n Miller Rebuts Fraud Charges - See Page 40

CQ

ICD

April 1968

75¢

V.H.F. TODAY

A NEW FEATURE BY ALLEN KATZ, K2UYH

The Ra[illegible]mateur's Journal

there's a reason for the S/Line's reputation

The main reason is performance. Amateurs around the world praise the S/Line's clean, strong signal. But there are design reasons, too. The S/Line is an engineered system. Each unit augments the others to provide single sideband operation at its best.

You can operate the system as a transceiver, or transmit with the 32S-3 and receive with the 75S-3B on separate frequencies. The S/Line offers upper and lower single sideband and CW operation . . . plus AM reception.

Two linear amplifiers, 500 watts or 1000 watts PEP, round out the full-performance S/Line.

See your Collins distributor for details on the most respected system in the amateur field.

COLLINS

The Model 6000 Modular Frequency Meter will measure frequencies 10 KHz to 600 MHz with .000125% accuracy. Special plug-in modules allow the instrument to be used as an audio frequency meter from 500 Hz to 20 KHz full scale and in addition to be used as a dc voltmeter (10,000 ohms/volt).

The wide variety of plug-in oscillator accessories and range modules makes the Model 6000 adaptable to a number of jobs in the field and in the laboratory. Portable, battery operated with rechargeable batteries.

Model 6000 with 601A charger, less plug-in modules.....$195.00

INTERNATIONAL MODEL 6000 FREQUENCY METER

easures frequencies 10 khz to 600 mhz with accuracy as close as .000125%

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Range Modules (Mixers)
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Oscillator Modules
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For further information, check number 1, on page 126

A NEW Thoroughbred in Solid-State Receivers

NOW—a **Competitively Priced Receiver** for the **most exacting** Professional **Performance!**

Phase-locked Frequency Synthesizer for Maximum Stability!

The superb, new R-530 *by* GALAXY

Designed for the exacting requirements of ***laboratory***, ***broadcast*** and ***HF monitoring*** and ***point-to-point*** complex system ***communications***, the R-530 is an advanced ***solid-state*** communications ***receiver.*** Its unsurpassed performance is the result of over three years of exhaustive research.

It receives selectible Upper and Lower Sideband, CW AM and RTTY signals...provides ***accuracy of 1 KHz*** tuning throughout the 0.5 to 30 MHz frequency spectrum.

Unique front end design and crystal lattice filters insure ***optimum sensitivity and selectivity.*** An adjustable ***noise blanker*** minimizes interference ...background noise. Frequency stability is amazing...less than 100 Hz drift after turn-on!

Complete transistorization and ***modular construction*** provide ***maximum stability.*** Minimum heat generation and power requirements allow the R-530 to be used in field applications now impractical with vacuum tube equipment. The new Galaxy R-530 is compatible with existing systems. ***Beautifully styled,*** compact, weighing only 25 pounds.

(Priced in the $700 range) Write for free brochure and complete specifications.

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"Pacesetter in Commercial/Amateur Equipment Design"

10 South 34th Street, Dept.CQ-f 28Council Bluffs, Iowa 51501

See page 126 for New Reader Service

CQ

APRIL, 1968 VOL. 24, No. 4

The Radio Amateur's Journal

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DEPARTMENTS

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See page 126 for New Reader Service

EIMAC

3-500Z's used in Drake linear amplifier for 2 kW PEP at 3.5-30 M

The R. L. Drake L-4B linear amplifier shown here uses two of EIMAC's new 3-500Z zero-bias triodes in grounded grid circuitry to achieve 2-kW PEP SSB input and 1-kW dc input on CW, AM, and RTTY. Drive power is 100 watts PEP and 75 watts CW, AM, and RTTY.

Drake chose EIMAC 3-500Z's because these rugged, compact, high-mu power triodes are ideal for grounded grid operation. They can provide up to 20 times power gain in a cathode driven circuit. And the two tubes have a total plate dissipation rating of 1000 watts.

For more information on EIMAC's line of power tubes for advanced transmitters, write Amateur Services Department, or contact your nearest EIMAC distributor.

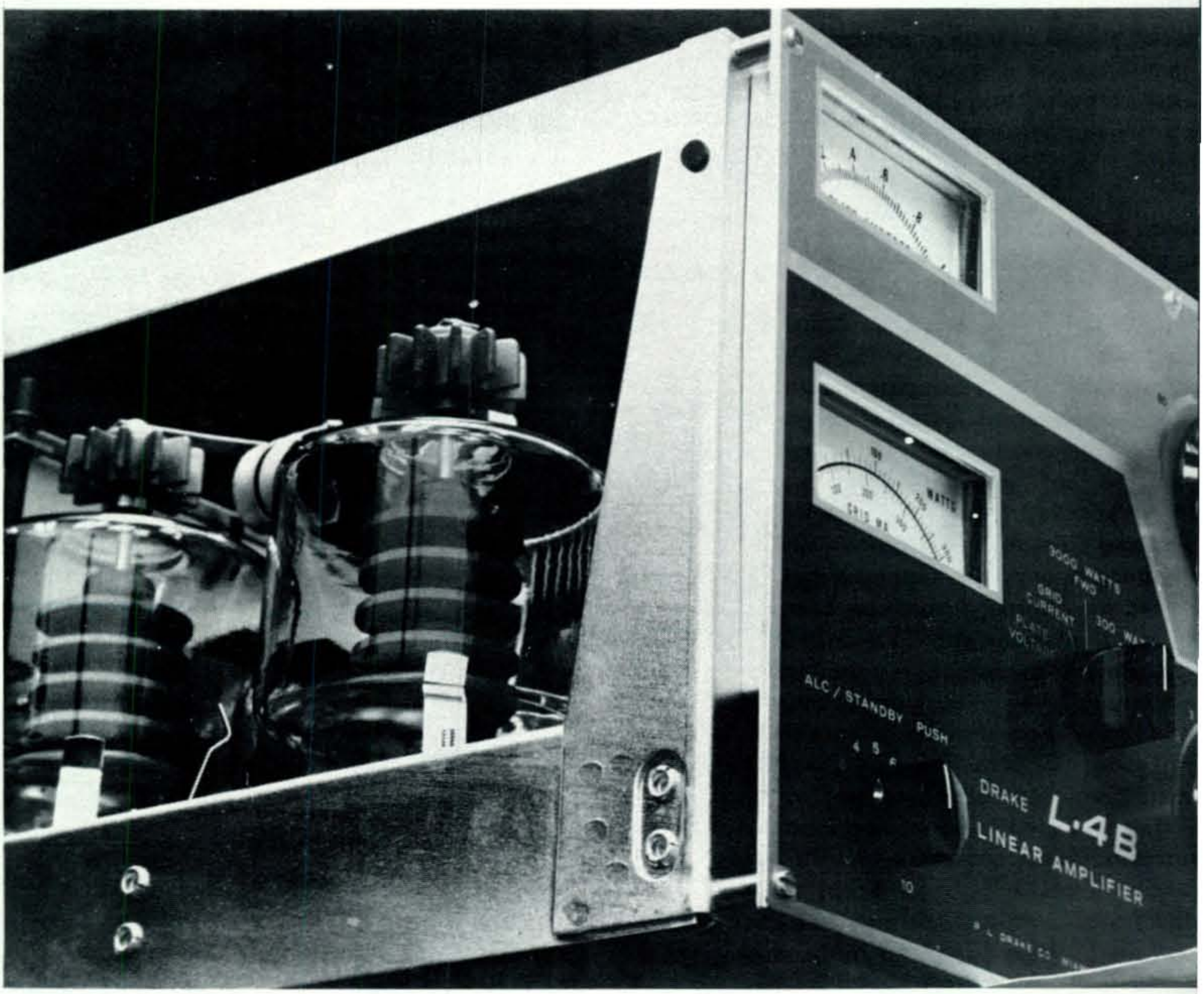
3-500Z TYPICAL OPERATION*

DC Plate Voltage	2500
Zero-Sig DC Plate Current**	130 m
Single-Tone DC Plate Current	400 m
Single-Tone DC Grid Current	120 m
Two-Tone DC Plate Current	280 m
Two-Tone DC Grid Current	70 m
Peak Envelope Useful Output Power	500
Resonant Load Impedance	3450 ohm
Intermodulation Distortion Products	—33 d

*Measured data from a single tube

**Approximate

EIMAC
Division of Varian
San Carlos, California 94070



See page 126 for New Reader Servic

ZERO BIAS

ELSEWHERE in this issue is an article which the DX world has anxiously awaited, for it answers questions vital to the integrity of DXing. For many months, Don Miller, W9WNV, has been challenged by DXers to reply to charges lodged by numerous amateurs, most notably Wayne Green, W2NSD/1, that he has falsely claimed to have operated from several rare DX locations.

Ordinarily, Don needs little encouragement to defend his actions, so why, if irresponsible and false accusations were made in print in *73* did Don hesitate for so long to reply? Was his delay a subtle acknowledgement of the veracity of the charges, or was it a sign that Don was up to something?

Over the past several months our relationship with Dr. Miller has been rather close, what with his forthcoming *DX Handbook*, and his series of DXpedition articles in *CQ*. We've learned a lot about this man—more, perhaps, than most amateurs ever will. With this learning has come a fair degree of respect for his ability to accomplish what he sets out to do. So when Don came to us a short time ago asking for the go-ahead to "fire back" in print, we listened. He said, "I've about had it up to here. How much yellow-rag trash can be allowed to go unanswered!" He was clearly angered, and ready to once more defend his integrity and honor.

When we asked Don to explain in detail how he planned to reply to charges based on "firm" evidence, he drew out what must be the largest US Passport we've ever seen, and thumbed through the many fold-out pages, stopping occasionally to carefully display an entry stamp here, a visa there, Burma, Thailand, Niue, and a hundred more. He asked if this evidence was firm enough to convince us of the legitimacy of his operations and if, in light of such evidence, we would publish his reply to Wayne Green's fraud charges. We agreed to do so, and the story begins on page 40.

But there will still be some people who will continue to cry fraud. "Forged Passport stamps," they'll say. "A hoax like everything else." All we ask is what *do* you believe? What *is* the truth? We've seen the Passport. We've seen the telegram. We've seen photos, logs, letters and have come away feeling that we finally are as sure of the truth of Don's claims as we can be. Only when we were that sure did we agree to publish his material. But what will it take to convince the unconvinced?

We asked earlier, was Don up to something. He was, and frankly it is with mixed emotions that we report that Dr. Donald A. Miller has filed a $550,000 suit in California against the American Radio Relay League for alleged libel. Don has engaged the firm of Melvin Belli, noted criminal lawyer, to press his case. If, by chance, Don has been libeled by ARRL in the course of their relentless attacks upon his operations, then without doubt, justice must be served, and ARRL should be made to pay. If, however, the courts find ARRL not guilty of libel, after due consideration of the evidence, then an even greater injustice will have been done to ARRL. In either case, the biggest loser is amateur radio itself and this we sincerely lament.

Earl R. Thomas, W2MM

We are saddened to report the passing of the President of QCWA, Earl R. Thomas, W2MM, on March 7, 1968. Earl received his first amateur license as 8KY in 1914, having begun his amateur career in 1912. Amateur radio has lost a fine engineer and a hardy pioneer.

Our Cover

Beginning this month we will be featuring a short, but important one-page item entitled VHF TODAY. This item won't be a v.h.f. column. Rather, it will be a strictly technical page dedicated to what's *current* in v.h.f., and what hasn't yet become routine. Regular readers will recognize our cover model as Al (The Bearded One) Katz, K2UYH, moderator of *CQ*'s new forum of v.h.f. development.

73, Dick, K2MGA

See page 126 for New Reader Service

RELIABILITY QUALITY VALUE

SWAN 410C FULL COVERAGE EXTERNAL VFO

The Model 410C Frequency Control Unit is designed for full coverage of 80, 40, 20, 15 and 10 meters. It is intended for fixed station operation and plugs directly into Model 500C. It may also be used with Model 350C. Eight ranges, 500 kc each, 5 kc calibration.

$115

DUAL VFO ADAPTOR

Provides for the addition of second VFO for separate control of transmit and receive frequencies. Plugs directly into Model 500C and may also be used with Model 350C and other Swan transceivers.

MODEL 22 . . . . . $25

MARS OSCILLATOR

Five crystal controlled channels with vernier frequency control. Plugs directly into Model 500C and may also be used with Model 350C and other Swan transceivers.

MODEL 405X (less crystals) . . $45

SWAN 500C SSB-AM-CW TRANSCEIVER

Five band, 520 watts for home station, mobile and portable operation.

The new model 500C is the latest evolutionary development of a basic well proven design philosophy. It offers greater power and additional features for even more operator enjoyment. Using a pair of the new heavy duty RCA 6LQ6 tetrodes, the final amplifier operates with increased efficiency and power output on all bands. PEP input rating of the 500C is conservatively 520 watts. Actually an average pair of 6LQ6's reach a peak input of over 570 watts before flattopping!

The 500C retains the same superior selectivity for which Swan transceivers are noted. The filter is made especially for us by C-F Networks, and with a shape factor of 1.7 and ultimate rejection of more than 100 db, it is the finest filter being offered in any transceiver today.

For the CW operator the 500C includes a built-in sidetone monitor, and by installing the Swan VOX Accessory (VX-2) you will have break in CW operation.

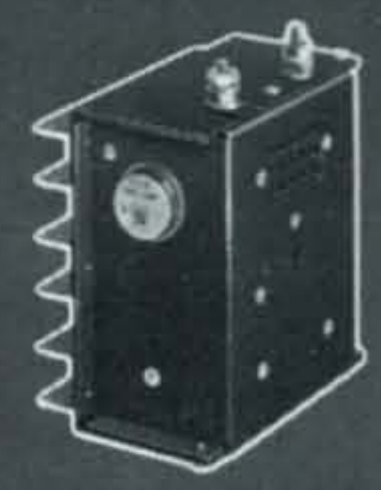
Voice quality, performance and reliability are in the Swan tradition of being second to none.

$520

SWAN 117XC MATCHING AC POWER SUPPL

Complete A.C. supply for 117 v 50-60 cycles, in a matching ca with speaker, phone jack, and cator light. Includes power with plug for transceiver, and line cord. Ready to plug in operate.

$1



SWAN 14C DC CONVERTER

Converts the above 117XC A.C. p supply to 12 volt D.C. input mobile, portable, or emerg operation.

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SWAN SPEAKS YOUR LANGUAGE . . . ASK THE HAM WHO OWNS ONE

POWER

VERSATILITY

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NEAR AMPLIFIER

o Eimac 3-400Z Triodes provide
legal power input: 2000 Watts
P. in SSB mode or 1000 Watts
or CW input. Planetary vernier
es on both plate and loading con-
s provide precise and velvet
oth tuning of the amplifier.
atly reduced blower noise is pro-
ed by a low RPM, high volume fan.
vides full frequency coverage of
amateur bands from 10 through
meters and may be driven by any
nsceiver or exciter having be-
en 100 and 300 watts output.

$395

LUG-IN VOX UNIT

gs directly into Model 500C, and
y also be used with Model 350C
other Swan transceivers.

ODEL VX-2 . . . . $35

WAN 350C
SB-AM-CW
RANSCEIVER

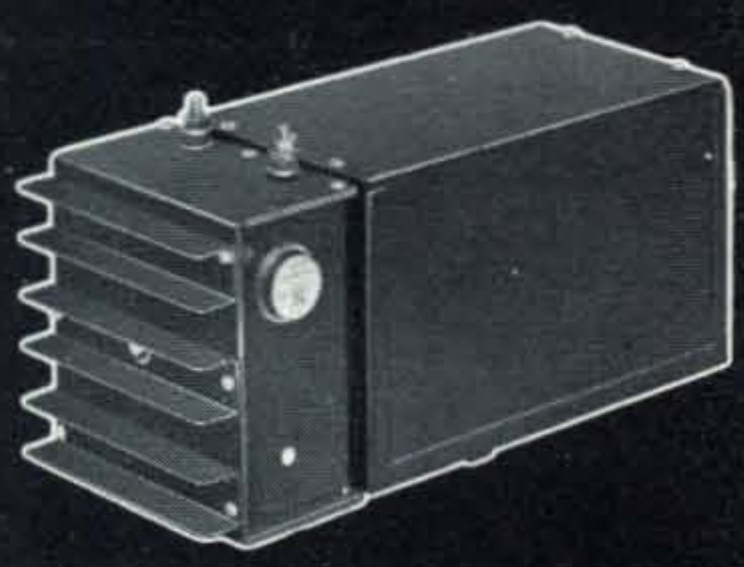
improved standard 5 band model,
v in production and still only . . .

$420

MARK II POWER SUPPLY

May be placed beside the Mark II, or with its 4½ foot connecting cable, may be placed on the floor. Silicon rectifiers deliver 2500 volts D.C. in excess of 1 ampere. Computer grade electrolytic filters provide 40 mfd capacity for excellent dynamic regulation. A quiet cooling fan allows continuous operating with minimum temperature rise, thus extending the life and reliability of all components. Input voltage may be either 117 or 230 volts A.C.

$235



SWAN 14-117
12 VOLT DC SUPPLY

Complete D.C. supply for 12 volt mobile or portable operation. Includes cables, plugs, and fuses. Will also operate from 117 volt A.C. by detaching the D.C. module & plugging in 117 volt line cord. Negative ground standard. Positive ground available on special order.

$130

Illustrated on these pages is a complete Swan amateur radio station, one of the finest money can buy. Starting with the powerful 500C and an AC power supply, you are immediately on the air with a big, high-quality signal. Thanks to the excellence of the high-frequency crystal lattice filter, made especially for Swan by CF networks, you will have one of the cleanest and most readable signals on the air, as well as outstanding receiver selectivity and sensitivity. The various accessories from the Swan line may be added at any time, providing greater operating pleasure and performance. The tremendous acceptance of Swan products by radio amateurs throughout the world is most gratifying to all of the people at Swan. It is our continuing policy to offer the finest communications equipment we know how to design and manufacture, with quality control, craftsmanship, and service that is second to none.
73

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ELECTRONICS
OCEANSIDE, CALIFORNIA
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OUR READERS SAY

Alien Operators

Editor, *CQ:*

In connection with your ZERO BIAS editorial from January 1968, I would like to make a few remarks:

I am one of those amateurs who came in United States as an immigrant and started with great hopes for a new life. Being a graduate of electronics and telecommunications engineer, I got a very good job and I work for CBS Television network in New York City. I have all the reasons to be very happy in this wonderful country, but I happened to be an enthusiastic radio-amateur and the Communications Act of 1934 prohibits me as a permanent resident of the United States, but not yet a citizen, to have my own station, In my native country, Romania, I had a license, my own call was YO2BO and I was the chief operator of YO2KAC club station. Only a ham can understand what means to me to wait 5 years to get citizenship and a license. It seems unbelievable that I can operate a professional broadcasting equipment for one of the biggest television net—of the world, but I can not operate my own amateur radio station. It is interesting to mention that many countries give amateur licenses to their immigrants, for example Canada does it. Other countries grant licenses not only to their citizens and residents but to all visitors interested in amateur radio. The Communications Act, based on Reciprocal Operating Agreements, permits to citizens of 33 foreign countries to operate their own amateur radio station here in U.S. but does not permit the same thing to the permanent residents of United States, people who live constantly in United States, work in United States and support the United States.

Here in the United States there are many immigrants from different countries who are also amateur radio operators and they all dream the "impossible dream" to get a W license.

I understand that only an amendment of the Communications Act by action of the Congress can offer a solution to our problem. For this we need the support of American amateurs, citizens will—to write to their Congressman, urging for support.

George Pataki, ex-YO2BO
New York, New York

Phone Patch Courtesy

Editor, *CQ:*

At this location each Sunday afternoon it seems as though every station on the phone bands is calling, "CQ Los Angeles for a phone patch." More often than not, a Los Angeles station answering on of these calls finds that the patch is not local but requires a telephone toll call. As a result, many Los Angeles stations have become "gun-shy" and avoid phone patching except when they know the patch is local. This is true even though the telephone charges can be reversed, because the process of reversing charges on a 25-cent or 30-cent call becomes quite a nuisance.

The city of Los Angeles covers an extremely large area; the metropolitan area, including surrounding communities, covers a still larger area. No single telephone in the city of Los Angeles can reach all other telephones in the city, much less the surrounding communities, on a toll-free basis. In comparison with the total area of Los Angeles, the toll-free area for any single telephone is extremely limited; toll charges to other parts of the city may be as high as 30 or 35 cents. Charges to surrounding communities in the same area code (213) as Los Angeles, or in adjacent area codes 714 and 805, can be even higher.

Thus, phone patching in Los Angeles generally involves a toll call, and it can be understood why hams in the Los Angeles area may be reluctant to answer your "CQ Los Angeles for a phone patch."

A solution for this problem is for stations desiring a phone patch to be as explicit as possible in defining the destination of the patch. Instead of "Los Angeles," say "Canoga Park," or "San Pedro," or "the Crenshaw section of Los Angeles." Better yet, "CQ the Los Angeles 481 exchange" leaves no question as to the toll status of the desired phone patch.

These suggestions for Los Angeles probably apply to other metropolitan areas as well. I use my phone patch only for overseas patching, preferring not to use it domestically when domestic long-distance rates are as low as they now are (and the bands as crowded as they are). However, I hope these suggestions might help those wishing to run this type of patch.

S. C. Shallon, K6CYG
Los Angeles, California

QSL's for W9WNV

Editor, *CQ:*

This is an appeal to the DX'ers among us to be more careful in the way they send QSL's.

As we all know, Don Miller is on an extended DXpedition and, as far as I know, is telling everyone to QSL via KØTCF. Since KØTCF is not in any Callbook except the newest one, quite a few amateurs are sending their cards to me (WØTCF). Since I have recently moved, every card has to be forwarded to me (an extra load on the Post Office) and then I have to send them on to KØTCF.

I don't even know for sure if KØTCF is still Don's QSL Manager since my last three requests to him for SASE's have gone unanswered.

Through 1-10-67, I have received 67 cards from all over the world and one request from the Post Office to notify people that I don't still live at the address—I moved from there 2½ years ago.

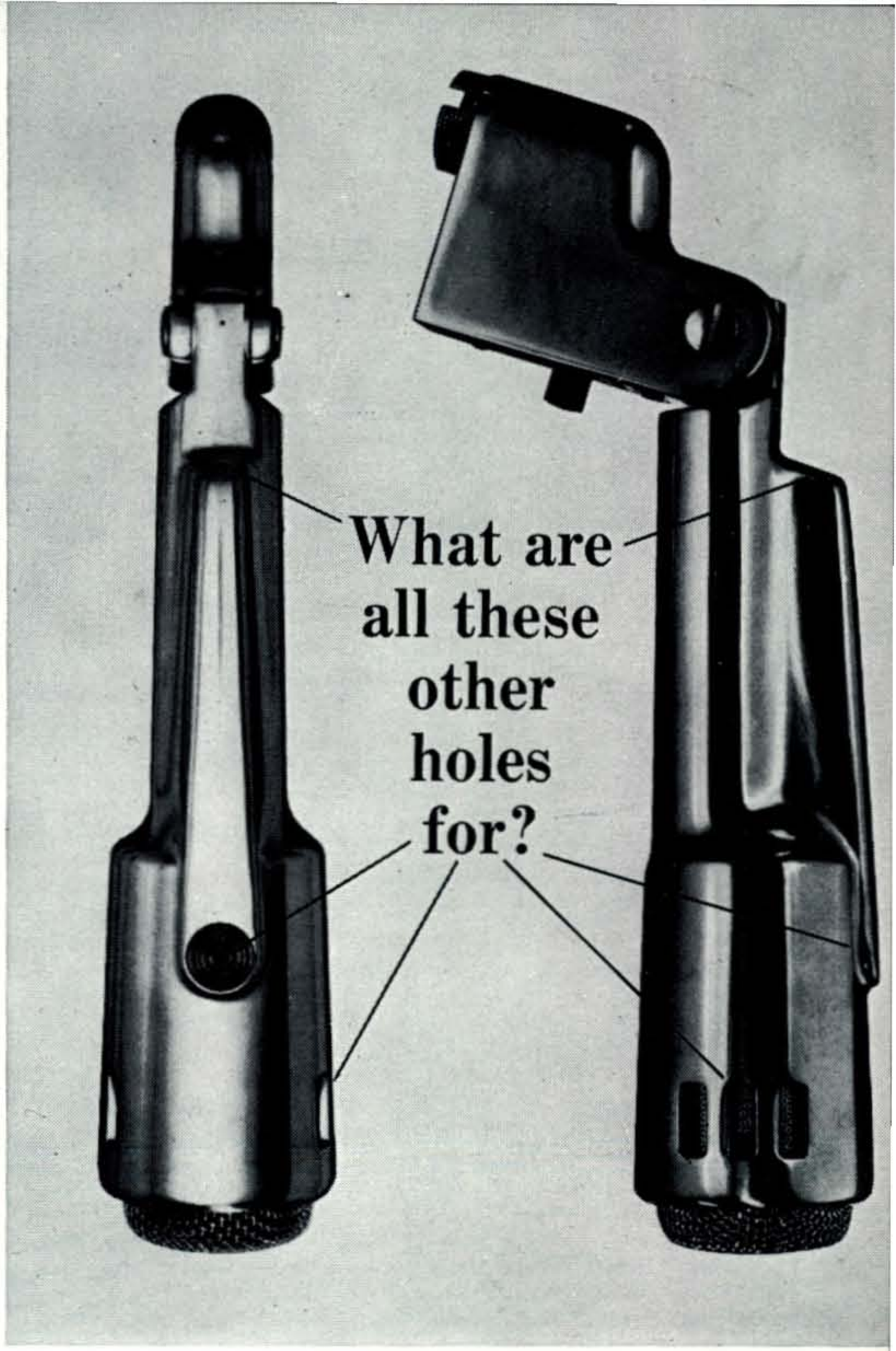
After this letter appears in print, I will stop forwarding the cards and start returning them to the sender if they contain SASE's.

Bill Wheeler, WØTCF/8
Stevensville, Michigan

KØTCF *is* still Don's QSL Manager. The correct QTH is: Roy Kronauge, KØTCF, 423 Miriam Ave., Kirkwood, Mo. 63122.—*Ed.*

See page 126 for New Reader Service

If the Electro-Voice Model 664 picks up sound here...



The holes in the top, sides and rear of the Electro-Voice del 664 make it one of the finest amic cardioid microphones you buy. These holes reduce sound kup at the sides, and practically cel sound arriving from the rear. ly an Electro-Voice Variable-D® rophone has them.

Behind the slots on each side is ny acoustic "window" that leads ectly to the back of the 664 oustalloy® diaphragm. The route hort, small, and designed to let y highs get through. The path is arranged that when highs from back of the 664 arrive, they are in loudness by almost 20 db. ghs arriving from the front aren't ected. Why two "windows"? So t sound rejection is uniform and hmetrical regardless of micro-one placement.

The hole on top is for the mid-ge. It works the same, but with onger path and added filters to ect only the mid-frequencies. And near the rear is another hole for the lows, with an even longer path and more filtering that delays only the bass sounds, again providing almost 20 db of cancellation of sounds arriving from the rear. This "three-way" system of ports insures that the cancellation of sound from the back is just as uniform as the pickup of sound from the front—without any loss of sensitivity. The result is uniform cardioid effectiveness at every frequency for outstanding noise and feedback control.

Most other cardioid-type microphones have a single cancellation port for all frequencies. At best, this is a compromise, and indeed, many of these "single-hole" cardioids are actually omnidirectional at one frequency or another!

In addition to high sensitivity to shock and wind noises, single-port cardioid microphones also suffer from proximity effect. As you get ultra-close, bass response rises. There's nothing you can do about this varying bass response—except use a Variable-D microphone with multi-port design* that eliminates this problem completely.

Because it works better, the E-V 664 Dynamic Cardioid is one of the most popular directional microphones for demanding communications applications. To learn more about Variable-D microphones, write for our free booklet, "The Directional Microphone Story." Then see and try the E-V 664 at your nearby Electro-Voice microphone headquarters. Just $85.00 in satin chrome or non-reflecting gray.

*Pat. No. 3,115,207

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618 Cecil St., Buchanan, Mich. 49107

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Announcements

Glen Burnie, Maryland

The B&O/C&O Railroads Amateur Radio Club will hold its Ninth Annual Banquet at the Barn Restaurant, 750 Ritchie Highway, N.E., Glen Burnie, Maryland on April 20, 1968. Tickets are $5.00 if secured prior to April 10th and $6.00 after that date and may be secured from Joseph W. Zorzie, W3LBC, c/o "GO" Telegraph Office, Central B&O Building 107, Baltimore, Maryland 21201.

Chicago, Illinois

The Six Meter Club of Chicago will hold its Annual Banquet and Dinner Dance on April 6, 1968 at the Park Manor V.F.W. Hall, located at 1310 West 87th Street, Chicago, Illinois. The event will begin at 7 P.M. and will feature a 7-course dinner (family style), and prizes. Donation—$4.50.

Tickets are available from members of the club or ticket chairman: Mike Corbett, K9ENZ, 5215 73rd Court, Summit, Illinois 60501.

Boulder, Colorado

Boulder Amateur Radio Club auction will be held at National Guard Armory, Boulder, Colorado, April 28, 1968, at 1:00 P.M. All hams are invited to bring all that unwanted gear and put it up for auction.

For further information contact Don Hanaford, WAØNFO, Secretary of the Boulder A.R.C. at 4760 Ludlow St., Boulder, Colorado 80302.

Columbus, Georgia

The Columbus Amateur Radio Club will hold their annual Hamfest on April 6 and 7 at the Fine Arts Bldg., located at the Fair Grounds in Columbus, Georgia. Bingo for the XYLs and Harmonics. Communications will be on 3985 kc. For reservations or information call Harold DeVaughn, W4FIZ at 3804 Conrad Dr., Columbus, Ga. 31904, or contact any GSN member.

Auction In Rockaway, N.Y.

The Rockaway Amateur Radio Club will hold their Spring Auction on Friday evening April 26, 1968 at 8:00 P.M. at the American Irish Hall, Beach Channel Drive at Beach 81st Street, Rockaway Beach, N.Y. Doors will be open at 6:00 P.M. to accept items for sale. One dollar donation will be accepted at the door. For further information write to Rockaway ARC, P.O. Box 205, Rockaway Park, N.Y. 11694.

Sullivan, Illinois

The Moultrie Amateur Radio Klub is having it's 7th annual hamfest, being held at Sullivan, Illinois, in the American Legion Pavillion on April 28, 1968.

QSO Party In Oregon

The David Douglas Radio Club (W7DMC) will hold their first annual QSD Party from 0000 GMT Saturday April 13 to 0000 GMT Sunday April 14, 1968. Amateurs in Oregon will work as many hams in as many states, provinces, and countries as possible. Certificates will be sent to high scorers in each state, province, country and to the top 10 in Oregon. Logs showing time of QSO (in GMT) both RS(T) and QSO numbers, state province, country or county should be postmarked no later than April 22, 1968. Send entries to: Chuck Gasaway, WA7CPT, 5739 S.E. 128, Portland, Oregon 97236.

Brookfield, Illinois

The Chicago Suburban Radio Association will hold their annual on Wednesday, April 3, at 8 P.M. at the National Hall, 3907 Prairie Ave., Brookfield, Ill. For more information contact WA9CCQ, Karl Weisshappel, 3122 Clinton Ave., Berwyn, Ill. 60402.

Stolen Equipment

The following items were stolen on the morning of February 11, 1968: 1—National NCX-5 Transceiver Mark II serial #82-8884 (many visible modifications). 2—Electro Voice microphone, Model 602. 1—Hustler, 20 meter loading coil and whip support. 1—Mobile power supply, 3 phase a.c., custom built in black crackle case.

If any of the above equipment is presented for sale, trade, repair, or a request made for a service manual please contact: Mr. H. Abrams, K2JEF, c/o C.A.I., 1208 3rd Ave., New Hyde Park, L.I., New York. Phone: HU 8-2323 between 8 A.M. & 4:30 P.M. FI 3-6663 after 5 P.M.

Orlando, Florida

The Orlando Amateur Radio Club, Inc. are sponsoring their Hamfest on April 27 and 28 at the Statler-Hilton Inn, 3200 West Colonial Drive, Orlando, Florida. On the Hamfest agenda will be meetings for Army, Navy, and Air Force MARS, RACES, ARRL, QCWA, and Floridora's, forum's on v.h.f., sideband, ham TV, DX, transmitter hunts, c.w. contests, and of course the displays of the many manufacturers of ham equipment. The club's address is P.O. Box 13267, Orlando, Florida 32809.

Foundation for Amateur Radio

The Foundation for Amateur Radio, Inc., with headquarters in Washington, D.C. announces the sixth John W. Gore Memorial Scholarship for either graduate or under-graduate study. The Scholarship for 1968-1969 consists of a $500.00 award. It may be re-applied for in succeeding years.

Licensed radio amateurs who intend making a career in electronics or related sciences may now send for the 1968-1969 scholarship application. To be eligible, applicants must have completed one year in an accredited college or university and must be enrolled in a course of studies leading to a bachelors or higher degree. They must also be radio amateurs holding a valid FCC license of at least a General Class rating. Preference will be given to applicants from the area served by the Foundation—the District of Columbia, Maryland and Virginia, although those living elsewhere are not excluded. Scholarship applications should be mailed not later than August 31, 1968, and should be addressed to:

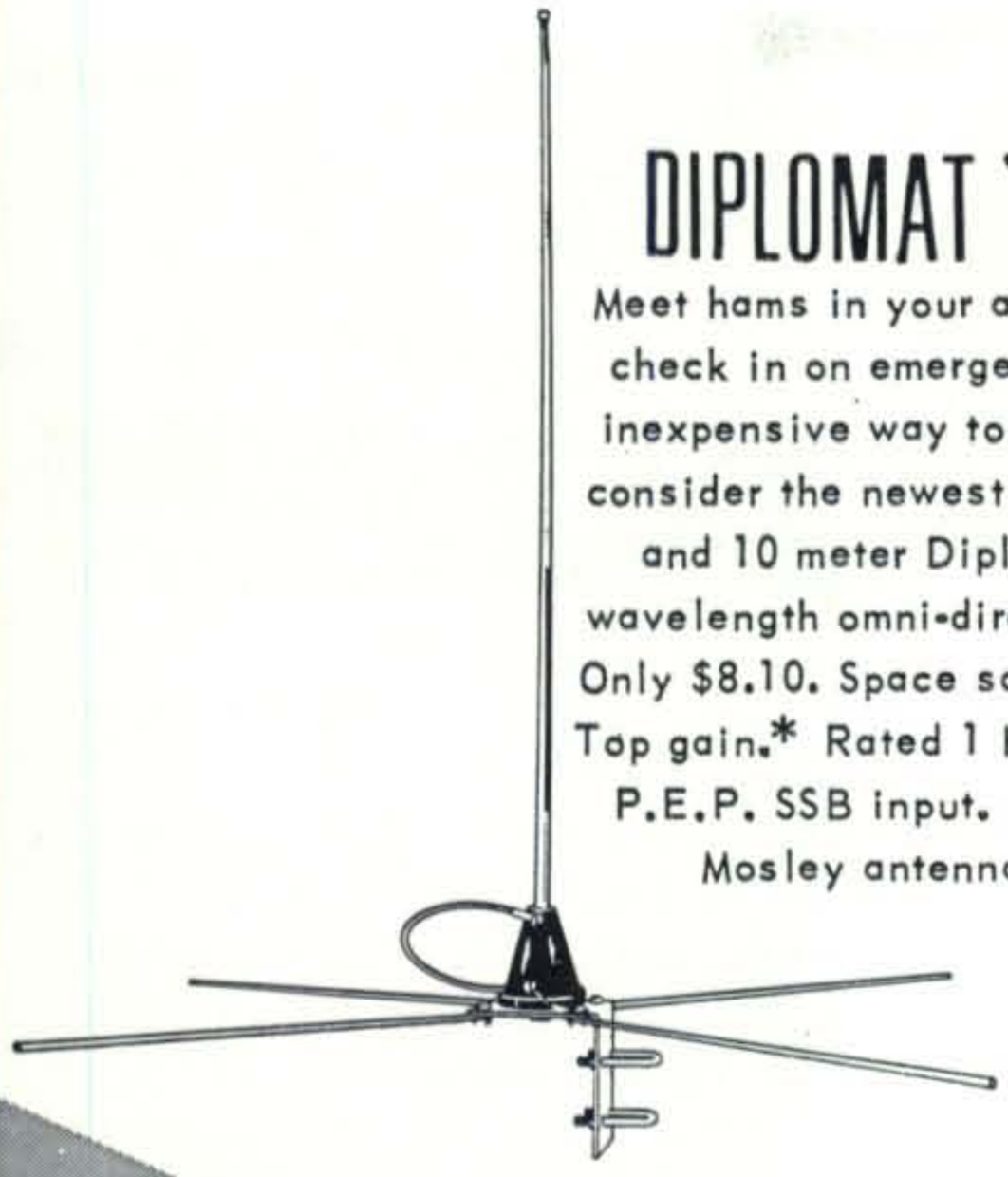
Chairman, Scholarship Committee, Foundation for Amateur Radio, Inc., P.O. Box 5902, Bethesda, Maryland 20014.

See page 126 for New Reader Service

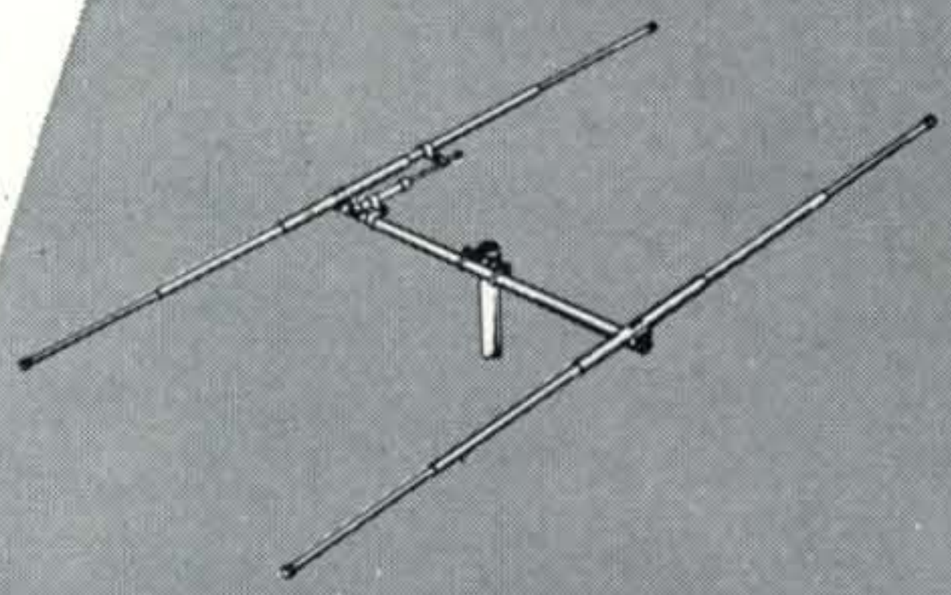
Whats NEW from Mosley!

DIPLOMAT '2'

Meet hams in your area on 2 meters . . . check in on emergency nets! For an inexpensive way to keep in touch, consider the newest addition to the 6 and 10 meter Diplomat family of 5/8 wavelength omni-directional antennas. Only $8.10. Space saving. Lightweight. Top gain.* Rated 1 KW AM/CW, 2 KW P.E.P. SSB input. Another Quality Mosley antenna!



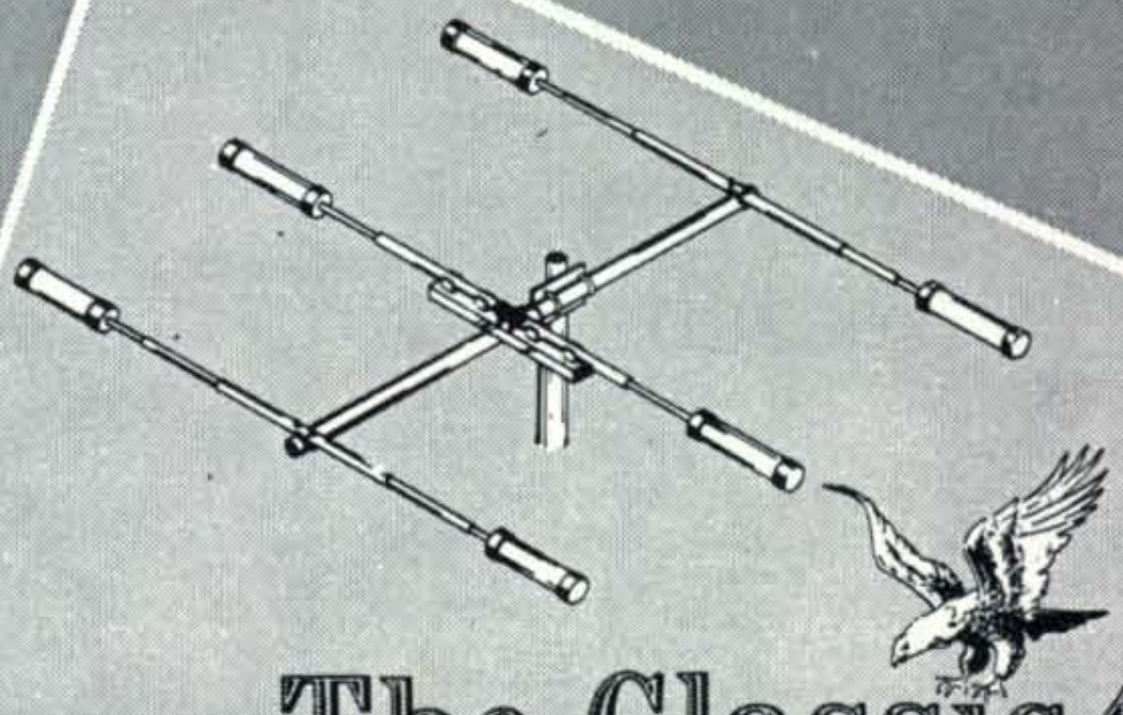
X-15



Own a Quality Mosley 15 meter beam, yet build it yourself - - just like in magazine projects. Drill your own holes and assemble according to concise instructions given. All parts included (minus coax). Gamma matched. Outstanding gain.* Full power rated. By readjusting elements according to instructions supplied, Generals may use this beam on 10 meters.

LANCER 1000

Hams are working lots of DX with this 5-band mobile antenna! Full power rated. Use on 10 meters without coil. Interchangeable coils for other bands. Adjustable upper whip section for peaking antenna to desired frequency. Coils with whip tip pre-cut and set for each band, available (extra). Hinged break over.



The Classic 10-15

The 10 and 15 meter bands are hot again! Command your share of DX on these popular bands with this Classic New Trap-Master beam. Full power rated. Broad Band Capacitive Matching. Incorporates performance proven Mosley metal encased traps. Tops in DX punch . . . gain!*

Gain omitted due to requirements of certain publications. For full details, send for FREE '67 catalog. Dept. 140

MOSLEY ELECTRONICS, INC.

4610 N. LINDBERGH BLVD., BRIDGETON, MO. 63042

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SCRATCHI

Feenix, Ariz.

Dear Hon. Ed:

It's later than you think—we amchoors gonna hafta hurry, hurry if we want to making any progress. Reely, Hon. Ed., we behind the times and time is running out of crack in bottom of Hon. Hour Glass.

Now, don't thinking just because you editor of big 1/c amchoor magazine you can argew me out of this, as Scratchi are concerned reel serious like. I know you thinking amchoors are progressive peeple, keeping up-to-date on every last development, pushing pack fronteers of science.

Hon. Baloney and double bosh. If you facing facts square in Hon. Face you finding out maybe amchoors are losing ground, or at best staying even with progress. Like take amchoor thirty years ago. He working just as much dee-x as anybuddy these days are working.

He having rotary beem, fancy reseever and kilowatt rig. In fackly, with excepshun of single-sideband, amchoor then and now having same kind of geer, with one difference. Amchoor thirty years ago making his own rig, his own antenna, and lotsa them making own reseever.

Today, all amchoor needing is good credit rating. He buys all he needs, then asks some thirty-yeer old-timer to come over and hook up chrome-plated boxes so they work. Shades of Marconi!!

I probably shouldn't even say "shades of Marconi!" on acct. maybe your Hon. Reeders think I talking about some kind of Italian food.

Just where are the experimenters of today? Oh, of course Scratchi having to agree there are a few left, but what are they doing? They spending most of there time writing artickles for your Hon. Mag on there new reseever. Nobuddy is going to build one like it, but you

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running artickle in your Hon. Mag on acct. reeders keep writing in saying "run more construckshun artickles." Hah!!

What you should run artickles on is things like: "How To Getting Out of Debt in 24-Months," or, "How To Go Bankrupt and Still Keep Your Rig."

Natchyourally are some small changes. Like you can't finding newtralizing condensers in catalog any more. And if you could, they'd be called newtralizing capacitors.

Likesame not finding any 500 watt class B modulayshun transformers in catalog either. This because everything is SSB.

You thinking that sign of progress? Hon. Ed., single-sideband for amchoors are almost twenty yeers old!! My point is, what are amchoor doing resently?

By this time I suppose you wondering what getting Scratchi so upset and excited. Very simple—I've been reeding back issues of Hon. Seek-You magazine. Dragging out the December 1948 issue. Looking at page 10.

What you seeing? You seeing letter Scratchi writing you. Twenty yeers ago I taking look into future, and predicting what amchoor shack being like in 1970.

I won't going into detales—you can reeding it yourself. Hon. Ed., we only got two yeers to go! Normally predickshuns being out-of-date soon after being made, on acct. science advancing faster than predickshun. Howsumever, that not true for Scratchi's predickshun.

Hon. Ed., are amchoors going to making liar out of Scratchi? We gotta hurry, hurry and do something reel quick-like! Time is about gone!

Respectively yours,
Hashafisti Scratchi

P.S. Just blowing amplifier toob in my homebrew reseever, and can't seem to locating replacement for it. Local amchoor radio parts stores acting like they never even heering of it. Do you know where I can buying a 2A5 toob?

H. S.

Back Issues

Back issues of *CQ* are available from our Circulation Department. Issues in the current year sell for face value (.75) and all others in stock are one dollar each, postpaid. If the issue is no longer in stock, photo copies of specific articles are available at one dollar each. Preferably, the entire issue will be sent.

See page 126 for New Reader Service

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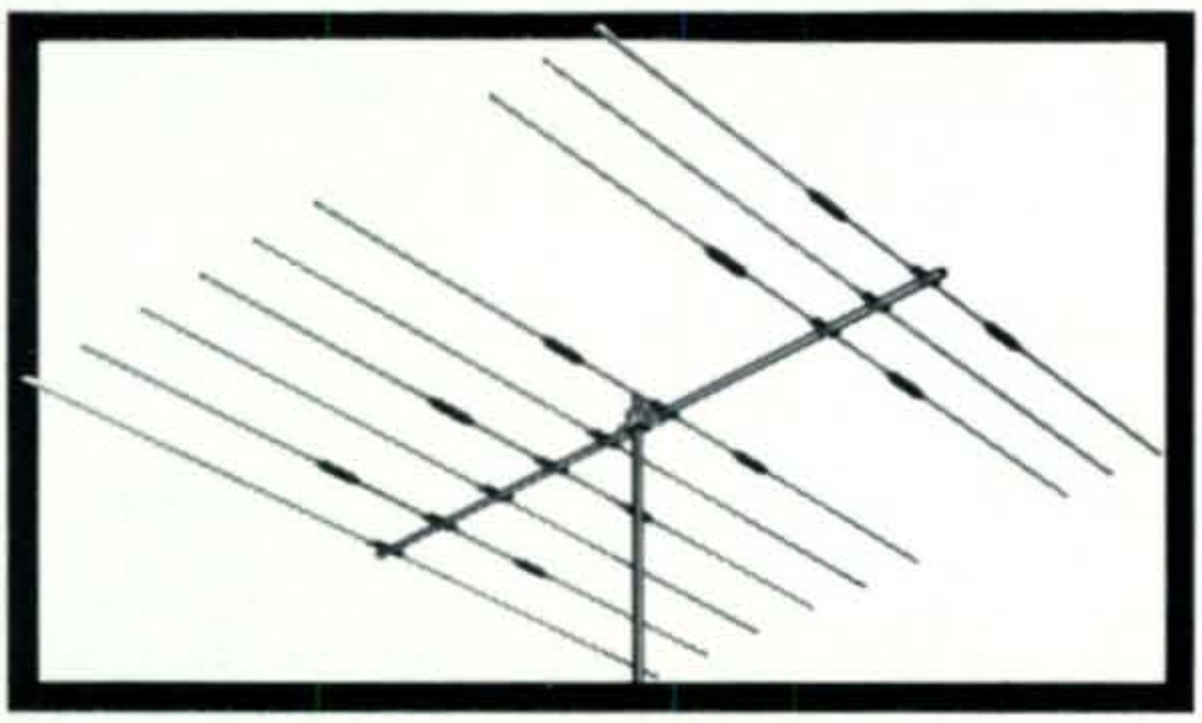

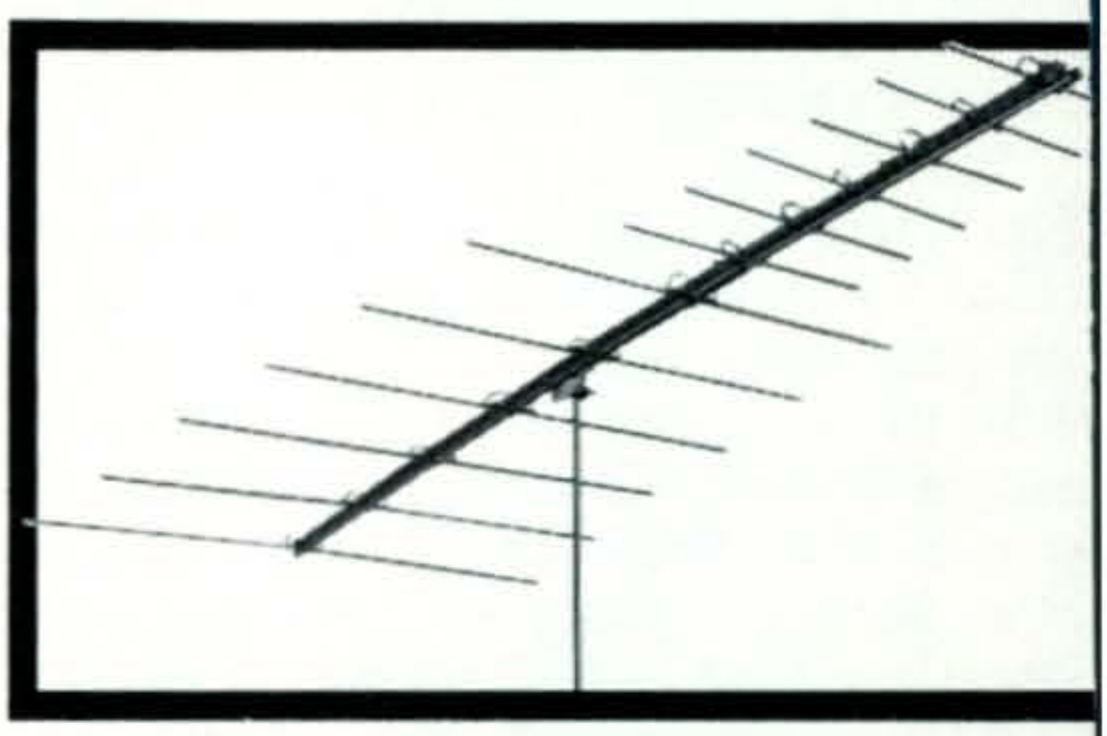

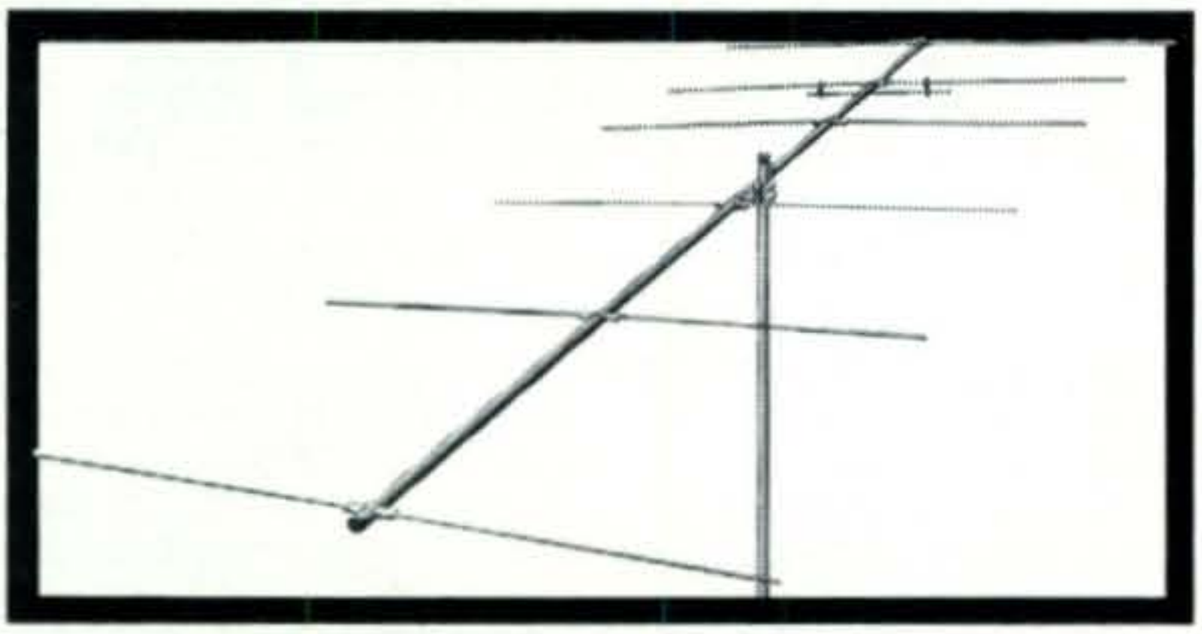

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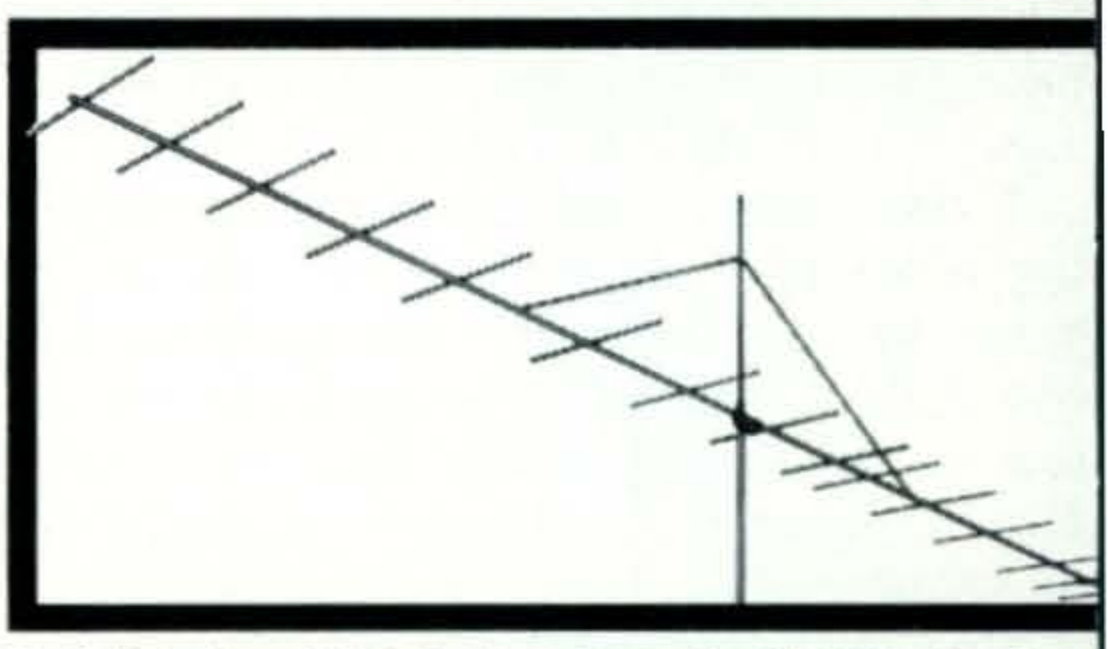

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Hy-Gain 6 Meter Beams — All Take 1 KW Max. Power Input. VSWR At Resonance 1.5:1 or Better.

Model	Elements	db Gain	F/B Ratio	Boom Length	Turn Radius
63B	3	10	20-25db	8′	6′
64B	4	12.7	20-25db	12′	8′
66B	6	15	20-25db	24′	12′6″
611B	11	19	20-25db	47′	24′2″

Hy-Gain 2 Meter Beams — All Take 1 KW Max. Power Input.

Model	Elements	db Gain	F/B Ratio	Boom Length	Tu Rad
23	3	9	20	3′	4
28	8	14.5	25-30	14′	7
215	15	17.8	20-30	28′	14

FOR THE MOST ADVANCED ANTENNAS UNDER THE SUN

See page 126 for New Reader Service

Hy-Gain's maximum performance beams put your signal where the action is. Not just by accident, but as the rewarding result of years of experimentation and computerized research in the most modern antenna and RF laboratory as well as exhaustive field testing.

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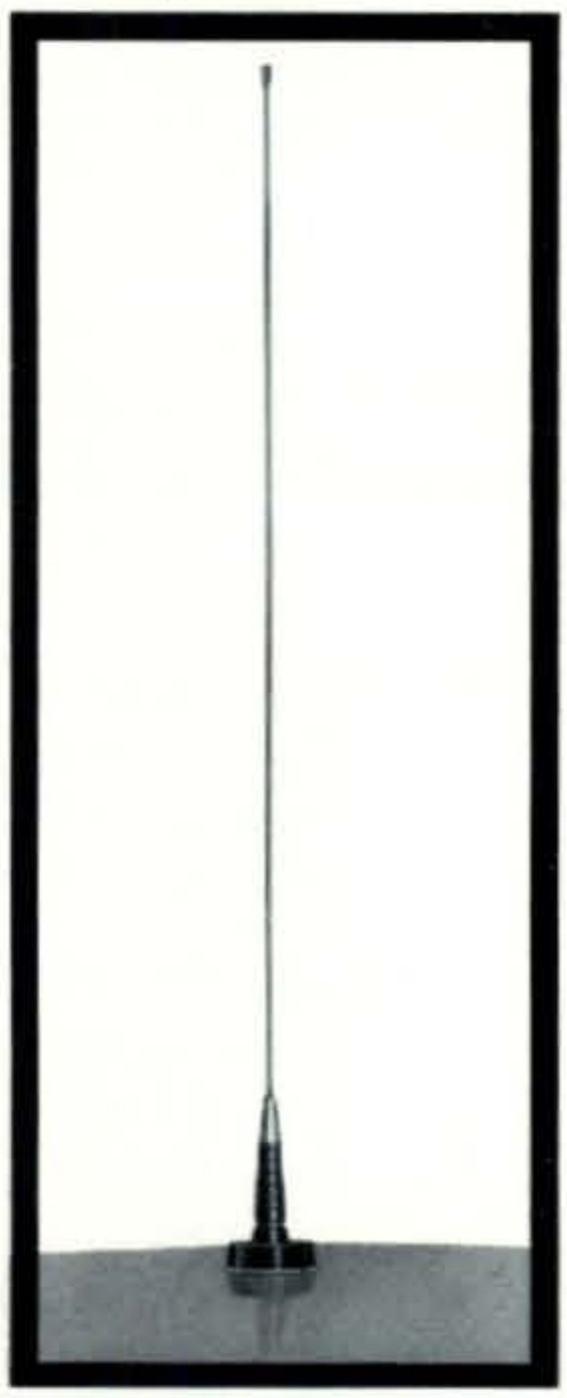
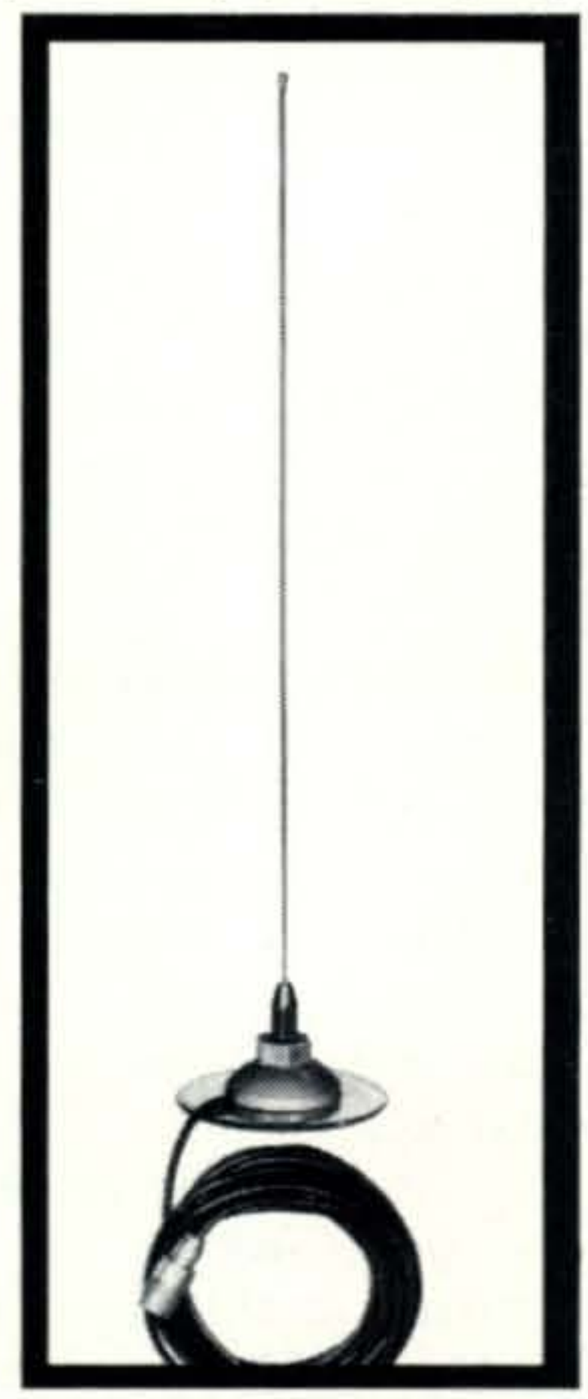
Exclusive Hy-Gain Beta Match — All Hy-Gain VHF Beams feature a special VHF Beta Match configuration. The unique pre-tuned Beta Match permits maximum gain and front-to-back ratio with a nominal 50 ohm feed point impedance without de-tuning any of the parasitic elements. An optimum transfer of energy thus results without sacrifice in gain or pattern control.

Coaxial Balun — All Hy-Gain VHF Beams are supplied with a coaxial balun.

Mechanical Reliability — The rugged, long life construction is available only in Hy-Gain antennas which feature heavy walled, seamless aluminum tubing. All element-to-boom clamps are machine formed of heavy gauge aluminum. All steel hardware is iridite treated to Mil-Specs for the kind of long life reliability our Government expects in equipment they buy.





y-Gain's 4-Element tacked Jay-Pole for 2 leters — 4-element tacked Jay-Pole delivers .2 db gain. Phasing and natching harness naintains perfect parallel hase relationship and is enter fed to minimize eam tilting for better ow angle radiation. May e side-mounted on mast r mounted on roof saddle.

Hy-Gain Mobile Antennas for 6 and 2 Meters — For the very highest degree of mechanical reliability, while eliminating pattern distortion generally prevalent in off center mount halo's, Hy-Gain's center mount halo's are unsurpassed. They feature the exclusive Hy-Gain Beta Match to insure optimum transfer of energy.

CRG150 — Vertically polarized omni-directional 55" whip with photographically etched copper base matching coil. Exclusive "Claw" mounting device easily installs in any hole 3/8" to 3/4".

HH6BK — Center mount 6 meter Halo with mast and bumper mount kit. Complete w/everything for quick installation. Perfect omni-directional pattern and excellent impedance control. Supplied with tuning rods for precise frequency adjustment.

HH2BA — Rugged center mount 2 meter Halo eliminates pattern distortion prevalent with off-center mount halos. Most efficient 2 meter halo available. Exclusive Hy-Gain Beta Match assures optimum energy transfer.

MAG150 — Alnico magnet base allows quick installation. Can be removed just as easily when parking in uncertain places. No need to scrape paint... the MAG150 is capacitively grounded. Superb performance from so versatile an antenna.

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A Continuous Motion Narrow Band Television System

Part I

BY SID DEUTSCH* AND RAYMOND SIMPSON, †WA2PYX

Part I of a two part series describes the concepts and principles of a narrow-band continuous motion television system ideal for amateur use. Part II will cover the requirements of the transmitter and receiver.

ONE of us (WA2PYX) has described a continuous-motion narrowband amateur television system that uses pseudo-random dot scan.[1] The present article provides additional information about this technique. A 3.072 kc (nominally 3.1 kc) system is employed as a convenient numerical vehicle for further discussion.

In addition to the 3.1 kc system, standards are proposed for 6.2, 12.3, 24.6, 49.2, . . . kc systems so that amateurs will be able to communicate with each other with wider video bandwidths where they are applicable.

The reader is warned that television work is an order-of-magnitude more difficult than audio work, and should not be undertaken unless the operation of a conventional black-and-white system is thoroughly understood.

Resolution versus Frame Rate

There is not much of a picture that one can get with a bandwidth of 3.1 kc. This conclusion is based on the considerations outlined below:

The number of visible picture elements N is given by

$$N = \frac{2WK}{F} \qquad (1)$$

where W is the bandwidth, F is the frame frequency, and K is the fraction of time that is devoted to visible scan. The factor 2 is needed because a single sine wave is seen as

* Polytechnic Institute of Brooklyn, 333 Jay Street, Brooklyn, N.Y. 11201.

† 22 Carlisle Place, Merrick, New York 11566.

Bandwidth, C.p.s.	*Frame freq., C.p.s.*	*Total elements*	*Field scan freq, c.p.s.*		*Field scan elements*		*Random scan order*	*Total elements*	
			Horiz.	*Vert.*	*Cols.*	*Rows*		*Cols.*	*Rows.*
3072	3	2048	48	384	8	16	H, V, H, V	32	64
6144	3	4096	48	768	16	16	V, H, V, H	64	64
12288	3	8192	48	768	16	32	H, V, H, V	64	128
24576	3	16384	48	1536	32	32	V, H, V, H	128	128
49152	3	32768	48	1536	32	64	H, V, H, V	128	256

Table I — Long-persistance narrow band systems.

