CQ

February 1975
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SB-104 SSB transceiver– a new standard for the industry

A revolutionary "new generation" transceiver. It's completely solid-state and totally broadbanded to eliminate preselector tuning. And the output can be instantly switched from 100 watts to 1 watt. The true digital readout offers resolution down to 100 Hz and outstanding tuning accuracy. Receiver intermodulation distortion has been minimized and there are very few active devices ahead of the highly selective crystal filter. Adjacent channel overload is negligible, yet sensitivity is better than 1 μV (.6 μV typical) and front-end overload is dramatically reduced. The "104" is 12 VDC-powered for mobility and the optional HP-1144 fixed station supply fits inside the SB-604 speaker cabinet. An optional noise blanker can be installed in the "104" and an optional 400 Hz crystal filter improves CW selectivity.

Kit SB-104, 31 lbs., mailable **669.95***
Kit SBA-104-3, 400 Hz CW crystal filter, 1 lb., mailable **34.95***
Kit SBA-104-1, Noise blanker, 1 lb., mailable **24.95***
Kit SBA-104-2, Mobile mount, 6 lbs., mailable **34.95***
Kit HP-1144, Fixed station power supply, 28 lbs., mailable **89.95***

SB-230 — the lowest-cost conduction-cooled linear around

The SB-104's "silent partner." 1200 watts PEP or 1000 watts CW from less than 100 watts drive. It's rated at 400 watts input for slow-scan TV and RTTY. The high-efficiency Eimac 8873 triode is double-shielded to reduce stray RF and a massive heat sink replaces noisy fans and blowers. The "230" assembles in just 15 to 20 hours with no alignment.

Kit SB-230, 40 lbs., mailable **319.95***

SB-634 station console combines 5 convenient accessories

The "634" performs 5 important functions — a 10-minute digital ID timer with visual or visual and audible indicators an RF wattmeter that reads 0-200 or 0-2000 watts with ±10% accuracy, an SWR bridge, a hybrid phone patch that can be used manually or with VOX control, and a 24-hour digital clock that runs independently of all other functions. It's a must for every well equipped station.

Kit SB-634, 14 lbs., mailable **179.95***

SB-614 station monitor shows you how clean your signal is

Highly visible 1½ x 2" CRT detects problems that can reduce the effectiveness of your signal — nonlinearity, insufficient or excessive drive, poor carrier or sideband suppression, regeneration, parasitics and CW key clicks. It monitors SSB, CW and AM signals from 80 to 6 meters. Push-pull drive for keystone free trace; automatic sync sweep generator with 3 ranges from 10 Hz to 10 kHz. Can be used as an ordinary oscilloscope from 10 Hz to 50 kHz.

Kit SB-614, 17 lbs., mailable **139.95***

SB-644 remote VFO

Designed exclusively for the SB-104. It provides split transmit and receive control and you aren't frequency-limited in any way — transmit at one end of the band, receive at the other. The "644" even has two crystal positions for fixed-frequency control. The "644" has a linear dial, but the exact frequency is displayed on the "104's" digital readout. The display automatically changes when switching from transmit to receive.

Kit SB-644, 10 lbs., mailable **119.95***

SB-604 station speaker — response-tailored to SSB

Designed to match the SB-104 in styling and performance. The "604" uses a 5x7", 3.2-ohm speaker. And there's room inside for the HP-1144 power supply. With connector cable and plug.

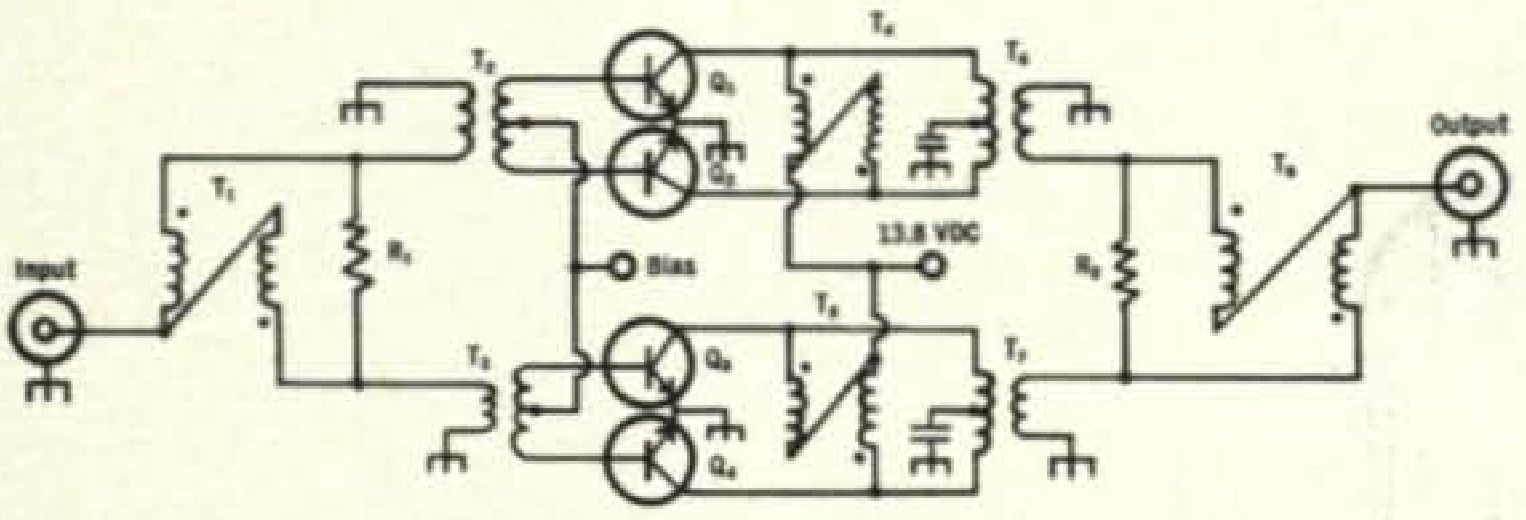
Kit SB-604, 8 lbs., mailable **29.95***

DESIGN NOTES

Mike Elliott
Sr. Design Engineer

Broadband solid-state power amplifier design

Designing a 100 watt output broadband power amplifier that will operate from a 12-volt source requires close attention to impedance matching. It is desirable to use as few devices as possible, to reduce overall complexity. However, high power devices display extremely low input and output impedances which are difficult to match over wide bandwidths. The SB-104's design uses only four transistors to develop 100 watts output across the 3 to 30 MHz range. A simplified schematic diagram is shown below with much of the bypassing and filtering deleted for clarity.



Transistors Q1 and Q2, with transformers T2 and T6 form a straightforward push-pull amplifier. Q3, Q4, T3, and T7 form a second push-pull amplifier. The push-pull configuration is desirable due to the even order harmonic rejection inherent in such an amplifier. In the SB-104, the push-pull amplifiers, combined with an effective low pass filter, reduce all harmonics to at least 45 dB below the 100 watt level.

Transformers T1 and T8 convert the nominal 50 ohm source and load impedances into two 100 ohm ports which are in phase. Any amplitude or phase imbalance causes power to be dumped in R1 or R2, thus assuring equal load sharing between the two push-pull amplifier sections. Similar hybrid transformers feed the supply voltage to the transistors at T4 and T5. Differences in phase or amplitude that would otherwise exist at the collectors are bypassed to ground, resulting in highly balanced output currents in T6 and T7. This technique helps insure excellent second harmonic rejection.

All transformers employ ferrite loading for broad response. In addition, T2, T3, T6 and T7 use brass tubing for the low impedance base and collector windings to minimize high frequency losses. The result is an amplifier which is flat within ±2.5 dB across the 3 to 30 MHz frequency range.

Intermodulation distortion, which results in splatter, has been minimized in the SB-104, and is at least 30 dB below the output carrier level. This is accomplished by careful attention to the selection of device types and operating points. The bias voltage applied to the four power output transistors is fixed, and controlled by a diode mounted on the transistor heat sink. The proper operating point is automatically established in this manner, and thermal runaway is prevented since the bias diode characteristics change with heat sink temperature.

VSWR protection is afforded by a fast-acting ALC circuit. A directional coupler at the transmitter output provides both forward power and VSWR information. The resulting voltage controls the gain of the transmitter, thus controlling power output. In high VSWR environments, the power output is reduced to protect the power amplifier. Typically, a 2:1 VSWR results in a 10% power reduction, and a 3:1 VSWR reduces the output power to approximately 50 watts.

M L Elliott

Next month:
Digital frequency readout

For the best RTTY, you need all the help you can get.

It's all right here.

The HAL ST-6 terminal unit has been hailed by experienced RTTY amateurs. Its immunity to interference and noise is the talk of the RTTY world as the best in the business. In fact, we built it to highest standards — but kept the price in a range that you can afford.

The features of this unit tell the story of why it's so popular: Autostart operation, separate input filters for each shift, an antispace feature, and switch selection of 850 and 170 Hz shifts are standard. An extra discriminator for a 425 Hz shift is available as an option. A space-saving special power transformer is part of the package; it includes windings for low voltage and loop supplies, and a 115/230 VAC primary. Dual-in-line IC's are mounted in sockets for ease of testing and replacement. Seven G10 epoxy glass boards with reliable wiping contacts hold all circuitry. Tuning is read from a 1 ma. panel meter which, at the flick of a switch, serves as a loop current readout. Other visual indicators display AC power on, Mark, and Space conditions. Two other lamps indicate whether the ST-6 is in the receive or standby mode. For maximum safety, a three-wire grounding cord and grounding outlet for the printer are included. The power supply card contains easy-to-replace clip-in fuses. The ST-6 is available factory assembled and aligned, or in kit form. The PC boards and cabinet only are also available.

A popular option designed to plug right in to the ST-6 is HAL's AK-1 AFSK oscillator. Available assembled or in kit form, the AK-1 is an AFSK oscillator that demonstrates stability and reliability. It provides switch selection of 170 Hz and 850 Hz shift using standard AFSK tones. The AK-1 may also be mounted in its own cabinet for use as an independent unit. Frequencies are set by 15-turn trimmers for ease of accurate tone adjustment. The AK-1 operates on 12 VDC, or directly from the ST-6 power supply.

If you're ready for the very best RTTY at an attractive price, look into the HAL ST-6 TU, the 425 Hz discriminator, and the AK-1 AFSK oscillator. They'll give you all the help you need. Order yours today!

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$ 29.00 — AK-1 AFSK Unit

All prices postpaid, USA. For air shipment add $4 for the ST-6 kit or cabinet, $1 each for the 425 Hz kit or the AK-1 kit, $10 for the assembled ST-6 with any options.

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CQ

FEBRUARY, 1975 VOL. 31, NO. 2

The Radio Amateur's Journal

FEATURES

DEPARTMENTS

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

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ZERO BIAS

For years we've been aware that the commer cial services are hot after amateur frequencies, especially in the v.h.f.-u.h.f. area. Realistically speaking, we've been lucky that, up until now, ham radio has had friends and supporters at the FCC, in the Congress, and in the military.

Now, for the first time, there's a dire threat that we might lose much or all of the invaluable 220 MHz band. And this time, the scuttlebutt is more than just idle rumors. Within the past month a "strong request" was sent down from OTP (Office of Telecommunications Policy -- the White House advisory group on communication) to the FCC, urging that the Class E Citizen Band service be rushed through by early spring, incorporating two MHz of amateur spectrum from 222-224 MHz. Note that while the original proposal for Class E was to consider either the top or bottom of this ham band, the OTP request was to take the heart of the band, leaving hams on both sides of the service. Such a situation would cripple the operation of repeaters in the 220MHz amateur band, and would probably curtail the availability of good usable equipment designed specifically for ham use. After all, who'd market a radio that could only be used on the outer fringes of the band? No one with any marketing sense, we're sure.

What's more, the splitting of the ham band in this way would very likely lead to eventual loss of either the remaining top MHz, the bottom 2 MHz, or both, since the precedent would have been set that amateur frequencies are there for the taking. By extension, why shouldn't the 2 meter or 450 MHz bands be next to go? The signs are ominous.

Fortunately, we still have friends at the FCC and in Congress who'll see to it that such a proposal be stalled off, at least until the new restructuring program and the expanded Class D CB service have had a chance to prove themselves. But it's obvious that time is running out. The few friends of amateur radio in Washington aren't that far away from retirement age, and the chance of their replacements being friendly to amateur radio are quite remote. In other words, if we're going to retain 220 MHz, we have to start now, not a year or two from now when the 2 meter band finally gets saturated. We need 220 operation in large numbers, and that can only come about through repeater availability. That means that we need repeaters -- not just a few -- but hundreds of repeaters across the country, with thousands of hams on them daily. And we need them this year, because next year will most likely be too late.

To set up a good 220 MHz repeater, including antennas, duplexers, amplifiers, etc., would cost an amateur radio club about $1000 to $1200. Would a club spend that amount to set up a repeater on a band that they could eventually lose? That's a good question, but here's a better one: Would a club spend that amount if the FCC suddenly told us we could pick up two or three MegaHertz of new spectrum space in the v.h.f. or u.h.f. regions merely by occupying them? You're darned right it would! Then why not spend that much to hold onto five MegaHertz of spectrum space we already have and are in danger of losing?

At the moment there is only a single 220 MHz repeater in the New York Metropolitan area, although the 2-meter band abounds with activity. The single repeater goes begging for use in fact. We at *CQ* are trying to do our part. We feel that more repeaters on 220 will invite more activity simply because it's easier to justify the purchase of a 220 MHz rig if the operator has broader opportunities to use it. Therefore we will be installing a second 220 MHz repeater in Suffolk County about 50 miles east of New York City in the heavily populated Smithtown area. The repeater should be operational within 60-90 days after you read this. But to be significant, this approach to utilize the 220 MHz band must be promulgated nationwide. If your local club has been fence-sitting on the subject, get 'em off the fence before it's too late! "Use 'em or lose 'em!" Not a cliche... a reality.

If You Bought It Through CQ, Say So!

Most *CQ* readers have the idea that we're a mammoth organization with a giant staff and money we haven't counted yet. 'Taint so, I'm afraid. In fact we've probably got the smallest staff of any major ham magazine, working on a shoe-string to give more service to our readers than any of the others. So what? So we're asking your help.

When you buy from our advertisers, it's very important to us that you tell the advertiser you saw his ad in *CQ*. We find that too many fellows think we're such a big outfit that it doesn't matter if we get the credit or not. But believe me, it matters. How else is the advertiser going to know that his *CQ* ads are working?!

You can help us still more by telling *us* what you've bought from *CQ* advertisers. Send a QSL to my attention, with a note telling me what you've bought recently and from whom, and I'll send you something you've always wanted (?) – another bumper sticker!

73, Dick, K2MGA

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GENERAL: • **Frequency Coverage**: 144 through 148 MHz. 12 Channels, 2 supplied: (1) Receive: 146.52 MHz, Transmit: 146.52 MHz; (2) Receive: 146.94 MHz, Transmit: 146.34 MHz • **Power Requirements:** 13.0 Volts DC±15% • **Current Drain**: Transmit: 450 mA, Receive: 45mA • **Antenna Impedance:** 50 Ohms • **Dimensions:** 5⅜" x 2 5/16" x 7½" (13.6 x 5.8 x 19.1 cm) • **Weight:** 3.75 lbs (1.7 kg)

RECEIVER: • **Sensitivity:** Typically .5 microvolt for 20 dB quieting • **IF Selectivity:** 20 kHz at 6 dB down; ±30 kHz channel rejection greater than 75 dB down. • **First IF:** 10.7 MHz with 2-pole monolithic crystal filter. • **Second IF:** 455 kHz with ceramic filter. • **Intermodulation Response:** At least 60 dB down. • **Modulation Acceptance:** ±7kHz. • **Audio Output:** At least 1 Watt at less than 10% distortion. • **Audio Output Impedance:** 8 Ohms

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OUR READERS SAY

Honor Roll Ethics

Editor, *CQ*:

After a hiatus of two years or so I am again active in amateur radio in general and DX'ing in particular.

Upon returning to active DX'ing I find that the level of dishonesty and cheating has grown by leaps and bounds among the amateur fraternity. It now seems that the standard DX'ers transmitter must be capable of running ten to twenty or more kilowatt d.c. input. RG-17 cable to the antenna is a must to handle the power levels in use. I have seen these transmitters in this area and the standard excuse is that "all of the 'real' DX'ers run high power and I have to do it to compete."

I am not concerned with the owner of a Heath SB-220 who may, in a moment of desperation, drive the final a bit too hard and exceed the legal limits by a few watts. The malefactors are those that use a normal kilowatt amplifier as a driver stage for their "two tubers" (pair of 4-1000A's) or, more modern, 4CX10,000A finals with six to ten-thousand volts on the plates. These units can have no possible legitimate use in amateur radio but they proliferate, Naturally, many of the operators are high on the DXCC lists and on the "Honor Roll." What is there to prevent it? Their position has been gained through nefarious conduct, but who is there to challenge them? They scoff at the FCC.

Each "amateur" magazine that I peruse contains comment about the illegal activities of the CB'ers but never a word about the conduct of those in our own ranks. The CB'er may be violating the rules, but he is not hurting the amateur. Let us direct our attention to the ones who are hurting amateur radio and cheating their fellow hams by their improbity. It is time for the amateur publications, especially those that promote DX activities and contests, to make a valid attempt to purge the amateur ranks of those that have no regard for the rules of the game.

Melvon G. Hart, W0IBZ
St. Louis, Mo.

No Contest?

Editor, *CQ*:

I recently read the letter entitled "No Contest?" under Our Readers Say in the November issue of *CQ*. The problem that Gary Grant, K6VOQ, brings up is becoming a cancer here in the Midwest - especially the Chicago area. I am also a DX contest operator competing with big 10 kw rigs throughout the Chicago area. These are the types who are bringing a CB atmosphere to ham radio. I am presently at 161 countries confirmed and plan not to pursue the ARRL's DX program any further-mainly because I still believe in the rules of the FCC.

I have talked to FCC people about hams in our area running illegal power and they just tell me they are under staffed or have more important things to do than to chase down a ham running illegal power. I am forming the opinion that the FCC has adopted the attitude "let ham radio destroy itself just as CB has destroyed itself."

I would like to pose the question to these people who do run excessive power. How do you expect amateur radio to grow when people coming up through the Novice ranks see and hear experienced hams using illegal power levels and show CB-type operation in DX pile-ups?

I don't have the answer to the excessive power problem and apparently neither does the FCC. Maybe through the years as the number of U.S. hams dwindles even more, these high-power boys can go back to a legal kw input when U.S. competition will only be a handful of hams.

So, go ahead and have fun with the multi-kw rigs, guys, but Gary was right when he said it's "No Contest".

Don Backys, K9QN
Hoffman Estates, IL

Editor, *CQ*:

Re: Mr. Grant's letter (K6VOQ, Our Readers Say, Nov. '74) concerning DXing. My conclusions are:

1 - All rules can be bent if not broken, and in our particular interest enforcement is all but impossible and in any event a great nuisance.

2 - Even if we all ran QRP, who could compete with 6 el. tribanders @ 250'? with a couple of dipoles tied underneath?!

3 - Who could benefit from cheating? Probably less than 100 W/VES. The same guys as above. All other cheaters are foolish.

4 - Who cares? Who takes those mega-point scores really seriously? I don't nor do I let WØXXX's operating procedure irk me. There is nothing in a contest 'cept me, the QRM, QRN, QSB cigarettes, coffee, and the DX.

Of course, I'm just a novice running about 50w. into either a quarter wave vertical or a very low trap dipole.

Stephen A. Cothran, WN8PBN
Cincinnatti. Ohio

Wireless Pioneers

Editor, *CQ*:

It is obvious from reading *CQ* that a large number of subscribers are or have been professional c.w. operators. However, many of the readers of *CQ* may not be aware of the Society of Wireless Pioneers (SWP), an organization that bands together current and ex-professional radio operators and officers. The Society is open to any operator who has earned his living as a "brass pounder." This includes army, navy, coast guard and air force operators as well as commercial ship and shore operators.

Additional information and membership applications can be obtained by writing to the Society of Wireless Pioneers, P.O. Box 530, Santa Rosa, California, 95402.

William C. Willmot, K4JPF
Merritt Island, Florida

Announcements

Lawton, Oklahoma

The Lawton-Fort Sill Amateur Radio Club will hold its 29th Annual "Founders Day" Hamfest on February 15th-16th 1975. Registration information is available from K5BYF, Box 892 Lawton, Oklahoma, 73501.

Gary, Indiana

On February 22, 1975 the Indiana-Lake County Amateur Radio Club will hold its 22nd Annual Banquet at the Scherwood Club, 600 East Joliet St., Schererville(2miles east of Rt 41, 1/4 mile North of Rt 30). Tickets are $10.00. For more information write: Herbert S. Brier, W9EGQ, 385 Johnson St., Gary, Indiana 46402.

Cuyahoga Falls, Ohio

The Annual Cuyahoga Falls Amateur Radio Club Auction will be held on Friday, February 28,- 1975 at the United Electronics Institute Building, 1225 Orlen Ave., Cuyahoga Falls, Ohio. Flyers containing more details are available from: W8VPV Cuyahoga Falls Radio Club, P.O. Box 106 Cuyahoga Falls Ohio 44222.

East Meadow, New York

The Nassau County Amateur Radio Club is now running novice and general classes every Monday night from 7:30 to 10:30pm. and special code sessions on Tuesday night at 8 to 10pm. in our Headquarters in Eisenhower Park, East Meadow NY. The club meets in general session every second Tuesday of the month. We are giving the Novice examinations too. For more information: 516-292-4248/Eisenhower Park, East Meadow, NY, 11554.

Delavan, Wisconsin

The Tri-County ARC Midwinter Swapfest is March 16th, 9am at the National Guard Armory. Advance tickets are eligible for special prize. For more details, write: Dan Servais, WA9AJW, Rt. 4 Box 309AA, Elkhorn, Wisconsin. (414)-723-2227.

Berrien Springs, Michigan

On Saturday, March 15, 1975, the Blossomland ARA Hamfest will take place at the Berrien Co. Youth Fairgrounds, in Berrien Springs, Michigan. Advance registration is $1.50; $2.00 at the gate. For more information, write: BARA Hamfest, P.O. Box 175, St. Joseph, MI 49085.

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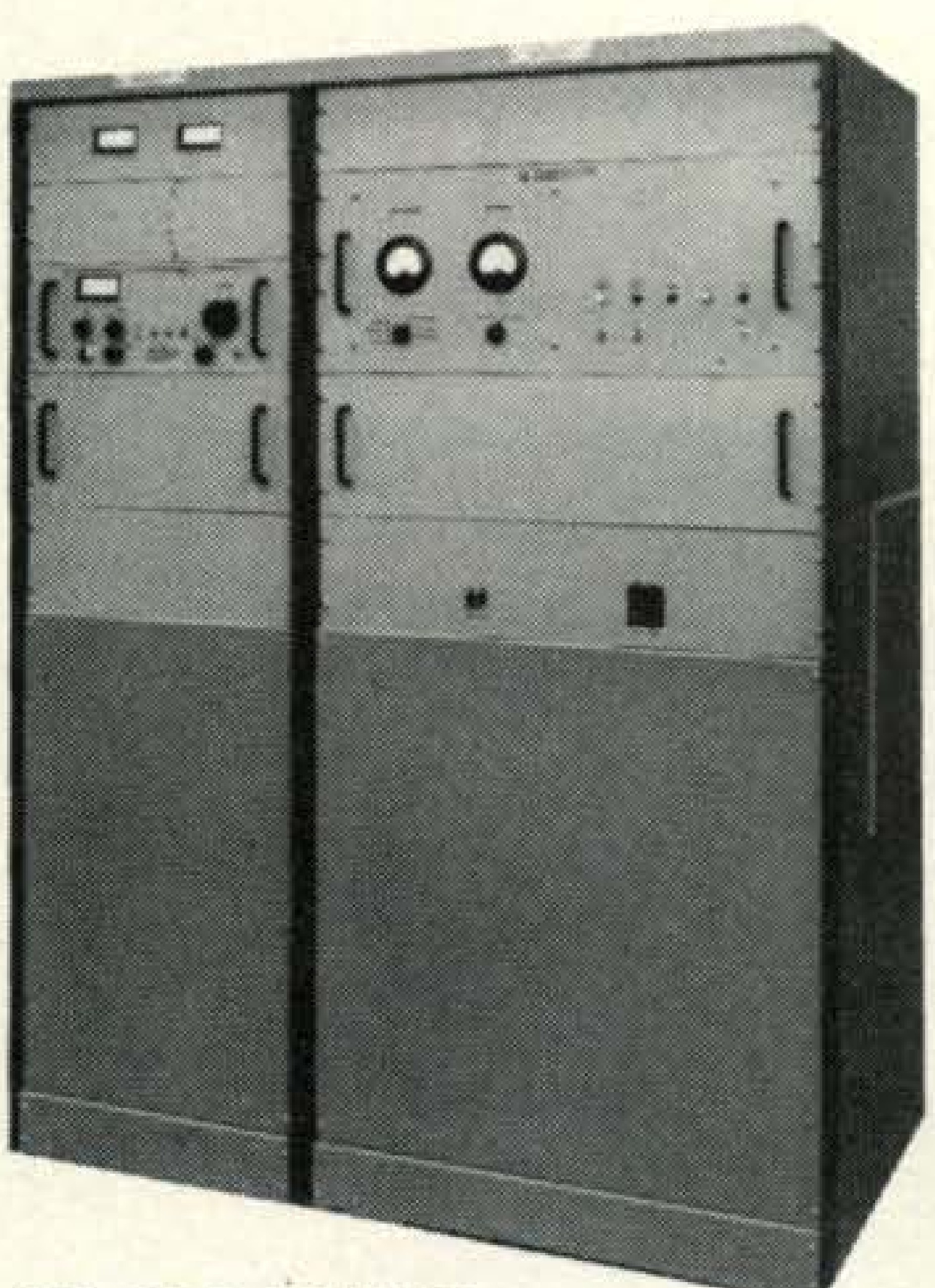

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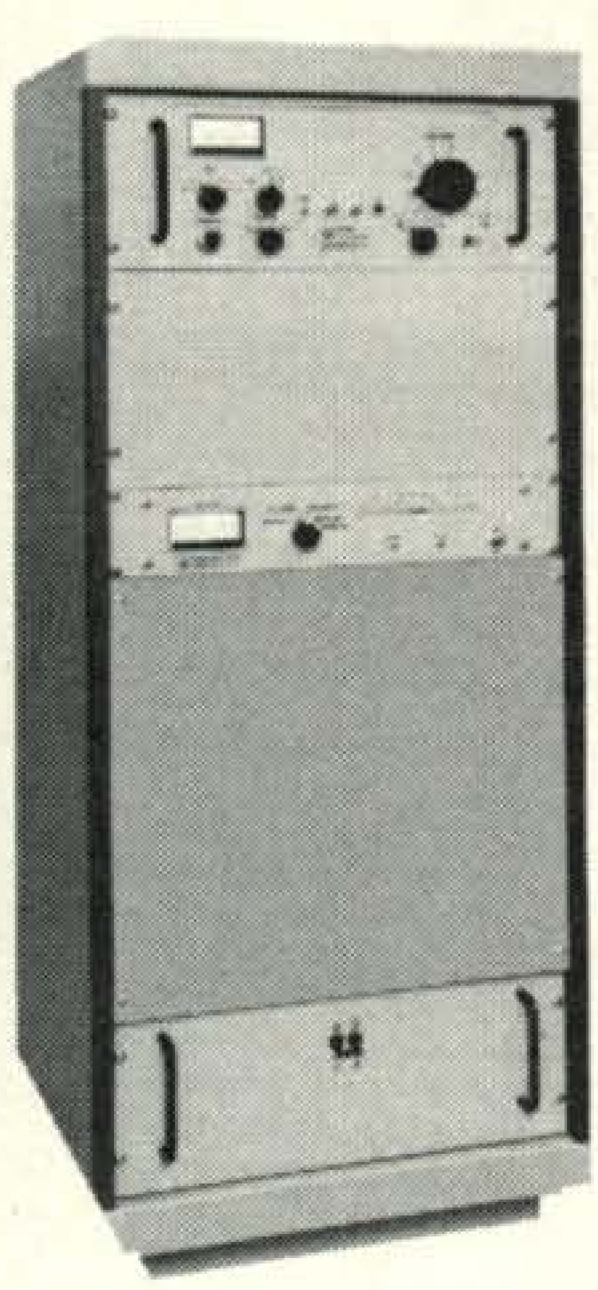

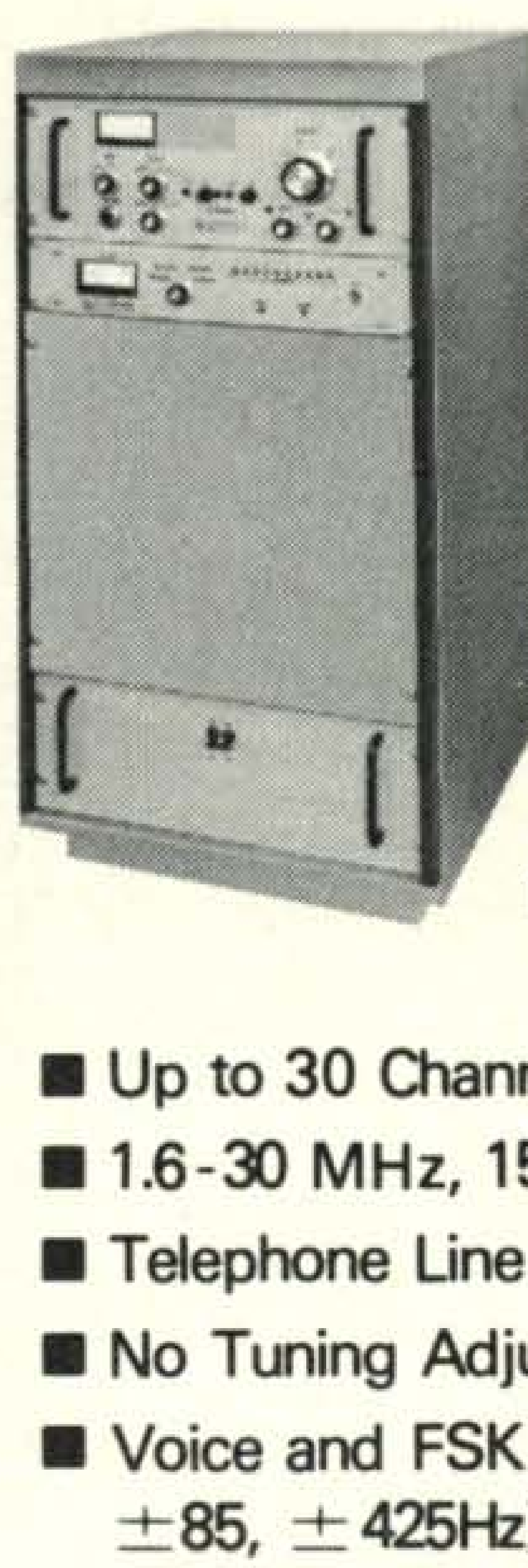

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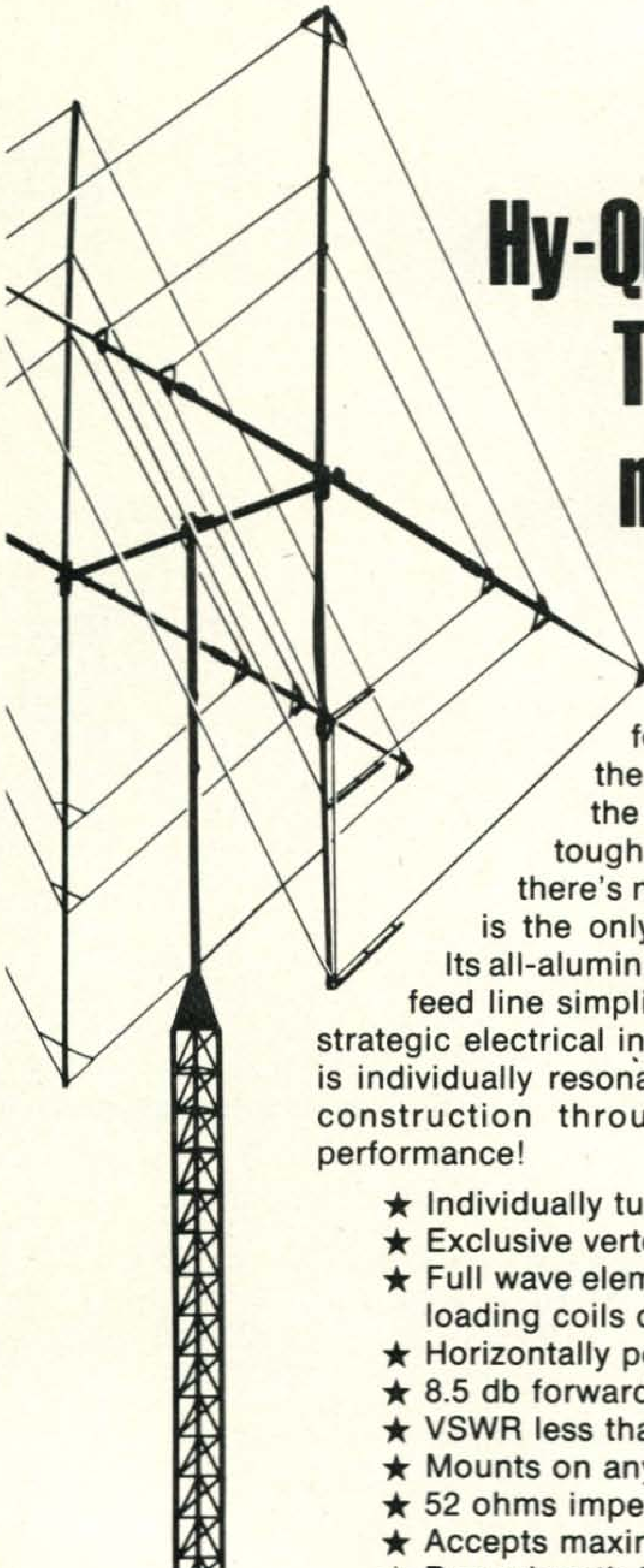

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$$\text{*SINAD} = \frac{\text{Signal + noise + distortion}}{\text{Noise + distortion}}$$

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An Audio Filter For Direct-Conversion Receivers

BY IRVING M. GOTTLIEB,* W6HDM

THIS article is directed toward that group of motivated experimenters and innovators who have displayed the temerity to challenge the "establishment" receiver—the superheterodyne. Schematics and construction notes for a rival receiver will not be herewith presented. Rather, it is assumed that the interested reader has already had experience with, or maintains a knowledgeable interest in the so-called direct-conversion receiver. Specifically, a very important circuit section of this intriguing type of receiver will be dealth with—the low-pass audio filter. Those familiar with these receivers are well aware that the audio filter happens to be the heart of the novel demodulation technique; it most certainly behooves the constructor of such a set to make sure that performance is not limited by an inadequate audio filter. It is the opinion of the author that the filters generally shown for these receivers tend, for the sake of a few pennies saved, to incline towards skeletal configuration and marginal filter action. Such an approach is bound to impair the performance of the receiver in much the same way that a skimpily designed i.f. channel will rob the superhet of its potential for high-calibre operation.

By way of background, the superheterodyne technique for the reception of radio waves has long enjoyed almost undisputed preference over other circuitries. To be sure, the adherents of "off-beat" receiving circuits have been allowed their day in court. Their allegations have been heard with the interest traditionally accorded to the unique and the bizarre. Recurrent waves of faddism have, for times, popularized one or another of these non-superhets. But invariably, they have been divested of their claims to magic, and relegated back to the oblivion from whence they sprang. Included have been various regenerators, super-regenerators, TRF circuits, and clever reflex arrangements. None of these could in any way qualify as technological beakthroughs—in retrospect, they appear as ancient vintage in revamped bottles.

The direct conversion receiver, it should be admitted, also dates back to you-know-when. Not only have we had synchrodynes, homodynes, auto-synchronized oscillators, but the technique of direct conversion has long been utilized in carrier frequency telephony. Moreover, a regenerative receiver tuned to zero-beat the carrier of an a.m. signal was operating very much like a set deliberately intended for direct conversion. So why the enthusiasm over another attempt at resuscitation of a not-so-new idea?

A simplified block diagram of the direct conversion receiver is shown in fig. 1. To the mathematics purist, this technique retains the basic principle of the superheterodyne. As in the superhet, one of the two heterodyne products is selected, the other rejected. Only, in the direct conversion set, the i.f. channel provided for the selected heterodyne product happens to

*931 Olive Ave., Menlo Park, CA 94025.

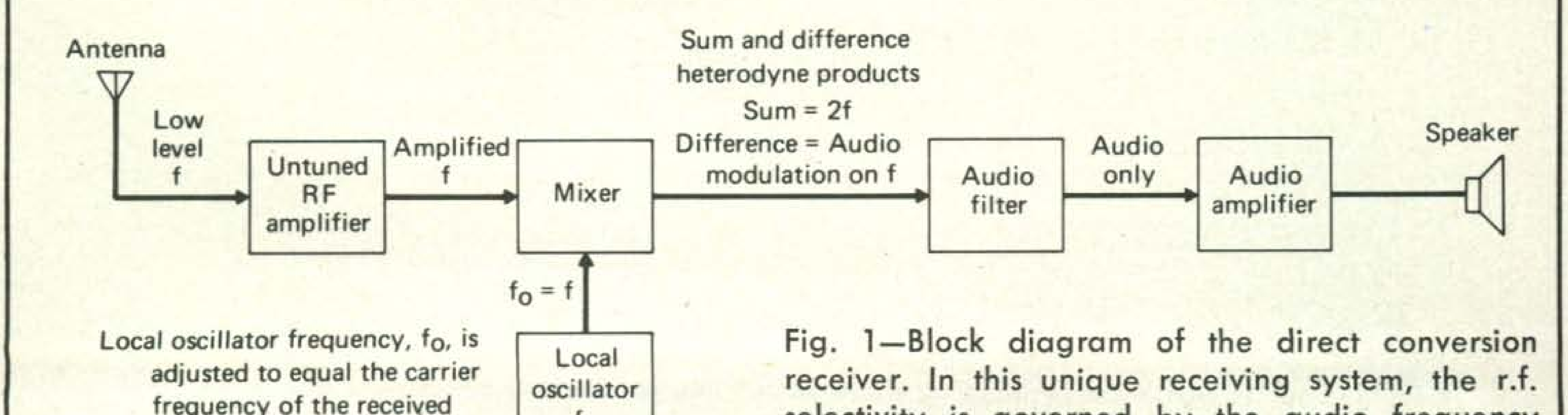


Fig. 1—Block diagram of the direct conversion receiver. In this unique receiving system, the r.f. selectivity is governed by the audio frequency filter.

