March 1976
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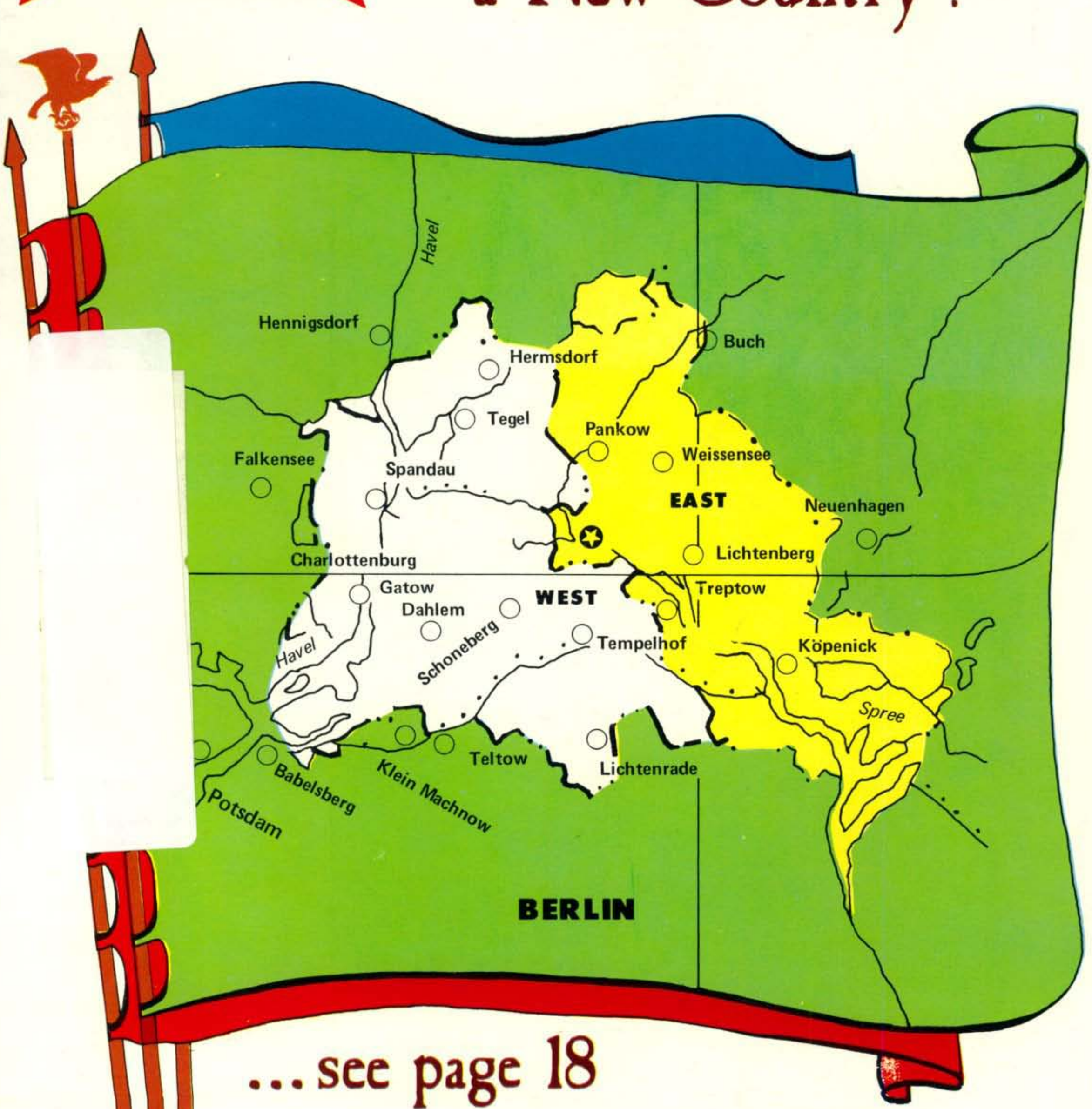
What and who makes a New Country ?



...see page 18

The Radio Amateur's Journal

98240

State of the Art...

Heathkit SB-104

Heathkit HW-104

Whether you choose the SB-104, or the HW-104, you're getting one of the finest Amateur transceivers you can buy at any price. And because you build them yourself, you get a feel for the equipment you simply can't duplicate with ready-made units.

100% solid-state construction including finals ...totally broadbanded circuitry for instant QSY without pre-selector, load or tune controls...switchable 100 watts/1 watt out...0.6 μV typical sensitivity...super-clean operation thanks to reduced cross-mod and IM distortion...specs that show what state-of-the-art is all about...and styling second to none!

The SB-104 offers true digital frequency read-out with resolution to 100 Hz on all bands, and complete frequency coverage from 3.5 MHz through 29.7 MHz without accessories.

Kit SB-104, Shpg. wt. 31 lbs. **669.95**

The HW-104, for $130 less, brings you the same broadbanded circuitry as the SB-104, but it has an easy-to-read circular tuning dial, and 3.5 to 29.0 MHz coverage (to 29.7 MHz available with HWA-104-1 accessory). It's one of the best price/performance combinations available in Amateur Radio today.

Kit HW-104, Shpg. wt. 31 lbs. **539.95**

Reviews and articles in the major Amateur magazines have consistently praised the 104's because of their advanced circuitry, reliability and sheer operating pleasure! If you're serious about Amateur radio, you owe it to yourself to find out more about the 104's. For complete descriptions and specifications, order the new FREE Heathkit catalog.

Station of the Art...

The SB-104 with sophisticated station accessories. Unquestionably, some of the finest Amateur gear you can own.

Clockwise from top:

SB-104 Transceiver:

SB-230 Conduction-Cooled Linear: 1200 PEP SSB: 1000 watts CW from less than 100 watts drive. Also 400 watts for SSTV and RTTY.
Kit SB-230, Shpg. wt. 40 lbs. **339.95**

SB-614 Station Monitor: CRT indicates signal quality. Also RF envelope and Trapezoid displays. For SSB, CW and AM to 1 kW; 80-6 meters.
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SB-634 Station Console: 24-hour clock, 10-minute ID timer, RF wattmeter, SWR bridge, phone patch.
Kit SB-634, Shpg. wt. 14 lbs. **179.95**

SB-644 Remote VFO: For split transmit/receive on SB-104. Not for HW-104.
Kit SB-644, Shpg. wt. 10 lbs. **119.95**

Fixed Station Power Supply. Fits inside accessory speakers of SB-104 and HW-104. 120/240 VAC, 60/50 Hz.
Kit HP-1144, Shpg. wt. 28 lbs. **89.95**

Station Speakers: 5x7", 3.2 ohm speakers response-tailored to SSB. With cable, connectors and cabinet.
Kit SB-604, For SB-104 Shpg. wt. 8 lbs. **29.95**
Kit HS-1661, For HW-104 Shpg. wt. 5 lbs. **19.95**
Useful options for both the SB-104 and HW-104.
SBA-104-1, Noise Blanker, Shpg. wt. 1 lb. **26.95**
SBA-104-2, Mobile Mount. Shpg. wt. 6 lbs. **36.95**
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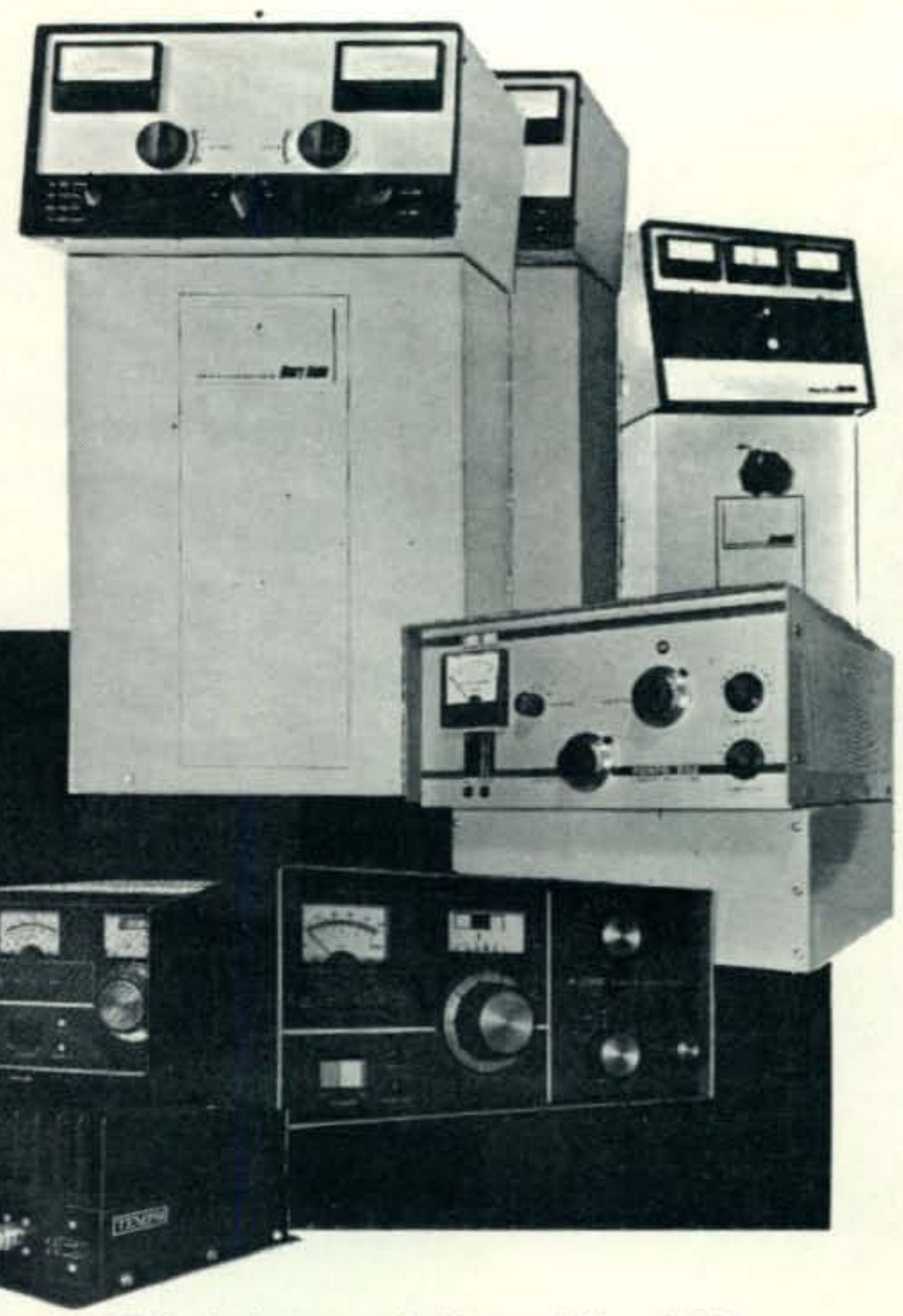

Never before has one company manufactured such a broad line of amateur amplifiers, both vacuum tube and solid state, for HF, VHF and UHF; fixed station and mobile; low power and high power. Take your pick from 20 models...the world's finest line of amateur amplifiers.

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THE "WORKHORSE"
The 2K-4 linear amplifier offers engineering, construction and features second to none, and at a price that makes it the best amplifier value ever offered to the amateur. Constructed with a ruggedness guaranteed to provide a long life of reliable service, its heavy duty components allow it to loaf along even at full legal power. If you want to put that strong clear signal on the air that you've probably heard from other 2K users, now is the time. Move up to the 2K-4. Floor console or desk model...$995.00

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A high quality linear amplifier designed for commercial and military uses. The 3K-A employs two rugged Eimac 3-500Z grounded grid triodes for superior linearity and provides a conservative three kilowatts PEP input on SSB with efficiencies in the range of 60%. This results in PEP output in excess of 2000 watts. In addition, the 3K-A provides a heavy duty power supply capable of furnishing 2000 watts of continous duty input for either RTTY or CW with 1200 watts output. Price...$1250.00

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TEMPO 6N2
The Tempo 6N2 brings the same high standards of performance and reliability to the 6 meter and 2 meter bands. Using a pair of advanced design Eimac 8874 tubes, it provides 2,000 watts PEP input on SSB or 1,000 watts input on FM or CW. The 6N2 is complete in one compact cabinet with a self-contained solid state power supply, built-in blower and RF relative power indicator. Price...$795

TEMPO 2002
The same fine specs and festures as the 6N2, but for 2 meter operation only. ...$695.00

TEMPO 2006
Like the 2002, but for 6 meter operation. ..$695.00

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

K-2000 LINEAR AMPLIFIER
The new K-2000 is the perfect companion for Kenwood's TS-520...matched for style and circuitry. The same specifications as the T-2000...$795.00

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

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

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MARCH, 1976 VOL. 32, NO. 3

The Radio Amateur's Journal

FEATURES

DEPARTMENTS

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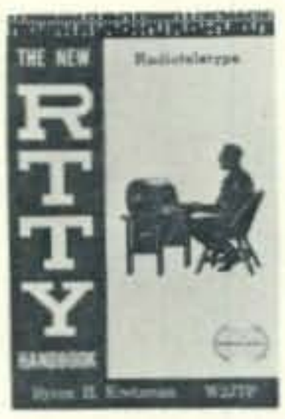

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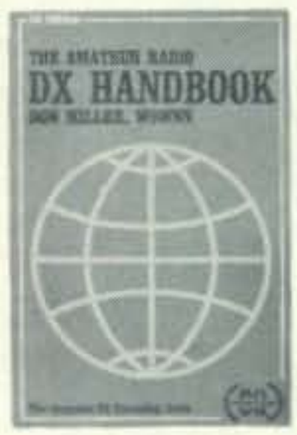

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Zero Bias

Just at press time we received word through W4UMF that a new Senate Bill S.3033 had been introduced in the 94th Congress by Senetor Barry Goldwater, W7UGA. The Bill could be an important step towards requiring manufacturers of Consumer Electronic products to bear responsibility for the susceptibility of their products to RFI - Radio Frequency Interference. You may know of it as TVI.

Senator Goldwater's Bill is similar to one introduced by Congressman Vanik of Ohio, so it would appear that with the proposed legislation being pushed from both ends of the Capital, liklihood of passage is good. Support for the measure by your own Senators and Representatives is always helpful, so let your elected representatives hear from you. Don't let the TV industry lobbyists short circuit this much needed legislation.

The following are Senator Goldwaters remarks to the Senate, and the actual wording of S.3033, as reprinted from the Congressional Record for Feb. 25, 1976.

By Mr. GOLDWATER:

S. 3033. A bill to amend section 302 of the Communications Act of 1934 to authorize the Federal Communications Commission to prescribe regulations with respect to certain electronic equipment that is susceptible to radio frequency energy interference. Referred to the Committee on Commerce.

Mr. GOLDWATER. Mr. President, I am pleased to introduce today a companion bill to legislation proposed by Congressman CHARLES VANIK of Ohio to drastically reduce the amateur and CB radio bugaboos of television interference, hi-fi interference, and other radio frequency interference to home electronics equipment.

Most consumers do not understand that when they may encounter interference with their home television or radio set after an amateur or citizen band radio operator moves next door, the source is not a defect in the equipment of their neighbor but with their own radio or television receiver. It is perfectly legal and appropriate for the ham or CB radio operator to be using his or her unit in accordance with FCC regulations and the fault actually lies with the radio, phonograph, or television equipment which is not, but could easily be, adequately shielded from unwanted signals. This interference can be corrected in almost all cases by the installation of simple filtering or shielding parts and could be accomplished most efficiently and economically if it were done by the manufacturer.

Mr. President, the bill I am introducing would help to clear up radio frequency interference not only in radio and television receivers, but in all home audio and visual electronic equipment. It would authorize the Federal Communications Commission to prescribe regulations with respect to home electronic equipment that is susceptible to this interference so that the equipment would operate free from such interference.

Mr. President, I ask unanimous consent that the bill be printed in the RECORD.

There being no objection, the bill was odered to be printed in the RECORD, as follows:

S. 3033

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That (a) section 302 of the Communications Act of 1934 (82 Stat. 290; 47 U.S.C. 302a.) is amended as follows:

(1) Subsection (a) of such section is amended—

(A) by inserting "(1)" immediately after "governing" in the first sentence;

(B) by striking out the period at the end of the first sentence and inserting in lieu thereof ", and (2) the use of protective components in audio and visual electronic equipment which are capable of reducing interference to such equipment from radio frequency energy."; and

(C) by striking out "shipment, or use of such devices" in the second sentence and inserting in lieu thereof "or shipment of such devices and electronic equipment or the use of such devices.".

(2) Subsection (b) of such section is amended by striking out "ship, or use devices" and inserting in lieu thereof "or ship devices and electronic equipment or use devices".

(3) Subsection (c) of such section is amended—

(A) by inserting "or electronic equipment" immediately after "devices" wherever such term appears in the first sentence;

(B) by inserting "and eletcronic equipment" immediately after "Devices" in the second sentence; and

(C) by striking out "the common objective of reducing interference to radio reception," in the second sentence and inserting in lieu thereof "the objectives of reducing interference to radio reception and to electronic equipment,".

(b) The heading for section 302 of such Act is amended to read as follows:

"INTERFERENCE WITH RADIO COMMUNICATIONS AND ELECTRONIC EQUIPMENT".

73, Dick, K2MGA

Now...more than ever--- the TEMPO line means solid value

Tempo VHF/ONE

the "ONE" you've been waiting for

No need to wait any longer — this is it! Whether you are already on 2-meter and want someting better or you're just thinking of getting into it, the VHF/ONE is the way to go.

• Full 2-meter band coverage (144 to 148 MHz for transmit and receive. • Full phase lock synthesized (PLL) so no channel crystals are required. • Compact and lightweight — 9.5" long x 7" wide x 2.25" high. Weight — About 4.5 lbs. • Provisions for an accessory SSB adaptor. • 5-digit LED receive frequency display. • 5 KHz frequency selection for FM operation. • Automatic repeater split — selectable up or down for normal or reverse operation. • Microphone, power cord and mounting bracket included. • Two built-in programmable channels. • All solid state. • 10 watts output. • Super selectivity with a crystal filter at the first IF and E type ceramic filter at the second IF. • 800 Selectable receive frequencies. • Accessory 9-pin socket. • $495.00

TEMPO SSB/ONE

SSB adapter for the Tempo VHF/One

• Selectable upper or lower sideband. • Plugs directly into the VHF/One with no modification. • Noise blanker built-in. • RIT and VXO for full frequency coverage. • $225.00

TEMPO/fmh

So much for so little! 2 watt VHF/FM hand held 6 Channel capability, solid state, 12 VDC. 144-148 MHz (any two MHz), includes 1 pair of crystals, built-in charging terminals for ni-cad cells, S-meter, battery level meter, telescoping whip antenna, internal speaker & microphone.

$199.00

FMH-MC for Marine & Commercial service also available.

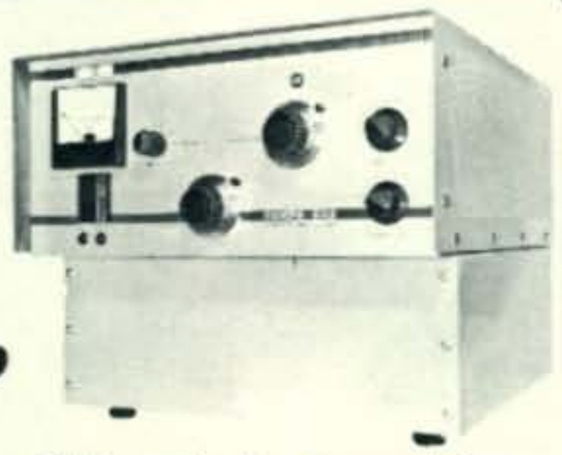
TEMPO/CL 146A

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

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

TEMPO CL 220

As new as tomorrow! The superb CL-220 embodies the same general specifications as the CL-146A, but operates in the frequency range of 220-225 MHz (any two MHz without retuning). At $299.00 it is undoubtedly the best value available today.



TEMPO 6N2

The Tempo 6N2 meets the demand for a high power six meter and two meter power amplifier. Using a pair of Eimac 8874 tubes it provides 2000 watts PEP input on SSB and 1000 watts input on CW and FM. Completely self-contained in one small desk mount cabinet with internal solid state power supply, built-in blower and RF relative power indicator.

$795.00

The Tempo 2002.. 2 meters only $695.00
The Tempo 2006.. 6 meters only $695.00

TEMPO 100AL10 | **SOLID STATE VHF LINEAR AMPLIFIER.** 144-148 MHz. Power output of 100 watts (nom) with only 10 watts (nom) in. Reliable and compact.

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VHF/UHF AMPLIFIERS

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

VHF (135 to 175 MHz)			
Drive Power	Output	Model No.	Price
2W	130W	130A02	$199
10W	130W	130A10	$179
30W	130W	130A30	$189
2W	80W	80A02	$169
10W	80W	80A10	$149
30W	80W	80A30	$159

UHF (400 to 512 MHz)			
Drive Power	Output	Model No.	Price
2W	70W	70D02	$270
10W	70W	70D10	$250
30W	70W	70D30	$210
2W	40W	40D02	$180
10W	40W	40D10	$145
2W	10W	10D02	$125

FCC Type accepted models also available.

Most of the above products are available at dealers throughout the U.S.

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

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Our Readers Say

Fire In The Hamshack

Editor, *CQ*:

Al Smith's article, "Fire In The Hamshack!" (November, p. 34) certainly does have a place in *CQ*! Fire is the cause of many deaths and loss of property . . . and where there is electronics there is the chance of fire. We should do our best to protect ourselves.

It should be made clear that the device one should employ as early detection is an Ionization Detector rather than a Smoke Detector. These terms are being used interchangeably and some confusion is resulting: The ionization detector actually will signal the presence of products of combustion (generated in the very early stages of a fire) whereas the smoke detector will only respond to smoke dense enough to obscure the detector (smoke is generated much after products of combustion).

Some advertisments do not make it clear what is being purchased. If it is not obvious that the device in question actually responds to products of combustion do not purchase it. There are numerous manufacturers of the ionization-type of detector.

Bob Sullivan, WØYVA/4
Arlington, VA

Reward

Editor, *CQ*:

A check for $100.00 from Wide Band Engineering Company, Inc. has been deposited in a West Coast Amateur Radio Service (WCARS) special fund. This sum was specifically directed to match the $100.00 reward offered by WCARS as recently announced by Oakland Attorney Ed Peck (K6AN).

This fund, established by WCARS, offers a reward to person/persons furnishing information leading to the conviction of person/persons deliberately interferring with Amateur Communications.

WBE, Inc. would like to see other companies with an interest in Amateur Radio Communications add to this fund. It is only by a concerted effort that such "jammers" can be removed from communications bands.

Marilyn G. Ticknor
Phoenix, AZ

CP Workers Need Help

Editor, *CQ*:

The Cerebral Palsey Center is starting an amateur radio

(continued on page 70)

Hy-Gain 270 2-meter antenna.

A great mobile that's also a great base.

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

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

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

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

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

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

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

hy-gain®

Hy-Gain Electronics Corporation: 8601 Northeast Highway Six; Lincoln, NE 68505; 402/464-9151; Telex 48-6424

Take your 2-meter hand-held everywhere with a Hy-Gain 2-meter flex antenna 144-148 MHz.

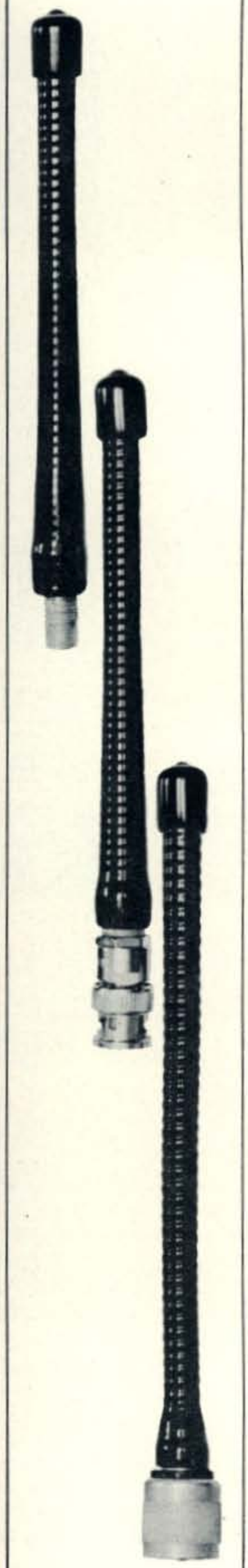
Replace your cumbersome whip with a high performance flex antenna from Hy-Gain. They're so short and flexible you can take your 2-meter hand-held everywhere with ease.

These rubber duckies are tough enough to take almost any kind of abuse. A special vinyl coating completely insulates the continuously loaded element. It won't crack, break or split, no matter how you bend it. Hy-Gain flex antennas cannot be shorted accidentally. They are completely impervious to weather and corrosion, designed with the same expert care that produces our superb military and commerical antennas.

Whether your 2-meter hand-held is one of the fine commercial units or one you built by hand, a Hy-Gain flex antenna will let you take it wherever you go . . . with the performance you want.

Available in three connector types pre-tuned for optimum performance.

Order No. 274 BNC or "snap" fitting. Fits Tempo, Wilson, Ken Product, Clegg, and other with BNC connector.
Order No. 275 For SO-239. Fits Drake and Motorola.
Order No. 269 5/6 x 32 stud. Fits Motorola, GE, Johnson, RCA, Comco, and Standard.



hy-gain®

Hy-Gain Electronics Corporation
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When you get tired of compromises...

KENWOOD'S TS-700A finally fulfills the promise of 2-meters...more channels, more versatility, tunable VFO, SSB-CW and, best of all, the type of quality that has placed the Kenwood name out front.

- Operates all modes: SSB (upper & lower), FM, AM, and CW
- Completely solid state circuitry provides stable, long lasting, trouble-free operation
- AC and DC capability. Can operate from your car, boat, or as a base station through its built-in power supply
- 4 MHz band coverage (144 to 148 MHz) instead of the usual 2
- Automatically switches transmit frequency 600 KHz for repeater operation. Just dial in your receive frequency and the radio does the rest . . . Simplex repeater reverse
- Or do the same thing by plugging a single crystal into one of the 11 crystal positions for your favorite channel
- Outstanding frequency stability provided through the use of FET-VFO
- Zero center discriminator meter
- Transmit/Receive cabability on 44 channels with 11 crystals
- Complete with microphone and built-in speaker
- The TS-700A has been thoroughly field-tested. Thousands of units are in operation throughout Japan and Europe

The TS-700A is available at select Kenwood dealers throughout the U.S. For the name of your nearest dealer, please write.

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116 East Alondra / Gardena, California 90248

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Amateur Electronic Supply
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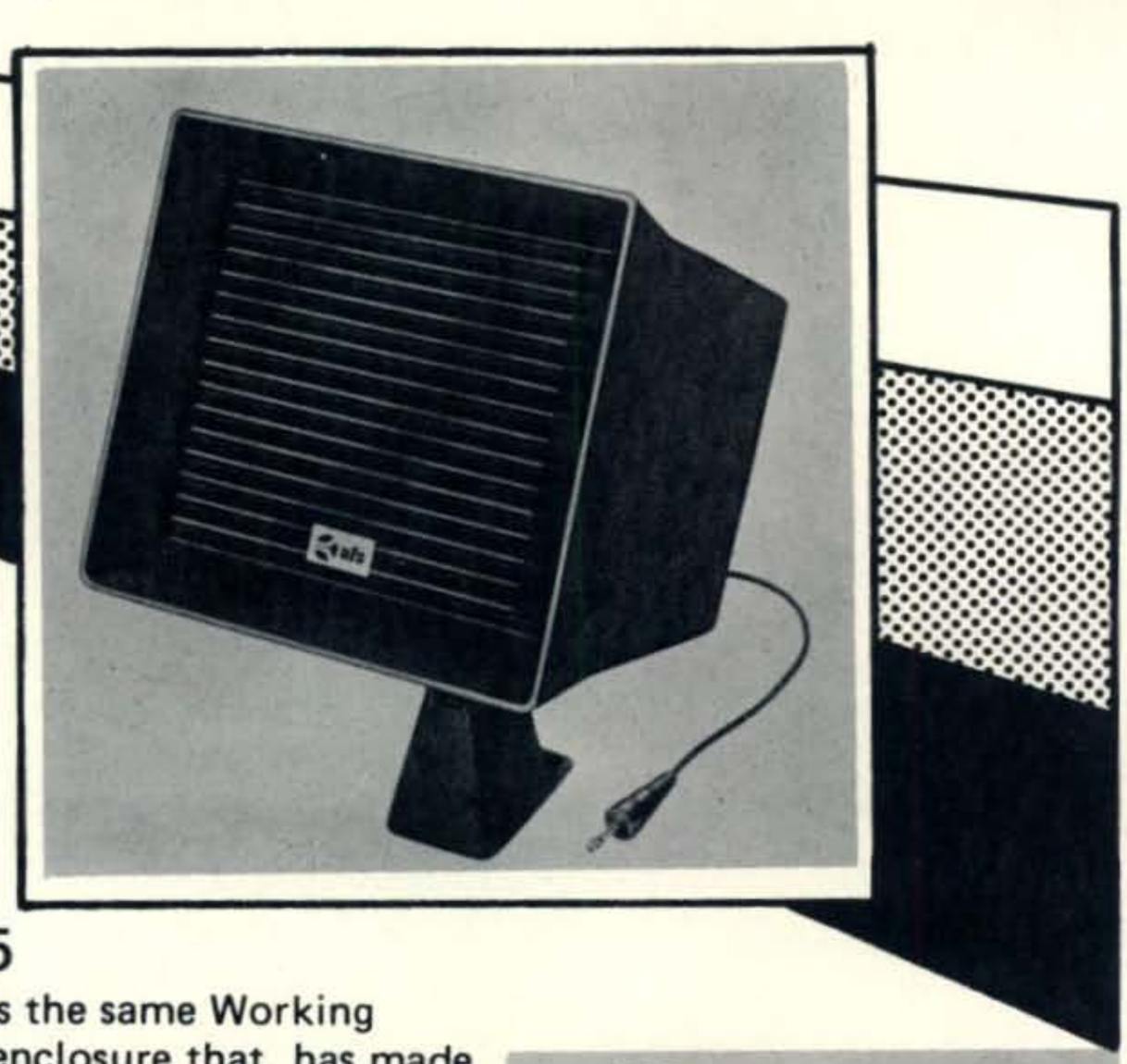

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Announcing

● **Curundu, Canal Zone** — The '76 Annual Canal Zone Hamfest and Fleamarket will be held on March 27, at the Curundu Jr. High Cafetorium. It is being sponsored by the CZARA (Canal Zone Amateur Radio Association). For more information contact: Jake Meyer KZ5JA, Box 415, Balboa Heights, Canal Zone.

● **Tucson, AZ** — The ARRL South Western Division Convention will be held April 9, 10 and 11, at Braniff Place. Contests, Prizes, Talk in Stations, Banquet. For more information write: P.O. Box 12261, Tucson Arizona 85712.

● **Hull, MA** — A Ham Auction will be held on April 17 at the VFW Hall sponsored by the South Shore Repeater Assoc. Talk in on 90/30, 07/67, 04/64 and 52/52. For more information contact WA1RKT, WA1QWT, or W1FGI on 90/30.

● **Dorado, Puerto Rico** — The Radio Club de Puerto Rico will hold its annual Convention at the Dorado del Mar Hotel, on April 23-25. Weekend activities for the whole family. For information contact KP4AOC, GPO Box 693, San Juan, PR 00936.

● **Dayton OH** — The Dayton Hamvention will be held April 23-25 at the Dayton Hara Arena and Exhibition Center. Prizes, Awards and Banquet. For more information contact: Ted Suarez Box 44, Dayton, Ohio 45401.

● **Grand Rapids, MI** — The 2nd Annual Swap and Shop will be held April 24, 9 am to 5 pm, in the auditorium at Woodland Mall on east 28th St. Featured will be: Ham Equipment, Electronic Parts, Moniters, and C.B. Admission $1.50. For more information write: Grand Rapids React Inc., P.O. Box 2402, Grand Rapids Mi. 49501.

● **Sullivan, IL** — The Moultrie Amateur Radio Klub will hold its 15th Annual Hamfest at the American Legion Pavilion in Wyman Park, on April 25th.For more information write: MARK, 916 W. Strain, Sullivan, Il. 61951.

● **Las Mesa, NM** — The Mesilla Valley Radio Club sponsers Whitey's Bean Feed and Swap-Fest April 25th at 10 AM. Talk in on 16/76 and 3940 KC. Big Prizes and plenty of food. All included for $4.00 for adults and $1.75 for children. For more information contact W.E. Ratcliff, Box 3457 University Park, Las Cruces, NM 88003.

● **Meadville, MA** — The Northwestern Pennsylvania Swapfest will be held on May 1, at the Crawford County Fairgrounds. Free Admission. $1 to display. Flea market begins at 10 AM. Hourly door prizes, refreshments. Commercial displays welcome. Talk in 146.04/64 and 146.52 Mhz. For more information write: Crawford Amateur Radio Society Box 653 Meadville, Pa. 16335.

● **Birmingham, AL** — The annual Birminghamfest Amateur Radio convention will be held on May 1 & 2 at the Alabama State Fairgrounds in Birmingham. Headquarters Motel: Sheraton Downtown. Two-day swap circle, Manufacturers exhibits, forums, family activities, huge prize list. Write B.A.R.C., P.O. Box 603, Birmingham Al. 35201.

● **DeKalb, IL** — The DeKalb County Hamfest sponsered by the DeKalb Repeater Club will be held May 2, 8 AM to 3 PM, at the Notre Dame Special Education Complex on Gurler Rd., Tickets are $2.00 at door, $1.50 in advance. Talk in: 147.13/.73 and .94 simplex. For more information write: Howard Newquist, P.O. Box 349, Sycamore, IL 60178.

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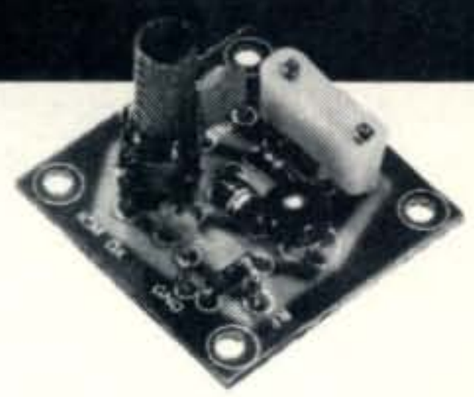

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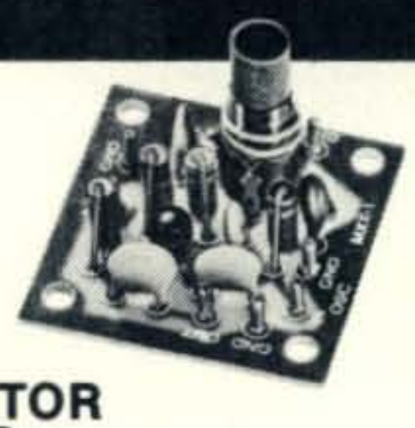

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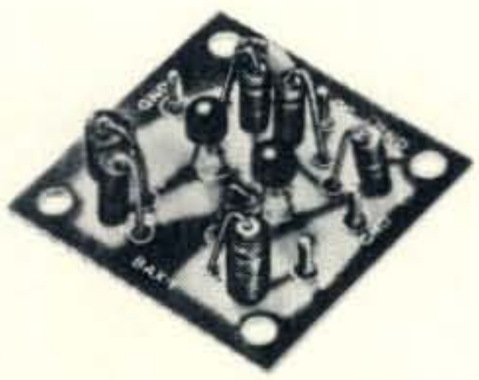

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When is an island a country?
And when is a country no longer a country?
If these questions—and others about country status—have puzzled you, then you're a candidate for Walt Schroeder's critical examination of the DXCC Country List Criteria.

The DXCC and the Countries List Criteria

BY WALTER A. SCHROEDER WB5OXC

When Tibet was recently deleted from the DX Century Club Countries List, how many Amateurs knew the reasons why? When Kingman Reef was added to the Countries List, how many DXers could say that they understood the reasoning behind this action? As one looks over the DXCC Countries List, there are many changes where countries have been added or deleted. There are quite a few other countries on the List that don't seem to belong there. In order to understand this seemingly odd and confusing collection of entities over which DXers will fight and on which numerous contests are based, one must look to the DXCC Countries List Criteria. The Criteria is the present standard for the Countries List, which has led to the DXCC awards program.

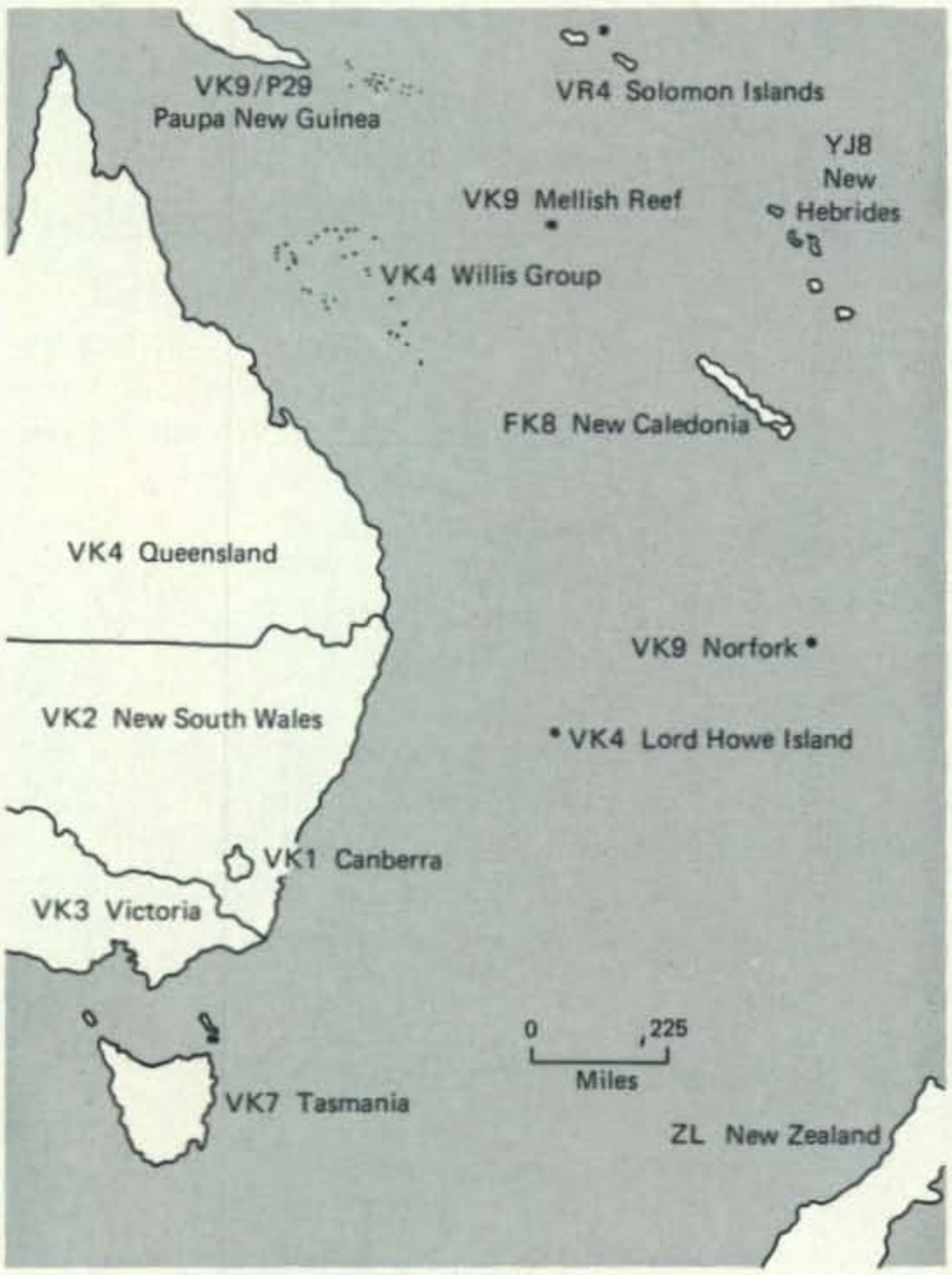

Fig. 1—Note that both Lord Howe Island and Mellish Reef are more than 225 miles off the coastline, and that each one counts for a separate country. Tasmania, which is not that far away, is counted for Australia. The Willis Islands, which are not quite 225 miles out, are an inconsistency.

What's a Countries List?

In reality, the Country List is a combination of valid countries, as defined by the Criteria, and inconsistencies. There are numerous countries that do not meet the Criteria, and almost every DXer can think of at least ten countries that don't seem to belong on the Countries List. The Countries List has been in existence for quite a while, dating back to prior to World War Two. It is basically an awards criterion, but time has also provided for it to become far more than just the basis for the original DXCC award.

After the Second World War, there were quite a few political changes occuring in the world. Most of the political changes would result in a problem as far as the Countries List was concerned, because a country might not exist any longer while another had appeared in its place. This would usually result in a change for the Countries List. Something had to be done to account for these changes, and the basic Countries List, in a form that we know it today, emerged.

All of the countries on the Countries List have gotten there by one of three ways. First, some of the countries have gotten there by a process of "grandfathering." When the Post World War Two countries list was made up, some countries were left on it merely because of their position before the War. Another way that a country got on the List was through "default." If an entity existed that no one knew what to do with in terms of DXCC countries, most likely that entity would also find its way onto the Countries List. The third way that something could get onto the Countries List was through application of the Countries List Criteria.

The Countries List Criteria

The purpose of the Countries List Criteria was to legitimize and organize the Countries List. It provided for the insertion of new countries or political entities that came into existence and for the deletion of entities no longer in existence or that no longer qualified as DXCC countries. It is this thought that has carried the Countries List up to today. Some of the entities on the list that were grandfathered there have never been removed. Others have been added to the list since the Second World War through Criteria interpretation. It is this combination of events that helps to explain the numerous inconsistencies noted before.

The first part of the Criteria to come into existence was Rule Point One, which deals with governmental or administrative differences. This one point, by itself, soon became too broad to satisfy the Country List's needs in terms of the varied political and geographical conditions of the world. The need for other criteria to fulfill those needs was met in the early 1960s when Rule Point Two-A and Rule Point Three were established. They dealt with offshore islands and intervening territory, respectively. In 1963, Rule Point Two-B was added, which deals with inter-island differences. Finally, in 1972, Rule Point Four was incorporated into the Criteria. Each of the four points was added as the need for a new standard to judge a DXCC country arose. The criteria have been applied most consistently to Africa and Asia, as these are the parts of the world where the most political changes have occured in the last thirty years.

Rule Point One

Getting into the actual interpretation of the Criteria, Rule Point One deals with Government and Administration. It says:

> *An area, by reason of government or a distinctly separate administration constitutes a separate country.*[1]

This short sentence can be applied to both islands and land areas, although each type of area has a slightly different interpretation.

When used between land areas, political boundaries usually provide the basis for distinction. Countries, colonies, protectorates and netural zones can be used for determination. If two colonies or territories should happen to be next to each other, they are usually distinguished as two separate countries for DXCC purposes. However, if the colonies are not separated from the mother country, neither one would be recognized as a separate country. This is shown in Canada where the Yukon Territory and the Northwest Territories lie next to Canada, but they all count for one country. The occurrence of two colonies under the same political rule existing geographically next to each other is rather hard to show today since many colonies have gained their independence. However, if one looks at a map of French Africa in the 1950s and compares this with the Countries List in existence at the time, a rather good example of side by side colonies counting as separate countries can be shown. A final distinguishing mark for this Rule

Fig. 2—New Zealand and surrounding waters.

[1]*QST*, October 1972, page 131.

Point is that of protectorates. The status of the Republic of South Africa and the territory of Southwest Africa (Nambia) is a good indication of this.

When Rule Point One is applied to islands, one must be careful not to confuse the issue with that raised by Rule Point Two. Rule Point Two deals with islands *all of which are under the same administration.* Examples of Rule Point One as it applies to islands can be seen in the south Pacific, where there are a number of island-nations and/or colonies. The colonies, although they may be ruled by the same mother country, can be administered differently, and in this case the two colonies would be regarded as separate countries for DXCC purposes. Inter-island groups, within these various colonies, would be dealt with under Rule Point Two. Another case is where a group of islands lays off the coast. If the islands are of a different administration than the mainland, the islands would be regarded as a separate DXCC country. If the islands

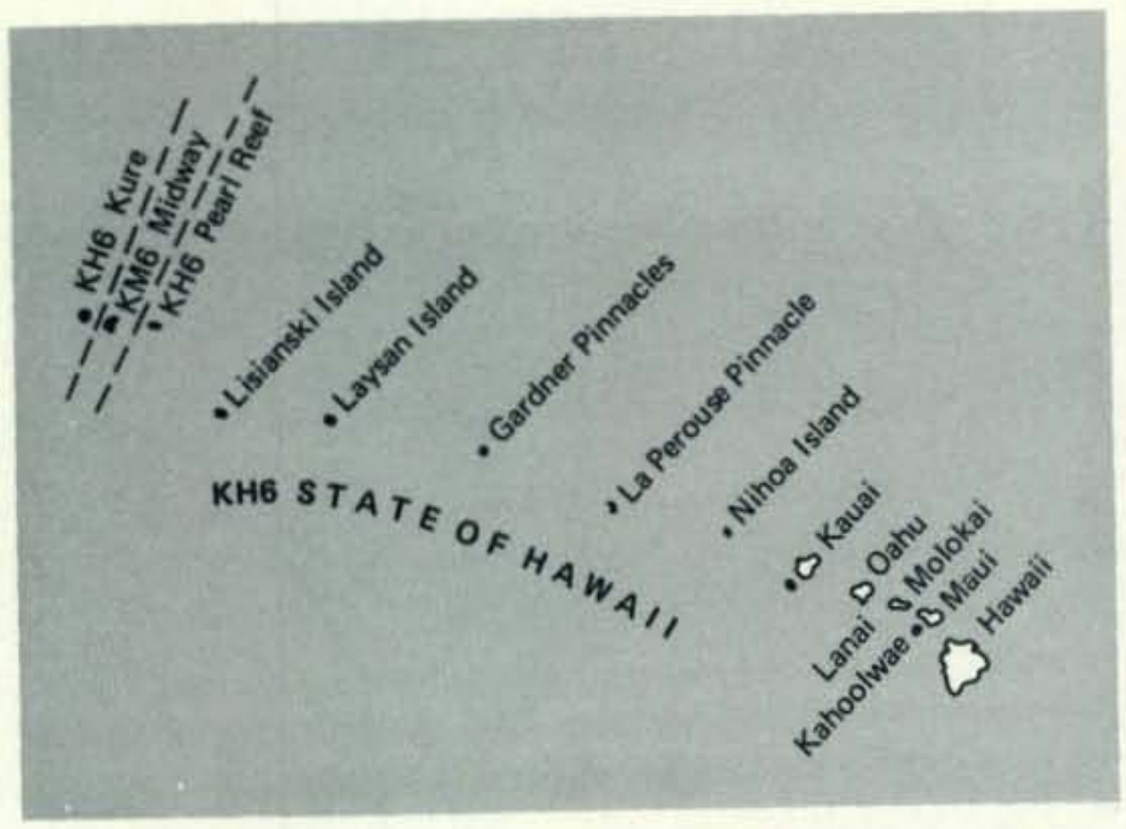

Fig. 3—The Hawaiian Islands with Kure and Midway.

were of the same administration as the mainland, they would be dealt with under Rule Point Two. A few examples of this are the Bahamas off Florida, and the Cape Verde Islands off the coast of Africa.

The first Rule Point has its inconsistencies. The most obvious deals with the Soviet Union. Each of the Soviet Republics is regarded as a separate country for DXCC purposes, when possibly they should not. However, since the practice of recognizing separate country status for the Soviet Republics has been in force for some time, it would appear that little would be gained by trying to reverse anything. Additionally, some of the rarer Republics provide quite a bit of challenge to work, and this can prove to be rather enjoyable to a DXer. Because of this, sometimes nontangible things are also considered regarding the Countries List. This proves to be the exception rather than the rule, and it should be noted that in the application of the Countries Criteria to the Soviet Republics, the Criteria is applied consistently when one Republic is split into two DXCC countries because of political demarcations.

Other inconsistencies in the Countries List Criteria regarding Rule Point One deal with separated countries. This can be seen by the lack of recognition of two Koreas or until recently of two Vietnams or two Germanies. The line of thought here tends to follow that of the official United States government policy in recognizing the political existence of certain countries. This is further supported by the addition of two new countries, East and West Germany, shortly after the United States formally recognized the German Democratic Republic in 1973. Since the Republic of Vietnam is no longer in existence, this example is moot.

Rule Point Two

Moving on, Rule Point Two deals with islands and separation by water. There are two parts to this rule point, and they will be dealt with separately, because they are mutually exclusive.

Rule Point Two says:

> *An island, or a group of islands, not having its own government or distinctly separate administration, is considered as a separate country under the following conditions:*
>
> *(a) Islands situated off shore from their governing or administrative area must be goegraphically separated by a minimum of 225 miles of open water. This point is concerned with islands off shore from the mainland only. This point is not concerned with islands which are part of an island group or are geographically adjacent to an island group.*[2]

This point, as the text attempts to explain, deals only with off shore islands. The islands in question must be of the same administration as the mainland, and there must not be any other islands between the island or island group in question and the shoreline. In addition, the island or island group must be a minimum of 225 miles out. The rule point does not take into consideration the difference between two offshore islands or groups of islands (see fig. 1)

A few examples of this point are Marion Island, Hawaii, and Mellish Reef. Some inconsistencies here are the islands that are counted as countries near Europe and in the Mediterranean, such as the Aland Islands, the Balernic Islands, Corsica and Sardinia. Most of these were grandfathered onto the Countries List.