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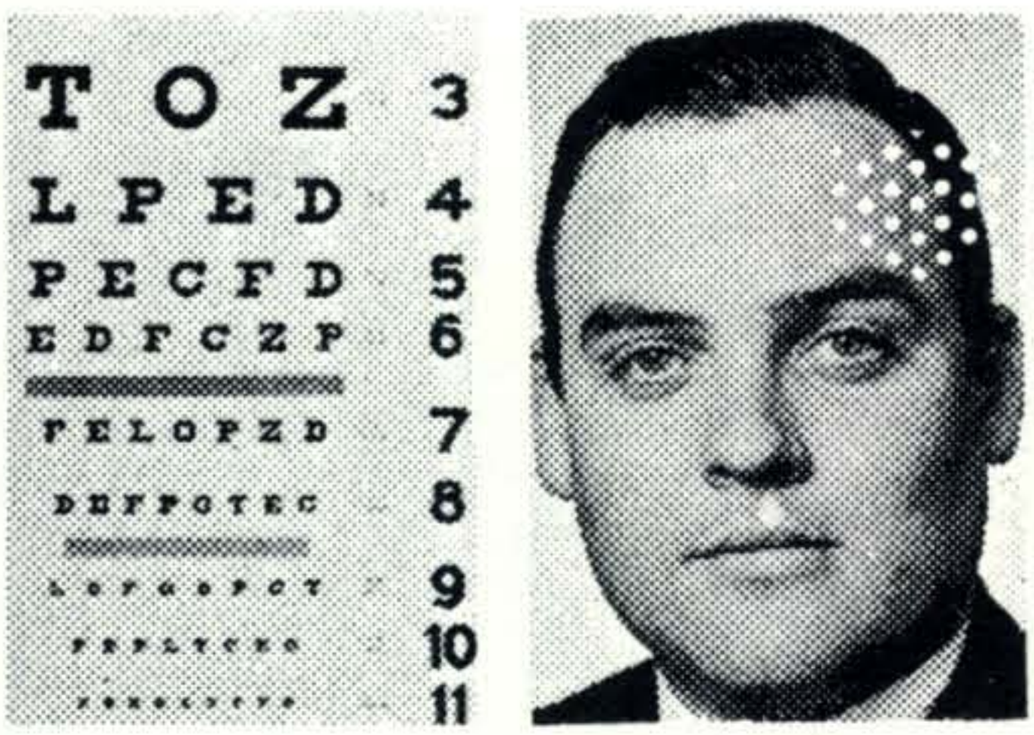
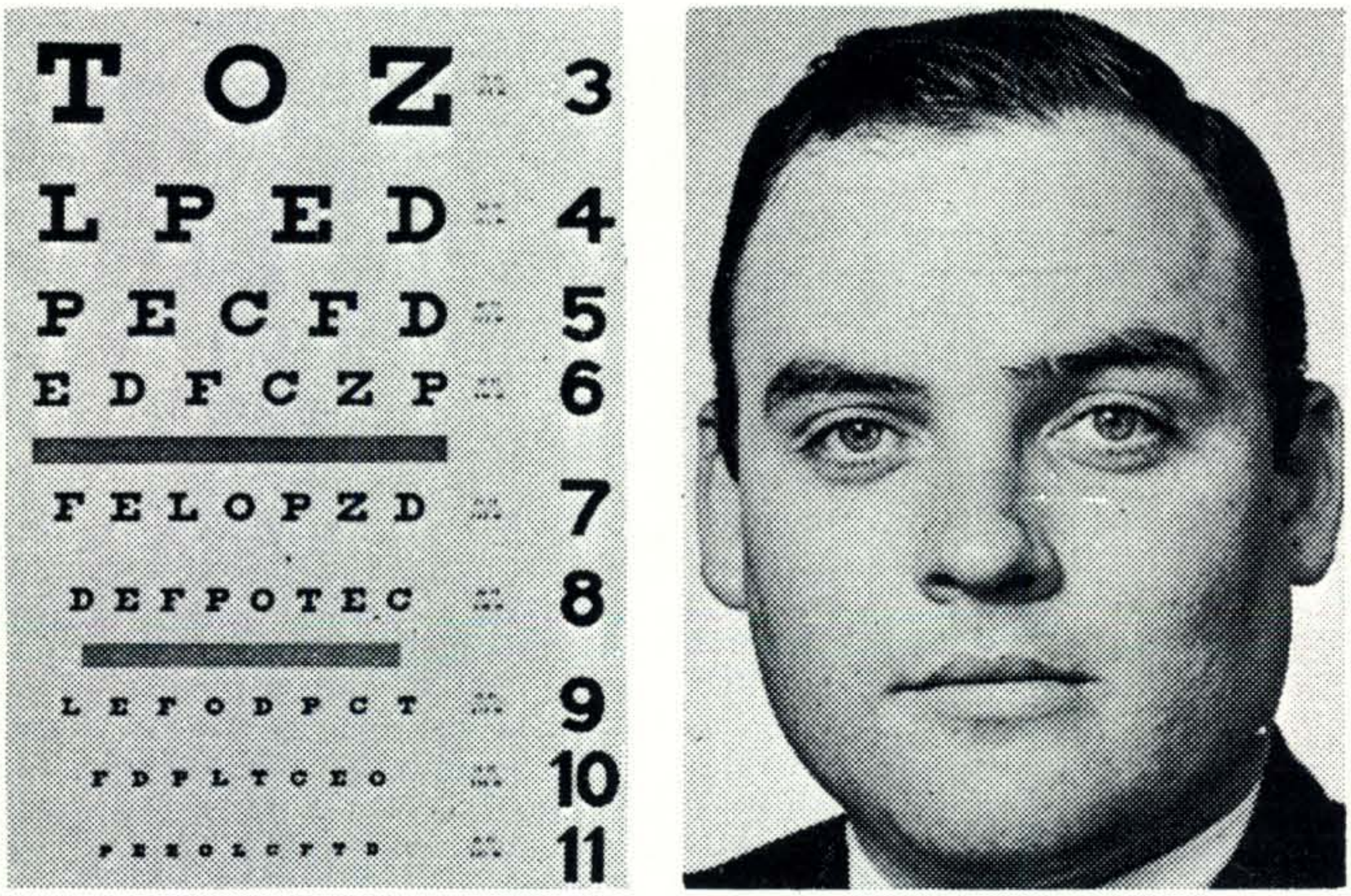
Fig. 1—Various 25 dot/cm halftone reproductions.

(A)



(B)



(C)

two picture elements, black followed by white or vice versa. The factor K appears because the picture is blanked out for an appreciable period of time while the cathode-ray tube beam is returning from right to left or from bottom to top. In conventional U. S. television, where $W = 4$ mc, $F = 30$ c.p.s., and $K = 0.8$, we get $N = 213{,}000$ visible picture elements.

The conventional television-type scan is inefficient because the images are replenished at a 30 cycle rate although side-to-side motion at a rate of only 3 cycles appears to be completely blurred to the eye. The 30 cycle frame rate is needed to prevent large-area flicker. If a pseudo-random type scan is employed,[2, 3, 4] however, it is possible to achieve low frame rates without large-area flicker. If the picture is viewed on a long-persistence screen, one can go as low as $F = 3$ cycles. Because of reduced scanning frequencies, only 10% of scan time need be devoted to beam retrace, so $K = 0.9$. With $W = 3.1$ kc, eq. (1) yields $N = 1800$ visible elements. This case is illustrated by the pictures of fig. 1(a).

It is obvious from fig. 1(a) that 1800-element pictures are useful, in fact, the resolution shown here is quite common in newspaper halftone reproductions. The reader should be warned, however, that severe motion deterioration can occur because of the long-persistence screen. The picture also suffers, even in the absence of motion, because the phosphor is yellow-orange compared to the white on conventional television. But two amateurs *can* achieve some degree of identification, without large-area flicker ,

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although their lips will appear blurred as they speak.

Pseudo-random dot scan gives a low-resolution continuous-motion picture that is completely different than the high-resolution intermittent-motion pictures of WAØNLQ.[5,6] The system used by WAØNLQ has a frame period of 8 second ($F = 1/8$ c.p.s.). With $W = 3.1$ kc, eq (1) then yields $N = 45{,}000$ visible elements. This is a picture that slowly "wipes on" over the 8-second period. The pseudo-random and linear-scan pictures should not be compared with each other. If the amateur wants a high-quality still picture, he should use the 8-second system; if he wants continuous motion, he should use pseudo-random dot scan.

The 3 Frame/sec Picture

The philosophy behind pseudo-random scan is that flicker can be minimized by a random positioning of scanning dots, where each dot corresponds to a picture element. With a frequency of 3 frames/sec, each dot is excited, on an average, once every 0.333 seconds The surrounding dots, however, are not excited in unison, so *there is no large-area flicker*. There is no line or dot crawl since the net scanning motion in any given direction is zero. The picture is not unlike that of a newspaper photograph in which some "snow" is added to the halftone dots.

A truly random dot scan is not feasible because there is no simple way to synchronize the receiver and transmitter scanning motions. Instead, a pseudo-random dot scan is used that is easily synchronized and that appears to be random to the eye.

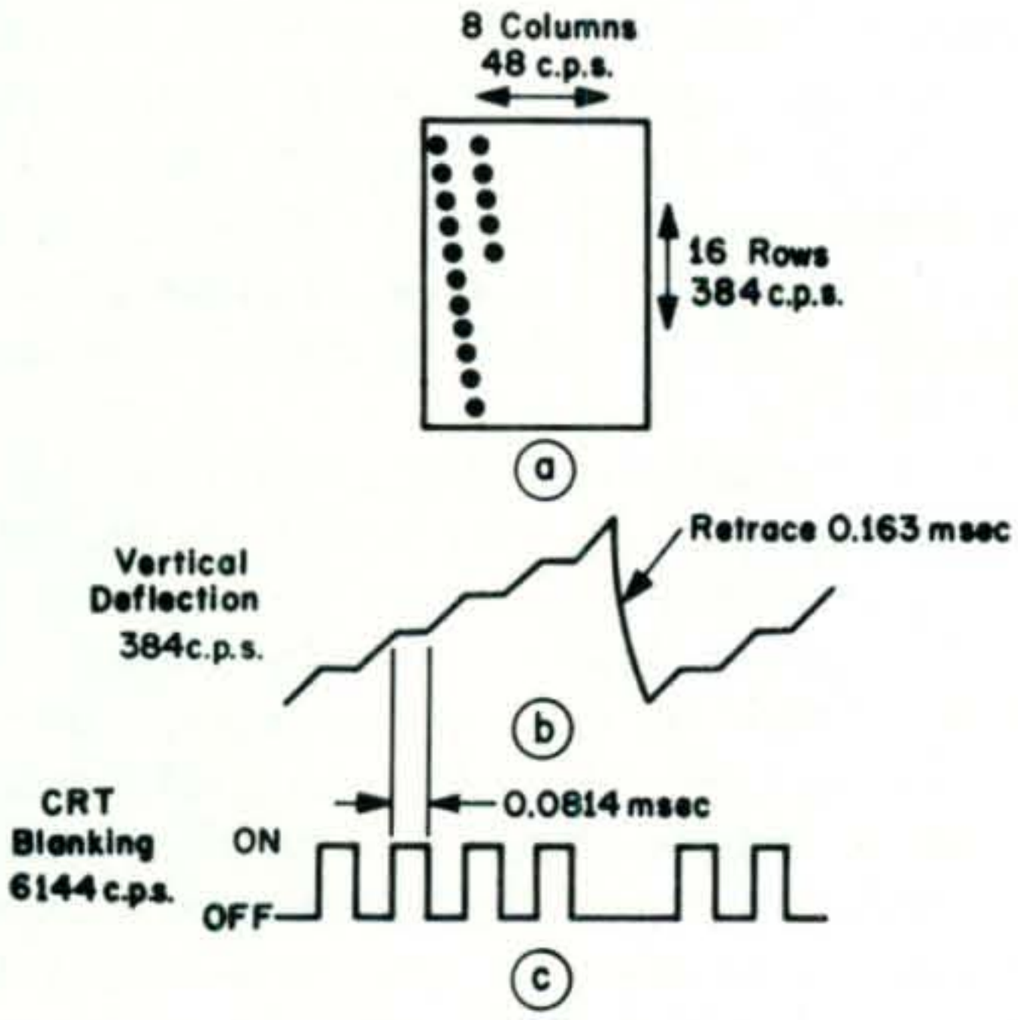

Fig. 2—Dot scan field coverage of the screen and the waveshapes associated with the scan.

The pseudo-random motion is the composite of a coarse field scan plus a fine local scan. The coarse field scan is described in fig. 2. Each *frame* of our 3.1 kc picture contains 64 elements vertically and 32 elements horizontally (including those lost during retrace), but only 1 out of 16 elements is covered by each *field* scan. As shown in fig. 2(A), the beam hops in such a way that only 16 elements vertically and 8 elements horizontally are visited. The vertical scan frequency is given by $(2)(3072)/16 = 384$ c.p.s. while the horizontal scan frequency is given by $384/8 = 48$ c.p.s. With a field frequency of 48 cycles, there is no large-area flicker under ordinary viewing conditions. The vertical scan waveshape is shown in fig. 2(B); the beam remains stationary for 0.08 msec and then moves rapidly during the next 0.08 msec. As shown by the square wave of fig. 2(C), the beam is turned on while it is stationary and it is blanked during the rapid movement.

The fine scan is described by fig. 3. Each dot of fig. 2(A) subsequently moves so that it covers a local 4×4 area. Suppose that, at $t = 0$, the dot is in the upper-left corner of its local area, as denoted by box 0 in fig. 3. One field period later at $t = 1/48$ second, the dot will be in box 1; at $t = 2/48$ second, it will move to box 2, and so on. At $t = 16/48$ second= one frame period, it will complete the local scan and start again in box 0.

The local scan movements are generated by adding small square waves, as listed on the right side of fig. 3, to coarse scan. The field of fig. 2(A) is covered during the first 1/48 second; the *entire* field is shifted two elements to the right during the next 1/48 second; it is moved back to the left and down two elements during the next 1/48 second, and so forth. The local movements of fig. 3 appear to be random. Actually, be-

0	4	1	5
8	12	9	13
2	6	3	7
10	14	11	15

24c.p.s. H, 2el p-p
12c.p.s. V, 2el p-p
6c.p.s. H, 1el p-p
3c.p.s. V, 1el p-p

Fig. 3—The apparent local scan sequence is shown on the left, and the square wave components are listed on the right.

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cause simple square waves are used, the sequence is easily generated; only a single sync pulse, to start receiver and transmitter beams in unison in the box labeled 0, is needed.

Phosphor Time Constant versus Frame Rate

With long-persistence phosphors, experiments show that *dot* flicker becomes excessive if F is less than $2/\tau$, where τ is the phosphor time constant. For F equal to 3 c.p.s., τ should be at least 0.67 second.

The most popular long-persistence phosphor is the *P*7 It is a "cascade" type[7]; that is, a short-persistence blue component that has a decay time constant of 0.02 msec excites a long-persistence yellow component that has a time constant of 50 msec. As is true of many phosphors, the yellow component does not decay exponentially. Instead, there is a long trailing off such that the relative brightness is 10% at $t = 0.32$ second after excitation, and 1% at $t = 3$ seconds. The *P*7 is not suitable for pseudo-random dot scan because the initial decay is very rapid, so that the dot structure can be seen at a frame frequency of less than 15 c.p.s., while the long phosphorescence produces excessive motion blurring.

Much better results are obtained with an exponential-decay type, such as the *P*19. The latter[7] has an orange chromaticity (CIE coordinates $x = 0.572$, $y = 0.422$), with a time constant of 75 msec. It is suitable for frame frequencies as low as 10 c.p.s. The relative brightness is 10% at $t = 0.22$ second after excitation, and 1% at $t = 0.53$ second.

A phosphor that can be used at frame frequencies down to 3 c.p.s. is the *L*3 type.[8] It has an exponential decay, a yellow-orange color (peak at 5900Å), and a decay time constant of 0.67 second. The relative brightness is 10% at $t = 1.7$ second after excitation.

The *P*26 or *P*33 types may also be suitable.

Optimum Viewing Conditions

One must pay careful attention to the viewing conditions to extract the maximum amount of information from the narrowband picture.

The dot structure of a newspaper halftone vanishes at a viewing distance 1500 times the center-to-center spacing between dots. For the 25 dot/cm reproductions of fig. 1, the dots vanish at a viewing distance of 60 cm. At a viewing disance of 30 cm, however, fine detail is more easily seen and the dot structure, although visible, is not annoying. Similarly, for television pictures, one should plan for a viewing distance of 750 times the average center-to-center spacing between elements.

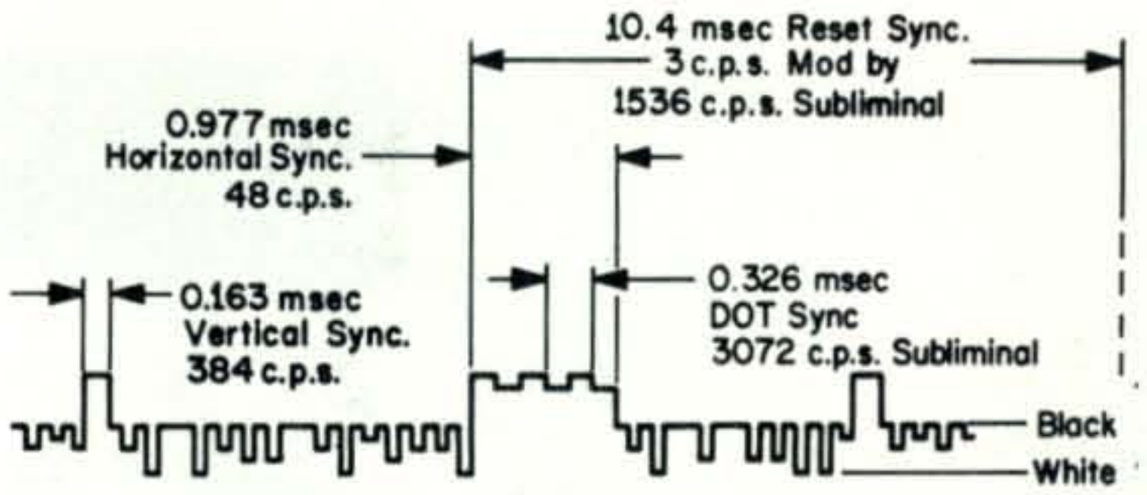

Fig. 4—Composite video signal before it is sampled and filtered.

Synchronizing Waveshape

The transmitted video signal must, of course, carry sync information. As shown in fig. 4, the sync signal is the "blacker-than-black" portion of the composite signal. [The slots in the video signal are caused by blanking, fig. 2(C).] Each sync component is briefly discussed as follows:

Dot Sync: This should be a 6144 c.p.s. signal, but is sent at half this frequency because of bandwidth limitations. The 3072 c.p.s. signal is added to the video-plus-low-frequency-sync signal. The dot sync is of subliminal amplitude; that is, it is so weak (we use 26 db down) that it cannot be seen in the picture. At the receiver, a high Q 3072 *c*.p.s. tuned circuit rejects the video and low frequency sync components, and the dot square wave is derived from a frequency doubler.

Vertical Sync: This is a 0.16 msec pulse. At the receiver, a 384 c.p.s. automatic phase control loop locks on vertical sync.

Horizontal Sync: This is a 0.98 msec pulse. At the receiver, *RC* integration yields a signal that synchronizes a 48 c.p.s. astable multivibrator.

Reset Sync: When the local scan sequence of the transmitter enters box 0 of fig. 3, a 10.4 msec wide square-wave burst of subliminal amplitude, at 1536 c.p.s., is added to the video plus-low-frequency-sync signal. At the receiver, a high Q 1536 c.p.s. tuned circuit responds to the wide burst. Envelope detection then yields a pulse that resets the receiversquare wavegenerators to their "zero" state.

As shown in fig. 4, the 3072 and 1536

[*Continued on page 118*]

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MORE ON:
SPECIAL SUBSCRIBER SERVICE
THE TELEPHONE COMPANY'S ANSWER TO AMATEUR RADIO

BY JERZY OSTERMOND-TOR, *EX—YM4XR

Last year, Professor Ostermond-Tor exposed the plan of an international telephone organization (ONIT) to replace amateur radio with a special subscriber telephone service (SSS). In this article, the Professor reports on the latest progress of SSS, and his efforts, at great personal risk, to defeat the plan.

I AM sure that many readers of *CQ* are aware of some of the agonies I have been forced to endure during my lifetime. I have seen my beautiful home town of Danzig bombed during the War, and the University there, along with my amateur radio station, completely destroyed. I have been in concentration camps and forced to work as a slave laborer, and I have had to live, more than once, under hostile political systems. Yet, again during this past year, I had to bear additional agony, this time in the defense of amateur radio!

In my last article in *CQ*[1], I exposed a plan of the *Organisation Nationale d' Industries Téléphoniques* (ONIT), to replace amateur radio with a special subscriber telephone service (SSS) in much the same manner as undersea cables have replaced h.f. radio telephone communications.

SSS

To briefly summarize what I reported last year, the proposed new telephone service would consist of a small encoder attached to a regular telephone, enabling it to be used as an SSS phone by merely flicking a switch. When in the SSS position, an inaudible signal from the encoder switches the phone to a world-wide telephone master computer center. The computer, on a purely chance basis, connects the SSS phone to another SSS phone anywhere in the world, through undersea cables, microwave systems, satellites, etc. Once connected by the computer, the SSS phone remains connected for at least one minute, and for as long as the operators at each end care to talk to each other, or until the circuit is needed for a regular commercial call.

ONIT planned to establish the charge for an SSS telephone at about $5 a month, or a small fraction of the cost of an amateur radio station. No license would be required to operate SSS, technical knowledge would not be a prerequisite, and there would be no need to learn the Morse code. There would be no

Secret 1967 Plenary Assembly of Organization National d' Industries Telephoniques (ONIT), was held at this Pfalzland resort hotel. *(Photo by Ostermond-Tor)*

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* Professor Ostermond-Tor resides at the Lauton Institute in Austria, but correspondence to him can more conveniently be addressed c/o *CQ*, 14 Vanderventer Ave., Port Washington, L.I., New York, 11050.

1 Special Subscriber Service — The Telephone Company's Answer To Amateur Radio, J. Ostermond-Tor, *CQ*, April, 1967, p. 24.

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Clandestine photo taken at 1967 ONIT Plenary Assembly. Assembly was attended by hundreds of telephone officials and experts from almost every country.

problem of TVI, BCI or QRM. There would be no propagation blackouts or skip conditions to worry about, no need for outside antennas, and no receiving or transmitting equipment to purchase, or build.

ONIT stressed that SSS would have all the thrills of amateur radio—talking to far away places, making unseen friends, collecting QSL cards, working SSSpeditions sent to remote areas of the world for this purpose, competing for WAC, DXCC, WAS and all the other awards familiar to amateur radio. ONIT officials claimed that there would be a great march to SSS from the ranks of radio amateurs, SWLs, CBers and the general public. They estimated that as many as a million subscribers might be possible in a year or two. SSS would be a clear profit for the telephone organizations since it would utilize existing telephones and equipment, and since the master computer would connect SSS phones only when the routing is not required for regular commercial use.

Reader Response

I have been a radio amateur for my entire adult life, and I didn't loke the ONIT proposal. It seemed to me to threaten the future of amateur radio, and I decided to speak out against it in *CQ* last year, although I realized it would make enemies for me within the powerful ONIT organization. I was overwhelmed at the large number of letters I received from readers of *CQ* sharing my view and encouraging me to oppose SSS.

I received more than 250 letters, from 12 different countries.

All of these, except for a handful, were vic
lently opposed to SSS. Many of the letter
are the most articulate I have ever seen i
the defense of amateur radio. As an example
I quote from one written by Rev. Gabriel F
Garguilo, WA1GFJ, of New Haven, Conn

"The suggestion of the ONIT is absur
. . . it fails to understand the true natur
of Amateur Radio. It sees Amateu
Radio as a game, as a hobby, whos
main attraction is the contacting of a
many different countries as possible
with the subsequent exchange of card
to confirm the contact. . . . Needless t
say, this is a trivial understanding o
Amateur Radio. Amateur Radio is not
game, it is a SERVICE. It exists to serv
. . . "NO ONE OWNS THE FREQUEN
CIES (used by radio amateurs)! The
are in the same category as the air, (a
beit polluted) the oceans, the wind, th
magnetism of the earth, the sunligh
gravity, and the tides. All these phe
nomena are there for everyone's use, bu
in such a way as not to interfere with th
rights of another, or injure another. NO
ONE OWNS THESE NATURAL PHE
NOMENA! Their use can be regulate
by laws, but the basic right to them ca
not be taken away!

"Amateur Radio is the use by an ind
vidual, a private citizen . . . of thes
natural pre-existing frequencies, for
good purpose, in such a way as to benef
the individual, serve the common good
and not interfere with the rights of any
one else . . .

"Amateur Radio is then a service, usin
the naturally available frequencie
Amateur Radio serves the commo
good by providing an independent com
munications system run by private in
itiative and funds, ready to SERV
freely in the case of disaster or need
It provides a citizen's message servic
. . . for absolutely no cost. It provide
a link with those places where telephon
service is not provided, or is impractic
able (meaning not profitable). It keep
friends in contact with each other . .
It allows people to meet one anothe
and to get to know one another a
human beings. Our present civilizatio
is de-humanizing in many respect
Amateur Radio allows people to mee
as human beings, with voice and per
sonality, rather than as machines. Th

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two people in contact by radio respect one another as persons; black does not ask if the other is white, nor does white ask if the other is black, nor do they care. Old does not look down upon immature young, nor does young shy away from venerable aged. Moslem does not shun Christian, nor Jew the Gentile, nor agnostic the believer. Americans and Russians, Germans and French, Italians and Irish, all treating one another as humans, individuals, persons, brothers. Please, in the name of all that is good, and for the sake of brotherly love, do not let this be taken away from us! . . . "Don't let anyone put us on a commercially owned and operated chance contact type of communications system, whose purpose is to facilitate the taking over of the frequencies allotted to amateurs, and use them to expand the profit-making capabilities of a commercial communications system, thus robbing the individual of a basic and fundamental right. Amateur Radio is more than just a hobby, a game, a fancy way of collecting exotic QSL cards; let the ONIT and other vested interests realize that once and for all, and not take another step on the road to making us highly mechanized, technological animals.

"Professor, represent Amateur Radio to your best, lament the fact that we were not consulted on this, and emphasize the previous right of the individual as I have outlined above, confident that in protecting our rights you have our backing, and that of far more than are able to put it into words such as these. You will not only be protecting our equipment from obsolescence, but you will be doing the human race a favor, of which it may not even be aware."

Supported by this stirring letter from WA1GFJ, and by the hundreds of others written in a similar nature, I decided to do everything in my power to prevent passage of the SSS proposal at the 1967 ONIT Plenary Assembly.

Mrs. Lixber

ONIT meetings are generally held in secrecy, and attendance is by invitation only. As a result of my last *CQ* article in which I exposed the SSS proposal, I had been declared *persona non grata,* and expelled from ONIT. I had no idea when or where the 1967

Mrs. Janeva Lixber conducting demonstration SSS calls at ONIT meeting. In a 30-minute period she managed to make contact with every continent for an SSS-WAC. ONIT claims SSS will replace amateur equipment shown on table. *(Official ONIT photo)*

meetings would be held. Even if I did, security at ONIT meetings are such that it would be impossible for me to "crash" them. There wasn't anyone for me to turn to, since the entire ONIT membership was hostile to amateur radio, and to me in particular. How would I be able to defend amateur radio at a meeting I could not attend?

Then I remembered Mrs. Janeva Lixber. Mrs. Lixber, the daughter of a fellow radio amateur and school-mate of mine at the University of Danzig, had been working as a bilingual secretary for the past few years at the Geneva heaquarters of ONIT. I located Mrs. Lixber by telephone, and arranged to fly immediately to Geneva from Austria to discuss the matter with her.

Mrs. Lixber is an attractive, robust young lady. It did not take me long to see that her father's devotion to amateur radio had "rubbed off" on her, although she herself was not a radio amateur. I told her of the danger facing amateur radio, and my difficulties in attending the ONIT meetings. Without hesitation, she offered her services in the defense of amateur radio. Not only did she tell me the exact dates and location of the meetings, but she would make arrangements to attend the meetings as an ONIT secretary, and keep me posted on what was happening on the inside. She also planned to carry a small MINOX camera with her in order to obtain photographic proof of what went on at the meetings.

1967 ONIT Meeting Place

I learned from Mrs. Lixber that the 1967

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Exclusive photo of Committee O, the most anti-amateur radio group in ONIT. They are responsible for proposing SSS as a replacement for amateur radio.

ONIT Plenary Assembly would convene during the entire month of July in the German Pfalz. The Pfalz lies in the west-central part of Germany, roughly between the Rhine River and the borders of Luxembourg and Belgium. Beautiful landscapes full of romantic places, spas, health resorts, vineyards and castles make the Pfalz one of Europe's most popular resort areas. The rolling, wooded hills, beautiful fertile valleys and long, wide winding rivers blend together harmoniously to form a multi-colored mosaic. The mineral laden spa water of the area restores energy and health, while the golden Pfalz wines are a never failing source of delight and good cheer. Everywhere there is the traditional warmth and friendliness of the Pfalzlanders.

On the last day of June I arrived at the Pfalzland Kurhaus Hotel, where the ONIT meetings were to be held. I registered as a tourist in this very large, white, almost entirely wooden Victorian-like resort hotel located in the center of the flower-laden Kurpark. The hotel was already bedecked with two flags of each of the almost 10 countries sending representatives to the co ference. The huge hotel was full to capaci with telephone officials, executives, enginee and technicians from all corners of the worl

Saline-Bath Rendezvous

Promptly at 10 A.M. on July 1, the Pl nary Assembly convened. Of course, I cou not attend the meetings, but I did work o a plan with Mrs. Lixber. Each afternoon, du ing the traditional two-hour lunch break, s would don her swim-suit and join me at t hotel's *saline-bath*. The Pfalzland Kurhaus world famous for its saline-bath. Here o sits in a secluded outdoor area, around fenced-off gaping hole in the earth, fro which belches forth thick, yellowish cloud full of sulphur, radium and other natur minerals. The idea is to let this cloud, co ing from the bowels of the earth, envelo you with its health giving minerals. Medic authorities claim the heat and steam from t saline-bath cleanses one's exterior, while t inhaled minerals cleanses one's interior. T make matters even more pleasant, at the edg of the saline-bath area was a large shel shaped bandstand, from which drifted swee soft strains of Johann Strauss and Johan Sebastian Bach. What an obvious place t rendezvous with Mrs. Lixber. Once enve oped in the cloud of health-giving mineral we were no longer visible to outsiders, an the soft music in the background protecte us from eavesdroppers. In this way, Mr Lixber briefed me daily on the ONIT mee ings in strict privacy, as we enjoyed the wo derful curative features of the saline-bath

SSS Progress

The news Mrs. Lixber brought me wa not good. Committee O, the most ant amateur radio group in ONIT, under th leadership of Dr. Sidney Wickfen, was mak ing steady progress on developing the speci subscriber telephone service. They had re ported, that despite my article in *CQ*, SS was sure to attract at least a million sub scribers in two years. Mrs. Lixber showe me an official ONIT survey which claime that in response to my article, several thou sand letters of support had been received fro s.w.l.s; CB'ers and radio amateurs, who wer enthusiastically awaiting SSS. What poppy cock! But who was there to tell them th truth?

By the third week, I could stand no mor of this. It was obvious, that the notoriou

ONIT computer center, through which SSS calls will be automatically connected at random, to simulate amateur radio contacts.

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eader of Committee O. Dr. Wickfen, and his qually notorious associates Herr Kitzler and Monsieur Richard, in their zeal to sell SSS o ONIT, were feeding the conference with alse facts and figures. Something drastic had o be done, soon!

Professor Tor's Plan

At our rendezvous on July 20, I discussed ith Mrs. Lixber a plan for putting into the NIT distribution system a clandestine docuent attacking SSS and containing copies of ozens of the letters sent to me by readers f *CQ*. Again Mrs. Lixber came to the rescue. he next afternoon she had "obtained" a ackage of official ONIT document staonery. That evening I drafted the report, nd Mrs. Lixber typed it in the official ONIT ormat. The finished product looked absoutely genuine, and we even managed to give an official number—COM 0-94. Mrs. Lixer saw to it that the usual number of copies ere run off, and that they were distributed o each delegate along with his other ONIT ocuments! Viva Mrs. Lixber!

The report was placed on the Agenda for uly 22. When it came up for discussion, any ONIT members were surprised to learn hat there was strong resentment to SSS and hey began to realize that the Committee O eadership had been pulling the wool over heir eyes. Oh, what I would have given to ee the melee that Mrs. Lixber said ensued.

I understand that Dr. Wickfen shook with nger. "How did *this* document get into NIT", he shouted? Herr Kitzler, incoherntly raging in a mixture of German and English demanded to know who the *spitzel* (stool-pigeon) was. Monsieur Richard, grabing the Chairman's gavel from the stunned Dr. Wickfen, pounded the table, begging for rder. Thanks to Mrs. Lixber, the views of adio amateurs were dramatically presented o the ONIT members.

SSS Demonstration

On July 23, a special announcement apeared on the hotel's daily activities board. NIT was going to hold a demonstration of SS for the public and the press. Amidst a reat deal of fanfare, and with a seemingly ndless supply of food and wine, the SSS emonstration began. I was shocked to see who had been assigned to man the SSS phone, none other than Mrs. Lixber! What an emotional stress for such a charming, courageous, young lady, so devoted to amateur radio!

Sharing the pleasures of an SSS contact at an SSSxpedition, high in the Andes of South America. This young SSS recipient gets a charge out of his call from Mrs. Lixber.

The audience was awed by the performance. In rapid succession Mrs. Lixber chatted with a young businessman in Japan, a schoolteacher in East Africa, and a housewife with a mobile telephone whizzing along a California freeway. In less than 30 minutes, she contacted SSS telephones on all the continents, including an SSSxpedition ONIT had sent to the remote Andes in South America for this purpose.

The audience was absolutely spellbound. Unless something was done, they were sure to leave the demonstration thinking that SSS was a tremendous success.

Perhaps it was the heat of the afternoon, or the wine, or my anger, but I could not let this happen. "Stop this demonstration", I shouted, "It is meaningless". There was silence. Again I shouted, "How will it save lives? How will it develop engineers and technicians? How will it promote friendship between the peoples of the world?"

Mrs. Lixber dropped the SSS phone and ran to my assistance. In her hand she carried a package of the clandestine document we had prepared. Ripping the package open she began handing copies out to the press and bystanders. She managed to give out several dozen by the time the ONIT security men escorted us, rather bodily, from the demonstration.

Our mission was accomplished. The viewpoints of radio amateurs had been injected

[*Continued on page 112*]

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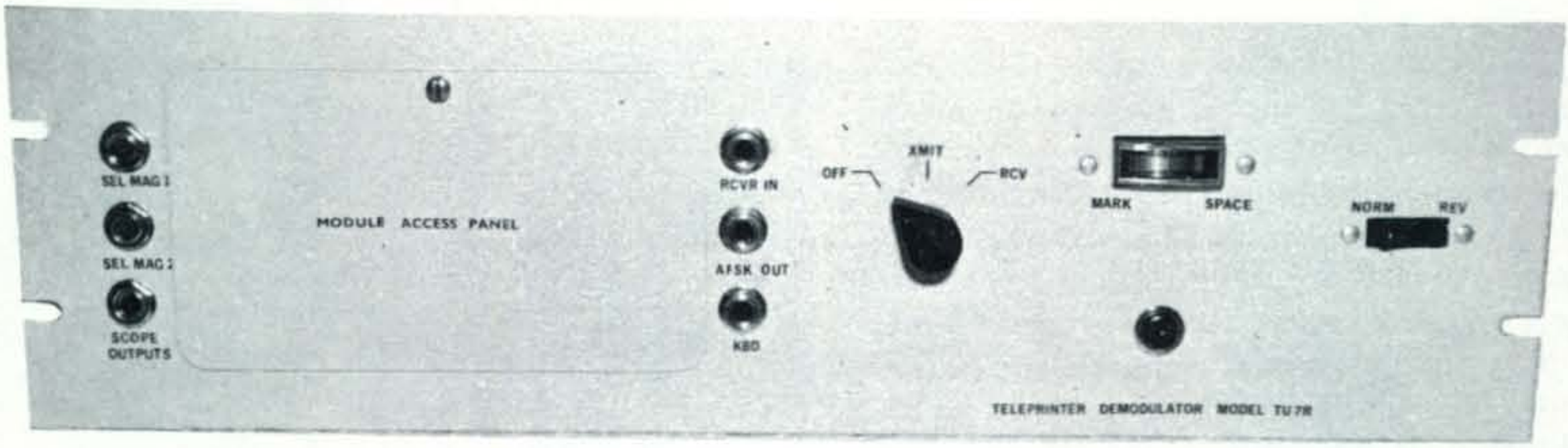
COMMERCIAL-
AMATEUR-
INDUSTRIAL-



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DETERMINING THE CAPACITY OF VARIABLES

BY LOUIS B. ALEXANDER, *K4BYN

AN OLD handbook formula which may be miliar to some of you, would be helpful to l of you if you're trying to determine the lue of a variable capacitor without the aid a grid-dip meter. This method is by far eaper, perhaps simpler, and I would almost nture to say somewhat quicker than a grid-p meter once you have learned how to use Here's the formula straight from the hand-ook:

$$C=0.224\frac{KA}{d}(n\text{-}1)$$

Now let's take a closer look at this formula nd see what each of the letter symbols repre-nts before we actually proceed with any lculations.

(1) C is the symbol representing the ca-acitance we're trying to find, and it has a umerical value expressed in mmf.

(2) 0.224 is a constant which will always emain the same regardless of how many apacitances we calculate. Its value has been etermined by experimentation.

(3) K is the symbol for the dielectric con-tant of the capacitor and is dependent upon he material between the plates of our capaci-or. Variables which have air between the lates have a dielectric constant equal to 1.

(4) A represents the area of one side of ne plate in the capacitor.

(5) d is the symbol for the distance be-ween the plates of the capacitor and must be xpressed in decimals of an inch.

(6) n is the number of plates in the capaci-or, and the quantity $(n\text{-}1)$ means that you must subtract from n the quantity 1.

Typical Example

As an example let's take the capacitor shown in fig. 1. Notice that the capacitor is shown as you would see it if looking directly at one side of it. Now count the number of plates in both sections of the capacitor (the plates that rotate and the plates that are stationary). If you counted 17 plates, then you are correct. You may now replace the n in the formula with the number 17.

The next easiest step would be to measure the distance between the plates. Distance d as shown in fig. 1 measures 0.125 inches. Now replace d with 0.125.

There remains only one symbol for which we have no numerical value, "A". Notice that in fig. 2 the plates take the form of a semi-circle; therefore, we must find the area of a semi-circle by using the formula $A=1.57\ r^2$. Measurement r is the radius of the semi-circle and we can determine this with our ruler. Be sure and measure from the center of the rotatable shaft to the outside edge of the smallest plate. In this example the radius was equal to 1.25 inches Since r^2 means the same as multiplying r by r, we get $r^2=1.56$. If we multiply the 1.57 in our area formula by 1.56 we get the area of the plate, or 2.45.

We now have numerical values for all symbols in the formula with the exception of C. Put them all together and you should have the following:

By multiplying and then dividing correctly,

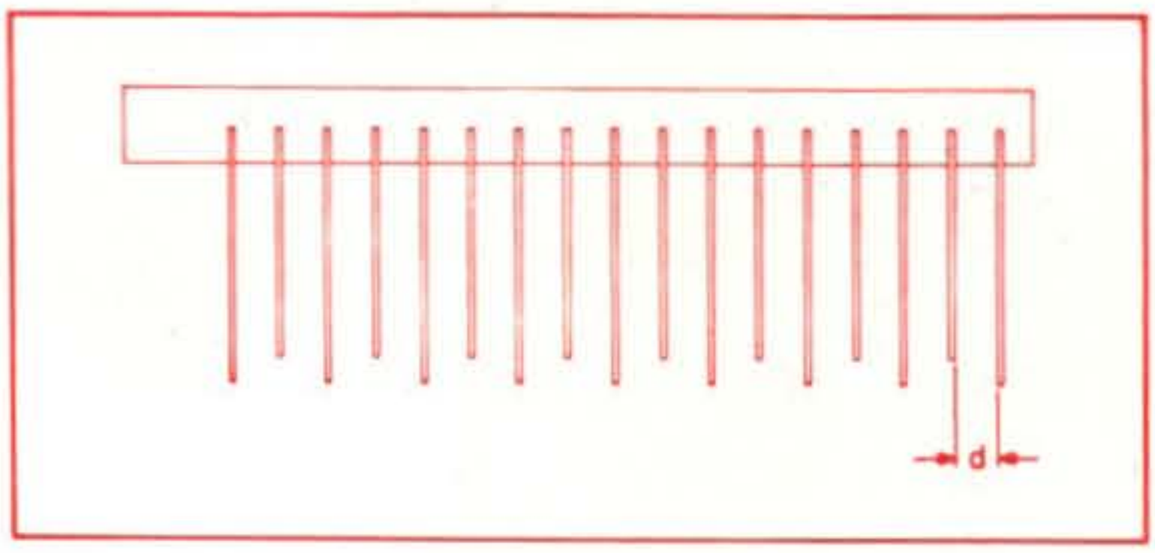

Fig. 1—Partial side view of a variable capacitor showing the rotor (shorter plates) and stator plates. Distance d is the measurement between a rotor and stator plate.

* 208 Millbrook Road, Raleigh, North Carolina 27609.

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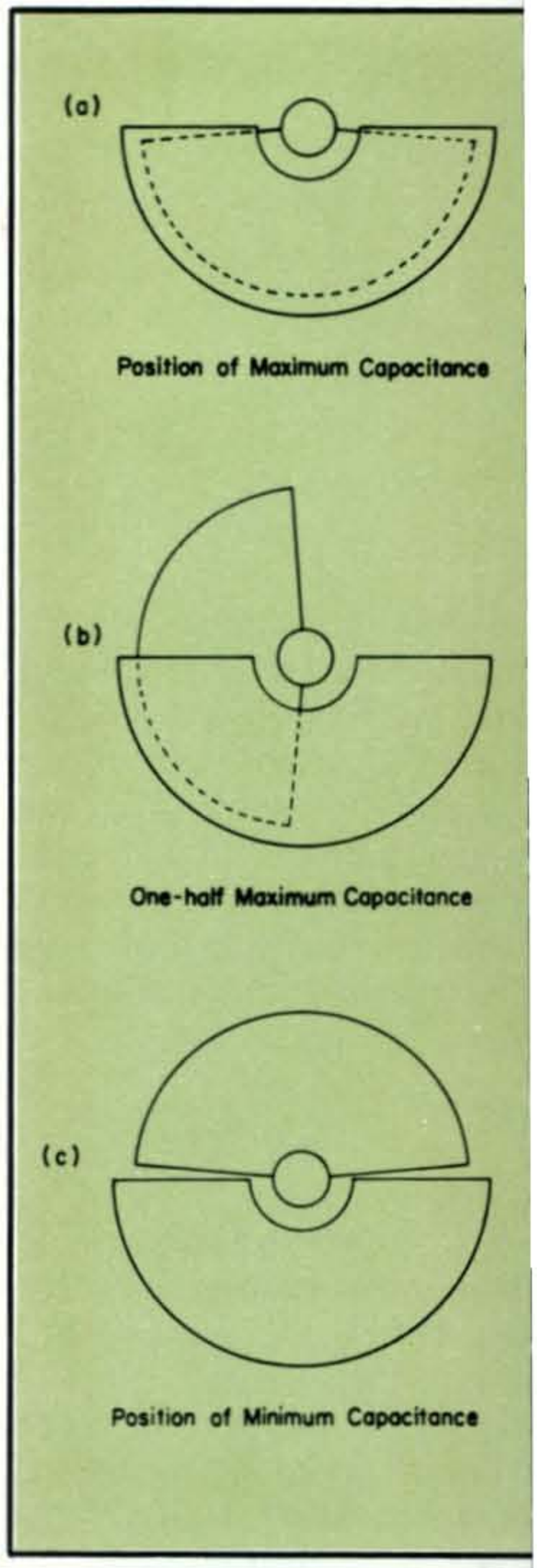
Fig. 2—End view of one pair of plates shows the various positions for *(a)* maximum capacity, *(b)* one-half maximum and *(c)* minimum capacity.



we find that $C = 70$ mmf. This is the maximum value of our capacitor.

Minimum Capacity

Notice that we used only the radius of the smallest plate in figuring the area. This is because the capacitance is dependent upon several factors one of which is the area common to both the rotatable and stationary plates. Refer to fig. 2 which shows several "end" views of a capacitor. In (*a*) we have shown the capacitor in the "meshed" position, maximum capacitance when all the plates are together. In (*b*) only half the rotatable plates are still inside the bottom plates. This results in only half of the maximum capacitance developed in (*a*). If we turn the shaft still more until the plates are in position (*c*), we have minimum capacitance. Since in (*c*) there is no area common to both sets of plates you might think that there should be no capacitance, Strangely enough capacitance is there. This is because when two metal surfaces are placed close to one another there will be *some* capacitance.

Generally speaking, capacitors of the straight-line type which have a maximum capacitance between 50 and 500 mmf will have a minimum capacitance between 15 and 45 mmf, respectively. (Incidentally, our capacitor which had a maximum of 70 mmf has a minimum of 15 mmf.)

For those of you who don't own a grid-dip meter, can't borrow one, and can't steal one, shake the rust off those brains and wipe the cobwebs off those surplus variables. (If you've got one with a manufacturer's number on it, forget what you're just read.) ■

This group photo was taken at the 20th Anniversary Banquet of the Quarter Century Wireless Association on Oct. 27, 1967. More than 200 members, XYLs, and friends attended. At the rostrum are, left to right: Fred Huff, W2AMB, George Bailey, W2KH, Frank Gunther, W2ALS, Earl Thomas, W2MM, Clarence Seid, W2KW, Gus Giranda, W2JE, Dave Talley, W2PF, and John DiBlasi, W2FX. Engraved steel placques were distributed to about 40 of the charter members who were present.

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Grumbles

by Sam

EVERY month when my copy of *CQ* arrives in the mail I eagerly thumb through the pages to see what fascinating devices have emerged from the brains of my fellow hams. What delights there are to behold! S.s.b. transceivers, fancy antennas, super-selective receivers, and the like. And have you seen how the gear looks in the photos? Wow! These guys come up with stuff that looks like it was factory-built.

As a matter of fact, I have it on good authority that most of the snazzy looking so-called "homebrew" gear shown in construction projects is really built by a little old lady in Cedar Rapids who moonlights during her lunch hour at Collins. Yup, for a fee she'll even ghost write the article and sign your name to it. I'm not kidding—do you think that there really are such people as Ed Marriner, Don Stoner, Frank Jones, Jim Kyle, Paul Lee, Bill Scherer? They're really this fantastic old gal in Iowa!

Don't believe me? Take a look at the last thing *you* built; the gizmo with the meters hanging from clip leads, Scotch tape holding the tube sockets in place, adhesive tape wrapped around the pot shafts instead of knobs, power cord taken from the XYL's coffee pot. Do you think that *any* ham could build anything different, better, or fancier than you? I can't and neither can anybody I know.

First of all, none of us can even come up with sufficient tools to physically piece together anything fancy. I remember that once I bought a Bud Minibox to make a transmitter. After several hours of hacking away at it with ice picks, awls, and a pick axe I was able to get a hole big enough for my rat-tail file and a scrap of sandpaper. The hole, once enlarged, was the shape of an amoeba and in my attempts to even it out it become so large that the tube socket had ¼" clearance all around. Then again, that was only the first hole and there were a few more to go. The transmitter project was eventually transferred over to a Dutch Masters cigar-box chassis where I could really get full utilization of the chassis tools on hand in the shack—a Wilkinson blade and a 3-penny nail.

The remainder of my workshop tools were, of course, there to aid me should I need them. They currently consist of a mallet once used for knocking the wheel spinners off the green MG Model TC, a universal size wrench, a screwdriver with friction tape on the handle, a staple remover, and an Official Swiss Army knife which I got as a bonus for selling Clover Ointment from an ad in Katzenjammer Kids comic books. Really now, that's all any ham needs to whomp himself up the necessities for getting on the air. I am immediately suspicious of any guy I come across who displays an array of hardware even slightly more sophisticated than the foregoing.

For actual construction I can tell you that most of the flap found in magazine articles and in kit instruction books is a combination of tongue-in-cheek space-filler and outright barefaced lies!

The little lady in Cedar Rapids is a long-winded cuss and she pads out the construction projects for effect. Insofar as kits go, remember that the guys who write the instruction books are probably paid by the word and will say just about anything to keep the typewriter warmed up.

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*c/o *CQ*, 14 Vanderventer Ave., Port Washington, L.I., N.Y., 11050.

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I'll give you a few examples of common misconceptions being fed to us.

Never, but *NEVER*, solder wires together —it makes the components difficult to use in future projects and I have also found that by eliminating this common construction practice I have also done away with annoying cold solder connections which plagued me for so many years. Just pigtail the wires together and if you want a more permanent connection you can throw a rubber band around it.

Wire sizes? Hah! More old-wives' tales. I have yet to build anything with wire sizes specified—I always use zip cord, transformer wire, or bell wire; and that includes for winding coils too! As a matter of fact I once built a 20 meter phone rig from plans in a magazine and made all of the coils from some galvanized fence wire I had kicking around in the back yard. OK, so it put me *slightly* off 20 meters; but talking to the YL overseas telephone operators on 8 mc was quite a refreshing change of pace from the 20 meter rat race.

Another hoax is the business about capacitor and resistor ratings. My junk box contains resistors and capacitors of such vintage that all descriptive markings have long been worn off. On a few of them I have placed a piece of tape which states "not many microfarads", or "a lot of Ohms;" that's all the guidance I have ever required. Wattage and voltage ratings are only a gimmick dreamed up by people who manufacture these devices. Half the time I stick a resistor where a capacitor should be and it doesn't seem to make much difference; they even look the same with the markings off.

Antennas too! Here's my word on good antennas; they are all cut to exactly 45 feet and consist of a single wire. This is fine and dandy for working all frequencies lower than 30 mc. Just string out a length of the stuff (anybody knows what 45 feet looks like) until its apparent that you have at least 44 feet (but not more than 46 feet) and you've got it made. Any wire that's thick enough to support a few birds and thin enough to deter its possible use as a clothesline is good enough.

As you can see, the whole "thing" about radio construction is largely a lot of hogwash coupled with some old traditions left over from the early days of wireless.

I say down with good looking ham gear, it's ruining our image with the public. When someone comes to visit a ham shack they *expect* to see a haywire lashup; they are disappointed if you show them a lot of fancy-pants gear, and they'll never believe that *you* made it.

For those sissies out there who still *insist* on building kits by following all of the insane instructions, the very *least* you can do for your fellow hobbyists is to immediately discard the front panel of the thing and make your own out of a hunk of corrugated cardboard or a Mission Orange Soda tin serving tray. ■

BY THE WAY...

Alamo YL Club to Host YL Program at National Convention

Members of the Alamo YL Club, hosts for the ladies activities at ARRL's National Convention at San Antonio, Texas, June 7-9, 1968, in conjunction with the San Antonio Radio Club. L. to r., seated: K5OPT, Ruth; W5TSE, Ella; W5KQG, Frances; K5OPV, Aileen. Standing: WA5GZO, Peggy; K5YCE, Gerry; W5WXT, Inez. Ruth, K5OPT, is chairman for the licensed YL doings, while Ella, W5TSE, is planning a program for all the ladies. Frances, W5KQG, is heading up the prize committee. The Alamo YLs invite you to attend, and as a dual attraction visit "Hemisfair '68," the World's Fair whose theme will be "The Confluence of Civilization in the Americas," and which will be located close to the convention site. (Photo by W5KHL)

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1750 METERS

BY GORDON E. WHITE*

Some data on an undiscovered experimental band.

I SUSPECT most *CQ* readers have never heard of the 1750 meter band, and consider that region in the electromagnetic spectrum as territory long forgotten, along with spark coils and rotary gaps of yesteryear. The low frequency bands have been of declining interest during the last two decades, but in a little-known action in 1950, the FCC opened to unlicensed operation a 30 kilocycle segment between 160 and 190 kc, thus the 1750 meter band.

Created under Part 15 of the FCC rules, which also controls (?) 100 milliwatt walkie-talkies in the 11 meter band, and garage door openers, phono oscillators, *etc.*, the 1750 meter authorization allows one watt input and a 50 foot antenna and feedline length, or actual transmitted power not to exceed $2400/f_{kc}$ microvolts per meter, plus a non-interference stipulation.

As a practical matter, the one watt, 50 foot antenna limit is far easier to observe than the field strength requirement, which calls for expensive and sophisticated measuring equipment.

The purpose of the original authorization is now obscured a bit by the passage of years. Some FCC officials suggested that low-frequency garage door openers were expected to operate there, but the designs apparently were not successful. The Commission now describes it as available for experimental purposes. The FCC frowns upon describing it as an unlicensed amateur band, apparently fearful of another CB mess, but told me in a recent communication that there was no restriction on its use other than the usual strictures against profane language or illegal operations such as eavesdropping.

1750 Activity

I mentioned the 1750 meter authority in a Surplus Sidelights column a year ago, after it was brought to my attention by WA7GMI, and I have since heard from more than a dozen readers who are interested in low-frequency work, or who have already experimented in this band.

The most active 1750 meter experimenter has been Jim Hagan, WA4GHK, of Palm Bay, Florida, who sent me a suggested transmitter circuit (fig. 1) and described some experiments he has run on low frequency propagation under the one watt limit. So far the best distance Jim has gotten is more than 200 miles, using a Navy surplus RBL receiver.

Jim has been using a 6BZ6, crystal-controlled, with a fifty-foot TV mast for his antenna. He noted in the description he sent me of the antenna that he was loading the mast with a six-foot capacity top hat made from welding rods. The mast is insulated by standing it in a beer bottle, and is guyed at two levels with nylon cord.

A good ground connection is essential for 1750 meter work, with copper radials ideal, though a good cold water pipe connection

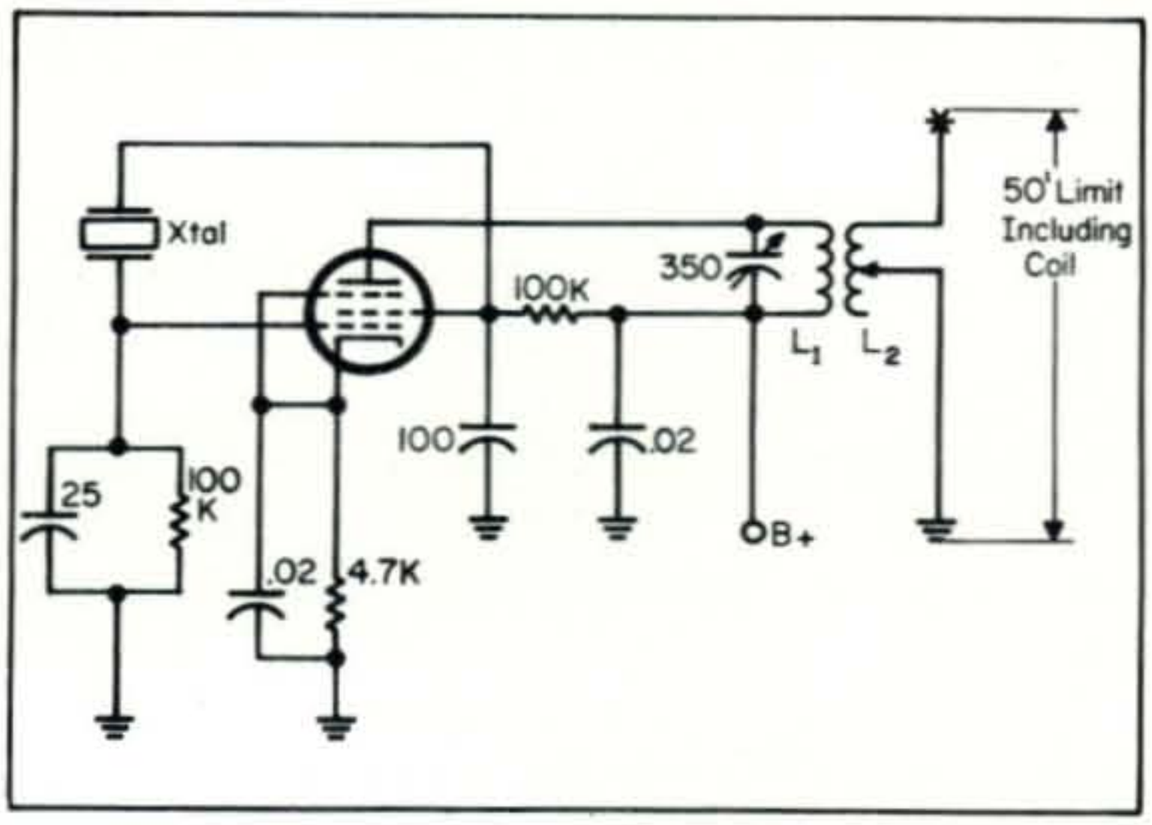

Fig. 1—Circuit of a 1750 meter transmitter. The crystal frequency should be between 160 and 190 kc. Coil L_1 is made of #31 enameled wire, close wound, 2¾" long, 3¾" diameter. The loading coil, L_2, is discussed in the text.

* 5716 North King's Highway, Alexandria, Virginia 22303.

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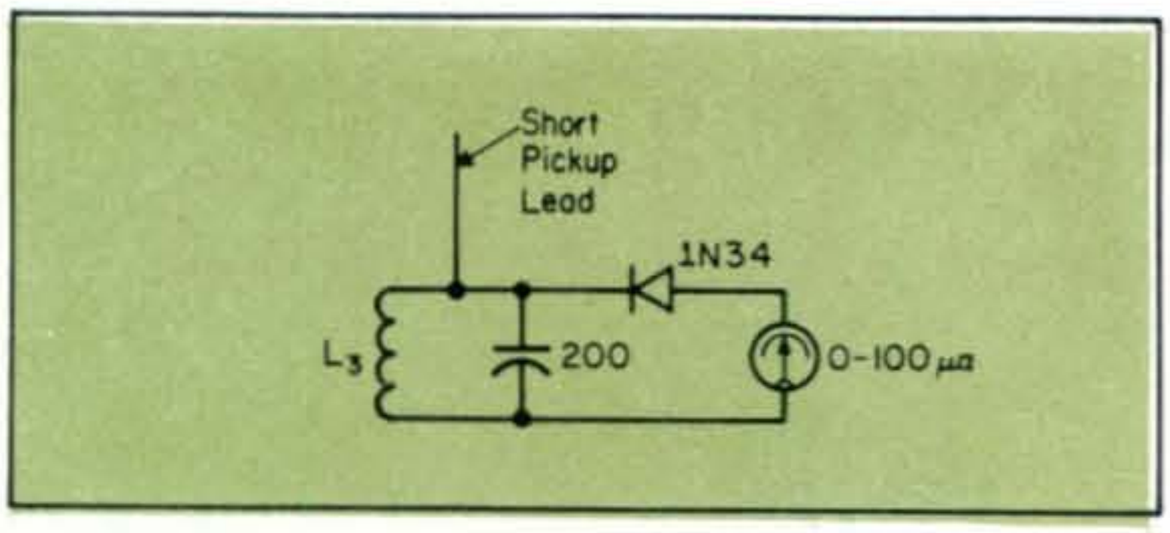

Fig. 2—Simple field strength meter circuit that can be used for transmitter tuneup. Coil L_3 and the capacitor should cover the desired frequency.

may be satisfactory. Vertical antenna polarization is vital at these frequencies.

Interpretations

There is conflicting opinion over the legal interpretation of the authorizing FCC regulation contained in part 15 section 15.203 of the Commission rules. As interpreted by some individuals, the fifty foot antenna limit would include the overall height from top hat to the ground connection, but permits insertion of a loading coil within the antenna circuit. FCC engineers feel that the fifty foot restriction should include the actual length of wire in the loading coil and the top hat.

Loading through a large coil would be the most efficient, with a winding of 200 turns of #16 enameled wire, ten inches in diameter and twelve inches long giving best efficiency and a Q of over 300. A smaller adjustable coil such as the Miller #9004, or a ferrite core coil (to increase inductance without adding to antenna length) would be possible, with less efficiency.

Coupling from the transmitter could be inductive, and variable, with one practical primary consisting of #31 enameled wire, closewound on 3¼ inch diameter form, 2¾ inches long (L_1 in fig. 1).

Tune-Up

Tuneup of the WA4GHK transmitter consisted of tuning the transmitter plate coil (L_1) and adjusting the tap on the loading coil for maximum output at minimum coupling, then increase the coupling until radiated output peaks as indicated in a field strength meter.

Figure 2 illustrates a field strength meter suitable for 1750 meter tuneup, with L_3 and the 200 mmf capacitor tuned to the transmitter frequency.

This band ought to be extremely interesting for many amateurs and unlicensed experimenters, offering as it does, a chance for original work in a band which has not been open to experimentation for many years. Transmitting equipment should be simple and cheap, and surplus low frequency receivers are readily available for receiving.

Interference

There should be little problem of 1750 meter experimentation causing interference to other low frequency users. These bands are populated almost entirely by high-power military point-to-point transmissions which use massive rhombic antennas and many kilowatts output. Their sidebands clutter up the 160-190 kc area, but it is highly unlikely that their circuits could be affected by one-watt transmissions.

There are enough "holes" in the QRM in the 30 kc of the band to make it useful, though atmospheric noise is often troublesome in the 1750 meter area. Electrical interference also becomes severe at times, and for truly long-distance reception, battery-powered receivers will be necessary, with receiving locations as far from power and utility lines as possible. At WA4GHK, Jim has been operating on a frequency of 166.25, a spot he says is fairly clear of manmade QRM.

While crystal control is not a requirement, it simplifies the problems in the transmitter, and insures staying within the band. At these frequencies, surplus crystals are hard to come by, though John Meshna, 19 Allerton St., Lynn, Massachusetts, has 121.0 and 142.0 crystals at $2 each which could be ground to a frequency in the 160-190 kc band. Quaker Electronics, box 215, Hunlock Creek, Pa. has a small stock of 183.00 kc crystals at $2.50. For new, custom-ground crystals, Texas Crystals, 1000 Crystal Drive, Ft. Myers, Florida, can supply rocks at $8.00 each.

Experimenters in the 1750 meter band should be careful to avoid interference to licensed operations, particularly outside the 160-190 kc band edges. The Commission is quite stuffy about prohibitions on use of Part 15 devices for eavesdropping, or transmission of obscene or indecent language.

Applications

The 1750 meter band could be used for RTTY, fax c.w., phone, s.s.b., or any non-pulse mode that could be fitted into a reasonable bandwidth. The 30 kc total width of the band would seem to rule out any but slow-

[*Continued on page 120*]

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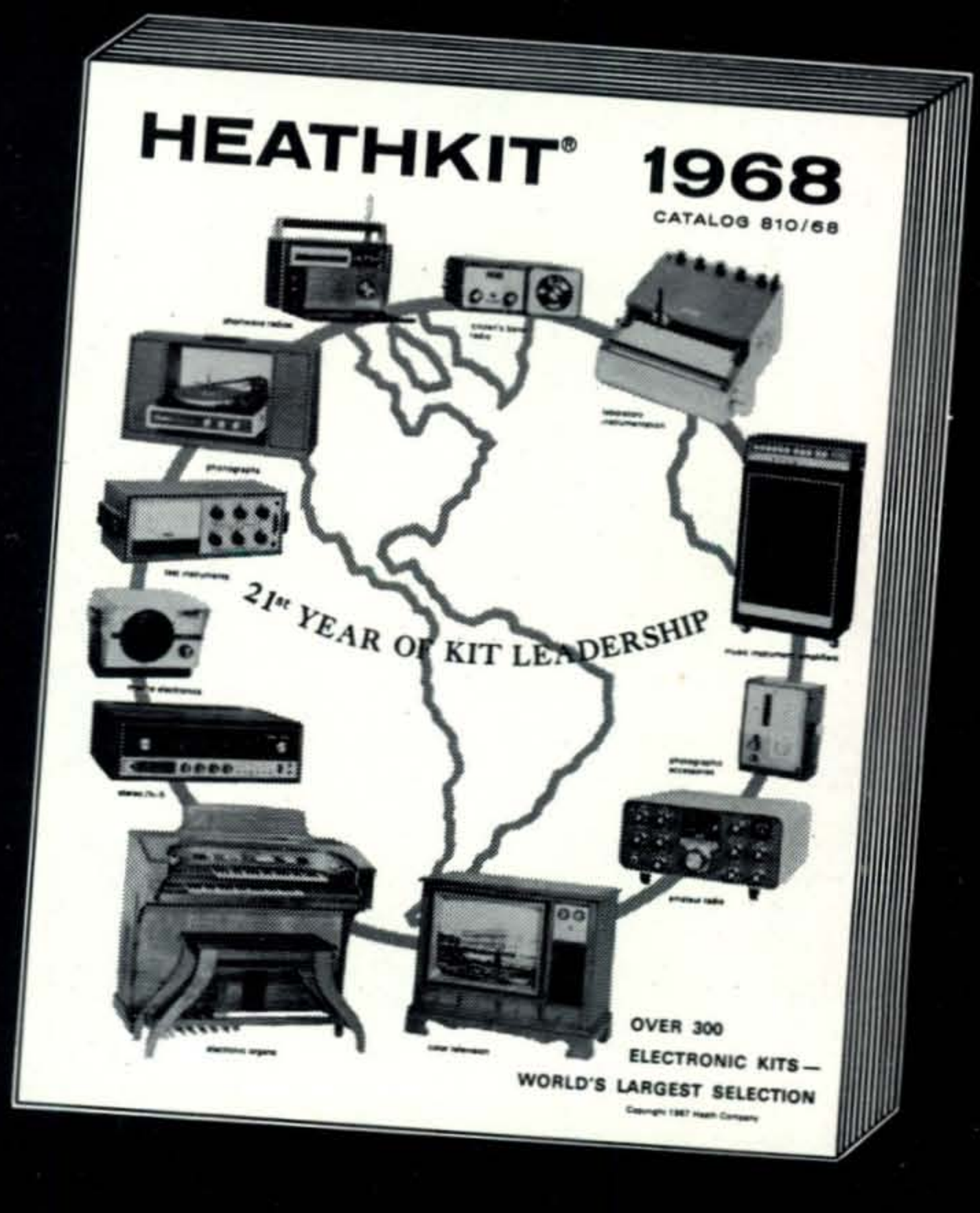

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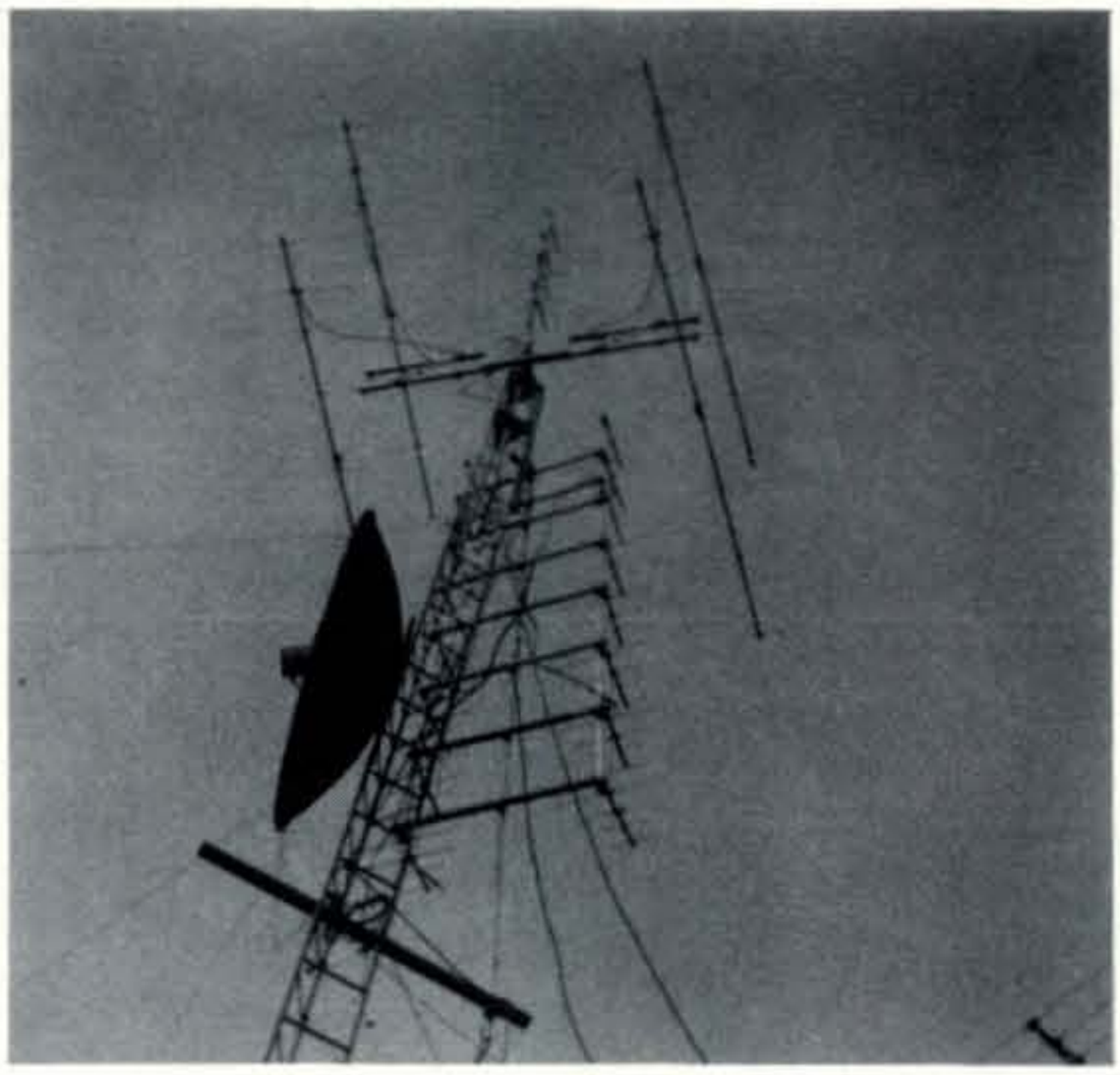

Four 14-foot 2-meter yagis top a 24-element colinear for 432 mc, a 96-element colinear for 432 (under test), and a six foot dish for 1296 mc, all at the K2UYH QTH.

