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Amateur Radio

SERVING AMATEUR RADIO SINCE 1945

JUNE 1991 \$2.95

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CQ

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John Schultz Reviews the New Kenwood TS-850S . . . page 22

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On The Cover: W0AIH

74820
AMATEUR'S JOURNAL

AMATEUR'S JOURNAL

KENWOOD



Double Header!

TH-77A

Compact 2m/70cm Dual Band HT

Here's a radio that deserves a double-take! The TH-77A is a feature-packed dual band radio compressed into an HT package. The accessories are compatible with our TH-75, TH-25, and TH-26 Series radios. Repeater and remote base users will appreciate the DTMF memory that can store all of the DTMF characters (*, #, A, B, C, and D) that are usually required for repeater functions!

- **Wide band receiver coverage.** 136-165 (118-165 [AM mode 118-136] MHz after modification) and 438-449.995 MHz. TX on Amateur bands only. (Two meter section is modifiable for MARS/CAP. Permits required.)
- **Dual receive/dual LCD display.** Separate volume and squelch controls for each band. Audio output can be mixed or separated by using an external speaker.

- **Cross band repeat function.**
- **Dual Tone Squelch System (DTSS).** Uses standard DTMF to open squelch.
- **CTCSS encode/decode built-in.**
- **Forty-two memory channels.** All channels odd split capable.
- **DTMF memory/autodialer.** Ten 15-digit codes can be stored.
- **Direct keyboard frequency entry.** The rotary dial can also be used to select memory, frequency, frequency step, CTCSS, and scan direction.
- **Multi-function, dual scanning.** Time or carrier operated channel or band scanning.
- **Frequency step selectable for quick QSY.** Choose from 5, 10, 12.5, 15, 20, or 25 kHz steps.
- **Two watts (1.5 W on UHF) with supplied battery pack.** Five watts output with PB-8 battery pack or 13.8 volts. Low power is 500 mW.
- **DC direct-in operation** from 6.3-16 VDC with the PG-2W.
- **T-Alert with elapsed time indicator.**
- **Automatic repeater offset on 2 m.**
- **Battery-saving features.** Auto battery saver, auto power off function, and economy power mode.

- **Supplied accessories:** Flex antenna, PB-6 battery pack (7.2 V, 600 mAH), wall charger, belt hook, wrist strap, keyboard cover.
- Optional accessories:**
 - **BC-10:** Compact charger
 - **BC-11:** Rapid charger
 - **BH-6:** Swivel mount
 - **BT-6:** AAA battery case
 - **DC-1/PG-2V:** DC adapter
 - **DC-4:** Mobile charger for PB-10
 - **DC-5:** Mobile charger for PB-6, 7, 9
 - **PB-5:** 7.2 V, 200 mAh NiCd pack for 2.5 W output
 - **PB-6:** 7.2 V, 600 mAh NiCd pack
 - **PB-7:** 7.2 V, 1100 mAh NiCd pack
 - **PB-8:** 12 V, 600 mAh NiCd for 5 W output
 - **PB-9:** 7.2 V, 600 mAh NiCd with built-in charger
 - **PB-11:** 12 V, 600 mAh OR 6 V, 1200 mAh, for 5 W OR 2 W
 - **HMC-2:** Headset with VOX and PTT
 - **PG-2W:** DC cable w/fuse
 - **PG-3F:** DC cable with filter and cigarette lighter plug
 - **SC-28, 29:** Soft case
 - **SMC-30/31:** Speaker mics.
 - **SMC-33:** Speaker mic. w/remote control
 - **WR-1:** Water resistant bag.

KENWOOD U.S.A. CORPORATION
COMMUNICATIONS & TEST EQUIPMENT GROUP
P.O. BOX 22745, 2201 E. Dominguez Street
Long Beach, CA 90801-5745
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Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications and features are subject to change without notice or obligation.

KENWOOD

The DXpeditioner!

TS-440S

Compact high performance HF transceiver with general coverage receiver

Portable reliable performance and ease of use makes the TS-440S your obvious "low bands" choice. It is "Every Ham's" rig to go — ham shack, portable or mobile. But don't let the small size fool you — there's lots of "big rig" performance packed into this package. Built-in antenna tuner option. Continuous duty transmitter. Super DynaMix™ front end. Five filter functions. The TS-440S is at your service wherever you wish to operate.

- **Covers all Amateur bands**

General coverage receiver tunes from 100 kHz–30 MHz. Easily modified for HF MARS operation.

- **Direct keyboard entry of frequency**

- **All modes built-in**

USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.

- **VS-1 voice synthesizer (optional)**

- **Built-in automatic antenna tuner (optional). Covers 80–10 meters.**

- **5 IF filter functions**

- **Superior receiver dynamic range**

Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500 Hz bandwidth on 20 m.)

- **100% duty cycle transmitter**

Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB. 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The PS-50 power supply is needed for continuous duty.)

- **Computer interface port**

- **Adjustable dial torque**

- **100 memory channels**

Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.

- **TU-8 CTCSS unit (optional)**

- **MC-43S UP/DOWN mic. included**
- **Superb interference reduction**
IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and opt. filters fight QRM.
- **Dual SSB IF filtering**
A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, dual filtering is provided.
- **VOX, full or semi break-in CW**
- **AMTOR compatible**



Optional accessories:

- **AT-440** internal auto. antenna tuner (80 m – 10 m)
- **AT-250** external auto. tuner (160 m – 10 m)
- **AT-130** compact mobile antenna tuner (160 m – 10 m)
- **IF-232C/IC-10** level translator and modem IC kit
- **PS-50** heavy duty power supply
- **PS-430** DC power supply
- **SP-430** external speaker
- **MB-430** mobile mounting bracket
- **YK-88C/88CN** 500 Hz/270 Hz CW filters
- **YK-88S-88SN** 2.4 kHz/1.8 kHz SSB filters
- **MC-60A/80/85** desk microphones
- **MC-55** (8P) mobile microphone
- **HS-4/5/6/7** headphones
- **SP-41/50B** mobile speakers
- **MA-5/VP-1** HF 5 band mobile helical antenna and bumper mount
- **TL-922A** 2 kw PEP linear amplifier
- **SM-220** station monitor (no pan display)
- **VS-1** voice synthesizer
- **TU-8** CTCSS tone unit
- **PG-2C** extra DC cable.

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KENWOOD

Mobile Companion!

TM-241A

TM-441A/TM-541A

Compact FM Mobile transceivers



Here are your new mobile companions — at your service whenever you're on the road! Their compact size makes installation a snap, and the remote control options allow you to customize your installation for that "professional" look!

- **Wide band receiver coverage.** The TM-241A receives from 118–173.995 MHz. Transmit range is 144–148 MHz. (Modifiable for MARS and CAP operation, permits required.)
- **TM-441A** covers 438–449.995 MHz, and the **TM-531A** covers 1240–1299.995 MHz.
- **CTCSS encode built-in, selectable from the front panel.**
- **Selectable frequency steps** for quick and easy QSY.
- **TM-241A provides 50 W. TM-441A 35 W, and TM-541A 10 W.** Three power positions, 5, 10, and full. The TM-541A has two power positions, 1 and 10 watts.
- **20 full-function memory channels** store frequency, repeater offset, sub-tone frequencies, and repeater reverse information. **Repeater offset on 2m is automatically selected.** There are **four channels** for "odd split" operation.
- **Tone Alert System with Elapsed Time indicator.**
- **Auto-power off function, and time-out timer.**



RC-20 Remote Control Unit

As supplied, one RC-20 will control one transceiver. **Most often-used front panel functions** are controllable from the RC-20. The RC-20 and IF-20 combine to allow control of up to four radios.

- **Selective calling and pager option.** The DTU-2 option enables the Dual Tone Squelch System (DTSS), allowing selective calling and paging using standard DTMF tones.
- **Digital recording system option.** Used in conjunction with the tone alert system, the DRU-1 allows message storage of up to 32 seconds.
- **Multiple scanning functions.** Band and memory scan, with selectable scan stops and memory channel lock-out.
- **Large LCD display with four-step dimmer control.**
- **Automatic Lock Tuning (ALT) for the TM-541A.** Compensates for drift.

- **Supplied accessories.** Mounting bracket, DC cable, fuses, MC-44DM multi-function DTMF mic.

Optional accessories

- **DRU-1** Digital Recording Unit
- **DTU-2** DTSS unit • **IF-20** Interface unit, used with the RC-20, allows more than two transceivers to be remotely controlled
- **MA-700** 2m/70cm dual band antenna with duplexer (mount not supplied)
- **MB-201** Extra mounting bracket
- **MC-44** Multi-function hand microphone
- **MC-55** (8-pin) Mobile mic. with time-out timer
- **MC-60A, MC-80, MC-85** Base station mics.
- **PG-2N** Extra DC cable
- **PG-3B** DC line noise filter
- **PG-4G** Extra control cable
- **PG-4H** Interface connecting cable
- **PG-4J** Extension cable kit
- **PS-50/PS-430** DC power supplies
- **RC-10** Handset remote controller
- **RC-20** Remote control head
- **SP-41** Compact mobile speaker
- **SP-50B** Mobile speaker
- **TSU-6** Programmable CTCSS decoder

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The Radio Amateur's Journal



ON THE COVER: Seen at the antenna switch at his Eau Claire, Wisconsin QTH is the Reverend Paul Bittner, W0AIH. Out on the farm, Paul's main crops appear to be of the aluminum, steel and copper varieties. (Photo by Larry Mulvehill, WB2ZPI who also shot last month's cover, although we failed to credit him. Sorry 'bout that!)

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The battle of the BBSes continues with enough ambiguity to keep attorneys busy for some time to come. Some amateurs feel that because the technology exists, they have an apriori right (since real time precludes it) not to be responsible for message content passing through their unattended automatic packet radio systems. You have to admit that to slow down things so as to read and pass judgment on everything passing through the system would sort of defeat the purpose of the system.

The government, on the other hand, seems to feel it has an apriori right to distinguish what it deems to be broadcasting and therefore not part of amateur radio, and to take what it feels is appropriate action.

There are some things, easily recognizable, which most people would construe as broadcasting. These usually involve a commercial product or service being offered for sale. These are the issues from which most people in amateur radio shy away. The cloudy issues which have been raised involve implied or inferred profit somewhere down the line by an unnamed group or individual. That sort of opens a Pandora's box of opportunity to create an ever-enlarging list of what is acceptable and what isn't.

So we apparently have a conflict in that we are technologically capable of passing traffic at remarkable rates whether we are in attendance or not, and at the same time we are also responsible for what our stations and our licenses are used. That is a quandary fit for Solomon.

If we were to assume for a moment that a very specific and finite list did exist to guide us as to what terminology, phraseology, amateur radio public service, and more importantly what ideology were permitted, its very existence would preclude automatic message handling since everything would have to be screened against that list. A very interesting conundrum.

This past January ten of our amateur radio brethren were cited for "broadcasting" via their BBSes. The timing is interesting, as was the "product" being offered for profit, if by extension you view political dissension as a "product." The offending commercialism was a 900 phone number for an anti-war group protesting our participation in the war with Iraq. Strictly by coincidence, no doubt, the citations were issued from the FCC office in Norfolk, Virginia, which is by happenstance a large military installation. I'm sure that had nothing to do with it and it was all very routine.

Being a devout hawk for most of my life, I still find it hard to see the commercialism in this 900 phone number incident. Maybe the government through the

FCC office in Norfolk would have come down just as hard on a 900 number for a Cancer Care Telethon at that same time. I'd like to believe that it wasn't a crude attempt to stifle dissent and selectively carried out. I hope I'm wrong, but that's what it looks like.

I don't think I know, or have met, any of the ten involved in this situation, so I really can't pass judgment on their motivation. I do know from reading the releases and correspondence generated that they seem to share a righteous indignation and are trying to deal with what they perceive as an implied application of an unclear statute. Their frustration and to some degree anger are due in part to their dealing with the letter of the law itself, and not possibly with the intent of the accusation.

Obviously, the overwhelming majority of people actively supported our efforts in the war with Iraq. We were all in a highly charged emotional state of readiness and accepted the fact that we were going to war. We were in vocal agreement that the lessons of Vietnam would not have to be relearned and that anti-war sentiment would be shunned so as not to give comfort and aid to the enemy.

January 1991 was indeed a very special time if you consider what everyone was feeling. This particular offense coincidentally taking place at this same time does leave one with a feeling of overzealousness on someone's part. Perhaps in a state of war one could try to make a case for the ends justifying the means. I really don't know why this particular charge at this particular time, but it does seem suspect.

Going back to discuss what a basic BBS is, is sort of a reiteration of what I wrote about last month. The technology has made possible things that are only limited by one's imagination. Proferring a law does not make the technology exigent. Some happy medium will have to be devised to recognize the potential (and the reality) of the technology, and the demands and intent of the law. I do not believe that as a group we are as pristine as we would like others to believe. However, it does not follow that we flagrantly disregard the law either. The statutes that govern amateur radio by their very nature lag far behind the technology. The same can be said for most laws, as they are created to protect or defend something that exists now, not necessarily ten years from now, or even next year. Whether a law by itself is legal or even enforceable is a whole other story involving the concept of case law.

It looks as if these ten amateurs really stepped in it, and may the best lawyer win. I do wonder, though, if the anti-war group sponsoring the 900 number had

been a not-for-profit organization, would the charge still be commercialism, as technically since there is no profit, there is no commercialism. Perhaps then we could amend 97.113(a) to include altruism.

Perhaps we as amateurs are overly sensitive, or maybe even a bit borderline paranoid. A month after the BBS situation we had the power survey (reported on in this issue), and let's face it: We haven't had this much interest placed on us for a long time—if ever. Maybe we've grown complacent over the years and think of ourselves as sacrosanct and above the law. Maybe it's normal to expect a governing agency to govern once in a while. Maybe they're here from the government and they are here to help us. Maybe the whole thing isn't arbitrary and capricious.

As the technology continually improves, as it will, we will be able to pass data at faster and faster rates, making any real time controls impossible. After-the-fact censoring still leaves a tinge of responsibility for something that, given the speed and volume, cannot realistically be enforced. I would rather not see a heavy hand come down that would in effect deny the technology simply because there is the possibility for abuse.

At the same time let us as amateurs not confuse the definitions of altruism and naivete. As a group we tend to be altruistic, trying basically to help foster health and welfare. We do not enjoy a special status that makes us exempt from the law. We do enjoy the right, under our licensing structure, to fail the element on Rules & Regulations and still get an amateur license. We don't really have to know what we should and shouldn't do (and what can happen if we transgress). That is naive.

In the BBS situation someone or some group took umbrage at the message and knew the rules. At this writing, the active war is over, but the aftermath is far more devastating than the war itself. Let us hope that this amateur radio incident was an aberration and that its aftermath doesn't produce "collateral damage." To discuss logically and rationally the guilt or innocence of these ten amateurs and a clarification of the Rules and their intent in my opinion would require a much different incident, different time frame, and no threat of war. Laws and rules are written specifically to be loose and somewhat vague so as not to box in the writer with absolutes and present targets of opportunity for legal staffs. To seek an absolute, clear-cut, unambiguous clarification can (and does) elicit more than everyone bargained for, and everyone loses. As my mother always said, "Be careful of what you want, because you're liable to get it."

73, Alan, K2EEK

high-quality

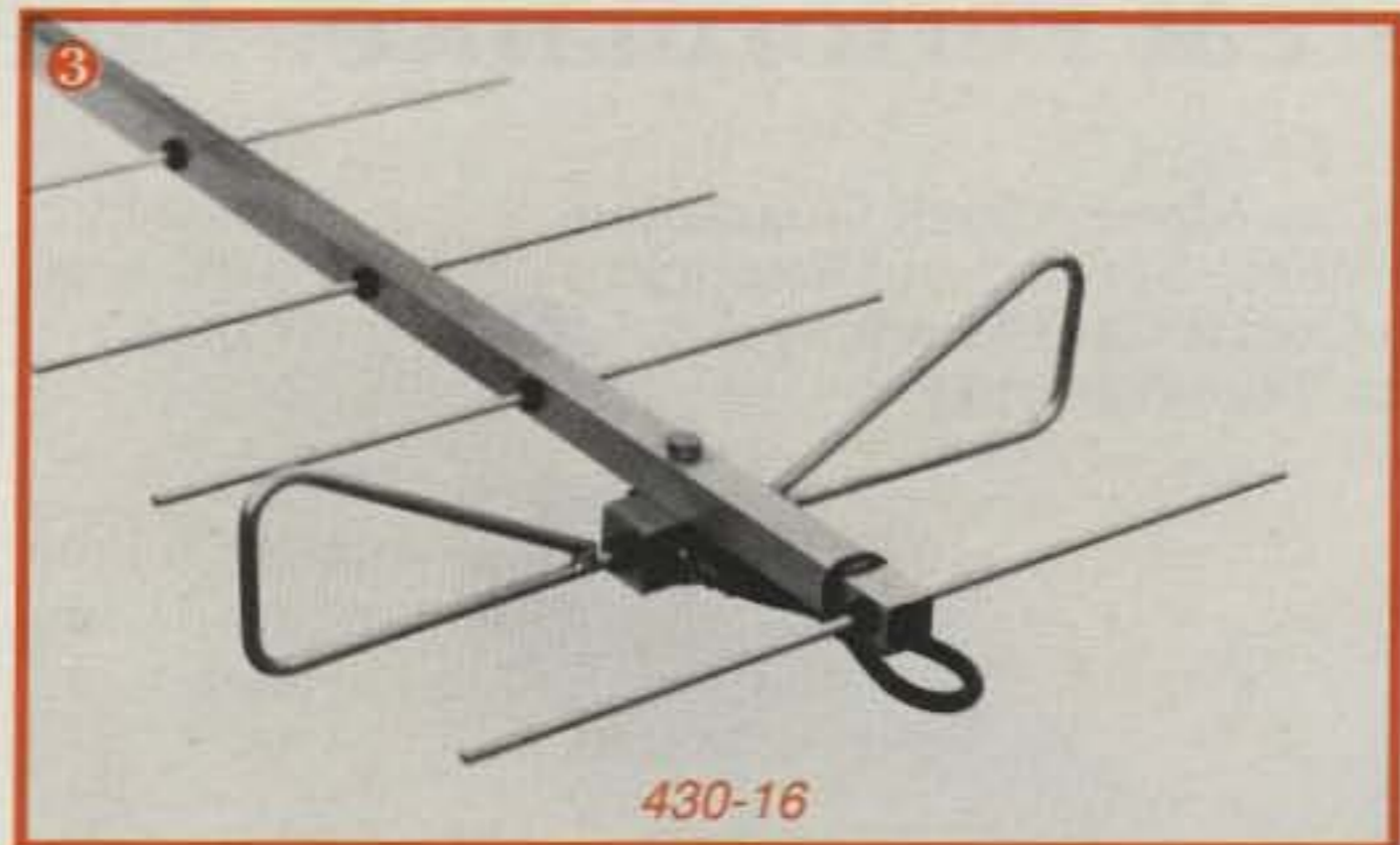


low-cost

Amateur Television Products



VSB-70



430-16



RLA-70 w/MPS-100



AVT Master

① **NEW! VSB-70 ATV Transceiver:** the only amateur television transceiver utilizing VSB (Vestigial Sideband) technology to minimize adjacent channel interference and preserve spectrum space; built-in UHF GaAsFET preamp to improve reception; covers the 70 cm band, 420 - 440 MHz; inter-modulation distortion less than -42 dBc; one watt PEP output; monitor transmitted and received signals on your standard TV receiver; audio and video input via front panel 10-pin camera jack or rear panel RCA audio and video inputs (switchable); crystal-controlled or variable-tuning down converter; crystals for 434 and 439.25 MHz are included; optional crystals for 421.25 and 426.25 are available; requires 13.6 VDC @ 1.5 amps **\$349.95**

② **NEW! RLA-70 Remote Linear Amplifier with Power Supply:** mast-mounted amplifier boosts your ATV signal up to 50 watts PEP; equivalent to a 100 watt amplifier in the ham shack with a 3 dB line loss; built-in GaAsFET preamp mounted at the antenna where it does the most good; power supplied through the coax; includes MPS-100 Multi-purpose Power Supply: provides a well-regulated 28V DC @ 6 amps for the RLA-70; also provides regulated 13.6V DC @ 2 amps for the VSB-70 **\$699.00**

③ **430-16 Antenna:** high-performance, computer optimized yagi specifically designed for ATV operation; broadband frequency

coverage from 420 to 440 MHz; 16 elements give you 14.3 dBd gain; O-ring sealed connectors; 28 degree E-plane beam width; 32 degree H-plane beam width; 10 foot boom **\$119.95**

④ **AVT Master Amiga Video Terminal:** SSTV and FAX system (hardware and software) for transmit and receive with your Commodore Amiga Computer; 55 SSTV modes in up to 4,096 simultaneous colors; Nine FAX modes in up to 16 grey levels; eight function "repair kit" vastly reduces damage caused by QRM or QRN; on-screen tuning scope; mode-to-mode conversions; interpolating zoom; image tinting, brightness and contrast control; text overlay using multiple fonts, boldface, italics and underlining in any combination or color; automatic CW and/or synthesized speech ID after transmit; custom color bar generation; user-defined FAX demodulation curves; image rotation and flipping; paint compatible; extensive ARexx language support; real-time software filtering for scope and receive operations; grab screens to transmit from any digitizer or operating program in real-time; automatic start and run at any time; image printing in both black-and-white and color on hundreds of printers **\$299.95**

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Technical support may be obtained through CompuServe's Hamnet forum. Messages should be sent to user ID #76702, 1013.

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Free Freight
25-Day Money-Back Guarantee
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One Year Warranty



AR1000 \$499

1000 Channels. 8-600MHz, 805-1300MHz

Standard Features:

- Extremely compact size.
- Continuous coverage (except UHF TV 600-805)
- Antenna attenuator switch, 10db.
- Manual tuning knob.
- Earphone jack, 3.5mm.
- AM, FM and wide band FM tuning modes.
- Backlighted LCD display.
- 10 Scan Banks, 10 Search Banks.
- Selectable Priority Channel.
- Delay, Hold Features.
- Selectable Search Increments, 5-955KHz.
- Permanent memory backup.
- 4 AA Ni Cad batteries included.
- AC adaptor/charger.
- Carry Case.
- Cigarette Lighter Charger.
- Belt Clip.
- Earphone.

Options:

External Speaker. Mobile Mount. MS190 \$19.50
Extended Warranty. 2/3 yrs \$45/\$55

Specifications:

Coverage: 8-600, 805,1300MHz
Sensitivity: .35uV NFM, 1.0uV WFM, 1.0AM
Speed: 20 ch/sec. scan. 40 ch/sec. search
IF: 561.225, 58.075, 455KHz or 10.7MHz
Increments: 5 to 955KHz selectable/ 5 or 12.5 steps.
Audio: .4 Watts
Power: Input 9 - 13.8 V. DC
Antenna: BNC
Display: LCD
Dimensions: 6 7/8H x 1 3/4D x 2 1/2W. 12oz wt.

AR950 \$239



100 Channels. Low, Air, High, UHF & 800MHz.

Standard Features:

- Extremely compact size.
- Unrestricted 800MHz coverage.
- 100 channels permanent memory.
- Earphone Jack & Attenuator.
- Delay, Hold features.
- Channel 1 Priority.
- 5 Scan Banks, 5 Search Banks.
- Telescopic and Flexible Antennas w/ BNC connector.
- AC & DC Power cords w/ mtng hardware.
- One Year Limited Warranty.

Options:

Base type antenna
25 to 1000MHz w 50' coax. AS300 \$59.95
Mag Mnt Mobile Antenna. 15' coax. MA100 \$25.00
Cigarette Lighter power adaptor. CP100 \$4.00
External Speaker
with mobile mount. MS100 \$19.50
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Specifications:

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Increments:	50Hz and greater
Selectivity:	2.4KHz/-6db (SSB) 12KHz/-6db (NFM/AM)
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Radiation Angle, Degrees	16
Frequency selection	Automatic
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Mast Size Range, in (cm)	1.5-1.75 (3.8-4.4)
Wind Load, ft ² (m ²)	1.4 (.13)
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ANNOUNCEMENTS

• **SEANET 91** - The Radio Amateur Society of Thailand (RAST) will host SEANET 1991 from November 8-10 in Chiang Mai at the Chiang Mai Plaza Hotel. For more information and reservation details, write to the Radio Amateur Society of Thailand, P.O. Box 2008, Bangkok 10501, Thailand, or check into the SEANET net which meets daily on 14.320 MHz from 1200Z (contact any HS station that checks in).

• **Suffolk County Radio Club Meetings** - The radio club meets on the third Tuesday of every month (except July) at 7:30 PM at the Bohemia Recreation Center, Bohemia, Long Island, New York. All welcome (handicapped accessible). For more information, contact Jim Heacock, KA2LCC, at 516-473-7529.

• **The following special events are scheduled for June:**

WB1CAG, from "Rochester Around the World," Rochester, New Hampshire's 100th anniversary; Great Bay Radio Assn.; 1500Z June 29 to 2000Z July 3; SSB General portion of 14 and 21 MHz and Novice 28 MHz band (no CW). For certificate send 9 x 12 SASE to KA1STU, 42 Lois St., Rochester, NH 03867.

One-land, from Vermont's 200th anniversary; various Vermont special event stations; throughout 1991; 25 kHz up from bottom of Novice and General bands, RTTY, AMTOR, etc., in digital subbands. For certificate send \$1.00 and SASE to Amateur Radio Bicentennial Project, P.O. Box 200, Graniteville, VT 05654. (Foreign stations send SAE and IRCs to cover postage.)

N2LDU, from 213th anniversary of the Battle of Monmouth, New Jersey; Highway Gentlemen RC and Ocean Monmouth ARC; 0000-2400Z June 29; Novice portion of 10 meters. For commemorative QSL send QSL and No. 10 SASE to Jerry Ham, 82 Braeton Way, Freehold, NJ 07728. (DX stations will receive QSL through the Bureau upon receipt of their QSL.)

K2AA, from 75th anniversary of South Jersey Radio Assn., Haddonfield, NJ; June 8-9 and 15-16 from 1500-2400Z General portion of 15, 20, 40, 80, and Novice 10 meters. Also random operation between the 9th and 15th. For commemorative QSL send QSL and SASE to South Jersey Radio Assn., P.O. Box 1026, Haddonfield, NJ 08033.

KA3MMM, from 50th annual Pennsylvania State Laurel Festival, Wellsboro, PA; Tioga County ARC; June 14 and 15; lower portion of General 80, 40, 20, 15 meters and Novice 10 meters. For certificate send QSL and 9 x 12 SASE to E. Austin, RD 6 Boc 370, Wellsboro, PA 16901.

KD4SS, from 50th anniversary of Mammoth Cave National Park, KY; Mammoth Cave ARC; June 29-30, 1500Z Saturday to 1900Z Sunday; lower portion of General subbands and 28.475 MHz. For QSL send SASE to MCARC/Special Events, P.O. Box 858, Glasgow, KY 42142-0858.

K5TYP, from 50th anniversary of Keesler Air Force Base, Biloxi, MS; Keesler ARC; June 8-9 from 1400-2400Z; CW 28.160, 21.160, 18.080, 14.040, 7.040; Phone 28.460, 21.360, 18.160, 14.260, 7.265. For QSL send QSL and SASE to KARC, 3380 ABG/SS/Amateur Radio, Keesler AFB, MS 39534-5000.

KG5QO, from "Lum and Abner Days," Mena, AR; Ouachita ARA; 1300-2400Z June 6-8; lower 25 kHz of 40, 20, 15 meter General phone bands and 28.350-400 MHz. For certificate send QSL and 9 x 12 SASE to Jack Brewer, KG5QO, Rt. 1 Box 137, Hatfield, AR 71945.

K5ALU, from Frank Childress Boy Scout Reservation, Joplin, MO; Joplin ARC; 200-0200Z daily June 17-21 and June 24-28; CW 7.050, 14.050; phone lower 25 kHz of General 40, 20, 15 meters and upper 50 kHz of Novice 10 meters. For QSL send QSL, name of op worked, and SASE to Joplin ARC, P.O. Box 2983, Joplin, MO 64803.

N5MBD/P, from Annual Statewide Masonic Rally, Lake Keystone, OK; Masonic Dist. 12; 1300-2200Z June 22; 10 meter Novice phone band. For certificate send QSL and large SASE to P.O. Box 182, Owasso, OK 74055.

6-land, from Emergency Preparedness Fair, Hacienda Heights, CA; Mercury ARA using their own call signs; 1800-2300Z June 1; 28.3 to 28.5 on 10 meter phone band. For certificate send QSL and SASE to MARA, Attn. WA6BZX, 2751 Montellano, Hacienda Heights, CA 91745.

K7AC, from Auburn, Washington's centennial; Academy ARC; June 9-16; lower 25 kHz of General bands and 10 meter Novice phone. Also there will be an informal net of US Auburns (about 22 of them) June 16 at 2200Z on 14.240 MHz. QSL via WA7QCC, 3513 Orchard Place SE, Auburn, WA 98002.

8-land, HF/VHF/UHF weather balloon launch, Dayton, OH; Dayton ARA; 1330Z launch June 29; HF net to begin at 7.232

MHz (for further transmission info contact Dave Pelaez, AH2AR, 513-233-1641, or via packet in care of the W8BI BBS, Dayton, OH). Special certificates for furthest reception reports on three frequencies utilized (70 cm ATV, 20 meter FM, and 20 meter CW beacon). All reception reports will be QSLed. QSL via W8BI.

KO8O, from Ohio Wine Month, Madison, OH; Wireless Institute of Northern Ohio (Lake County ARA); 2330-0300Z June 1 on 7235 and 21315 kHz; 1500-1900Z June 2 on 21315 and 28490 kHz. For certificate send legal-size SASE to KO8O—WINO Weekend, 10418 Briar Hill, Kirtland, OH 44094.

WK8N, from "Tecumseh" production, Chillicothe, OH; evening and weekend hours June through September; SSB lower 25 kHz of 40 and 20 meter General and 28.370 MHz in 10 meter Novice band. For commemorative QSL send QSL and No. 10 SASE to Ron Cade, WK8N, 711 East Main St., Chillicothe, OH 45601.

KE9FH, from New Hammond Marina, Hammond, IN; SCHARC/CAREN ARCS; 0000Z June 15 to 1800Z June 16; SSB 40, 20, 15 meters, and 10 meter Novice, plus 224.74 repeater. For QSL send QSL and SASE to SCHARC, Area Career Center, 5727 Sohl Ave., Hammond, IN 46320.

HW6JUN, from Utah Beach, Normandy; June 1-9 (no times given); CW 3544, 7030, 14044, 21044, 28044; SSB 3775, 7070, 14244, 21344, 28444. QSL info is FF1PFW via French Bureau, or direct to P.O. Box 234, 50102 Cherbourg, France.

VE3CRC, from Festival of Nations, Chatham, Ontario, Canada; Chatham Kent ARC; June 29 and 30, July 1 noon to 8 PM local time near bottom end of the US General portion of 15, 20, 40, 75 meters. For 8 x 11 certificate send QSL (no SASE) to Chatham Kent ARC, P.O. Box 284, Chatham, Ontario, Canada N7M 5K4.

• **The following hamfests, etc., are slated for June:**

June 1, **Columbia Hamfest & Computer Expo**, Midway Expo Center, west of Columbia, MO. Contact Jesse Bowen, WM9Y, 1915 Blue Ridge, Columbia, MO 65202 (314-474-7674 evenings). (Handicapped accessible, VE exams.)

June 1, **Knoxville Amateur Radio & Computer Convention**, Knoxville Convention Center, Knoxville, TN. Contact Steve Fritts, WA4GZE, 400 Tobler Lane, Knoxville, TN 37919 (615-525-0801).

June 1, **Independent Repeater Assn. Hamfestival**, Wyoming National Guard Armory, Wyoming, MI. Contact Independent Repeater Assn., 562 92nd St., Byron Center, MI 49315, or call Tom, KA8YSM, 616-698-6627. (VE exams.)

June 1, **Athens Radio Club Hamfest**, VFW Post 2872, Athens, GA. Contact Joe Londeree, KC4EJY, 404-353-8196. (VE exams.)

June 1, **Cleveland ARC Hamfest**, Bradley County High School, Cleveland, TN. Contact David Evans, WD4E2C, 615-472-1421. (VE exams.)

June 1, **Bangor Hamfest**, Hermon Elementary School, Hermon, Maine. Contact Roger Dole, KA1TKS, RR 2 Box 730, Bangor, ME 04401 (207-848-3846). (VE exams.)

June 1, **Bergen ARA Hamfest**, Fairleigh Dickinson University, Teaneck, NJ. Contact Jim Joyce, K2ZO, 286 Ridgewood Blvd. No., Westwood, NJ 07675 (201-664-6725). (VE exams.)

June 1, **Central Ontario Amateur Radio Fleamarket**, Bingeman Park, Kitchener, Ontario, Canada. Contact Ray Jennings, VE3CZE, 61 Ottawa Cres., Guelph, Ontario, Canada N1E 2A8 (1-519-822-8342).

June 2, **Contoocook Valley RC Spring Fleamarket**, Contoocook (near Concord), New Hampshire. Contact K1OPQ at pkt WA1WOK-2, or evenings 603-746-5090.

June 2, **Breezeshooters ARC Hamfest & Computerfest**, Butler Farm Show Grounds, Butler, PA. Contact Rey Whanger, W3BIS, 412-828-9383. (VE exams, preregistered only.)

June 2, **Hall of Science Hamfest**, NY Hall of Science parking lot, Flushing Meadow Park, Queens, NY. Contact Steve Greenbaum, WB2KDG, 718-898-5599, or Arnie Schiffman, WB2YXB, 718-343-0172.

June 2, **Chelsea Swap 'n Shop**, Chelsea Fair Grounds, Chelsea, MI. Contact Robert Schantz, 313-475-1795.

June 2, **Newington AR League Amateur Radio and Computer Fleamarket**, Newington High School, Newington, CT. Contact Les Andrew, KA1KRP, c/o NARL, 68 Wildermere Ave., Waterbury, CT 06705 (203-523-0453). (VE exams by preregis-

tration only; contact Susan Fredrickson, WM1B, P.O. Box 165, Pleasant Valley, CT 06063.)

June 2, **Starved Rock Radio Club Hamfest**, Bureau County Fairgrounds, Princeton, IL. Contact Bruce Burton, KU9A, 1153 Union St., Marseilles, IL 61341 (815-795-2201).

June 2, **Manassas, Virginia Hamfest & Computer Show**, Prince William County Fairgrounds, Manassas, VA. Contact Jim, WD4OJY, 703-369-3940. (Handicapped accessible.)

June 7-9, **Ten-Ten International Convention**, Arlington Ham-Com Expo Hall, Arlington, TX. Contact Republic of Texas Ten-Ten Convention, Box 29721, Dallas, TX 75229.

June 7-9, **Ham-Com 91**, Arlington Convention Center, Arlington, TX. Call 214-521-9430.

June 9, **Goodyear ARC Hamfest & Family Picnic**, Wing-foot Lake Park, near Akron, OH. Contact William Dunn, W8IFM, 216-673-8502.

June 9, **HAM-O-RAMA 91**, Erlanger, Kentucky Lions Park. Contact KC4FET, c/o Northern Kentucky ARC, P.O. Box 1062, Covington, KY 41012, or call 606-341-1213.

June 9, **Six Meter Club of Chicago Hamfest**, Santa Fe Park, Willow Springs, IL. Contact Mike Corbett, K9ENZ, 606 South Fenton Ave., Romeoville, IL 60441.

June 9, **LIMARC Hamfest**, New York Institute of Technology, Old Westbury Campus, Old Westbury, NY. Contact Neil Hartman, WE2V, 516-462-5549, or Mark Nadel, NK2T, 516-796-2366.

June 9, **Egyptianfest 91**, Egyptian Radio Club grounds, Granite City, IL. Call 618-344-2401. (Exams at Sanford Brown Business College, sign up 8-9:45 AM at hamfest.)

June 9, **Lancaster, New York Hamfest**, Elks Club Hall, Lancaster, NY. Contact Luke Calianno, N2GDU, 1105 Ransom Rd., Lancaster, NY 14086 (716-683-8880).

June 14-15, **SouthNet Packet Conference**, Albany, GA. Contact John Crosby, K4XA, 912-883-7910. (VE exams.)

June 14-16, **Central Alberta Radio League Father's Day Picnic**, Burbank, Alberta, Canada. Contact Pat Wright, VE6ALD, 886-3883 (or look for message on the CARL BBS VE6BJH).

June 15, **Raritan Valley Radio Club Hamfest & Computer Show**, Watchung Hills High School, Warren, NJ. Contact Dave, KA2TSM, 908-763-4849, or Walt, W2FLB, 908-968-5993. (VE exams by preregistration by May 31 only; send form 610 and photocopy of current license to RVRC, P.O. Box 192, Martinsville, NJ 08836.)