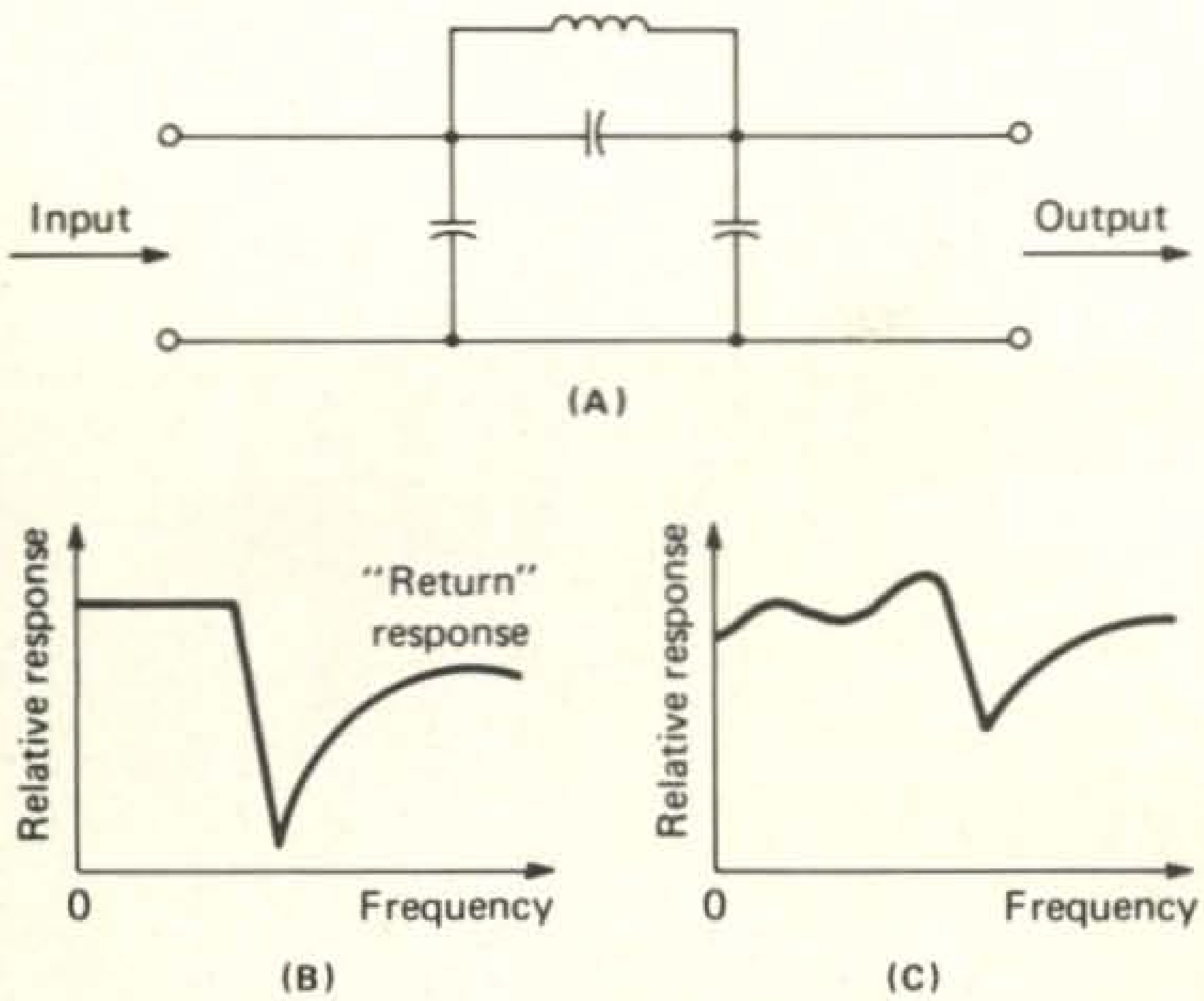


Fig. 2—Configuration and responses of filter commonly used in direct conversion receivers. (A) Configuration is that of a full "m" section. (B) Approximate theoretical response of a single "m" section with correct terminating impedances. Note "return response." (C) General nature of the single "m" section response when terminating impedances are incorrect. The response, which is none too good under matched conditions, is now certainly worsened.

be at audio frequency. (This, incidentally, constitutes *demodulation* sans the customary "detector.") Interestingly, the selectivity of the direct converter depends upon the filter characteristics of the *audio channel* in the same way that i.f. bandwidths affects the selectivity of the superhet! Obviously, then, an audio filter which passes speech frequencies, but which rapidly attenuates higher frequencies is what the doctor ordered for our direct conversion receiver. The devotees of direct conversion cite the following advantages in comparison with the superhet:

- Simplicity and economy of construction.
- Freedom from superhet type image responses, where the same signal may be tuned in at two far-apart dial positions.
- Freedom from "birdies" and most of the spurious signals which often plague the superhet.
- Freedom from tracking problems.
- No critical alignment required.
- Performance rivaling that of simpler superhets—possibility of enhanced performance with modern IC's and solid state devices, as well as with more rigorous implementation of circuit engineering. (The filter described in this article exemplifies this philosophy.)
- No b.f.o., product detector, or mode switching needed to demodulate a.m., f.m., s.s.b., or c.w.

Audio filters of the type shown in fig. 2(A) are commonly found in technical literature describing direct conversion receivers. Such a filter has serious shortcomings. Because only a

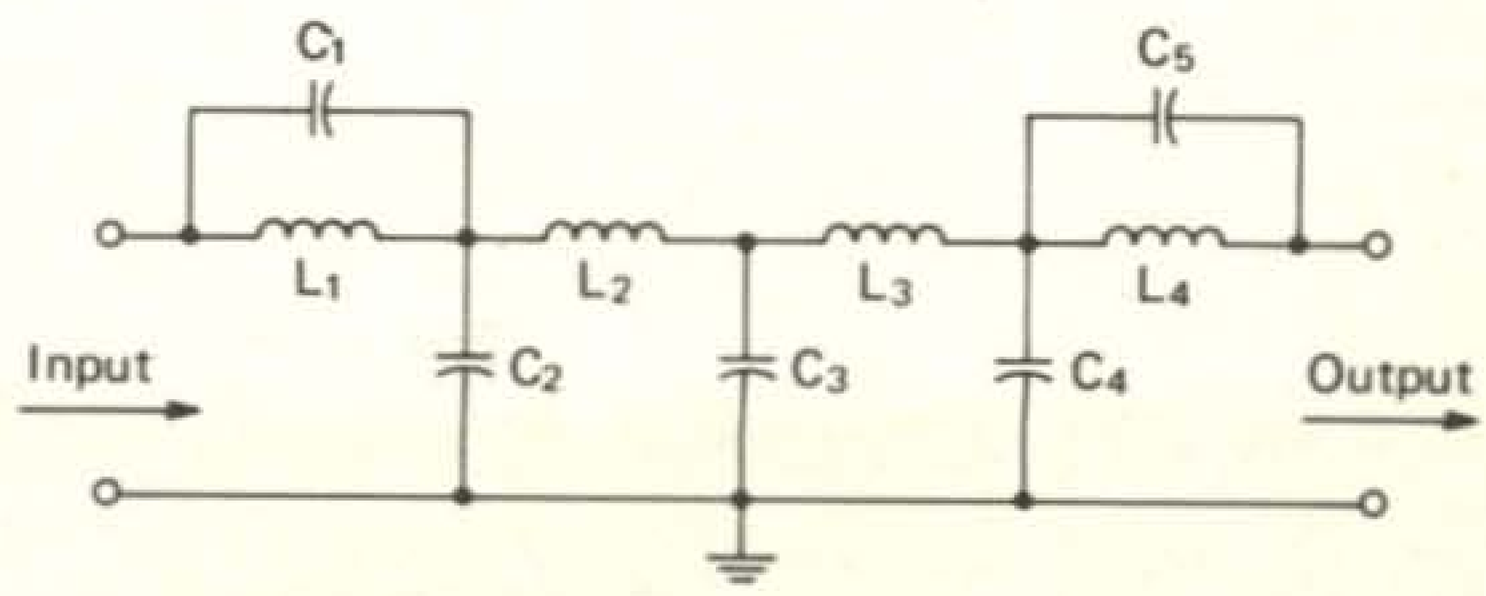


Fig. 3—Circuit and parts list of audio filter for direct conversion receivers. For best results, the source and load should both be in the vicinity of 1000 ohms. Note the L_2 and L_3 can be made from the 88 mh toroidal telephone inductors available from surplus stores. Simply add 50 turns in the same direction as the previous winding. #28 enamel wire is convenient for this purpose, but the wire size is not important electrically. These inductors are physically large, but have high Q's and are excellent choices from the standpoint of performance.

single full-section is used, response degradation from impedance mismatch can be quite pronounced. The capacitor shunted across the inductor identifies this configuration as an "m" derived type. Such single "m" sections have, at best, responses in the nature of that shown in fig. 2(B). Here, the designer has achieved a more rapid attenuation following cut-off, but at the expense of the "return" response. For the purpose of direct conversion, the return response has to be designated as an undesirable trade-off. And see what happens to the single

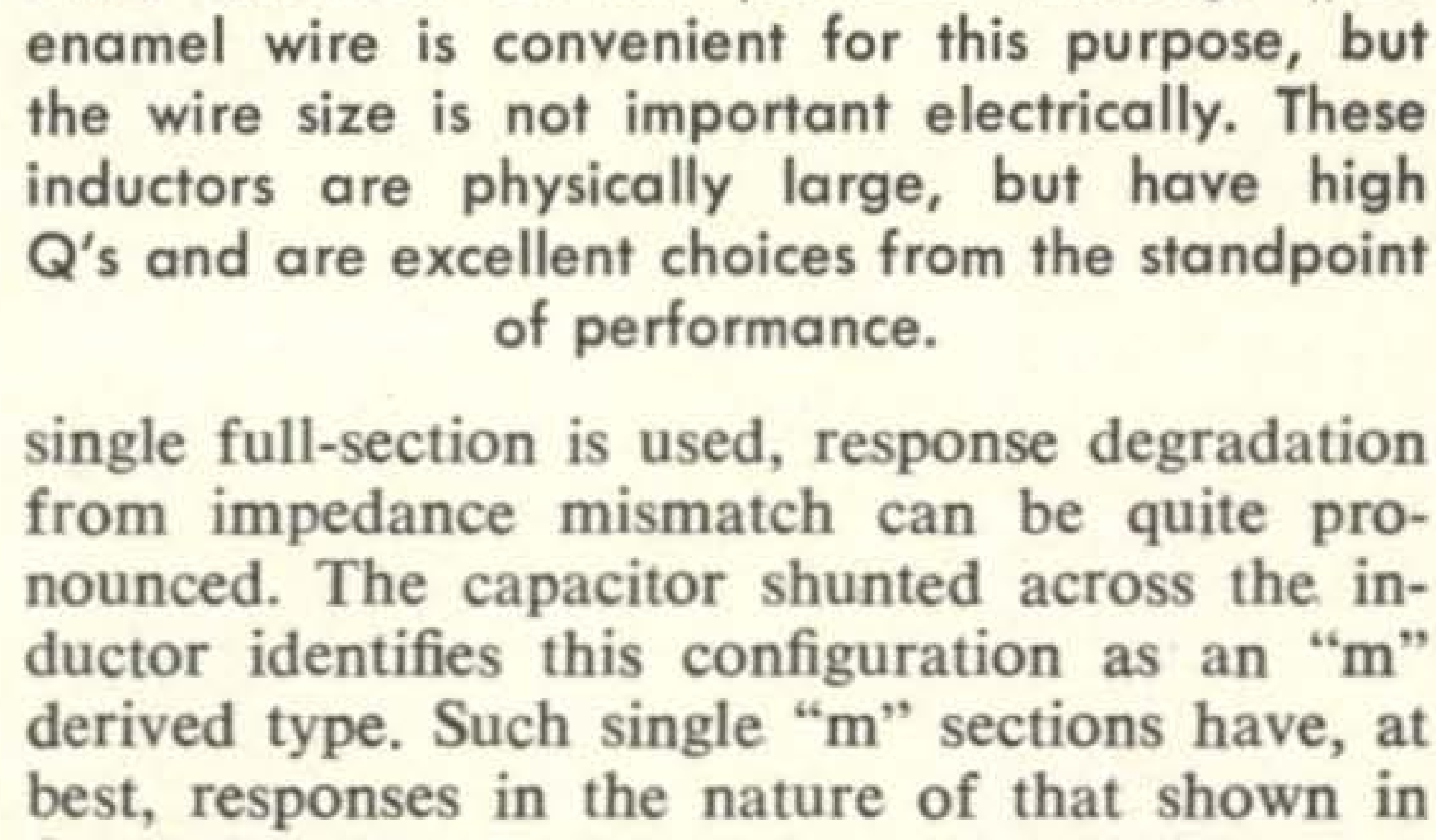


Fig. 4—Frequency response of audio filter. Insertion loss of matched filter is approx. —6.5 db.

L_1, L_4 — 30 mh.

L_2, L_3 — 100 mh (see caption). Recommended inductors are the Collins MPF-051 types. These inductors have satisfactory Q's and are physically small. Other toroidal inductors may be used such as the Burnell S-52837 series.

C_1, C_5 — .053 mf Mylar, ± 10%, 100 to 400 volts. Best approach is to use .05 mf and .003 mf in parallel.

C_2, C_4 — .08 mf Mylar, ± 10%, 100 to 400 volts. Parallel .05 mf and .03 mf.

C_3 — .1 mf Mylar, ± 10%, 100 to 400 volts.

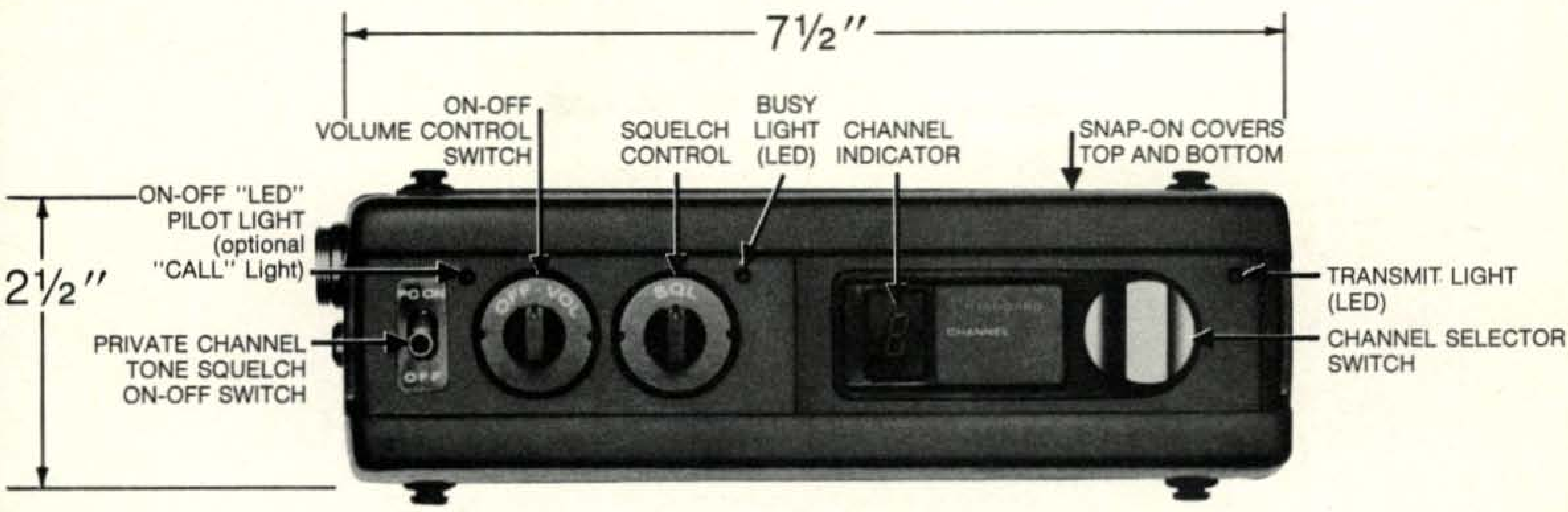
"m" section if it is not happy with its input and output impedance terminations—fig. 2(C).

The circuit and parts list for the audio filter is shown in fig. 3. At first inspection, it may appear that a brute-force extension of simpler filters has been made on the premise that several sections are better than just one. Although cascaded sections do provide higher attenuation rates in the stop band, the filter of fig. 3 has the following operational features:

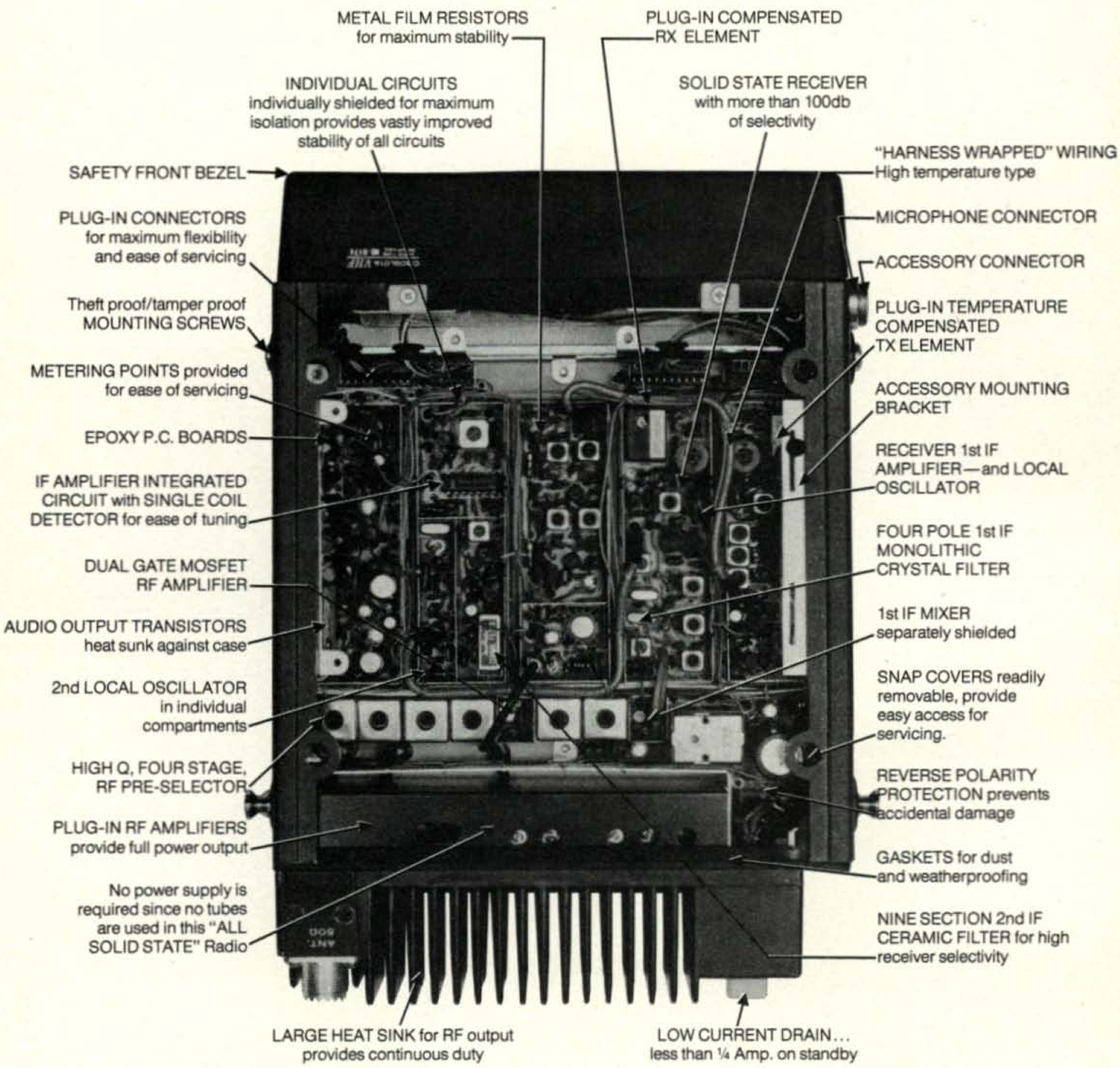
- Two inner constant k sections ensure that there will be no "return" from the sharp attenuation provided by the two outer "m" sections.
- The two outer sections have an "m" value of 0.6. This tends to make the filter operate closer to its theoretical response and makes the filter more tolerant of impedance mismatch.
- The use of four cascaded sections also renders the filter less vulnerable to impedance mismatch than would be the case with fewer sections.
- The characteristic impedance of the filter is 1000 ohms. This is a very practical value and is readily approximated both at the output of the mixer and at the input of the audio amplifier.
- The component values are readily obtainable.
- R.f. feedthrough is negligible.
- The approximately 6 db insertion loss of the filter (under matched conditions) is of little consequence, for voltage amplification is easily and economically obtained in the subsequent audio amplifier.
- The rapid attenuation after the cut-off frequency not only enhances the selectivity of the direct conversion receiver, but improves the signal-to-noise ratio as well.

The response of the filter is shown in fig. 4. Curve A depicts performance with matched source and load (1000 ohms). Curve B is the response under conditions of rather severe mismatch, with 500 ohms at the source and 2000 ohms at the load. Note that curve B is still a very satisfactory response for the intended purpose. It is altogether superior to the responses which can be attained from the commonly used circuit of fig. 2. The undulations appearing in Curve B are of negligible consequence and the response remains characterized by a substantially-flat passband, and rapid attenuation in the stop band without significant "returns." A mismatch of this nature, that is with low source impedance and with high load resistance is preferable to the converse situation, wherein a much higher insertion loss would obtain. It should be noted that the operating conditions represented by Curve B can be transformed to those of Curve A by the simple expedient of

[*Continued on page 60*]



The 809/859 Base Mobile Transceiver



Front view of the Kenwood TS-900 s.s.b. transceiver. A small door on the left side of the cabinet conceals the Mic Gain and VOX Gain controls. The lever switches below the meter are for Send/VOX/Receive, Noise Blanker On/Off, RIT On/Off, Crystal Controlled Channel 1 or 2, and AGC Off/Fast/Slow. The RIT control is to the right of the main tuning knob. In the space above the v.f.o. dial can be seen two of the three illuminated warning legends: RIT and T MUTE.

CQ Reviews: The Kenwood TS-900 SSB Transceiver

BY RICHARD A. ROSS,* K2MGA

FOR the past several months it has been our good fortune to have the use of one of the Kenwood TS-900 SSB Transceivers manufactured in Japan and imported to the USA by Henry Radio of California. Good fortune indeed that this rock-solid reliable rig was loaned to us by Mary Silva of Henry Radio without whose forbearance we might not have had occasion to enjoy the TS-900 for as long as we have. You might term this evaluation a "one-year-later" report since that's how long the '900 has been under the scrutiny of this reviewer and others.

With few exceptions, the TS-900 incorporates as many desirable operating and technical features in a single rig as any discriminating amateur could ask: noise blanker, semi-break-in c.w., 500 Hz c.w. filter option, RIT, FSK provisions, phone patch connections, full metering, crystal control for net operation, 25/100 Hz calibrator, 15 MHz WWV reception, full 80-10 meter amateur band coverage with all crystals included, dual AGC systems, selectable AGC speed, plug-in modular construction and many more subtle niceties which continually disclose themselves as one gets to know the rig.

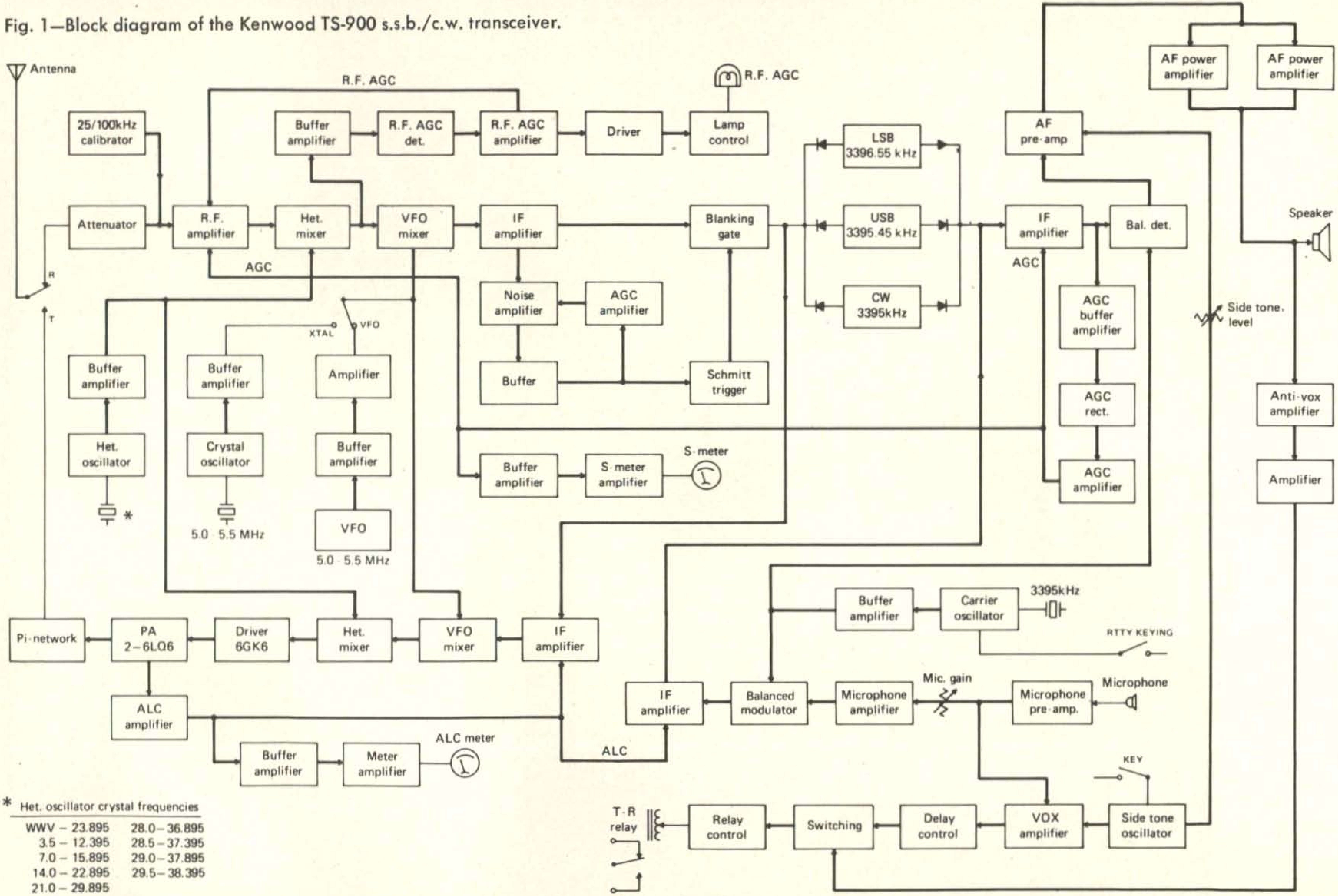
Receiver Circuitry

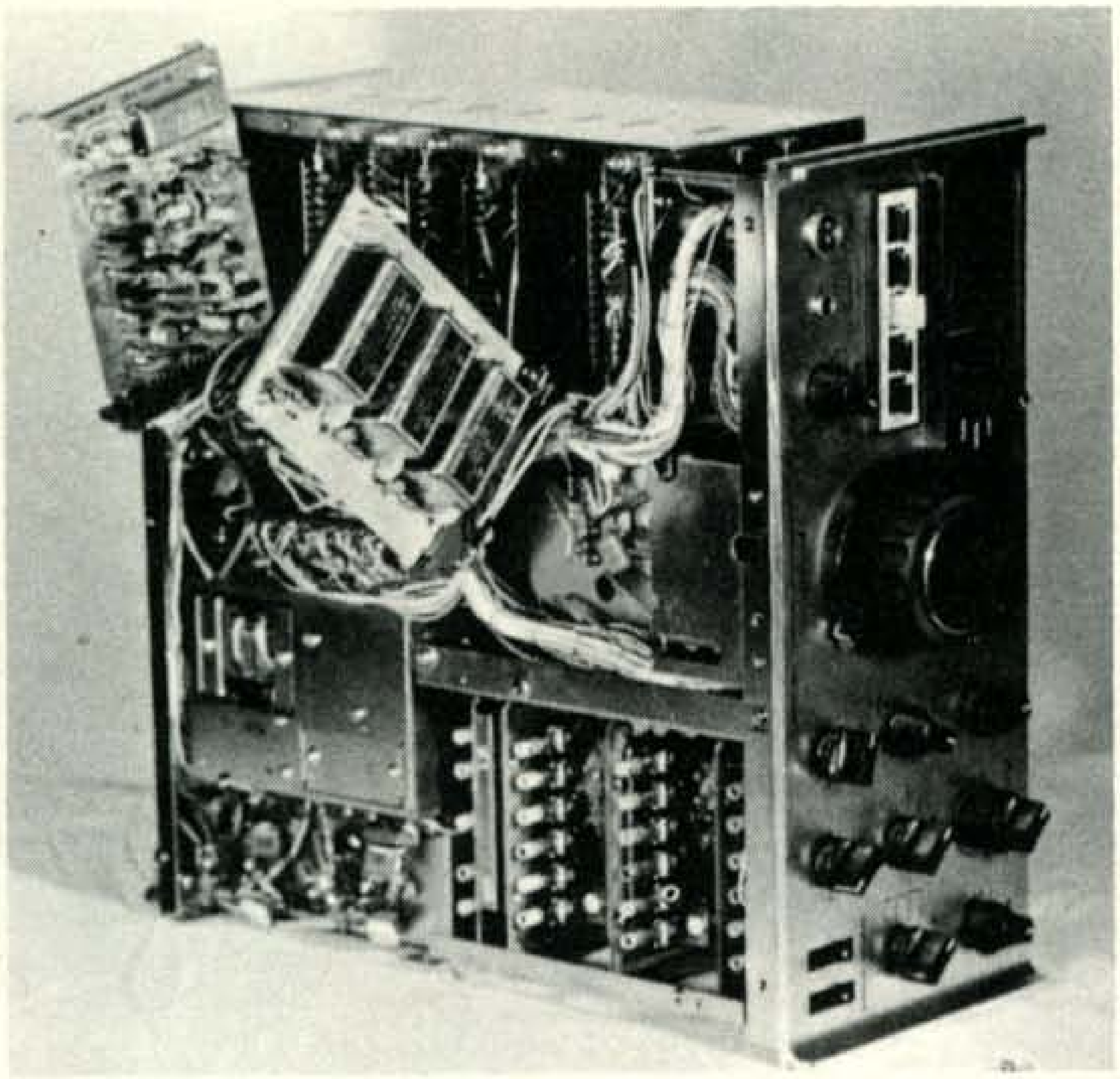
Let's begin our trek through the TS-900 with a look at the block diagram, fig. 1, which shows a double conversion transceiver. On receive, signal from the antenna is first passed through a variable attenuator to a dual gate MOSFET r.f. amplifier and then to the heterodyne mixer, also a dual-gate MOSFET, where it is mixed with the amplified output of a band-switched crystal controlled oscillator to produce the first i.f. range of 8.895 to 8.395 MHz. For example on 14.000-14.500 MHz, the heterodyne crystal frequency is 22.895 MHz yielding the 8.895 MHz to 8.395 MHz difference frequency range (other heterodyne oscillator frequencies are shown in fig. 1). The output of the heterodyne mixer is fed to the input of the v.f.o. mixer through a band-pass filter and is tuned over the 8.895 to 8.395 MHz range by means of a varicap diode whose applied voltage is varied by a pot ganged to the v.f.o. In the v.f.o. mixer the amplified v.f.o. output of 5.500 to 5.00 MHz is subtracted from the first i.f. range to yield the 3.395 MHz second i.f.

The 3.395 MHz signal is then fed to the Noise Blanker board where it is filtered and amplified by a dual gate MOSFET and fed to one of three diode-switch-selected crystal lattice filters for u.s.b., l.s.b. or c.w. Two dual gate MOSFET i.f. stages follow the filters and feed the 4-diode balanced mixer. The carrier oscillator (common to both transmit and receive) uses diode-switch selection of the desired carrier crystal: 3394.15 kHz for c.w., 3395 kHz for s.s.b., 3397.125 kHz for FSK Space (on transmit, Mark is accomplished by diode-switching a short across two small capa-

*Editor, *CQ*

Fig. 1—Block diagram of the Kenwood TS-900 s.s.b./c.w. transceiver.





For in-circuit testing of circuit modules the PC boards are unplugged from their sockets, the sockets are hinged out from the bottom of the rig, and the PC boards are re-inserted.

citors in series with the FSK crystal). Audio output from the balanced mixer is fed to the audio amplifier string which includes a low pass filter to shape the audio response; the 8 ohm speaker output is transformerless using a complimentary pair of power transistors. 600 ohm output for phone patch operation is provided through an 8 ohm to 600 ohm transformer from the 8 ohm speaker line.

AGC Systems

Two independent a.g.c. systems are incorporated in the TS-900. A conventional system picks up signal voltage from the output of the second i.f. amplifier, amplifying and detecting it and applying the amplified a.g.c. signal to the second i.f. string and r.f. amplifier.

Should a strong signal be present outside the receiver's i.f. passband, strong enough to cause overload of the r.f. amplifier or intermodulation, a second a.g.c. system is activated. This system, called "RF AGC," samples signal at the output of the bandpass filter preceding the v.f.o. mixer, detects and amplifies it to provide an a.g.c. voltage, and applies the control voltage to the same gate of the r.f. amplifier MOSFET as the conventional a.g.c. The conventional a.g.c. voltage is applied through a steering diode.

The action is as follows: A strong signal within the receiver passband activates the regular a.g.c. loop. The r.f. a.g.c. is inactive if no strong signal is present *outside* the passband. If a strong signal appears outside the passband, the normal a.g.c. loop will not "see" it, but the r.f. a.g.c. will since it samples signal *before* i.f. selectivity is introduced. The r.f. a.g.c. thus reduces the gain of the r.f. amplifier, preventing overload or intermodulation.

A signal lamp on the front panel lights when the r.f. a.g.c. is working but extinguishes when the very strong off-frequency signal is actually tuned in. This occurs because as the strong signal enters the i.f. passband, it is "seen" by the conventional a.g.c. which in turn reduces the gain of the r.f. amplifier. Since the signal then reaching the r.f. a.g.c. loop is then reduced below its operating threshold, the r.f. a.g.c. is disabled, and the warning lamp extinguishes. R.f. a.g.c. voltage is prevented from reaching the i.f. stages through the conventional a.g.c. line because of the steering or blocking diode. See figure 2.

Noise Blanker

The TS-900 noise blanker uses a balanced gate arrangement to open the 3.4 MHz signal path for the duration of a noise pulse. Broadband 3.4 MHz i.f. input from the v.f.o. mixer is first fed through a half-lattice crystal filter having a bandwidth of about 10 kHz to restrict blanker operation to noise pulses in close proximity to the tuned frequency. A two-stage IC amplifier taking signal from the filter output is controlled by a relatively slow-attack a.g.c. system which allows the fast-rise-time noise pulses to be amplified before the a.g.c. begins to act. These pulses are then shaped and drive a Shmitt trigger which biases the gating diodes off for the duration of the noise pulse. In operation the blanker is extremely effective on impulse noise, though where the pulse noise level is low its effectiveness diminishes.

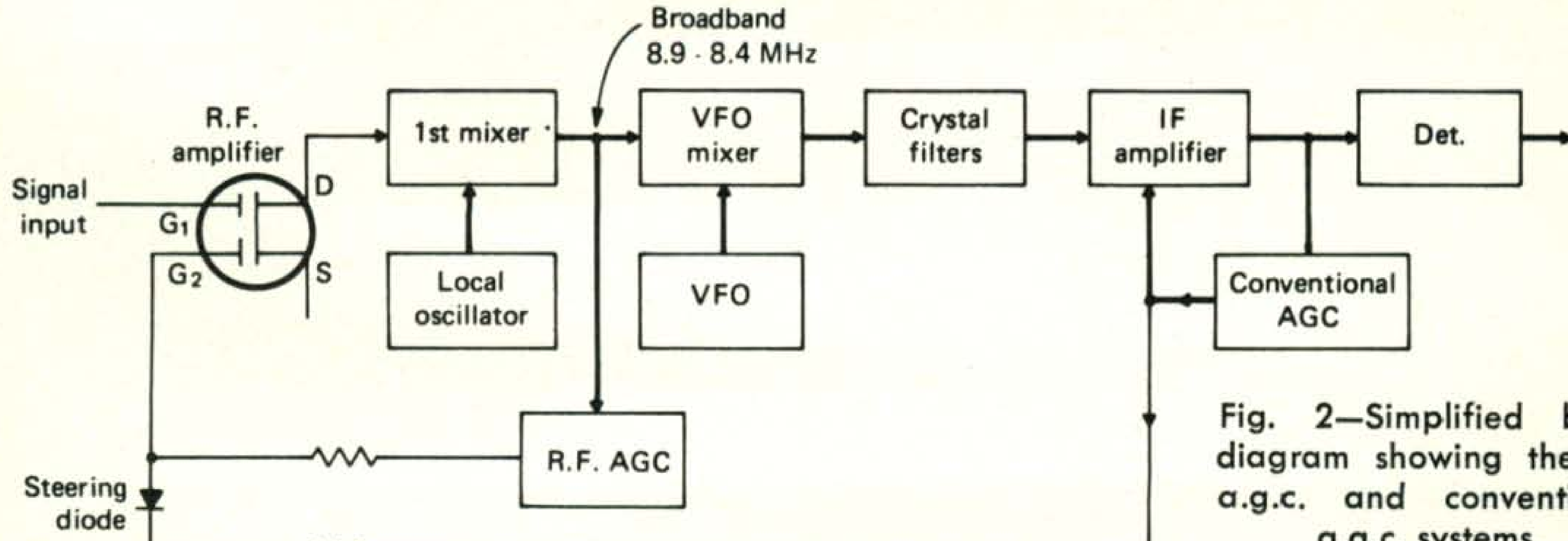


Fig. 2—Simplified block diagram showing the r.f. a.g.c. and conventional a.g.c. systems.