BY ALLEN KATZ,* K2UYH

DURING the past five years we have witnessed the demise of at least three v.h.f. magazines—the latest being Loren Park's *VHFer*. The reason for these deaths is quite simple. There are just not enough technically oriented v.h.f. enthusiasts to make such magazines an economic success. This situation is sad. Exchange o ftechnical ideas is a necessity for v.h.f. progress.

V.h.f. amateur radio, despite the fact that it is a minority, makes an important contribution to amateur radio in general as most thinking amateurs realize. The editors of *CQ* are no exception and consequently approached us as to the possibility of putting together a v.h.f. column. This column; however; was to be different, it would stress the technical aspects of v.h.f. radio rather than operational activities.

We had to agree. What v.h.f. really needed was more outlets of technical ideas. After all, the ARRL does do a good job, (not that it can't be improved), in reporting v.h.f. activity through their OVS program. If you're not a member we suggest you join. The question was, could we obtain a continuing supply of v.h.f. ideas month after month?

The first person we contacted was Jud, K2CBA (we sked Jud every Wednesday night at 10:00 o'clock on 432 mc). Jud is one of the most prolific builders we know; he is always coming up with new (good) ideas. He agreed to help us. Next we phoned Bill, K2TKN. Bill spends so much of his time at the bench that he never seems to get on the air, and so it was a necessity to call him. He was also agreeable. Later we got in touch with Dick, W2IMU (of K2WMA fame). Dick's feelings were also positive, thus we decided to give the column a try. As can be seen most of our contacts come from the Eastern part of the United States. There are a lot of things going on here, but not everything. Therefore we invite you to submit your ideas. But note: this column is not and will not degenerate into a question and answer or who-worked-who page! We are interested in ideas and techniques which are of value to the v.h.f. community.

[*Continued on page 110*]

* 48 Cumberland Ave., Verona, New Jersey 07462.

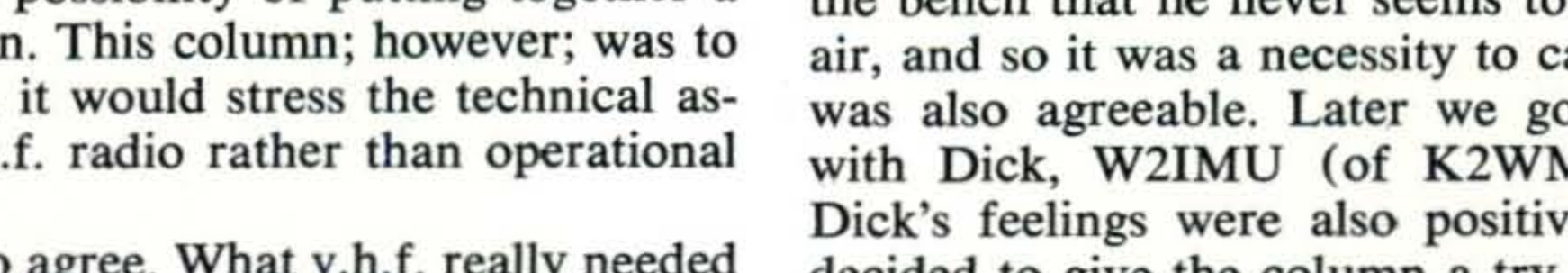

Fig. 1—The radio communications system. Where:

K = Bolgman's Constant 1.38×10^{-23}
B = Receiver bandwidth in cycles
T = Effective temperature of receiving system
P_o = Transmitter output power in watts
A_e = Effective area of antenna in square feet
λ = Wavelength in feet

1968 CQ Reader Survey Report

THE information reported in this survey was compiled by *CQ*'s marketing staff from questionnaires which appeared in the January, 1968 issue. More than 1,100 such replies have already been received in the mail. Since the survey was only made to *CQ* readers, it cannot be construed as representative of the opinions of the entire group of 295,000 licensed amateurs, but it can certainly be interpreted as being closely representative of the opinions of the *active* amateur group.

The largest single group of replies have come from the second call area, which is to be expected, since that area represents a large percentage of the overall amateur population, as well as a proportional segment of *CQ*'s distribution. Next, as was expected, came the sixth call area, followed by the fourth, again closely following the general amateur licensing list and the *CQ* circulation. Most of the other call areas were relatively even in response, with the exception of the seventh, which was slightly lower, and, of course, the Foreign which could not be expected to reply within the time limits to any great extent.

Since the most hotly debated and widely discussed subject in amateur radio for several years has been that of incentive licensing, we decided to ask specific questions on that subject. Needless to say, the results were most interesting.

We asked the question, "Were you in favor of incentive licensing before the FCC adopted it?" The total response was 52% in favor, 48% opposed. However, we then broke the response down by the classes of licenses now held by the respondees, and the picture changed quite drastically. For example, current holders of the Amateur Extra license voted 94% in favor to 6% opposed. Holders of the old Class A or what would now be the Advanced license also were strongly pro incentive licensing originally, voting 66% for to 34% against. These figures were to be expected, since these groups had little to lose from the incentive licensing concept. With other classes, however, not so.

The General class group were originally *opposed* to incentive licensing by 58% against to 42% in favor. Conditionals were even more strongly opposed, 72% against to 28% in favor, while both Novices and Technician alike were still opposed, but by less a margin 53% against to 47% in favor.

Completely discounting only the Amateu Extra class who have absolutely nothing t lose from incentive licensing, we find that a other groups combined were generally op posed 54% to 46% in favor.

However, and this is most important, w find that a far greater portion of *CQ*'s reader hold Amateur Extra and advanced class li censes percentagewise than are ordinaril found in the entire amateur licensed ranks This means that a poll of *all* licensed amateur would probably show a far greater oppositio to the incentive licensing concept, althoug the opinions of less active amateurs shoul certainly be weighted and counted less heav ily, for obvious reasons.

Next, we wanted to ascertain the reactio to the actual incentive licensing program es tablished by the FCC, which is certainly fa less restrictive than the original one pro posed by ARRL. Again, the results were mos enlightening.

The new incentive program was receive pretty favorably, 59% in favor to 41% op posed. Even after eliminating the Amateu Extras, the program won a vote of confidenc by 55% in favor to 45% opposed, and eve after discounting the votes of present Ad vanced license holders, it was still a fifty-fift proposition, so it would appear that the FC program is, for the most part, palatable to th amateur fraternity.

Of course, incentive licensing would b meaningless unless current amateurs actuall intend to upgrade their status, so we naturall wanted to find out what percent intend t apply for a higher class license within th next year. We found that 61% intend to appl for a higher license grade to 39% who do no but here again, we must discount the Ama teur Extras who already have the highest clas license available. Doing that, we find that a most 70% of the other groups will apply fo or have already applied for a higher class c license. Slightly more than half indicated tha they would do so if it were not for the ne regulations.

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Table I — CQ Readers Employed In The Electronic Industry — 42.7%

Job Function / Type of Industry:	*Manuf.*	Distrib.	Dealer	Manuf. Rep.	Military	Indust. Comm.	R & D	Total
Engineers	13.1	—	—	.4	2.7	1.0	.2	17.4
Technicians	6.2	2.1	2.4	—	3.1	2.0	—	15.8
Communications Specialists	.4	.2	.3	.5	2.7	2.4	—	6.5
Sales	.1	.1	.1	.2	—	.1	—	.6
Executives	1.6	.2	.3	.1	—	.2	—	2.4
TOTAL IN PER CENT	21.4	2.6	3.1	1.2	8.5	5.7	.2	42.7

Conclusions: It's obvious that the League's original contention that at least half of all amateurs were originally in favor of incentive licensing was completely untrue. We believe that, had a vote been taken of *all* licensed amateurs on the original ARRL incentive licensing proposal as it was officially presented to the FCC, that it would have been defeated by an almost three to one margin. We also believe that even the *concept* of incentive licensing of any sort would have been defeated by a complete caucus of the ham fraternity, although probably not by so wide a margin. We do feel, however, that the present regulations as recently instituted are acceptable to most amateurs and would win a favorable vote today.

CQ Reader Profile

As in the past, we were particularly interested in obtaining a picture of *CQ*'s readership list, especially as to how they fit into the electronics industry, careerwise. Our survey this year was more specific, asking not only for job classifications by industry, but job functions as well. The breakdown is shown in Table I and Table II.

Financial Investment

Partially for our own information, and also to provide market statistics to our advertisers, we devoted a section of the survey to the amounts spent by our readers on the hobby. We have been able to determine approximately how much the average *CQ* readers have invested totally in amateur equipment, how much was spent during 1967, and how much will be spent during 1968. We can also tell what effect the uncertainties in the hobby caused by incentive licensing had on the spending during the last year.

Total Investment

According to the survey 11% of *CQ's* readers have made a total investment in amateur equipment of under $500.00.

21% have invested between $500 and $1000.
43% have invested between $1000 and $3000.
25% have invested above $3000. (Of this figure, approximately one out of ten have invested above $5000.

1967 Investment

According to the survey, 21% of *CQ*'s readers spent under $50 during 1967.
28% spent between $50 and $100.
19% spent between $100 and $200.
21% spent between $200 and $300.
11% spent above $300.

1968 Investment

According to the survey 13% of *CQ*'s readers are not certain what they will spend during 1968.
25% will spend less than $100.
32% will spend between $100 and $300.
30% will spend above $300.

It was most enlightening to discover that the great majority of readers replying to the survey did not feel that incentive licensing caused them to hold back on investments in amateur radio equipment. Only 9% replied yes to the question, whereas 91% replied that the incentive licensing uncertainty had no effect whatsoever on their purchases or lack thereof.

Table II — CQ Readers Not Employed In The Electronic Industry — 57.3%

Professional (Including doctors, lawyers, teachers, dentists and accountants)	16.2%
Non-Professional	27.4%
Students (Technical)	4.3%
Students (Non-Technical)	5.3%
Retired	2.9%
Miscellaneous (Housewives, shut-ins, unemployed, etc.)	1.2%
TOTAL	57.3%

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Conclusions

It would appear that *CQ*'s readers may be accounted for a lion's share of the amateur radio equipment market. Projecting the figures from the above questions to the overall *CQ* circulation, it would seem that *CQ*'s readership group spent upwards of $14 million during 1967 on equipment, antennas, accessories, parts, books and magazines. Although the total dollar market for the year is at best speculative, since most manufacturers and distributors do not make their sales figures public, we estimate that the amount spent for the year was between $17 and $19 million. This was considerably higher than the average for the preceeding three year period, which we estimate at about $13 to $14 million. Where these dollars were spent will be detailed more closely under the equipment section of the survey.

Equipment In Use

We were interested in learning to what extent home-brew equipment is in use by the amateur fraternity as opposed to commercially manufactured gear. It was interesting to learn that approximately 58% of the readers replying have at least one piece of home built equipment in the station, although this accounts for only about 18% of the total equipment in use by volume and an estimated 9% of the total dollar value. The reasons are as follows: The largest single item being home-brewed appears to be antennas, with linear amplifiers, accessories, and transmitters following in that order. Very few *CQ* readers have built receivers, largely due to the difficulty and cost involved as compared with the commercially available receivers on the market. The same holds true for single sideband exciters. On the other hand, antennas, linear amplifiers and receiving converters seem to be popular with the home builder group.

Commercial Equipment in Use

From the survey returns we have been able to ascertain not only what commercially manufactured equipment is in use, but also which manufacturers have been selling most actively during the past year. This latter determination has been made by comparing the relative ranks of the various manufacturers as they stood in previous *CQ* surveys made in 1956 and again in 1966. The results were most interesting. We will break the equipment down into four major categories: 1) total units; 2) receivers; 3) transmitters; 4) transceivers.

Total Commercial Equipment

The largest single factor in terms of total pieces of equipment being used by *CQ* readers is Collins with slightly more than 17% of the total group. Heath is a close second with 16%, while Hallicrafters runs third with 13%. Other manufacturers who trailed in the total equipment survey did so either for lack of a single category or later entry into the market. However, these other manufacturers will show up under specific equipment categories. Some of the more important factors in that list with their percentage totals are:

R. L. Drake	12%	Swan	5%
Hammarlund	6%	Johnson	5%
National Radio	6%	Galaxy	3%

Receivers

More amateur operators own commercially built receivers than any other single type of equipment. Many own two, three or even more separate receivers so the category represents a vital portion of the amateur market. The largest single manufacturer listed in the replies was Collins Radio, with 18½%. Hallicrafters ran a close second with 16%, while R. L. Drake also had 16%, running just a few returns behind the second place manufacturer. Other receiver manufacturers who showed strongly were:

Hammarlund	12%
National	7%
Heath	6%

Transmitters

This particular category is a bit deceiving when using percentages, since there are a great many a.m. transmitters still being used as well as the large number of s.s.b. units which dominate today's market so strongly. Our figures represent overall total use, so these factors must be kept in consideration.

The largest single factor in the transmitter category is Heath Company with a 23% total. Second is Collins with 17%, while E. F. Johnson with 16% and Hallicrafters with 15% are third and fourth respectively. No other single manufacturer had any appreciable percentage with the exception of Galaxy at 4%.

Transceivers

Here again, it must be noted that the single category of transceivers includes high priced s.s.b. units and also very low priced v.h.f. a.m. equipment. Nevertheless, the survey report is all inclusive and must be evaluated with that information in mind.

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The leading transceiver manufacturer in the survey was Heath with 17%, but very close behind was Swan with 16%. Other companies with strong mention were:

Collins	9%
Drake	9%
National	8%
Galaxy	8%
SBE	6%
Hallicrafters	4%

Miscellaneous Mentions

Numerous other manufacturers appeared in the survey replies, but did not have strong enough percentages in any single category to be listed. These firms include Squires-Sanders, Lafayette Radio and Knight (Allied Radio). There were several mentions of Gonset.

Of the companies who no longer manufacture amateur equipment, we were surprised to find that there were practically no mentions although we had suspected that used gear remains in circulation for several years. Particularly conspicuous by their absence were Central Electronics, Eldico and Polytronics, although Barker & Williamson did appear several times.

Conclusions

Many of the conclusions arrived at have been made by evaluating this survey report in comparison with previous reports (1956 and 1966). Also taken into consideration were the relative lengths of time involved in amateur radio equipment production and the relative prices of products offered. From this we have determined that the following information is *probably* accurate:

Health Company *probably* sold more single units of equipment during 1967 than any other manufacturer. Swan, Drake, Galaxy, Collins, Hallicrafters and National were *probably* next in that order.

In total dollar volume Heath *probably* remained in first position, although the price factor *probably* placed *Collins* in second. place. Again considering price, Drake and Swan were probably deadlocked for third and fourth positions, with Galaxy, Hallicrafters and National running once more in the same order.

Kits and Surplus

More than 82% of all readers indicated that their stations included at least one kit, while many included two or more. No single type of equipment seemed to dominate the kit market, although test equipment was definitely the largest single item. Transmitters, transceivers, receivers, and linear amplifiers also showed a large kit builders market. Since several of the more prominent names in the industry have kits in their lines this is not surprising.

Surplus equipment was considerably lower than kit usage, since only about 19% of the replies indicated possession of at least one piece of surplus gear. This also is not surprising since there has been a shortage of good convertible surplus for amateurs during the past several years.

Antennas

Most readers did not list manufacturer's names, but rather, indicate dthe type of antennas used. We therefore cannot evaluate the relative positions of the antenna manufacturers. We do know that commercial antennas represent at least 8% of the total dollar market value in amateur radio, and possibly as much as 12%.

Linear Amplifiers

We did not specifically ask for a listing of commercial linears, but many readers volunteered the information anyway. Several leading manufacturers appeared, including Collins, Heath, Hallicrafters, National Galaxy, Swan, Henry and Drake. We did not have sufficient data to make any further evaluation.

Reading Habits

One of the areas that was of especial interest to us was the reading habits of our readers, since this is a vital factor in helping advertisers determine where to spend their dollars most effectively. We wanted to determine duplication with other publications in the field, as well as to differentiate between the subscribers as opposed to newsstand and store counter purchasers. Results were most interesting.

In reply to the question "Are you a member of ARRL?", 39% replied no to 61% yes. Of the 39% who said no, less than 2% reported that they regularly buy *QST* from store counters, so we can now be quite certain that *CQ* has at least 37% who do not regularly read *QST*.

In reply to the question "Do you subscribe to *73* Magazine?, " the no replies ran 63% to 37% replying yes. Of the 63% who answered no, only 5% indicated that they buy *73* regularly. This means that *CQ* has a duplication factor of about 42% with *73*. Taking

[*Continued on page 114*]

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The DXpedition

BY DON MILLER,* W9WNV

Part IV — Exposing Wayne's Canard

After describing the DXpedition's revival in the first three chapters we were about to begin the story of the actual Indian Ocean DXpedition with this issue. However, due to the continuing malicious prevarications appearing in another publication it seems necessary to interrupt briefly to enlighten our readers and expose a most ugly hoax.

"A gentleman, nurse, that loves to hear
himself talk,
And will speak more in a minute
Than he will stand to in a month."
—Shakespeare's *Romeo & Juliet* (II.iv.156)

Soon after Bill Rindone and I had departed on the DXpedition last summer, Wayne Green initiated a most fantastic series of attacks against the DXpedition and against me, personally. Rather than reply to some most absurd and outrageous charges at that time, create additional furor in an already enraged DX community, and give that gentleman the free publicity he was obviously seeking, I chose to ignore the smear, as sick and repulsive as it was, for few if any DXers take Mr. Green seriously any more. However, the aroma of Wayne's charges has become so morbific of late that I feel the amateur fraternity is deserving of an explanation of both what has been printed and why it has been printed.

I have heard that Wayne is of the opinion that he has the right as an editor to print anything he fancies, without much regard for the truth, apparently feeling that he could always make a retraction at some later date. He has, in fact, followed this practice. The only thing wrong with this procedure, however, according to qualified attorneys, is that Wayne would be wrong in this presumption and could easily be made to pay the full consequences of any lies or defamations he has printed, retraction or no retraction. I think the reader can easily determine whether the gentleman in question has, in fact, committed libel beyond repair.

Those reading this material must be reminded that Wayne's publication, now slipping badly, was built on controversy, thriving on the ugly rebellions Wayne managed to create among the once-united ranks of amateurs. His editorials have consisted of (a) the "crying towel" approach, bestowing his personal, business, and marriage problems upon the reader, and (b) the "angry" approach, attempting to defame reputable amateurs to create more controversy and sell more of his material. We have noted the recent decline of his publication, through a series of mishaps, the most recent being the resignation of his Editor-In-Chief, a most capable and respected individual. Despite all these troubles Wayne claims to have milked amateur radio for over a million dollars and has even published a book telling us, too, how we can follow in his footsteps (*How to Make a Million Dollars*, by Wayne Green)!

In all fairness I must admit that many close friends had warned me against associating with Green, but I've always waited to draw my own conclusions personally and sometimes have had to learn the hard way. Without calling Wayne Green any names, I'll just present a few facts and allow the reader to draw his own conclusions. Instead of sifting through the hundreds of lines of twisted material, let's just compare his claims with the facts and explain what it was that motivated him to conduct his "campaign."

In July of last year Green published a

* c/o *CQ*, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050.

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Exhibit A—Direct QSL card to WB2EPG from ZK2AF, Niue Island. Cards were printed at Niue, filled in, stamped, and postmarked from Niue.

three-page editorial reprimanding the ARRL for their treatment of my DXpedition, an article which contained a few accurate facts. It should be remembered, however, that at the time I was writing my *Amateur Radio DX Handbook* (now published by *CQ*), in which Wayne was quite interested and for which he had guaranteed a $3,000.00 advance—money which was to be used to support the DXpedition. Jim Fisk, W1DTY, witnessed these arrangements. I had also promised Wayne to write a monthly column for his publication. On June 8th, however, I was totally shocked to receive a short letter from Green calling off the deal, and he confirmed by telephone when we reached New York the following week that he was "no longer interested" in the arrangement! Fortunately, a most satisfactory agreement was made with *CQ*, and the *Handbook* will probably be out by the time you read this. However, in the meantime Green began advertising a DX Handbook of "his own," but the published outline coincided with the one of my own book which I had sent him during the time he had agreed to publish my book. It is my rather strong belief that Wayne's chief motivation for his smear campaign against the DXpedition revolves around the *Handbook* deal. At that time he began his attacks upon us, seemingly trying to discredit my *Handbook* as much as possible and promote "his own." In September, according to Green, the blame for the mess suddenly shifted from ARRL to Don Miller. Let's examine some of his charges.

Niue Island (ZK2AF)

Wayne claims that the "locals insist that no expedition has operated in recent years" from Niue Island. Green should be brought to task for such an outrageous statement. In fact, not a single resident of that remote Pacific island was unaware of the DX operation from Niue by the late Ted Thorpe, ZL2AWJ, and myself in December, 1965 and January, 1966. I do not believe that such a "local" exists; this has to be either a deliberate and outright prevarication, or material which was published conveniently without first being verified. To prove we operated from Niue, Exhibit A is a reproduction of one of the direct QSL cards, *printed at Niue* during our stay and *stamped and postmarked from Niue*. Exhibit B is a copy of the exit stamp from my passport.

Thailand (K7LMU/HS)

Wayne insists that Chuck and I weren't in Thailand because an "active amateur" said that "local operators had not been able to hear Don and Chuck during this operation." Once again, either the "active amateur" forgot to turn on his receiver during the operation, wasn't there at the time, or Wayne or someone else is prevaricating. For reference, next time you contact or write to Arno, HS4AK (ex-HS1AK), or Harry, WA4GTB (ex-HS1HS) then the most active amateurs from that country, ask them to describe our operating location, the Bangkok Hotel, where they helped Chuck and me install our beam. Since we were registered at the hotel, this can

Exhibit B—Reprinted from Don Miller's US Passport, January 5, 1966, exit stamp from Niue Island endorsed by the Resident Commissioner of the Niue Police Department.

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Exhibit C—K7LMU/HS. Chuck and Don operating from their Bangkok Hotel room in late 1965. The photo is published for interest, not proof, but can be verified.

easily be verified. They will also relate our meeting with the entire Bangkok amateur group and their meeting our flight from Rangoon, Burma, another place where Wayne claims we weren't. Not to prove anything Exhibit C is a photo of Chuck and me from his room at the Bangkok Hotel during the HS operation.

Also from Thailand, the K7LMU/HS QSL's were mailed directly. Exhibit D shows the QSL card, picturing Chuck and me with our gear on the lawn of a Siamese Temple.

Burma (XZ2TZ)

Wayne's story about the CIA, attributed to me, is another of his fabrications. I have, at times, related the rather humorous story of how Chuck and I were accidentally taken for CIA men at one point, but this had

Exhibit D—Both sides of a direct QSL card from K7LMU/HS, Bangkok. Photographed, printed, stamped, postmarked, and mailed from Bangkok, Thailand.

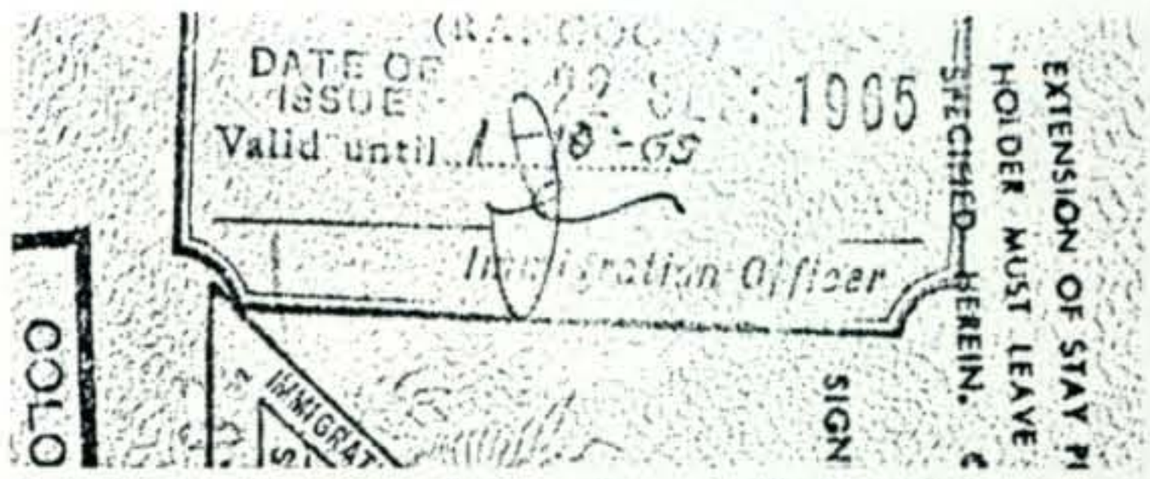

Exhibit E—Reprinted from Don Miller's US Passport (unretouched, therefore poor quality). "Burma In Transit Pass," issued September 22, 1965, by Burma Immigration to legally extend Don and Chuck's stay in that county until October 1, 1965.

nothing to do with Burma. However, Wayne has again created a story to fit in with his scheme. Five months later Green claimed he checked at the Strand Hotel in Rangoon to learn that Chuck and I were never registered there. The fact that I never *claimed* to have operated from there (we stayed at a hospital) doesn't seem to mean anything to him. He also attempts to make a few other, unrelated points about Burma, all guesses on his part, and all, unfortunately, wrong. We did not stay two weeks, as he mentions (only a few days), we did not remain there under a 24-hour visa as he indicates, but our visit was legally extended for the necessary period as proven by Exhibit E., which is a copy of another stamp from my passport during the time we were in Burma. In addition, Exhibit F shows a direct QSL card from Burma, bearing the stamp and postmark of that country.

Heard Island (VK2ADY/Ø)

Here, Wayne applies the same technique, but he makes the mistake of naming the "source" of his information ,and the source flatly denies the story. Wayne printed that he had it from a "good source" that "Don was positively in Vancouver, British Columbia the day before the operation went on the air from Heard." As in each of the other arguments he goes on to base his conclusion on that "fact:" ". . . But it is difficult for me to understand how Don was able to move 12,000 miles in one day to a very remote island not far from Antarctica." Wayne has tried to convince us that the operation did not take place from Heard, by basing this physical impossibility on his initial "fact." Again, there is a major fallacy: Wayne has named as his source Mr. Gus Browning, W4BPD, and Gus flatly denies the story and has no idea why Wayne conceived it. Thus, the finger of guilt once again points in Green's direction. Our "direct" QSL's reproduced one of our own photographs of Heard Island, and this can

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Exhibit F—Direct QSL card from XZ2TZ, Rangoon, Burma, stamped, postmarked, and mailed from Rangoon. In this case cards were mailed to a Post Office box in Bangkok and forwarded in bulk at the cheaper rate. This was done not only to save money through use of cheaper rates, but because it had been reported at that time that some stateside and European mail wasn't getting through.

easily be verified, Exhibit G, although proving nothing other than the fact that we took a photograph.

Minerva Reef (1M4A)

Here, Wayne has three gripes. First, he says the reefs are under three feet of water at low tide. Since we weren't the first people to have landed at Minerva, and since Wayne has never been there himself and again doesn't name his source, I'll leave it to the reader to decide who's prevaricating. Second, he raises the objection to having used a "1" callsign. This was explained in Part I of this series (January, 1968 *CQ*) and Wayne might be reminded that it was ARRL and FCC who suggested that callsign and that the procedure was eventually abandoned. ITU has never objected—the decision to use more applicable callsigns was voluntary and made one year before Wayne's suggestion. Third, Wayne claims we weren't at Minerva because our photographs didn't show one of the shipwrecks there. The fact is that we photographed the operating position on the coral reef, far removed from any of the sunken vessels, so that they could not possibly have been expected to appear in the same photographs.

This brings to mind an amusing set of circumstances, revolving around Green's well-known ability to "touch up" photographs. In discussing Navassa during my Peterborough visit last spring I expressed amazement that, during the Navassa operation by Herb Kline, K1IMP, and myself we were unable to find the callsign, "W2NSD," painted on the concrete slab as it had appeared on Wayne's cover photograph in the June, 1958 *CQ*. I mentioned to Wayne that, while many other callsigns were painted on the slab, his own callsign had mysteriously disappeared. Chuckling to himself, Wayne led me down a hallway to a metal filing cabinet filled with material which, he confided in me, he had brought with him from *CQ* when he was fired by Cowan in 1960. Opening the top drawer, he removed a large, black-and-white photograph and laughingly demonstrated how he had dubbed in, with black ink, his own callsign on the slab and also a "shark" in the water below, on the glossy surface of the original photo. And so, my friends, while it is true we did not photograph the shipwrecks at Minerva Reef, we can all well imagine how the photos would have appeared if it had been up to him!

Letters

It wasn't only the editorials and talk on the air. Soon, letters began appearing throughout the world; bearing Green's signature, they were filled with personal material about me and were even more greatly misrepresented than his articles. His technique, it turned out, was to use rather negative material to entice a negative reply from an unsuspecting reader, and Wayne would use the reply to support his stand in some future issue. And the *Handbook* still bothered him. A 27 July letter from Wayne to me stated:

". . . Naturally I am disappointed that you have decided to have *CQ* publish your *Handbook*. . . .

Exhibit G—Direct QSL from VK2ADY/Ø, Heard Island, showing the 9,000 foot Big Ben in the background.

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On the other hand this is good for us in that it allows us more money for *73*. And it saves us a lot of work."

A confidential letter to certain prominent DXers, organizations, and manufacturers, dated 14 August and signed by Green, claimed that our DXpedition was a fraud and a hoax but presented no supporting material for the unusually harsh accusations. In a September 13 letter Green claims:

". . . an accomplice of Don's privately confessed to me that Don has been a pirate in the great bulk of his operations."

Not only is this statement an outright lie, but Green goes on to expose his real motivation:

"If you are going to continue DXing you will have to go after your Advanced ticket and I think you'll find the coming technical advancement series in *73* of value, so perhaps you might just save $5 of that $50 that you are going to send to Don and invest it in *73*. . . ."

Green letters of 22 September and thereabout went so far as to falsely proclaim that Don Miller was in serious trouble with the United States Department of State and also the Brasilian authorities! Good grief!

In February Green stated:

"I see Miller has found a publisher for his DX book. I looked over his outline, decided it was a hodge-podge, and wrote my own book which, with luck, will be out by the time this is printed . . ." (*Ed*: it wasn't.)

Fortunately, the readers will draw their own conclusions here, too. Since it was, for the most part, my own outline that appeared in Green's *Handbook* ads, I am eager to see if his guide is a copy of my material. Fortunately, I did not show him the manuscript.

In November, in an article entitled, "Miller & Company," Green claims, using a "survey" so absurd that even the ARRL ignored it, that I unfairly discriminated against certain amateurs during my Farquhar (VQ9AA/F) operation. It claims some DXers called for 50 hours, although they must have been calling some other station since my signals were audible for no more than 25 hours into any area of Europe or the USA, due to the split operating schedule from that island. Wayne continues, "every single fellow who had donated to the expedition was able to get a contact with Don and not one of those who tried and failed had donated." Not only is this a deliberate, outright *lie*, but, in fact, a careful check of the logs from that operation, the honor roll, and other factors, clearly shows that those who did not make contact were divided between contributors and non-contributors.

After Wayne's expressed shock at my refusing to contact certain stations, let's examine material written by Green a year earlier; on 14 December, in a letter to me, he stated:

"Don, do you feel you have a moral obligation to make a contact with someone just because he is calling you? You have every right to work just whom you please and no one has the right to demand that you contact him. I can think of several DX hounds that I probably would stop working after a couple of stops . . . the ones that keep calling on your frequency or on the channel you're listening to even after you ask them to stop, making you wonder if they have a receiver or are really that dumb, etc. . . ."

"Also, no matter your motives, I do think it is great to leave the top boys high and dry now and then and break the DX habit for them. The important thing to me is that you are giving a lot of fellows a good time . . . making ham radio fun. And there is no doubt whatever that you are accomplishing this. I think I can work stations a little faster than you can with my method. . . . I am about to set up a . . . non-profit research foundation which will bankroll future DXpeditions. We'll probably start out with about $25,000.00 a year and see what we can do with it . . . if you leave any place left to go."

Another letter from Green to Ack, dated 15 December, states:

"Don is having a ball . . . so is Chuck . . . and so are thousands of hams. That is the important thing. No one has been hurt except a few DXers who should have had this happen to them years ago so they could come up for air and see that there is a whole world around them that they had lost when they climbed the DX tread-mill."

"If your propagation Association is getting to be a drag we might talk about changing its management. If not I'll probably set up another one that I can promote in *73* and put *73* funds into for DXpeditions."

"Also, you should be advertising in *73*. We're really doing a job for distributors now . . . that's why so many are using *73* opposed to *QST* these days. Heh . . . heh."

Laccadives (VU2WNV)

Here, Wayne quotes certain "authorities" out of context to insinuate *forged* documents when, in fact, the document in question *was* issued by the appropriate authorities, authorities whose position may have been jeopardized had it been known they issued an amateur license for an area which was militarily "off-limits" without first obtaining the approval from their military authorities.

That operation was based on one item only. that being a telegram from New Delhi issuing my callsign. Although the telegram did not mention the Laccadives by name, there was no doubt in my own mind about the validity, for I had applied to operate from Bombay and from the Laccadive Islands. The telegram instructed me to collect the license in Bom-

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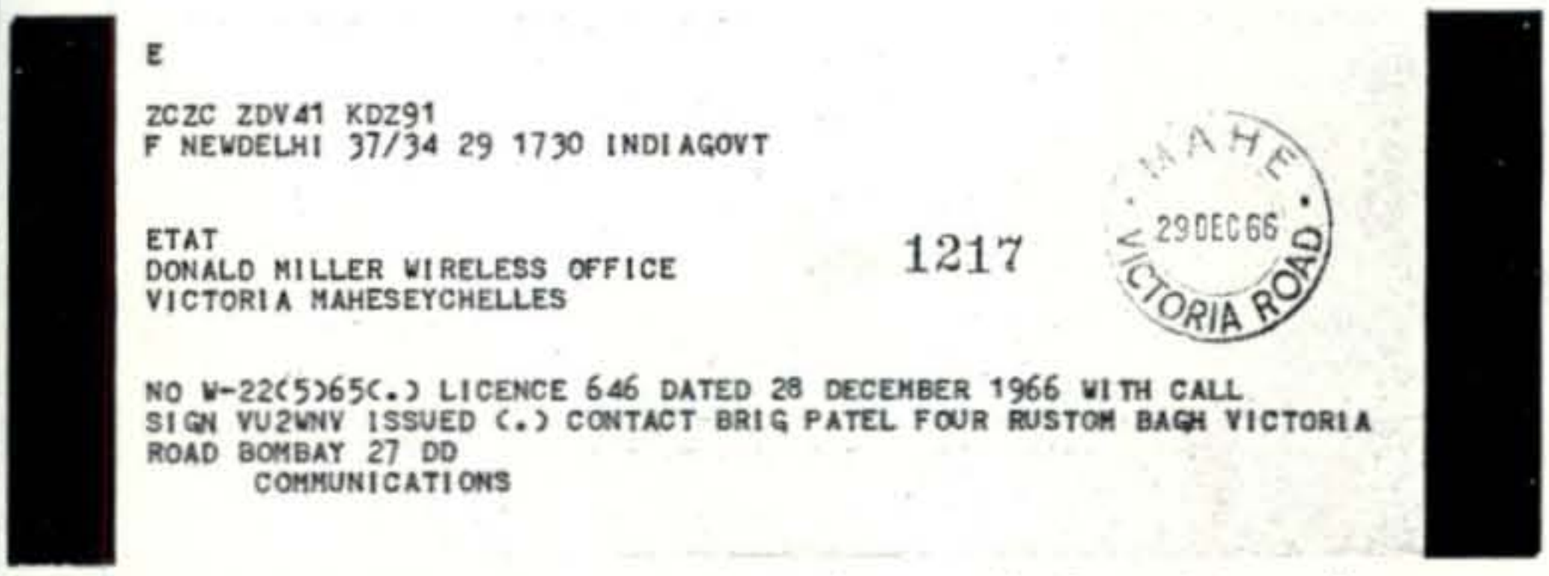

E

ZCZC ZDV41 KDZ91
F NEWDELHI 37/34 29 1730 INDIAGOVT

ETAT
DONALD MILLER WIRELESS OFFICE
VICTORIA MAHESEYCHELLES

1217

MAHE 29DEC66 VICTORIA ROAD

NO W-22(5)65(.) LICENCE 646 DATED 28 DECEMBER 1966 WITH CALL SIGN VU2WNV ISSUED (.) CONTACT BRIG PATEL FOUR RUSTOM BAGH VICTORIA ROAD BOMBAY 27 DD
COMMUNICATIONS

Exhibit H—Telegram from the Indian government confirming the issuance of VU2WNV to Don Miller.

bay from Patel (the plans at that time called for sailing to Bombay after the Laccadives and I was to meet Patel, VU2JM, in Bombay where he was vacationing from Delhi). The original telegram is illustrated as Exhibit H.

Wayne printed that the license says, "for Bombay only." Do *you* see anything like that in the telegram? Since Wayne had in his possession a copy of the same telegram, and since he had outright positive verification from the Indian Government that the telegram was, indeed, authentic, any such statement on his part would have to be deliberately inaccurate. I might add, regarding any argument over whether or not the license was valid for the Laccadive Islands, that regardless of what any "authorities" claim, licensing in that part of the world is sometimes quite vague and informal as compared to our own FCC procedures, and misunderstandings do develop. However, it causes a great deal of ill-will and actual harm to amateur radio licensing to promote misunderstanding and all feelings by publishing material as Green has.

Ebon (K7LMU/HC8E)

Perhaps it might be stated Green has demonstrated a complete and utter ignorance of what a DXpedition involves. For example, in November he claims that atolls could only be landed from within the lagoon. Such a statement is laughable, at best, but perhaps Green has never been in a position to make such a landing or perhaps he has never sailed at all. Then, in January, he claimed that the Indian Ocean is an area "famous for low prices." However, my friends, that area is, without a doubt, the *most expensive* in which I have traveled, especially for a DXperdition. Prices of our needs in the Indian Ocean were exhorbitant and far exceeded those in other parts of the world. Canned foods there cost quadruple their normal price, fuel sells for triple the ordinary price, ships seldom charter for under 100£ ($250) per day, and prices of electrical components, marine supplies, and other material needed by the DXpedition are prohibitive in the Indian Ocean. Wayne's misunderstanding, however, might be excusable, since most of his own "operations" have occurred from the likes of hotel rooms.

Green's recent material is so obnoxious that I have been urged to file suit. Green claims we raised $12,000 for the DXpedition, a figure he conveniently invented but which is many times our actual funds. It is no longer a question of his "facts," "sources," or faulty information, and I simply cannot believe any self-respecting amateur is being fooled anymore. Speaking of money, let's take a close look at Green's now-defunct Institute of Amateur Radio (IAR). Green told me that he had, at one time, over 5,000 members, and had collected "$10 a head" for the venture, in his own words. Those closer to the facts than I insist the membership figure was closer to 500. Regardless, this represents somewhere between $5,000 and $50,000 in amateurs' money. Since it never appeared that any of this money was ever spent for anything, and since that organization mysteriously evaporated into thin air, what happened to all the money? Did Green ever return it to the "subscribers?" Did he use it to finance his trips around the world and skiing vacations? Did he ever account for it in any way? Why not? Should that gentleman be brought to task himself, instead of accusing others of fraud?

I have attempted, without calling names, to give the reader the other side of a picture so grossly misrepresented in another publication, and even to indicate what motivations exist. Having devoted 24-hours each day for these past years to amateur radio, I have a great interest in this matter. Not many amateurs are fools and most are capable of drawing their own conclusions. Since there are now, unfortunately, legal complications, I can go no further. Further tirades by that gentleman, which this article is sure to evoke, will remain unanswered. I don't think, in my own opinion, there can be any question as to which individual amateur has, throughout the years, deliberately created more controversy, caused poorer public relations, and done more irreparable damage to our amateur radio service, than any other. What should be done about it?

Next month we will continue along the trail to the Indian Ocean DXpedition. ■

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SUPPORTING THE TUNED DOUBLET

BY PAUL C. AMIS, *W7RGL

This article is a sequel to W7RGL's opus on the virtues of the tuned doublet antenna in a previous issue.[1] He now tells how to assemble and install this, or any other flat top wire antenna, so that it will stay up.

HAVING extolled the virtues of a tuned doublet antenna in a previous article[1], the author thought some of you might have decided to have a go at it. Therefore, the problem of erecting it in the air and keeping it there becomes one of prime importance. Probably the most satisfactory antenna support is a pair of permanent poles, but most of us are not so blessed. Trees are quite commonly used, but precautions against them swinging in the wind must be reckoned with. Houses and outbuildings are satisfactory but their placement may leave much to be desired and their height may not be sufficient. However, like all things, it isn't what you want that makes you fat; it's what you get (or have on hand). With a Tuned Doublet and antenna coupler, the antenna height is compensated for, and all that is left is a method of keeping the wire in the air where it can be useful, not coiled on the ground after the first storm.

Before we delve into this subject of antenna wire installation hardware, a visit to some commercial or military antenna site would be most instructional. You will note that these non-amateur concerns hang wire as if they meant it to stay up a long time—which they do. No hair-wire hardware, or lamp-wick supporting lines for them. Strain insulators are massive, metal hardware is stout and heavily galvanized, down-hauls have quiet authority, and antenna wire looks as if it had been recently removed from a crane. Leave us do likewise.

---

* Route 2, Box 2378-B, Bainbridge Island, Washington 98110.

1 Amis, Paul C., "The Tuned Doublet," *CQ*. March 1968, p. 67.

Insulators

You will need three strain insulators for the flat-top portion of the doublet. These should be heavy duty and low loss. Some military glazed ceramic insulators with generous ribs, with and without cast bronze ends, have appeared on the surplus scene. (See fig. 1.) These are excellent. Some heavy duty commercial plastic strain insulators are very good. But the inexpensive small clear glass strain insulators such as found in dime stores are definitely *out*. The attaching holes of the center insulator should nearly match the spacing of your chosen feed-line, although this is not too important.

Pulleys

If you plan to utilize one or two trees as antenna supports, be prepared for them waving in the wind. This means that a counterweight on one down-haul will be required, with its subsequent pulley in the tree. And this pulley should be a rugged, heavy-duty type, able to stand your atmosphere for long periods, and should have as large a diameter wheel as possible. Three, or four-inch diameter wheels are the minimum recommended. Awning pulleys and small cast boat pulleys are not suitable because of their small wheel diameters and generally frail axles. A down-haul running over a swaying, small-diameter pulley wheel will invariably break at the pulley before too long because of the relatively sharp, right-angle bend. Cast aluminum clothesline pulleys of about five-inch diameter are sized right, but are not strong enough for a heavy-duty antenna hanging from a swaying support. One of the catalog houses

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has a line of rugged yet inexpensive pulleys with roller-bearing axles for less than $3.50 each. If two trees are used for supports, generally one counter-weighted down-haul is required, but both antenna down-hauls should be run over pulleys for ease of installation and maintenance.

Hardware

Securing pulleys to fixed supports, such as poles or buildings, can usually be accomplished by eye bolts, heavy screw eyes, or straps. When living trees are used, however, strict attention to mounting hardware is advised. A wire loop or strap, wrapped around the trunk or limb of a tree can result in "girdling" and the subsequent death of the tree beyond that point. A large size eye-bolt inserted in a hole drilled through a small trunk may weaken the top so that it breaks during a wind-storm. Neither of these methods are beneficial to the tree, the landlord's nerves, or your antenna. A large galvanized screw-eye has proved the best method of securing hardware to a growing tree. Actually, the screw threads become more firmly enmeshed in the trunk as the tree grows, and the screw does practically no damage to the tree. Further, a minimum of tools are needed to install such a screw-eye, and this becomes of prime importance when you are using most of your arms just to hang on.

For connecting hardware, boat shackles, heavily galvanized, are hard to beat. The antenna can then be taken down for Field Day or maintenance with just the use of a pair of pump pliers. A bit of grease on the shackle threads will assure long-lasting ease of disassembly.

Antenna Wire

For the antenna wire and feeders, strength and resistance to constant strain and flexing is mandatory. The most satisfactory flat-top is made up from three #14 or two #12 Copperweld wires twisted together. This twisting together of two or more Copperweld wires will take the fight from the wire and give it a tamed flexibility that is a joy to the heart.

To properly twist up a flat-top cable, measure out the two or three individual Copperweld wires, each being about 10% longer than the desired finished antenna length. At one end, collect the wires into one strand and secure it to a stout post or tree. Stretching the individual wires out, being extremely careful not to pull an "eye" (or loop) into any

Fig. 1—Heavy duty strain insulator with ½" diameter porcelain and aluminum alloy end bells. (E. F. Johnson type #136-151.)

of the wires, chuck the far end of the three wires into a pistol drill or, if power is not at hand, a wood brace or large hand twist drill. Then, with the wires tightly and evenly chucked into the drill, pull an even strain on your cable and start twisting.

For Copperweld, I like from one to two complete twists per inch. You will have to over-twist the cable a bit since it will untwist after power has stopped being applied. Once you have the wires twisted together into a cable, secure it at the end you've twisted from so as to keep a strain on it, and tack-solder the cable every two or three feet along its entire length. Break the exact center of the cable for the center strain insulator and install the end insulators for the length desired. Electrician's brass wire clamps work very well to secure a wire loop through the eye of the insulators.

Feeders

For wide-spaced feeders, the wires can be made up from two #14 Copperweld wires twisted together in the same fashion as above. To attach the feeder spreaders, stretch out the two finished lengths of twisted #14 Copperweld at waist height, spaced apart the distance which will fit your spreaders, and secure to a couple of supports. For four to six inch ceramic or plastic spreaders, the wire used to secure them to the feeders should be no smaller than #14 soft copper. It's natural for the feeders to sway and "work" when erected, and smaller securing wires will eventually break, allowing the feeders to come adrift. Unless it is absolutely necessary, do not try to install feeder spreaders on a feedline which is hanging loosely down from the antenna. You will wind up putting twists on each feeder with the spreader securing wire

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which will "cork-screw" the feeders when re-erected. A spreader every three or four feet seems to work out quite well.

Probably the most important proviso in the construction and erection of a Tuned Doublet (or, for that matter, almost any center-fed wire antenna) is that the feeders must come away from the antenna at 90° to prevent feedline radiation and antenna unbalance. If, due to placement circumstances beyond your control, the feedline must eventually angle away from the antenna, run the feedline away at a 90° angle as far as possible *then* gently angle it towards the shack.

While we're on the subject of feeders, if the finished antenna is secured to a tree, the feeders must be expected to whip about in a wind to some extent. This means that care must be exercised at the shack end of the feeders to prevent stand-off insulators, if used, from being snapped off during a storm, or undue strain being placed on your entrance insulators and hardware.

A simple way to attach the feeders to the flat-top is to simply thread each feeder wire through its respective eye of the center strain insulator and secure it to the antenna under the same wire clamp used to fasten the flat-top eye.

Down Hauls

The subject of down-hauls becomes slightly controversial, but it's hard to beat a good grade of Manila rope, one-half-inch diameter, or larger. It will outlast wire rope, stranded clothesline wire, nylon braid, or solid wire, and brings no additional metal within the field of the antenna. Also, Manila takes kindly to continual running across a pulley wheel with little wear, and weathers excellently. Unless the pulley wheel is of good diameter and is quite smooth, nylon ropes have a tendency to abrade and break at the pulley. Wire ropes are expensive and will break, in time, from the same causes as above.

By the way, the down-haul rope need not be long enough to reach from the ground, up to the pulley, and back to the ground again. Each rope need be only slightly longer than the height of the pulley above ground. Then, when you lower the entire antenna for servicing, merely tie on a lighter line so that the upper rope eye can be lowered to the ground. When the antenna is again erected, the lighter line can be removed and stored.

An eye should always be woven into the upper end of each rope for the antenna shackle. A diagram of how to weave an eye

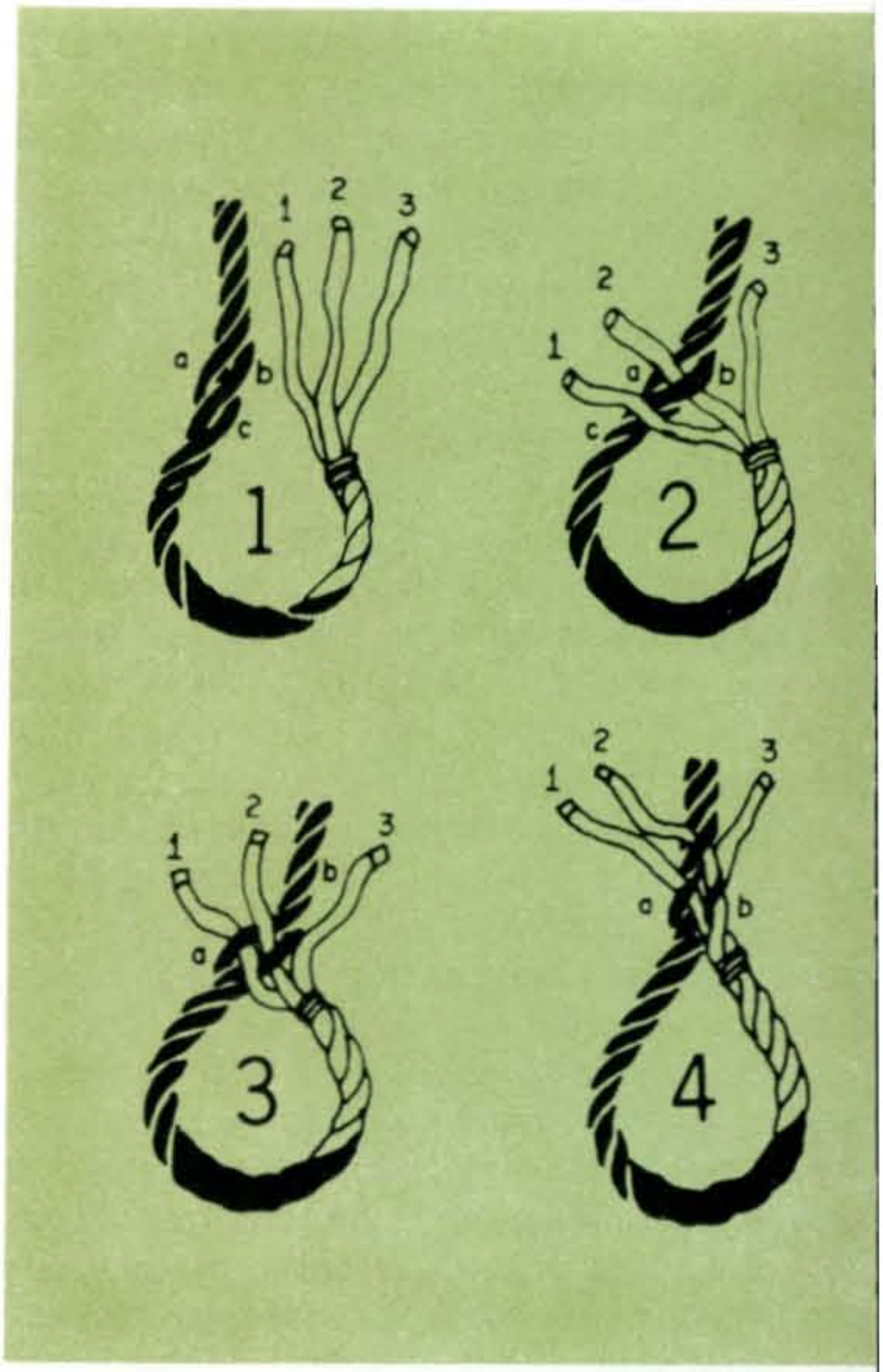

Fig. 2—The basic method for making an eye splice is shown in the four steps above. 1—Untwist the ends; 2—Slip strand 2 over C and between A and B; 3—Slip strand 1 over B and under A as shown; 4—Insert strands 1 and 3 as was done for strand 2.

into a rope is shown in fig. 2. A galvanized thimble for the size of rope should be used to prevent rope eye wear.

If you use Manila rope for your down-haul, remember that this rope will be exposed to all the weather elements your area can produce. Since half-inch (or larger) Manila rope is not exactly cheap, any means for extending its useful life is well worthwhile. After the rope eye has been woven into the end of the rope and the other end wrapped with light, waxed twine to prevent unravelling, soaking the rope for several hours in creosote and allowing the treated rope to air dry for a day or so, does wonders. It smells to high Heaven, and is messy to handle, but it is an excellent preservative, and will generally double the life expectancy of a down-haul.

The only two things needed for permanent wire antennas is an open mind and an open hand. For the antenna, think efficiency and height; for the hardware, think strong, build stout. ■

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10 reasons to buy Hallicrafters' new SR-400 Cyclone

FEATURE	Hallicrafters SR-400	Collins* KWM-2	Drake* TR-4
Power Input	SSB=400 watts CW=360 watts	SSB=175 watts CW=160 watts	SSB=300 watts CW=260 watts
Accessory "dual receive" VFO available	**Yes**	No	No
Noise Blanker	**Yes**	$135.00 Accessory	No
Receiver Incremental Tuning	**Yes**	No	No
Built-in notch Filter	**Yes**	No	No
Sharp CW Filter	**Yes** 200 cycles	No	No
Sensitivity	.3 uv for 10 db S/N	.5 uv for 10 db S/N	.5 uv for 10 db S/N
1 kHz dial readout	**Yes**	Yes	No
Carrier Suppression	60 db	50 db	50 db
Unit Price	**$799.95**	**$1,150.00**	**$599.95**

*Data from published specifications.

Now: can you think of one reason why you shouldn't?

Superb sensitivity, 400 watts RF, 200 cycle CW selectivity, receiver incremental tuning, 1 kHz readout, amplified automatic level control, exclusive notch filter! There's even the HA-20 dual receive VFO for sensational, award winning DX operation. No matter what specifications or features you choose as a standard of comparison, the exciting new SR-400 fixed/mobile transceiver is unsurpassed. Unsurpassed feature for feature. Unsurpassed for rugged dependable performance in all environments. Unsurpassed in value and versatility. Prove it to yourself. Write for complete specifications in a four page brochure. See your Hallicrafters' distributor today.

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See us at the Sideband Show, March 19, New York City, N.Y.

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AN F.M. PRIMER

BY KEN W. SESSIONS, JR., *K6MVH

FOR point-to-point communications, f.m. is the *now* mode.[1] And the reasons are many and varied. Band noise, one of the most undesirable characteristics of a.m. radio, is virtually nonexistent with f.m. Efficient squelch circuits are standard equipment in f.m. receivers. They keep all audio from the speaker until an intelligible signal appears on the channel. F.m. receivers are typically more sensitive than their a.m. counterparts, too. (One-half microvolt is very common for 20 db quieting of band noise, or an a.m. equivalent of an *S*9 signal.) This superior sensitivity, coupled with the inherently lower noise of f.m. means greater range for a given operating power.

Reliability is another key advantage. F.m. units are built to withstand the adverse environments of vibration, dust and dirt, heat, and mechanical shock.

Unlike a.m., f.m. operation employs the channel concept. Transmitters and receivers are crystal-controlled to operate on a single frequency. So there is never a need to "tune in" a station or zero-beat a carrier. Since f.m. channels are standardized on the amateur bands, new operators need but crystal up on one or two of the popular f.m. channels and their "tuning" days are over.

Frequency

There are 31 standard f.m. channels on two meters.[2] The first, channel 1, is 146.04 mc. These channels are spaced 60 kc apart and continue up through channel 31, which is 147.84 mc. Not all f.m. channels are active yet, but a growing number of them are. In the greater Los Angeles area the most popular channels are 13 (146.76 mc), 14 (146.82 mc), and 16 (146.94 mc). Nationally, the most popular channels are 6 (146.34 mc), 13, 14, and 16. There is some operation on channel 12 (146.70), but not much, because of the RTTY activities there.[3, 4] Across the country, channel 16 is the most common and is referred to as the "calling" frequency. Amateurs use it for point-to-point communications as well as for repeater operation.

Many metropolitan areas, Los Angeles is an exception[5] are active around two-meter repeaters. The standard repeater input is channel 6; ouput is channel 16. This idea was adopted so that an f.m.'er, operating through a repeater in his own area, could travel to other states and retain the usefulness of his equipment. Since not all cities have repeaters, an f.m.'er who wants to get the most out of his gear will select an f.m. unit with two-channel transmitting capability. He'll select, say channel 16 as his basic transmit and receive frequency, and use channel 6 as an alternate transmit frequency. In this way, he'll be able to use existing repeaters or operate straight simplex (point-to-point).

Deviation

In f.m. circles, the term deviation is roughly comparable to "modulation level" of a.m. Deviation, however, is a function of frequency variation rather than audio amplitude. The standard deviation level for amateur operation is 12 kc. A transmitter set up for anything much greater may be so broad as to be undetectable by other stations. Less deviation will decrease the apparent audio level. At 12 kc, a fully modulated signal

* 4861 Ramona Place, Ontario, California 91762.

1 Lincoln, Marshall (W7DQS), "FM Hams—The New Breed," *Electronics Illustrated,* July 1967, pp. 87-89.

2 Charter, Resolution, Southern Calif. FM Association, Box 385, West Covina, California 91790.

3 Kretzman, B. H., "FM Mobile Techniques," *CQ,* May 1966, p. 51.

4 The FM Bulletin, 2005 Hollywood, Grosse Pointe, Michigan 48236.

5 Two repeaters are currently under construction in the Los Angeles area; both are to repeat 146.34 mc to 146.94 mc.

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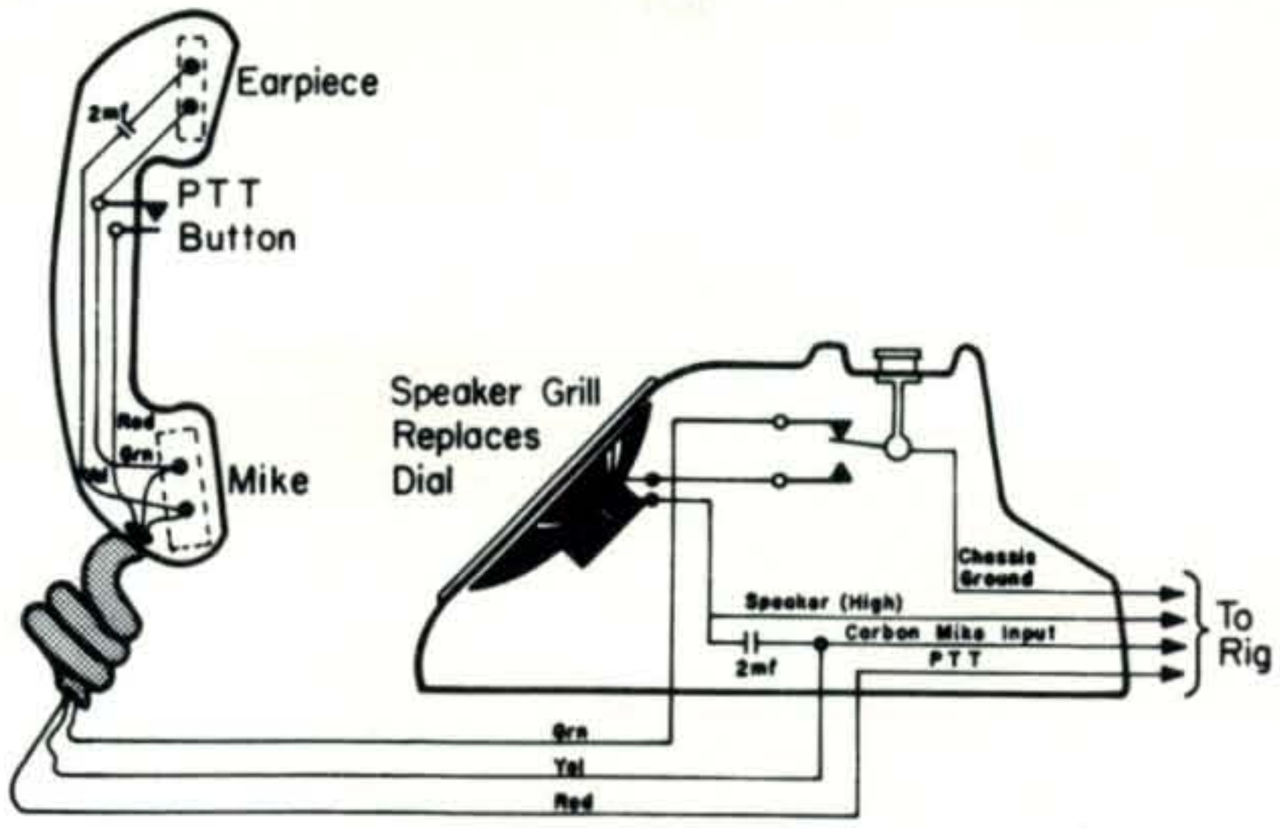

Fig. 1—Circuit wiring for telephone handset with three leads. The speaker mounted where the dial usually is located is switched off by lifting the handset from the cradle. A suitable speaker is the Motorola 50C852738 ($1.76). The grill for use with a Western Electric 500 or a Kellog 500K dial is the Motorola #35A830-164 or with the Motorola logo, #13K851832.

should just fill the passband of a standard f.m. receiver. The result is optimum audio quality and level and minimum distortion. There's usually no need for any special test equipment to adjust deviation. This can be done on the air.

Portable Hamshack

XYL's tend to favor f.m. over a.m., too. And their reasoning is pretty logical. A.m. tends to isolate the amateur from his family. When he's operating, he's generally stuck back in some quiet (perhaps that isn't exactly the right word) corner or in a room by himself so the rest of his family won't be subjected to the QRM and noisy squawks that traditionally accompany a.m. operation.

Not so with f.m. There's no need to tune, because both transmitter and receiver are crystal-controlled. If the transmitter was in tune a month ago, it will be in resonance now, or a week from now, or a month. And if the receiver was "on channel" yesterday or last week, it will be on frequency tomorrow. So the equipment can be stashed in some unobtrusive corner of the garage. After the operator sets the squelch to get rid of the band noise, all he needs is a speaker, a mike, and a push-to-talk switch. So he'll perhaps use a standard telephone with the dial replaced by a speaker and grill, and the handset modified by the addition of a pushbutton. He'll attach the telephone to the rig with a long cable so that wherever he goes in the house, his hamshack goes with him.

The switching capability of a telephone makes it uniquely appropriate for f.m. use. As the circuit of fig. 1 shows, all audio is fed to the speaker when the handset is on the cradle. When the handset is lifted, the ground signal for the audio and push-to-talk is removed from he speaker and fed to the handset. This enables the operator to hold QSO's with the convenience of a telephone conversation and without disturbing other occupants of the room. Then, too, if the operator isn't using the phone and the din of the channel gets too bothersome, all he needs to do is remove the handset from the cradle to restore peace to the room.

PTT

Since a conventional telephone handset has but three conductors in the "curly cord," one must resort to a little trickery to accomplish the multiple functions of receive, transmit, and push-to-talk. Here's how it's done: The green wire from the handset will be a common ground for all audio and switching circuits. (This is not the most desirable method because of the likelihood of generating hum, but it is a necessary expedient with only three wires.) The red lead will be used for the push-to-talk, and should remain isolated. The yellow will serve as the audio lead.

And here's where the trickery comes in. At the rig itself, ground one side of the speaker to the chassis. Then couple the audio from the other speaker terminal to the carbon mike line through a 2 mf capacitor. The mike line will now carry transmit as well as receive audio. At the handset, connect one side of the earphone to the green common lead, and couple the carbon mike lead to the earphone through another capacitor of like value. That's all there is to it.

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Most f.m.'ers mount the pushbutton in the side of the hollow handset up near the earpiece, a convenient spot for thumb-actuation. The most important thing to remember here is to use a button with a *weak* spring. Stiff pushbutton springs mean sore thumbs.

Operating Habits

If you've ever listened to an f.m. channel in operation, you've no doubt noticed how markedly the procedures differ from those of a.m. CQ's are *never* used. There's no need. On a.m., you put out a CQ in the hopes that someone will tune across your signal, zero-beat it, and give you a call On f.m., though, no one tunes. The channel inhabitants are either listening or they're not. Consequently, a simple identification is usually sufficient to get a QSO started.

If you do any preoperational snooping, one of the most interesting phenomena you'll observe is the virtual absence of the old cliches heard so often on a.m. Expressions such as salt mine, snore shelf, big switch, feedbag, bucket of bolts, sandbox, modulated milk bottle (or one-eyed monster), and handle have all been replaced with such unlikely titles as work, bed, shut down, eat, station (or mobile unit), bathroom, television, and name. And it's really kind of nice if you stop to think about it. The use of generic terms to describe real things makes your contact seem more like an intelligent individual and a whole lot less like a "voice."