The second part of the rule point says:

> *(b) Islands forming part of an island group or which are located adjacent to an island, or island group, which have a common government or administration, will be considered as*

[2]*Ibid.*, p. 131.

separate entities provided that there is at least 500 miles of open water separation between the two areas in question.[3]

When this part of the Rule Point is considered, a more comprehensive view of things can be obtained. This portion of the Rule Point does not consider off shore islands, but those which are located by themselves away from the mother country or which constitute a country by themselves. The entire group of islands must qualify as a country under Rule Point One. After this requirement has been met, the country can be divided up further if the provisions of the 500 mile separation can be met.

Some examples of this Rule Point are the American Phoenix Islands and the Line Islands in the Pacific Ocean. Collectively, all islands in these two groups are administered by the United States Department of the Interior. Howland, Baker and the American Phoenix Islands are more than 500 miles apart from Palmyra and Jarvis Islands, so both of these two groupings are counted as separate countries. Beyond this, none of the islands within these groups are more than 500 miles apart, so no further country divisions can be made. When dealing with islands, it is sometimes helpful to deal with the islands in groupings first and to consider the individual components later.

An inconsistency noted for this Rule Point is New Zealand. New Zealand, Chatham Island, the Kermadec Group, and Auckland and Campbell Islands Group all count as separate countries on the Countries List. The reason for this is that prior to 1963, when Rule Point Two-B was added to the Criteria, each of these islands had been operated from and had been put on the Countries List. Each of these islands or groups were more than 225 miles off the coast of New Zealand, so they met the qualifications for country status.

However, there are two other islands, each more than 225 miles off the coast, which are not on the Countries List. These two islands, the Bounty and Antipodes Group, were never operated from prior to 1963, and hence were not added to the Countries List. One requirement for a potential country, in order for it to be added to the Countries List, is that someone must operate from it. After 1963, the inter-island group distance of 500 miles was applied to the Bounty and Antipodes Islands Group, and the islands did not qualify for country status. What this results in is an inconsistency. Here, the Criteria was applied consistently during the time period when the country was added to the Countries List, but due to present changes in the Criteria these countries do not qualify. [4] (See fig. 2.)

Rule Point Three

The third Rule Point deals with separation by foreign land. Rule Point Three says:

In the case of a country, such as that covered in Point 1, which has a common government or administration but which is geographically separated by land which is foreign to that country, if there is a complete separation of the country in question by a minimum of 75 miles of foreign land, the country is considered as two separate entities. This 75 miles of land is a requirement which is applicable to land areas only. In cases of areas made up of a chain of islands, there is no minimum requirement concerned with the separation by foreign land.[5]

This rule point can also be split into areas. The land requirements state that in order for a country to count as two entities for DXCC purposes, the two territories must be at least seventy five miles apart and there must be contiguous land between them. Two good examples of this are Alaska and its relation to the United States, and prior to 1972, East and West Pakistan. In each case, there is more

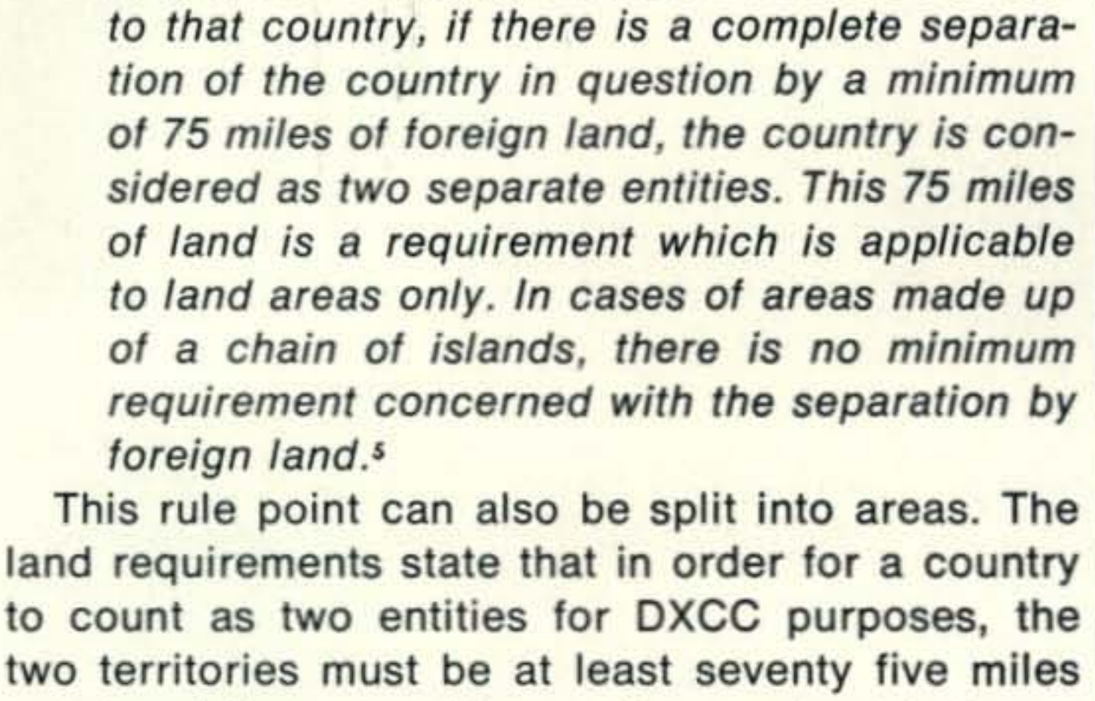

Fig. 4—The islands of the Central Pacific Ocean.

than seventy five miles of contiguous foreign territory in between the two areas in question.

The island interpretation states that in a chain of islands, the same requirement of intervening territory applies, but that there is no minimum mileage requirement. This is the case in the Hawaiian Islands chain, where Midway Island, under the jurisdiction of the Navy Department, separates the State of Hawaii and Kure Island into two DXCC countries. (See fig. 3.)

There is an important clarification that needs to be made here. Many people have wondered why Midway, which is under the jurisdiction of the Navy Department, can apply under Rule Point Three. They reason that there is no difference between

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[3] *Ibid.*, p. 131.

[4] If anyone can document operation from either the Bounty or Antipodes Island Groups prior to 1963, it might be interesting if they would contact Mr. R. L. White at ARRL Headquarters, as a "new" country might be added to the List.

[5] *Ibid.*, p. 131.

Fig. 5—Berlin is located some 90 miles inside the German Democratic Republic, but presently counts as the Federal Republic of Germany for DXCC purposes.

Midway and its relation to the State of Hawaii and with any other military base stateside which presently does not qualify for DXCC country status. If Midway qualifies as a separate country for the DXCC, they wonder, why shouldn't every military base be so counted?

This is an interesting question. Any discussion about the differences should really be dealt with in reference to Rule Point One, but it would have been difficult to understand the differences until all the criteria that might appear to be applicable had been explained. For this reason, the matter was left until now. The reason why Midway qualifies as a separate country is that Midway Island is specifically recognized by United States Law as a Territory of the United States. It is not considered to be an integral part of the State of Hawaii, nor within the confines of its political boundaries. Furthermore, since the State of Hawaii claims no sovereignty over Midway, this satisfies the requirement for different adminstration, and geography satisfies the requirement of intervening territory (Rule Point Three). The same cannot be said for military facilities elsewhere in the fifty states. While a military base is recognized as federal property, the states still retain some control over the military bases, such as income taxation of civilian employees. Most often, military personnel are exempted; however, if a state so desired, it could tax them, too. Furthermore, no statute of the United States specifically recognizes any military facility as existing separately to a state in which it is located. Because of this, military bases do not appear to qualify as being separately administered under the interpetation of Rule Point One.

Returning to Rule Point Three, there are two analogies that can be made regarding intervening territory. One is the reason that Panama is not counted as two DXCC countries. It is because the Canal Zone which divides the country is not seventy five miles wide. Rule Point Three cannot apply unless the land separation is greater than seventy five miles. A second analogy is why Palmyra and Jarvis Islands, mentioned previously, are not two DXCC countries. There are no intervening islands between them. There are some nearby islands, in the same underwater mountain ridge, which are British possessions, but on the surface of the water there is nothing physically in between the two islands. Therefore, Rule Point Three cannot be applied. (See fig. 4.)

The final Rule Point to be dealt with is Rule Point Four. This regards unadministered areas, and reads:

> *Any area which is unadministered will not be eligible for consideration as a separate country.*[6]

Just what unadministered means is not clear. Every square inch of territory of the face of the globe has been claimed by at least one country at one time or another. There is no territory presently unknown, or else just about everyone is going to be in for a surprise. Most likely, Rule Point Four was made to eliminate certain problems when someone "discovered" a new rock or seamount somewhere and then tried to get country status for it. Most of these situations are of questionable status anyway, such as Maria Theresa. Quite obviously, if something doesn't exist, or its existence cannot be accurately determined, it cannot count as a DXCC country by any measure.

New Countries

This concludes the Criteria interpetation. Presently there are some new countries that could be found through the Criteria's interpetation and precedents made up to this time. The first is the City of Berlin. Berlin qualifies for DXCC country status under two separate Rule Points. First, under Rule Point One. Berlin has a separate and distinct administration from the Federal Republic of Germany. Berlin presently counts for West Germany. According to agreements between the United States, France, Great Britain, and the Soviet Union, known as the Quadrapartie Agreement, the four countries declare that

> *the ties between the Western Sectors of Ber-*

[6]*Ibid.*, p. 131

lin and the Federal Republic of Germany will be maintained and developed, taking into account that these sectors continue not to be a constituent part of the Federal Republic of Germany and not to be governed by it.[7]

Additionally, other agreements address the status of Berlin, and they also clearly indicate the separate administrative status of Berlin.

Our governments [*the United States, the United Kingdom and France*] *will continue, as heretofore, to exercise supreme authority in the Western sectors of Berlin . . .*[8]

It would appear that Berlin is regarded as a separate administrative entity and the Countries List should be corrected to show this.

Under a separate Rule Point, Berlin qualifies as a separate country under Rule Point Three. Due to intervening territory of the German Democratic Republic, which is greater than seventy five miles, Berlin also qualifies for separate DXCC country status in this sense. (See fig. 5.)

A second area where a new country could be found is the British Sovereign Bases on Cyprus. This case is very similar to Guantanamo Bay in Cuba, where Rule Point One applies. Rule Point One also applies to the Cyprus bases, although the present political situation there may prevent any Amateur Radio operation for some time. When reviewing military bases belonging to one country and found on another country's soil, it is difficult to draw a distinction between what should be made a separate country and what should not. Matters as to sovereignty and who retains title to the land are two important considerations. In many cases, the military bases are leased for a long period of time, and the original country remains in control of who can use the base. This can be seen in the case of the United States, when the American Military Forces have been forced to close a base or where limitations have been placed on the use of the base, such as in Libya or in the Azores, respectively.

The final possibility for a new country is Walvis Bay. Walvis Bay is an enclave on the Atlantic Coast of Southwest Africa which is under the jursidiction of the Republic of South Africa. At the present time, both Walvis Bay and Southwest Africa use the same callsign, ZS3. This appears to be the only rationale offered presently as to why the two areas both count for the same country, namely Southwest Africa. Walvis Bay is administered differently from Southwest Africa, and for this reason should qualify as a separate country for the Countries List. (See fig. 6.)

[7]§II(b), Quadrapartie Agreement between the United States, the United Kingdom, France and the Soviet Union, dated 3 September 1971, *inter alia*.

[8]Annex II, paragraph 3, diplomatic note from the United States, United Kingdom and France to the Federal Republic of Germany, issued pursuant to the Quadrapartie Agreement of 3 September 1971.

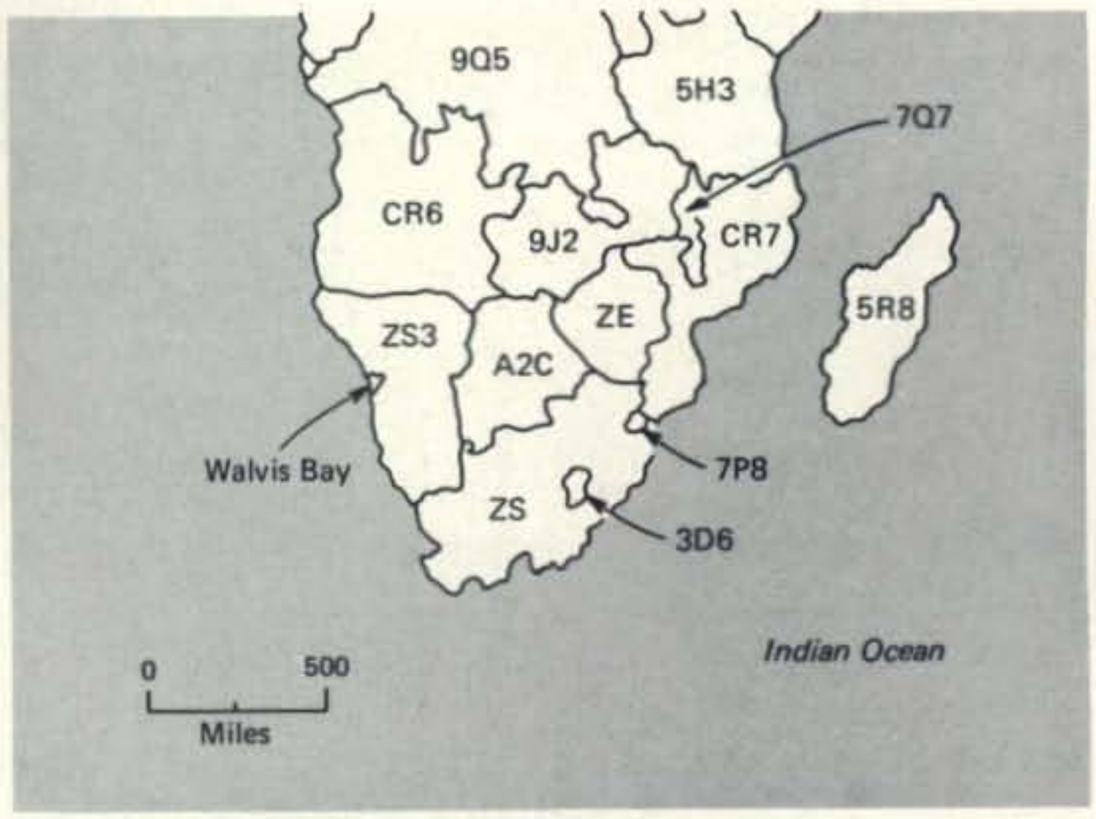


Fig. 6—The southern portion of Africa.

In addition to the above examples, there are various political events that might have an impact on the Countries List. The Middle East could always provide a possibility, and trying to second guess what could happen there is pure speculation. The Gilbert and Ellice Islands are due to be split into separate colonies next year in preparation for eventual independence. A couple of new countries could emerge there. Finally, the Republic of South Africa is preparing to grant independence to certain native land areas, known as *buntostans*. There are ten of them, and each one would be a separate country politically, so each would count separately for DXCC purposes. The government of South Africa has said that it definitely plans this action, so implementation appears to be only a matter of time.

Through this interpetation of the Countries List Criteria, hopefully the reader will now have a basic idea of why Countries List matters are handled the way they are. Everyone should be able to answer the questions posed at the beginning of this article, and in addition, some new thought and discussion in the Amateur world should be generated regarding DX and the Countries List. ■

Kenwood TS-520 Transceiver Additions

BY BRIAN H. ALSOP, WA3KOS

Additions have been made to the TS-520 to make it nearly the ultimate c.w. transceiver, in this author's opinion. The additions were the installation of: 1—The factory 500 Hz i.f. crystal filter; 2—The MFJ selectible bandwidth active audio filter; 3—The Curtis 8043 IC keyer. Only the later two additions will be discussed here since complete installation instructions come with the i.f. filter.

The Challenge

Those of you with a TS-520 (and those who have seen pictures of the guts) readily appreciate the challenge of adding anything, however small, to the rig. To make the challenge more demanding some additional constraints were imposed: Panel holes and lead lengths should be minimized. Existing features should be preserved. All additions should be convenient to use. Power should come from the rig.

MFJ Filter Installation

Figure 1 shows where the audio filter PCB was finally located. Note that the PCB is suspended by two ears attached to existing screws within the TS-520. The ears can be made from ¼" wide 0.050" thick pieces of brass plated strips available from train and hobby shops (about 30 cents for a 9" strip).

For this addition, it was decided to relax one of our constraints and use the existing fixed channel selector switch to select the bandwidth of the audio filter. The switch leads can be removed from the wirewrap terminals (C, 1, 2, 3, 4) of the Fixed Channel AVR board (X43-1100-00) and routed by the panel meter to the underside of the chassis. Position 1 was chosen as the filter "out" position. It is advisable to record the wire color coding in case you later want to remove the modification. Voltage (+9 v.) can be obtained from wirewrap terminal BS of the carrier board (X50-0009-1). The ground side of the filter can be attached to any convenient ground. For this installation, the filter was installed in series with the earphone jack. Note: This installation puts the active filter in the phone leads only and does not alter speaker operation. All screws were then Q-doped.

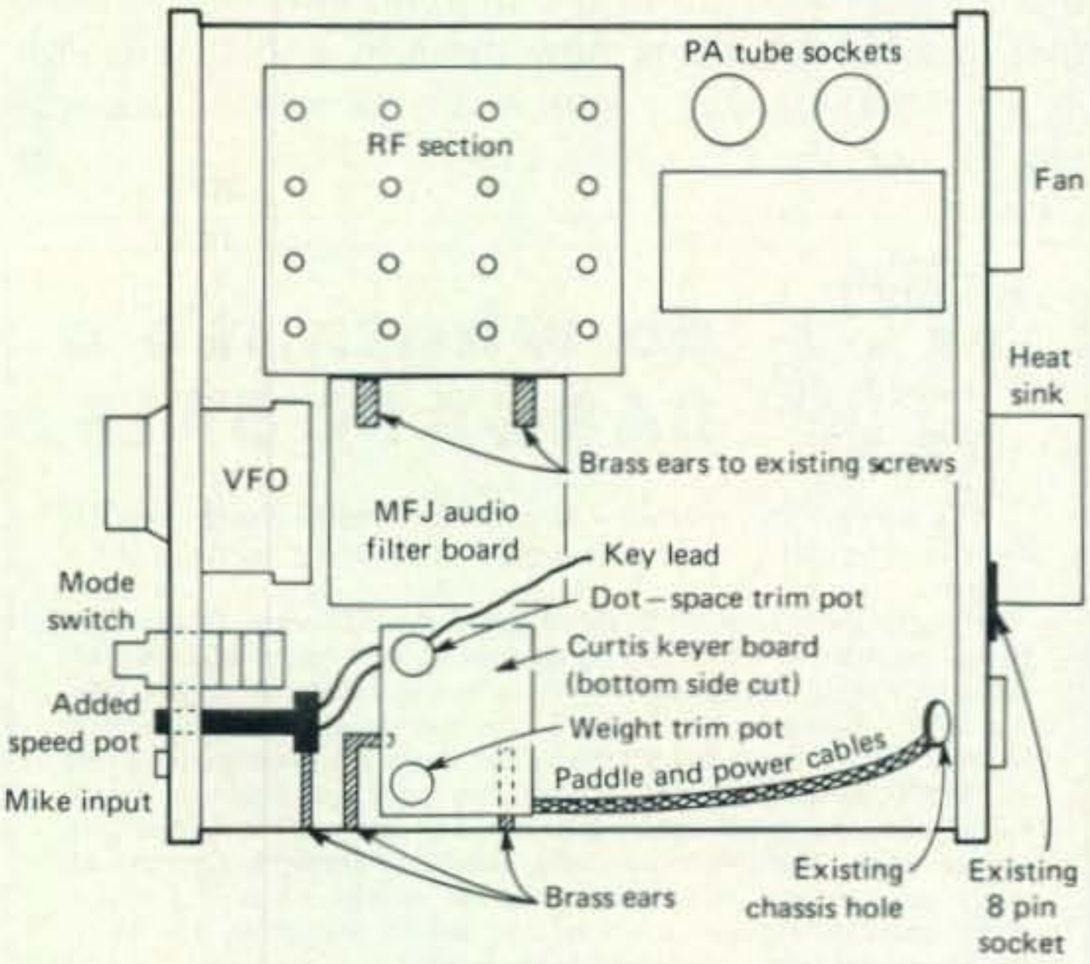


Fig. 1—Bottom view of the Kenwood TS-520 transceiver showing the locations of the MFJ audio filter and Curtis IC keyer PC board.

Curtis 8043 IC Keyer Installation

The keyer installation is more difficult. Location of speed pot posed the first problem. Finally teeth were gritted and a ¼" hole drilled in the front panel between the mode switch and the mike receptacle as shown in the photo.

Caution: Precise location of this hole is necessary. If you goof, the pot will not fit within the cabinet or the shaft will interfere with mode switch. Allow room for the Speed pot knob to clear the mode switch knob for all mode positions. Clean out all metal chips after drilling. In our case a pot with a 2" long non-metallic shaft was chosen and mounted to a brass ear as shown in fig. 1.

The next task was location of the PCB and running of power and keying paddle leads to it. The best overall location was to mount it near the Speed pot as shown in fig. 1. Note that wirewrap terminal "Key" of the AF board (X49-0008-1) is right underneath this location. Connect a wire to it for the keying lead. Two brass strips were attached to the chassis and PCB as indicated. Make sure the keyer board clears the cabinet and chassis. Actual mounting is done after all leads have been run.

Since the keyer requires three shielded insulated paddle leads, it was decided to use the existing remote eight pin socket on the back of the chassis as the keyer input. Three pins (2, 4, 7) can be used.

The shield should be connected to pin 1. A three-conductor shielded cable was made from a piece of RG-58 sheath and shield and three 24 gauge insulated wires and run through the chassis hole beneath the remote socket and around the chassis to the PCB. A few small holes were drilled in the chassis to secure the cable enroute. Power for the keyer comes from the —6 v. supply in the TS-520. In this case (grid blocked keying) the Curtis Keyer has the positive voltage side grounded to the chassis and a supply with positive ground is required. The required voltage can be found on the "—6 v." wirewrap terminal of the Fixed Channel AVR Board (X43-1100-00). The keyer PCB is then mounted after all leads have been attached. In this application no monitor was needed and the keyer audio output transformer mounting holes were used to mount the Weight trim pot in. For this and the Dot-Space pot (also a trimmer) to be accessible they should be mounted either on the PCB bottom or in such a way that they can be adjusted with the board in place. Q-dope all screws.

Addition of a label and a knob on the speed pot shaft complete the installation. One small drawback of the entire installation is that the key paddle common lead is at —6 v. with respect to chassis ground

Front view of the TS-520 showing the location of the Speed pot for the Curtis 8043 IC keyer.

and shorting it to ground shorts out the TS-520 —6 v. supply. This is not fatal since it only causes the inverter oscillator to quit until the short is removed.

Results

These three additions have truly made the TS-520 a "go anywhere, do anything" rig. The c.w. man no longer has to settle for any compromises if he wants a transceiver. Now, where can the quasi-logarithmic speech amplifier fit? ■

Chicago FMers Direct-Dial Police Via 911 Emergency Number

BY JORDAN KAPLAN, W9QKE

Last month, WA9EXP, a member of MAPS, (Midwest Amateur Propagation Society) punched up the number 911 on his Touch Tone Pad, and heard the voice of the dispatcher at the Cook County (Illinois) Sheriff's Police Communications Center ask for his traffic. Ray advised the dispatcher of a car blocking a traffic lane on a major highway near Chicago. This was the first recorded use of the 911 two meter repeater system in the Chicago area.

Early in 1975, representatives of repeaters associated with the Illinois Repeater Council were discussing the problem of relaying to police and fire departments, emergency traffic without the need to go through third parties. The trouble with Amateurs reporting emergencies had been the need to call another station on the frequency and request that station to call the local public safety department with the information. Quite a few times, repeats of the traffic was required to insure that accurate information was given to the proper agency. Also, errors in forwarding the information back and forth between the Amateur and the police had caused slowdowns that delayed help to persons at the scene of accidents and other incidents.

As the talks continued on this subject, some possible areas of relief were suggested. As an example, one thought was to assign a special frequency for communicating with the police in the two meter band. To report an emergency, you would switch to this frequency, and then you could talk to the dispatcher direct. The trouble with this approach was the need to buy crystals for both receiver and transmitter, and of course the big hangup was the licensing of the police dispatchers in the Amateur

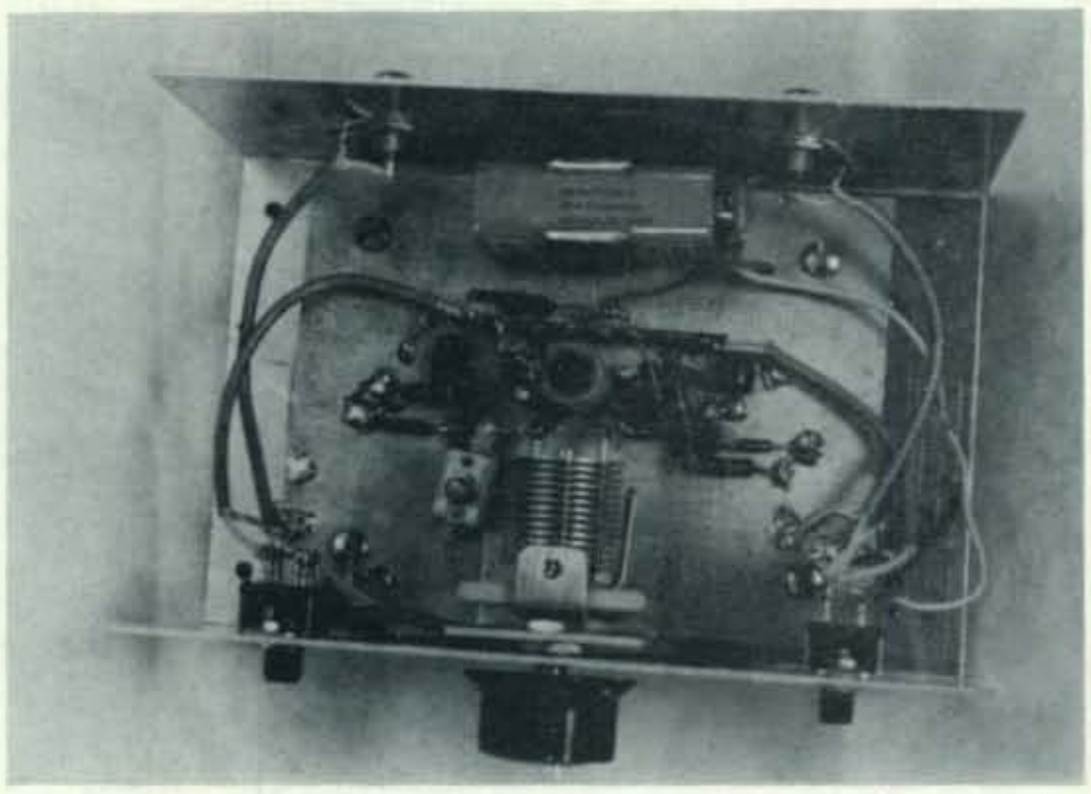
[*continued on page 71*]

A Receiver Pre-Amp for Heath SB and HW Series Transceivers

BY J. F. STERNER, W2GQK

I enjoy listening to ten meters for those weak ones that unsuspectedly skip through during this low in the sunspot cycle, but for this you need plenty of receiver gain and a good signal to noise ratio. The writer uses a Heathkit SB-102 and it does have a good s/n ratio but it could use more gain on 10m. and 15m. As it was, listening for the weak ones meant keeping the a.f. gain control quite high, but then when you tuned across a strong signal, you were blasted out of the chair. Also, passing trucks' ignition noise keeps you busy riding the a.f. gain. If we had about 20db more gain, these weak signals would develop some a.g.c. voltage and permit backing the a.f. gain to a more reasonable point as on 20, 40, and 80m. Likewise the weak ones would register on the "S" meter. Obviously the answer was to add more gain in the h.f. ranges to the receive portion of the set. This being a transceiver, it is not possible to insert a preamplifier in the antenna circuit without elaborate switching at a high power level. In going over past articles on preamps for receivers, none referenced transceiver use.

If you examine the schematics of the SB-100 and HW-100 series of sets, you will see that the 6CL6 driver plate coil (L_{801}) is in a common tuned circuit to both the receiver r.f. amplifier and the 6CL6 Driver. Antenna signal switching for receive is through relay RL_1 to the low impedance winding on L_{801}. To prevent damage to a pre-amp it must be switched out when transmitting. Fortunately the relay wiring made for the "Driver Output" feature



Underchassis view of the receiver preamp shows the simple construction.

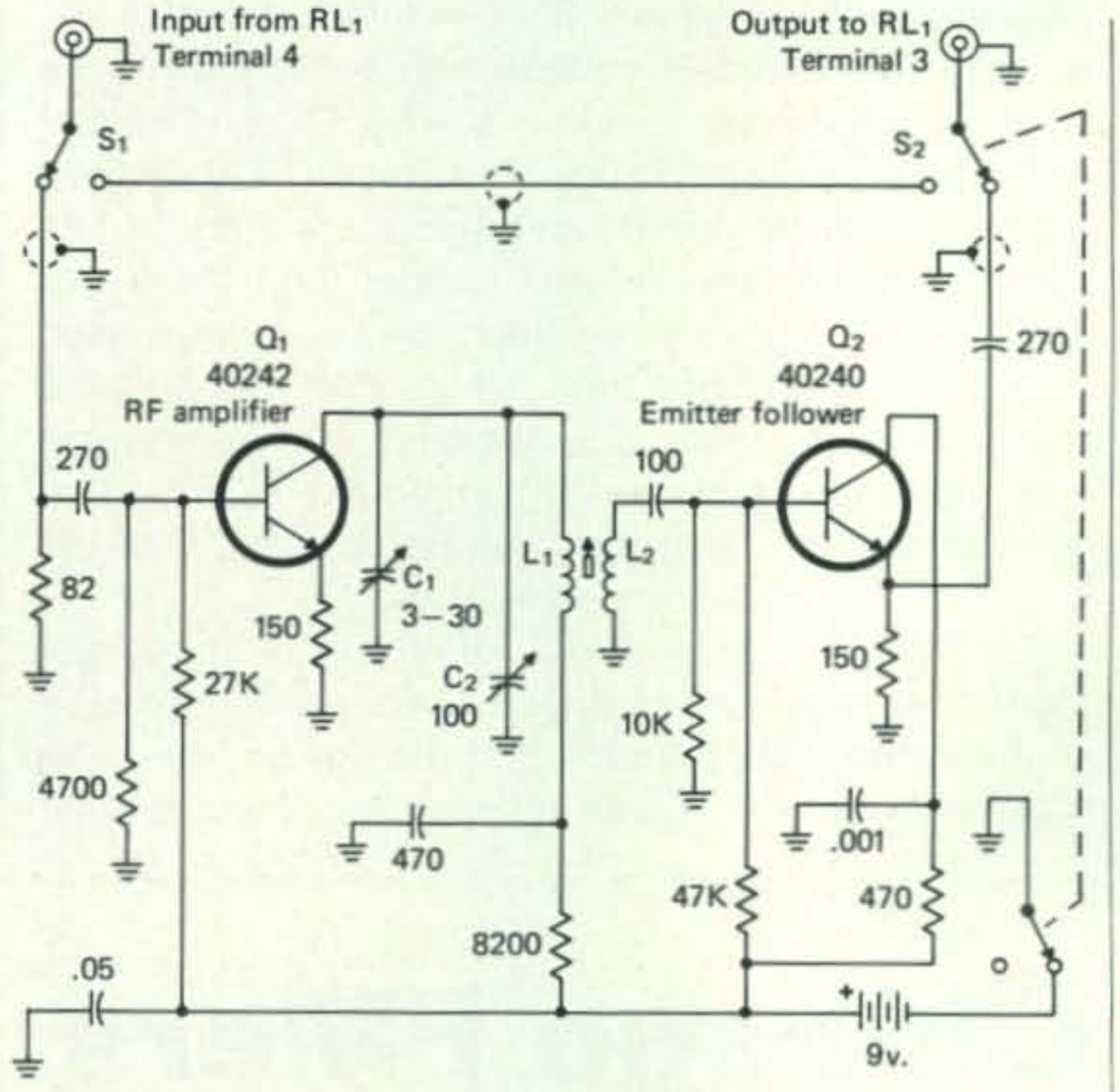


Fig. 1—Schematic or receiver preamp for the Heath HW and SB series transceivers. Coil L_1 is 13 t. #24 d.c.c. closewound on a ⅜" dia. slug-tuned form. L_2 is 5 t. #24 d.c.c. closewound over bottom end of L_1. Note that #22 enamelled wire is a close replacement for #24 double cotton covered (d.c.c.) with respect to turns per linear inch. (Cotton covered magnet wire is becoming quite difficult to obtain.)

permits insertion of a pre-amp between terminals 3 and 4 of relay RL_1. To do this, first remove the jumper across terminals 3 and 4 then connect a length of small coax from each terminal to phono jacks on the rear apron of the chassis. It will be neccessary to add one more jack to HW-101 sets as only one "Spare" is provided. This can be done by drilling a ¼" hole about 1" away from the "Spare" jack and mounting a Switchcraft type 3501-FP phono jack here. The SB-102 has two Spare jacks so this is not neccessary with these newer models. Connect the coax from the relay to these jacks. Identify the coax from terminal 4 as "Input" and the one from terminal 3 as "Return". Connect the coax shield at the relay end to the ground lug on the terminal board under the 8.5 MHz trap. Ground the other ends of the coax shields at the phono jacks. For convenience all of the coax leads I used were the small type RG-174/U.

Referring to the schematic for the pre amp, it is

quite simple to build and the only real precautions to take are in keeping the "Input" and "Return" circuits separated. An RCA 40242 is used as an amplifier and the 40240 is used as an emitter follower for impedance matching. Selectivity and gain are derived by tuning the primary of L_1 with C_1 in the collector circuit of Q_1. L_2 is a low impedance winding over the cold end of L_1 for coupling to the base of Q_2. Note the emitter resistor is left unbypassed to stabilize the circuit. Battery operation was chosen for convenience, as the battery drain is low and it should give at least 50 hours service in intermittent duty.

All parts except the two d.p.d.t. slide switches and the coax connector phono jacks are mounted on a PC board with foil on one side, the foil serving for all grounding. The HF-100 tuning condenser is mounted to a small L bracket which is bolted to the foil side of the board. The board is mounted to the U portion of an LMB 3" × 4" × 6" case with four ¾" long metal spacers. One small 8-lug terminal strip serves as a tie point for resistors and the coax input and return lines to the amplifier board. The two d.p.d.t. slide switches are used to isolate the input and return circuits. Attempts at combining these circuits on one switch may result in oscillation or regeneration. One of the unused switch terminals of S_2 is used for turning on the battery. Note that both switches must be turned on to put the pre-amp in the circuit. When these switches are out, the set is returned to normal operation as the signal is looped through S_1 and S_2 to relay terminals 4 to 3.

When finished, connect the pre-amp to the transceiver as follows: A short length of coax from the transceiver Input jack to the Input jack of the pre-amp; then a length of coax between the two Return jacks.

To align, first tune the transceiver to about 30 MHz and adjust C_2 in the pre-amp for maximum noise with the *tuning capacitor at minimum*. Next preset the core of L_1 so that it is just entering the bottom of the L_1 and L_2 windings. Again readjust C_2 for maximum noise. Retune the transceiver to 14 MHz and tune C_1 toward the *maximum capacity* end and listen for an increase in noise. If none is noted, mesh C_1 fully, turn the coil core in until an increase in noise is heard. Now open tuning capacitor C_1 fully, retune the transceiver to 30 MHz and readjust C_2. This now should cover a range from 14 MHz to 30 MHz. 21 MHz will peak at approximately 25% in from the 30 MHz end of tuning. Measured gain of the model shown is 20db at 30 MHz and approximately 15db at 21 MHz and 10db at 14 MHz.

Additional gain in these sets can be had by merely changing the first and second i.f. amplifier tubes V_3 and V_4 from type 6AU6 to type 6HS6. It

The author's receiver preamp sits above the SB-102 at the shack of W2GQK. Front panel controls consist of two slide switches for Preamp In-Out (both must be operated together), and a Tuning control to peak the single tuned circuit.

is neccessary to change both as their filaments are in series and heater currents are different for each type. No rewiring is necessary as the basing is the same. The two i.f. tranformers should be retuned when this change is made to correct for the slight capacity differences between the two types.

The addition of the pre-amp and the latter tube change has readied the SB-102 here for if and when the sunspot cycle changes and ten meters becomes a real DX band again. ■

HAMSPEAK

Or, Benson Writes A Book

BY BILL DeWITT, W2DD

A couple of weeks ago, I stopped in to see my old friend Benson. You remember Benson. He's the fellow who got me started in Ham Radio years and years ago. Last time I saw him he was in the middle of a real honest-to-goodness HOMEBREW project,* starting with the materials right out of Mother Earth.

Well, this time things were different. When I walked into his hamshack, the place was covered with stacks of paper. There were legal size sheets covered with Benson's more or less illegible scrawl all over the place.

"What the devil are you up to now?" I asked Benson. "It looks like you're re-writing the Encyclopedia Britannica!"

"Well Bill," he said, "You're close. I'm writing a book."

This just about floored me. Benson, a real Yep/Nope type guy writing a BOOK! Remember how he used to sit in our club meetings, puffing on that rotton old pipe—not saying a word? It was only when some klutz got the conversation all screwed up that Benson would zing a few remarks right over the plate to clear the air. But the evidence was there, Benson really was writing a BOOK!

"OK Benson," I said, "What's the name of the book, and what's it all about? Have you developed a new theory of propagation, a lapel button CPU for phase controlled-super-sub carrier c.w., or are you writing a digi-dictionary for non-digi-types?"

Between puffs on that same old pipe, Benson told me the story of his book.

"In the first place, Bill," he said, "the name of the book is Hamspeak. H-A-M-S-P-E-A-K, H, Honolulu——"

"Spare me the phonetics Benson," I said, "But what, pray tell, is Hamspeak?"

Benson grinned. "Hamspeak is the result of artfully extending normal conversation by the use of discursive, disjunctive excursions and superfluous loquacity. In its purest form it involves the use of terminology peculiar to Ham Radio to imply exclusivity of knowledge in that field of activity."

"Yipes!" I said, "Give me that dictionary Benson, I want to find out what you're talking about!"

"Never mind the doggone dictionary," Benson growled through a cloud of smoke, "It's simple."

"All over the world there are people like me who have one helluva time making any small talk. Sure, if there's something important on their minds, they do speak up, but most of the time they're hard pressed for something to say. They just aren't comfortable with those smooth talker types who can ramble on about almost nothing at all by the hour.

"When they get in front of a mike on Ham Radio, they really have a tough time making conversation. I've figured out a way to help these hams, and here's how it all started.

"A few weeks ago I worked a guy who told me all about the ten thousand three hundred and seventy-eight soldered connections he made in the last forty-three rigs he's built. I sat there like a dummy, all I could think of to say was, "Fine business OM on the ten thousand and three hundred and seventy-eight soldered connections.

"I think his transmission ran about eight minutes on the first over. As you know, I've built a lot of stuff in my day too, but I seemed to be tongue-tied. My 'Fine business OM,' etc. only lasted about four seconds, can you imagine how I felt? Maybe it was right at that moment that I got the idea for this book, Hamspeak."

By this time, I thought that I was beginning to see the light, but I wanted to be sure.

"Do you mean," I asked Benson, "that your book is going to teach the quiet guys like you how to carry on a hammy-ham type conversation with his more talkative friends on the air?"

"Right on Bill," he replied, "and since the book is going to teach Hams to talk like other Hams, I thought I'd call it HAMSPEAK.

"You see," he continued, "one of my big conversational problems is that I tend to be very direct. This is completely contrary to the principles of small talk in general and Hamspeak in particular. My book will teach anyone how to S-T-R-E-T-C-H the conversation and how to use ham terminology effec-

*DeWitt, "The True Essence Of Homebrewing, *CQ*, July

tively."

I said, "Let's see if I've got the idea. What you're telling me is to talk like a real Ham, I shouldn't just state a fact. I should lead up to it indirectly and embellish it with unrelated happenings."

"You're learning Bill," Benson agreed. "Don't just blurt out information like—Hey, I blew a fuse today! —start off by telling your friend W8XXZ that today while you were home taking care of your sick dog, you happened to hear some DX on 20. Then explain that while you were getting fired up to work the DX, your wife came in and told you about the phone call from your Aunt Edith whose second husband, not your real Uncle, is recovering from the heart attack he had while he was watching their house burn down last year, right after the insurance expired. You can skip the part about the malfunction of the oxygen tent and get back to how you turned on the exciter with the funtion switch in the 'Locked Key' position and the fuse blowing without too much trouble. But be sure to mention the fact that the linear was connected to the 75 meter antenna at the time. Now, do you see how easy it is to stretch your conversations?"

"Benson," I told him, "you're a genius! I could kick myself black and blue for not thinking of this. Are you sure that someone hasn't already written a book on this subject?"

He pointed to the stacks and stacks of pages, "Do you think I cranked out all these pages without checking that FIRST? No sir, there just isn't anything in print on this."

Always a perfectionist, Benson started his book with a set of easy-to-remember rules. I've already spilled the beans on Rule One a paragraph or two back—Never be direct. Rule Two cautions you to avoid common parlance when referring to members of your family. Terms like My Wife, My Son, involve the use of only two words, while The EX Y EL and The Junior Op, give you added word advantage. Similarly, My Home, or Home, cannot compete with The Home Que Tee Aitch.

Rule Three: Migosh, this isn't fair to Benson, with the book coming out soon. You'll just have to wait until you get a copy. But Benson did say that it was okay to quote a few items from the early chapters of his book.

Benson's smart. He showed me how he is going to have the publisher lay out these two examples to clearly show the time and word differences between People-talk and Hamspeak.

Example A (People-talk): Hello W2XXX, this is W3XXX. You're good copy here in Philadelphia. My name is Joe, what's yours, and how's your weather?

Example B (Hamspeak): Hello Whiskey The Figure Two Xray, Xray, Xray, this is Whiskey The Figure Three Xray, Xray, Xray, coming back to you. Say old man, you sure do pack a bodacious signal up here in this neck of the woods, home of the Liberty Bell, Phil-A-Del-PHY-A. You're pinning the ol' meter KA-BANG right over to the 40DB Plus mark. The hannil* here is one of those Saint's monickers, Joe, Jig-Oboe-Easy, short for Joseph. That's Jig Oboe Sugar Easy Peter Honolulu, Joe is the hannil. I don't think you passed along your hannil, but you know, I think I know your hannil, because I think we may have Q-Soed before, although I'm not sure about that. So maybe you could make a note to pass along your hannil, if you don't mind on the next transmission. Think your hannil may be Tom, well, anyway, I sure would like a signal report on this ol' bucket of bolts. Kawung, Kawung, got a relay that hums here, so how are we doing down there at your Que Tee Aitch, and is your weather as bad as ours? We have been having rain and fog here all morning, been a lot of that lately. Well, I'll pass it back to you just in case the Queen Roger Mexico is getting to me. Whiskey the Figure Two Xray, Xray, Xray, this here be Whiskey The Figure Three Xray, Xray, Xray, go ahead Tom, I think that's your name, maybe.

Stop watch in hand, Benson timed me on the two examples. Hamspeak came out a clear winner with a better than fifteen to one increase in time.

Well, I know you're going to buy the book, but let me tell you, Benson gives examples of every kind of contact you can imagine with the Hamspeak that fits them. There's a listing of long phonetics like Constantinople, Yokohama, Novosibirsk, and Xanthipus. Priceless! Another chapter tells how to form and use redundant Q-signal-word combinations. Terrific!

Oh! I almost forgot the chapter on Ham lingo for beginners. It explains how to use "Twisted Pair" or "Landline" instead of telephone. Includes "Barefoot," "Afterburner," "Eyeball" (I may frow up!) etc. It even explains how to use the pronoun "We" even though you may have only one head and body. (Example: "We got our haircut yesterday.")

Well, I had at least a dozen more questions to fire at Benson, but the arrival of three odd-ball looking writer-fellows at the door cut short my visit. I've forgotten their names but Benson mumbled something to me about collaboration on three more books for release next Fall, I think he said that they'll be called "Skispeak," "Golfspeak," and "Snorkelspeak!" That Benson is really amazing!

That's the story of Benson's book, sure hope we can have an eyeball at your Que Tee Aitch or meet for some 807s sometime soon. I'm going to have to hit the Big Switch and Queen Susquehanna Yokohama back to the salt mine after I stop at the sandbox, so I'll see you further down the log. But before I leave, did I tell you about the fine business Que So I had with Dusseldorf Kokomo The Figure Eight———— ■

*Texan vernacular for the word "handle." W3XXX obviously spent some time in Texas prior to moving to Philadelphia.

CQ Reviews: The KENWOOD TS-700A 2-Meter All-Mode Transceiver

BY HUGH R. PAUL, W6POK

New equipment for the 2 meter enthusiast continues to appear on the market at a fast and furious pace. A prototype of the Kenwood TS-700A was introduced at the Burbank Hamfest this past summer and interest in the unit has continued to build since that time. Kenwood reports that orders exceed supply, as of this date.

The TS-700A is an adaptation of the TS-700G, which has been on the market in Japan and Europe for some time. The "G" model covered 144 MHz to 146 MHz, thus revision was required to provide full coverage of the American 2 meter band.

Offering all modes of operation with either v.f.o. or crystal control and the capability of being powered by 12-16 volts d.c. or 120/220 Volts a.c., the TS-700A is a lot of transceiver in a not-so-small package.

Measuring approximately 11" x 5" x 12½" and weighing in at 24 lbs., the TS-700A is a little smaller and about 13 lbs. lighter than the popular TS-520 transceiver. As the photographs reveal, the TS-700A bears a strong resemblance to its high frequency cousin.

The Kenwood TS-700A puts f.m., s.s.b., c.w. and a.m. at the fingertips of the advanced 2-meter operator, along with a choice of v.f.o. or crystal controlled operation. Repeater offsets of plus or minus 600 kHz are selectable with either v.f.o. or crystal. Microphone is included.

Operating features include upper or lower sideband, plus or minus 600 kHz offset for repeater operation, 100 kHz calibrator, receiver incremental tuning, noise blanker, multi-function meter to read signal strength and relative power output or zero-center monitoring of the f.m. detector. What more could you ask for? How about an optional tone burst generator, r.f. gain control and an honest to goodness headphone jack on the front panel, where you can reach it.

Provisions have been made on the back panel for an optional VOX unit, an external speaker, external relay control and a.l.c. input for those wishing to drive a linear.

Construction

Construction of the TS-700A can best be described as rugged. Like other Kenwood equipment, the main and sub frames to which the circuit boards are mounted are heavy gauge steel. The front panel is heavy cast aluminum and the back panel is thick aluminum sheet.

The cabinet itself is made of steel and is in two parts. The top incorporates a hinged lid to facilitate access to the a.m. carrier level control and the separate s.s.b. and f.m. microphone gain controls. The two sections are easily removed to facilitate service.

Another aid to servicing is the clever design of the transmitter driver and final amplifier section. The entire assembly, with it's heat sink, can be removed from the main frame by unbolting the sink from the back panel and pulling.

The entire front panel and attached v.f.o. assembly can be tilted outward from the main frame by removing four retaining screws, thus allowing access to all panel controls and the v.f.o. for maintenance.

There are nine major circuit boards mounted within the main frame. While these are not the plug

in type, it appears that wiring harness lead length is such that they can be unbolted and pulled away from the chassis far enough to allow reasonably easy component replacement.

All circuit boards are constructed of the heavy phenolic material used in other Kenwood equipment. Component identification and foil outlines are clearly silk screened on the top of each board.

A feature that seems to be exclusive with Kenwood equipment, is the two extension feet that bolt onto the existing feet at the front of the transceiver, thus raising and tilting the front panel. This is a small item that contributes greatly to operating pleasure.

Not exclusive, but still very desirable, is the sturdy carrying handle on one side of the transceiver. Complimenting the handle is an extra set of plastic feet on the other side, which allows the unit to rest on its side without scratching the cabinet.

The escutcheons surrounding the dial, meter and control switches are plastic and contrast nicely with the light grey panel and dark grey cabinet. Brushed chrome knob skirts and edge trim, contribute to the overall attractiveness of the TS-700A.

The two speed dial mechanism is a joy to operate. It has a firm, but smooth response to the touch. The larger outer knob is for fast tuning and covers 100 kHz per revolution. The smaller knob is for fine tuning and covers 25 kHz per revolution.