Transmitter Circuitry

The transmitter is quite conventional in most respects. On s.s.b. a JFET provides high impedance mic input and is followed by two bipolar pre-amp stages which provide audio to the 4-diode balanced modulator. Carrier is provided by the same carrier oscillator as on receive. The balanced modulator output drives a MOSFET i.f. amplifier which is a.l.c. controlled. The 3395 kHz d.s.b. signal from the i.f. amplifier feeds the diode-selected crystal-lattice filters which produce an s.s.b. signal.

C.w. operation is accomplished by unbalancing the balanced modulator by applying a d.c. bias through a carrier level adjust pot. Mic pre-amp circuits are disabled. Keying is achieved by keying the sidetone oscillator whose output operates the VOX circuit. Sidetone is also applied through a level control to the receiver audio section for monitoring.

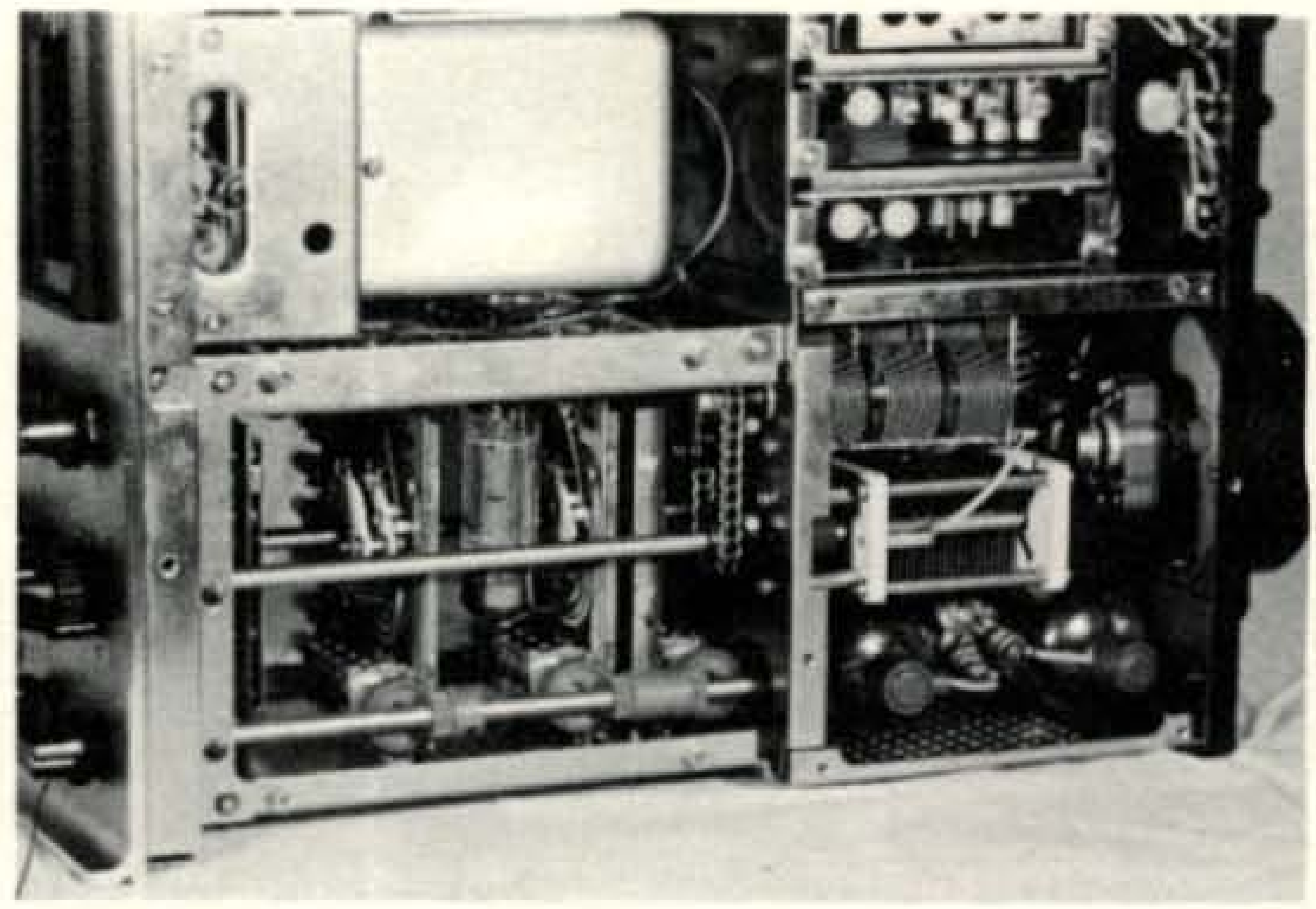
The remainder of the transmitter circuitry is straightforward; a stage of i.f. amplification after the filters, v.f.o. mixer producing 8.895-8.395 MHz signal output which is mixed again with the heterodyne oscillator output to yield the operating frequency. Output from the heterodyne mixer drives a 6GK6 which in turn drives a pair of 6LQ6's in parallel as power amplifiers.

A.l.c. is of the amplified type with the a.l.c. amplifier sampling PA grid current amplifying and applying corrective bias to the two transmitter i.f. amplifiers. A.l.c. voltage is also amplified and metered as an indication of correct or excessive mic gain and also for driver tuning adjustment.

A few words about the installation of the optional 500 Hz c.w. filter: As delivered the TS-900 uses the upper sideband filter for u.s.b. and c.w. on both transmit and receive though on c.w. the 3394.15 kHz carrier crystal is used for transmit and 3395 kHz for receiver b.f.o., meaning that the dial pointer will indicate 850 Hz lower than the actual received and transmitted frequency. When the optional c.w. filter is used these two crystals are reversed (3394.15 kHz b.f.o.; 3395 kHz carrier) meaning that the received and transmitted frequencies coincide with the dial pointer. This reversing is accomplished by unplugging, reversing and re-plugging a flat 6-conductor plug and socket under the chassis at the time of installation of the c.w. filter.

Metering

In addition to the a.l.c. metering mentioned previously a front panel switch permits reading PA plate current, r.f. output (relative), and PA plate voltage. On receive, the meter automatically reads signal strength. PA plate current is measured by reading the voltage drop across 1 ohm PA cathode resistors and amplifying this voltage which is then read by the meter.



Close-up of the driver and PA compartments, viewed from the top. Right angle gears drive variable capacitors for receiver r.f. amplifier and transmitter driver tuning. At the center, the chain/sprocket drive for the PA loading is visible.

R.f. output is measured through a voltage divider across the 50 ohm transmitter output, and detected by a diode. PA plate voltage is read across a voltage divider at the PA B-plus feed point.

RIT and Indicator Lights

Receiver incremental tuning is accomplished by applying and varying the bias on a varicap diode paralleling the v.f.o. tuning capacitor. The diode is always connected, but is biased only when the front panel RIT switch is engaged and the transceiver is in the receive mode. When the RIT switch is engaged, a warning legend "RIT" illuminates in the space above the tuning dial and remains on until the switch is disengaged.

On the front panel RIT control pot (which has a tuning range of ±2kHz approx.) is another switch at the full counter clockwise position which disables the v.f.o. completely and energizes a crystal controlled oscillator in its place. Two crystals in the 5.0-5.5 MHz range may be inserted in sockets provided internally and selected by a front panel switch for net operation or other purposes requiring precisely repeatable frequencies. The illuminated v.f.o. dial pointer extinguishes when crystal control is used.

Other lighted legends also appear above the v.f.o. dial: the RF AGC warning light and a T MUTE light indicating that the driver and PA filaments are switched off by their front panel switch as they might well be when just monitoring the bands.

Construction

This reviewer takes particular delight in fine mechanical devices in addition to fine electronic devices. For this reason among others, the Kenwood TS-900 has been a pleasant review to

Rear view of the TS-900 shows a variety of connectors: speaker and phone patch at upper right, relay contacts and a.l.c. below. Right to left along the bottom are: ground post, external v.f.o. connector, power connector, RTTY and c.w. key jacks, SO-239 antenna connector, antenna selector switch, receiver-only antenna jack, and another ground post. Above the key and power connectors are slide switches for PA screen supply on/off, and remote/internal v.f.o. At the top center adjacent to the fan are adjustments for PA bias, r.f. voltmeter, and anti-vox.

write. The TS-900 is a well-constructed, well-thought-out and smoothly functioning piece of equipment.

The package measures 12⅝" wide × 5½" high × 12⅝" deep and weighs a little over 26 pounds. The front panel is satin-finished extruded aluminum with moulded satin black high-impact plastic escutcheons for the dial and S-Meter, and for a bank of five lever switches. The cabinet is steel, finished in a rugged black textured paint, and is designed for several degrees of access to the interior. A removable "hinged" top lid is secured by snap fasteners, (and a single screw for shipping or transporting), and allows access to most internal adjustments. For more extensive work topside, removal of seven screws allows the top portion of the cabinet to be swung aside on split butt hinges. Removal of several more screws removes the cabinet bottom.

The TS-900 is largely modular in its construction, with most circuitry on PC boards which plug into high quality PC edge connectors. These boards are closely packed, but well shielded from each other as each fits into its own metal compartment. Service is facilitated by a swing out arrangement on the PC board connectors permitting the board to be removed, the connector swung out from the bottom of the set, and the board reinserted in the connector. Thus access is available to both sides of the board while the set is live.

In addition to the shield compartments for boards, several top shields cover various compartments, and also identify the boards and their associated adjustments, the most commonly used of which are accessible through holes in the shields.

The PA is conventionally wired and a permanently installed part of the structure. Driver tuning is accomplished by means of several unusually small multi-gang variable capacitors which are ganged by means of nylon bevel gears to mating gears on the driver tuning shaft. PA loading is concentrically located on the PA tuning control shaft, and the loading capacitor is driven by a rugged chain and sprocket arrangement. Operation of these controls is smooth and very positive, particularly in view of the quantity of mechanical devices involved.

V.f.o. tuning is very light, but with adjustable weighing. The machined black anodized aluminum tuning knob is quite heavy and gives excellent flywheel type tuning along with great smoothness. The large knob is one of the better ones in use today on any amateur transceiver.

A 3" dia. shielded fan-type blower is mounted at the rear of the PA compartment for cooling. Unfortunately the noise level from the fan is rather high and the fan runs continuously as long as the power switch is on even if the driver and PA filaments are not powered, something we found annoying.

The bandswitch wafers are all high quality ceramic types, a welcome feature. Two switches are used: one to select the band — WWV, 80, 40, 20, 15 or 10; the other to select the ½ MHz segment of 10 meters desired — 28.0, 28.5, 29.0 or 29.5.

External connections are provided at the rear for a multitude of purposes: speaker, 600 ohm phone patch input and output, relay make or break, a.l.c. input, RTTY keying input, key jack, 50 ohm antenna for both receiving and transmitting (SO-239), a receiver-only antenna input (switch selected, phono jack), power supply 12 conductor locking Jones plug and special 12 conductor jack for connection of an optional external v.f.o., model VFO-900. In addition, two rugged ground posts are provided at the rear.

Another convenient feature is the inclusion of slide switches for disabling the driver and/or PA screens for neutralization.

Performance

In all respects which we could ascertain, the TS-900 equaled or exceeded the manufacturer's claimed specifications. The figures in parentheses below are our measurements; the first figures are those claimed.

Receiver: SENSITIVITY — 0.5 μv for 10 db S+N/N (<0.25μv on s.s.b.; <0.125 μv on c.w.). INTERNAL SPURIOUS—Not rated (none on 40-10m.; 3737.5 kHz .03 μv equiv.; 3799, 3899 and 3999 kHz .01 μv equiv.). A.V.C. FIGURE OF MERIT — Not rated (0.1μv — 1μv change, 4 db; 1 μv to 10,000 μv change, 1db!).

[*Continued on page 67*]

MATH'S NOTES

BY IRWIN MATH,* WA2NDM

LAST month we covered r.f. amplifier circuitry for the 6 meter band and this month we will attempt to do the same for two meters.

While the high noise level present in the 50 MHz region was the limiting factor in amplifier design at that frequency, the situation becomes much better when operating at 144 MHz. Here atmospheric and man-made noise is significantly less and advantage can really be taken of good transistors. As far as QRM from other services is concerned, the power levels are much lower (no close proximity TV or f.m. stations) and the only real problem is in the f.m. part of the band where stations can be 10-15 kHz apart. The basic requirement then for the 2 meter front end is rejection of adjacent frequency signals (but not to the previously mentioned degree) as low a noise figure as practical but not "the ultimate", and enough gain to provide an adequate signal through the mixer and into the succeeding stages in the case of a converter.

In keeping with the format we used last month, Fig. 1 is a typical 144 MHz r.f. ampli-

*5 Melville Lane, Great Neck, N.Y. 10023.

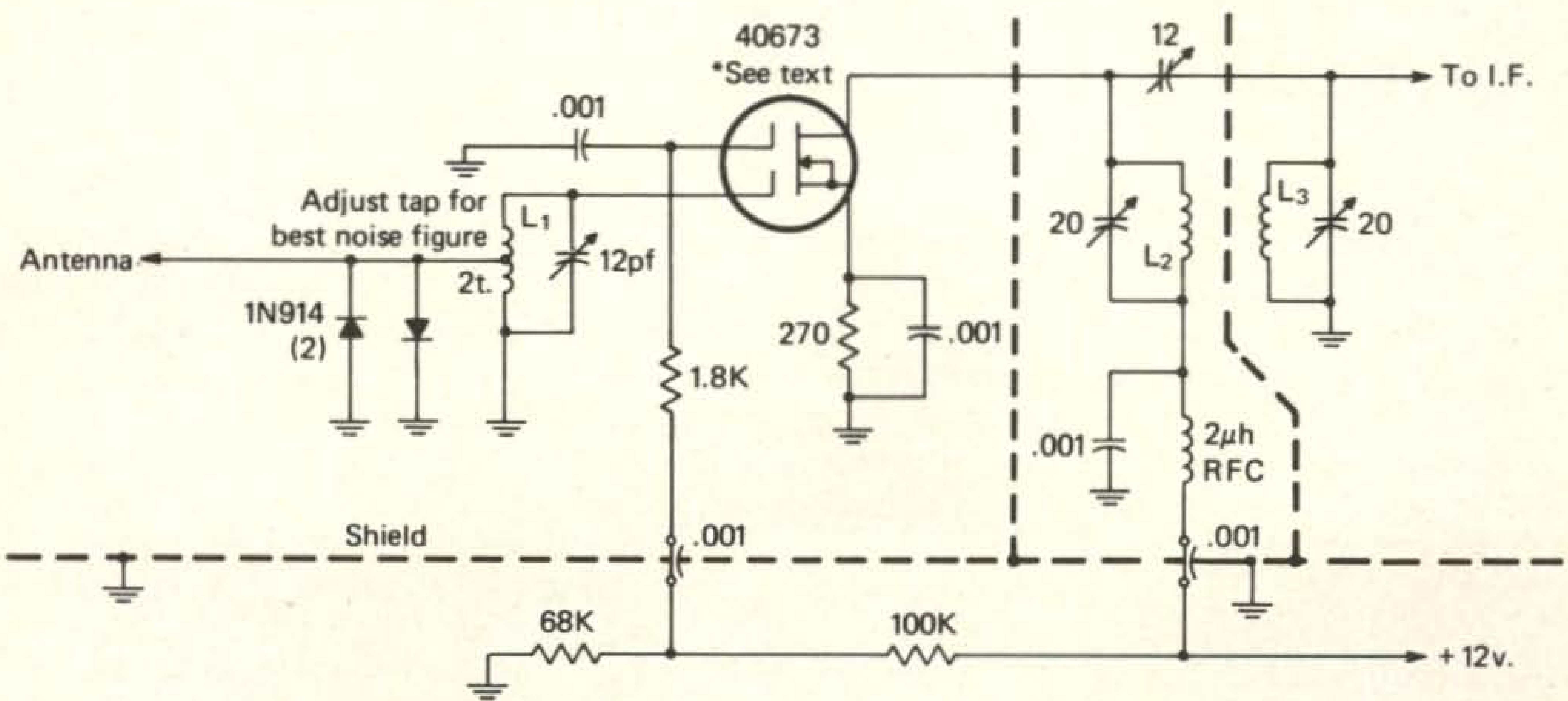


Fig. 1—A MOSFET r.f. amplifier. Note the use of shields for proper operation. They are a must at these frequencies.

L_1 — 5t. #20, ½" d., ½" long. L_2, L_3 — 6t. #20, ¼" d., ¾" long.

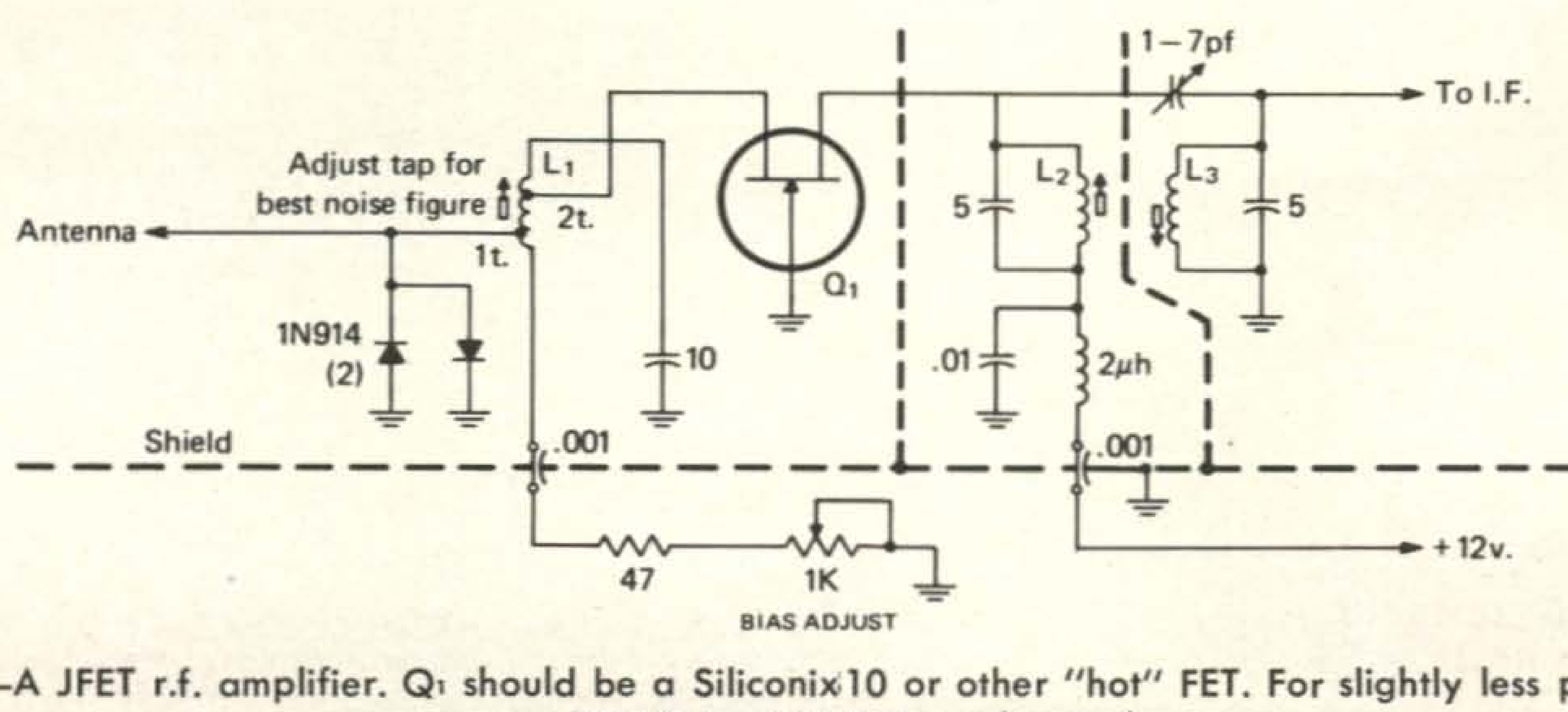


Fig. 2—A JFET r.f. amplifier. Q_1 should be a Siliconix 10 or other "hot" FET. For slightly less performance a 2N5486 or 2N4416 can be used.

$L_{1,1,3}$—4½t. #22 on ¼" d, ceramic form spaced 1 wire diameter.

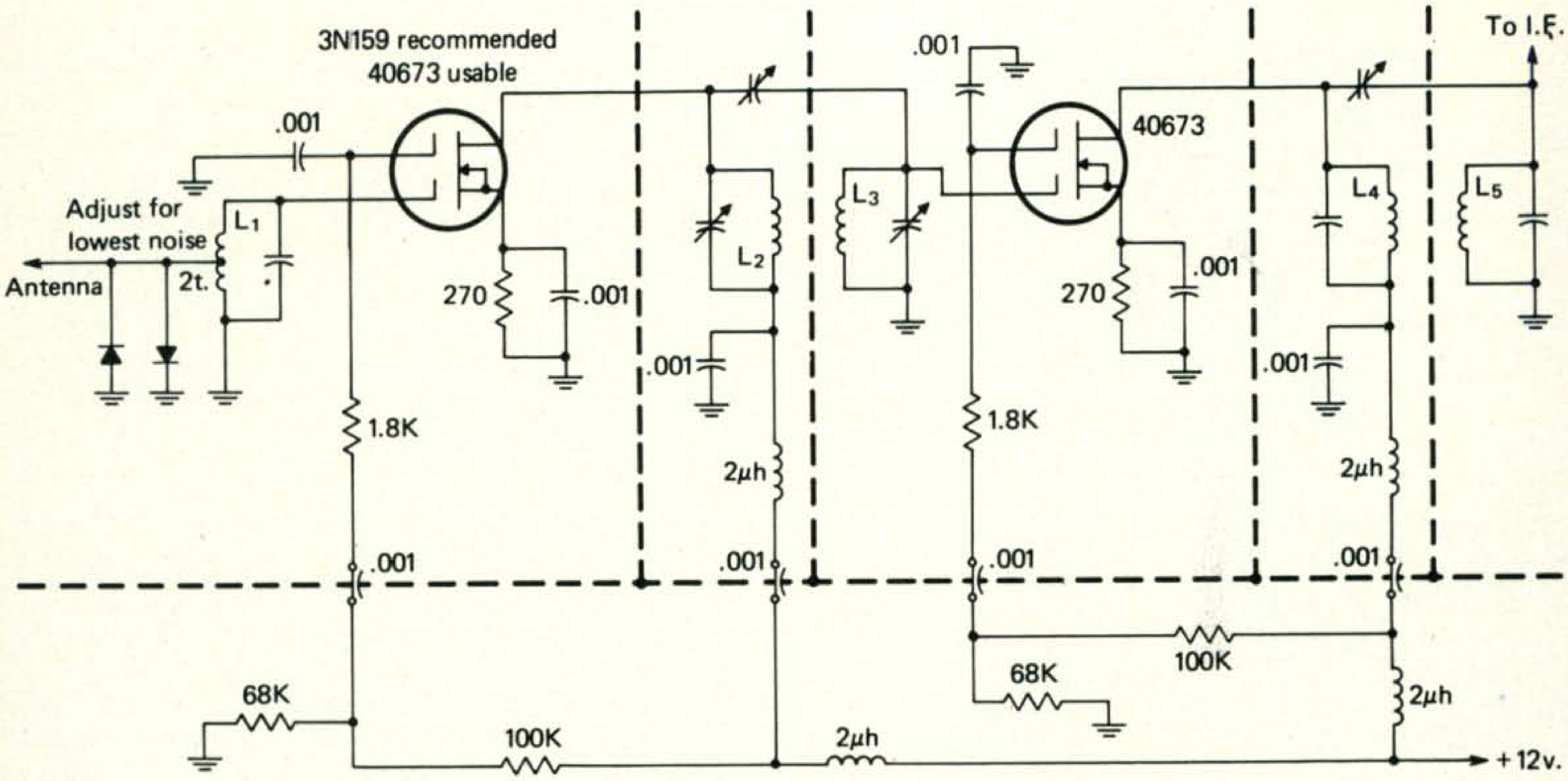


Fig. 3—A MOSFET amplifier. See text and fig. 1 for missing values.
L_1—5t. #20, ½" d., ½" long. $L_{2,3,4,5}$—6t. #20 ¼" d., ¾" long.

fier stage using a MOSFET and Fig. 2 shows another 144 MHz stage using a junction FET. Both circuits are capable of providing 15-20 db of gain and will be adequate to drive a subsequent mixer if a narrow range of frequencies such as 750 kHz-1 MHz is to be covered.

In comparison to 50 MHz, as already mentioned, the noise figure of the stage is important and it is here that we see some departure between MOSFETS and JFETS. These differences are:

(a) MOSFETS will exhibit a noise figure of 2.5-3.5 db while the junction FET circuit can approach a level actually lower than 2 db. In the circuit shown in fig. 1 I suggest the use of a 3N159 rather than the popular 40673 as it has a lower noise figure. It is not protected however and extreme care is necessary when installing it.

(b) The cross modulation figure with the MOSFETS will usually be better than that of the JFET however this is not necessarily a serious consideration on the 2 meter band.

(c) Although we are considering only FET's in this discussion there are some bipolar transistors, quite expensive I might add, that have beer specifically fabricated for v.h.f. and u.h.f. amplifier service that can actually outperform

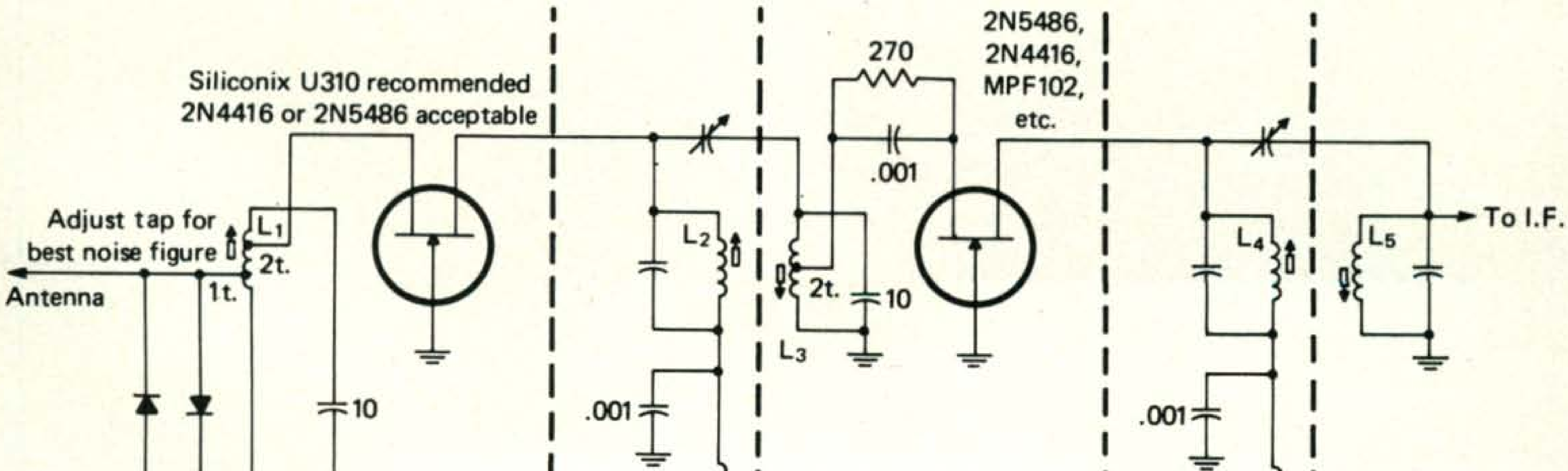


Fig. 4—A JFET amplifier. L_3 is the same as L_1 but without the antenna tap. See fig. 2 for other coil and component data.

even hot FETS. For example, the KMC corporation type K6001 exhibits 15 db of gain at 200 MHz with a noise figure of only 1.3 db maximum. If this type of state-of-the-art device (at $20 each) is what you think you need, I would suggest you write directly to them at the following address:

KMC Semiconductor Corporation,
Parker Road, Long Valley, New Jersey
07833 (201) 876-3811

They have applications information and recommended schematics for their transistors.

Note that the two amplifier schematics just given employ double tuned output circuits. These, in addition to the trimmer capacitor between the two coils should be adjusted with the aid of a sweep generator for proper response over the range of frequencies of interest. If only a single frequency is to be amplified then simply tune all stages for maximum output. The use of a noise generator is suggested to obtain the ultimate from the stage and the antenna tap should be varied for the lowest noise figure when using such a generator. In the case of the JFET circuit, the 1K bias pot should also be adjusted for minimum noise. One note here—the point of minimum noise may not necessarily be the point of maximum gain so be careful.

The preceeding amplifiers are fine for narrow frequency range coverage but when it is desired to cover the entire 4 MHz of the band, or even half the band, the use of two stages of r.f., stagger tuned with the aid of a sweep generator, is highly recommended. Only in this way can adequate gain, compensating for the losses through the bandpass elements be achieved. As we did last month, figures 3 and 4 show potential two stage r.f. amplifiers with JFETS or MOSFETS. All of the adjustment procedures are exactly the same as previously stated. Please remember that these schematics are untested but should be an excellent starting point.

If you anticipate building any of these amplifiers I would suggest you read the references in last months column to round out this discussion—you will find them most helpful.

Next month we will conclude this discussion with local oscillators and mixers suitable for both bands. Until then,

73, Irv, WA2NDM

COP's COLUMN

BY COPTHORNE MACDONALD,* WØORX

Save March 8th & 9th

No, that weekend is not going to slip into the sea, but it might slip by without your ever having sampled the Futures Hamfest activities. Now might be a good time to mark the calendar. Most of the activity will take place on 7175 kHz during the mornings, on 14234 in the afternoons, and on 3849 during the two evenings. These frequencies are just up-band from the usual SSTV gathering frequencies, and some sessions will involve picture transmission. The plan is to have the net control stations (using a second receiver) also monitor that frequency exactly 100 kHz above the primary operating frequency. This will give General Class operators a chance to call in with questions and comments.

If you read the December column you will recall that the basic game plan is a weekend-long on-the-air rap session about the future; what the problems are, and what our options are in dealing with them. We will be talking with some "experts," and with ordinary people who are doing some extraordinary things. For example, the well known Economist and Futurist Robert Theobald has agreed to share some of his ideas and insights with us. (He is best known for his work in developing the guaranteed minimum income concept.) He strikes me as a realist in his assessment of world problems. His optimism about the capability of ordinary folks to save the day is very heartening.

Another well known, grass-roots-oriented participant will be Nicholas Johnson. Nick was the FCC Commissioner who preferred to ride his bike to work rather than ride in the chauffeur-driven government limousine to which his position as a Commissioner entitled him. He now heads up the National Citizen's Committee for Broadcasting, and should have some interesting things to say about the future of electronic media.

Then there is the crew who publish *The Mother Earth News,* a magazine with a circulation of about 100,000 which advocates ecological awareness, and natural modes of living in which man and the earth are in harmony. They will share their feelings about the future and the plans they have for starting a research

*P.O. Box 483, Rochester, MN 55901.

This monitor picture of Jack Petree was made after a two hop transmission from WB4OVX to WA1NXR and return, with just 2 watts into the antenna at WB4OVX.

center in the mountains of North Carolina. There they intend to work on such problems as the generation of natural power, food growing techniques adaptable to city and suburban living, and ecologically sound transportation techniques.

Many other interesting and doing people will be sharing their insights with us. We hope that you'll be there too, to put our marvelous capability of engaging in dialogue-at-a-distance to good use.

Eliminating RFI—The Political Approach

In the November and December columns we dealt with the technical side of Radio Frequency Interference, and some technical approaches to eliminating it. Ted Cohen, W4UMF, and the other members of the ARRL RFI Task Group are working on the human side of the problem. RFI in your own shack is a technical problem. RFI in your neighbor's stereo or TV is not only a technical problem for somebody, but is also a public relations problem for you and for ham radio, and is a real pain in the tail for your neighbor. According to an FCC bulletin, 90% of all TVI problems are due to deficiencies in receiver design. In *all* cases of interference to audio equipment, it is the equipment's inability to reject r.f. signals which is to blame. The FCC recognizes this and will send you bulletins upon request which can help to explain the situation to your irate neighbor. (You can request FE bulletins number 24 and 25 from your nearest FCC Field Engineering Office.)

While these bulletins lay the blame on the inadequate design of the home entertainment equipment and may help get the ham off the hook, the neighbor still has his RFI, and quite possibly still has his hostile feelings toward you. At present, the FCC has no power to force a manufacturer either to design RFI preventive measures into his equipment in the first place, or to force him to take corrective action when a case of RFI crops up in the field. Some manufacturers will voluntarily offer assistance. Most domestic TV manufacturers will offer free high-pass filters, for example, to help eliminate TVI problems. The poor consumer still bears the major burden in most cases, however, since he usually picks up the serviceman's tab, and in many cases must also pay for the filters and/or filter components. Interestingly, we now have a situation where the FCC, the hams, and the consumer are all pointing fingers at the manufacturer. When enough fingers start pointing in one direction there is hope for political action, and this is precisely what the RFI Task Group is trying to get. The group has a very interesting and informative packet which includes copies of FCC bulletins, addresses of TV manufacturers who will supply high-pass filters, a suggested "RFI Bill" to send to your congressman, and other good stuff. To obtain your packet send a 9 × 12 manila S.A.S.E. having 40¢ in stamps on it to: Dr. Theodore Cohen, Secretary—RFI Task Group, 8603 Conover Place, Alexandria, Va. 22308. I recommend it highly for any ham who has neighbors troubled by RFI, and for those others interested in trying to find a long term solution to the problem.

The Task Group's suggested bill would empower the FCC to regulate the allowable susceptability of electronic devices to interference from licensed stations. These covered devices would include everything from TV and radio receivers, to audio systems and electronic organs. The FCC would establish the limits and test specs, and it would be against the law to manufacture, import, or sell equipment which did not meet the FCC specs.

The home entertainment equipment manufacturers have opposed legislation of this type, saying that 99% of the people would be buying protection they don't need. The RFI Task Group takes issue with the 1% interference figure, and estimates that it is much higher. My own thought is that if the manufacturers really believe their 1% figure then they should have no great objection to legislation which would require them to foot the full bill for cleaning up all cases of interference experienced by purchasers of their equipment! Katashi Nose, KH6IJ, has suggested another alternative: legislation which would require that a printed disclaimer be placed on products to warn the purchaser that the product is not guaranteed to reject interference. (With this approach the consumer, while warned, may still end up with the short end of the stick. Where will he turn if there is no RFI-proof equipment on the market, as at present?) If you have any suggestions of your own please pass them along to Ted Cohen.

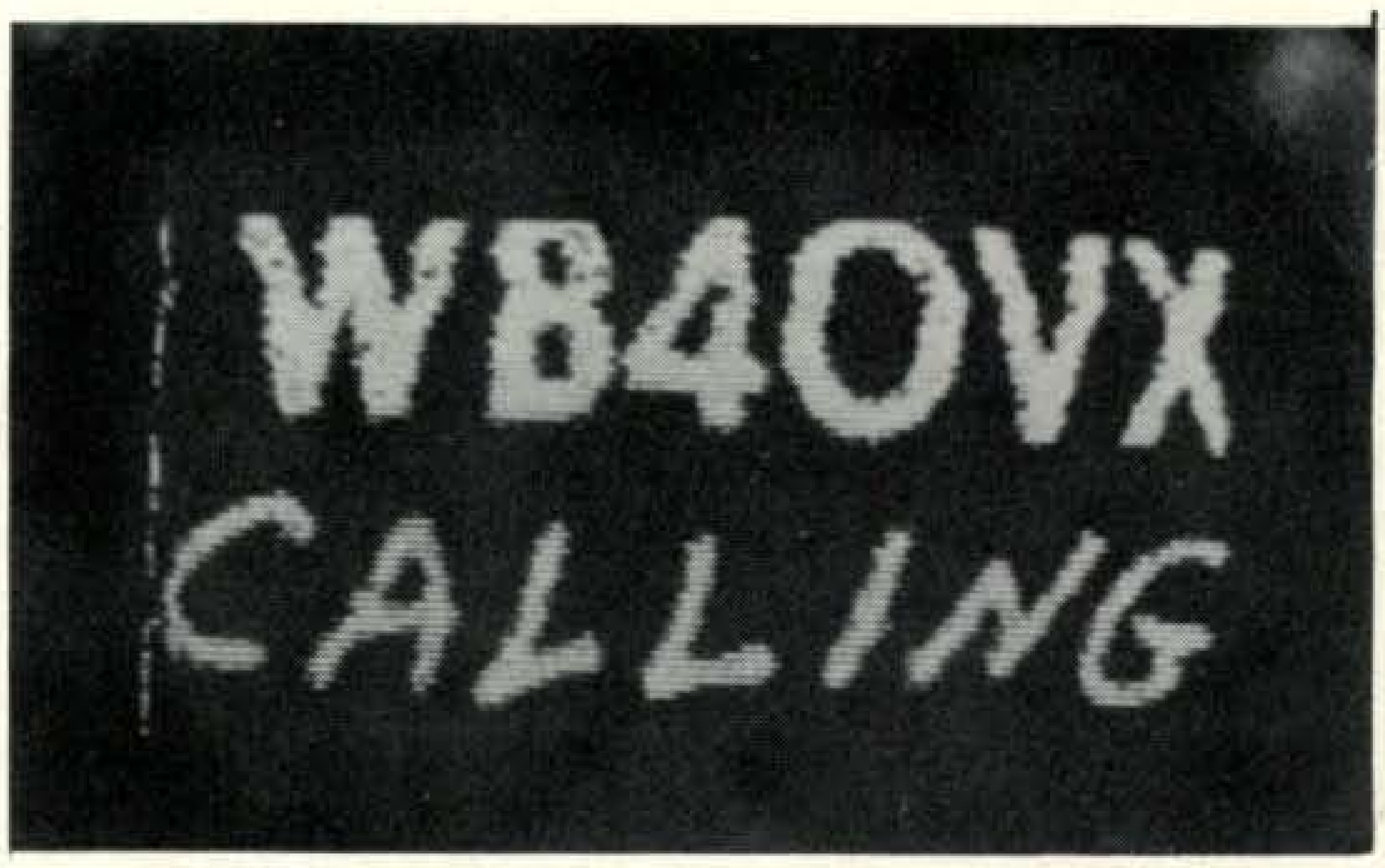
At the nitty-gritty level, most of us with RFI problems in our neighborhoods need better information on just how to approach and work with our neighbors. The usual advice to "be helpful but don't get involved" really isn't very helpful at all. Somewhere among us is ham radio's Henry Kissinger who has walked into the homes of irate neighbors, and walked out having made personal friends and friends for ham radio. Henry, if you're reading this, please pass along your secrets to the RFI Task Group and to me. We need you!