Another interesting characteristic of f.m. is the typical short transmission.[6] There are no "roundtables" even though you'll often hear large groups participating in a single conversation. When someone has something to say, he'll transmit just long enough to say it—no longer. The f.m.'er has learned—likely as not, from experience—that a long transmission is about as effective as no transmission at all. Here's way: Heterodynes on f.m. are rare—so there is usually no QRM. When two stations transmit simultaneously, the stronger will "capture" the weaker in the listeners' receivers. And when an operator gets overly verbose, the other participating amateurs will assume the other fellow is talking for the sole enjoyment of hearing his own voice—and they'll carry on their QSO right over the top of him!

To an a.m.'er accustomed to 20 minute transmissions, this may seem a bit cruel. But most f.m.'ers feel there is nothing of such earthshaking importance that it requires more than a few minutes of air time to convey. The f.m.'ers can't QSY a few kc to avoid the longwinded ham. They all realize that if they didn't talk over him, no one could use the channel while the talky soul was giving his periodic dissertations. So, if you're going to become an f.m.'er, remember this important point: If *you're* transmitting, no one else can unless they want to clobber you.

Equipment

The most popular makes of f.m. equipment are Motorola and General Electric. Many other types of units are available, but they don't hold the resale value of the two giants. The reasons are serviceability, availability of documentation, and component costs. Most hams feel that GE and Motorola are the easiest to service, but this is probably attributable to the fact that they are more familiar with these units than any of the lesser known types. Handbooks and schematics are readily available for GE and Motorola, and if none of the local f.m.'ers in your area have them, they can still be purchased from the manufacturers

If you scout around a bit in your city, you'll probably find there are a number of old f.m. units just waiting to be grabbed up by an enterprising ham or ham group. Check your local taxi companies or police station. Chances are very good they're well stocked with a bunch of old units (particularly mobile) that no longer meet the FCC's requirements for commercial use. The going price varies from $30 to $100, depending on the make, model, and year. Converting the equipment for ham use normally involves nothing more than ordering the right crystals and tweaking the various stages with the aid of a voltohmmeter.

But be careful! F.m. is contagious. It's kind of like DXing and traffic-handling. Once the bug bites, you're a goner. For you, too, amateur radio will take on a whole new dimension. And hamming will never again be quite the same as it was. ■

[6] Kretzman, B. H., "FM Mobile Techniques," *CQ*, May 1966, pp. 57-59.

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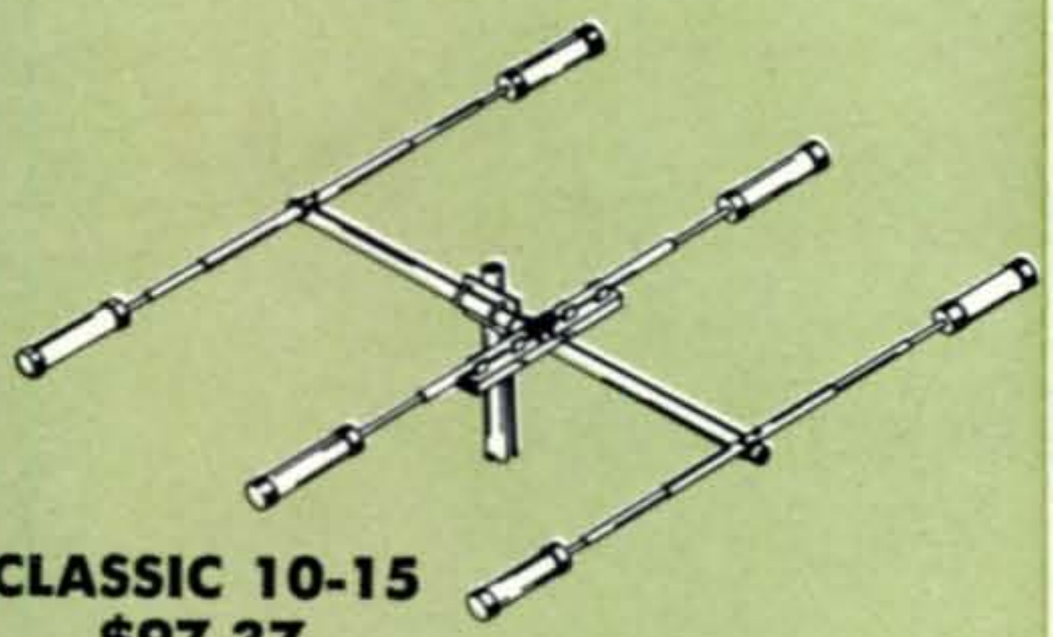

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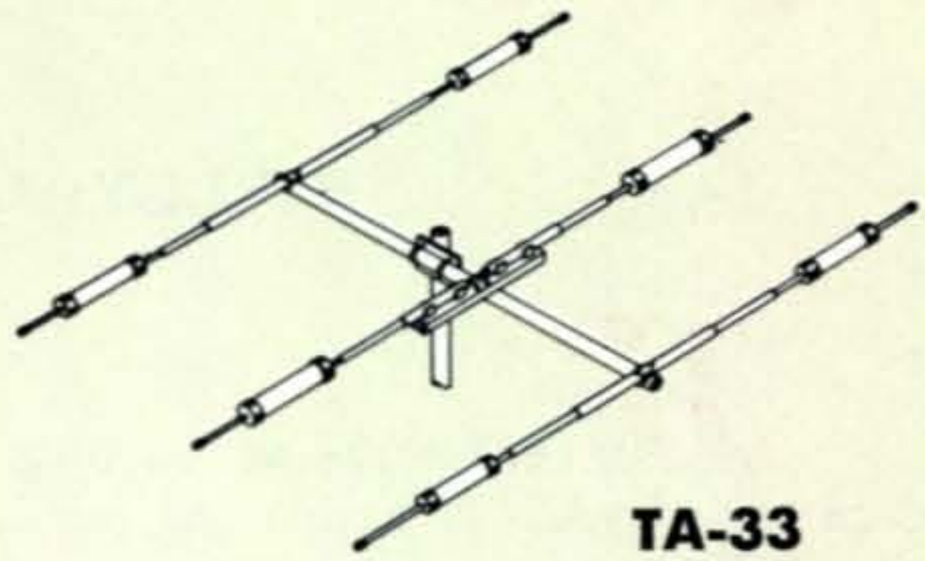

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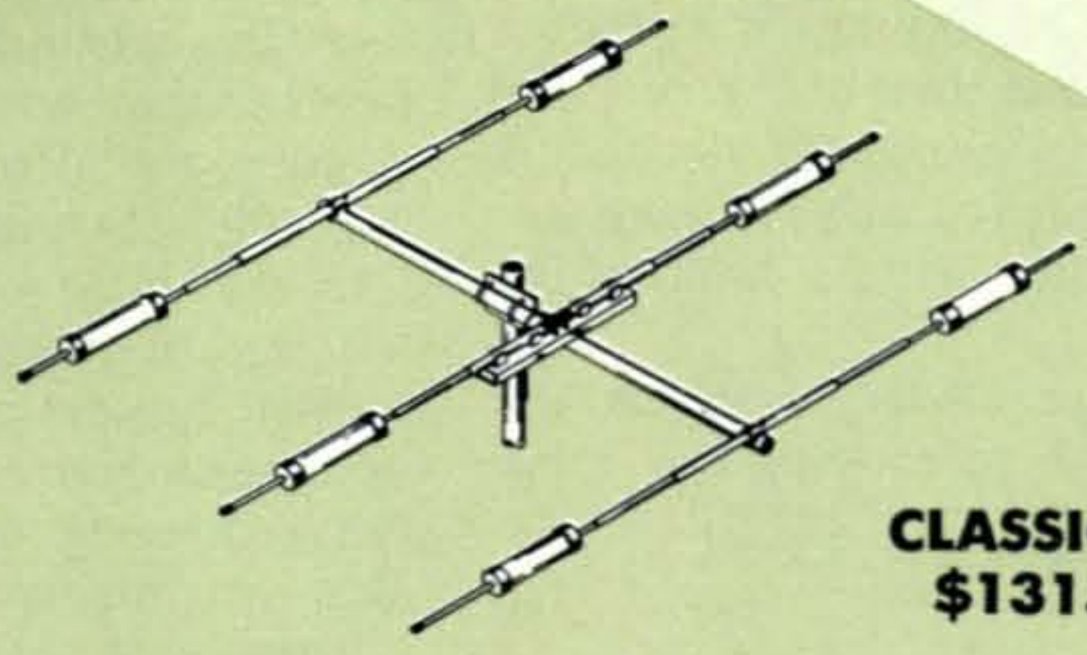

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METERS AND THEIR FEEDING

BY LLYALL SHERRED, *K9VHA

METERS serve as the only visual indicators of what is happening inside your transmitter or transceiver. Their function is to tell you the voltage present or the current flowing through a particular circuit. Properly used they will allow you to measure the operating conditions of any piece of electronic gear. Improperly used they are one of the first parts to go up in smoke, and about impossible for home repair.

Meter Operation

All meters basically measure current, or the flow of electrons through a wire coil which is used as a magnet. The simplest is a magnet which pulls an iron vane toward the coil; the vane is connected to the pointer needle. A moving vane type of meter will measure a.c. or d.c, but the calibration will be different for each.

A better and more costly meter is the D'Arsonval movement, or moving coil type, which has a coil wound on an iron core suspended on a shaft. The shaft and core are in the field of a permanent or an electromagnet. Current flowing through the winding causes the core to become a magnet whose poles are such that the core wants to turn. A coil spring opposes the rotation, and the more current flowing, the more the core turns on its axis thus winding the spring. The core can be compared to the armature of a motor which turns because of the attraction and repulsion of two magnets. A d.c. meter generally has a permanent magnet around the moveable core. An a.c. meter has an electromagnet and uses the alternating current to create *both* fields so they are always of the proper polarity to cause the torque needed to move the center coil. This is called a dynamometer.

A d.c. D'Arsonval meter will not work on a.c., although an a.c. dynamometer will give limited success on d.c. One can measure a.c. voltage and current with a d.c. meter by rectifying, filtering and proper calibration. Basically, you measure a.c. voltage and calibrate the meter to read a.c. average or r.m.s. (See fig. 1)

*819 W. Lincoln Blvd., Freeport, Illinois.

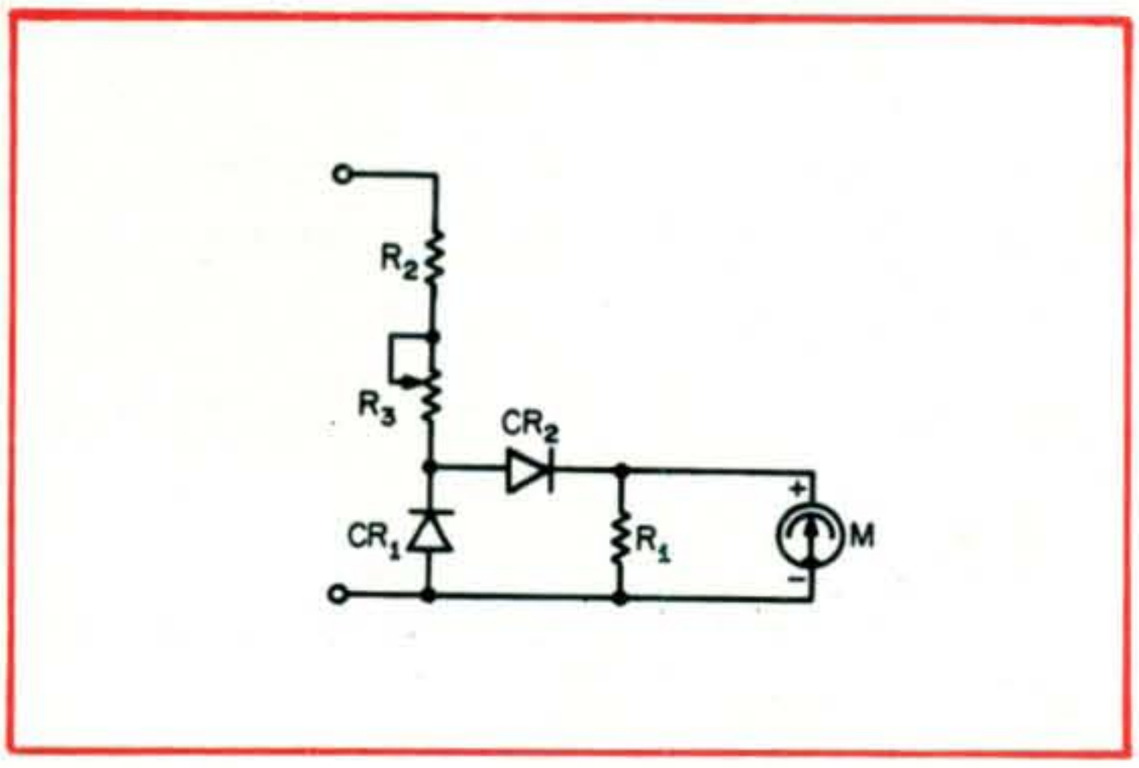

Fig. 1—Circuit used to measure a.c. with a d.c. meter. The combination value of R_2 and R_3 is adjustable for calibration. Resistor R_1 is used to improve linearity and its value is generally one third of the meter resistance. The diodes CR_1 and CR_2 can be general purpose germanium units.

Current Range

The basic limitation of a meter as to current capacity is the gauge of the wire used to wind the moving coil. Meters have a basic movement of a few microamps to about 500 milliamperes. All readings beyond this are done by the use of shunts, resistors in parallel with the meter, which allow only a portion of the current to pass through the meter. The most common, and probably the most useful meter movement is the 0-1 milliammeter because with the proper series and shunt resistors, you can measure any voltage or current likely to be encountered in your equipment.

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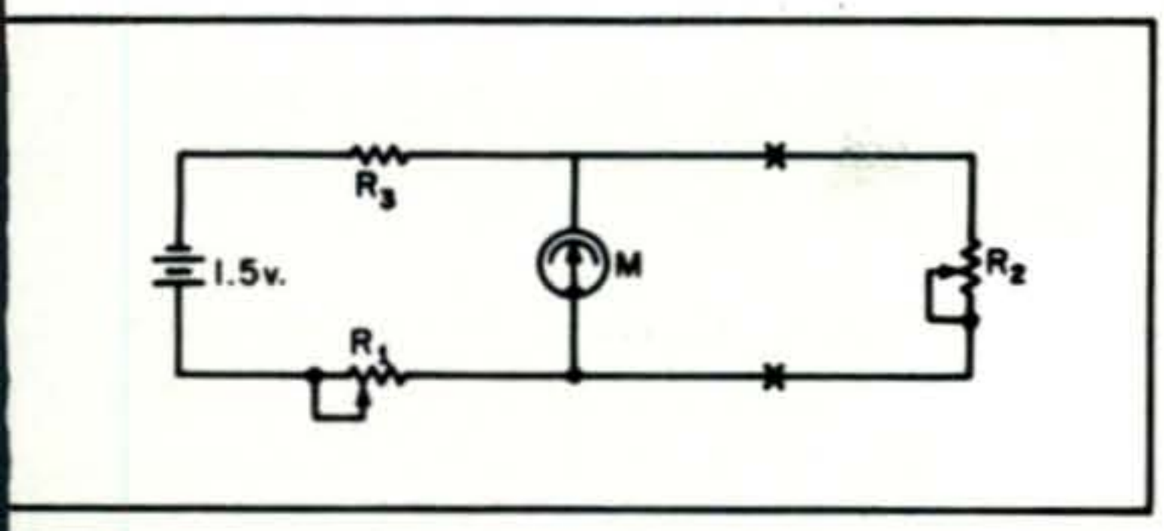

Fig. 2—Circuit used to measure the internal meter resistance. The meter protection circuit shown in fig. 3 should also be used here.

Meter Resistance

Before determining the proper shunt and series resistance required, it is necessary to determine the internal resistance of the meter you wish to use. The internal resistance of a meter is measured at full scale, and is composed of the ohmic resistance of the wire in it and the impedance of the magnetic forces. Figure 2 shows the best way to measure the internal resistance of a meter. The internal resistance is generally between one and two hundred ohms. Connect resistors R_3, R_1, and the meter to a 1½ volt battery. Begin with resistor R_1 set to full resistance in the circuit. Resistor R_3 is used as a precaution against placing the battery directly across the meter and destroying it. Adjust R_1 until the meter reads full scale. If it will not adjust to full scale, set R_1 to maximum resistance and reduce the value of R_3. The values of the resistors are not critical so long as you are able to adjust the total to the value needed for a full scale deflection of the meter. When you have adjusted the meter to full scale (and only then) connect resistor R_2. This resistor should have a value of about 1000 ohms. Although it is not critical, a very large value will be hard to adjust. Adjust R_2 so the meter reads ½ scale. Carefully remove R_2 and measure its resistance. This will be equal to the internal resistance of the meter.

Meter Protection

Since a meter has the unfortunate attributes of being both expensive and not able to be repaired, you should always protect them. Meter protector devices are sold for one dollar and are well worth the price. Simpler and cheaper protection is to use two silicon rectifiers back to back in parallel as shown in fig. 3. A silicon rectifier has a high resistance until about ½ volt appears across its junction. It then begins to conduct and has a relatively low resistance. By using two rectifiers the meter is protected even if you should

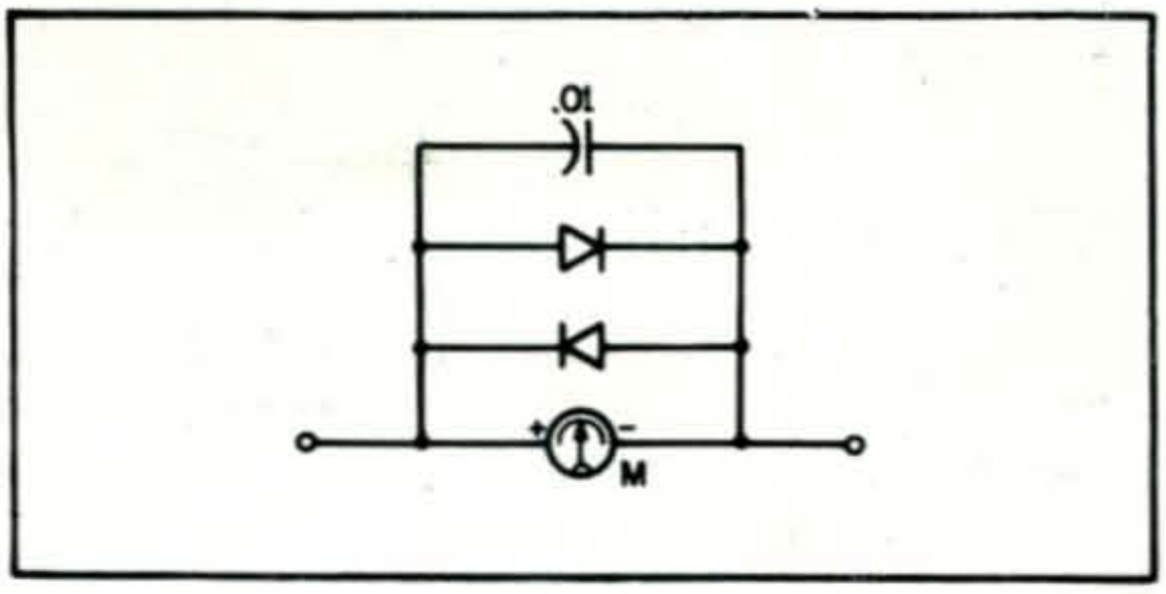

Fig. 3—Diode meter protection. The diodes may be any general purpose silicon type. The capacitor is used to suppress r.f. and transients.

reverse polarity. The peak inverse voltage rating of the diodes is unimportant except that very high rated silicons (over 800 p.i.v.) should not be used as they may really be a series of diodes in one capsule. The capacitor protects against transients and r.f. which can destroy a meter, and will certainly upset its readings. Such protection should be the first thing that you do with a meter. You will find that this is also cheap protection for your v.o.m. and tube tester meters as well as for the meters in your rig.

Shunt Construction

Having installed meter protection and measured the internal resistance of your meter, you can figure the proper shunts by the application of Ohms law. (Ohms law is: $E=IR$, or $I=E/R$, or $R=E/I$.) Let us assume that you have a meter with an 0-1 ma movement and a resistance of 150 ohms. You want the meter to read from 0-100 ma. The simplest way is to calculate the required shunt using Ohms law. The circuit is shown in fig. 4. At full scale your meter will have a voltage of 0.15 volt across its terminals and will have 1 ma going through it. You need a resistor in parallel (R shunt) which will pass 99 ma at the same voltage, or 0.099/0.150=1.515 ohms. Don't go rushing down to the store to buy a resistor of this value as they don't

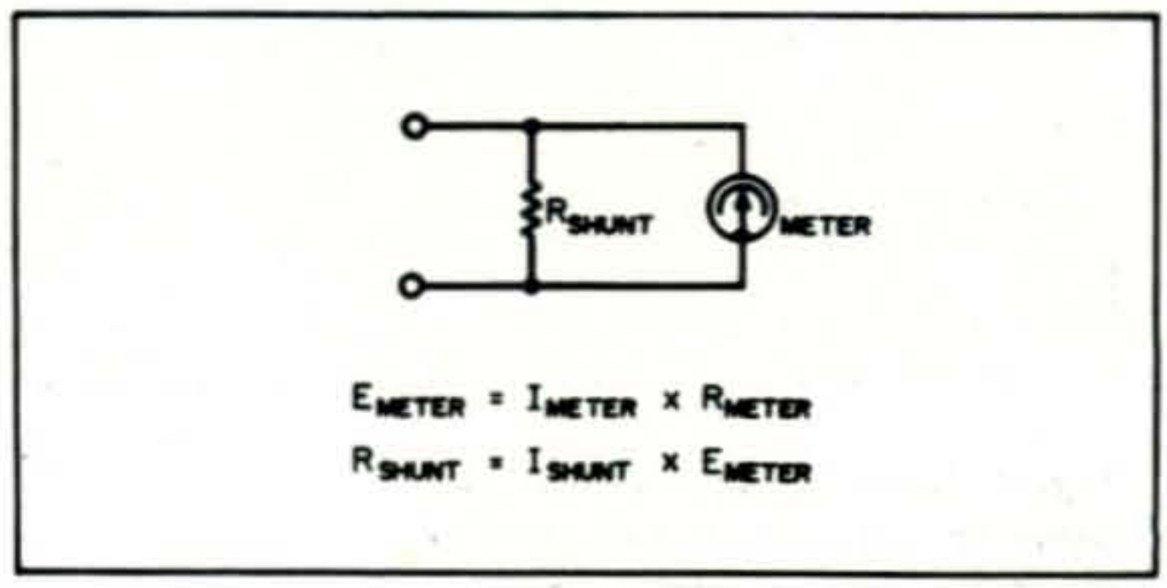

Fig. 4—Circuit arrangement for a resistive shunt used to increase the meter current range.

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Wire	Current Capacity (ma)	Resistance per 1000 ft.
26	1000	41.62
28	600	66.17
30	400	105.2
32	250	167.3
34	160	266.0
36	100	423.0
38	60	672.6

Fig. 5—Partial extract from a copper wire table showing the information needed to make meter shunts.

normally make them, but *you* can. The copper wire tables, partly shown in fig. 5, give the resistance per foot and the current capacity for each gauge of wire. If you want a shunt for 500 ma full scale, you use number 28 wire. Divide the resistance per foot into the desired resistance to get the number of feet needed.

For a form, any one watt resistor over 50 ohms will do. Make certain that the ends are well soldered and wrap the coil with tape to prevent the wire from breaking. You can easily test how well you did by connecting a battery, a variable resistor and another milliameter in series. The current should read the same on both meters. If your meter reads too low, you will have to add wire to your shunt; if it reads too high, you will have to remove wire.

Voltage Multipliers

Measuring voltage is an even simpler matter. You simply need a series resistor which will conduct the proper current through the meter in proportion to the voltage as shown in fig. 6(A). This resistor is called a multiplier. For example, you want to use your 0-1 ma meter to read 0-100 volts. At 100 volts you want a multiplier resistor which will conduct 1 ma. $R=E/I$ or 100,000 ohms.

If you are measuring over 200 volts, I would recommend using one watt resistors and placing them in series for each 250 volts.

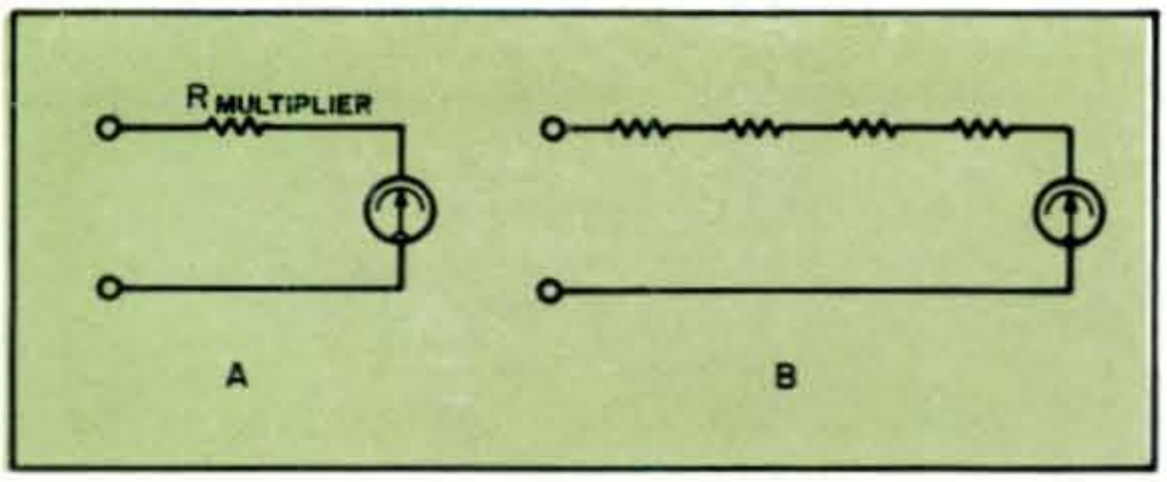

Fig. 6(A)—A series resistor, called a multiplier, is used to convert a milliammeter into a voltmeter. (B) When measuring higher voltages the multiplier is broken up into several equal value resistors which, in series, add up to the required value.

(Fig. 6(B)) The series should total the d sired value and each resistor should be nearly the same value. Series resistors pr vent arcing over.

Voltage/Current Measurements

Since shunts are bothersome and need to b wound for the individual meter, many desig measure the current by measuring the voltag drop created across a resistor. Generally th is easier, and the internal resistance of th meter is not of as much concern as when shunt is used by itself. This method has i drawbacks in that close tolerance resisto are generally not used and there is a muc larger voltage drop across the shunt resist which means that the shunt resistor is di sipating heat.

Conventional shunts normally are used f currents over 500 ma, and on fairly low vol age devices, while the voltage method is use on smaller currents. The simplicity of mea uring the *voltage* across a shunt commenc its use for most applications. The series r sistor used (as shown in fig. 7) is such th its total with the internal resistance of th meter is about 1000 ohms. Ohms law tel us that full scale deflection of an 0-1 ma mete will be achieved when one volt is develope across the series combination of R_1 and th meter.

The desired resistance of R_1, the shunt, f any given current is also derived from Ohm law. For example, if we want a full scale d flection of 500 ma, the value of R_1 would b 2 ohms in order to develop a one volt dro At full scale, the resistor R_1 would dissipa ½ watt, however, the wattage rating of suc a resistor should be at least twice the max mum total dissipation. A slight change in th value of this resistor causes a great chang in the meter reading, and a burned out shun places a great strain on the meter. Alway use a conservative wattage rating and at lea a 5% tolerance.

Metering A Rig

In designing a rig, the metering should a ways be placed in the negative leads wit protection against the possibility of the shun opening and placing a high voltage across th meter circuit. Negative lead measuring of th current is achieved by placing the shunt be tween the power supply ground lead and th ground, or by placing the shunt in the cathod circuit. Figure 8 shows how this is done.

Metering in the high voltage lead shoul

See page 126 for New Reader Servic

e avoided as far as possible because it in-olves longer high voltage leads, and there is ttle comfort in having from 600 to 3500 olts separated from you by a little adjusting crew. The author has seen metering shunts n the high voltage leads of a.m. and f.m. roadcast transmitters, however the meters ere always behind a glass panel. Such design ften causes problems, the biggest being in witching. This problem is compounded in oth amateur design and commercial trans-itters by an innate desire to use the cheap-st switch possible for the meter. High voltage etering with phenolic switches and 30 de-ree indexing, especially if you have some osin on the insulation from your soldering, akes you a candidate for disaster. From the gion of us who have had to rewire a wafer witch in the most inaccessible place, use *od switches*. While you do not need as good switch when you use all negative lead witching, it is still good design to use a uality ceramic switch; and watch the extra ux when soldering as it can form a con-uctive surface between contacts.

In fig. 8 resistor R_1 is a larged wattage type f about 50 ohms. This resistor is used only s a safety precaution and is connected di-ctly in the negative lead. Its purpose is to eep the voltage on the negative lead at a low alue should the shunt and meter become dis-onnected. Its effect is as a resistor in parallel ith the shunt, but its value is large enough be negligible with a simple shunt circuit. it is convenient to simply place the resistor unt close to the ground point of the nega-

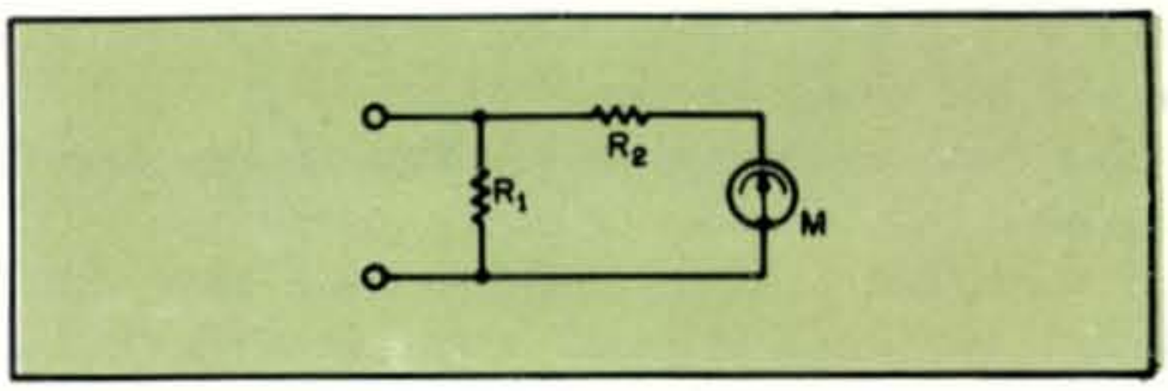

Fig. 7—The milliammeter, converted to voltage measurements by R_2, measures the voltage drop across shunt R_1.

tive terminal of the power supply, and there is no danger that it could possibly become disconnected, then R_1 can be omitted.

The disadvantage of measuring tube current in the negative lead is that you measure the cathode current rather than the plate or screen current. If separate supplies are used for the various elements of the tube, this is not a problem. By returning the cathode lead from the other tubes through shunts R_3 and R_4, you can measure their total current. It is generally an easy matter to subtract the screen current from the cathode voltage in determining input power.

Positive Lead Measurements

If you wish to measure the current in the positive elements of your rig, you simply *have* to measure in the positive lead. The screen current can be measured by putting your shunt resistor in series with the dropping resistor and the screen as shown in fig. 8. By a combination of measuring the screen in the positive lead, and the cathode current in the negative lead, you can keep the voltage in the leads to the switch and meter under

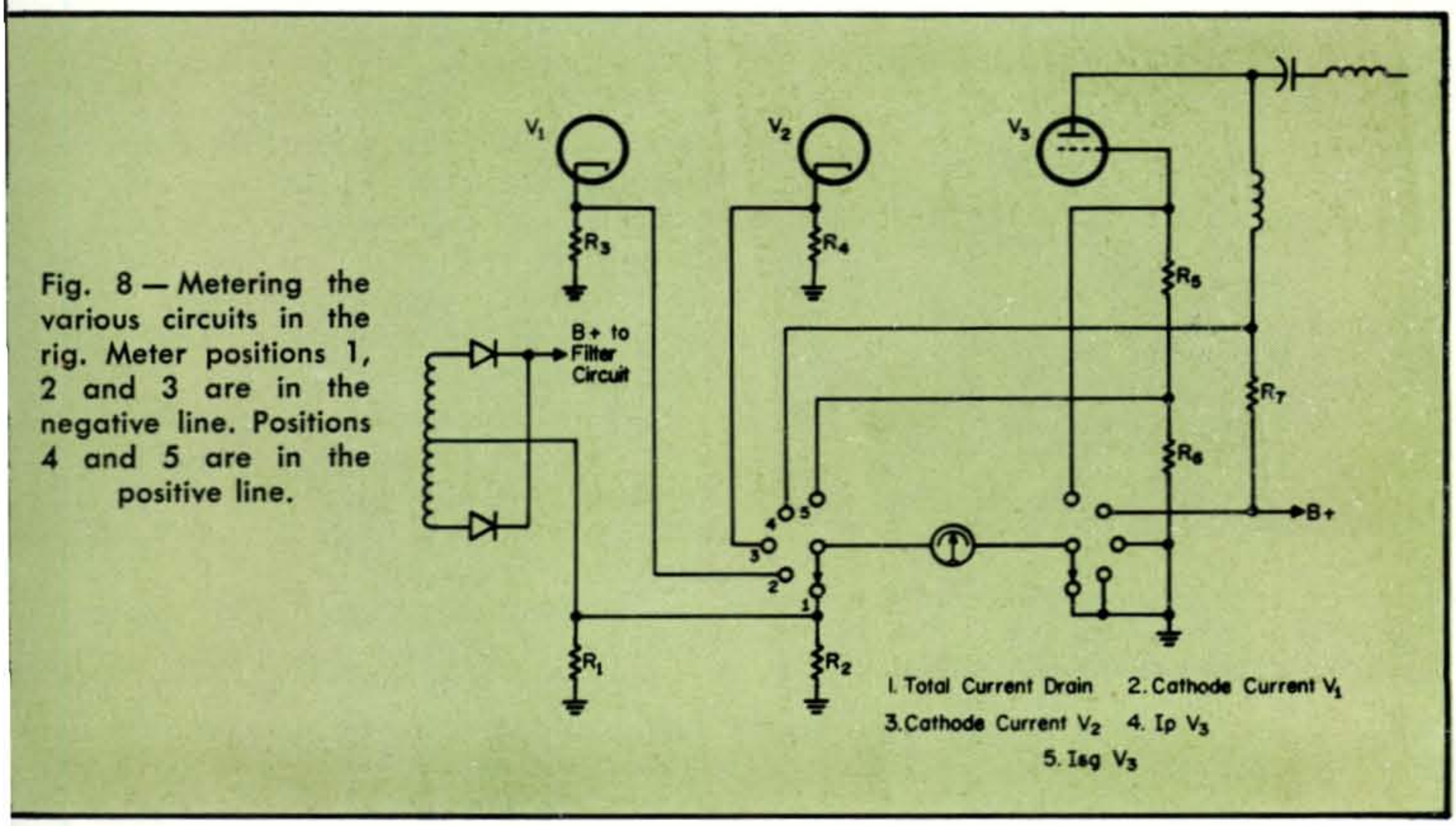

Fig. 8 — Metering the various circuits in the rig. Meter positions 1, 2 and 3 are in the negative line. Positions 4 and 5 are in the positive line.

a few hundred volts. Most meters are safe up to 800 volts, but beyond this you should mount the meter on an insulated board and install a glass window or heavy screen in front of the meter. Also, make certain that all meter switching is done with switches that have grounded shafts.

Generally, meter switching is done with a double pole switch to allow you to measure positive and negative voltages. If the metering is not to be done in strong r.f. fields, you can use a single pole switch and the diode bridge shown in fig. 9. Any general purpose germanium diodes such as 1N34's can be used.

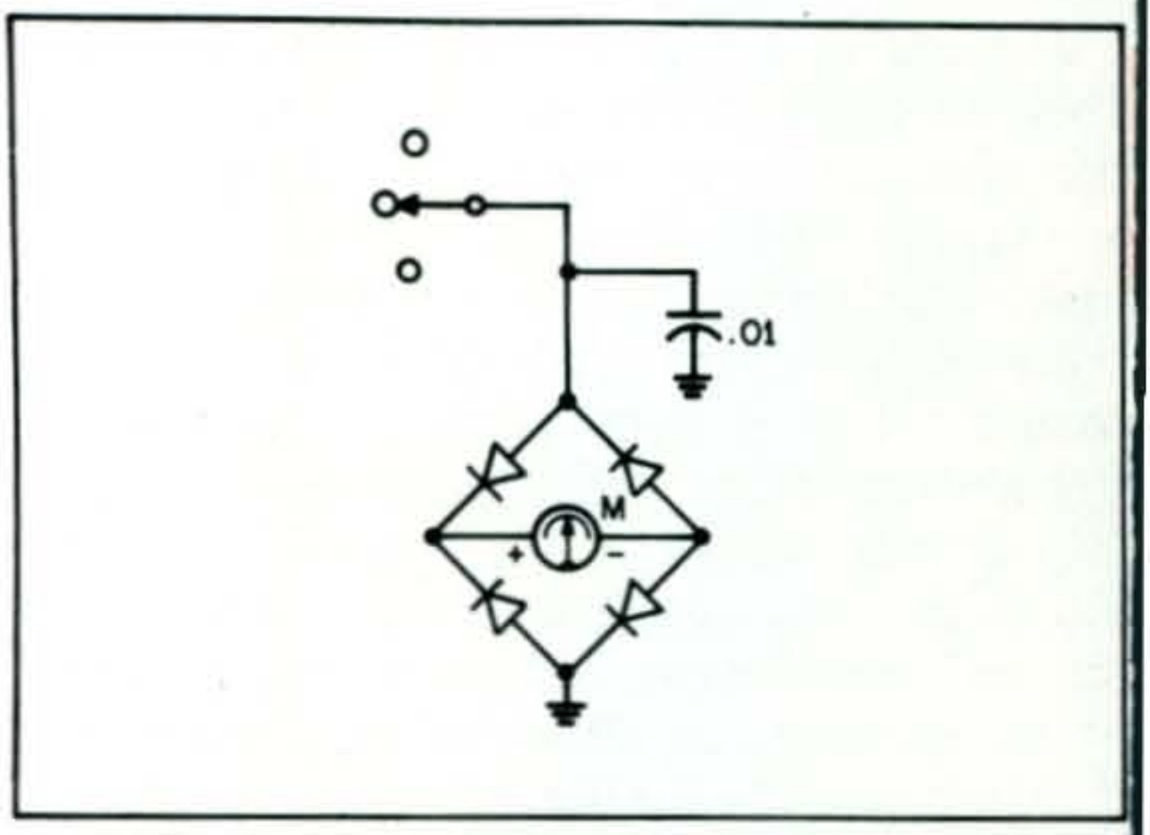

Fig. 9—If a single pole switch is to be used, no polarity reversal can be made. The use of the diode bridge will correct this, automatically switching the meter polarity as required.

Meter Shielding

In an r.f. field, the meter should be shielded to prevent the radiation of harmonics. An aluminum chassis slightly larger than the meter can be mounted over the back of the meter and holes (with rubber grommets) drilled for the leads. You can often cut down a tin can to serve the purpose and bond it to the panel. All leads to and from the meters should be shielded and bypassed.

There is nothing mysterious about meters, or their care and feeding. By simple design, you can measure many voltage and current points in your rig and pin-point problems when they develop. Nearly every problem on the application of meters in your rig can be solved by Ohms law. Take your meter, some patience, and some courage and use meters to measure the operating conditions of your rig. ■

ILLINOIS SESQUICENTENNIAL

ONE hundred and fifty years of the good life in Illinois will be celebrated in 1968, the Sesquicentennial anniversary of Illinois' entry into the Union as the twenty-first state. Dozens of publications, hundreds of events, and thousands of people will celebrate the Sesquicentennial all over the land throughout the year. By December 3, 1968, the anniversary of admission to statehood countless organizations will in as many ways have told the wondrous story of Illinois to millions here and abroad. Our thousands of amateur radio operators can tell the story of Illinois and its Sesquicentennial to hundreds of thousands throughout the world.

Bud Drobish, W9QUA, presenting the first card to Illinois Gov. Kerner. From l. to r.: L. A. Wollan Jr., assistant director of the Illinois Sesquicentennial Commission, Bud Drobish, Gov. Kerner, Edmond A. Metzger, W9PRN regional ARRL Vice Director and Charles W. Wilson, W9FFP, QSL Committee Chairman.

Gov. Otto Kerner announced that the Amateur Radio Program of the Illinois Ses- Day, Sunday, Dec. 31. In connection with quicentennial will begin on Lee De Forest the announcement, the Governor was presented the first QSL card by Bud Drobish, W9QVA, an executive with Hallicrafters, Inc., Chicago.

Hallicrafters, the largest manufacturer of amateur radio equipment in Illinois, has donated an initial supply of 100,000 QSL cards, which will be sent by thousands of Illinois hams all over the world.

A handsome certificate will be awarded to non-Illinois amateurs for 10 v.h.f. or 25 u.h.f contacts wilh Illinois amateurs, and to Illinois amateurs for 60 v.h.f. or 150 u.h.f. contacts with non-Illinois amateurs. Contacts

[*Continued on page 120*]

See page 126 for New Reader Service

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X 12v DC Module/cable	$ 65.00
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7X Basic 117v AC supply ONLY	65.00
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7 or 230vac Line Cord (specify)	5.00
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230 12v DC supply w/230v Basic	140.00

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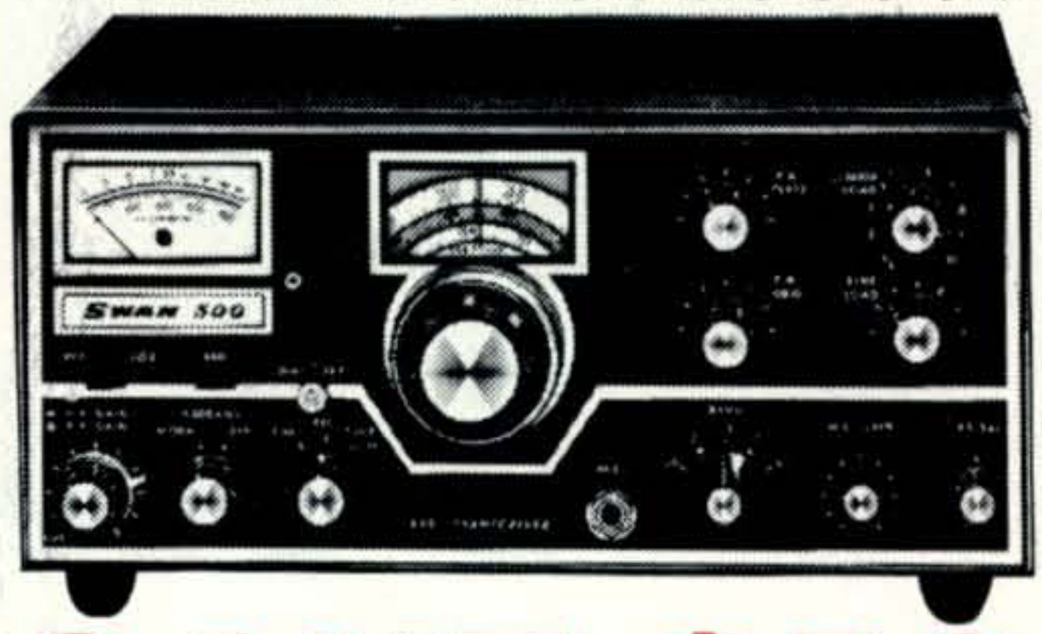

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See page 126 for New Reader Service

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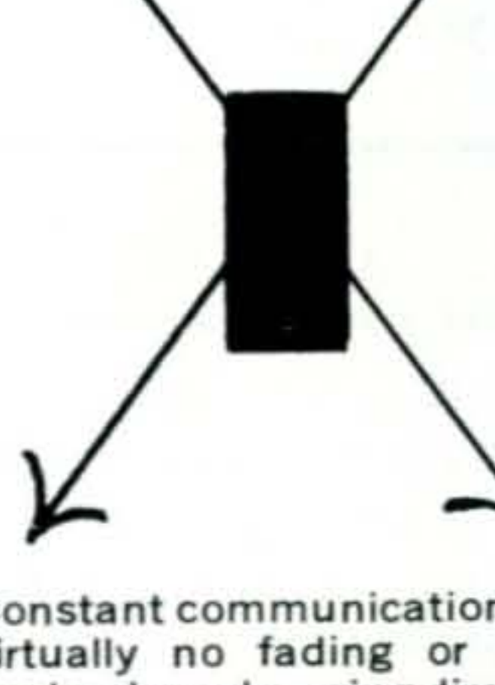
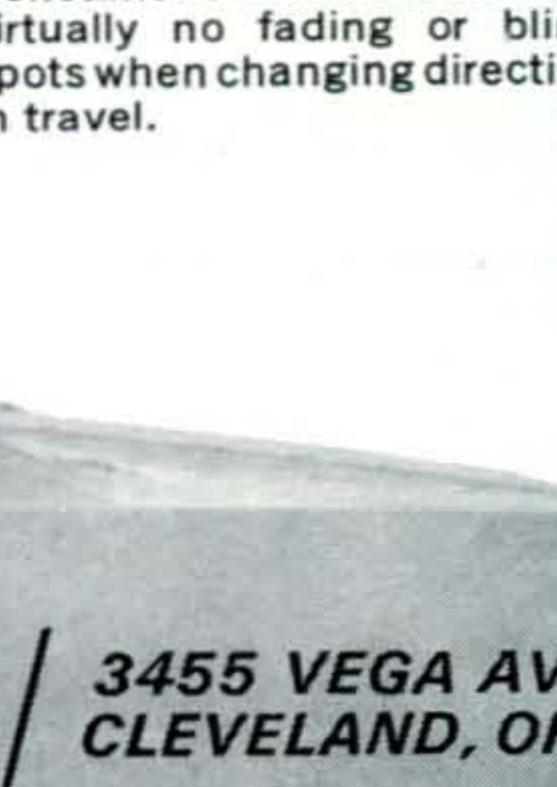
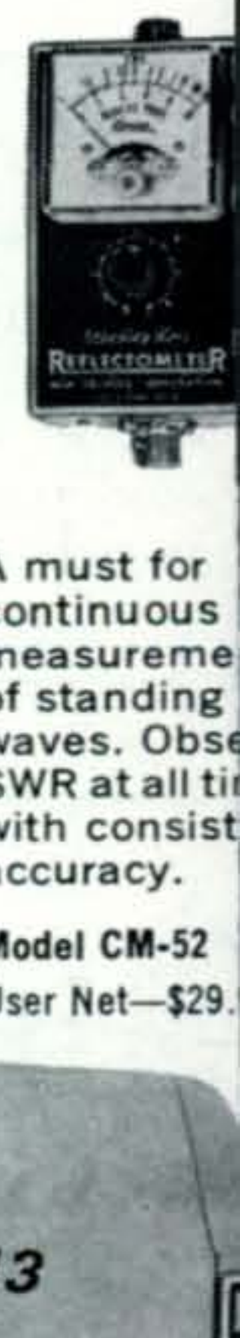


Turn the corner and you could get lost with a single antenna.



Constant communication with virtually no fading or blind spots when changing direction in travel.



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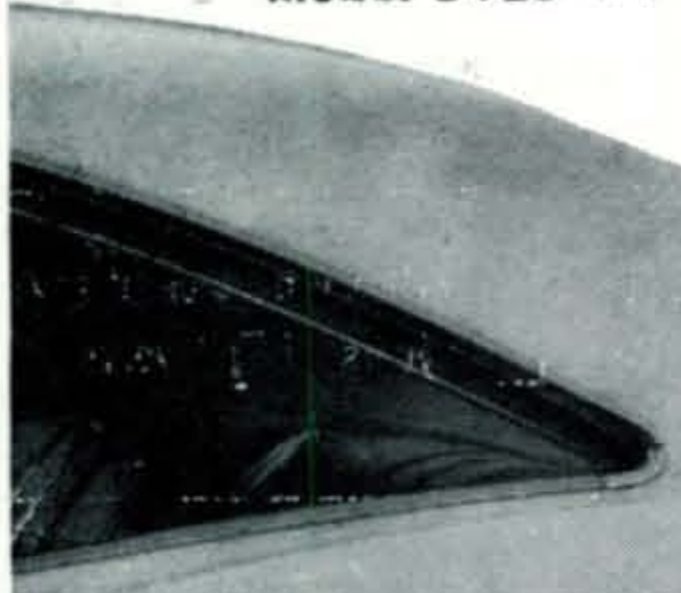

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FRONT PANEL CONVERTER SWITCHING

BY WILLIAM SCHOPPE JR., *WB2FWS

THE introduction of the Heath SB-301 receiver with the converter switching from the front panel gave me the incentive to modify my SB-300 to perform the same function. Of course, Heath has incorporated it as part of a combination control and this would not be possible without extensive modification of the SB-300 and it is the intention of this article to show how to accomplish the same thing with your SB-300.

After some thought and a little measuring, I decided that I could preserve the symmetry of the front panel as well as increase the resale value without any trouble. (See fig. 1.) The change entails drilling of either one or two holes in the front panel, depending how far you wish to go and the purchase of some rather inexpensive parts. It might be fitting at this juncture to list the parts needed to do the job.

1. Panel bearing assembly, 3 inches long, with a ¼ inch shaft.
2. A Millen universal coupler.
3. 6 inch extension shaft, brass or other available material.
4. 3 inch flexible extension shaft.
5. Brass coupler, ¼ × ¾ inches.
6. Knob, to match the other Heath knobs.

The parts can be obtained from most parts houses and the knob can be ordered directly from Heath Co., Benton Harbor, Mich. Just mention that it is a replacement for one of the small knobs on the SB-300.

* 31 Penny Drive, Huntington Station, New York. 11746

Fig. 1—Location of the preselector control knob added to the Heath SB-300. The pilot light is just to the right of the arrow.

Modification

The first step was to drill a hole in the front panel to accept the panel bearing assembly and this hole was made the same distance from the preselector knob as the preselector knob is from the r.f. gain knob. This was done to retain the symmetry of the panel. No need to remind you that caution is necessary in the drilling of the hole but don't be afraid to attempt it. It greatly simplifies the job if you measure very carefully and then use one of the electronic motor controls currently available for small electric hand drills.

If you feel it necessary, use an under-

See page 126 for New Reader Service

sized bit first to make a pilot hole, then enlarge it with the proper bit to accept the assembly. Mount the assembly, making sure it turns freely on the panel.

Next, attach the universal coupler to the shaft of the panel bearing and the extension rod to the coupler. The flexible shaft is then connected to the extension shaft and to the converter switch shaft. See fig. 2 for details.

All that remains now is to place the knob on the panel bearing shaft. Don't tighten the knob permanently but just enough to turn the switch to the middle or VHF #2 position; then loosen the knob to set the pointer so that it faces in a 9 o'clock direction.

This concludes the first portion of the modification and only those with strong stomachs for drilling another front panel hole should continue reading.

Pilot Light

The switch is now in the VHF #2 position and at this point I decided that some sort of marking was necessary to remind me just where I was. I felt that the use of white decals would be out of the question since I could not hope to duplicate the factory lettering method. I could have also tried upholstery nail heads or some other similar device but, like some people, I'm a nut for pilot lights and I figured that the use of a single lamp to designate the VHF #2 position would be a good choice.

For this purpose, I chose a very tiny lamp, well-known to model train fans as "grain o' wheat" lamps. These lamps are little baseless glass bulbs with fine pigtail leads and they require no mounting bracket. That is not to say they are self-supporting but they can be inserted into a small hole. The hole in this case is drilled in the front panel, adjacent to the knob pointer, just large enough to accept the lamp. Then either cement or tape it to the panel. See fig. 1 for the placement of lamp.

The lamps are rated at 12 volts but I used 6.3 volt which was easy to come by on the receiver and which should lengthen their life considerably. The power for the lamp is taken from the converter switch and routed to follow the cable harness to the front panel.

On the panel itself, I had mounted a two lug terminal strip, utilizing the screw which holds the panel to the chassis bracket. The pigtail leads of the lamp are then connected to the strip.

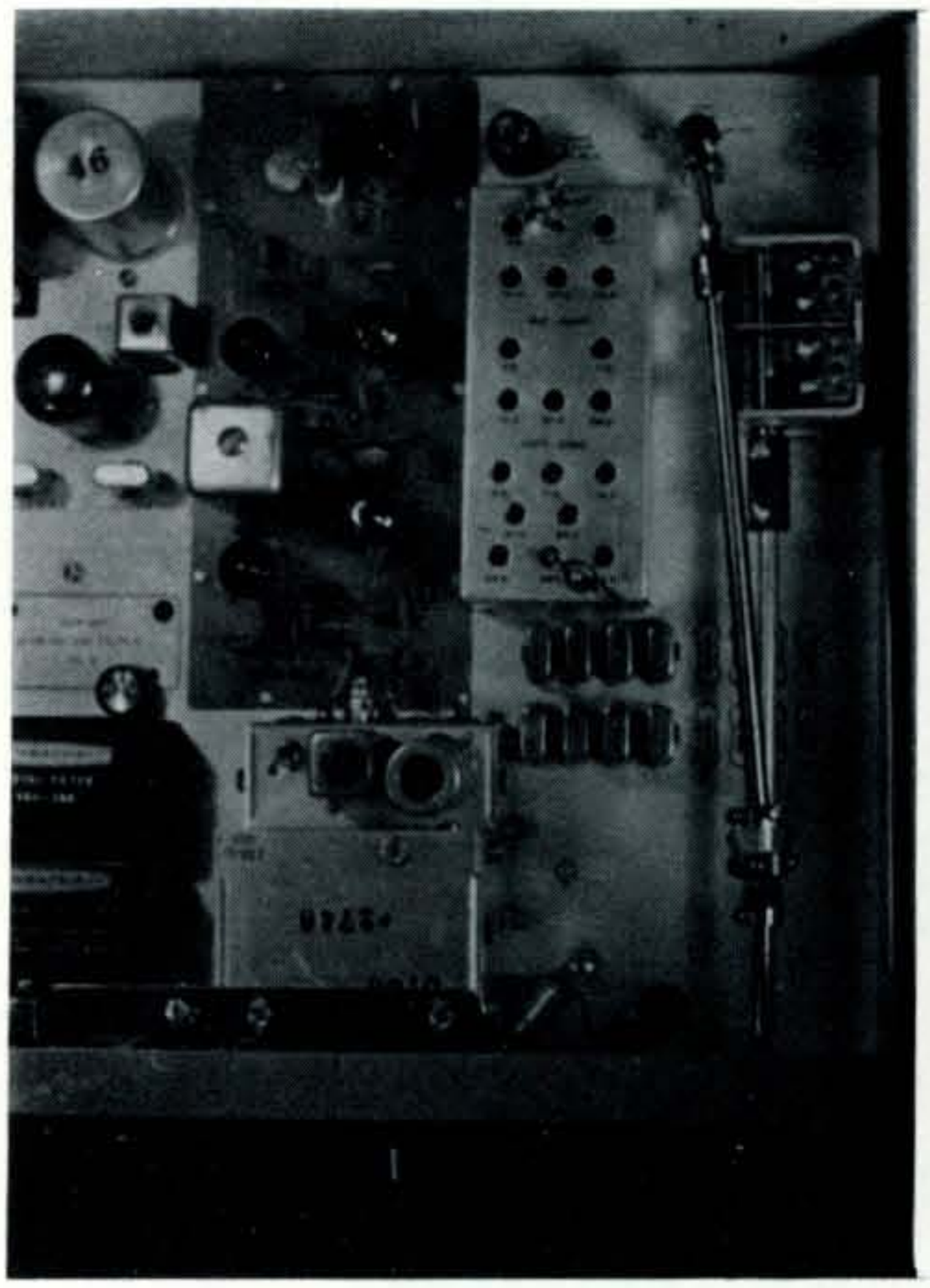

Fig. 2—Top view of the SB-300 showing the shaft extension arrangement.

That completes the modification and, unless you don't feel up to using a pilot lamp as I did, the job is somewhat simpler. In any event, it is a very worthwhile project in view of the fact that you will no longer have to remove objects from atop the receiver in order to utilize the converter switch when you decide to change bands. No doubt the veteran modifier will find numerous ways to couple to the switch but the method I used has been working trouble free for some time now and certainly does not detract from the appearance of the receiver.

Addenda

Another thing that comes to mind with the receiver is that if you are experiencing some problems with the i.f. section, check or replace the 6BA6s. The ones that came with the receiver had very poor or low emission and when the new ones were put in, the change was so great that I thought I had a new and different receiver. Also, some improvement in sensitivity can be realized by changing V_1, 6BZ6, to a 6DE6.

One other item; if you are having trouble zeroing your "S" meter, try writing to Heath for a new "S" meter adjusting pot. It seems to have solved my problem.

Good luck on the modification and don't be afraid to drill those holes. ■

See page 126 for New Reader Service

Compact . . . all in one package

DRAKE MODEL TR-44B Communications Station

The TR-44B consists of an R-4B Receiver and a T-4B Transmitter in the same cabinet with built-in speaker. Ideal package for Ham Radio, Mars, RACES, Civil Defense, National Guard, Semi-Military, Government or Commercial.

Basically a 120 watt output AM-SSB-CW transceiver with provision for ten crystal-controlled channels and ten 500 kc tuneable ranges with 1 kc dial accuracy. Receive and transmit on different frequencies by using crystal controlled transmit and tuneable receive. Receive and transmit on same frequency, either crystal-controlled or tuneable.

Operates on frequencies from 3 to 30 MHz (except no transmitting 5.0 to 6.0 MHz and no tuneable range for transmitting 11.0 to 11.5 MHz). It also operates 1.8 to 2.3 MHz standard or 2.3 to 3.0 MHz on special order. Receiver section of TR-44B may be operated 1.5 to 30 Mc with the exception of 5.0 to 6.0 MHz. Crystals for fixed frequency channels and for tuneable ranges available.

Two power supply units for TR-44B: Model AC-4 operates from 120-240 V, 50/60 cps source. Model DC-4 operates from 12 V DC. Both these supplies operate transceiver on any mode continuous duty.

TR-44B is housed in a perforated metal cabinet 11½"H x 10¾"W x 12¼"D. Unit less power supply weighs 30 lbs.

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*Power Supply is included in price of L-4B. Solid State, excellent dynamic and static voltage regulation. Separate for a more flexible installation.

For more information, see your distributor, or write:

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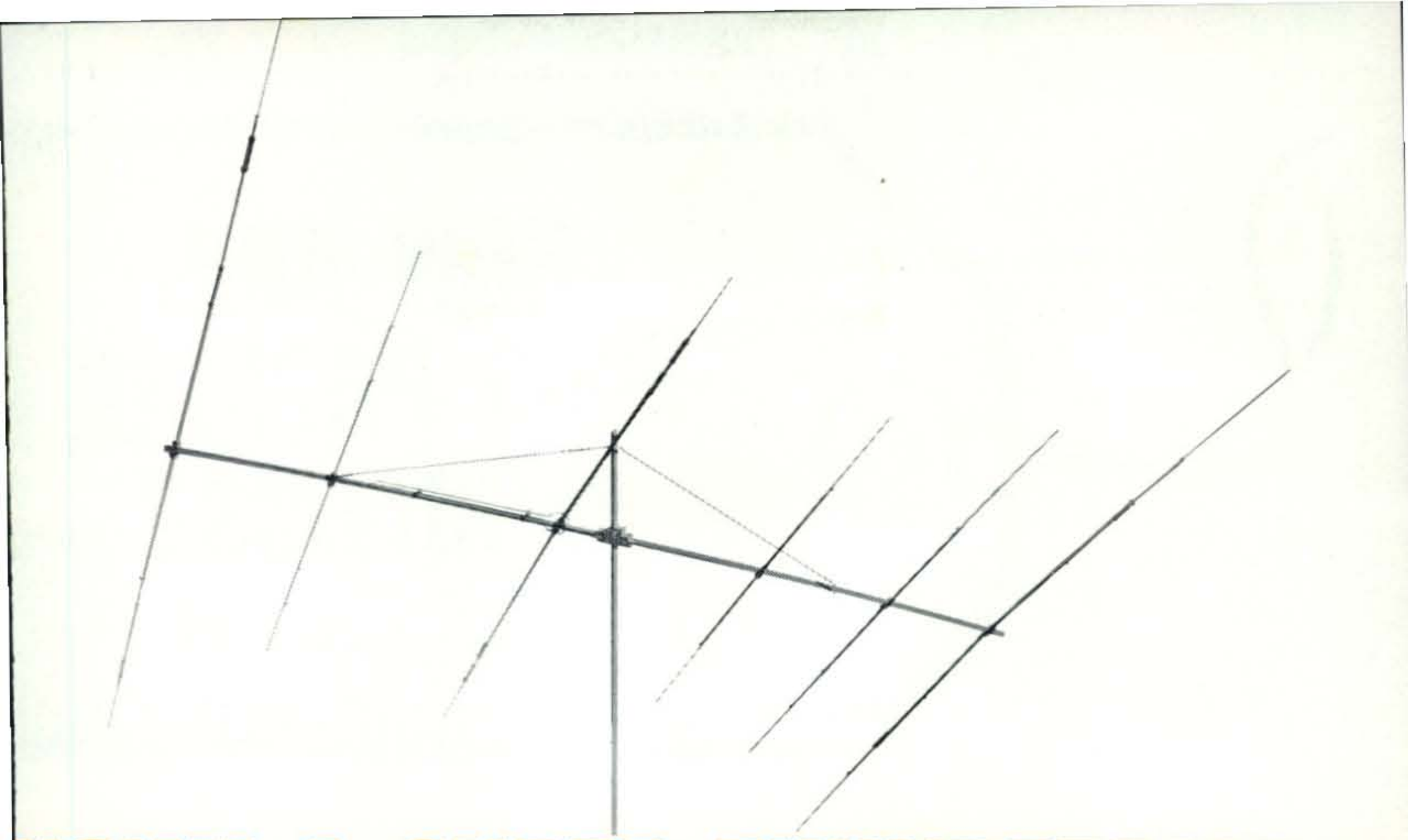

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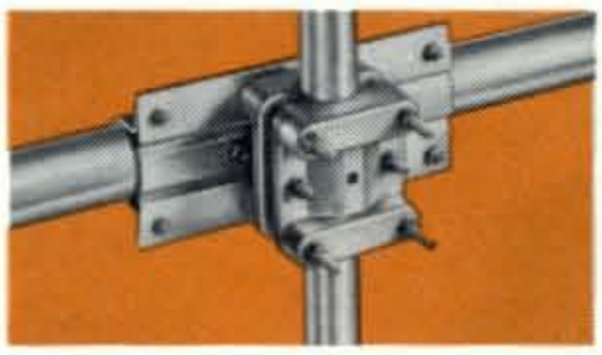

Tilt-head, universal boom-to-mast bracket—all new, cast aluminum bracket accommodates masts from 1¼" x 2½". Allows easy tilting for installation, maintenance and tuning, provides mast feed-thru for beam stacking.

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The most advanced antennas under the sun.

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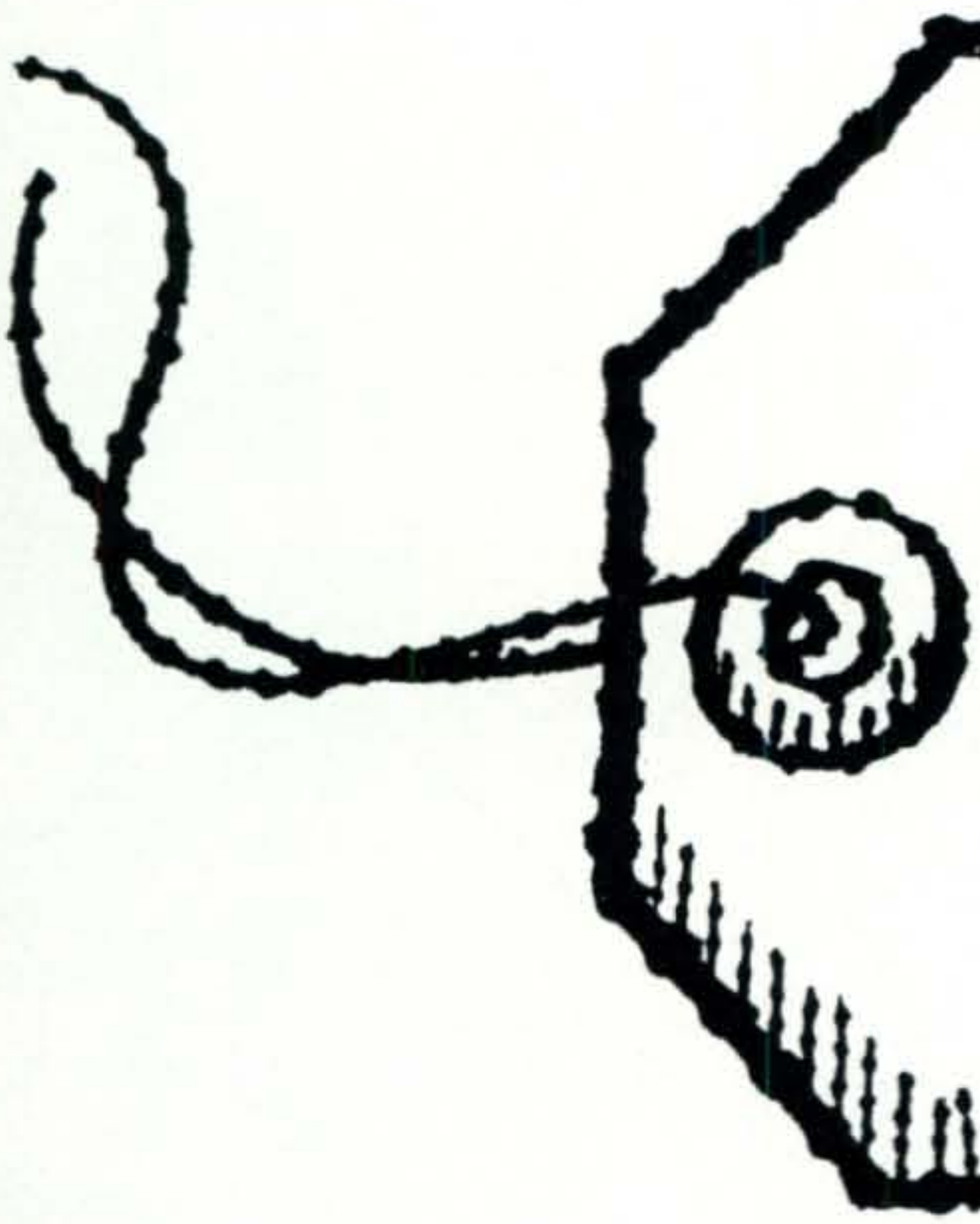


HOW ARE YOUR PACKING PROBLEMS?

BY EDWARD A. LACY*, K4BJL

WHETHER you are returning your gear for factory service, sending it to a retailer as a trade-in, or shipping it to a ham in another state, you probably need help in packing it for shipment. At least that's the opinion of some of the largest manufacturers and retailers.

Lafayette's supervisor of package opening Charles A. Clark says, "In most cases the return packing of electrical equipment is insufficient and the returns come back damaged."