June 15, **Milford, Ohio ARC Hamfest**, Live Oaks Vocational School, Milford, OH. Contact Russ, WA5Y, 513-683-7528. (VE exams, preregistration preferred, walk-ins as materials available.)

June 15, **Cortland International Hamfest**, Cortland County Fairgrounds, Cortland, NY. Contact Skyline ARC, Box 5241, Cortland, NY 13045 (SASE).

June 15-16, **Lower Yellowstone ARS Father's Day Hamfest Picnic**, Dawson County Fairgrounds, Glendive, MT. Contact Gene Huskinson, K7CDN, 406-365-3749. (VE exams Saturday 1 PM.)

June 16, **Lake County ARC Dad's Day Hamfest**, Lake County Fairgrounds, Crown Point, IN. Contact Mike Warot, KA9DGX, 219-845-7970. (VE exams.)

June 16, **MIT/Harvard Electronics, Computer, Amateur Radio Fleamarket**, Albany and Main St., Cambridge, MA. Call 617-253-3776.

June 16, **CWRA Swapfest**, University Center, University of Wisconsin, Stevens Point Campus, Stevens Point, WI. Contact Art Wysocki, N9BCA, 3356 April Lane, Stevens Point, WI 54481 (715-344-2984). (VE exams.)

June 16, **Frederick, Maryland ARC Hamfest**, Frederick County Fairgrounds, Frederick, MD. Contact Frederick Hamfest, P.O. Box 589, Mt. Airy, MD 21771.

June 16, **Santa Maria Amateur Radio Swapfest & Barbecue**, Union Oil Company Newlove Picnic Grounds, south of Santa Maria, CA. Contact Esther Miller, P.O. Box 2067, Orcutt, CA 93457-2067, or call 805-937-8878.

June 22, **Conn. Valley FM Assn. Hamfest**, Goshen-Lempster Co-op School Gym, Lempster, NH. Contact Conrad Ekstrom, WB1GXM, P.O. Box 1076, Claremont, NH 03743-1076 (603-543-1389).

June 22, **Upper Cumberland ARS Tailgate Fleamarket**, USDA Bldg., Cookeville, TN. Contact Ken Roberts, Rt. 4 Box 307, Cookeville, TN 38501.

June 23, **South Bend, Indiana Hamfest**, Parking Garage by Society Bank Bldg., South Bend, IN. Call 219-233-5307.

In late February rumors abounded in the amateur community as to the seemingly mass inspections being carried on by the FCC. What exactly was going on had hams creating more nefarious plots than even Robert Ludlum could concoct. N0EA went out and actually interviewed some of the amateurs who were visited, and here is their reaction plus an explanation of what happened.

The FCC Survey of Amateur Power Use

Who Was Surveyed, What They Thought, What It Meant

BY DON BISHOP*, N0EA

During the last week in February electronics engineers from the 35 FCC Field Operations Bureau (FOB) offices visited 200 amateur radio stations as one element in a series of special projects. Special projects are information-gathering and enforcement projects to which a high level of resources are dedicated for relatively short periods. They frequently involve simultaneous action by all 35 offices.

Interviews with the participants reveal that the FCC engineers generally asked for the following demonstration: The amateur should operate his station normally, establish a contact, then reduce power to one-half while the engineer observes how the reduction affects communication. That procedure was not completed at every station. For example, one participating amateur interviewed for this story reduced power more than 50%, one could not reduce power, and one increased power during his communication and was not requested to reduce it.

Three Station Categories

According to FOB investigations and inspection branch chief Dan Emrick, engineers-in-charge and electronics engin-

eers at each office chose amateurs to visit. "We asked them to identify the stations in three categories," Emrick said.

"First, stations for which they could do pre-inspection monitoring, as they drove up, and then interrupt the operator and ask him to reduce power while the engineer observed the effect on communication. We preferred this choice." Emrick said the monitoring network supervisor supported the project and had information available if the engineers needed it.

"Second, stations not active when we arrived, in which case the engineer would ask the amateur to go on the air. We wanted them to pick stations capable of HF operation, and that required some knowledge of local activity on the part of the field staff.

"Third, amateurs against whom interference complaints had been filed, typically home entertainment equipment complaints. Under ordinary circumstances," he said, "we might not have an opportunity to send an engineer to investigate the complaint. This project made it possible to do so, in some cases."

No Fines Issued

Word of the special project spread quickly throughout the amateur community along with uncertainty as to whether some amateurs were issued fines. "The engineers were told specifically that if in

their judgment reasons were sufficient, they could issue advisory notices," Emrick said. "There were some advisory notices issued, but no violation notices requiring a response were issued and no fines were issued."

Emrick explained that the special project is part of a broad-ranging enforcement plan worked out among representatives of FCC bureaus that issue licenses, including the Mass Media, Common Carrier and Private Radio Bureaus, and the Office of Engineering and Technology. "The enforcement plan formalizes the kind of service we have been providing to the other FCC bureaus over the years," Emrick said. "Now it has been written down in more formal fashion."

The branch chief said most of the emphasis for the special project came from within the FOB. "PRB was aware of it before we did it," he said. "One of the items in the PRB section of the enforcement plan is a study of amateur compliance with power restriction rules."

No Hidden Agenda

Emrick said he is aware that the amateur community has been calling the special project a power audit or power survey, and that some amateurs believe the FCC has a hidden agenda to reduce amateur power limits. Actually, he said, the PRB request "gave us an opportunity to visit some amateur stations. We don't do a lot

*P.O. Box 4075, Overland Park, KS 66204-0075



Bill McGrannahan, KØORB: "I almost felt it was like a social call. I didn't feel as though we accomplished anything. I was ready to cooperate, but [the FCC engineer] didn't ask for anything."

of non-safety work these days. The project gave us a chance for our engineers to see amateur stations in normal operation. One test they made was an evaluation of a contact as a station reduced power."

The power reduction test principally is what has caused concern among some amateurs, but Emrick said some comments he has seen indicate some amateurs question the FCC's authority to make station inspections. "They are trying to draw a parallel between station inspections and the search-and-seizure process," he said. "If we are going to search, we serve a warrant." Amateur radio regulations require that amateur licensees make their stations available for inspection. FCC engineers without warrants cannot force entry, but refusal to admit them during reasonable hours is a rule violation.

Rule Compliance

The project's results are expected to indicate how well amateurs comply with FCC rule 97.313(a), which reads: "An amateur station must use the minimum transmitter power necessary to carry out the desired communications."

Jeffrey Young, a staff engineer with the FCC Field Operations Bureau's Enforcement Division at commission headquarters in Washington, DC, said the bureau conducted a similar survey five years ago. "We suspected that amateurs transmit with the highest power they are capable of to get the best communications they can get," said Young in a March 18 telephone interview. "The rule

says amateurs should use minimum power, but they do not specify how to maintain that minimum power level," he said, referring to the potential need to adjust power output under continuously changing propagation, noise, and interference conditions.

"But amateurs should take some steps to ensure the use of minimum power," he continued. "If everyone uses maximum power, then the interference level—the noise floor—rises, and the ability to communicate is not helped by using high power."

"I believe that it is nearly impossible, given enough time, that an amateur operator does not violate the rule. Band conditions change, and there is no perfect way to know what is the minimum power necessary to carry out the desired communications. And the definition of 'desired' is uncertain," he said. "Nevertheless, we wanted to try to discover to what extent amateurs are violating the rule."

The Power Level Test

Young explained how the field engineers conducted the survey: "They asked the amateurs they visited to use the transmitter power they normally use in making contacts, and then to reduce the power during the course of the conversation. The engineers measured the degradation in communications ability based on the number of times the other person at the other end of the radio circuit asked for clarification."

"During the February survey, we did find amateurs in violation of the rule, just as we did during the previous survey.

Last time 65% of the amateurs surveyed, when they cut their power in half, could communicate just as well as they could before reducing power," Young said.

The FCC headquarters engineer said the previous survey focused more heavily on interference caused to nearby home entertainment equipment. "A spin-off of using less power is to reduce the potential for interference to home entertainment equipment," he said. "As amateurs increase power, corresponding increases in their ability to communicate get smaller, and at some point the ability to communicate stops improving. But interference caused to nearby home entertainment equipment continues to increase geometrically as transmitter power increases."

Young said the previous survey's results were provided to the FCC Private Radio Bureau, which administers the amateur rules. "They found it interesting," he said, "but there is no indication that it affected any rulemaking proceedings."

Amateurs vs. Consumers

He said the current survey is motivated by the Commission's desire that amateurs use no more transmitter power than necessary because high power contributes to the interference problem. "It is a difficult position for us," he explained, "because most often the root of the interference problem is the receiving equipment's susceptibility to RF interference, when the equipment should not respond to amateur frequencies in the first place. But the counter-argument is 'Why should the consumers, 99% of whom do not live near an amateur, pay for a receiver with high unwanted signal rejection that normally is not needed?' That leaves us in the position of either focusing on the amateur who uses more power than necessary or on the consumer, who is non-technical, to use filtering."

Young said that the fairly small sample of approximately 200 stations cannot be used as the basis for a firm conclusion. "The survey is a snapshot picture to see if it reveals something striking or unexpected. I don't know whether a public notice will be issued. That will be up to the bureau chief," he said.

Kansas City

In the Kansas City area FCC electronics engineer Ronald D. Ramage called on Albert L. "Lee" Bergren, WØAR; Thomas O. Maharg, Jr., WAØRCL; and Ralph B. Maddox, WAØQIA. FCC electronics engineer George M. "Mike" Moffitt called on Mayo J. "Mac" McAllister, WØCW; William W. "Bill" McGrannahan, KØORB; and one other amateur. FCC sources would not reveal the amateurs' identities, which

were obtained through interviews with area amateurs.

Karen L. Raines, a Kansas City FCC office public service specialist, said the office issued no violation notices to the amateurs surveyed. "The survey was for information-gathering purposes only," she explained. "We had instructions from headquarters not to issue violation notices to amateurs stemming from their participation in the survey." As it happened, she said, "the ones we chose were operating pretty much where they were supposed to be."

Raines said the six Kansas City area amateurs were chosen through referrals, monitoring, and happenstance:

- Sharon Scott, a public service specialist at the Kansas City FCC office, telephoned Chuck Miller, WA0KUH, and asked for the callsigns of amateurs active on the high-frequency (HF) bands. Kansas City FCC staff members are acquainted with Miller because of his work with amateur radio conventions and local and national clubs. The engineers reached some of the amateurs Miller identified and made appointments to visit them.

- The FCC monitoring station network gave the Kansas City office information about active amateurs in the area. Arrangements were made to visit at least one of these amateurs.

- Engineer Ramage, as he concluded his visit to Maharg's station, asked Maharg if he knew any amateurs who are active on HF. Maharg walked him over to Maddox's nearby house and introduced him to Maddox. "Maddox was scared," Maharg said, "until I explained we weren't going to get any citations for anything. I wasn't worried about citations because I had not done anything illegal. I knew Ralph hadn't because he doesn't even own an amplifier."

Referrals

Miller said when Scott telephoned him "she said she wanted the six callsigns and that she could not and would not tell me why."

Miller said the FCC previously called and asked him for callsigns of active amateurs about two years ago when the agency was seeking help in testing radio direction-finding equipment. Some new equipment was being tested at the Livermore, California, FCC office. The FCC asked amateurs around the country to transmit at specific times and frequencies to offer radio direction-finding targets whose locations were known to the test managers but unknown to the equipment operators.

"I thought it was something like another direction-finding test," Miller said. "With what it turned out to be, I don't like having been put in the position of giving

these referrals. But when the FCC asks me for something, I have to cooperate."

Maharg's Visit

Tom Maharg, a General Class amateur who has been licensed for 25 years, said: "Ramage called and wanted to know if I would care to help him out. I said, 'Come on out.' When he arrived he introduced himself and handed me his card. I showed him into the ham room, fired up the rig, and talked with someone on 15 meters. He watched, then said, 'Cut the power in half.' I did, and he said, 'OK, that's all I need.'"

Maharg had initiated the contact using 150 watts, although his transmitter is capable of 200 watts, and he reduced power to 75 watts as indicated on his station RF wattmeter. "The man on the other end noticed the difference," Maharg said, "but he said I was still Q5 copy." (Q5 means perfectly readable.)

Maharg's station is equipped with an RF power amplifier. "It was sitting next to

everything else," he said, "but I do not use it. I do not need it. I unplugged it during a storm and I haven't plugged it back in. Since I bought my new rig, I have only used the amplifier two or three times, just to see whether it works."

Maharg said the only reference in conversation Ramage made to transmitter power was to say, "You know, a lot of people are running too much power."

"I had to agree with him," Maharg said.

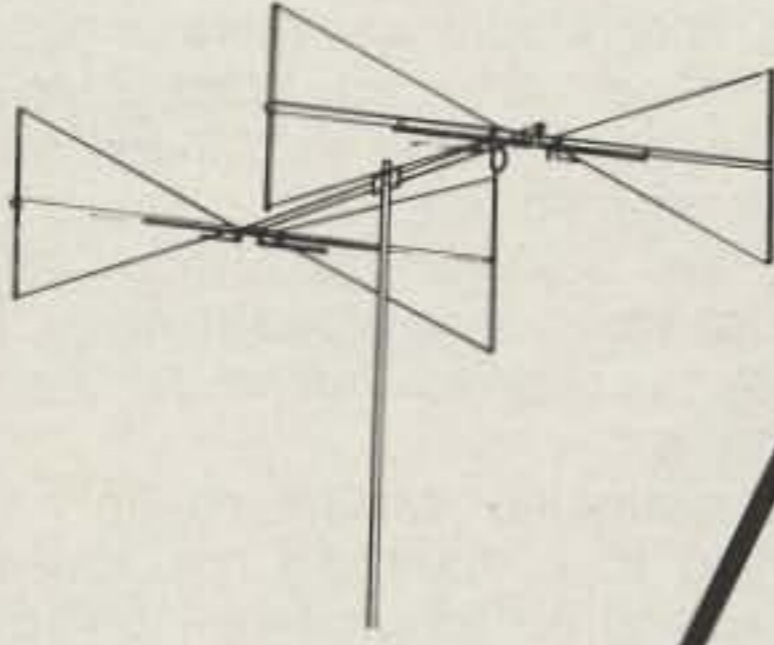
At Bergren's House

Lee Bergren, an Extra Class licensee who has been a radio amateur for 59 years, said Ramage telephoned and said he would like to come out and visit and run some tests on communications and the power level.

"When he came over," Bergren said, "he came to the shop in the back where I was working—the door was open. We went inside to my station where he asked

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me to turn the transmitter on and contact somebody.

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When he reduced power from 500 watts to 50 watts, Bergren's friend gave him S-meter readings "that compared favorably within the limits of accuracy to the power that I changed to."

Bergren said Ramage did not discuss the purpose of the visit beyond saying "it was an edict from the FCC in Washington that the field office do the test."

McAllister's Test

Mac McAllister said Mike Moffitt called him and said he would like to come and observe his station in operation and asked whether it would be convenient. McAllister arranged an appointment.

"Moffitt arrived and introduced himself," said McAllister, an Extra Class amateur. "I took him to my ham shack and he was very polite and told me just to operate as though I were having any regular contact. Before we started, he asked me if I had a high-power amplifier. I said, 'Yes, but I seldom use it unless it is necessary.' 'Well, you do it the way you usually do,' he said. I used the Kenwood 940 barefoot."

McAllister first tried to establish contact on 20 meter CW. Having no luck, he switched to 15 meter CW. No contact followed there, so he switched to 20 meter SSB, where he heard a Belgian amateur finishing a conversation with an American amateur. McAllister called the Belgian.

"I had about a 25-minute conversation," he said. "Moffitt was sitting alongside, taking notes. The Belgian amateur gave me an S6 signal report. Soon he began having trouble understanding me, and I said to Moffitt, 'Maybe this is a good time to switch on the amplifier.' I switched it on and things improved considerably. The Belgian said my signal rose to S9, and from that time the conversation went considerably better. After I switched to high power, another station broke in and it was quite a nice contact."

Asked exactly what made him decide to increase power, McAllister said: "The Belgian ham asked me to repeat before I switched on the amplifier. He said something about automobile license plates—he collects them. I said I knew what he was talking about, amateur call letter license plates. He said he would like one from Kansas. I said I could help him with that. He asked me to repeat at that point,

and that is when I said to Moffitt that it might help to switch on the amplifier."

McAllister said Moffitt remained until the radio contact was finished, then for another five minutes to chat, and left. "I found out where he went because I had an appointment with K0ORB. It turned out that Moffitt went over to Bill's place for the next interview."

McGrannahan's Story

Moffitt telephoned for an appointment the day before he visited Bill McGrannahan's station. McGrannahan, an Advanced Class amateur, recounted the call: "He asked, 'Can you arrange to have two hams contact each other?' I said, 'I can arrange for someone to contact me or vice versa. What band do you want?' He said it made no difference as long as it was below 30 MHz. So I scheduled a contact with a local amateur on 28.4 MHz." McGrannahan said he picked an hour when the 10 meter propagation would allow only local contacts.

Asked why he thought Moffitt called him, McGrannahan said: "I presume they got my name from QST." McGrannahan is listed in QST as the Missouri Section Manager for the American Radio Relay League's (ARRL) field organization.

McGrannahan described Moffitt's visit as "kind of benign. It puzzled me, in fact. I didn't get the gist of the visit until I talked with some other people he visited." One reason Moffitt's visit may have been puzzling is that McGrannahan's equipment is not capable of the power-reduction demonstration Moffitt was there to observe. Moffitt had nothing else to ask of McGrannahan, so when the visit ended, its purpose seemed unclear. "I almost felt it was like a social call. I didn't feel as though we accomplished anything. I was ready to cooperate but he didn't ask for anything."

The amateur McGrannahan had arranged to contact did not appear as scheduled, but an amateur 8 to 10 blocks away heard McGrannahan and called him. McGrannahan said he told the other amateur that he was demonstrating his station for an FCC engineer. Once the contact was underway, Moffitt asked McGrannahan to reduce his transmitter power by one-half. "I explained that I couldn't do it," the amateur said. "My Kenwood 930 doesn't have a provision for power reduction. It goes flat out all the time. I didn't know that when I bought it, and the next time I buy a radio, I'll ask about that."

Texas Connection

FCC electronics engineer Bradley H. Gilliland handled the part of the project assigned to the FOB's Kingsville, Texas, office.

"No one knew I was coming," Gilliland said. "About half of the amateurs I visited were chosen at random; the other half were the subject of interference complaints involving home entertainment equipment."

Asked how he obtained information about amateurs who were capable of operating on HF, Gilliland said: "I drove by the addresses of some amateur stations, and if I saw no HF antenna, I would leave. I have a pretty good idea of which amateurs carry out which kind of operation in this area. I know who operates in one band and who operates in another." The engineer said he attempted to visit one amateur he monitored while the station was on the air, "but he signed off before I got there."

Because his visits were made during weekday business hours, most of the amateurs he found at home are retired. "Half of them were spooked," he said. "I told them it was just a survey, and they calmed down. Others said, 'No problem; come on in.'"

"A couple of them did not know how to reduce their power by half," he said. One amateur Gilliland visited used 100 watts and did not know how to operate his transmitter at any other power. Of the six or seven amateurs Gilliland said he visited, at least half used RF amplifiers. He observed operations on the 40, 20, 15, and 10 meter bands.

"I did not find any instances where an amplifier was used that the amateur did not have interference on his own television and telephone," Gilliland said. "Neither did I find any station that lost any ability to communicate when the power was reduced by one-half. A typical comment from an amateur on the other end of the radio circuit was, 'You might have dropped a tad on the S-meter.' One amateur even said, 'You sound better now,' when the amateur I was visiting reduced power."

Project Reactions

Branch chief Emrick said that based on feedback reaching him via E-Mail and comments he has monitored on amateur frequencies, amateurs are "overreacting" to the project. "There appear to be two areas of concern," he said. "One is a fear that we are trying to reduce amateur power to some terribly low level. The other seems to be that we shouldn't be allowed to make inspections. 'Whatever happened to our civil liberties, and where is the American Civil Liberties Union when you need them?' is one comment I read."

Radio amateur Miller said he thought the FCC conducted the project in part to apply pressure in reaction to amateur support for a bill introduced in Congress to protect amateur frequency allocations.

(Don Bishop is editorial director of Mobile Radio Technology magazine.)

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Let's clear off the workbench, dig out some catalogs, and get down to some serious (albeit fun) projects.

The Practical Aspects of VFO Design Plus How to Build One

BY DOUG DeMAW*, W1FB

I'd like to welcome to the pages of CQ the talented output of Doug DeMaw, W1FB. Most of you, like myself, for years have followed with great interest his work in the pages of QST. In my younger years of what I euphemistically call "butchering aluminum" I built many of Doug's projects and so got to know first hand the man and his work. If you'd like to learn, build, and use, then you've come to the right place.

—K2EEK

How many times have you struggled to obtain acceptable frequency stability and the desired output power from a homemade VFO? The challenge is a difficult one, especially when output power greater than a milliwatt or so causes transistors to generate heat. This heat encourages long-term frequency drift.

There are a number of things we can

do to ensure VFO stability. This article treats the design methods I use to obtain VFO performance which parallels, and at times exceeds, that of the local oscillators in commercial amateur gear. We will also examine the circuit for a practical, stable VFO that you can build and get working in a couple of hours. The VFO is suitable for transmitters, receivers, and a host of other equipment.

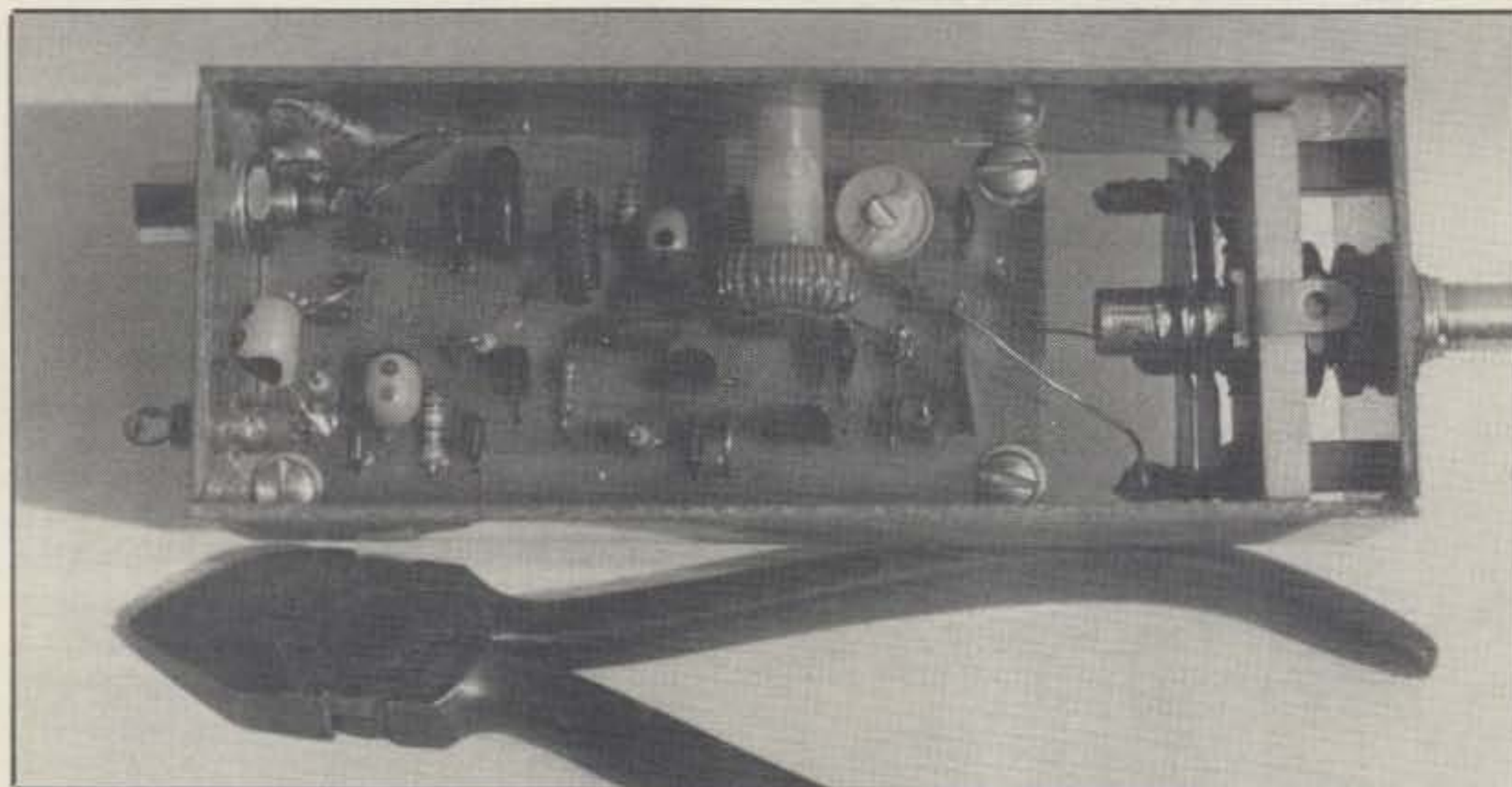
Choice of VFO Components

Try to avoid using silver-mica capacitors in your VFO. These parts were once considered excellent choices with respect to stability, but better capacitors are available today. Silver micas are not uniform in their temperature-stability characteristics. Some exhibit positive drift, while others have a negative-drift trait. Pains-taking experimenting can produce a set of silver-mica capacitors that are temperature-stable, but I prefer to avoid this process for grading them. Rather, I use NPO ceramic capacitors in the frequency-determining part of the VFO circuit. A fine second choice is the polystyrene capaci-

tor, which is cheap and has a slight negative drift characteristic. This negative coefficient complements the positive coefficient that is common to most powdered-iron cores, such as toroids and slug-tuned coils. The result is often superb stability. A wide assortment of NPO capacitor values are listed in the Mouser Electronics catalog (call 800-992-9943 for a free catalog) and their individual cost is modest.

An ideal VFO would have no magnetic core in the main VFO coil. A rigid air-wound inductor or one wound on a ribbed ceramic form would yield the best Q and the least drift. This approach is seldom practical today, owing to the need and desire to build miniature equipment. Powdered-iron cores change permeability as the ambient temperature in the VFO compartment changes. There is also a minor change in coil temperature that is caused by circulating RF current. This temperature variation causes what we know as "long-term drift." The VFO frequency may not settle down for 30 minutes to one hour. Some poorly designed VFOs never stabilize.

*P.O. Box 250, Luther, MI 49656



Interior view of the assembled VFO. The toroidal inductor is mounted on a plastic rod that is attached to one wall of the VFO enclosure (center of photo). The VFO case is made from sections of double-sided PC board. The box is extended beyond the PC board (far right) to provide room for the tuning capacitor. The capacitor and resistor at the far upper left inside the box are not part of the circuit in fig. 1. They were used to provide a load for the VFO during the test period.



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$$XC = \frac{1}{6.28 \times F \text{ (MHz)} \times C \text{ (\mu F)}}$$

$$XL = 6.28 \times F \text{ (MHz)} \times L \text{ (\mu H)}$$

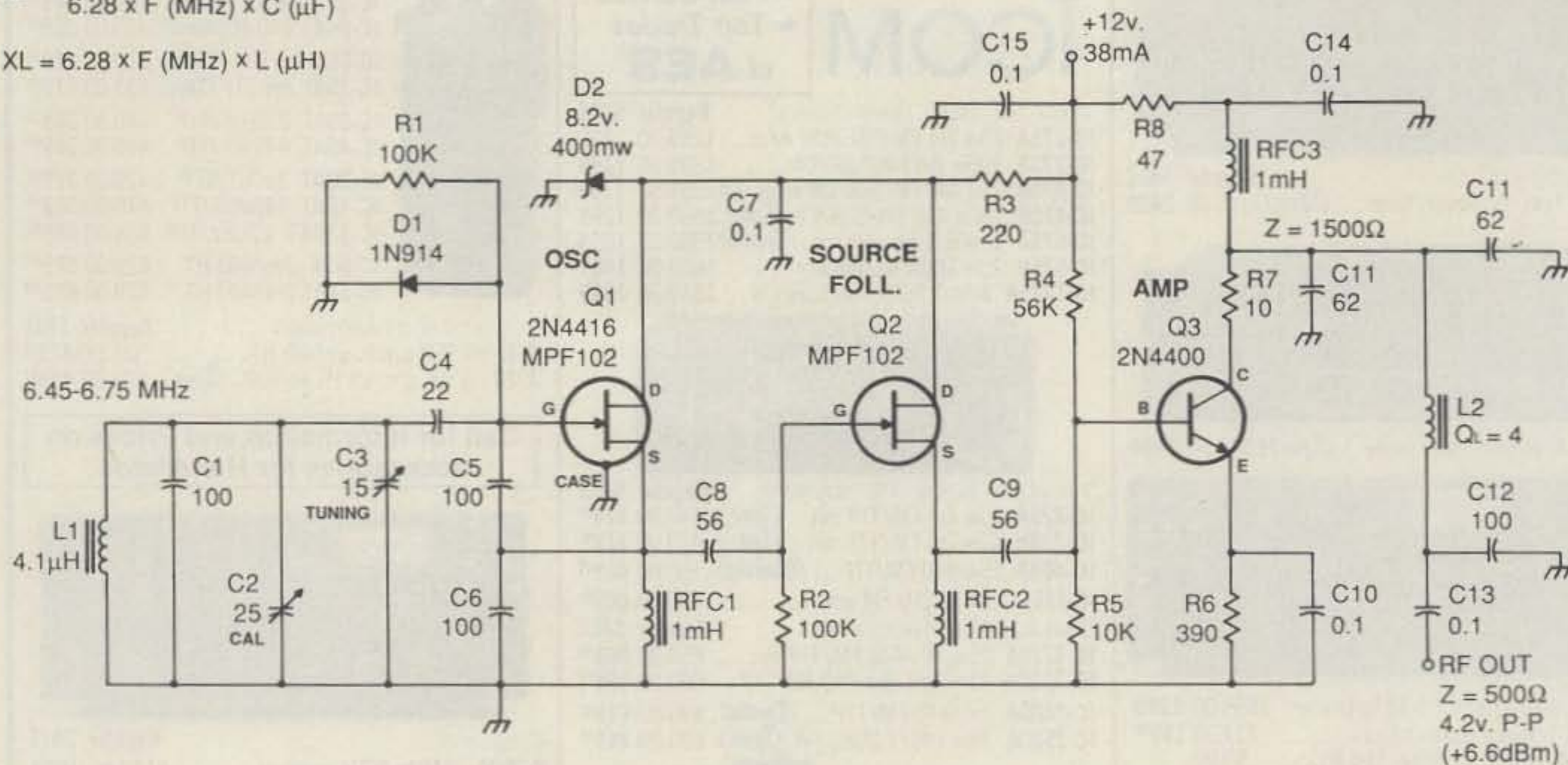


Fig. 1—Schematic diagram of the VFO. Fixed-value capacitors are disc ceramic. C1, C4, C5, C6, and C8 are NP0 ceramic or polystyrene. C2 is a 25 pF ceramic trimmer and C3 is a 15 pF miniature air variable. Resistors are ¼ watt carbon film or composition. The RF chokes are miniature Mouser Electronics No. 43LR103 units. For L1 use 32 turns of No. 28 enamel wire on an Amidon Assoc. T50-6 (yellow) toroid. L2 has 25 turns of No. 28 enamel wire on an Amidon FT-37-61 ferrite toroid.

If I use a magnetic core for my VFO inductor, I employ No. 6 material, such as the Amidon or Micrometals Corp. yellow-coded toroids. This mixture seems to have the best overall stability for HF oscillators. These cores are made from Carbonyl SF material. Likewise for the core material in slug-tuned forms. The completed coil should be doped twice with General Cement polystyrene Q Dope.¹ This keeps the coil turns from moving and changing the value of distributed capacitance. Such changes would otherwise occur from vibration and changes in heat.

It is important also to select the right transistor for the oscillator. I personally don't care for bipolar transistors. They exhibit greater changes of internal resistance and capacitance (with heat) than are found when using JFETs or MOSFETs. The 2N4416 is my favorite device for VFOs because it has a high pinch-off characteristic. This permits the device to produce greater output power than is available from the somewhat generic MPF102 family of FETs. I also have obtained good performance from dual-gate MOSFETs such as the RCA 40673 and TI 3N211 and 3N212 devices. I often tie gates 1 and 2 together and use the transistor as a single-gate device. This eliminates the need to bias gate No. 2.

The VFO tuning capacitor needs to be of good mechanical design. Double-bearing capacitors that turn freely are best. Try to avoid using capacitors that have aluminum vanes. These are rather temperature sensitive, and this causes drift. Plated brass or iron vanes are better. A variable capacitor that is tight or "lumpy" when adjusted will cause backlash and frequency jumps.

Half-watt carbon film or carbon composition resistors may offer greater stability than ¼ watt units, owing to the difference in physical size. The larger resistors can take more heat before they change value.

VVC (varactor) tuning diodes complicate the stability factor. This is a result of changes in diode junction capacitance with temperature. As the bias is changed on these diodes there will be a change in junction temperature, and this causes drift. Try to use mechanical tuning capacitors when you can.

More Aids for Stability

I have learned that using two or more capacitors in parallel to obtain a specific capacitance value is helpful in obtaining VFO stability. Specifically, I might use two 50 pF NP0 capacitors in parallel to

secure 100 pF. This provides greater internal surface area for the capacitor, which minimizes heating from RF currents. The same trick has proven useful for the feedback capacitors in a Colpitts oscillator.

Don't use double-sided PC boards for your VFOs. The etched-side conductors form low-Q capacitors in combination with the ground-plane side of the PC board, and these unwanted capacitors are very unstable. I prefer to use single-sided G-10 glass epoxy board material for my VFOs. I do not use phenolic base board material, even though it costs less than the quality board stock.

Separating the oscillator portion of the VFO from the buffer and amplifier stages is important, too. The heat tends to build up in the VFO shield enclosure even when small transistors are used. It is wise to put a shield divider (made from PC-board stock) between the oscillator and the stages that follow. The cover for the VFO box can then be vented above the buffer and amplifier stages to let the heat escape before it reaches the oscillator circuitry. This shield acts as a heat baffle. I learned this kink from Zac Lau of the ARRL staff.

It is wise to use the lowest operating voltage practicable for the oscillator. The

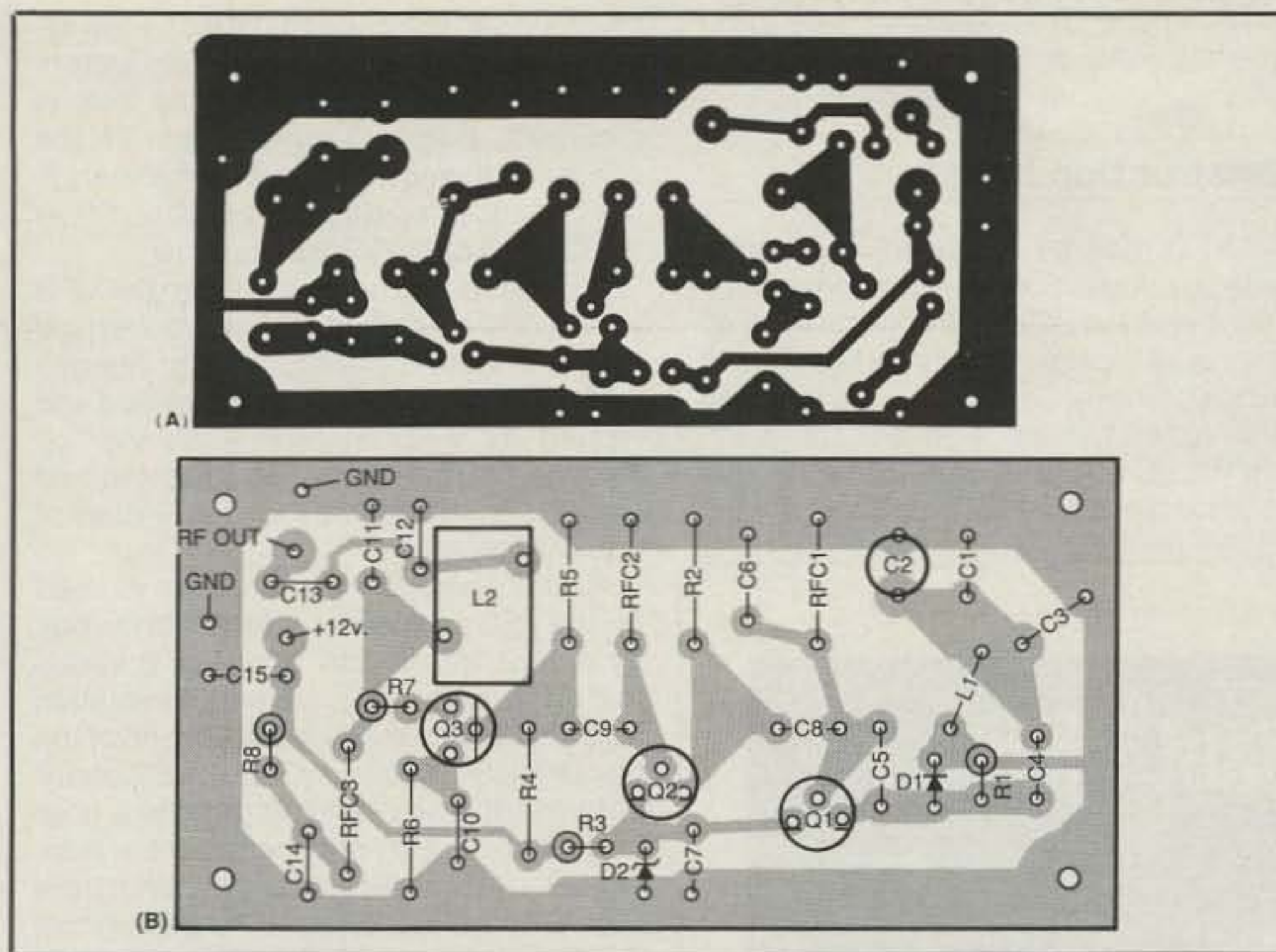


Fig. 2—Scale etching template (A) for the VFO, as shown from the etched side of the board. An X-ray (not to scale) of the component side of the VFO board is shown at (B).

lower the Vcc or Vdd, the less internal heat for the transistor. I prefer an operating voltage between 6 and 8 for the solid-state oscillator. I have had good results when using 9 volts also. In any event, this voltage should be regulated by means of a Zener diode or small three-terminal regulator.