QRPp SSTV

About the only thing a ham can do in his own shack to reduce neighborhood RFI is to reduce the intensity of the r.f. field he radiates. But RFI reduction is just one of the reasons for the growing interest in low power operation. Perhaps a more typical reason is the urge to retreat from the excesses found in ham radio, in much the same way that people are retreating from excesses in other areas of life.

I've usually thought of QRPp as mainly a c.w. operators activity, though I do remember having lots of fun with 1 watt e.r.p. on 40 meter a.m. phone years ago. When Jack Petree, WB4OVX, wrote me about his QRPp SSTV activity I became intrigued. Just what is possible in this time of slipping sunspot numbers? Well, Jack got his Argonaut in February, 1974, and by November had worked 35 states and 7 foreign countries on two-way SSTV. Power input to the Argonaut final was 5 watts; the power to the antenna was 2 watts; and high power preliminaries were never used. The photos show round trip transmissions to two of the stations he has contacted. In both cases the pictures were transmitted with two watts transmitter output, tape recorded by the distant station, and transmitted back to Jack. The pictures are as he received them on the return transmission.

Just how important is the power level one runs? The answer depends on the kind of operating you are trying to do. Jack Petree's 5 watt input is 23 dB down from the maximum legal input of 1 kw. If your signal is really truly "20 over 9" at times when running a kw, you would still be S8 or better if you reduced power to 5 watts. In other words, when ionospheric conditions are good-to-excellent, 5 watts can provide a quite adequate signal level in the absence of interfering signals. Here lies the real problem. While your QRPp signal level may be well above the cosmic and atmospheric background noise level, it will still be 23 dB below the signal from the fellow across town running a kw. And a minus 23 dB signal-to-noise ratio makes for rough copy! QRPp is not for the pileups or the usual Sunday afternoon on 20 meters. It requires the patience to wait for that all too rare combination of good ionospheric conditions and low QRM levels.



Another round trip transmission, this one QRP from WB4OVX to YV1AQE with a QRO return.

You may recall that Jack was the first ham to work all states on SSTV (using higher power the first time around). He has very kindly passed along some of his observations on QRPp SSTV:

"Calling 'CQ' is a wasted signal, but 'Break-Break' is much more effective."

"Patience and a good antenna system are both musts."

"WAS-SSTV-QRPp will take some time to do, especially under present 20 meter band conditions."

"QRPp on A3 is a real ball, but SSTV-QRPp is the greatest." Wondering how far power reduction can be pushed, Jack reports a recent QSO with a station 700 miles away during which he dropped his power level to ⅛ watt output. He says, "I did not think I had a prayer, but believe it or not, I read the ⅛ watt frames when he sent them back to me. That was hard for *me* to believe!"

Vy 73, Cop, WØORX

QRPp

LOW-LOW POWER OPERATING

BY ADRIAN WEISS,* K8EEG

Putting The Wire In The Sky

Let's turn to some practical considerations with respect to getting the antenna up high and in the clear. The normal case (*i.e.*, the absence of zoning regulations, neighbor disapproval, and most important the absence of spousal resistance) is usually a simple matter. Two major options are available: (1) using existing mounting points such as trees, telephone poles, and other typical structures as tie-points for an antenna; and (2) erecting the necessary mounting structure especially for the antenna. With respect to the first, sometimes a little imagination is necessary—one must develop the ability to view one's natural surroundings specifically in terms of the adaptability of those surroundings to antenna requirements. The layman will see a beautiful oak tree in your front yard; with the proper perspective, however, you will be able to see a beautiful antenna mast which will allow you to get your antenna cheaply into the sky. Likewise, the structure in which one domiciles (*i.e.*, his house or habitation) is a ready-made antenna mounting point. If you are so lucky as to live in a two-story affair, you will already have about 30-35 ft. of altitude in your hip pocket. In any event, one can settle for the height of the peak of one's roof as it is, or better yet, one can use that peak as a starting point to achieve a really significant height.

*213 Forest Ave., Vermillion SD 57069.

QRPp has a way of doing things to a guy's mental equilibrium. Here is one of our more avid QRPp fans, Bob WA2KTW, with his hand-embroidered Ham-Fest uniform reading "WA2KTW QRP Read the Milliwatt." Now how's that for class?

This approach is rather simple. If we are aiming at a 60 ft. height for a low-band antenna, and the house peak is at 30 ft., the added 30 ft. can be easily achieved through the use of a cheap telescoping TV mast, or simpler yet, three 10 ft. sections of regular TV mast. In either case, the mast may be mounted on standard chimney mounts, or a universal angle roof mount will serve to anchor the base of the mast. Guying can consist of a pair of three line sets strung from the top and 15 ft. point if you want to be really secure. I've gotten away with a single set of three lines from the top of the mast.

Another option is to work from the ground up. The simplest approach here is to use a 50 ft. telescoping TV mast mounted on the ground (bury a brick or two three inches down so that the mast doesn't keep going deeper) and secured to the roof peak or side of the house as far up as possible. A side-mounting bracket can be used to attach the mast if the situation requires it. The nice thing about this approach is that one can stand on the roof while mounting the antenna on top of the nested top sections. Further, only one set of guy lines from the top is usually necessary because of the support given by the house. This approach will allow one to mount a standard 20 meter yagi if desired.

Suitable Types of Antennas

With the above mounting arrangements, just about any wire antenna is suitable. These include dipoles, trap dipoles, inverted Vees, end-fed wires, Vee beams, Lazy-H's, sloping dipoles, and, of course, the TV mast itself as a vertical radiator so long as it is insulated from the guys and the house.

If a horizontal dipole, Vee beam, or other type is desired, mounting points for the ends of the antenna are a necessity. These can consist of trees, utility poles (as long as the antenna wire is kept a safe distance from power lines), other buildings (your neighbor's house if you use invisible wire and don't have to worry about ice!), or any other convenient structure. In cases where strictly horizontal configurations are out of the question, an inverted Vee with the apex at the mast top does as good a job as a horizontal dipole. A sloping dipole also fits the bill. Likewise, an end-fed wire will work satisfactorily on a slant. The trick when using an inverted Vee is to get the ends of the antenna as high off the ground as possible; but this is not absolutely essential.

If a beam is mounted on the mast, two points should be observed. First, do not pull each section of the mast all the way extended—leave about 2 ft. of each section telescoped into the one under it. Second, during the raising of the mast, hold your breath, but don't worry too much about the leaning of the mast unless a wind is blowing—it generally will hold the sag for a short time until the first set of guys is secured. Don't expect more than 45 ft. with a 50 ft. mast. Use two sets of guy lines.

Subversive Cases

So you're one of the guys whose neighbors and wife object strenuously to anything that mars the natural ecology of your estate? No problem. Subterfuge is a necessity in such a case, but even so, a good antenna can be raised. The approach is the all-important aspect of this situation. No one, not even the faithful XYL, must know that there is actually a ham antenna connected with what you are going to put up. What you are actually putting up (as far as everyone but you are concerned!) is a TV antenna. Depending on the touchiness of the situation, more or less preliminary subversion is necessary. In the touchiest case, begin by commenting weeks ahead of time on the really excellent TV fare to be had on the UHF channels. In an off-the-cuff manner, build up the impression with the XYL that what you are really hankering for in life is access to the programming on some u.h.f. station. The reason for this is simple: whatever you put up in the way of an antenna support, it will be topped off by a tiny u.h.f. yagi in order to maintain the official public position that the whole thing is to enable reception of the weak u.h.f. channel.

The strategy is to make guy lines into dipoles. Or whatever type of antenna will look unsuspicious. Fig. 1 illustrates the basic principle. Standard aluminum guy wire will serve both as antenna legs and guy lines. Use a set of four wires from the top of the mast. The only precaution is to use bolts to connect feedline to antenna elements to insure a good and lasting connection. Now, the size of the house will determine how long the antenna legs can be, and the angle at which they will slope from the mast. Don't worry about acute angles at the apex. If an 80 meter inverted Vee is the objective, two tricks can take up the slack line after the fake guy-line connection to the roof is made. First, the excess wire can be nestled under the eaves of the roof and run around the house for as long as necessary. The direction of turn should be opposite, with one leg heading to the right, and the other to the left. The second trick is to wind the remaining excess wire into a helix. Thick nylon or plastic clothesline (without wire inner reinforcement!) will serve the bill. The helix line can be run to the ground, or under the eaves. Some pruning probably will be necessary to resonate the antenna again.

If two-band operation on 80 and 40 is desired, inconspicuous traps can be made using Amidon T-68-2 toroid cores[1] shunted by silver mica capacitors. These can be inserted to give the impression that they are insulators in the

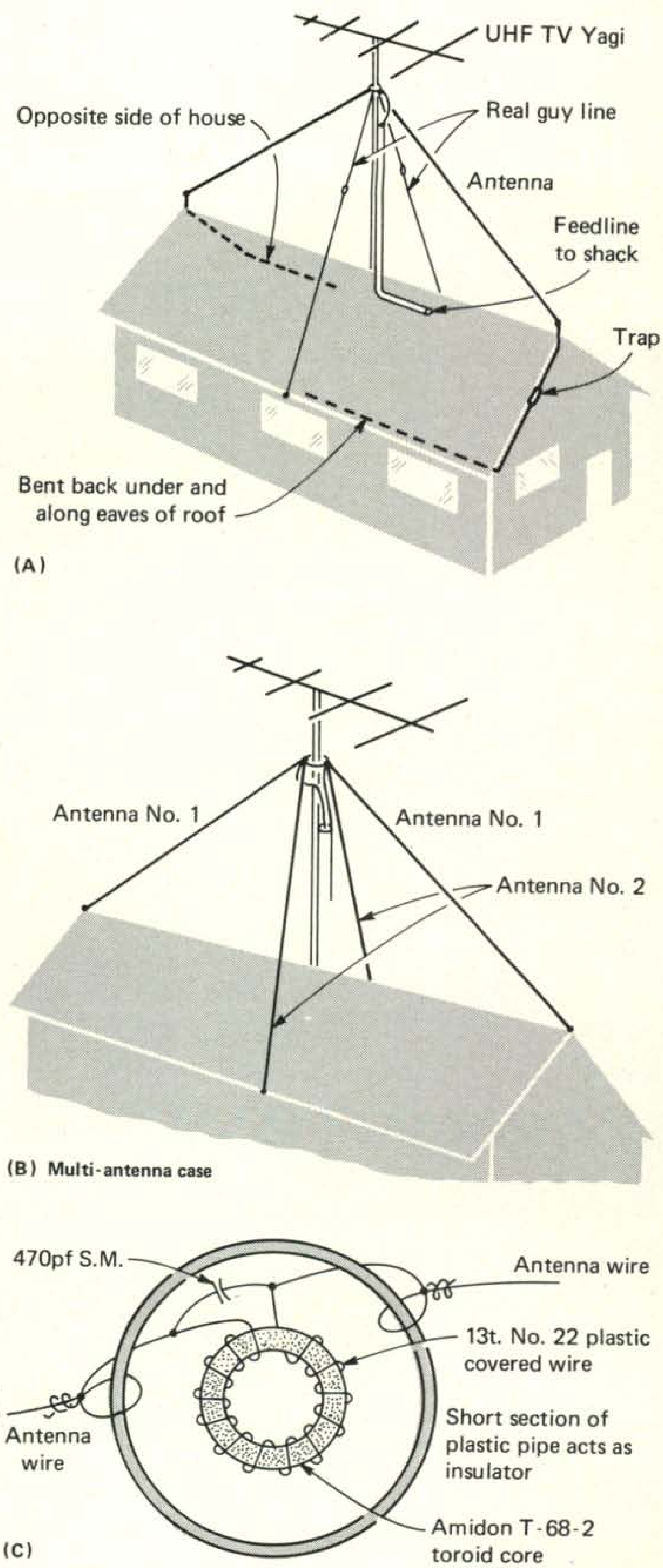


Fig. 1—The "Subversive" Inverted Vee antenna posing as the guyline for a mast supporting a u.h.f. TV antenna. (A) A single-band or two-band-with-trap version. (B) Multi-antenna situation. (C) Detail of trap construction. Connections to trap should have some slack to enable plastic insulator to absorb strain of antenna.

[*Continued on page 63*]

Announcing

THE CQ WORLD WIDE WPX SSB CONTEST

March 29-30, 1975

I Contest Period: Starts 0000 GMT Saturday. Ends: 2400 GMT Sunday. Only 30 hours of the 48 hour contest period permitted for Single Operator stations. The 18 hours of non-operating time may be taken in up to 5 periods anytime during the contest, and must be clearly indicated on the log. Multi-operator stations may operate the full 48 hours.

II Objective: Object of the contest is for amateurs around the world to contact as many amateurs in other parts of the world as possible during the contest period.

III Bands: All bands, 1.8 thru 28 MHz may be used, but operation is confined to two-way single side band *only*.

IV Type of Competition: 1. Single Operator (a) All Band, (b) Single Band. 2. Multi-operator, All Band, *only*. (a) Single Transmitter, (only one signal permitted), (b) Multi-Transmitter, (one signal per band permitted).

V Exchange: Five figure serial number, RS report plus a progressive three digit contact number starting with 001 for the first contact. (Continue to four digits if past a 1000) Multi-Transmitter stations use separate number for each band.

VI Point: 1. Contacts between stations on different continents; count 3 points on the 14, 21, and 28 MHz bands, and 6 points on the 7, 3.5 and 1.8 MHz bands.

2. Contacts between stations in the same continent but not in the same country count 1 point on 14, 21 and 28 MHz, and 2 points on 7, 3.5 and 1.8 MHz. (Exception: Contacts between different North American countries count 2 points on 14, 21 and 28 MHz, and 4 points on 7, 3.5 and 1.8 MHz. This applies to North American countries *only*.)

3. Contacts are permitted between stations in the same country for the purpose of obtaining a Prefix multiplier, but have no QSO point value.

VII Multiplier: The multiplier is determined by the number of different prefixes worked.

A "prefix" is considered to be the two or three letter/number combinations which forms the first part of an amateur call. (W1, W2, WA2, DL1, DJ, 4X4, 5A1 etc. See WPX rules.)

Each prefix may be counted only *once* during the contest.

VIII Scoring: 1. Single Operator (a) All Band score, total QSO points from all bands multiplied by the number of different Prefixies worked. (b) Single Band score, QSO points on that band multiplied by the number of different Prefixes worked.

2. Multi-Operated Stations. Scoring in both these categories is the same as the All Band scoring for Single Operator.

3. A station may be worked once on each band for QSO point credit. However, prefix credit can be taken only *once* regardless of the band.

IX Awards: Certificates will be awarded to the highest scoring station in each category listed under Sec. IV.

1. In every participating country.

2. In each call area of the United States, Canada and Australia.

All scores will be published. However to be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must show a minimum of 24 hours.

A single band log is eligible for a single band award *only*. If a log contains more than one band it will be judged as an all band entry, unless specified otherwise. However a 12 hour minimum is required on the single band.

In countries or sections where the returns justify, 2nd and 3rd place awards will be made.

X Special Awards: 1. WORLD—Single Operator, Single Band. A trophy donated by Jack Reichert, W3ZKH.

2. WORLD—Single Operator, All Band. A Trophy donated by Don Murray, K4FMA.

3. WORLD—Multi-operator, single transmitter. The Ted Thorpe, ZL2AWJ Memorial Award, donated by Don Miller, W9WNV.

4 WORLD—Multi-operator, multi-transmitter. The Chuck Swain, K7LMU, Memorial Award, Donated by Don Miller, W9WNV.

5. CANADA—Single operator, Single Band. A Trophy donated by Gene Krehbiel, VE7DKS.

WORLD-WIDE WPX SSB CONTEST

Page 3 of 13 Pages

CALL HV3SJ Log For 28 Mc Band COUNTRY ______

(Use separate log for each band.)

DATE / Time GMT	STATION	SERIAL NUMBER Sent	SERIAL NUMBER Received	Fill in only when QSO is mult. PREFIX	Points
30 MARCH					
1344	EI1AA	59078	59221	EI1	1
1402	EA6BJ	59079	59081	EA6	
10	SQ5Z	59080	59042	SQ5	
30	CR7IZ	59081	58240	CR7	3
41	W1GYE	59082	59101	W1	
45	W1WY	57083	58079		
54	K1DWQ	56084	55042	K1	
1500	W2PY	59085	59147	W2	
03	W3AZD	59086	57099	W3	
18	W8IMZ	59087	56078	W8	
22	K2BQO	57088	56083	K2	
37	W4SYL/5	59089	58102	W5	
48	WAØTKJ	56090	56079	WAØ	
55	W6FD	56091	55100	W6	
1601	TE2CF	57092	45209	TE6	
09	W1MDO	58093	59088		
18	LU2DEK	55094	54212	LU2	
25	PY1MB	57095	57113	PY1	
38	4A4AA/1	59096	59372	4A1	
49	9Z4LO	59097	59372	9Z4	
1700	PY1MO	44098	54103	PY1	
OFF	1703	- 1903 -	2 HRS.		
1904	KS6DY	59099	59412	KS6	3
18	5W1AR	59100	59399	5W1	
21	WB4MIZ/HK3	56101	57099	HK3	
25	8P6FN	57102	58201	8P6	
44	CN8HD	59103	59371	CN8	
58	CQ6LF	59104	39400	CQ6	
2005	VQ9R	57105	55413	VQ9	
30	RAØUBG	55106	44101	RAØ	
31 MARCH					
OFF	2033	- 0633	- 10 HRS.		
0635	~~K1DWQ~~	~~55107~~	~~56095~~		DUP
49	WA9HYS	56108	56101	WA9	3
0703	OD5BA	58109	59495	OD5	
13	HM1AJ	57110	57778	HM1	
22	XW8FS	55111	54801	XW8	
41	GC3YIZ	59112	59639	GC3	
57	UD6HB	58113	57807	UD6	
0809	LX1BW	59114	59449	LX1	
12	DK400	59115	59369	DK4	
		TOTAL POINTS THIS SHEET			

CQ Form 1069 eff. Feb. 1968

A sample log sheet already filled out. Official log sheets are available from CQ, see (XII) below.

6. USA—Single Operator, All Band. The Charles "Joe" Hiller, W4OPM Memorial. Donated by Jerry Hagen, WA6GLD.

7. USA—Single Operator, Single Band. The Charles "Joe" Hiller, W4OPM Memorial. Donated by the Virginia Century Club.

XI Club Competition: No club award is planned at this time, however one may be given if sufficient interest is shown.

XII Log Instructions: 1. All times must be in GMT. The 18 hour non-operating periods must be clearly shown.

2. Use a separate sheet for each band.

3. Prefix multipliers should be entered *only* the FIRST TIME they are contacted.

4. Logs must be checked for duplicate contacts and prefix multipliers. Recopied logs must be in their original form, with corrections clearly indicated.

5. A prefix check list is not only desirable but a *must* for proper contest operation. (It is recommended that you also send it along with your contest log.)

6. Each entry must be accompanied by a Summary Sheet listing all scoring information, the category of competition and the contestant's name and mailing address in BLOCK LETTERS.

Also a signed declaration that all contest rules and regulations for amateur radio in the country of the contestant, have been observed.

7. Official log and summary sheets are available from *CQ*. A large self-addressed envelope with sufficient postage or IRCs must accompany your request.

If official forms are not available you can make your own by following the attached stample, with 40 contacts to the page.

(Daystrom Limited has made an International Log Form which is available to Canadian amateurs. We will supply them with Summary Sheets. Write to: 1480 Dundas Highway East, Cooksville, Ontario.)

XIII DISQUALIFICATION: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct; taking credit for duplicate contacts; incorrect QSO's or incorrect prefixes will be deemed sufficient cause for disqualification.

Disqualifiction can also result in the disqualified operator(s) being barred from competition in all *CQ* contests for a period of up to three years.

Actions and decisions of the *CQ* Contest Committee are official and final.

XIV Deadline: All entries must be postmarked *no later* than May 1, 1975. In rare isolated areas the deadline will be made more flexible.

Logs go to: *CQ* WPX SSB Contest Committee, 14 Vandeventer Avenue, Port Washington, L.I., N.Y. 11050.

1974 CQ World Wide DX Contest High Claimed Scores

The following are high claimed scores received and processed by December 15, 1974, so don't be alarmed if you don't see your score listed

Phone

USA

Single Operator
All Band

W3LPL (Op. WA3HRV) 1,327,742
W6RR 1,326,186
W3AU (Op. W9SZR) 1,323,170
K6UA 1,265,232
W7JST 1,237,120
W6MAR 1,182,360
W3GRF 1,144,540
K4VX 883,872
W3BGN 880,149
W2GXD 841,338
K3GJD 692,384
W3CRE 684,738
K1CSJ 648,174
W4QQN 642,224
K6OVJ (Op. W6DSQ) 641,352
W4UPJ 614,725
W4YWX 570,489
W2GUH/0 534,136
K5PFL 532,856
W9MIJ/4 505,284

Single Operator
Single Band
1.8 MHz

WB8APH 2,418
K1PWB 1,175

3.5 MHz

W1EBC 44,540
K8INX 35,332
W4CRW 33,129
W5LUJ 26,411

7 MHz

W3PHL 88,683
W4QCW 73,332
WA6IQM 36,704
W6PXG 32,964
K8LUU 32,370
WA3TLR 26,900
WA9HEU 26,136

14 MHz

K4IRQ 262,800
W2GRR 259,160
WA8YVR 218,854
WA1NKK/1 193,595
W9YRA 153,120
WA8DXG 131,220
WØPCO 130,013
WA8QOY 127,500
K8DYZ 114,480
W3EZT 113,316
W7KHS 107,738
W9ZRX 102,258

21 MHz

K6SDR 349,544
WA6EKL 292,866
W6HX 210,600
WA5RXT 167,442
K8LEE 166,400
W2NIN 154,572
KØGJD/6 135,736
K1IMP 134,664
WB4TPU 129,280
WB6PNB 115,000
K5FKD 101,135

28 MHz

K4JRB 51,306
W4LBP 42,456
K4KJN 35,478
W8WPC 35,022
WA1HFN 31,339
WB6PXP 26,796

Multi-Single

W3WJD 2,440,167
W6ONV 1,277,586
W4FDA 1,217,920
W9LT 1,119,180
K6CQF 1,030,428
W6YRA 883,353
W2HPF 878,218
W5NOP 523,392

Multi-Multi

W2PV 3,859,185
W3GPE 3,093,552
W4BVV 2,889,254
WA8ZDF 2,889,048
WB5DTX 2,564,568
W1ZM 2,492,648
W3FRY 1,985,404
W3GM 1,520,649
W6DGH 1,365,210
K4CG 1,212,200

DX

Single Operator
All Band

ZD3X 6,653,881
4M6AW 6,428,946
FYØBHI 5,974,560
KH6RS (Op. W6DQX) 3,337,005
XU1DX 2,624,220
9Y4VU 2,522,532
HC2YL 2,374,818
9L1JT 2,267,406
KP4EAJ 2,181,856
KH6IGJ 1,908,988
VU2DK 1,797,602
KH6IJ 1,694,640
LU8AJG 1,684,530
6W8FP 1,619,385

Single Operator
Single Band
1.8 MHz

PAØHIP 5,200
9Y4GS/VP7 3,822
GM4ASY 2,224
4X4UR (Op. VE3MR) 1,188
VE3NCT/3 (Op. VE3ECP) 520
KZ5AA 429

3.5 MHz

YV5CVE 268,140
YV2AA (Op. YV4YC) 86,043
EIØREI 68,991
IT9ZGY 67,915
I3MAU 46,588
OH1XX 43,435
VE5NW 26,825

7 MHz

EA4LH 165,300
VE3BMV 130,660
YU3DBC 117,260
SM6CKU 110,922
JA2BAY 78,805
DK3FB 57,960
ZL4BO 56,610
G4BUE 54,614
HI8LC 52,320

14 MHz

CR6WW 1,058,446
CX7B 974,700
4W1GM 743,840
YV4TI 587,011
I5BPD 570,048
PY7NS 489,600
YU4VFC 416,570

21 MHz

KP4AST 780,015
CR6OZ 633,780
CR6OR 589,680
EA8JJ 358,254
KH6BZF 271,215
ZF1SV 270,810
KH6IGC 242,276
KH6ICR 210,675

28 MHz

CR6NO 640,170
CR6CN 591,155
CE6EZ 565,616
HT10AA 485,210
YV1AQE 401,520
XG1J 286,580
CR6II 248,292

Multi-Single

PY2CAB 7,095,222
VP2GMB 6,146,268
VP2MSU 5,637,380
CV4C 5,076,696
OD5HC 4,606,547
VP7BC 3,741,516.
VP5WW 3,316,500

Multi-Multi

PJ9JR 19,542,240
4Z4EU 3,950,292
KS6EZ 2,792,145
OH1AA 1,812,723
HB9H 1,616,220
OH2AW 1,159,158

C.W.

USA

Single Operator
All Band

W6RR 907,136
K6UA (Op. W6BHY) 804,340
W7IR 796,975
W1BPW 779,508
W6MAR 693,714
K6OVJ 672,221
W7TML 543,840
W3VT 539,068
W9LT 536,607
WB4AEX 529,210
W9IRH/7 517,532

Single Operator
Single Band
1.8 MHz

W1BB 6,279
W3IN 3,914

3.5 MHz

W4CRW 43,600
W6NLZ 21,168

7 MHz

WB5DTX (Op. W5BJA) 158,886
W6ITY 112,983
WB5DIZ 61,542
WA6AHF (Op. WA6PMK) 34,398
W4QQN 25,956

14 MHz

K6SDR 223,560
W4AAV 181,630
W9KNI 136,736
WØPCO 131,806
WB6KBK 124,080
WA5ZNY 99,800

21 MHz

W4KFC 161,880
W4WSF 133,380
K4PHY 106,106

28 MHz

No entries yet received

Multi-Single

K4YFQ 799,578
W8ROF 500,717

Multi-Multi

W3FRY 1,609,097
WA6EPQ 1,057,398
W3TV 694,568

DX

Single Operator
All Band

KH6RS (Op. W6DGH) 2,738,904
YJ8GS 1,213,086
KH6IJ 1,028,146
JA2JW 820,338
HS2AIG 432,820
DK4PH 404,863
PAØTAU 131,453

Single Operator
Single Band
1.8 MHz

PAØHIP 12,704
KH6CHC 6,891
KZ5AA 966

3.5 MHz

KV4FZ 185,110
VX1KE 70,449
G3ESF 42,351

7 MHz

VA7WJ (Op. VE7AON) 96,085
KH6HSW 58,080
JA2BET 58,065
I3LID 50,400
JA2INO 26,832

14 MHz

G3HCT 300,978
JA2MGE 178,524
G3KDB 129,470

21 MHz

9H1CH 88,634

28 MHz

WB4KSE/KW6 207,662
ZL2ACP 30,384
YU3ER 14,839

Multi-Single

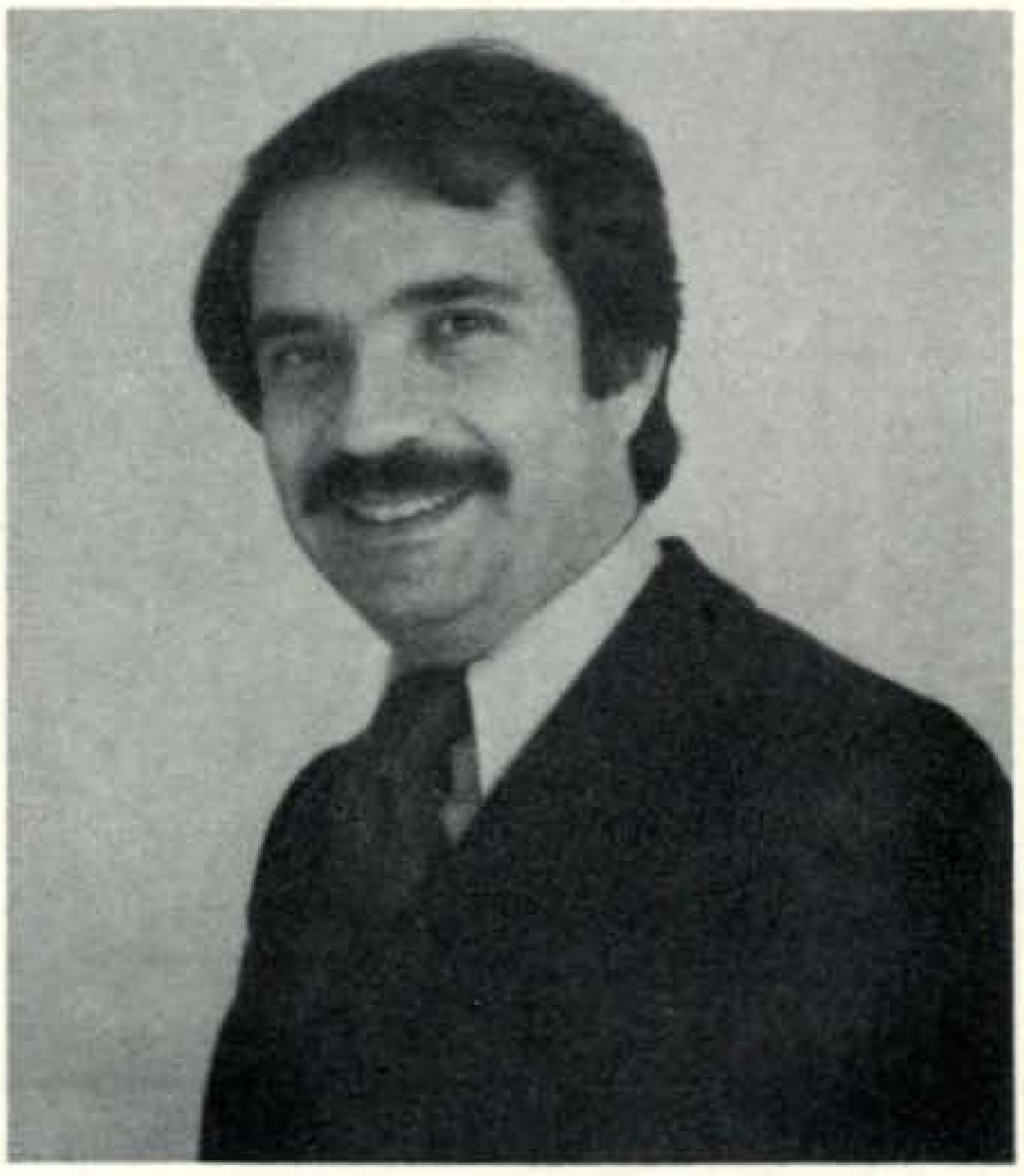
CT3WA 3,004,333
EA2IA 2,018,458

W2IWC/6 Named New Director of the CQ DX Contest

FRED L. Capossela, Jr., W2IWC/6, is the new man in charge of the *CQ* World Wide DX Contest. He assumes responsibility for the DX Contest and the Contest Committee. We're also happy to report that Frank Anazalone, W1WY, will continue as Contest Chairman and Editor.

W2IWC/6 has been licensed nearly 25 years and holds an Extra Class ticket. He is rounding out 10 years on the Contest Committee as Frank Anazalone's right-hand man and *CQ's* Contest Consultant. Fred entered his first contest more than 20 years ago—the 1953 Sweepstakes—and finished 39th—in his section. Undaunted, he returned the next year and won it. Then went on to become one of the chief operators of the Multi-Multi, K2GL. You may have worked Fred as W2IWC/KC4 when he DXpeditioned to Navassa in the late 1950's, or more recently, when he activated HV3SJ.

Two years ago he moved to Los Angeles and lives in Rudolph Valentino's alleged hideaway house in Laurel Canyon. When not running the largest DX contest in the world or chasing DX on 80 meters, Fred is vice-president, Batten, Barton, Durstine & Osborn Advertising, Inc.



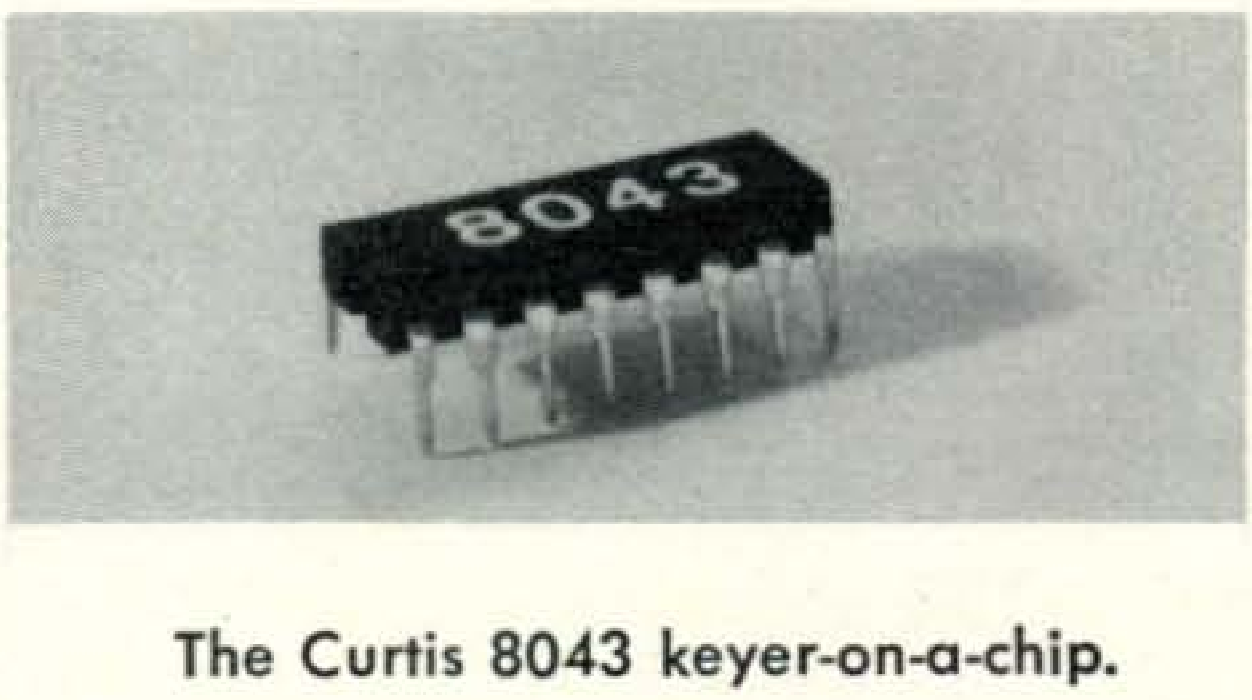
W2IWC/6 new DX Contest Director. Contest-related mail to Fred should be addressed to Fred Capossela, Jr., W21WC/6 Director, CQ DX Contest, c/o CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

A Close Look At The Curtis 8043 Keyer Chip

EVERY now and then, a new amateur product is introduced which merits special note because it is radically new or a marked departure from what we have been used to. The new Curtis Electro-Devices 8043 IC keyer chip definitely qualifies. This is the first instance that an integrated circuit has been developed specifically for the radio amateur. It is not an offshoot of another program or a product adaptable to other needs. It's for the c.w. operator only. Given the present state-of-the-art, development costs for integrated circuits and the relatively limited number of potential customers, it's unlikely you will see too many similar circuits in the immediate future.

Using the experience gained in producing various models of keyers using discrete integrated circuits, Curtis has combined in this IC, all the features required by the dyed-in-the-wool c.w. operator . . . instant starting clock; self-completing dots, dashes and spaces; dot memory; weight control; iambic operation and adjustable sidetone. In addition, the 8043 provides key debouncing filters which solve the perennial problem of extra dot and dash insertions caused by imperfect key closure.

All this performance is available at practically no expense of electrical energy because complementary metal-oxide semi-conductor (CMOS) technology is employed. CMOS circuits require no power when at rest and little more when switching, especially at low frequencies. The only power consumed in a keyer using the 8043 is associated with producing an audible sidetone and driving a switching transistor.



The Curtis 8043 keyer-on-a-chip.