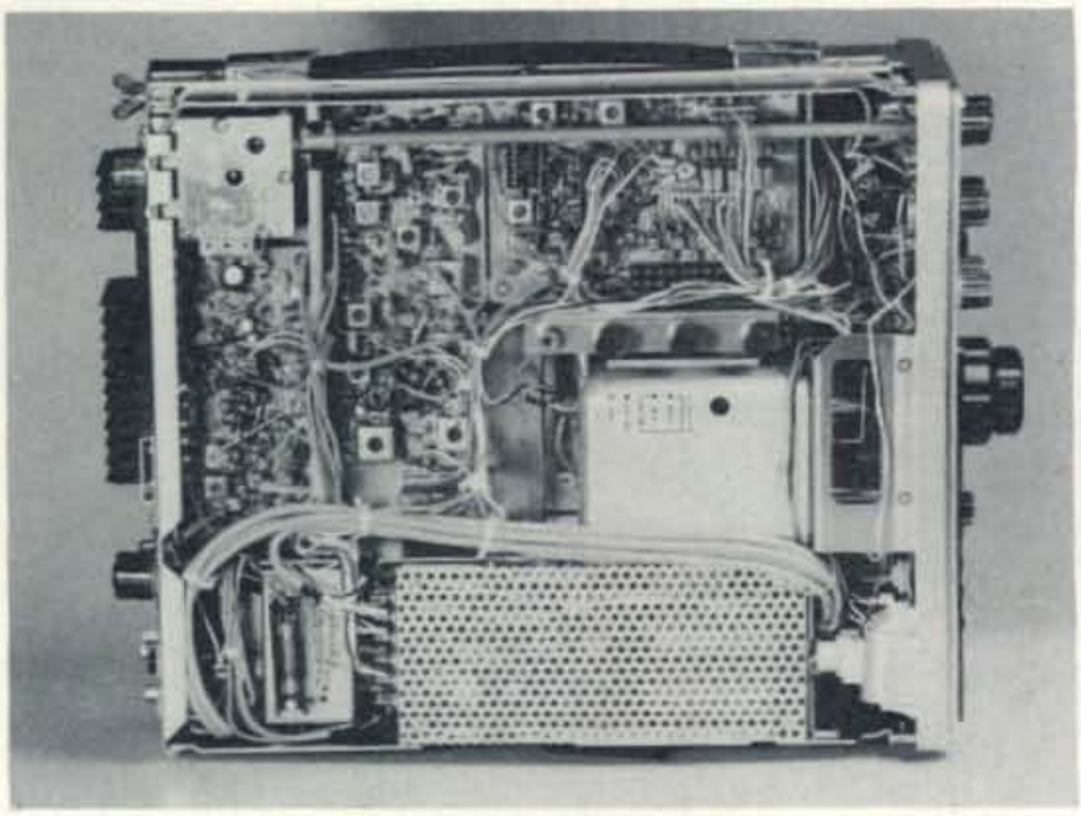
The tuning dial reads from 0 to 1000 kHz, with interval markings every 50 kHz. The 146 MHz and 147 MHz repeater assignments are block marked on the upper side of the dial scale, at intervals of 30 kHz.

The main dial consists of a metal skirt located behind the tuning knob and reads from 0 to 100, with each division representing 1 kHz. The skirt is adjustable and can be calibrated to the nearest 100 kHz marker signal produced by the internal calibrator. Just above the main dial is a gauge, with marks indicating the frequency offset, when in the lower or upper sideband modes. This eliminates the need to recalibrate the main dial skirt when changing modes.

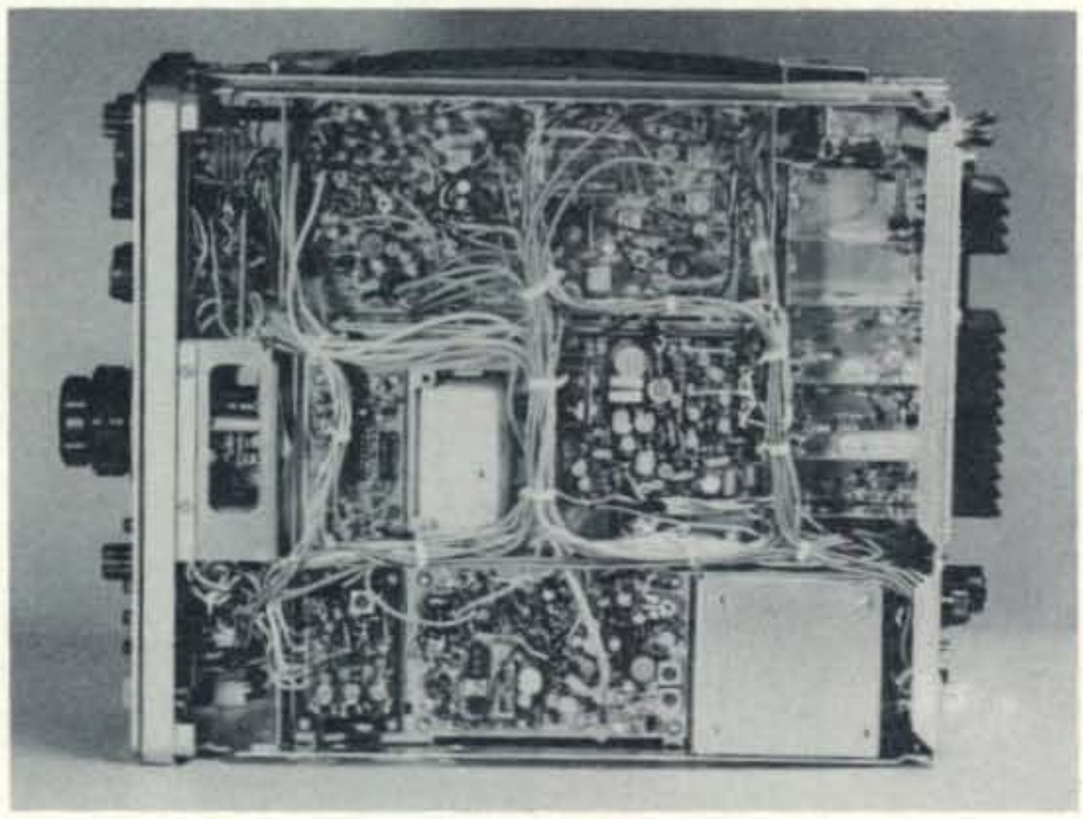
The TS-700A employs the same frequency readout scheme as the TS-520, but similarity does not end here. The v.f.o. and the noise blanker are basically the same as those used in the TS-520 and TS-900.

VFO

The v.f.o. tunes from 8.2 MHz to 9.2 MHz and exhibits extremely good stability and linearity. While separate long term frequency measurements of the v.f.o. were not made, a number of long term measurements to determine overall stability of the transceiver were run. Frequency drift was measured at specific intervals over a twelve hour period. Of several test runs, the one exhibiting the greatest drift



(Top View)



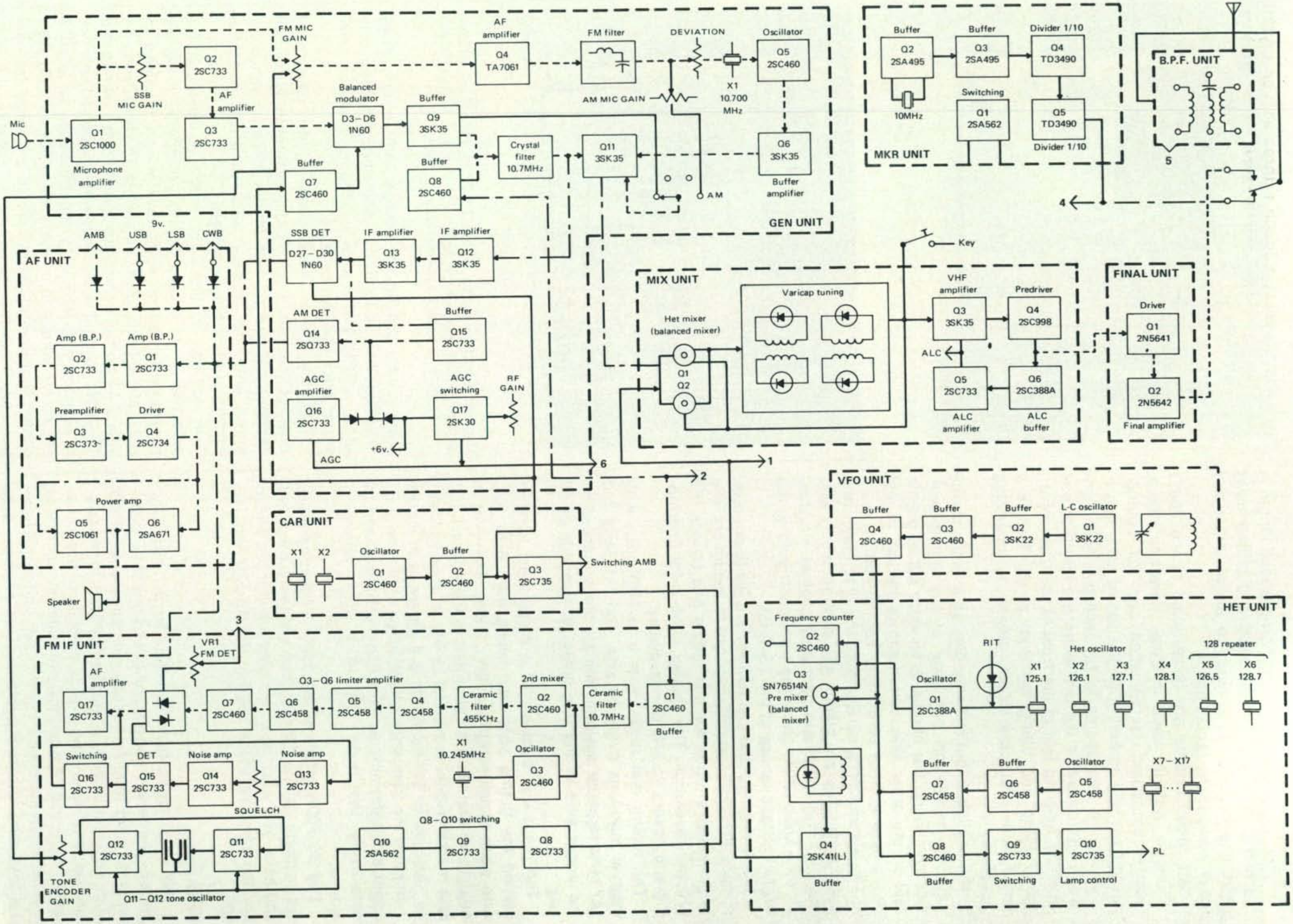
(Bottom View)

Top and bottom views of the TS-700A reveal no wasted space in that fairly large cabinet (11" x 5" x 12½"). Power output is nominally 10 watts.

from a cold start at an ambient temperature of 67 degrees, was as follows: —610 Hertz after ten minutes, —2,210 Hertz after two hours and a —2,685 Hertz after twelve hours.

Linearity checks were made of the v.f.o. over each of the four, 1 MHz band segments. Maximum readout error of plus or minus 1.7 kHz was measured, with the greatest error occurring near the middle of each band segment.

In addition to the v.f.o., there is provision for selection of 11 crystal controlled channels. By the heterodyne process each crystal can be used in each of the four, 1 MHz segments. In effect, you can select 44 crystal controlled channels. If I owned the TS-700A, I would not bother with crystals. The v.f.o. is so good and frequency determination so easy, I see no advantage to crystal control. One friend suggested that crystal control would be better for mobile use. From the standpoint of stability, this just


GEN UNIT
FM MIC GAIN
AF amplifier
Q4 TA7061
FM filter
DEVIATION
Oscillator
Q5 2SC460
X1 10.700 MHz
AM MIC GAIN
SSB MIC GAIN
Q2 2SC733
AF amplifier
Mic
Q1 2SC1000
Microphone amplifier
Q3 2SC733
Balanced modulator
D3–D6 1N60
Buffer
Q9 3SK35
Buffer
Q8 2SC460
Buffer
Q7 2SC460
Crystal filter 10.7MHz
Q11 3SK35
AM
Q6 3SK35
Buffer amplifier
MKR UNIT
Buffer
Q2 2SA495
10MHz
Buffer
Q3 2SA495
Switching
Q1 2SA562
Divider 1/10
Q4 TD3490
Q5 TD3490
Divider 1/10
B.P.F. UNIT
5
4
Key
9v.
AF UNIT
AMB
USB
LSB
CWB
SSB DET
D27–D30 1N60
IF amplifier
Q13 3SK35
IF amplifier
Q12 3SK35
MIX UNIT
Varicap tuning
Het mixer (balanced mixer)
Q1
Q2
VHF amplifier
Q3 3SK35
Predriver
Q4 2SC998
ALC
Q5 2SC733
ALC amplifier
Q6 2SC388A
ALC buffer
FINAL UNIT
Driver
Q1 2N5641
Q2 2N5642
Final amplifier
AM DET
Q14 2SQ733
Buffer
Q15 2SC733
Amp (B.P.)
Q2 2SC733
Amp (B.P.)
Q1 2SC733
AGC amplifier
Q16 2SC733
AGC switching
Q17 2SK30
RF GAIN
+6v.
AGC
Preamplifier
Q3 2SC373-
Driver
Q4 2SC734
Power amp
Q5 2SC1061
Q6 2SA671
Speaker
6
1
2
CAR UNIT
X1
X2
Oscillator
Q1 2SC460
Buffer
Q2 2SC460
Q3 2SC735
Switching AMB
VFO UNIT
Buffer
Q4 2SC460
Buffer
Q3 2SC460
Buffer
Q2 3SK22
L-C oscillator
Q1 3SK22
3
FM IF UNIT
VR1 FM DET
AF amplifier
Q17 2SC733
Q3–Q6 limiter amplifier
Q7 2SC460
Q6 2SC458
Q5 2SC458
Q4 2SC458
Ceramic filter 455KHz
2nd mixer
Q2 2SC460
Ceramic filter 10.7MHz
Q1 2SC460
Buffer
Switching
Q16 2SC733
DET
Q15 2SC733
Noise amp
Q14 2SC733
Noise amp
Q13 2SC733
SQUELCH
X1 10.245MHz
Oscillator
Q3 2SC460
Q8–Q10 switching
Q12 2SC733
Q11 2SC733
Q10 2SA562
Q9 2SC733
Q8 2SC733
TONE ENCODER GAIN
Q11–Q12 tone oscillator
HET UNIT
Frequency counter
Q2 2SC460
Q3 SN76514N Pre mixer (balanced mixer)
RIT
Het oscillator
128 repeater
Oscillator
Q1 2SC388A
X1 125.1
X2 126.1
X3 127.1
X4 128.1
X5 126.5
X6 128.7
Q4 2SK41(L)
Buffer
Buffer
Q7 2SC458
Buffer
Q6 2SC458
Oscillator
Q5 2SC458
X7–X17
Buffer
Q8 2SC460
Buffer
Q9 2SC733
Switching
Q10 2SC735
Lamp control
PL

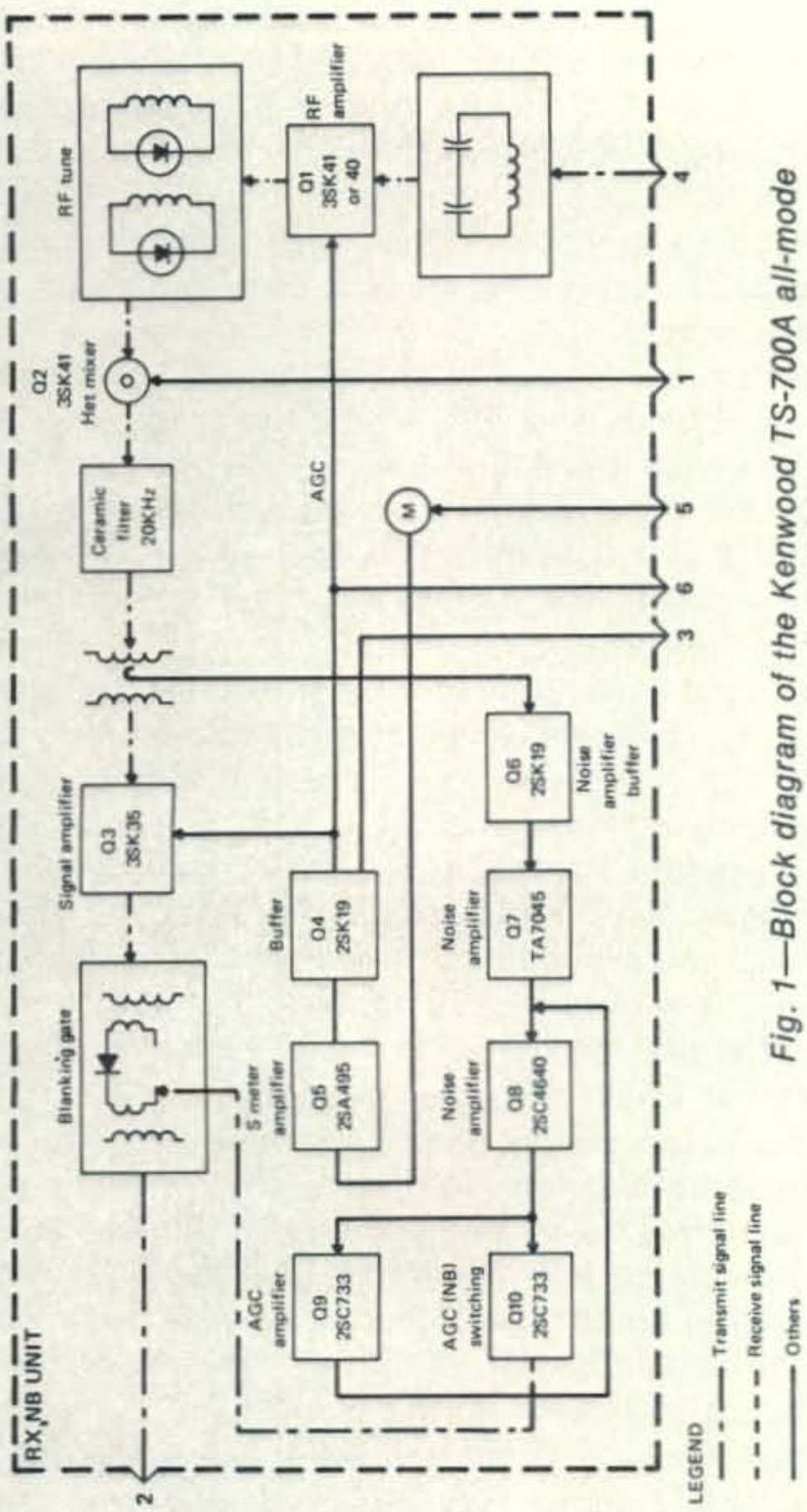


Fig. 1—Block diagram of the Kenwood TS-700A all-mode 2-meter transceiver.

isn't so. The rig was subjected to heavy vibration, with absolutely no effect on v.f.o. stability.

Receiver

The receiver section of the TS-700A employs single conversion for s.s.b., a.m. and c.w. The i.f. frequency is 10.7 MHz. In the f.m. mode the receiver is double conversion, with a 10.7 MHz first i.f. and a 455 kHz second i.f. Kenwood has not compromised, in order to provide all modes in the same transceiver.

The receiver front end is the best of any unit I have tested to date. A band pass filter, which is tuned by a variable capacitor, functions as a preselector during receive and a final loading network when transmitting. There are band pass filters preceeding and following the 3SK41 dual gate FET r.f. amplifier. A number of manufacturers are using this FET in the front ends of their transceivers, because of its low cross-modulation characteristics. The first mixer is of the balanced type, as are the others throughout the transceiver.

Immediately following the first mixer, the 10.7 MHz signal passes through a three section crystal filter and one stage of amplification. At the blanking gate circuit, the s.s.b., a.m. or c.w. signal is switched to the 10.7 MHz six section Trio crystal filter, via a buffer stage. Following the filter, the signal goes through two stages of i.f. amplification and is detected in a balanced diode ring circuit, if s.s.b. or c.w. The b.f.o. signal is generated by a crystal controlled oscillator, located on the board labeled "Carrier Unit." The appropriate crystal for lower or upper sideband and c.w. is selected by a diode switch.

If the receiver signal is a.m., the signal is switched through another buffer stage, to a separate a.m. detector.

In the f.m. mode the signal is switched at the blanking gate circuit through a buffer stage to a 10.7 MHz Murata eleven-section ceramic filter. The signal is then converted to 455 kHz and passes through another Murata four-section filter. Following four stages of i.f. amplification the signal is detected by a ratio-type detector.

The manufacturer rates the receiver selectivity at 6 db down at 12 kHz and 60 db down at 24 kHz, for f.m. Other modes are 6 db down at 2.4 kHz and 60 db down at 4.8 kHz.

The combination of a good r.f. stage, well-designed tuned circuits and balanced mixers, along with copious ceramic and crystal filters, has paid off in the TS-700A. On-the-air operation disclosed no cross-modulation or inter-modulation problems, even when listening to the split channel repeaters.

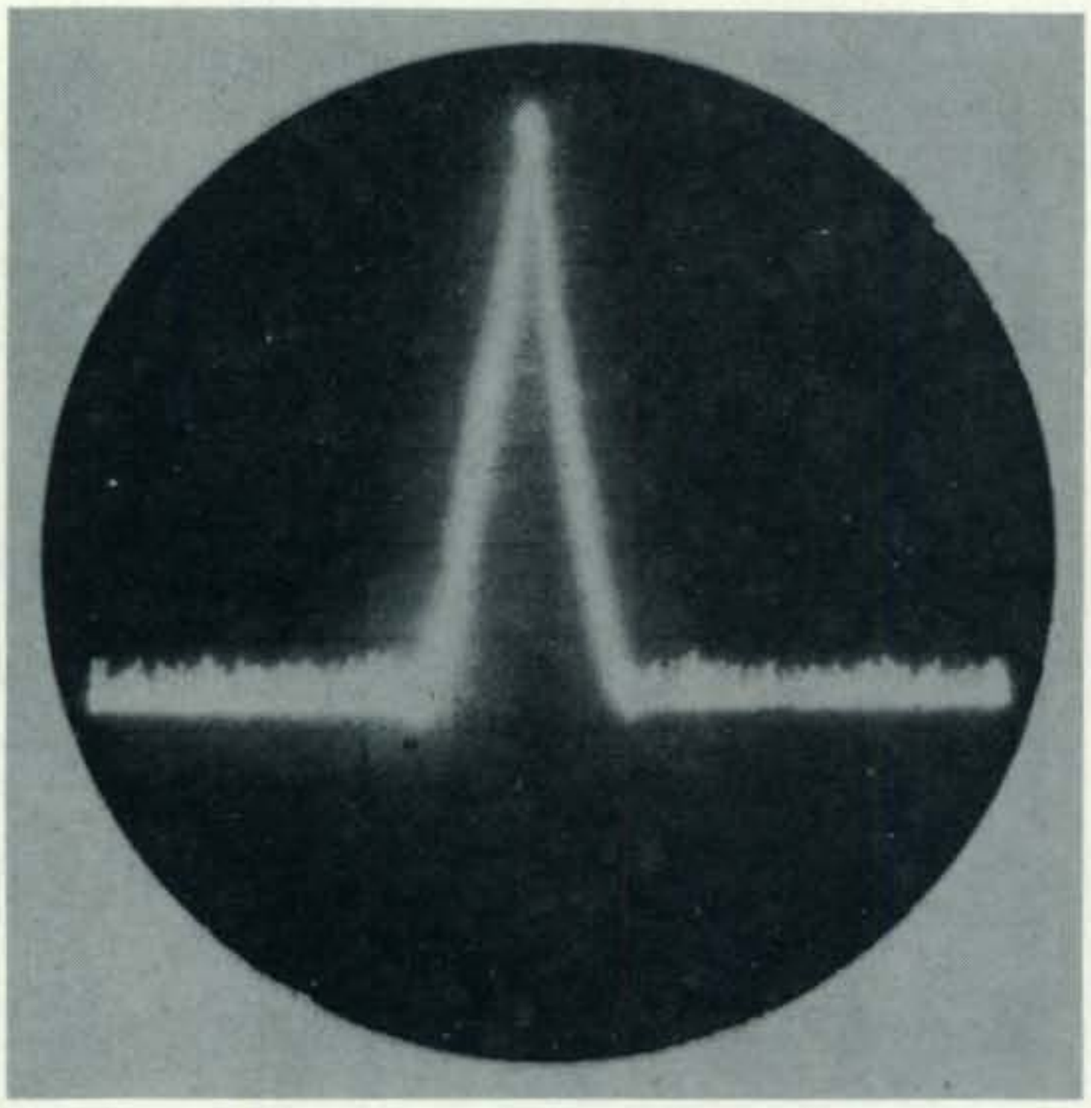
I am also pleased to report that in tuning the entire two meter band, not one birdie was found; another testimony to the fine design inherent in the TS-700A.

Receiver sensitivity as measured in the laboratory ranged from 0.20 microvolts to 0.25 microvolts for 20 db of quieting on f.m. Squelch opened at an average of 0.12 microvolts. On s.s.b. the sensitivity averaged 0.16 microvolts for 10 db signal plus noise to noise.

This receiver is so capable of handling strong signals that it was not necesary to reduce the r.f. gain control from its full "On" position during any of the "on air" tests. A.g.c. action is slow for s.s.b. and fast for f.m. and c.w. I would rate a.g.c. performance as among the best.

Receiver incremental tuning is provided and will deviate the receiver frequency by approximately 3 kHz plus or minus. When RIT is on, a back-lighted indicator reads out the letters RIT in green.

Receiver audio from the TS-700A is excellent and there is over two watts of it available. Kenwood has designed a rather elaborate power supply system that other manufacturers would do well to emulate. A well-regulated 20 volts d.c. is supplied to the audio power amplifier transistors and to the final r.f. driver and amplifier transistors. The result is not only greater power output, but much better linearity.



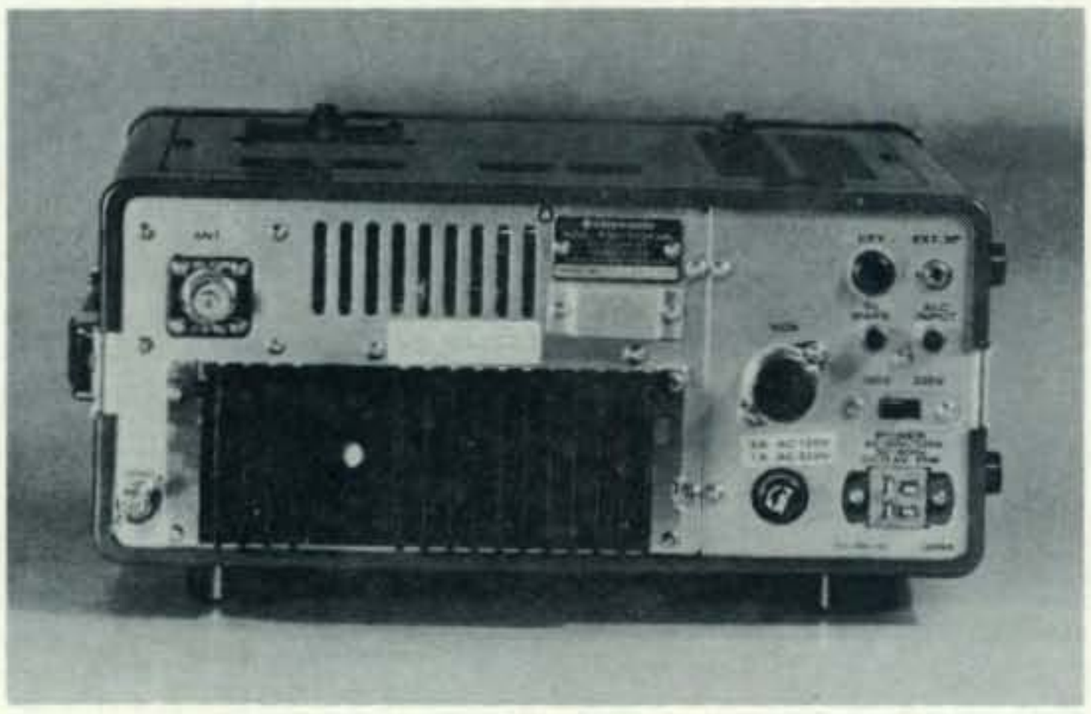
Ten-MegaHertz-wide spectrum analyzer display of the TS-700A transmitter output, centered on 147 MHz. Spurs are 78 db down from carrier. Second harmonic (not shown) is down 64 db.

The built-in speaker is adequate, but a bit small to realize the quality of which the audio amplifer is capable.

Transmitter

From the block diagram the transmitter appears to be fairly straight-forward. What the diagram does not show is the careful attention given to individual circuit design and construction.

F.m. is achieved by reactance modulation of a 10.7 MHz crystal controlled oscillator located in the section labeled "Gen Unit" on the block diagram. Also in this section is the diode ring balanced modulator and Trio crystal filter, which produces the s.s.b. signal. The 10.6985 MHz u.s.b. signal or the 10.7015 MHz l.s.b. signal is produced by the crystal oscillator in the section labeled "Car Unit" on the diagram, which is injected into the balanced modulator. For a.m. or c.w. this oscillator supplies 10.7006 MHz and the balanced modulator is unbalanced to produce carrier. The amplifier designated at Q_{11} serves as the low level modulator in the a.m. mode.



Rear panel of Kenwood TS-700A is dominated by large finned heat sink for PA and driver transistors. A large variety of external connections are available at the rear panel for flexible installation in either the mobile or home station.

The balanced mixer in the section labeled "Het Unit" combines the 125.1 MHz from the crystal oscillator with the 8.2 MHz v.f.o. signal to produce 133.3 MHz. This signal is in turn mixed with the 10.7 MHz signal from the "Gen Unit" in the balanced mixer in the transmitter "Mix Unit" to produce 144 MHz.

The band pass filters following the balanced mixers appear to be very effective. Spectrum analysis of the transmitter signal was made at a number of of sweep widths and they all looked the same. The one presented here is a 10 MHz display. What is significant about the photograph is what you don't see. With the exception of the second harmonic, all spurious is in excess of 78 db down from the carrier level. The second harmonic was 64 db down from the carrier level.

Transmitted power output as measured across the band varied from 10.2 watts to 12.1 watts on c.w. and f.m. Due to the limitations of the low level a.m. modulator, it is necessary to reduce the carrier level to about 3 watts output to get a sufficient level of modulation. At the 3 watt level, modulation was about 95% and very clean.

S.s.b. from the TS-700A is of very good quality. Power output across the band measured from 10.5 watts PEP to 12.4 watts PEP. The a.l.c. circuit is adjustable and most effective. It holds the power to the preset level and significant increases in modulation level produced only minimal increases in distortion.

Carrier suppression was measured at —44 db and unwanted sideband was down by a —48 db. Third order product distortion was 32.5 db below a single tone of a two tone test. That figure is correct and about 3 db better than my old reliable TS-520 will do.

Kenwood's published specifications for the TS-700A appear to be very conservative. Test figures exceed the published specifications by a wide margin.

The TS-700A is a real pleasure to operate. With my car it's not a mobile rig, but what a base station! I should also make a suggestion to purchasers of the rig. Kenwood has available a fine service manual, that, in combination with the operator's manual, gives you all the info you need to properly maintain the TS-700A.

I hope no one noticed the tears in my eyes as I was returning the rig to Kenwood. ■

A Backspace Modification for the WØLMD Keyboard

BY TONY PESSIKI, W3GKW, AND PHIL ROTHSCHING

For those keyboard SSTVers among us who tend to be fumble-finger typers, this circuit provides a quick means of back counting (backspacing) so that an erroneous character may be corrected without erasing the memory and reloading it entirely. The circuit is designed to be added to the keyboard built by Dr. Robert Suding, WØLMD, and described in *CQ* for Sept. 1974 p. 20.

Before describing how the backspace circuit works, let's first look at the circuit it will replace; that is, the memory address counters consisting of IC_{19} and IC_{20}. IC_{19} is the horizontal address counter. IC_{20} is the vertical address counter. Refer to the main schematic on pages 24 and 25, Sept. 1974 *CQ*.

Theory of Operation

In the original WØLMD circuit, IC_{19}, a 7493, is a 4-bit binary counter. Three-quarters of this chip are utilized. Thus, it has count capabilities 0, 1, 2, 3, 4, 5, 6, 7, which are output as 3-bit binary numbers. The two reset inputs are tied to the bits with value 4 and 2. The resulting count chain is 0, 1, 2, 3, 4, 5, 0, 1, etc. . . . 6 different possibilities which correspond to the 6 horizontal character positions. IC_{20}, a 7490, is a divide-by-ten counter which is achieved by cascading the divide-by-two and the divide-by-five sections of this chip. In this case, only the divide-by-five section is utilized. The resulting count chain is 0, 1, 2, 3, 4, 0, 1, etc. . . . five different possibilities, which are output as 3-bit binary numbers. These correspond to the five vertical character positions. IC_{19} must receive 6 character count pulses before IC_{20} updates once. Then after the next 6 pulses IC_{20} again updates and so on. The horizontal counter IC_{19} goes through its

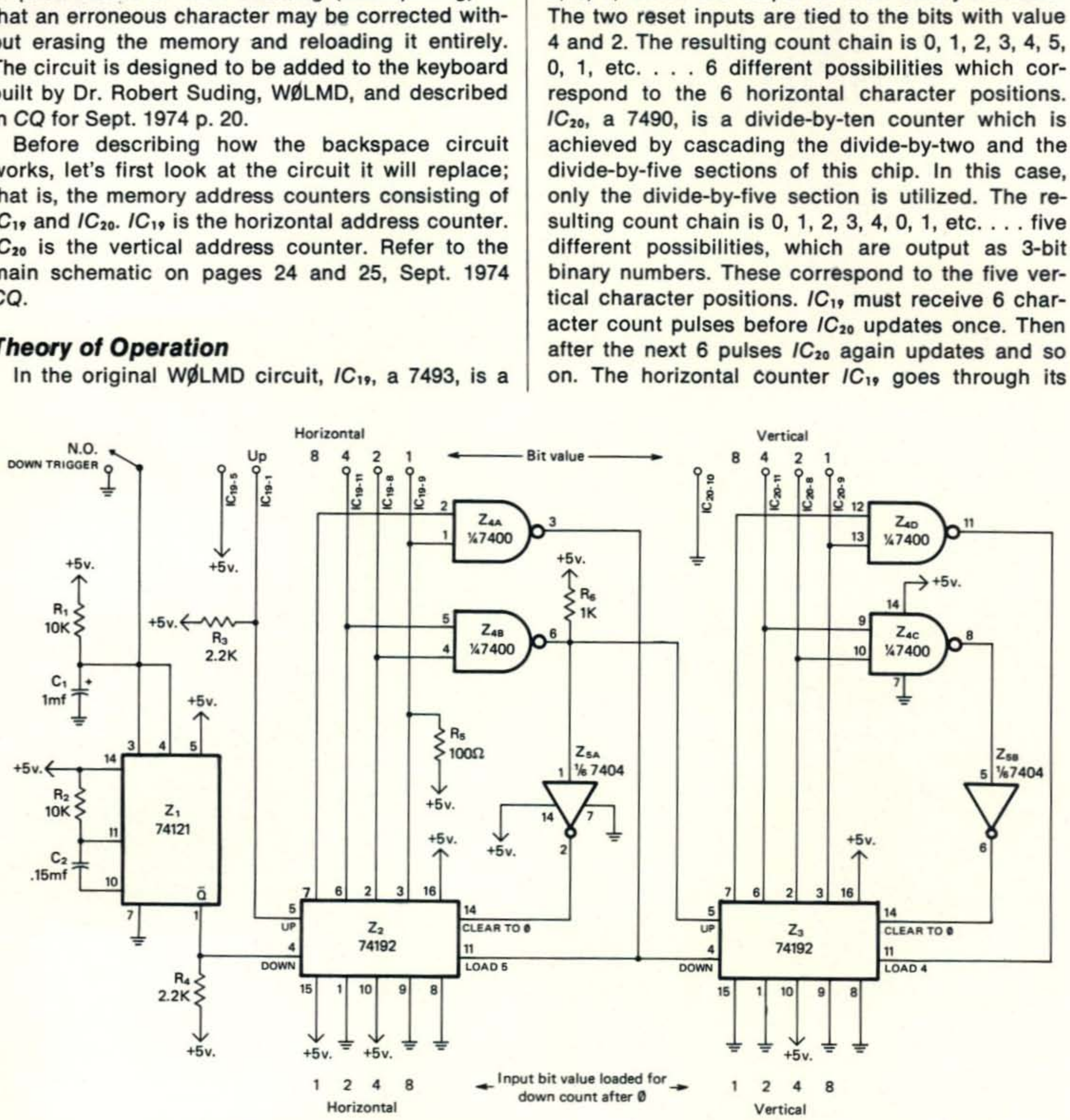
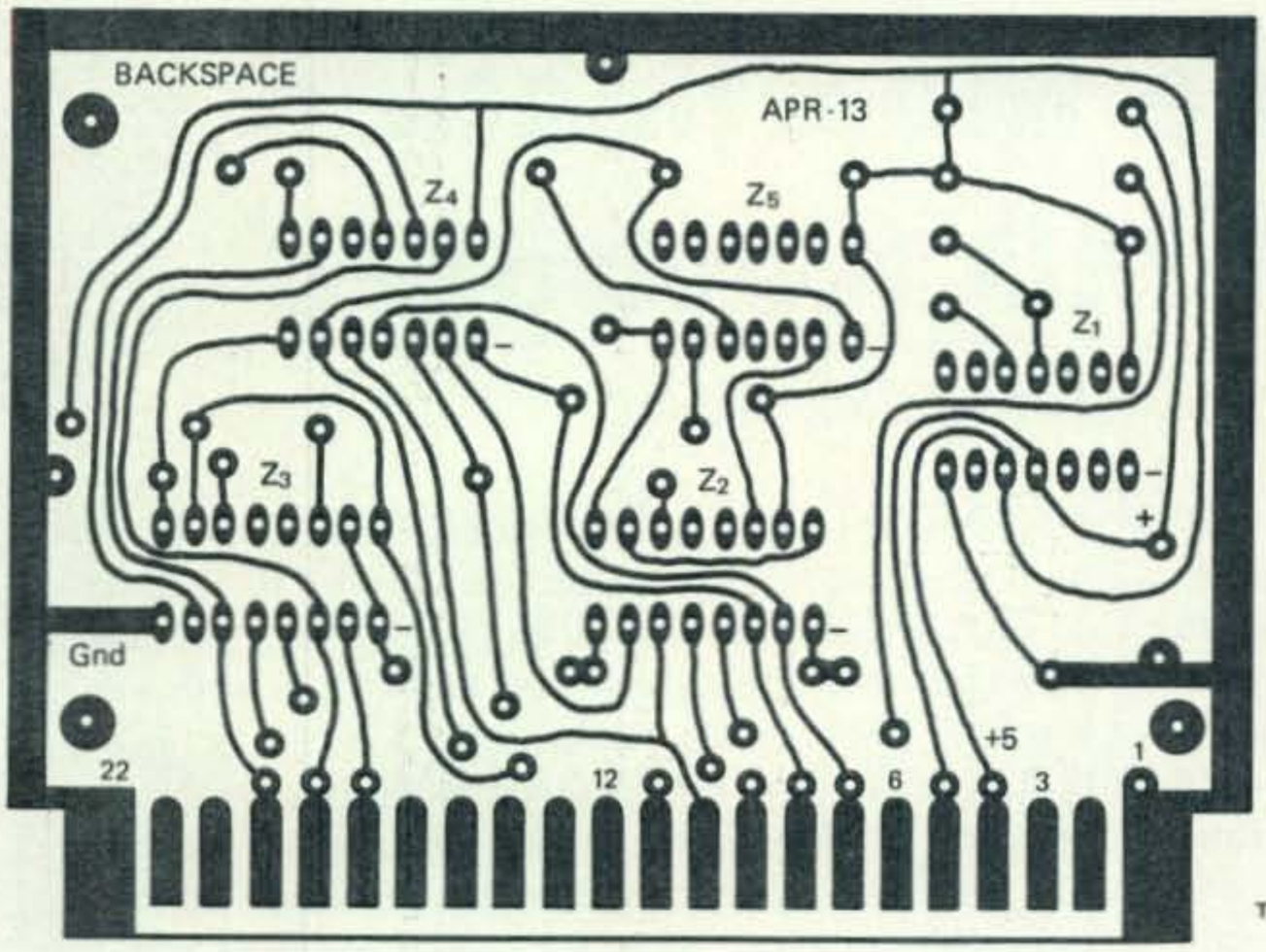
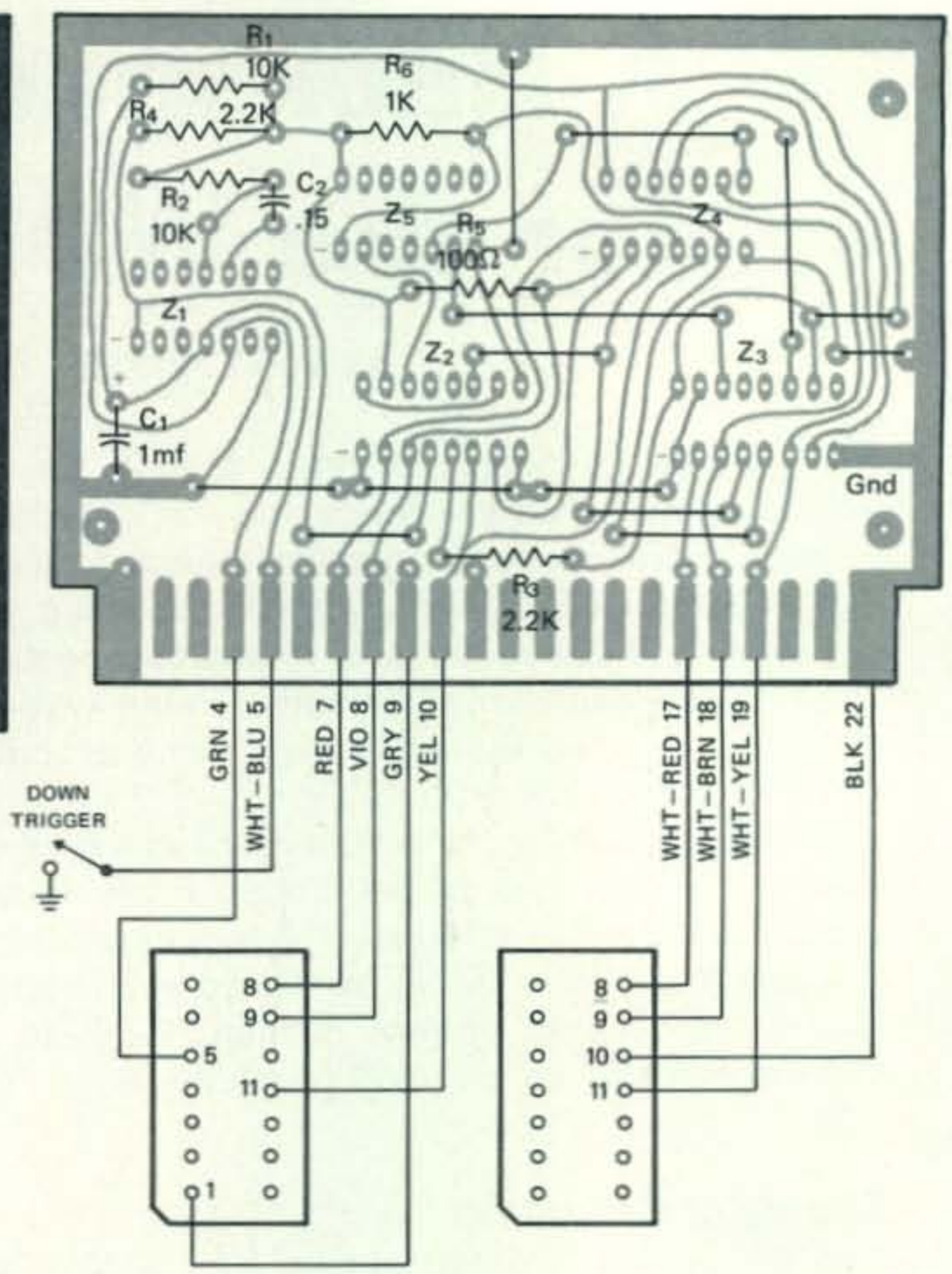


Fig. 1—Schematic of the backspace modification board for the WØLMD SSTV keyboard described in CQ for Sept. 1974. Connections to the WØLMD boards are made through two IC header plugs which plug in place of IC_{19} and IC_{20} in the original keyboard.



FOIL SIDE



IC plug to IC_{19} IC plug to IC_{20}

1 – Gnd – IC_{20-10}
2 – Open
3 – Open
4 – +5v. – IC_{19-5}
5 – Down trigger switch
6 – Open
7 – Horizontal – B – IC_{19-8}
8 – Horizontal – A – IC_{19-9}
9 – Up trigger – IC_{19-1}
10 – Horizontal – IC_{19-11}
11 – Open
12 – Open
13 – Open
14 – Open
15 – Open
16 – Open
17 – Vertical – B – IC_{20-8}
18 – Vertical – A – IC_{20-9}
19 – Vertical – C – IC_{20-11}
20 – Open
21 – Open
22 – Gnd

Fig. 2—(A) Full-size template for the backspace modification board for use with WØLMD's SSTV keyboard. (B) Parts and jumper layout for backspace modification, showing connections to IC headers which in turn plug into the sockets for IC_{19} and IC_{20} in the original keyboard. Headers are available from James Electronics, P.O. Box 822, Belmont, CA 94002. When soldering to headers, use IC socket as heat sink since header terminals melt quite easily.

6 position count cycle 5 times while IC_{20} goes through its 5 position count cycle once. The result is 30 possible character addresses. Sound familiar?

Looking at the requirements of the backspace circuit we see that we want the circuit to function exactly as above in normal up count use, and to also have the capability of counting down. This brings us to the 74192, and up-down decade counter. The 74192 has an up count chain of 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, 1, etc. It has a down count chain of 4, 3, 2, 1, 0, 9, 8, 7, 6, 5, 4, 3, 2, etc. The function of the backspace circuit, fig. 1, is described in detail below.

The up-count pulse comes into Z_2 on pin 5, the binary output is on pins 7, 6, 2, 3, for the 8-bit, 4-bit, 2-bit, 1-bit respectively. Z_{4B} senses the 6 count and Z_{5A} converts this sense to the correct logic level to clear the horizontal character counter Z_2 to O. Z_{4B} also supplies an up count pulse to pin 5 of Z_3, the binary output is on pins 6, 5, 2, 3, for the 8-bit, 4-bit, 2-bit, 1-bit respectively. Z_{4C} senses the 5 count and Z_{5B} converts this sense to the correct logic level to clear the vertical character counter Z_3 to 0.

When backspacing or down counting, the closure of switch, S_1, is debounced by R_1 and C_1, and also triggers the monostable multivibrator, Z_1, which supplies the down count pulse to pin 4 of Z_2. When the count on Z_2 is 0 and a down-count pulse is supplied, the 74192 wants to go to 9 (see down-count chain above), but the desired down-count chain is 3, 2, 1, 0, 5, 4, 3, 2, 1, 0, 5, etc. Thus Z_{4A} senses 9 and trips the load (preset) trigger to load the preset binary number 5 to the output pins of Z_2. At the same time, Z_{4A} provides a down-count pulse to pin 4 of Z_3. When the count on Z_3 is 0 and a down-count pulse is input Z_{4D} senses 9 and loads the preset binary number 4 to output pins of Z_3. The resulting vertical down-count chain is 3, 2, 1, 0, 4, 3, 2, 1, etc.

Backspacing

It is important to remember that this circuit *will not* actually erase an erroneous character. It moves the memory write address backward one character for each switch closure. Example: You wish to write to the memory the characters W3GKW, but you

(Continued on page 71)

Better receiver selectivity, more transmitter output, and Magnum Six RF Speech Processor installation.

Improved Performance from the Drake R-4B and T-4XB

BY JOHN A. DEVOLDERE, ON4UN

The Drake R-4/T-4 line of equipment has proved to have a long, reliable life, delivering excellent performance even under adverse conditions. As with all amateur equipment, however, there are some performance areas which can benefit from change. The purpose of this article, therefore, is to describe certain changes in the R-4B receiver and T-4XB transmitter which significantly improve the operating capabilities of the rig.

Improving the R-4B Skirt Selectivity

An excellent modification appeared in January 1972 *QST* which consists of replacing the original 4-pole crystal lattice filter (5645 kHz) in the first i.f., with two 8-pole filters identical to those used in the T-4XB transmitter. A modification kit comprising the two filters (u.s.b. and l.s.b.) and matching transformers can be obtained from Drake at reasonable price.