The DC leads that enter the VFO box should be filtered by way of an RF choke and 0.001 μ F feedthrough capacitor. This measure keeps unwanted RF energy from entering the VFO circuit. Stray energy of this variety can cause VFO instability, especially when the VFO is used in a transmitter.

Short- and Long-Term Drift

We encounter two types of frequency drift when operating a VFO. Short-term drift generally occurs during the first five minutes of operation. This drift is caused by internal heating of the transistors and frequency-determining components. Frequency change is usually the greatest during the short-term cycle.

Long-term drift should end within an hour of operation, and it should not exceed 100 Hz in a well-designed VFO. If you monitor the frequency changes with a frequency counter, you will note that they may occur "uphill" or "downhill," depending upon the temperature characteristics of the VFO components. It is not uncommon to observe the VFO frequency drift 100 Hz lower in frequency and then creep back to within a few Hz of the

starting frequency. Once stabilization is reached, the frequency may ramp up and down five or ten Hz until the VFO is turned off and started again. A frequency counter is a valuable tool for VFO builders.

A Practical Colpitts VFO

The circuit for my pet VFO is shown in fig. 1. There is no razzle-dazzle associated with this VFO. It is stable and easy to get working. The PC board artwork for this project is found in fig. 2. Plated and drilled PC boards are available at a nominal cost.² The board is small enough to permit reasonable miniaturization of your project.

The VFO operating frequency specified in fig. 1 was chosen for a 75 meter superhet receiver I built. It has an IF of 2.75 MHz. This circuit can be modified easily for other tuning ranges by merely determining the capacitive and inductive reactances of the critical components (tuned circuits) and scaling them for a different frequency. The circuit is suitable for use from 1.8 through 10 MHz with no other changes.

Output power from this VFO is 4.6 mW or +6.6 dBm. The output network is designed to interface with 500 ohms. This makes it suitable for use with most bipolar RF amplifiers and IC types of mixers. C11, C12, and L2 need to be modified if you wish to connect the VFO to a 50 ohm load, such as a diode doubly balanced mixer.

D1 is used to stabilize the Q1 bias. Q2

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is a source follower buffer stage that isolates the oscillator from amplifier Q3. The high-input impedance (set by R2) minimizes loading at the output of the oscillator. The Q2 drain voltage is also regulated by means of D2. This helps to eliminate oscillator load variations with changes in operating voltage.

Q3 functions as a class A amplifier. R7 has been included to prevent VHF parasitic oscillation, which often plagues transistors with an FT in the VHF or UHF range. C11, C12, and L2 form a pi-network matching circuit that has a low-pass

characteristic. This network helps to reduce harmonic output currents.

Construction Notes

This VFO may be enclosed in a homemade box that is constructed from pieces of double-sided PC board while using a 40 watt soldering iron to join the sections at the box corners. The PC board is then soldered to the box walls on four sides. Locate the PC board at least 1/2 inch above the bottom edges of the box. This will min-

imize unwanted capacitance-change effects between the PC-board conductors and the chassis on which the box is mounted. Such changes occur if the chassis is flexed under stress. Allow additional space for tuning capacitor C3 at the Q1 end of the VFO enclosure.

L1 is mounted near C3, above the VFO board, on a piece of plastic or wooden rod that is attached at each end to the box walls. The ends of the rod are drilled and tapped for 4-40 screws. Pass the rod through the center of the L1 toroid and glue the toroid to the rod with a drop of epoxy cement.

A U-shaped aluminum cover is used for the VFO enclosure. Attach it to the box by means of four No. 4 or No. 6 sheet-metal screws. Drill several ventilation holes in the cover at the Q2, Q3 end of the box. Finally, solder a piece of PC board between the box walls to provide a heat baffle between Q1 and the two other transistors. This baffle should extend from the PC board to the box lid. A nibbling tool can be used to notch the bottom edge of the baffle where components would otherwise prevent a snug fit to the PC board.


VFO Adjustment and Performance

My tests were performed at 6.7 MHz with a room temperature of +70 degrees F. Short-term drift amounted to 2 Hz during the first 5 minutes of operation. Long-term drift was checked next. The frequency drifted 75 Hz lower, then back to within 10 Hz of the starting frequency before stabilization occurred. This took 35 minutes. These tests were made with the VFO terminated at C13 with a 560 ohm resistor. Oscillator isolation was checked by shunting a 10 ohm resistor across the 560 ohm one. This caused a 4 Hz frequency shift, thereby indicating that Q2 and Q3 were providing good load isolation.

Trimmer C2 is adjusted to provide the desired tuning range for C3. The value of C3 determines the frequency spread of the VFO. The tuning range may be reduced by using an NPO fixed-value capacitor in series with C3. Some experimentation will be required to determine the proper value for the series capacitor.

Happy building!

References

1. Q-Dope and many of the parts for this VFO are available from Oak Hills Research, 20879 Madison Ave., Big Rapids, MI 49307 (KE8KL). Send \$1.00 for catalog.
2. A drilled and plated PC board for this project is available from FAR Circuits, 18N640 Field Court, Dundee, IL 60118 (N9ATW) for \$3.50 plus \$1.50 shipping. 

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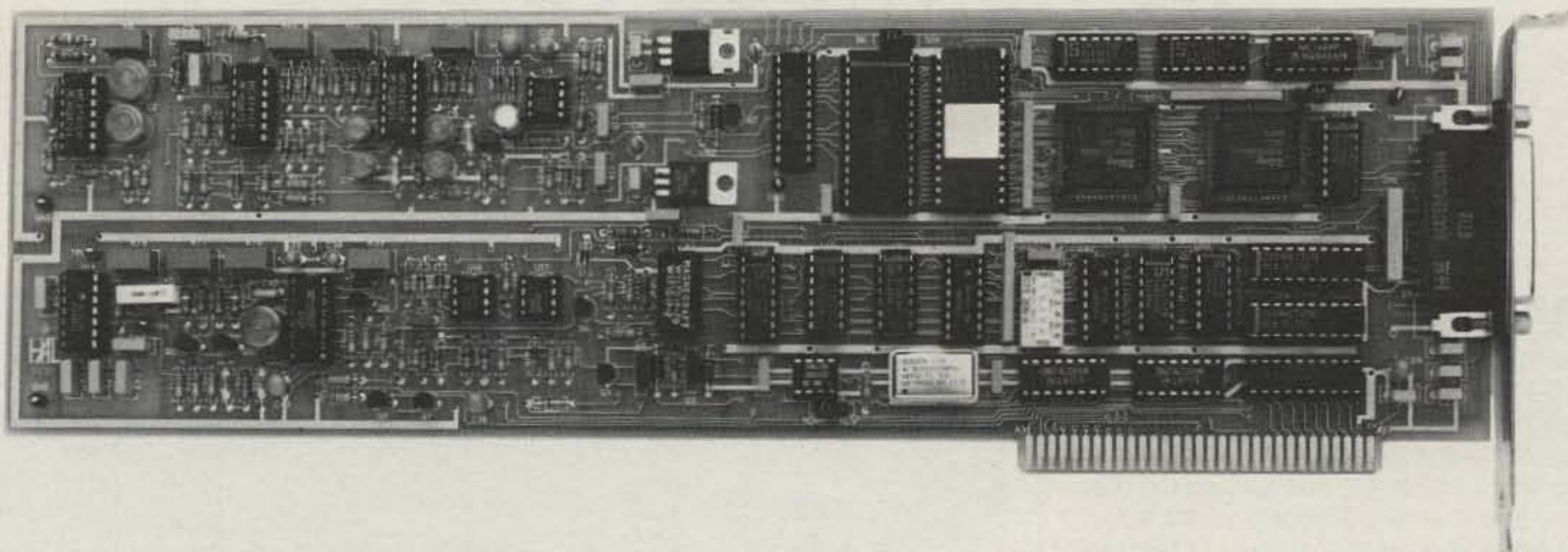
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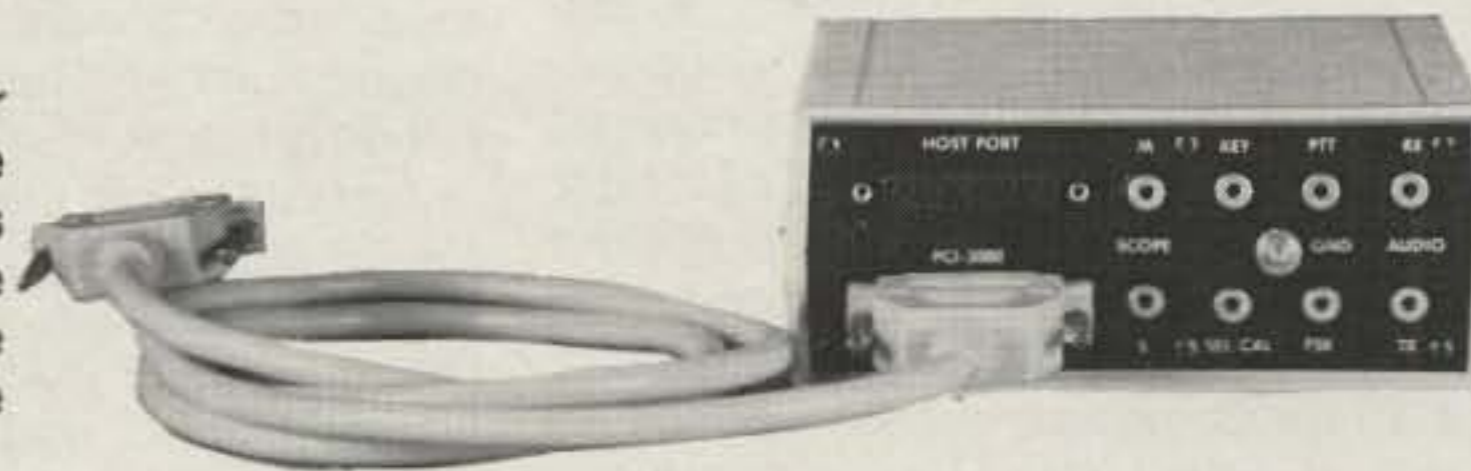
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CQ REVIEWS:

The Kenwood TS-850S HF Transceiver

BY JOHN J. SCHULTZ*, W4FA

When I first looked at the TS-850S, I had the impression that Kenwood took a TS-940S and TS-440S, boiled them down together in a pot, added many of the new features from the TS-950S and a bit of "spice" to the brew, compacted the mixture, and then the TS-850S came out of the mold! The "spice" refers to a few features not even included in the TS-950S.

The size of the TS-850S is about 400 cubic inches more than the TS-440S and roughly that much less than the TS-940S. Its weight of 24 lbs. falls somewhat in between that of the 44 lbs. for the TS-940S and 14 lbs. for the TS-440S. The TS-850S is one of the neatest transceiver packages Kenwood has come out with to date. Considering that it replaces the venerable and popular TS-940S, Kenwood simply had to make the TS-850S something special.

Specifications

Well, a transceiver is just a transceiver, isn't it? No, not quite. Table I presents the specifications for a *basic* TS-850S—that is, performance that you could expect if you just purchased the basic transceiver without any of the various options available such as optional filters, digital processing, etc. The specifications show a transceiver with all modes, including FM, as standard, 100 memory channels, extremely good frequency stability, excellent spurious characteristics, good selectivity for all modes, 100 watts nominal output on CW/SSB, 100 kHz to 30 MHz general-coverage receive, etc. One can't discern from the specs all of the special features (bells and whistles, if you like) of the TS-850S, but all of the special features, of which there is an enormous amount, shouldn't overshadow the fact that the basic TS-850S is a very good basic transceiver.

Although I'll try to highlight some of the main features of the TS-850S as we go along, let's take a quantum leap forward just for the fun of it.



Kenwood's TS-850S HF transceiver.

On most state-of-the-art transceivers such as the TS-850S manipulations of the front-panel controls can select various features. But then there are the variations or *modifications* to the front-panel-selectable features to even more closely suit individual operator preferences. What to do to provide an operator the opportunity for what amounts usually to a one-time preferred setting of these modifications? The usual solution is to instruct the operator to hold down some front-panel keys while the main power switch is toggled from off to on. The TS-850S has a far neater solution. The feature to be modified is called up according to a displayed number. Then the desired *modification* is made.

A brief look at the modification list for the TS-850S provides an insight into the enormous number of features built into the transceiver. Table II provides such a listing. There's no need to cover every feature, but you can see that the listing is very, very comprehensive. You can modify everything from VFO frequency steps, to the 10 Hz frequency display resolution, to the FSK shift range, RIT/XIT range, frequency display for VHF/UHF transverters, recording times for an optional digital record/playback unit, etc.

One of the handiest modifications I like is No. 03 in the table. It means that the VFO, besides being continuously tun-

able, can also be stepped in 1, 5, or 10 kHz steps. Setting up the control on the radio for 5 kHz is extremely handy for SWL purposes. Another nice touch is that the RIT/XIT range, No. 17 in the table, can be modified. They are illustrations of some of the "spice" I referred to earlier.

Don't get confused by the foregoing if you have not had much exposure to the latest generation of transceivers. The TS-850S has an enormous array of features selectable "up front" by front-panel controls. I was only talking about *modifications* possible to those features for readers who might appreciate the sophistication involved. Now let's get back to a more conventional look at the TS-850S.

Operating the TS-850S

If we could sit down together and discuss the TS-850S, we would certainly have to turn it on and exercise some of the front-panel controls. However, I think we can accomplish something useful by taking a look at the front-panel layout, as presented in fig. 1, and just discussing some of the main control functions. It presents a very good insight into the capabilities and operating conveniences provided. When videotapes at 50 cents each replace magazines just think of the fun we'll have, but in the meantime. . . . Fig. 1

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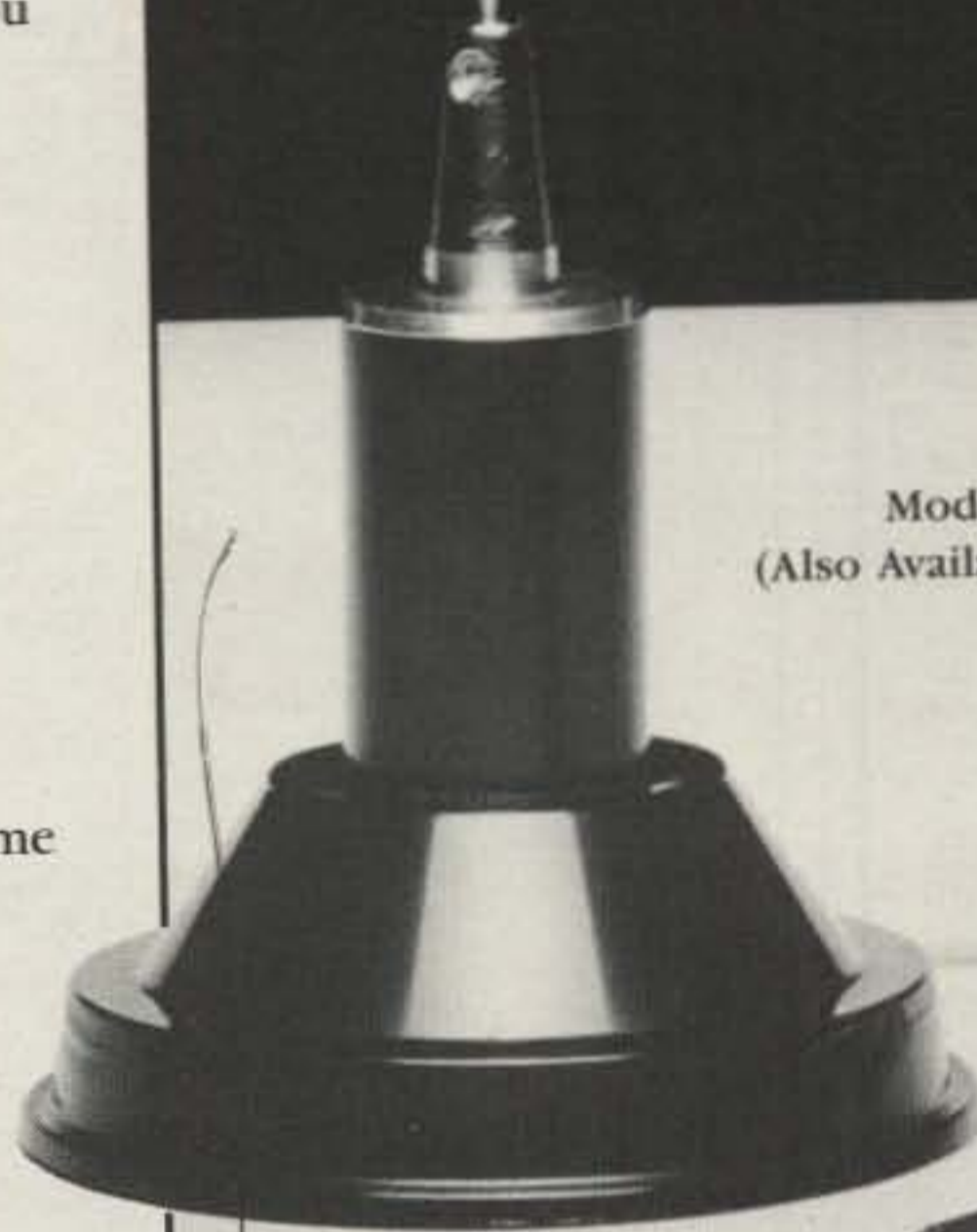
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	Memory Channels	100				
	Antenna impedance	50 ohms With AT-850 Antenna Tuner 20~150 ohms				
	Power requirement	12 to 16 VDC (13.8 VDC reference)				
	Grounding	Negative				
	Current drain	Receive mode with no input signal	2A			
		Transmit mode	20.5A			
	Operating temperature	-10°C to +50°C (+14°F to +122°F)				
	Frequency stability	Less than ±10 PPM				
	Frequency accuracy	Less than ±10 PPM				
	Dimensions [W×H×D] (Projections included)	339×135×375mm (13-11/32"×5-5/16"×14-3/4")				
	Weight	With AT unit	10.9kg (24lbs)			
		Without AT unit	9.4kg (20.7lbs)			
Transmitter	Frequency range	160m band	1.8	to	2.0 MHz	
		80m band	3.5	to	4.0 MHz	
		40m band	7.0	to	7.3 MHz	
		30m band	10.1	to	10.15 MHz	
		20m band	14.0	to	14.35 MHz	
		17m band	18.068	to	18.168 MHz	
		15m band	21.0	to	21.45 MHz	
		12m band	24.89	to	24.99 MHz	
		10m band	28.0	to	29.7 MHz	
		Output power	1.9~24.5MHz	SSB, CW, FSK, FM	MAX	100W
MIN	20W					
AM	MAX			40W		
	MIN			10W		
28MHz	SSB, CW, FSK, FM		MAX	100W		
			MIN	20W		
	AM		MAX	40W		
			MIN	10W		
Modulation	SSB		Balanced modulation			
	FM		Reactance modulation			
	AM		Low level modulation			
Spurious radiation		Less than -60dB				
Carrier suppression (with 1.5kHz reference)		More than 40dB				

Table 1—Specifications for a basic Kenwood TS-850S.

shows the front panel broken down into fields. The "P" numbers refer to pages in the TS-850S's instruction manual where the controls in each field are explained in detail.

Just taking an overview of the controls, particularly the rotary ones, you can see some of the features. A keyer is built-in and its speed and also the weighting can be varied (between about a 1:2.5 and 1:4 dot-dash ratio). Sidetone monitoring is available with adjustable level in the SSB and FSK modes. RF speech processing is built-in. The controls in the P12 and P15 fields are generally self-explanatory. Note the neat idea that noise blanker 1 has a variable level control, while noise blanker 2 has a variable blanking pulse

width control. The tone control refers to the received audio. A separate "High Boost" switch in field P10 influences the transmit audio. Fortunately, Kenwood retained in the TS-850S their very effective slope tune feature (lower right corner of field P15). It's an extremely useful anti-QRM device especially if various of the optional IF filters are not installed. For just casual CW operation, for instance, it obviates the need for an optional CW filter, although dedicated CW fans will still appreciate the steeper skirts possible with a narrow filter.

Let's take a look at field P13, since it has a lot of interesting features. The meter switch toggles through the bargraph meter displays for transmit—SWR, ALC,

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CIRCLE 94 ON READER SERVICE CARD

Specifications		Model	TS-850S
Unwanted sideband suppression (with 1.5kHz reference)			More than 40dB
Maximum frequency deviation (FM)			Less than ± 5 kHz
Frequency response (-6 dB)			400 to 2600Hz
XIT variable range	10 Hz step		More than ± 1.2 kHz
	20 Hz step		More than ± 2.4 kHz
Microphone impedance			600 Ω
Circuitry			Triple conversion superheterodyne
Frequency range			100kHz to 30MHz
Intermediate frequency			1st : 73.05MHz, 2nd : 8.83MHz, 3rd : 455kHz
Sensitivity	SSB, CW, FSK (at 10dB S + N/N)	100kHz~500kHz	Less than 0.2 μ V
		500kHz~1.62MHz*	Less than 4 μ V
		*1.62MHz~24.5MHz	Less than 0.2 μ V
		24.5MHz~30MHz	Less than 0.13 μ V
	AM (at 10dB S + N/N)	100kHz~500kHz	Less than 2 μ V
		500kHz~1.62MHz*	Less than 32 μ V
		*1.62MHz~24.5MHz	Less than 2 μ V
		24.5MHz~30MHz	Less than 1.3 μ V
FM (at 12dB SINAD)	28MHz~30MHz	Less than 0.25 μ V	
Selectivity	SSB, CW, FSK	-6dB:2.4kHz, -60dB:3.8kHz	
	AM	-6dB:6kHz, -60dB:15kHz	
	FM	-6dB:12kHz, -60dB:24kHz	
Image ratio			More than 80dB
1st IF rejection			More than 80dB
Notch filter attenuation			More than 40dB
RIT variable range	10 Hz step		More than ± 1.2 kHz
	20 Hz step		More than ± 2.4 kHz
Squelch sensitivity	SSB, CW, FSK, AM	100kHz~500kHz	Less than 2 μ V
		500kHz~1.62MHz*	Less than 20 μ V
		*1.62MHz~30MHz	Less than 2 μ V
	FM	28MHz~30MHz	Less than 0.25 μ V
Output			1.5W across 8 ohms load (10% distortion)
Output load impedance			8 ohms

and Compression. Separate bargraph displays remain dedicated to an S-meter scale on receive and a power output scale on transmit. It's almost the same as the excellent bargraph meter display used on the TS-950S. The two filter switches allow independent selection of any of the 8.83 MHz and 455 kHz filters in any mode (except FM where only 6 and 12 kHz bandwidths for the 455 kHz IF can be chosen). The filter selection last used is memorized for the mode used and also the VFO used for the last band used. The filters used are displayed in a field above the switches. There is, however, no separate display for the optional 1.8 kHz SSB filter if it is installed. Since it fits into one of the slots reserved for the optional 500

or 270 Hz 8.83 MHz CW filters, you'll have to remember that when 500 or 270 illuminates, it represents the narrow SSB filter.

The numeric keys allow for direct keypad entry of any frequency into either of the two VFOs or into any memory channel (which can also be chosen by numeric entry). However, notice that the numeric keys have a notation above them for the dual purpose that they serve. The 1 through 6 keys have the secondary function of controlling the optional DRU-2 digital recording unit. This unit can be used to record CW or voice messages (from the built-in keyer or station microphone) and then play them back for transmit. Three record/playback segments are available—8, 8, and 16 seconds (unless

Several of the functions of this transceiver can be changed at the time the transceiver is turned ON. Repeat to release each function.

1. Press and hold the LSB/USB key while you turn on the POWER switch.
2. A number will appear in the display.
3. Select the desired number by rotating the M.CH/VFO CH control.
4. Change the function by pressing the UP/DOWN switch.
5. Function selection can be turned off by pressing the CLR key, or by pressing the POWER switch OFF and back ON.

No.	Programmable functions	Initial state
00	Beep tones: ON/OFF	ON
01	Audible mode announcement: ON(Morse code)/OFF(Beep tones)	ON
02	Audible alarm: ON(Morse code)/OFF(Beep tones)	ON
03	M.CH/VFO CH control step frequency selection: 10 kHz/5 kHz/1 kHz	10 kHz
04	M.CH/VFO CH control step frequency selection: 10 kHz/9 kHz (AM mode only)	10 kHz
05	TUNING knob step frequency selection: 100 Hz/10 Hz (AM and FM mode only) (Except the FINE function is ON.)	100 Hz
06	UP/DOWN switch step frequency selection: 1000 kHz/500 kHz/1 kHz (When 1 MHz key is ON.)	1000 kHz
07	10 Hz display resolution: ON/OFF	ON
08	SSB AUTO mode shift: ON/OFF	ON
09	Meter peak hold: ON/OFF	OFF

No.	Programmable functions	Initial state
10	Automatically increments the memory channel data time each time you enter a frequency into memory.	OFF
11	FSK transmission key short : OFF(SPACE)/ON(MARK)	OFF
12	The shift range of the FSK mode can be set to 170, 200, 425, or 850 Hz by using the UP/DOWN switch.	170 Hz
13	You can switch between FSK mode receive tones high (2125 Hz) and low (1275 Hz).	2125 Hz
14	Program scan hold: ON/OFF	OFF
15	Storing the band frequency before the UP/DOWN switch is pressed : Required(ON)/Not required(OFF)	ON
16	Determine whether to change the frequency with the tuning knob (ON) or not (OFF) when the standard memory channel is recalled to RX VFO.	OFF
17	RIT/XIT variable range : 1.27 kHz/2.54 kHz	1.27 kHz
18	Select the sub tones	88.5 Hz
19	Sub tones : b(Tone burst)/c(Continuous tones)	c
20	Antenna Tuner : ON(AUTO)/OFF(MANUAL) (When the SW 1 switch is INT.)	ON
21	Auto weight function : ON/OFF (When the ELECTRONIC KEY switch is ON.)	ON
22	Reverse mode: ON/OFF (When Auto weight function is ON.)	OFF

No.	Programmable functions	Initial state
23	Select the Manual weight (When Auto weight function is OFF.)	3.0
24	Bug key: ON(Used)/OFF(Not used) (When the ELECTRONIC KEY switch is ON.)	OFF
25	When split is selected, the temporary display of the transmit frequency can be turned on and off.	ON
26	Display for the 50 MHz converter : ON/OFF	OFF
27	Display for the 144 MHz converter : ON/OFF	OFF
28	Display for the 430 MHz converter : ON/OFF	OFF
29	Change the REC 1 recording time to 8 or 16 seconds. (When optional DRU-2 is installed)	8 seconds
30	Change the REC 2 recording time to 8 or 16 seconds. (When optional DRU-2 is installed)	8 seconds
31	Change the REC 3 recording time to 16 or 32 seconds. (When optional DRU-2 is installed)	16 seconds
32	Transfer function when two TS-850 are connected : ON/OFF	OFF
33	Turn on and off direct writing into VFO by the transfer function when two TS-850 are connected.	OFF
34	The IF and AF circuits of this transceiver can be switched off (mute mode) so the transceiver will not transmit even if the standby terminal is grounded.	OFF

Table II- Optional function selections for the TS-850S.

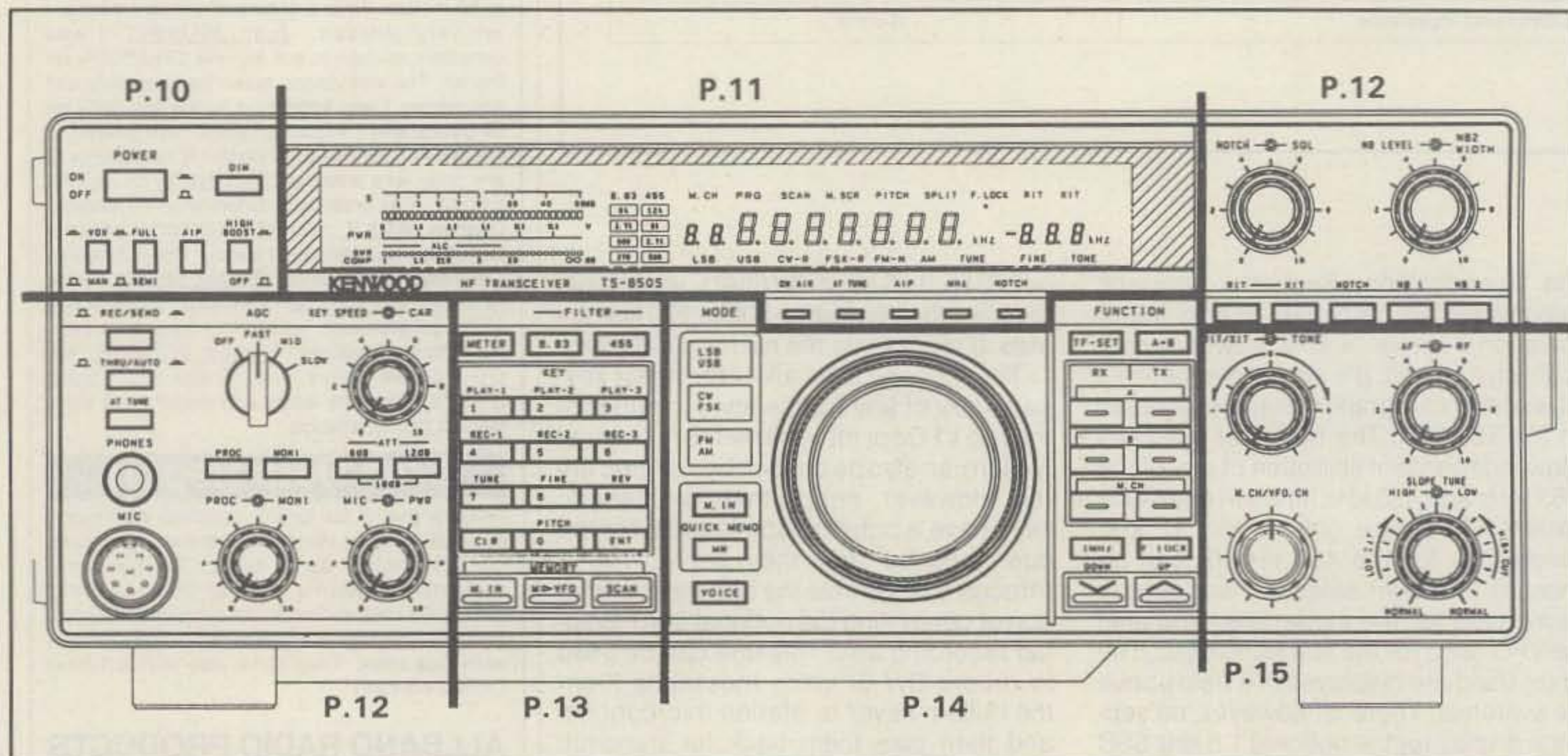


Fig. 1- Front-panel-control layout. "P" numbers refer to instruction- book pages, but are used in the text for reference purposes.



Here is the TS-850S wedged in the front seat of the author's car in a quasi-mobile installation. It does illustrate the point that the intermediate size of the transceiver makes it quite suitable for base-station or portable/mobile use.

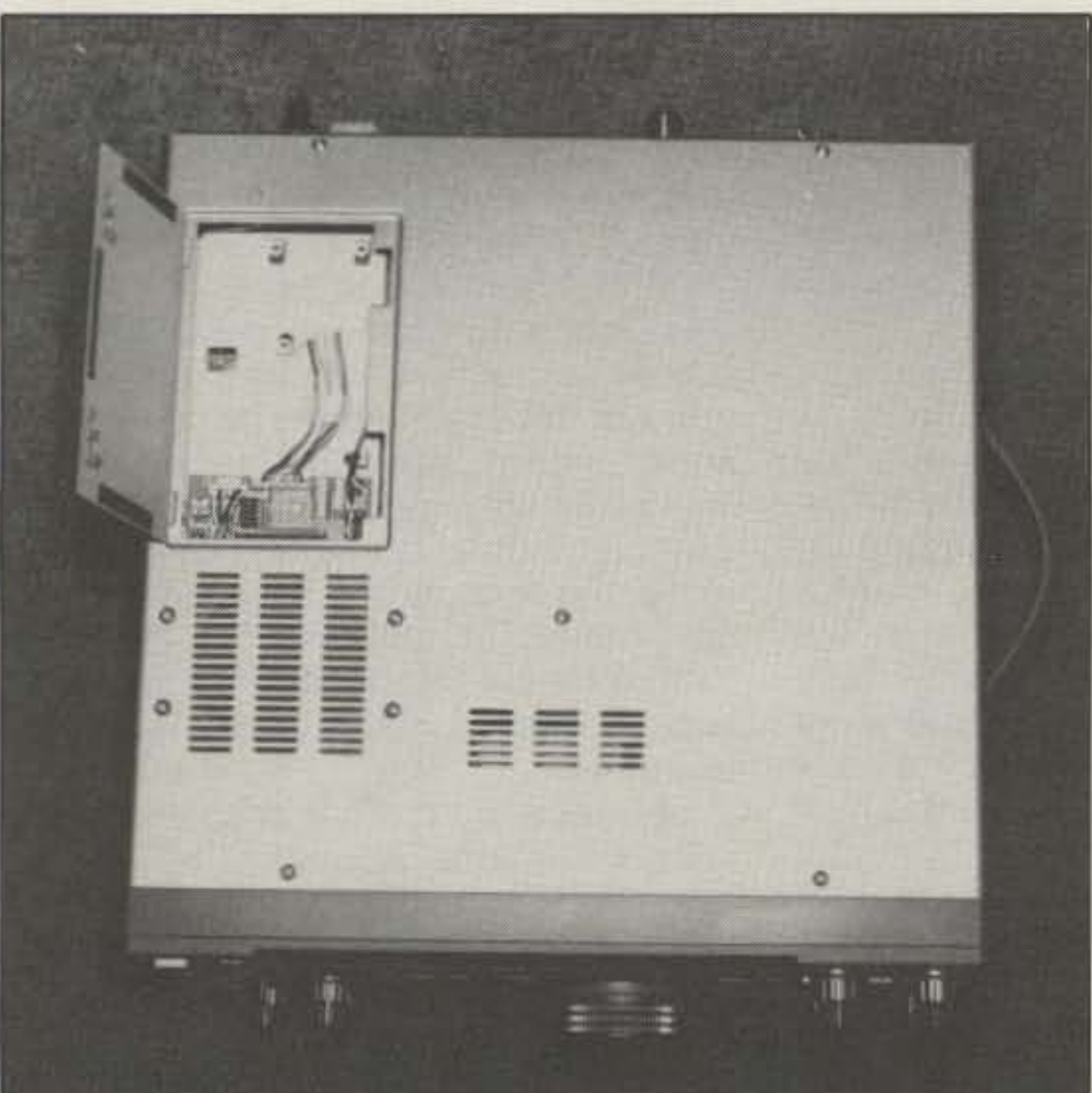
modified). The segments can be used individually or combined for maximum length. The number 7 key also has a "tune" function. In the SSB mode it reduces the power output by roughly half to facilitate tuning a linear amplifier. In the CW mode it is used to zero beat a received signal. The numeric 8 key also activates a fine-tune function. The normal tuning rate (10 kHz per tuning knob revolution for SSB/CW/FSK and 50 kHz for AM/FM) is changed to 1 kHz. The numeric

9 key is also associated with a reverse function for changing the sideband used for both reception and transmission on CW and FSK. The numeric 0 key is associated with a very neat pitch function. By using this key in conjunction with the M. CH/VFO. CH control any CW pitch from 400 to 1000 Hz can be selected in 50 Hz steps. The frequency display field displays the pitch frequency. The sidetone frequency tracks along.