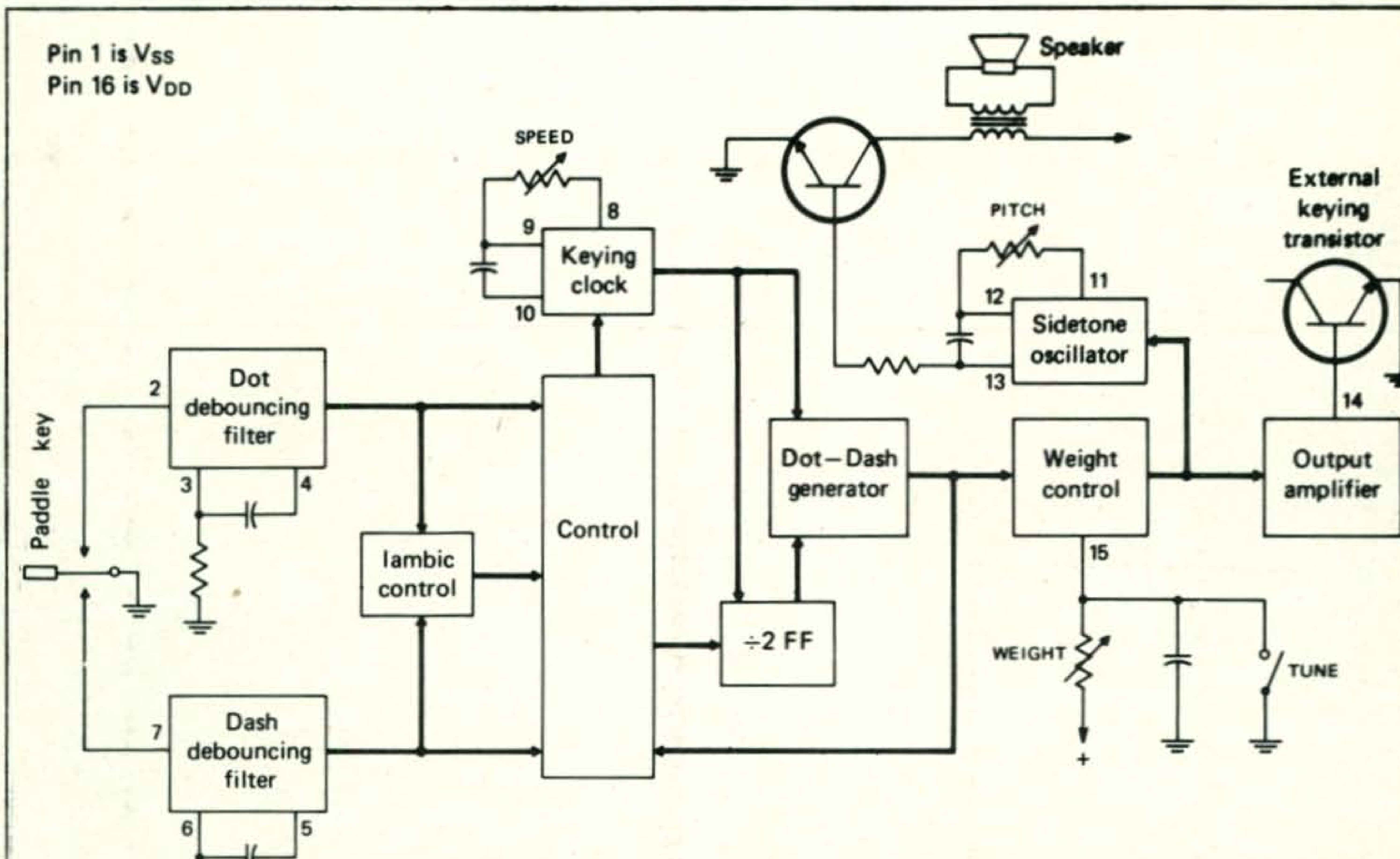


Fig. 1—Block diagram of the Curtis 8043 keyer-on-a-chip. Additional circuitry which the builder may wish to add to the 8043 is shown (outboard a.f. amplifier to drive a loudspeaker, and an external keying transistor for keying loads greater than the chip itself is capable of handling).

The 8043 is housed in a 16 pin dual in-line package. It replaces eight discrete IC's plus the interconnecting circuitry and some of the associated components. It's hard to believe that all that function (about 150 transistors) is crammed onto a piece of silicon only eighty thousandths of an inch square (about the size of this capital "M").

With a single IC performing the function of what formerly was a board full of IC's, the possibilities for application become endless. We can now have a really good keyer built into that QRP rig; we can build a keyer into a paddle, modernize that (impressive looking) "tube" keyer or just use it for a guaranteed-to-work home brew job. Speaking of guarantees, after a three month unconditional guarantee, Curtis will replace a defective 8043 for under 10 dollars, forever.

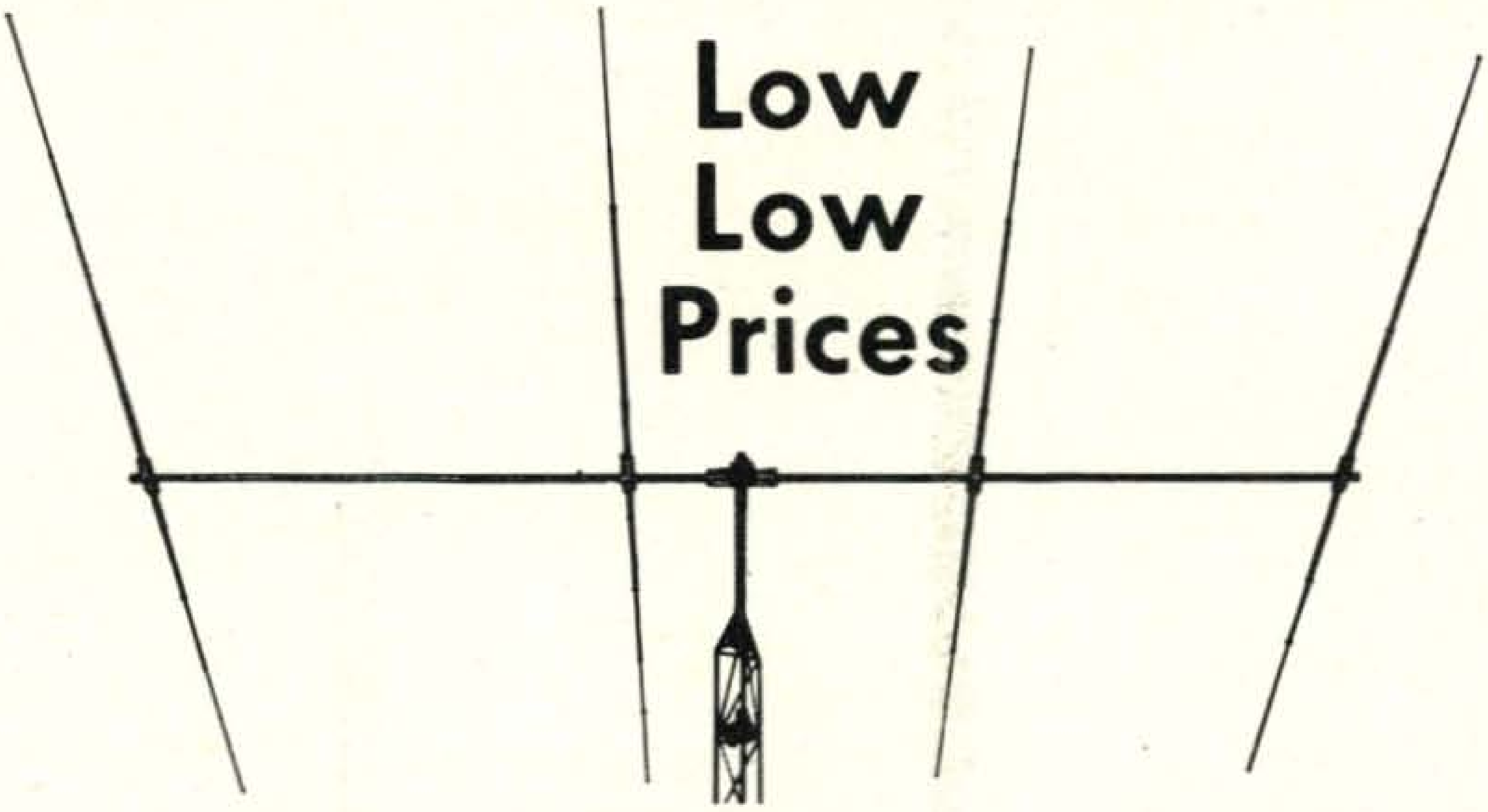
Curtis sells the IC in either a barebones $24.95 kit (IC, PCB and socket) called the 8043-1, or in a $49.95 kit (8043-2) containing all the hard-to-find parts. You still have to add a cabinet, jacks, switches and knobs. It is possible to key plus or minus 300 v at up to 200 ma with the keying transistors provided. You can use a 9 v transistor radio battery for power.

Goup rates are available for clubs interested in doing a keyer project.

For further information, write Curtis Electro Devices, Inc., Box 4090, Mountain View, California 94040. ■

Wilson Electronics

WILSON 204 MONOBANDER



The Wilson 204 is the best and most economical antenna of its type on the market. Four elements on a 26′ boom with Gamma Match (No balun required) make for high performance on CW & phone across the entire 20 meter band.

The 204 Monobander is built rugged at the high stress points yet using taper swaged slotted tubing permits larger diameter tubing where it counts, for maximum strength with minimum wind loading. Wind load 99.8 lbs. at 80 MPH. Surface area 3.9 sq. ft., Weight 50 lbs., Boom 2″ OD.

All Wilson Monoband and Duoband beams have the following common features:

- Taper Swaged Tubing
- Full Compression Clamps
- No Holes Drilled in Elements
- 2″ or 3″ Aluminum Booms
- Adjustable Gamma Match 52 Ω
- Quality Aluminum
- Handle 4kw
- Heavy Extruded Element to Boom Mounts

- **M204** 4 ele. 20, 26′ 2″ OD **$109.00**
- **M203** 3 ele. 20, 20′, 2″ OD **$ 79.00**
- **M155** 5 ele. 15, 26′, 2″ OD **$109.00**
- **M154** 4 ele. 15, 20′, 2″ OD **$ 79.00**
- **M105** 5 ele. 10, 20′, 2″ OD **$ 69.00**
- **M106** 6 ele. 10, 26′, 2″ OD **$ 89.00**
- **M104** 4 ele. 10, 17′, 2″ OD **$ 49.00**
- **M340** 3 ele. 40, 40′, 3″ OD **$349.00**
- **M240** 2 ele. 40, 16′, 3″ OD **$199.00**
- **M520** 5 ele. 20, 40′, 3″ OD **$189.00**
- **M715** 7 ele. 15, 40′, 3″ OD **$149.00**
- **DB45** 4 ele. 15, 5 ele. 10, 26′, 2″ OD **$119.00**
- **DB43** 4 ele. 15, 3 ele. 10, 20′, 2″ OD **$ 99.00**
- **DB54** 5 ele. 20, 4 ele. 15, 40′, 3″ OD **$209.00**

All Wilson Antennas are FACTORY DIRECT ONLY! The new low prices are possible by eliminating the dealer's discount. All antennas in stock. If you order your antenna by March 15th you may purchase a CDR Ham II for $119.00 or a CDR CD44 for $79.00. Order by Phone, COD. All 2″ Boom antennas shipped UPS or PP. 3″ by truck.

Wilson Electronics Corporation

P. O. BOX 794 HENDERSON, NEVADA 89015 702–451-5791

antennas

BY WILLIAM I. ORR,* W6SAI

"Baluns," said Pendergast emphatically, gently pounding the table so that the bottle would not overturn. "Baluns are the name of the game."

I held my glass of *Chateau Yquem '64* up toward the window, letting the golden, afternoon sunlight illuminate the liquid.

"Good body and color," I said. "Notice the aroma. A superlative wine in a good year."

*48 Campbell Lane, Menlo Park, CA 94025.

"You are not listening," replied Pendergast. "Hardcore just put a balun on his tri-band beam. Claims it improved his front-to-back ratio and gave him a good S-unit more signal strength. What do you think of that?"

I put the glass on the table. "Poor Hardcore," I replied. "It seems as if he has reinvented the wheel. Baluns have been around for a long time."

Pendergast figeted impatiently. "Well, his tri-band beam was fed directly with a 50 ohm coaxial line. Bound to be plenty of mismatch. He never could get a decent s.w.r. figure—."

"Now, hold it," I said. "I'm tired of hearing you sound off about s.w.r. and Hardcore's ability to work DX. And that goes for baluns, too. Believe me, baluns, speech compressors and multi-element high frequency beams are joining the status of horsepower in cars, antenna gain and receiver sensitivity as far as the sales pitch is concerned.

"Let's get to the point—baluns, in this case! A balun is nothing more or less than an electrical transformer for converting a balanced electrical system to an unbalanced one, or vice-versa. By a balanced system, I mean a 2-conductor system with both conductors electrically

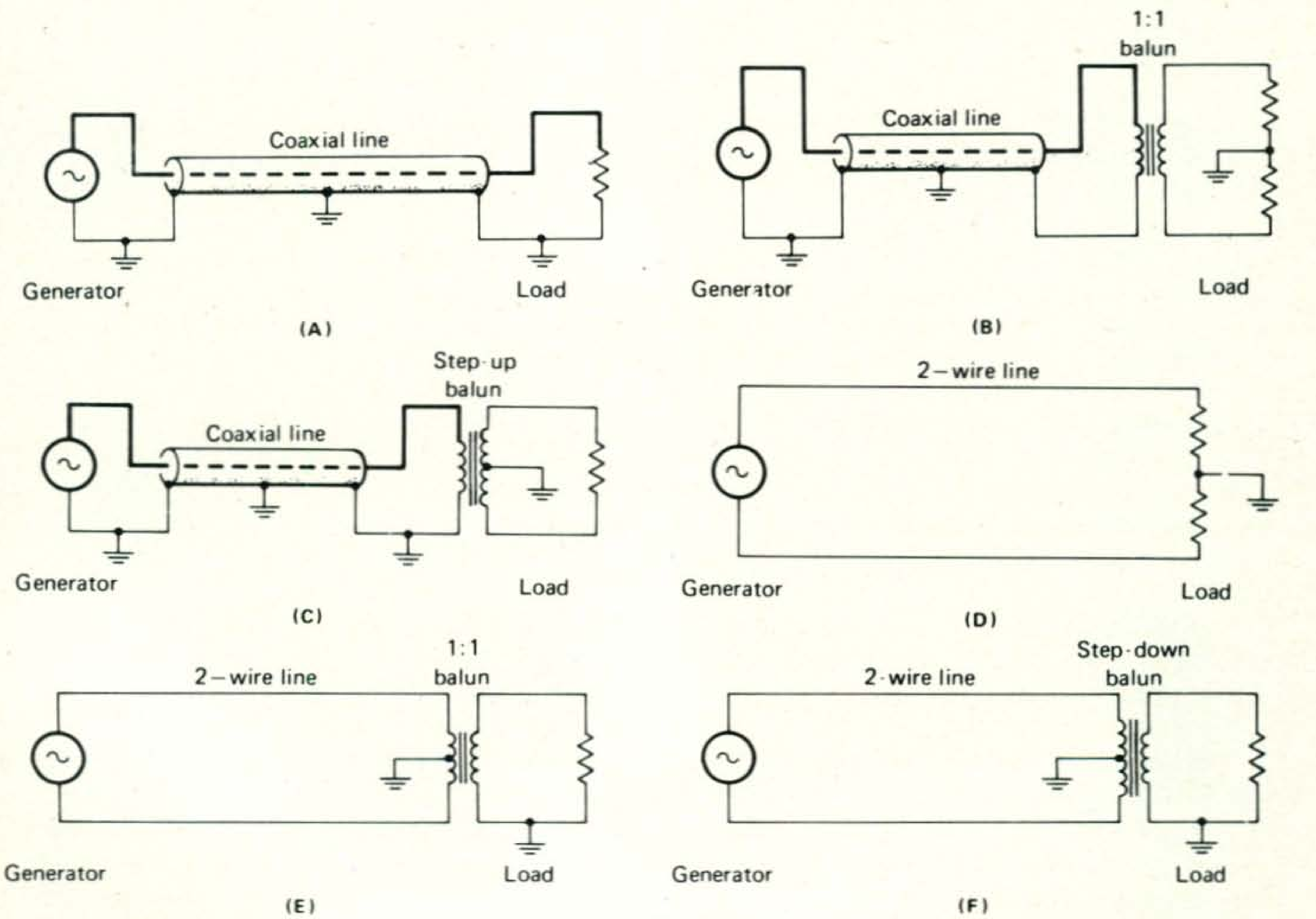


Fig. 1—The simple balun transformer. (A) Unbalanced generator feeds unbalanced load via coaxial line. (B) Unbalanced generator feeds balanced load through coaxial line and balun transformer. The secondary of the transformer may be center-tapped and returned to ground. (C) Unbalanced generator feeds high impedance load through coaxial line and step-up balun. In this example, secondary of balun is center-tapped. (D) Balanced generator feeds balanced load through 2-wire, balanced line. (E) Balanced generator feeds unbalanced load through 2-wire balanced line and balun transformer. (F) Balanced generator feeds low impedanced, unbalanced load through a balun and 2-wire, balanced line.

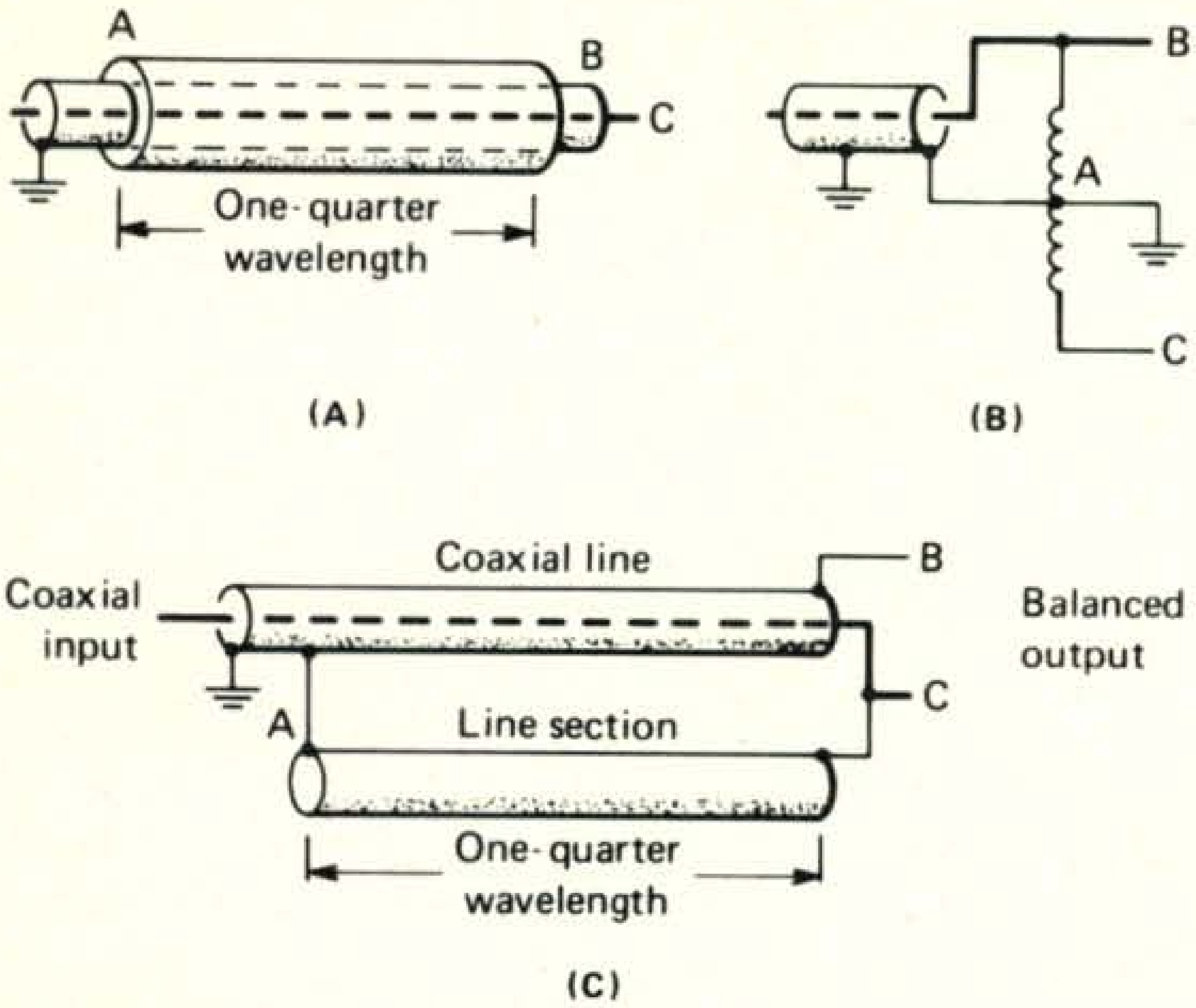


Fig. 2—Unbalanced coaxial line provides a balanced termination at points B-C by introducing a high impedance between the outer conductor of the coaxial line and ground by means of a quarter-wavelength sleeve (A). The equivalent electrical circuit is shown in (B). (C) shows a linear version of the coaxial balun utilizing a quarter-wavelength long transformer section. Point A is at ground potential and points B-C are electrically balanced to ground. This linear balun provides no impedance transformation and is the prototype for the coil balun shown in fig. 4. The line section has the same diameter as the coaxial line and forms a 2-wire transformer with an unbalanced input and balanced output.

balanced to ground. And by an unbalanced system, I mean a 2-conductor system with one conductor at ground potential (fig. 1). Sometimes an impedance transformation is accomplished in the balun, but not always.

"Quite simply, it is possible to transform from an unbalanced system to a balanced system by merely introducing a high impedance between the outer conductor of the unbalanced coaxial line and ground. The simplest example of this is the coaxial sleeve (fig. 2). This balun is quite frequency sensitive but is usable over a single amateur band. There's no impedance transformation and the balanced output is at the same impedance level as the unbalanced input. A modified version of this uses a parallel-line construction instead of a coaxial construction."

"Yes, yes," said Pendergast impatiently. "That's old stuff. But how about the newer coaxial coil baluns and the ferrite core baluns?"

"Look at this," I replied, sketching fig. 3. "This is the balun of fig. 2(C) redrawn in a straight line. Notice that a common ground point is required for the end of the right-hand balun section and the shield of the transmission line, which forms the left-hand section. Now, if you just roll this up into a coil—."

"You have a coaxial coil balun," interrupted Pendergast. "Now, I see the similarity between the two designs! And the bandwidth is greater with the coiled balun than with the linear balun, is it not?"

"Correct," I replied. "The leakage reactance and turn-to-turn capacitance determine the upper frequency limit (30 MHz) and the inductance of the coils determines the lower frequency limit (6 MHz). I described a balun of this type, and how to build it, in the February, 1966 issue of *CQ*. The article was before its time, because it caused not a ripple of excitement. However a few years later, the letters started to come in, and the coaxial balun finally came into its own.

"If you don't have a 1966 *CQ*, here's a quick summary of the design. Physically, the balun looks like fig. 4(A). The coil has an inner diameter of about 6½ inches for RG-8A/U coaxial line. I wound my balun on a hunk of PVC plastic pipe I got at a plumbing supply shop. The balun consists of 9 turns. The far end of the coil is shorted, inner-to-outer conductor, and the bottom end is the 50 ohm unbalanced feed point. The coil is tapped at the exact center for the balanced output connections, which attach to the driven dipole element of the antenna. Finally, a flexible copper strap-jumper connects the top end of the coil to the coax outer conductor at the fed-end of the coil (A). It is as simple as that."

I noticed Pendergast had taken out his notebook and was scribbling furiously.

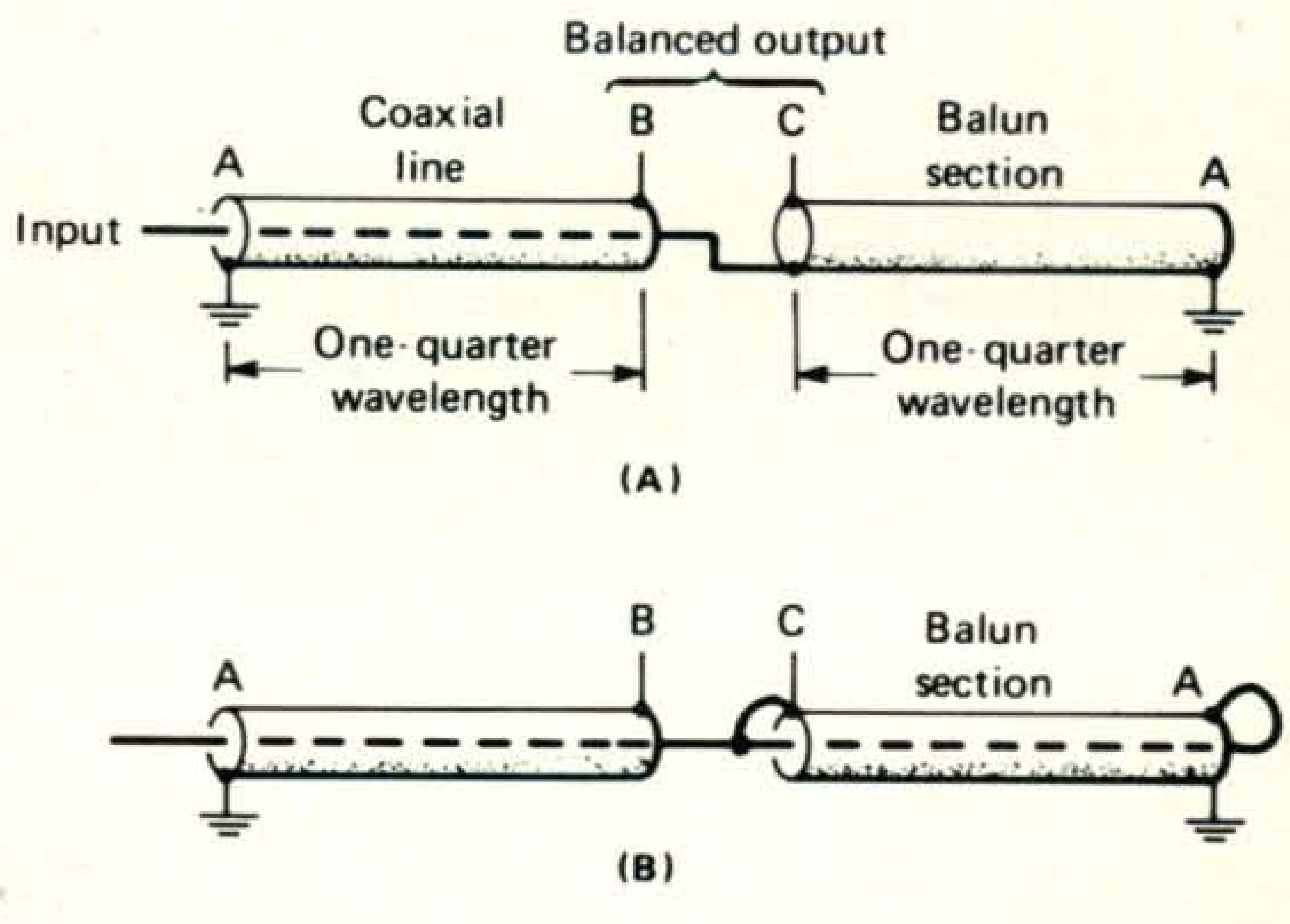


Fig. 3—The balun of fig. 2(C) is stretched out in a line and redrawn as shown here. Two quarter-wavelength sections of line are used, with the balanced output taken off at the midpoint of the configuration. The right-hand end of the device is at ground potential. The balun section has no center conductor and may be made of the outer conductor of a section of coaxial line. In the balun of fig. 4, the outer and inner conductors of the line are shorted together for ease in construction and to make the unit more rugged, but the inner conductor of the balun section contributes nothing to the action of the device. (B) shows the electrical equivalent of the balun of fig. 4, with the shorted balun section.

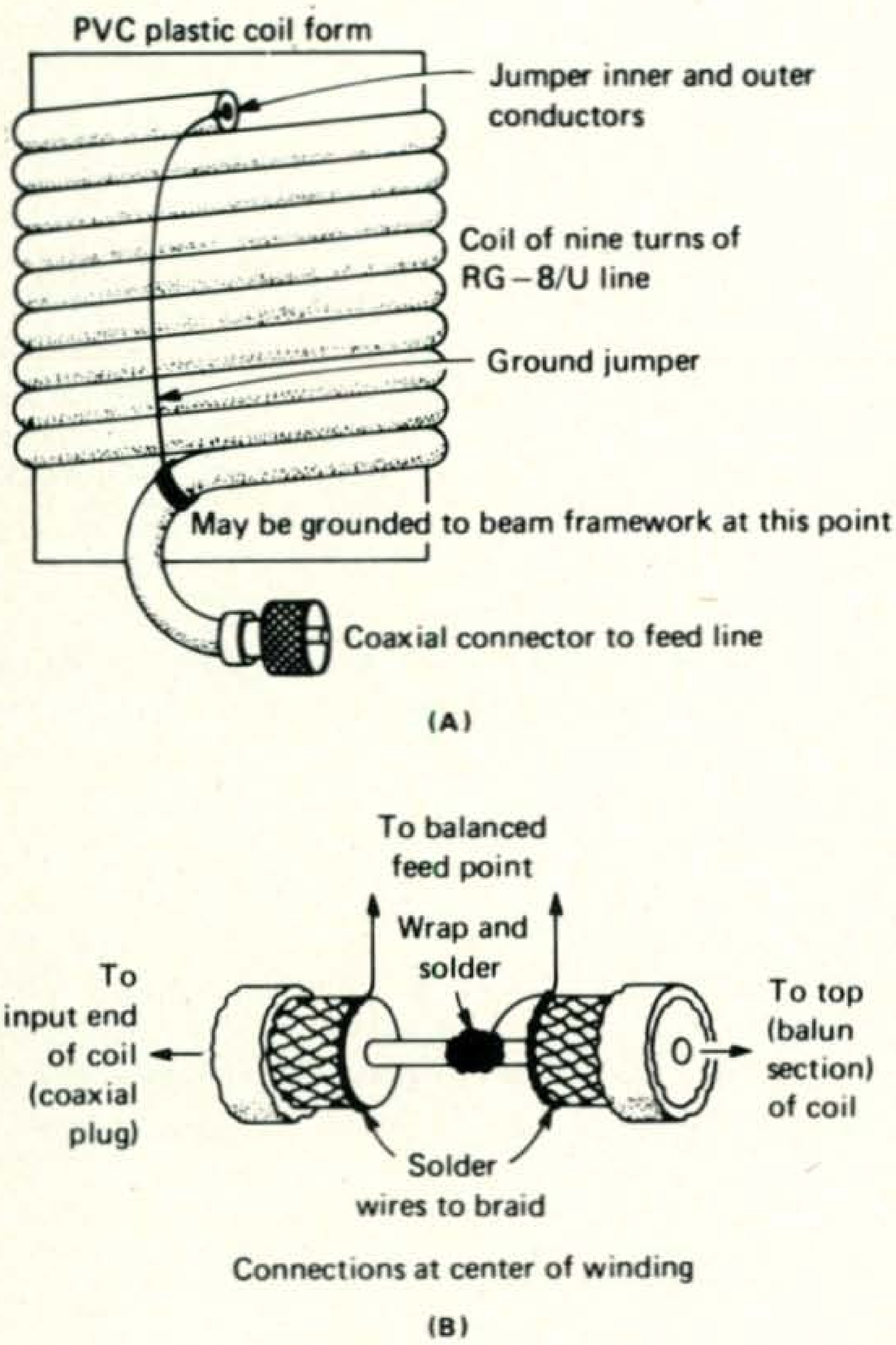


Fig. 4—(A). The coaxial coil balun is made up of nine turns of 50 ohm line wound on a form 6½ inches in diameter. In comparison with fig. 3(B), the balun section is the top portion of the winding. (B). The connections at the center of the winding are on the opposite side of the coil from the end connections and are not shown in (A). Additional information on this balun design is shown in the Feb., 1966 issue of CQ and also in the 19th edition of the *Radio Handbook*, published by Editors & Engineers division of Howard Sams, Inc.

"Tell me about the center connections," he asked.

"Start off with a piece of coaxial line about 16′ 6″ long. This will work for a coil having an inner diameter of 6½″ to 6¾″, with an inch or two of cable left over at the ends. Wind a 9 turn coil, closely spaced, and mark the mid-point, which is 4½ turns from either end. Unwind the coil so you can work with the coaxial cable more easily. Use a sharp knife and remove the vinyl outer jacket about an inch on each side of the center mark. Next, cut the braided outer conductor of the line at the center point and trim the braid back until about ½-inch is left on each side of the center point. Don't touch the center conductor or inner insulation at this stage of the game (fig. 4(B). Now, using some #14 tinned wire, wrap it around the braid at each exposed point, making terminating connections. The end of the coil which is to be shorted has two leads connected to the braid, the other end of the coil, which is the input end, has one lead attached to the braid."

"Gotcha," said Pendergast, making a large drawing in his notebook.

"Just so you won't get mixed up, better short out the far end of the coil at this point. Trim the vinyl jacket back, loosen the braid a bit and snip off a quarter-inch of the inner insulation. Twist the outer braid about the exposed inner conductor and solder the two together.

"Now you can rewind the coaxial cable on the coil form and fasten it in place with heavy twine passed through holes drilled in the form. Remember the input end of the coil has two leads connected to the shield at the center point? Well, one lead is for connection to the antenna, and the other lead is soldered to the center conductor at this point. Just remove a tiny slug of insulation from the center conductor to make the connection.

"The last step is to connect a grounding jumper from the shorted, top end of the coil back to the outer braid at the input end of the coil. I used a length of ½-inch wide copper strap scrounged from the junk box. This is the common ground point (A) and a bracket may be attached to the copper strap to mount the balun to the antenna framework if you wish.

"As a final point, you can place a coaxial plug on the input end of the balun to make a quick-disconnect joint."

"The balun goes right up at the antenna," said Pendergast.

"Correct," I replied. "You now have a balance-to-unbalance transformer that will work well over the range of 6 MHz to 30 MHz. It will take a kilowatt with ease. In fact, the balun works very well at 3.5 MHz, and also up to 35 MHz. At 3.5 MHz, however, the transformation is not quite unity, as a 50 ohm load "looks like" about 54 ohms at the input terminals of the balun. Still, that's pretty damned good performance."

"It should help the s.w.r. performance of the beam," said Pendergast.

"Negative," I replied. "If the balun is a 1-to-1 transformer, the s.w.r. on the line will not change. However, certain advantages do accrue with the use of a balun, particularly with a beam antenna. First, the balun prevents antenna currents from passing down the outside of the coaxial line. Line radiation can screw up the pattern of a good beam and produce some very puzzling effects. The most apparent effect is the loss of front-to-back ratio. Since coaxial transmission line carries some degree of antenna current when it is attached to a balanced driven element, line radiation will alter the antenna pattern. If the transmission line descends vertically below the antenna, it becomes a fine vertical antenna, radiating energy in all directions. This is usually unnoticed by the operator, until he finds that line radiation obscures the front-to-back ratio of his beam.

"In addition, antenna line currents travelling on the outer surface of the coaxial line can provide some weird s.w.r. measurements when an s.w.r. meter is inserted in the line. Most inexpensive s.w.r meters react to antenna current in an unpredictable way. The best bet is to use a balun at the antenna and remove this unwanted antenna current on the line. The balun won't change your s.w.r., but probably the s.w.r. reading you get *with* the balun is more correct than a similar reading made *without* the balun."

"How about a compact wide-band balun," asked Pendergast. "I've seen some baluns advertised that cover 3.5 MHz to 30 MHz and are only 2 or 3 inches long."

"Well, judging from the physical size, they are probably ferrite-core baluns," I replied. "As in the case of the air core balun we just discussed, the bandwidth is limited at the high frequency end by shunt capacitance and leakage reactance. The low frequency limit is defined by the shunt inductance. In order to keep the leakage reactance small, the winding should have as few turns as possible. This calls for a high permeability core of small size. Such a core is very heavily loaded. The power capability of this type of balun is limited by core temperature, which might become quite high. As the temperature increases, a runaway temperature is finally reached where operation is impractical because of unbalance in the device. If this keeps up for long, the balun will be destroyed by heat. So, you see, the common ferrite balun provides greater bandwidth at the expense of a power limitation.

"You can wind a simple ferrite balun on a rod of ½-inch diameter ferrite material of good quality. I use Q-1 rod material which has medium permeability. Good ferrite material is not easy to find, and most radio or electronic distributors don't carry it in stock. You can wind a toroid, if you like, but the toroid core costs more than the rod, and it is much harder to wind. Frankly, it doesn't seem to work any better, either. So I suggest you stick with the ferrite rod. You can get information on ferrites by writing to: *Indiana General Corp.,* Ferrite Division, Keasby, N.J. 08832. Ask for information on their ferrite rod #CF-503 and a list of distributors which carry the rod, or who can order it."

"Assume I have the rod," said Pendergast. "What do I do next?"

"The rod is about 7½″ long. You'll only need a piece about 2½″ long, so you can get three balun cores out of one rod. It is easy to break the rod. Nick it with a sharp file around the circumference at the desired length and break it with a sharp blow with your palm. The brittle rod will snap neatly off, following the scribed line.

"The winding is called a *trifilar* winding because it consists of 3 windings wound in parallel. Each winding is 6 turns, for a total of 18 turns on the core. Number 14 wire is used. Enamel-coated wire can be used, but *Formvar*-coated wire is better. *Formvar* wire can often be gotten from outfits that rewind electric motors. *Nyform* or *Nyclad* wire is even better, as it has the highest dielectric breakdown strength. However, I had to settle for *Formvar.* All you need are three lengths of

[*Continued on page 65*]

How Do You Rate?

What's Your ARM-Q*?

*Amateur Radio Marriage Quotient.

BY CHARLENE KNADLE,* WB2HJD

IF you're an average amateur-radio couple, the husband is a ham and the wife either is not or is a less active one. This questionnaire has been prepared with just such a couple in mind. Just for fun, answer *all* the questions. (Each of you might answer differently for yourselves than your spouse would answer *for* you.) To find your Amateur Radio Marriage Quotient, invite your spouse to also answer them all, then rate yourselves by the scale at the end of the article.