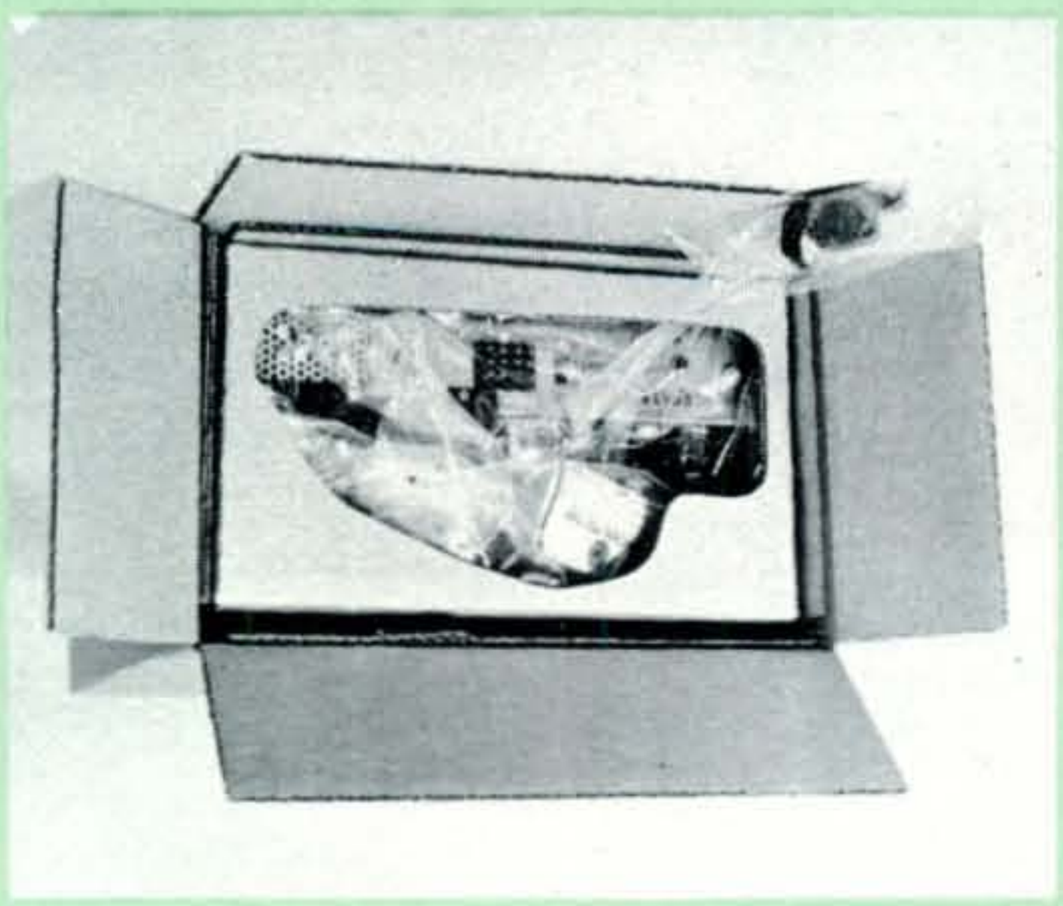
A manufacturer states: "We have found that the incident of damage is a great deal higher when home-made packing materials are used."

Electronics manufacturers have of course developed packing into an art. They go to a great deal of effort to get their products to you without being damaged. With all this effort they naturally urge: hang on to that original shipping container and its protective materials. Then when the need arises, use this container and you will have no problems.

Note: However, don't ship an assembled kit in the carton it came in when it was unassembled.

In case you don't have the original shipping carton handy, here are some suggestions from both manufacturers and retailers for

* 356 Claridge Street, Satellite Beach, Florida 32935



If possible save the original packing material.

See page 126 for New Reader Service

home packing:

(1) Tighten chassis and cabinet screws and nuts before packing.

(2) Wrap external cables and cords and place them carefully and securely inside the cabinet if possible.

(3) Place loose items that should accompany the equipment in a small bag.

(4) Place order papers or instructions in an envelope and tape it to the top of the gear.

(5) Enclose gear in a tough plastic bag (if you can find one) or wrap it with brown wrapping paper (waterproof paper is best) to protect the finish. Do not use newspaper since the ink could "bleed", especially if your carton got wet from being left out on a loading dock.

(6) The experts agree: the two carton system—one inside the other—is the best method of packing. First, place the wrapped gear in a strong cardboard carton that is just large enough to hold the gear. (If necessary, "rebuild" your carton so as to get a tight fit.) Then tape the carton securely.

(7) Should you use a wood crate or a cardboard carton for the outer or second carton? Obviously a wood crate is stronger, but the shippers disagree on its value. As one company puts it: "We recommend cartons as they can absorb shock without transmitting it to the unit inside. A crate being rigid often results in internal damage to the unit." If you use a carton, check the bottom flap—it may state the gross weight limit, which of course you should not exceed.

(8) The outer carton should be at least 2 inches (some experts say 3 in.) larger in all directions than the inner carton.

(9) Place 2 in. (3 if you use the larger carton) of resilient packing material such as foam rubber, molded animal hair, mineral or rock wool in the bottom of the outer carton as a cushion. (If you can't find these materials, you can use *crumpled* newspapers.) Then set the inner carton down on the packing material.

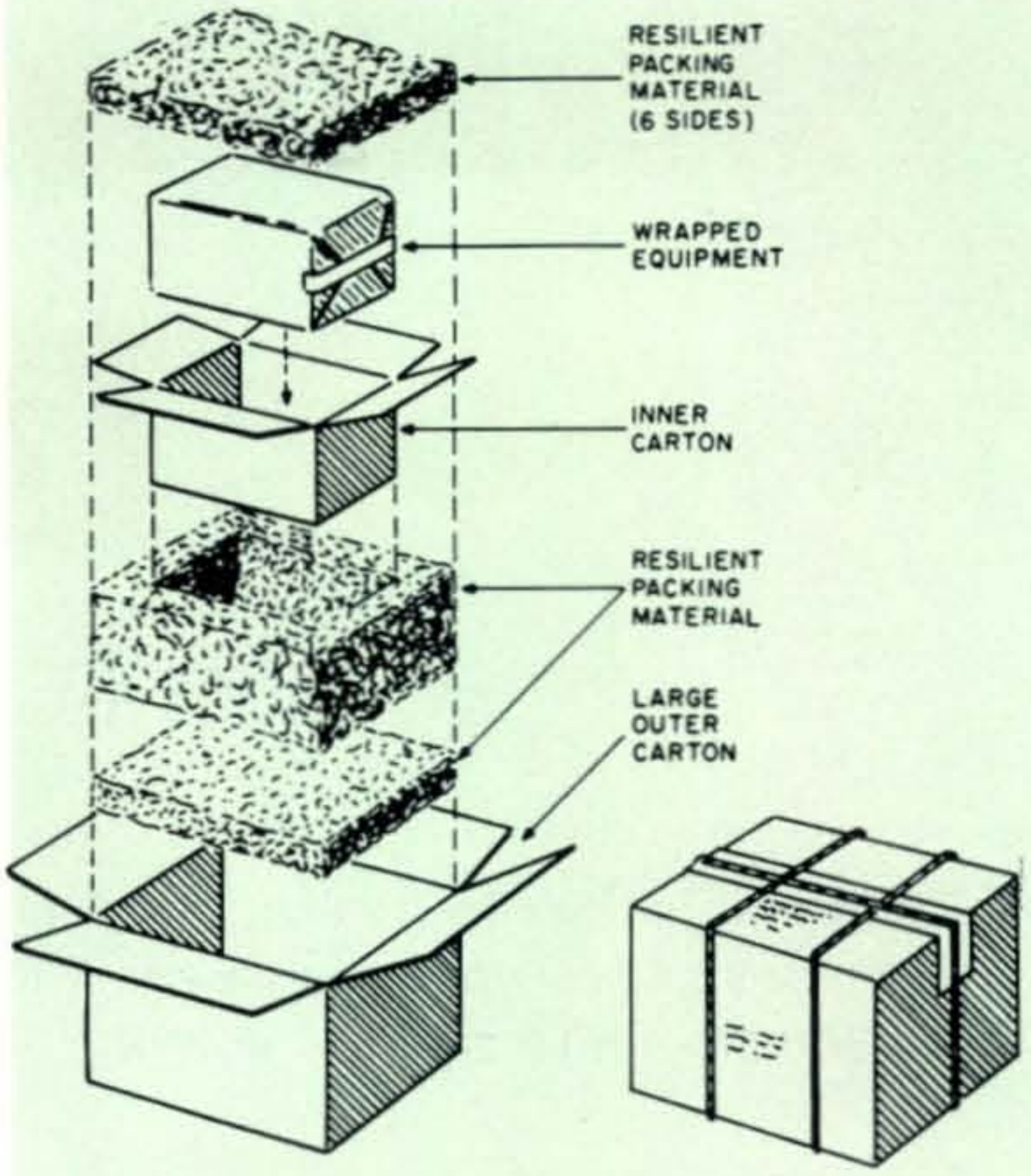
(10) Place 2 in. (or 3) of the packing material then on all four sides and the top of the inner carton.

Note: Professional packers sometimes use fibreboard liners at top, bottom, and four sides of the shipping container instead of cushioning materials but it's not recommended for the nonprofessional packer.

(11) Close the outer carton and seal it with 2-in. wide gummed paper tape or with one of the new tapes such as laminated rayon, pressure sensitive, filament, or laminated glass. Apply the tape to the full length of the carton and extend it not less than 2½ in. over each end of the box. Tape the end seams of the box also, and then tie the carton securely with strong cord.

(12) Address the carton in two or more places.

(13) Don't forget to insure the package. ■



The ideal method of preparing equipment for shipment.

"Is it true that you worked like a dog building your new rig?"

See page 126 for New Reader Service

FURTHER IMPROVEMENTS FOR THE 51J

BY CAPT. PAUL H. LEE, *W3JHR

The modifications include a new (and inexpensive) crystal lattice bandpass filter for s.s.b. reception, a new first mixer to provide improved performance on the high frequency end of the receiver and an antenna trimmer.

IN A past issue[1] of *CQ* I described a product detector modification for the 51J series of receivers. I have received letters as a result of that article asking me for other ideas as to how the 51J series can be improved for s.s.b. reception. I have responded individually to the writers, and have given them information on two simple changes which I have found to be of great benefit. This article is for those readers who have not written, and for those who will find the ideas herein adaptable to and useful in other receivers which they may have, and which they can modify through their own efforts.

Bandpass Filters

One of the most obvious things about the 51J series is the lack of a bandpass filter suitable for s.s.b. reception in all models except the 51J-4. That model has the Collins mechanical filters built-in, and this gives the 51J-4 a very fine s.s.b. capability when the product detector is installed. The earlier models, such as 51J, 51J-2, and 51J-3 (R-388/URR) do not have the mechanical filters installed. A filter conversion kit can be purchased from Collins for these receivers, but the price is rather high (over $100) even with only one filter. I found it quite easy to install a nominal 3 kc crystal lattice filter in my 51J-2, at a total cost of less than $5.00. Its performance is quite good, and for the price I have been quite satisfied with it for over 5 years.

This filter configuration is similar to one which I installed in a surplus Super-Pro receiver in 1958.[2] The filter I installed in the Super-Pro was quite effective, and shortly after acquiring the 51J-2 I incorporated the same idea in that receiver. Figure 1 shows the original single-crystal filter in the 51J-2. It was designed for c.w. only.

Figure 2 shows the modified crystal filter, in which I used certain of the FT-241-A low frequency surplus crystals which are still available from Texas Crystals in Ft. Myers, Florida at low cost. Channels 359 and 361 are used in the series positions in the lattice. Their frequencies are 498.611 kc and 501.388 kc, respectively. In the shunt posi-

* 5209 Bangor Drive, Kensington, Maryland 20795.

1 Lee, P. H., Cdr. "A Single Tube Product Detector," *CQ*, April 1961, p. 50.

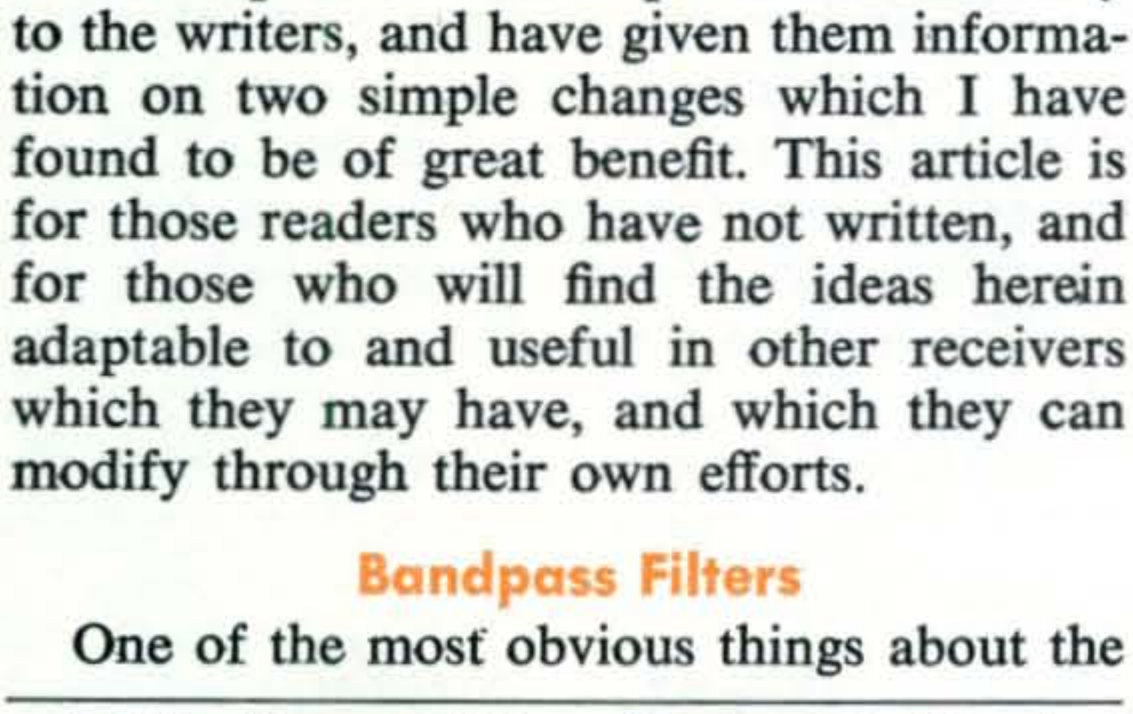


Fig. 1—Circuit of the original filter in the 51J used for c.w. reception.

2 Lee, P. H., Cdr., "Save Your Super-Pro for Sideband," *CQ*, Sept. 1958, p. 52.

See page 126 for New Reader Service

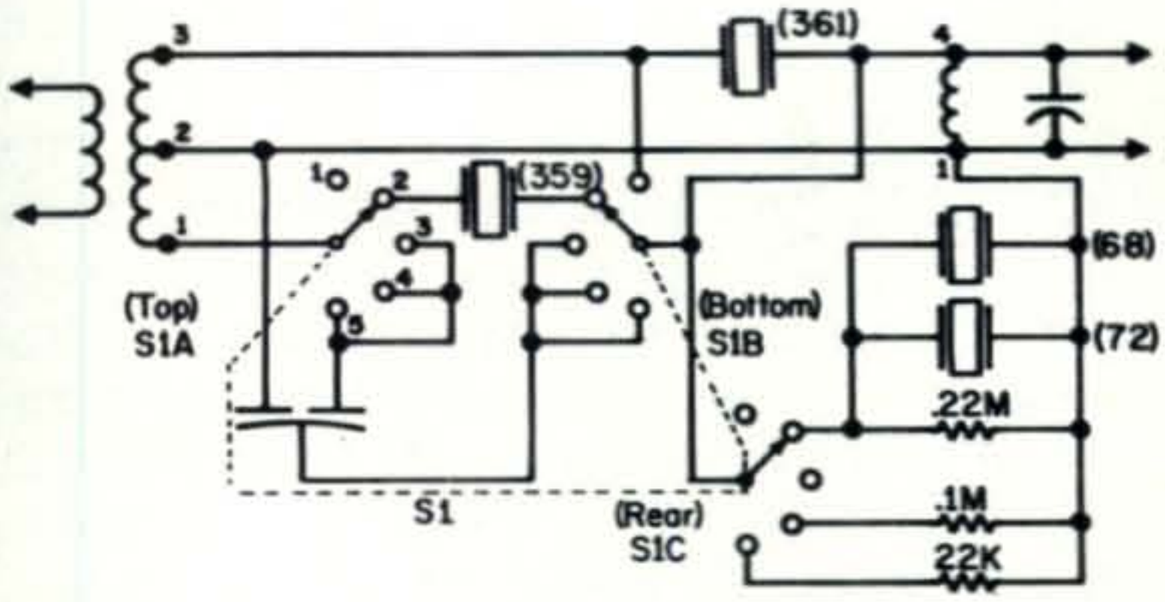


Fig. 2—Circuit of the modified filter in the 51J series. Position one provides no filter and position two provides the crystal lattice filter for s.s.b. reception. The remaining three positions provide crystal 361 for c.w. reception with varying degrees of selectivity. The new switch is a Centralab type PA-2007. The resistors are all ½ watt and the crystal frequencies are discussed in the text.

tions the reader has a choice of channels 68 and 72, or channels 358 and 362. Their frequencies are 496.296 kc and 503.704 kc, or 497.222 kc and 502.777 kc, respectively. The resulting passband will depend on which pair of shunt crystals is used.

Figure 3 shows the overall received passband with no filter and with the two different pairs of shunt crystals. I used channels 68 and 72 in shunt, because the two side "spikes" were of lower amplitude than with the other pair, although the "skirt" width at the 40 db point is a bit greater. This set of curves was plotted using the DB-Meter (the S-Meter is calibrated in db on these sets), as an r.f. input signal of constant amplitude was shifted in frequency across the passband.

Modification

The actual physical modification is not difficult. First, remove and discard the existing crystal switch, S_1. Then remove and discard the existing i.f. crystal. Insert a new 3-pole 5-position switch, Centralab type PA-2007, and rewire the filter as shown in fig. 2. The connections to the FT-241-A crystals can be made by carefully soldering stiff pretinned wires to the holder pins. The crystals can then be suspended in position from the connecting wires. New swamping resistors for proper shaping of the passband are used.

With the switch in the first position there is no filter in the circuit. On the second switch position the s.s.b. filter is in use. On the third, fourth and fifth positions, the channel 361 crystal is in the circuit alone for use on c.w. Selectivity increases with clockwise rotation of the switch from position three to position five. In these c.w. positions the trimmer capacitor is in the circuit for crystal filter adjustment on c.w., just as it was in the original circuit.

This filter makes a receiver of the 51J series a very acceptable s.s.b. receiver, when used with the product detector modification mentioned previously.[1] While the crystal filter does not have the high degree of out-of-band rejection of a mechanical filter, I have found its performance for amateur work to be quite satisfactory, and have used it since 1961.

First Mixer

Another worthwhile modification for any of the 51J series receivers is the installation of a dual triode first mixer. This change greatly improves operation, especially on the higher frequency bands such as 21 and 28 mc, by giving better mixer signal-to-noise ratio and greater weak-signal gain. I read all available literature on the subject of triode mixers, and finally settled on the choice of a little-used tube, the 6DJ8. This little gem has a G_m of over 13,000. When used with proper

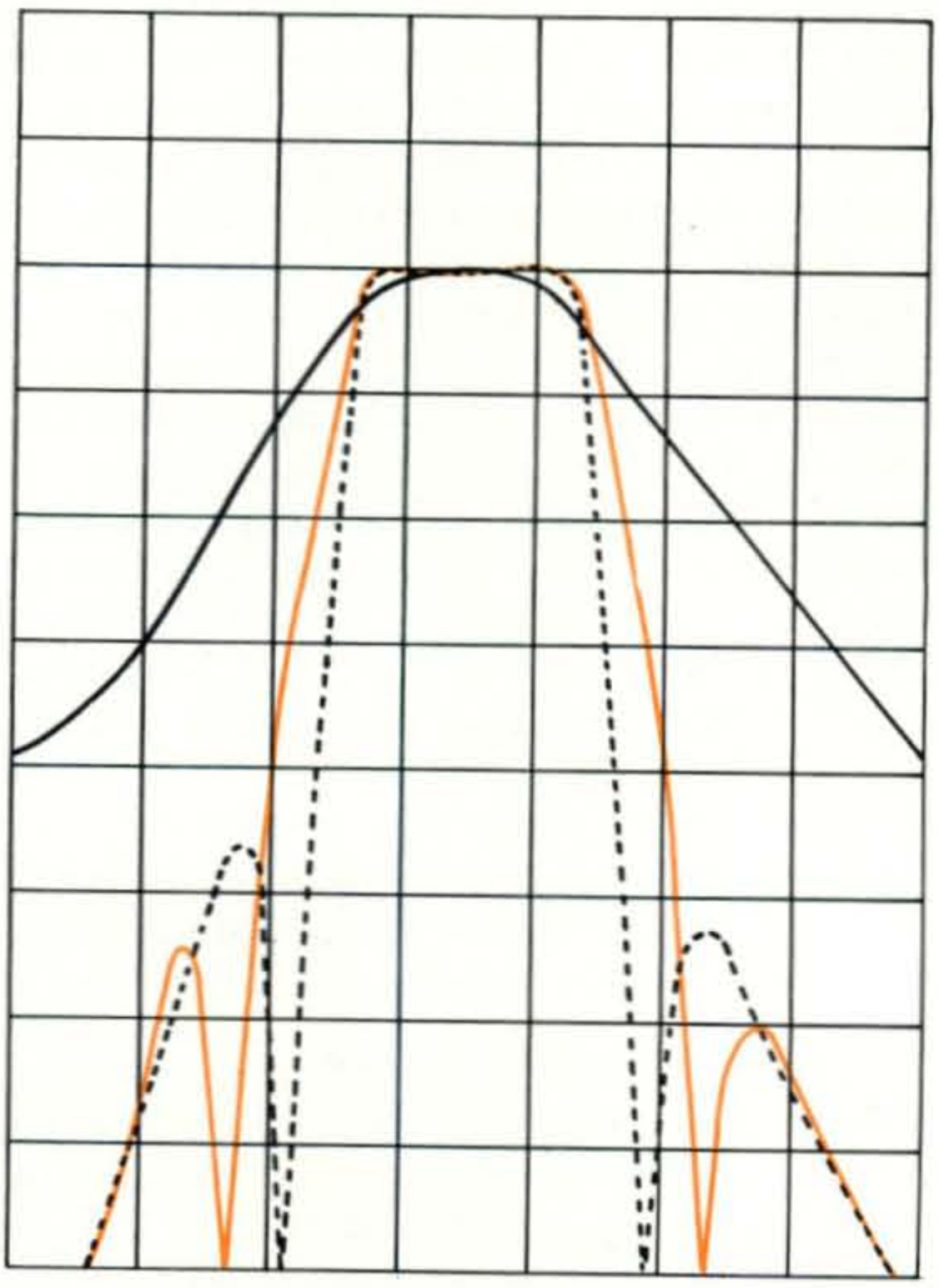


Fig. 3—The response curve shown by the solid line is that for the 51J with no filter at all. The curve shown by the colored line is obtained with crystals 359 and 361 in series and 68 and 72 in shunt. The response indicated by the dotted line is for the 359 and 361 series crystals but 358 and 362 shunt crystals.

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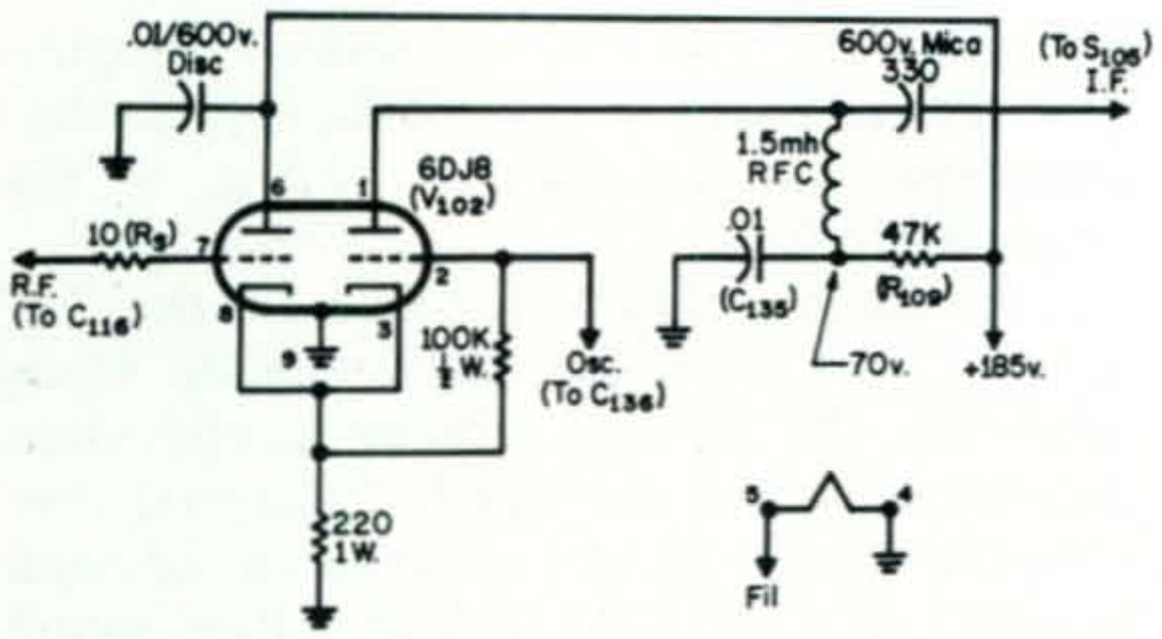

Fig. 4—Circuit of a dual triode first mixer described in the text.

voltages and circuit component values, it gives outstanding performance as a dual triode mixer.

I might say that I first tried other types, such as the 6J6, 6BK7, 12AU7, 12AX7, 6ES8 and others. The only one which can approach the 6DJ8 in performance is the 6ES8. Both of these types are made by Amperex, Mullard, and several other manufacturers.

Use of the 6DJ8 or 6ES8 necessitates a socket change. The existing 7 pin socket must be replaced with a 9 pin socket. This is not hard to do by disconnecting all wires from the socket, removing it, carefully clearing a space for a Greenlee socket punch to be inserted, and punching out the hole to a slightly larger size. The 9-pin socket is then mounted and wired in as shown in fig. 4. Several new components, shown in fig. 4, have to be added. Those labelled with circuit symbols such as C_{135}, *etc.*) are existing parts. A socket with a tube shield mounting ring should be used, and the shield should be in place for stable operation. If any instability occurs (as it did in my set) on the 1.5—2.5 mc and 2.5—3.5 mc bands, add a small swamping resistor R_s, 10 ohms, ½ watt. Component leads should be kept short and direct. The 6DJ8 showed more tendency to be unstable than did the 6ES8, and this is probably due to its slightly higher gain.

Realignment

After the installation of this mixer, the associated r.f. circuits should be re-aligned, of course. A terrific improvement on 21 and 28 mc will be noted, almost immediately. Signals which were previously down in the receiver noise will be easily readable, with considerably more a.v.c. action being apparent on the DB-meter. I performed this mixer modification on two 51Js, and they were really outstanding receivers after this was done. I still have one of them[3], [4]. A queer thing that happened was that one of them was unstable without R_s and the other was not. Why, I do not know. Perhaps it had something to do with the placement of associated r.f. wiring under the chassis. I might state here that any attempt to use a plug-in socket-change adapter to avoid replacing the 7-pin socket will result in dismal failure. I tried this, but circuit losses increased, instability was incurable, and results were very disappointing. Leads must be kept short and direct, and losses kept low, with this high gain mixer and this is impossible with an adapter. The actual socket replacement is a necessity. However, the results are certainly worth the trouble.

R.F. Stages

This leads me to my next item of discussion, which is that of attempts at r.f. stage improvement. There have been many articles written about use of dual triodes or special pentode types for improved front-end performance in older receivers. I have written one myself[5].

One look at the bottom of the 51J, however, is enough to deter any attempt to change the r.f. socket from a 7-pin to a 9-pin type. One of the interstage partitions under the chassis passes right across the center of the r.f. socket, and in fact it is soldered to the appropriate pins of that socket to provide optimum interstage shielding. Removal of the socket without literally demolishing the receiver front-end is impossible. One's thought might then turn to use of a plug-in socket-change adapter. I tried this, using various types of dual triodes in cascode, cathode coupled, and other exotic arrangements. Again, due to the long leads in the adapter arrangement, those with high enough gain to be really useful self-oscillated miserably. The others did not give enough improvement over the 6AK5 to be worth the effort. No doubt some other types of pentodes could be used with appropriate circuit changes, but I did not feel that the work involved would be worth it. So, the 6AK5 stayed in the set.

---

3 Lee, P. H., Cpt., "Modifying the R-390A5 for SSB, *CQ*, Jan. 1968, p. 55.

4 Lee, P. H., Cpt. "Diversity Receiving Made Simple," *CQ*, May 1964, p. 44.

5 Lee, P. H., "Worthwhile Improvements For That Old Receiver," *CQ*, Feb. 1957, p. 24.

[*Continued on page 116*]

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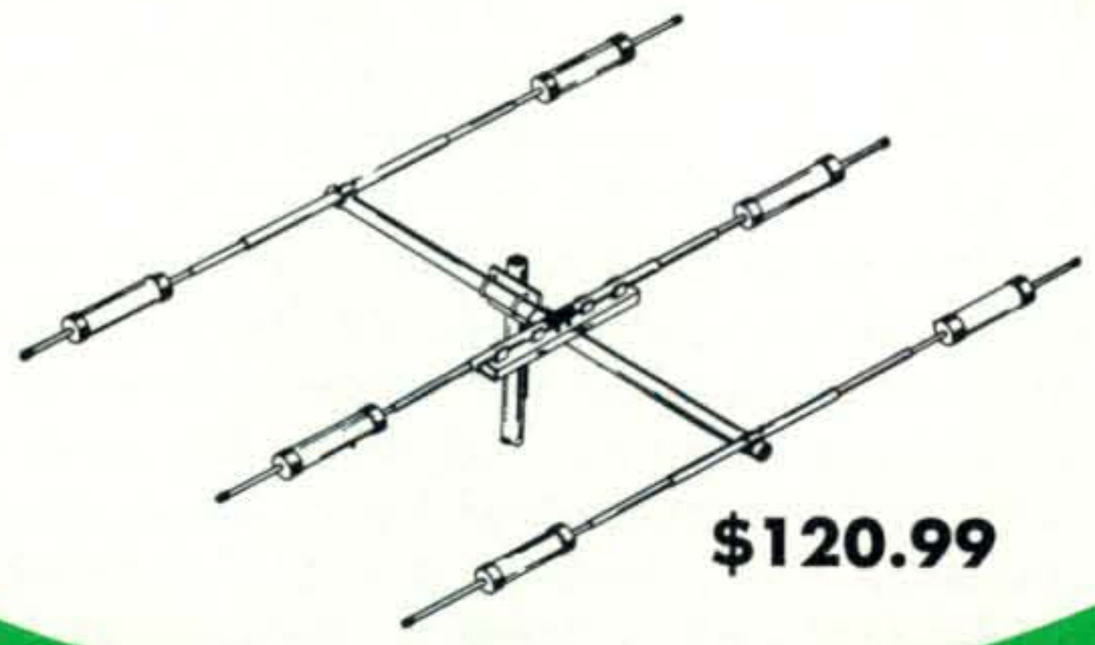

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FORTY EIGHT HOURS IN THE DAY

BY SYLVIA MARGOLIS *

I guess it's because most radio amateurs are men that radio amateurs are so obstinate.

I've yet to meet a man who wasn't obstinate, although they'll never admit they are obstinate—they are "decisive." They are "determined." They are "unswerving." Men equate obstinacy with virility.

There was a radio amateur, once, who was brave and true—and obstinate, like all radio amateurs. And, in the way of radio amateurs, he used his technical skill when the chance arose, to do something which he knew must almost certainly lead to a dreadful death. Yet he persisted in doing it, because, as he saw it, he was doing the *right* thing. And he died.

A generation has passed since World War II, when that Belgian amateur, ON4DS, operated his c.w. station as a link between the Belgian Resistance and London. The Nazis captured him and he was executed in a concentration camp in 1943. He lived in the coastal town of Knokke, where his deeds and his martyrdom are commemorated on the War Memorial.

1967 was the third year that a group of radio amateurs have laid a wreath at the Knokke War Memorial, in memory of their colleague, who died in 1943. They had gathered at Knokke for the Third International Amateur Radio Convention.

The life and death of ON4DS could be said to be the cornerstone of the Knokke Convention. But there's a significant tendency, in these days of full employment and the quest of pleasure for leisure, for radio amateurs to congregate for a Convention at the drop of a hat. In 1967 a radio amateur visiting Europe for three weeks' vacation could, if he were cunning enough to sell the idea to his wife, attend an R.S.G.B. Mobile Rally at Woburn Abbey; then the Knokke Convention in Belgium; then the I.A.R.C. Convention in Geneva, Switzerland; then back to London for a final fling at the R.S.G.B. International Radio Communications Exhibition. The longest plane-time between these places is 75 minutes. In between the weekends he could take time out to visit a few museums and churches and palaces and shop around a little, things that ordinary tourists do. But the peaks of the holiday would be those four weekends. What more could a radio amateur ask of a vacation? And what more could his wife demand? Her husband would be happy and relaxed, doing things he wanted to do, so that he could go home refreshed and recharged, to earn the money to bring them back to Europe next year!

For each of these events he would be able to get a local amateur licence, which makes sense after all those years of negotiation, lobbying and nagging in the cause of Reciprocal Licensing.

The Convention trend is a good one for amateur radio. Apart from presenting the chance for the exchange of ideas, it boosts relations between the licensing authorities and the amateurs, giving them the opportunity to meet on a social basis and iron out the wrinkles; it boosts relations between local businessmen and the amateurs, who bring

* 95 Collinwood Gardens, Clayhall, Ilford, Essex, England.

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in fresh business in the off-season; it boosts international friendship and it boosts the impression that wives get of amateur radio. Many wives who have remained for years firmly on the other side of the "XYL Barrier," have been converted after only one Convention. Some wives get hooked on them, like me, and scan the magazines, diary in hand, casting the year's social program. For they get to see that amateur radio can be as good an excuse as any for a party and a new dress:—

"Honey, I must have a new one. I wore the black to the V.H.F. Convention and it wouldn't be *right* for the wife of that DX-er to see me in the satin again, not when her husband has got more countries confirmed than you have.....!"

So Knokke and Geneva and Constanz and the London SSB Dinners flourish because they are what the amateurs, and their wives, want. Knokke is organized by a tiny group of U.B.A. (*Union Amateur Belge*), but they have energy, influence, foresight and tremendous enthusiasm.

This was our first Knokke Convention. September is a time of year when my husband, G3NMR, has to concern himself with the sordid necessity of earning a living, tiresome, because it diverts him from the vital things in life, like amateur radio. But if he didn't work hard in September, then we wouldn't be able to go to any Conventions, anywhere, any time.

The Knokke Organizers had invited him to chair the Convention's Mobile Forum. As he had been working very hard, *I* needed a weekend vacation. Besides he had been showing signs of fatigue. It manifests itself in subtle ways in a man. You can always tell. When a friend calls at 5:30 A.M. and says, over the phone, two words:-

"HE'S ON!"

if your man isn't out of bed, downstairs and twiddling knobs within 15 seconds, he's either senile or he's been working too hard.

For once I didn't want to be a woman alone in a world of men. This isn't always so easy to carry off as some radio amateurs' wives think. Lots of amateurs are delighted to have a woman take an interest in their hobby and they demonstrate their pleasure in all sort of ways that flatter a girl. But some resent it and look on me as a brash intruder, not only a woman, but one who has no licence, for a reason that she insists to be genuine—that she doesn't believe Ohm's Law.

I made Maurice, my husband, see things my way. It was easy. All I said was that if he didn't take me to Knokke, *take* me, not send me, I'd hide all his 6146's the day before the CQ-DX Contest.

To get from London to the Belgian coast, you drive 30 miles to the little airport at Southend, then fly in an animated bucket, God willing, across the English Channel, that strip of sea which kept British radio amateurs from the fate that overtook ON4DS in 1943.

The Knokke amateurs have got things so far tied up that an enthusiastic s.w.l., who owns a beautiful small hotel, is prominent on their Convention Committee. Robert Fevery received us into the Hotel Albert-Plage, which his wife runs like a miniature Hilton. And the nicest thing about it that weekend was that it was full of radio amateurs. So, when the people across the hall left their shoes outside their door, overnight, to be cleaned, we knew we could pop a QSL-card, or a crystal, or a resistor, or a capacitor into the shoe as a token of amity, and not be thought eccentric. There's a lot of comfort to be derived from knowing you are amongst your own kind.

All Convention programs follow a pattern, from which it is unwise to diverge. There must be technical sessions, in case anybody has come to improve his knowledge of amateur radio. There must be entertainment for the ladies. A fashion show is the favorite, but I'm not sure this is the best choice, be-

High level Confrontation—there were 5 Presidents of national amateur radio organizations at the Convention—1. to r. V.R.Z.A., V.E.R.O.N. (both from Holland, which has two societies;) R.S.G.B.; D.A.R.C. (Germany;) U.B.A. (Belgium.)

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This is why women like Conventions! The author, Sylvia Margolis, with Commandant Jaminé, of the Belgian Air Force, and K1QHP, Al Kemmesies, (International Roving Ambassador of the C.H.C.)

cause it makes some wives mean to see the clothes they could buy if the rig didn't have to be bought first. There must be a couple of lavish evening affairs. And, most of all, there must be the time and place for gossip. Anybody who has ever organized an amateur radio event will know that what the radio amateur wants to do, more than anything, is to rag-chew. He can rationalise this urge in all sorts of devious ways. Some eager beavers genuinely believe they want to talk to other radio amateurs because they want to *learn* about amateur radio, Lord love us! Some enjoy putting a face to a callsign. Some use the occasion to arrange DXpeditions—arrangements so complex, so secretive, so portentous, so high-level, that you'd think they were settling the affairs of the nation, or solving the mysteries of the Universe, rather than practising a hobby. Most people, though, admit they came along just for the ride, because they like to enjoy themselves and what better company to enjoy yourself with than people who have your own standards? It's more fulfilling, for instance, for a radio amateur to dance with the wife or daughter of another radio amateur, than with Elizabeth Taylor or Sophia Loren. Liz would never understand his stories about how he caught the VR6, nor appreciate his low s.w.r. And Sophia could be expected to show annoyance if her partner left her stranded on the dance floor, because there was a rumour that the VR6 was on, and he joined the rush to get outside to the mobile rigs.

The 1967 Knokke Convention kept to the pattern. By the end of the Opening Ceremony, we knew exactly where we stood—wobbly and kind of shimmering. Belgium produces hardly any wines or spirits, so they are very expensive. But the Belgians are practical, too, one of the most prosperous nations in the world. With an eye affectionately fixed on a fast buck, they have built up an enormous beer industry. As beer drinkers they come second only to the Czechs, beating even the Germans. Belgian beer is light, cheap and more-ish. Sometimes it is very special indeed, like the beer brewed by Trappist monks, which has a kick like a fully charged capacitor. So the canny visitor to Belgium starts with beer and stays with beer.

Belgian food is quite special, too, with not so much *chi-chi* and conceit as French. But the Belgians are so busy eating their food, in vast quantities, that they don't make a song and dance about it. Solid, sensible, hard-working people, the Belgians, with a high standard of living, two languages and the worst driving record in the world.

There was a splendid dinner, and an even more splendid progression afterwards to a bar, where the serious business of the Convention began. Of course, our purpose in being in Belgium was to celebrate international friendship. The trouble was that there are now over 400,000 radio amateurs. I don't claim we toasted every one of them individually. We might have left out one or two. But, every time the door opened, to let in a breath of mild, damp, Autumn air, and yet another batch of celebrants, we had to start all over again, toasting yet another nation's radio amateurs, yet another President of a national organization, the Vice President, the QSL Manager, then the F.C.C., the G.P.O. and all the European P.T.T.'s, then the famous DX-ers, the infamous DX-ers, the memory of Hertz, Morse, Marconi and somebody called, surprisingly, *Georg Simon Ohm*. I never realised the expounder of the Law I Hate Most had any name other than *Ohm*. I had never thought of him as a man, a human being. Just imagine—at one time he must have been a little baby, all helpless, who should have been strangled at birth.

I hate the dawn.

The dawn is mean and cold and alien and was never meant to be seen by men, or women. And I didn't like the way the dawn leered at me as we walked carefully back to our hotel.

Our room was faultless, with comfortable furniture, a bathroom to satisfy the most demanding American and all the little touches

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that make for a good hotel. I think there was a bed there, too.

Punctually, an hour behind schedule, the next day's program began with a series of learned lectures. I would dearly have loved to attend, but the revelation about Georg Simon was as much news as I could absorb for one Convention, so I went shopping.

I bought a picture postcard. Knokke is a very posh resort, where the Belgians take time off from making money. It has magnificent hotels, villas, apartments, golf courses, pools, equestrian schools, sometimes reminiscent of the smarter parts of Newport, Rhode Island. Fifth Avenue and Bond Street have nothing on the goodies and the prices in the shops. And there's a long promenade where you can see some of the most elegant women and snootiest poodles in Europe.

After lunch there was the mobile rally. Some of the rigs were superb. No doubt the operation was superb, too. But nothing, *nothing*, will excuse the hand-held mike in mobile operation. We saw far too many. The operaters got very huffy if we suggested they alter their ways.

European mobile contests are tremendously complex. There was a Control Station transmitting instructions to the competitors, as they swanned around the countryside, finding the answers to vital problems like how many grains of sand there are in five grams, how many steps in the church tower, what was stored there in 1609 (bet it was government-surplus radio components!) and some surprisingly intimate questions about the mating habits of local birds. Apart from this ornithological Kinsey Report, the contestants had to answer, off the cuff, whilst mobile, routine queries like:—

> One has to cover with the aid of a variable capacitor the midwaves from 200 to 600 meters wavelength. When open the V.C. has—all parallel capacities comprised—50 pF of residual. Up to what maximum should the V.C. arise, all parallel capacities comprised?

or:—

> What is the characteristic impedance of an open-wire line having conductors of 2 mm. diam. and a center-to-center spacing of 200 mm?

European amateurs always play these contests fiercely, no quarter given, *to win*. British and Americans are notoriously lackadaisical. I remember a Belgian contest when G3BID,

The wreath laying ceremony at the Knokke War Memorial, to remember a Belgian amateur who was executed by the Nazis in 1943 for his activities with the Belgian Resistance. President of the German society is extreme left of the row of spectators.

Edgar Wagner, a world authority on mobile operation, came last, and my husband, Editor of *Mobile News*, came second from last!

The Convention was centered on the Knokke Casino. That evening there was a great to-do outside, with special police to control the traffic and crowds of sightseers. Amateurs, self-conscious in formal clothes, waited to be allocated car transport for the procession and ceremony which has become an annual tradition of the Convention and the high-spot of each year's event.

With great, curving flourishes, the motorcycle police, who need to be a very tough and efficient crew in Belgium, worried and teased the mass of cars into a tidy procession, then, amateur whips waving, police escort stylishly fore and aft, we drove to the War Memorial. There, a member of the Convention Committee, with Commandant Robert Jaminé, of the Belgian Air Force, laid a wreath.

Cdt. Jaminé had had close connections with amateur radio since he was a Spitfire pilot in the British Royal Air Force during World War II. Now he is Assistant Director of Communications to the Belgian Air Force. It was fitting that he should have come with us to pay homage to a brave radio amateur's memory. This was the eve of the day in the year, "Battle of Britain Sunday," when we remember the "Few," those young R.A.F. pilots, boys, most of them, who saved the world from tyranny in 1940, of whom Churchill said:—

"Never in the field of human conflict

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was so much owed by so many to so few....."

Cdt. Jaminé was one of those young men who survived. He stod with us in silence, whilst the memories crowded in. Radio amateurs of seven nations, we were—Belgian, British, German, French, Dutch, American and Italian. The trumpeters of the Belgian Air Force played the Last Post (Taps) and even passing motorists slowed for a moment, to remember.

Afterwards I shook the hand of the President of D.A.R.C., the German national amateur radio organization, DL1QK, Karl Schultheiss, and we said solemnly:—

"*Niemals, niemals weiter!*"—"never again." and we all went into a bar and drank Belgian beer to prove it.

We had been warned about the night that followed. "*La nuit d'amateur,*" they called it—"the night of the amateur," with the rider "once experienced, never forgotten."

Nor shall we forget it. In the Casino Ballroom we began with an hour's concert by the 55-man Band of the Belgian Air Force, by courtesy of Cdt. Jaminé. Then a dance band took over. At first the dancing was decorous, but after midnight things hotted up. Twice we got involved in riotous, Conga-type dances that took a line of 150 radio amateurs up and down staircases, across the stage, round corridors and through the Casino foyer, where there was an exhibition of Salvador Dali drawings. Some of the drawings were rather rude, but there had to be the joker who compared one, with a lot of arms and legs projecting from a block of concrete, with a yagi. That was when we could see *one* of each drawing. Intelligent comment on the work of the Master became more difficult as the night wore on.

Cdt. Jaminé, so dashing in his uniform it made me feel 17 again, just to see the beauty of him, the medals on him, the gold braid on him, danced with me, all slinky, Continental style, hug-me-close-and-look-me-in-the-eyes-until-I-go-boss-eyed.

"What beautiful blue eyes you have!" he murmured, cuddling up so close we were like twin feeder.

"They're green." I purred.

"What beautiful green eyes you have!" he agreed.

"Watch out for that Gallic charm!" I hissed to Anne Patterson as he led her onto the floor. She is the wife of Barney Patterson, GI3KYP, President of the Radio Society of Great Britain.

"He told me I'd got beautiful brown eyes." she said afterwards.

I hate the dawn.

The sun was high when I looked in the mirror to settle once and for all the enigma of my eyes. They were neither blue nor green. They were red.

After lunch they presented the prizes, a thousand dollars' worth. Cdt. Jaminé got one for the help he gave the Convention. He was very happy, because by then he had found his car where he had left it a little earlier that day, parked the wrong way round on a one-way, no-parking street. I got a prize, for "efforts beyond the call of duty in the field of amateur radio public relations" and everybody kissed me.

We left with as few goodbyes as possible. The one thing I don't like about Conventions is the end of Conventions. People go away, thousands of miles away sometimes, and a place that has been humming with activity and laughter and friendship echoes emptily. There's a crumpled pamphlet, a forlorn glass, to show where the action was.

I looked round the Ballroom, where we had careered a few hours before. There, on those chairs, one of them tipped over now, was where the Dutch party had made us all laugh with their laughter. And there the Germans had taught us a drinking song. And the American, who had come from Viet Nam and got the prize for the longest distance travelled to the Convention—and somebody—was he French or British?—had challenged anybody to work a ZA on 10 that very night. And the table where we had argued about DXpeditions—was it a Belgian or an American who had got so het up? And was it a German or a Frenchman who had filled my glass with champagne, at 20 bucks a bottle, and we had drunk the health of you-know-who on you-know-which island? Was it a W or a G who had led that frenetic crocodile amongst the Salvador Dalis?

I couldn't remember which prefix belong to which souvenir. For we radio amateurs had achieved something that eludes the politicians. We'd forgotten atavistic hatreds, old bitterness. We'd even forgotten which language we were speaking. Nationality didn't matter. All that counted was that you were a radio amateur, and of good will.

I think that Belgian amateur who died in 1943 would have been content to see us. ■

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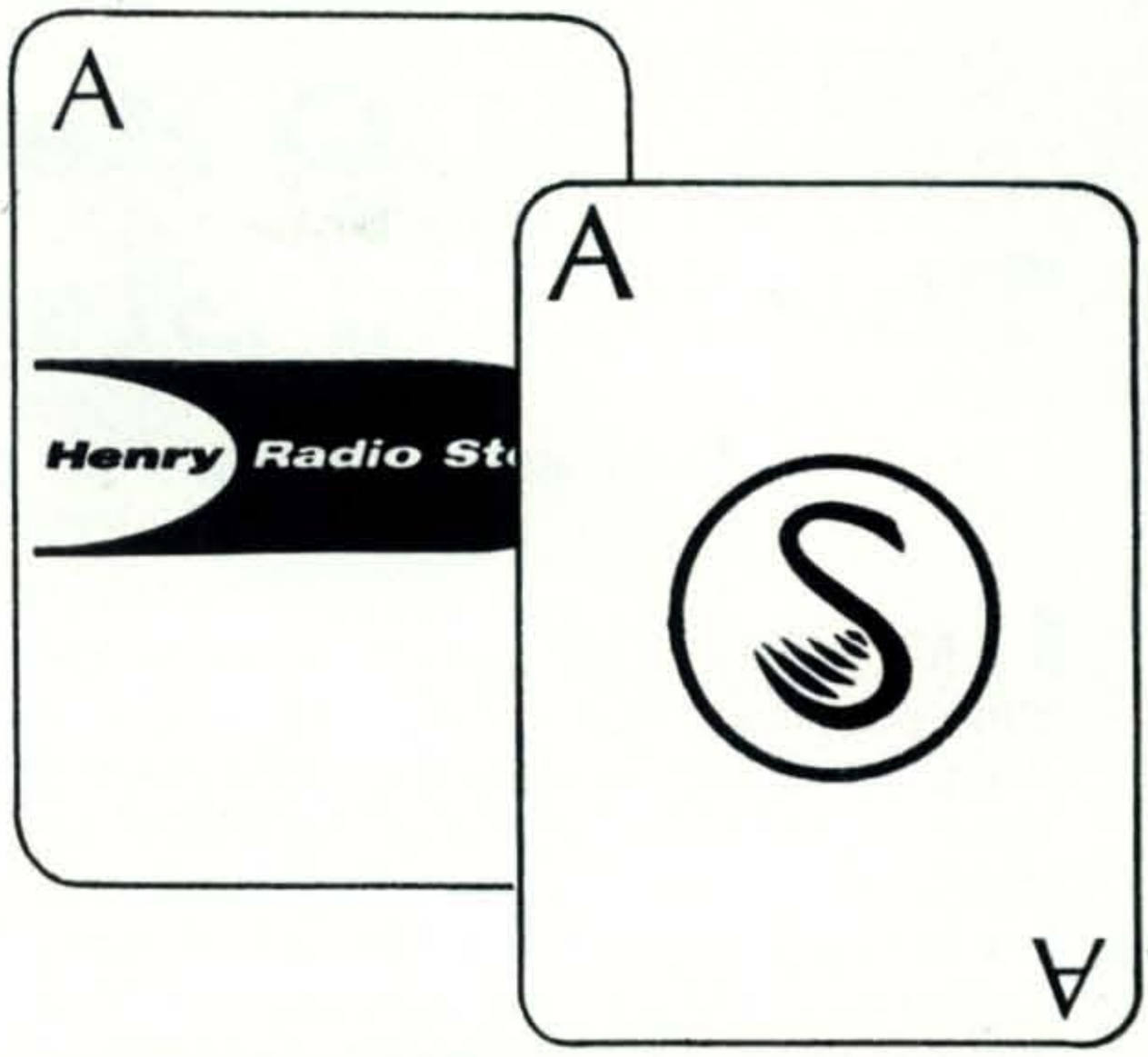
STILL A WINNING PAIR



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CQ Reviews:
The Solid State Voltmeters

BY WILFRED M. SCHERER,* W2AEF

It has not been our custom to review the almost inexhaustible variety and makes of v.o.m.'s and v.t.v.m.'s that are on the market; however, with that advent of the field-effect transistor (f.e.t.), a new breed of instrument has emerged. This is the solid-state voltmeter or s.s.v.m. It provides the advantages of both the conventional v.o.m. and v.t.v.m.

We shall therefore take a look at several models that have become available to meet various applications and which are priced according to the user's needs and purse, making them attractive for amateur, professional, service shop or lab use.

A solid-state voltmeter incorporating an f.e.t. input is akin to the v.t.v.m. in that it exhibits a very high input impedance both for a.c. and d.c. on *all* ranges and thus may be used for measurements on high-impedance circuits without undue unloading that might otherwise cause erroneous readings.

It has no filament warmup time so may be placed in operation instantly and can be powered by self-contained batteries, both features providing the convenience of the conventional v.o.m., particularly for work in the field. There is no waiting period for the "zero" to settle down. Portability and storage also are simplified by eliminating the v.t.v.m.'s usual dangling line cord. Battery operation can also minimize the possibility of detrimental ground loops during a measurement often introduced by a line cord.

Very high sensitivity for voltage and a wide resistance range can be achieved. The high sensitivity also permits the s.s.v.m. to be employed for measurement of current both on a.c. and d.c. with very low resistance-insertion loss. It is particularly well suited for use on solid state circuits where voltage and resistance values are now.

Basic Setup

The basic arrangement of most s.s.v.m.'s is shown at fig. 1. The input is applied to a voltage divider made up of very high-value resistances and that can be switched to the necessary values needed for the various voltage ranges. The output of this network goes to the gate of an f.e.t. which functions as a d.c. coupled source-follower to drive a balanced d.c. amplifier in a bridge setup similar

* Technical Director, *CQ*.

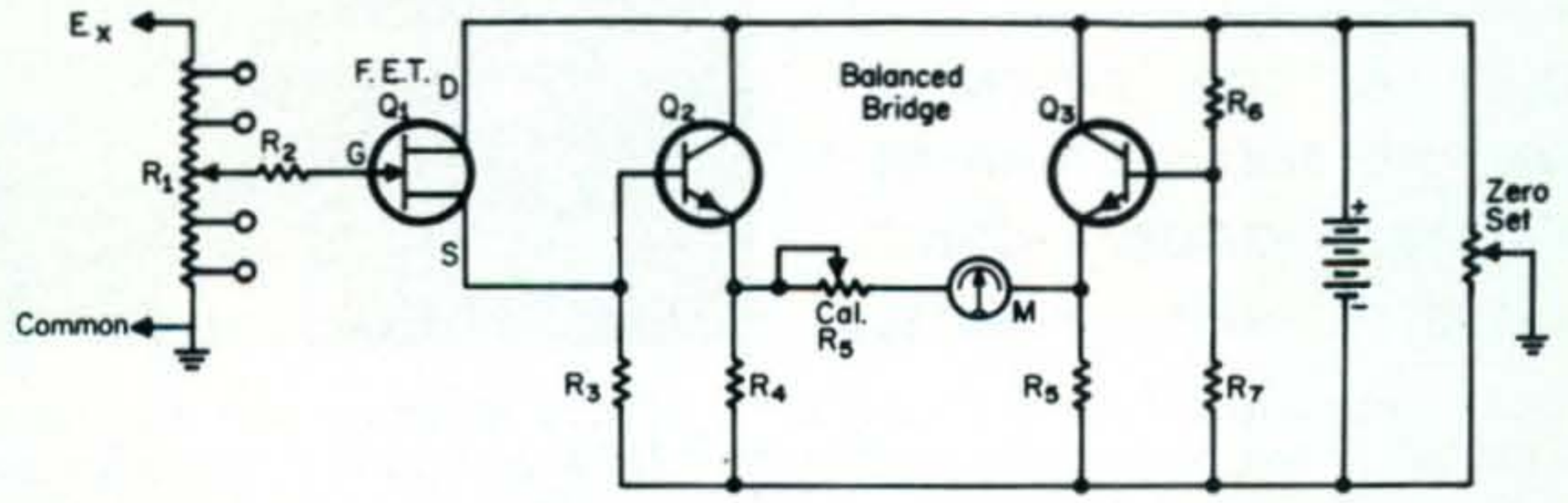

Fig. 1—Basic circuitry for solid-state voltmeter. Q_2, Q_3 comprise a balanced-bridge amplifier with Q_2 d.c. coupled from the source of the f.e.t. impedance inverter Q_1. The gate bias on Q_1 is adjusted with the zero-set with the resulting voltage at Q_1 source in turn biasing the base of Q_2 to the point where its emitter current is the same as that of Q_3. The result is that due to the *IR* drop through identical emitter resistors R_4, R_5, the emitter voltages are equal. Consequently, there is no potential difference between the meter terminals and the meter pointer remains at zero. A test voltage applied to Q_1 gate, causes Q_2 base bias to shift with an attendant change in its emitter current, resulting in a differential between Q_2 and Q_3 emitter voltages. This is indicated by the meter. Not shown, is a switch for reversing the meter polarity according to the direction in which Q_2 emitter voltage changes with a reverse polarity applied at Q_1 gate.

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to that in a v.t.v.m., but using conventional transistors instead.

Unlike the ordinary transistor, the f.e.t. has a very high input impedance which therefore does not load the voltage-divider network. Its source-output impedance is low and thus can readily be matched to the base of the input transistor for the balanced amplifier. The f.e.t. thus functions as an impedance inverter.

For a.c. measurements a solid-state diode rectifier is sometimes used ahead of the f.e.t., but due to diode loading, the a.c. input resistance is quite a bit less than the d.c. input value; however, a higher upper-frequency limit is more readily obtained without the need for compensation.

An alternate method, that maintains the very high input resistance, feeds the a.c. voltage directly to the f.e.t. impedance inverter, through the bridge emplifier and then rectifies it with diodes directly ahead of the meter itself.

Sensitivity may be increased with additional amplification using another f.e.t. ahead of the impedance inverter or with conventional transistors between the bridge output and the meter rectifiers.

The ohmmeter section is like that in the v.t.v.m. where a battery is connected in series with a voltage divider network and the unknown resistance. The ratio between the divider resistance and the unknown determines the voltage across the latter. This voltage is then measured with the s.s.v.m. which is accordingly calibrated in terms of resistance.

Heathkit Model IM-17 Utility S.S.V.M.

We shall first take up the Heathkit Model IM-17, inasmuch as it is the simplest of the three to be described at this time.

This is a low-cost utility job ideally suited for general service work, particularly in the field. It has four d.c. voltage ranges of from 1 to 1000 v. full scale, four similar a.c. ranges and four resistance ranges.

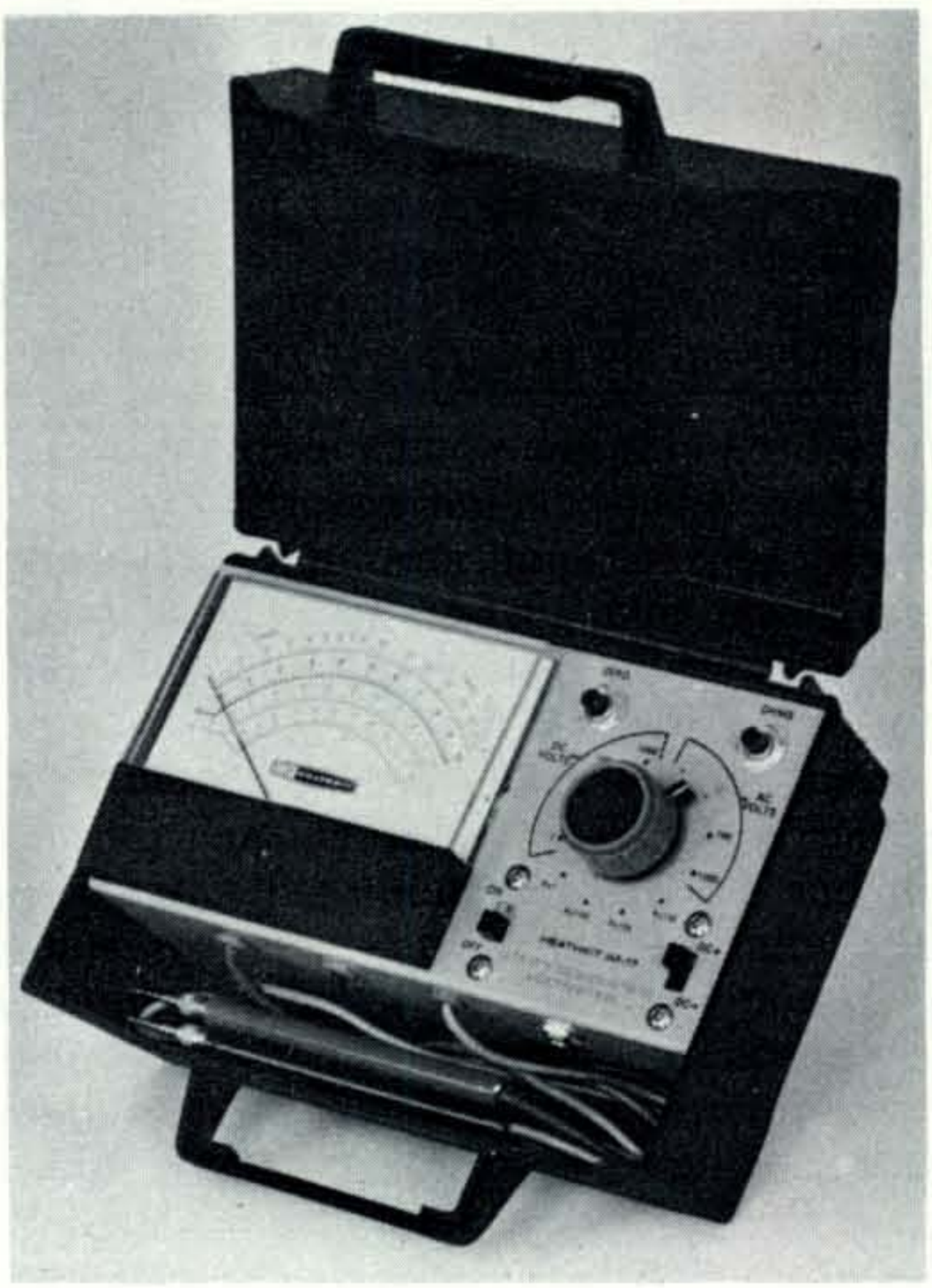
The basic circuitry is essentially the same as that shown at fig. 1 with the addition of two transistors connected as diodes in a back-to-back arrangement that provides overload protection for the f.e.t. impedance inverter as indicated at fig. 2.

For a.c. voltages, a single diode rectifier is switched in ahead of the d.c. voltage divider. The response is to the positive-peak voltage regardless of the input-voltage waveform.

The various divider networks also are switched in or out as needed for the different functions, but the setup will not be discussed, since the system is similar to the familiar one as used in the v.t.v.m.

Power is obtained from an 8.4 v. self-contained battery. An additional 1.5 v. C-cell is used in the ohmmeter circuit. Except for the operating controls and the meter, the IM-17, which is supplied in kit form, is built on a printed-circuit board. Only 4-5 hours are needed to put the unit together.

The meter is a 4½" job with a 200 μa movement. It has four color-coded scales,



The Heathkit IM-17 Solid-State Utility Voltmeter.

Heathkit IM-17 Specifications

D.C. Voltmeter Ranges: 0-1, 10, 100, 1000 v. **Input Resistance:** 11 megohoms on all ranges. **Accuracy:** ±3% of full scale. **A.C. Voltmeter Ranges:** 0-1.2, 10, 100, 1000 v. **Input Impedance:** 1 megohm shunted with 100 mmf on all ranges, except 38 mmf on 1000 v. range. **Frequency Response:** ±1 db 10 c.p.s. to 1 mc (from low source impedance). **Accuracy:** ±5% of full scale. Ohmmeter-Ranges: R×1, R×100, R×10K, R×1M (10 ohms center scale). **Weight with batteries:** 2⅝ lbs. **Size:** 4¼" × 8½" × 7¼." **Price:** $19.95 (kit), less batteries. This is a product of The Heath Company, Benton Harbor, Michigan 49022.

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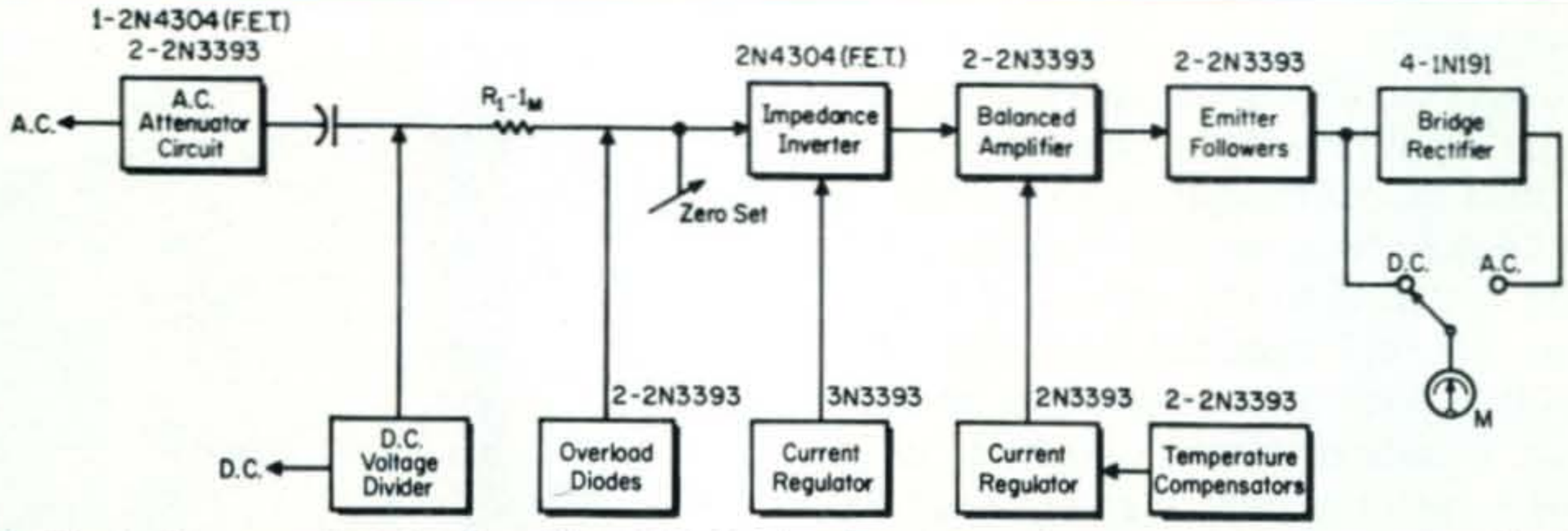

Fig. 2—Block diagram for the Heathkit IM-25. The f.e.t. impedance inverter is protected against overload by two shunt-connected back-to-back diodes (transistors using only collector-emitter junction) which limit the potential to 0.6 v. at the gate of the impedance inverter. The excess applied voltage is dropped across R_1. Other details are given in the text.

one for ohms, one for all d.c. and the high a.c. ranges, and two separate ones for each of the two lowest a.c. ranges. High accuracy is ensured by the use of 1% precision resistors in the voltage-divider networks. Only one switch is employed to select any of the functions and ranges and it may be rotated continuously in either direction, thus avoiding the need for "backing up."

The test leads are permanently attached to the instrument, but are not an encumbrance during transportation, inasmuch as they may be rolled up and placed in the carrying case in which the meter is installed. A phone jack is furnished for plugging in accessory probes such as for r.f. or h.v. The case is made of black textured polypropylene and has a permanently-attached hinged cover that mates with the body to form a carrying handle.

There are two slide switches, one for power ON-OFF, the other for switching to plus or minus d.c. voltage. In the OFF position the power switch shorts the meter terminals to provide heavy damping that protects the meter movement from damage if jarred during transportation. There is also a zero-set and an ohms-adjust control.

Heathkit Model IM-25 Solid-State V.O.M.