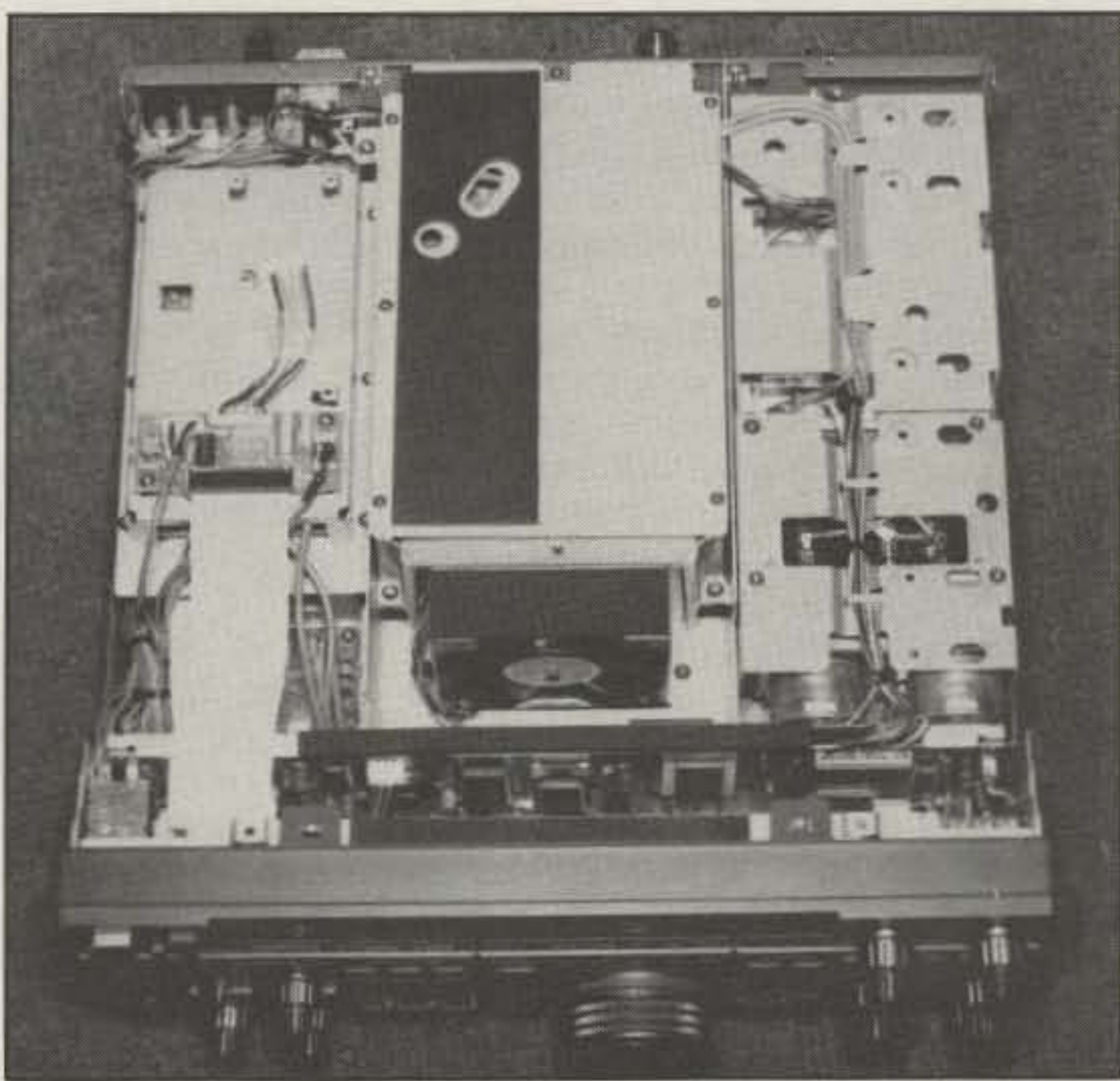
The rest of the keys are associated

with the pretty much routine functions of getting frequencies into a memory channel, or VFO, transferring data from memory to a VFO, and initiating a scan mode. Several scan modes are possible: memory channel scan (with lockout of undesired channels), group scan (memory channels 00 to 09, 10 to 19, etc.), and programmable band scan (memory channels 90 to 99 only). Each of the last ten memory channels can be programmed with individual high and low frequency scan limits. You can scan from 30.0 kHz to 30.0 MHz, if desired, and the mode and filter can be changed during scan. The scan speed is front-panel adjustable from about 20 to 700 Hz/second.

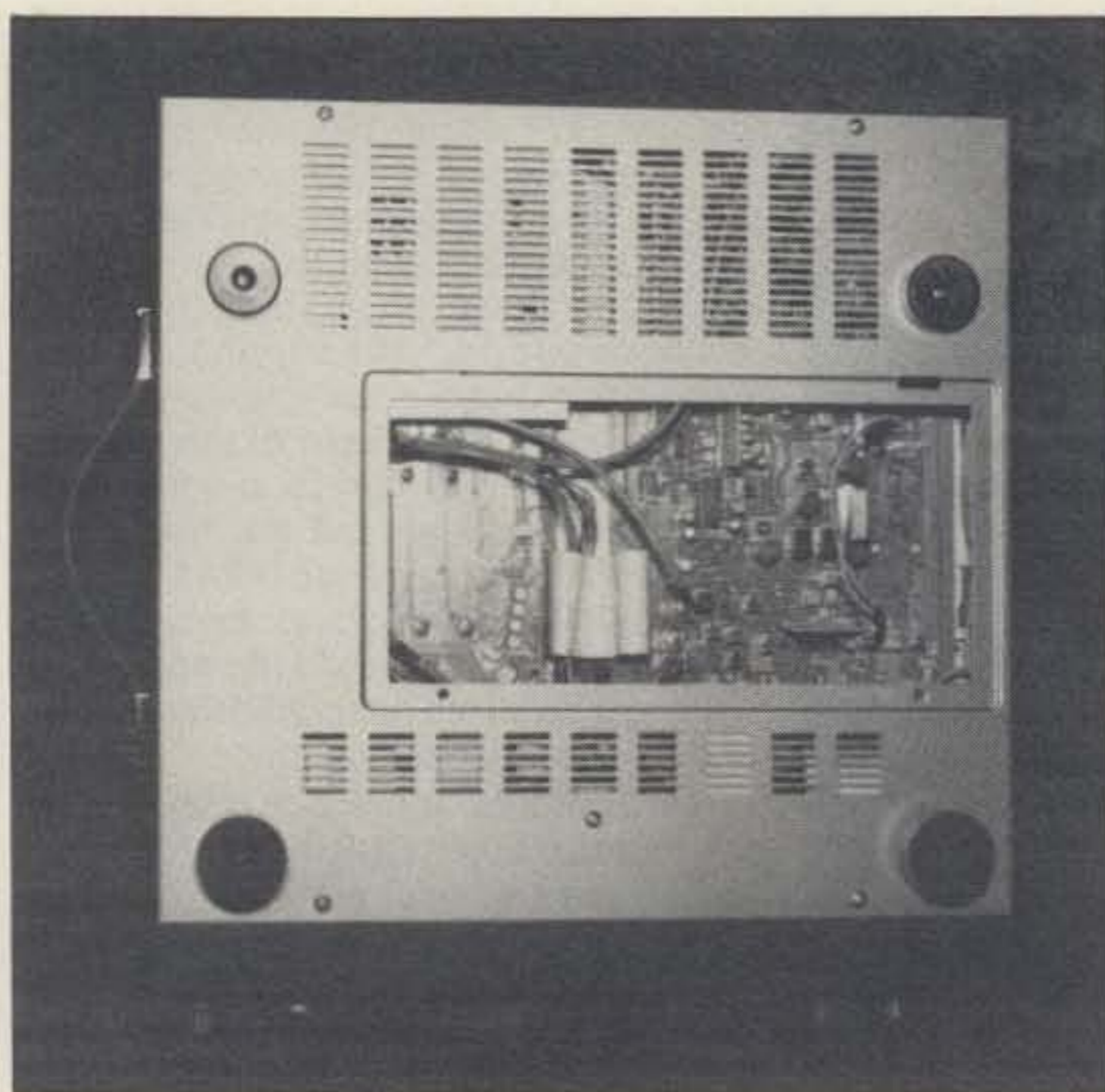
Taking a look at the field marked P14, the button marked **QUICK MEMO** immediately catches your attention. Actually, there are five stacked quick-memory channels. Each one stores *everything*—receive/transmit frequencies, modes, filters, AIP on/off, fine-tune on/off, meter selection, etc., etc. The memories are stacked in the sense that every time the **M. IN** key is depressed for a given transceiver setup, the last entry goes into memory channel 1, the data that was in 1 moves to 2, etc., and the data in 5 is lost. To recall a quick memory, **MR** is depressed and the **M. CH/VFO. CH** control rotated to the desired channel number on the display. I suppose if you are fast enough and the nets are slow-going, it would be possible to participate in almost five nets simultaneously. Of course, that's an exaggeration, but the quick memo function is the quickest way to switch among preselected operating fre-



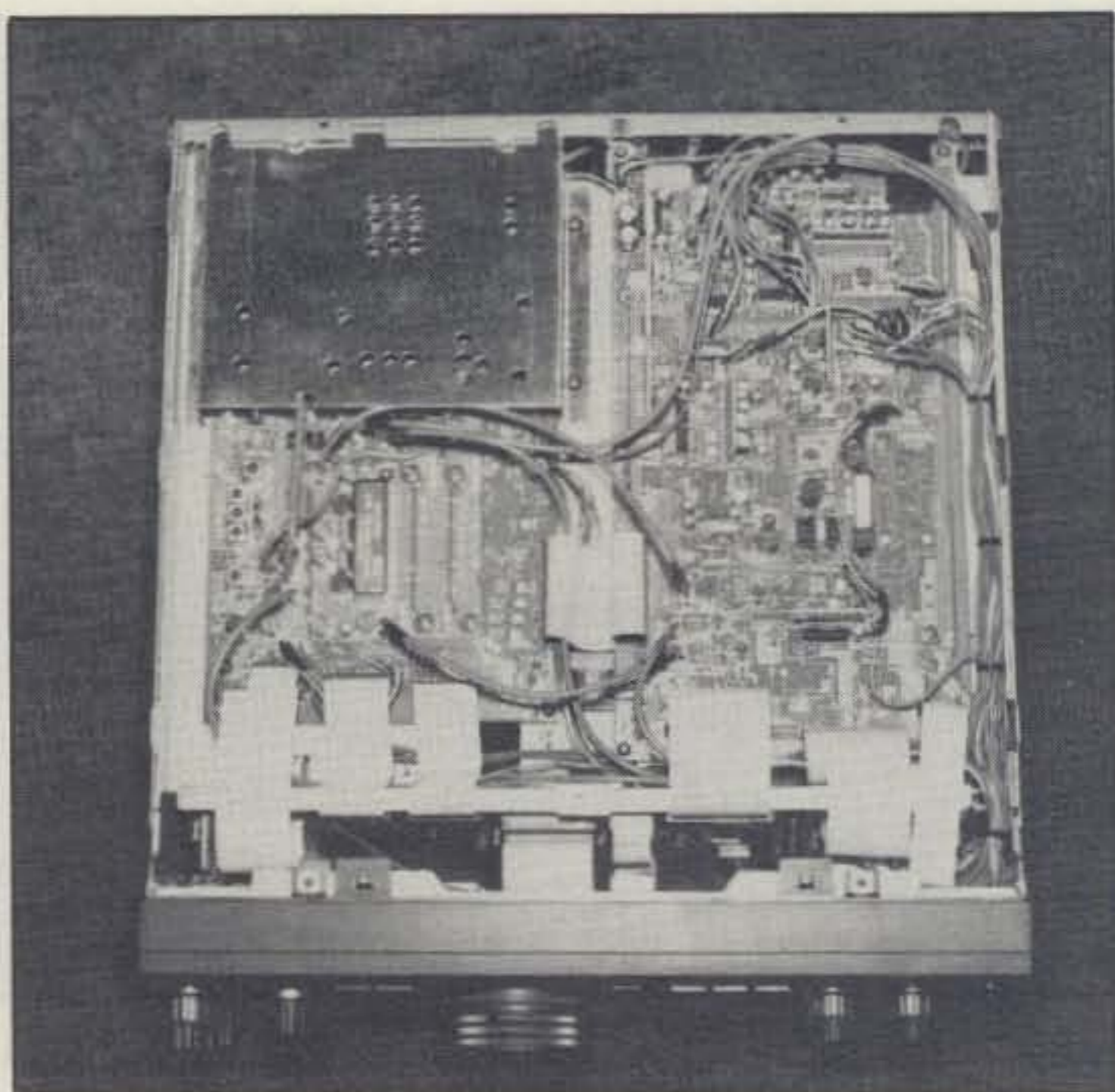
A latch cover on the top of the transceiver allows the insertion of the DRU-2 digital recorder option.



Taking off the top cover completely you can see the power amplifier/fan assembly in the middle and the automatic antenna tuner to the front right. The fan is exceptionally quiet.



Here is a nice surprise looking at the bottom of the TS-850S. A separate cover, held in place by two screws, can be removed if you want to plug in any of the optional IF filters. Space for two filters is to the left, and space for another is at the far right.



Taking off the bottom cover completely, you can see two of the large PC boards for the RF and IF sections. It is quite easy to access almost all of the circuitry in the TS-850S.

quencies. The only delay when switching between channels is due to the second or two it takes the automatic antenna tuner, if installed, to reset. Each recalled channel is immediately "tunable," since the memo data is transferred to a VFO automatically as the **M. CH/VFO. CH** control is rotated.

The rest of the controls are straightforward. The VFO system is the conventional VFO A/B one. Either VFO can be used as the receive or transmit VFO, and either can be set to any frequency within the range of the TS-850S. Data can be transferred from either VFO to a conventional memory channel. Data has to be transferred from a memory channel to a VFO to make that memory channel "tunable." That is, that's the way the radio operates when you receive it! If procedure No. 16 in Table II is executed, *surprise of surprises*, all the memory channels become tunable except for some channels in the 90-99 group which have dual frequency data stored in them. If a recalled memory channel is within an amateur band, it can be used immediately for transmit purposes. Why in the world Kenwood didn't immediately make apparent that the radio has 90-plus tunable memories sort of mystifies me.

The **DOWN** and **UP** switches function as a bandswitch and toggle through the various amateur bands unless the **1 MHz** switch is also used. In that case, the frequency increments in 1 MHz steps. The transceiver does return to the last frequency setup used on a given band even

though VFO A or B might be retuned when switching to another band.

Field P11 shows the frequency/meter/annunciator displays. The display looks a bit "crowded," but in fact, it is quite clear, since only a few displays are active at one time and multiple colors are used.

Test Results

I did some bench checks on the TS-850S, but not really extensive ones, since much of the circuitry in the TS-850S comes from other Kenwood transceivers and I didn't expect any surprises. There weren't any, as confirmed by later operating experiences.

The mundane specifications such as those for power output, spurious responses, etc., were all easily met. The front end is not noise limited, and the dynamic range slightly exceeds 112 dB using the unity gain RF preamplifier (AIP on)! It's a good, "stiff" front end with strong signal-handling capabilities such that the "weak ones" can be pulled out easily even in a crowded band. The automatic antenna tuner is only rated to handle SWRs of up to 2.5:1, but I found it could easily handle SWRs of up to 5:1 if the reactive part of the load is not too great (e.g., don't use it with an end-fed wire which is $\frac{1}{2}$ wavelength long on a given band). The automatic-tuning power level is set at 10 watts, so it is unlikely that any harm would be done to the tuner even if you tried to test match an unknown load.

On-The-Air Results

Most amateurs aren't really too concerned about a transceiver's specifications. They just want to get on the air. Well, I think first understanding a bit about the makeup of a radio makes it all that more fun when you get it on the air. However, be that as it may, the TS-850S is a fun rig to operate. Since it uses the conventional VFO A/B system, there is no confusion factor there. To use the keypad for frequency entry to either selected VFO, press the **ENT** key followed by the frequency numbers, followed again by the **ENT**. No confusion there. To get that frequency into memory, press **M. IN**, choose a memory channel, and then press **M. IN** again. Again, no confusion, and on it goes. I found the frequency selection/memory system in the TS-850S extremely straightforward to use. All the rest of the controls are clear and easy to use. I think CW buffs will find the fine-tuning rate of 1 kHz per tuning knob revolution combined with a sharp CW filter a joy to use.

SSB received audio is crisp and clear using the internal speaker. The receive tone control is of marginal use. When listening to noise you can hear the effect of the control, but it's far less dramatic when listening to a station, since so many stations on SSB tend to have a bit of "shaped" audio. The Slope Tune feature in conjunction with the notch filter provides excellent results against QRM.

However, I think anyone who does a lot of SSB contest operating would benefit from the optional 1.8 kHz SSB filter.

On the transmit side, excellent reports were received on SSB, especially when using the speech processor. In fact, I loaned the radio to Doc, KM4ZA, for a "second opinion." One of his first contacts was with a YO station who said that Doc using the TS-850S with the RF processor active had the best audio he had ever heard from a Stateside station. Almost all stations asked indicated that they preferred the audio with the "High Boost" active. The boost effect is achieved by switching in a capacitor across one of the emitter resistors in a microphone pre-amplifier stage, thus providing a boost in gain for the higher audio frequencies. It's a gradually sloping increase in gain rather than the more peaked response provided by an equalizer stage. Nonetheless, it's a very nice touch. The bargraph-type meter makes adjustment of the controls for ALC range and speech-processor compression very easy indeed. The different colors used in the bargraph display as well as in the main display (three colors in all) are very helpful for clarity.

The CW keyer functions very smoothly over a range of a few WPM to 30-plus WPM. The full break-in feature seemed to also function smoothly over the same range. Some light relay clicking can be heard, but it poses absolutely no problem. The built-in cooling fan is very quiet and remains so even after long operating periods.

The Manual

Two separate manuals are supplied with the TS-850S. One is an instruction manu-

al and the other is the "External Control Instruction Manual." An optional IF-232C interface is needed for use with a PC. The function list for PC control is shown in fig. 2.

Both manuals are very nicely organized and contain a profusion of illustrations and tables. The basic instruction manual, for instance, has very easy-to-understand setup illustrations for various modes (SSB, CW, etc.). Even if the TS-

- Function list
- AUTO INFORMATION ON/OFF setting
 - Same function as microphone UP/DOWN switch
 - VFO A, VFO B and memory frequency selection and readout
 - Filter setting
 - VFO A, VFO B and memory frequency TX/RX setting
 - Model No. readout for transceiver recognition
 - Display of transceiver's current condition
 - F.LOCK ON/OFF setting and display
 - Memory channel setting
 - Mode setting
 - Memory display
 - Memory entry
 - AIP switch ON/OFF setting
 - PITCH setting
 - RIT/XIT frequency clearance
 - RIT/XIT frequency UP/DOWN
 - METER key setting
 - RIT ON/OFF setting
 - RX : For receive operation, TX : For transmit operation
 - Scan ON/OFF setting
 - Slope tune band setting and readout
 - Meter signal output
 - Sub-tone frequency setting
 - Generation of synthesized voice
 - XIT ON/OFF setting

Fig. 2- Function list for control of the TS-850S using a personal computer. A separate manual supplied with the TS-850S completely describes the computer control interface.

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CIRCLE 88 ON READER SERVICE CARD

June 1991 • CQ • 31



A look at the rear panel. It looks uncluttered, but it can accommodate an enormous amount of external connections ranging all the way from those necessary to control a linear to TNCs. That interesting little automobile-type fuse labeled "FUSE 3A" had me confused for a while. It's a separate fuse for a remote automatic antenna tuner (AT-300) which can be controlled by the TS-850S.

850S is your first transceiver, it should be easy enough to get it into operation. You can then ease into learning the more sophisticated manipulative features of the transceiver as time allows.

Although the concept and format of the instruction manual is excellent, a few translation tongue-twisters did find their way into the manual. "Select the meter indicate" and "the PROC switch is ON when the SSB mode" are examples. One can sort out the meaning of the sentences when read in the context of the instruc-

tions. However, the excellent technical quality of the transceiver is not quite matched by the quality of the literature that describes it.

Accessories

The TS-850S can be used with the whole line of Kenwood accessory items, including the new SM-230 Station Monitor. Some items such as the SM-230, various optional IF filters, VS-2 Voice Synthesizer, SO-2 TCXO, IF-232C Interface, etc.,

are all available on the market. However, some accessory items such as the PS-52 Power Supply, DRU-2 Digital Recording Unit, DSP-100 Digital Signal Processor, and AT-300 Remote Automatic Antenna Tuner were developed just for the TS-850S. The radio has instantly become so popular that the accessory items were not available at the time of this writing. Some of them, at least, will be covered in a follow-up article.

Summary

HF transceivers have come a long, long way in the last decade or so. They have become increasingly packed with features and a maze of operating controls and indicators that would seem to rival those on a small jetliner. The new transceivers do perform, however, and are a lot of fun to operate. In the background all of the major manufacturers seem to have realized that until we get into a new age of spoken-command-driven equipment, those HF transceiver front-panels have to strike some balance between quickly learnable ease of basic operation and access to the more sophisticated "bells and whistles" functions.

If there were a Golden-Mean award, I'd give it to the TS-850S. Electrically, the unit has about every feature you would ever need. On the receive side there are plenty of selectivity features. On the transmit side the processor, monitor, and audio high boost all make for interesting SSB, while I think CW buffs have been well treated with semi/full break-in, selectable pitch, and a built-in keyer with adjustable weight. The frequency-manipulation possibilities are not quite as enormous as on a TS-950S, but hey are enormous enough, I would think, to satisfy most operators' needs and then some. Mechanically the unit also has very excellent "balance." The most-often-used controls are large in size and operate very smoothly. All the controls are up-front except for seldom-adjusted ones associated with the VOX feature. On the debit side I would cite the odd omission of an "in-use" indicator for the optional 1.8 kHz filter, since it is bound to be a popular option. I would also like to see some display-field prompting for things like setting the scan modes.

No one HF transceiver is ever going to be perfect, I hope, or I won't be able to have fun continuing to write reviews. But on a features-to-price ratio I'd rate the basic TS-850S as being a value par excellence. One should not regard it as a junior version of the TS-950S nor a modified version of the discontinued TS-940S. It can well stand on its own as a full-fledged HF transceiver.

The TS-850S is priced at \$1900 and is manufactured by Kenwood U.S.A., P.O. Box 22745, Long Beach, CA 90801-5745.

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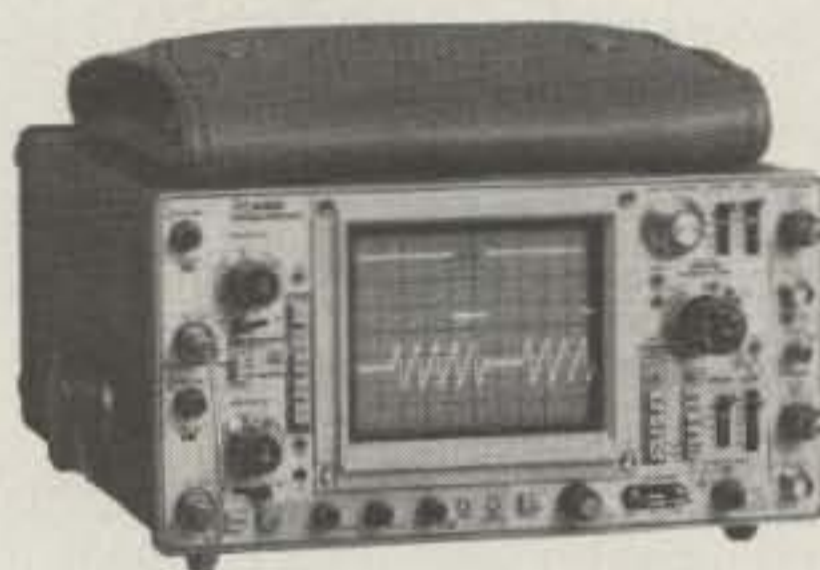
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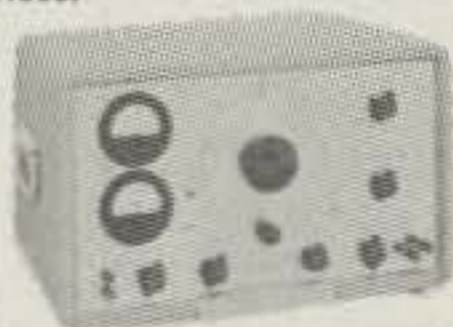
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In Part II we get down to the actual nuts and bolts of building the transceiver, plus how the authors arrived at the design.

Getting Started in Amateur Radio In The 1990s—Part II

BY DANIEL BASILETTI, VY2DB, AND COP MACDONALD*, VY2CM

I had originally intended to run this article in two parts. Truthfully, I wasn't too sure where Cop was going with his modification of a DX-60B, and my first impression was to eliminate a lot of the modification details and trim down the manuscript. After reading it several times, however, one basic and very intriguing thought comes through. Someone was doing literally what all of us profess should be done, although most of us don't get around to it. Here, in installments, is a true learning experience whereby Dan is instrumental in designing and building his first amateur radio station. Cop is taking the time to teach, explain, and show Dan the ubiquitous "how to."

Accordingly, this article will now run in three parts, long enough to include the circuitry and rationale behind the design. Perhaps it might motivate more of us to try to emulate Cop's efforts, and perhaps it might stimulate more of us to learn about design ourselves, and how and why things work.

—K2EEK

Cop: In Part I of this article we went into the human side of our rig-building collaboration—who did what and why. Here we want to share with you some of the project's technical aspects—things we found interesting and of possible value to other amateurs in their construction projects. Let me begin by going over the fig. 1 block diagram of the transceiver system.

Overview

I say transceiver system because in Dan's rig the functions normally performed in the single box of a commercially built amateur transceiver are performed here by three separate units working together. One unit is the DX-60B that Daniel was given by friends. We rendered its amplifiers more linear, and

*P.O. Box 2941, Charlottetown, P.E.I., Canada C1A 8C5

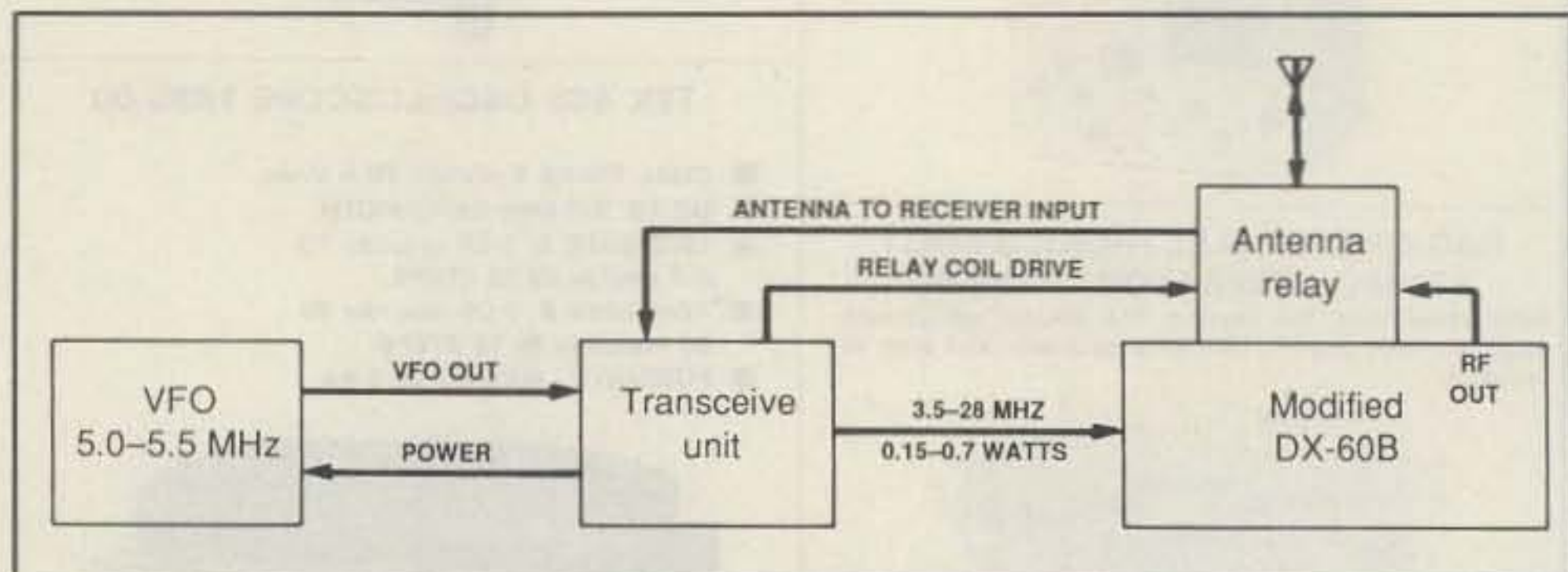


Fig. 1—The VY2DB transceiver consists of these three units, interconnected as shown.

its role is to provide RF power amplification on transmit. The other two units are ones we built: a VFO that sets the common receive and transmit frequency, and a catch-all unit that contains the rest of the circuitry.

We call this third piece of equipment the *Transceive Unit*. As fig. 2 indicates, the Transceive Unit contains five circuit boards: a board containing the power regulators and transmit-receive control circuitry, an SB-104A front-end board, a high-frequency crystal oscillator (HFO) board, an IF/mixer/mechanical-filter board, and the transmit mixer/amplifier board that drives the DX-60B.

The VFO

To minimize heating of the VFO components, and resultant frequency drift, we decided to make the VFO a separate unit. The tuning capacitor from the fleamarket, with its massive cast-bronze frame and 100-to-1 worm-gear reduction drive, was the key component around which we worked. The VFO circuit combines features from several standard 5.0 to 5.5 MHz VFO designs and is not reproduced here. (A FET Hartley oscillator feeds a FET buffer which drives a 2N2222A amplifier with pi-network output.)

As the photograph shows, the circuit

board is mounted cantilever-fashion on the tuning capacitor itself. The mechanical stability of the assembly, the use of polystyrene capacitors in the oscillator's tuned circuits, and the low power dissipation within the VFO case combine to give excellent frequency stability and near zero drift after a few minutes warm-up. As hoped, the precision worm-gear drive exhibited no detectable backlash, and since one full rotation of the knob changes the frequency only 10 kHz or so, tuning in SSB and narrow-shift RTTY signals is a cinch.

Although the circuit is standard, some of the mechanical features might interest builders. A digital readout was beyond our budget, so we needed some sort of calibrated VFO dial. With worm-gear drives, the tuning shaft and capacitor shaft are at right angles to each other. This led us to use a drum-type indicator.

The drum itself is the screw-on lid from a Coffee-Mate jar fastened to the end of the capacitor shaft with a large blob of 5-minute epoxy that was allowed to ooze through a ring of small holes in the lid near the shaft. The Coffee-Mate lid was the winner because it had the right outside diameter—a diameter that put the drum's surface quite close to the front panel. I nibbled and filed a rectangular opening in the panel to allow the drum to be viewed, and again used 5-minute epoxy, this time to fasten the thinnest