HUSBAND (and wife as *she* sees husband):

1. When the XYL brings you a snack in the shack, do you generally
   A. Smilingly thank her and brag to the amateur on the other end,
   B. Simply thank her,
   C. Silently smile and/or begin eating, or
   D. Glance around momentarily to see what the noise was, then return to your business, taking the food and service for granted?

2. If you're on the air and the phone rings, do you
   A. Say you've got a landline and answer it, knowing it's probably a fellow amateur,
   B. Let it ring to see if the XYL will get it, and if not, pick it up,
   C. Tell the XYL to get it and screen the caller for you, or
   D. Ignore it completely?

3. If the phone rings, the XYL answers it, and it's an amateur who wants to speak to you, do you
   A. Take the call immediately,
   B. Ask the XYL who it is and decide whether you'll take it,
   C. Ask the XYL to see what the caller wants, then if it's important enough, take it, or
   D. Ask the XYL to see what he wants, then ask her to repeat your answer to him and provide landline crossband as long as is desirable to you?

4. When the XYL calls you for a meal or an obligation do you
   A. Tell her how long you'll be and arrange to be no longer,
   B. Tell her you'll be there as soon as you can, giving no time estimate,
   C. Give her an approximate time, but adjust it according to what happens in the shack, or
   D. Not answer, because you're obviously busy?

5. If your XYL is antagonistic to amateur radio do you
   A. Limit your radio talk around her but show approval when she enters the shack or says anything favorable about your hobby,
   B. Tell her about female hams you know to try to interest her,
   C. Tease her about her lack of knowledge of ham radio, hoping she'll take it as a challenge to learn about radio, or
   D. Chide her for her lack of interest in radio and pooh-pooh her interests in return?

6. If your XYL is an actively interested non-amateur do you
   A. Show pleasure as you explain things to her, giving only as much information as she has asked for,
   B. Show pleasure as you give very complete explanations, bringing in related details (thus also benefitting yourself, by reviewing what you know),
   C. Tell her to stop pestering you and get a license manual, or
   D. Tell her she wouldn't understand? (After all, you don't want her taking over your private domain.)

7. If the XYL asks you to watch the children and you want to get on the air, do you
   A. Bring the kids into the shack with you,

*316 Vanderbilt Parkway, Dix Hills, NY 11746.

B. Stay off the air to baby sit but resent the intrusion on your relaxing time,
C. Get on the air and let the kids watch themselves, checking them occasionally, or
D. Refuse to watch the kids?

8. If your wife is talking to you as you've just turned on the rig, and you notice an interesting transmission do you
A. Wait till she finishes before you tune the rig,
B. Try to tune and converse simultaneously,
C. Tell her to hurry, or
D. Interrupt her and tell her you'll talk to her later?

9. If you had to cut your wife off for some legitimately important reason, do you subsequently
A. Contact her at the first possible moment,
B. Contact her only when you are sure you can spare several minutes,
C. Forget about it, but give your undivided attention when and if she brings it up, or
D. Forget it, and feel no obligation for subsequent apology or consideration?

10. If the XYL objects to a cluttered shack or station area do you
A. Keep it neat,
B. Invite her to make suggestions for improvement, and follow through on the ones that are practical, explaining the others,
C. Agree to clean and straighten, but somehow never get around to it, or
D. Tell her to mind her own business and concentrate on the rest of the house?

WIFE (and Husband as *he* sees wife):

1. If you just cannot see why your husband is so interested in amateur radio, do you
A. Ask him, and listen to his answers and his radio conversations,
B. Tease him about his silly hobby, but accept it,
C. Try to talk him or schedule him into spending his time at something else, or
D. Put your foot down and demand that he spend an allotted minimum of time at it, or operate or build during certain portions of the day only?

2. If you try to get through to the OM as he's on the air and he ignores you, do you
A. Leave him alone until he's more receptive,
B. Write your message and shove it in front of him,
C. Brood about his self-centeredness, building your case to confront him about it as soon as possible, or
D. Scream profanities at him, knowing he'll have to get off the air to comply with FCC rules?

3. If the OM's use of the "rig" prevents your use of the vacuum cleaner, TV, etc., do you
A. Try to use it when it does not conflict with his use of the rig, and find other things to do when he is in QSO,
B. Work out a time-sharing system with him,
C. Conform to his wishes but fret and fume either alone or in his presence, or
D. Use the appliance to thwart his radio activity, if only temporarily?

4. If you wish your husband would spend more time responding to you and/or the family, do you
A. Demonstrate your interest in his needs at the same time that you explain yours,
B. Accept the idea that he will spend little time with the family and make the most of the time he does spend, keeping his image up with the rest of the family,
C. Exclude him from family plans and gripe about him to the rest of the family, or
D. Tell him he must choose between his hobby and his wife and family?

5. If you are called upon to play hostess to amateurs whom you had nothing to do with inviting do you
A. Welcome it as a chance to make new friends and/or learn more,
B. Take it patiently for your husband's sake,
C. Resent it and talk it out with your husband, or
D. Demonstrate your resentment by neglecting or actively discouraging the guests or otherwise taking it out on them, or harbor suppressed resentments?

6. If your husband's "shack" is messy, do you
A. Leave it alone, or ask him to help you clean it,
B. Clean it to your own satisfaction, or ignore it and apologize to others about it or close the door on it,
C. Demand that he clean it or move it out of sight of the main part of the house, or
D. Neglect cleaning other parts of the house that are important to him, since he likes to live like a slob, or to show him how it feels?

7. If your husband plans to attend an amateur radio event do you
A. Plan to go along to enjoy it and help make it more enjoyable for him,
B. Plan to go for the ride and to stimulate an early return,
C. Plan to stay home and leave him alone to enjoy himself, or
D. Protest and show him how unfairly dull your life is by comparison?

8. If you're curious about some aspect of amateur radio do you
A. Ask your husband about it, listening carefully to his answer,
B. Keep quiet about your curiosity, but keep an ear and eye open for an opportunity to catch on,
C. Ask other XYLs or hams rather than your husband, for fear of the OM's possibly putting pressure on you to get into amateur radio, or
D. Squelch the impulse, since you don't plan to have anything to do with "that stuff"

[*Continued on page 63*]

NOVICE SHACK

BY HERBERT S. BRIER,* W9EGQ

New Amateur Call Sign Prefixes

The FCC is now issuing WD6 amateur call signs in California. The Army has released the *A* prefix for amateur use, and the Navy has released the *N* prefix, both upon request from the FCC. Apparently, the Commission is serious about restructuring our call letters.

ONCE upon a time, the first step in equipping a new amateur station was acquiring a receiver and using it to copy commercial and amateur c.w. stations for code practice and eavesdropping on conversations in the amateur phone bands for information and entertainment. The new operator often waited until he had passed the amateur examination before he acquired his transmitter. This procedure gave the operator the opportunity to learn how to get maximum performance from the receiver before having to worry about the transmitter, and still has much to recommend it. In recent years, however, many newcomers choose transceivers, rather than separate receivers and transmitters for their stations.

A transceiver combines "receive" and "transmit" functions in one unit and employs some components in both modes. It is more compact and may be more economical than separate units. The Heathkit HW-16, 15, 40, and 80-meter c.w. transceiver, for example, functions as a 75-90 watt, 3-band c.w. transmitter and selective receiver and sells for approximately $115.00 in kit form. The broadly comparable Heathkit DX-60B transmitter and HR-10B receiver have a price tag of approximately $200.00 in kit form, and the Drake 2-NT CW transmitter and 2-C receiver combination go for about $450.00, ready to operate. The latter units are more expensive, but they cover more frequencies, and their "receivers" are more versatile. Incidentally, all transceiver are not less expensive than separate units.

Single-sideband c.w. transceivers usually transmit and receive on the same frequency. Therefore, if the station worked is also using a transceiver, the two signals are automatically on the same frequency. This feature is particularly convenient in s.s.b. operation, because s.s.b. signals must be tuned in very precisely to be readable. Having "receive" and "transmit" frequencies locked is not always an advantage, however. Not all operators agree when signals are properly tuned in, and others are constantly fiddling with their "receive" dial. As a result, they seldom transmit on the same frequency that the other station used. The second operator, in turn, adjusts his dial to make the incoming signal sound right to him, and they waltz across the band during their contact.

Some transceivers are equipped with an "offset" control that permits their "receive" frequency to be changed a few kHz without affecting their "transmitter" frequency. The offset is not sufficient to accommodate stations that transmit and receive on frequencies far apart, as many DX stations do to keep the howling mob calling them off their transmitting frequencies. To meet this development, some transceivers may be used with an external variable frequency oscillator (v.f.o.) to permit their transmitting and receiving frequencies being controlled independently at will. But the compactness and the economy of the transceiver is gone, which brings us, full circle, back to the separate transmitter and receiver.

Modern matching transmitters and receivers combine the operating convenience of the transceiver and the versatility of the separate units at a flip of a switch. The Novice, who is equipping his station with an eye to the future, might consider buying the best receiver that he can afford from the start, and operate it in conjunction with an inexpensive c.w. transmitter —either new or used—until he gets his higher grade license and then trade the transmitter in on the matching transmitter.

Working W1AW

An ambition of many new amateurs is to work W1AW, the headquarters station of the American Relay League, Inc., Newington, Connecticut, the code-practice transmissions of which helped them to get their licenses. A surprisingly high percentage of them never hear W1AW, except during its code-practice and bulletin transmissions however, although it is open for general contacts nine times a day. Monday through Friday, U. S. time. One reason is that the operations are divided between the General class c.w. and phone bands and the Novice sub bands between 1.8 and 148 MHz, and W1AW can work only one individual and frequency at a time. The first step in working W1AW, except by chance, is to consult its latest general operating schedule, especially as it is changed periodically to meet changing

*385 Johnson St., Gary, Ind. 46402.

W1AW C.W. and S.S.B. General Operating Schedule

Time[1]	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*
			Frequency and Mode[2]		
1:00-12:00 P.M.	21/28C	21/28F	21/28C	21/28F	21/28C
2:20- 3:00 P.M.[3]	14.29F	14.08C	14.29F	14.08C	14.29F
3:00- 4:00 P.M.	7.08C	7.29F	7.08C	7.29F	7.08C
5:00- 5:30 P.M.	7.1N	21.1N	28.1N	21.1N	7.1N
8:30- 9:00 P.M.[3]	3.7N	14.08C	14.08C	7.1N	14.08C
9:10- 9:30 P.M.[3]	3.99F	50.19F	145.588F	1.82F	3.99F
10:30-11:00 P.M.	3.58C	—	1.805C	—	3.58C
11:40-12:00 A.M.[3]	7.29F	3.99F	7.29F	3.99F	7.29F
12:20- 1:00 A.M.[3,4]	3.7N	7.08C	3.99F	7.1N	3.58C

[1]EST in winter, EDT in summer. Subtract one hour for CST/CDT, two hours for MST/MDT, and three hours for PST/PDT. [2] Frequencies in MHz. C = c.w., F = s.s.b. phone, n = Novice c.w. When W1AW hears a Novice calling, it replies on the calling station's frequency. [3]Starting times approximate. [4]Actually the next morning.

Figure 1. This chart shows the times and frequencies when W1AW, the ARRL headquarters station, Newington, Connecticut, works all comers.

propagation conditions. The latest information is tabulated in Figure 1 below. The information should be accurate for a couple of months, at least. After you work W1AW, send your QSL card to ARRL, 225 Main St., Newington, Conn. 06111.

News and Views

Edward F. Munsell, K6CL, 3452 Colonial Ave., Los Angeles, Calif. 90066, advises Novices to listen more carefully for replies to their CQ's. He has heard "real DX" like VR6TC (Pitcairn Island), Western Australia, New Zealand, answer their CQ's repeatedly, only to have the Novices come on and call CQ again! Ed also advises Charles Bral, who said that he was going to use a folded dipole antenna constructed of 300-ohm TV lead in the October NOVICE SHACK to use the round type of 300-ohm line. Otherwise, its operation will be adversely affected by rain and snow. By the way, the folded-dipole usually consists of two ½-wave, insulated, parallel wires connected together at their ends. One wire is cut at its center, and the ends of a 300-ohm feed line connected to the severed ends. It has fallen into disfavor, because its impedance is 300 ohms and modern amateur transmitting gear is designed to work into a nominal 50-ohm load... Unfinished business: Mark, WB2SFF, pictured in the November column, has worked 74 countries in nine months. His TA-33 rotary beam is only 125 feet high, and he uses a 1000-watt amplifier. **Howard Koenig, WN2TQE,** 20 Shadetree Lane, Stonyboork, L. I., N. Y. 11790, works 40 meters with a Heathkit HW-7 c.w. transceiver running three watts and feeding a "long-wire" antenna. He has worked 16 states with the combination, and he is ready to take his General class test... **Joe Cherry, WN4EYW** Drawer H, Webster, Fla. 33597, offers a possible solution to Louis Kruth's antenna problem in November NOVICE SHACK. Joe uses a ground-mounted Hy-Gain 18-AVT/WB vertical with eight radials as per the data sheets packed with the antenna. He easily buried them and the coax feed line using a spade to part the grass just enough to get the wires below the ground and then pushed the grass back in place. After a few days, the grass showed no signs of being disturbed. Joe worked most of Canada, 43 states, and New Zealand in 10 months before going up for his General ticket.

Remember, this is your column. Send your pictures, news, problems, and suggestions to the address at the start of the column, and we will do the rest. You do not have to be a Novice to contribute. 73, Herb, W9EGQ

Charles Holdmann, WN9PIP, 933 N. Indiana St., Griffith, Indiana, is this month's Novice Shack Photo Contest winner. Operates 40 meters using a Heathkit HW-16 transceiver feeding a Hy-Gain 18-AVT vertical antenna. Charles is 10 and in the Fifth grade in school, builds models, and plays "little league" baseball, and is a member of the Lake County Amateur Radio Club. We are sending WN9PIP a 1-year subscription to CQ for sending this winning picture in our monthly contest. If you would like to enter the contest, send a clear photo (preferrably black and white) and some details about your amateur career to Novice Shack Photo Contest, 385 Johnson St., Gary, Indiana 46402. Suitable non winners will also be published as space permits. (photo via WB9CAC)

DX

BY JERRY HAGEN,* WA6GLD

WINTER DX conditions and low solar activity have cut down h.f. DXing. However, the ever-serious DXers have turned to the low bands to get that rare QSO. Some excellent accomplishments are reported on 160 and 80 meters and DXpedition enthusiasm continues to be excellent. Let's hope February brings the higher bands up to the level of the fantastic openings experienced in October!

DXpedition Activity

The Southern New Jersey DX Association activated Navassa Island in late November and has provided the following account of their trip:

"Navassa is rare DX indeed. It is uninhabited, completely surrounded by 50- to 100-foot cliffs (there are no beaches) and access to the island is difficult and hazardous. The island has a rugged terrain consisting of sharp, cratered, limestone rocks, scrub trees and cactus. There is no potable water supply. The only possible landing is a place where a small boat can be held long enough for men to jump onto a wire rope ladder that dangles about 35 feet from a cantilevered catwalk which juts out from the cliff. All equipment and supplies must be hauled up the same route, a process complicated by the fact that there is a constant danger of having the boat smashed up against the cliffs.

"The original plan was to arrive on Navassa mid-morning on Sunday, November 24th, and stay until about noon on Friday, November 29th. This schedule would have capitalized on the latter part of the *CQ* WW DX contest c.w. weekend to let people know we were on the air, so we could have good activity for the remainder of Sunday until the bands (or the operators) folded. Unfortunately, this goal was not achieved. Our 65-foot chartered boat encountered a severe storm at sea during Saturday evening; heavy pounding and seasickness reduced the available watchstanders to the point where the Captain was forced to steer back to Jamaica. About 8 hours later, with the storm subdued though still in progress, we again headed for Navassa. At 11 P.M. Sunday we reached the island and anchored off-shore in heavy swells, with the engines idling all night in case the anchor failed to hold.

"At daybreak on Monday, November 25th, we began to offload from the boat to a small dinghy and then to the landing ladder. A hurried station was aired and the first QSO was made shortly after 10 A.M., just one day later than scheduled. We had lost the contest operating period and with it went our initial goal of 10,000 QSO's. We were all quite beat, physically, and the task of setting up the remainder of the gear went rather slowly. It took us a couple of days to begin to feel anywhere near normal again, and the all-too-short hours of sleep didn't help much, either. Even so, during the four days on Navassa, which included the setting up and dismantling of three stations, camping facilities, and seven antennas, we did manage to make 7,321 QSO's, including 89 on 160 meters. To our surprise the total contacts were nearly equally split between s.s.b. and c.w. We had expected s.s.b. to be more top-heavy, but the final count showed 53% were on s.s.b. and 47% on c.w."

The following story appeared in a New Zealand newspaper and also featured a photo of YL *CQ* Contest DXpeditioners Marion, ZK1BKL, and Carol, ZL1AJL. The newspaper caption was "On Chathams With a Wall of Sound."

"Two Auckland amateur radio enthusiasts, Mrs. Marion Lister, of Papatoetoe, and Miss Carol Johnston, of Papakura, have been making the Chatham Islands known to the world in a big way.

"They set up 250 pounds of radio masts and gear on Chatham Island and then, for 48 hours from noon on Saturday, the airwaves were taken over for an international contest organized by *CQ*, an American radio magazine."

"The contestants' main aim was to work as many countries as possible. Because the Chathams are more than 300 miles from New Zealand, they are classed as another country—about the 150th [sic] in the radio hams' world.

"Night and day in their room at the Waitangi Hotel, Mrs. Lister and Miss Johnston faced 'a wall of sound' as operators vied to establish contact with them.

One of the world's rarest DX stations is Tim Chen, BV2A, who was visited by Dick, W0EXD and Bob, ex-TJ1AZ. Tim signs BV2B on 14 MHz s.s.b.

*P.O. Box 1271, Covina, CA 91722

"Only when dawn brought a change in the ionosphere and a short 'white-out' did the women get a break. Otherwise they slept by turns only one or two hours. At the end of the contest, they had worked nearly the full 150 countries—and logged more than 2,000 contacts.

"Mrs. Lister is a printer with a business at Papatoetoe. She took up ham radio eight years ago 'just for a hobby.' She is now councillor for New Zealand Amateur Radio Transmitters in the ZL1 area, which extends to Taumarunui.

"Miss Johnston is a clerk with the Auckland Regional Authority. She is one of a family of hams and has been operating for five years."

Three Southern California amateurs operated from Wallis Island and New Caledonia during November. Don, K6YFZ signed FWØIC and FKØIC, Gary, K6RIR was FWØGA and FKØGA while Ron, WB6LTJ signed FWØDX and FKØDX. The FKØ prefixes were the first ever issued and were new ones for WPX! During the *CQ* WW C.W. Contest, the group signed FWØAA. In total, over 10,000 QSO's were made on the DXpedition and the group enjoyed the fine hospitality of local amateurs.

Gary, W6NJU, visited Bob, YJ8BL, and operated as YJ8GS in the *CQ* WW C.W. Contest. Gary has been QSL Manager for Bob since his operation as VRIL over five years ago. Before the contest, Gary operated from 3D2CC and visited long-time DXer Felix, FK8AU.

Arvoredo Island DXpedition

The first DXpedition to Arvoredo Island, off the coast of Brazil, (46°10'W-23°58'S) has been planned for February 8-10. The DXpedition is being organized by seven Brazilian amateurs who will operate with individual special call signs. The operation will be on 28550, 21295, 14195, 14250, 7085 and 7250 kHz s.s.b. The word Arvoredo means "grove of trees" and the island has a unique history.

Arvoredo Island is considered by many as the most beautiful small island in the world. It was developed and maintained by its owner, Brazilian millionaire Fernando Edward Lee. Its hundreds of species of birds and fish originate from places as far as Florida and the Amazon River. Its wind generator is the largest in South America and its lighthouse serves as a reference point for the sea traffic. It features hot water system heated by sun rays, drinking water system derived from collected rain water and rocks resembling famous faces ranging from the Prophet to General de Gaulle. Its 70-ton crane resembling the legendary Phoenix can easily lift a 3-ton yacht into the special tank built as berth for vessels. The entire island has a global protection against lightning by a radioactive isotope placed on a pole close to the highest point of the island.

A special QSL for the DXpedition is planned and QSL's should be sent to P.O. Box 22, Sao Paulo, Brazil with IRC's for return postage.

DX Achievements

WAZ on 80 meters! Back in January 1973, *CQ* began the Single Band WAZ Award. At the time, there was concern by some DXers that WAZ on 80 meters might be impossible or be

The CQ DX Award Program

C.W. DX

166 HS3AIG
167 ZL2IR
168 OK1DAV
169 DK5MP

2×SSB

374 WA5STI
375 WA3SWI
376 K8DYZ
377 W4EEE
378 WB4BWN

Endorsements

C.W.: G5GH-28MHz
2XSSB: WA3IKK, WB6DXU-300 Countries, DK2BI-275 Countries.

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

The WPX Program

Mixed

460 DJ1TC
461 DK4SY
462 OK1DVK
463 HA2RB
464 OK1KZ

C.W.

1366 OK1FJS
1367 WB5DIZ
1367 HP1AC
1368 DK6ML

2×SSB

820 W6LQC
821 F6AED
822 SV1GO
823 IT9AZS
824 JA6GDG
825 K8IQB
826 ZL2AH

WPNX

75 WN8PJR
76 WN8QED

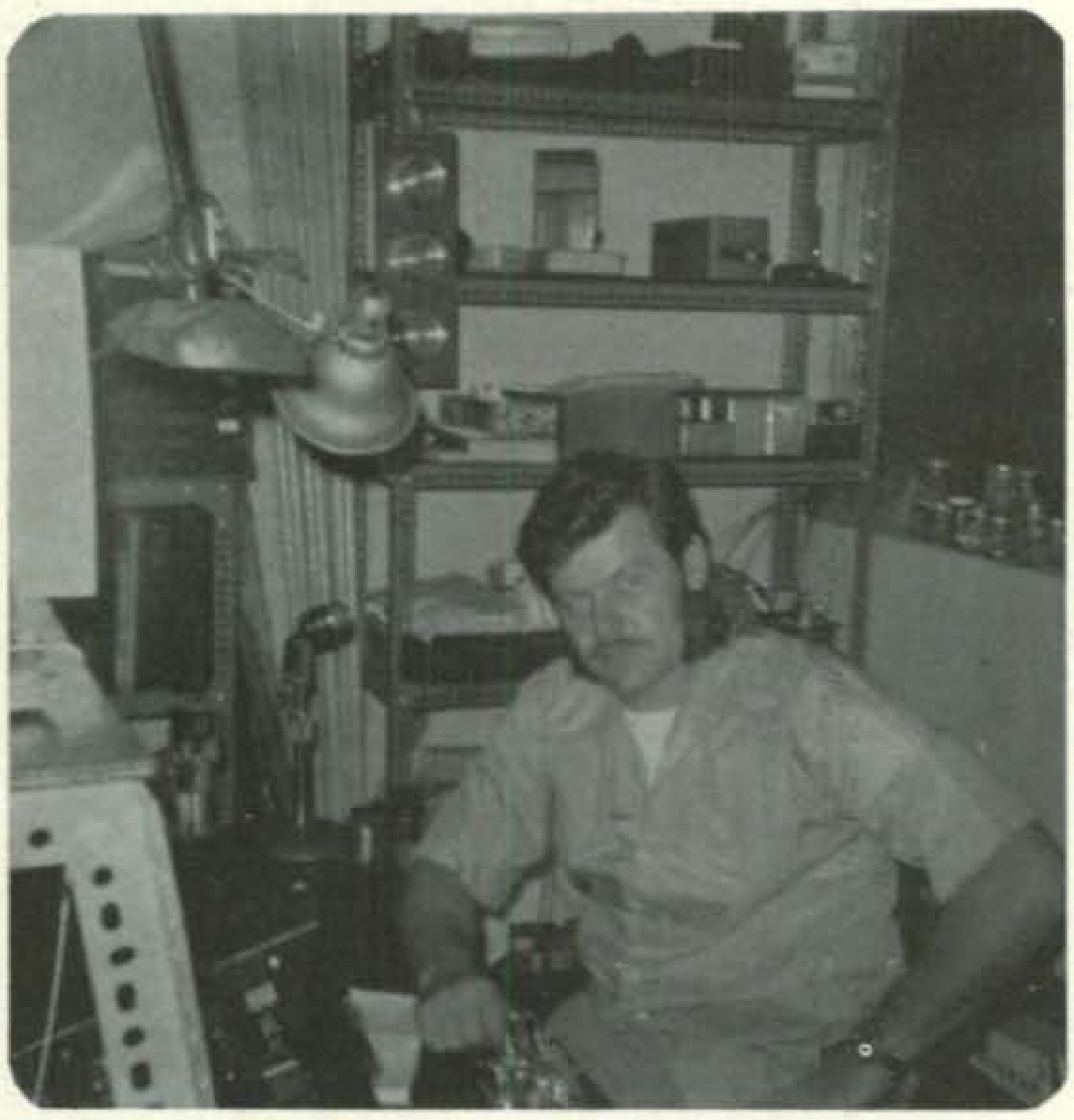
VPX

81 KDX1A

Endorsements

Mixed: W3PVZ-1100, DJ7CX-1050, K2SHZ-850, WA5-VDH-800, WA6HRS-750, W6KHS-600, DJ1TC, OK1-KZ-500
C.W.: W8LY-1150, K8MFO-700, K0ARS, WA2HZR-600, W8DSO, W1OPJ, HP1AC-400, K9UQN, W1EWD-350
2XSSB: K2POA-950, W6RKP-850, DK2BI-800, WB2-NYM-750, TF2WKP-500, W6LQC-400, WB4QFH-350
80 Meters: K8MFO
40 Meters: W3ARK, DK2BI
20 Meters: K2POA
15 Meters: K2POA, DK2BI, JA2IU
10 Meters: K2POA
Africa: OK2DB, K2POA, W3MDO, W3ARK, G5GH, DK2BI
Asia: K2POA, DK2BI
Europe: WDX2OBU, K2POA, W3MDO, DK4SY, F6AED
North America: W6KHS, WDX2OBU, OK2DB, K9UQN, K2POA, YU1AG, WA2HZR
Oceania: K2POA, DK2BI
South America: WA5VDH, K2POA, W3ARK

Complete rules for WPX may be found on page 67 of the February, 1972 issue of *CQ*. Application forms and reprints of the rules may be obtained by sending a business size, self-addressed stamped envelope to WPX Award Manager, P.O. Box 1271, Covina, CA 91722.



This is Bill, YS1WPE of San Salvador where he runs a Drake line and 4 Element quad. In August 1974, W5QPX put this station on 160 Meters.

a five-to-ten year project. Well, to dispell the skeptics, Pete Dalton, W6NLZ, completed working all zones on 80 meters with a December QSO with UA9VH/JT1-Zone 23. Of the 40 zones worked by W6NLZ, only two are on c.w. so Pete is very close to completing WAZ on 80 meter Phone! Pete is no stranger to the 80 meter band, having piled up a huge country and zone total from his previous location at K2RBT. At present, his antenna includes a two-element reversible wire beam. However, it is patience and long hours which account for his DX accomplishments. Congratulations to W6NLZ!

Gene, W8YEK, completed working 100 countries on two-way SSTV with a QSO with EA6BQ on November 12, 1974. He is possibly the first amateur to accomplish this goal. Gene earned the SSTV endorsement for his *CQ* DX Award by having 50 countries confirmed in June 1973.

Herb, KV4FZ worked all continents (WAC) in one night on 160 meters breaking his own record of 24 hours which he set several years ago. The whirlwind 1.8 MHz WAC effort began on December 6, 1974, at 2215 GMT when he heard 9L1JT calling CQ on 1828. After frantically calling him several times on 1804, Herb had to QSY to 9L1JT's frequency to work him. A few minutes later he bagged HH2WF for a new country and an hour and a half later worked Asia-4X4NJ. A few minutes later Herb worked a string of Europeans including GD4BEG, GW3UCB and GM3YCB. At 0158 he picked up FYØBHI as well as HC1CW, YV5CKR, PY1RO and LU6EF for South America. He had to wait another five hours for the sun to set in Hawaii to work KH6CHC to complete a 160 meter WAC in a little more than eight hours. KV4FZ is trying to work 100 countries on 160 meters for the first ever on 6 Band DXCC.

The WAZ Program

Single Band WAZ 20 Meter C.W.

4.....WB4HQE

20 Meter Phone

3.....I8YRK

S.S.B. WAZ

1233.....W8DFQ
1234.....K6IR
1235.....VU2OMR

C.W.—Phone WAZ

3779.....DL2HQ
3780.....K6GWN
3781.....I1FOX
3782.....YU3NP
3783.....W5AC
3784.....ZL2BCO

Phone WAZ

501.....OE1GHC

Complete rules for the Single Band WAZ Program are shown on pgs. 57-58 of the December, 1972 issue of *CQ*. Complete rules for regular WAZ may be found on pgs. 64-66 of the June, 1970 issue. Application blanks and reprints of the rules for all WAZ awards may be obtained by sending a self-addressed, stamped envelope to the Assistant DX Editor, P.O. Box 205, Winter Haven, FL 33880.

QSL Information

CR6OR—via W0GX
CT2BN—via WA9PZU
CT3WA—via W2AYJ
CT3WH—via W2AYJ
EA9FB—via EA6BL
EP2FR—via W3YMB
F0AHY/FC—via DK5OS
FK0GA—via K6YFZ
FK0IC—via K6YFZ
KF0DX—via WB6LTJ
FW0AA—via K6YFZ
FW0GA—via K6YFZ
FW0IC—via K6YFZ
FW0DX—via WB6LTJ
FY0FC—via F6CWB
HC1CW—via K7NHV
HS2AIC—via Jack Corson Box 5715 APO, SF, CA 96330
HZ1AT—via G5KW
JY5SAS—via WA3HUP
KC4NI—via K2FT
KG4DS—via WB8LUI
KG6RA—via JA2KLT
PA9WRR—via W6ZM
PJ8AS—via W0IPU
PJ8IDX—via WB4IDX
PZ5FA—via W2FCR
SV1CH—via WA3KSQ
S21CW—via JA1MCU
S21DX—via JA1MCU
W5QPX/TG4—via W5QPX
TY1UW—via ET3ZU
VP1AJ—via W0ELT
K2FJ/VP2D—via K2FJ
VP2EEC—via K2FJ
VP2LAI—via W2AAF
VP2LAO—via W3HNK
VP2LBJ—via W2DEO
VP2MMM—via WB9KLB
VP2MSO—via WA9JCO
VP5CW—via W4ORT
VP5WS—via W4SME
VP5WW—via WB4EYX
XV5AA—via W2PHO
XW8HJ—via K3SWZ
YB0ABV—via WA7OBV
YN4IM—via W5QPX
ZF1JH—via WA6VNR
ZF1SV—via K6SVL
ZF1WE—via K6SVL ('74 *CQ* WW only)
ZF1TZ—via Box 52701, Atlanta, GA 30305
ZP5HZ—via WA6YOO
3D2CC—via VE6AKV
4Z4PX—via WB4FSV
5J4CJB—via HK4CJB
5R8SD—via F8US
5T5GS—via W6KTE
5V7PW—via DJ1AM
6W8FP—via WA6NFC
9H3M—via G3CDK
9L1JB—via W4BAA, Captiva Is., Fl 33924
9X5PT—via VE3BOZ

73, John, K4IIF

CQ'S DIAL-A-PROP

For the latest up to the minute propagation forecasts and special contest predictions call 516-883-6223 any time day or night for a recorded message on conditions.

Propagation

BY GEORGE JACOBS,* W3ASK

THE Swiss Federal Solar Observatory, the world's official keeper of sunspot records for more than 200 years, reports a monthly mean sunspot number of 23.9 for November, 1974. This results in a *smoothed sunspot number* of 36, centered on May, 1974. The progress of the sunspot cycle is measured by the value of smoothed sunspot number. A smoothed sunspot number of 26 is forecast for this February.

DX Openings

Declining sunspot activity, coupled with normal seasonal changes in h.f. propagation conditions, is expected to result in few openings on *10 meters* during February. The band may occasionally open to Europe and the east from the eastern states between 10 A.M. and Noon. There's a slightly better chance for openings to Africa between the same hours, and some of these may extend to the western states. Better conditions should exist towards South America, with fairly regular openings possible between Noon and 4 P.M., and occasionally as early as 10 A.M. from all sections of the country. The western states are favored for openings towards the South Pacific and Asia, with some possible between 2 and 5 P.M. When conditions are better than normal, some of these openings may extend towards the eastern states between 3 and 6 P.M., local time.

Fifteen meters looks fairly good for world-wide DX propagation conditions during most of the daylight hours. The band should open first towards Europe, Africa and the east between 9 A.M. and 2 P.M. in the eastern states, and until Noon in the western states. Openings towards South America should be possible throughout the day, with conditions peaking between Noon and 4 P.M. Openings towards the South Pacific, Far East and Asia look best from the western half of the country between 4 and 8 P.M., with some openings extending eastwards between 4 and 7 P.M., local time. The path to Antarctica should peak between 3 and 6 P.M. in all sections of the country.

On *20 meters*, look for a DX window of fairly good openings in almost all directions for an hour or two after sunrise. The band should peak again towards Europe and the east between Noon and 3 P.M. in the eastern states and between 11 A.M. and 1 P.M. in the west. Towards Africa, propagation should be best between 3 and 6 P.M. in the east, and to 4 P.M. in western states. Look for *long-path* openings from the western states to Europe and Africa for an hour or two after sunrise. Openings towards the south should peak again during the late afternoon, with the band remaining open to as late as 8 P.M. Check until 10 P.M. for regular openings deep into South America and to Antarctica. Evening openings to the South Pacific, Far East and Asia should peak between 6 and 9 P.M. in the eastern states and between 7 and 11 P.M. in the west.

Fairly good *40 meter* openings are forecast to many areas of the world during February. Check between 6 P.M. and 2 A.M. for openings to Europe, Africa and the east from eastern states, and until Midnight in western states. South America should be within range between 7 P.M. and 5 A.M. From the west coast, the band should open to the South Pacific, Far East and Asia between 2 and 7 A.M., with openings to the South Pacific often extending towards the east coast between 5 and 7 A.M., local time.

Eighty meter openings are forecast to many areas of the world during the hours of darkness. Best bet for Europe and the east is between 8 P.M. and 1 A.M. in eastern states and between 8 and 10 P.M. in the west. Check openings towards South America between 8

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

LAST MINUTE FORECAST

Day-to-Day Conditions Expected For February, 1975

	Rating & Forecast Quality			
Propagation Index	(4)	(3)	(2)	(1)
Date *February*				
Above Normal: 14-15, 21-23, 27-28	A	A-B	B-C	C
Normal: 1-2, 8-9, 11-13, 16-20, 24, 26	A-B	B-C	C-D	D-E
Below Normal: 3, 5-7, 10, 25	B-C	C-D	D-E	E
Disturbed: 4	C-D	D	E	E

Where *expected signal quality is:*

A—Excellent opening, exceptionally strong, steady signals.

B—Good opening, moderately strong signals with little fading or noise.

C—Fair opening, signals between moderately strong and weak, with some fading and noise.

D—Poor opening, signals weak with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the particular opening for any day of the month. For example, all openings shown in the Charts with a *propagation index* of (3) will be fair-to-good (B-C) on Feb. 12, Fair-to-poor (C-D) on the 3rd and poor (D) on the 4th, etc.

For updated information dial Area Code 516-883-6223 for DIAL-A-PROP, or subscribe to weekly MAIL-A-PROP, P.O. Box 86, Northport, NY 11768.

P.M. and 4 A.M. from all sections of the country. From western states there is a chance for some good openings towards the South Pacific between 4 and 7 A.M., with possibilities in the eastern states between 4 and 7 A.M., local time. Conditions to the Far East and Asia are expected to be poor, but an occasional opening should be possible from western states between 3 and 7 A.M.

Openings on *160 meters* will occur less frequently, but within the same time periods as the openings forecast for *80 meters*. Remember that DX conditions on this band peak when it is just breaking dawn at the *eastern* end of a path. Some openings should be possible from parts of the country to Europe, Latin America and the South Pacific during February. On February 9 there is a special Trans-Atlantic Test period scheduled for *160 meters* between 0500 and 0730 GMT. See page 62 in December 1974's *CQ* for additional information about this propagation test.

A seasonal increase in static levels may begin to be noticeable on both *160* and *80 meters* during February.

Short-Skip Conditions

On *160 meters*, no significant skip expected during the daylight hours. Up to at least 1300 miles should be possible at night, often extending up to the one-hop short-skip limit of 2300 miles. On *80 meters*, expect openings up to around 250 miles during most of the daylight hours, with the skip lengthening to between 350 and 1300 miles just after sundown, and between 750 and 2300 miles by Midnight. On *40 meters*, daytime skip should be possible between 250 and 750 miles, extending to between 750 and 2300 miles during the evening hours to about 8 P.M., and between 1500 and 2300 miles until shortly after sunrise. Daytime skip on *20 meters* should range between 750 and 2300 miles to about 4 P.M. Between 4 and 6 P.M., the skip should lengthen to between 1500 and 2300 miles, with the band out by 9 P.M. on most nights. On *15 meters*, skip should range between 1300 and 2300 miles during most of the daylight hours between 9 A.M. and 6 P.M., with the band dead for short-skip an hour or so after sundown. An occasional F-layer short-skip opening may be possible on *10 meters* during the afternoon hours, over distances between approximately 1300 and 2300 miles. An occasional sporadic-E opening over shorter distances may also be possible.

V.H.F. Ionospheric Openings

No significant meteor showers are expected during February, so few, if any meteor-type ionospheric openings are likely to occur.