The Heathkit IM-25 is a more sophisticated instrument that is available either as a kit or a factory-wired unit. It is designed for use as a volt-ohm-milliammeter with 9 full-scale d.c. and a.c. ranges of from 150 m.v. to 1500 v., 7 resistance ranges of from R×1 to R×1 meg. (10-ohms center scale) and 11 d.c. and a.c. current ranges of from 15μa to 1.5 a. Operation may be had using internal batteries or external 120/240 v.a.c. power.

The circuitry differs from that of the IM-17 in that the meter functions according to the differential balance between the collectors of the balanced amplifier, rather than that between the emitters. Two additional transistors are used at this point as emitter-followers for activating the meter. The setup provides greater sensitivity and the necessary conditions to allow employment of a full-wave bridge ractifier in the meter circuit for a.c. measurements.

A current-regulating transistor is used in place of a resistor in the source circuit of the f.e.t. impedance inverter. A similar regulator and two temperature-compensating transistors are installed in the emitter circuit of the balanced amplifier. Overload protection is provided as with the IM-17. See fig. 2.

A.C. Input

In order to provide a voltage-dividing system while maintaining a high input resistance and a wide frequency response for a.c., an "a.c. attenuator circuit" is incorporated. This consists of an f.e.t. a.c. amplifier preceded by a three-step high-impedance frequency-compensated attenuator. The f.e.t. amplifier is followed by a lower-impedance voltage divider which they feeds the f.e.t. impedance inverter. Overload protection also is provided for the f.e.t. amplifier using diode-connected transistors.

The ohmmeter circuit is a conventional type used with the d.c. amplifier section, except for a current-regulating transistor that provides a constant current of 7 ma which maintains a 70 mv drop across 10 ohms in the ohms-ratio divider network. This then is the supply source for resistance readings, so the voltage and current on any test resistor can never exceed the low values indicated above.

This is an advantage when components are checked in solid-state gear, because the junctions of installed transistors will not com-

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mence conduction at these low values and nterfere with resistance readings nor damage ransistors or diodes. A small price to pay for this advantage is that the forward and reverse resistance ratios of diodes cannot be measured; however, such attempts with conventional v.t.v.m.-type ohmmeter circuitry, anyhow, might burn out a diode when a low-ohms range is used where there is no or insufficient current-limiting resistance.

Current Readings

Current readings are made by passing the current through a resistor of known value and measuring the voltage drop across it. Such resistors are installed in the IM-25 and are automatically switched to the test leads according to the desired range. The voltage drop is measured by either the d.c. or a.c. voltmeter section and is directly indicated in terms of current on the scales. The necessary amount of resistance to be inserted for a given current range is considerably less than with conventional v.o.m.'s and thus will cause less disruption of the circuit parameters.

The IM-25 has a 200 μa meter with a 6½" full-view case. The ranges of the unit are in decade steps of 5 and 15. The meter has two scales for d.c., two for a.c and one for ohms.

A unique feature is the inclusion of two additional scales with a zero center each side of which are voltage calibrations with a range equal to half the normal full-scale amount. Thus, with the meter pointer initially set to the center zero, the polarity of the test voltage need not be known aforehand, as the meter will automatically deflect either to the left or right and indicate the actual voltage.

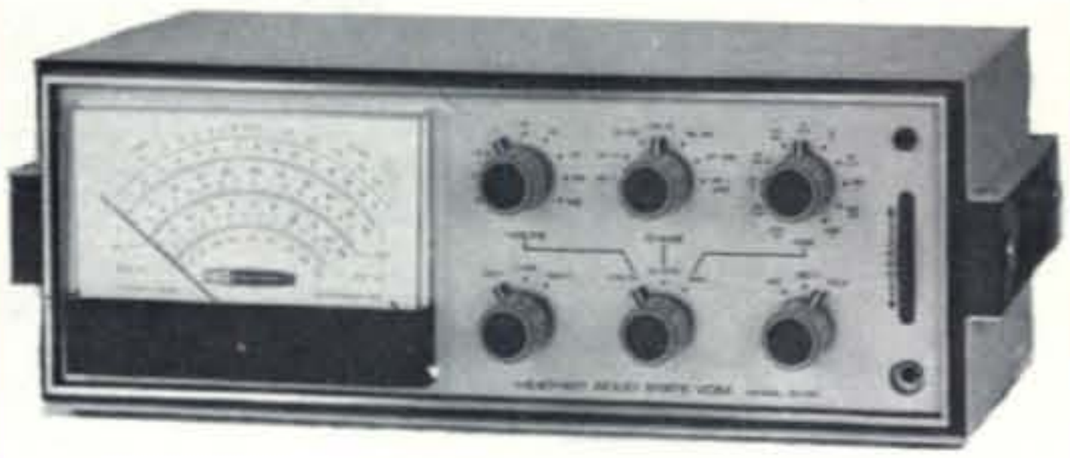
Furthermore, when measurements are to be made on circuits where the polarity changes, such as when an associated control is adjusted, the inconvenience of manually switching the meter polarity is avoided. You simply watch the meter swing from the voltage of one polarity to that of the other polarity. This is also handy for discriminator and null adjustments.

Separate range switches are used for each type of measurement. A handy feature at the current-range selector is that each position is also marked with the value of the insertion resistance for the particular range. This enables you to conveniently evaluate the effect that the desired meter range might have when it is connected into the test circuit.

The zero-set control is a thumbwheel type. Because of the constant-current feature, no ohms-adjust is required on the panel. This is initially set by an internal control.

There are two test leads, a common with a clip, and one terminated by a probe with a switch for d.c. or a.c.-ohms readings, The probe tip is threaded to accomodate a clip. Both leads are attached to a standard phone plug for which there is a jack on the panel, allowing the use of accessory probes also.

A separate panel control switches power from off to internal-battery or external-a.c. operation. A permanently-attached line cord for the latter may be wound on retaining clips at the rear of the unit, thus enhancing storage and portability. A retractable plastic handle also is provided at each side of the case which is a two-piece metal job with separate top and bottom halves.



The Heathkit IM-25 Solid-State V.O.M.

Heathkit IM-25 Specifications

D.C. Voltmeter Ranges: 0-0.15, 0.5, 1.5, 5, 15, 50, 150, 500, 1500 v. **Input Resistance:** 11 megohoms on all ranges. **Accuracy:** ±3% of full scale. **A.C. Voltmeter Ranges:** Same as for d.c. **Input Impedance:** 10 megohms shunted by 175 mmf (measured at probe tip). **Accuracy:** ±5% of full scale. **Frequency response:** ±2 db, 10 c.p.s. to 100 kc. **D.C. and A.C. Milliammeter Ranges:** 0-.015, .05, .15, 0.5, 1.5, 5, 15, 50, 150, 500, 1500 ma. **Insertion Resistance:** 10K for .015 ma range to 0.1 ohm for 1500 ma range. **Accuracy:** ±4% of full scale on d.c., ±5% on a.c. **Ohmmeter Ranges:** R×1, R×10, R×100, R×1K, R×10K, R×100K, R×1M (10 ohms center scale). **Power Source:** Battery Operation with 14 C-cells and one 1.35 v. mercury cell; or transformer operation with 120/240 v. 50/60 c.p.s. a.c. **Weight with batteries:** 9 lbs. **Size:** 5⅛ × 13½" ×6¼". **Price:** IM-25 (kit)—$80, less batteries; IMW-25 (factory assembled)—$115. **Producer:** The Heath Company, Benton Harbor, Michigan 49022.

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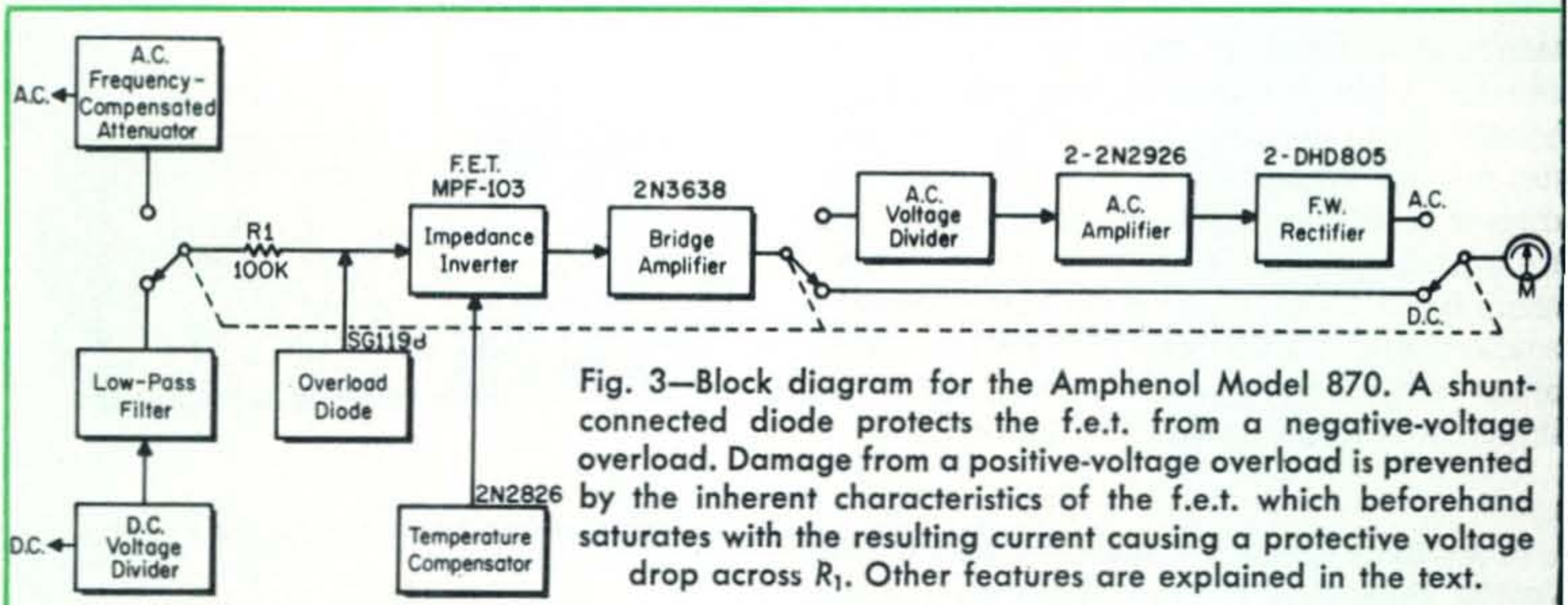

Fig. 3—Block diagram for the Amphenol Model 870. A shunt-connected diode protects the f.e.t. from a negative-voltage overload. Damage from a positive-voltage overload is prevented by the inherent characteristics of the f.e.t. which beforehand saturates with the resulting current causing a protective voltage drop across R_1. Other features are explained in the text.

Construction

The IM-25 is built on a printed-circuit board. A color-coded harness provides interconnections to the various scew-driver-adjust controls mounted on a bracket for the assembly. Some point-to-point wiring is made between switches. 1% precision resistors are used where needed to maintain high accuracy. Construction time involves about 8 hours.

Initial d.c. calibration is made with a 1.35 v. mercury cell that is used in the instrument. A.c. must be calibrated against a known coltage Average accuracy at the higher a.c. frequencies may be obtained by setting the frequency-compensating trimmers as indicated in the manual. For maximum accuracy, a square-wave generator and an oscilloscope are needed during adjustment Proper adjustment of the ohms ranges is checked with a 1% resistor in the test-lead probe.

Amphenol Model 870 Millivolt Commander

The Amphenol Model 870 Millivolt Commander Solid-State Voltohmeter is a compact factory-built job designed for bench or portable use. Among its features is the measurement of very-low voltages. It has 9 d.c. ranges of from 100 mv to 1000 v., 10 a.c. ranges of from 10 mv to 300 v. and 7 ohms ranges of from R×1 to R×1 meg (10-ohms center scale)

The circuitry differs from that of the previously described models in that only one transistor is used in the amplifier/bridge setup with a resistor and two batteries making up the other three legs of the bridge. A second transistor provides temperature compensation and stability for the f.e.t. impedance inverter. Overload protection is furnished with a shunt-connected diode at the input. A low-pass filter with a cutoff around 5 c.p.s. is at the input of the f.e.t. to attenuate power-line frequency and other noise pickup during low-voltage d.c. measurements. See fig. 3.

In order to preserve the high input impedance for a.c. measurements, rectification is employed with diodes after the d.c. amplifier where an additional 2-stage transistor ampliifier also is utilized, providing the extra full-scale a.c. sensitivity of 10 mv. The amplifier is a conventional d.c. coupled job with d.c. feedback for bias stability. The rectifier is a full-wave type that responds to the average a.c. voltage. Current feedback from the rectifier output to the first stage ensures gain stability and linearity. This, plus the fact that the amplification allows the diodes to operate at a level where their characteristic is linear, permits use of the same meter scales for both d.c. and a.c., including the lowest ranges. The input of the f.e.t. is frequency-compensated for a.c.

The ohmmeter section is the conventional setup like that used in the v.t.v.m.

The meter ranges are in decade steps of 1 and 3 for which there are two scales. There also is a standard resistance scale, a zero-center calibration and a db scale which is based on a power reference of 0 db=1 mw into 600 ohms. Due to the wide range for a.c. readings, the whole db range covers −40 to +50 db.

Both d.c. and a.c. current may be measured using the voltage-drop method through an insertion resistor and because of the very low full-scale ranges, a given current can be determined with a smaller resistance and less circuit disturbance than with other meters. An external resistor must be used the value of which for each current range, (10μa to 1a.) is indicated in the manual.

The Commander is powered by self-con-

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tained pen-lite size batteries (supplied with the unit). The various functions are selected by one switch at which there also is a position for checking the battery voltage. A second switch selects the ranges. Two small thumbwheel controls are used for the zero-set and ohms-adjust. The meter is a 4" type with a concave face to minimize light glare. It has a Taut-Band suspension movement, making it impervious to shock or sticky operation.

The unit is completely enclosed in a tight shield with added internal shielding, both of which minimize undesired pickup when measurements are conducted in the presence of strong r.f. fields. Is is a compact job installed in a stitched-vinyl case with a hinged cover that is detachable. The power switch is a rocker type and in case you forget to turn off the power when the meter is not in use, a foot, that is attached to the cover, comes down and depresses the switch to OFF when the case is closed. Another handy feature is a wire bracket on the rear of the case that can be swung out to permit the unit to be placed in a tilt-up position.

The two test leads, one of which is the common with a clip, the other a multi-function lead with a probe and switch for d.c. or a.c.-ohms, are both attached to a common screw-on plug. They are thus easily detachable for storage in a pocked provided in the case cover. Available accessoory h.v. and r.f. probes also may be connected. A carrying handle is attached to the case.

Results

The Heathkit models were assembled from kits and calibrated against internal batteries, except as otherwise instructed in the manual. The Amphenol job came off the factory production line.

Their operation was checked in the *CQ* Lab against a Ballantine 421-A 0.25% voltage calibrator and 0.5% precision resistors. The voltage accuracy of all three models was well within their ratings; in fact, the stated percentages were applicable to the actual readings over 80% of each range. Other results were as follows:

Heathkit Models IM-17 and IM-25—*Resistance Accuracy:* both within 2% of reading (center scale). *Zero Drift:* within 3% (for IM-17) and 1% (for IM-25) of scale with ambient-temperature change of 20-80° F; within 0.5% of scale (for the IM-17) and insignificant (for IM-25) during operation at near constant ambient.

The Amphenol Model 870 Millivolt Commander.

Amphenol Model 870 Specifications

D.C. Voltmeter Ranges: 0-0.1, 0.3, 1, 3, 10, 30, 100, 300, 1000 v. **Accuracy:** ±2% of full scale. **Input Resistance:** 10.6 megohms on all ranges. **A.C. Rejection:** less than 1% effect with 60 c.p.s. voltage 40 db greater than full scale. **A.C. Voltmeter Ranges:** 0-0.1, .03, 0.1, 0.3, 1, 3, 10, 30, 100, 300 v. **Accuracy:** ±3% of full scale, 50 c.p.s. to 50 kc. **Input Impedance:** 10 megohms shunted by 31 mmf (10 mv—1 v. ranges), 10 megohms shunted by 20 mmf (3-300 v. ranges). **Decibel Ranges:** —40 to +50 m 10 db steps (—12 to +2 db scale). **Ohmmeter Ranges:** R×1, R×10, R×100, R×1K, R×10K, R×100K, R×1M (10 ohms center scale). **Accuracy:** ±3 degrees of arc. **Open Circuit Potential:** 1.5 v. **Weight with batteries:** 5 lbs. **Overall size:** 9¼" × 5¾" × 6⅜". **Price:** $99.95 factory-wired and calibrated complete with batteries. **Producer:** Amphenol Corp. (Distributor Division) 2875 South 25th Avenue, Broadview, Illinois 60153.

Amphenol Model 870—*Resistance Accuracy:* within rating and less than 1% of reading (center scale). *Zero Drift:* Negligible with ambient-temperature change of 20-80° F.; none noticeable during operation at near constant ambient. —*W2AEF*

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DX

BY JOHN A. ATTAWAY,* K4IIF

Contest Time Is Here

The annual WPX S.S.B. Contest is just hours away. If you don't already have those special contest antennas up its a mite too late, because kickoff time is 0000 GMT on Saturday, April 6 (7:00 P.M., EST; 6:00 P.M., CST; 5:00 P.M., MST; or 4:00 P.M., PST, on Friday, April 5.) Operation is limited to s.s.b. only, however, the multi-transmitter category has now been added to this contest. Complete rules the in Frank's column on page 87 of the February issue of *CQ*.

Band condition should be good. Let's see how many qualify for the specially endorsed WPX S.S.B. Award for making WPX during this year's contest period.

New Certificate Winners

It is with great pleasure that we announce 21 new WAZ Awards, 14 new WPX Awards, and 3 new S.S.B. DX Awards. In addition there are 20 new WPX endorsements. The WAZ certificates break down into 8, S.S.B.; 12, C.W.—Phone; and 1, Phone. In the WPX category there were 5, S.S.B.; 4, C.W.; 3, Mixed; and 2, Phone. The following are the new winners:

WPX S.S.B.: K2POA-312 (all 14 Mc), K2POA-313 (all 21 Mc), W4DQD-314, W7EKM-315, and WB2NSG-316.

WPX C.W.: HB9PQ-825, W1AGP-826, W6TMP-827, and K1CDN-828.

WPX Phone: YV3CN-146, and I1YRK-147.

WPX Mixed: 4U1ITU-156, W4ZYQ-157, and KØBLT-158.

WAZ C.W./Phone: DL7AY-2386, W4MOJ-2387, W4EI-2388, SM6CKU-2389, K8BSM-2390, K1CDN-2391, DL1GK-2392, PY2BGL-2393, UW3BC-2394, UW3CS-2395, UA1ZL-2396, and UA2KAW-2397.

WAZ 2-Way S.S.B.: G3TUF-502, I1KG-503, IT1GAI-504, W8EVZ-505, I1AA-506, W8NVP-507, OZ3SK-508, and W6SUD-509.

WAZ Phone: W6ZKM-369.

S.S.B. DX Awards: 200 Countries: VE71G/VE8-151; 100 Countries: DL2AH-503 and VE2PV-504.

WPX Endorsement Stickers: *Continent:* Europe: HB9PQ, W1AGP, 4U1ITU, WA5LOB, and W4ZYQ. Asia: 4U1ITU. Band: 14 mc: W4ZYQ. mc: SM5BGK. 3.5 mc: SM5BGK. Mode: Mixed DL3RK-750, 4U1ITU-600, and KØBLT-600. C.W W9GFF-650, K4YFQ-500, W4ZYQ-400, SM5BGK 400, and K1CDN-350. S.S.B.: CN8AW-45(W6OHU-400, and W8FPM-250.

De Extra

DXpeditions—A Big Plus to the Radio Sport

As a consequence ot the recent controvers surrounding one particular series of DXped tions some individuals have tended to b overly critical of DXpeditions in genera Therefore it's time to set the record straigh DXpeditions and DXing are a strong, pos tive force in amateur radio. This is true for wide variety of reasons which will now b discussed in detail.

First of all, let's consider what DXing an DXpeditions contribute in light of the basi and purpose of the amateur radio service a defined in the FCC regulations:

Part 97.1, subpart a., recognizes the valu of the amateur service in providing emer gency communications. It is obvious tha there is no better laboratory for learning hov to maintain reliable communications unde highly adverse circumstances than taking par in a DXpedition. It's Field Day without th hardware store and electronic supply hous right down the highway. If you didn't brin it with you, you don't have it. A man or group situated on an isolated island with couple of rigs and a gasoline generator ar strictly on their own. If something goes wron with either rigs or generator they've go nothing to fall back on but their wits and in genuity. This is simulated emergency unde its most stringent conditions.

Part 97.1, subparts b. and c., cite the ama teur's ability to contribute to the advancemen of the art, and to advancing skills in both the communications and technical phases Well, from the standpoint of pure old prac tical, applied knowhow, the DXer, energeti cally squeezing the last db of gain out of th antenna and improving the signal—nois ratio of his receiver so that he can commu nicate with stations whose signals are so weak that most others aren't even aware o their existence, is certainly doing his shar in advancing skills.

Although it is difficult in these times t make a major theoretical contribution to ad vancement of the art, the vast storehouse o data accumulated during the recent sunspo minimum by Gus Browning and the Worl Radio Propagation Study Association, pro vides a valuable reference for those interested

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

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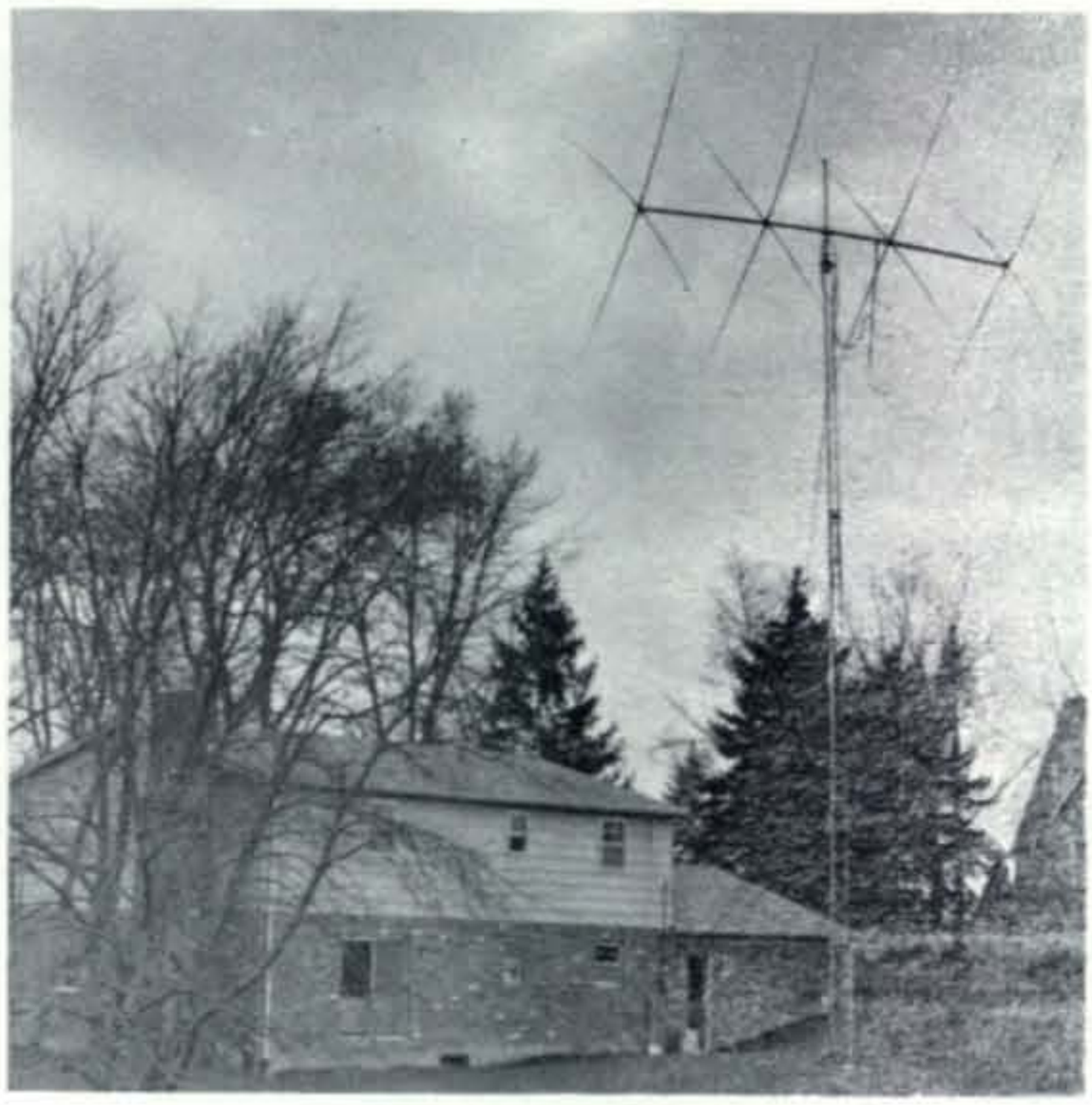

he fine station of Les Bannon, W9ZTD. The quad on a 30 ft. boom and is up 70 ft. ⟹
es is one of the top guns in the new Indianapolis DX Association.

n studying propagation phenomena.

Part 97.1 subpart e., pertaining to the amateur's ability to enhance international good will is one of the best reasons for DXpeditions and DXing. DXers provide by far the bulk of international contacts, the DXpeditions contribute a large share of the international "eyeball QSOs." Gus Brownings DX-editions were outstanding in this regard, and will be remembered for years to come by the overseas amateurs who met him.

Now that we have considered the purer aspects of DXing, how about the plain enjoyment involved? DXpeditions contribute as much or more to the sheer fun of this hobby than any other single aspect. There are a great number of hams working for WAZ, DXCC, WPX, the SSB DX Awards, and a host of other DX achievements. Countries activated by DXpeditions are required to get to the top of the standings. Anyone who doubts the extent of the interest in DXpeditions among the world's amateurs has only to consider the amount of effort spent putting out reports, bulletins, and magazines devoted solely to news of DXpeditions and other rare country operations. Almost every section of the country has at least one DX bulletin. For example, The North Eastern DX Association Bulletin, The Long Island DX Association Bulletin, the Ontario DX Association *Long-Skip*, the Florida DX Report, the *DXers Magazine*, the West Gulf DX Club Bulletin, the Northern California DX Club's *DXer* (for NCDXC members only), the Southern California DX Club Bulletin, the *DX News-Sheet* from England, *DX-Press* from the Netherlands, and *DX-MB* from Germany just to name a few.

This is a grand hobby, and DX is one of its most important phases. Be proud you're a DXer. Let's organize some more DXpeditions, those rare countries are calling!

The Award's Program

WPNX—We are happy to announce that WPNX No. 2 has been won by D. Craig Boyer, WN5RWU, of Oklahoma City. Congratulations Craig for a job well done.

Novices interested in applying for WPNX should send a self-addressed, stamped envelope (s.a.s.e.) to DX Editor, P.O. Box 205, Winter Haven, Fla. 33880 in order to receive the rules and an application blank. It's no longer necessary to send the QSLs with your application, but all QSLs must be available for checking if necessary.

WPX—A number of people are not aware of the rules change regarding the acceptability of prefixes worked during the late 1940's and early 1950's. At one time prefixes worked prior to 1957 did not count. However, we have extended the WPX period back to include everything since World War II. We also are no longer eliminating obsolete prefixes. Any legitimate prefix may be counted. For example, both VP4 and 8Y4 are valid.

For the WPX Honor Roll, on the other hand, this liberal rule doesn't apply. A strict list of up-to-date prefixes will be used. A lot of effort has been put into compiling this list, but because of its complexity there may still be some additional prefixes which should be included, and perhaps some on the list should

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Sune "Doc" Ericsson, SM5BPJ. Doc recently qualified for the Europe, Asia, Africa, 20 meter, 80 meter, Mixed 600, C.W. 500, and S.S.B. 400 WPX endorsements all at one whack. Here is a real top prefix man.

be dropped. Consequently, we are publishing this as a *tentative* list (see below), and we ask that all interested prefix hunters check it carefully. Let me have your suggested additions and deletions by June 15 so that the final list may be compiled and the forms printed. We hope to have every prefix which is in use today or *may* be in use during the next year on the list. Thereafter, the list will be revised annually.

WPX Prefix List

AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC9, ACØ, AP2, AP5, AP8, BV1, BV2, BY1, BY2, BY3, BY4, BY5, BY6, BY7, BY8, BY9, BYØ, CE1, CE2, CE3, CE4, CE5, CE6, CE7, CE8, CE9, CEØ, CM1, CM2, CM3, CM4, CM5, CM6, SM7, CM8, CM9, CMØ, CO1 CO2, CO3, CO4, CO5, CO6, CO7, CO8, CO9, COØ, CN2, CN8, CP1, CP2, CP3, CP4, CP5, CP6, CP7, CP8, CP9, CPØ, CR3, CR4, CR5, CR6, CR7, CR-8, CR9, CT1, CT2, CT3, CX1, CX2, CX3, CX4, CX5, CX6, CX7, CX8, CX9, CXØ.

DI2, DJ1, DJ2, DJ3, DJ4, DJ5, DJ6, DJ7, DJ8, DJ9, DJØ, DK1, DK2, DK3, DK4, DK5, DK6, DK7, DK8, DK9, DKØ, DL1, DL2, DL3, DL4, DL5, DL6, DL7, DL8, DL9, DLØ DM1, DM2, DM3,, DM4, DM5, DM6, DM7, DM8, DM9, DMØ, DU1, DU2, DU3, DU4, DU5, DU6, DU7, DU8. DU9, DUØ, EA1, EA2, EA3, EA4, EA5, EA6, EA7, EA8, EA9, EAØ, EI2, EI3, EI4, EI5, EI6, EI7, EI8, EI9, EIØ, EL1, EL2, EL3, EL4, EL5, EL6, EL7, EL8, EL9, LØ, EP1, EP2, EP3, ET3.

F1, F2, F3, F4, F5, F6, F7, F8, F9, FØ, FB8, FC1, FC2, FC3, FC4, FC5, FC6, FC7, FC8, FC9, FCØ, FG7, FH8, FK8, FL8, FM7, FO8, FP8, FR7, FS7, FU8, FW8, FY7, G2, G3, G4, G5, G6, G7, G8, GB2, GB3, GB4, GB5, GB6, GB7, GB8, GC2, GC3, GC4, GC5, GC6, GC7, GC8, GD2, GD3, GD4, GD5, GD6, GD7, GD8, GI2, GI3, GI4, GI5, GI6, GI7, GI8, GM2, GM3, GM4, GM5, GM6, GM7, GM8, GW2, KW3, GW4, GW5, GW6, GW7, GW8.

HA1, HA2, HA3, HA4, HA5, HA6, HA7, HA8, HA9, HAØ, HB1, HB3, HB4, HB7, HB9, HBØ, HC1, HC2, HC3, HC4, HC5, HC6, HC7, HC8, HC9, HCØ, HE9, HG1, HG2, HG3, HG4, HG5, HG6, HG7, HG8, HG9, HGØ, HH1, HH2, HH3 HH4, HH5, HH6, HH7, HH8, HH9, HHØ, HI1 HI2, HI3, HI4, HI5, HI6, HI7, HI8, HI9, HIØ HK1, HK2, HK3, HK4, HK5 HK6, HK7, HK8 HK9, HKØ, HL9, HM1, HM2, HM3, HM4, HM5 HM6, HM7, HM8, HM9, HMØ, HP1, HP2, HP3 HP4, HP5, HP6, HP7, HP8, HP9, HPØ, HR1, HR2 HR3, HR4, HR5, HR6, HR7, HR8, HR9, HRØ HS1, HS2, HS3, HS4, HV1, HV3, HZ1, HZ2, HZ3

I1, I2, I3, I4, I5, I6, I7, I8, I9, IØ, IS1, IS2, IS3 IS4, IS5 IS6, IS7, IS8, IS9, ISØ, IT1, IT2, IT3 IT4, IT5, IT6, IT7, IT8, IT9, ITØ, JA1, JA2, JA3 JA4, JA5, JA6, JA7, JA8, JA9, JAØ, JH1, JT1 JW1, JW2, JW3, JW4, JW5, JW6, JW7, JW8, JW9 JWØ, JX1, JX2, JX3, JX4, JX5, JX6, JX7, JX8 JX9, JXØ, K1, K2, K3, K4, K5, K6, K7, K8, K9 KØ, KA2, KA3, KA4, KA5, KA6, KA7, KA8, KA9 KB6, KC4, KC6, KG4, KG6, KH6, KJ6, KL7 KM6, KN1, KN2, KN3, KN4, KN5, KN6, KN7 KN8, KN9, KNØ, KP4, KP6, KR6, KR8, KS4 KS6, KV4, KW6, KX6, KZ5.

LA1, LA2, LA3, LA4, LA5, LA6, LA7, LA8 LA9, LAØ, LH4, LU1, LU2, LU3, LU4, LU5, LU6 LU7, LU8, LU9, LUØ, LX1, LX2, LX3, LXØ, LZ1 LZ2, LZØ, M1 MP4, OA1, OA2, OA3, OA4, OA5 OA6, OA7, OA8, OA9, OAØ, OD5, OE1, OE2 OE3, OE4, OE5, OE6, OE7, OE8, OE9, OEØ, OF2 OF2, OF3, OF4, OF5, OF6, OF7, OF8, OF9, OFØ OH1, OH2, OH3, OH4, OH5, OH6, OH7, OH8 OH9, OHØ, OK1, OK2, OK3, OK4, OK5, OK6 OK7, OK8, OK9, OKØ, OL1, OL2, OL3, OL4, OL5 OL6, OL7, OL8, OL9, OLØ, ON1, ON2, ON3, ON4 ON5, ON6, ON7, ON8, ON9, ONØ, OR4, OX3 OX2, OX3, OX4, OX5, OX6, OX7, OX8, OX9 OXØ, OY1, OY2, OY3, OY4, OY5, OY6, OY7 OY8, OY9, OYØ, OZ1, OZ2, OZ3, OZ4, OZ5, OZ6 OZ7, OZ8, OY9, OZØ.

PA1, PA6, PA9, PAØ, PI1, PJ1, PJ2, PJ3, PJ4 PJ5, PX1, PY1, PY2, PY3, PY4, PY5, PY6, PY7 PY8, PY9, PYØ, PZ1, SL1, SL2, SL3, SL4, SL5 SL6, SL7, SL8, SL9, SLØ, SM1, SM2, SM3, SM4 SM5, SM6, SM7, SM8, SM9, SMØ, SP1, SP2, SP3 SP4, SP5, SP6, SP7, SP8, SP9, SPØ, ST2, SU1, SU2 SV1, SV3, SVØ, TA1, TA2, TA3, TA4, TA5, TA6 TA7, TA8, TA9, TAØ, TF1, TF2, TF3, TF4, TF5 TF6, TF7, TF8, TF9, TFØ, TG1, TG2, TG3, TG4 TG5, TG6, TG7, TG8, TG9, TGØ, TI1, TI2, TI3 TI4,, TI5, TI6, TI7, TI8, TI9, TIØ, TJ1, TL8, TN2 TR, TT8, TU2, TY1, TY2, TY3, TY4, TY5, TY6 TYØ, TZ1, TZØ.

UA1, UA2, UA3, UA4, UA6, UA9, UAØ, UB5 UC2, UD6, UF6, UG6, UH8, UI8, UJ8, UL7 UM8, UN1, UO5, UP2, UPØ, UQ2, UR2, UT5 UV1, UV2, UV3, UV4, UV6, UV9, UVØ, UW1 UW2, UW3, UW4, UW6, UW9, UWØ, UY5, UZ1 UZ2, UZ3, UZ4, UZ6, UZ9, UZØ, VE1, VE2, VE3 VE4, VE5, VE6, VE7, VE8, VEØ, VK1, VK2, VK3 VK4, VK5, VK6, VK7, VK8, VK9, VKØ, VO1 VO2, VP1, VP2, VP5, VP7, VP8, VP9, VPØ, VQ1 VQ9, VR1, VR2, VR3, VR4, VR5, VR6, VS5, VS6 VS9, VU2.

W1, W2, W3, W4, W5, W6, W7, W8, W9, WØ WA1, WA2, WA3, WA4, WA5, WA6, WA7, WA8 WA9, WAØ, WB1, WB2, WB3, WB4, WB5, WB6 WB7, WB8, WB9, WBØ, WH6, WL7, WP4, WV1 XE1, XE2, XE3, XE4, XE5 XE6, XE7, XE8 XE9, XEØ, XF4, XP1, XT2, XU1, XUØ, XW1 XZ2, YA1, YA2, YA3, YA4, YA5, YAØ, YI9 YIØ, YJ8, YK1, YN1, YN2, YN3, YN4, YN5 YN6, YN7, YN8, YN9, YNØ, YO1, YO2, YO3

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YO4, YO5, YO6, YO7, YO8, YO9, YOØ, YS1, YS2, YS3, YSØ, YU1, YU2, YU3, YU4, YU5, YU6, YU7, YU8, YU9, YUØ, YV1, YV2, YV3, YV4, YV5, YV6, YV7, YV8, YV9, YVØ.
ZB2, ZC4, ZD3, ZD5, ZD7, ZD8, ZD9, ZE1, ZE2, ZE3, ZE4, ZE5, ZE6, ZE7, EZ8, ZE9, ZEØ, ZF1, ZF2, ZF3, ZK1, ZK2, ZL1, ZL2, ZL3, ZL4, ZL5, ZM7, ZP1, ZP2, ZP3, ZP4, ZP5, ZP6, ZP7, ZP8, ZP9, ZPØ, ZS1, ZS2, ZS3, ZS4, ZS5, ZS6, ZS9, 3A2, 3AØ, 3B1, 3B2, 3C1, 3C2, 3C3, 3C4, 3C5, 3C6, 3C7, 3C8, 3V8, 3W8, 3CØ, 4L3, 4L7, 4M1, 4M2, 4M3, 4M4, 4M5, 4M6, 4M7, 4M8, 4M9, 4MØ, 4S7, 4U1, 4U2, 4U3, 4U4, 4U5, 4U6, 4U7, 4U8, 4U9, 4UØ, 4W1, 4W2, 4X1, 4X2, 4X3, 4X4, 4X5, 4X6, 4X7, 4X8, 4X9, 4XØ, 4Z4, 5A1, 5A2, 5A3, 5A4, 5A5, 5B4, 5H3, 5J1, 5J2, 5J3, 5J4, 5J5, 5J6, 5J7, 5J8, 5J9, 5JØ, 5N2, 5R8, 5T5, 5U7, 5V1, 5V4, 5W1, 5X5, 5Z4.
6O1, 6O2, 6O3, 6O4, 6O5, 6O6, 6W8, 6Y5, 7G1, 7P8, 7Q7, 7X1, 7X2, 7X3, 7X4, 7X5, 7X6, 7X7, 7X8, 7X9, 7XØ, 7Z1, 7Z3, 8F3, 8P6, 8R1, 8R2, 8R3, 8Z4, 8Z5, 9A1, 9E3, 9F3, 9G1, 9H1, 9J1, 9J2, 9J3, 9J4, 9J5, 9J6, 9J7, 9J8, 9J9, 9JØ, 9K2, 9L1, 9M2, 9M6, 9M8, 9N1, 9Q5, 9U5, 9V1, 9X5, 9Y4.

WAZ—The WAZ rules are unchanged since they were published in the August, 1967 issue. Except for placing the southern half of Sakhalin Island in Zone 19, the rules of this award have been as stable as the proverbial Rock of Gibraltar since W9IOP and company first devised this award many, many years ago. Complete rules as well as application blanks may be obtained by sending an s.a.s.e. to the DX Editor.

Attention, WPX Endorsement Applicants

The DX Department receives many, many applications for WPX endorsements which do not indicate whether the desired endorsement is for a Mixed, a C.W., a S.S.B., or a Phone certificate. Frequently this necessitates digging through the files of all four categories before the endorsement can be properly tabulated. Therefore, always put a check mark in the proper square to show which type of WPX the endorsement represents.

ISWL QSL Service

Last month when we described the W3KT and W3GJY outgoing QSL Bureaus we mentioned that information on the International Short-Wave League Bureau would be available this month, so here goes. First of all, the fee for membership in the League is $5.00 per year which entitles the member to the QSL service plus other benefits as well. However, since our main concern is QSLs we will confine our discussion to this aspect only.

The League provides facilities for 2-way QSL exchange anywhere in the world. A member may send *any number* of cards to

Hans Schleifenbaum, DL1YA, sends greetings to all the readers of CQ. Hans must be one of the best low frequency DXers in the world as he recently qualified for the 160 Meter WPX endorsement using only 10 watts. Hans is also QRV on 80-10 meters with 150 watts and a ground plane, and is a holder of the WAZ award. He is 100% QSL.

the League Bureau for outward dispatch, and all cards are cleared weekly. All incoming cards received by the Bureau will be dispatched to members at regular intervals, free of charge, without any need to send a supply of stamped, addressed envelopes. This important feature is unique to the I.S.W.L. QSL Bureau.

If you are interested in affiliating with I.S.W.L. the address is 60 White Street, Derby, England.

160 Meter News

The following special flash from Stew, W1BB: "DOUBLE CONGRATULATIONS to A.R.R.L. President Bob Denniston, WØNWX. First for making 160 meter WAC, a historic achievement in itself, and secondly for doing it via a most unusual QSO. Bob's Asia contact was KA9MF (KA9AK), whom he worked on the morning of January 28 during the *CQ* WW 160 Meter DX Contest. The QSO took place between 1305 and 1330 GMT with KA9MF on 1880 kc with 449 signals and WØNWX on 1998 kc with 439 signals. Bob used a 700 ft. long 'directional' wire 75 ft. high at one end and 50 ft. high at the other end, and a 50 watt home-brew transmitter. This is believed to be the fourth 160 meter WAC ever.

"This historic achievement is the outgrowth of Forrest Castle's (KA9AK) ambitious 160 meter Transpacific tests to see how far east into the U.S. it is possible to QSO from Japan. Going to considerable work and study, 'Cas' has erected verticals, inverted vees, beverage antennas, etc. and set schedules for tests every Sunday, Wednesday, Friday, and Saturday mornings from 1130-1400 GMT. He transmits on 1880 kc and listens on 1802-04 and 1998-2000 kc. Thus far his signals have been heard as far east as this

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WØNWX QSO, but he has heard W8ANO in Japan. The tests continue and anyone is invited to take part."

From the Mailbag

de HM1AJ/HM9AJ—"I operate on 20m. s.s.b. on most days and am looking for W/K contact from 1100-1300 GMT on 14200-235 kc. I listen especially for the east coast as I am working for WAS, but answer all W/K calls. My address is not longer correct in the Callbook. My new address is Cho Dong-In, Shindaebangdong 360-38, Seoul, Korea."

de W2AEP—"The attached information from 9M2DQ explains why he hasn't been heard by his friends for some time: 'In March I left Baling Estate as it had been sold. This was a real calamity for my ham radio operations as I had 2 towers and 3 element beams for 15 & 20 meters there. I am now on another estate but I have no beams here, only my Drake TR-4 barefoot and a trap dipole. Please tell this sad story to *CQ* to explain why no 9M2DQ signal to the states these days'."

de W9SZR—"As a cooperative measure with the Union Dominicana de Radioaficionados K3EST is serving as QSL Manager for the following stations after Jan . 1, 1968: HI7JMP, HI8RVD, and HI8TEP. K9GZK is serving as QSL Manager for QSOs after Jan. 1, 1968 for HI8IBC, HI8CNJ, and HI8BST. S.a.s.e. will get direct reply. Others via bureau."

de W4YDD—"Please remind the gang that postage rates are up. I have 175 cards for 7Z3AB and SVØWP without sufficient postage on the s.a.s.e. Incidentally, I do *not* handle cards for HZ3TYQ and HZ1AB."

de CN8AW—"Enjoyed my holiday in Wales. I used my own call, GW5AHU, and had a real ball as I am the only GW5 in existence. Worked 92 prefixes and 52 countries in 10 days of very sporadic operation."

de F9OE, Secretary-General of REF—"Unfortunately the reciprocal agreement between the U.S. and France does not exist between the U.S. and French possessions. Therefore it does not apply to FS7, St. Martin."

de K8WXV/KG6IC—"Activity in January was less than usual with only 30 hours of operation and 254 contacts. The U.S. call areas were worked as follows: WØ—9 contacts, W1—6 contacts, W2—7 contacts, W3—2 contacts, W4—17 contacts, W5—15 contacts, W6—18 contacts, W7—36 contacts, W8—6 contacts, and W9—15 contacts. The activity of KG6IC is usually as follows Daily, 21405 at 0200 GMT; Monday, 14250 at 0730 GMT, Mon.-Wed.-Fri., 14330 at 0830 GMT, and weekends 21405 and 28560 at 2300-2400 GMT."

QSL Information

AP5HQ–c/o Cond. Signal Training Center, Kohat, Cantt., West Pakistan.
CN8FV–To W2CTN.
CR4BJ–P.O. Box 83, Sao Vicente, Cape Verde Islands.
CT2AN–Jose Botelho, Avenida de Belem 450, Ponte Delgada, Azores Islands.
DI2LE–Via DL9FK.
DL4LL–Lt. William L. Lloyd, S & MA-Admin., APO N.Y. 09052.
DXpedition of the Month (DOTM)–To W2GHK, P.O. Box 7388, Newark, N.J. 07107.
EA6BF–P. R. Romo, Reyes Catolicos 145, Palma de Malorca, Balearic Islands.
ET3FMA–c/o W7WLL.
FB8XX–Via FR7ZD.
FB8YY–To R.E.F., B.P. 70, *75 Paris 12*, France (for March 9–Dec. 13, 1967 contacts send directly to F9MS, 63 Rue Voltaire, Suresnes, (Seine), France.
FB8ZZ–c/o FR7ZD.
FH8CD–Via R.E.F.
FM7WO–c/o WB2SSK.
FP8DM–To VE1ASJ.
FP8DW–c/o W6AM.
FY7YI–Via W3AYD.
GC8HT–To R. H. Taylor, La Cour de Longue, St. Saviours, Guernsey, Channel Is.
HKØBKW and HKØBKK–Via WA6AHF, 17494 via Alamitos, San Lorenzo, Calif. 94580.
HZ1AB–Hqtrs. USMTM, SSC, APO, New York, N.Y. 09616.
HM1AJ/HM9AJ–Cho Dong-In, Shindaegangdong 360-38, Seoul, Korea.
I1AV/M1–F. Chechi, Via Azzura 40, Bologna, Italy
IS1CZQ–Pete Gallo, Casella Postale 93, Nuoro Italy.
KC6BY–c/o W7DNU.
KC6JC–Via W2RDD.
KG6ALY–To P.O. Box 901, APO, San Francisco Calif. 96634.
KG6SB–c/o W7PHO.
KM6BI–Via P.O. Box 43, FPO, San Francisco Calif. 96614.
KS6BX–To P.O. Box 458, Pago Pago, American Samoa.
KV4FA–c/o K3AHN.
OX5AR–Fred R. Ragland, 5717 Botkins Rd., Dayton, Ohio 45424.
OY6FRA–To W2CTN.
PYØCDZ–Via W1GHY.
SVØWY–To Box 66, Rhodes Island, Greece or to W1RPW.
TR9AI–c/o B.P. 177, Libreville, Rep. du Gabon.
TT8AR–Via B.P. 466, Fort Lamy, Rep. du Tchad.
UV4HB–To P.O. Box 88, Moscow, Russia.
VK9KS–c/o P.O. Box 530, Rabaul, Territory of New Guinea.

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Propagation

BY GEORGE JACOBS,* W3ASK

BEGINNING this month, the Propagation Charts appearing in this column will be valid from the 15th of the month in which they appear, rather than the first of the month, as the case was previously. For example, the DX Propagation Charts in this month's column will be valid from *April 15 through June 15, 1968.*

It is hoped that this change will make the Charts more useful to the many readers, primarily in the central and western areas of the country, who often receive their copies of *CQ* late.

A similar change has been made in the "Last Minute Forecast", appearing at the beginning of this column. Day-to-day forecasts will be given for the entire month of issue, as in the past, *plus* the first 15 days of the following month. For example, this month's forecast covers the period April 1 through May 15. Next month's will cover May 1 through June 15, with the forecast for May 1-15, revised if necessary.

In the future, DX Propagation Charts will be published in this column according to the following schedule:

CQ Date	*Period Covered By Charts*
January	Jan. 15—Feb. 15
February	Feb. 15—Apr. 15
April	Apr. 15—June 15
June	June 15—Aug. 15
August	Aug. 15—Sept. 15
September	Sept. 15—Nov. 15
November	Nov. 15—Jan. 15

Similar changes will be made in the Short-Skip Propagation Charts, which will be discussed in next month's column.

April Propagation

A seasonal decrease is expected in DX conditions on 10 meters. On the average, considerably fewer openings will take place during April, compared to the winter months.

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

LAST MINUTE FORECAST

Day-to-Day Conditions and Quality for April through May 15, 1968

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

How To Use These Charts

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

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

2—Following each predicted time of band opening is a forecast rating which indicates the relative number of days the band is expected to open during each month of the forecast period. The higher the rating, the more frequent the opening, as follows: (4) band open more than 22 days each month; (3) between 14 and 22 days; (2) between 8 and 13 days; (1) less than 7 days.

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 meanings: (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 DX Propogation Charts are based upon a transmitter power of 250 watts c.w.; 500 watts s.s.b., or 1000 watts d.s.b., into a dipole antenna a quarter-wave above ground on 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wave-length above ground on 15 and 10 meters. For each 10 db gain above these reference levels, reception quality shown in the "Last Minute Forecast" will improve by one level; for each 10 db loss, reception will become poorer by one level.

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

6—The Eastern USA chart can be used in the 1, The Central USA Chart in the 5, 9, and Ø areas, 2, 3, 4, 8, KP4, KG4 and KV4 amateur call areas; and the Western USA Chart in the 6 and 7 areas. The Charts are valid from April 15 through June 15, 1968, and are prepared from basic propogation data published monthly by the Institute For Telecommunication Sciences And Aeronomy of the U.S. Dept. of Commerce, Boulder, Colorado.

Some excellent openings, however, are still forecast during the daylight hours to many areas of the world.

Optimum DX propagation conditions are expected to occur on 15 meters during April. From shortly after sunrise, through the late afternoon and early evening hours, exceptionally good openings are forecast to most areas of the world. On some circuits, primar-

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ily to southern and tropical areas, the band may remain open well into the hours of darkness as well.

With increased hours of daylight during April, 20 meters is expected to remain open to one area of the world or another, practically around-the-clock. Peak DX conditions are forecast for the sunrise period, and again during the late afternoon and early evening hours, when excellent openings are expected to most areas of the world.

Fairly good 40 meter DX openings are predicted to many areas of the world during the hours of darkness and the sunrise and sunset periods. Some 80 meter DX openings may also be possible during the hours of darkness, and there is some chance for an occasional DX opening on 160 meters during the same period.

Static levels are expected to increase considerably during April, especially on the 40, 80 and 160 meter bands.

DX propagation predictions for each of the amateur bands from 10 through 160 meters appear in the Charts on the following pages. For predictions of short-skip openings, between distances of 50 and 2400 miles, refer to the *Short-Skip Charts*, which appeared in last month's column.

Sunspot Cycle

The Zurich Solar Observatory reports a monthly mean sunspot number of 115.3 for January, 1968. This results in a smoothed sunspot number of 95, centered on July, 1967. A smoothed sunspot number of 114 is forecast for April, 1968, as the present cycle nears its maximum level of intensity.

V.H.F. Ionospheric Openings

There's a good chance for some v.h.f. meteor-scatter openings to occur between April 19 and 23, when the *Lyrids* meteor shower is expected to take place.

April's a fairly good month for trans-equatorial scatter propagation on 6 meters. The optimum time for these openings are the early evening hours, and the optimum direction is due south.

Sporadic-E short-skip propagation begins to increase during April, and a number of openings between distances of approximately 750 and 1300 miles should be possible on the 10 and 6 meter bands. While sporadic-E openings may occur at any time of the day or night, there is a tendency for them to peak between 8 A.M. and noon and again between 5 and 8 P.M., local standard time.

V.h.f. auroral-type ionospheric openings are likely to occur during April when the ionosphere is disturbed for h.f. signals. Days that are expected to be "disturbed" or "below normal" are shown in the "Last Minute Forecast" at the beginning of this column. These are the best days to check for auroral-type openings on the v.h.f. bands. ■

APRIL 15 - JUNE 15, 1968

Time Zone: EST (24-Hour Time)

Eastern USA To:

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

* Predicted times of 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.

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ar ast	17-19 (1)	08-10 (1) 15-17 (1) 17-19 (2) 19-21 (1)	03-05 (1) 05-06 (2) 06-08 (3) 08-09 (2) 09-10 (1) 17-19 (1)	04-06 (1)
acific slands New ealand	15-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-10 (2) 10-14 (1) 14-18 (2) 18-20 (3) 20-22 (2) 22-00 (1)	19-21 (1) 21-22 (2) 22-00 (3) 00-03 (4) 03-08 (3) 08-09 (2) 09-10 (1)	00-02 (1) 02-05 (2) 05-07 (1) 02-06 (1)*
us- alia	16-18 (1) 18-20 (2) 20-21 (1)	08-09 (1) 09-10 (2) 10-11 (1) 16-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	22-23 (1) 23-01 (2) 01-03 (3) 03-07 (4) 07-08 (3) 08-09 (2) 09-10 (1)	03-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
orth- rn & entral outh merica	10-11 (1) 11-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-08 (2) 08-13 (3) 13-19 (4) 19-21 (3) 21-23 (2) 23-00 (1)	03-05 (2) 05-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-23 (4) 23-02 (3) 02-03 (2)	18-19 (1) 19-20 (2) 20-04 (3) 04-06 (2) 06-07 (1) 20-01 (1)* 01-03 (2)* 03-05 (1)*
razil, rgen- na, hile & ru- uay	07-09 (1) 09-13 (2) 13-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-15 (2) 15-16 (3) 16-19 (4) 19-22 (3) 22-00 (2) 00-02 (1)	15-16 (1) 16-17 (2) 17-18 (3) 18-00 (4) 00-02 (3) 02-04 (2) 04-05 (1) 05-07 (2) 07-09 (1)	20-21 (1) 21-03 (2) 03-06 (1) 23-04 (1)*
Mc- Murdo ound, ntarc- ca	16-18 (1)	14-17 (1) 17-20 (2) 20-21 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-07 (2) 07-08 (1)	19-00 (1) 00-04 (2) 04-05 (1)

Time Zone: CST & MST (24-Hour Time)
Central USA To:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western Central Europe & North Africa	10-16 (1)	06-11 (1) 11-13 (2) 13-17 (3) 17-18 (2) 18-19 (1)	04-08 (2) 08-13 (1) 13-16 (2) 16-18 (3) 18-20 (4) 20-22 (3) 22-00 (2) 00-04 (1)	19-20 (1) 20-22 (2) 22-01 (1) 21-22 (1)* 22-23 (2)* 23-00 (1)*
Northern Europe & European USSR	*Nil*	09-11 (1) 11-14 (2) 14-16 (1)	00-06 (1) 06-08 (2) 08-13 (1) 13-18 (2) 18-22 (3) 22-00 (2)	18-20 (1) 20-22 (2) 22-00 (1) 20-22 (1)*
Eastern Mediter- ranean, Middle East & East Africa	14-18 (1)	10-13 (1) 13-19 (2) 19-21 (1)	12-15 (1) 15-18 (2) 18-22 (3) 22-00 (2) 00-02 (1)	19-23 (1)
West & Central Africa	14-18 (1)	10-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-22 (4) 22-23 (3) 23-00 (2) 00-02 (1)	19-20 (1) 20-22 (2) 22-00 (1) 20-22 (1)*
South Africa	09-12 (1)	09-11 (1) 11-13 (2) 13-14 (1) 23-01 (1)	15-17 (1) 17-19 (2) 19-22 (1) 22-23 (2) 23-01 (3) 01-02 (2) 02-03 (1)	19-21 (1) 21-23 (2) 23-01 (1)
Central & South Asia	*Nil*	15-17 (1) 17-19 (2) 19-20 (1) 08-10 (1)	04-06 (1) 06-09 (2) 09-11 (1) 18-20 (1) 20-22 (2) 22-23 (1)	06-08 (1)
South- east Asia	*Nil*	08-10 (1) 10-12 (2) 12-14 (1) 16-18 (1) 18-20 (2) 20-22 (1)	22-02 (1) 02-05 (2) 05-07 (3) 07-09 (2) 09-11 (1)	06-08 (1)
Far East	17-20 (1)	09-10 (1) 10-16 (2) 16-20 (3) 20-22 (2) 22-00 (1)	22-01 (1) 01-03 (2) 03-05 (3) 05-07 (4) 07-08 (3) 08-10 (2) 10-12 (1)	02-03 (1) 03-05 (2) 05-07 (1) 03-05 (1)*
Guam & Pacific Islands	10-12 (1) 12-13 (3) 13-17 (2) 17-19 (3) 19-20 (2) 20-22 (1)	07-09 (1) 09-11 (3) 11-13 (2) 13-17 (1) 17-18 (2) 18-20 (3) 20-22 (4) 22-00 (3) 00-02 (2) 02-04 (1)	16-18 (1) 18-20 (2) 20-22 (3) 22-04 (4) 04-09 (3) 09-11 (2) 11-13 (1)	00-02 (1) 02-05 (2) 05-07 (1) 01-02 (1)* 02-05 (2)* 05-06 (1)*
Aus- tralia & New Zealand	14-15 (1) 15-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	07-08 (1) 08-09 (2) 09-10 (1) 14-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-00 (1)	08-11 (2) 11-13 (1) 13-15 (2) 15-20 (1) 20-22 (2) 22-00 (3) 00-04 (4) 04-08 (3)	01-03 (1) 03-05 (2) 05-07 (1) 04-06 (1)*
North- ern & Central South America	08-11 (1) 11-14 (2) 14-17 (3) 17-18 (2) 18-20 (1)	06-08 (1) 08-11 (2) 11-14 (3) 14-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	02-05 (2) 05-07 (3) 07-09 (4) 09-11 (3) 11-15 (2) 15-18 (3) 18-22 (4) 22-02 (3)	18-20 (1) 20-03 (3) 03-04(2) 04-06 (1) 20-22 (1)* 22-01 (2)* 01-05 (1)*
Brazil, Argen- tina, Chile & Uru- guay	07-09 (1) 09-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-21 (1)	05-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-21 (3) 21-23 (2) 23-01 (1)	12-15 (1) 15-17 (2) 17-19 (3) 19-00 (4) 00-01 (3) 01-02 (2) 02-04 (1) 04-06 (2) 06-08 (1)	20-22 (1) 22-00 (2) 00-02 (1) 02-04 (2) 04-06 (1) 00-04 (1)*
Mc- Murdo Sound, Antarc- tica	16-19 (1) 22-00 (1)	12-15 (1) 15-17 (2) 17-19 (3) 19-21 (2) 21-00 (1)	15-17 (1) 17-18 (2) 18-20 (3) 20-22 (4) 22-04 (3) 04-06 (2) 06-07 (1)	21-23 (1) 23-01 (2) 01-06 (1)

Time Zone: PST (24-Hour Time)
Western USA To:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western Europe & North Africa	08-11 (1) 15-16 (1)	07-10 (1) 10-13 (2) 13-15 (3) 15-16 (2) 16-18 (1)	08-14 (1) 14-18 (2) 18-22 (3) 22-00 (2) 00-06 (1) 06-08 (2)	19-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
Central & North- ern Europe & Euro- pean USSR	*Nil*	10-13 (1) 13-15 (2) 15-16 (1) 21-23 (1)	00-06 (1) 06-08 (2) 08-12 (1) 12-16 (2) 16-20 (1) 20-00 (2)	19-22 (1)
Eastern Mediter- ranean & Middle East	*Nil*	08-10 (1) 10-14 (2) 14-18 (1) 18-20 (2) 20-21 (1)	07-12 (1) 12-15 (2) 15-18 (1) 18-22 (2) 22-02 (1)	19-22 (1)

See page 126 for New Reader Service

West & Central Africa	12-15 (1) 15-17 (2) 17-18 (1)	07-11 (1) 11-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	10-14 (1) 14-17 (2) 17-18 (3) 18-22 (4) 22-00 (3) 00-02 (2) 02-05 (1)	20-00 (1)
East Africa	14-17 (1)	09-11 (1) 11-13 (2) 13-16 (3) 16-18 (2) 18-20 (1) 20-22 (2) 22-23 (1)	10-14 (1) 14-16 (2) 16-18 (3) 18-20 (2) 20-22 (3) 22-23 (2) 23-01 (1)	18-23 (1)
South Africa	07-09 (1)	06-09 (1) 09-11 (2) 11-13 (1) 21-23 (1)	12-14 (1) 14-16 (2) 16-18 (1) 20-22 (1) 22-00 (2) 00-02 (1)	18-19 (1) 19-21 (2) 21-23 (1)
Central & South Asia	*Nil*	07-08 (1) 08-10 (2) 10-17 (1) 17-20 (2) 20-22 (1)	01-02 (1) 02-04 (2) 04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-12 (1)	04-07 (1)
South-east Asia	09-11 (1) 15-18 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-18 (1) 18-20 (2) 20-22 (1)	22-01 (1) 01-02 (2) 02-03 (3) 03-06 (2) 06-08 (3) 08-10 (2) 10-13 (1)	02-06 (1)
Far East	12-14 (1) 14-16 (2) 16-18 (1)	07-09 (1) 09-12 (3) 12-18 (2) 18-20 (3) 20-22 (2) 22-00 (1)	18-21 (1) 21-23 (2) 23-00 (3) 00-02 (4) 02-05 (3) 05-07 (4) 07-09 (3) 09-10 (2) 10-12 (1)	00-02 (1) 02-05 (2) 05-07 (1) 02-05 (1)*
Pacific Islands & New Zealand	10-12 (1) 12-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	08-09 (1) 09-11 (3) 11-16 (2) 16-18 (3) 18-20 (4) 20-00 (3) 00-01 (2) 01-02 (1)	11-16 (1) 16-18 (2) 18-20 (3) 20-04 (4) 04-09 (3) 09-11 (2)	22-00 (1) 00-05 (3) 05-06 (2) 06-07 (1) 00-02 (1)* 02-05 (2)* 05-06 (1)*
Aus-tralia	12-13 (1) 13-14 (2) 14-18 (3) 18-19 (2) 19-20 (1)	10-12 (1) 12-17 (2) 17-19 (3) 19-22 (4) 22-23 (3) 23-00 (2) 00-02 (1)	09-11 (1) 18-20 (1) 20-22 (3) 22-02 (4) 02-08 (3) 08-09 (2)	00-01 (1) 01-06 (2) 06-07 (1) 01-02 (1)* 02-04 (2)* 04-05 (1)*
North-ern & Central South America	09-11 (1) 11-13 (2) 13-17 (3) 17-19 (2) 19-20 (1)	05-06 (1) 06-07 (2) 07-09 (4) 09-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-22 (1)	15-17 (3) 17-23 (4) 23-02 (3) 02-04 (2) 04-07 (3) 07-15 (2)	18-20 (1) 20-01 (3) 01-03 (2) 03-05 (1) 20-00 (1)* 00-02 (2)* 02-04 (1)*
Brazil, Argen-tina, Chile & Uru-guay	07-10 (1) 10-13 (2) 13-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	05-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-23 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-23 (4) 23-01 (3) 01-03 (1) 03-06 (2) 06-07 (1)	18-19 (1) 19-02 (2) 02-03 (1) 19-02 (1)*
Mc-Murdo Sound, Antarc-tica	15-19 (1)	13-16 (1) 16-17 (2) 17-19 (3) 19-21 (2) 21-00 (1)	15-17 (1) 17-19 (2) 19-01 (3) 01-04 (2) 04-06 (1)	20-21 (1) 21-23 (2) 23-04 (1) 04-06 (2) 06-07 (1)

Classified Ads

One of the many services that *CQ* provides is free classified space for its subscribers. If you check page 122, you can find out how easily you can buy, sell, or find out about anything in amateur radio.

See page 126 for New Reader Service

THE awards PROGRAM

THE April, "Story of The Month" on Geo., K8VSL after this data on awards issued. A USA-CA-3000 award endorsed ALL A-3 went to Arcy, K5SGK and Mixed USA-CA-3000 awards went to Victor, WØGYM and Harry, K8KOM. A USA-CA-2500 award endorsed ALL A-3 was earned by Norm, W5NXF/KH6FQB. Arne, W8DCD received a USA-CA-2500 award as well as USA-CA-2000 and USA-CA-1500 awards. Dave, WAØJKT won a USA-CA-2000 award and Richard, WAØDCQ/WA9KHW hit the jackpot with USA-CA-2000, 1500 and 1000 awards. George, W1EQ earned USA-CA-1500 and 1000 awards. John, W5BUK received his USA-CA-1000 award. USA-CA-500 awards endorsed ALL A-1 went to Clint, K5JBC and Ken, WA9OQE. USA-CA-500 awards endorsed Mixed were earned by Paul, K1LJO; John, W8GZF; Clem, K8HWW; Dr. Serafino Franchi, Pres. of A.R.I. (#4 to Italy); and Arne, LA3UF (#5 to Norway).

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

USA-CA HONOR ROLL

3000
WØGYM 11
K5SGK 12
K8KOM 13

2500
W5NXF/KH6FQB 22
W8DCD 23

2000
WAØJKT 42
W8DCD 43
WAØDCQ/WA9KHW 44

1500
W1EQ 66
W8DCD 67
WAØDCQ/WA9KHW 68

1000
W1EQ 122
WAØDCQ/WA9KHW 123
W5BUK 124

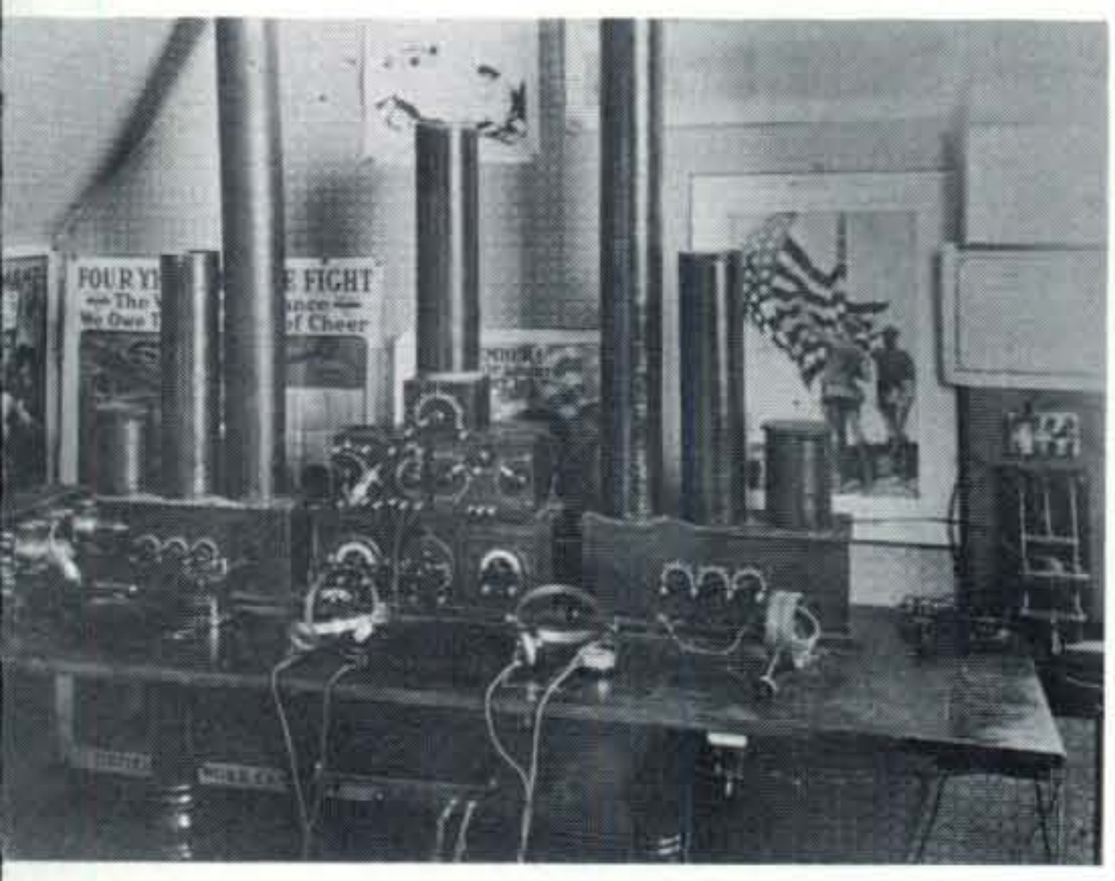
500
W8GZF 647
I1SF 648
WA9OQE 649
K8HWW 650
K1LJO 651
LA3UF 652
K5JBC 653

George W. Hale, K8VSL

How appropriate to have the story of K8VSL in April *CQ* as his birthday is April 30th and he first saw the light of day in 1904.