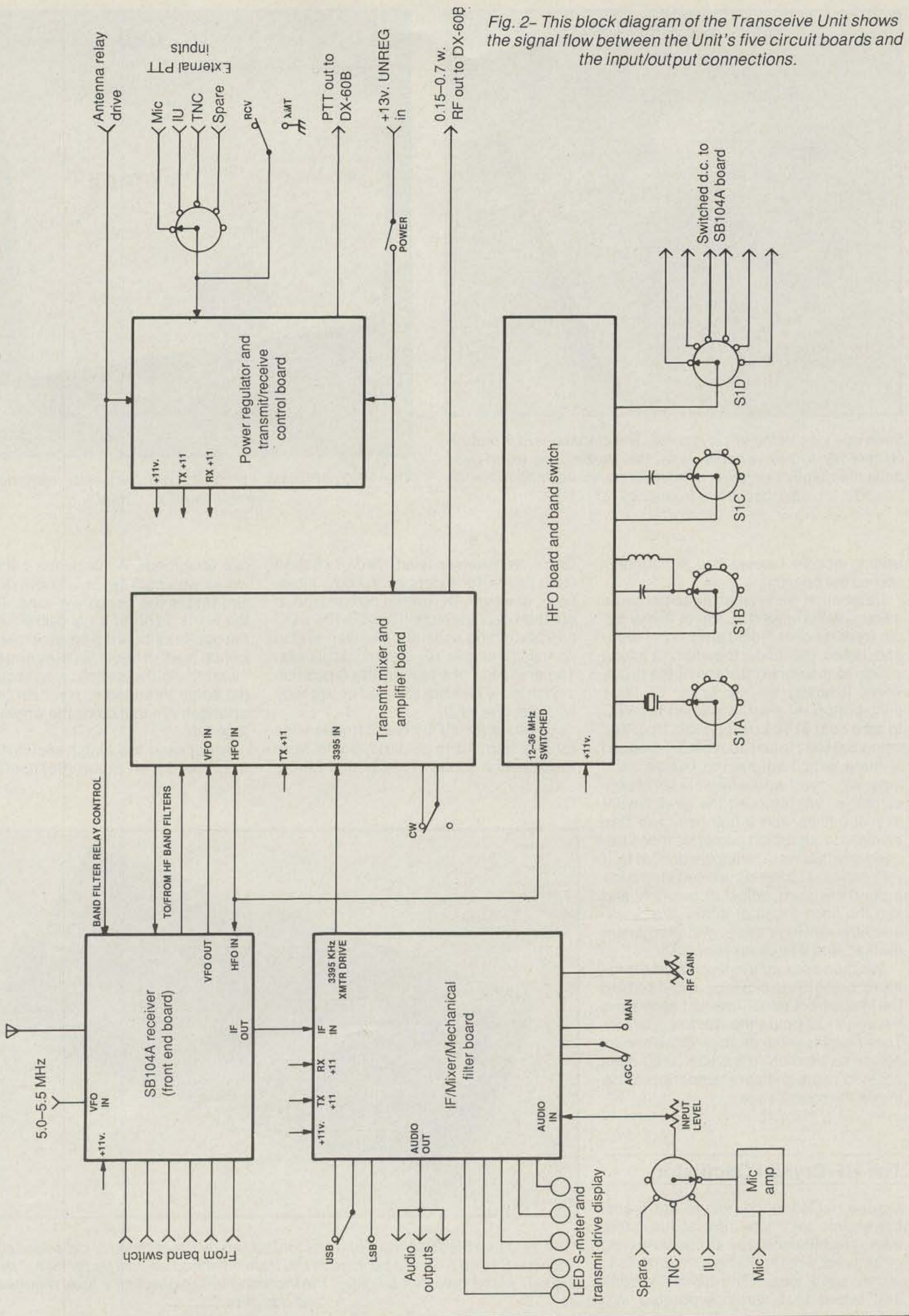
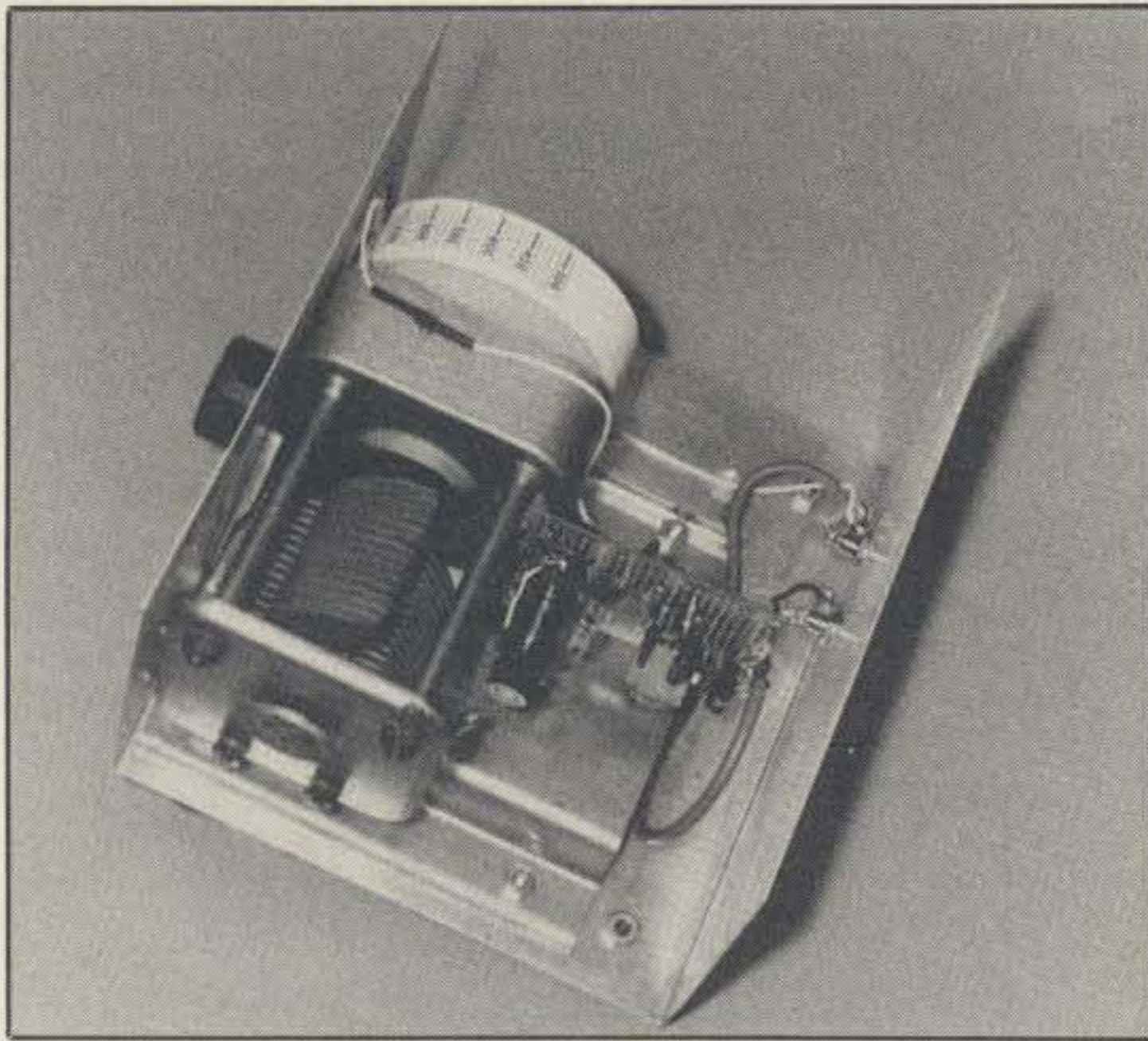
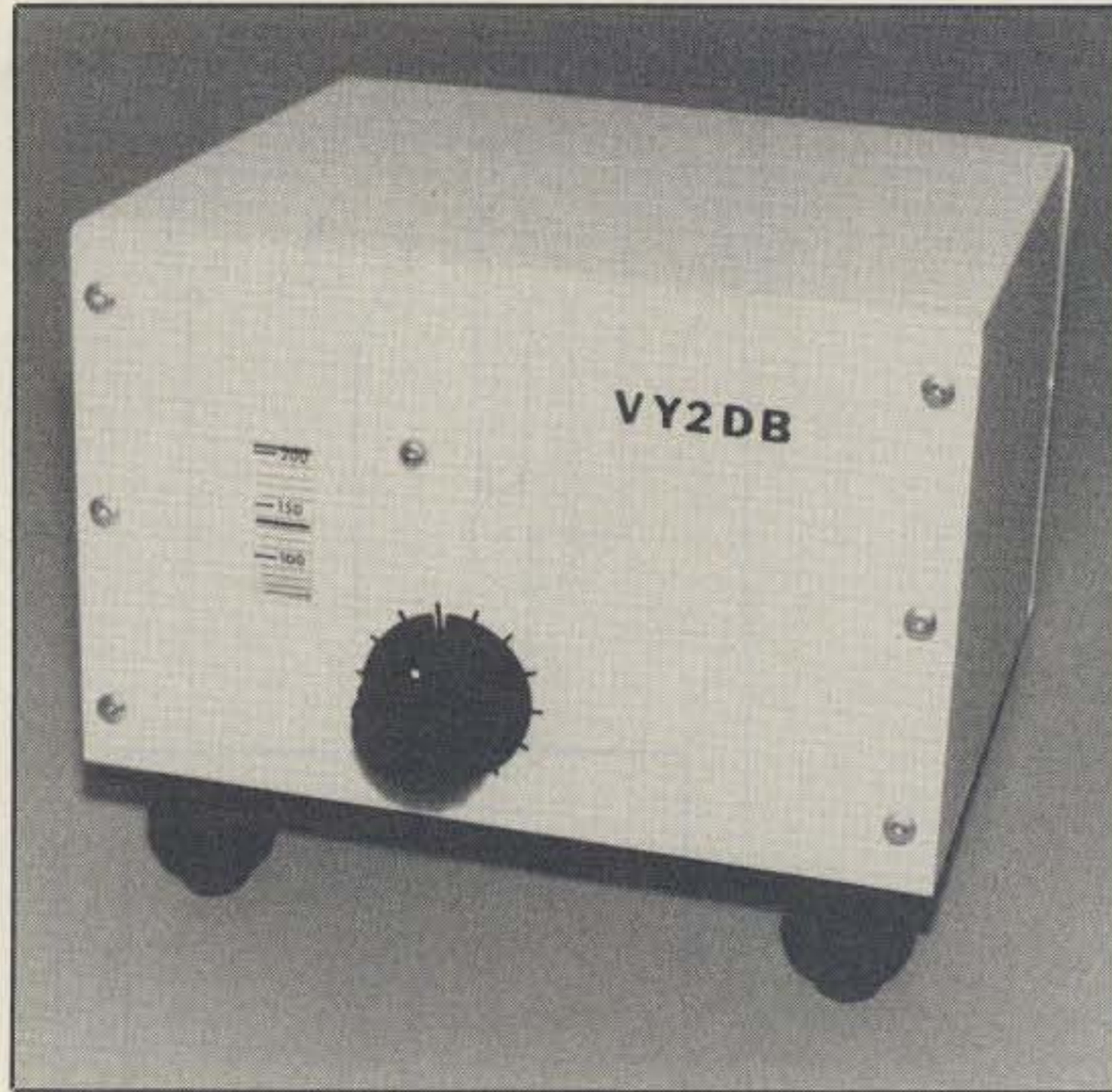


Fig. 2- This block diagram of the Transceiver Unit shows the signal flow between the Unit's five circuit boards and the input/output connections.



Birds-eye view of the VFOs innards. The circuit board is mounted directly to the variable capacitor frame. The worm-gear drive mechanism requires almost 50 complete knob rotations to change the frequency 500 kHz.



The VFO, showing the drum-type frequency indicator and "sewing needle" cursor.

sewing needle I could find horizontally across the opening.

Calibration with this arrangement was a snap. We wrapped a strip of heavy paper (report cover stock) around the drum and taped the ends together. It clung snugly to the ribbed surface of the drum. Then, listening on my Sony ICF-2001 push-button receiver, we tuned the VFO to zero beat at 10 kHz intervals from just below 5.0 MHz to just above 5.5. I dragged a sharp pencil across the needle each time. When we had a complete set of pencil marks, we removed the strip. I went over the lines with a fine pen, and Dan identified with rub-on numerals those frequencies that were multiples of 50 kHz. It was easy to slip the completed strip back around the drum, adjust its position, and join the ends together again. We blackened the sewing needle with permanent marker, and it became our cursor.

We then epoxied two 6 volt 25 MA miniature bulbs (Radio Shack 272-1140) to the inside front panel, one just above and the other just below the window opening. They illuminate the drum, and their small power dissipation (0.3 watts total) does not lead to a significant temperature rise inside the roomy case.

The HF Crystal Oscillator

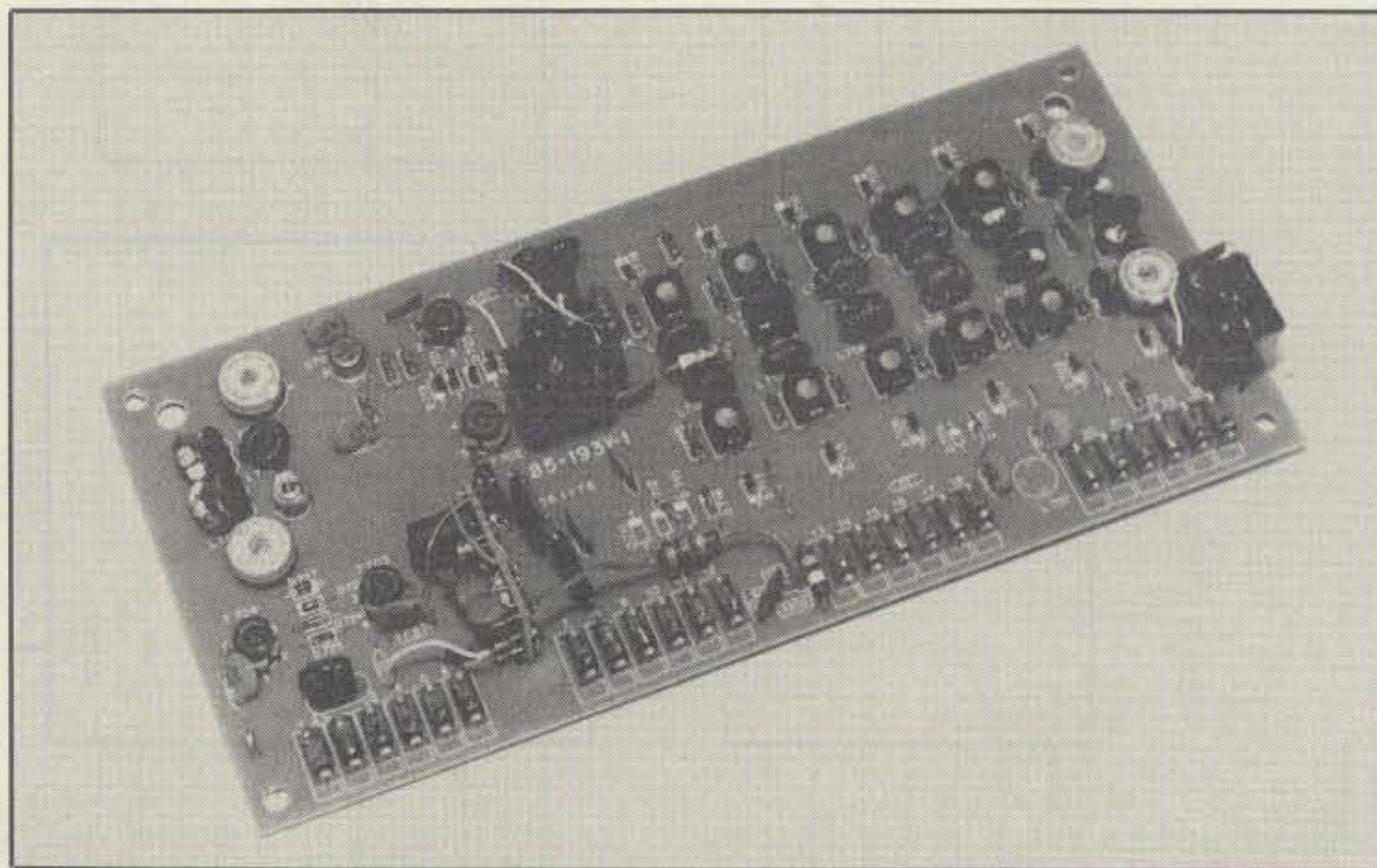
Moving our attention now to the Transceive Unit, let's look first at the band-switching HF oscillator. Diode switching of frequency-determining components is widely used today. The SB-104A front-end board that we incorporated into

Dan's transceiver used diode-switched input filters, for example. In some situations, however, DC switching can lead to complexity. To maintain the SB-104's DC bandswitching scheme, Heathkit ended up using multiple HF crystal oscillators. The presence of a multi-wafer 6-position switch in my junk box allowed us to get by with just one HFO.

Because the HFO crystal frequencies ranged from 12 to 36 MHz, some were fundamental mode crystals and others

overtone mode. An oscillator circuit that works with both types is shown in fig. 3, and that is the circuit we used. To keep the leads as short as possible we made the oscillator board a physical part of the switch itself. It became, in effect, the last "wafer" on the switch; it is secured by the same threaded rod, spacer, and nut arrangement that holds the whole switch together.

In our case, the switch section farthest from the circuit board (Section D) han-



The modified SB-104A front-end board. The two relays epoxied to the board allow the individual band filters to be used in the transmit mode as well as receive. The "baby board" at the lower left amplifies the incoming VFO signal to the level required by the diode mixer.

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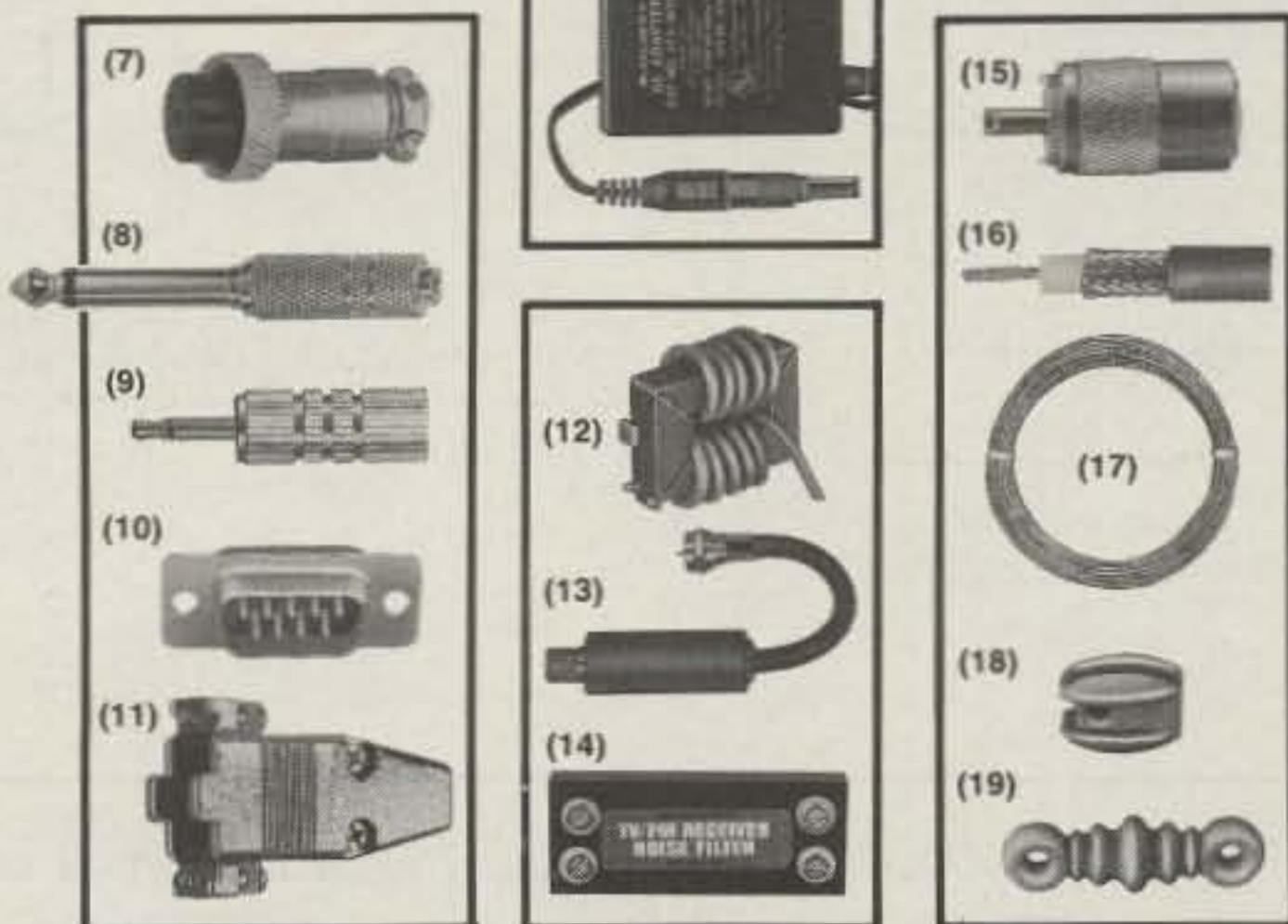
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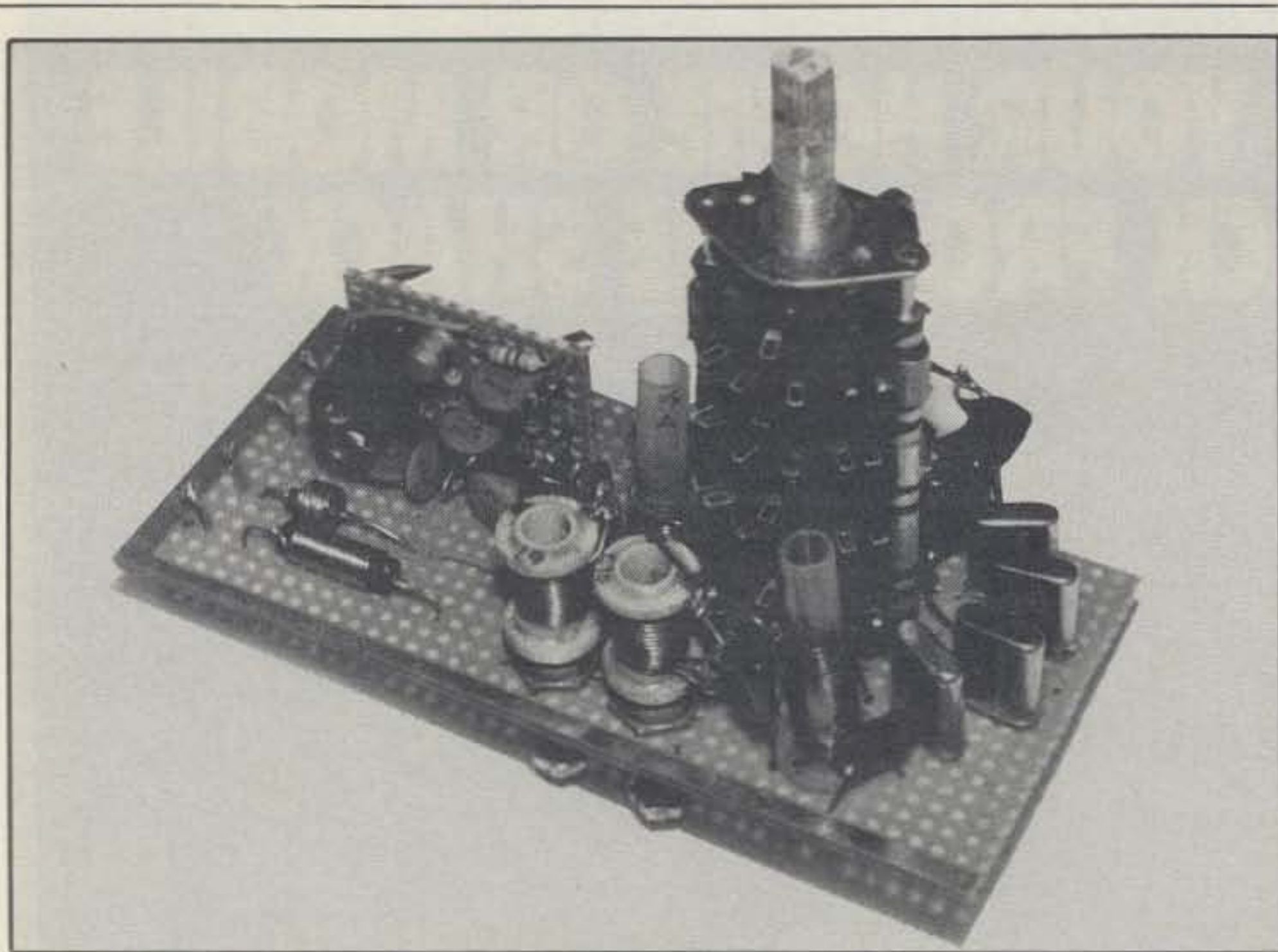
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This HF crystal-oscillator board was made a permanent part of the switch itself—sort of a large extra wafer.

kHz away from that marked on the crystal case. Switching additional capacitance into the circuit brings the oscillator frequency closer to the rated crystal frequency. As the photo of this assembly shows, even with all this switching to do, we had several switch sections left over.

LED Driver Circuit

Dan: As I mentioned in Part I, Cop asked me if I would like to design the LED driver circuit. We used the linear LM3914 to indicate received signal strength. We used the logarithmic LM3915 to indicate Transceiver Unit output. The final circuit appears in fig. 4.

The 1K resistor from pin 7 to pin 8 of each chip determines the LED "ON" current—10 MA in this case. The varying DC input voltage goes to pin 5. Inside the IC there is resistance network giving a total resistance between pins 4 and 6 of 10K. You choose external resistors to make the voltage at pin 6 equal to the maximum expected input voltage, and the voltage at pin 4 equal to the minimum. We originally expected a minimum AGC voltage of 3.8 and a maximum of 4.1. In actual operation we got less swing than that, and the values shown are what gave one lit LED on a weak signal and five on a very strong one. The 0.1 μ F film capacitor was needed to eliminate the pickup of stray

dles the DC switching for the SB-104A front-end board. Three sections near the circuit board are involved in the actual oscillator circuit. Section A switches the crystals, Section B switches the collector

tank circuits, and Section C comes into play with fundamental mode crystals. Although fundamental mode crystals will oscillate in this circuit when C1 is only 10 pF, they may do so at a frequency several

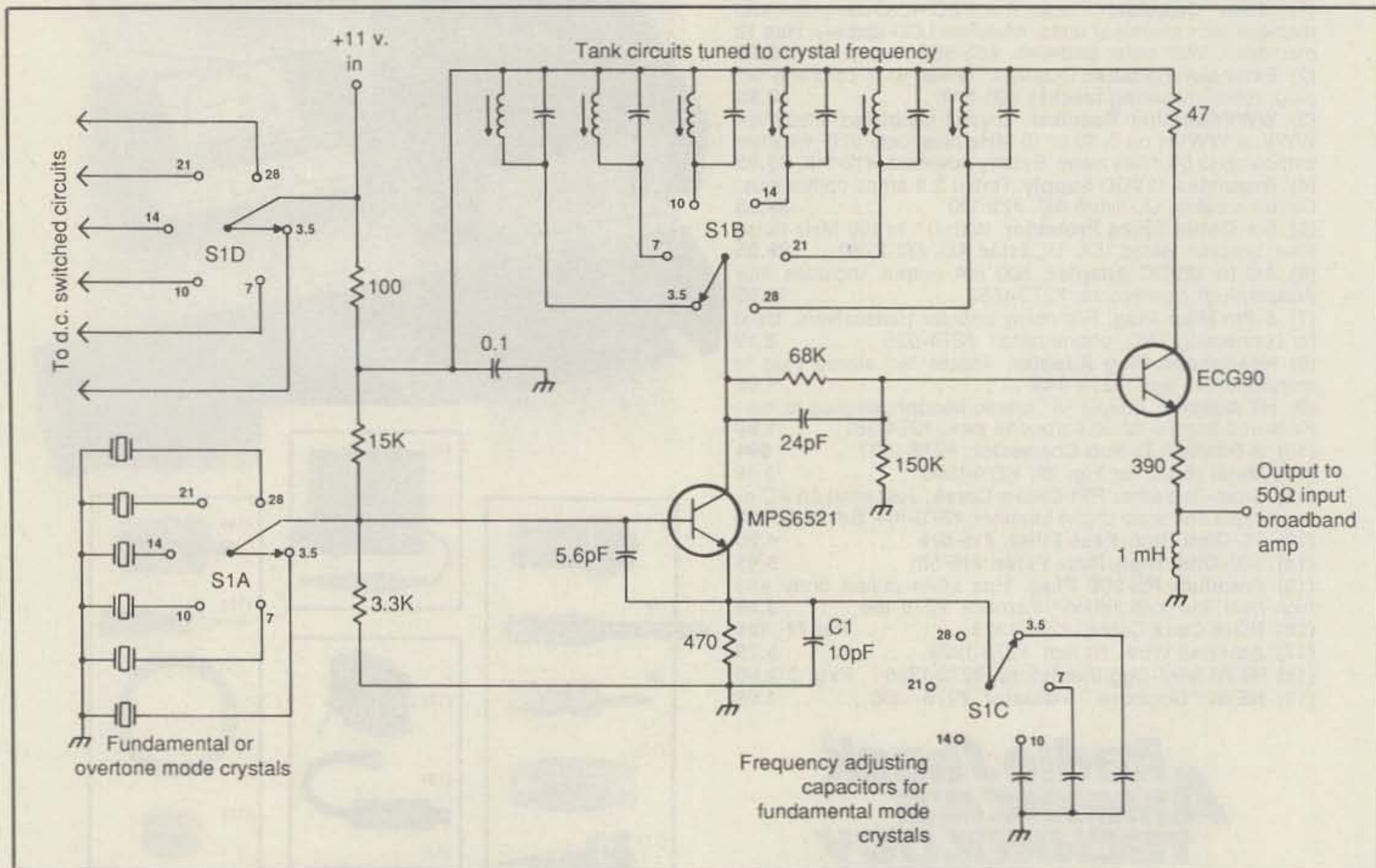


Fig. 3- Oscillator-on-a-switch. This is the circuit of VY2DB's high-frequency crystal oscillator.

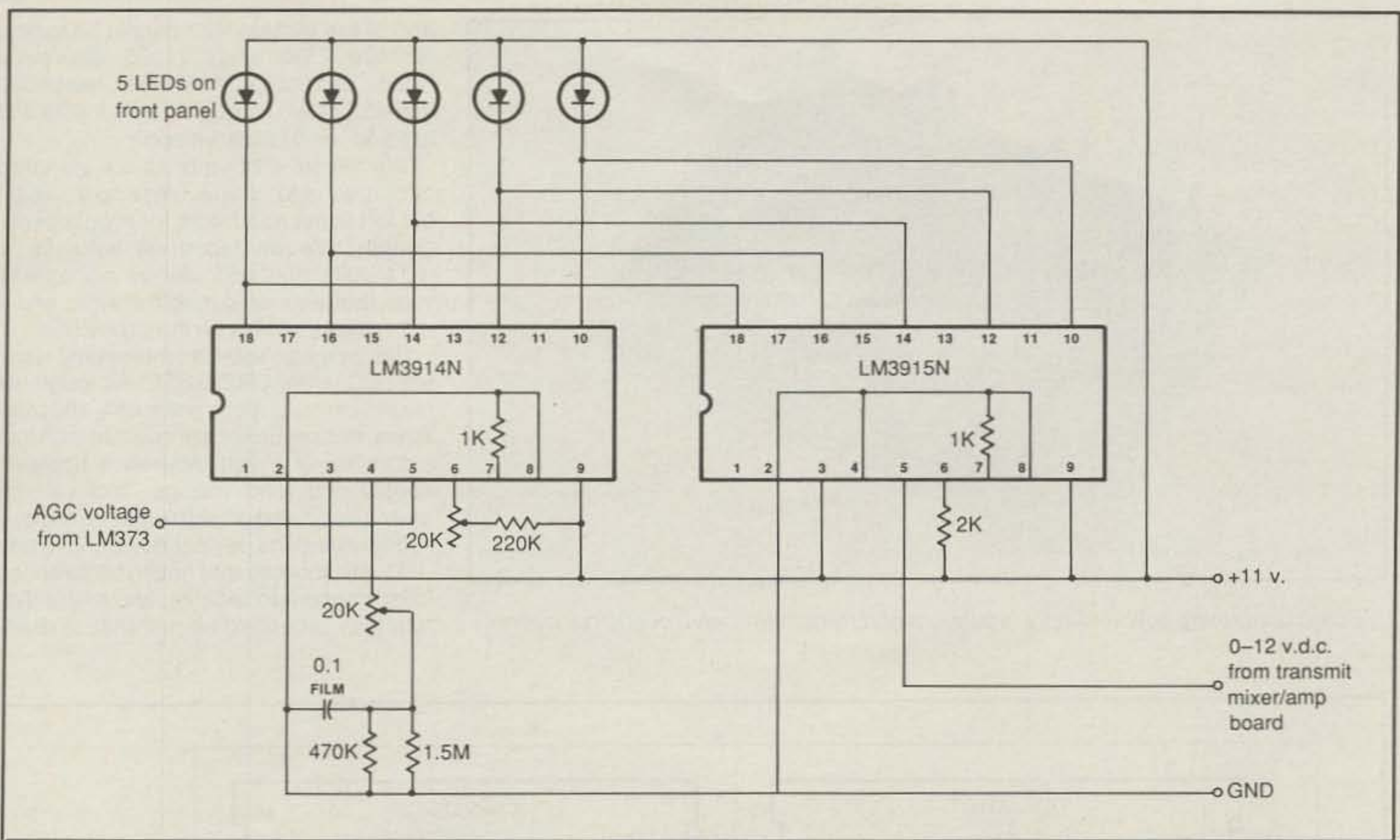
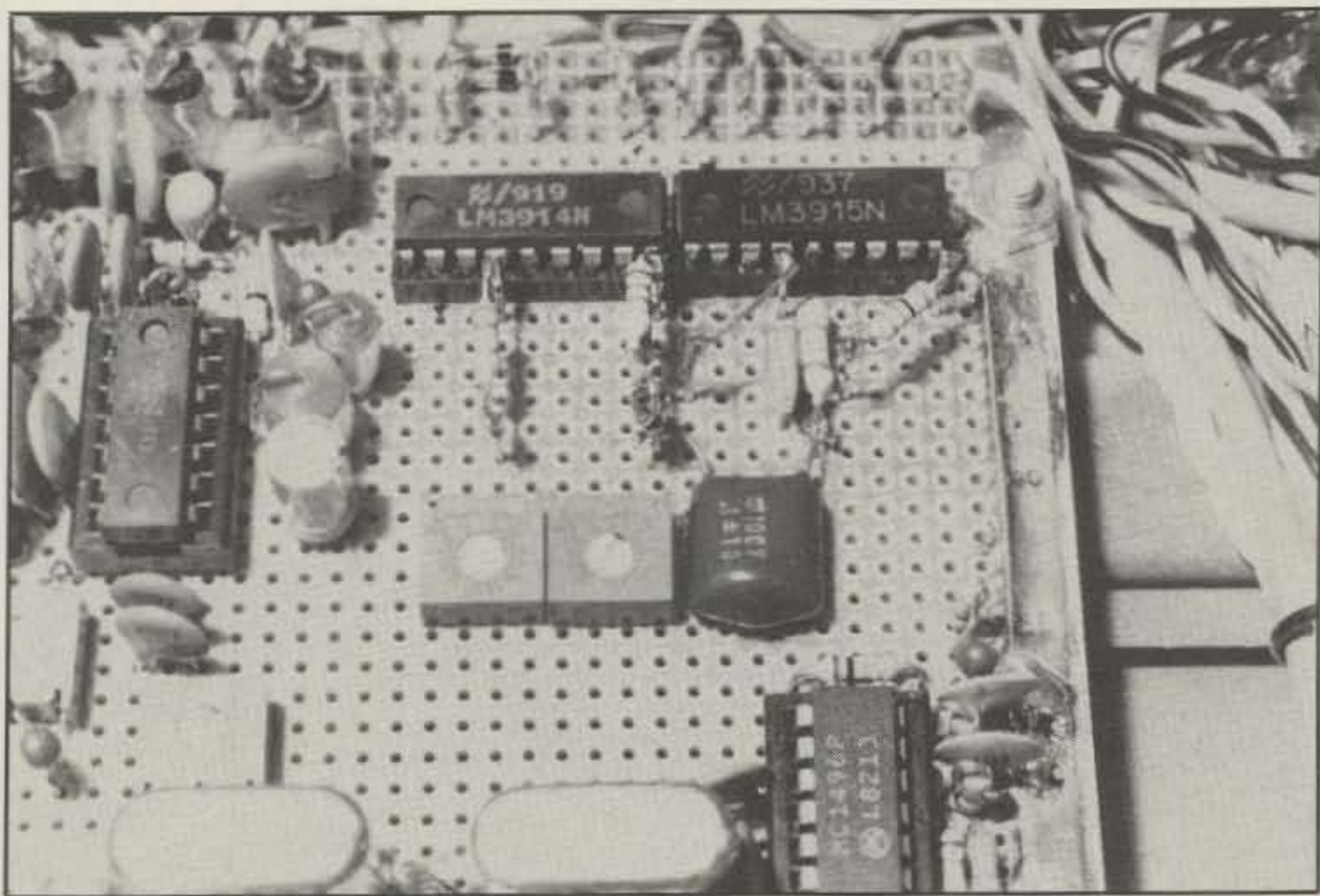


Fig. 4- The LED driver circuit. No transmit-receive switching is needed with this circuit because of the open-collector-type IC outputs, and because whenever one input is active, the other has dropped to zero.



A close-up view of the LED driver circuitry. See the schematic of fig. 4.

AC voltages by this high-resistance, high-sensitivity divider.

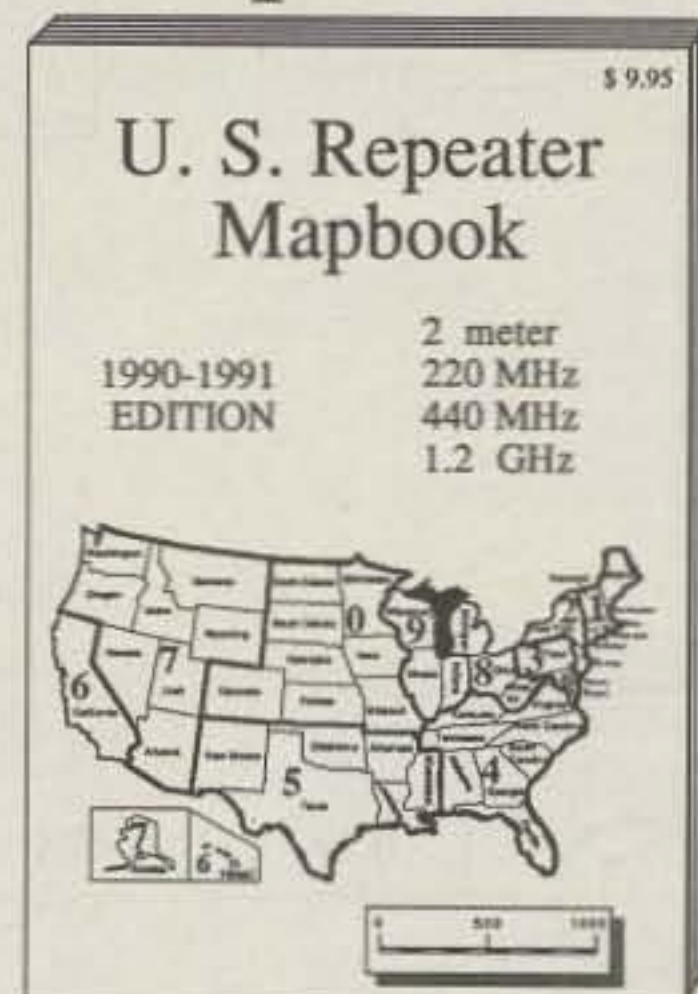
The current drivers in these chips are the "open collector" type, so both chips can be connected to the same LEDs. With no resistance at the bottom end of the LM3915 divider, and only 2K at the top, that IC gradually lights more LEDs as

its pin 5 voltage is increased from 0 to about 10 volts.