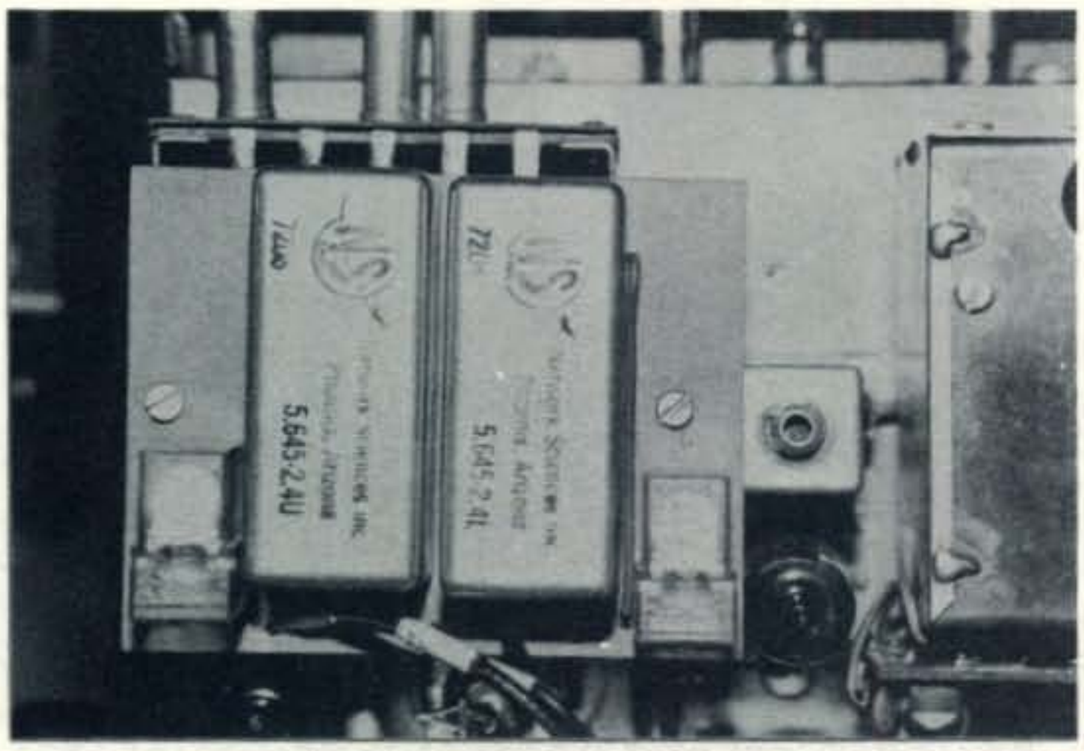
The mechanical layout described in the *QST* article, however, is very unattractive (small outboard box containing the two filters). Instead of switching the filters with a manually operated switch, one can use two low-capacitance relays, and mount the relays and the filters on a small P.C.-board inside the receiver. The author mounted the printed circuit in the left rear corner above the crystal bank (see photo). The original r.f. gain potentiometer was replaced by a pot with a push-pull switch. With this switch one can now select u.s.b. or l.s.b. Filament voltage (12 v. a.c.) can be rectified to provide the necessary d.c. voltage for relay switching. Figure 1 shows the schematic of the set-up.

The results are very impressive, and skirt selectivity identical to that in the Drake R-4C is obtained. Using the original bandpass-tuning in the second i.f. (50 kHz), one now has an i.f. system that has continuously variable bandwidth! Indeed, the two filters superimpose, and as the 50 kHz one can be shifted in frequency, the resulting "window" can be varied in width.

Increasing the T-4XB Output

Some Class B grounded grid triode linears need just a bit more drive than is originally available from the T-4XB. With the 6JB6-A's, the d.c. output varies between 100 and 140 watts on c.w. key-down (about the same PEP value on s.s.b.), depending on a.c. line voltage and tube age.

Using 6JF6-s (identical pin connections, and identical size—at least from the RCA brand) the output can be increased by more than 50%! (typically 220 watts PEP output on 20 m. s.s.b.). The Drake AC-4 power supply can easily handle the extra d.c. input as it has been designed to work



Two additional receiver i.f. filters and their associated switching relays are mounted on a piece of PC board which is then located above the crystal bank

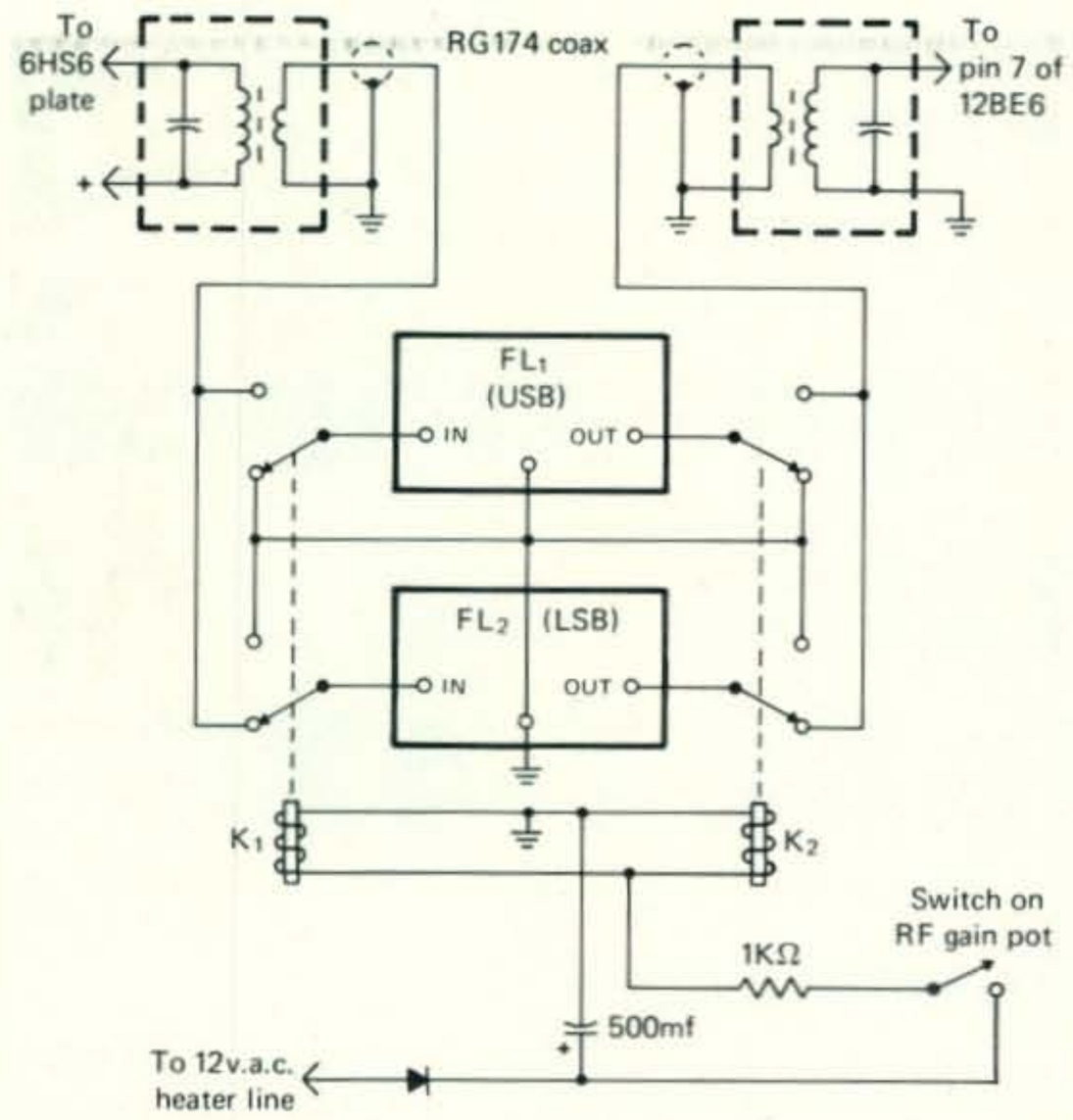


Fig. 1—Installation of two 8-pole crystal lattice filters in the Drake R-4B to improve skirt selectivity. The use of two small low-capacitance relays for filter switching enables the use of a push-pull switch on the r.f. gain control to select sidebands.

with the TR-4 as well (which uses three 6JB6's).

The author has bought 10 RCA 6JF6's and matched them up in the T-4XB. It is essential to use well-matched tubes. Just don't try it with any two tubes; it will be a catastrophic!

Matching the tubes can be done as follows:

1. Insert two 6JF6's in their sockets.
2. Adjust the bias control on the AC-4 for about 60 ma idling current.
3. Measure the voltage across R_{32} (or R_{33})—two 15 ohm resistors—in one of the cathode leads. This voltage is proportional to the tube's idling current. Note this voltage for this particular tube.
4. Switch off the T-4XB, discharge the h.v. and plug in another 6JF6.

An exciter grid current meter sits atop the Magnum Six RF Speech Processor. The muffin-type cooling fan can be seen on the T-4XB.

5. Repeat steps 3 and 4 and do so for all tubes.
6. Using the list of recorded voltages, match the tubes. A pair of matched tubes should have idling currents within 5 to 10% of each other.

Don't be surprised to find a deviation of 30 ma or even more. In my batch the idling current varied from 10 to 28 ma for one given bias value!

No changes in supply voltages have to be made to use the 6JF6's. After inserting a pair of matched tubes, the grid input circuits have to be retuned as outlined in the T-4XB manual.

The increased anode capacitance (9 pf instead of 6 pf) makes slight adjustment of the Pi-tank circuit necessary only on 10 meters. This involves reducing the 10 meter coil inductance to a value where the tank circuit can be resonated on the top end of 10 meters. To do this, locate the self-supporting 10 meter coil in the PA-compartment. Using two sets of pliers, stretch the coil slightly to reduce the inductance, until the tank circuit can be resonated. Finally the PA has to be re-neutralized. This can be done as outlined in the T-4XB manual, but a better method is as follows:

1. Connect a 50 ohm dummy load to the rig.
2. Disconnect screen and plate voltage to the 6JF6's by unsoldering two wires at the RFC's near the tube sockets.
3. Connect an r.f. probe and v.t.v.m. across the 50 ohm dummy load.
4. Switch on the rig and tune the transmitter on 10 meters. Adjust the preselector and PA tank circuit for maximum output as indicated on the v.t.v.m.
5. Now adjust the neutralizing capacitor for minimum reading (should be zero).

This completes accurate neutralizing of the rig. Reconnect screen and plate voltage. Now adjust the bias potentiometer on the AC-4 for 70 ma idling current.

It is obvious that the increased output coincides with greater heat development in the PA compartment. It therefore is essential to provide forced air cooling around the tubes to ensure longer tube life and to keep the cabinet cool altogether. The author solved this problem as follows:

1. Remove the PA shield compartment and close all sides and the top (excepted in the immediate vicinity and above the tubes) with cardboard (stick it with glue to the inside of the compartment).
2. Reinstall the screened compartment.
3. Stick self-adhesive foam tape to the top of the PA compartment so that when the cabinet is installed on the T-4XB, the foam-tape touches the inside top (this makes an air-tight joint between the PA compartment and the cover).
4. Get a 4" muffin-fan and place it on top of the T-4XB cover, so that it exhausts the air from the PA compartment. The fan can be ran at reduced

speed (use an appropriate capacitor, resistor or autotransformer) to minimize noise and still get sufficient cooling. The author's T-4XB feels cold, even after a 48 hour contest!

Although the author has not tried any other substitute tubes, it seems that 6KM6's would make a good substitute for the 6JB6A's too. Has anyone tried those?

One more word about the AC-4 power supply. If you feel it's getting too hot, remove the shielding plates, and remove it from your loudspeaker case. That should cool it down sufficiently.

Using the Magnum Six with the Drake T-4XB

The Magnum Six r.f. speech processor makes a tremendous mate for the T-4XB, when properly used and adjusted. The Magnum manual, however, does not, in the author's opinion, indicate clearly enough which points should be watched in order to get optimum results.

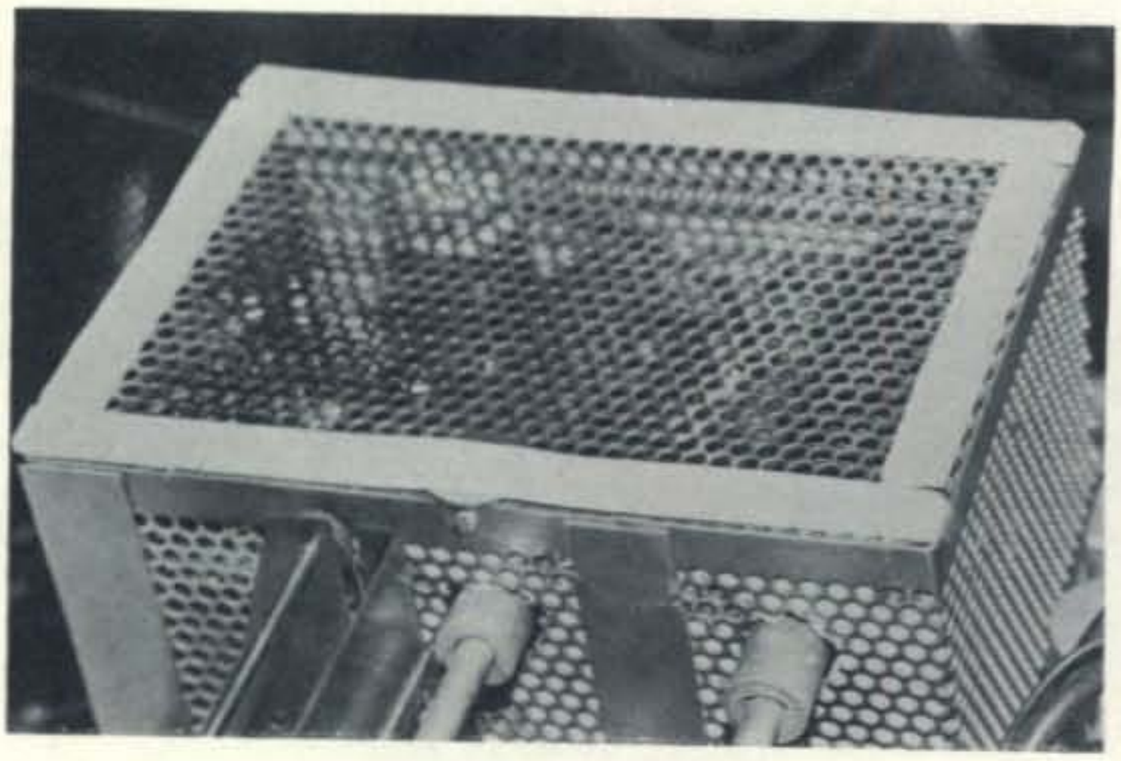
The processor is inserted between V_2 (12BA6—i.f. amplifier) and V_3 (6AU6—mixer). The original Drake a.l.c.-circuit generates a.l.c. voltage as soon as grid current starts to flow in the final tubes. The main disadvantage of such a system is that the evil has already occured before the a.l.c. can start working. That's why excessive audio gain, resulting in excessive a.l.c. action generates a lot of splatter.

Increasing the average power of the T-4XB by merely advancing the audio gain potentiometer is always done at the sacrifice of quality! Proper use of an r.f. speech processor (r.f. limiter) eliminates these problems and gives much higher average power.

The most valid reason for using a r.f. speech limiter in order to obtain increased average power is the fact that the increase can be realised with almost no sacrifice of quality. For this it is essential to keep the output level from the Magnum Six down enough as not to overdrive the final tubes. The slightest grid current results in flat topping and heavy splatter, and reduction in r.f. input to the Magnum Six, thus reducing the amount of clipping, and not reducing the drive to the final (action of the original a.l.c.-circuit).

How can we keep the output level from the Magnum Six down to the proper level? The ideal way is to use a monitor scope. The output level from the processor should be advanced to the point where flat topping just starts showing. Then back off just a bit. This point coincides with just a trace of grid current in the final tubes (on peaks).

This means that an equally effective way of adjusting the processor output level is to watch the grid current in the T-4XB. Unfortunately there is no grid current meter in the transmitter. An outboard grid current indicator can, however, easily be installed and necessitates *no* changes in the T-4XB. Figure 2 shows the schematic.



To improve PA compartment cooling, the PA shield enclosure is sealed with cardboard cemented to the inside surfaces. Self-adhesive foam tape around the outside top edge of compartment lid provides an air seal to the T-4XB cabinet.

How does it work? The original a.l.c. circuit, built around V_{1B} (a.l.c. amplifier) is a high impedance circuit (1 megohm load resistor in V_{1B} anode). If one loads the anode with a 47K resistor (plus 100 microamp meter) two things happen: 1. The meter starts flickering when grid current occurs. 2. Due to the heavy loading of the 1 megohm anode circuit, the a.l.c. circuit becomes virtually inoperative, which is to our benefit (the a.l.c. circuit had to be eliminated as it regulated V_2 which comes before the processor).

The author has found that the output level of the Magnum may be adjusted to the point where about 10 microamps flow on peaks in the indicator circuit. More current coincides with flat topping on the scope.

One phone plug, a few feet of shielded cable, a 47K resistor and a 100 microamp meter will do just as fine for adjusting the Magnum Six as will the expensive monitor scope!

Adjustment of the Microphone Gain Potentiometer

How far should the audio gain potentiometer be opened? To determine this, several situations have to be examined:

1. *Signal-to-Noise Ratio.* When there is a lot of background noise in the shack (noisy blowers, etc.) the amount of clipping in any case should be

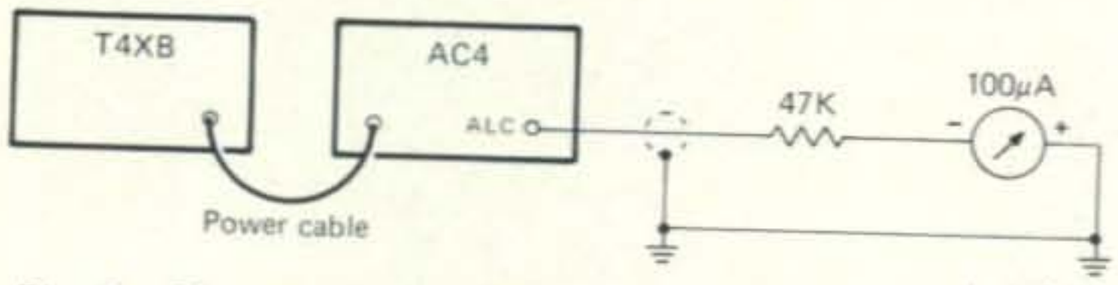
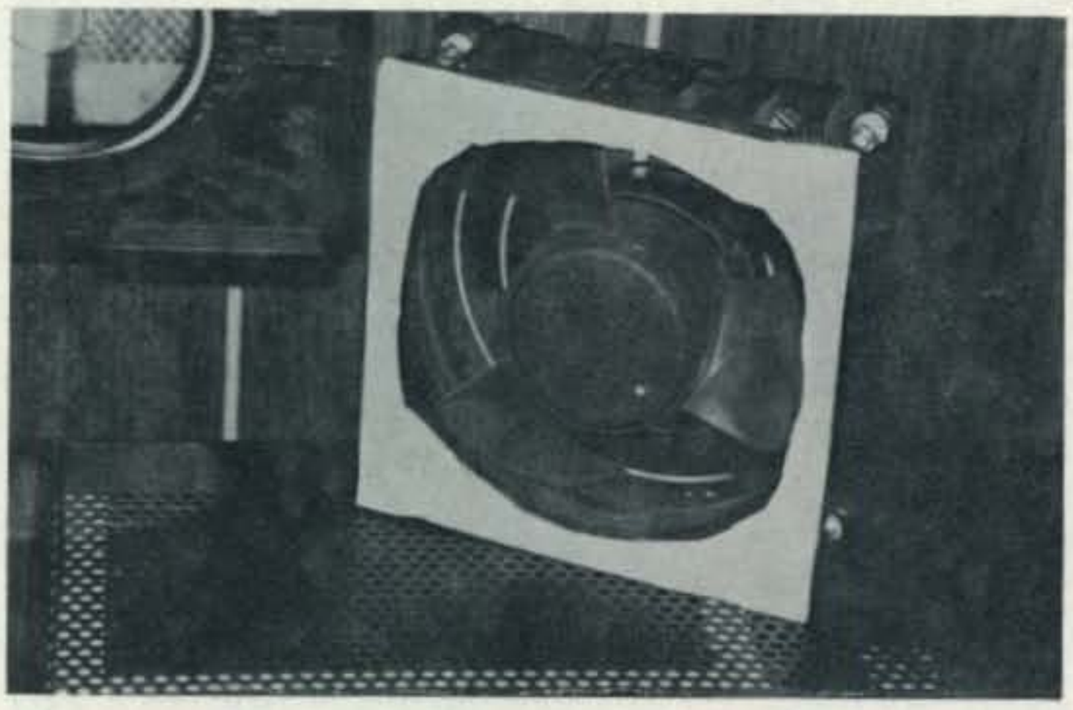


Fig. 2—The addition of an external 100 microamp meter and a 47K resistor enables monitoring the T-4XB PA grid current through the a.l.c. jack on the AC-4 power supply. About 10 microamps on the meter is a safe value; more than this generally indicates flattopping.



Self-adhesive foam applied to the rim of the muffin-type fan provides air seal.

limited to the point where at least 25 db of signal-to-background-noise ratio is obtained.

How can this point be determined? If your station runs 1400 watts output on a single tone whistle, the unmodulated output (noise from blowers, etc.) should be no more than about 4 watts p.e.p. or about 2 watts indicated on your output meter.

$$\text{Max. allowable noise power} = \frac{1400}{\text{antilog}\,\frac{25}{10}} = 4.4 \text{ watts}$$

This means that in no case should the mic gain pot on the T-4XB be advanced any further than to the point where the noise indicates about 2 watts on your output meter. Otherwise, the back-ground-noise will become really objectionable. In order to keep the background noise down, a good cardioid type microphone may help. Always speak very closely to the microphone when using speech processing!

2. *Minimum Microphone Gain Level.* For a given microphone there will be a setting of the T-4XB mic gain potentiometer where clipping ceases. We determine this point by:
   a. Using the monitor scope: Set the mic level at 12 o'clock. Adjust the Magnum output level for maximum amplitude on the scope (watch out for flat topping!). Now reduce the mic gain until the peak amplitude starts falling off. That's the point where clipping ceases. This point does not change with bands. It may change with different microphones and voices, however.
   b. Using the grid current indicator: Set the mic level at 12 o'clock. Adjust the Magnum output level until the 100 microamp meter kicks up to about 10 microamps on peaks. Now reduce the mic gain until the meter shows no current. That is the point you're looking for.
3. *Optimum Microphone Gain Adjustment.* It is a waste of energy to run 20 db of r.f. clipping at all times. But how to get the feeling of how much clipping one is running? Here's a trick. 0 db is when the grid current indicator stops moving on peaks.

Set the microphone gain for 0 db clipping and watch the output on the wattmeter (Drake W-4 or similar). It may peak up to 400-500 watts on peaks (for 2 kw p.e.p. input).

Now advance the mic gain slowly. The indicated output will increase slowly until a point where further increase of the mic gain will show only a marginal increase of output. The reading for a long "aaa . . ." will now be about 1200 to 1400 watts on your wattmeter. That is definitely the maximum setting you should ever use with this particular microphone. Check if for this setting the background noise is at least 25 db down from your peak output. This maximum setting (estimated at approx 20 db clipping) should only be used when fighting a pile-up or in really marginal conditions. For normal QSO's with normal signal strengths a gain setting half-way between the 0 db clipping and the maximum clipping (20 db) level is ideal.

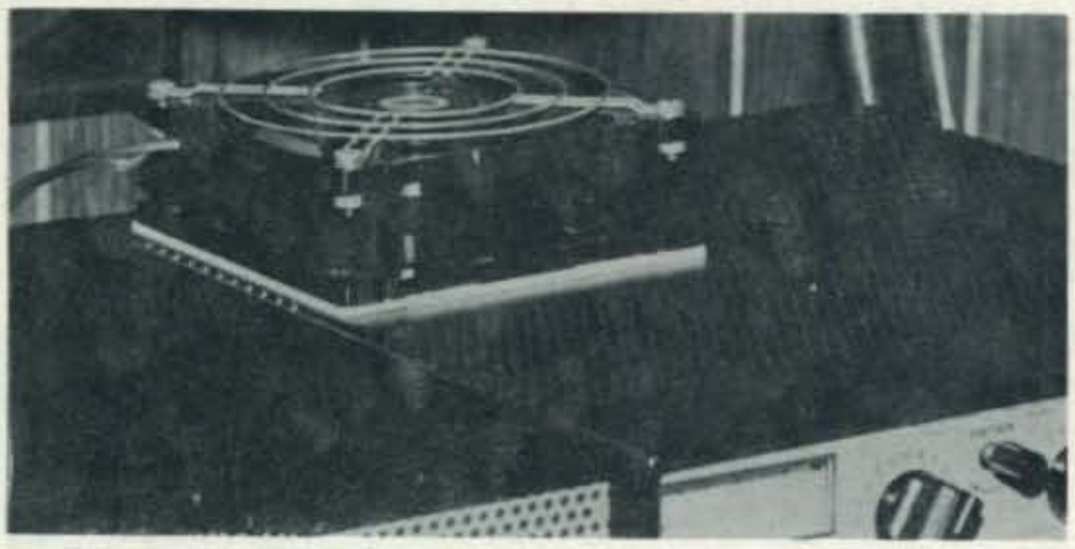
Final Comments

A properly adjusted Magnum Six definitely gives you 4 to 6 db average power gain over a system with no limiting or compressing. One frequently hears amateurs on the bands comparing r.f.-limiting with a.l.c.-type compressing. Here, of course, the difference is much less, typically 2 db, and that's barely noticable on the S-meter, especially when signals are strong!

So why do we want to spend the money for r.f. limiting with the Magnum Six? Here's why:

1. The properly adjusted Magnum Six will give you the 4-6 db of average power gain *without broadening* the signal, because there is no grid current in the T-4XB PA at any time!
2. Because of the presence of a second 8 pole crystal filter in the i.f. strip of the transmitter, the shape factor of the system will be improved, and the signal will actually become narrower than with the T-4XB by itself!

Local on-the-air tests have revealed a substantial decrease in signal bandwidth when using the magnum at 15-20 db clipping (no grid current!) as compared to the original T-4XB configuration with a normal amount of a.l.c. compression. ■



Fan exhausts hot air from T-4XB PA compartment.

Longwave Simplified

BY MIKE MUENCH, VO1KE

It's natural for us to be curious about parts of the radio spectrum outside our own Amateur bands. Yet many of us have never heard a signal below the bottom of the standard broadcast band. Many Hams would be interested in tuning these frequencies, but the large inductances and capacitances required to tune them are a deterrent to homebrew construction. And sinking money into a commercial longwave receiver is an expensive investment to cover only 540 kHz or less, especially since you may not know what is down there and since there isn't any Ham band in this frequency range.

In order to simplify the problems of receiving longwave, I decided to eliminate the problem of awkward tuning circuits by eliminating the tuning circuit altogether. Since I was eliminating the front-end tuning, the output tuning was also discarded. Next I deleted the oscillator, and instead made use of my v.f.o. to supply the heterodyne. This didn't leave much. It did, however, leave the mixer tube, which would require an external power source. So as a final gesture of closet-cleaning I eliminated the mixture tube too!

The result is shown in fig. 1. A low-pass filter is used to attenuate broadcast band and shortwave signals. This filter also ensures that the v.f.o. will not radiate into the antenna. After the filter, the v.f.o. injects the oscillation for mixing, and a simple 1N34 diode is used for the conversion. Naturally, no fantastic claims can be made for the sensitivity, but surprisingly enough, it isn't half bad. I regularly receive the Omega navigation station in North Dakota on 10.2-13.6 kHz, the NAA Teletype on 17.8, JXZ c.w. on 17.5, and GBR time signals on 16 kHz. Up on 500 kHz, the maritime calling and emergency frequency, I have heard ZRH, GYI, YVG, and KLC, in addition to many boats and many North American east coast and European coastal stations.

The circuit is preceeded by a 100 kHz wavetrap for Loran C. If you live at all near a Loran C station you will need this, though if you live far inland you could do without it. If you are subject to Loran C interference in your present equipment you might want to build this wavetrap for use in other equipment, and you will note that the parts required are inexpensive and readily available. The variable capacitor used in the wavetrap is a 270-365 pf unit, the type commonly used in broadcast radios, with both sections wired in parallel. It is mounted as a "front-panel" control.

Nothing is critical in the wiring except that L_2 and L_3 should not be in the field of each other. The easiest way to keep them isolated is to mount them at right angles to each other. The leads to C_6 should be kept short, since this capacitor serves as a TVI-suppressant. Otherwise, the only other important consideration is that the unit should be well shielded, which is to say it is wise to build it in a chassis with a bottom-plate. Otherwise there may be too

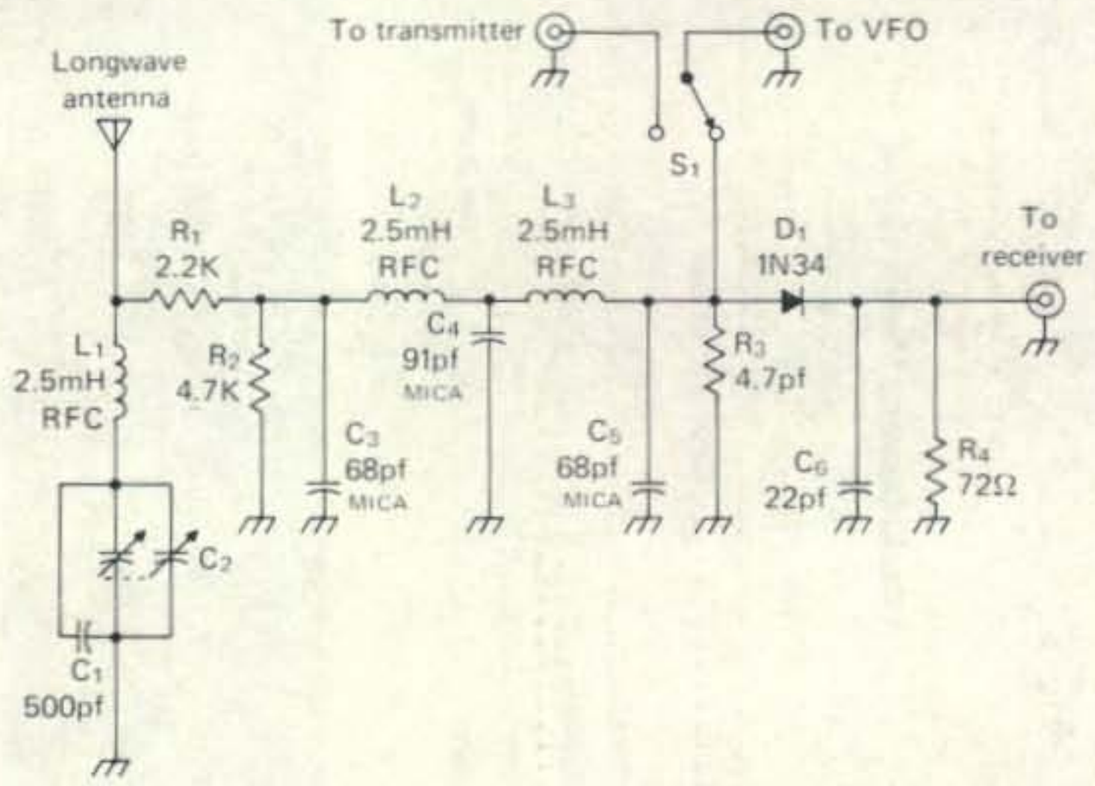


Fig. 1—Schematic diagram of passive longwave converter. Transmitter v.f.o. is used as local oscillator to provide longwave reception on an Amateur receiver. Capacitor C_2 is a 2-gang broadcast receiver variable capacitor with both sections in parallel.

much pickup of signals on the fundamental frequency to which the receiver is tuned.

Of course you will need a way to connect and disconnect the receiver from the converter. You could install an s.p.s.t. switch at the output of the converter, but when listening on shortwave the lead to the converter will then become a coaxial stub, which can attenuate the h.f. signals. So it is better to use an alligator clip on the end of the inner lead of the coax used between the converter and receiver, and to clip the converter output onto the antenna terminal of the receiver when you want to listen to longwave.

Operation of the converter is extremely simple. You need only to connect up the antenna to the converter, connect the converter to the receiver, turn on the v.f.o., and put S_1 into its position for converter operation. Tune the receiver to the bottom of whatever Ham band you choose for use in longwave, on a frequency equal to the difference between the v.f.o. frequency and that to which the receiver is tuned. That is, if the v.f.o. is on 7 MHz and the receiver is tuned to 7.085, then you are listening on 85 kHz.

Longwave and the Amateur

If you listen on longwave you may get the itch to do two-way work on these frequencies. There are, of course, no Ham bands down here. Furthermore, the 1979 WARC will not deal with this part of the spectrum, so no Amateur longwave allocations are possible in the forseeable future. However, in the USA, unlicensed use of 160-190 kHz is permitted with one watt input and 50 feet of antenna, including the length of any transmission line. This has been shown to be good for about 80 miles in urban areas and a few hundred miles in rural areas. A beacon transmitter on a mountain in New Mexico has been heard in California. W21MB has a very interesting book of info on this band, which is available for $1.75.

Since I have no other longwave receiving equipment I cannot compare this converter with other gear. From what I have heard about what others are able to receive, I am inclined to think this circuit must be pretty good, especially on v.l.f. where many circuits apparently suffer from lack of sensitivity.

For some odd reason my circuit works much better here when the receiver is tuned to the high side of the v.f.o. This doesn't make any sense, but I've given up trying to figure it out. I'd be very interested in hearing how this converter compares to other longwave equipment. If you have any comments, please drop me a line. ■

Improving The Heathkit HW-101 Transceiver

BY CORNELIO C. NOUEL, YV5FL/WB5LAO

The HW-101 is probably one of the most popular s.s.b. transceiver kits and, despite its relatively low price, it is an excellent performer when properly put together and operated.

This article has been written in an attempt to describe a few improvements carried out by the author which can add in performance without detracting from its appearance and basic design either electrically or mechanically. Naturally, it is assumed that the kit has been assembled as per the instruction book and that it performs reasonably well to begin with.

After using the HW-101 for several months the writer felt that some items could stand some improvement; these items are listed below, together with the appropriate comment and procedure.

I.F. Screen Voltage

The screen voltage dropping resistor at V_4 (2nd i.f. amplifier) identified as R_{113} in fig. 1 is 1K, which seems too low and should be changed to 10K ½ watt. This improves the operation of the i.f. chain somewhat in that it lowers the gain some, bringing about better product detector action and a lower heat dissipation at V_4, thus avoiding its early failure. The overall gain may still be too high and can be lowered further as will be seen later.

Bandpass Transformer Re-Alignment

The bandpass transformer T_{202} is a constant-K network using three toroid coils (see fig. 2) and comes adjusted from the factory. Nevertheless, it is possible for it to drift out of adjustment during shipment or after prolonger use. If this is suspected, it can be checked as follows: connect the transceiver antenna connector to a 50 ohm non-inductive resistor, set the bandswitch to the 3.5 to 4.0 MHz band, turn the calibrator on and check the S-meter readings, keeping the preselector peaked for maximum throughout the band. If the readings are within one S unit from one end to the other, the transformer is probably OK. If not, it should be adjusted by removing the shield temporarily and peaking all trimmers found inside with the set tuned to 3.75 MHz (a signal generator is needed for this adjustment, but it can be approximated using the calibrator at either 3.7 or 3.8 MHz mark). After the adjustment, replace the shield and check to see

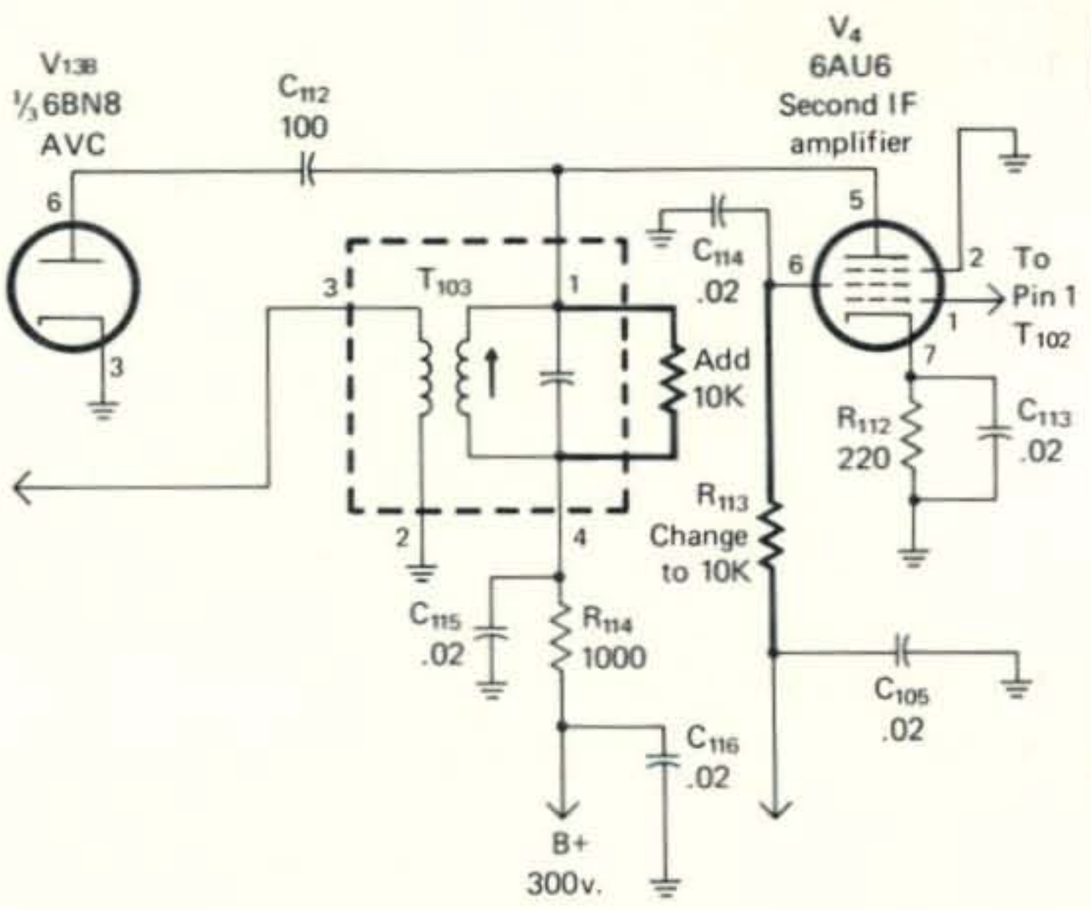


Fig. 1—Changes to the second i.f. amplifier stage, V_4, reduce overall gain of the HW-101 to useable levels and make S9 meter readings 50 μv.

that the calibrator signal readings hold through the band. It is important to use an insulated tool for this adjustment.

Replacing V_{10} and V_{11}

The HW-101 specifies 6HS6 tubes for the receiver r.f. and first mixer stages (V_{10} and V_{11}), these are very high transconductance tubes and will provide an excellent signal-to-noise performance; however, they are rather susceptible to cross modulation and blocking effects when operating near very strong signals from local stations. Also, in this set they are operated very close to their maximum rated plate

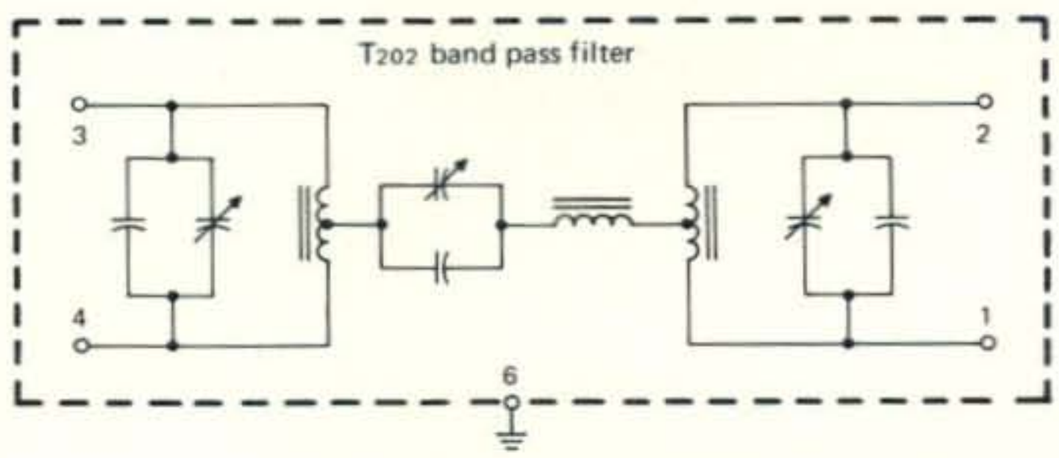


Fig. 2—Bandpass filter T_{202} may require re-adjustment after long use. Peaking the three trimmers at the center of the 80 meter band should provide flat coverage across the entire band.

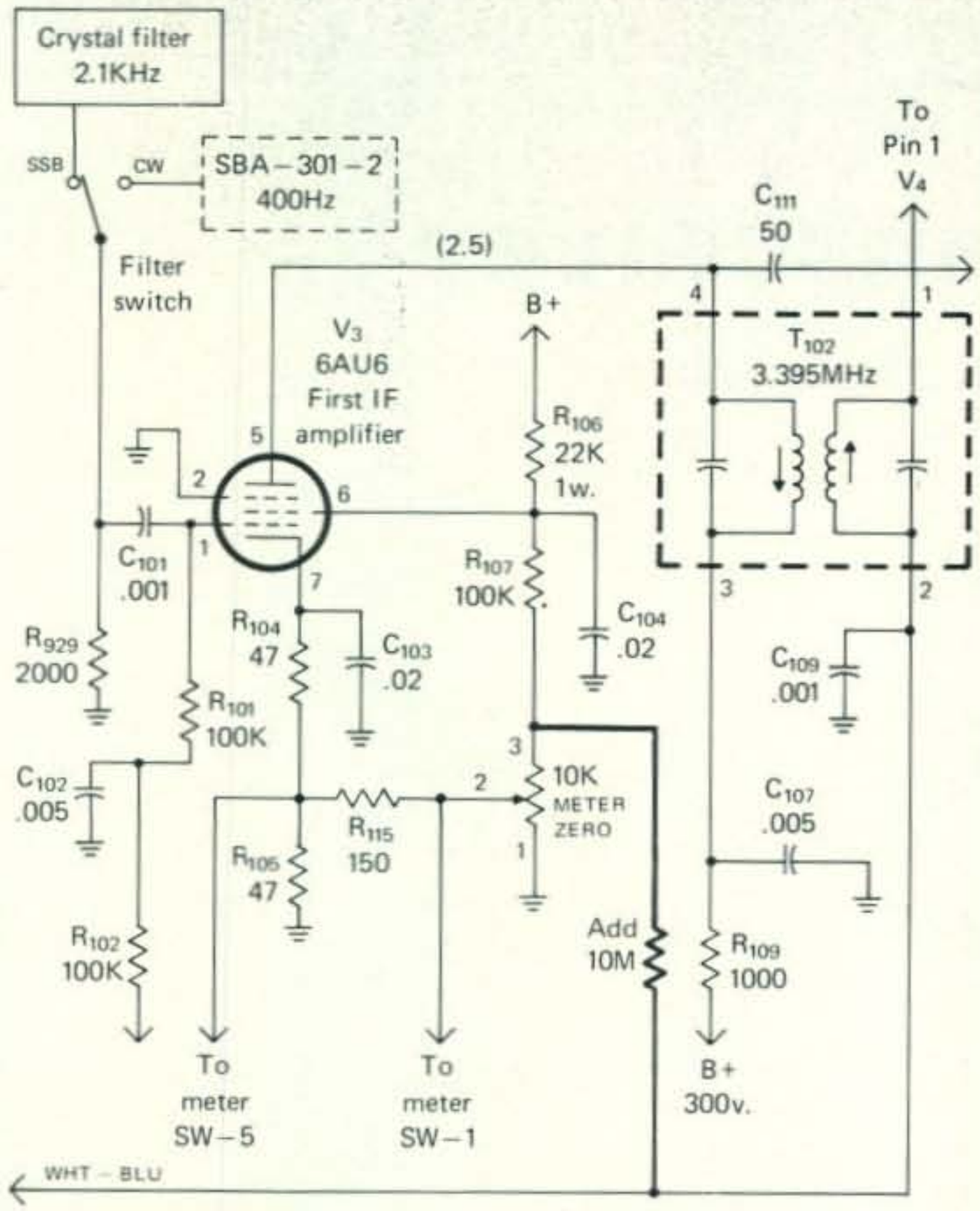


Fig. 3—Adding a 10 meg resistor as shown will raise the zero point of the meter when reading a.l.c. voltage.

dissipation and in fact may even exceed it at times. Therefore they get extremely hot and consequently do not last very long. These tubes can be directly replaced by 6AU6 without any modification and it is up to the individual operator to decide which is more suitable to his needs. If they are replaced, it is necessary to peak the "Driver" and "Mixer" coils for each band, following the Heath recommended procedure as stated in the manual.

VFO Stability

The v.f.o. coil (L_{941}) is a ferrite core, adjustable inductor with two windings in series. When properly set up, the frequency stability is excellent, but if the core is positioned towards the high side (hot end) of the frequency determining part, the stability will be degraded and the warm-up drift will be in the vicinity of 2 kHz or more. To correct this, the slug should be positioned near the ground end of the winding and the dial re-calibrated. The v.f.o. trimmers will probably have to be readjusted and it is possible that C_{951} may have to be lowered in value, but keeping the same temperature coefficient; a value of 10 pf (N750) has been found suitable. The total drift will be less than 1 kHz this way.

ALC/S-Meter Zero

During transmitting, the S-meter measures the a.l.c. action when the meter switch is set to a.l.c. However, the zero setting offsets considerably, keeping the indications at very low values. This is easily corrected by adding a 10 meg ½ watt resistor between lug 3 (hot end) of the zero adjusting potentiometer and pin 2 of T_{102} where the a.g.c. is connected to. This compensates automatically between transmit and receive with no ill effects except that the a.g.c. discharge time is shortened slightly. The potentiometer action is less critical now and more towards the middle of the range. If a large discrepancy remains in the zero settings it is probably due to gassy tubes in the a.g.c. stages. For proper modulation, the mic. gain should be adjusted so that the a.l.c. swings up to about S-6 (with the meter in the a.l.c. position). Refer to fig. 3.

VFO Tuning Mechanism

The v.f.o. tuning system of the HW-101 works very smoothly when properly installed; however, with time, as with most v.f.o.s, some irregularities may show up due to either wear or oxidation. If scratchiness is observed, a little contact cleaner or penetrating oil (such as "Mystery" brand) may be put in the rotor wiper contact and in the spring loaded split gear of the variable capacitor. If excessive play or backlash is observed, it is usually due to the ball bearing drives. Spare ones can be obtained from the factory for replacement but in some cases it is possible to tighten them by squeezing the metal fingers that hold the assembly together. This is not really too recommendable since if too much pressure is put on the fingers, the mechanism may not work well and the drives will have to be replaced anyway. When removing and installing the v.f.o. assembly, it must be done very carefully so that the shafts are aligned exactly. If this is not done, the v.f.o. knob may be too hard to move in certain positions and too easy in others; a most annoying situation. Beware of using any oil lubrication in the drives, they use a special type of grease that should last the life of the drive. Also, one should be very careful about using any kind of spray cleaners or lubricants in the v.f.o. compartment as they might contaminate the frequency determining components and degrade the stability.

Erratic Transmit/Receive Action

This may be caused by carbon deposits between the contacts of the relay RL_2 and is simply cured by blowing this deposit away. The contacts may be burnished with a special tool or with a small strip of white bond paper passed between the contacts with the set off (there are dangerous voltages here). Do not use abrasives or oily substances to clean the contacts. However, a non-residual cleaner may be used sparingly. Another cause of instability may be caused by one or more of the circuit boards becom-

(Continued on page 72)

WILLIAM I. ORR, W6SAI, ON

Antennas

Pendergast looked out of the shack window and sighed. The rain was coming down in torrents and drumming against the glass. The yard was full of puddles of water and a miniature river ran down the walk to the gutter, which was bubbling over with sticks and dead leaves jammed against the drain. The guy wires on my tower hummed in protest to the gusty wind blasts. Looking up, I observed that the sky was a cold, gray color with lowering clouds scudding swiftly across the horizon.

My friend sighed. "This isn't a very good day to think about antenna projects", he said. "Now, if you only had a warm fireplace in this shack, we could have a conversation about antennas in the proper atmosphere. That would be great! Sit around the fire, with a tall, cool one in your hand and discuss DX and other good things". He pulled down the window shade so that we could no longer see the advancing storm. Its presence was still felt, however, as the shack trembled a bit under the wind blasts and an icy scimitar of air slashed in around the window cracks.

"I've been catching up on my reading", I remarked. "Do you ever read *Broadcast Engineering*? No? A fine magazine. In the November, 1975, issue there is a very interesting article on detuning skirts for tall towers that radio amateurs would do well to consider.

"The article considers the case of a broadcast station which used one tower for both a.m. and f.m. transmission. The f.m. array was placed at the top of the tower which was 490 feet high. This was of great advantage for extended f.m. coverage, but the height screwed up the use of the tower for general a.m. broadcast use, since the electrical height at the operating frequency was about 0.74 wavelength. This meant . . ."

