pay shipping. Bill Eubanks, WN-4ORN, 7722 Graves Road, Pensacola, Fl. $30.00.

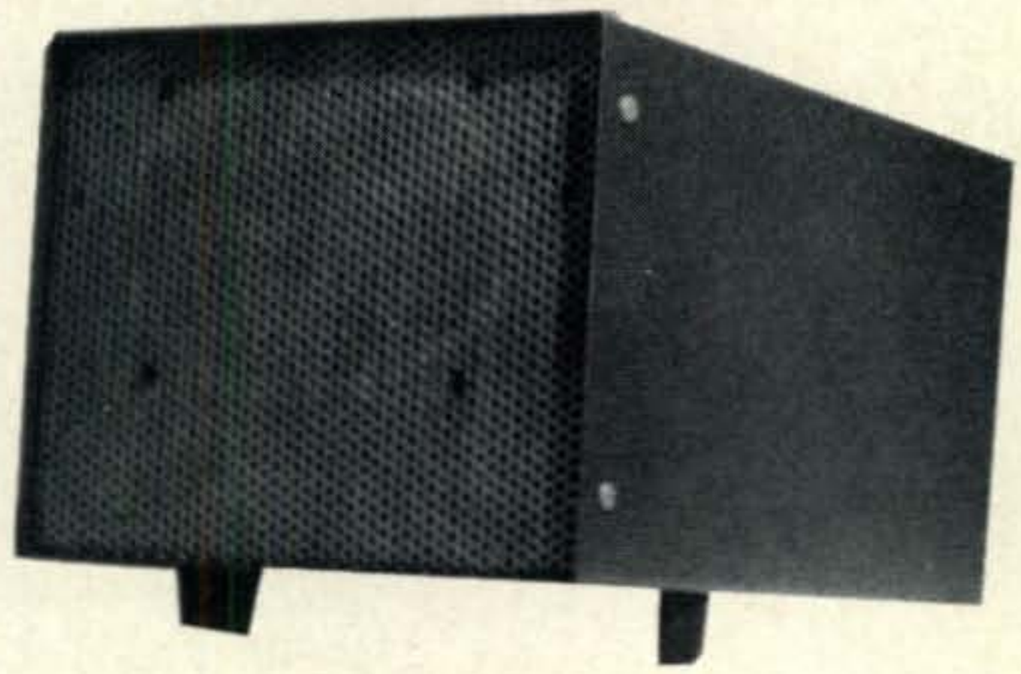
MAKE OFFER for CQ's and/or QST's 1960 thru 1959 inclusive. E. G. Taylor, W6DOR, 4100 Worthington Drive, North Highlands, Calif. 95660.

Look for SAROC classified and display advertising for details on an amateur radio operators convention you won't forget. Flamingo Hotel Convention Center, Las Vegas, January 7-10, 1971.

WHY DELAY FURTHER in joining THE OLD OLD TIMERS CLUB? Send a QSL card today for application if you have been licensed for forty years to Chas. W. Boegel, Jr., W0CVU, 1500 Center Point Road, NE, Cedar Rapids, Iowa. 52402.

RTTY Model 28 uncoded function bar, number 153440 for stunt box. $1.20 (list $1.85). $1.00 per order for shipping and packaging. R. Clark, 806 Jones Avenue, Maryville, Tenn. 37801.

All New Transceiver Power Supply
(Of universal design for AC operation)



The Reginair Model XCB power supply has been produced by our company as a means of helping to reduce over-all transceiver costs and is considered a step in the right direction since the price on this completely wired and assembled power supply is but $75 FOB Harvard, a savings from its natural price of at least $35. Moreover, the robust reliable components are of first line quality and are naturally heavier than are the comparable power supplies as made by several prominent manufacturers.

The XCB can be used to power the Collins KWM-1 or KWM-2; can be used for the National NCX-200, NCX-500, or NCX-5; can be used with the Drake TR-3 and TR-4; can be used with the Heath SB-100, SB-101, or SB-110; and can likewise substitute for the original Swan supplies as used with the 350, 500's, 500C or 500CX. They can also be used with all of the Galaxy transceivers and with most conventional transmitting excitors requiring 800 volts, 300 volts, a bias of up to 150 volts and 12.6 volts of AC. Supplied complete with instructions, this very attractive unit measured 8 1/4 by 6 5/8 by 11 1/2 and weighs but 28 lbs. packaged for shipment. Hundreds of these have been built awaiting your pleasure. A particularly high quality oval speaker 4 by 6 is included within the unit to match the audio output of practically all transceivers. So this unit in effect becomes the power supply console for all standard transceivers. Remember, Reginair products are designed by and exclusively sold by the Herbert W. Gordon Company.

HERBERT W. GORDON COMPANY

HELPING HAMS TO HELP THEMSELVES

Woodchuck Hill Road Y *Harvard, Mass. 01451*

PHONE: 617 456 3548

READER SERVICE

To obtain literature from advertisers simply check the name of each advertiser listed below whose product or service is of interest to you. We'll pass your name on and you'll get literature from the advertiser in short order