Best chances for ionospheric openings on the v.h.f. bands should be during the period of radio storminess expected between the 3rd and 7th of February, and on the 10th and 25th. Look for auroral-type short-skip openings on *2* and *6 meters*, for distances from a few hundred, up to approximately 1300 miles. These openings may be characterized by flutter fading and some audio distortion.

This month's *Propagation Charts* contain band opening predictions for the major DX paths for the period February 15 through April 15, 1975. A short-skip propagation forecast for February appeared in last month's column. Instructions for the proper use of these *Charts* appear earlier in this column.

February 15—April 15, 1975
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	10-12 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-09 (3) 09-11 (2) 11-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-18 (1)	17-18 (1) 18-19 (2) 19-00 (3) 00-02 (2) 02-04 (1) 18-20 (1)* 20-21 (2)* 21-23 (3)* 23-00 (2)* 00-02 (1)*
Northern Europe & European USSR	*Nil*	08.09 (1) 09-11 (2) 11-12 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-15 (2) 15-16 (1)	17-19 (1) 19-02 (2) 02-03 (1) 20-22 (1)* 22-00 (2)* 00-01 (1)*
Eastern Mediter-ranean & Middle East	*Nil*	08-09 (1) 09-10 (2) 10-12 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-15 (3) 15-16 (2) 16-19 (1)	18-20 (1) 20-22 (2) 22-23 (1) 20-23 (1)*
West Africa	10-13 (1)	08-10 (1) 10-12 (3) 12-14 (4) 14-15 (2) 15-16 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-20 (1)	18-20 (1) 20-00 (2) 00-02 (1) 22-01 (1)*
East & Central Africa	11-13 (1)	09-11 (1) 11-15 (2) 15-16 (1)	13-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	19-22 (1) 22-00 (2) 00-01 (1)*
South Africa	10-13 (1)	08-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	07-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-21 (1)	18-20 (1) 20-22 (2) 22-00 (1) 21-23 (1)*
Central & South Asia	*Nil*	08-10 (1) 16-19 (1)	06-07 (1) 07-09 (2) 09-11 (1) 18-20 (1)	19-22 (1) 04-06 (1)
Southeast Asia	*Nil*	17-19 (1)	06-07 (1) 07-09 (2) 09-11 (1) 19-21 (1)	19-22 (1) 05-07 (1)
Far East	*Nil*	16-19 (1)	06-07 (1) 07-09 (2) 09-11 (1) 17-18 (1) 18-20 (2) 20-21 (1)	05-08 (1) 05-07 (1)*

*Indicates best time to listen for 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.

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

Time Zones: CST & MST (24-Hour Time)
CENTRAL USA TO:

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

How To Use The DX Propagation Charts

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

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates 80 Meter openings. Openings on 160 meters are likely to occur during those times when 80 meter openings are shown with a *propagation index* of (2), or higher.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) " " " between 14 and 22 days
(2) " " " between 7 and 13 days
(1) " " " on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this Propagation column for the actual *dates* on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 P.M., etc. Appropriate *standard* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate Chart 8 hours in the PST Zone, 7 in the MST Zone, 6 in the CST Zone and 5 in the EST Zone. For example 14 in Washington, D.C. is 19 GMT and 20 in Los Angeles is 04 GMT, etc.

5. The charts are based upon a transmitter power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level; for each 10 db loss, it will lower by one level.

6. Propagation data, contained in the Charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

Far East	14-18 (1)	14-16 (1) 16-18 (2) 18-20 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-21 (2) 21-23 (1)	02-04 (1) 04-06 (2) 06-08 (1) 05-07 (1)*
South Pacific & New Zealand	12-14 (1) 14-16 (2) 16-17 (1)	10-12 (1) 12-14 (2) 14-16 (1) 16-19 (2) 19-20 (1)	06-07 (1) 07-09 (3) 09-11 (2) 11-18 (1) 18-20 (2) 20-21 (3) 21-23 (2) 23-01 (1)	22-00 (1) 00-01 (2) 01-06 (3) 06-07 (2) 07-08 (1) 00-02 (1)* 02-05 (2)* 05-07 (1)*
Australasia	14-17 (1)	08-10 (1) 13-16 (1) 16-19 (2) 19-21 (1)	06-07 (1) 07-09 (3) 09-12 (2) 12-15 (1) 15-17 (2) 17-19 (1) 19-21 (2) 21-01 (1)	01-04 (1) 04-06 (3) 06-07 (2) 07-08 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*
Central America & Northern Countries Of South America	09-13 (1) 13-15 (2) 15-16 (1)	07-08 (1) 08-10 (2) 10-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	05-06 (1) 06-07 (2) 07-09 (4) 09-10 (3) 10-15 (2) 15-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	18-19 (1) 19-20 (2) 20-02 (3) 02-04 (2) 04-06 (1) 19-21 (1)* 21-03 (2)* 03-05 (1)*

[*Continued on page 62*]

THE awards PROGRAM

BY ED HOPPER,* W2GT

The February, "Story of The Month", as told by Steve, is:

Stephen H. Morris, W1AQE

(All Counties #110, 10-13-73)

"Born in Fulton, N.Y., March 19, 1910 and at age 15 was given my first radio, a Crosley Pup, by my oldest sister. On the high end of the broadcast band, I was able to hear hams in N.Y. and Canada.

"This, set in motion an interest on how to become a ham. After a couple of years I passed the test in late 1928. Had no a.c. so built rigs (many different ones in my first 5 years) with 201A tube and B Batteries. First in the 30s was 59 osc. with 210 final (tubes given to me) and power supply with 201 rectifiers and condensers and transformer from an old radio receiver. When the wind blew, signals swung all over the band. In 1935 built rig with PP 45s with carbon pile resistor in primary to raise or lower power.

"During the war worked for Glenn Martin Aircraft, FEC RID Staff, in Laurel, Md.; Pittsburgh, Pa.; Fairbanks & Nome, Alaska; Portland, Oregon and Scituate, R.I. Then to Merchant Marine as Radio Operator and finally out October 1944.

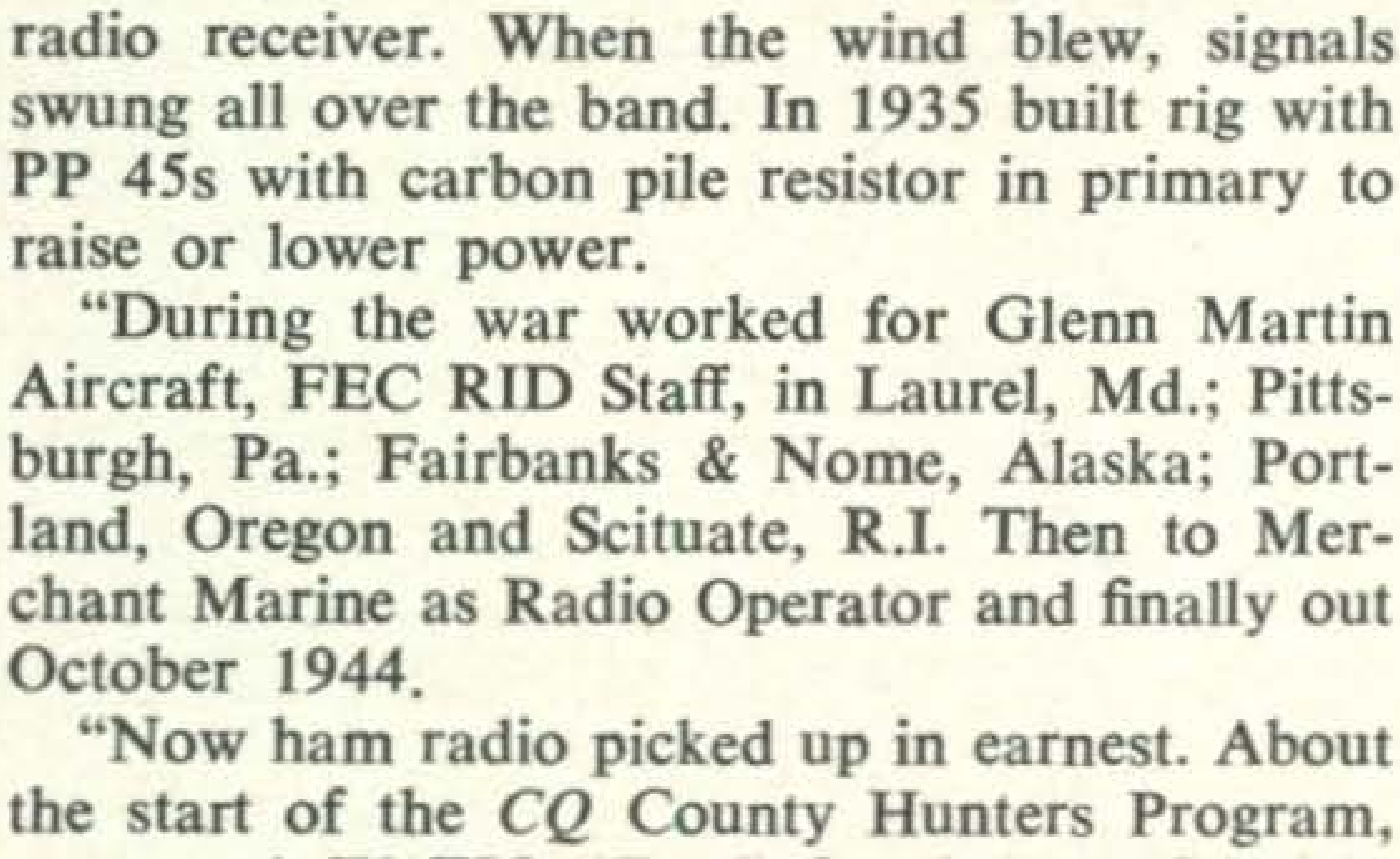
"Now ham radio picked up in earnest. About the start of the *CQ* County Hunters Program, met a pal, W1EIO, "Red" Goodwin (USA-CA-500-#83, May 1, 1962) who told me all about County Hunting and I bragged that I had many more than 500 counties. "Red" said that after 25 years he thought he had a lot but on checking found he had only 486. I counted mine and found I had less, and so I started to try to get my 500. I wanted only home base stations, so stuck to c.w. hunting. In 1963, after a serious auto crash, I went entirely on the Novice bands for about 3 years.

"In 1966 I found the CH Net on 40 meters, by accident, and stuck with c.w. for the next three years, inching my way up to 1000 Counties. Finally deciding that no one could ever get 3079 on c.w., I decided to go s.s.b. as my a.m. did not set well with the mobiles and many would not work a station with a carrier, even if they could copy him.

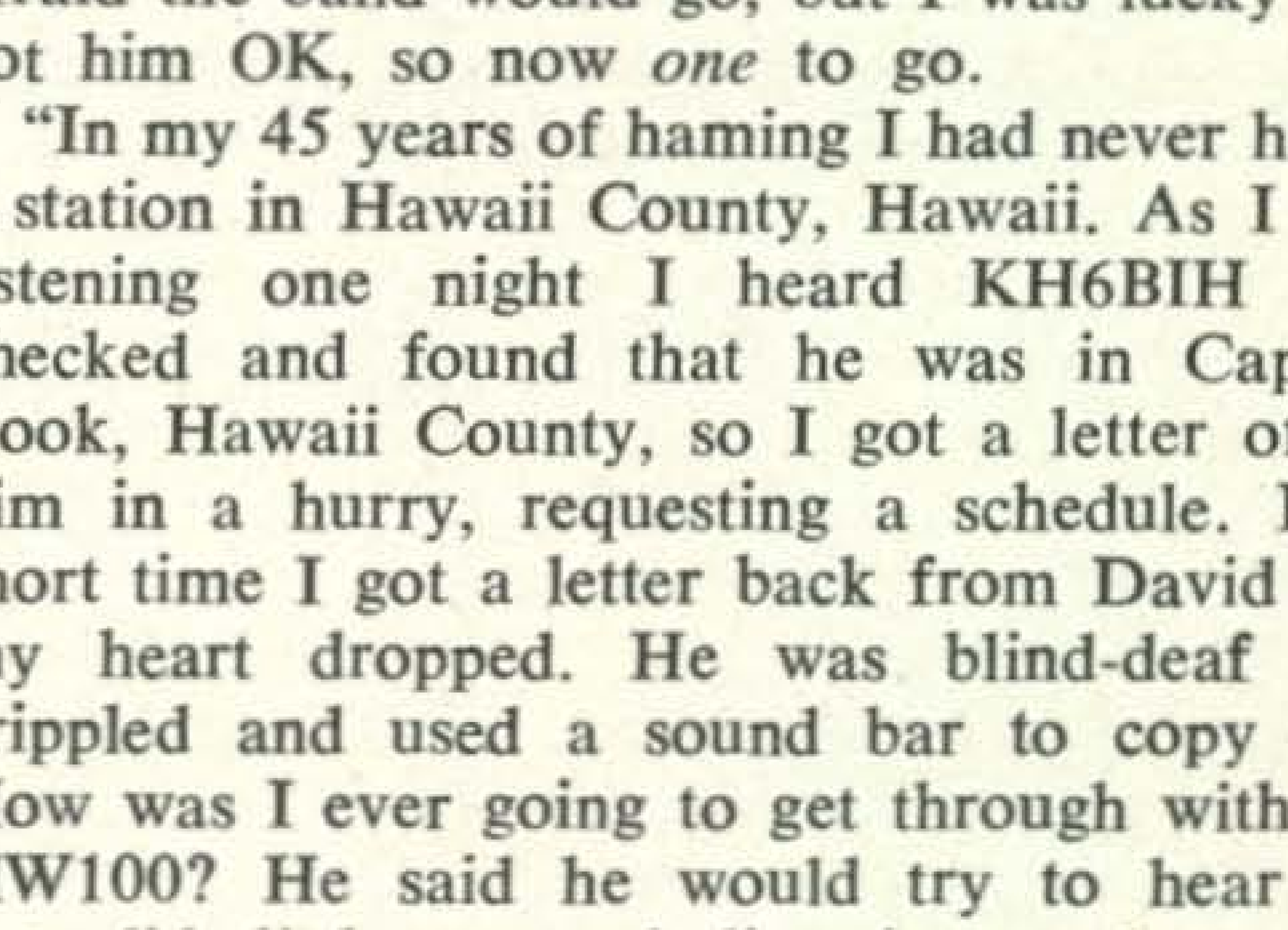
In September 1969, checked into the 20 meter s.s.b. Net and really started to pick up counties with my HW100 transceiver and Vertical. Stayed with this Net for the next couple years and by the time of the Kansas City Convention I was down to 21 needed, but it was getting tough. In another year I was down to 8 needed and it took another year to get 5 of those and then I went back to general haming on c.w. I was down to 2 needed, in the fall of 1973 and I was going to the Convention but heard that WA5KQD was going to Mississippi for CHN c.w. contest. I worked Gordy on the way and he promised to get Hancock, Mississippi for me. I listened all day for him but was afraid the band would go, but I was lucky and got him OK, so now *one* to go.

"In my 45 years of haming I had never heard a station in Hawaii County, Hawaii. As I was listening one night I heard KH6BIH and checked and found that he was in Captain Cook, Hawaii County, so I got a letter off to him in a hurry, requesting a schedule. In a short time I got a letter back from David and my heart dropped. He was blind-deaf and crippled and used a sound bar to copy c.w. How was I ever going to get through with my HW100? He said he would try to hear me but did little general listening and worked mostly schedules. That night he missed a schedule and called CQ. I called and tried to send perfect copy, nice and slow, and I nearly fell off my chair when KH6BIH came back, saying he heard several stations but did pick out my call and was happy we made it. Well,

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



All County Holders at KC-74 Convention



Massachusetts Bicentennial Award

Hams at KC-74 Convention

there was 3079 and I was sure excited—since then I have worked David many times and I did send him a Plaque and Certificate for my *Last County*, which he proudly displays to the many visitors to his shack.

"I am proud to have been a member (still am, but not so active) of the c.w. CHN. I am also proud to have been and still am, a member of the s.s.b. Net and MARAC with it's many fine female and male operators.

Many thanks to *all* who helped me get them *all* and to those who helped me get the QSLs".

Awards

Note: The C.W. County Hunters have started their own Award Program with 3 fine awards and I will pass along data and fotos as soon as possible. If you can not wait, send s.a.s.e. and request data from: George Levensalor, W1DPJ, 399 Buck Street, Bangor, Maine 04401.

Massachusettes Bicentennial Award: The Mass. Bicentennial Award is issued for contacts with Mass. Amateur stations during the United States Bicentennial Years 1975-1976. Contacts must be between the dates January 1, 1975 and December 31, 1976. The Award is earned on a point basis: Massachusetts amateurs must have 200 points, the rest of United States must have 100 points, and DX (including KH6 and KL7) *and* v.h.f. *outside* Mass. must have 50 points.

Contacts with a Mass. station count two (2) points. Contacts with a Mass. station in a city or town having historical significance or bearing the name of an American Revolution Era important person count four (4) points: such as Adams, Boston, Cambridge, Clinton, Concord, Franklin, Hamilton, Hancock, Huntington, Lee, Lexington, Marion, Middleton, Montgomery, Mount Washington, North Adams, Otis, Revere, Warren and Washington.

Double the above points if contacts with Mass. stations are made on any of the four Mass. Holidays of March 17, April 19, June 17, and July 4.

Stations may be worked only once, except that a station may be worked *one* additional time if mobile. Station may also be worked again for bonus points on any of the four Mass. Historical Holidays.

QSL cards are not required. Send log data only, showing station worked, time, date, band and mode, and city or town if bonus points claimed. Include points claimed for each contact. Certificates will be endorsed for band and mode, if requested. There is no charge but application must be accompanied by a self-addressed-stamped envelope for return of the certificate. (DX include one IRC.) Oh yes, repeater contacts acceptable. Submit applications to: William Holliday, WA1EZA, 22 Trudy Terrace, Canton, Mass. 02021. Credit the National Award Hunters Club, Massachusetts Chapter for sponsoring this Award, which is printed in Blue & Gold, the Mass. State colors.

Siam Award: Sponsored by the Radio Society of Thailand and will be presented to non-HS amateurs for contacting ten (10) Thai amateurs including one each HS1, HS2, HS3, HS4, HS5

Siam Award

Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

*Feb.	1-2	ARRL DX Phone Contest
*Feb.	2	Two Meter RTTY Contest
*Feb.	8-9	QCWA QSO Party
*Feb.	8-9	Ten Ten Net QSO Party
Feb.	8-9	World Wide SSTV Contest
Feb.	15-16	ARRL DX C.W. Contest
*Feb.	22-23	French Phone Contest
Feb.	22-23	YL-OM Phone Contest
*Feb.	22-24	Vermont QSO Party
Mar.	1-2	ARRL DX Phone Contest
Mar.	8-9	YL-OM C.W. Contest
Mar.	8-9	Commonwealth Contest
Mar.	15-16	ARRL DX C.W. Contest
Mar.	22-23	Tennessee QSO Party
Mar.	22-24	BARTG Spring RTTY Contest
Mar.	22-24	Prairie Dog QSO Party
Mar.	**29-30**	**CQ WW WPX SSB Contest**
Apr.	5-6	Polish (SP) Contest
Apr.	12-13	Swiss (H-22) Contest
Apr.	26-27	WAEDC RTTY Contest
May	2-5	CHC/FHC/HTH QSO Party
May	17-19	Michigan QSO Party

*Covered in last month's Calendar.

QCWA QSO Party

Starts: 0000 GMT Saturday, February 8
Ends: 2400 GMT Sunday, February 9

Complete rules were published in last Month's CALENDAR. A later communication confirmed that a new plaque will be awarded to the "Top Banana" in the party. (The last one was retired by W3IN) A member winning it for three consecutive years retains it permanently.

The "Worked 100 Members" certificate is also available, so all those working 100 or more members in the party should send their requests to: Ted Heithecker, W5EJ, 1409 Cooper Dr., Irving, TX 75061.

Party logs however go to: QCWA Houston Chapter Att: Monty Montemayor, W5YZ, P.O. Box 55254, Houston, TX 77055.

World Wide SSTV Contest

Two Periods
1500-2200 GMT Saturday, February 8
0700-1400 GMT Sunday, February 9

This is the 5th annual Slow Scan TV Contest, this year sponsored by *CQ Electronica* of Italy and *73 Magazine*.

Contacts must be made on SSTV only, any band 3.5 thru 28 MHz. (The TVers have their own established frequencies.)

Exchange: Picture, call sign, signal report and QSO number starting with 001.

Scoring: One point for contacts on each band, except 28 MHz where they are worth 2 points.

Score 5 multiplier points for each continent worked on each band, and 2 points for each DXCC country on each band. In addition each US call district and VE call area may also be counted as a multiplier.

Final Score: Total QSO points times the sum of the multiplier from each band. Winners of previous contests must deduct 6% from their final score.

Awards: A 12 month subscription to *CQ Electronica* to the highest scoring station and 6 months subscriptions to 2nd and 3rd places.

Include a summary sheet with your entry showing the scoring and a station description. You are expected to observe rules and courtesy in your operation.

Logs must be received no later than March 25th and go to: Prof. Franco Fanti, Via A. Dallolio n. 19, 40139 Bologna, Italy.

YL—OM Contest

Phone: Feb. 22-23 C.W.: Mar. 8-9
Starts: 1800 GMT Saturday
Ends: 1800 GMT Sunday

It's the YL's working the OM's in this one. All bands may be used but cross-band or Net contacts do not count.

Exchange: QSO no., RS(T) and ARRL section or country. (See *QST* for section list.)

Scoring: One point per QSO, multiply by the number of ARRL sections and countries worked. The same station may be worked once only regardless of the band.

There is also a power multiplier of 1.25 for stations running 150 watts or less input. (300 watts p.e.p. if on s.s.b.) Multiply your final score by above factor.

Phone and c.w. are separate contests and require separate logs.

Awards: Certificates to the highest scoring YL and OM in each State and VE call district and in each country. There are also 4 Trophies for the Top YL and OM in each contest, and 2nd and 3rd place certificates for the runner-ups.

Logs must be mailed by March 25th and received no later than April 25th. They go to: Myrtle Cunningham, WA6ISY, 1105 E, Acacia Ave., El Segundo, Calif. 90245.

Commonwealth Contest

Starts: 1200 GMT Saturday, March 8
Ends: 1200 GMT Sunday, March 9

*14 Sherwood Road, Stamford, Conn. 06905.

Eligibility for this one is limited to RSGB residents in the United Kingdom and amateurs licensed to operate within the British Commonwealth or British Mandated Territories. And should be of special interest to our neighbors to the north and Caribbean Islands.

It is requested that operation be confined to the lower 30 kHz of each band, and of course on c.w. only.

Exchange: Just a signal report, no serial number was mentioned.

Scoring: Each completed contact counts 5 points. In addition a bonus of 20 points may be claimed for the first, second and third contact with each Commonwealth call area. (All of the British Isles count as one call area).

Entries may be single or multi-band, with separate log sheet for each band. The separate band totals to be added and shown on the summary sheet. Multi-band entries are not eligible for single band awards but may request a single band to be used for competition.

There is also a *s.w.l.* category with scoring same as above. Report of station heard as well as call of station being worked should be listed. Include check list of call areas heard on each band.

Awards: Rose Bowl Trophies to the winner and runner-up and to the leading UK station, and to the leading s.w.l. score. Certificates to the top UK and overseas single band entries on each band, and the UK and continental leaders on all bands.

Logs go to: D. J. Andrews, G3MXJ, 18 Downview Crescent, Uckfield, Sussex, England. And must be received before May 12th.

Tennessee QSO Party

Two Periods (GMT)
2000 Sat. Mar. 22 to 0600 Sun. Mar. 23
1400 to 2200 Sunday March 23

This is the 5th annual party sponsored by the Tennessee Council of Radio Clubs. Many counties with low activity will be activated by portable and mobile stations.

Exchange: Signal report and QTH. County for Tenn., state, province or country for others.

Scoring: One point per QSO for phone contacts, 1½ points for c.w. The same station may be worked on each band and each mode.

Tenn. stations multiply total QSO points by sum of states, provinces and countries worked. Out-of-state, QSO points by Tenn. counties. (Max. of 95)

Frequencies: 3550, 3725, 7050, 7125, 14050, 21050, 21125, 28050, 28125 on c.w. 3980, 7280, 14280, 21380, 28580 on phone.

Awards: Certificates to each station submitting a log with 7 or more contacts. Plaques to top score in and outside Tenn., club portable and mobile station. (There is a 200 point bonus for mobiles making 5 or more contacts from each county outside own county.)

Use separate log sheet for each band with over 25 QSOs. Portables must operate outside own county. And there is a disqualification clause for Tenn. stations soliciting contact from non-contestants. (?)

Mailing deadline is April 27th to: Dave Goggio, W4OGG, 1419 Favel Drive, Memphis, Tenn. 38116. Include s.a.s.e for results.

BARTG Spring RTTY Contest

Starts: 0200 GMT Saturday, March 22
Ends: 0200 GMT Monday, March 24

The British Amateur Radio Teleprinter Group again sponsors this contest which is open to all amateurs and s.w.l.'s.

All bands 3.5 thru 28 MHz may be used, but not more than 30 hours out of the 48 hour contest period may be used for scoring. The 18 hours off may be taken any time but in not less than 3 hour periods. Indicate on/off times in your log.

Exchange: Time GMT, QSO no. and RST.

Points: Contacts within one's own country 2 points. Contacts with other countries 10 points. A bonus of 200 points will be earned for each country worked on each band, including own. The same station may be worked on different bands for QSO and multiplier credit.

Multiplier: Total sum of countries worked on each band. And the number of continents worked. (counted once only, max. 6) Use ARRL country list and each W/K and VE/VO call area.

Final Score: (a) Total QSO points × country multiplier. (b) Country points × bonus points × continents worked. (c) Add sum of (a) and (b) for final score. (*It gets rather complicated Ted*)

Awards: Certificates to the leading scorers in each class and top in each continent, country and W/K, VE/VO call areas. Final position will be valid for entry in the World RTTY Championship. There are also awards for working 25 countries or all six continents.

Logs must be received by May 31st and go to: Ted Double, G8CDW, 89 Linden Gardens, Enfield, Middlesex, England EN1 4DX.

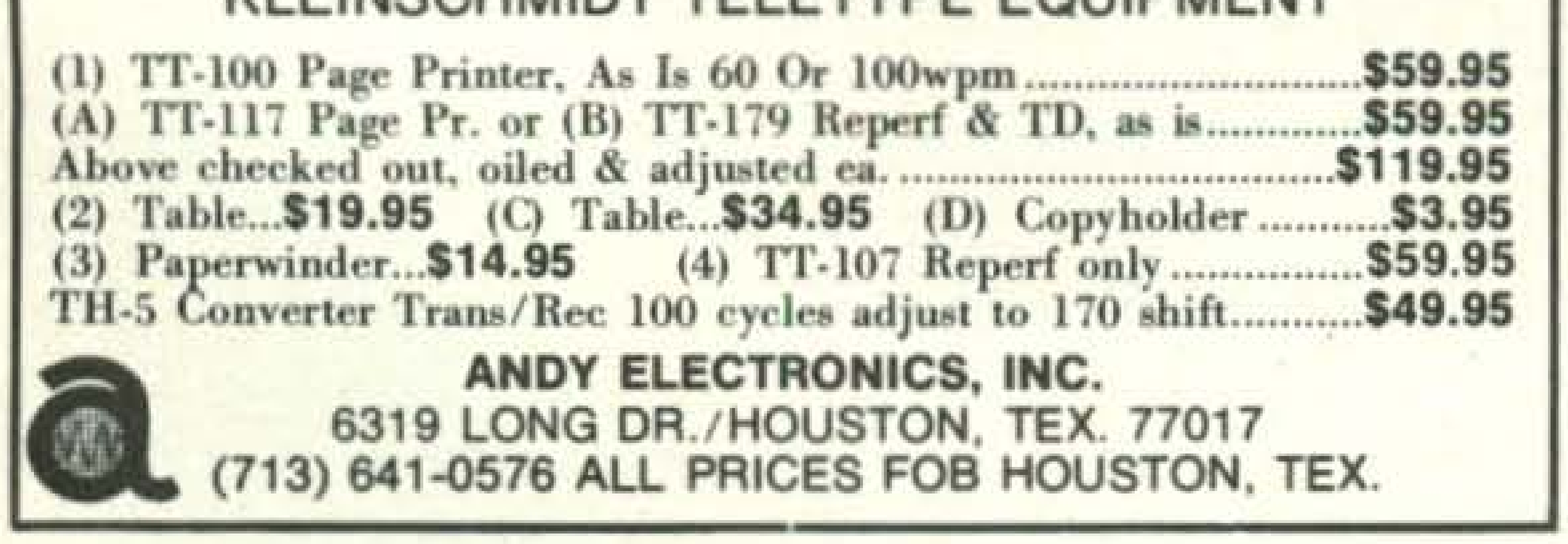
Prairie-Dog QSO Party

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

The Prairie Dog ARC of Vermillion, S.D. is sponsoring this one and will award a certificate to those who contact at least 5 of the 22 club members.

The exchange is a signal report, your state and name.

Look for the boys on 3690, 7070, 14070, 21070, 28070 on c.w. and 3955, 7240, 14285, 21390, 28550 and s.s.b. Novices will be found on 3710, 7110, 21110 on even hours. Also look for some activity on 2 and 6 meters.



Audio Filter [*from page 22*]

inserting a 500 ohm resistance in series with the input and a 1000 ohm resistance in shunt with the filter output. The filter then would "see" its characteristic impedance of 1000 ohms at both the source and the load. (The author recommends that such "tailoring" be imple-

Include 25¢ in stamps when you send your confirmations to: Lowell Nelson, WB0EVQ, Box 493, Springfield, S.D. 57062.

Editor's Notes

Complete rules for this year's WPX SSB Contest, March 29-30, appears on page 36 of this issue. Rules are the same as they have been for the past few years. Rest periods, double QSO points for contacts on 40, 80 and 160, and counting the multiplier *once* only. (not once on each band) No Club Award has been planned but indicate your affiliation and we will list the standings. If we receive enough interest, Bernie W8IMZ is planning a club competition award next year.

There has been a re-organization in the *CQ* Contest Program. Fred Caposella, W2IWC/6 will now be responsible for the directorship of the World Wide DX Contest. Bernie Welch, W8IMZ and Charlie O'Brien, W9NFC will continue to manage the WPX SSB and 160 contests respectively. And yours truly continues as Chairman of the *CQ* Contest Program. This arrangement will give me more time for administrative contest duties and keep an up to date informative CONTEST CALENDAR. Outside of that I can take it easy. (?)

Due to a typo the multi-multi Phone score of WA8ZDF in the 1973 listings was incorrect. The corrected reads as follows: Score 2,722,658, QSO's 1908, Zones 131, Countries 383. This moves Doc and the boys up one place.

Conditions for the C. W. Contest in November were not quite up to W3ASK forecast, so I am told. Unfortunately I was not able to participate. Guess we will have to give George a partial on this one. First one in a long time.

73 for now, Frank, W1WY

mented without too much regard to attenuation, for audio voltage gain is generally easy to come by.)

When the filter is connected between the mixer and the audio amplifier of the receiver, it may be necessary to provide d.c. isolation so that the first audio stage will not have its operating bias disturbed. This is readily accomplished with a 47 mf 35 volt solid-state tantalum capacitor connected in series with either the input or the output of the filter. Be sure to observe polarity. Such a capacitor will provide roll-off below a hundred Hz or so, but will not harm speech reproduction.

Once this filter is properly installed in a direct conversion receiver, a performance limiting factor will have been removed. Then, experimentation with other portions of the receiver, such as the r.f. amplifier, the r.f. resonant circuits, the mixer, and the local oscillator can be meaningfully evaluated. With all due respect to the superhet, we have long yearned for the super-simple set. Hopefully, this audio filter will help make such a quest a reality. ■

SURPLUS sidelights

BY GORDON ELIOT WHITE*

SOMEHOW the post-Vietnam crop of modern new surplus has not materialized. Probably the reduced military budgets and the increased give-away of used military gear to U.S. allies has soaked up the sort of surplus flood that followed the end of the Korean war. There was never a chance of a re-run of the 1946 outpouring which followed WWII.

Another factor is the huge stockpile of World War II equipment which is still in the hands of the U.S. military establishment. Fantastic as it seems, those 33 year old transceivers are still serving in military work around the World. AN/ARC-5's and SCR-274-N's and even AN/ART-13's are still flying in C-47's built before Pearl Harbor.

A batch of Collins' AN/ARC-2 transceivers were sold in Defense Property Disposal Service sales late last fall, probably stripped out of older Air Force planes. Although these are of WWII vintage, they are very modern sets for their age, and still quite useful to the amateur.

Oddly, there have been few conversation articles on the ARC-2, and the set has not been covered in the various surplus handbooks.

There are two versions of the AN/ARC-2, the R-T-91/ARC-2, produced late in the 1941-45 period, and the R-T-298/ARC-2A, a later re-issue. My references cover only the ARC-2A version, so I cannot describe the differences, but my indications are that the earlier sets are almost identical to the -A units.

The ARC-2 was a Collins autotune design, covering 2 - 9 MHz in four bands. There is a 200 kHz "extra" at the upper end.

Rated power output is 25 watts, but with a little better power supply than the original dynamotor, somewhat more power can be derived from the power amplifier stage.

The chief drawback of the ARC-2 is probably its 70 pound weight. It's not exactly a portable set. The unit measures 15½ × 21½ × 7¾ inches, and was designed for shock-mounting in aircraft. It goes nicely on the tabletop, and is not designed for rack use.

Tuning uses the famous Collins Permeability-Tuned-Oscillator for both the sending and receiving sides. Eight pre-set channels may be selected, or the set used in variable frequency mode. The automatic tuning uses a 28 volt d.c. motor, while variable-tuning may be done manually.

The transmit section includes transmitter loading and antenna tuning controls.

On transmit mode the master oscillator is followed by a multiplier stage, and r.f. driver, and power amplifier. On the lower two bands the r.f. driver is used as an amplifier only, while on the higher bands the driver is a second multiplier.

The final uses a pair of old reliable 1625 tubes and is inductively coupled to the antenna circuit. A Variometer coupling arrangement gives great flexibility in feeding almost any length antenna. A relay of course is used to switch from transmit to receive mode with the same antenna.

The modulator contains a double-bridge limiter, control stage and speech amplifier driving another pair of 1625's in class AB.

The circuitry includes oscillators for checking the frequency output, and for tone-keying of Morse. The audio circuit has a 300-3000 Hz filter, and audio limiting keeps the modulation below 100 percent.

The receive section uses three radio-frequency stages, a single mixer, and four intermediate frequency stages at an i.f. which varies from 1 to 1.5083 MHz, using the now-familiar Collins variable i.f. design, slug-tuned, through a movable rack and cam arrangement. This scheme was followed in the 51J4 and the R-390-A, to mention two very successful later Collins designs.

The detector of the receive section uses a 12H6, with the other diode section operated as

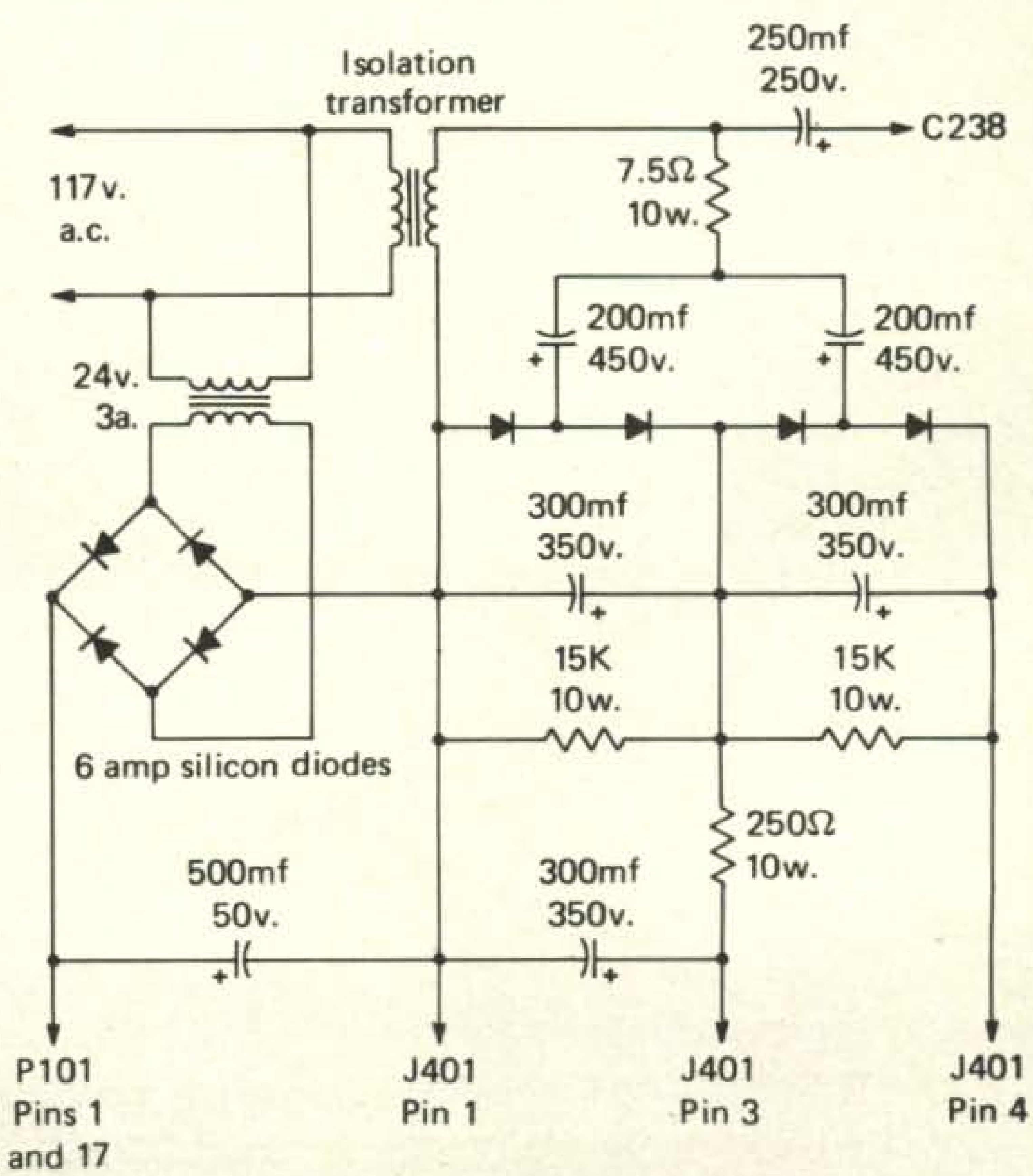


Fig. 1—An a.c. supply for the AN/ARC-2 receiver.