An interest in radio started when his father gave him a dandy loose coupler complete with galena detector and head phones for a Christmas present December 25, 1916. Things were going along fine until April 1917, when WW1 arrived in Uncle Sam's lap.

After the war, Geo. built a receiver and got a license in 1920 as 8ADO. The one photograph shows the rig in 1920, a lot of Quaker Oats was eaten to get all those coil forms.



The 8ADO rig circa 1920.

K8VSL and Plane.

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Basic Certificate—25 Achievement Awards

Century Award—100 Achievement Awards

Before going to the University of Pennsylvania in 1923, the rig had graduated to a 1KW Thordarson, with a rotary gap and cage antenna.

After college, Geo. got married and a job (in that order). Having been unsuccessful in interesting his son in amateur radio in 1941, it was not until 1960 that Geo. decided he would get back into ham radio. He got a 75S-1 to get into the swing of things and got his General License in August of the same year.

The present rig includes the complete "S" line, a tri-bander on a 50 foot tower, a 2 el. 40 meter beam on a separate 65 foot tower and an 80 meter dipole.

The photograph with Geo. and plane, indicates how he shares his free (?) time, along with ham radio. Having acquired his pilot instrument rating, Geo. hopes to find some time to concentrate a bit on getting his Amateur Extra License.

The USA-CA record of K8VSL shows: #175 USA-CA-500 award received January 1963—now endorsed MIXED, ALL A-1, ALL A3A and ALL 7MC. #42 USA-CA-1000 and #10 USA-CA-1500 in May 1964. #16 USA-CA-2000 issued March 1, 1965 and at this writing his confirmed county total is 2250.

Letters

Jack, W7CNL, writes: "After being inactive for several years, due to a traveling job, I am now getting settled down here in Boise, Idaho.

Progress Certificate—50 Achievement Awards

I've been interested in the USA-CA Program since its beginning, although I had limited time to take part in it previously.

Perhaps I could help some County Hunters with Ada county (home QTH) and if possible this summer I could operate mobile from some of the rare Idaho counties and Malheur county in Oregon.

My address is, P. O. Box 404, Boise, Idaho 83701."

Larry, KØRWL, President Lee's Summit ARC, writes: "As I am a county hunter I wanted to drop you a few lines to express the club and my thanks for a job well done in the form of your monthly column.

May we request a little assistance from other hams in the way of ideas for the 150th Anniversary of the admittance of Missouri into the Union in 1821. Jack, WØSJE (another county hunter) has been working hard and already has an Amateur Radio Week planned. The program has been outlined similar to that of Nebraska's.

Jack is the vice-president of the radio club and has gotten the backing of the Southwest Missouri Amateur Radio Club and a St. Louis area radio club.

We would be pleased to receive ideas and help from your readers. We are planning to have a very beautiful award for this program that any ham would be proud to hang in his shack.

Kindly write suggestions and ideas to Lee's Summit Radio Club, P. O. Box 91, Lee's Summit, Misouri 64063."

Kenny, WA9OQE, writes: "Received my USA-CA-500 award #649 in good shape. Thank you very much for your promtpness a trait I find lacking in most award custodians.

Should anyone need Clark county, Illinois I will be happy to sked c.w. or s.s.b., 10 thru 80."

Thomas, WAØGWM, writes: "Hi Ed, seem that with the many articles I have read o yours in *CQ* magazine, that I know you personally.

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Special 150 Honor Award

I have been in amateur radio about five ears now, and have spent many hours in- ulging in the various operations and phases s chosen by so many such as DXing, phone atching, message handling and certificate unting.

Of all the experience that I have built up nd am keeping up with the art, I am very uch interested in County Hunting.

I do a lot of listening on the ham bands, a ot of reading of various magazines, a lot of ours in studying on how to be an A-1 opera- or and in general try to do the best that I an for our wonderful hobby. I feel that I ave just scratched the surface and have any more enjoyable years ahead of me to urther my interests and help others, but this s not the place to express my opinions nor lo I wish to spout off on the whims and gripes hat you as well as others in the writing pro- ession are plagued with.

I only wish to thank you for all the advice, uggestions and information I have acquired rom your columns and letters.

By the time you read this, I will be on the sland of Attu, Alaska and will be glad to ontact the Independent County Hunters Net rom Alaska to give out the Third Judicial District. My address will be, SSgt Thomas V. Davis, AF17364439, Det. 271, USCG Loran Station, Attu Island, Alaska 99501."

Awards

This month will be devoted to the **Amateur Achievement Club** and some of their awards already available.

A committee of The Amateur Radio Club f Florida (also publishing *Signal Report* monthly—year sub. $2.00) has organized the Amateur Radio Achievement Club strictly or the purpose of publicizing certificates for ponsors with the motto—"Dedicated to the Propagation of Amateur Radio Through Achievement Awards."

By the time you read this, ARAC should ave available an *Achievement Awards Directory*.

Class A1 Honors 200 Awards

The six (6) listed awards are available from the Amateur Radio Achievement Club, Box 7326 Euclid Station, St. Petersburg, Florida 33734. In each case, send a list of your awards and have it certified by two other amateur radio operators or an officer of a Radio Club or have it notarized. This is their *general certification rule* that must accompany each applicant's list that either of these people have seen the issued awards and certify thereto. Rules and cost are listed under each award.

Basic Certificate: 25 Achievement Awards includes an Honorary Membership in the Amateur Radio Achievement Club. Price of the award is $2.00.

Progress Certificate: 50 Achievement Awards. To attain this award you must have 50 achievement awards and be an honorary member of ARAC—in other words you must have the basic certificate or application in, to attain this one. Price of the award is $1.00.

Century Award: If you have the basic award and have 100 total awards then you can apply for this one and endorsement will be made for the Progress Award without actually applying for it. Price $1.00 and no charge for additional endorsement.

Special 150 Honor Award: This is issued for the Honor of achieving a goal of 150 achievement awards. This one is also $1.00 and will be endorsed at no extra charge, if you have the basic of 25 awards.

Class A1 Honors 200 Awards: Issued for the

Ultimate Achievement Award—250

ee page 126 for New Reader Service

achievement of 200 awards On the basis of accomplishment this will be rather difficult to attain but worthy of any one seeking class A1 as an award seeker. Price $1.00 with endorsement for lower grades at no extra charge.

Ultimate Achievement Award: This one is issued for the ultimate in achievement and those that attain it will be the ultimate class of Amateur Radio Operator. This award issued for attaining the goal of 250 or more award certificates. You must have the other certificates or endorsements. Cost $2.00.

Notes

Just as I was about finished with this column, a letter came from Bob Brown WA9QQB regarding the lack of activity on the 7035 County Hunters Net. He is willing with the help of WA8LWK to pep up activities on 7035 Monday thru Friday starting at 0230 GMT, thus giving students and hard workers a chance to pick up some new counties. And it is hoped that we can give monthly reports on these activities in this column. So start checking into 7035 Monday thru Friday at 0230 GMT to WA9QQB acting as NCS and WA8LWK as assistant NCS.

Two other notes of BIG interest, one from Jim, K1QZV and one from Ed. de Young K6CAA/KP6AP and now KH6GLU. Ed did fine on his trip to Kalawao county on 6 & 7 of January but he will not make it as hoped on 10 & 11 Feb. as he will be at VR3 at that time. He worked over 300 county hunters made WAS & WAC in January. This data was in March, *CQ* so look up all the frequencies and times as he hopes to go there again in April and May.

Time and space have run out, but I must say I did enjoy all your fine letters and continue to write and tell me—How was your month? 73, Ed., W2GT.

Back Issues

Back issues of *CQ* are available from our Circulation Department. Issues in the current year sell for face value (.75) and all others in stock are one dollar each, postpaid. If the issue is no longer in stock, photo-copies of specific articles are available at one dollar each. Preferably, the entire issue will be sent.

See page 126 for New Reader Service

CQ BOOK MART

ANTENNA ROUNDUP Vol. II

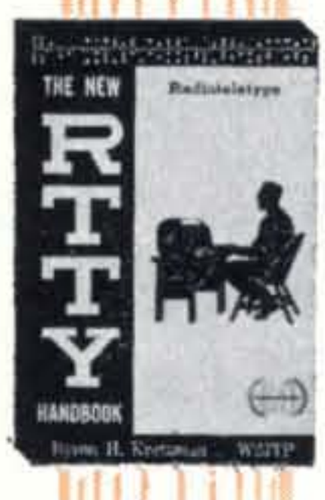
Cat. #119-2. Here's your chance to get a copy of one of the most comphensive books on antennas ever offered to the Amateur. Ten big theory articles backed up by 82 detailed and illustrated construction projects for VHF on into microwave, from longwires to 17 element beams and Sterba Curtain arrays.

VHF FOR THE RADIO AMATEUR

Cat. #115. If you are, or are planning to be a VHF operator you can't afford to be without this dynamic new handbook written especially for you. Filled from cover to cover with all new and original construction material presented so you can understand it.

ELECTRONIC CIRCUITS HANDBOOK

Cat. #121. Describes and discusses in detail 150 of the most often needed circuits around the shack. Novices and old-timers alike will find many valuable circuits here ideal for construction projects. Eleven great chapters cover a multitude of circuits for all.



THE NEW RTTY HANDBOOK

Cat. #116. A treasury of vital and "hard to get" information. Loaded with equipment schematics, adjustment procedures, etc. A valuable asset to both the beginning and the experienced RTTY'er. Special section on getting started, written by Byron Kretzman, a well known authority in the field.

ANTENNA ROUNDUP Vol. I

Cat. #119. A common denominator for all ham stations is the antenna. Here at last is the cream of antenna information packed into a 160 page book. Forty-seven information-packed articles that will dispel much of the mystery surrounding antennas.

SHOP & SHACK SHORTCUTS

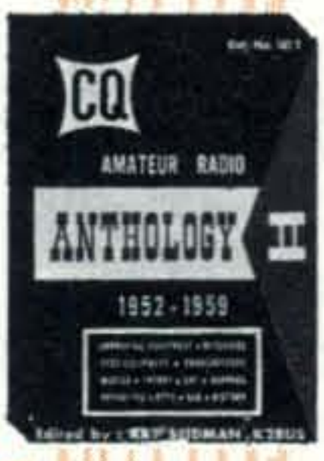
Cat. #120. Here is a collection of hundreds of hints, kinks and short cuts which should be part of the library of every experimenter ham and CB'er. A veritable gold mine that will help save time, improve their shop techniques, dress up their shacks, and increase the efficiency of their equipment.

CQ ANTHOLOGY I

Cat. #102-1. We've looked back through the years 1945-1952 and assembled all in one place the articles that have made a lasting stir. The issues containing most of these articles have long ago been sold out and are unavailable.

SIDEBAND HANDBOOK

Cat. #103. One full year in the preparation of this terrific volume. This is *not a technical* book. It explains sideband, showing you how to get along with it . . . how to keep your rig working right . . . how to know when it isn't . . . and lots of how to build-it stuff, gadgets, receiving adaptors, exciters, amplifiers.



CQ ANTHOLOGY II

Cat. #102-2. Top favorite CQ articles from 1952 to 1959 . . . including some you may have missed . . . compiled into one new information-packed book! No more need to try to locate sold out back copies of CQ. This Anthology includes past articles of lasting interest to every amateur radio enthusiast. Over 250 pages of text.

SURPLUS SCHEMATICS

Cat. #117. This is a book literally loaded with schematics for all the currently popular pieces of surplus gear. Most amateurs are well aware of the problems encountered in purchasing seemingly inexpensive surplus units, only to find that no schematic diagram is available.

SURPLUS CONVERSION HANDBOOK

Cat. #122. Contains 192 pages of conversion articles including the famous Command Set's plus a whole slew of the most popular military surplus gear including such gems as: SCR-522, ART-13, BC603, BC659, ARC 1, ARC 3, etc. Actually, it covers almost every piece of surplus gear worth the effort to convert for ham use.

ELECTRONIC CIRCUITS HANDBOOK VOL. II

Cat. #121-2. Tom Kneitel, K2AES, does it again with this sequel to his best selling Volume I. This time it's 159 additional circuits which will appeal to all Every shack will have a spot for this book. All circuits fully described in text with complete detailed construction steps plus schematics.

NAME _____

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Cat. No.	Name	Price	Order	Cat. No.	Name	Price	Order
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102-1	CQ Anthology vol. 1	2.00		116	The New RTTY Handbook	3.95	
102-2	CQ Anthology vol. 2	3.00		117	Surplus Schematics	2.50	
103	New Sideband Handbook	3.00		119-1	Antenna Roundup vol. 1	3.00	
105	New Mobile Handbook	2.95		119-2	Antenna Roundup vol. 2	4.00	
109	Ham's Interpreter	1.50		120	Shop & Shack Shortcuts	3.95	
112-A	Reg. Ham Log Sheets, per C	1.00		121-1	Electronic Circuits Handbook vol. 1	3.00	
112-B	SSB Ham Log Sheets, per C	1.00		121-2	Electronic Circuits Handbook vol. 2	3.00	
113	CQ Binders (Indicate year)	4.00		122	Surplus Conversion Handbook	3.00	

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Q AND A

BY WILFRED M. SCHERER,*
W2AEF

We shall commence this month's column with a continuation of some points regarding power levels, this time related to "talkpower".

Talkpower

Talkpower is another subject which may be somewhat confusing. This may be divided into two categories: 1—*Voicepower,* which is the average power resulting from a train of voice sounds. The higher the *voice* power, the *louder* a signal will appear to the ear, but not necessarily with the greatest intelligibility; 2—*Useful talkpower,* which is the average power of the intelligence-bearing components of speech. The higher the *useful talkpower,* the better will be the conveyance of intelligence.

In both cases *average* power has been specified, the reason for which is as follows:

For proper performance, the maximum allowable operating level for the speech input to a modulated transmitter is limited by the peaks of the speech waveform, according to the capabilities of the p.a.

During the greatest portion of a train of speech sounds, the voice energy is considerably less than the peak values that occur less frequently. The result is that the *average* voice energy is a small percentage of the peak values. Unfortunately, the intelligence-producing sounds, such as the consonants or sibilants, are contained in the low-energy region, while the vowel sounds, which contribute little to voice intelligibility, produce the high-energy peaks which are the determining factor for the maximum allowable operating level for the transmitter. Consequently, the average *useful talkpower* is attenuated in relation to the peak power.

It also should be noted that the power distribution over the speech range is highest at the low frequencies and it is this portion of the spectrum where the vowel sounds occur; while the intelligence-bearing sounds are the higher-frequency components of speech which produce lower power.

The *useful talkpower* thus is dependent both on the frequency response of the equipment and on the average level of the desirable speech components in relation to the maximum permissible peak amplitude.

The *useful talkpower* can therefore be raised by tailoring the frequency response of the equipment, including that of the mic in accordance with the particular voice, and by providing some means of holding down the useless peaks while at the same time allowing the average level of the weaker needed-components to be raised. The latter may be accomplished by speech processing with a compressor or clipper in the a.f. or r.f. chain, or by means of one of the familiar a.l.c. systems. These methods will be the subject of a future discussion.

The conventional wattmeter will not indicate the voice power in absolute values. Readings therewith are helpful only from a relative standpoint; provided, that in each case the same meter is used and that the same *peak* level is obtained as monitored with an oscilloscope. While the *relative voice* power may be noted, only this component of the *useful* talkpower can be ascertained since the meter does not differentiate between the two types of power. In this respect you have to adjust the gear for maximum *voice* power while judging by aural monitoring whether or not the indications are compatible with *useful* talkpower.

Short-Wave Broadcast Receivers

QUESTION: Can you recommend a receiver suitable for the serious short-wave listener? My interest lies in broadcast reception; the price limit is $600.

ANSWER: An important requisite for serious short-wave listening is that the receiver is capable of an accurate frequency readout and resettability. This will make it possible always to tune to the exact frequency on which a station is expected to be operating. The general run of short-wave receivers do not have this facility, nor do they usually include such other desirable features as sharp selectivity, high image rejection, frequency stability, good audio quality and a noise limiter.

There are, however, two receivers within your price range that meet these requirements.

* Technical Director, *CQ*.

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The Heathkit SB-310 provides an accurate frequency readout to 1 kc and is exceptionally stable. It has fine sensitivity and a high degree of selectivity, the latter obtained with a 5 kc crystal-lattice filter. Two additional filters of 2.1 and 0.4 kc also are available as optional accessories. The receiver covers the 3.5, 7 and 14 mc amateur bands, the 5.7, 9.5, 11.5, 15, 17.5 mc short-wave broadcast bands and the 26.9 mc Citizen's Band. Heathkit has a modification for converting the CB range to the 26 mc broadcast band. No provisions are included for the 21.5 mc broadcast band. A beat-frequency oscillator also enables single sideband and c.w. signals to be copied. This receiver is priced at $249 in kit form, but if you're hesitant about assembling it yourself, (which you needn't be), you can probably engage the services of a local amateur.

The older Collins 51J-2 and 51J-3 receivers also are highly stable and have a 1 kc readout. Frequency coverage is continuous from 0.5 to 30.5 mc and is provided in 1 mc ranges. A single-crystal filter provides varying degrees of selectivity. It also has a b.f.o. and a noise limiter. Many of these sets are used by the Military and therefore all are very ruggedly built. They are available on the surplus market at prices ranging upwards from $400, depending on their condition. Suggest you write to Herbert Gordon Company, Harvard, Mass., 01451, Military Electronics Corp., 4178 Park Ave., Bronx, N.Y. 10457 or one of the surplus dealers listed in the January *Q & A* column. The Military versions of these sets, by the way, are identified as R-381/URR-23 and R-388/URR.

12 V.D.C. Supply for Transistorized Gear

QUESTION: Can you tell me how to build a simple power supply for my transistorized transceiver? I have tried two designs already

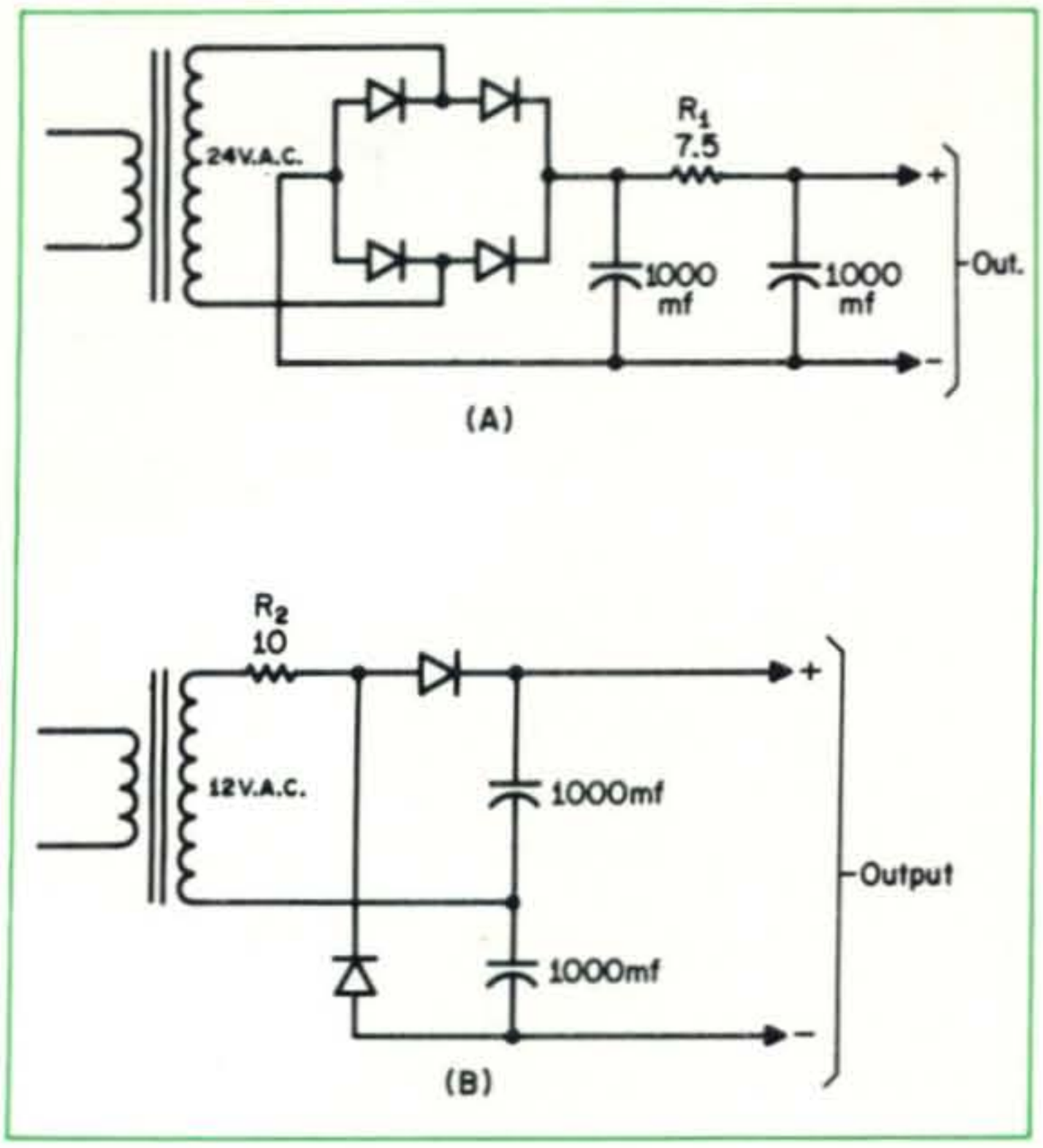

Fig. 1—Circuitry of 12 v.d.c. power supplies that have poor regulation at high current, primarily due to R_1 & R_2. With (A), fairly good operation may be had by shorting out R_1 and using an 18 v.a.c. transformer (12 and 6 v. windings in series).

(shown on attached sheet), but they won't do the job. I want to get rid of the 12 v.d.c. battery and use 110 v.a.c. The receiver draws 0.5 a., the transmitter takes 1.25 a.

ANSWER: The circuits at fig. 1A and fig. 1B that you have tried do not have sufficient regulation to meet the current demand due to the 7.5 or 10 ohm resistors plus the rectifier and transformer resistances. In addition, the full-wave doubler at fig. 1B has poor inherent regulation, even without the resistor. Your full-wave bridge circuit will do fairly well with the resistor eliminated and an 18 v.a.c. transformer.

For this type work, a regulated supply is generally best. It also provides better filter-

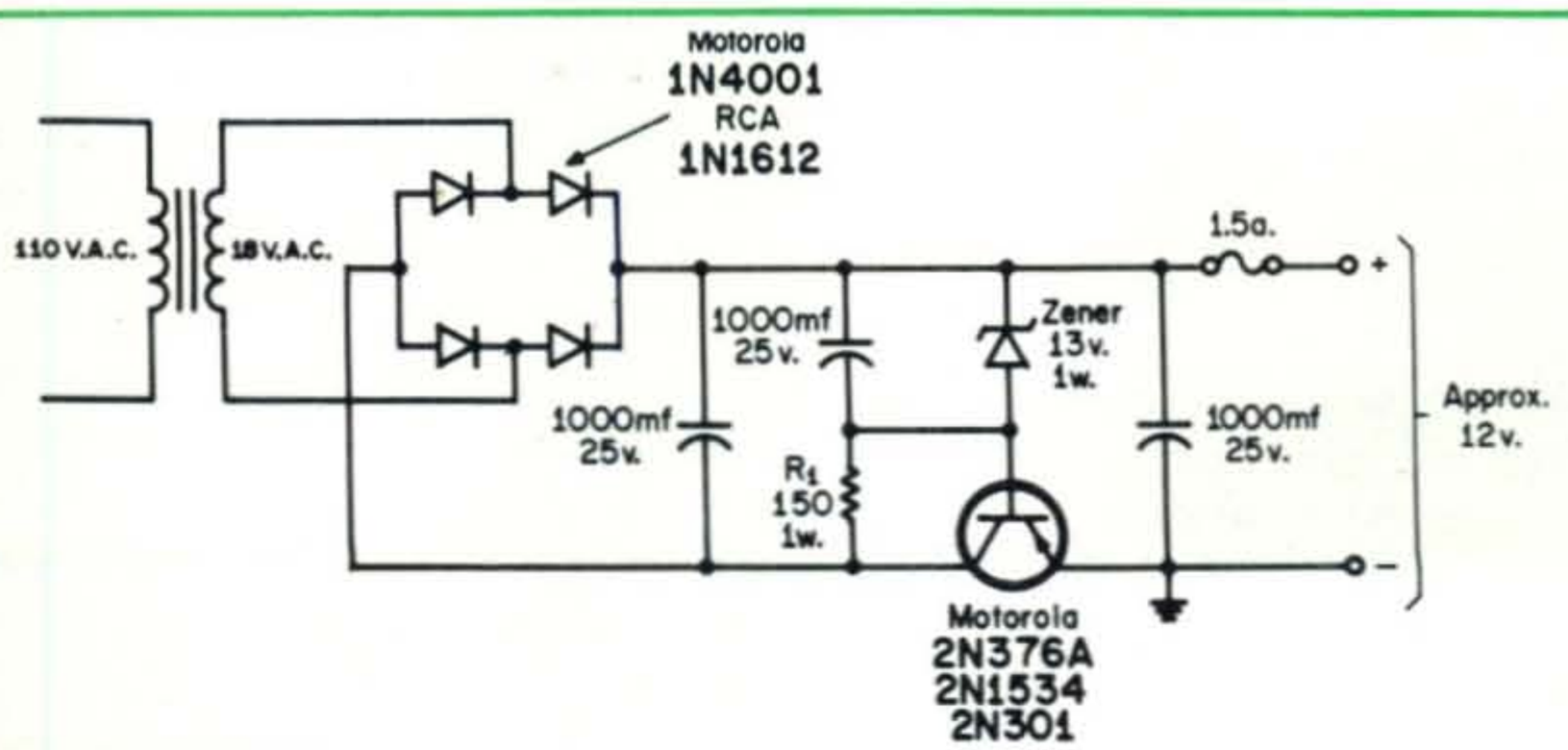

Fig. 2—A.c. power supply circuitry for obtaining 12 v.d.c. output up to 1 a. or so with good regulation and better filtering. Higher current may be handled with two transistors connected in parallel.

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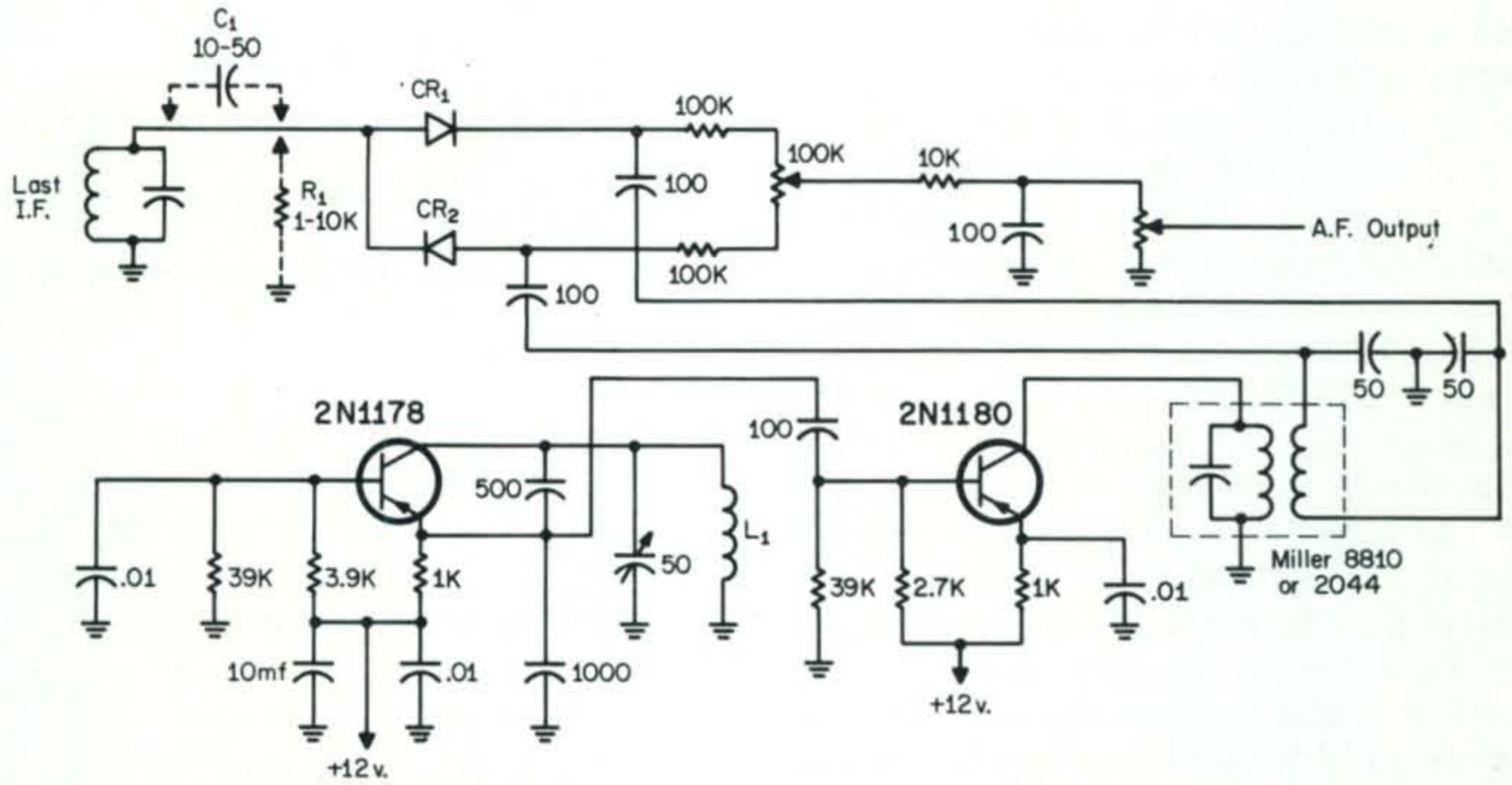

Fig. 3—B.f.o. for use with a tubeless product detector, using a stable self-excited oscillator instead of a crystal. Output may be attenuated if necessary for good product detector output waveform by adding C_1 and R_1.

ing. A simple arrangement is shown at fig. 2. Others may be found in the various transistor handbooks. The 2N376A should be installed on a large heat sink. If the current is much more than 1 a., two transistors may be needed connected in parallel.

BFO for Tubeless Product Detector

QUESTION: I am looking for a b.f.o. circuit using transistors for use with the Tubeless Product Detector described in March '65 *CQ*, page 41. I can't find a b.f.o. circuit with inductive coupling in the output. I'd like to stay away from crystals, but otherwise desire a stable circuit for use with s.s.b.

ANSWER: Circuitry for a transistorized tunable b.f.o. is given at fig. 3. You did not specify the desired b.f.o. frequency. The constants shown are for 455 kc. Q_2 is used as a buffer/amplifier to minimize circuit loading and to raise the output level to at least 5-10 volts as needed for operation without detector distortion, particularly at the lower audio frequencies as would otherwise be evidenced by rough-sounding s.s.b. signals. With oscillator voltages of this magnitude, the r.f. input-signal level to the detector should be limited to 0.1-0.25 volts to minimize distortion possibilities.

The maximum allowable input level can be determined by observing the a.f. output waveform on an oscilloscope with a beat frequency of 100-300 c.p.s. obtained from a steady strong signal, such as a crystal calibrator. If other than a good sine-wave is indicated, the input level should be attenuated by adding C_1 and R_1 as indicated by the dashed lines, keeping R_1 as large as possible without introducing a distorted pattern.

ART-13 On SSB

QUESTION: Do you have any information on putting AN/ART13 transmitter on s.s.b.?

ANSWER: An article on converting the AN/ART13 to s.s.b. in conjunction with the B&W 51-SB sideband adapter appeared in *CQ*, August 1956, page 42. This conversion also may be used with the Heathkit SB-10 s.s.b. adapter. Back copies of *CQ* are available at $1.00 each. A reprint of this article also will be found in *CQ's Surplus-Conversion Handbook*.

Re Inquiries

Quite a few inquiries have been received concerning articles in other publications. Among these were four about a setup that could not possibly work as described. While we should like to provide as much assistance as possible to everyone, we feel that in all fairness, queries about other magazines' articles should first be sent to the authors of the "foreign" articles or to the publication in which such articles appear. Come to us only as a last resort. We should also like to take this opportunity to ask those who have written to us without a reply as yet, to please be patient. We are many weeks behind due to the avalanche of questions and to the time for the necessary research. Tnx fellas & gals!

73, Bill, W2AEF

See page 126 for New Reader Service

Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

April	1-30	IARC CPR Competition
April	**6-7**	**CQ WW WPX SSB Contest**
April	6-7	SP DX C.W. Contest
April	20-21	Helvetia 22 Contest
April	27-28	PACC CW/Phone Contest
April	27-28	One Land QSO Party
May	4-5	USSR DX C.W. Contest
May	4-5	Nebraska QSO Party
May	11-12	OZ-CCA Contest
May	11-12	Georgia QSO Party
May	18-19	YL Int. SSBers Contest
May	18-20	Michigan QSO Party
May	19-25	Michigan Week Party
June	8-9	National Field Day
August	10-11	DARC WAE C.W. Contest
September	7-8	DARC WAE Phone Contest
October	12-13	RSBG 28 mc Phone Contest
October	**26-27**	**CQ WW DX Phone Contest**
November	**23-24**	**CQ WW DX C.W. Contest**

CQ WW WPX SSB Contest

Starts: 0000 GMT Saturday, April 6
Ends: 2400 GMT Sunday, April 7

Complete rules will be found on page 65 of last month's issue. A condensed coverage was also given in the last two CALENDARS.

Mailing deadline is May 15th and your logs go to: CQ WPX SSB Contest, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050

SP DX C.W. Contest

Starts: 1500 GMT Saturday, April 6
Ends: 2400 GMT Sunday, April 7

Its the world working the SPs on c.w. only, so if you are not interested in s.s.b. this will give you something to do. Rules in last month's CALENDAR.

Mailing deadline is May 1st and logs go to: PZK Contest Committee, P.O. Box 320, Warszawa, 1, Poland.

IARC Propagation Contest

Starts: 0001 GMT April 1
Ends: 2359 GMT April 30

The object of this contest organized by the International Amateur Radio Club is for amateurs around the world to make contacts in as many different CPR Zones as possible.

NOTE: CPR Zones (Contributed to Propagation Research) are *not* the same as *CQ* Zones. There are 75 CPR Zones, as against 40 *CQ* Zones.

Information gathered from the logs received will be used for propagation predictions.

Rules are much to lengthy to cover here but in brief they are as follows:

All amateur bands may be used and contacts can be made on c.w., phone and teletype. Each mode being a separate contest.

The same station may be worked on each band and mode during any 24 hour period, duplicate contacts are therefore possible. All contacts in which there is an exchange of calls and signal reports are valid, provided the correct CPR Zone information is noted in the submitted log.

Classification: 1. Single operator. (a) Single Band. (b) All Band. 2. Multi-operator, All Band only.

Exchange: A four or five figure number, signal report plus the CPR Zone in which station is located.

Scoring: 1 point for contacts between fixed stations in different CPR Zones. 2 points between a fixed station and a mobile station. 3 points for mobile to mobile. Contacts between stations in the same Zone have no value.

Final score: For a Single Band, contact points multiplied by Zones worked. All Band, total contact points multiplied by total Zones from all bands.

Awards: Certificates to the top scorers for each mode in each CPR Zone in the different categories. Certificates will also be issued to each participant who submits a log showing 100 or more contacts. Suitable Plaques are also planned.

Log forms and additional information and final reports go to: Contest Chairman, L. M. Rundlett, W3ZA, 2001 Eye St., N.W., Washington, D.C. 20006

CPR Zone maps can be obtained by writing direct or by sending a s.a.s.e. to *CQ*. The full story on the CPR award appeared in the March 1965 issue of *CQ* on page 57.

* 14 Sherwood Road, Stamford, Conn. 06905.

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Helvetia XXII

Starts: 1500 GMT Saturday, April 20
Ends: 1700 GMT Sunday, April 21

Every effort will be made to activate all 22 Cantons so that you will also be able to gain credits for the very attractive H 22 certficate.

Use all bands, 1.8 thru 30 mc, c.w./c.w. and phone/phone. The same station may be worked once on each band, either on c.w. or phone.

Exchange: The conventional five and six digit serial number, RS/RST plus a progressive 3 figure contact number starting with 001. Swiss stations will also include the abbreviation of their Canton. (ie: 579001/ZH)

The 22 Cantons are: AG, AR, BE, BS, FR, GE, GL, GR, LU, NE, NW, SG, SH, SO, SZ, TG, TI, UR, VD, VS, ZG, ZH.

Scoring: Each contact counts 3 points. The multiplier is the sum of Swiss Cantons worked on each band, a possible 22 per band. Final score, total QSO points from all bands multiplied by sum of Cantons from all bands.

Awards: Certificates to the top scorer in each country and each call area in the United States and Canada.

Logs: Use a separate sheet for each band, and include a summary sheet showing the scoring and name and address in BLOCK LETTERS. Also sign the usual declaration that all rules and regulations have been observed.

Mail log within 30 days to: Marius Roschy, HB9SR, USKA Traffic Mgr., Chemin Grenadiers 8, 1700 Fribourg, Switzerland.

PACC CW/Phone

Starts: 1200 GMT Saturday, April 27
Ends: 1800 GMT Sunday, April 28

Contest contacts may also be credited for the PACC Award for working 100 different PA stations.

Use all bands, 1.8 thru 30 mc. C.W. and phone are different contests and separate logs must be submitted.

Exchange: The usual five and six figures, RS/RST report plus a progressive 3 digit QSO number starting with 001. PA/PE/PI stations will also include their province. (579001/GR)

The 11 provinces are: GR, OV, NH, ZL, FR, GD, ZH, NB, DR, UT, LB.

Scoring: Each QSO counts 3 points and the same station may be worked once on each band. The multiplier is the sum of provinces worked on each band, a possible 11 per band. Final score, total QSO points multiplied by the sum of provinces worked on all bands.

Awards: Certificates to the top scorers in each country and each call district in W/K, VE/VO, CE, PY, JA, VK, ZL, ZS.

Logs: Date/time in GMT, station, serial number sent/received, multiplier column for each band, (fill only when it's a new multiplier) and QSO points.

Include a summary sheet showing the scoring and your name and address in BLOCK LETTERS. The usual signed declaration that all rules and regulations have been observed is also requested.

Mailing deadline is June 15th to: P.v.d. Berg, PAØVB, VERON Contest Mgr., Keizerstraat 54, Gouda, Netherlands.

One Land QSO Party

Starts: 0000 GMT Saturday, April 27
Ends: 2400 GMT Sunday, April 28

This party is once again sponsored by the New England CHC Chapter 32.

Only 24 hours out of the 48 hour contest period may be used for contest credit. New England stations may work anyone, outsiders work only NE stations. The same station may be worked on each band and mode, and more than once if operating from a different county. Only single operator stations will be considered for awards.

Exchange: QSO Nr., RS/RST, county, state and operator's name. Same for all stations.

Scoring: Domestic QSOs 1 point, DX 3 points and Novice 5 points.

NE Stations—QSO points × (states + provinces) × (countries + continents).

Outside NE—QSO points × NE counties (max. of 67) × NE states. (max. of 6)

Canada and U.S. can be credited as countries, and KH6 & KL7 as both state and country.

A minimum of 250 points must be obtained to qualify for an award.

Novice stations are scored separately and s.w.l. stations get double point value if both sides of the QSO are reported.

Frequencies: c.w.—3575, 7030, 14075, 21090, 28090. a.m.—3810, 7235, 14230, 21330, 28800. s.s.b.—3990, 7210, 14340, 21440, 28690. Also all Novice bands.

Awards: Certificates to the 1st, 2nd and 3rd place winners in each state, VE province and country, and each New England county. Awards also go to Novices and s.w.l.s.

Trophies will also be awarded to the Top DX, U.S. and New England scorers.

Mailing deadline is June 16th. Logs go to:

See page 126 for New Reader Service

Carl Porter, W1ZLX, 19 Penniman Terrace, Braintree, Mass. 02184. Include s.a.s.e. if results are desired

USSR DX Contest

Starts: 2100 GMT Saturday, May 4
Ends: 2100 GMT Sunday, May 5

The Radio Sport Federation of the USSR is once again sponsoring this contest open to amateurs and s.w.l.s all over the world. Its a world wide contest so do not concentrate on working USSR stations only.

1. Use all bands, 3.5 thru 28 mc but on c.w. only.

2. The exchange will be a six digit serial number. USSR stations will send the RST report plus the number of their oblast. Others will send the RST plus a progressive QSO number.

3. Contacts between stations on the same continent count 1 point, between stations on different continents, 3 points.

4. The final score is determined by the total QSO points on each band multiplied by the number of different countries worked on that band.

The final all band score is the sum of the score from each band. (Not like our WW contest, you add the scores in the last column.)

5. Only 12 continuous hours out of the 24 hour contest period may be used for scoring. The same country may be counted only once as a multiplier, and contacts between stations in the same city are not allowed.

6. S.w.l.s get 1 point for reporting the serial number of one station, 3 points if both sides of the transmission are reported.

7. 1st, 2nd and 3rd place certificates will be awarded to single and multi-operator stations, and s.w.l.s in each country and continental leaders. However at least 5 participating logs must be received from each country eligible for awards.

8. Contacts on contest logs can be credited for any of the USSR awards: R-150-S, W-100-U, R-100-O, R-15-R, R-10-R and R-6-K.

Mailing deadline is June 1st and logs go to: Central Radio Club, P.O. Box 88, Moscow, USSR.

Nebraska QSO Party

Starts: 1600 GMT Saturday, May 4
Ends: 2200 GMT Sunday, May 5

The Lincoln ARC has elected to continue the QSO Party that was so successful last year. However a better choice of dates would have been desirable.

The same station may be worked on each band and mode for QSO points. Operation is confined to single operator stations.

Exchange: QSO Nr., RS/RST and QTH; County for Nebr., ARRL section for others.

Scoring: Nebr. stations: 1 point per QSO multiplied by ARRL sections, plus a max. of 10 foreign countries worked. Out of state: 3 points per QSO multiplied by Nebr. counties worked. (Max. of 93)

Frequencies: 1815, 3525, 3982, 7025, 7225, 14070, 14290, 21070, 21370, 28050, 28600. The Club is planning activity from many counties, so be alert for stations changing counties, which may be worked again.

Awards: Certificates to the top station in each Nebr. county, each ARRL section and each country.

Logs: Must show, date/time in GMT, exchange sent/received, band, mode and points. Also a summary sheet with scoring and name and address in BLOCK LETTERS.

Mailing deadline is June 10th and logs go to: Lincoln ARC, Att: KØQIX, 3829 "W" Street, Lincoln, Nebraska 68503

OZ - CAA Contest

Starts: 1200 GMT Saturday, May 11
Ends: 2400 GMT Sunday, May 12

This is a world wide type contest on c.w. with double QSO credit for contacts with OX, OY and OZ. Rules in detail next month.

Georgia QSO Party

Starts: 2100 GMT Saturday, May 11
Ends: 0300 GMT Monday, May 13

The seventh annual Georgia QSO Party is once again sponsored by The Columbus ARC.

Rules same as last year and will be covered in next month's CALENDAR.

Editor's Notes

Conditions for the 160 Contest were excellent, especially on Saturday night. Here on the east coast the path to Europe was open from dusk to shortly after midnight, which was a departure from the usual pattern when the Europeans peak after 0500. So was the path to the west, if you listened at the right time. (I didn't, so I missed KH6IJ calling me. *! etc.)

You will note that we now have a full compliment of Trophies for our WPX SSB Contest. The last two being donated by Don Miller, in memory of two faithful friends, K7LMU, ZL2AWJ, who gave their lives in the pursuit of DX.

73 for now, Frank, W1WY

See page 126 for New Reader Service

SURPLUS sidelights

BY GORDON ELIOT WHITE*

BACK in July, 1966, I mentioned in passing that the AN/FCC-3 terminal equipment might be useful for amateur RTTY. At that time there was a small amount of FCC-3, -7, and -8 equipment available in the Washington area, and it apparently did not show up elsewhere in quantity. Today however the military has begun to unload virtually all of its middle-aged (1953) carrier terminal gear and move into third-generation transistorized equipment. Major quantities of AN/FCC-3 type material are being dumped, and there is apparently little awareness of its possibilities.

Fortunately for the amateur-experimenter fraternity, there is little interest in the FCC-3 gear on the part of commercial or foreign military markets—the state of the art has passed it by in terms of size, weight, power drain, and heat output; but for most of us, a single drawer of an FCC-3 terminal is a useful and not overly bulky item.

The FCC-3 and its relatives, FCC-7 and FCC-8, were designed to provide *frequency-division teleprinter communications* on up to 12 channels, sent via microwave lines or wire or f.m. or v.h.f. radio circuits. (Unlike time-division terminals of the FGC-5 type, *frequency-division* is readily adaptable to single-channel, *i.e.* ordinary amateur work.)

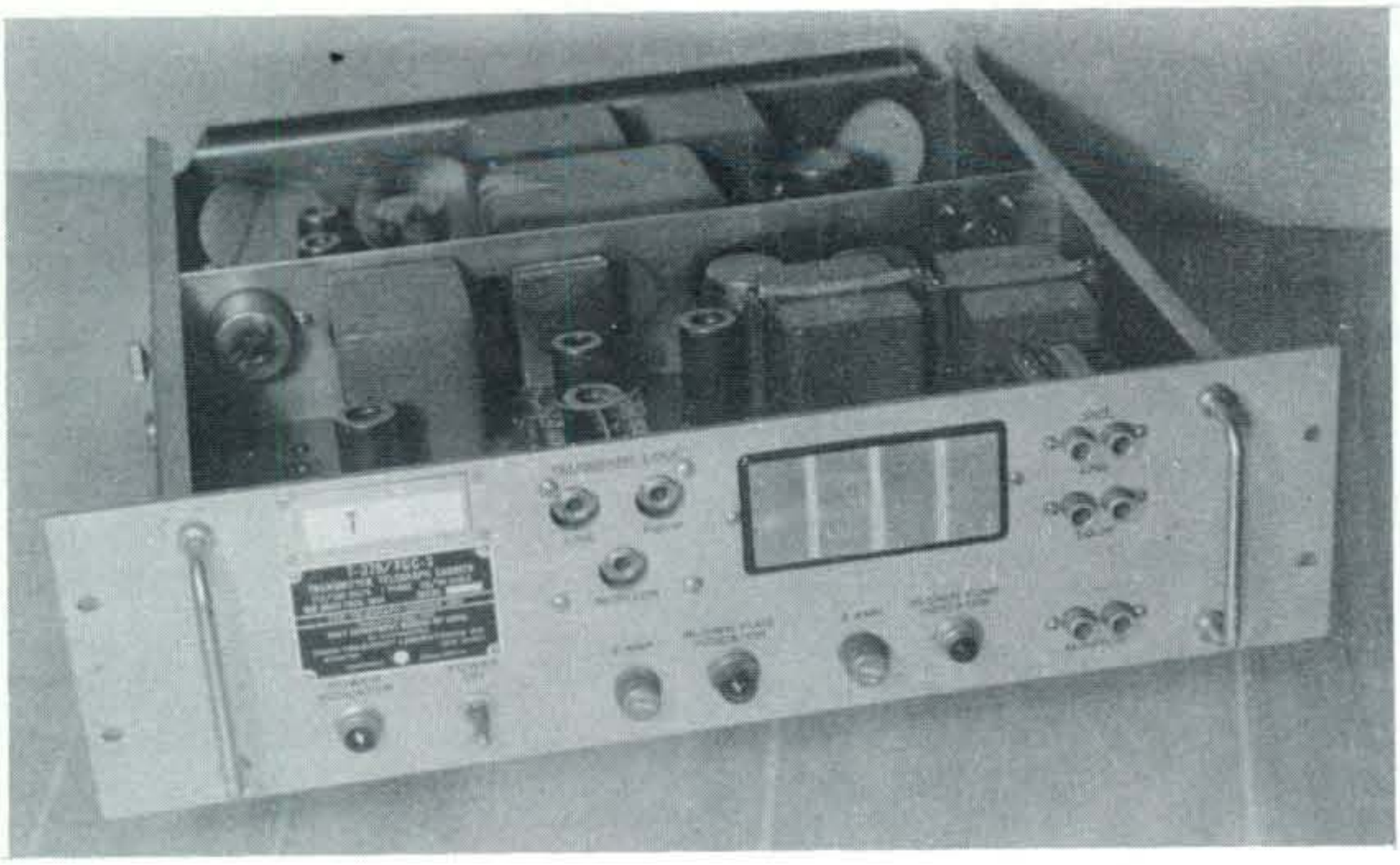
The photo shows a receiver drawer from an FCC-3 terminal. Normally a set of twelve receivers plus a "frequency converter" and power control panels are contained in a single seven foot high, 19 inch rack cabinet. Fortunately each drawer is self-contained, with its own 115/230 volt a.c. power supply and patching jacks. This was part of the military "redundancy" provision, very useful when you only use one receiver and one transmitter.

By using single drawers you have a fully self-contained audio demodulator and oscillator in a pair of rack-mount units only 19 inches wide and 5½ inches high, weighing about 40 pounds each. With the heavy-duty Navy power circuits and overdesigned audio system, at a price that is probably under $10.00 per unit in surplus, this terminal equipment ought to be attractive to many readers, particularly as an easy way to get on a.f.s.k.

The transmitter output is rated at 6 dbm maximum into a 600 ohm line. The receiver will handle 600 ohm audio from −40 db to +6 db.

Since there is no tuning indicator on the FCC-3 demodulator, an oscilloscope may be desired to help in tuning an incoming RTTY signal. Any scope, or even a simple "eye" tube display, may be added by bringing leads out from pins 5 and 6 of the discriminator (T_{101}), pins 4 and 7 can also be used. By hooking 4 or 5 to the vertical input and 6 or 7 to the horizontal scope input, the scope will show the familiar + pattern on an RTTY signal.

One hint in adapting the FCC-3 to amateur use: the audio jacks are designed for tandem plugs: it will be necessary to do minor rewiring of the jacks, or to use a dummy shorted phone plug in the open jack when patching to the various inputs/outputs.



An open view of the AN/FCC-3 terminal unit.

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See page 126 for New Reader Service

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RECEIVERS: R-220/URR, R-388/URR, R-389/URR, R-390/URR, R-391/URR, R-392/URR, COLLINS 51J-3, 51J-4, URR-13, URR-27, URR-35, RAL.

TEST EQUIPMENT: SG-1A/ARN, SG-2A/GRM, SG-13/ARN, SG-12A/U, URM-25D thru F, AN/URM-26, MD-83A/ARN, UPM-98, UPM-99, SG-66A/ARM-5, ARM-8, ARM-22, ARM-25, ARM-66, ARM-68, USM-26, USM-44, TS-330, TS-510A, TS-683, TS-757, ARC H-14, H-14A, also, H.P., BOONTON, ARC, BIRD, MEASUREMENTS TEST EQUIPMENT.

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See page 126 for New Reader Service

Of course as used originally, each channel would be transmitting separate information through a voice-grade circuit of about 3,000 c.p.s. bandwidth, with separation at the receive end made in the top-grade audio filters used in this system. Only one channel would be used in ordinary amateur work. The FCC-3 compares approximately to the Bell System 43A1 a.f.s.k. carrier equipment, though the Bell equipment channels fall in standard amateur RTTY frequencies, and physically it is quite different.

Each transmitter unit is designed to handle a single RTTY channel, providing 60 mil d.c. loop current from the transmitter power supply (although local power *can* be used instead). The output from the transmitter is narrow-shift audio keying, suitable to feed directly to v.h.f. transmitter modulator for a.f.s.k.

Each receiver can also supply 60 mil loop power, and of course demodulates a.f.s.k., providing direct d.c. keying to a printer.

Though the transmitter section may be more complex than most a.f.s.k. oscillators used by amateurs, its function is just that, an a.f.s.k. oscillator. Output frequencies shift by 85 cycles per second from mark to space, i.e. plus or minus 42.5 c.p.s. from the center frequency, in the eight lower bands. Spacing is 170 c.p.s. from center to center of each channel from 425 c.p.s. to 1615 c.p.s. Shifts for the upper four channels are plus or minus 85 c.p.s., with correspondingly wider spacing between channels. "Modulated" channels are simply any of the lower eight bands "converted" to higher frequencies by mixing their outputs with a 3400 c.p.s. signal in a balanced modulator and selecting the lower of the resultant sidebands: i.e.

$$f = 3400\text{-}Ch.F$$

The modulator is described in military parlance as an "electronic frequency converter" and two are provided in the AN/FCC-3 system, one for transmitting and one for receiving. These were used for expansion of the number of available channels in the military system, and the converters do not seem to promise much use to the amateur except possibly as a source of parts. These sections contain excellent attenuators and other goodies.

There is a possibility that the "converters" could be used to form the basis of mixers which, with a variable audio oscillator, would make an any-shift RTTY receiving system. This has been tried by amateurs before, but

See page 126 for New Reader Service

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40045	NPN Silicon transistor Hi gain—small signal 50 Volt P.I.V. 2 amp. cont.
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spurious frequencies have always been a problem. The theory involves "beating" one side of the incoming signal with the local oscillator and varying the local frequency as required to center the resultant output in a narrow filter passband.

This type of system offers reception of any shift from a very narrow one of possibly 30 cycles or less to the maximum legal amateur shift of 900 c.p.s. or more, using a single pair of filters which can be made quite narrow. I have not worked out this sort of system using FCC-3 components, but I offer the idea as a possibility.

A fortunate circumstance in the FCC-3 design from a surplus point of view is the fact that the frequency-determining circuits—the bandpass filters and the oscillator and discriminator circuits—are all easily changed, being mounted on plug-in octal bases. Except for the frequency modules, each receiver and transmitter is identical.

Unfortunately, spacing of the AN/FCC-3 channels does not happen to put the various bands on standard amateur RTTY frequencies, which are 2125, 2295 and 2975 c.p.s. for the 170 and 850 cycle (narrow or wide) shifts. However, if you wanted to set up a small net among a few friends or v.h.f., or wanted to use wire lines for non-licensed communications, the stock FCC-3 channels could be used for those purposes. Selectivity of the filters is excellent, and probably could not be readily matched by home-designed filters, particularly the square-topped results of the four high bands. It might be worthwhile to build the hetrodyne-converter I suggested above, in order to use these beautiful filters!

It is relatively simple to alter the operating frequencies or to wind new modules using standard RTTY techniques and the familiar 88 millihenry telephone loading coil toroids. Refer to *QST* for September, 1966 or RTTY Magazine for details of that technique.

A couple of observations: printer frames should be grounded to prevent 60 cycle power line ripple from flowing back through the filter capacitors into the FCC-3 loop circuit. Keying of the d.c. loops is through 6Y6G power pentodes, thus there is no relay hash in the system. Though not of wide use to amateurs, the FCC-3 has diversity provisions by which a single channel would be represented by two carrier signals, spaced apart in frequency but containing identical intelligence. The two channels are applied to a single limiting amplifier preceding the dis-

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criminator; during a fade the stronger signal captures the limiter and controls the keying.

The An/FCC-3 and associated terminals (the -7 and -8 are simply other arrangements of the same units) were designed by Radio Frequency Laboratories, Boonton, N.J. for the Navy. The book on this set is NavShips 91901, and an Army version was TM 11-2260. The FSC on the Navy book is 0280-213-0001.

For anyone who would like to attempt a heterodyne mixer conversion, I would provide the diagram for a SASE and 50¢ to cover the Xerox copy. I also have a small number of receiver, transmitter, and converter units, if your friendly surplus dealer cannot supply them to interested readers. ■

VHF [*from page 35*]

The Systems Amateur

No matter how much you wish, "the good old days" are gone and won't return. Today amateurs do not make their own capacitors or wind their own transformers and it seems at least on the lower v.h.f. bands builds less and less of his equipment. If you are one of these amateurs (and likely as not you are) and like to think of yourself as just as much an experimenter as those hams of "the good old days," you had better know some systems theory. For you can always argue to yourself that it is designing and making the system work that counts. It has been said that one of Sam Harris' greatest assets is his ability to make a system work. And if you still roll your own, it would not hurt to know a little systems theory so that you can concentrate your efforts in the most efficient areas.

A radio communications system can be broken down into roughly five blocks (see fig. 1). Each of which can be assigned a plus or minus db value: Transmitter, number of db output relative to one watt; antennas, number of db gain above as istropic radiator; Path, number of db lost due to a particular propagation over a given distance; Receiver, minus the number of db of noise due to the antenna and the receiver.

Most types of propagation used by amateurs o nthe v.h.f. bands produce strong signals (meteor scatter, Tropo, aurora) and the sum of the db values (which equal the received signel to noise ratio) is positive. However, as we push for more and more distance, we inevitably reach the point where the system equation yields a negative value. If we wish to communicate further we must im-

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prove our system. Many v.h.f. stations today run high power and have relatively low noise receivers. For these stations the easiest place to improve their systems is at the antenna. Antenna improvements have the added advantage of improving the system in both directions. Next month we shall discuss the construction of large two-meter antennas (large enough for moonbounce) by a method which is inexpensive and easy. In future months we shall discuss other parts of the system equation. 73, Al, K2UYH

SSS [*from page 25*]

into the ONIT meetings. But this success was achieved at a price. Mrs. Lixber was fired on the spot by ONIT, and is now unemployed.

Although it was not possible to find out what went on during the last days of the ONIT meetings, I understand that *no* final decision was made on SSS. Mainly as a result of our intervention, Committee O has been requested to obtain more objective data. While SSS may not yet be defeated, I belive that we've slowed it down considerably.

Another ONIT Plenary Assembly is scheduled for 1968. Of course, I shall not be invited, and at this time I do not even know where or when the meetings will be held. I can assure you, however, that I *will* find some way to make the position of amateur radio known at the meetings. To do this effectively, dear readers, you must continue to send me your viewpoints concerning amateur radio and SSS.

In closing, I must again pay tribute to the courage and devotion of Mrs. Janeva Lixber, who sacrificed her employment with ONIT in the defense of amateur radio. Without her assistance, SSS would probably be in operation today, much to the detriment of amateur radio.

Any comments concerning SSS, or suggested sources of employment for Mrs. Lixber, can be sent directly to me, Prof. J. Ostermond-Tor, c/o *CQ*.

DX [*from page 88*]

VK9TB—Via E.W. Bastow, Box 56, Port Moresby, Papua Territory.
VP2ME—To W3KAU.
VP2MU—c/o VE2BRO.
VP2SY—Via P.O. Box 80, St. Vincent, B.W.I.
VP2VM—To G5FH.
VP6CJ—c/o WB2UKP.
VP8IU—Via VE7AON.
VQ1GDW—To W2CTN.
VR2FM—c/o WA6GLD.
VS6DO—*Not* via W2RDD.
XW8CAL—Via VE6AO.

See page 126 for New Reader Service

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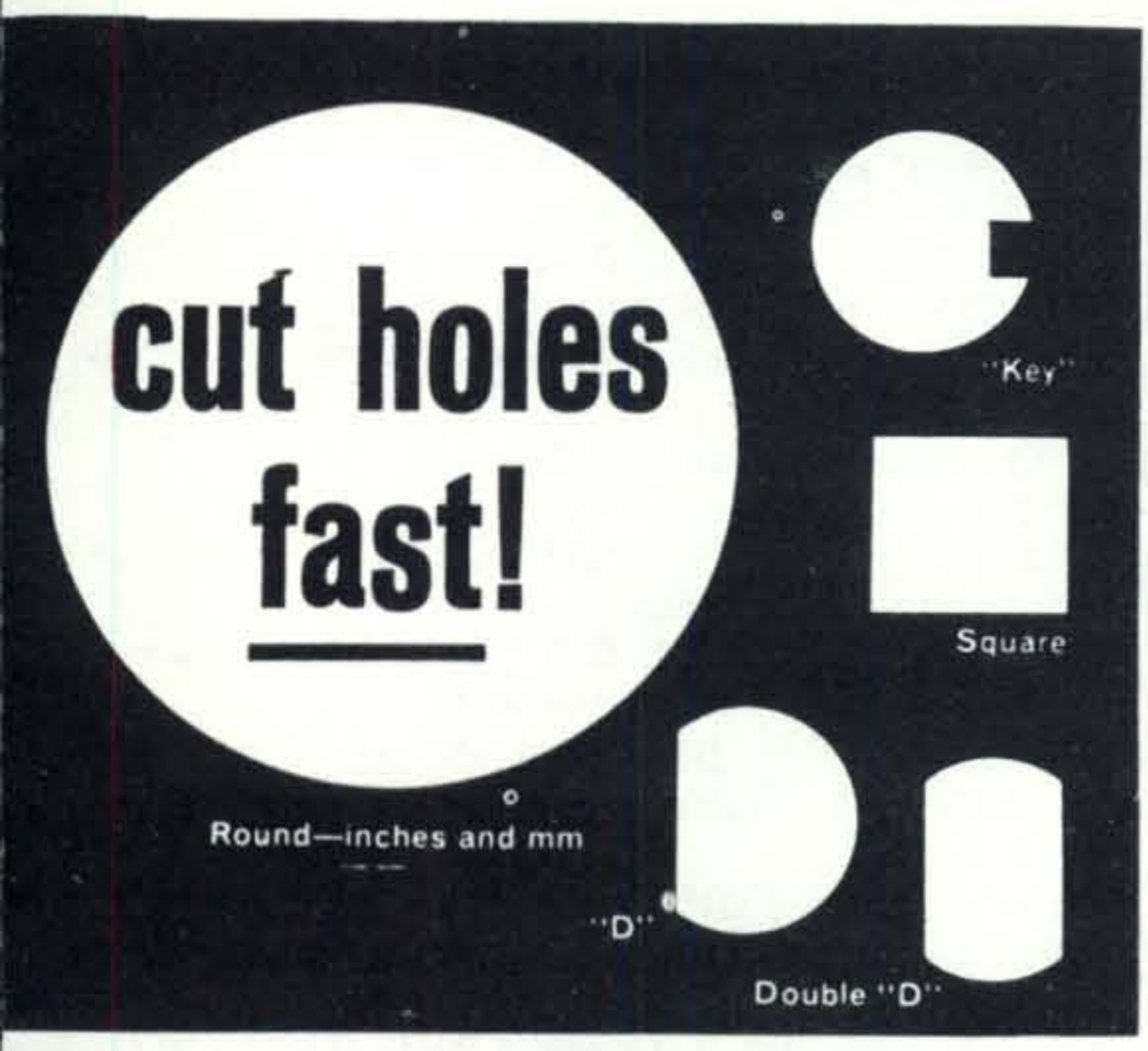

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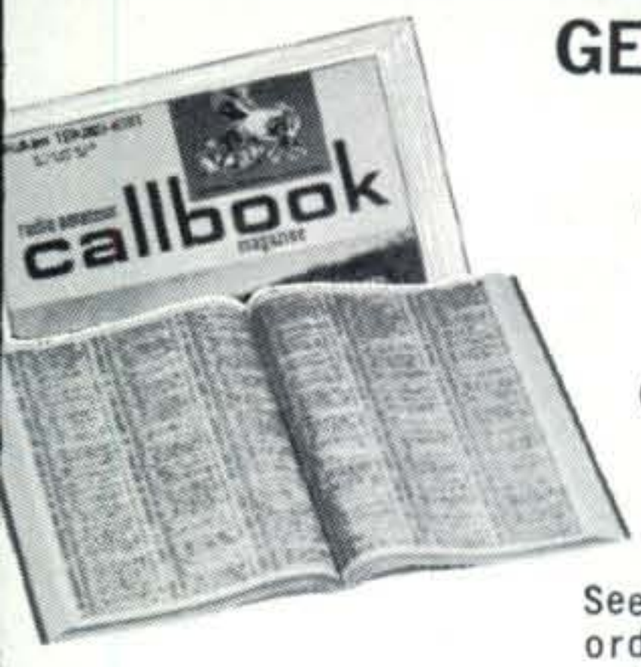

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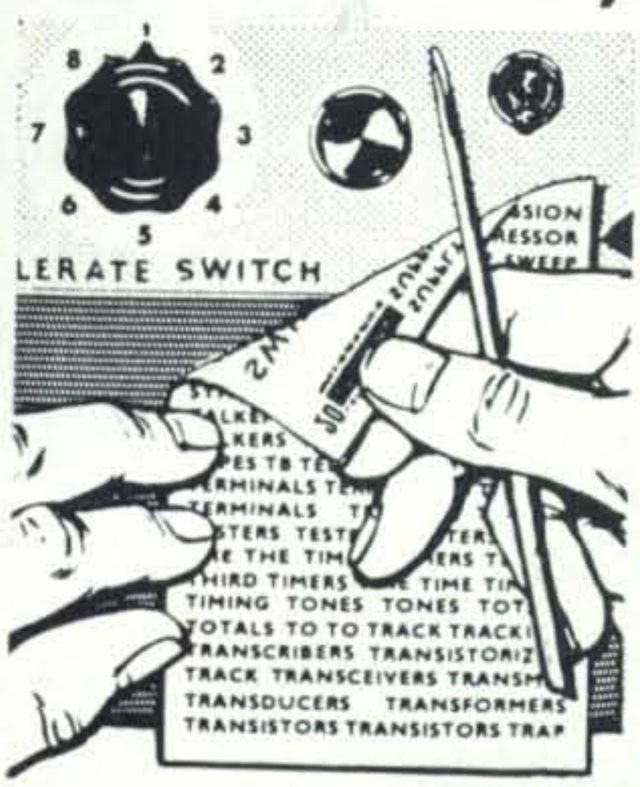

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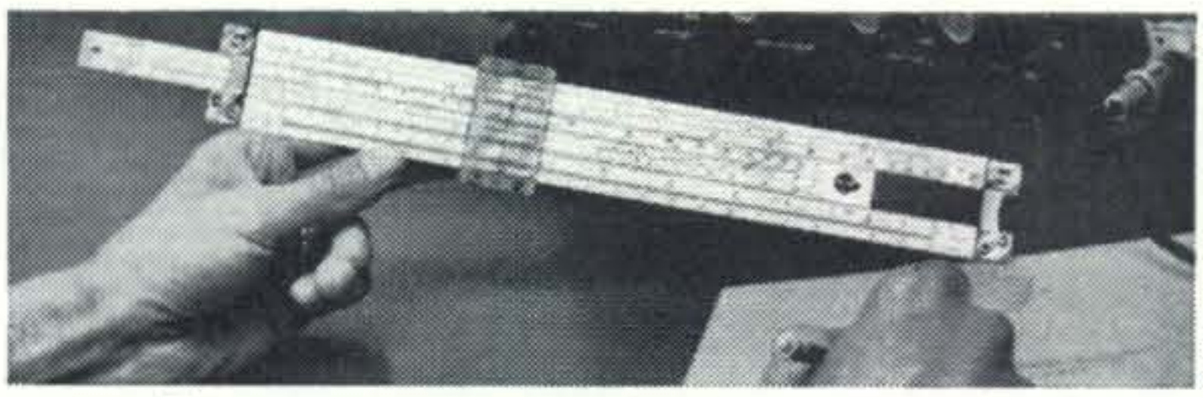

Radio amateur's tool for figuring like a "pro"

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YA1DAN–To KP4CL.
ZD3D–c/o W9JVF.
ZD9BE–Via W2GHK (DOTM).
ZE1CY–To K9BNF.
ZF1ES–E.J. Sandy, Box 293, Grand Cayman, B.W.I., or to G3UEO.
ZS6XL–To Box 4576, Johannesburg, Republic of South Africa.
4J3A–c/o P.O. Box 88, Moscow, Russia.
4W1H–Via HB9ACD.
4X4CJ–Direct or via bureau, WB2SSK has not received any recent logs.
5U7AL–Fred Powell, B.P. 201, Niamey, Niger Republic, Africa. *Not* via W4WHF.
5V4EG–To P.O. Box 33, Atakpame, Rep. of Togo.
5VZRQ–Via VE2AFC, P.O. Box 382, Quebec 4, Canada.
6Y5CB–c/o VE3DLC.
7P8AR–Via W4BRE, 1207 Locust Ave., Huntsville, Alabama.
8F1SH–Indonesian Amateur Radio Union, P.O. Box 2127, Djakarta.
8R1C–P.O. Box 739, Georgetown, Guyana.
9N1MM–c/o W3KVQ, 3221 Gaul, Philadelphia 34, Pa.
9Y4VU–To WA3EPB, 703 3rd. Ave., Lester, Pa. 19113.