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Cop: In our attempt to keep things simple, I decided to power the solid-state por-

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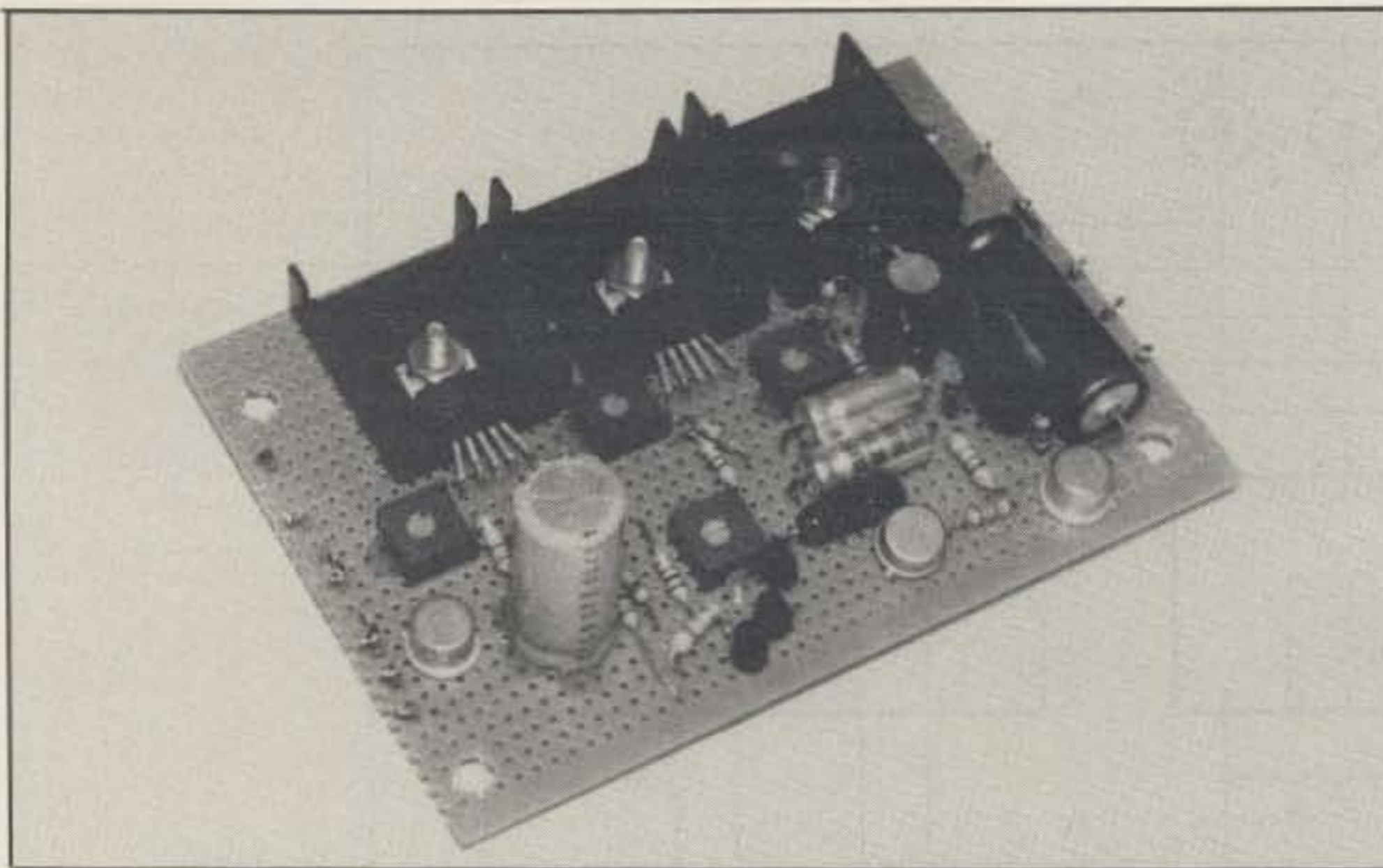
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Board containing power-supply regulators and transmit/receive control circuitry.

tion of the system with plug-in adapters. Jameco Electronics (1355 Shoreway Road, Belmont, CA 94002, telephone 415-592-8097) listed a 12 volt 1 amp unit at \$5.95, and I ordered two.

We chose +11 volts as our standard circuit voltage; it was close to 12 volts, but left some headroom for regulator operation. We wanted three voltages: a +11 volts that was always on, a +11 volts that was on during transmit, and a +11 volts that was on during receive.

Jameco also listed an interesting regulator IC—the LM2931CT. Although its maximum output current is only 150 milliamps, this regulator will operate with just a fraction of a volt difference between supply and load voltage, and can be switched on and off with external logic. It sounded like the perfect device for those +11 volt sources that had to be switched from transmit to receive, and in this system they proved to be just that. A draw-

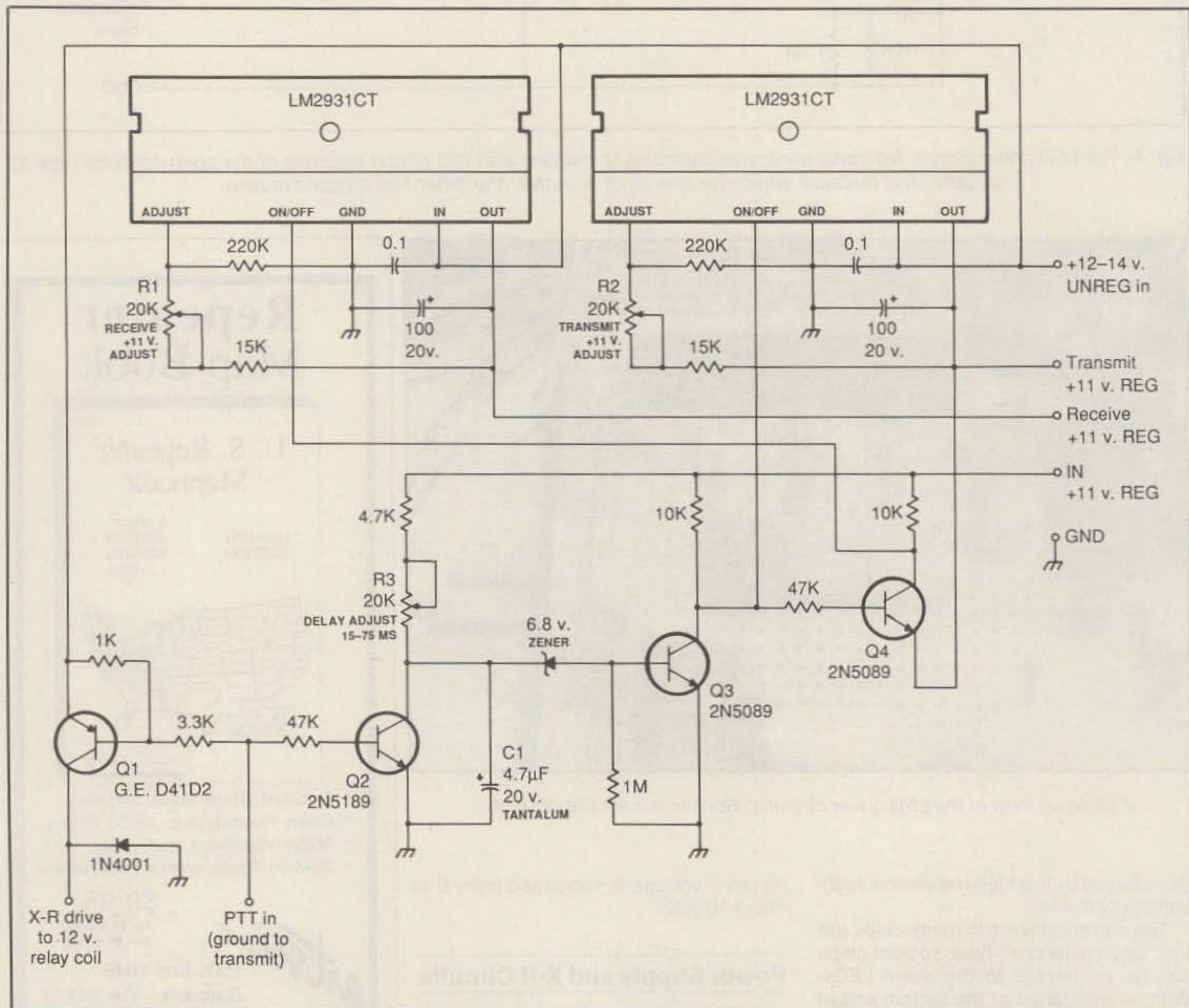


Fig. 5- The XMT +11 volt and RCV +11 volt regulators, and the control circuitry that turns them on and off.

DIGITAL VOICE RECORDER

VERY SIMPLE

Due to its advanced circuit design, the operation of the DVM-58C Digital Voice Recorder is as easy as 1-2-3.

1. Connect DC power source
2. Hook up a microphone
3. Start recording
(and, believe it or not, it's done!)

VERY USEFUL

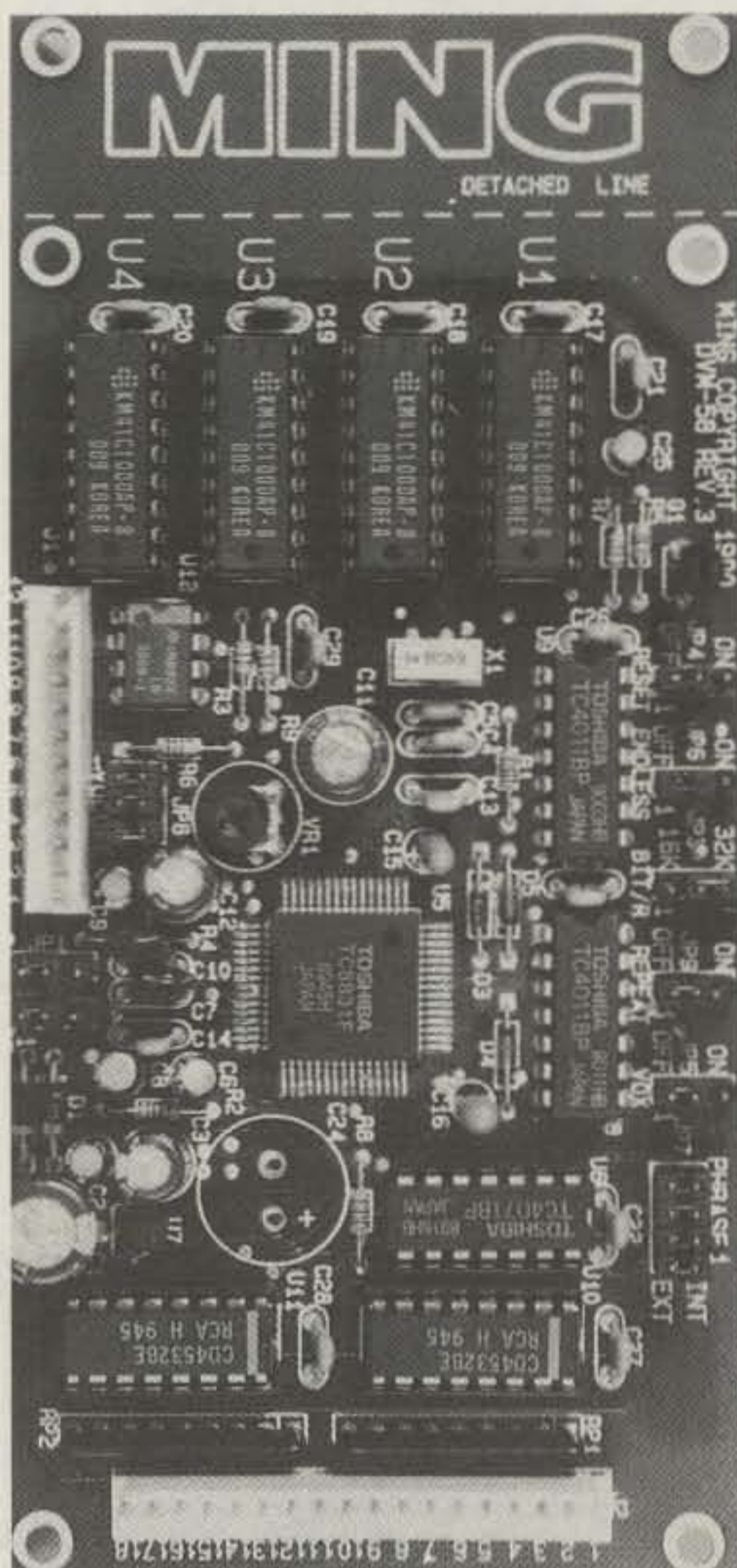
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3. HAM radio communications.
4. CB radio communications.
5. Telephone applications.
6. Verbal instruction and warning systems

VERY ECONOMICAL

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with 1 Meg DRAM onboard.
(Additional DRAMs available at extra charge)



VERY POWERFUL

State-of-the-art technology & circuit design make the DVM-58C Digital Voice Recorder very powerful, compare following features:

- Very low standby current - only 8mA w/ 4 Mega DRAM.
- On board 0.5W audio amplifier w/ volume control (internal or external).
- ADM (Adaptive Delta Modulation).
- Selectable 16K/32K bps sampling rate.
- Memory expendable up to 4 Mega DRAM which gives you total of 2 minutes recording at 32K bps.
- Selectable "REPEAT" mode switch.
- 16 variable length messages each w/ direct triggering terminal enables you to play back any one of the messages at anytime you want -instantly.
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- "ENDLESS RECORDING" option allows continuous recording that can be stopped at any time to review past conversation.
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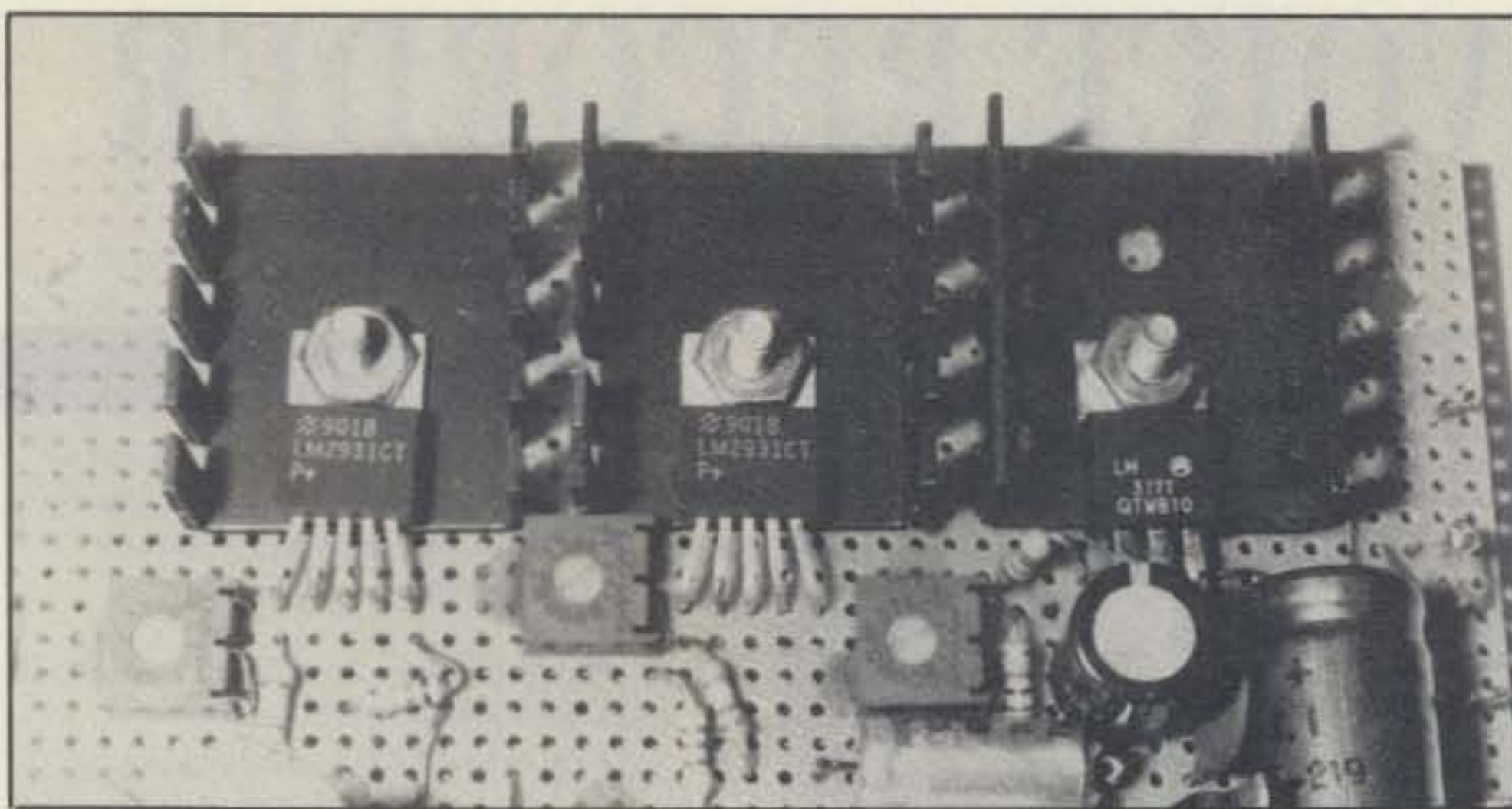
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A close-up view of the power-supply regulators. Note that the LM2931CT ICs have five leads. When the regulator supply voltage is only 2 or 3 volts higher than the output voltage, and the current is less than 200 milliamps, the heat sinks are not needed.

back in some applications is that these regulators require a 100 uF capacitor from the output terminal to ground. With that capacitor there, the output voltage doesn't drop instantly to zero when the regulator is turned OFF. Instead, the voltage drops gradually as the capacitor discharges through the connected circuitry. With a 100 milliamp resistive load, for instance, it takes close to 3 milliseconds for the voltage to drop below 1 volt.

This turn-off delay has not proven to be a problem in Dan's system. His system uses mechanical relays for antenna switching and for filter switching within the Transceive Unit, and these relays take nearly 10 milliseconds to switch from receive to transmit. Because we don't want high-power RF flowing through the antenna relay contacts until they are safely closed, we introduce an artificial delay when switching to transmit. In re-

sponse to a push-to-talk command, power is applied to the relay coil immediately, but the solid-state transmit circuitry does not switch ON until 15 to 75 milliseconds later. The specific time depends on the setting of trimmer potentiometer R3 in fig. 5.

For those who are interested, the circuit works this way: When the PTT IN line is grounded, the base-emitter junction of Q1 is forward biased with a current of at least 2 MA. If Q1 has sufficient DC gain, it will saturate and deliver +13 volts or so to the relay coils. Grounding PTT IN also turns Q2 off, and its collector voltage gradually rises as the current through R3 charges C1. When the voltage reaches 7.5 volts or so, the 6.8 volt zener starts to conduct and Q3 saturates. This grounds the transmit regulator ON/OFF terminal, turning this regulator ON. At the same time Q4 is turned off, raising the voltage on the receive regulator ON/OFF terminal, and turning that regulator OFF.

Note that the emitter of Q4 is connected to the XMT +11 line, not to ground. This was done so that the receive regulator will not turn on the instant the ground on PTT IN is released. Instead, RCV +11 turn on is delayed until the voltage on the XMT +11 bus drops to +1.5 volts or so. This ensures that the receive circuits are not turned ON until the transmit circuits are really OFF.

(To Be Continued)

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H10-3	10 m	6.46	1.79	\$190
H6-6	6 m	9.41	1.91	\$200
H144-5	2 m	9.10	1.70	\$ 50
H144-15	2 m	13.73	1.68	\$145
H220-5	1.25 m	9.10	1.70	\$ 50
H220-17	1.25 m	13.53	1.29	\$150
H432-24	70 cm	16.14	1.76	\$145

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Display	10 Digit LCD w/Function Annunciators	10 Digit LCD w/Function Annunciators	10 Digit LCD	10 Digit LCD	8 Digit LED	8 Digit LED
RF Signal Strength Indicator	16 Segment Adjustable Bargraph	16 Segment Adjustable Bargraph	16 Segment Adjustable Bargraph	.	.	.
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CQ REVIEWS:

The MFJ-207 HF and MFJ-208 VHF SWR Analyzers

BY JOHN J. SCHULTZ*, W4FA

Most amateurs catch the antenna experimentation "bug" at times, and some of us suffer from it constantly. Of course, the word "suffer" is a bit overdone. Antenna experimentation, or even just learning a bit as to how antennas function, can be a lot of fun. The fun factor often becomes diluted a bit, however, when you have to pay attention to the instrumentation involved in antenna measurements rather than concentrating directly on antenna adjustments. If you have to readjust or recalibrate the instrumentation every time an antenna adjustment or modification is made, not only is the "fun factor" diluted, but you can often become confused as to the true results being achieved.

Therefore I was delighted to see the MFJ SWR analyzers come on the market. The HF model covers 160-10 meters and the VHF model covers 2 meters. Both units are battery (or AC) powered and completely self-contained. Basically, instead of connecting into the SO-239 connector in the back of your transceiver, an

*302 Glasgow Lane, Greenville, NC 27858

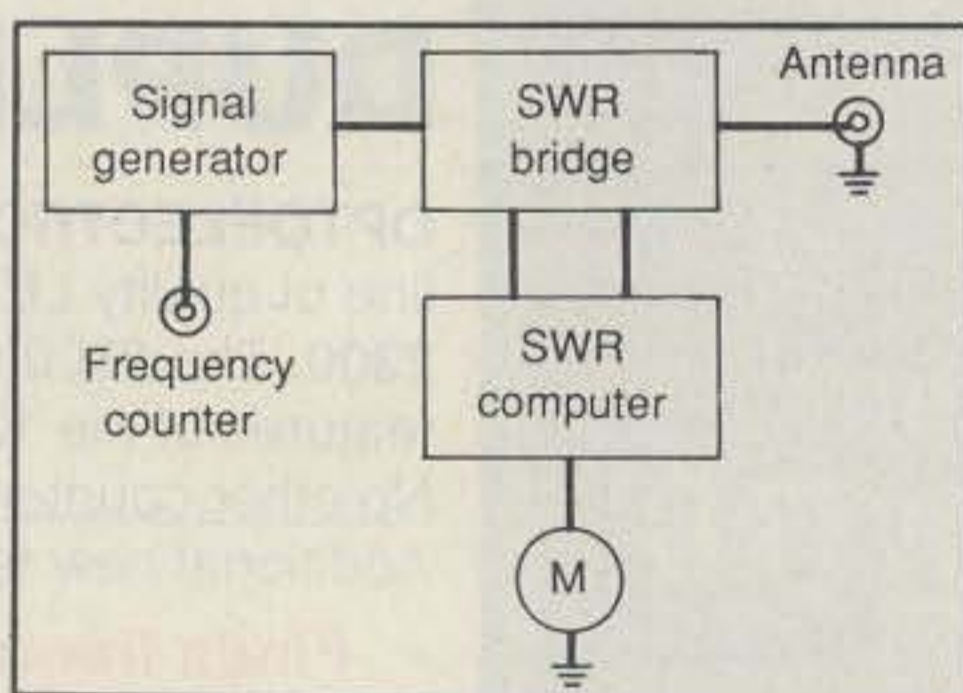


Fig. 1—The MFJ units are completely self-contained test instruments. You can use a station's transceiver for exact frequency setup or a frequency counter.

antenna load is connected into the SO-239 on an MFJ-207 or MFJ-208. You can then experiment endlessly with antenna loads, make tuner adjustments, etc., without causing QRM or stressing the actual transmitting equipment. The beauty of both units is that when you reconnect from them into the SO-239 on a transceiver, nothing is going to change. No extra coaxial-cable line lengths have been introduced, etc.

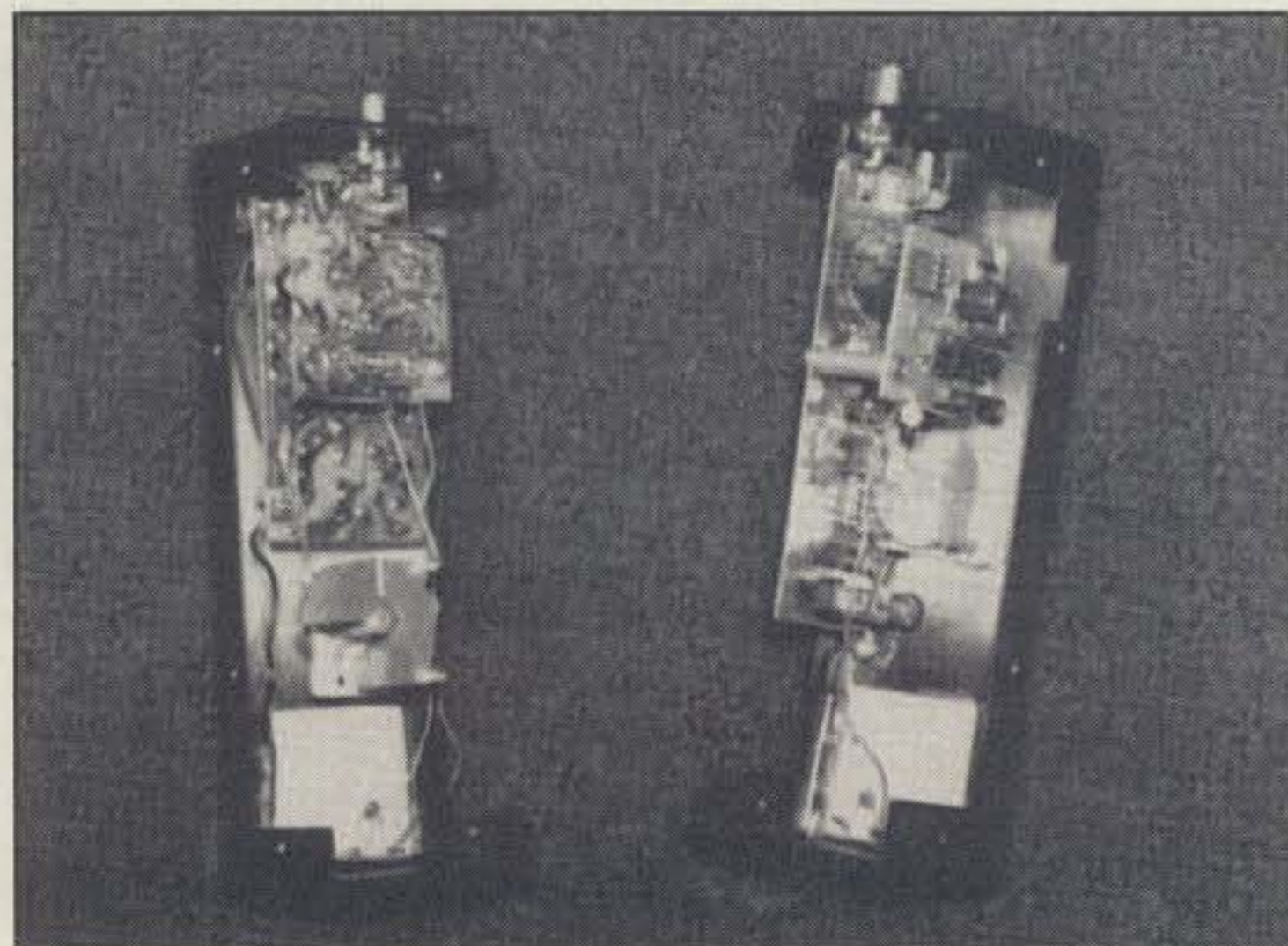
Circuitry, Controls, and Construction

Both units have essentially the same circuitry except that the MFJ-207 has a bandswitched signal generator while the generator in the MFJ-208 covers only the 2 meter band with generous overlaps at the low and high end of the band. Fig. 1 is a block diagram. The signal generator drives an SWR bridge, and the forward and reflected outputs from the bridge go to a comparator circuit which computes the SWR and drives a meter which has only an SWR scale (expanded for readings below a 1:2 SWR). There is an output for a frequency counter. It all sounds simple enough, but a fair amount of circuitry is involved. The only operating controls are those associated with power on/off and the setting of the operating frequency.

Both units are housed in well-shielded aluminum enclosures. One of the photographs shows the internal construction. There are two PC boards in each unit, one of which contains the signal-generator/SWR-bridge circuits, while the other board contains the SWR computer/meter



Both units look similar, except the MFJ-207 is bandswitched to cover the bands from 160 to 10 meters.



Both units have two internal PC boards, but they are arranged in a different fashion. An internal 9 volt battery or an external 9-12 VDC source can be used.

interface circuitry. As can be seen from the photograph, the boards are arranged quite differently for the HF and VHF models. Also, a different size tuning capacitor is used for each model. The PC boards in both models are very neatly constructed as are, in fact, the entire units. Screw hardware and lockwashers are used throughout. Both units have an SO-239 connector on their rear panel plus a phono jack for an external frequency counter and a jack for an external 9-12 VDC power source. A battery clip inside the bottom cover holds an internal 9 volt battery when that power source is used. The current drain is about 80 ma for the HF model and 50 ma for the VHF model. An alkaline-type battery is pretty much a "must" for a reasonable operating period.

Setup and Bench Checks

As was mentioned, setup is simplicity itself with just the antenna coaxial line being connected to either analyzer. However, I found it interesting to start out by simulating various antenna SWR loads using various values of carbon resistors (e.g., 100 ohms for a 1:2 SWR, 150 ohms for a 1:3 SWR, etc.). I even went on to devise various series and parallel LC circuits from junkbox parts and was fascinated to see how the SWR results would vary over the HF range as the MFJ-207 unit was used. Of course, the theory of tuned circuits explains it all. However, I couldn't help but think what a powerful teaching tool a unit like the MFJ-207 could be when one tries to explain SWR and particularly the idea of single or multiple resonances in antenna systems, because the SWR results can be seen immediately. I don't think MFJ started out to market a teaching tool in the MFJ-207/208 units, but it certainly is there.

Checking the SWR calibration of both units, I found it to be within 5-10% of the SWRs I could produce by dummy loads or checking it against other instrumentation. This was particularly true in the important range below a 1:2 SWR. Considering small errors in my own instrumentation, I would rate the automatic SWR readout as highly accurate for all practical purposes.

Since the MFJ-208 only covers 2 meters, its frequency calibration is quite good and perfectly adequate for any antenna adjustment I could imagine on that band (the actual coverage is roughly from about 140 to 160 MHz).

The MFJ-207's frequency coverage of from 1.75 to 30.0 MHz is divided into five bands. The coverage is almost continuous except for a gap between 5 and 6 MHz. MFJ tried to expand the analog scale to favor the amateur bands. Bands "A" and "B," in fact, cover the 160 and 80 meter bands, respectively. However, band "E" covers the entire range from 18 to 30 MHz.

The MFJ-207's frequency calibration varies from being quite good on the lower frequency bands to rather broad (± 1 MHz) on band "E." At first I thought this was going to be a problem, but in reality there was no problem. Of course, you can connect a frequency counter to the unit and read the test frequency directly. But you can also use a situation's transceiver as a frequency readout device. If the MFJ-207 is being used to test an antenna, for instance, an extremely weak signal will be radiated (the same as if any signal generator is connected to an antenna). By placing a few inches of wire to the antenna terminal of a transceiver, you can easily receive the radiated signal and note its frequency using the transceiver as a "tunable" frequency counter. There is no need to make a direct connection between the MFJ-207 and the transceiver, although you could do so between the frequency counter jack on the MFJ-207 and the transceiver's antenna input connection. In any case, if you are going to use the MFJ-207 on the higher HF bands for anything more than a cursory SWR sweep, you should use a counter or transceiver to verify the test frequency.

A criteria in which I was far more interested was the frequency stability of the MFJ units, since they might be used to experiment with very high-Q, narrow-bandwidth antennas on the lower frequency bands and relatively wider bandwidth antennas on the higher VHF or 2 meter frequencies. Both units did exhibit some frequency drift, as would be typical of any VFO, but the amount was amazingly small. In fact, the drift after a few minutes of operation at room temperature was only about 1 kHz for the MFJ-207 on 10 meters and 5-10 kHz for the MFJ-208. There is no vernier on the tuning capacitor and the tuning is sharp but manageable. When battery power is used, the generated signal sounds very clean, but it is slightly hum modulated when an AC plug supply is used (MFJ-1312). The hum is not a disadvantage; in fact, it makes the signal easier to find if a transceiver or general-coverage receiver is being used to read the test frequency.

Application

The MFJ units can have some ancillary uses as signal generators, but their prime application is for automatic SWR measurement and they perform that job very well indeed. They bring to the ham shack the basic equivalent of commercial instrumentation that costs thousands of dollars.

The units can be used for any application where you desire to see how SWR changes as some antenna adjustment or the environment surrounding an antenna is changed or even for preventive maintenance if you periodically check the

SWR of a multiband antenna (a procedure recommended by most manufacturers of triband beams, for instance). They can also be used to adjust tuned circuits, such as those in an antenna tuner or those in various filter networks. The SWR readout is clear and unambiguous, and you can take as long as you desire to make observations. I think that the units are useful both for understanding the SWR concept related to antennas and for experimentation. I expect that HF antenna experimenters will have a ball with the MFJ-207, especially those who like to experiment with multiband antennas. I didn't realize how many SWR resonance responses some of my antennas had until I used the MFJ-207. It simply would have been too tedious to check the antennas over the entire HF range using conventional SWR measuring techniques. You might say that computer simulation could do some of the work. That's true, up to a point. But in the final analysis, you have to deal with a real antenna in a real environment. It's also a lot more fun, I find, to deal with a "real" antenna.

The MFJ-207 sells for \$99.95, while the MFJ-208 is \$89.95. Both have a one-year warranty and 30-day money-back return policy (on direct orders). They are available from MFJ, Box 494, Mississippi State, MS 39762 (800-647-1800).

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RL00	3,905,199
JA8RWU	3,860,864
XM2ZP	3,790,320
JA8YBY	3,598,372
EA1JO	3,377,080
V47KP	3,345,572
OE6MBG	3,274,089
I2SVA	3,228,120
V63DX	3,097,748
WL7E	3,048,430

28 MHz

ZP0Y	3,007,915
LS6T	2,830,025
PQ5C	2,658,240
FM5DN	1,888,987
CX8BBH	1,656,640
LZ1KOZ	1,430,877
4N3AA	1,363,425
IR9R	1,325,835
DF0SSB	1,256,266
IT9BLB	1,225,194
JH7DNO	1,143,807
IO0MNI	1,123,981
LU4MEE	1,089,288
JA0JHA	1,068,632
EA4AK	1,039,497
OK1ALW	1,003,591
LZ5N	953,403
IT9HBT	949,074
HG1W	948,445
I2PJA	926,649
OE2XEL	911,274
KH2/N3EMA	889,410

ZS6WPX	887,220
YO6VZ	886,824
LU8FDG	883,272
JR1IJV	881,488
JH8CLU	859,415
JR3NZC	840,219
LP3F	806,036
4M5Y	803,845
RB5IM	782,772
9J2FR	778,950
YP0A	763,464
VS6WV	762,550
KH6/N2ME	749,436
YT3SK	718,865
YT3L	715,266
I2HVE	702,560

21 MHz

P40R	2,749,144
9Y4VU	2,231,037
PR5T	2,096,680
NH2/N7DF	1,838,314
CQ4A	1,757,780
CE3FIP	1,726,812
HD1T	1,486,188
ZW4OD	1,351,579
XM7SV	1,281,057
7L1GVE	1,278,560
7L1GVV/8	1,196,166
OM7DX	1,129,301
YU3PV	1,127,829
OH1AD	1,086,534
4M5T	1,065,694
YT3M	1,035,045
VE3CPA	1,017,522
7Z1AB	1,016,715
OH0MAM	879,712
OH2BAH	866,640
VE7EIK	840,164
JA1USO	839,930
OH8SR	838,971
FU1X	787,314
OH7MA	774,177
FF6KBF	725,712

14 MHz

YV3A	1,529,500
EA9LZ	1,506,600
YU1EXY	1,229,680
F2EE	1,102,887
G4CNY	1,029,908
CE6EZ	1,005,620
YU1KQ	936,320
YT3T	920,975
SM0AJU	917,946
XM2PJ	856,673
YT4I	798,000
JA7SGV	594,528
CE0ZIJ	587,142
UA6BGB	546,804
YU1JW	533,520
KH6FKG	521,289
OZ7HT	514,794
CR2CQK	494,720
CT1DVV	433,720

7 MHz

ZF2JR	878,280
IK5BAF	687,040
4M3X	622,251
YV5JDP	534,936
DL3OI	493,626
HC1HC	492,833
ZW5B	473,850
JA8IXM	469,012
GB0DX	392,160
DU9RG	305,502
KL7U	281,731
IG8R	263,128
JA2BAY	261,612
KH2D	248,965
OZ4MD	203,710
OZ1FTE	203,574

3.7 MHz

HA8IE	363,736
GW4OFQ	135,590
YV1CP	96,640
LY1BZG	91,368
SP5MXZ	90,300
OH4BEN	56,643
DL8QS	54,556
OH0BCI	52,950
OH7UE	52,720
UW9CYA	49,320
4M5E	48,363
YL3AD	44,484
G4PKP	40,870
I5OYY	36,696
LY2BHM	35,828
HA4FF	33,916

1.8 MHz

VE1ZZ	31,974
UT5DK	26,880
OM6JDX	21,774
OZ3SK	19,500
SM5AQD	19,470
CT1AOZ	16,473
UA3ZOV	14,840
VE3PN	13,234
YU3QI	12,985
VE3DO	12,960
YV1DRK	9,666

Assisted

K1ZM	4,443,222
K1TO	4,106,907
AG1C	3,756,342
DJ2YA	3,654,720
K3WW	3,599,379
N3AD	3,538,623
G0HSD	2,912,644
K8MR	2,848,844
WB2K	2,805,712
W2GD	2,768,598
K1VR	2,634,590
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K4JPD	2,429,414
K1CC	2,424,628
KI3V/7	2,341,925
N2MM	2,109,704

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KK9V	2,030,986

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K5RX	1,103,513
YU2TY	739,112
KN1M	606,816
WA2UUK	584,684
F1BEG	556,920
KD2TT	531,286
W5VGX	498,980
K2WK	422,177
HB9ADD	410,992
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KZ5Q	317,604
AB4LX	242,088
OH5NHI	229,918
SM0DJZ	224,840

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6D2X	13,424,823
GU6UW	13,201,032
P40T	12,491,478
HG5A	12,273,606
CR3M	11,698,470
XM1DX	11,280,391
VP9AD	11,040,968
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OM5W	10,290,540
HG1S	9,995,578
UW2F	9,195,872
RL0L	9,167,046
RQ9W	8,893,779
OK7ZZ	8,401,509
V31K	8,282,335
UF7VWA	8,243,453

Multi-Operator Multi-Transmitter

PJ1B	58,307,551
PJ9W	52,201,282
KH0AM	36,153,398
IQ3A	25,214,252
5W1JJ	22,285,168
KL7RA	17,130,631
R6L	14,948,868
DA0BV	13,628,376
VE7ZZZ	11,908,764
J37DX	11,789,415
ZF2MZ	11,680,167
ON7LR	10,398,388
YT2B	10,268,253
JL1ZCG	10,220,366
LY2ZO	9,215,418
FS/KC1F	9,042,370
JE2YRD	8,089,074
4U1VIC	6,794,172

BEST OF MFJ

MFJ, Bencher and Curtis team up to bring you America's most popular keyer in a compact package for smooth easy CW



MFJ-422B

\$134⁹⁵

The best of all CW world's -- a deluxe MFJ Keyer using a Curtis 8044ABM chip in a compact package that fits right on the Bencher iambic paddle!