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

the a.v.c. rectifier and diodes in another 12H6 as noise limiters. Next is a 12SA7 limiter/audio amplifier, followed by a 12A6 output tube. Output is one-half watt into a 300 ohm load.

The Crystal Frequency Indicator circuit provides signals at 100 kHz points which may be used to calibrate the main tuning dial.

The ARC-2 also includes a separate low-frequency receiver covering 190-500 kHz. This was used for navigating on the old low-frequency aircraft homers and the four-course Adcock radio ranges which were in use until the late 1950's. Old-timers will recall radio dramas of air line flying with the pilots listening to a static-plagued receiver for the dah-dit signal which indicated the left side of the "beam," or the dit-dah on the right. As the "A" merged with the "N" to produce a uniform tone the pilot would say to his co-pilot "We're on the beam."

The whole set, all 25 tubes, draws quite a bit of power—about 18 amps when used with the 28 v.d.c. dynamotor, and another 6 amps to run the autotune. Since most users will build a.c. powered supplies, try to provide 260 volts at 125 ma for the receiver and 500 volts at 325 ma for the power amplifier and modulator.

If you convert this set to use power from a 117 v.a.c. powered supply, you will have to provide 28 v.d.c. to operate all those relays, or convert the relays—a messy wiring job. It looks easier to get a small 28 volt transformer and a bridge of silicon rectifiers to do that job.

An a.c. supply, whipped up for the B+ voltages, should fit nicely in the dynamotor well. The diagram of Fig. 1, while not an original design, ought to do the job. One note: the autotune motor has to be taken into account when designing the 28 volt portion of the supply. It's draw will overload the transformer briefly. The transformer can take it, but the diodes must be rated at 6 amps.

Awards [*from page 57*]

and HS6 (HSØ may be substituted for the HS6) *or* fifteen (15) RAST members with any callsign prefix. Submit list (do NOT send QSL cards) of the HS stations qualifying them to RAST Attention: Awards Manager, GPO Box 2008, Bangkok, Thailand. The list should include the date and time of the QSO, station worked, frequency and mode. Please include three (3) IRCs to cover mailing cost. The Awards Manager will confirm the contacts and issue the AWARD.

Notes:

In order to get as much data in this column, no Awards issued have been listed, next month hope to catch up.

Nice letter from John, WA2EAH about QSLs to mobiles who spend so much time and effort giving out needed Counties—*please* send them one of *your* regular QSLs *properly* made out to the station like WA2EAH/M4, etc . . .

Through the courtesy of Jerry Dowell, WBØGYR, see the photograph of most at the KC-74 Convention. 1st row: WA5YSC, WA7ZGF, WNØJXE, WNØJXF, W5HDK, W4IZR, W6CCM, W9LHG, WB9DCZ. 2nd row: W5TQE, WAØATI, WB9DFJ, KØIFL, K9TLZ, WØKYG, W9SOM, WAØSHE, W8WUT, WØBL, K4ZA, WAØWOB. 3rd row: K1IIK, WØSJE, WØQWS, KØQIX, WAØUPL, WAØYJL, WAØRXK, WBØHSV, W4GXB, WBØBVI, W8OA, W9CNG, KØENS, WAØSKQ, WA6FTN, K9CSL, WØFBB. 4th row: WAØLMK, K8DCR, KØYGH, KH6FQB, K1VKY, W9JR, WA3VLB, W9CTA, KØCVA, KØPFV, WBØELJ, WA2AEA, K5KDG. 5th row: WB4TNY, K9DCJ, W8LDZ, KØARS, KØAYO, WØMTC, WNØJXC, WNØNDT, KØRRO, WN9NUL, W9ZHD. 6th row: W9IWJ, WAØDCQ, W5OYG, KØPHZ, WØNKE, W1DIT, WBØGYR, WAØZHD, KØRTH, WA9BHH. Cliff Corne 3079's at KC-74 Convention. 1st row: W5TQE, W4IZR, W8WUT, WAØSHE, K8DCR, WØBL. 2nd row: KØAYO, WØSJE; K5KDG, K9DCJ, W5HDK, WAØDCQ, WAØWOB. Again thanks to Jerry, WBØGYR.

How was your month? 73, Ed., W2GT.

Propagation [*from page 55*]

Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	11-13 (1) 13-14 (2) 14-16 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	14-15 (2) 15-16 (3) 16-19 (4) 19-20 (3) 20-21 (2) 21-01 (1) 04-06 (1) 06-08 (2) 08-14 (1)	19-20 (1) 20-02 (2) 02-05 (1) 21-04 (1)*
McMurdo Sound, Antarctica	*Nil*	13-16 (1) 16-18 (2) 18-20 (1)	16-19 (1) 19-22 (2) 22-01 (1) 07-10 (1)	22-02 (1) 02-04 (2) 04-06 (1)

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

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

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

What's Your ARM-Q? [*from page 47*]

and wouldn't want to give your husband any false encouragement?

9. If your husband needs your active assistance with some amateur radio project, do you
   A. Give it willingly, perhaps even before asked,
   B. Give it grudgingly,
   C. Attempt to put him off to a more convenient time, or
   D. Refuse and suggest he get help from his ham friends?

10. If space is at a premium in your house or apartment do you
   A. Plan to provide space in the comfortable part of the house for at least the minimum operating necessities of an amateur station and work other space problems and possibilities around that,
   B. Insist that the station be moved to the cellar, attic or other comparable location,
   C. Allow space for the station but resent its visibility and complain about it, or
   D. Insist that either the station must go or larger living quarters must be obtained?

Now, give yourself four points for each "A" answer, three for each "B," two for each "C" and one for each "D." Add all four scores together (those earned by each of you for yourselves and for each other) and divide the total by four. Rate the resultant ARM Quotient according to the following scale:

35 or above—There ain't no such animal
30-34—Excellent
25-29—Normal
20-24—The situation's livable
Below 19—Can't win 'em all

How'd you do? ■

QRP [*from page 35*]

guy line which is the antenna. Plumbing houses have good plastic tubing in various sizes which can be hack-sawed easily into one-half inch wide circles. These can be used as the insulators in the real guylines, and the T-68-2/capacitor trap can fit inside one and tapped shut. No one will ever suspect that it is a trap. Two such traps have been in use at K8EEG/Ø for two years now. They consist of 13 t. #22 plastic covered wire on T-68-2 cores, shunted by 470 pf silver micas. The traps should be tuned to 40 meters using a grid-dipper or by a less trusty method. Connect the trap between the rig and a dummy load, tune up on 40, and then prune the coil until measured output at the dummy load drops drastically. The trap's function is to stop 40 meter r.f. energy from going beyond the trap. An r.f. impedance bridge is a great help in cutting an antenna to frequency, but an s.w.r. bridge can also be used.

New QRPP Net

Hopefully the new net will be under way as announced in the last column. Sessions are on 3540 kHz ±3kHz, Tuesday evenings at 2200 EST (Wednesday, 0300 GMT). K8EEG/Ø has managed to work from coast to coast with good signal reports on 80 so far this year, so success should be no problem with the net if the fellows decide to turn out.

Until next time, 73, Ade K8EEG/Ø

[1] Available from Amidon Associates, 12033 Otsego Street, North Hollywood, CA 91607. Price—50c each, plus 50c handling charge per order under $10.

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absolute ultimate in quality. Your friends will eye this little rig with envy the first time you show it off at the local club. Check these specs and then compare them with those of other rigs on the market. We're sure you'll make the 144 Jr. your next rig.

Fully synthesized covering 143.5 to 148.5 MHz in 5 kHz increments. Standard 600 kHz offsets up or down automatically. Reverse simplex and frequency split allow totally independent receive and xmit frequencies, and a priority channel guard that switches you back to it as soon as a signal is detected.

- Sensitivity – .35μV for 12 dB sinad, .30μV for 20 dB quieting
- 20 watts output
- Intermodulation, spurious and image 60 dB minimum
- 10 pole xtal filter
- Frequency stability .001%
- S-meter speaker built in
- Independent selectable priority channel

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emergency beacon corp.

Antennas [*from page 45*]

wire about 15″ long, each. This gives ample wire for the coil, plus generous end leads.

"The three wires are wound as one. Fasten the far ends in a vise, and you can wind the coils on the core very easily."

"How do you fasten the ends?" asked Pendergast.

"I was afraid you would ask that," I replied. "It's not so easy. The coils tend to stay in position, if you wind them with a little tension. You don't want to use coil dope, or cement on the windings, as that increases the distributed capacity. After you make the cross-connections, you can wrap the end turns with twine and epoxy, or cement the last turn at each end to the ferrite material. That will do the job.

"The inner of the three wires is cross-connected at the ends to the other windings, as shown in fig. 5. This winding is called the *balancing winding*. The point at which the balancing winding is connected to an outer winding is taken for ground at the input end of the balun. That's the point to connect to the shield of the coaxial line."

"Right," said Pendergast. "And I take it that this is a one-to-one balun, also."

"It is," I agreed. "And very handy, too. It will take one kilowatt PEP input to the transmitter on voice up through the 20 meter band. At 21 MHz, the power handling capability is about 500 watts PEP transmitter input and at 28 MHz, about 300 watts p.e.p. input. About the same on c.w., too. You can push it harder than this, but the core starts to run warm. Since I have no means of measuring temperature, I don't know the ultimate power capability of the device."

"Very nice," said Pendergast. "Easy to build and inexpensive. But what about the weather? How do you go about waterproofing the ferrite balun?"

"First of all, you don't want to place any material in proximity to the windings that will alter the characteristics of the balun," I replied. "You shouldn't dip it in epoxy or spray it with *Krylon* or other aerosol sealant.

"A good way to waterproof the ferrite balun is to place it in a plastic bottle and seal the bottle openings. Polystyrene bottles are nice to use for a job like this. Better still, is to place the balun in a section of PVC plastic pipe about 2 inches in diameter and 6 inches long. Cut PVC discs to fit the end of the pipe from sheet PVC material. Place coaxial fittings, or whatever terminals you choose, on the discs and wire up the balun to the terminals. When everything is ready, then cement the discs to the section of tubing. That makes a neat,

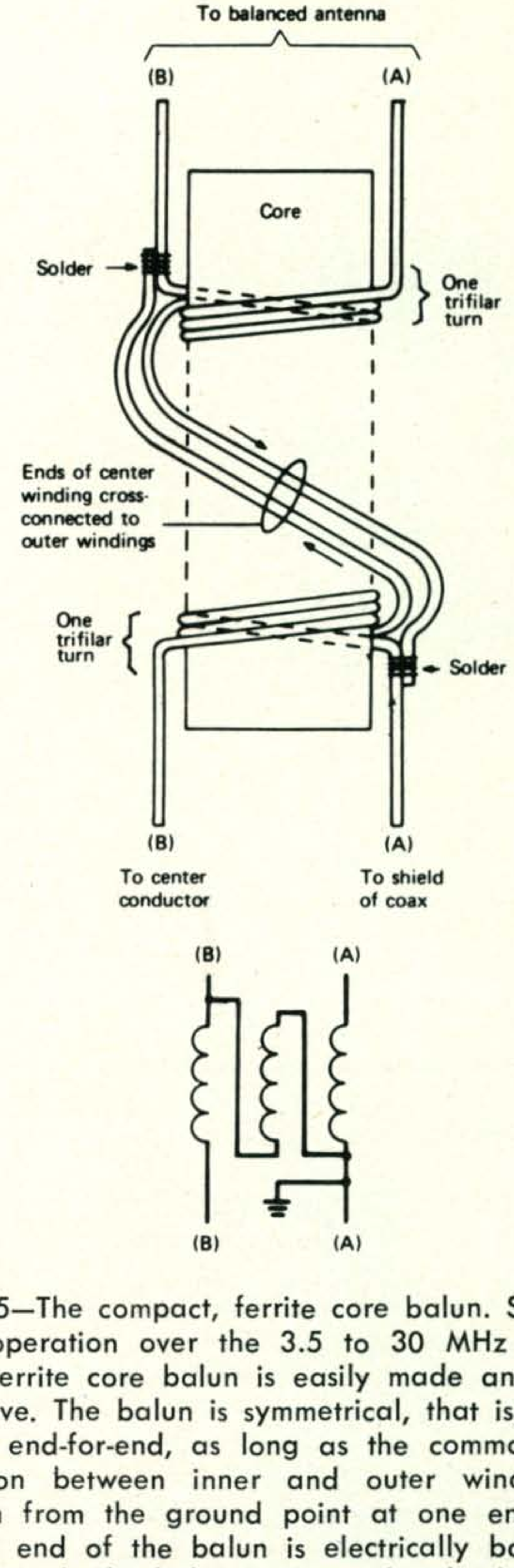

Fig. 5—The compact, ferrite core balun. Suitable for operation over the 3.5 to 30 MHz range, the ferrite core balun is easily made and inexpensive. The balun is symmetrical, that is, reversible end-for-end, as long as the common connection between inner and outer winding is taken from the ground point at one end. The other end of the balun is electrically balanced to ground. The balun is a very handy device to place between a coaxial line and a split, driven element of a beam antenna. It will work well with triband beams, or Quads, provided the s.w.r. on the transmission line is reasonably low (below about 2 to 1). As the s.w.r. on the transmission line increases, the power handling capability of the balun decreases.

rugged and completely waterproof enclosure, provided the terminals, or fittings don't leak."

Pendergast sighed, "Yes, and you can always go out and buy a balun and save the time and trouble. "

"Yes," I agreed. "It becomes harder and harder to build your own equipment. Parts are not commonly available and—when you do build up something nice—it has no trade-in value, as opposed to a commercial piece of equipment. It l ooks as if the hard laws of economics are making appliance operators of us all." ■

CQ Reviews Kenwood TS-900 [*from page 28*]

FIRST IF REJECTION—45 db (70 db min >85 db on 40 and 10). SECOND IF REJECTION—(Not measurable). IMAGE RATIO — >50 db down from output signal (−54 db). STABILITY —100 Hz during any 15 min period after warmup (20 Hz), ±2kHz during first hour after 1 min. warmup (±0.5 kHz). S-METER—(S-9=26 μv 80-15, 10m. S-9=45 μv. 6 db per S-unit and correctly calibrated to +40 db). FRONT END DE-SENSING FROM STRONG ADJACENT SIGNAL — (1μv @ 14.300 is de-sensed 1½ db by 100,000 μv 10 kHz away). SELECTIVITY—SSB 2.2 kHz 6 db (2.4 kHz), 4.4 kHz 60 db (4.4 kHz); c.w. 0.5 kHz 6 db (0.5 kHz), 1.5 kHz 60 db 1.2 kHz).

Transmitter: SSB PEP OUTPUT-150 watts into 50 ohms (160 w. except on 10m. 150 w.); c.w. output—100 watts nominal (with 230 w. input, 150 w. output 80, 40, 20; 135 on 15 and 125 on 10). CARRIER SUPPRESSION—>45 db down from output (−60 db). SB SUPPRESSION—Unwanted sideband −40 db from output (at 1 kHz, USB −44db; LSB —40 db). HARMONIC RADIATION—40 db down from output (50 db or better on all bands). SPURIOUS EMISSIONS—(None detectable within amateur bands when properly neutralized).

Conclusions

As the reader might suspect, we found the Kenwood TS-900 to be an excellent all-around piece of equipment. Only a few small additions would be worthwhile improvements to the operating convenience of the rig. The most significant addition we'd like to see is a provision to use the 2.2 kHz i.f. filter for c.w. reception when band conditions permit. The optional 0.5 kHz filter is excellent under crowded conditions but too sharp for casual operation. Also, we would have liked to see a quieter blower switched on along with filament voltage.

But all in all the TS-900 is the most sophisticated transceiver we've reviewed to date. With the rugged leather carrying handle on its side and rubber feet on the opposite side, it's an easily carried full feature station. Power supplies are available for home station or mobile use, the former being in a matching package with built-in speaker.

The Kenwood TS-900 is imported and distributed by Henry Radio of Los Angeles, California and is priced at $795.00. The PS-900 a.c. power supply is $120.00; the DS-900 mobile supply is $140.00. The VFO-900 is $195.00. The optional CW-900 c.w. filter is $45.00.

—*K2MGA*

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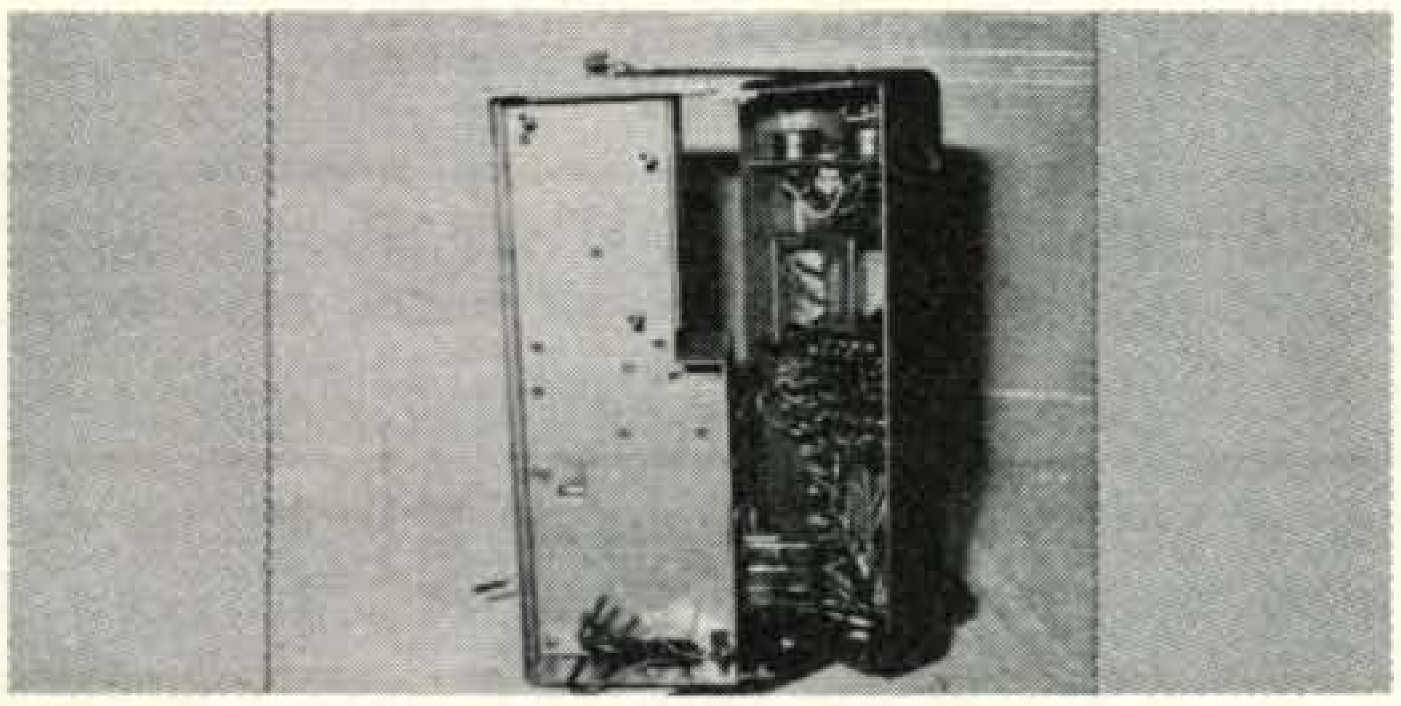

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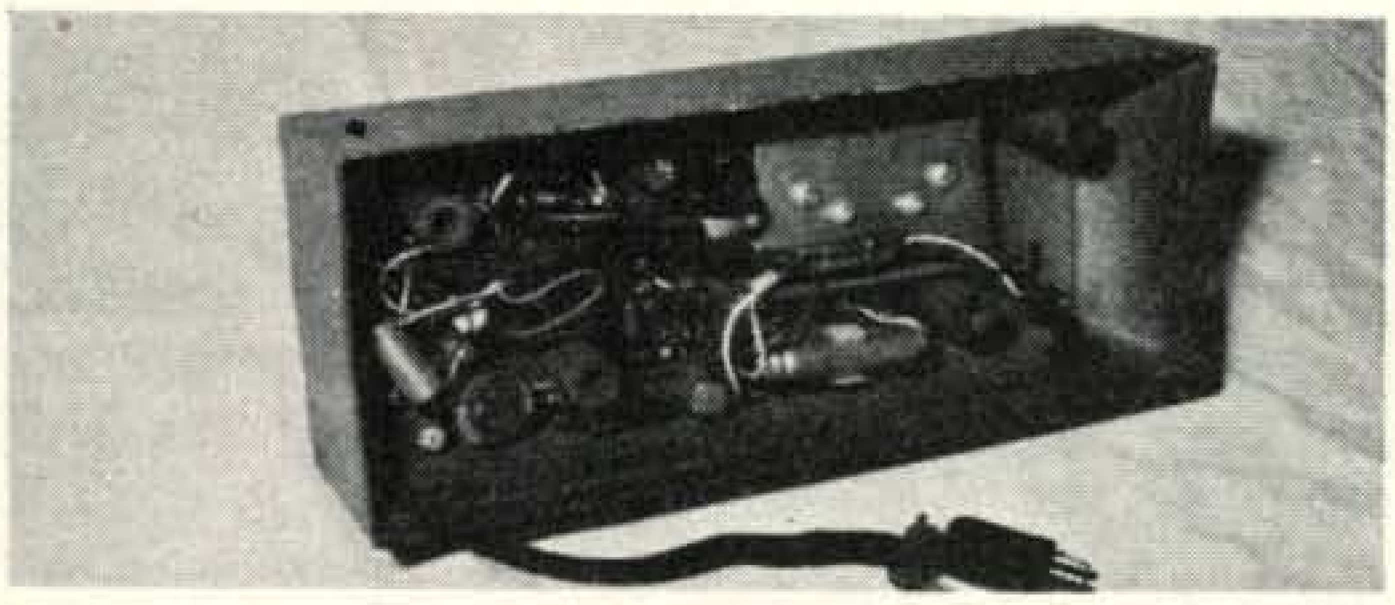

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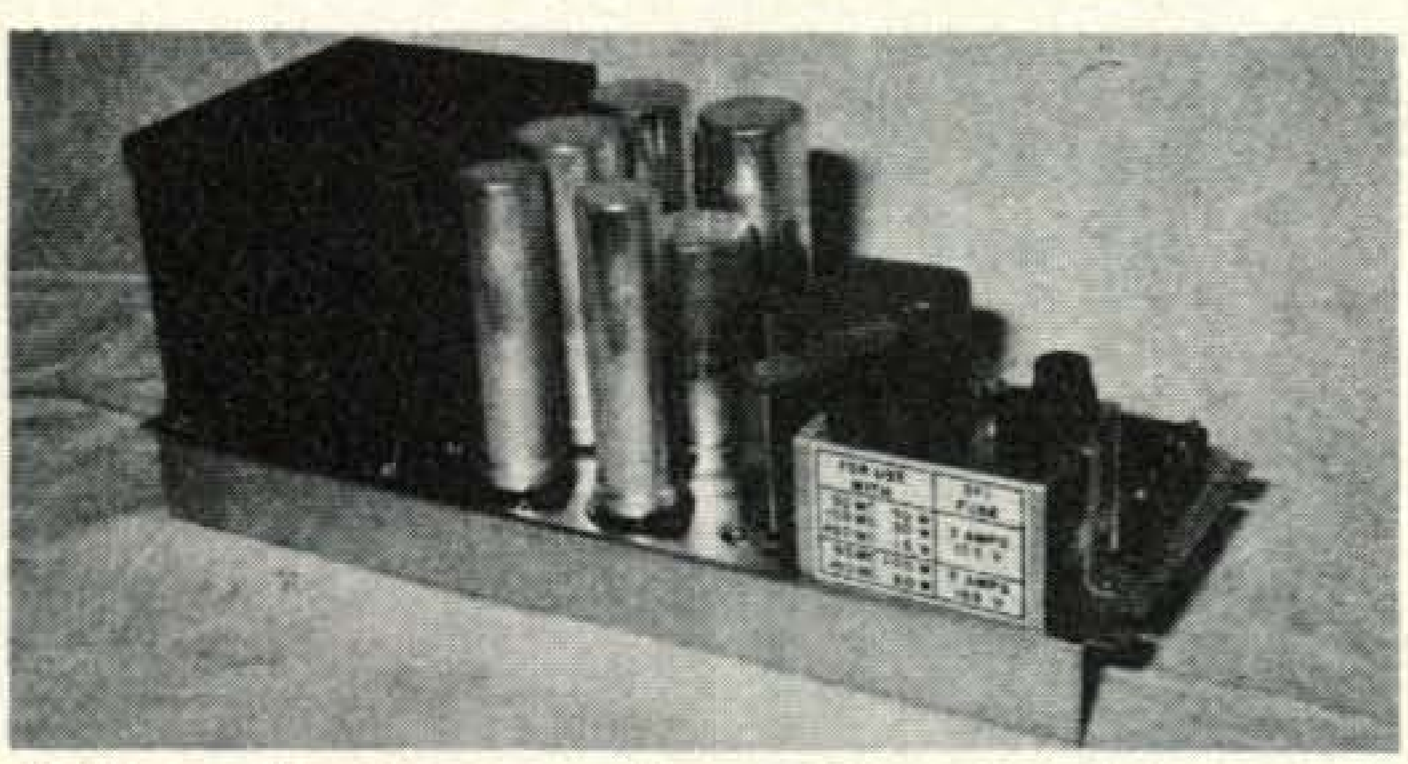

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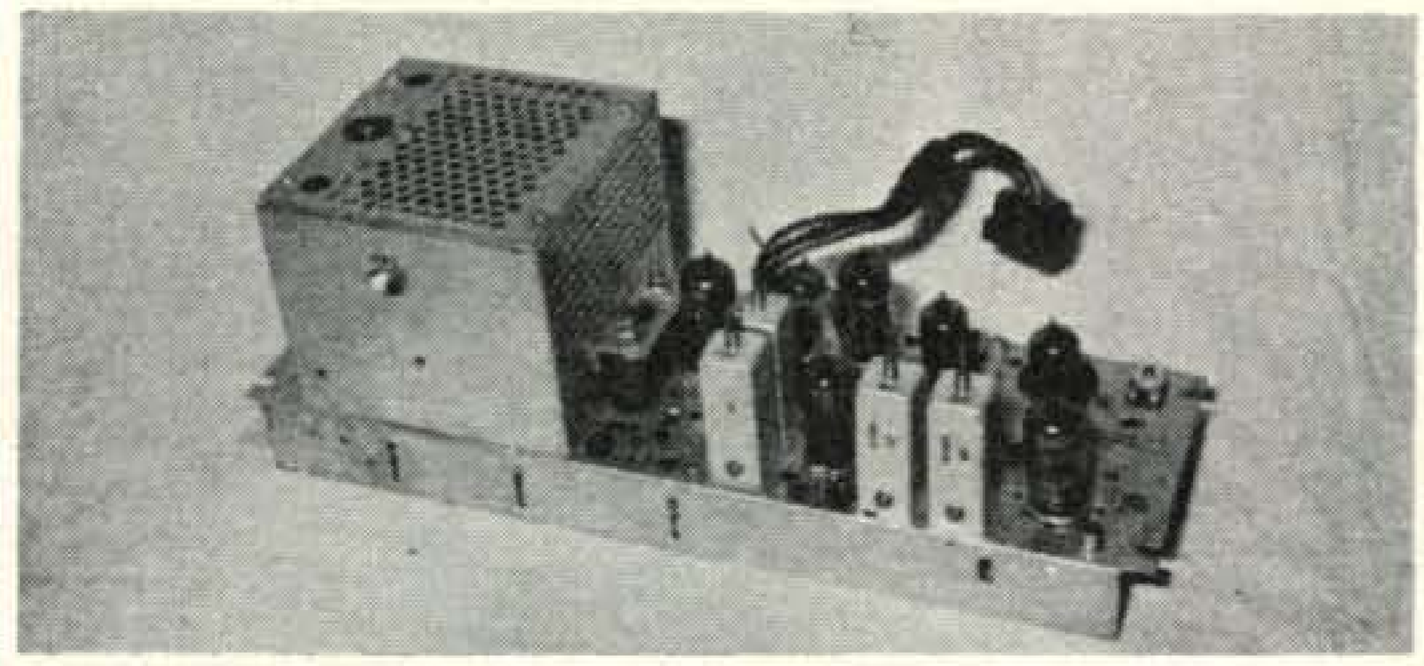

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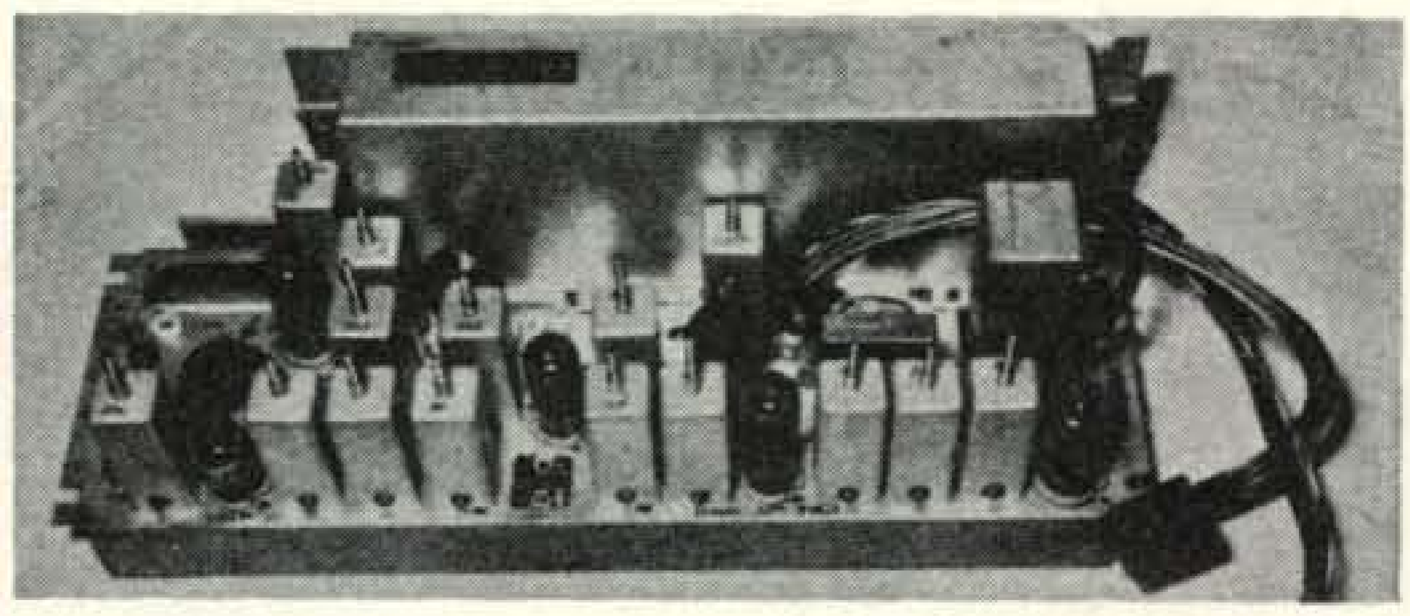

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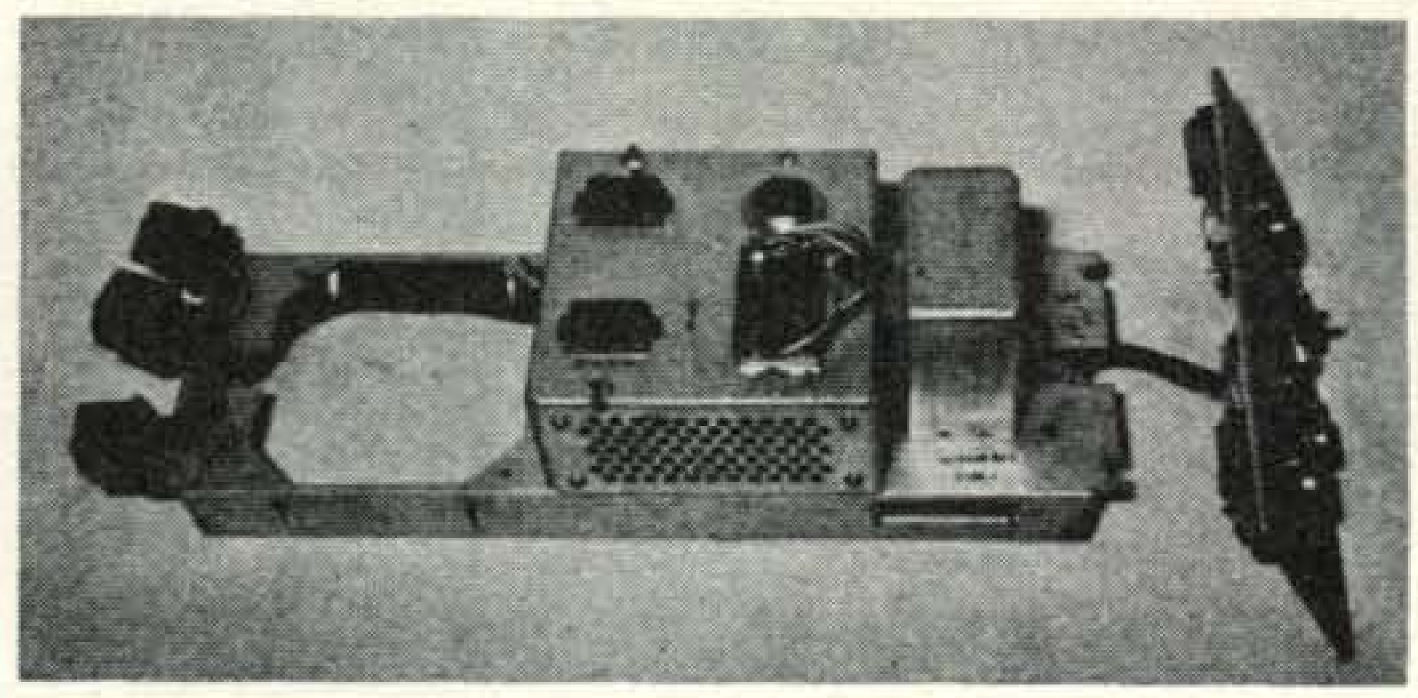

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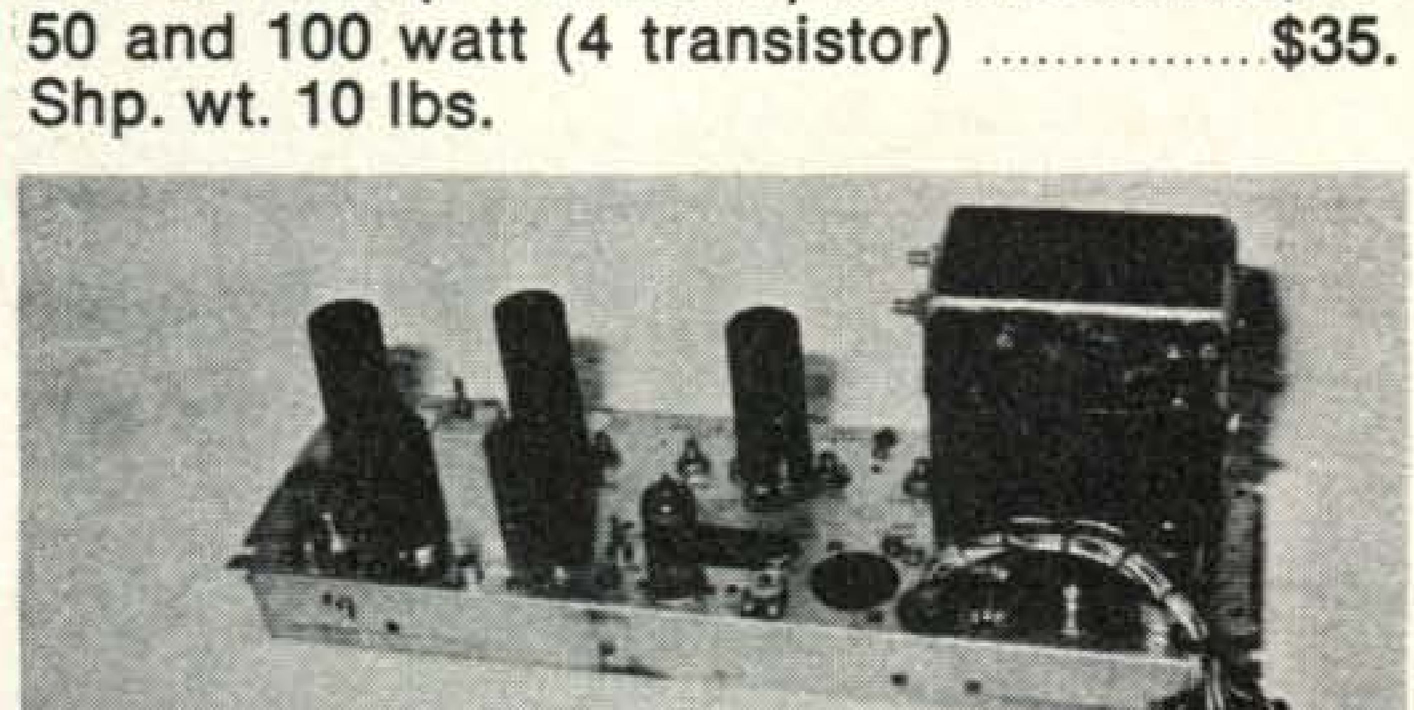

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