73, John, K4IIF

CQ Reader Survey [*from page 39*]

73's circulation into consideration, however, we are led to believe that almost 88% of *73*'s readers also read *CQ*, whereas only about 61% of *QST*'s readers read *CQ*.

We were also able to ascertain that ARRL membership is relatively weak in the 4th, 5th and 7th call areas as compared to other geographic areas. Surprisingly though, the league was not substantially stronger in New England than in any other particular call district. These figures, of course, can only refer to *CQ* readers, so the information may be somewhat different with regards to the non-duplicated circulation.

Change In Trends

It is obvious from the survey returns that transceivers have come to represent a far greater portion of the equipment used today than ever before, as opposed to separate receiver-transmitter stations. It is also apparent that many active amateurs still do use separate stations, and that of those who do use transceivers, many have come to find use for additional receivers or v.f.o.'s.

It's also quite obvious that of the thousands of pieces of old or used equipment scattered throughout the country, only a few top brands are being sold and resold with any regularity. The leaders in the older or used equipment area would appear to be Collins, Hallicrafters, Johnson, National, and Heath. Other companies who have become major factors

See page 126 for New Reader Service

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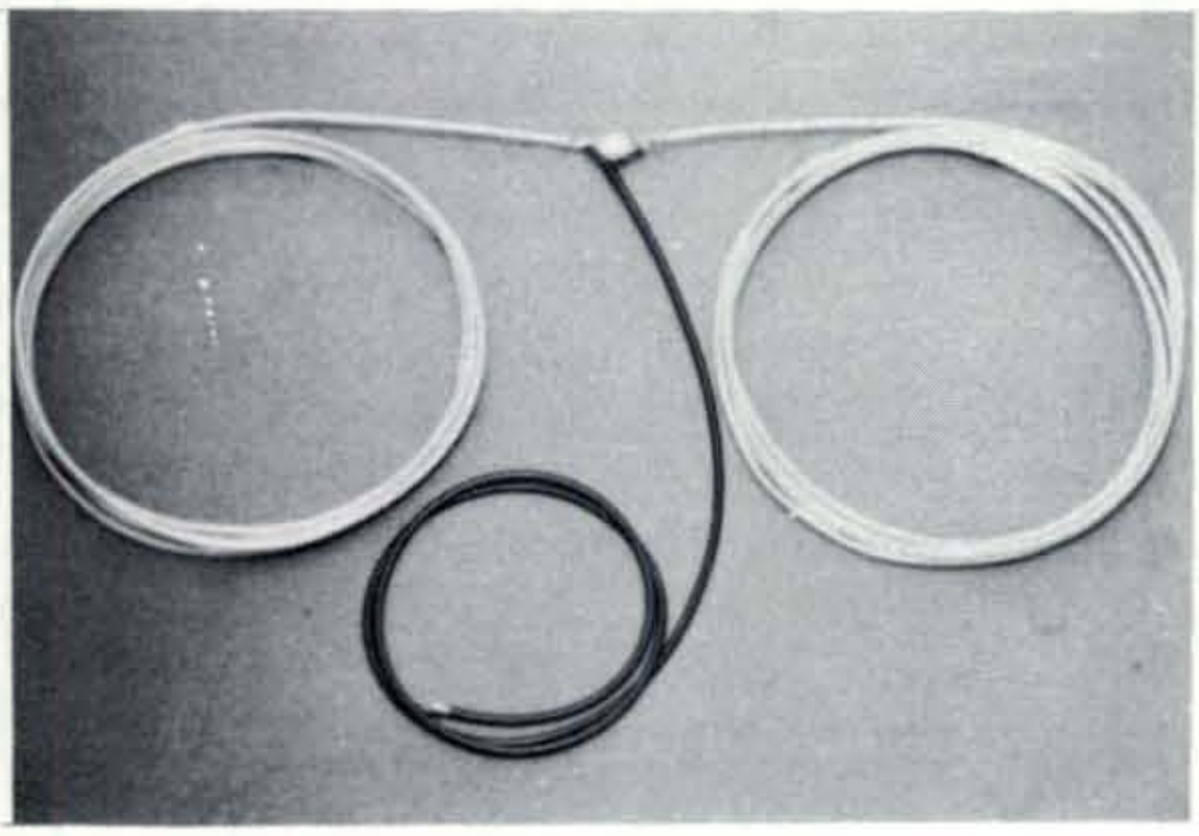

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Antenna Impedance—52 ohms at resonance.

Broadest Bandwidth (if instructions are followed)—Covers 3.5 to 4.0 with SWR of 3:1 or less, 1.1:1 at resonance. Covers 7.0 to 7.3 with SWR of 1.5:1 or less, 1.1:1 at resonance.

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(Additional info, see January and March QST)

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in ham radio, such as Swan, Drake and Galaxy have been in the market for a relatively shorter period of time, thus making it almost impossible for us to judge as to these manufacturers' used equipment status. It would appear, however, that the equipment of the manufacturers listed above retains a rather high used equipment resale value.

Another interesting fact comes to us, not through the survey, but from the Radio Amateur's *Call Book*. During the years from 1963 to 1966 the United States amateur population remained at a very stagnant 265,000 license level. However, the latest *Callbook* indicates a jump during 1967 to over 295,000. In addition, we are pleased to report that the current rate of licenses being issued indicates that 1968 will show a jump as great or greter still. ■

Improving The 51J [*from page 70*]

Antenna Trimmer

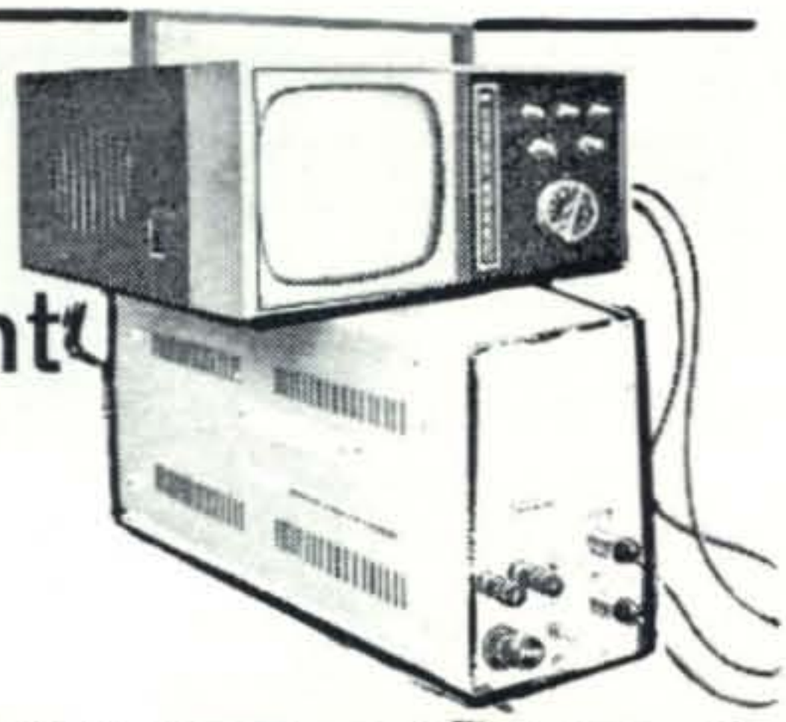
There is one further modification which should be performed on any 51J which does not have an antenna trimmer capacitor already installed. Some were produced without antenna trimmers for some unknown reason. This small variable capacitor across the r.f. input circuit is a necessity if best results are to be obtained, especially on the higher frequency bands. Although a receiver's r.f. input can be aligned for a perfect match to a particular antenna on a specific frequency, it will not remain in alignment with changes in frequency or with different antennas. The trimmer is needed to peak up the r.f. stage input tuning for best selectivity. It is useful in reducing front-end overload from adjacent strong signals.

A 100 mmf midget capacitor is used and it can be mounted on the shield partition near the rear of the set, in the r.f. compartment underneath the chassis. It should be connected from the junction of C_{113} and S_{102} to ground. The extension shaft is connected by two flexible couplings, and it comes through the shield partition to the lower area of the front panel near the calibration oscillator adjustment, where a small knob is used for its adjustment. In operation the trimmer is tuned to give maximum DB-Meter reading on a specific signal.

With these modifications, and with the product detector previously presented[1], any 51J receiver can be made into a very fine s.s.b. receiver, and an excellent shortwave listening receiver as well. I would not trade

See page 126 for New Reader Service

Rube Goldberg
would have liked this
piggy-back arrangement



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See page 126 for New Reader Service

mine for any of the amateur-band-only equipments available, nor for any other make of general coverage receiver on the market within its price range. With its p.t.o. and accurate dial plus these modifications, it has now become an outstanding receiver, equalled only by something more outstanding like the R-390A or R-390/URR, both of which also require a product detector modification[3] for satisfactory s.s.b. reception.

Queries

I will be glad to answer any queries from readers concerning the 51J series (or the R-390A/URR) which are accompanied by a self-addressed stamped envelope. However I cannot supply any information concerning modifications to other receivers. The reader will have to do his own work of that kind. Any licensed amateur should possess the basic technical knowledge required. ■

Slow Scan TV [*from page 19*]

c.p.s. components are originally in the form of square waves, and the camera output contains a strong 6144 c.p.s. component due to blanking. In order to minimize the bandwidth of the final output, the composite video signal of fig. 4 is first sampled by narrow (10%) pulses at the Nyquist rate of 6144 c.p.s. The sampled video is then band-limited in a low-pass 3072 c.p.s. filter that is of the maximally-flat time delay (linear phase) variety. We use a five-reactance CLCLCR filter whose output is 5 db down at 3072 c.p.s. and 22 db down at 6144 c.p.s.

Part II of this series will cover the characteristics and requirements on the transmitter and receiver.

[*To be continued*]

1 Simpson, R., "Narrow-band TV Using Pseudo Random Dot Scan," *QST*, pp. 46, 47, Oct. 1966.

2 Deutsch, S., Patent No. 3,309,461, assigned to Battelle Development Corp., March 14, 1967.

3 Deutsch, S., "Pseudo-Random Dot Scan Television Systems," *IEEE Trans. on Broadcastin*, July 1965.

4 Deutsch, S., Balaban, P., and Atzmon, A., "Experimental Results Of Pseudo-Random Dot Scan," Report 1308, *Poly Inst. Bklyn*, Jan. 1966.

5 Macdonald, C., "SCFM—An Improved System For Slow-Scan Image Transmission," *QST*, Jan. 1961.

6 Macdonald, C., "Pseudo-Random Scanning," *QST*, Jan. 1967.

7 JEDEC Publication No. 16A, E.I.A., 2001 Eye St., N.W., Washington, D.C. 20006.

8 Supplied by Ferranti Electric, Plainview, N. Y. Equivalent supplied by Thomas Electronics, Wayne, N. J.

See page 126 for New Reader Service

Illinois S. [*from page 58*]

must be made between December 30, 1967, and July 1, 1968.

Application for certificate must be postmarked by midnight of June 30, 1968, and be sent to Illinois Sesquicentennial Commission, Amateur Radio (QSL) Program, 1016 Myers Bldg., Springfield, Illinois, 62701. It must include the applicant's name, address and call sign, and must list the stations contacted including call sign, date, time and band. QSL's should not be sent in. The Illinois amateur's information may be filled in on the log supplied with QSL cards.

1750 Meters [*from page 32*]

scan TV. Modulation products outside the band must be suppressed at least 20 db.

Propagation

Theoretically, such low-frequency signals as 1750 meters travel strictly by groundwave propagation. Reception over water is much better than over land, though under certain conditions extremely long range can be obtained over land. I have heard a San Francisco aeronautical beacon on the east coast of the U.S., though the transmitter power was too low to reach across the continen under normal conditions.

Range of a part 15 transmitter should nor mally be at most a few dozen miles, but effi cient antennas (within the rule) and a quie receiving location can make a great differ ence, with confirmed contacts now indicat ing up to 200 mile reception is possible.

Surplus Gear

In addition to the big Navy RBA, RBL an RAK receivers, low frequency signals in th upper end of the 1750 meter band can b received on the familiar BC-453/ AN/ARC 5 receivers, which will tune down to 185 kc Returning of the command receiver front en can extend the range even lower, and offer the cheapest type of receiver for this band.

Though efficiency would be less for short er antennas, I would think that small battery powered transistorized transmitters would b practical, using ferrite-core loopstick anten nas, with transistorized receivers to eliminat the noise that tends to ride in on a.c. powe lines. Of course there are no antennas limit for *receiving* part 15 transmissions, so withi the general antenna rules, the sky's the limi on the receiving end. Experimentally, ba loon-borne antennas could be used. ■

See page 126 for New Reader Servic

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WANTED—QST's—Last four issues needed to complete pr collection 1916—FEB., MAY, JUNE, JULY. Any reasonable p paid. K2EEK, CQ Magazine, 14 Vanderventer Ave., Port W ington, L.I., New York 11050.

QSL's by RUTGERS VARI-TYPING SERVICE, Thomas St., Mil N.J. 08848. Free samples.

QSL's—BROWNIE-W3CJI—3111 Lehigh—Allentown, Pa. 18 Samples 10¢ with catalog 25¢.

WANTED: Tubes, transistors, semiconductors, test equipm meters. Bernie W2MNP, Box 257, Canal Station, N.Y., N. Y. 10

YOUR CARD in glittering raised 3-D on blazing backgro becomes a beautiful collector's item. Samples 25¢ (refunda 3-D QSL Co., Monson, 4, Mass. 01057.

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EARN YOUR DEGREE in electronics engineering. Highly effe home study courses in electronics engineering technology electronics engineering mathematics. Free Literature. Co Institute of Electronics Engineering, P.O. Box 36185, Hous Texas 77036 (Established 1945).

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HEATHKIT: Model DX-60A Transmitter and HG-10B Vfo. M Cond. Going SSB $75 plus shipping. S. Barry, 384 Union St, Un town, Pa. 15401.

75A2 FACTORY Modified to 75A3 Prod. Det. Good cond. Kopp 939 Mar. Card, Rd. East. Marion, Ohio 43305.

ANTIQUE radio tubes wanted. Made prior to 1920. S. LaDage, Oakland Ave, Maple Shade, N.J. 08052.

SELL: Heath HX11 50 watt CW trans ex $35. Hallicrafters HA 5-80 thru 2 mts ex $55. 14 AQV Vertical + 80 meter loa coil and relay $25. E. Baade, 18 Bayberry Rd, Lake Ronkonko NY 11779.

75A4 EXCELLENT Cond, vernier tuning knob 3.1 and 0.5 filters, serial number 2375. $375 plus postage. H. Garretson Box 2622 ASD, Wright-Patterson AFB, Ohio 45433.

FOR SALE: Seneca VHFI With plate modulator $175. J. We Box 102, W. Liberty, Ohio 43357.

See page 126 for New Reader Serv

rader" ED, says if you don't buy your Ham Gear from u paid too much. Limited supply of new equipment in ealed cartons, while they last. New Swan 500 Transceiver, Price, $495.00, Cash Price $395.00; One new Drake rial #26033, Regular Price $599.95, Cash Price $479.00; Deal: New Eico 753 Kit 3 Band Transceiver and new 1 Kit AC supply with speaker, $249.00, Cash Price New Mosley Classic 33 and Demo Ham-M Rotor, $189.50: splayed BTI 2000 Watt Linear, $659.00; Demonstrator nt with factory warranty: Demo Ham-M Rotor $94.50; d Swan Mark II Linear, $495.00; New Demo SB-34, Demo Drake T-4XB, $359.00; Demo Drake R4-B, $369.00; Rohn 50 ft. foldover tower prepaid, $185.00: ED Moory le Radio Co., Box 506, DeWitt, Arkansas Phone 946-2820.

75S3B mint condition $450.00 W6FEX, 4900 La Calandria s Angeles, Calif. 90032. 222-2551 eves.

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E: Pair of Gonset Twins, all band G66B & G77 with modu- d 12v-110v power supplys, G77 never used, $175.00 G50 six meter tranceiver less than 10 logged hours, like 00.00. Gonset 6 meter converter like new $15.00. Code machine with many tapes, a $50 value, will sell for plus postage. Gary Wolverton, 1042 Keegan Lane, 3301.

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E BUYERS for used ham gear, Collins, Drake, Swan, WRL, fters, Hammarlund, National, Johnson, SBE etc. Let us r used ham gear for you. Write Ken WØZCN, Electronic ring & Equipment, 1028 Central Avenue, Fort Dodge, Iowa.

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LE: Hallicrafters SX117 receiver; R-50 speaker, HA10 tuner. $310. Richard Wirkkanen, 2915 Baseline Rd, Apt ulder, Colo. 80302.

ADDRESS STAMP including all letters in exchange for er dollar, any year, for my private collection. Cheryl ox 1111, Homestead, Florida 33030.

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E: Heath Apache Transmitter, for $130. In excellent con- Will ship. WA4ZGQ, Rodney Bland, 512 Roberts St., N.C. 27910.

allicrafters Hurricane SR2000 transceiver. Factory sealed, d cartons. Sorry reason for selling this beautiful pro- l equipment Illness. $1300.00 or offers. E. Grieco, P.O. , Meriden, Conn. 06450.

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K Variable frequency antennas, JOYMATCH Antenna Advertised in CQ. Immediate delivery. SWL Guide, 218-Q Syracuse, N.Y. 13202.

LE: Antenna Rotators, Crown RC-1 new $20 also Radiart sed $10. D. Scher, 11 Webster St, Irvington, N.J. 07111.

JOHNSON Sideband adapter wanted. Please quote price. Rev Capencer, Saint Paul Island, Alaska 99660.

KWM-2 $750; 516F-2 $75. Both $800. 30L1 $375; 516E-1 $149. All for $1250.00. GPP-1 phone patch $35. Mc Jones Electronics VSWR Meter $27.50. SX100-Hallicrafters, Very Clean, $139. G. Scott, 2015 Beverly Blvd, N. Platte, Nebr. 69101.

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PC Bd famous TTL/2 TTY converter; See Sept. '67 RTTY Mag; $6 pp. J. Slater, 11040 Creekmere, Dallas, Tex. 75218.

FOR SALE: DX100 Gud shape w manual fob $80, Heath VF 1 VFO $15, Hallicrafters R45 All band $50. Heath Q. Multiplier $50. H. Lowery, 915 Madison St, Manchester, Tenn. 37355.

FOR SALE: $35. 150 W. Linear amplifier using two 6146's complete with power supply—Described in Jan. '67 CQ. E. Marriner, 528 Colima St, La Jolla, Cal. 92037.

FOR SALE: Drake 2B receiver with 2BQ, 2 LF and 4 extra crystal. Immaculate cond less than 25 hrs. Ed Pinanski, 124 Essex St, Beverly, Mass. $225.

HW 30 twoer and xtal in gud cond $40. VF-1 vfo $15. S. Rowly, P.O. Box 293, Willison Academy, Easthampton, Mass. 01027.

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EICO 324 Sig Gen nu Cond $25, BC696 A Trans -1 $20. BC 348 Rec $50. Pr. 829 tubes nw trade pr 813 Nu. Mcintosh, 804 Cureton St, Camden, So. Car. 29020.

TOWER: 40 ft Tristao crankup; AR-22 rotator; Hornet TB-750 10-15-20 meter 3 element beam All 3 $75. K. Grinde, 536 W. Hillsdale, Inglewood, Cal. 90302.

SALE: Model 19 cover $10. Model 18ASR(LBPC) Cover $27. Will swap ASE Pls Wanted: Worner Model 81 Phot Cell unit. J. Thomsen, 1280 Tennessee Ave, Clarendon Hills, Ill. 60514.

BARGAINS: SB33 with D.C. Inverter and mike $190. Excellent SB400 $270. Heath HR-10 RX $65. Ranger Xmtr $65. QST's much more. Stamp for list. J. Shank, 21 Terrace La, Elizabethtown, Pa. 17022.

HEATH am Tuner $7. FL tuner $7.12 Watt amp $10. Pilotone 10 watt Amp. $12. Local only. R Hutchinson, 1705 Kaywin Ave., Bethlehem, Pa. 18018.

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ARC-3 Trans & receiver units partly stripped & Less tubes. Enough useable parts left to convert to lot 2 meter gear. $5 ea., $9 pr. FOB by Qth wt 20#. I. Megeff, 50 15 Weeks Lan, Flushing, N.Y. 11365.

SALE or swap for DC scope like new Collins MP 2. Schum, 11658 Mayfield Ave., pt. 5, L. A., Cal.

FOR SALE: Heath model scope OL-1 $40. Vibroplex Presentation model and case $35. C. Kaufman, 231 So. Jasmine St, Denver, Colo. 80222.

RCA Employees SSB net meets on 3885± 2kc Monday nights 0130 gmt; also 21330± 2ke Saturdays at 1500 gmt and 1800 GMT. All stations welcomed. K. Miller, 309 Cherry Hill Blvd, Cherry Hill, N.J. 08034.

FOR SALE CLEAN SB-300 $200. SB-400 $250. All cables, Manuals. R. Waite, 10213 Las Tunas Court, Rancho Cordova, Cal. 956700.

88 MILLIHENRY Toroids for sale, uncased, five for $1.25, pp. L. Smith, 6218 E. King Pl, Tulsa, Okla 74115.

RAYTHEON Marine transceiver, 30 watt 12c new cond. Trade for Hallicrafters SX-117SX-117 or SX-146 receiver in good cond. G. Anderson, 1100 New Jersey Ave, Pine Beach, N.J. 08741.

SP600JX 54 mc $175, FL1000 Linear $125, two RCA 811A never used—Swap for good headsets or pair 6146W. D. Meeves, 7209 Old Branch Ave, Camp Springs, Md.

WANTED: Heath Hamscan or Scanalyzer. Any condition. M. Ludkiewicz, 143 Richmond Rd, Ludlow, Mass. 01066.

NCX-5 owners: NCX-501 VFO, brand new, factory-sealed carton, best offer. R. Grinder, 1204 Bowdoin Rd, Madison, Wisc. 53705.

BC-221-AH Frequency meter 125/20,000 kc Ser. 4909. What am I offered? Sorry, no shipping. RF. Parsons, 12 Washington Park, Maplewood, N.J. 07040.

SELL: SB-10 with built in power supply $65. Adventurer 50 watt C.W. $45. Ten dollar postage allowance on each. Fox, Box 2202, Huntsville, Tex. 77340.

WANTED: Technical material corp. SSB adaptor model GSB-1 Ge. Baldauf, 175 Wernersville Blvd, Wernersville, Pa. 19565.

WANTED: Instruction manual, Patt No. 68P835265-0, for Motorola high-band 60w mobile. F. Butler, 323 Elliott Rd, SE. ft. Walton Beach, Fla. 32548.

BOOKS on Antennas, transmission lines, propagation,, wanted. Binders for CQ, QST 73 magazines wanted. First year of VHFer & 6 UP Magazines wanted. D. Etherdge, 12040 Redbank St, Sun Valley, Cal. 91352.

NEED: Mountings for Jennings UCS 500 and UCSXF 1200 Vacuum Capacitors. Will swap new UCS500. J. Don Carlos, DCA-Europe, Code E-316, Apo New York, N.Y. 09131.

WANTED: Knight, KG220, 30To 50 MC. Receiver, state cond and weight. L. Wuertz Sr., 517 Camp St, Sandusky, Ohio 44870.

2PITT Steatite KW bandswitch $4. Timed sequence mod kit $3. TS-9 Handset $2. Laff 300 OHM Dyn mobile mic $2. J. Schultz, 40 Rossie St, Mystic, Conn. 06355.

TRI-STATE Indiana, Kentucky, Ohio amateurs, send info on activities, new licensees, etc. to: Ham Call Column, WA8COA/WA9FEW, Cincinnati Sunday Enquirer, Cincinnati, Ohio 45202.

COLLINS KWS-1 for sale. SSB, CW, 1KW. 80 thru 10. Spare finals & Others. Offers considered. No Ship. H. Riddle, 2661 Northwood Ave., Toledo, Ohio 43606.

COLLINS 75S-3B with spkr. 2.1 and 500 Kc. mech filters $500. ex cond. Bandit 2000B w/tubes linear $300 or best offer. W. Wiaduck, 4926 Hawthorne Ave, Hillside, Ill. 60162.

SELL: 75A1 with A2 Xtal filter, $125; SX-100, $110; TX-62, CB-6 conv., Turner 350 mike, $140; Hi-Gain 3-el. 6-met. beam, rotor, $50. Satterlee, 213 Frederick, Fort Atkinson, Wis. 3538.

2 METER FM Receiver wanted—Converted or OEM. Prefer Rig with permakay filter. State condition and Price. R. Yanda, Box 25, Oxford, Junction, Iowa. 52323.

WANT TO Swap my 32S-1 and 75S-1 with 500 CY Filter and N.B. For clean KWM-2. B. Gode, 1036 Hillside Rd, Northbrook, Ill. 60062.

WANTED: 3-5KW 115/220 vac generator. Will trade ssb gear for same. Must be in good cond. Will pickup. C. Ellis, Rd. 1, Box 401, Watsontown, Pa. 17777.

WHO WOULD like to change the journal "Amaterske radio" printed in the czech/slovak language for the American journal CQ—or who would like to correspond—let him write to this address: Jaroslav Presl, Horazdovice 700, Czechoslovakia

SSB Adapter: Heath SB10. Excellent cond. $70. F. M. Jannet, 11557 Evanston No. Seatlte, Wash. 98133.

FOR SALE: HR050—T1 with ABCDE Coils & Spkr SSB prod det, xtl calibr. instr book. First check for $125. W. Walker, 17 Goodwin Rd, Newport News, Va. 23606.

SHACK CLEANOUT—Xmtrs (most converted) ARC 5 3-4 mc $10; BC 459A 7-9 mc VFO new $15; BC457A 4-5.3 mc new $10.50; BC458A Conv. To 10 meters + meter $25; More FOB. J. Miller, 133 Lowell Ave., New Hyde Park, N.Y. 11040.

WANTED: 32-S3 Collins transmitter in mint cond. Advise serial number, cond, and best price in letter. All will be answered. G. Snyder, 1839 Port Clinton Rd, Fremont, Ohio 43420.

BRITISH Wartime SPY B2 transmitter/receiver complete with AC/DC psu coils. Key, phones etc. Good cond. $50 plus freight. Derwent Radio, D. A. Wood, 28 Hillcrest Ave, Scarborough, England.

HALLICRAFTERS SR2000 and power supply as new used little. First $1100.00 includes co-ax-swr and Hustler vertical. Quitting Ham radio. D. Gillepsie, 11160 Gaviota Ave, Granda Hills, California 91344.

WANTED to Buy 2-meter FM gear for base or car. Iso, 4-11000 tube, new or used. State price. R. Zuccarello, 3104 Harrison, Glenview, Ill. 60025.

VFO Hallicrafters HA5 very stable. Covers 80 thru 2 meters 18 months old exc shape $55. CW 50 watt transmitter Heath HX-11 $35. Local Sale. E. Baade, 18 Bayberry Rd, Lake Ronkonkoma, N.Y. 11779.

COLLINS PM-2 power sup $75. 136B-2 noise blanker for needs a little work $35. Mainline TT/L RTTY Terminal un 4CX1000 tubes used $20. Need a B&W 850A inductor, co price. G. Shade, 7026 N 14thA St, Phoenix, Ariz. 85020.

WANTED: Swan 14-117 DC power sup and Hallicrafter keyer send price. V. Mills, 521 Cumberland, Park Ridg 60068.

SELL 75s3 $399. Want General Coverage Rx 51V or ?—Want 32s-75S3B. Sell new BTL LLK2000—Save—will trade. Bo McComb, Ohio 45858. F. Baker.

FOR SALE: Elmac AF67 xmtr pmr 7 rcvr and M-1070 Pow in good cond. Schwartz, 166-36 24th Rd, Flushing, N.Y. 11

WANTED COLLINS 30S-1 Linear give number year, cond. and Bunge Box 4099, Tuscon, Arizona 85717, G. M. B. Electro

CRT WANTED: Need Type SC2799P7 and AC2799P11 Catho Tubes, Advise Wayne Shroyer, RFD 2, Box 305, Fairmont, 26554.

WANTED: One each tuning units TN-19/APR-4 and TN-54/ Give price and cond in first letter. J. Krentz, 8640 Me Downey, Cal. 90242.

WANTED: 2 meter FM xmtr's receivers or transceivers Gauer, 1049 No Dellrose, Wichita, Kansas 67208.

TELEVISION DX? 6 yr old DX club with new format. P international column, DX reports. Dues $3.50, sample Worldwide TV-FM DX Assn., Box 5001, Mil., Wis.

WANTED: Ham recvr. I give genuine EDISON phonograp 1900) with many cylinders, fully working! Christian Z A-6850 Dornbirn I., I Nachbauerstrasse 28 VBG, Austria,

SELL/SWAP—Mint Glove Champ 300; 350 W, CW, RTTY; SSB. $75 cash, carry or swap for 2M transceiver, RTTY L. Van Dyck, 6 Appletree Lane, Newtonville, N.Y. 12128.

WON'T someone make me a happy chappie by offering tha 1945 issue of CQ I need to complete my files? F. Herric George St, Basingstoke, Hampshire, England.

FOR SALE: Gonset Tri-bander. One broken element but a prints included. Pick up only $25 or ?. P. Holmes Jr Comanche Ave, Chatsworth, Cal. 91311.

HALLICRAFTERS S-120 receiver $35. Heath GR-64 Receive Both need touchup of the alignment, otherwise excellen H. Hecht, 96 King St, Bridgeport, Conn.

UHF/VHF Amateurs—want serious comments on how to e national scoring techniques in major VHF contests for to be published. Credit & Reprints will be given contri D. Etheredge, 12040 Redbank St, Sun Valley, Cal. 91352.

FOR SALE: Bohme oiled tape 15/32" width. P. Lemon Stony Point Rd, Santa Rosa, Cal.

TRADE: Harmon Kardon—citation 1 Stereo control center meter antenna and VOM. C. Piester, 304 Alpert, Ft. Collins 80521.

WANTED: two sets 60 wpm gears for Kleinschmidt 150 forator and Page Printer. John, 10755 Thornview Dr, ville, Ohio 44674.

WANTED: Old amateur radio handbooks and any radio E. Sjolander Jr., Box 231, Ashland, Wisc. 54806.

SALE: Mosley CM-1 rcvr. FB condtn. Manual & Extra 6AW8 expr. collect. B. Lindblom, 512 Grandview Ave, Chillicoth 64601.

WANTED: Hallicrafters SX-16 or S-20 condition unimport Sjolander Jr., Box 231, Ashland, Wisc. 54806.

WANTED: 900-20000 Kc coil for HRO/RAS; also coils fo to 430 Kc, J. McMechan, Rt. 34, Ames, Iowa 50010.

XCU-27 Crystal Calibrator for National Equipment. Used few hours. Traded rig. $20 post paid or trade? L. Gatlin Causey Ave., Suffolk, Va. 23434.

SELL: DeWald 6 mtr radiophone xcvr & other equipment, sell old mags. Stamped addressed envolope for list. J. Cu 1747 Memorial Blvd., Connellsvile, Pa. 13425.

WANTED: Drake DC-3 mobile power supply. State cond. and F. Ruzick, 221 North Garland Ave., Dayton, Ohio 45403.

73 MAGAZINE back issues. The works—Oct. '60 to Feb. issues. No reasonable insult refused. Lee Roy Scott, 335 wood Lane, San Antonio, Texas 78213

SELL OR TRADE: TR-4, AC-3 $425 Tektronix 511 AD Scop both mint. Need Collins, Henry, Drake Linears. KWN 2, 75S-3, KWS-1. D. Burns, 4410 Reading Rd., Dayton, Ohio

WANTED: Old radio tubes, WE212D, UV213, UV203, Sodion S13, Welsh 501. Marathon 608 and others in this peri Schendorf, 610 Monroe Ave., River Forest, Ill 60305.

WANTED: Replacement motor (abt. 4½" dia.) for smal pitch rotator; Sell or trade new 807's & 866A's. R. Shong Cameron Pl., New Rochelle, N.Y. 10804.

RTTY—Easy route to FB demodulator. AN/FCC-3 telegraph receiver $39.50 each. Brand new in original carton. W Beeby, 4 Corte Nueva, Millbrae, Cal. 94030.

See page 126 for New Reader Se

TER Station: Clegg 22'er wth original box, 2 xtals, 1 halo sed. All $185. G. Skloot, 158-14 85th St. 11414, Howard 4, New York.

ERS For Sale: Mohawk in perfect cond., late model, $120; good cond., used on SSB, $60. W/manuals. Will ship. J. on, 4th CoOUS Nav Academy, Annapolis, Md. 21412.

LE: TH-3 and two element 15 meter quad, NCX-5, H-B supply. Best offer. J. D. Adamson, 3167 F. Lana Dr., Fran, Cal. 96557.

: Schmatic and Info on type-CRR-46291 Radio Receiver r Unit of DAZ Equip. State what expect for same. G. W. , 461 Chapman Ave., Sanbruno, Cal. 94066.

: Operation manual for P & H Audio Compressor, model Will buy or return manual according to your instructions. ob, 40 Laurel Ave., Millbrae, Cal. 94030.

: Ionospheric Radio Propagation (NBS Circular 462) in ondition. S. Shallon, 11058 Queensland St., Los Angeles, 34

: Johnson or Heathkit SSB Adapter. K. C. S., 10 Fiske lt. Vernon, N.Y. 10550.

: Cabables for ART-13, state price. H. Nieman, Greenley 27, Coulterville, Cal. 95311.

-1 Ma. DC panel meters, $2.75 postpaid, TS-173 Manual air of 4CX250R/7580W's unused $21. Samkofsky, 201 Pky., Brooklyn, N.Y. 11238.

LE: 80M-10M linear amp. 1KW-SSB. 2-813S-GG HV duty oto on req spare tubes $350. f.o.b., firm, L Kulhay, 19 e Dr., Shelter Knolls, Danbury, Conn. 06810.

MOTOROLA T43GGV, rear mnt., complete w/acc., good cond. Fully narrow banded $100. R. E. Beatie, 1904 E. ., Tampa, Fla. 33612.

LEANING: 4-125a's used, ok $5 ea. Select-O-ject $10. Star Roamer $30. 6AC7, 6AG7, 6H6, 6SN7, 6SJ7, tested or 6 for $1. Coahran, 703 Olson St., Pullman, Wash.

LE: NCL 2000 perfect con. $395. A. Westmont, 5517 low Rd., Norfolk 2, Va. 23502.

ANTED: Auxiliary Reperferactor and base for 28ASR. ond. and price. Have $14 reperf for sale or trade. F. 5963 N. Nina Ave., Chicago, Ill. 60631.

counters, like new, six miniature tubes, 100 microamp ted meter, beautiful case with lucite handle, $10 ea. chie, RFD 2 Box 149, Salem Va., 24153.

LE: Eico Model 666 mutual conductance tube tester, like . Dow Relay DK2-60B new $20. S. Cohen, 4525 Michigan iami Beach, Fla. 33140.

(4CX250B'o,R's etc.) Xfmrs, relays, TCs xmtr-rcvr, DX-ult, lotsa junk. SASE Brings list. J. Pehousehek, 1185 od Ct., Cincinnati, Ohio 45224.

ourself—Build 40 foot crank-up tower under forty dollars. plans and specs. D and D towers, 1007 Jan Lee, Burk- Texas 76354.

LE: Webcor microcorder, Hi-Fi Tape recorder, model EP ith mike $45. pre paid. H. Turner, 124 Manning Dr., e, N. Carolina 28209.

Digital Freq meter $250. Communicator IV VFO $45, R-274-SP600) $175, Millen 100W 2 mtr. Rig $75, Cleanup stamp. Spitx, 1420 S. Randolph St., Arlington, Va. 22204.

RBOLT, Late model, mint cond. used only 10 hrs. with tamper, $295. Will ship prepaid. D. Woodruff, 15 Castle-., San Rafael, Cal. 94901.

: Heath twoer HW-30 also QST and CQ Magazines 1955- . Charlick, 163 Ledgewood Circle, Rochester, N.Y. 14615.

75A S/N 5200 w/Spkr 1.5, 3 kc filter & manual. Spare & S. S. Rect. Never used $450. F.O.B. L. Kulhay, 19 e Dr., Shelter Knolls, Danbury, Conn. 06810.

lammarlund HX-50. 10-160 m. All extras. One year old, v. $250. W3ASK, 11307 Clara St., Silver Spring, Maryland

mint cond. with manual $55. Add P.P. Zone 15 Lb. 1st kesit. M. Green, 1411 Stockton St., San Fran, Cal. 94133.

LE: Hallicrafter receivers in good cond. SX-88 and manual X-62A $125. W. Kuyhendall, 209 E. 4 Blain Blvd., Van- Wash. 98663.

WANTED: B & W 51SB or SB10 SSB adapter in good cond with manual. P. Lotzer, Box 1441 Langley, B. C. Canada.

OLD TIMERS please forward info. on old QSL etc. you hold from stations W1MX, W1XM, 1XM. MIT Radio Society, Box 558, 3 Ames St., Cambridge, Mass. 02139.

FOR SALE: Galaxy V, with Power and Sp., Act de nearer mod extra clean. First $400 check will ship. R. Lampley, Box 326, El Campo, Tex. 77437.

WANTED: Plug-in unit assembly consisting of S-1, C-59 and ten crystal sockets for the collins KWM-1 transceiver. State cond. and price. A. Sayre, P.O. Box 244, Milton, Wisc. 53563.

SELL: Galaxy V, 100 kc cal., AC-35, Spkr-consol., Rem. VFO, 1 yr. old, just fact. aligned, will ship. $400 or trade deal for 75S-3. B. J. Leestma, 6 Kensington Terr., Bronxville, N Y. 10708.

MAGAZINE SALE: QST, CQ, 73 most issues. 30¢ ea. 1952-1965. B. Hayward, 3408 Monterey, St. Joseph, Missouri 64507.

6 METER Xmtr, 150 W. with linear, 6-2 VFO: 8 element beam—Real goodies—for $120. R. Dickinson, 201 Waltham Rd., Concord, Cal. 94520.

OSCILLOSCOPE: Eico Model 427 DC oscilloscope with demodulator proble, like new, used very little. Want $70, make reasonable offer. R. Wilson, 1328 San Clemente Way, Sacramento, Cal. 95831.

SELL: BC-342-N Receiver $45; BC-610 crystals 75¢ each 10 for $5. R. Ireland, Pleaasant Valley, N.Y. 12569.

FOR SALE: KP-81 receiver. Operating condition but needs attention $75. Amertran swinging choke ½ amp $6. Pick-up only, no can ship. V. Barker, West Dr. no-Haven, Sag Harbor, L.I., N.Y. 11963.

DAH-DITTER Electronic Keyer . . . New Integrated Circuit Electronic Keyer. Fully Self Completing on both dit and dah. Built in AC supply and keying monitor. Isolated reed relay output. Completely assembled and tested, ready for operation. Price only $34.95. Order now direct from M & M Electronics, Dept. K, 6835 Sunnybrook, NE, Atlanta, Georgia 30328.

PROXIMITY Switch. Detects nearness of human body! Free information. Zonar, 860 Reed, North Claremont, Calif. 91711.

SELL 6.5KVA generator, 120-240 single phase 60 cycles, water cooled on trailer. 40 hrs since complete rebuild. $550. R. Ellis 1356 Elizabeth, Las Vegas, Nev. 89109.

WANTED: Old manuals on Oscilloscope Kits and Assoc. Test Equipment also Factory Wired. Billy K. Hart, 32 Best Drive, Saraland, Alabama 36571.

WANTED: Old Oscilloscopes any condition. Send Info. Make Model, Condition, How much. Billy K. Hart, 23 Best Drive, Saraland, Alabama 36571.

SALE: HW32, HW22, $80.00 each. Good working Cond. 4-1000A Brand new $60. each FOB, NYC. K21JL, Lawrence Moreno, 315 Riverside Blvd., Longbeach, N.Y. 11561.

LAMPKIN 105-B Dual Frequency Meter-Type 111PPM Meter and type 205 A FM Modulation Meter (Dual). First certified check for $295 takes all. J. Hawes, 513 Longwood Dr, NE Cedar Rapids, Iowa 52402.

WANTED: Communications typewriter, short carriage, all caps. Not ancient Good cond. F. Rodd, P.O. Box 163, Bayville, N.J. 08721.

NATL 200: Natl AC/PS: Ncxd mint cond $400. Panasonic RS770S Stereo 4 track tape recorder & 2 spkrs. Mint cond $150. Want good signal generator. W. Shapiro, 845 Cliffside Ave, N. Woodmere, N.Y. 11581.

HX-20 SSB Xmtr-Professionally wired by Collins radio engineer. $100. Ex condx. J. Demler, 1100 W. Godfrey Ave, Apt. 407, Philadelphia, Pa. 19141.

FOR SALE: New R 175A choke $2.00, viking thunderbolt operating manual $3 Gonset super "6" & Noise clipper $25. 1 Dow key DK72, new $15. P. Neveu, P.O. Box 653, Bristol, Conn. 06010.

HEATH DX-60A Novice transmitter, 5 hrs TT, no "BUGs" $65.; Eico 753/751 SSB combo, solid state VFO, mint cond $150. Need HW-22A, HP-13, and Hustler 40mtr Res.; Grissom PH 7535666 Area Code 501 5525 J. F. Kennedy Blvd, No. Little Rock, Ark. 72116.

COMPLETE novice station. Heath DX-40 smtr, Ant, Relay, HR-10 rcvr, coax, and key. All perfect working cond. $100. Gus Lucas, 414 Durango St, El Paso, Texas 79901

READER SERVICE

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CITY _____

STATE _____ ZIP CODE _____

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25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48
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73	74	75	76	77	78	79	Total Inquiries				☐

Void after April 1968

CQ MAGAZINE, Dept. RS

14 Vanderventer Ave.

Port Washington, L. I., N. Y. 11050

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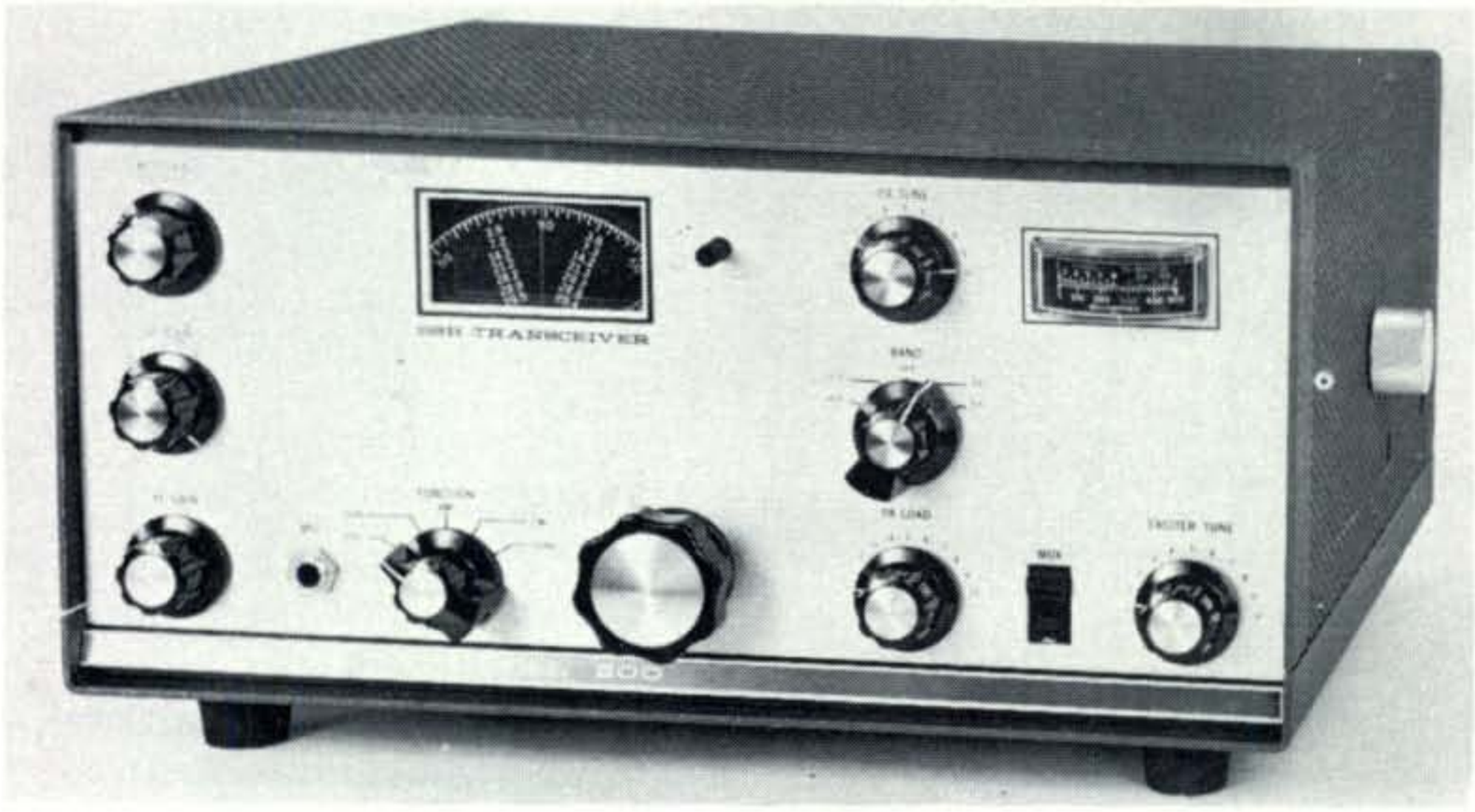


Swamscott Ham Fest Special!!

So as to enable the maximum number of hams to get the very best value in a 5 band SSB transceiver, and also as a means of expressing our thanks for the business which you have given us over the past several years, we are making the following unusual offer.

At Swampscott we will have a substantial number of factory fresh National NCX-200's, the very latest versions, with both their supply and our husky meat and potato power supply kit, stacked up in our large, double-size display booth, at these very unusual combination prices. For the NCX-200 with our meat and potato power supply kit, $379.95. For the National NCX-200 and their AC-200 power supply, $399.95.

The National NCX-200 is an attractive, high performance, modern sideband transceiver, created by National's experts, to operate over the 5 ham bands, 10 through 80 meters, with 600 kc of coverage per band. This permits an extra hundred kc of coverage outside the band for MARS operation. The NCX-200 features a solid state balanced modulator for exceptional stability and suppression of carrier. Also, it provides fully automatic AM or CW carrier emission, as proven out on the famous National NCX-5. Excellent ALC characteristics and a 4 pole, 5.2 megacycle filter with 2.8 kc of band width are provided in the NCX-200. The power capabilities vary, depending upon the power supply selected, from 200 watts to 400 watts.

We will have on display an NCX-200 equipped with our meat and potato power supply and some simple changes which will demonstrate smooth operation with over 250 watts of RMS out into a Waters watt meter. The NCX-200 will provide for CW, AM, or sideband modes of emission on all bands. This set is particularly appealing to beginners and those making their first change from AM to sideband. Clean, sharp talk power are yours at the lowest possible price for a 5 band set, with this Ham Fest Special.

Moreover, since we are in a mood to want to do business with you, in addition to shaking your hand and saying hello, we will be prepared to evaluate your equipment which you want to trade, at that particular time. So bring your gear in with you and let's talk turkey. In short, what we are offering you is the opportunity to enjoy the best deal in the nation while you are enjoying the best ham show in the nation.

Compare these prices, and then decide and schedule your trip to the ham fest. You will obviously save enough to more than pay for the cost of your week-end. To those unable to make the show, write in to us. The same deal is yours; just mention the Swampscott Ham Fest Special, and tell us what you have to trade, or otherwise make remittance and we'll see to it that the best deal is available to you, too.

HERBERT W. GORDON COMPANY

"Helping Hams to Help Themselves"

Woodchuck Hill, Harvard, Mass. 01451

Tel. 617—456-3548

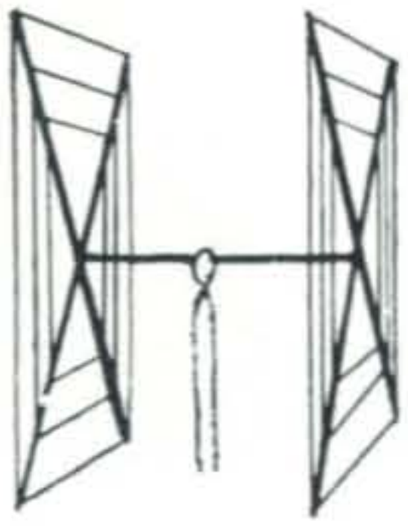
See page 126 for New Reader Service

GOTHAM'S AMAZING ANTENNA BREAKTHRU!!

How did Gotham drastically cut antenna prices? Mass purchases, mass production, product specialization, and 15 years of antenna manufacturing experience. The result: The kind of antennas you want, at the right price!

QUADS

Worked 42 countries in two weeks with my Gotham Quad and only 75 watts . . .



W3AZR CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount: uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Antenna Designation: 10/15/20 Quad
Number of Elements: Two. A full wavelength driven element and reflector for each band.
Freq. Covered: 14-14.4 Mc. 21-21.45 Mc. 28-29.7 Mc.
Shipping Weight: 28 lbs. Net Weight: 25 lbs.
Dimensions: About 16′ square.
Power Rating: 5 KW.
Operation Mode: All
SWR: 1.05:1 at resonance
Gain: 8.1 db. over isotropic
F/B Ratio: A minimum of 17 db. F/B
Boom: 10′ long x 1¼″ O.D.; 18 gauge steel; double plated; gold color
Beam Mount: Square aluminum alloy plate incorporating four steel U-bolt assemblies. Will easily support 100 lbs. Universal polarization.

Radiating Elements: Steel wire, tempered and plated, .064″ diameter.

X Frameworks: Each framework consists of two 12′ sections of 1″ OD aluminum 'hi-strength' (Revere) tubing, with telescoping ⅞″ tubing and short section of dowel. Plated hose clamps tighten down on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings

Feedline (not furnished); 52 ohm coaxial cable

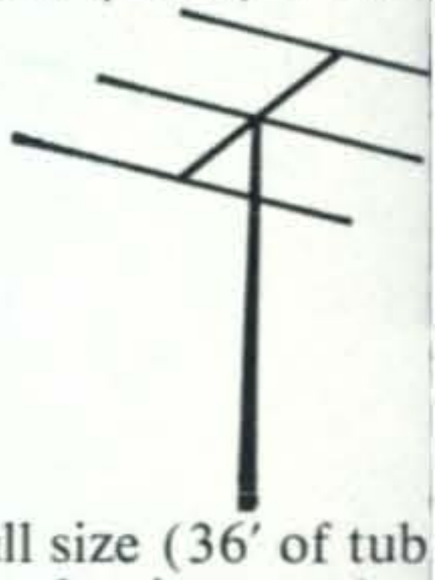
Now check these startling prices—note that they are *much lower* than even the bamboo-type:

10-15-20 CUBICAL QUAD	$35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00
TWENTY METER CUBICAL QUAD	25.00
FIFTEEN METER CUBICAL QUAD	24.00
TEN METER CUBICAL QUAD	23.00

(all use single coax feedline)

BEAMS

The first morning I put up my 3 ment Gotham beam (20 ft) I worl YO4CT, ON5LW, SP9-ADQ, and 4U1ITU. THAT ANTENNA WORKS! WN4DYN Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history!



Each beam is brand new; full size (36′ of tub for *each* 20 meter element, for instance); solutely complete including a boom and all ha ware; uses a single 52 or 72 ohm coaxial fe line; the SWR is 1:1; easily handles 5 KW; and 1″ alumnium alloy tubing is employed maximum strength and low wind loading; beams are adjustable to any frequency in band.

2 EL 20	$16	4 EL 10	$1
3 EL 20	22*	7 EL 10	3
4 EL 20	32*	4 EL 6	1
2 EL 15	12	8 EL 6	2
3 EL 15	16	12 EL 2	2
4 EL 15	25*	*20′ boom	
5 EL 15	28*		

ALL-BAND VERTICALS

"All band vertical!" asked one skept "Twenty meters is murder these days. Let's you make a contact on twenty meter phone w low power!" So K4KXR switched to twen using a V80 antenna and 35 watts AM. Here a small portion of the stations he worke VE3FAZ, T12FGS, W5KYJ, W1WOZ, W ODH, WA3DJT, WB2FCB, W2YHH, VE FOB, WA8CZE, K1SYB, K2RDJ, K1MV K8HGY, K3UTL, W8QJC, WA2LVE, YS MAM, WA8ATS, K2PGS, W2QJP, W4JW K2PSK, WA8CGA, WB2KWY, W2IWJ, VE KT, Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ IKN, KZ5OWN, HC1LC, PY5ASN, FG7X XE2I, KP4AQL, SM5BGK, G2AOB, YV CLK, OZ4H, and over a thousand other statio

V40 vertical for 40, 20, 15, 10, 6 meters	$14.
V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters	$16.
V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters	$18.

HOW TO ORDER: SEND CHECK OR MONEY ORDER. WE SHIP IMMEDIATELY UPON RECEIPT OF ORDER BY RAILWAY EXPRESS, SHIPPING CHARGES COLLECT.

GOTHAM, 1805 Purdy, Dept. CQ, Miami Beach, Fla. 3313

See page 126 for New Reader Service

'Duo-Bander 84"

80-40 Meter SSB Transceiver

HAM NET... $159.95

WRL CHARG-A-PLAN $8 Monthly

HERE'S NEW MOBILE POWER!

NOW 400 WATTS *the HOT one!*

WHY SETTLE FOR LESS!

A Complete 80-40 Meter MOBILE PACKAGE!

Includes: 1 ea.: Duo-Bander 84, DC384 Power Supply, one Bandspanner Antenna, BDYF Mount, 350C mic, Mic Plug, PL 259 Plug, UG176/U Reducer and 25' RG58/U coax Cable. All supply cables are included.

ORDER: ZZMA103 package. $279.95 ($14 monthly)

OR...

A Complete 80-40 Meter FIXED STATION PACKAGE!

Includes 1 ea.: Duo-Bander 84, AC48 250 watt supply, 80/40 Duo-Doublet Antenna kit, 350 mic., Mic. Plug, PL259 Plug, UG-176/U Reducer and 100 ft. RG58/U coax cable.

ORDER: ZZMA104 Package. $205.00 ($10 monthly)

ORDER: ZZMA105 Package. $235.00 (Same as above with 400 watt AC supply) ($12 monthly).

A Real POWERHOUSE

at a Real WRL Bargain Price!

A GREAT RIG...Now even Better than Before! Designed for the Amateur whose interest is 80 and 40 meter SSB. Here's Power (now 400 watts!) to make good contacts...a Selective Receiver...Stability... Compactness (only 5x11¼x10"). It was a great value at the old price. *Now you get 100 watts more power and can buy either of these two great packages at $20.00 less!* Buy now on our easy monthly terms!

• 400 watts PEP-SSB • Rugged—Reliable Printed Circuitry • 2k-Hz Dial Calibration • Dual-Speed Vernier VFO tuning • E-Z One-Knob Tune-Up—"Just Peak Output" • Built-in Speaker • Mobile Bracket supplied • Combination "S" and Output meter • Crystal Lattice Filter.

No Other Rig offers ALL these Great "84" Features!

Use this Handy-Quick Mail-Order Coupon—

You can buy your Duo-Bander 84 on WRL's easy payment plan.

WORLD RADIO LABORATORIES, Inc. CQ-g 28

3415 West Broadway Council Bluffs, Iowa 51501

Please ship me the following:

- ☐ Duo-Bander 84 66MA059 $159.95
- ☐ Duo-Bander MOBILE Package ZZMA103 @ $279.95*
- ☐ Duo-Bander Fixed Package ZZMA104 @ $205.00*
- ☐ Duo-Bander Fixed Package ZZMA105 @ $235.00*
- ☐ Your FREE 1968 HAM Catalog
- ☐ My Check or Money Order for $_____ is attached.
- ☐ Charge it to my WRL charge acct. #_____.

***Sorry—these reduced prices are without trade. Write us for trade-prices**

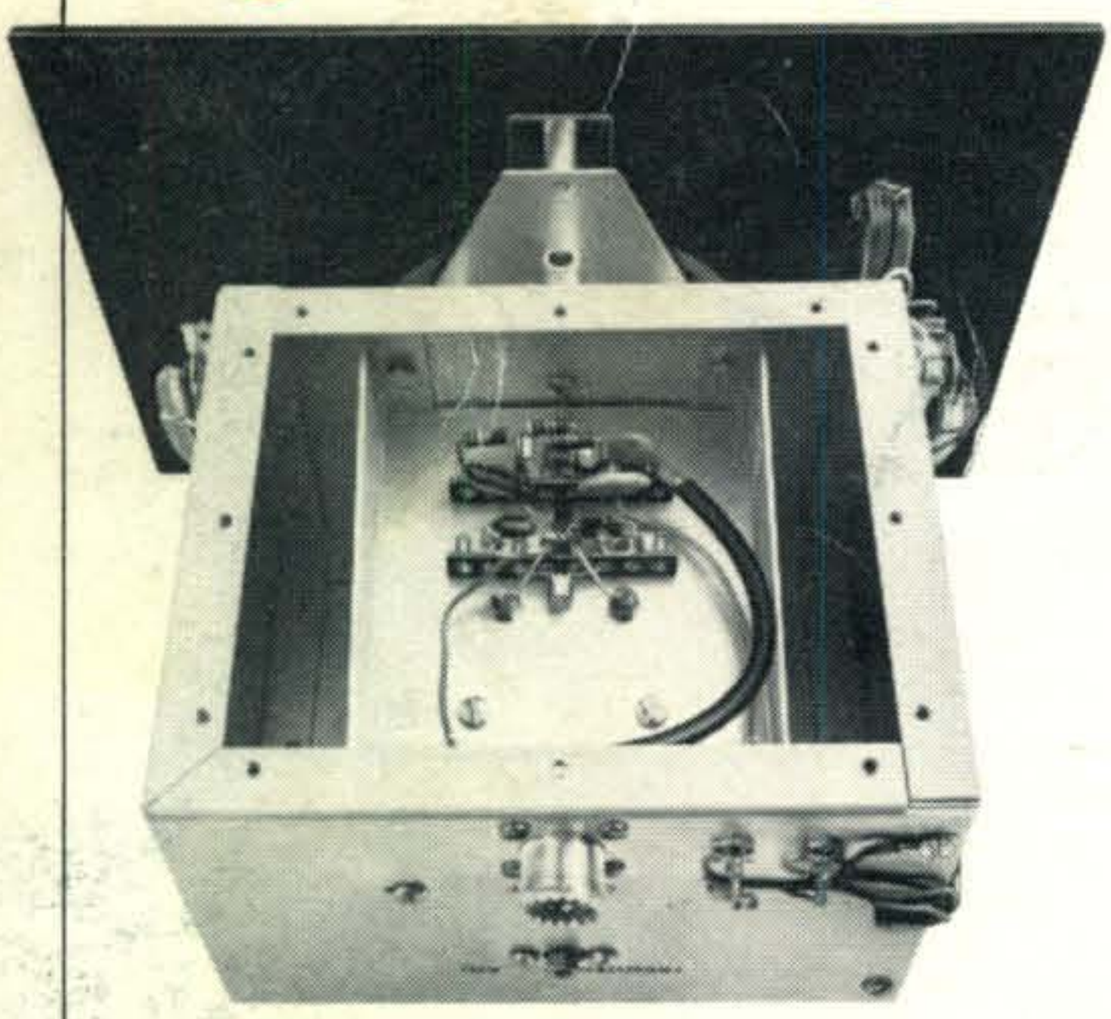
Name _____

Address _____

City _____ State _____ Zip _____

Solid-State Projects for the shack

Build this high stability VFO

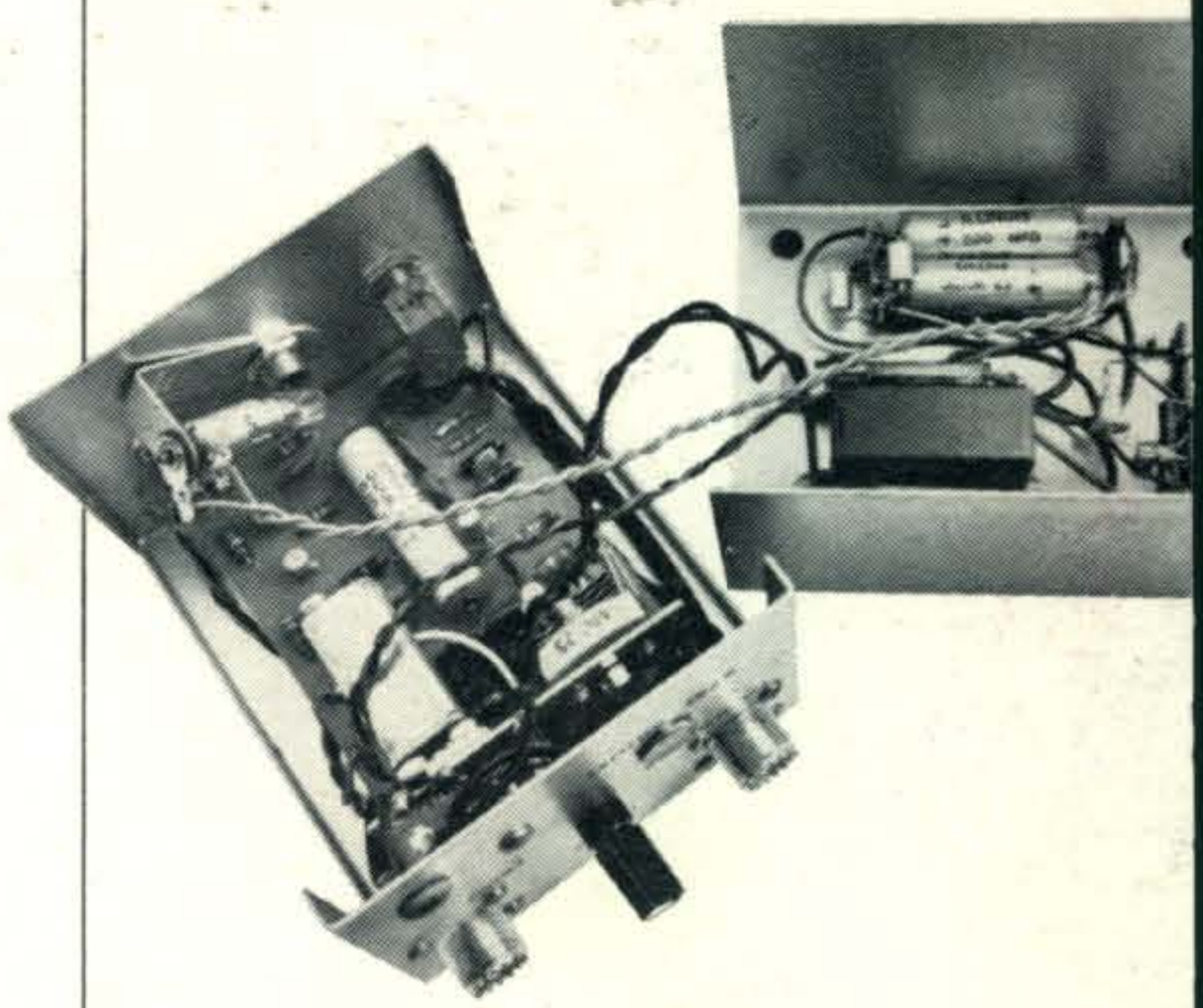


Here's an almost drift-free VFO built around the RCA-3N128 MOS/FET for flexible operation. After just 30 seconds warm-up, it tests out at less than 30 cycles drift in a two hour period.

Look in The Radio Amateur's Handbook, 1968 edition or write to RCA, Commercial Engineering, Section D15-SD, Harrison, N.J. 07029 for full design details, including parts list, schematic, and building tips.

All listed RCA devices are available from your RCA Industrial Semiconductor Distributor

Build this VFO calibrator



If you're interested in MARS and have jus "ham-bands-only" receiver, this may be your answer to VFO calibration outside normal bands. It uses two RCA-1N3193 rectifiers; two 1N34A signal diodes; on RCA-2N2614 and seven RCA-2N3241A transistors—provides calibrating beats at kHz points as well as 50, 33, 25 and 20 kH Handy, too, for calibrating test equipmer

Look in August 1967 QST or write RCA, Commercial Engineering, Section D15-S Harrison, New Jersey 07029 for August 1 "Ham Tips." RCA Electronic Component Harrison, New Jersey.

RCA