This MFJ Keyer is small in size but big in features. you get iambic keying, adjustable weight and tone and front panel volume and speed controls (8-50 WPM), dot-dash memories, speaker, sidetone and push button selection of automatic or semi-automatic/ tune modes. It's also totally RF proof and has ultra-reliable solid state outputs that key both tube and solid state rigs. Use 9 volt battery or 110 VAC with MFJ-1305, \$12.95.

The keyer mounts on a Bencher paddle to form a small (4-1/8 x 2-5/8 x 5/2 inches) attractive combination that is a pleasure to look at and use.

The Bencher paddle has adjustable gold plated silver contacts, lucite paddles, chrome plated brass and a heavy steel base with non-skid feet.

You can buy just the keyer assembly, MFJ-422BX, for only \$79.95 to mount on your Bencher paddle.

Deluxe 300 W Tuner



MFJ-949D is the world's most popular 300 watt PEP tuner. It covers 1.8-30 MHz, gives you a new peak and average reading Cross-Needle SWR/Wattmeter, built-in dummy load, 6 position antenna switch and 4:1 balun -- in a compact 10 x 3 x 7 inch cabinet. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

SWR Analyzer

MFJ's innovative new SWR Analyzer gives you a complete picture of your antenna SWR over an entire band -- without a transmitter, SWR meter or any other equipment!

Simply plug your antenna into the coax connector, set your SWR Analyzer to the frequency you want and read your SWR. You can instantly find your antenna's true resonant frequency, something a noise bridge can't do. Covers 1.8-30 MHz (or choose MFJ-208, \$89.95 for 2 Meters). Use 9 V battery or 110 VAC with MFJ-1312, \$12.95.

MFJ-207
\$99⁹⁵



SuperActive Antenna

"World Radio TV Handbook" says MFJ-1024 is a "first rate easy-to-operate active antenna ... quiet ... excellent dynamic range ... good gain ... very low noise ... broad frequency coverage ... excellent choice."

Mount it outdoors away from electrical noise for maximum signal, minimum noise. Covers 50 KHz to 30 MHz.

Receives strong, clear signals from all over the world. 20 dB attenuator, gain control, ON LED. Switch two receivers and aux. or active antenna. 6x3x5 in. Remote unit has 54 inch whip, 50 ft. coax and connector. 3x2x4 in. Use 12 VDC or 110 VAC with MFJ-1312, \$12.95.

MFJ-1024 **\$129⁹⁵**

VHF SWR/Wattmeter

MFJ-812B **\$299⁹⁵**
Covers 2 Meters and 220 MHz. 30 or 300 Watt scales. Also reads relative field strength 1-170 MHz and SWR above 14 MHz. 4 1/2 x 2 1/4 x 3 in.



Prices and specifications subject to change without notice or obligation.

MFJ Coax Antenna Switches



\$34⁹⁵ MFJ-1701

\$21⁹⁵ MFJ-1702B

\$59⁹⁵ MFJ-1704

Select any of several antennas from your operating desk with these MFJ Coax Switches. They feature mounting holes and automatic grounding of unused terminals. They come with MFJ's one year unconditional guarantee. MFJ-1701, \$34.95. Six position antenna switch. SO-239 connectors. 50-75 ohm loads. 2 KW PEP, 1 KW CW. Covers 1.8-30 MHz. 10x3x1 1/2 inches. MFJ-1702B, \$21.95. 2 positions plus new Center Ground. 2.5 KW PEP, 1 KW CW. Insertion loss below .2 dB. 50 dB isolation at 450 MHz. 50 ohm. 3x2x2 in. MFJ-1704, \$59.95. 4 position cavity switch with lightning/surge protection device. Center ground. 2.5 KW PEP, 1 KW CW. Low SWR. Isolation better than 50 dB at 500 MHz. Negligible loss. 50 ohm. 6 1/4 x 4 1/4 x 1 1/4 in.

"Dry" Dummy Loads for HF/VHF/UHF



MFJ-260B
\$28⁹⁵

MFJ-262
\$69⁹⁵

MFJ-264
\$64⁹⁵

MFJ has a full line of dummy loads to suit your needs. Use a dummy load for tuning to reduce needless (and illegal) QRM and save your finals. MFJ-260B, \$28.95. VHF/HF. Air cooled, non-inductive 50 ohm resistor. SO-239 connector. Handles 300 Watts. Run full load for 30 seconds, derating curve to 5 minutes. SWR less than 1.3:1 to 30 MHz, 1.5:1 to 150 MHz. 2 1/2 x 2 1/2 x 7 in. MFJ-262, \$69.95. HF. 1 KW. SWR less than 1.5:1 to 30 MHz. 3x3x13 in. MFJ-264, \$64.95. Versatile UHF/VHF/HF 1.5 KW load. Low SWR to 650 MHz. Run 100 watts for 10 minutes, 1500 watts for 10 seconds. SWR is 1.1:1 to 30 MHz, below 1.3:1 to 650 MHz. 3x3x7 inches.

MFJ Ham License Upgrade Theory Tutor



MFJ Theory Tutor practically guarantees you'll pass the theory part of any FCC ham license exam. Versatile MFJ software is the best computer tutor ever tailor-made for ham radio. You can study the entire FCC question pool, selected areas and take (or print) sample tests. Auto. saves each study session (ex. sample tests), gives you all FCC test graphics (ex. mono.), explanations of hard questions, pop-up calculator, weighted scoring analysis, color change option and more. Order MFJ-1610-**Novice**; MFJ-1611-**Tech.**; MFJ-1612-**Gen.**; MFJ-1613-**Adv.**; MFJ-1614-**Ex.** for IBM compatible. For Macintosh: MFJ-1630-N; MFJ-1631-T; MFJ-1632-G; MFJ-1633-A; MFJ-1634-E, \$29.95 per license class. MFJ-284 or MFJ-286

MFJ Speaker Mics

MFJ's compact Speaker/Mics let you carry your HT on your belt and never have to remove it to monitor calls or talk.

You get a wide range speaker and first-rate electret mic element for superb audio on both transmit and receive.

Earphone jack, handy lapel/pocket clip, PTT, lightweight retractable cord. Gray. One year unconditional guarantee.

MFJ-284 fits ICOM, Yaesu, Santec. MFJ-286 fits Kenwood.



MFJ-1278 Multi-Mode Data Controller

MFJ-1278 **\$279⁹⁵** Use computer to transmit/receive in all 9 digital modes: Packet, AMTOR, ASCII, CW, RTTY, FAX, SSTV, Contest Memory Keyer and Navtex receive. Automatic Signal Analysis™ (ASA™), Easy-Mail™ Personal Mailbox, Built-in printer port, 20 LED tuning indicator, AC power supply, Host/KISS, 32K RAM, Multi-gray level FAX/SSTV modem, CW key paddle jack and tons more. Options include 2400 baud modem (MFJ-2400, \$69.95) and software with computer cables, for IBM compatible, Commodore 64/128, Macintosh and VIC-20.



12/24 Hour LCD Clocks



\$19⁹⁵ MFJ-108B **\$9⁹⁵** MFJ-107B

Huge 5/8 inch bold LCD digits let you see the time from anywhere in your shack. Choose from the dual clock that has separate UTC/local time display or the single 24 hour ham clock.

Mounted in a brushed aluminum frame. Easy to set. The world's most popular ham clocks for accurate logs. MFJ-108B 4 1/2 x 1 x 2; MFJ-107B 2 1/4 x 1 x 2 in.

Cross-Needle SWR Meter

MFJ-815B
\$69⁹⁵

MFJ Cross-Needle SWR/Wattmeter has a new peak reading function! It shows you SWR, forward and reflected power in 2000/500 and 200/50 watt ranges. Covers 1.8-30 MHz.

Mechanical zero adjusts for movement. SO-239 connectors. Lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

Deluxe Code Practice Oscillator

MFJ-557 **\$24⁹⁵**

MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base so it stays put on your table. Portable because it runs on a 9-volt battery (not included) or an AC adapter (\$12.95) that plugs into a jack on the side.

Earphone jack for private practice, Tone and Volume controls for a wide range of sound. Speaker. Key has adjustable contacts and can be hooked to your transmitter. Sturdy. 8 1/2 x 2 1/4 x 3 3/4 in.

MFJ Multiple DC Outlet

MFJ-1112 **\$299⁹⁵**

New MFJ DC Power Outlet saves you space and money. Hook it to your 12 VDC power supply and get 6 DC outlets for connecting your accessories. RF bypassing keeps RF out of power supply from DC line outlet. 13 1/2 x 2 3/4 x 2 1/2 in.

Nearest Dealer/Orders: 800-647-1800

MFJ MFJ ENTERPRISES, INC.
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MIRAGE/KLM

COMMUNICATIONS EQUIPMENT

New Antenna Power

The same high efficiency, lossless linear loading technology used in the world famous KT-34A and KT-34XA H-F tribanders is now available in a rotatable dipole for 10, 15, 20M and a dipole and a vertical for the WARC bands.

KT-31

10M, 15M, 20M Dipole
Length: 24' 6"
VSWR: less than 1.5:1
Weight: 9 pounds
Retail: \$270.00

12-17-30-V

12M, 17M, 30M Vertical
Height: 21' 1/4"
VSWR: less than 1.5:1
Weight: 6.5 pounds
Retail: \$141.00

12-17-30-D

12M, 17M, 30M Dipole
Length: 39' 8 1/2"
VSWR: less than 1.5:1
Weight: 13 pounds
Retail: \$269.00

New Amplifier Power

A-1035G

50-54MHz
5W - 15W input
10W in, 350W out
18 Amps @ 24vDC
Retail: \$586.00

A-1560G

50-54MHz
5W - 20W input
15W in, 600W out
36 Amps @ 24vDC
Retail: \$ T B A

New Pre-Amp Power

KP-1 (In-Shack)

KP-2 (Mast-Mount)

Both models in 10M, 6M, 2M, 1-1/4M, 70cm
100W.....Power Handling.....165W
20dB.....Gain.....25dB
less than 0.6dB...Noise...less than 0.6dB
\$117.00.....Retail.....\$165.00

For many years MIRAGE/klm has provided Amateurs throughout the world with the best equipment for their communications needs.

Whether you've needed an H-F tribander to chase DX or crossed YAGIs to bounce around the corner or around the world... we've answered the CQ.

When you asked for more UHF/VHF power in an amplifier and higher accuracy in a wattmeter, MIRAGE/klm came through.

We will continue our long-standing pledge to quality and performance into the 90's.

MIRAGE/KLM

COMMUNICATIONS EQUIPMENT

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(408) 779-7363 (800) 628-5181 (outside CA)
FAX 408-779-8845 • TELEX 910-590-4460

USA Single Operator All Band

WM5G	6,308,064
K3OO	5,706,990
K5ZD/3	4,922,856
N4RJ	4,683,448
K1RU	4,664,400
K3ZO	4,561,608
W9RE	4,525,010
K8PO/1	4,129,521
W3BGN	3,959,928
N2LT	3,892,876
K2DM	3,700,578
N4WW	3,597,756
KM2P	3,537,720
W1WEF	3,434,291
W1PH	3,323,895
WC6H	3,002,830
N6AW	2,585,410
K1ST	2,574,000
K3ZJ/8	2,460,025
N3BB/5	2,457,054
K2PS	2,414,000
K4XS	2,337,390
W1GD	2,297,350
NN7L	2,227,905
K8LT/1	2,191,140
N3BJ	2,158,927
WB3KX/8	2,123,985

28 MHz

NR5M	1,116,390
W0ZV	975,175
K1DG	932,696
KS1L	915,399
KM1C	912,560
W6NV	877,389
NX1H	779,365
N4ZZ	737,975
WE3C	729,289
KT4W	725,760
K1VUT	633,368
N8CXX	628,830
K4VX/0	610,902
K7QQ	588,141
N9AG	585,820
NX7K	569,328

21 MHz

NG2X	943,578
NB2P	685,542
W5WMU	673,218
K2SX/1	600,483
N6VV	502,366
KD0ZR	381,312
N8RA/1	376,200
N4CT	357,133
WB3ICL	330,536
WB5UDX	329,522
N4MO	304,612
KA5W	299,932
N6HR	279,260
K1DWQ	250,308
N6YKL	224,436

14 MHz

W1RR	1,028,020
K2VV	939,624
NB1H	902,275
W00G	734,290
K2HFX	689,095
KV4P	439,520
WB8OHO	365,876
W3FW	354,815
K7LR	315,068
W8TWA	308,880

K6SVL	285,576
K2MGA	247,940
N5GM	188,343
K9CLO	176,808
K8HJD	167,616
NY1E	163,080

7 MHz

KV0Q	181,252
NO2D	146,875
W2SC/1	130,625
WQ2M	130,161
N4ZC	120,832
K8MJZ	102,368
WA4SVO	78,116
AD8C	65,540
WA4FFW	63,130
KD9ST	55,752
W9CH	55,263
WD4KXB	54,908

3.7 MHz

W6RJ	105,343
N2KK	102,390
KZ3H	74,700
W2VP	63,597
AD1G	62,392
KE5FI	59,486
W5EU	41,679
WA2WVL	26,480
K0OD	23,532
KQ3V	17,632
W4QCU	16,224

1.8 MHz

K5UR	14,152
W2FCR	4,719
K5WXZ	1,914
K4TEA	1,856
K8CFU/4	1,300
W2VO	1,288

Multi-Operator Single Transmitter

K1AR	11,193,606
N3RS	7,752,168
KS9K	7,190,746
K5NA	6,194,342
K0RF	6,124,248
K1YR	6,066,750
K1NG	5,803,684
K2TR	5,787,315
AA1K	5,293,096
W4MYA	5,269,550
KA1GG	5,269,363
W3XU	5,034,101
N2NU	4,446,720
KB1H	4,138,416
K2SG	3,590,194
NK7U	3,550,130
W6QHS	3,509,271
W1AF	3,490,830
W2HPF	3,458,650
NN3Q	3,341,018
WF2A	3,294,400
K3YL	3,071,236

Multi-Operator Multi-Transmitter

N2RM	18,474,620
W3LPL	17,038,056
N5AU	16,960,860
W7XR	12,400,630
KY1H	11,468,292
K8CC	9,785,580
NQ4I	9,532,050
N6ND	8,483,628
NE3F	7,087,960

MFJ gives you *all 9* digital modes and *keeps on* bringing you state-of-the-art advances . . . while others offer you *some* digital modes using 3 year old technology!

MFJ-1278

\$279⁹⁵



No 3 year old technology at MFJ!

Using the latest advances, MFJ brings you 9 exciting digital modes and *keeps on* bringing you state-of-the-art advances like new ASA™.

You get tons of features other multi-modes just don't have.

Only MFJ gives you *all 9* modes

Count 'em -- you get 9 fun modes -- Packet, AMTOR, RTTY, ASCII, CW, FAX, SSTV, Navtex and Contest Memory Keyer.

You can't get all 9 modes in *any* other multi-mode at *any* price. Nobody gives you modes MFJ-1278 doesn't have.

The best modem you can get

Tests in *Packet Radio Magazine* prove the modem used in the MFJ-1278 copies HF packet more accurately than all other modems tested.

MFJ-1278 is the *only* multi-mode with a *true* DCD circuit. This dramatically reduces sensitivity to noise and dramatically increases completed QSOs.

Exclusive Built in Printer Port

Only the MFJ-1278 has a dedicated printer port that lets you plug in your Epson or IBM compatible printer.

You don't need to buy a silly \$40 cable just to plug in your printer.

20 LED Precision Tuning Indicator

MFJ's unequalled tuning indicator makes it really easy to work HF packet. Unlike others, you use it the same for all modes -- not different for each mode. Just tune your radio to center a single LED and *you're precisely tuned in to within 10 Hz* -- and it shows you which way to tune!

New Easy Mail™ Personal Mailbox

You get MFJ's new Easy Mail™ Personal

MFJ Packet Radio



MFJ-1274

\$159⁹⁵

MFJ-1270B

\$139⁹⁵

MFJ-1270B super clone of TAPR's TNC-2 gives you more features than *any* other packet controller -- for \$139.95

You can double your fun by operating VHF and HF because you get *high performance* switchable VHF/HF modems.

You get the Easy Mail™ Personal Mailbox with soft-partitioned memory so you and your buddies can leave messages 24 hours a day.

In MFJ's new WeFAX mode you can print full-fledged weather maps to screen or printer and save to disk using most computers.

A new KISS interface lets you run TCP/IP and MSYS. NET ROM compatible.

You also get 32K RAM and a free 110 VAC power supply (or use 12 VDC).

For dependable HF packet tuning, the MFJ-1274 gives you a high resolution tuning indicator -- and it's only \$20 more.

New 2400 baud *Turbo* models available: MFJ-1270BT, \$209.95; MFJ-1274T, \$229.95.

Mailbox with soft-partitioned memory so you and your ham buddies can leave messages for each other 24 hours a day.

Multi-Gray Level FAX/SSTV Modem

You'll see tomorrow's news today when you copy outstanding FAX news photos with crisp clear details. MFJ-1278 is the *only* multi-mode with a built-in multi-gray level modem. It lets you transmit and/or receive multi-gray level pictures with an appropriate terminal program.

MFJ's new Automatic Signal Analysis™

NEW! gives you *exclusive* HF packet identification!

MFJ's new ASA automatically identifies HF packet, RTTY, ASCII and AMTOR signals. A

New MFJ-1278T Turbo with fast 2400 baud modem

MFJ-1278T

\$359⁹⁵



The new MFJ-1278T Turbo gives you *fast* 2400 baud packet -- *twice* the baud rate of any other multi-mode. By communicating faster you'll reduce chances for error, lessen congestion and more efficiently utilize our ham frequencies. You'll also get 1200/300 baud for compatibility with older TNCs.

The 2400 baud modem is also available separately. Order MFJ-2400, \$69.95, for any MFJ and most other TNCs.

quick "OK" command selects the mode!

One FREE Upgrade!

When you buy your MFJ-1278 *today*, you don't have to miss new modes and features that come out *tomorrow*. Why? Because your 1278 comes with a coupon good for one *free* eeprom upgrade exchange that'll add new features.

Plus More . . .

Plus you get . . . 32K RAM, *free* AC power supply, Host mode that lets MFJ-1278 serve as

New MFJ MultiCom™ . . . exciting new 1278 software

High resolution AP news photo received on 20.738 MHz using MFJ MultiCom and MFJ-1278 with multi-gray modem.



MFJ-1289 New menu-driven MultiCom™ brings out the full power of your MFJ-1278 with multi-gray modem. No set-up required -- just load and use. You get incredible high resolution WeFAX maps and AP news photos right off HF. You also get color packet pictures and multi-gray SSTV.

Bursting with features . . . One-Key Macros™ combine multiple keystrokes into a single touch, Call-Alert™ sounds an alarm when any characters you tell it to watch for come in, Auto-Set™ instantly switches entire stored sets of parameters, Auto-Router™ stores digipeater node routes for instant use, Packet Multi-Plex™ lets you transmit or receive a binary file and continue your QSO, Multi-Word™ gives a powerful word processor that is tailor-made for multi-mode communications. Custom QSL created with paint program

a kiss interface or dumb modem, fast throughput anti-collision technology, independent transmit level for each radio port, random code generator, lithium battery backup, RS-232 and TTL serial ports, socketed ICs, tune up command, peripheral I/O port, automatic serial numbering, programmable message memories, dual radio ports (*each* HF or VHF), CW paddle jack, audio amplifier and speaker jack so you can monitor CW sidetone, transmit and receive audio and packet connect bell, *new* fully intergrated instruction manual with *Fast Start*™ booklet and more. 9½ x 9½ x 1½ inches.

No Matter What™ Guarantee

You get MFJ's one year No Matter What™ Guarantee.

That means we will repair or replace your MFJ multi-mode (at our option) *no matter what* happens to it for a year.

Others give you a *limited* warranty. What if *they* say, "Sorry, your *limited* warranty doesn't cover *that*?"

Get 9 new ways of having fun

Don't settle for 3 year old technology. Choose the *only* multi-mode that gives you the latest advances and all 9 modes.

Get 9 new ways of having fun *today!*

Software Pack gets you on the air *instantly!*

MFJ software packs with interface cable get you on the air *instantly* if you use an IBM compatible, Commodore or Macintosh computer. Here are some of the programs available:

MFJ-1289, \$59.95. Menu driven. Super IBM compatible program. See ad below for details.

MFJ-1282B, \$39.95. New with multi-gray receive for Commodore 64/128. Menu driven.

MFJ-1287, \$24.95. Macintosh starter pack.

Multi-Gray WeFAX weather map received on 16.410 MHz using MFJ MultiCom and MFJ-1278 with multi-gray modem.



can be transmitted by FAX, SSTV or Packet. On-line help. RS-232 cable. Tons more. Call for *free* MFJ catalog for full information: 800-647-1800.

Optional MFJ-1292 digitizer, \$199⁹⁵ . . . lets you *instantly* point, shoot and transmit a video picture -- all in one smooth sequence

Transmit your very own digitized pictures all over the world by packet, FAX or SSTV. MFJ MultiCom™ lets you integrate the MFJ-1292 "Picture Perfect" Video Digitizer, \$199.95 with your MFJ-1278 for shooting and transmitting your pictures in one smooth sequence.

Nearest Dealer/Orders: 800-647-1800

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MFJ . . . making quality affordable

CQ SHOWCASE



Geochron Enterprises World Time Indicator

The Geochron World Time Indicator demonstrates where the sun is rising and setting each minute of the day. Its display is a Mercator projection map illuminated to simulate the sun's light as it is cast on the planet. The map scrolls left to right at a speed of one inch per hour, in synchronous with the Earth's rotation. At a glance, the Geochron illustrates which parts of the world are in daylight and which are in darkness. Closer examination reveals the sun's declination. The time of day or night around the world is indicated on the Time Scale at the top of the map. As the map moves, the time-zone arrows indicate the correct time in each zone.

The 3' x 2' wall-mount timepiece also displays the day of the week and month at any point on the globe. Manual controls allow you

to display the times of sunrise and sunset on desired dates during the year. For more information, contact Geochron Enterprises, Inc., 899 Arguello St., Redwood City, CA 94063 (telephone toll-free 1-800-342-1661), or circle number 107 on the reader service card.

QSO Software QSO Comp-Troller®

QSO Comp-Troller® is a companion for controlling your late-model Kenwood radio. It is actually two programs, one for the Macintosh and one for the MS-DOS machines (IBM compatibles). The program not only provides instructions to the transceiver, but it also keeps track of any adjustments made directly on the rig and reflects them on the computer display. The program has been designed to take full advantage of the entire command set currently supported by Kenwood.

QSO Comp-Troller® is priced at \$149.95 and is available from QSO Software, 208 Partridge Way, Kennett Square, PA 19348, or for more information, circle number 109 on the reader service card.

IDC Communications RF Preamp

The WBA1500, introduced by IDC Communications, is a wide-band mast-mounted RF preamplifier designed to be used with wide-band receivers, scanners, or TVs and stereos



to improve performance and make up for long antenna cable runs. The WBA1500 covers 2 MHz through 1.5 GHz. A bench-type version (WBA1500B) is also available for frequency counters, oscilloscopes, spectrum analyzers and related test equipment. The WBA1500 system comes complete with amplifier module, DC supply module, and AC adapter. The WBA1500 comes standard with BNC connectors, but "F" type jacks are available.

The unit utilizes a state-of-the-art low-noise MMIC for the amplifier device along with surface-mount devices and strip-line circuitry to yield an amplifier with wide bandwidth, high gain, and low noise figure, maker says. The WBA1500 sells for \$77.95, and the bench-top model (WBA1500B) sells for \$56.95, ppd. For more information, contact IDC Communications, 2745 Winnetka Ave. N., Suite 205Q, New Hope, MN 55427 (612-888-7456), or circle number 103 on the reader service card.

DATA COMMUNICATIONS INTERNATIONAL, INC.

—PRESENTS—

COMLOOP-100

HIGH TECHNOLOGY TRANSMIT/RECEIVE COMPACT LOOP ANTENNA

FREQUENCY RANGE

KW VERSIONS (Special order only)

MODEL A	14.0 MHZ-29.0 MHZ	TRANS/RECEIVE
MODEL B	7.0 MHZ-14.0 MHZ	TRANS/RECEIVE
MODEL C	3.5 MHZ- 7.0 MHZ	TRANS/RECEIVE
MODEL D	2.1 MHZ- 4.5 MHZ	TRANS/RECEIVE

250 WATT VERSION

MODEL E	7.0 MHz-29.0 MHz	(\$325.00)
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(EXCELLENT FOR SHORTWAVE LISTENING)

- * BETTER THAN 1 KW CONTINUOUS POWER RATING (EXCEPT MODEL D)
- * TUNES TO 1:1 SWR PROVIDING A PERFECT MATCH ALLOWING FULL POWER OUTPUT ON TRANSCEIVERS, WITHOUT ANTENNA TUNER
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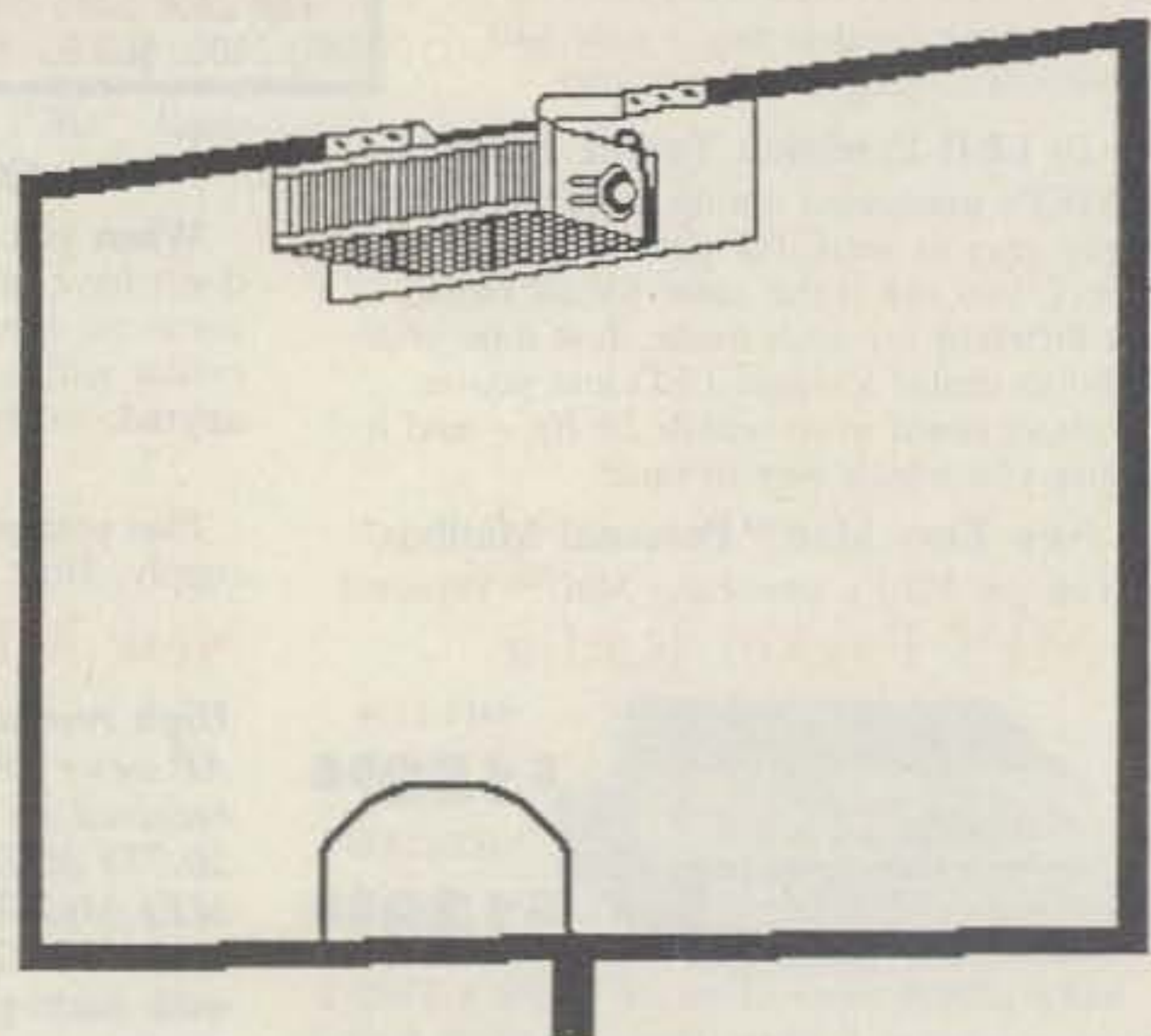
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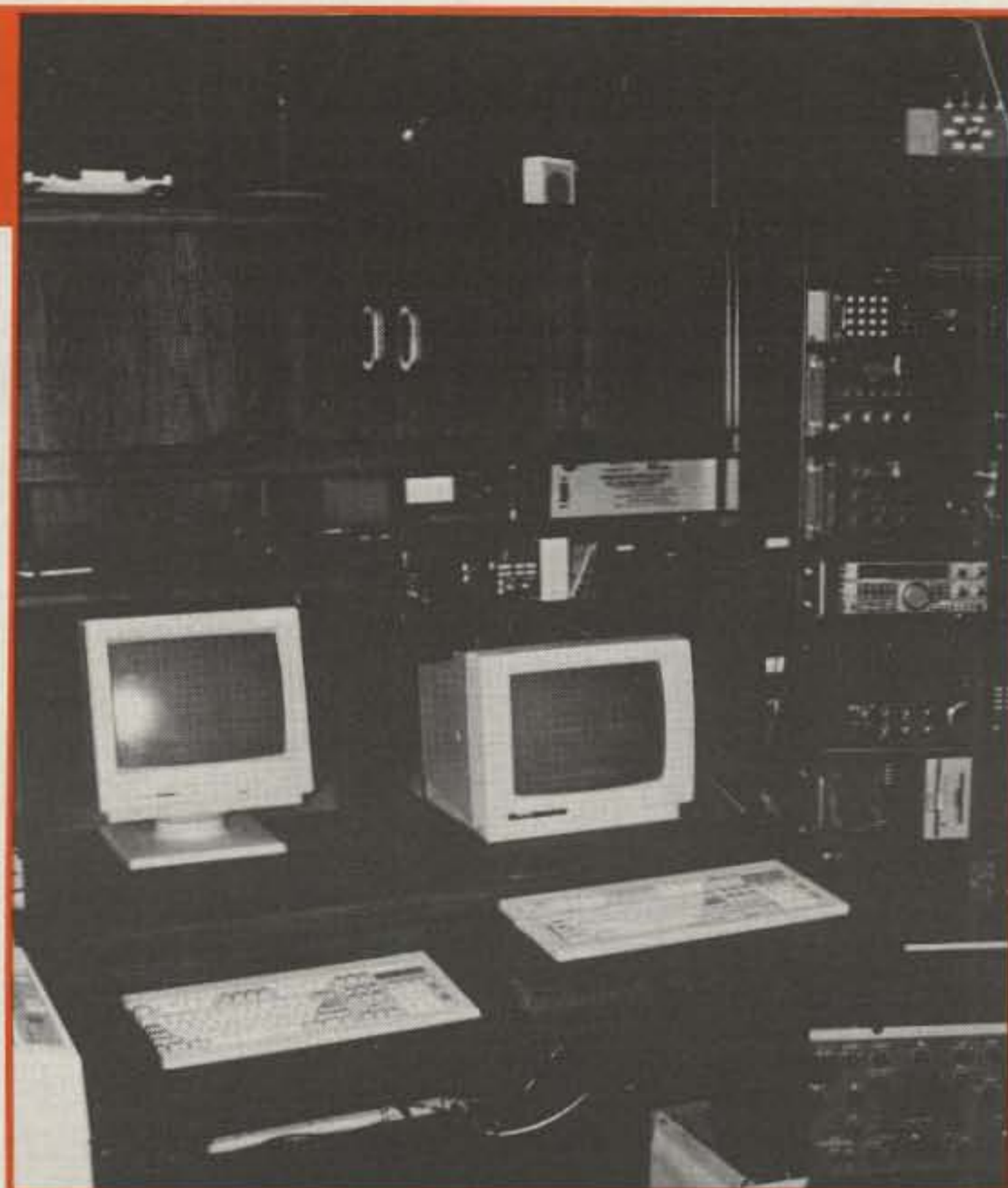
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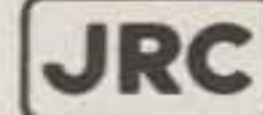


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REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

Code-Free Hamming An Early Success! Questions about the Codeless Technician

By far, our March 1991 column generated more mail from readers than any column we have ever written in all the years we have been covering the amateur radio hobby! This was the article in which we announced the Federal Communications Commission decision to adopt an amateur radio license without a requirement for Morse code.

Even though we tried to cover the parameters of the new Codeless Technician Class license in as much depth as we could, we still got dozens of letters. Most, but not all, were from readers who are not yet licensed as ham operators. Some were from existing amateurs who didn't agree with the decision. This month let's cover some of these inquiries and comments.

"I had to pass the code and it's not fair that others do not have to...." This comment was voiced more than once, and while understandable, it is not reasonable. It assumes nothing changes. When I got my first automobile driver's license, I was tested on giving turn signals manually. Today every car has directional signals, so hand signals have been dropped as a testing requirement. When I got my first amateur radio ticket, amateur radio was primarily a CW (Morse code) and AM phone pursuit. High tech then was radioteletype communications using an oil-guzzling surplus Model 15.

Today amateur radio is a very diversified pursuit indeed, with many sub-hobbies. Satellite, amateur television (ATV), and computer-to-computer communications are the fastest growing. It is simply irrational to expect today's newcomers to embrace the technology of yesterday. Updating the amateur radio entry requirements to reflect today's interests and technology is long overdue.

"Won't the 2 meter ham band end up sounding like CB Channel 19 now that code isn't required?" The Amateur Radio Service has always had a few "undesirables." Less than 1% of the amateur population seems to cause 90% of the problems, and this probably will not change. There is no relationship, how-

ever, between being code proficient and "agreeable."

Learning the code does take effort and determination, but so does studying for a Codeless Technician license. Nothing is being "given away." You still must pass a test. In fact, two tests—the 30-question Element 2 and the 25-question Element 3(A). And yes, there probably will be more problems on the bands, but only because 1% (if that is the correct number) of a higher amateur population equals more problems.

I don't buy that the average citizen is undesirable. CB radio acquired more than their share of misfits because (a) there were no rules, and most important (b) because there were no role models for newcomers to follow. By and large, the amateur bands will only be as good as existing amateurs allow them to be.

Now let's talk about advantages. Personal computing arrived on the scene in the late 1970s. Today a PC is almost a household appliance. There are millions of computer enthusiasts out there who will make excellent candidates for amateur radio. They could—and should—be exchanging communications via the free radio waves rather than the expensive phone lines.

The old-timers don't want to hear it, but innovative computer software writers certainly will contribute more to the future of amateur radio than brass pounders. A "no-code" amateur radio license is really 10 or 15 years overdue. There is no telling what amateur radio would be like today if we had a code-free class back a decade ago. The hobby—and our country—needs to take advantage of the young and the curious with their boundless enthusiasm and interest in the unknown.

"Codeless Technicians aren't interested in electronics and experimenting." There are many ways to "contribute" to amateur radio besides "... advancement of the radio art." Trained operators are important in times of emergency. And there is also nothing wrong with just being a DX communicator or a social rag-chewer if that is what the individual wants to do. We have the spectrum and there is room for everybody! It is important that we leave as many doors open

to the potential amateur as possible.

I fail to see the relationship between Morse code knowledge and experimenting. No-code amateurs are as likely to participate in technical areas as those with Morse proficiency. There is nothing in the "Basis and Purpose" FCC Rules that would lead one to believe that Morse code knowledge is needed or even desirable to become a ham operator.