"This meant that they had a lot of high angle, useless radiation since

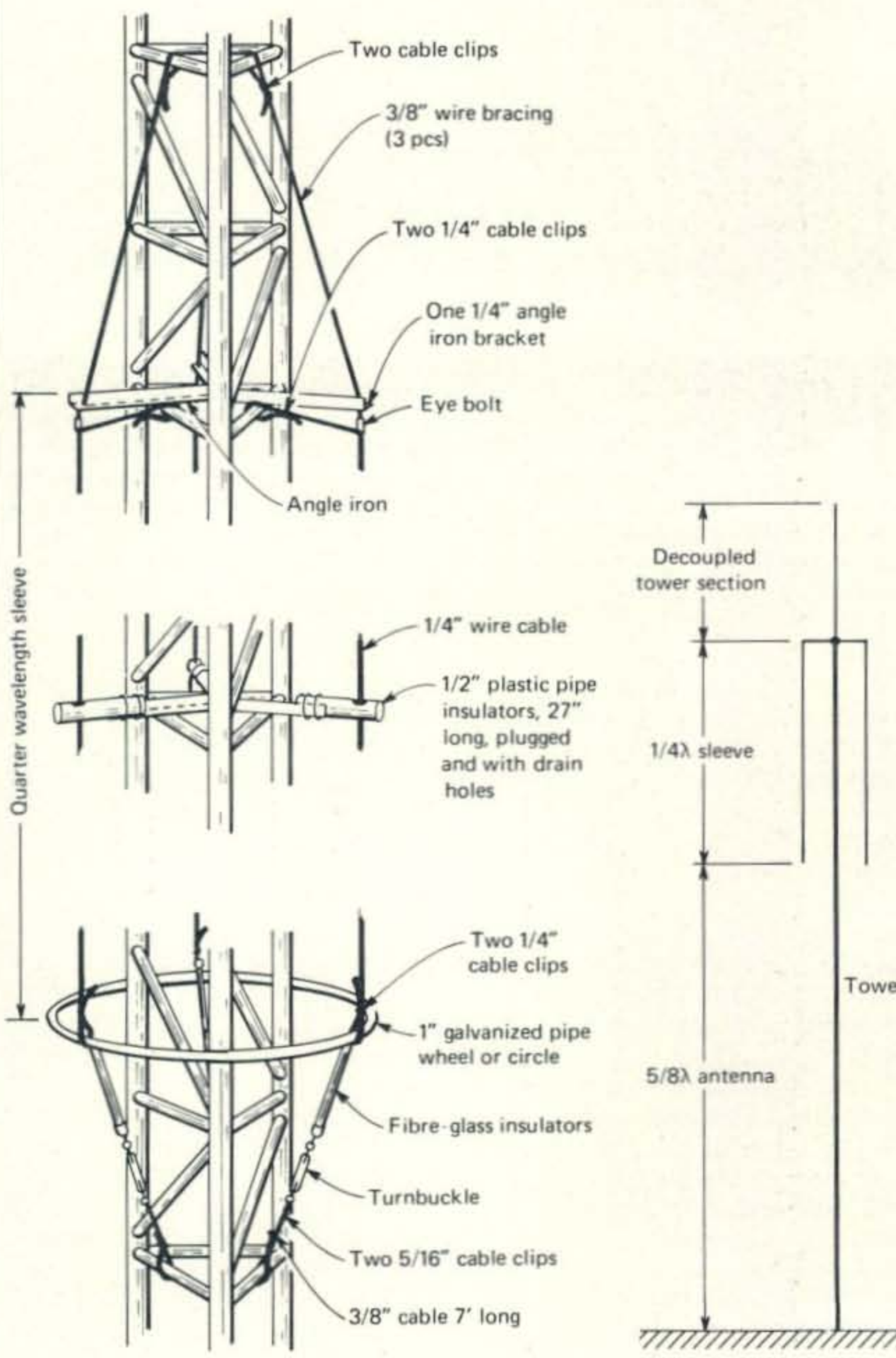
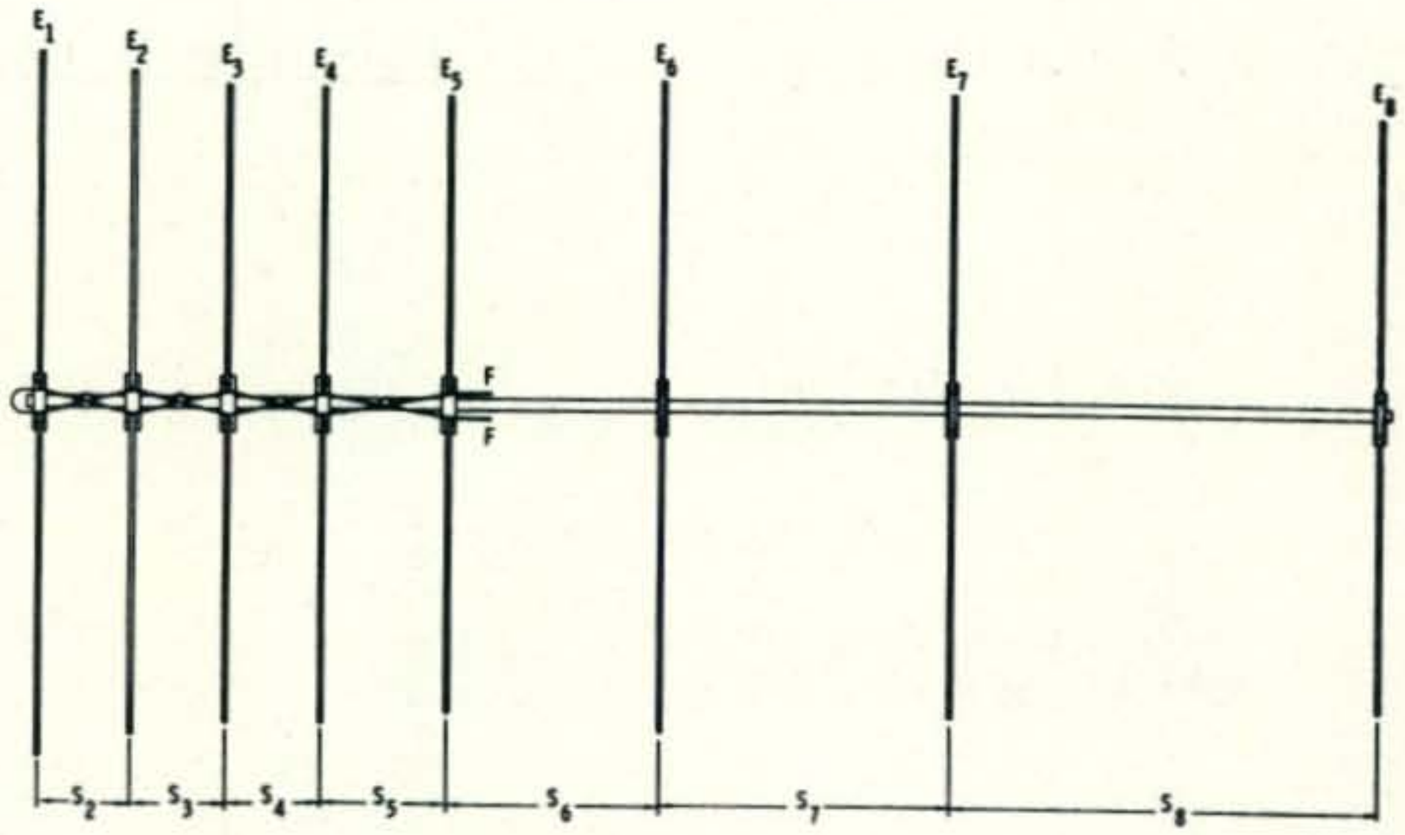


Fig. 1—The detuning sleeve for a broadcast antenna tower. The sleeve is a quarter-wavelength long at the operating frequency and isolates the top section of the tower. Made up of three conductors, the sleeve is grounded to the tower at the top end by the angle iron brackets. The bottom end of the sleeve is shorted to a circular metal support ring and braced to the tower with insulators, turnbuckles and cables. The center of the sleeve is strengthened by plastic pipe insulators extending out from the sides of the tower. The electrical equivalent is shown at the right.



L-P YAGI DIMENSIONS (TIP-TO-TIP)

ELEMENTS	1	2	3	4	5	6	7	8
INCHES	116.5	110	106	104	102	108	103	100
cm	296	279	269	264	259	274	261	254

SPACING	1	2	3	4	5	6	7	8
INCHES	-	15.5	15.7	15.7	20	35	49	71.5
cm	-	39.4	40	40	51.1	88.3	124.5	181.6

Fig. 2—The Log-periodic beam antenna for 50 MHz. This beam provides about 12 decibels power gain over a dipole and is mounted on a 18½ foot long boom. The L-P elements are insulated from the boom by mounting on insulated blocks. Yagi elements are grounded to the boom at their center point. The antenna is fed with a balanced 70 ohm ribbon line at feedpoint F-F. The L-P transposed transmission line is made of No. 8 aluminum clothesline wire, criss-cross connected between the element centers. The rear element is shorted with a six-inch loop of aluminum wire. The spacing between the inner tips of the L-P elements is 3½ inches. Elements are made of ⅜-inch diameter aluminum tubing tip sections, with ⅝-inch inner sections. (Drawing courtesy of "Radio Handbook", 20th edition, Editors and Engineers Division, Howard W. Sams, Inc.).

maximum horizontal field intensity is achieved with a vertical antenna of 0.625 wavelength, or ⅝-wave, as commonly expressed", interrupted my friend.

"Exactly right!", I replied. "Since broadcasters are interested in maximum groundwave radiation, as are amateurs on lower bands, the tower was too high. So the problem was, what to do? Cut the extra length off the top of the tower and degrade the f.m. coverage?"

Pendergast said nothing, so I continued. "The solution decided upon was to isolate a portion of the tower electrically, or detune it, if you prefer. This was done with a detuning skirt, such as shown in fig. 1. And there's no reason why such a gadget can't be applied to an amateur tower, if the user wants to use an existing tower as a vertical antenna.

"The technique is to add a quarter-wavelength detuning sleeve to the tower, isolating the unwanted section. The sleeve used for the broadcast tower is made of a wire "skirt" suspended from brackets. The skirt is grounded to the tower at the top end and insulated at the bottom end. This arrangement isolates all the tower above the skirt. The bottom of the skirt is interconnected to a metal support ring to make certain each wire of the skirt had an equal r.f. voltage potential on it.

"The skirt is made 0.234 wavelength long, since by underestimating the length, it could always be resonated with a capacitor at the bottom end. But, because of other effects, such as tower diameter and adjacent hardware, the length turned out exactly right. The remote field strength of the a.m. signal at the ground was boosted 3 decibels by the addition of the skirt".

"That's not a bad idea", admitted Pendergast. "Particularly for those amateurs who have a tall tower, top loaded by a beam, and want to work the tower as a 40 meter vertical, for example".

"Of course, control wires and the like, should run through the skirt, adjacent to the tower so that they do not detune it" I added.

Pendergast sketched the detuning skirt in his notebook, raised the shade to note that it was still raining, then said, "I have a request from a buddy for some information on the LPY (log-periodic Yagi) beam antenna for 6 meters. Got any information in your file?"

"Yes", I answered. "I show just such an antenna in the new 20th edition of the *Radio Handbook,* which just came off the press. Here's a quick run-down and sketch of it for your friend (fig. 2).

"This antenna consists of a log-periodic section, plus a number of parasitic directors. The log-section consists of a series of dipoles, fed at the center in such a way that adjacent dipoles are out of phase. The array is fed at the apex. Dipole lengths are adjusted across the band of frequencies in use and a broadband structure is formed. The bandwidth of the device is limited by the length of the longest and shortest elements, which must be about a half-wavelength long at the extreme frequency limits of the antenna.

"The LPY antenna is composed of a five element log-periodic section designed to cover 50 MHz to 52 MHz and is used in conjunction with three parasitic director elements mounted in front of the log-periodic structure. The antenna exhibits about 12 decibels power gain over a dipole and compares nearly identically with an 8-element Yagi mounted on a 30 foot long boom. The overall length of the LPY beam, on the other hand, is only about 18½ feet. Best of all, the LPY antenna provides superior bandwidth performance, as compared to the Yagi".

"How about the feed system?", asked Pendergast, sketching the antenna in his notebook.

"Notice that the rear element of the periodic structure is shorted with a wire loop across the line. This reduces reactance at the feedpoint, and the beam is fed with a balanced 75 ohm "ribbon" line. An antenna tuner can be used at the station to convert from balanced line to a coaxial feed system."

Pendergast smiled. "It sounds as if this antenna is a block-buster for six meters".

"It is", I replied. "And it also provides rejection against a nearby channel 2 TV transmitter, since antenna response drops quickly outside of the passband. That's great comfort in areas where channel 2 competes with weak 50 MHz DX signals in the front end of your receiver".

"How about coaxial feed?", asked Pendergast. "That would be nice".

"You can do it", I replied," with a balun placed at the antenna. But

don't forget: coaxial line losses start to mount, even at 50 MHz".

"I am a great believer in coax", stated my friend as he peeked out of the window again. "Not to change the subject, but I note your coaxial line to the tower is underwater now. Won't that damage the cable? Is it waterproof?"

"No and yes", I answered. "I use good cable, and the ends are sealed to prevent moisture from getting into the line". I handed Pendergast a small pamphlet. "Look throught this engineering information I compiled from brochures distributed by *Amphenol* and *Times Wire and Cable* which discuss coaxial cables. Here's some good and very timely information.

"And now that spring is on the way, the next few months will be a good time to maintain and overhaul your antenna installation.

"With the big rise in CB popularity, there's more and more coaxial cable on the market, some of it at attractive prices. But you have to watch out, because some of it is junk".

"I thought all coaxial lines were built to military classifications", objected Pendergast.

"Some of them are", I replied. "But there are important differences in the types of cable you can buy now. For instance, let's talk about the insulating jacket of the cable for a moment.

"The original, outer jacket used on the older cables, such as RG-8/U and RG-58/U, was made with a plasticizer compound that kept the jacket flexible and prevented it from cracking or crazing. It was found, however, that after a period of time the plasticizer would migrate from the jacket, through the outer braid and into the polyethylene insulating material around the inner conductor. This caused a chemical change in the insulation which increased the electrical loss of the material with time. As a result, the military established a useful life period for these cables, at the end of which they were either junked, or dumped on the surplus market."

"How do you tell if the coaxial cable is contaminated?" asked Pendergast, looking uneasily at a roll of coax in the corner of the room, as if it were a serpent, ready to strike.

"If the cable is really old, the inner insulation will have a yellowish, tint to it", I replied. "In addition, the outer copper braid will be badly tarnished. The cable loss, too, can be readily measured, especially at the higher frequencies".

I continued. "Newer coaxial line has an improved outer jacket which has a long life and is noncontaminating. Estimated useful life of these new cables is 20 years, or greater. Examples of these cables are RG-8A/U and RG-213/U. These cables are almost the same, the 8A having an impedance of 52 ohms and the 213 having an impedance of 50 ohms. Also, RG-58C/U replaces RG-58/U."

"Well", said Pendergast, "I still see a lot of new RG-8/U cable for sale in electronics stores. Is it old stuff, or new cable with the older jacket?"

"Hard to tell", I replied. "RG-8/U is no longer a military approved, MIL-SPEC cable, so it can be anything. For instance, an easy way to reduce the cost of coaxial cable is to reduce the amount of copper in the braid. Some new RG-8 cables have been cheapened to such an extent that if you bend the stuff, the braid spreads, leaving holes in it through which you can see the center insulating material. This is bad, as it allows r.f. leakage at the higher frequencies. This junk costs as much as better cable, but the profit to the manufacturer is higher. RG-213/U and RG-8A/U cables, for example, always have 7 strands in the inner conductor and the weave of the braid is very tight."

"How about the so-called "RG-8/U" *type* cable?", asked Pendergast.

"Well, you have to watch out for RG-8/U cable and also RG-8/U *type* cable. Since the MIL-SPEC control no longer applies, the cable can be altered, or modified, at the desire of the manufacturer. The shielding no longer has to be woven tight and the polyethylene inner dielectric is often omitted in favor of a foamed dielectric. The foamed stuff, in itself is not bad, but unless the foamed material is gas filled, moisture will ooze through the jacket and braid and into the foam. And, as you know, losses go up rapidly when moisture enters the inner dielectric of the cable".

"The moral, then, is to use MIL-SPEC RG-8A/U, RG-213/U or RG-58C/U cables", exclaimed my friend. In the long run, they are cheaper than some of the non-standard brands!"

"That's right", I replied. "The cost of a good coaxial line is a small part of the cost of a modern installation. Why be penny-wise and pound-foolish?"

Pendergast smiled as he said, "I shudder to think of all the junk coax I have bought over the years. Maybe

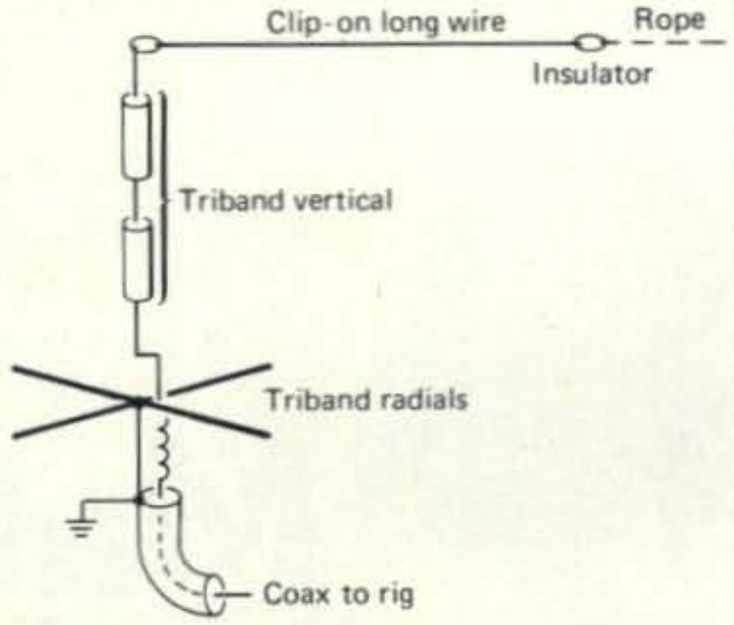


Fig. 3—The 160 meter clip-on antenna of WA2UGO. A triband vertical antenna for 10-15 and 20 meters is the basic antenna. Sufficient wire to make up a quarter wavelength (about 100 feet for 160 meters) is clipped to the top of the vertical antenna for top-band operation. The scheme will work for 80 meters, too, with about 50 feet of wire. The whole antenna can be resonated to frequency with the aid of a dip meter.

that's why I am low man on the totem pole in a DX contest!" He changed the subject abruptly, as if to banish the thought from his mind. "Anything interesting in today's mail?"

"Well, I received a nice note from Gary, WA2UGO. He mentioned that he has used a quick-and-dirty antenna for 160 meter operation and recommends it to the readers of this column. Here's what he has to say. 'My main antenna is an inverted V dipole at about 50 feet. However, I've used a much smaller antenna on occasion with good results. It is a common multiband vertical antenna for 10 thru 80 meters, with 8 radials for those bands. For 160 meter operation, I just clip a wire onto the top of the vertical to make overall length about a quarter-wave at 160 meters (fig. 3). My wire runs horizontally from the top of the vertical to a tree, then zig-zags through the tree and to a second one, until all the length is used up. I suggest using a step ladder to attach the wire, as standing on my XYL's shoulders really got her mad'."

"Is this for real?" asked Pendergast, arching his eyebrows.

"I gues so", I replied. "All except about standing on his XYL".

"A clip-on wire is a good idea", admitted my friend. "This could apply to any multiband vertical. If you have a triband job for 20, 15 and 10 meters, you can clip on extra wire at the top for 40, 80 or 160 meter work. The overall length of vertical plus wire is about a quarter wavelength, but you can zero-in on it exactly, if you wish, by coupling

(Continued on page 72)

Math's Notes

BY IRWIN MATH, WA2NDM

In recent months we have received a number of requests for information pertaining to updating or improving the type of test equipment generally available to amateurs. As a result, in a manner similar to the one we used for receivers, we will present suggestions on this subject from time to time in the months to come.

To start the test equipment discussion we will present several updating suggestions to r.f. generators this month, and hope that you find them helpful.

Most inexpensive r.f. signal generators suffer from a lack of stability, and shielding as compared to commercial gear, particularly at higher frequencies. In order to attempt to minimize drift it is first necessary to stabilize or regulate the B+ voltages on the oscillator and output amplifier stages.

Since these are almost always one or two tubes (or transistors in later equipment) at the most, complete B+ regulation is in order. This can be achieved as shown in fig. 1. This procedure is similar to the procedure outlined in the August 1975 installment of this column where we suggested a similar scheme for low cost receivers.

Briefly, measure the B+, select a VR tube from the chart in fig. I that will fit the bill (use the nearest lower value tube), calculate the resistor parameters and wire the circuit.

In the case of solid state equipment, or for voltages below the 75 volt lower limit for VR tubes, zener diodes will have to be used. The circuitry in this case, fig. 2, is very similar to that of fig. 1 as are the calculations. The extra 2 milliamperes in the formula are to assure zener conduction.

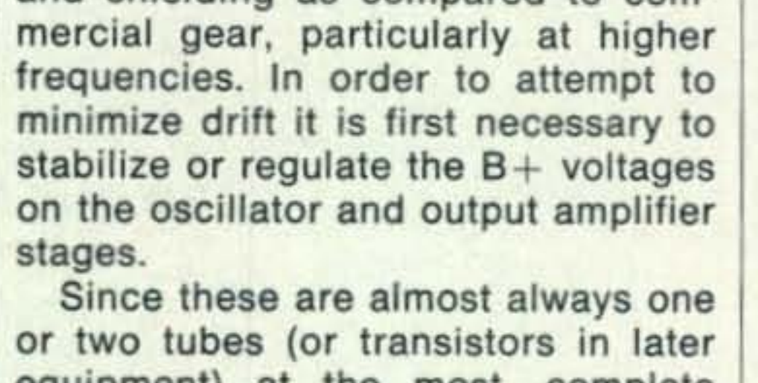
At this point I should add that any of the popular 3 terminal voltage regulators as well as more elaborate voltage regulating systems may also be employed if so desired.

Now that the B+ line has been stabilized, let us look for other areas to improve.

Many amateur projects such as receivers and converters require the use of a sweep generator in addition to a simple signal source to properly align them. Since this type of device is not too common, most amateurs either hap-hazardly tune the device or spend hours rocking the tuning dial of the generator back and forth attempting to obtain some sort of acceptable pass band. Fortunately, addition of a sweep feature is not too difficult as can be seen in fig. 3. This schematic shows (in the dotted lines) a typical r.f. generator and the point at which to connect the sweep circuits.

The sweep circuit consists of a variable capacitance diode connected in parallel with the main tuning capacitor of the generator. The diode is biased at approximately 4 volts by means of a regulated d.c. derived from the filament line which puts it at the center of its capacitance range. A.c. at 60 Hz is then fed to the other side of the diode causing its capacitance to vary at a 60 Hz rate. The amount of variation being proportional to the amount of 60 Hz signal selected by the sweep width control. Since the diode is now a varying capacitance, in parallel with the main tuning capacitance of the generator, the frequency of the generator sweeps back and forth at the 60 Hz rate. Also provided, is the 60 Hz sweep signal through a phase shift network for application to the horizontal input of an oscilloscope.

In constructing this unit be sure to keep the varicap and the two .01 capacitors as close to the main tuning capacitors as possible to prevent losses at higher frequencies. After building the unit and connecting it, it will be necessary to realign the generator as you now will have added additional capacitance to the main tuned circuit. Incidently, if you do not wish to purchase the varicap, you can try using a small signal diode such as the IN914 as a replacement—you may find one that

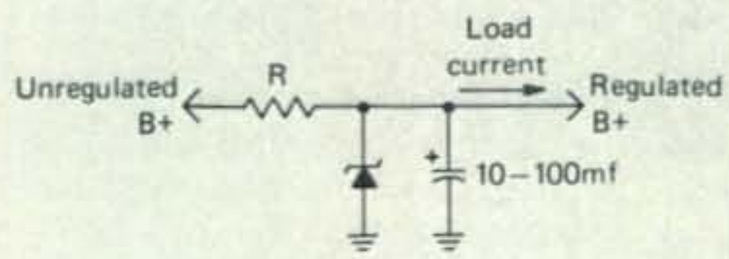


Tube	Voltage	I	Tube type
OA3/VR75	75v.	.04a.	Octal
OB3/VR90	90v.	.04a.	Octal
OC3/VR105	105v.	.04a.	Octal
OD3/VR150	150v.	.04a.	Octal
OA2/6073	150v.	.03a.	7 pin miniature
OB2/6074	108v.	.03a.	7 pin miniature

$$R = \frac{B+ - \text{VR tube voltage}}{I}$$

Wattage of R = 2(B+ – VR tube voltage)I

Fig. 1—A method for using VR tubes to regulate B+. The .01 μf capacitor is used for suppressing the noise generated by these tubes. For negative supplies, simply invert the VR tube and for higher voltages, put them in series.



$$R = \frac{B+ - \text{Zener v.}}{I_{LOAD} + .002 \text{ amps}}$$

Wattage of R = 2(B+ – Zener v.)I_{LOAD}

Wattage of Zener = Zener v. X I_{LOAD}

(Use next higher wattage Zener)

Fig. 2—Using a zener diode to regulate voltage. For negative supplies reverse the connections to the zener and to the capacitor.

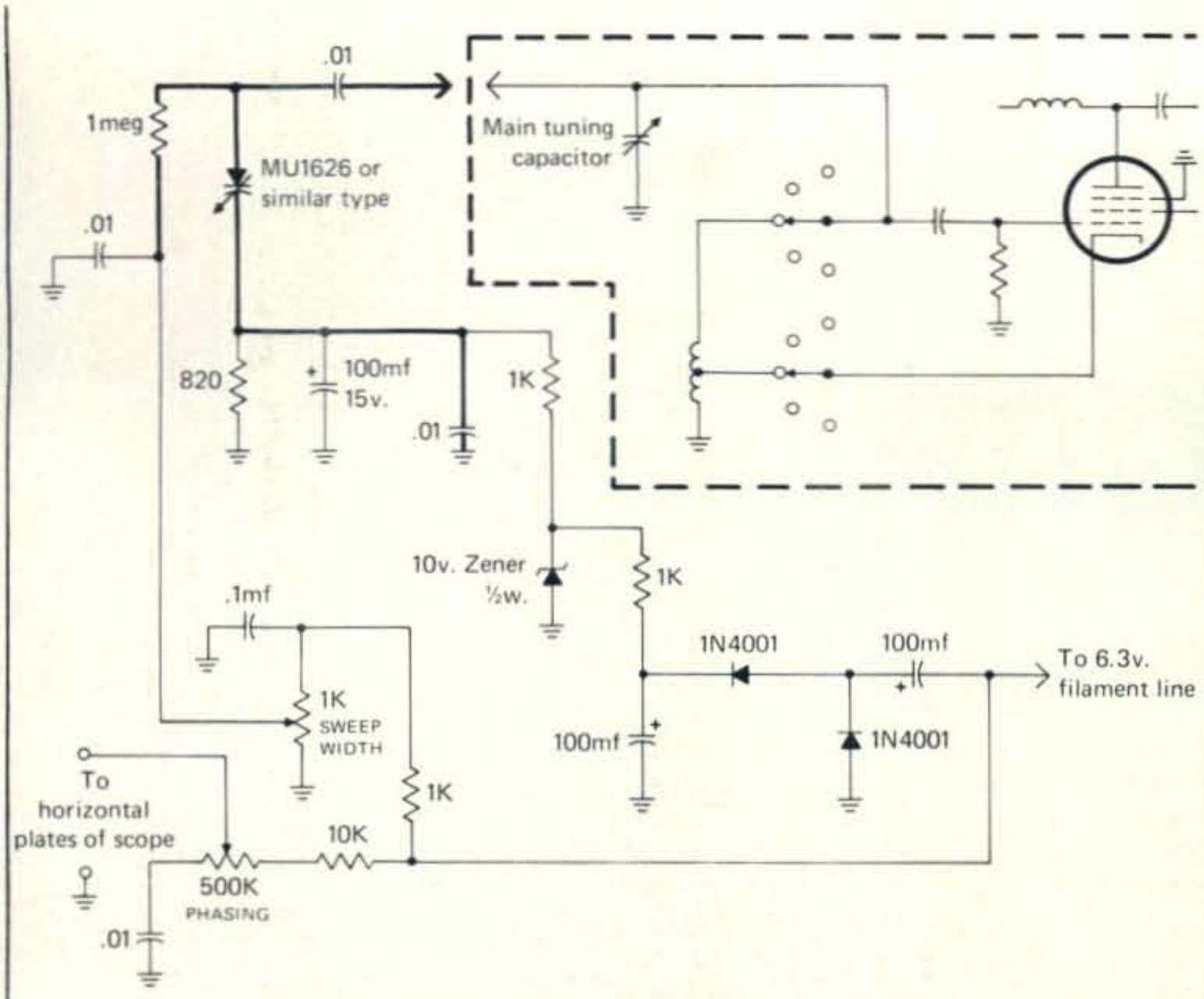


Fig. 3—A sweep addition for signal generators. Note that heavy lines should be as short as possible.

works OK in the circuit.

This sweep addition will not allow sweeping over very wide ranges of frequencies and the amount of sweep will vary with the dial setting but it is a very easy and inexpensive way to achieve this feature in a generator you may already own.

Several other things you might want to do to your signal generator follow:

a) Replace all binding posts, particularly the r.f. output ones with UHF and BNC type coaxial connectors. This will prevent radiation of signals from the posts —which can be a real annoyance when tuning up a sensitive receiver.

b) Bypass both sides of the a.c. line cord where it comes into your generator with .01 μF 600 volt disk ceramic capacitors and be certain to use a 3-wire grounded a.c. line cord. This should prevent any r.f. from going into the power line, being coupled by the line to the device you are testing, and giving false results.

c) Beef up the mounting method of the main tuning capacitor and coils to prevent these parts from moving—even slightly and causing noise, frequency jumps, or microphonics. Also you might want to change the main tuning knob to the largest one you can find that will still allow the dial to be seen. This will do amazing things toward easing the stability of the generator particularly at higher frequencies.

d) Finally, if your generator is not in a metal, grounded case, be certain you coat the entire inside with aluminum foil and somehow ground the foil to the chassis. If your generator is not adequately shielded you will never be able to do any small signal work.

While the preceding was certainly not revolutionary or earth shaking, making the outlined changes in an r.f. generator will result in a piece of test equipment that will at least do a possible job for its owner.

73, Irwin, WA2NDM

ADRIAN WEISS, K8EEG, ON

QRP

This month, let's continue the discussion of the December, 1975, column about homebrew design and construction of solid state transmitters. In a sense, we're moving into some "thin-ice" on this subject because it doesn't readily lend itself, at least with respect to reporting "failures", to discursive presentation. Most published designs present only a finished product—without comment on the "trial and error" steps that were necessary to put the transmitter in operating condition. This is unfortunate, because such commentary can be a great benefit to all homebrewers (except the really advanced type) who stumble through the debugging and peaking of a homebrew rig oftentimes faced with problems for which they have no solution—other than to start tinkering with the "trial and error" approach in search of a solution. More information on successful *and* unsuccessful debugging attempts and approaches can be extremely helpful to the typical homebrewer. A few articles have gone into specifics in this respect, and are recommended reading for the homebrewer interested in solid state transmitters.[1] Actually, it is sometimes quite difficult to write about the trials and errors encountered in debugging a rig and make any sense out of it. At times, variables unknown to the experimenter are at the basis of a given problem, and he just "lucks out" in solving the problem. And again, changing one part of a circuit can eliminate a variable in a related circuit which is the actual source of the problem— in which case, attributing success to the changed part would not be absolutely correct as the solution. At any rate, let's have a crack at it, and if any of you readers can contribute instances and explanations of debugging successes, we'll be more than grateful to add them to a future column. First, some positive general suggestions.

[1] *D. DeMaw, "How to tame a Solid State Transmitter," QST, November, 1971, 29; W. Hayward, "Increased Power for the Solid State Transmitter," QST, May, 1972, 19; A. Weiss, "Design Notes on a Moderate Power Solid State Transmitter for 1.8MHz," CQ, November, 1972, 18; D. DeMaw, "More Basics on Solid State Transmitter Design," QST, November, 1974, 22. See also points in the QRPp Columns for March-May 1975.*

Homebrewing Technique

Only a foolhardy experimenter goes from paper design directly to the finished p.c. board in one step! Inevitably, it is necessary to "breadboard" the paper design first in order to see if it works at all, and then to fiddle with it in the process of cleaning up and peaking the signal developed by the circuit. The move from breadboard to final p.c. board is a last step, and it oftentimes introduces variables into the operation of the circuit which were not present in the breadboard version. These variables are usually related to the p.c. board's elimination of such things as stray inductive and capacitive coupling due to long "haywire" leads, changes in component positions, ground points, and r.f. loops, and other factors.

In order to minimize the impact of the breadboard-to-p.c. board step on the operation of a circuit, a very wise practice is to make the two versions as nearly alike as possible. This is usually impossible with point-to-point breadboarding. A better approach is to use breadboards constructed from double-sided p.c. stock: one side is converted into a "checkerboard" of "isolated foil pads" by drawing the blade of a hacksaw across the boards—components are soldered to the isolated pads; the underside foil is left intact and serves as a ground foil. Fig. 1 shows the strategy and appearance of such a breadboard, which is simplicity itself. One-quarter inch pads are usually adequate for component leads in common connection,

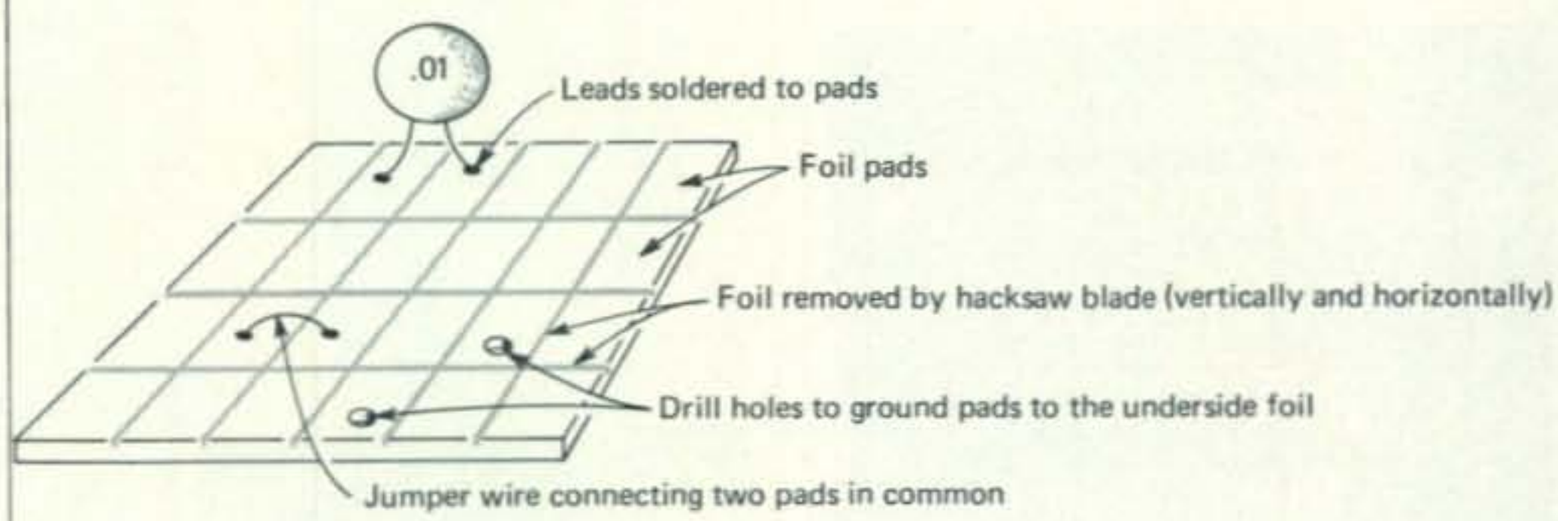


Fig. 1—"Breadboard" from double-sided p.c. board stock. The foil is removed in a criss-cross pattern by using a sharp hacksaw blade drawn carefully across the foil. Start the cut at one edge and gradually extend the cut across the width or length of the board. To ground the pads to the underside foil, drill holes through the top and bottom foil, pass short bare wire through the hole, and solder to both sides. The underside foil is left intact.

(Continued on page 72)

In Focus

BY BILL DEWITT, W2DD

The Dayton Hamvention Reservations Committee is repeating its outstanding job of getting amateurs with similar interests booked into the same motels. As of January, the Committee was flooded with a downright deluge of requests for space at the La Quinta Motel where SSTV-minded amateurs are gathering for the April 23, 24, 25 hambash.

The strong spirit of camaraderie among slow scanners is evidenced by the fact that their reservations led all others, according to the committee.

Dayton has become a MUST! The Friday night Seminars and Saturday SSTV Forums of the last few years have provided benchmarks in the history of slow scan developments. This year's program promises more of the same.

At this writing, Dr. Robert Suding's "WØLMD Super System" has not been described in any detail—but you can count on seeing it in action at Dayton. Dr. Don Miller, W9NTP, will be reporting on a scan converter using RAMs in addition to his work on color and motion SSTV. Dr. George R. Steber, WB9LVI, just informed me on the "wireless" that there will be a triple-header presentation covering all aspects of the scan converted he designed (*QST*, March and May, 1975). Tony Pessiki, W3GKW, and Ed Arvonio, W3LY, will round out the WB9LVI discussion with a review of the design, fabrication, and de-bugging of the PC boards for George's design. If you are thinking scan conversion, don't miss this forum!

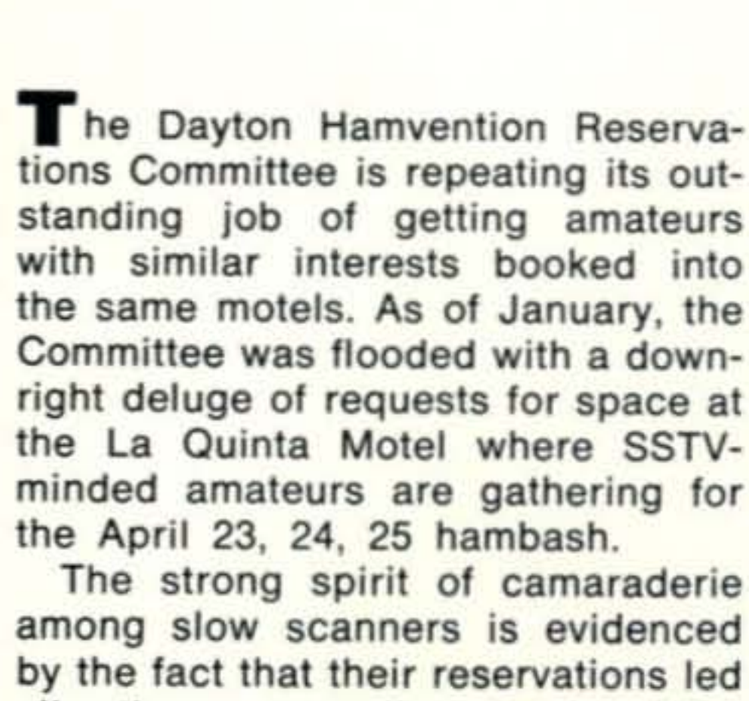


Fig. 1—Multi-path effects on a 128 Line Frame.

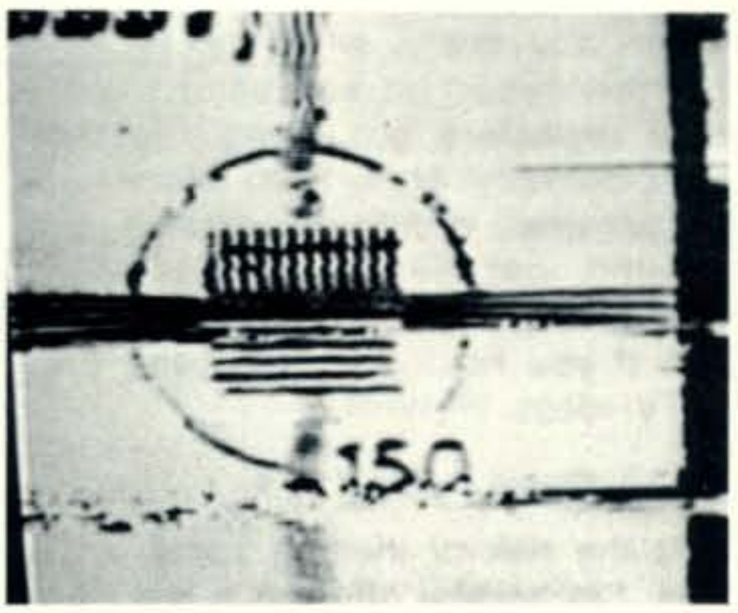


Fig. 2—Multi-path effects on a 256 Line Frame.

Mirror, Mirror, How Many Lines Have I?

The advent of the Robot Model 300 Scan Converter with its selectable 128/256 line capability has triggered a round of "Mods" like you wouldn't believe, to coin a phrase. I think Joe Hawkins must have a side interest in a solder factory. In any event, it seems that everyone is converting something to 256 lines, P-7 homebrew, keyboards, cameras, LMD scan converters are all suffering the indignity of having a switch, Xity thousand puffs, and a resistor or two added here and there.

Dr. Jim Thomas, WB4HCV, tells me that his new HCV-2CS CCD type scan converter is still headed for the market, and yes, it will have 256 line receive and (transmit) playback capability in addition to the usual 128.

Robot is currently offering a 256 line mod kit for their earlier monitors. I presume that by the time you read this column they will also offer a Model 80 series camera mod too. Dr. Thomas has sent out details on the 256 line mod for the SEEC keyboard to all warranty holders.

256 Line Frames Versus Multi-Path

In addition to improved definition, the 256 line mode sometimes offers a considerable reduction in multi-path effects. During the past few weeks, Phil Howlett, WA9UHV, and yours truly have taped a number of 128/256 comparisons on the 40 and 80 meter bands. The results of our tests can be summarized as follows: The use of a 256 line 34 second frame is not a panacea to eliminate all multi-path effects. However, under MOST multi-path conditions, the 256 line mode will produce a better picture (freer of multi-path defects) than the 128 line mode. Multi-path defects are generally randomly distributed throughout a 128 line picture. In a 256 line picture multi-path disturbances are most apt to affect entire single lines. These comments are illustrated by the photos of fig. 1, 2, and 3, representing frames recorded by WA9UHV under severe multi-path conditions.

Why does the 256 line mode effect an improvement? I believe that the

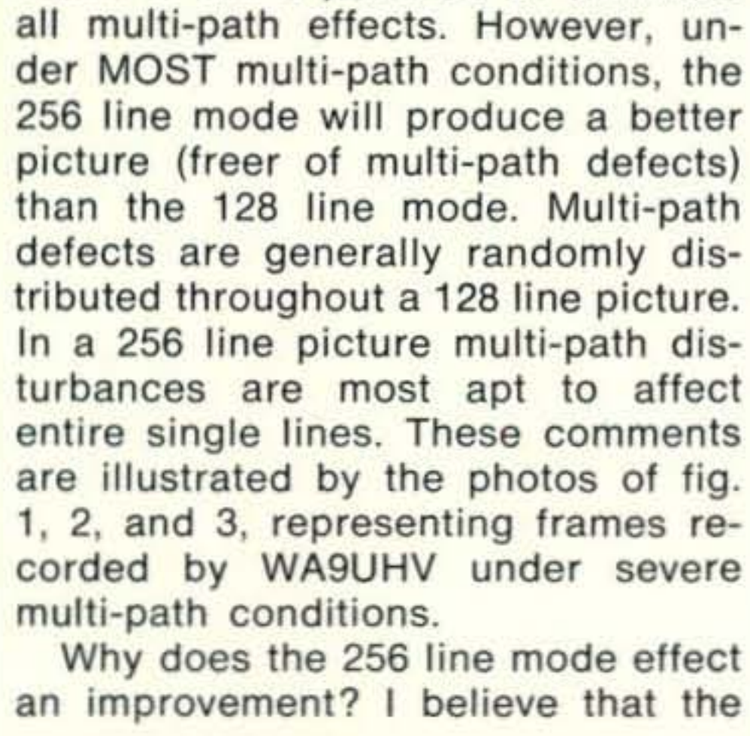


Fig. 3—256 line frame relatively free of multi-path effects.

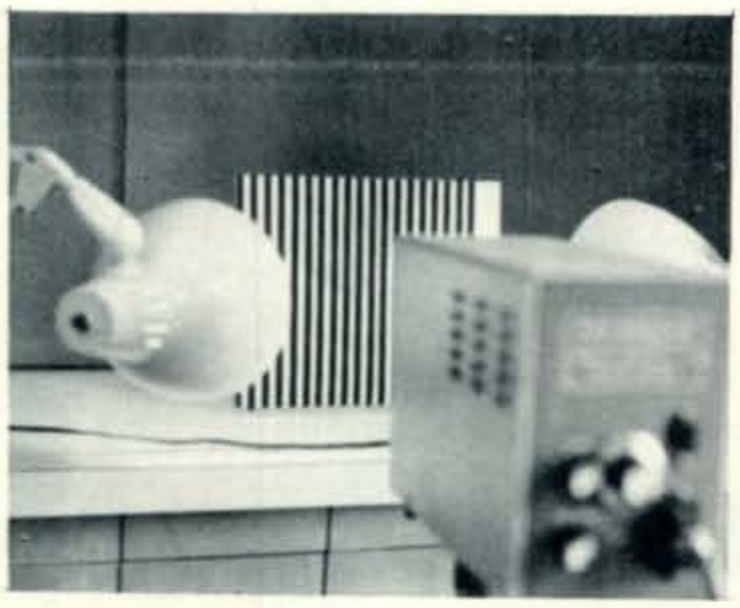


Fig. 4—Bar Chart set up for camera adjustments.

reason for the lesser susceptibility of the 256 line frames to this kind of defect is directly related to the time interval between the "wanted" and "ghost" information and the line rate of picture transmission. If we assume 128 pixels per 66 millisec. line (128 mode) and 256 pixels per 133 millisec. line (256 mode), then the pixel rate is the same for both modes. So, that's not an answer. However, if we assume a say, 6.6 millisec. disruption to occur with either line rate, it will represent a 10 percent disturbance in the 128 case, versus a 5 percent in the 256 case. Also, considering the total pixels per frame, we have 16384 with 128 lines versus 65536 with 256 lines. Since multi-path effects are sporadic and the picture information is continuous, it can be theorized that multi-path disturbances will have much less effect on the 256 line format.

So what do we do about 128 versus 256? The choice of the 128 or 256 line mode is dependent upon many factors calling for some judgment. Grinding out 256 line video CQs for minutes at a time seems a bit unnecessary. Anyone with 256 line capability has seen pictures of excellent quality. Seems like a good rule of thumb would be that if you *need* the added resolution, *use* it. It's also a good idea to consider the other fellow in your QSO. If he's using a P-7 monitor, don't lay a 34 second frame on him without asking him FIRST! Looks like 256 is here to stay, let's make good use of it.

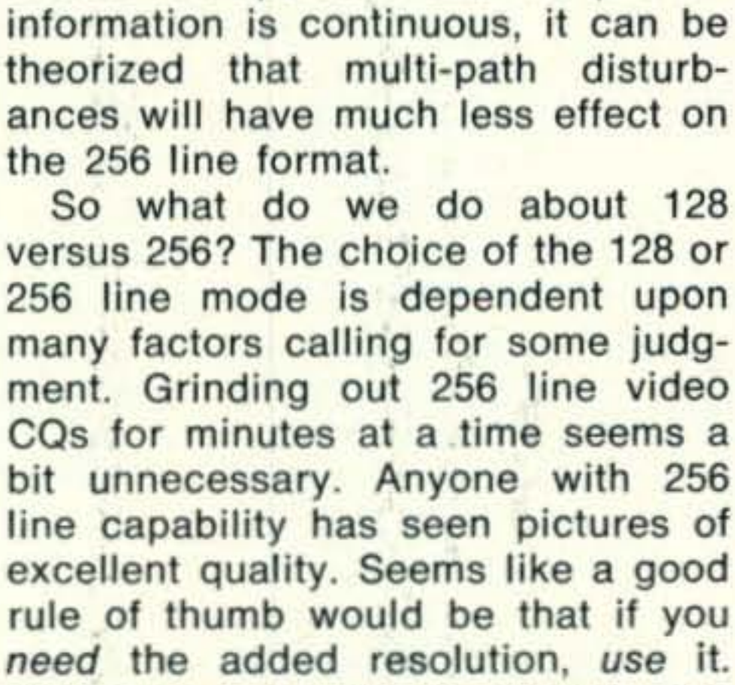


Fig. 5—Scope pattern resulting from bar chart.

STA In Kansas

Last Fall, the FCC granted a Special Temporary Authority to a group of Kansas amateurs eager to test the use of Wideband (16 kHz.) FM-SSTV transmissions in the 146 to 148 MHz. frequency range.

The purpose of the STA was to determine the compatibility of wideband f.m.-SSTV transmissions with existing amateur f.m. activities and to test for possible interference to other radio services.

According to a recent letter from Bill Briles, WØOQC, of Derby, Ks., activity under the STA has been substantial. Contacts between WØOQC and Al Goddard Jr., WØOF, about 135 miles away, are generally of closed circuit quality.

The STA for this activity will expire on April 30th, unless renewed, but in any event, we hope to have a further report on wideband and the local repeaters got along together!

Incidentally, Multi-2000 users have an optional wideband receive and transmit capability—in addition to s.s.b. But don't forget to request an STA if you have any wideband f.m.-SSTV ideas in mind.