Nov. 1970

- ☐ Amateur Electronic Supply
- ☐ Amrad Supply
- ☐ Arnold's Engraving
- ☐ Arrow Electronics
- ☐ Barker & Williamson
- ☐ Barry Electronics
- ☐ Carl Goldberg Models Inc.
- ☐ Curtis Electro Devices
- ☐ Drake, R. L. Company
- ☐ General Electric
- ☐ Global Research & Supplies
- ☐ Goodheart, R. E., Inc.
- ☐ Gordon, Herbert W. Company
- ☐ Greenlee Tool Co., Division of Greenlee Bros. & Co.
- ☐ H & L Associates
- ☐ Hal Devices
- ☐ Hambeurger
- ☐ Heath Company
- ☐ Henry Radio Stores
- ☐ Hy-Gain Electronics Corporation
- ☐ International Crystal Mfg. Co., Inc.
- ☐ Island Electronics
- ☐ Jan Crystals
- ☐ Lafayette Radio Electronics Corp.
- ☐ Liberty Electronics Inc.
- ☐ Mosley Electronics
- ☐ Millen, James Mfg. Co., Inc.
- ☐ ORD, Inc.
- ☐ Pennwood Numechron Co.
- ☐ RCA Electronic Components and Devices
- ☐ Sams, Howard W. & Co., Inc.
- ☐ Scientific Radio Systems, Inc.
- ☐ Swan Electronics
- ☐ Telrex Communication Engineering Laboratories
- ☐ Tri-Ex Tower Corporation
- ☐ Unadilla Radiation Products
- ☐ World QSL Bureau
- ☐ World Radio Laboratories

CQ Reader Service
14 Vanderventer Ave.
Port Washington, N. Y. 11050

Sirs:

Please send me information on the products and services which I have checked above.

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

Street Address.....

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

Advertiser's Index

Amateur Electronic Supply 78, 81, 86, 95
Amrad Supply 39
Arnold's Engraving 84
Arrow Electronics 79
Barker and Williamson 5
Barry Electronics 72
Carl Goldberg Models, Inc 82
Curtis Electro Devices 74
Drake, R. L. Company 6
General Electric Company 12
Global Research & Supplies 74
Goodheart, R. E., Inc 72
Gordon, Herbert W. Company ... 93
Gotham 96
Greenlee Tool Co., Division of Greenlee Bros. and Co 80
H & L Associates 74
Hal Devices 74
Hambuerger 69
Heath Company ..... Cov. II, 1
Henry Radio Stores 25, 85
Hy-Gain Electronics Corporation 9, 83, 87
International Crystal Mfg. Co., Inc. 21
Island Electronics 84
Jan Crystals 82
Jennings Industries, Inc 78
Lafayette Radio Electronics Corp 10
Liberty Electronics Inc 73
Mosley Electronics 11
Millen, James Mfg. Co., Inc 8
ORD, Inc 14
Pennwood Numechron Co 84
RCA Electronic Components And Devices ..... Cov. IV
SAROC 44, 86
Sams, Howard W. Co., Inc 33
Scientific Radio Systems, Inc ... 14
Spectronics 15
Structural Glass Ltd 80
Swan Electronics 2
Telrex Communication Engineering Laboratories 4
Tri-Ex Tower Corporation 13
Unadilla Radiation Products . 79, 31
World QSL Bureau 74
World Radio Laboratories . Cov III
W3KT QSL Service 73

WORLD RADIO.....

makes it EASY for YOU to own the HAM GEAR you NEED!

the NEW *Cygnet* 270-B

SWAN

HOME-PORTABLE TRANSCEIVER

$499.00

The *traveling companion*

- 5 BAND TRANSCEIVER (80/10 METERS)
- BUILT-IN AC SUPPLY
- BUILT-IN SPEAKER
- ACCESSORY PLUG-IN DC MODULE

The features that made the 270 so popular, now at a lower cost by including only the AC supply internal! The Model 14A DC adapter Module gives "plug-in" mobile operation from 12 VDC if desired. A potent 260 watts PEP-SSB and 180 watts CW. Compact 5.5x13x11"...weighs only 23 lbs. Includes 115VAC supply, speaker.

Save $64.00 on other "Cygnet" HOME-MOBILE Packages. Write for Details!

Serving the Needs of the Amateur for over 34 years!

AT WORLD RADIO you choose from TREMENDOUS STOCKS! The Nation's largest stock and variety of Ham Gear!

AT WORLD RADIO you get TOP TRADES on your present gear! World's tremendous volume means you get top dollar on your trade-ins!

ENJOY SPECIAL "PACKAGE PRICES"! Save a bundle on World's Package Buys...selected by people who know Ham equipment best!

FINANCING! Use World's Radio's convenient monthly credit plan or use your BankAmericard or Master Charge when you buy!

WORLD RADIO

3415 West Broadway
Council Bluffs, Iowa

Dept. CQ-NN59

Please ship me the following:

☐ 270-B Cygnet Transceiver 137M042.....$499.00
☐ 14ADC Adaptor Module 137M043.....$ 39.50
☐ Your FREE 1971 Equipment Catalog
☐ *Charge it* *My ☐ BankAmericard Number is* _____
My ☐ Master Charge Number is _____
☐ *My check in the amount of* _____ *is enclosed.*

Name _____

Address _____

City _____ **State** _____ **Zip** _____

Our fans take No.1 for granted.

Take power tubes, for example.

RCA amateur tube fans expect maximum performance year after year. And they get it. So do our professional customers. As a matter of fact, designers of amateur, commercial and military electronic equipment have rated RCA first in power tube brand preference studies year after year.*

So take a tip from the professionals. When you need power tubes, insist on No. 1—RCA. We have the widest choice. And the best. We suggest you obtain a copy of the 1970 Guide to RCA Industrial Tubes, TPG 200E.

The man to see is your RCA Industrial Tube Distributor. He's No. 1, too.

RCA | Electronic Components | Harrison, N. J. 07029

*Brand preference studies conducted by leading Electronic Publications.

RCA