A Sub-Band For SSTV?

At the risk of inviting some brickbats, I'm hereby offering a few comments pro and con related to the possibility of SSTV sub-bands within the h.f. bands.

On the plus side, it would seem that allocation of a segment for the exclusive use of specialized transmission techniques such as Fax, RTTY, and SSTV picture transmissions, would offer encouragement to those interested in state of the art technology. Under the present situation, new and more efficient communications techniques survive if they can be merged with the older predominating systems. Now I'd hate to be without voice communication, be it a.m., f.m., or s.s.b.—and I enjoy c.w., so don't get the idea that I want to do away with them! BUT, can't we do something *positive* about frequencies for the other modes of communication?

On the minus side, one must consider that although SSTV is growing at a very fast clip, it is still only a small proportion of the total amateur operation. In addition, much of the QRM experienced in SSTV contacts is caused by our collective stubborn determination to operate on essentially one frequency in each of the h.f. bands. It would help enormously if more than a few slow scanners were willing to S-P-R-E-A-D O-U-T over a broader segment of the bands.

Your constructive comments on this fascinating subject will be most welcome, but *please* observe Ground Rule One: What we are talking about is frequencies for SSTV picture transmissions, *not* voice-SSTV-talk-talk.

Singles Bars On SSTV?

Sorry, I had to get your attention. A simple easy-to-make tool for slow scanners is a bar chart like the one shown in fig. 4. This chart can be used to set your SSTV camera brightness and contrast controls for maximum swing. It can also be used to set the FM Deviation controls of the Robot Model 300 for maximum swing, and as an added bonus, it can be used for quick focusing of the camera when the subject is flat copy at close range. I suppose that this chart should have a more elegant name, maybe "Bi-level Multi-burst." I just call it my "Bar Chart."

Fig. 6—I5FLN and his wife enjoying an evening on the town.

Making The Chart

The chart is made by sticking strips of black tape about ¼ inch wide on a letter size piece of *white* paper. Use spacing equal to the tape width. For ease of use, lay down about 15 or 20 black strips. This will make the chart big enough so you don't have to position it exactly.

Adjusting An SSTV Camera For Maximum Swing

To check the swing (frequency excursion resulting from a given variation in subject brightness) of your SSTV camera, place the camera at a distance that will present about 15/18 bars on the monitor screen. Count both black and white bars. Position vertically.

Connect a scope to the video output point on the monitor. (Aux. Video jack on the SEEC and Robot Monitors.) Make sure that the chart is fairly evenly illuminated.

Adjust the lens aperture to a known reasonable setting for the level of illumination. Now, watching the scope, adjust the horizontal sweep rate for a steady display. Then adjust the vertical and horizontal gains as necessary to get a pattern like that shown in fig. 5.

At this point, the camera controls for brightness and contrast can be adjusted for maximum swing as indicated by the difference in height between the scope images representing the black and white bars of the chart.

The advantage of this kind of chart over a handy snapshot or magazine photo is that the repeating pattern of the chart makes it much easier to see what is happening when adjustments are made. The inter-relationship of the brightness and contrast controls does present a problem. Use of the chart makes optimization of these adjustments more of a quantitative measurement.

Adjusting The Robot Model 300 F.M. Deviation Controls

The quality of off-the-air playbacks and tapes made with the Robot Model 300 is excellent when the image storage is made at the correct level and the F.M. Deviation Controls are set to produce a good brightness variation in the slow scan video generated by the storage tube. Model 300 users who wonder how they're doing in this respect can quickly check their settings with the bar chart.

The same instructions apply in general so far as Model 300 users are concerned. However, one must assume that the Snatch Balance and Span are correctly set.

Using the Aux. Video output, the scope can be used to set the F.M. Deviation Balance and Span controls for maximum swing as the SSTV frame is produced after each frame grab. Don't forget to grab a new frame after each control adjustment. The Transmit switch should of course be in the Video position.

On The Subjective Side

Recognizing the wide variety of subjects being televised, the range of monitor brightness and contrast variations existing (among both slow and fast scan monitors!), the ambient lighting conditions prevailing, etc., etc., I do not presume to tell everyone how to set his camera or mon-

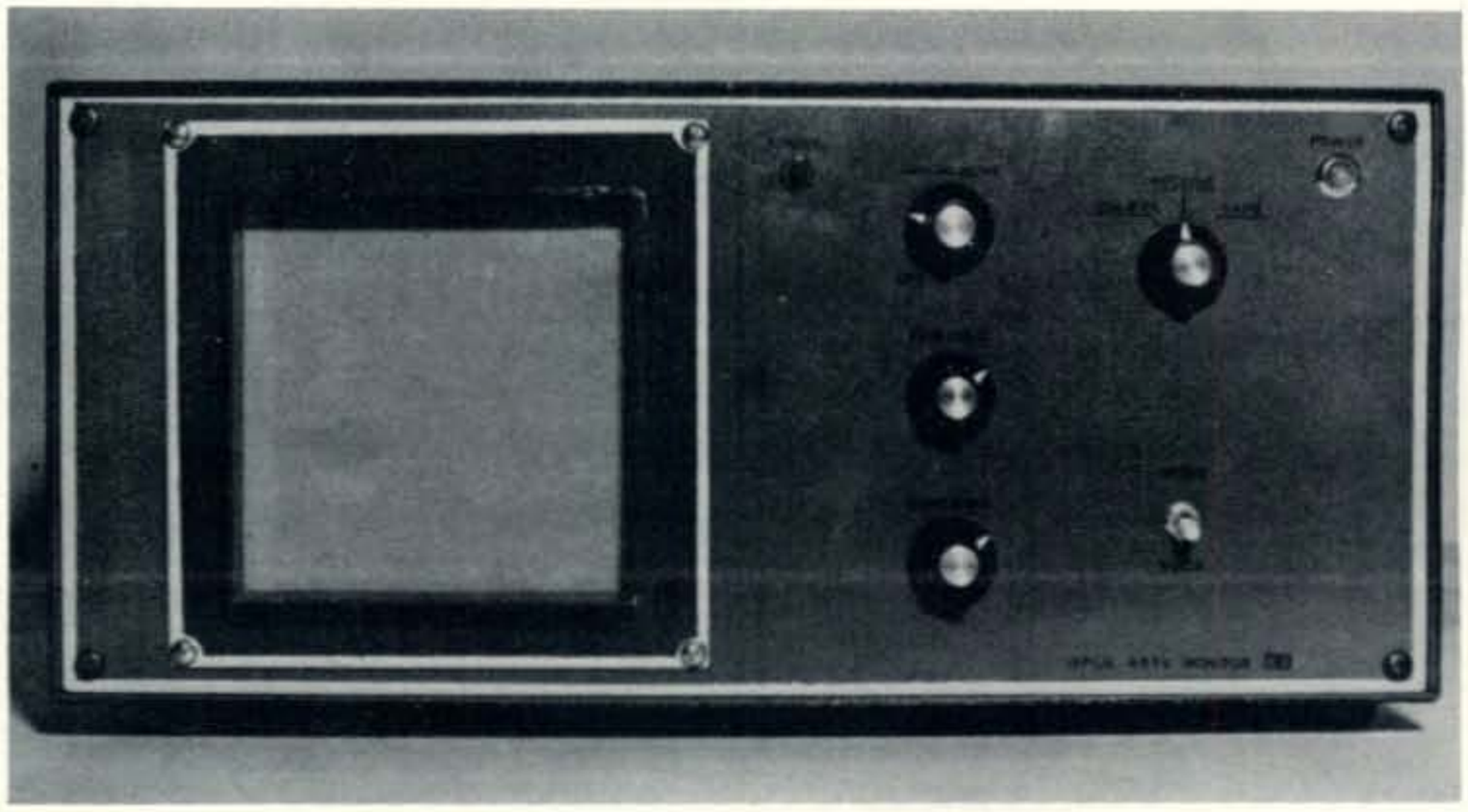


Fig. 7—SSTV monitor designed and built by I5FLN.

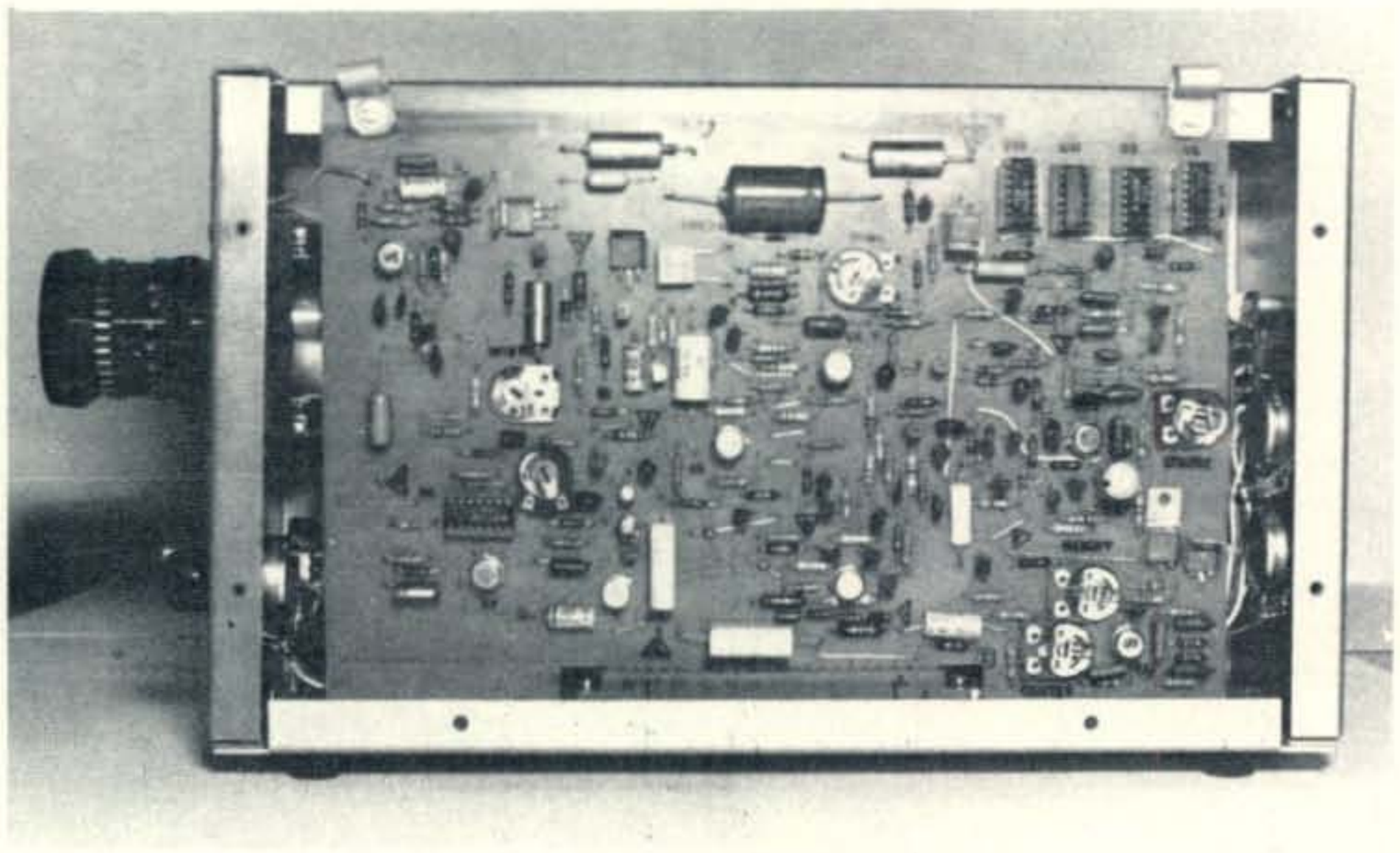


Fig. 8—Interior view of I5FLN's SSTV camera.

Fig. 9—I5FLN's transmitter with Drake v.f.o.

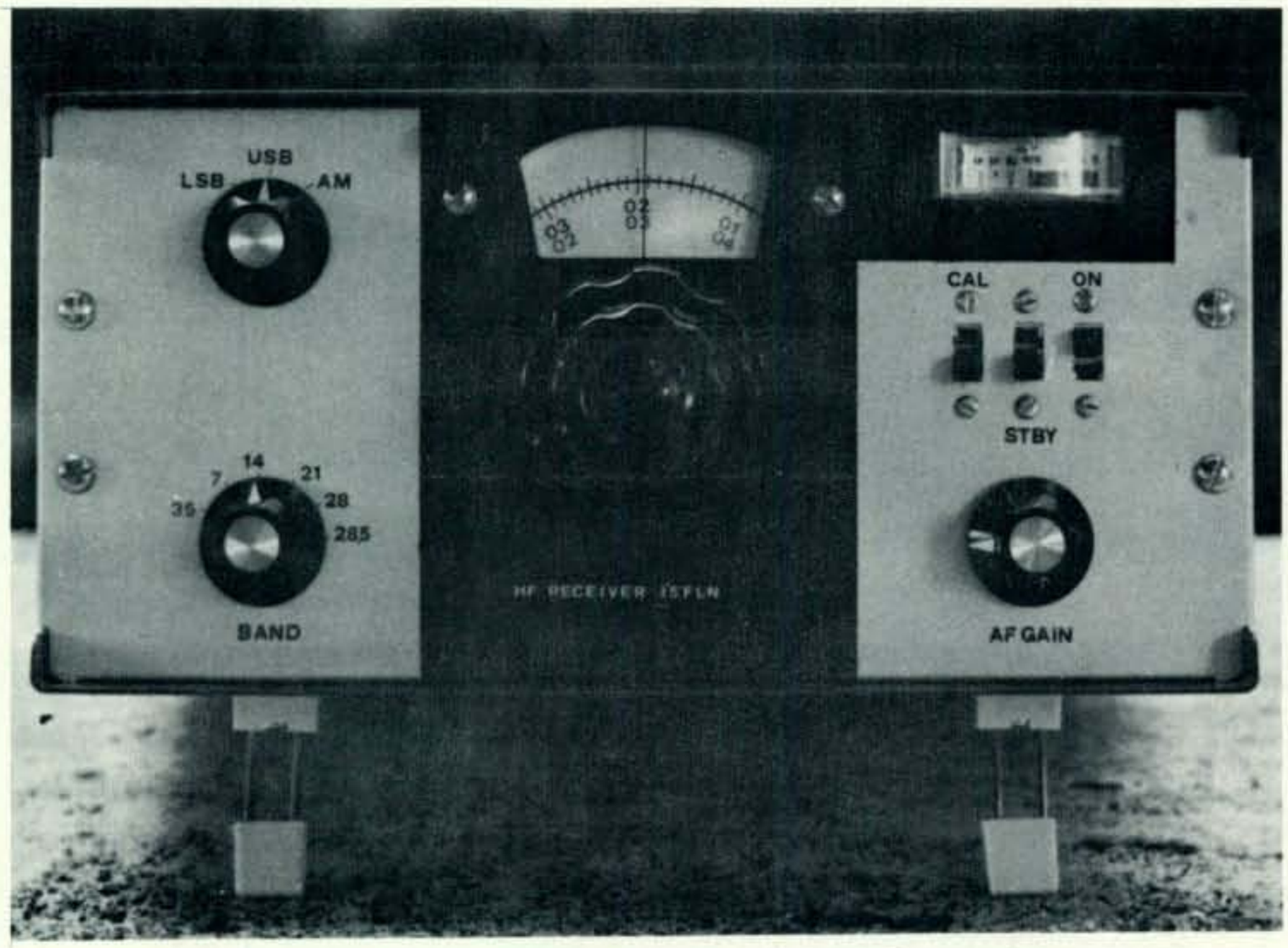


Fig. 10—I5FLN's receiver before addition of Drake v.f.o.

itor. However, if you do make up a chart and find it useful in this respect, please let me know.

Focusing With The Bar Chart

To use the chart for focusing with a P-7 monitor and SSTV camera, simply drop the chart in place over your flat copy subject, open the lens diaphragm all the way, and adjust the focus for the brightest image and narrowest width of the bars on the monitor screen. After focusing, reset the lens aperture to the correct value. If your scope is connected to the monitor, just focus for maximum amplitude of the bar pattern signal.

News And Pictures From Europe

Luciano Fusari, I5FLN, of Florence, Italy must be one of the most prolific designers and builders of amateur gear in the world. Luciano is an Italian Air Force Captain. His attractive blonde wife is a Doctor of Biology working in Medical Laboratory Analysis. They are shown relaxing a bit in fig. 6. The collection of equipment photographs shown in figs. 7 through 11 attest to Luciano's talent for designing and building. His receiver design was the subject of a recent magazine article (*HR*, Oct. 1975).

Luciano even designed the circuit boards for his camera and monitor. W6ATC helped him with some ICs and deflection coils, but just about everything is homemade. (He used a Drake v.f.o. in the transmitter and receiver. As you can see from the photos, when Luciano finishes a project, he has a useable piece of equipment in an attractive enclosure.

If you think you're seeing quite a few Italian SSTV stations on the air, you're right. Luciano reports that there are about 250 SSTV stations active in Italy! There are six in Florence. There are three Italian manufacturers of SSTV kits, one other making a Fast/Slow scan converter. *Very interesting!*

Luciano's interests extend beyond SSTV. On Nov. 23, 1975, he and three other Italian amateurs made the first Italy/USA EME contact with K2UYH.

Thanks to Luciano for the interesting letter and pictures. Congratulations on his many achievements!

How many non-amateur SSTV viewers do you suppose there are around the globe? I know of three. Judd Bodycote, K4QPR, of Sarasota, Florida, recently called my attention

Fig. 12—Dieter Berndt, slow scan TV viewer of Weisbaden, Germany.

to Dieter Berndt, of Wiesbaden, Germany. The picture of Dieter shown in fig. 12 was sent to me via SSTV by Judd. It originated in a tape mailed to Judd by Dieter who has both a camera and a monitor. (He also has RTTY equipment!)

Just in case Dieter's puzzled about how his name appeared at the bottom of the picture, I confess to a little maneuvering with a couple of frames—with the Model 300.

I keep wondering why Dieter isn't an amateur. Come on Dieter, take the exam and join us on the air!

Final-Final

Hope to see you-all at Dayton. Please keep those letters and pictures coming.

73, Bill, W2DD

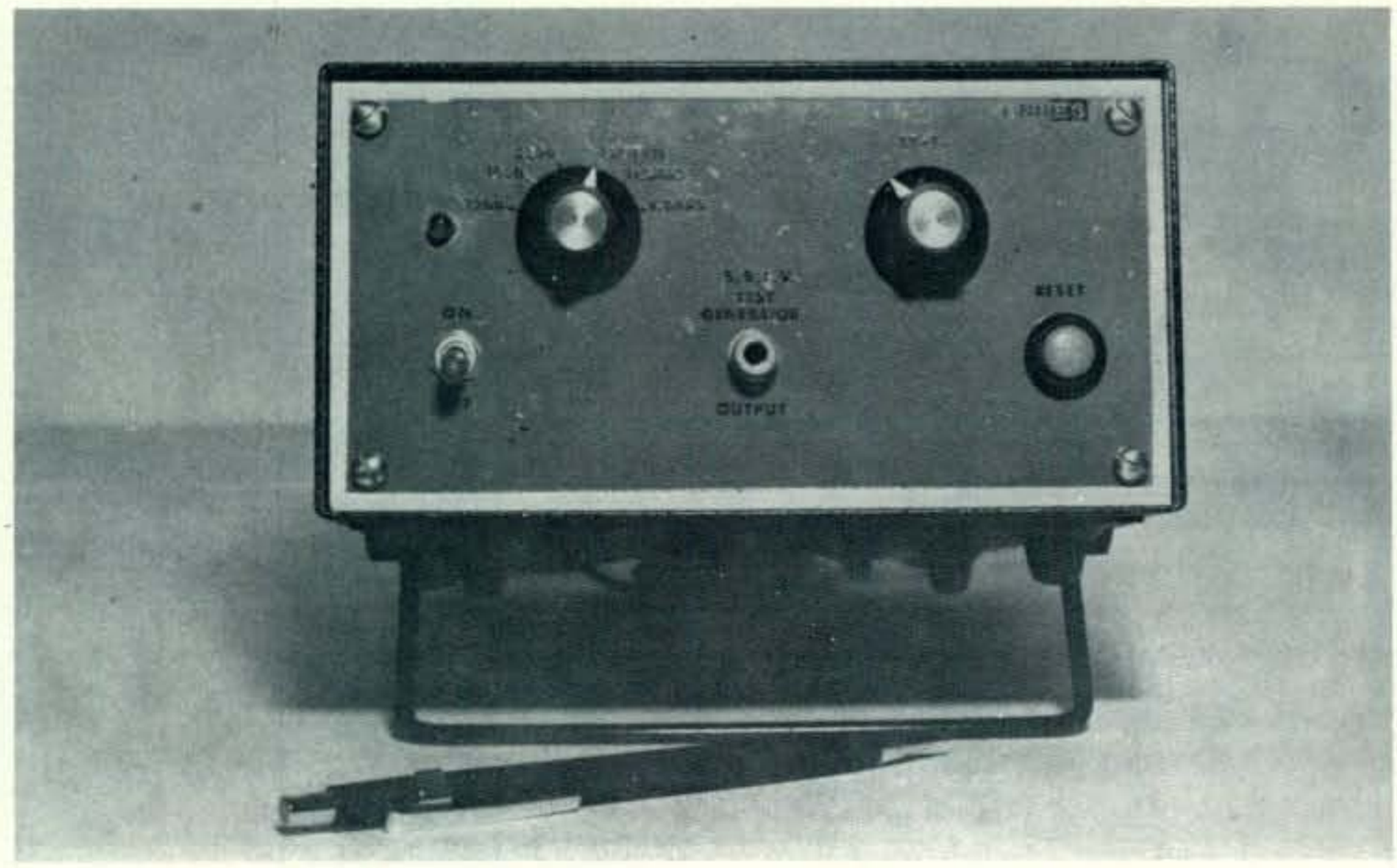


Fig. 11—SSTV test generator built by I5FLN.

Novice

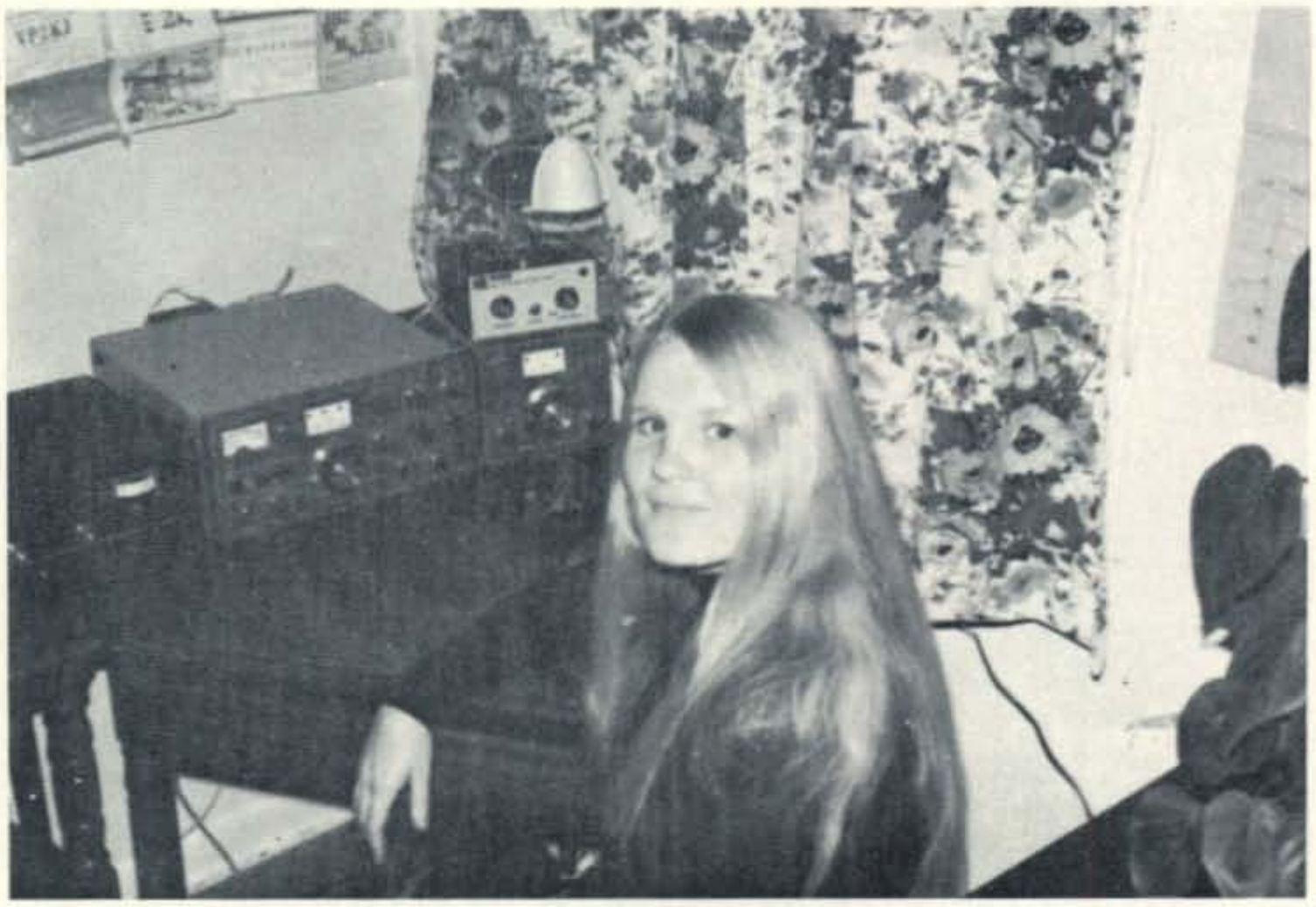
BY HERBERT S. BRIER, W9EGQ

How often does it happen that suddenly you cannot make a contact although everyone around you is working everything under the sun and the moon? You call and call, you retune your transmitter, you check its power output and the feed-line s.w.r. on the s.w.r. bridge, you make sure that your antenna has not fallen down, and you call some more. Finally, you make a contact and get an excellent signal report! Don't fret. It happens to all of us from new Novices to hoary old timers. The big question is why?

One explanation is that the law of averages is just catching up to you, compensating for the times when every call you make results in a contact. There is much more to it than pure chance, however. The height of your antenna, your operating frequency, the time of the day, and the heights of the *E* and *F* layers of the *ionosphere* are among the other important factors involved. From long experience, we know that high-frequency radio signals striking the *ionosphere*—the electrified region between 110 and 330 km (65 and 190 miles) above the surface of the earth—are reflected back to the earth up 2500 miles from the transmitting antenna. The distance depending upon the angle at which the signals strike the *ionosphere.* This angle depends, in turn, on the height of the antenna above the ground. (The efficiency of the *ionosphere* as a reflector of the radio-frequency waves depends on how heavily it is bombarded by ultraviolet radiations from the sun. But that is another story.)

By measuring their angle of arrival, it has been found that 7 MHz signals from distances approximately 3000 miles away arrive at angles between 10 and 35 degrees above the horizon 99 per cent of the time, and the median angle is 22 degrees. On 14 MHz, the limits are between six and 17 degrees, and the median angle is 11 degrees. On 21 and 28 MHz, the arrival angles are generally accepted as being between three and 15 degrees, with a median angle of nine degrees. By calculation or consultation of antenna-height graphs in antenna handbooks, these median angles translate to a height of 85-90 feet as being optimum for a horizontal DX antenna for the amateur frequencies between seven and 29.7 MHz. The same height works excellently on the 3.5-MHz band, too. Fortunately for most of us, much lower heights work almost as well under many conditions.

Some years ago, we conducted our own informal survey of the best height for amateur antennas by asking every operator we worked on the 14, 21, and 28 MHz bands who had a 100-foot crank-up tower, "If the raising and lowering mechanism of your tower jammed, which height would you prefer?" All answers were between 65 and 70 feet. The operators agreed that sometimes a height of up to 90 feet was a little better, but going from 90 feet to 100 feet was a waste of time. They also agreed that a height down to 50 feet was often as good as 70 feet. Finally, they all agreed that antenna performance decreased at heights below 50 feet. At the time, I thought myself very



Judy Regennitter, WNØPMA/4, 6417 Milford Rd., Fayetteville, N.C. 28303, works mostly on 15 meters with a Kenwood TS-520 transceiver and a 3-element monobander beam. She has 30 countries and 20 states worked and is surprised at the small number of Novices that work the band. Judy is a "retired" school teacher of 27 from Iowa. Her OM, Fred, WAØHFW/4, is a dentist in the army. Judy just got her 15 w.p.m. code proficiency certificate from W1AW and will soon take her General class exam. We are sending WNØPMA/4 a 1-year subscription to CQ for sending this winning picture in our Monthly Photo Contest. If you want to try your luck, send a clear picture, preferrably black and white, with some details of your radio career to Novice Shack Photo Contest, c/o Herbert S. Brier, W9EGQ, 409 S. 14th St., Shesterton, Ind. 46304. Suitable non-winners will also be published as space permits.

Dan Altenberger, WN9QYS, when the picture was taken shortly after he has passed his General Exam, is Dan Hoover, W9VEY's 100th student in amateur radio. Dan the student is showing Dan the maestro his new Drake TR-4C transceiver before they continued working on the Advanced class theory.

fortunate to have a 3-element beam, 45 feet high in the back yard and a 130-foot dipole center fed with an open-wire transmission line through an antenna coupler nestled 30 feet from the ground over the house and between two higher buildings.

For almost a year, I met a 14 MHz net starting at 10:00 a.m., CST, five days a week. The net control station was in El Paso, Texas, approximately 1200 miles away. Day after day, signals to and from the NCS were "solid," and I also worked other net members in all parts of the country with strong signals well into the afternoon. But, if the net lasted that long, shortly after 4:00 p.m., my signal would fade out in El Paso, and the only U.S. stations I could work were "5s" and "7s" between 850 and 1000 miles away, and they were not too plentiful. But I could work South Americans without too much difficulty. These conditions usually lasted for an hour or so until the westcoast signals took over the band.

An analysis of the above paragraph might help you visualize what happens to your signal when conditions change. Forty-five feet is approximately ¾ wavelengths at 14 MHz. An antenna ¾-wavelengths high radiates its best signals around 20 degrees and 90 degrees above the horizon. The latter signal is unimportant in high-frequency work, unless you are working aircraft directly overhead; however a 20-degree signal striking the *E* layer of the *ionosphere* will be bounced back to the earth approximately 350 miles from the antenna. When reflected from the *F* layer the bounce will be approximately 900 miles. Probably my signal was arriving in El Paso via three or four reflections between the *E* layer and the earth until the layer weakened as the sun began to set. At that time, the *F* layer took over in 900-mile hops. One hop was too short to reach El Paso, two were too great, and the antenna was not radiating enough eight-degree energy to make the trip in one 1200-mile hop.

The 130-foot dipole worked well for North American contacts on all bands up to 29.7 MHz—not as well as the beam on 14 MHz, of course—and fairly well on DX. But it was usually a struggle to work stations beyond 2000 miles on 7 MHz. In fact, it was usually easier to work DX on 3.5 MHz than on 7 MHz. Later, I raised the center of the antenna to a height of 50 feet. The increased height improved DX results on all bands but did not improve daytime results on 3.5 and 7 MHz appreciably, which was satisfactory anyway. Before raising the center of the dipole, an almost-vertical, centerfed antenna was tested for a couple of weeks. At least 90 per cent of the time, the horizontal antenna outperformed the vertical antenna. The poor performance of the latter was probably because it was surrounded by tall buildings and utility wires rather than because it was vertical.

Jim, K9RUH, who lived in a flat-roofed apartment building a block away, had just the opposite results. He had mediocre results from a horizontal antenna 45 feet above the ground, but only a few feet above the roof of the building. But he worked rings around me on 7 and 21 MHz with a Hy-Gain 14-AVQ vertical antenna mounted a foot above the roof. In addition, it held its own with my beam on 14 MHz up to distances of 3000 miles. The vertical began speaking with authority after he installed four separate, ¼-wavelength conductors extending radially around the base of the antenna for a "ground plane" on each band. As W6SAI has emphasized in his "Antennas" column several times, the results from a vertical antenna depend largely on how good a ground system can be achieved.

WB9GLQ
Bicentennial Year Awards

WB9GLQ has announced three bicentennial year awards that may be of interest to Novice Shack readers. They are the "American Bicentennial Activities Award" (ABA), the "Bicentennial Prefix Award" (BPX), and the American Bicentennial Districts Award" (ABD). Common rules applying to each award are: All amateurs and amateur clubs are eligible for them. U.S. entrants must use their special Bicentennial year prefixes. (See Novice Shack, December, 1975.) A copy of log entries covering the claimed contacts must be submitted with applications for the ABA and BPX awards, and the QSL cards must be in the applicant's possession. QSL cards must be submitted with ABD applications. U.S. applicants must include $1.00, cash, check, or money order to cover cost and postage. Foreign applicants send seven International Postal Reply coupons. Any profit will be donated to the American Radio Relay League, Inc. Specific requirements are: ABA—Work and confirm the 50 U.S. states. BPX—Work and confirm a minimum of 40 bicentennial prefixes. ABD — Submit cards confirming contacts with the 10 U.S. call areas between 0500 UCT, January 1, 1976, and 0500 UCT, January 1, 1977. QSL cards will be returned promptly. Send evidence, instructions on how the award is to be made out, and questions to: Bicentennial Awards, P.O. Box 981, Oakbrook, Il 60521.

(Continued on page 74)

JOHN A. ATTAWAY, K4IIF, ON

DX

Remember the DXers friend, the old 15¢ International Reply Coupon (IRC) which could be redeemed for a 13¢ stamp. He died just a few short years ago and the final nail has just been hammered in his coffin with an increase in the IRC price to 42¢. The redemption value of the IRC is 18¢, because the first class letter rate has temporarily been held to that figure.

The first jump in the cost of a reply coupon was from 15 to 22¢, but before they could be used the postoffice was stamping over them with a new price—26¢. Now, the postal service's Bicentennial present to the country's DXers is a quantum jump to 42¢ for *one* IRC. Where the differential between the cost and the redemption value of an IRC was once a mere 2¢, it is now an astronomical 24¢.

For you new DXers in the audience, an IRC and a self-addressed, stamped envelope (s.a.s.e.) will (hopefully) bring you a QSL card from a DX station by *surface* mail. However, from distant countries this process can take a couple of months each way which is less than satisfactory to many DXers who prefer air mail return which can take from 2 to 8 IRCs depending on the location and postal regulations of the particular country. From most countries in Europe, 2 IRCs will post an air mail return. Exceptions are Bulgaria and Romania which require 3 coupons and Albania which requires 4. Central and South American countries vary widely from 2 to as many as 5 coupons, while most African, Asian and Oceanic countries need 4 or 5 coupons. The highest requirement is 8 coupons by Brunei.

Some of the countries from which 4 IRCs are needed to effect an *air mail* return of a card enclosed in an envelope include Australia, Burma, Cuba, Cyprus, Gambia, Grenada, Guyana, Iran, Kenya, Nicaragua, Tanzania and Uganda. Countries requiring 5 coupons include Botswanna, Haiti, Hong Kong, Lesotho, Liberia, Malaysia, Rhodesia, South Africa and Sri Lanka.

At press time we do not know whether it will require fewer of the new 42¢ IRCs to stamp an air mail return letter. Our guess is that there will be no change, and consequently the IRC will cease to be a viable medium for pre-paying the return of s.a.e. by air for all but the most wealthy. Few can afford $2.10 worth of coupons for an Australian or South African card or for many other relatively easy countries, zones or prefixes.

IRC users be forewarned! Here is more bad news. After Dec. 31, 1976 the two older types of IRCs shown in fig. 1 will *no longer be accepted for redemption* by the postoffice. Only the newest type, shown in fig. 2, will have any value. Therefore you must redeem all your older type coupons for stamps before the end of the year or lose their value entirely.

For your information, the latest postage rate increases are as follows:

USA & Possessions, Canada & Mexico	Caribbean & Central & South America	Africa, Asia Europe & Oceania
QSL Card (Surface Rate)		
To 9c from 8c	No change, still 12c	No change, still 12c
QSL Card (Air Rate)		
Service deleted*	To 21c from 18c	To 21c from 18c
Letter, 1 oz. (Surface)		
To 13c from 10c	Still 18c	Still 18c
Letter, ½ oz. (Air)		
Service deleted*	To 25c from 21c	To 31c from 26c
Aerogram†		
Not available	To 22c from 18c	To 22c from 18c

*QSL cards may be Airmailed to Canada and Mexico for 14c. Letters may be Airmailed to Canada and Mexico for 17c first ounce, 15c each additional ounce.

†QSL cards may *not* be enclosed in an aerogram.

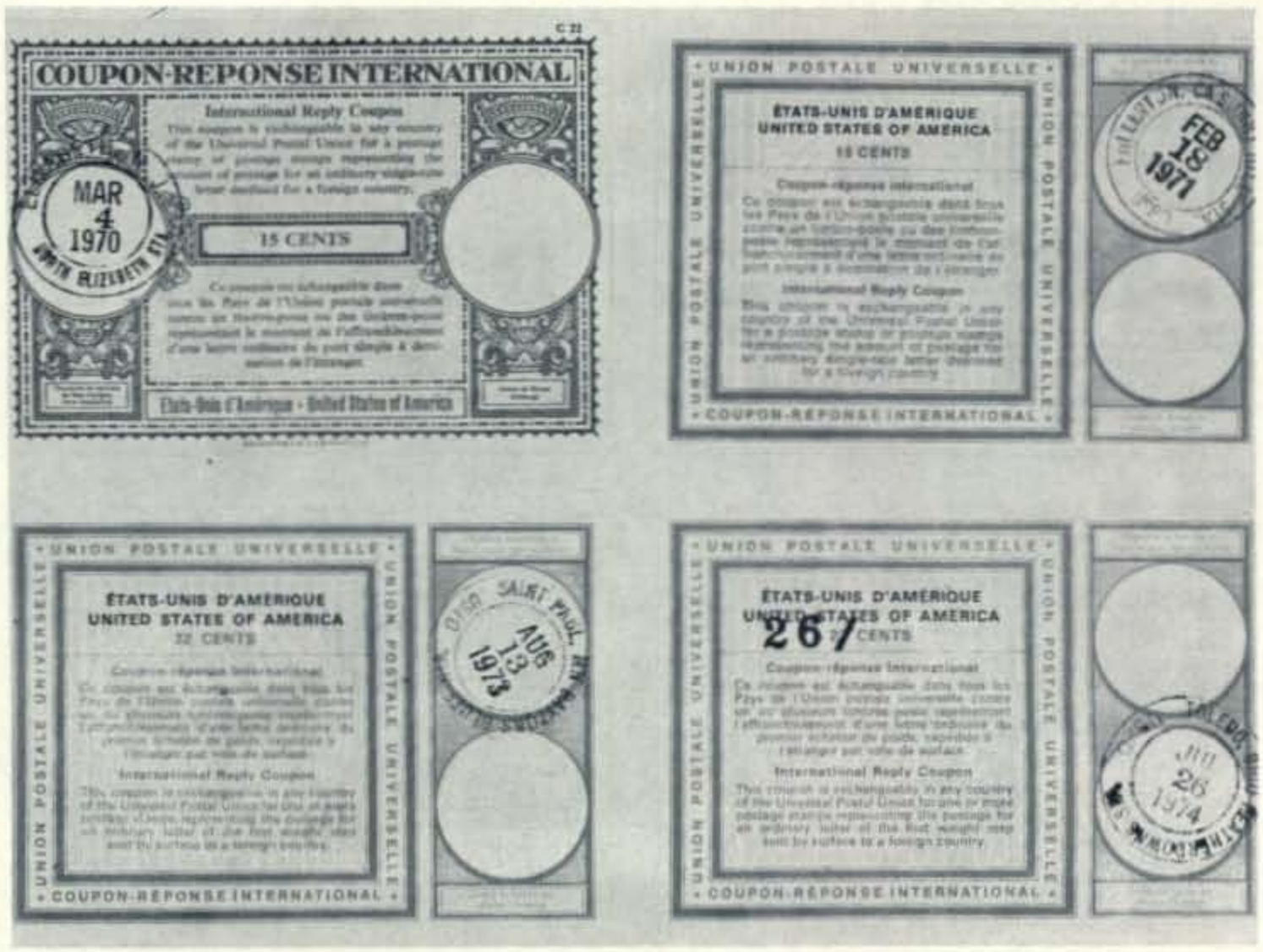


Fig. 1—Above are the old type IRC's which will completely lose value on Jan. 1, 1977. If you have any of these types on hand they should be redeemed before midnight Dec. 31, 1976. Note the steady increase in price from 15c to 26c over a 4 year period. The new cost is now 42c, but the redemption value of each is 18c worth of stamps.

Fig. 2—This is the new type IRC which the postal service will continue to accept after Dec. 31, 1976. Its present cost is 42c. Those you receive from other countries may be redeemed for 18c in stamps. U.S. postoffices will not normally redeem IRC's purchased in the U.S.

The above air mail rates are for each ½ oz. up to a total weight of 2 oz. Above 2 oz., a letter to the Caribbean, Central or South America becomes 21¢ for each additional ½ oz., and to Africa, Asia, Europe and Oceania 26¢ for each additional ½ oz.

The only bright spot in this dismal scenario is that surface mail rates to other countries have not yet been increased. They remain at 18¢ for 1 oz., 31¢ for 2 oz., 41¢ for 4 oz., 82¢ for 8 oz. and $1.58 for 16 oz. Therefore, if you have the time and patience to wait out the surface deliveries you can effect substantial savings in your postal costs. Additional savings are possible thru the use of a QSL service, several of which advertise in *CQ*. Among them are the World QSL Bureau and the QSL services of W3KT and W1EP.

A valuable alternative to IRC use is the purchase of foreign stamps right here in the U.S. so that you can send an s.a.s.e. This can be accomplished through the DX Stamp Service operated by G. N. Robertson, W2AZX, 83 Roder Parkway, Ontario, N.Y. 14519.

De Extra

An Outgoing QSL Bureau — With soaring postal rates greatly limiting the ability of most DXers to send cards overseas, especially during contest periods such as the *CQ* WPX Contest later this month, an outgoing bureau of the type operated by many national radio societies would be a great help to U.S. amateurs. Particularly for sending large batches of cards which do not require rapid delivery.

We are of course aware that ARRL has considered the possibility of such a bureau at several times in the past, but concluded that the disadvantages outweighed the advantages. We don't recall each factor involved, but it seems that finances were heavily negative the last time an outgoing QSL Bureau was considered by the ARRL board. However, times have changed. According to the September, 1975 isue of *QST*, page 10, the monthly circulation of that venerable journal exceeds the combined circulation of *CQ*, *Ham Radio* and *73*, all 3 of which must operate in the black to stay in business. Therefore it must be concluded that for a recession period ARRL stands out as one of the outstanding financial success stories of the year.

The need is great for an outgoing bureau capable of sending cards for a few pennies apiece. With our national amateur organization financially healthy now is the time to move.

Marcos, YV4AGP, in just 3 years as an amateur has made WAZ, 5-Band DXCC, 5-Band WAS and confirmed 250 countries. The cups in the background are from the Venezuelan Independence Contest. At the farm his antennas include a 4-element, triband quad at 65 feet, a 3-element 40 meter yagi at 90 feet plus inverted Vees for 80 and 160 In Valencia he uses a TH6DXX up 60 feet and inverted Vees for 40, 80 and 160.

Left to right are Tom, KH6HDA, who operated as ZM7AI during the 1974 CQ Worldwide DX Contest; Carol, ZL1AJL, and Marion, ZL1BKL, who operated during the same contest as ZL1AA/C; and on the right is well-known DXer Phil, 5W1AU, always in great demand during the contests. (Photo via ZL1TB)

Rare Prefix News

CR9 — The Northern California DX Foundation has arranged the shipment of a beam to Horacio Torres, CR9AJ, on Macao. Horacio has been using a dipole 400 feet above the sea from his lighthouse QTH. The beam should greatly improve his signal to the east coast. If you hear him booming through drop a note of thanks to the NCDXF, and maybe a tax deductible contribution too.

CT4—This prefix is now being used in Portugal proper. For country purposes it is the same as CT1.

D2—Art, ex-CR6SW, has been reported on 21275 at 1720 using the call D2ASW. QSL via W.R. Hicks, K4UTE, 8201 Cassie Road, Jacksonville, FL 32221.

D4—The prefix for the Cape Verde Islands has changed from CR4 to D4C. CR4BS is now D4CBS.

HL9—Gerry, HL9TG, operates near 14260 kHz between 2200 and 2330 GMT.

JTØ—This is a rare prefix and rare zone all wrapped up in one package. Grisha, UC2OAQ, operated as JTØ-OAQ on 80 and 40 meter c.w. QSL to UY5LK.

JY—Some of the rare Jordanian prefixes include JY4NA on 21283 kHz; JY5MB, whose QSLs go to Box 299, Aman; and JY9EK on 14220 who QSLs via WA5LMG.

KJ6—KJ6CW on Johnston Island is frequently active around 7288 kHz after 0800 GMT handling traffic. However, he is happy to give DXers a new one if they wait their turn and call properly.

PJ1-PJØ—To help you keep track of the Dutch West Indies prefixes, the following list was compiled by W9BG:

PJ1 and PJØ—Contests and special operations
PJ2—Curacao
PJ3—Aruba
PJ4—Bonaire

PJ5—St. Eustatius
PJ6—Saba
PJ7—Sint Maartens residents
PJ8—Sint Maartens non-residents
PJ9—Visitors to Curacao, Aruba and Bonaire

For country purposes, PJ1, PJ2, PJ3, PJ4 and PJ9 and PJØ count for the Netherland Antilles, while PJ5, PJ6, PJ7 and PJ8 count for Sint Maarten.

SQ5—SQ5Z operates from the Warsaw Technical Museum. The QSL, which comes via SP5PMT, is a reproduction of a Jan Seydlitz painting of the Royal Castle. Ten IRCs sent with your QSL will qualify you a special diploma.

ST2—Sid, ST2SA, M.D., is still your best and almost only bet for this rare prefix, rare country and rare zone 34. He recently completed some post-graduate work in ophthalmology and has moved downriver to Khartoum. He is using a Drake rig and a TH6DX beam.

VX9 & VYØ—The Canadian DX group made 12,000 contacts from Sable Island, VX9A during the *CQ* contest in October, and immediately followed with 5000 contacts from St. Paul Island, VYØA. QSL VX9A via VE3GMT and VYØA to VE3MJ. These count as new countries for *CQ's* DX country awards. For those of you who are new readers, these awards are now being managed by our new Assistant DX Editor, Hugh Cassidy, WA6AUD, P.O. Box 3388, San Rafael, CA 94901. Hugh also manages WPX.

YNA—YN1DW/YN4 was a 160 meter operation to Corn Island in the Caribbean. QSL to W4BRB.

3B7—Alex Mootoo, 3B8DA, plans to put 3B7, St. Brandon Island, on the air in March or April. Alex worked over 160 countries in making 5000 contacts from 3B9, Rodriguez, last fall. His rig is a Swan 500 supplied by the Northern California DX Foundation.

Well-known Florida DXers Bev Cavender, K4VW, ex- W4CKB, and XYL Carole, WB4NOI/ZF1YL.

This group represents the older members of the Radio Club "M. Pupin" in Pancevo, Yugoslavia, with each having over 15 years on the air. Left to right are Vasa, YU1NQW; Ljube, YU1QBC; Vladan, YU1ODS; Vlada, YU1ODO; and Mario, YU1PCF. Club station YU1BCD, has earned Single Band Phone WAZ No. 11 on 20 meters, 5-Band DXCC No. 265, WPX mixed, c.w. and s.s.b. including the Honor Roll, and over 200 other awards. It has amassed over 10,000 U.S. QSL cards and is closing in on 1000 counties. The club station equipment includes a KWM-2, FT-101, FT-200, SB-220 and a 51S1 receiver. Antennas are a TH6DXX, a 2-element quad for 40 meters and dipoles and Vee beams.

3D6—If you have trouble confirming this one, try P.O. Box 21, Ezulwini, Swaiziland. Many 3D6's are using this box as a central QSL address.

4W9—Rudi, 4W9GR, has been worked on 40 and 20 meters c.w. and s.s.b. QSL to DK4PP.

The CQ DX Award Program

SSB	C.W.
417...JH1VRQ	189...WA8TDY
418...IØMBX	190...UT5CC
419...UA6NQ	191...UY5GG
420...K3OFN	192...UB5VK
	193...UW9WB
	194...UA6AJG

Endorsements

200 JH1VRQ; 150 K6DSK, JH1VRQ

Complete rules and application forms for the CQ DX Award Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX/WPX Awards, Box 3388, San Rafael, Calif. 94902.

Reciprocal Operating Agreements

A reciprocal operating agreement allows the amateurs of one country to be licensed by and to operate from another country. The United States has such agreements with the following countries: Argentina, Australia, Austria, Barbados, Belgium, Bolivia, Brazil, Canada, Chile, Columbia, Costa Rica, Denmark, Dominican Republic, Equador, El Salvador, Fiji, Finland, France and its overseas territories, West Germany, Guatemala, Guyana, Honduras, India, Indonesia, Ireland, Israel, Jamaica, Kuwait, Luxemburg, Monaco, Netherlands, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, Sweden, Switzerland, Trinidad & Tobago, United Kingdom and dependencies, Uruguay, and Venezuela.

DX Wanted Poll

The results of a recent poll of all 10 U.S. call areas was recently released by the Southern Section of the New England DX Association. It was largely due to the efforts of W1AM and K1TZQ, and showed the top 50 stations needed within each U.S. area. Space considerations allow us to present only the top 10 for each of the W1—WØ zones shown in order of rank:

W1—VP8 South Sandwich, 8Z S.A./Iraq Neutral Zone, YI Iraq, 3Y Bouvet, FO8 Clipperton, XZ Burma, BY China, VS9K Kamaran, 1S Spratly and CR9 Macao.

W2—YI Iraq, VP8 South Sandwich, FO8C Clipperton, BY China, VS9K Kamaran, 8Z S.A./Iraq Neutral Zone,

Shigeo Kanehira, JA1VDJ, of Tokyo qualified for WAZ after a 6-month search for a station in Zone 34, a very rare zone from the Pacific. His antenna is a TH3MK3 up 18 meters.

The gents in these 3 photos sent by Gary Stillwell, W6NJU, have accounted for a lot of South Pacific DX. On the far left are Felix, FK8AC, and Raoul, FK8AU, from New Caledonia. In the center is YJ8BL from the New Hebrides and on the right is Fred, 3D2CC.

XZ Burma, 3Y Bouvet, HKØ Malpelo and VKØ Heard.

W3 — BY China, FO8C Clipperton, HKØ Malpelo, YI Iraq, FR7G Glorioso, TN Congo Republic, VK9Y Cocos, VP8 South Sandwich, VS9A South Yemen and XZ Burma.

W4—VP8 South Sandwich, YI Iraq, 3Y Bouvet, FO8C Clipperton, 8Z S.A./Iraq Neutral Zone, XZ Burma, BY China, VKØ Heard, VS9A South Yemen and VS9K Kamaran.

W5—VP8 South Sandwich, YI Iraq, FO8C Clipperton, 8Z S.A./Iraq Neutral Zone, BY China, 3Y Bouvet, ZA Albania, HKØ Malpelo, XZ Burma, and VS9K Kamaran.

W6—Y1 Iraq, 3Y Bouvet, FO8C Clipperton, VP8 South Sandwich, VS9K Kamaran, 8Z S.A./Iraq Neutral Zone, SY Mt. Athos, ZA Albania, VS9A South Yemen and BY China.

W7—YI Iraq, VP8 South Sandwich, BY China, FO8C Clipperton, VS9K Kamaran, 8Z S.A./Iraq Neutral Zone, SY Mt. Athos, TT Chad, 3Y Bouvet and FR7 Tromelin.

W8—YI Iraq, VP8 South Sandwich, FO8C Clipperton, 3Y Bouvet, BY China, XZ Burma, VS9K Kamaran, 1S Spratly, 8Z S.A./Iraq Neutral Zone and VS9A South Yemen.

W9—YI Iraq, VP8 South Sandwich, 3Y Bouvet, FO8C Clipperton, 8Z S.A./Iraq Neutral Zone, BY China, VS9K Kamaran, XZ Burma, 1S Spratly and VKØ Heard.

WØ—FO8C Clipperton, VP8 South Sandwich, YI Iraq, 3Y Bouvet, BY China, 8Z S.A./Iraq Neutral Zone, VS9K Kamaran, FR7/G Glorioso, TN Congo Republic and VS9A South Yemen.

As this poll was taken prior to the addition of Sable Island, St. Paul Island and Tuvalu to the list these countries do not appear in the listing.

Some interesting regional differences were found in the overall list. For example, SY Mt. Athos is rare for 6's and 7's but doesn't appear in the top 50 for the 1, 2, 3, 4 or 9th call areas. Conversely, CR9 is needed by many on the east coast but isn't mentioned by west coast DXers. A similar example is 1S Spratly.

Iraq was found to be #1 in the 2, 6, 7, 8, and 9th callareas and was #2 in the 4th and 5th callareas. However, it is rumored that a Swiss amateur has been granted a license to operate from Iraq so this situation could be changed by the time you read this column. South Sandwich Island is #1 in the 1, 4 and 5th callareas while China is top for W3 and Clipperton for the 0's.

The WAZ Program

S.S.B. WAZ

1284...JA6SVP
1285...G3XYP
1286...K5FVA
1287...W1RED
1288...W7HXH
1289...WØGKE
1290...JA1JRK
1291...JA3AEV
1296...IØZG
1297...VE3BMV
1298...UA4PW
1299...UL7FA
1300...UY5OO
1301...K4KQB

C.W.-Phone WAZ

3884...HB9AFI
3885...DL1EV
3886...ON4KK
3887...YU2RDW
3888...YU3DKS
3889...YU3TKL
3890...WA9TVM
3891...VU2JA
3892...EA8BK
3900...VE3BMV
3901...IT9FTT
3902...K9UTN
3903...F6CRT
3904...UB5NU
3905...UA6BV
3906...UAØAG
3907...W4CZU
3908...W4EFK
3909...WB4VUP
3910...I3MMM
3911...I3FIN
3912...W3JZJ

Phone WAZ

510...ZP5CF
511...W4HNW
512...VE3BMW

Single Band WAZ

20-Meter Phone

18...JH1VRQ

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

On the left is Wojciech, SP9PT/VE8, communicator for the Polish mountain climbing expedition which ascended Mt. McKinley in Alaska and Mts. Kennedy and Hubbard in the Yukon. The station QTH is shown on the right.

The WPX Program

Mixed

510...JA1VP
511...WBØBQG
512...YU2AKL

SSB

880...DK4I0
881...9H4L
882...JA1WVK
883...UP2OU
884...UK3WAC
885...UK3AAB
886...UL7NW

C.W.

1438...DL2JX
1439...KP4DIC
1440...W1CDC
1441...UI8AAX
1442...UAØBL
1443...UA9XS
1444...UY5GG
1445...PT2GFK

VPX

97...HE9-ILN Manfred Eisel
98...W5-10353 Richard Harris
99...Gernot Haunold OE3-105070
100...UA4-133-21 Dmitry Vlasov

WPNX

85...WN4HHJ

Endorsements

Mixed: 1150 YU2DX; 900 K9YXA; 850 W9ZTD; 800 W9ZTD; 550 ISØAEW, K3NEZ, WAØTKJ 500 K3-NEZ, K9HLW; 450 K3NEZ.
CW: 850 K8MFO/800 K8MFO; 500 W1OPJ; 450-K9HLW, UB5VK; 350 UY5GG.
SSB: 900 DK2BI, W8GKM; 750 WA5VDH; 700 UW-3IN; 500 G5GH; 450 9H4L; 400 WB4QGH, 9H4L; 350 UL7NW, 9H4L.
VPX: 700 WDX5FEB; 550 UA4 133-21; 500 UA4 133-21; 450 UA4 133-21; 400 UA4 133-21; 350 HE-9ILN, UA4-133-21.
80mtrs: HE9ILN, UB5WE.
40mtrs: K3NEZ, UB5VK, W4WSF.
20mtrs: G5GH, K3NEZ, UAØBL, UA3 133-21, UY5GG.
15mtrs: KØDEQ.
Africa: KDX1A, UB5WE, UW3IN, YU2DX.
Asia: UA3 133-21, UB5WE, UWØIE, UK4WAB, W4-WSF, YU2DX.
Europe: DK4I0, OE3-105070, REF-16903, UA4 133-21, UB5WE, UA0BL, UWØIE, UY5GG, YU2DX.
North America: KDX1A, YU2DX.
South America: W9ZTD.
Oceania: KDX1A, WDX5FEB, UWØIE, YU2DX.

Complete rules for WPX may be found on Page 67 of the February 1972 issue of CQ. Application forms may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to: CQ DX/WPX Awards, Box 3388, San Rafael, Calif. 94902.

QSL Information

Cards for the following *160 Meter* operations during 1974 and 1975 go to James M. DuPont, W2DEO, 391 Valley Road, Watchung, N.J. 07060: FP0JD, HP1XJB, W2DEO/HR2, VP2D/W2DEO, VP2LBJ, W2DEO/VP2S, YN1DEO/5, ZF1WO, 6Y5LA, 8P6GL, and W2DEO/8R1. Remember, these are only for 160 Meters.

(Continued on page 74)

A. EDWARD HOPPER, W2GT, ON

Awards

USA-CA Honor Roll

2000		1500		500	
WA2GLU	241	WBØJYB	288	WN5MBS/	
WB9ELH	242	WB9ELH	289	WN5OFF	1082
		1000		W9FLF	1083
		W9FLF	384	W2IAM	1084
				K7TTJ	1085
				WB9LGZ	1086

The March, "Story of The Month" as told by Danny is:

Daniel P. Bissett, K8DCR
All Counties #100, 3-29-73

"Danny Bissett was born December 6, 1920 in South River, N.J., and attended South River Schools. Upon leaving high school, he enlisted in the U.S. Army March 25, 1939, for Hawaiian duty. Served one year with the 8th Field Artillery at Schofield Barracks, Hawaii. The following year, 1940, transferred to the old Army Air Corps at Hickam Field, Hawaii. Served with the air and airways communications system as a radio operator, both air to ground and point to point c.w. Served tour of duties in the Southwest Pacific, European theatre of operations and last tour of duty at Ladd Air Force Base in Fairbanks, Adak and the Aleutian Islands, retiring 20 years later at Wright Patterson Air Force base, Dayton, Ohio.

"While attending a Christmas party at a girl friends home in New Carlisle, Ohio, I met a retired Lieutenant Colonel whose son was a Novice amateur radio operator. That evening we left the party to go see his son's rig. As I already knew the International code at 22 words per minute, it was just a matter of learning the theory to become an amateur. This Lt. Col. aided me in the theory and I obtained a Novice ticket at the Dayton Ham Convention in Dayton, Ohio in 1963. In the latter part of 1963, I obtained my General ticket.

"Upon receiving my General ticket, I operated 2 & 6 meters mobile for about a year. I later traded my 2 & 6 meter gear for a new Drake TR-3, mobile supply and Hustler antenna and went mobile on 40 meters. While parked in Dayton, Ohio, I happened to stumble across a net whose operators were exchanging numbers and counties. At that time, the late Cliff Corne, Jr. was net control. I broke into the net and asked what it was all about and was told it was the County Hunting Net. This was back in 1963, and when they gave me the full information on County Hunting, I sent for my USA-CA Record Book and became one of the many county hunters. Later I traded the TR-3 in for a TR-4 with the noise blanker.

"Since that time I have been mobiling in approximately 32 states and have given out more than 500 counties. During this time I have met many wonderful people, attended many mini-conventions, regular type conventions and made many friends while driving around seeing the country. My heartfelt thanks to *all* who helped me obtain *all counties* and made the past few years so much fun. And a special thanks to Cleo, WAØSHE for handling my QSLs and so much of my paper work". I must not forget to mention one of the greatest moments of my life when Jerry, KØQIX took his XYL and harmonics on a trip of over 1,000 miles to give me my last county, Todd, South Dakota. He took a picture of his daughter holding a black and white sign reading: Danny, K8DCR #3077, at the county line".

Awards Issued

Howard Siegel, WA2GLU (now also WB5QLU) obtained USA-CA-2000.
Cliff McCoy, WB9ELH added USA-CA-1500 & 2000 to his collection.
George Dunn, WBØJYB was issued USA-CA-1500 endorsed All S.S.B.
Richard Rose, W9FLF gained USA-CA-500 and 1000 endorsed All A-1.
Ray Wormley, WN5MBS/WN5OFF acquired USA-CA-500 endorsed All A-1.
This is #5 Award to a Novice.
Don Priebe, W2IAM gained USA-CA-500.
Darryl Goebel, K7TTJ applied for USA-CA-500.
Brice Fleckenstein, WB9LGZ received USA-CA-500 endorsed All QRP, All 2 × cw, All 7 mHz.

Awards

Budapest Award: This Award founded in 1963 by the Radio Amateur League of Budapest, but due to the increase in amateurs in Budapest, it was necessary to change some of the requirements effective January 1, 1976. Available to all amateurs for required QSOs and to s.w.l.s on a heard basis. *EU* stations: 75 different HA5 stations. *DX* stations: 25 different HA5 stations. *VHF* stations: 50 different HG5 stations or 5000 kms summarized distance. Contacts are valid from January 1, 1959, but the same station may be represented only once in your application. Any amateur bands and modes may be used, active land or air v.h.f./u.h.f. repeaters may be used as well. v.h.f./u.h.f. contacts by satellites or via the Moon count with 500 kms/QSO value. After January 1, 1976 the certificate is issued in one class and

Danny, K8DCR, at Shelby County, Iowa.

Centennial Award of Colorado Ten-Ten Chapter.

may be received only once and there are no special endorsements. But the Radio Amateur League of Budapest reserves the right to issue a unique special class Budapest Award to acknowledge some particularly remarkable amateur radio achievement. Apply with certified list of your contacts. (s.w.ls with heard list) with 10 IRCs to the Award Manager of BRAL, Dezso Tarcsay, HA5HA, H-1553 Budapest, P.O. Box 2, Hungary. Note: There are two activity week-ends of Budapest amateurs, one for h.f. bands during the second full week-end of May, and one for the 2 meter band one week later.

Four Awards Issued By The Colorado Ten-Ten Chapter:

Centennial Award: Issued for working stations (10 meters) with Centennial Award numbers (1 point) and stations with Senior Centennial numbers (2 points) for a total of 10 points.

Senior Centennial Award: Issued for working a total of 50 Centennial points.

Blackjack Award: Issued for submitting a list of at least 21 10-X Awards, including the 10-X Number and Centennial Number.

Top Forty Award: Issued for submitting a list of at least 40 10-X Awards, including the 10-X Number and Centennial Number.

Blackjack Award of Colorado Ten-Ten Chapter.

The handling charges are: $1.00 for the Centennial Award; 50¢ for the Senior Centennial, the Blackjack and the Top Forty Awards. Send log data to Rich Richardson, WB0FQD, 960 E. Cottonwood, Littleton, Colorado 80121. Oh yes, the ten meter band is *not* dead!

Diploma De La Linea Ecuatorial (DEHC): This new DEHC Diploma of Ecuador is available to all amateurs and s.w.ls on a heard basis. The required contacts with stations in HC-Ecuador, the land of, and named after the Equatorial Line:

Africa, Asia, Europe, Oceania	— 1 QSO.
Any Novice—	— 1 QSO.
North & Central America—	— 2 QSOs.
South America—	— 3 QSOs.

To apply, send list of QSOs (s.w.ls heard list) plus 1 dollar U.S. or equivalant or 8 IRCs to: DEHC Manager, HC5EE, R. Dorsch, P.O. Box 253, Cuenca, Ecuador. (The sponsor is the CUENCA Radio Club).

Top Forty Award of Colorado Ten-Ten Chapter.

Notes

A nice letter from Hazel Cain, K9QGR who had been raising-cane with the *National Enquirer* regarding their count of U.S. Counties—but of course everyone has a different idea—but our requirements are for 3075, at present. Other questions regarding error on page 53 of the new USA-CA Record Book which lists a Date Worked column, it should be City/Town and for Mobiles the City/Town column may be blank—these items caught by Dave, W6CCM.

Speaking of Dave Manescu, W6CCM who does such a great job with his Mobile QSL Bureau, P.O. Box 146, Lakeside, California 92040, write for full details. Dave is going all-out to help the County Hunters with his "Last Counties List"; his *County Map Record Books* ($3.50);

(continued on page 78)

Contest Calendar

BY FRANK ANZALONE, W1WY

A final reminder, don't pass up the WPX SSB Contest coming up the end of this month, March 27th-28th, its going to be a good one. (Conditions permitting of course.)

With the double multiplier credit for working US stations using the special Bi-Centennial prefixes, the overseas DX stations are going to concentrate on working the USA. Even non-contestants will be out to build up their totals for the "USA WPX '76 Award."

The Tennessee QSO Party had a problem finding an open week-end in March for their activity. What with the ARRL Marathon, our own WPX SSB and other activities. But picking the same dates as the WPX SSB Contest was poor judgment on their part. I'm afraid they will find it rough going on s.s.b. Maybe they can make up for it on c.w.

Add the following to the Florida QSO Party rules in last month's Calendar. "Florida mobiles and portables using emergency power and running 200 watts or less can multiply their total score by 2. And out-of-state contacts for this operation are worth 2 points." Logs for this party will be closely checked and disqualified stations will be barred from next year's contest. Note: the dates have been changed to April 17-18.

I can't give you any propagation forecast at this writing but recommend you call DIAL-A-PROP 516-883-6223 any time day or night the week of the Contest for the very latest forecast and last minute predictions. Good luck.

A note from Brother Ed, HV3SJ suggests that if you are visiting Rome and plan to visit HV3SJ, you should give him a call on the land-line and arrange a meeting, rather than show up unannounced. You stand a much better chance of seeing him if you do. Phone: 65 69 841.

The Radio Club Venezolano has advised that recent contacts with YV8AL/Ø, Aves Island are not valid. The YV8AL license expired in June 1960 and no authorization for this operation was given by the Ministry of Communications. The last authorized Aves Island operation was by YVØAA on January 10-12, 1973.

Calendar of Events

*Mar.	6-7	ARRL DX Phone Contest
*Mar.	6-7	YL-OM C.W. Contest
**Mar.	13-14	Commonwealth Contest
**Mar.	13-15	Virginia QSO Party
**Mar.	14-15	South Dakota QSO Party
*Mar.	20-21	ARRL DX C.W. Contest
***Mar.	27-28	**CQ WW WPX SSB**
**Mar.	27-28	Tennessee QSO Party
**Mar.	27-29	BARTG Spring RTTY
**Apr.	3-4	Polish (SP) DX Contest
Apr.	4	SIX Meter Contest
Apr.	3-5	ARRL "Open" CD C.W.
Apr.	10-11	County Hunters SSB
Apr.	10-11	Novice QSO Party
Apr.	10-12	ARRL "Open" CD Phone
**Apr.	17-18	Florida QSO Party
Apr.	17-19	ZERO District QSO Party
Apr.	18	TWO Meter Contest
Apr.	24-25	Bermuda Phone Contest
Apr.	24-25	PACC DX Contest
May	1-2	Swiss "H-22" Contest
May	8-9	Bermuda C.W. Contest
May	8-9	Vermont QSO Party
May	8-10	Georgia QSO Party
May	22-23	USSR DX Contest
June	4-7	CHC/FHC/HTH Party

*Covered in January Calendar
**Covered in February Calendar
***See page 36 Jan. issue

Global Research Activity

The Global Research organization is sponsoring two separate contests on all modes, open to all amateurs on a worldwide basis. It is suggested you write to K9DTB for more detailed information.

6 Meter Contest

0300 to 0700 GMT Sunday, April 4
(9 p.m. to 1 a.m. CST Sat., Apr. 3)

Contacts can be made on any mode allowed in the 6 Meter band.

Scoring is determined by the distance of the contact from your QTH. The areas are divided into Zones as follows: Zone 1, stations within 25 miles, 1 point. Zone 2, 25 to 50 miles, 2 points. Zone 3, 50 to 75 miles, 3 points. Zone 4, over 75 miles 4 points. (In the event of a band opening however, skip contacts will be worth only ½ point regardless of the distance.)

Awards will be made in the following categories: Mobile, Portable, High Power, 100 watts input and over. Medium Power, 51 to 99 watts. Low Power, less than 50 watts.

The SPESM, "Society for the Preservation and Encouragement of Six Meters," will also issue a certificate to all those submitting a log.

You are invited to join the SPESM 6 meter net, 50.125 MHz, at 9 a.m. local time each Sunday morning.

Score your log and include a summary sheet indicating your power, classification and etc.

Deadline for mailing is May 3rd to: Global Research, Att: Phil Caruso, K9DTB, P.O. Box 271, Lombard, Ill. 60148.

2 Meter Contest

0300 to 0700 GMT Sunday, April 18
(9 p.m. to 1 a.m. CST Sat. Apr. 17)

Contacts can be made on any mode allowed in the 2 Meter band.

Each completed QSO is worth 1 point. And you get a multiplier of 1 for each mode used. With a minimum of 5 contacts on each mode used. (i.e.: You make contacts on a.m., c.w. and s.s.b. your multiplier is 3.)

Awards will be made in the following categories: Mobile, Portable, High Power, 100 watts input and over. Medium Power, 51 to 99 watts. Low Power, 50 watts or less. Oscar 2/10 meters.

1st place score in each category will receive a Bi-Centennial certificate and a prize. 2nd place a certificate. All those submitting a log will receive a 3 month subscription to the York Radio Club publication.

You are invited to join the York

W3BGN a member of the Frankford Radio Club is a very active contester. Steve doesn't claim to be a "Big Gun" but he always turns in a good score for the Club's total and can always be found in the top group in the very competitive 3rd District.

R.C. 2 meter net, 145.500 MHz, at 8:30 p.m. local time, a.m. and s.s.b. on Monday, f.m. on Tuesday.

Your log must be scored and include information as to power used, category and etc.

Submit same no later than 3 weeks after the contest to: Global Research, Att: Phil Caruso, K9DTB, P.O. Box 271, Lombard, Ill. 60148

County Hunters SSB Contest

Starts: 0001 GMT Saturday, April 10
Ends: 2400 GMT Sunday, April 11

This is the 5th annual contest sponsored by the Mobile Amateur Radio Awards Club to increase activity for the County Awards program.

Emphasis is on mobile and portable operation. Fixed stations may work other fixed stations but only once during the contest. Mobile and portable stations may be worked for each county or band change.

Exchange: Signal report, county and state; country for DX stations.

Points: Contacts with a fixed W/K or VE station 1 point, 5 points if its a DX station, 10 points if its a mobile. (Portables considered fixed)

Multiplier: Total U.S. counties plus VE stations worked. Counties are counted *once* only, but VE's each time worked on each band.

Final Score: Total QSO points × (counties plus VE stations) worked.

Frequencies: 3935, 7240, 14290, 21390, 28580. Avoid Net frequencies, 3943, 7238, 14336. Contacts will not count.

Awards: Certificates to the Top 10 Mobile and fixed stations in the U.S. and Canada, and each DX country. Four plaques, to the top fixed U.S. or Canadian, DX station, and 1st and 2nd Mobile stations. Only single operator stations eligible.

Detailed rules, log and summary sheets are available by sending a large s.a.s.e. to K0ARS.

All entries go to: James Willingham, KØARS, Route 1, Bevier, Missouri 63532, and must be received by June 1st 1976.

Novice QSO Party

Starts: 0000 GMT Saturday, April 10
Ends: 0600 GMT Sunday, April 11

This is the 5th annual party sponsored by the International Novice ARA and is open to all class amateur stations. The object is to contact Novice stations in the US Novice bands.

Exchange: Signal report and name.

Scoring: For Novices, multiply total number of QSOs by the number of different prefixes worked. For non-Novices, number of QSOs times the number of different Novice prefixes worked. (i.e.: WN4, WN8, OA3N, OL1 and etc.) The same station may be worked *once* only.

Novice Bands: 3700 - 3750, 7100 - 7150, 21100 - 21200, 28100 - 28200. Activity will be found in the lower 10 kHz of each Novice band.

Awards: There will be appropriate awards for Novice and non-Novice winners.

Following prefixes will identify Novice stations in overseas areas: EL-NX, HC-NXX, HI-NXX, KG4NXX, KZ5XXN, LB-XX, OA-NXX, OL-XXX, VU2XXZ, WH6XXX, WL7XXX, WP4XXX. (And don't overlook AK, the Novice Bi-Centennial prefix.) The dash in the above indicates a numeral and the X a letter in the call.

Logs go to: Andi Anderson, WB5-MYV, Route 1, Box 193, Heavener, Okla. 74937.

Zero District QSO Party

Starts: 2000 GMT Saturday, April 17
Ends: 0200 GMT Monday, April 19

Again organized by the TRA ARC of Iowa State Univ. this one covers a lot of territory and should create a lot of activity.

Stations outside of Zero District will work Zero stations only, but Zeros may work both in and out-of-district stations. The same station may be worked once on each band and each mode, mobiles in each county change.

Exchange: QSO no., RS(T) and QTH. County and ARRL section for Zeros, ARRL section only for all others.

Scoring: *For Zeros:* Total QSOs multiplied by (ARRL sections + Zero counties + DX countries) worked. *For non-Zeros:* Total QSOs multiplied by (Zero counties + Zero sections.)

Frequencies: 3570, 7070, 14070, 21070, 28070, and 3900, 7270, 14300, 21370, 28570. Novice: 3725, 7125, 21125.

Awards: Appropriate certificates to leading scorers in each section.

Mailing deadline May 14th to: TRA Amateur Radio Club, WAØTKK, Iowa State University, B406 Wilson Hall, Ames, Iowa 50013.

Bermuda Contest

Phone: April 24-25 C.W.: May 8-9
Starts: 0000 GMT Saturday
Ends: 0200 GMT Sunday

The Radio Society of Bermuda held its first contest in 1959 and its popularity has increased with each year.

Stations in the U.S. and Canada may work the United Kingdom and VP9s only. While U.K. stations may work W/K, VE and VP9s. Phone and C.W. are separate contests with separate awards.

Participation is for single operator stations only, and operation must be from their own private residence or property.

Exchange: RS/RST report and QTH. State for W/K. province for VE, county for U.K. and Parish for VP9s.

Scoring: Each completed QSO counts 3 points. Multiply total by the number of different *VP9 stations* worked on *each* band, 3.5 thru 28 MHz.

Parish abbreviations: DEV, HAM, PAG, PEM, SAN, SMI, SOU, STG, WAR. (Not counted as a multiplier. Proof in the form of QSL cards is required for the Worked All Bermuda Award.)

Awards: A Trophy will be presented to the overall winner, phone and c.w., for North America and the United Kingdom. Presentation will be made at the Annual Banquet held October 21st in Bermuda. Transportation and accommodation for a week's stay at one of Bermuda's leading hotels will be provided by the Society. (Also certificates to top scorers in each U.S. and VE call area and each United Kingdom country.)

Trophy winners are ineligible for a period of two years regardless of the section won. (Last year's winners were W1CMH and G3JOC on phone and W1BPW and G3RUX on c.w.

Logs go to: The Radio Society of Bermuda, P.O. Box 275, Hamilton 5, Bermuda. And must be received no later than June 30th 1976.

PACC DX Contest

Starts: 1200 GMT Saturday, April 24
Ends: 1800 GMT Sunday, April 25

Its the world working the Netherlands in this one. On all bands, 1.8 thru 28 MHz, both phone and c.w. (c.w. only on 160). The same station may be worked only once on each band, either phone or c.w., for QSO and multiplier credit.

Exchange: RS(T) plus a QSO number starting with 001. PA/PI/PE will also include two letters indicating their province. (ie: 579001/GR).

There are 12 provinces: DR, FR, GD, GR, LB, NB, NH, OV, UT, YP, ZH, ZL. Making a possible multiplier of 72.

Scoring: Each completed QSO counts 3 points. For DX stations the multiplier is determined by the provinces worked on each band. Final score therefore is total QSO points times the sum of provinces worked on each band.

Awards: Certificates to the top scorers in each country and call areas in W/K, VE/VO, CE, JA, PY, UA9/O, VK, ZL, ZS (also s.w.l. awards).

Indicate the multiplier only the first time it is worked on each band. Include a summary sheet with your log showing the scoring and other pertinent information, your name and address in Block Letters, and a signed declaration that all rules and regulations have been observed.

Mailing deadline for logs is June 30th to: VERON Contest Manager, PA0DIN, P.O.B. 1166, Arnhem, Netherlands.

Swiss H-22 Contest

Starts: 1500 GMT Saturday, May 1
Ends: 1700 GMT Sunday, May 2

If you are still looking for some of the hard to get Cantons for your colorful "H-22" certificate, this is the time to look for them.

Contacts may be made on all bands, 1.8 thru 28 MHz, phone or c.w. The same station may be worked on each band for QSO and multiplier credit but only on one mode.

Exchange: RS(T) plus a 3 figure contact number starting with 001. Swiss stations will also include two letters indicating their Canton (579-001/ZH).

There are 22 Cantons: AG, AR, BE, BS, FR, GE, GL, GR, LU, NE, NW, SG, SH, SO, SZ, TG, TI, UR, VD, VS, ZG, ZH.

Scoring: Each QSO counts 3 points. The multiplier is the sum of Cantons worked on each band. Final score, total QSO points times the sum of

(continued on page 78)

25th Anniversary Column
March 1951-March 1976

GEORGE JACOBS, W3ASK, ON

Propagation

One of the questions I am asked most is "What season of the year is best for DX propagation on the h.f. bands?"

This isn't an easy question to answer since there are so many variables involved, and the answer can be different for different sets of conditions and for the various bands. In a general way, however, taking into account the overall number of hours each band between *10* and *160* meters can be expected to open for DX, and the number of different areas to which the bands may open, I believe that the *spring* and *fall* months are optimum for DX propagation.

There is a solar-ionospheric relationship to explain this. Spring and fall are called the *equinoctial* seasons. These are the times when the sun is most nearly overhead at the equator, making night and day of almost equal length in all parts of the world. On March 21st and September 22nd, the sun is *directly* over the equator, and the length of night and day is exactly equal.

The vernal, or spring equinoctial period in the northern hemisphere, has a noticeable influence on h.f. propagation conditions for a period of several weeks lasting from late February through late April. The effects of the autumnal, or fall equinoctial period are felt from early September through late October.

During equinoctial periods it is always spring in one hemisphere and fall in the other. This tends to create an ionosphere of more similar characteristics throughout the world than is possible during other times when it is summer in one hemisphere and winter in the other, and there are extreme differences in the ionosphere. It is this "ionospheric equalization" which takes place during the equinoctial periods that is responsible for optimum DX conditions.

An improvement in DX propagation conditions is usually most noticeable on the long circuits between the northern and southern hemispheres; for example, from the USA to Australia, South America, southern Africa, southern Asia, Antarctica, etc. Look for these openings during this coming month on the h.f. bands.

The best bands for DX propagation during March are expected to be *15* and *20* meters during most of the day; *20* and *40* meters during the early evening, and *40* and *80* meters during the hours of darkness and the sunrise period. Check *160* meters during the hours of darkness, and when conditions are High Normal, or better, check *10* meters for openings during the daylight hours. For more specific information, refer to the *DX Propagation Charts* which appeared in last month's column. This month's column contains *Short-Skip Propagation Charts* which are valid for both *March* and *April*, as well as *Propagation Charts* centered on Alaska and Hawaii. The Short-Skip Charts contain band opening forecasts for predominantly one-hop paths, ranging in distances between approximately 50 and 2300 miles.

For day-to-day changes in h.f. propagation conditions expected during March, see the *Last Minute Forecast*, which appears at the beginning of this column.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected For March 1976

	Expected Signal Quality			
Propagation Index	(4)	(3)	(2)	(1)
Date				
Above Normal: 26	A	A	B	C
High Normal: 2, 23, 25, 27, 29	B	B	C	D
Low Normal: 1, 3, 8-10, 13-16, 22, 24, 28, 30	B	C	D	E
Below Normal: 4, 6-7, 11-12, 17-18, 21, 31	C	D	E	E
Disturbed: 5, 19-20	D-E	E	E	E

Where *expected signal quality is:*

A—Excellent opening, exceptionally strong, steady signals greater than S9+30 dB.

B—Good opening, moderately strong signals varying between S9 and S9+30 dB, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with *a propagation index* of (3) will be *fair* (C) March 1, *good* (B) on the 2nd, *fair* (C) on the 3rd and *poor* (D) on the 4th, etc.

For updated information dial Area Code 516-883-6223 for DIAL-A-PROP, subscribe to bi-weekly MAIL-A-PROP, P.O. Box 86, Northport, NY 11768, or check WWV at 14 minutes past each hour.

Sunspot Cycle

The Swiss Federal Solar Observatory reports a monthly mean sunspot number of 7.5 for December, 1975. This results in a running smoothed sunspot number of 16 centered on June, 1974. A smoothed sunspot number of 8 is forecast for March, 1976, as the present cycle continues to decline very slowly towards a minimum.

Mail-A-Prop

A reminder that bi-weekly comprehensive propagation forecasts are now available that take the mystery out of band openings. Called Mail-A-Prop, these forecasts are based primarily on a detailed analysis of solar, geomagnetic and ionospheric data. They have achieved a high level of accuracy over the past two years. The format changes a bit with each issue, so that over a short period of time, band-by-band, continent-by-continent and major time periods throughout the day are covered with detailed forecasts and analyses. Short-skip forecasts are usually given at least monthly. The forecasts cover h.f. amateur bands from 160 through 10 meters, and apply also to adjacent bands used for broadcasting and other services. Mail-A-Prop's subscription list consists of radio amateurs, shortwave listeners and commercial users.

Newsworthy items concerning radio

propagation, solar activity, progress of the sunspot cycle, vhf ionospheric openings, schedules of meteor showers, etc., are also included.

Mail-A-Prop is issued every other week, covering a two week period in advance, on a day-to-day basis. The forecast period begins on a Tuesday, and the newsletter is sent via first class mail, or airmail if necessary, to reach subscribers well before the forecast period begins.

Mail-A-Prop is designed primarily for use in the continental USA, Canada and the Caribbean area. There are, however, satisfied subscribers in South America, Europe, Asia and the South Pacific as well.

Mail-A-Prop is the most complete propagation forecast available for the h.f. bands. It is in a convenient and easy to use format, and it is written in plain language so that it can be understood and used with ease. Here's what some of the present subscribers have to say about Mail-A-Prop:

"The service is great—best thing since the invention of the superhet!" —K4FW.

"Mail-A-Prop has heightened my enjoyment as an s.w.l., many thanks." Dr. Howard Stricker.

"Mail-A-Prop has been a big help in our world-wide operations." Associated Press Communications Dept.

"I'm a firm believer in Mail-A-Prop."—KH6BZF

For radio amateurs, shortwave listeners and other non-commercial users, an *annual* subscription of 26 issues is $25, postpaid. A *two-month* trial subscription of five issues is available for $5, postpaid. For a free sample copy send a self-addressed stamped envelope, legal size, to:

MAIL-A-PROP
P.O. Box 86
Northport, NY 11768

V.H.F. Ionospheric Openings

The possibilities for ionospheric openings on the v.h.f. bands usually improve during March and the spring months.

A seasonal increase in short-skip openings due to sporadic-E propagation generally takes place during March, and an occasional *6 meter* opening may be possible by this mode during the month. Sporadic-E openings most often occur during the daylight hours, over distances between approximately 1000 and 1400 miles.

Auroral activity often peaks during March, especially during periods when h.f. conditions are below normal or disturbed.

Not much meteor activity expected during March, but some might be possible for very brief periods during minor showers that may occur March 14-15 and 24-25.

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular Meter band (10 through 160 Meters), as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (15 through 80 Meters) for a particular geographical region of the continental USA, as shown in the left hand column of the Charts. A ** indicates the best time to listen for 10 meter openings; * best times for 160 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

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

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

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. On the Short-Skip Chart appropriate *standard* time is used at the *path midpoint*. For example, on a circuit between Maine and Florida, the time shown would be EST; on a circuit between N.Y. and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones, *add* 2 hours in the PST zone; 3 hours in MST zone, 4 hours in CST zone; and 5 hours in EST zone. *Add* 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 P.M. in Los Angeles; 17 or 5 P.M. in Washington D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* in other areas of the USA, *subtract* 8 hours in the PST zone, 7 hours in MST zone, 6 hours in CST zone and 5 hours in EST zone. For example, at 20 GMT it is 15 or 3 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; The Alaska and Hawaii Charts are based upon a transmitter power of 250 watts cw or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level; for each 10db loss, it will lower by one level.

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

25th Anniversary

CQ pioneered propagation forecasts specifically tailored to the needs of radio amateurs. The first "Monthly DX Predictions" column appeared in the June, 1946 issue, when *CQ* was little more than a year old. Edited by my good friend Perry Ferrell, the column appeared until November, 1949.

In March, 1951 the monthly propagation column was resumed under my editorship.

This month's column marks the end of my 25th continuous year as Propagation Editor for *CQ*. In the field of radio propagation, elapsed time is often measured in terms of sunspot cycles rather than months or years. By this system of reckoning, I have shared with *CQ* readers the last years of Cycle 18, the complete span of Cycle 19, and the now almost complete span of Cycle 20!

A new sunspot cycle, number 21, is likely to begin later this year. I hope that this column will continue to serve as a source of reliable propagation information throughout its life and beyond.

73, George, W3ASK

CQ Short-Skip Propagation Chart

March & April, 1976

Local Standard Time At

Path Mid-Point

Band (Meters)	Distance Between Stations (Miles)			
	50-250	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	*Nil*	08-19 (0-1)	08-14 (1-0) 14-16 (1) 16-19 (1-0)
15	*Nil*	08-21 (0-1)	08-12 (1) 12-17 (1-2) 17-21 (1) 21-08 (0-1)	08-10 (1) 10-13 (1-2) 13-14 (2) 14-16 (2-3) 16-17 (2) 17-18 (1-2) 18-19 (1) 19-20 (1-0)
20	*Nil*	08-12 (0-2) 12-16 (0-3) 16-18 (0-2) 18-08 (0-1)	06-08 (1-2) 08-09 (2) 09-10 (2-3) 10-12 (2-4) 12-16 (3-4) 16-18 (2-4) 18-19 (1-3) 19-21 (1-2) 21-06 (1)	06-08 (2-1) 08-09 (2-3) 09-10 (3) 10-15 (4-3) 15-18 (4) 18-19 (3) 19-20 (2-3) 20-21 (2) 21-05 (1-0) 05-06 (1)
40	07-09 (0-1) 09-10 (0-2) 10-12 (2-4) 12-16 (3-4) 16-18 (2-3) 18-20 (1-2) 20-22 (0-1)	06-07 (0-2) 07-08 (1-2) 08-10 (2-3) 10-15 (4-3) 15-16 (4) 16-18 (3-4) 18-20 (2-3) 20-22 (1-2) 22-06 (0-1)	06-08 (2) 08-15 (3-1) 15-16 (4-2) 16-18 (4-3) 18-20 (3-4) 20-22 (2-4) 22-00 (1-3) 00-06 (1-2)	06-08 (2-1) 08-15 (1-0) 15-16 (2-0) 16-17 (2-1) 17-18 (3-2) 18-21 (4-3) 21-22 (4) 22-00 (3-4) 00-02 (2-3) 02-06 (2)
80	08-11 (3-4) 11-18 (4) 18-20 (3-4) 20-22 (2-3) 22-00 (1-2) 00-06 (1) 06-08 (1-2)	08-11 (4-1) 11-16 (4-0) 16-18 (4-2) 18-20 (4-3) 20-22 (3-4) 22-00 (2-4) 00-06 (1-2) 06-08 (2)	06-08 (2-1) 08-11 (1-0) 11-16 (0) 16-18 (2-1) 18-20 (3-2) 20-00 (4) 00-05 (2-3) 05-06 (2)	06-08 (1-0) 08-16 (0) 16-18 (1-0) 18-20 (2-1) 20-22 (4-2) 22-00 (4-3) 00-05 (3) 05-06 (2-1)
160	05-07 (4-2) 07-09 (3-1) 09-17 (2-0) 17-19 (3-1) 19-20 (4-2) 20-05 (4)	05-06 (2-1) 06-07 (2-0) 07-09 (1-0) 09-17 (0) 17-19 (1-0) 19-20 (2) 20-22 (4-3) 22-03 (4) 03-05 (4-3)	05-06 (1) 06-19 (0) 19-20 (2-1) 20-22 (3-2) 22-03 (4-3) 03-05 (3-2)	05-06 (0-1) 06-19 (0) 19-20 (1-0) 20-22 (2) 22-03 (3-2) 03-05 (2-1)

ALASKA

Openings Given In GMT #

To:	*15 Meters*	*20 Meters*	*40 Meters*	*80 Meters*
Eastern USA	21-23 (1)	21-23 (1) 23-01 (2) 01-02 (1)	06-13 (1)	07-12 (1)
Central USA	21-00 (1)	21-23 (1) 23-02 (2) 02-04 (1)	06-14 (1)	07-13 (1)
Western USA	19-21 (1) 21-23 (2) 23-01 (1)	19-21 (1) 21-23 (2) 23-01 (3) 01-03 (2) 03-05 (1)	06-08 (1) 08-12 (2) 12-15 (1)	07-10 (1) 10-13 (2) 13-15 (1) 10-14 (1)*

See explanation in "How To Use Short-Skip Charts" in box at the beginning of this column.
* Indicates best time for 160 Meter openings.
** Indicates best time for 10 Meter openings.
Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

(continued on page 78)

Surplus Sidelights

BY GORDON ELIOT WHITE

Ever wonder how surplus got that way? How the U.S. Government gets so much equipment that it dumps, at a penny on the dollar—or less—of original cost and so much that appears to be new and unused, or at least not "worn out?" It's a sad tale, at least for the taxpayers. Sometimes it's sad even for surplus hounds. Ever try to make anything useful out of a Mark II transceiver, built for Russian lend-lease tanks?

To look back in history to World War II, it is possible to document why you still see shiny new SCR-183/283 tuned-radio-frequency aircraft sets in flea markets, even though TRF was obsolete in the early 1930's.

The SCR-183 was, during the thirties, the standard medium-range radiotelephone in fighter planes and in most heavier combat aircraft. It was available, and the Air Corps couldn't afford anything better. When Pearl Harbor came, procurement officers began buying "more" of everything they could get, including "more" 183's. As late as April 24, 1942, the Air Corps asked the Signal Corps to procure 14,225 SCR-183/283 sets, on top of existing orders for 38,342 such sets, enough, with spares, to equip the entire U.S. air fleet.

Though the 183/283 was a clunker, the Air Corps had a really splendid airborne radio, the SCR-274-N Command Set, already in production, and was getting a v.h.f. component for the 274-N designed. Unfortunately Western Electric Company, and Philco were ordered to get a new effort on the old 183's under way and began tooling up.

There were those in the Air Corps who knew the SCR-183 was over the hill, but they weren't talking to the Signal Corps. Suddenly, on June 27, 1942, the idea got through. The Air Force cancelled all 53,267 sets. The manufacturers had to write off $75,000 in critical materials (half a million dollars at today's prices) and $150,000 in special tooling, plus thousands of critical manhours spent fabricating the useless tools and half-finished equipment. Cancellation cost the U.S. $100,000 at Western Electric and $150,000 at Philco.

Worse was to come. In July the Air Corps decided it really wanted 3,230 SCR-183's after all. On November 20, 1942 the Corps ordered 8,000 more, almost all destined for the surplus market.

As often happens, the SCR-183/283 was a design that had been farmed out to manufacturers who were able to under-bid the original designers at Aircraft Radio Corporation. A.R.C. knew it was no longer useful, but Philco and Western Electric were asked to produce it, so they did.

The SCR-274-N (a.k.a. ARA/ATA, AN/ARC-5, etc.) has always been in surplus in large numbers, but that was because it was so good. It was bought for virtually every one of the 250,000 combat aircraft the U.S. built, with more than 1 million different units made, so when the air fleet was salvaged, there was a lot of Command gear left around. It was good enough that the low-frequency receiver (190-55 kHz) survives to this day for low-frequency navigation aboard older military aircraft.

You can write off World War II procurement as the confusion of war, but the same sort of thing goes on and on. Sometimes manufacturers go along to perpetuate the production of surplus, and, often, such production is the military way to "pay" the cost of designing special equipment. More efficiently, the Pentagon could issue a design contract covering all costs, but bidders sometimes "bid in" at low prices to get a job, and the military finds it useful to "low ball" a project at first, catching up later.

Copies of letters and memoranda have come to me that illustrate this point, whereby the Navy bought several thousand Mite teleprinters at very high prices (the memos say $22,000 each, but are probably in error. The price was probably $2,200,000 for 400 units, still a very high $5,500 each). Then,in 1967, the services had to lay out much more for modification kits to make them work. Political pressure was brought by Mite to save Mite's contracts when the unit was proving unsatisfactory in the field—the company was manufacturing instant surplus.

Mite was a sewing bobbin company that went into the teleprinter business after a former Navy admiral's aide went to work there. Mite designed a miniature printer on its own, then sold the unit to the Navy to meet a requirement for a lightweight shipboard printer. Design and engineering costs were more than a million, according to Mite president Robert J. Blinkin.

After the Navy bought 776 printers, its ardor cooled, noticeably. The service called for other companies to bid on similar units, which were to go into helicopters and tanks as well as submarines and ships. Mite was distressed, as it had planned to spread the design cost over 4,000 printers ($375 each on top of the manufacturing costs.)

In a January 21, 1964 letter, R. J. Blinkin, president of Mite, wrote to Sen. Thomas J. Dodd, D-Conn., (now dead), that "after years of private investment, we negotiated our first production contract with the government (and) we were prevailed upon to amortize $1,000,000 of our first $1,500,000 research and development investment over the first 4,000 units we sold, rather than over the first order of 726 units in order to offer the government a lower unit price. We have now sold only about 2,500 units, but the government threatens to ignore its moral obligation by denying us the opportunity

to sell even the 4,000 units, although specific requirements for that equipment exist."

Blinkin, protested to Assistant Navy Secretary Kenneth BeLieu, and, later again to Dodd. A Dodd aide, Gerry Zeiller, wrote his boss a memo saying, in part, that Mite "contends that it is giving the government a rock-bottom price for the item and has not tried to make excessive profits out of it."

Zeiller continued with the recommendation that "both you and I attend the meeting on Monday at 11:00 in BeLieu's office. (on the Mite contract) "I don't think we should let Giaimo (Rep. Robert N. Giaimo, D-Conn.) carry the ball on this."

Sen. Dodd did indeed carry the ball, writing to and meeting with BeLieu, Deputy Defense Secretary Cyrus Vance, and others, while sending copies back to Blinkin.

"I will continue to follow this situation very closely and I hope it will be possible to secure justice at this level," Dodd wrote Blinkin on February 18, 1964.

The Pentagon sent Assistant Secretary of Defense Thomas D. Morris and Deputy Assistant Secretary Graeme C. Bannerman to talk to Dodd about Mite.

Zeiller wrote a subsequent memo, noting that there was "no commercial market" for the Mite (it was later to be sold as an 8-level computer terminal for about $1,495.00) and noted that the Company might go out of business if it had to meet stiff competition from Kleinschmidt and Teletype. "Connecticut needs the company," Zeiller concluded.

The flow of memos, letters and meetings went on through the late winter of 1964. Mite finally was forced to bid against competition, and won a contract for 400 units with a reported $22,000 bid, $50 per printer under Kleinschmidt according to a Dodd office memo. Blinkin wrote Dodd to thank him:

"My sincerest thanks to you and to Gerry Zeiller for the extraordinary efforts you put forth on our behalf during recent months.

"As we told you quite a while ago, win, lose or draw, we realize that you are with us all the way, and we want you to know that we are extremely appreciative and are similarly with you all the way."

On the weekend of September 18, 1964, according to Marjorie Carpenter of the late Senator's staff, "we took the MITE cash contribution up to Dodd, it was in a sealed brown envelope. Mr. Blinkin gave it to me and told me it was $2,000 in cash."

On February 25, 1965, Sen. Dodd was writing Jack Valenti, then a White House aide to President Lyndon Johnson, about Mite's problems with competitive bidding. Blinkin wrote the Senator on March 5, 1965, seeking "your assistance in determining why the award of this $4,000,000 to 6,000,000 volume of business, so vital to our employees and the New Haven area, is being continually delayed."

At stake was not just a small number of printers, but eventually as many as 5,500, TT-299 and TT-298/UG sets. Actually, the Marine Corps and the Navy were having second thoughts about the Mite design, which required air cooling, but which had to be closed up to prevent the printer from putting out electronic signals which could be picked up and decoded by the enemy.

I was in a hospitality suite at the Armed Forces Communication and Electronic Association (AFCEA) meeting here during a long discussion between Navy chiefs and the Teletype Corporation over the Teletype UGC-20, a miniature Model 28 printer that Teletype produced on a hurry-up basis to take the place of the Mites. Not only were Mites overheating, but they were breaking down completely at speeds faster than sixty words per minute. Teletype's price on the AN/UGC-20 was about $1,600 each.

Mite later got out a rather complex modification kit for its printers, and charged the Navy a steep price for it. Presumably the modifications made the Mite printers meet the original specifications.

Support, i.e. making spare parts for the Mites still in use, became onerous for Mite, and the Company asked Teletype Corp. to bid on the work, in a final, ironic conclusion to the story.

In the end, the Navy and Marine Corps bought enough Mites to bail Mite Corporation out of its research and development costs, plus a handsome profit, while the equipment was being literally thrown overboard out in the jungle.

Mite staggered in the late 1960's when the roof fell in on go-go electronics companies, and Stelma Corp ended up selling its last major production, an 8-level ASCII Mite printer, to Stelma Corp., a Data Products subsidiary, for use in the Portacom. The entire Portacom, a briefcase printer and coupler terminal for computer use, sells for less than $1,500 today. Individual Mite ASCII printers are being quoted, in new condition, for $600.00 each. ■

Our Readers Say *(from page 7)*

program this January to teach the handicapped Amateur radio and help to rehabilitate their limbs while learning to operate the equipment.

There is an immediate problem though and that is the lack of funds to pay for necessaties such as reading material and radio equipment. The only way to obtain these are by tax deductable donations by other radio amateurs. The funds would also cover the necessary publicity to let other amateurs know what's going on.

What we are asking for is some space in your magazine in order for us to let other amateurs know what we're doing and what we need.

A quick response would be greatly appreciated in order for us to get started more quickly. Also, your cooperation may instantly make our radio program a total success.

Cerebral Palsey Center
Washington Ave.
Roosevelt, NY

Low Power COSMOS Keyer

Editor, *CQ*:

In reading my article "A Low-Powered COSMOS Electronic Keyer In Two Versions", (Nov. '75 *CQ*), I have noticed a number of errors, especially in the diagrams, which were not in my manuscript and which would very much confuse the reader. I respectively request that the following corrections be published so that my article may be fully understood. In the following diagram corrections, the correct version is shown.

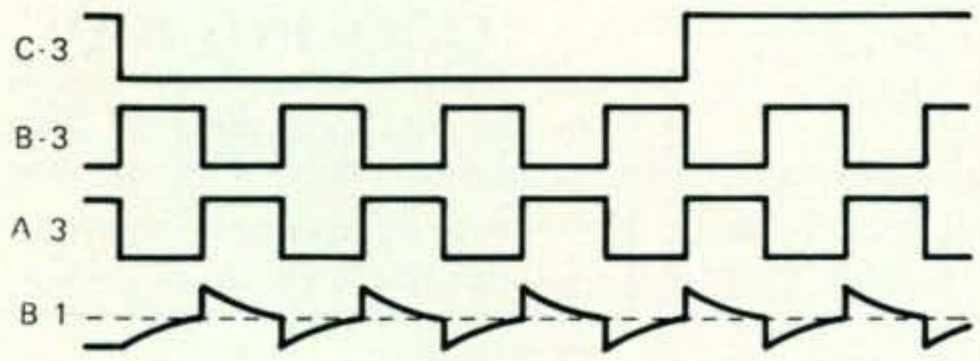


Fig. 2—Timing diagram for gated multivibrator.

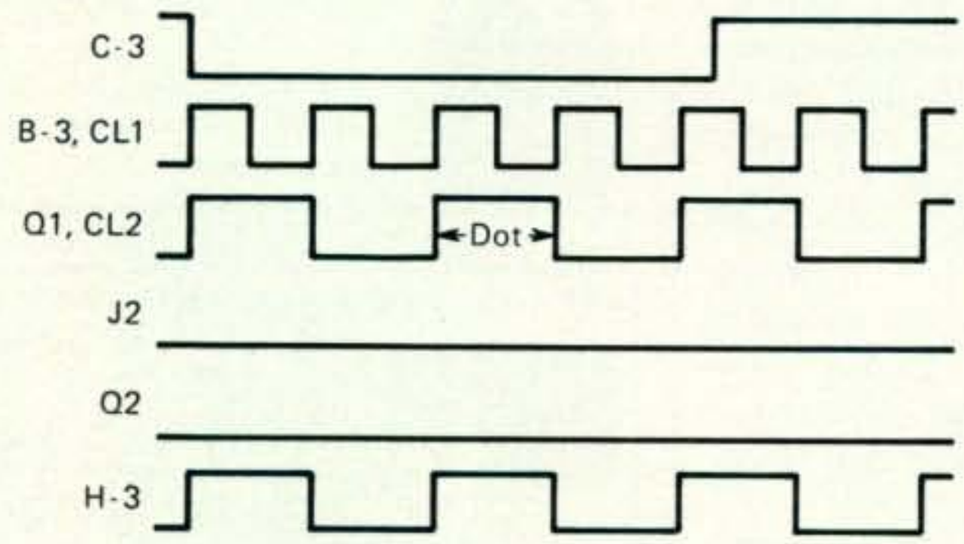


Fig. 3—Dot generation, version I keyer.

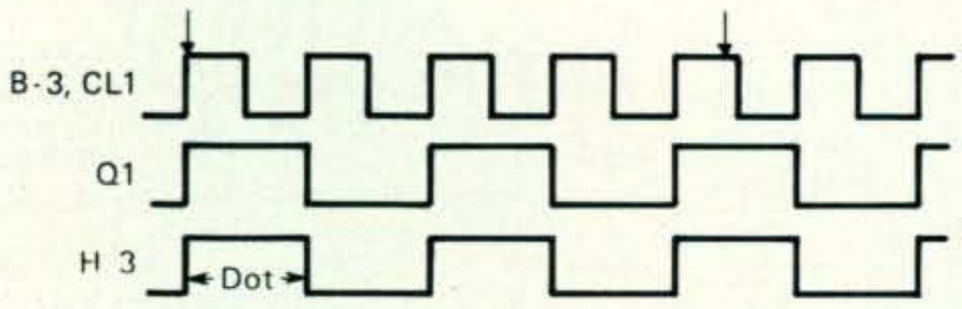


Fig. 6—Dot generation, version II keyer.

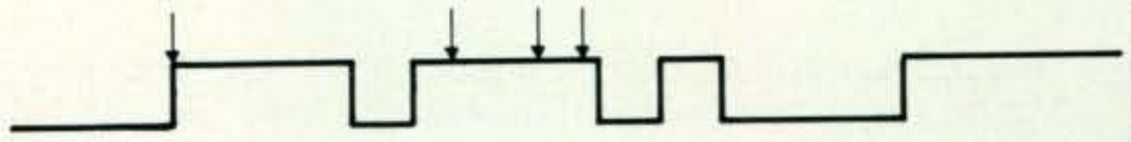


Fig. 8—Output of dash-dot keyer.

In the above diagram errors, your artist simply did not duplicate my manuscript diagrams. The following diagram errors are not errors because of a copy mistake but rather because the diagrams are incomplete. They are terminated at points which do not permit concise and correct interpretation of the diagram. Instead they will probably confuse the reader. I demonstrate these errors by again showing the correct version. By looking at your diagrams one would conclude that once the multivibrator on either version starts it never stops!

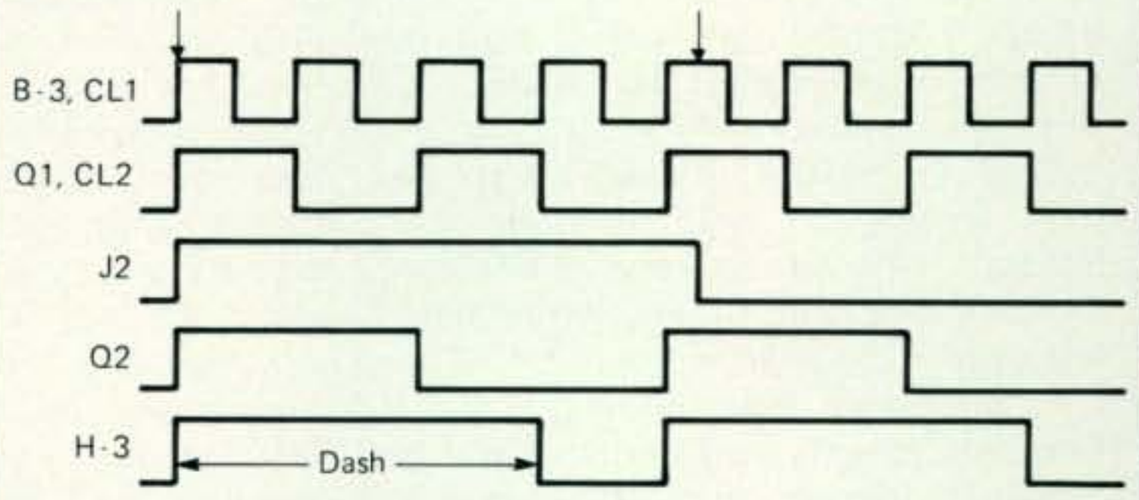


Fig. 4—Dash generation, version I keyer.

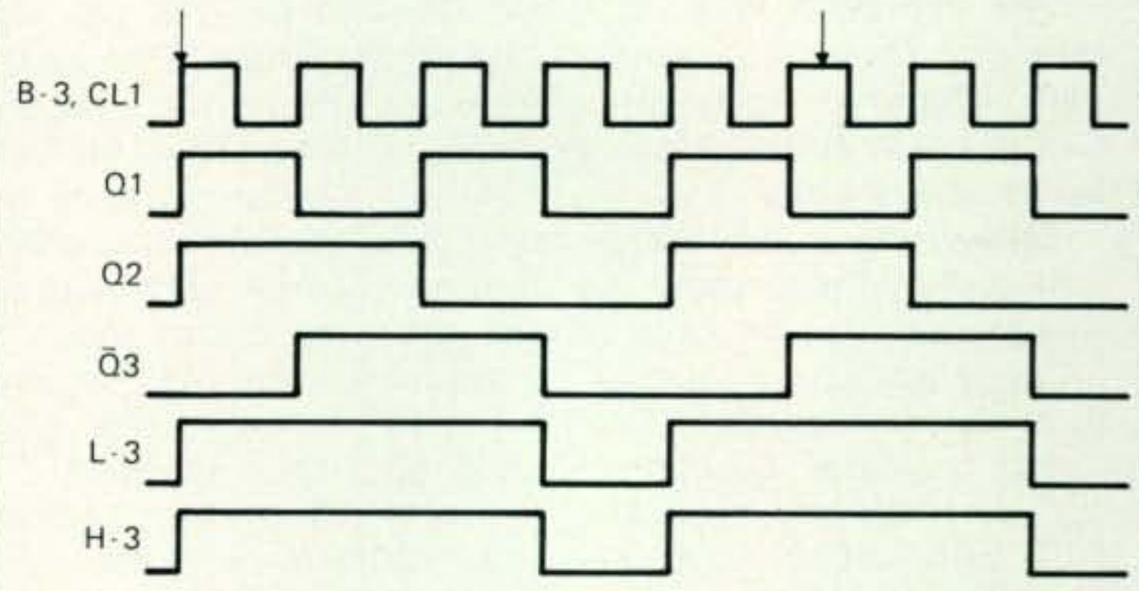


Fig. 7—Dash generation, version II keyer.

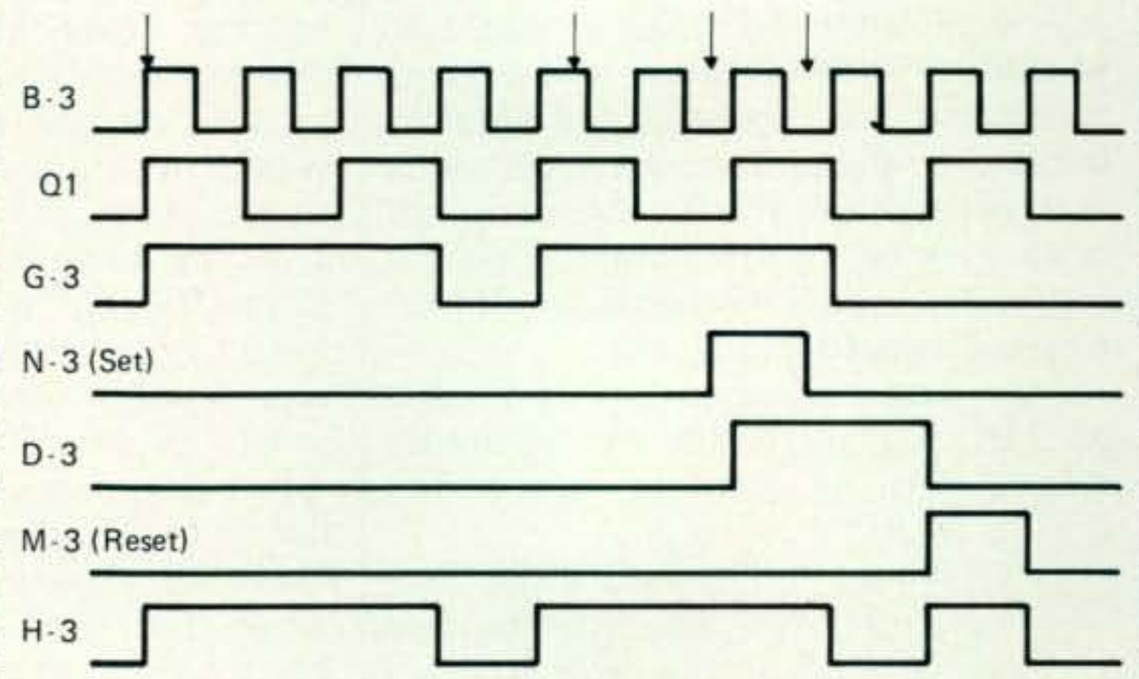


Fig. 9—Waveforms during use of dash-dot memory.

The only other mistake I found was in the paragraph under "Power Supply". It was Version II that lasted 11 hours with the Duracell battery, *not* Version I.

The above errors are serious enough to cause great difficulty in understanding the article. I am therefore asking that

you print corrections so as to make my article correct and understandable.

Thomas Raymond Crawford
Cambridge, Mass.

Recycled CRT

Editor, *CQ*:

Enclosed is a photograph of a project I recently completed that some of your readers may find of interest. This lamp makes an attractive and conversational addition to the ham shack or den.

First acquire a defunct oscilloscope C.R.T. of the flat face variety and devacuate it. The method I used to devacuate is as follows:

First wrap the C.R.T. in a blanket, with only the extreme socket end exposed. Next, with the base pointed away from yourself, gently file a minute hole in the evacuation nipple of the C.R.T. If this is done carefully, devacuation will occur slowly and the phosphorous on the C.R.T. face will remain intact. A quick devacuation may "blow" the phosphorous off the face of the tube. This doesn't render the tube unusable for this purpose but may detract from the appearance of the completed project.

Use extreme caution in the devacuation process as rough or abusive handling could cause an implosion and contribute to the diminishing number of active Radio Amateurs. The use of protective clothing such as gloves, safety glasses and a well padded coat are recommended.

Once the seal has been broken, proceed to enlarge the openening enough to accept the lamp cord.

Next, carefully drill out the metal anode connecter button on large enough to accept the lamp cord and a rubber grommet if possible.

Now you can snake the lamp cord through the anode hole and around the electron gun and out the evacuation nipple with a piece of stiff hook-up wire.

Once the lamp cord is routed through the C.R.T., the lamp socket base can be attached using a good quality two-part epoxy adhesive. Cement the base directly to the evacuation nipple. A suitable shade and socket assembly can be obtained at a nearby hardware or lighting store.

If the phosphorous remains on the face of the tube, there will be a persistant after-glow after the lamp is extinguished in a dark room.

Ronald L. Hicks, WBØNMS
Independence, MO

WØLMD Keyboard Backspace *(from page 36)*

erroneously load W3GLW. To correct this, depress the backspace switch once — this would address the next entry into the memory in the place of the second W. Depress the backspace again; this will address the next entry, K, into the memory in place of the erroneous entry, L. Then enter W. You are now ready to continue to write subsequent entries to the memory. Note that up counts only occur when a character is entered from the keyboard, and down counts can only occur when switch S_1 is depressed.

Possible Problem and Its Solution

If, after you depress the Erase Key and begin to write characters to the memory, you find that the first character written appears in the second character position, depress the Erase Key again and check the output pins of Z_2 and Z_3.

Z_2 pin 3 should be HI (+5)
Z_2 pin 2 should be LO (0)
Z_2 pin 6 should be HI (+5)
Z_3 pin 3 should be LO (0)
Z_3 pin 2 should be LO (0)
Z_3 pin 6 should be HI (+5)

These logic levels correspond to the horizontal address 5, and the vertical address 4 at which IC_{18} should release the erase latch. If you measure LO (0) on all six output pins, an address of 0, 0, IC_{18}, the 7430, is not switching fast enough. You can plug in 7430's until you find one that switches fast enough to correct the problem or replace IC_{18} with a 74H30, a high speed version of the 7430 or with a 74S30, a Schottky super fast version of the 7430.

As the user becomes more familiar with the operation of this circuit, he will find that there are other cute tricks possible using this circuit, depending upon when and where the circuits' capabilities are utilized. ■

Chicago FMers Direct Dial Police *(from page 25)*

service. Since the system was to be a 24 hour operation, the licensing requirement was all but impossible.

At one of the meetings held at the Cook County Sheriff's Police, a suggestion was made that the group was tackling the problem from the wrong angle, and that the proper approach might be to use auto-patch to the police communications center. The use of auto-patch would eliminate some of the problems associated with the third party system. However not all of the repeaters wanted to go to a full time auto-patch system, and of course the possibility that the lines might be busy in times of wide area emergencies was also discussed. The resourcefulness of radio amateurs came to the front, and a system was designed that starts with a 911

tone call from the car, or portable through the normal repeater system. A decoder is activated at the repeater by the 911 number, and connects to a special ring down line that terminates at one of the positions on a phone company call director in front of the dispatcher at the Cook County Communications Center. The dispatcher seeing the button flash, picks up the line and announces, "Cook County Sheriff's Police." The Amateur then gives his call, his repeater affiliation, his location, and the nature of the emergency. In most cases, the amateur would then disconnect by sending a # and 0 on his pad. In those cases where additional information is needed the connection can be held under the control of the Amateur. The Cook County dispatcher will handle all emergency calls for the six northern counties of Illinois.

This system has been approved by six repeaters so far, and at least two have the package working for their membership.

Properly used, this 911 in use by Amateurs can provide a great public service, and once again prove to the government, and the public in general, the advantage of Amateur Radio to the community. ■

Improving the HW-101 [*from page 44*]

ing loose or developing a poor connection between the ground foil and the chassis frame. Re-tightening the screws that hold the boards to the chassis should suffice, but for a more permanent solution, adding a few #4 flat solder lugs held by the nuts and washers used to hold the boards and soldering them to the board's ground foil at various points, will insure a better ground.

S-Meter Readings

As stated before, the i.f. gain of the set is quite high, tending to make the S-meter readings a bit too generous (even after replacing the 6HS6 with 6AU6). Also, during reception of very strong signals there may be some distortion due to product detector overload. The above can be corrected by soldering a small (¼ watt will suffice) 10 K resistor across the primary winding of the last i.f. transformer T_{103}. This will bring the S-9 reading to correspond to about 50 microvolts and the value of each S unit to between 4 and 5 db. At the same time the audio will be cleaner with strong signals.

Birdies

Some birdies show up on reception at 3.65, 3.74, 14.24 and 21.2 MHz. Although they normally are of no consequence, most can be reduced considerably by adding a .01 mf capacitor between contact no. 2 and ground foil of the bandpass board. This is the point where three brown filament wires are soldered.

Pilot Lamps

The assembly instructions and part list received by the writer called for the use of #44 pilot lamps (probably due to a printing error). This should be corrected to #47 lamps in order to maintain proper current balance in the filament circuits. The #47 lamps have brown identifying beads and draw .15 a. at 6.3 volts, each. The set should never be operated except with both these lamps on.

The writer would certainly appreciate hearing from other owners, especially concerning similar improvements and proven worthwhile modifications. ■

Antennas [*from page 47*]

a grid-dip meter to the base of the antenna through a one turn loop."

"Very good", I said. "I admire ideas like this. Don't forget that I'll send one of my Handbooks for any suggestion, idea or photograph used in my column".

Pendergast reached over and switched on the transceiver. "We haven't been listening in for over an hour", he said. "I'll bet somebody has created a new country in the meantime, and we have lost out. One has to keep on his toes these days, for all the exciting, new DX that's on the air".

"That's right", I replied. "I've heard the rumor that the Northern California DX Club is on their way to Catalina Island right now. Warm up the rig".

Pendergast raised the shade and looked out of the window. It was still raining very hard, but the wind had died down a bit.

"I guess they'll have to swm", he said grimly.

73, Bill, W6SAI

QRP [*from page 50*]

and if not, a jumper wire between two adjacent pads will provide the necessary space. Pads which serve as a ground connection are drilled thru, and a jumper wire from the pad to the underside foil established that pad as ground. In using this type of breadboard, the physical layout of components can approximate the layout of the schematic on paper, or rearranged slightly. (Some points regarding layout follow below.)

In experimenting with a multi-stage circuit, I usually follow a limit of two stages per board, with inter-connections among boards as is necessary. Two pieces of #18 wire soldered to the ground foil of two boards which have been butt-edged together provide adequate mechanical rigidity as well as minimum lead lengths for other interconnections. A chain of boards is the usual result.

The above approach coincides well with the advisable technique of developing and debugging a transmitter one stage at a time. Once the

first stage is performing to specs, the second can be added, and so on down the chain. Two alternatives apply with respect to loading the output of the stage under development. First, a carbon resistor which approximates the base input resistance of the transistor to be used in the second stage can be placed across the output of the first stage and monitored for drive developed by the stage through the use of an r.f. probe or simple r.f. indicator shown in previous columns. Second (and the approach I prefer), the base-emitter loop of the driven stage can serve as the load. In this case, the minor current loop components of the driven stage are soldered into place on the board, including the connection to the output of the first stage. An r.f. probe then monitors the r.f. drive voltage being developed at the base of the driven transistor. The collector circuit of the driven stage can be ignored until the first stage experimentation has been completed and desired performance achieved with respect to drive level and purity of signal. Working one stage at a time in the above fashion insures that problems which crop up when a new stage is hooked up are either limited to the new stage, or to a lack of isolation between the completed stage and the new stage.

Board Layout

One of the most important aspects of board layout—either breadboard or final p.c. board—is attention to d.c. and r.f. current loops as they are established on the board. Improper layout can be the source of many major problems which require debugging — parasitics, self-oscillation, inadequate stage isolation, harmonics, and inadequate gain. Generally, the experimenter should concern himself with three loops: (1) minor base-emitter r.f. loop; (2) major collector-emitter r.f. loop; and (3) d.c. lead r.f. bypassing.

The basic principle to bear in mind is that a component and its leads, in conjunction with other elements of a circuit, can establish a circuit that resonates on an undesired frequency (usually in the v.h.f./u.h.f. regions), or establish an r.f. feedback loop in one stage or between adjacent stages of an amplifier chain. The end results include the above-mentioned problems. Likewise, the same factors can influence the gain and efficiency of a single stage, or a chain of stages. In practice, some general "do's" and "don't's" should be followed, both in breadboard and final layouts. We'll get to them in the next column.

News

It's time to submit your QRPp WAS and QRPp DXCC standings for 1975. Please indicate power level. Also, QRPp DXCC listings should include number of countries QSL'd. We like to run a picture every column or so. Drop us one and let the world have a look at you!

Note: The Milliwatt

As noted in the last column, difficulties here have forced the indefinite suspension of publication of *The Milliwatt*. We are working on processing current mail, and returning outdated mail that has accumulated since August, 1975. Please hold off on correspondence, as the present process will require considerable time. We still have a decent stock of back-issues, but wait until a future announcement before attempting to submit an order. Till next month,

73, Ade, K8EEG/Ø

Novice *(from page 56)*

U.S. and Australian Amateur Examinations

By the time you read this, you will not have to wait for a year after getting your General ticket to try for your Extra class license. Who will be the first Novice to knock off the General, Advanced, and Extra class tests in one sitting? If you could pass the new Australian Novice exam, the written part of the U.S. Extra class exam might not seem too tough. Judging by their Novice test, it is no wonder that there are only 7,000 full-fledged amateurs in VK-land!

News and Views

Bill Beckerley, K6RGY, 1077 Grand Teton Dr., Pacifica, Ca. 94044, says, "My introduction to amateur radio as a Novice in 1955 when I was a sophomore in high school was the most exciting part of my amateur career. Though I hold an Advanced class license, my interests and feelings remain with the Novice genre. I served in the Navy as a Radioman from 1958 to 1961. Then I became a communications officer with an international airline, later an aircraft dispatcher, and am presently a flight controller at the San Francisco International Airport. As a hobby second to amateur radio, I have obtained a Bachelor of Laws degree and am doing some graduate work in legal research. With a wife and three children, my Kenwood T-599 transmitter, inverted-V antenna, and Hammarlund HQ-180A are somewhat under utilized at present." (Bill's QSL card shows him astride a motorcycle.) . . . **Larry Kleber,** K9LKA, 922 Whitney Blvd., Belvidere, Ill., is still going strong after 53 years in the "king of all hobbies," and is still an avid reader of all our columns. That's what he said. Larry still builds practically all his own transmitting equipment. He has been building his "dream receiver" for several years, but every time he is about to finish it, the engineers come up with something new in solid state, and back to the drawing board he goes, meanwhile limping along with a pair of Collins 75-A4's. His latest project is a device that automatically lowers his two *tall* towers when the wind hits 35 knots.

At the bottom of the page again. Send your "News And Views," pictures, and suggestions for column discussion to the address on the first page of the column.

73, Herb. W9EGQ

DX *(from page 60)*

A2CAB—Via WA2LOR
A4XGH—c/o P.O. Box 980, Muscat
C5AR and C5AU—To G3LQP
C9MFJ—Box 222, Nacala, Mozambique
CP1BCC—c/o WA2ZDF
CR6OZ—To RUA Marques de Pombal, N°4, Tomar, Portugal
CR9AK—Via W6WY, Box 717, Oakland, CA 94604
CT2BB—To W1EP
CT2BLM—c/o W1FXD
DU3BS—Box 74, APO, San Francisco, CA 96298
DU6BG—Via WA7RFH
EA8JJ—To W3HNK
EA9FG—Box 220, Madrid, Spain
EP2SN—c/o W3KT
FC2CD—Via W4KA
FGØCGV/FS—To K4KGD
FO8EJ—Box 1215, Papeete, Tahiti
FP8DX—c/o K9OTB
FR7AT—Box 278, St. Denis, Reunion Island
HS2AIG—Via WA4BKC
HS2AKO—To W3KT
HS2AKZ—c/o WB6RAD
HS3AJC—Via WA5DXI
HS5AKW—To W9NGA
HZ1AB—c/o WA6AHF
ISØSHU—Box 35, Sassari, Sardinia
JA8IEV/JD1—Via JA8JL
KC4AAA—D. Seeley, USARP South Pole Station, FPO, San Francisco, CA 96692
KC6AQ—To WA6AHF
P29WB—c/o J. W. Baker, P.O. Box 5626, Boroka, Papua-New Guinea
P29AJ, P29DW, P29HC and P29UC—Via WA7ILC
P29BS—To W3HNK
PJ9JT—c/o W1BIH
ST2SA—P.O. Box 1533, Khartoum, Sudan
TJ1BF—Via K1ZES
TU2GA—To K9KXA
VE7 Bureau—Via VE7AFY
VP1JW—Rainer, P.O. Box 257, Belize City, Belize
VP1PKW—c/o WB9LTY
VP2ABC—Box 444, Antigua, West Indies
VP2DM—Via WA9EED
VP2GRN—To W4YHB
VP2MIR—c/o W7FCD
VP8HA, VP8LC and VP8OD—Via W3HNK
VP8KR—To K7RDH, R. Haller, 4320 E. Fremont, Phoenix, AZ 85040
VR1Z and VR8B—c/o YASME Foundation, P.O. Box 2025, Castro Valley, CA 94546
VQ9HCS—Via WA1HAA
VQ9Z—To WA6HNQ
YB7AAA—c/o W1YRC
YJ8YD—Via Hotel des Casters, Santo, New Hebrides
YJ8GH—To Gordon Stanley Huckin, P.O. Box 888, Port Villa, New Hebrides
YJ8RD—c/o P.O. Box 567, Port Villa, New Hebrides
ZD8TM—Via W3KTW
ZF1CC, ZF1DG and ZF1RF—To VE7BXG
ZK2AP—c/o W0JRN, 5985 South Milwaukee Way, Littleton, CO 80121
ZS2MI—Via Box 3656, Pretoria 0001, Republic of South Africa
3V8DQ and 3V8WO—To W4NJF
5L4D—c/o WA5ZWC
5U4AG—Via W3HNK
6W8FP—To WA3NCP
8R1CB—c/o W2MIG
8R1J—Via W4MXL
8R1W—Rudolph N. King, P.O. Box 449, Georgetown, Guyana
9N1MM—To W2KV
9Q5GR—c/o P.O. Box 8456, Kinshasa, Zaire
9Y4SF—Via WA5GFS
9Y4YT—To W3DJZ

73, John, K4IIF

HAM SHOP?

YES, once again we are able to offer CQ subscribers free use of the Ham Shop on a non-commercial basis. Here's your chance to buy, sell, or swap your way into that ultimate station or just pick up some extra spending money. Join the crowd rushing to get in on the action. Run a different ad every month, and get your ads in early. Remember that we have a two month lead time in preparing CQ. Also keep in mind that with CQ's larger format there is far more room for your ads, so act now.

Fill out the form below and send it in with a recent mailing label. It's just that simple.

CQ HAM SHOP
14 Vanderventer Ave.
Port Washington, N.Y. 11050

Please run this in the next available issue of CQ:

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Address _____

City _____

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HAM SHOP

FREE TO CQ SUBSCRIBERS

Advertising Rates: Non-commercial ads are 10 cents per word including abbreviations and addresses. Commercial and organization ads are 35 cents per word. Minimum charge $1.00. No ad (non-subscriber) will be printed unless accompanied by full remittance. Free to CQ subscribers (maxamum 3 lines per month). Recent CQ mailing label must accompany ad.

Closing Date: The 10th day in the third month preceding date of publication. Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of CQ cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: **CQ Ham Shop, 14 Vanderventer Ave., Port Washington, New York 11050.**

WANTED: Used SSB XCVR in the HW-101, TR-3 SB-101, SB-102, Tempo one, etc. Price range. Must be in top notch condition, send details to B. Fetters, K8GID, 3201 Makley Dr., Lima, OH 45805.

MOULTRIE AMATEUR RADIO KLUB 15th annual hamfest April 25, Wyman Park, Sullivan, Illinois. Indoor-outdoor market. Advance ticket sales by mail only, $1.25 or $1.50 at gate. Write: MARK P.O. Box 327, Mattoon, IL 61938.

QSL CARDS - Something completely different. Nothing even close to it on the market! Samples: 25 cents. W5UTT, Box 1171E, Garland, TX 75040.

JOHNSON 275 MATCBOX SWR, Directional Coupler $78, Hal Alman 2 Meryl St. Medway Ma. 02053. (617) 533-8904.

INVERTERS - CONVERTERS - 12VDC/115/VAC 400HZ 12 VDC/24VDC, Power to 400W. Kits, transformers available. Details 25 cents. EBCO, 10 Sherwood, Nashua, H.H., 03060.

HAM RADIO CLUB needs equipment. St. John's University Jamaica, N.Y.C. 11439.

FOR SALE. FRDX-4005D, $250; DX-100B, $75. SX-99, $50; Eico 720, $30. Roger Pender, WA6BFK, 419 Westbourne Drive, Los Angeles, Ca. 90048.

HP 140A Oscilloscope, HP 1415A Time Domain Reflectometer, HP 805A Slotted Line, Like New, Manuals, Frank Stewart, 1212 Wisteria Way, Richardson, Tx. 75080.

HAM RADIO CLUBS - Engraved Pin Badges, 2 lines. $ 150, 3 Lines, $1.75. Desk Plates and Door Signs, also available. Free samples for clubs. REMS, 28 Depot St. Richmondville, NY 12149.

FOR SALE: 4 Jennings JB-12 JO-Bloks, 12 KV P.I.V. at up to 1.0 amp. $16.00, Stencor PC-S401 plate - filament transformer, $5.00, Filament transformer 110V to 6.3 v.c.t. at 10 amps, $5.00, Raytrack 30 amp. filament choke $4.00, Bud type H-9116 Chrome handles $3.50, Raytrack 6 meter plate choke on 3/4 steatite form $2.50, Retron Model 2A, type 4000 air flow switch $4.00, 3 pairs Raytheon circuit board mounting braclets, 1 1/2", 2", 2 1/2", $2.00, 3 Raytheon knots (2-MS91528-3F 2B, 1- MS91528-1F2B) $1.75. A Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

BUY-SELL-TRADE. Write for free mailer, Give name, address, call letters. Complete stock of major brands new and reconditioned equipment. Call us for best deals. We buy Collins, Swan, Drake etc. SSB and FM. Associated Radio 8012 Conser, Overland Park, Ks. 66204. 913-381-5901.

WANTED 30S1 Collins. L Rush 309 Walnut Jackson Tn. 38301.

CUSTOM EMBROIDERED CLUB EMBLEMS Your design, low minimum, informational booklet, Write Emblems, Dept. 10 Littleton, New Hampshire 03561.

MAGAZINES: CQ complete (some bound), $420; QST, 1929-73 (some bound) +33 earlier issues, $520; Ham Radio complete Aug '69 +3 issues, $40; 72 issues 73, $38; Break-In (NZ amateur magazine) complete from 1946 (except 3 issues) +1934,5,7-9,41,2 +28 other issues, $260. WA5TOZ, 1620 Los Alamos, SW, Albuquerque, NM 87104.

TEKTRONIX, Hewlett-Packard, and Military test equipment for sale. Many oscilloscopes available. Free information. American Calibration Services, Box 8104, Athens, Georgia 30601.

REPAIRS. K6BE. 415-548-1889.

SELL TS700. Kenwood all mode transceiver plus KLM linear amplifier and VHF engineering PSU comprise perfect condition all solid state 2 meter station. 140 watt output of SSB, AM, FM or CW from 12VPC or 110 VAC. Inspect NYC. $750.00 complete but will split or ship. Tel. (212) 427-2133.

UNSCRAMBLE POLICE CODE with decoders. Works on all scanners and receivers. For prices and brochure, write: Don Nobles, Route 7, Box 265B, Hot Springs, Ark. 71901. 501/623-6027 (Dealers Wanted)

F.M. BASH, DAYTON, OHIO, April 23, 1976 on the Friday night of the Dayton Hamvention. This is a social evening for all Hams and their ladies from 9 pm til midnight. Free admission, free snacks, C.O.D. bar, live entertainment by TV personality Rob Reider (WA8GFF) and his group. The 11 pm prize drawing will feature a CLEGG FM-DX and other prizes. A new larger location at the Dayton Biltmore Towers, (First and Main St. 45402) will accommodate the crowd and afford 3 alternate routes to the Hamvention Center. Make your reservation direct to stay where the action is.

FOR SALE: 9 Globar 470 ohm 50 watt non-inductive resistors, fuse-clip mtg. $10., IRC 5K, 225 watt adjustable power resistor, $2.75 Simpson Model 29" 0 - 1.5 ma d.c. meter, $6.00, 10 transmitting capacitors, 500 mmf (7 - 20KV, 3 - 10KV), $10.00, 4" National Steatite pillar (x 3/4) screw top, mtg. base, $2.00, Plate Transformer, 7200 v.c.t. @ 1 amp 115/230 pri., $35.00. Variable Transformer (Variac), General Radio type 100-R, 230 volt, 2KV, maximum current 9 amps, $15.00. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, N.Y. 11050.

MAGAZINES FOR SALE: CQ/73/QST/Ham Radio, issues at 20 cents each (including USA shipping) from Lockheed Ham Club, 2814 Empire, Burbank, CA 91504. Send list and check. Available issues and any refund due will be sent promptly.

FOR SALE: 480 back issues of QST from 1935 through 1973, most in binders, $125.00 plus shipping. 116 back issues of 73, including first 3, from 1960 through 1968, $70.00 plus shipping. Ed Hopper, W2GT, P.O. Box 73, Rochelle Park, N.J. 07662.

LOOKING FOR old Lionel trains. Interested only in "O" Gauge, excellent to like-new condition. Primary interest is locomotives prior to 1952, but will consider complete sets or more recent models. Am willing to buy outright for cash or swap radio gear to meet your needs. Write Dick Cowan. WA2LRO, c/o CQ Magazine, or call 516/883-6200.

SELL: 4-1000 A used, $30. 1,000 pf loading cap. $7. Raytrack kw plate tank coil for 80 & 40 plus kw bandswitch $16. UTC S-50 6Kv c.t. 300 ma, new, pick-up only, $75. 7200 v.c.t. 1 a. 115/230 v. pri. $35. Pick-up only. OZ-PAKS: Large (several kw) $30; small (2 (2 kw) $20. R. Ross, 95 Norwood Ave., Northport, NY 11768.

NOVICE, GENERAL AND CODE COURSES are available at the Harrison, New York School of Continuing Education. 10 two hour sessions one evening a week. Contact George Buchanan WB2FVX (914) RO-1-4183.

NORTHWESTERN PENNSYLVANIA Swapfest. May 1, Crawford County Fairgrounds, Meadville. Free Admission. $1 to display. Flea market begins at 10 AM. Hourly door prizes; refreshments. Commercial displays welcome. Indoor if rain. Talking 146.04/64 and 146.52 Mhz. Details, Crawford Amateur Radio Society, Box 653 Meadville, Pa. 16335.

25th DAYTON HAMVENTION at HARA Arena April 23, 24, 25, 1976. Technical forums, exhibits, and huge flea market. Program brochures mailed March 8th, to those registered within past three years. For accommodations or advance flyer, write Hamvention, P.O. Box 44, Dayton, Oh. 45401.

FREE CATALOG. LEDS, Mecrophones, Nicads, IC's, Relays, Ultrasonic Devices, Precision Trimmer Capacitors, Digital Thermometers, Unique Components. Chaney's, Box 15431, Lakewood, Co. 80215.

CUSTOM EMBROIDERED PATCHES, no minimum, no shape or color limits. Doubleknit vests, nylon jackets, custom imprinted tee-shirts LePhCo, 2860G Pinkerton, Zanesville, Oh. 43701 (614) 453-6966.

TECH MANUALS — $6.50 each: SP-600JX, URM-25D, OS-8B/U, BC-348JNQ. Thousands more available, Send 50 cents (coin) for large list. W3IHD, 7218 Roanne Drive, Washington, DC 20021.

WANTED: Old magazines, Books, Catalogs, Call books and early Radio receivers, parts Etc. Erv Rasmussen W6YPM 164 Lowell, Redwood City Ca. 94062.

FREQUENCY METERS. Military Surplus FR-5U, 10 Mhz to 100 Mhz, .001% accuracy $60. FR-6U, Same as above, except 100 Mhz to 500 Mhz, $60. Dick, W6BKY, Box 1633, Palo Alto, Ca. 94302.

TUBES: Have several new JAN 4CX-1000's, most in sealed plastic bags $55 each. 4 ea. 4CX-300A in hermetically sealed cans $9.50 ea. 6 ea. 8121 at 660w. DC in per tube 6M or 2M. $13.50 ea. Many 813, 4-125, 4X-150A, and others G.W. Grant, 1810 Hillsdale Rd., no. 40, El Cajon, Ca. 92020.

FOR SALE: FET V.F.O. and power supply, 8-8-9 MHz, extremely stable, as per QST article, Dec. 1966, P. 11. All high quality components used throughout. $35.00. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave. Port Washington, N.Y. 11050.

Did you know that supplements to the book, "CQ YL," are available? They bring the book up to date with YLRL Officers through 1973 and the 6th YLRL Convention, held at Long Beach in May '72. If you have a copy of "CQ YL" and would like to add the new supplements (the pages are "slotted" so they fit directly into the "CQ YL" Spiral backbone), drop a note with your request to author/publisher, W5RZJ, Louisa Sando, 4417 11th St., NW, Albuquerque, NM 87107. Please enclose two 13 cent stamps to cover cost of mailing. The one and only book about YLs in ham radio, "CQ YL," contains 21 chapters, over 600 photographs. Order your autographed copy, or a gift copy, from W5RZJ, $3.00

LEARN CODE in a few days with audio reflex method of teaching letters, numbers, punctuation. One hour cassette only $7.00. Guardian 20 E. Main Ramsey, N.J. 07446.

SOLAR CELLS DISCOUNT PRICES: 35% off list. Free information: Solenco, 818-Q 18th Street, Washington, D.C. 20006.

ROCHESTER HAMFEST 1976 is Saturday, May 22. Your name added to mailing list or information - - write: Rochester Hamfest, Box 1388, Rochester NY 14603.

MODERN 60 MIN CODE CASSETTES. Novice 0-5 wpm, General 13-15 wpm, Extra 20-22 wpm. $3 Ea. 4/$10. Royal Box 2174 Sandusky Oh. 44870.

BICENTENNIAL QSL samples 25 cents. The Q-Card Co. P.O. Box 413 Chester, Va. 23831.

RTTY - NS-1A PLL TU (RTTY Journal 1/76) Improved version, AFSK, FSK. Wired/tested $29.95 ppd. SASE for info. Nat Stinnette Electronics, Tavares, FL 32778.

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ADVERTISER'S INDEX

Propagation *(from page 67)*

HAWAII

Openings Given In HST #

To:	15 Meters	20 Meters	40 Meters	80 Meters
Eastern USA	08-12 (1) 12-14 (2) 14-16 (1)	04-06 (1) 06-08 (2) 08-12 (1) 12-14 (2) 14-16 (3) 16-18 (2) 18-20 (1)	18-19 (1) 19-21 (2) 21-00 (3) 00-02 (2) 02-03 (1)	19-21 (1) 21-00 (2) 00-02 (1) 22-01 (1)*
Central USA	08-12 (1) 12-15 (2) 15-17 (1)	04-06 (1) 06-08 (2) 08-12 (1) 12-14 (2) 14-17 (3) 17-19 (2) 19-21 (1)	18-19 (1) 19-21 (2) 21-01 (3) 01-04 (2) 04-05 (1)	19-21 (1) 21-01 (3) 01-02 (2) 02-03 (1) 22-02 (1)*
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Contest Calendar *(from page 65)*

Cantons worked on each band. (A possible 22 from each band.)

Awards: Certificates to the top scorers in each country and each W/K and VE/VO call areas.

Indicate a Canton in a separate column only the first time it is worked on each band. Check your log for duplicate contacts, include a summary sheet showing the scoring, and your name and address in Block Letters. The usual signed declaration is also requested.

Mail your log within 30 days to: USKA Traffic Mgr., Rene Oehninger, HB9AHA, im Moos, 5707 Seengen, Switzerland. ■

Awards *(from page 62)*

his "Good Buddy Award"; plus his new "Who's Who in County Hunting" which should be ready by the time you read this.

Other fine bureaus for forwarding County Hunter QSLs are: Jim Hoffman, K1ZFQ, 42 Gresham Street, Milford, Conn. 06460 and Bob Schmarden, WA2AEA, 4 Pinewood Circle, Corning, N.Y. 14830. Send s.a.s.e. for details to them. For more data on County Hunting, QSLs, Net procedure, etc. . . . send self-addressed envelope with 35¢ in stamps on it to: Bertha Eggert, WA4BMC, P.O. Box 6811, Southboro Station, West Palm Beach, Florida 33405.

How was your month?

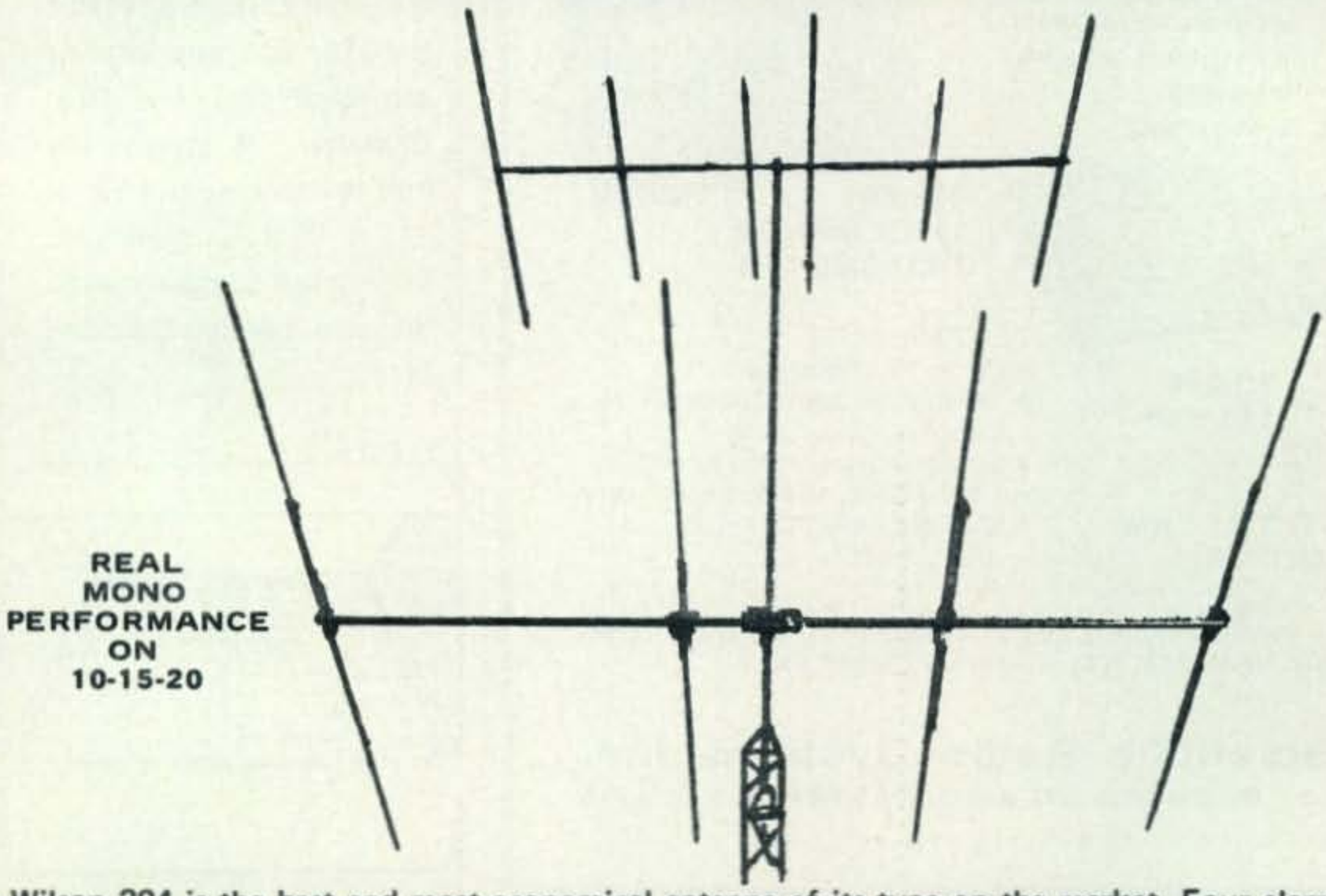
73, Ed., W2GT.

Spread The Word

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

Wilson Electronics Corp.

WILSON 204 MONOBANDER PLUS DB33



REAL MONO PERFORMANCE ON 10-15-20

The Wilson 204 is the best and most economical antenna of its type on the market. Four elements on a 26' boom plus a 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. Using taper swaged slotted tubing permits larger diameter tubing where it counts, for maximum strength with minimum wind loading.

The DB33 is the newest addition to the Wilson line of antennas. Designed for the amateur who wants a lightweight, economical antenna package, the DB33 compliments the M204 for an excellent DXers combination.

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 52 Ω Gamma Match
- Quality Aluminum
- Handle 4kw
- Heavy Extruded Element to Boom Mounts

WILSON AMATEUR ANTENNA SPECIFICATIONS

	Forward Gain (dB)	Front-to Back Ratio (dB)	Front-to Side Ratio (dB)	Boom Length (ft)	Number Elements	Longest Element (ft)	Turning Radius (ft)	Surface Area (sq ft)	Wind load at 80 MPH (lbs)	Assembled Weight (lbs)	Shipping Weight (lbs)	Price
M240	5.5	17	30	30	2	73'0"	39'6"	10.0	250	60	63	$299.00
M520	12.0	26	30	40	5	36'4"	27'0"	5.0	125	90	96	269.00
M204	10.0	25	30	26	4	36'4"	22'6"	3.9	100	46	49	139.00
M155	12.0	26	30	26	5	24'3"	18'0"	3.7	93	41	44	139.00
M154	10.0	25	30	20	4	24'3"	15'9"	3.0	75	30	32	89.00
M106	13.0	26	30	31	6	19'0"	16'1"	2.9	73	34	36	99.00
M104	10.0	25	30	17	4	18'0"	12'9"	2.0	50	20	22	64.95
DB54(20)	12.0	26	30	40	5	36'4"	27'0"	7.9	198	105	119	299.00
(15)	10.0	25	30		4	24'3"						
DB43(15)	8.5	20	30	26	4	24'3"	15'8"	4.3	108	36	38	119.00
(10)	10.0	25	30		3	18'0"						
DB33(15)	8.5	20	30	17	3	24'3"	12'2"	3.8	95	31	33	89.00
(10)	8.5	20	30		3	18'0"						

All Wilson Antennas are FACTORY DIRECT ONLY! The low prices are possible by eliminating the dealer's discount. Most antennas in stock. If you order any antenna, you may purchase a CDR Ham II for $124.95 or a CDR CD44 for $85.95. Send check or money order, or phone in BankAmericard or Master Charge. All 2" Boom antennas shipped UPS, 3" by truck.

Call for special Tower, Antenna & Rotor Package.

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6 Meter Transceiver

Our all new 6 meter solid state, 10 watt SSB, CW and AM transceiver features in one compact unit complete band coverage in eight 500 KHz segments with 1KHz VFO readout across the entire band. Provision for up to four crystal controlled channels in each of the eight band segments, a receiver offset clarifier, and an effective noise blanker — all add up to total operating flexibility. A built-in AC and DC power supply adds to the portability of the FT-620B transceiver.

Add up all these features and you have another total performance transceiver from **the radio company.**

FTV-650B
6 Meter Transverter

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2 Meter Transverter

Join the VHF action with the FTV-650B and FTV-250. These matching economical additions offer VHF transmitting and receiving when coupled to your HF transceiver.

All Yaesu products are backed by a strong warranty and a nationwide sales and service dealer network.

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