Code is presently required when the amateur operation takes place below 30 MHz because it is an international treaty agreement. Many believe that this standard will be abolished at the next general World Administrative Radio Conference (WARC), since code dependence as "... the communications medium of the last resort" is already being phased out by ocean-going vessels worldwide. Like it or not, the SOS-pounding maritime radio officer is fast becoming a romantic relic of the past.

Why should we require amateur Morse proficiency when the professionals are abandoning it? The answer is we shouldn't! The reality is there simply are more reliable and accurate ways of passing important radio messages that don't require the presence of error-susceptible operators and radio-wave propagation. Morse code begins signing off at sea when the Global Maritime Distress and Safety System becomes operational. The new satellite-based GMDSS system will allow the crew to send a distress signal by pushing a button!

"Just how popular is the Code-Free amateur class?" Well, it is still early, but the first results are in, and they are indeed decisive! Sales of license preparation materials at the Novice and Technician level are absolutely sky-rocketing! We, of course, distribute amateur radio study manuals, but we also checked with other major distributors, including the American Radio Relay League, the large amateur operators' association. All agreed that demand for study material was indeed substantial and unprecedented!

Instructors of amateur radio courses also report extremely high public acceptance of the no-code amateur license class. Gordon West, WB6NOA, of Costa Mesa, California heads up Radio School, Inc., which conducts very large amateur

*National Volunteer Examiner Coordinator,
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radio instructional programs. Gordo says that his enrollment is up 400% since the Codeless Technician Class took effect. It is the written theory examinations associated with the Novice and Technician classes that make up the two tests for the Codeless Technician.

The regular Novice examination requires passing a five words-per-minute code test and answering 22 out of 30 multiple-choice questions correctly. These questions come from Element 2, which has 369 questions. The "old" Technician required answering an additional 19 out of 25 questions selected from the 326-question test Element 3(A).

The "new" (or Codeless) Technician requires just passing Element 2 and 3(A), but does not have a Morse code requirement. All of the nearly 700 questions in the Element 2 and 3A question bank are known and widely published. No one is asked any "secret" questions these days—quite a change from the days when the FCC conducted the amateur exams.

If you eventually pass the 5 WPM telegraphy test you become a "Technician Plus" operator. "Codeless Technician" operators obtain all amateur privileges at full amateur power (up to 1500 watts) when the operation is above 30 MHz. That, of course, includes the very desirable 2 meter band, the amateur's social party line. Two meters is also the key band for computer-to-computer "packet" and amateur satellite communications. Did you know that the amateur community has launched some 20 communications satellites of its own into orbit?

Your author, Fred Maia, W5YI, heads up the W5YI-VEC operation. A VEC acts as the liaison between the amateur testing community and the Federal Communications Commission. It is the VEC who provides the examination information to their accredited volunteer examiners (VEs). Although there are 18 different VEC organizations, the W5YI-VEC and ARRL-VEC account for about 80% of all amateur radio examinations administered. The W5YI-VEC has about 10,000 accredited examiners and nearly 600 testing teams worldwide.

We have been carefully analyzing the "mix" and number of examinations administered, particularly to entry-level amateurs, since the arrival of code-free operating. The results of this study are interesting. We note the average size of the test sessions has been increasing, and our VEs are administering many more Element 2 and 3(A) tests (the requirements for the Codeless Technician class), but substantially less Element 1(A) tests (the 5 WPM telegraphy examination) than was previously the case.

We mentioned our new "Codeless Technician Education Package" in our March 1991 article on codefree hamming

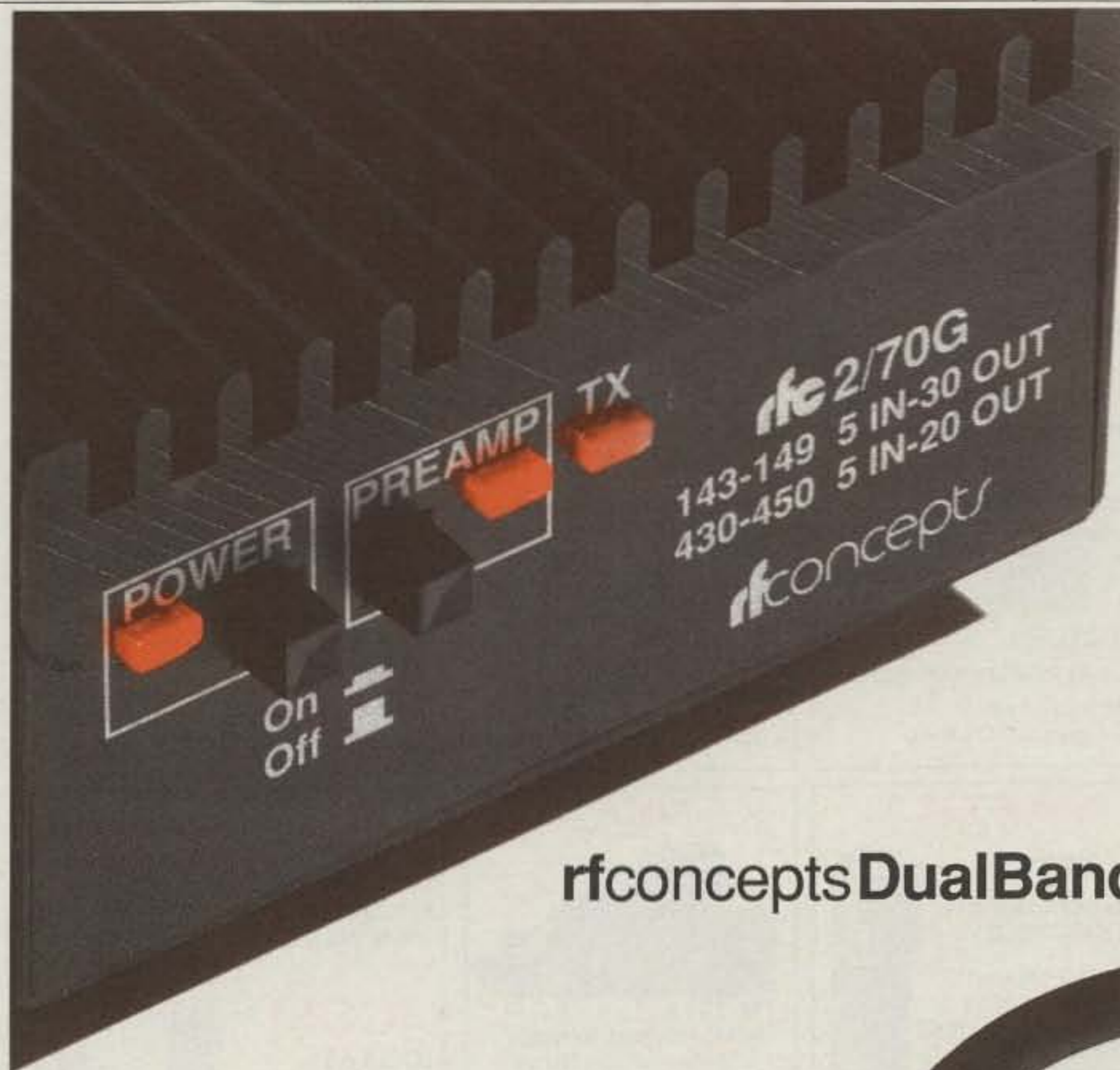
and received over 700 orders in a single month! There can be no doubt that the public is very interested in joining the amateur radio ranks without passing a code test.

We have made up several hundred more "Codeless Technician Education Packages," and they are available for immediate shipment. The package contains a book entitled *The Ham Radio Handbook*, a complete Part 97 FCC Rulebook, the Element 2 and 3(A) question pools (complete with the actual multiple choices and answers) and a 5¼ inch IBM-compatible disk for computer-aided instruction. Cost is \$21.95 with a money-back guarantee (includes shipping charge).

Orders can be telephoned to (toll free) 1-800-669-W5YI (9594) if you have a VISA or MasterCard.

"There are so many different Technicians, how does the FCC know who is authorized which frequency?" A very good question! It is up to the applicant to prove when he/she passed the Technician requirements and which examinations he/she has credit for. Applicants who passed the Technician requirements before March 21, 1981, are known as "Grandfathered Technicians" and receive credit for Elements 1A (5 WPM code) plus Elements 2/Novice, 3A/Technician, and 3B/General.

Examinees who passed Technician



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between March 22, 1987 and February 13, 1991 are unofficially known as "Classic Technicians" and receive examination credit for Elements 1A, 2, and 3A. "Codeless Technicians" are those who have passed Elements 2 and 3A, the Novice and Technician written tests, only on or after February 14.

All Technician license holders up until February 14 were authorized all Novice and Technician privileges. This includes all bands above 30 MHz plus slivers of the 80, 40, 15, and 10 meter bands. After February 14 "Codeless Technicians" re-

ceive access to all amateur bands above 30 MHz. As a general rule, applicants must prove which test elements they have credit for by showing their Certificate of Successful Completion of Examination (CSCE) presented to them by their volunteer examiners at their test session.

The Technician Plus (the "plus" meaning "plus code") presents a different problem to the FCC, the VEs, and the applicant. An applicant is not issued another Technician license by the FCC once he/she passes the 5 WPM telegraphy examination. Instead, the right to op-

erate below 30 MHz on Novice spectrum is granted by the CSCE issued by the VE team who administers the code test.

The Conference of VECs (that is, all of the 18 VEC organizations) has established one database for the FCC. Every Technician Class amateur radio operator who has passed Element 2, 3A, and 1A (5 WPM) is listed in this database. This list is periodically made available to the FCC so the Commission will know which Technicians are qualified to operate on Novice spectrum (that is, below 30 MHz).

There are actually three types of "Technician Plus" operators listed in this database. These are (1) Codeless Technicians who pass the 5 WPM code test, (2) Novices who pass Element 3A, and (3) those examinees who pass Elements 2, 3A, and 1A at a single sitting.

This database permits the FCC to know (for enforcement purposes) which Technician Class operators are authorized to operate below 30 MHz even though they do not issue a "Technician Plus" license to the applicant or record this status in their computer database. VECs retain in their records the Form 610 applications of Codeless Technicians who pass 5 WPM rather than sending them to the FCC. While all this may sound confusing, it does allow everyone to ascertain the Technician status of applicants even though no new Technician Plus license is issued once an examinee passes the code.

"I am a Novice awaiting my Technician license. The rules say I must append my callsign with /KT when operating on Technician spectrum. Why doesn't a new Tech Plus operator have to append his call with an identifier when operating below 30 MHz?" Another good question. The FCC authorizes immediate operating privileges to applicants who upgrade, even though they have yet to receive their new upgraded license. You will eventually receive a Technician license and at that time may discontinue using the "KT" identifier.

A Technician Plus operator does not receive a new license when upgrading from Codeless Technician. Instead, he/she is merely listed on a database by the VEC. If an identifier was required, the Tech Plus operator would have to use it indefinitely—maybe the rest of his life, or until he upgraded—since no new license is ever issued to a Tech Plus operator.

The FCC ruled that the use of a two-letter identification indicator system to distinguish between Technician and Technician Plus "... is inconsistent with the callsign assignment policy" which generally permits shorter callsigns when an applicant upgrades.

"What is the difference between a handicapped telegraphy waiver and a handicapped telegraphy exemption?" It's a long story, but up until June 15, 1990 the FCC steadfastly refused to grant any

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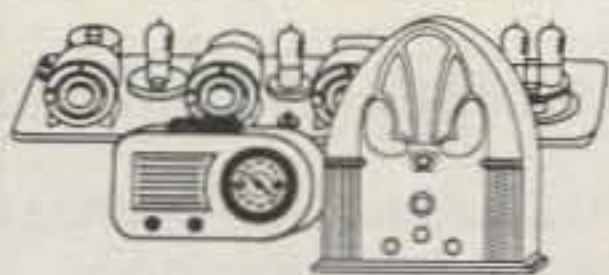
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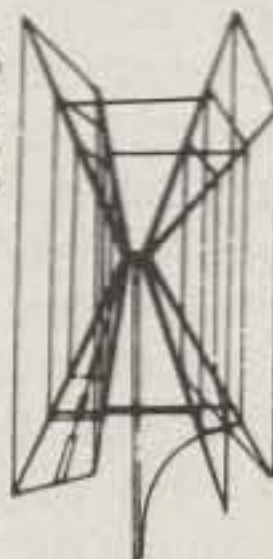
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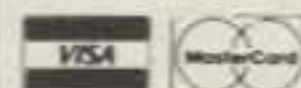
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telegraphy test waivers, fearing that "opening the door" would unleash a multitude of code waiver requests. A disabled Pennsylvania amateur, however, wrote to JY1, King Hussein of Jordan, about his plight. JY1 wrote to President Bush, who referred the matter to the State Department. The FCC was eventually directed to change their policy, which they did. A waiver of the higher speed (13 and 20 WPM) telegraphy requirements went into effect, but not the 5 WPM requirement.

Since code proficiency is an international treaty requirement, the 5 WPM speed requirement remained. VEs and VECs were directed, however, to implement new broadened "handicap accommodation" procedures at the 5 WPM level. These accommodations included accepting a telegraphy sending test instead of a receiving test, and pausing the code

test tape after each sentence, phrase, word, or even after each character. (VEs wondered how to send a 5 WPM code test by pausing the tape after each character!)

The FCC then went through routine rulemaking and (on December 13) released a new procedure permanently exempting severely handicapped amateurs from the 13 and 20 WPM telegraphy examinations. To obtain the exemption, a special certification form must be signed jointly by a doctor attesting to a severe disability and the applicant, who agrees to release of his medical records to the FCC.

The effective date of the telegraphy exemption procedure is the same as that of the Codeless Technician Class—February 13, 1991. Severely handicapped applicants may obtain copies of the certification form from W5YI-VEC, P.O. Box 565101, Dallas, TX 75356.

Amateur Radio News

FCC Looks into Mandatory Amateur Radio, Scanner Mods. The American Radio Relay League has asked the FCC to consider taking action to exempt amateurs from burdensome state laws that forbid mobile radio equipment capable of receiving police radio transmissions. In an unusual turn, the FCC is now looking into the technical feasibility of requiring amateurs and manufacturers to delete these frequencies from their amateur equipment! The inquiry applies to scanners as well as amateur equipment.

FCC Proposes Amateur Radio "User Fees." Confronted with inadequate funding, deteriorating buildings and equipment, and an ever-growing workload, the Federal Communications Commission has proposed controversial new "user fees" for all radio services, including the Amateur Radio Service. The newly proposed fees are separate from application and license processing fees which are levied on most radio services. The fee plan includes \$30 per license term from amateur radio operators. It is simply to help the Commission self-generate a portion of the money it needs to do its job! The FCC is trying to compensate for the past withholding of funding by Congress, who objected to certain FCC actions.

FCC Inspects Amateur Radio Stations Nationwide. The FCC's Field Offices around the country inspected some 200 amateur stations in an effort to determine compliance and knowledge of the Amateur Service power rule. According to Field Operations Bureau Chief Richard M. Smith, the power audits were routine. "I suspect if you ask the average amateur on the street 'What's your power limitation?' the immediate answer would be 1500 watts. This is not the right answer. The most important part of the amateur power rule says only use the power necessary. The second part of the rule says '... but in any case do not use more than 1500 watts.'"

Hams to Vacate 220-222 MHz Shortly. The FCC has established new rules for the use of 220-222 MHz by private Land Mobile licensees. The Commission reallocated this shared band to narrowband business use in 1988. The Amateur Service was one of the services sharing this spectrum. The FCC said the two megahertz will be divided into 400 five kHz wide frequencies paired to create 200 narrowband channels which will be set aside for nationwide and local applicants. Amateurs must discontinue all operations in the 220-222 MHz band in 90 days after the effective day of the order. This is believed to be around July 1st. An ARRL request for amateurs to share the 220-222 MHz band on a secondary basis was denied.

73, Fred, W5YI

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People generally think of a Novice's first few contacts as being across town or in a neighboring state. What happens if you're a Novice and DX at the same time? KC6JDK/DU3 fills us in on the remarkable experience.

A Novice DXer In The Fast Lane

BY DONALD J. BROOKS*, KC6JDK/DU3

Can you remember your first QSO? Was it a nervous affair, trying to talk to another amateur in the next state with that new language affectionately called "Charlie-Whiskey"? Remember when your ticket finally arrived? Remember how you thought nothing could be more gruelling than the Novice Morse code exam? Well, you found out that you were wrong. The first QSO is worse.

For me it had even more impact. My first QSO was a guaranteed DX! I don't mean just to VE land, but rather to Japan, Korea, or even New Zealand! I was an American living overseas (until recently), and I felt as if the eyes of the world were upon me.

I had been dabbling with amateur radio on and off for nearly 25 years, having been given the bug from my best friend in the fourth grade. I decided to take it seriously a while back, but somehow with three moves, two of them international, testing seemed to be a problem. I had a two-year contract to remain in the Philippines. I debated for months whether to obtain a real local license or take an FCC exam and apply for a reciprocal license. Thanks to Don, N2HEV, and Don, AB4KR, I obtained my Novice ticket through the W5YI testing program here at Clark Air Base, Republic of the Philippines, on my first try.

The testing room was AB4KR's impressive shack. The Philippine heat and humidity were also very impressive. I couldn't tell which was sweating more—me or the glass of ice tea in my hand. I had been waiting more than 25 years for this test, and I wasn't going to let down my original Elmer—Scott, then WN9UFD (now WA9UFD)—or myself. I proudly signed the form 610 and mailed it the

same day. Then I waited and waited. Several times I almost called Gettysburg, only to remember the international telephone rates. When my license arrived eight weeks later, I was joyful. I only had one more step before I could be on the air.

The reciprocal license was easily obtained from the local branch of the Philippine National Telecommunications Commission (NTC). A Philippine amateur offered to do the paperwork for me, but technically I'd have to wait another week until he returned with the reciprocal license. We amateurs are an independent lot, so I drove there with Paul, KC4PJE, who also needed his "recip" for Novice. We followed the directions explicitly for an hour and ended up face to face with two bamboo nipa huts and no buildings in sight. Three goats greeted us, and we couldn't believe the sign on the side of one of the huts that read "NTC Pampanga District." "Welcome to the Philippines," it seemed to say! We adventured down another dirt road behind the huts. Hidden behind a row of banana trees was the new two-story NTC building.

The NTC staff was very friendly, and we took advantage of the opportunity to check out what our reciprocal privileges were all about. As we read the list of frequencies typed on our station license, we knew there was an error. Fifteen meter phone, 2 meter mobile—for a Novice these were real privileges!

I set up an antenna when I determined I was in a permanent location (one of at least six months duration). Two 40 foot bamboo poles formed the masts for the multiband dipole. The dipole was sturdily tied to the poles with nylon rope and even survived four typhoons plus an earthquake before I dismantled it for my new QTH. Inside I arranged my rig several different ways to find my favorite position. I had been doing a lot of SWLing and had monitored the amateur bands for months. Even my key was in the right position. When your callsign is KC6JDK/DU3 (10

symbols), you have to take extra precautions.

That fateful night I sat at my rig and realized I could call CQ and get responses from UA9, 9M2, HL5, VU2, 3D2, and dozens of other callsigns within a short range of my QTH. According to a host of experts, your brain forms patterns that are to become Morse interpreters hopefully in several letter combinations or words. A Novice in the U.S. early on forms a brain pattern to hear the CQ of a K-something something or maybe Whiskey-Alpha something, just like the code tapes have you practice. But an overseas amateur, myself included, can have literally *any* prefix, any combination of numbers and letters, thrown at him! This is real tough on a Novice. Additionally, not all countries use Morse code. I have monitored several QSOs only to copy letters or word groups that made no sense in English. The QSOs between Japanese stations were Japanese Hitagana code. This is a real problem for a beginning amateur because dit-dah does not equal letter A; it is i (pronounced e). Dah-di-di-dit is not B; it is ha. And di-di-dah-di-dah is mi (pronounced me), which does not equal any symbol in our Morse code.

With all these thoughts pounding in my head, I was still anxious to try out my new international language. "What if I can't copy these callsigns?" I worried, needlessly. I copied several other QSOs for over an hour just to get into the rhythm. I had a "cheat sheet" next to my rig with my callsign, QTH, handle, and some Q-signals written down in large block letters just in case! My listening log was about to become my operations log.

I tuned my rig to 21.145 MHz and heard JA3CVM sending Morse code at a speed I could copy. Then came a steady CQ CQ CQ. I sent my call three times, because I made a mistake on the repeat of my callsign, but I hung in there. Kano-san in Osaka, Japan came back with a 5-5-9 for my RST! He actually heard me! We slow-

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ly exchanged information, doubling up on the important things such as name, QTH, and QSL VIA BURO! I was concentrating so hard I nearly forgot to have fun. I wasn't sure if a Japanese amateur would understand "New Ham" or "First QSO" in English. I now know they do! I pounded dah, di-di-dah, dit, dit, and completed my first QSO. I proudly walked around my shack grinning from ear to ear. My first QSO was only 25 years in the making. I made one other contact that night, and I was a real DXer—at least in my log book.

The Philippines allows their Class C operators (FCC Novice and Technician class) to use all of the 40, 15, 10, and 2 meter bands in any mode. What a temptation for an American Novice to use voice, packet, or RTTY instead of the archaic Charlie-Whiskey, right? Well, from personal experience, making two or three CW contacts a month does not prepare anybody for the 13 WPM code test, but it did allow me to compete in several phone-only contests.

The next evening I tuned my rig to 21.321 MHz and had my first phone contact with Park, HL0IKP. Two more QSOs and I was hooked on voice. It took me nearly three weeks to make another CW contact.

The first Saturday after I received my ticket was the CQ WW Phone Contest. What a temptation for a new amateur! At that time I had zero experience with contests and figured it was only a matter of signal report and a consecutive serial number. Boy, was I wrong! Band multipliers, zone multipliers, and on and on.

I was wrung out after the first two hours and enjoyed a nice ordinary QSO with Raymond, VS6EA, in Hong Kong. Amateur radio after all is communications, not just the hurry-scurry in the contest. He had originally apologized for not being in the contest, but his QSO was like a breath of fresh air, and we talked for a few minutes. I thanked him for the nice chance to rest.

I continued in several 2 hour bursts that weekend through the encouragement of my XYL. As a foreign amateur, there was a very good chance of my score being published. My call area is Oceania, and few local amateurs participate as compared to the CONUS amateurs. That means as a Novice I could have earned a plaque or had my score listed in a magazine. After the contest was finished I found out the requirements for log sheets and the single operator time requirement. I was 15 minutes short. No dice. Oh well, there's always next year.

Regardless, I would have been foolish not to have tried. Amateur radio is experimentation, trial and error. How many amateurs have built projects that didn't work the first time? Or that ever worked at all? No, I don't need a plaque on the wall to tell me that I'm having a blast with amateur radio.

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CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

Broadcasting Via Packet Radio

I'll begin this month's column by making the following point clear: I *do not* condone the use of the packet network by an unscrupulous hacker who would use the system for his/her personal gain.

This is not an effort to criticize the FCC for the recent action regarding certain 900 telephone numbers that were listed on the packet BBSes. Aside from being a commercially related call, the messages at the 900 numbers mentioned contained some alleged subversive language. The very thought of a subversive action by a packet user who wished to promote the use of a 900 telephone number that might undermine the core of our freedom is in itself revolting.

The term "broadcasting" is used by the FCC to define information that is transmitted for reception by the public (see section §97.3(a)(10)). An amateur radio station is prohibited from broadcasting, with few exceptions.

The FCC rules that concern themselves with these broadcasts prohibit an amateur from sending such transmissions into the ether. It is clear that such a rule is to prevent the amateur from competing with the commercially licensed radio and television "broadcast" stations.

It is also possible, in an indirect manner, that some transmissions could be deemed legal and useful. The use and application here is directed to the case of approved third-party communications (FCC Rules §97.3(a)(38) and §97.115(a)). These sections allegedly enable the packet system to import packet-originated messages to the non-amateur services. A few examples are educational systems, news-wire systems (approved), telephone-based bulletin-board (BBS) systems, and other information services. In some cases, the reverse of this condition exists. In either case, the rules appear to support and allow exporting messages from those sources into the amateur packet network.

These sections of the FCC rules should, in fact, reverse the FCC contention of any broadcasting complaint against the packet BBS operators and users.

It is a fact that packet radio is only effective when two stations are connected

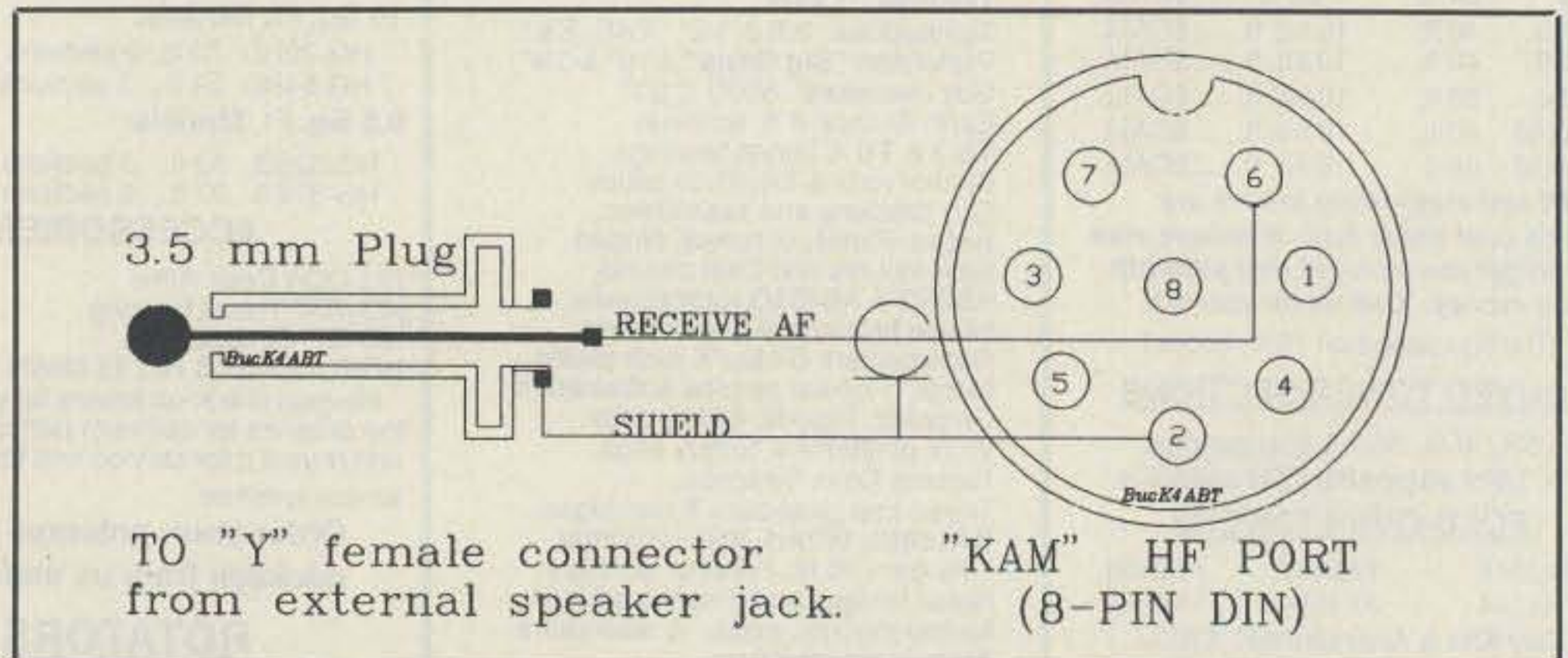


Fig. 1- Here is a simple modification that enables the KAM's tuning indicator to be used at 1200 bps on HF. Use the VHF port and connect to the HF rig. Set the MARK and SPACE commands as follows: MARK 1200, SPACE 2200. 1200 bauds is legal above 28 MHz.

via a reliable path. Only then is the AX.25 format in full effect. Moreover, there are only two stations connected, thus removing the foundation to the illusion that "broadcasting" has taken place in the AX.25 environment. The mere fact that only two stations are connected in a packet communication would tend to rule out the Commission's accusation of packet broadcasting.

My comments are intended as an expression of my concern for the future of our packet BBS networks. My hope is that we may continue without the fear of a "Big Brother" syndrome developing. It is difficult for me to see where the connection of only two packet stations can constitute a charge of "broadcasting."

Communications of a Third Kind

Many times I've applied restraint so as not to cross the demarcation line that distinguishes technical writing from outright "world affairs" journalism. For the next few paragraphs, I'm departing from this practice. I plan to keep my thoughts abbreviated and confined to as few lines as possible, and when I'm finished, perhaps you, the reader, will also agree.

As I'm writing this month's "Packet User's Notebook," I'm listening to a radio broadcast about the happiness that is being experienced by many families as they

welcome their husbands, wives, sons, daughters, mothers, fathers, brothers, and sisters home from the Persian Gulf war. There is a warm feeling that makes even the toughest of us clear our throats and wipe our not-so-dry eyes. Indeed, it is a celebration of homecoming as much as it is a jubilation in victory.

I'm confident that by the time you read this, there has already been much fanfare, but there is no limitation to the amount of thanks we owe the troops who enabled us to bask in the reflected glory they have so courageously earned. Welcome home to a grateful America, and even more, to a grateful world, not to mention the now "free" Kuwait.

The HF Packet Mind

There is still fun with packet on the HF bands. Some of the old-timers of HF packet are still there, but by and large, the influx of newcomers is helping to make the 10 meter portion of HF packet more enjoyable.

There continues to be some confusion surrounding the use and operating procedures in the 10 meter band with regards to packet radio. At several packet forums I conducted recently, I came in contact with operators who feel that 300 BPS is a bit slow, especially if they are accustomed to operating at four times that speed on the VHF packet frequencies.

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TECH KNOWLEDGY

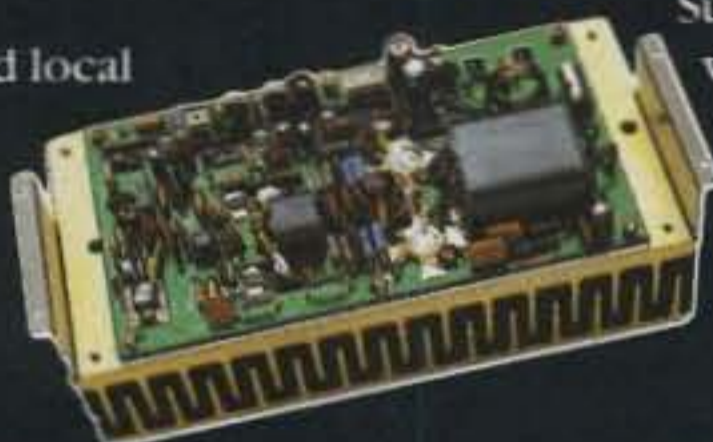
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In addition, the front end gain distribution may be adjusted by switching to IPO, or by adding attenuation in 6 dB (1 S-Unit) steps. Typical



RF Receiver Unit

measured two-tone dynamic range is 108 dB (at 50 kHz, 500 Hz BW, preamp off), yielding a +32 dBm 3rd order IPI.

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Use headphones or speakers for monitoring, mixing or splitting audio in either mono or stereo. A single RX MIX control adjusts the relative volume of each channel. Install the optional BPF-1 and enjoy true diversity reception by using a separate antenna for each receive channel.

Competition-Grade Receiver

Frequency, mode and bandwidth information are stored independently for each of the two vfos on each band (or the 100 memories). Filter bandwidths of 2.4 kHz, 2.0 kHz, 500 Hz and 250 Hz along with an IF notch filter, IF Shift, variable bandwidth and a CW Audio Peaking Filter provide unmatched ORM rejection. Plus, the FT-1000 offers a dual-mode noise blanker and all-mode squelch. The front-panel RX ANT switch allows convenient enabling of your Beverage or loop receiving antenna.

The optional DVS-2 Digital Voice Storage unit gives you a 16-second receive memory to correct potential "busted calls" or dump an important OSO to tape for archival pur-



Dual Tuning

poses. The DVS-2 also functions a two- or four-memory voice "CQ Machine" for contests.

CW Operation

The FT-1000 provides the most complete package ever offered to demanding CW operators. For instance, CW

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Optimal Digital Communication

The FT-1000 offers special provisions for RTTY/AMTOR and packet modes including an independent, built-in microprocessor to control AFSK generation. Use the RTTY mode button to select Mark frequencies and Hz shifts. The display can show the Mark or any offset you load in.

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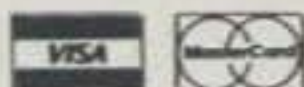
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When I mention the use of 1200 bauds on 10 meters, I can expect a quick response from some member(s) of the audience, reminding me that 300 bauds is as fast as we are allowed to use/operate at HF. It is then my turn to remind the challenger that this is *only true below 28 MHz*.

Above 28 MHz the story is different. The FCC looks at 10 meters as though it is the lower portion of the VHF spectrum instead of the upper portion of the HF spectrum. As a matter of fact, so do I.

In the 40-plus years of enjoying this wonderful hobby, I've grown to know the 10 meter band as a longer range, more open version of the 6 meter band. At 10 meters we were able to gather more DX than at 6 meters, and the band was open more often and to more areas. Oh, and one other point that is worth mentioning: "Ten meters caused less interference than 6 meters." NO! I did not say 10 meters did not cause interference. I said 10 meters caused *less* interference.

There are hot-beds of 1200 baud packet on 10 meters at 28.170, 28.185, 28.195, 28.205, and the list goes on. If you are inclined to try new regions for packet activity, and at the same time do some DXing, take time to wire a cable to interface the 1200 baud port of the TNC to the transmit and receive input/outputs of the HF rig. Now you are ready to enjoy the best of both worlds.

On many of the 1200 bps frequencies on 10 meters the new Novices and Technicians (those with operating privileges on the 10 meter band) are operating. This adds to the fun on 10 because we are apt to find more activity throughout the day and into the night due to their presence.

The Novice and Technician CW, RTTY, and DATA portion of the band begins at 28.100. The activity around 28.100 or 28.108 and sometimes up to 28.120 is usually devoted to the use of 300 bps packet and CW. As we move toward 28.300, we discover other digital modes. Around 28.120 to 28.135 you begin to find the AMTOR and RTTY stations. This is intended only as a reminder: "The Novice and Technician class ops are restricted to 200 watts 28.100 to 28.300 MHz sub-band of 10 meters."

1200 Baud Packet Territory

As we tune above 28.165 we begin to notice the faster packet signals. This is the same mode as that used on the 1200 bps 2 meter frequencies.

The AEA PK-232 and the MFJ-1278 have two ports that can be set to either 300 or 1200 bps. Thus, the user can connect one port to the VHF transceiver, and the second port can be attached to the HF rig. The speed of the ports is easily changed with commands entered from the CMD: mode.

The Kantronics KAM is a dual port "All

Mode" TNC also, but the VHF port is the port that allows the speed to be changed. The HF port, or PORT two, is fixed at 300 bps. Therefore, the VHF port is used when operating at 10 meters with 1200 bauds.

The reader mail continues to inquire as to how the KAM can be made to operate in the 10 meter band at 1200 bauds, and at the same time utilize the bar LEDs as an HF tuning indicator. This is a minor problem which can be overcome by implementing the simple wiring option that I've drawn in fig. 1.

223.400—A Hacker's Paradise

While we are discussing Novice packet operation, I notice more and more Novice stations operating packet at 223.400 MHz. Not reserved exclusively for the Novice, these premium channels offer a low noise, small antenna, and high data transfer speeds to the potential user. As a matter of fact, many hackers on the 222 MHz band are using 2400 bps QPSK, and a few of us are using 9600 bps in the 222.1 to 223.91 MHz band. This is the Novice sub-band in the 222 MHz band. Here the power level for the Novice is restricted to 25 watts.

A New Kind of "Speed"

With 1200 and 2400 bps modems we were able to attach the TNC directly to the standard microphone port of our transceiver. The receive audio connection was made to the external speaker/earphone jack. This system worked with the slower speeds. However, the new move is to 9600 bps.

The technique used with 9600 bps is still AFSK (the shifting between two audio tones), but the results are dynamically improved with the 9600 bps. Even with the faster throughput of 9600 baud packet, there is also an improvement in the transfer of data. By this I mean we have less errors, and the bandpass remains the same. Whoops . . . yes, we can still use the 20 kHz channel.

With 9600 bps we quickly discover a need to make certain minor changes in the radios. In a recent "Packet User's Notebook" column I made reference to the new breed of transceivers which will soon be available from the manufacturers. The manufacturers have been made aware that the present variety of transceivers will not fill the ticket of the true digital amateur and packet enthusiast. Some manufacturers are slow to learn and even ignore the handwriting on the wall, while others are making way for the new wave of "data-radios."

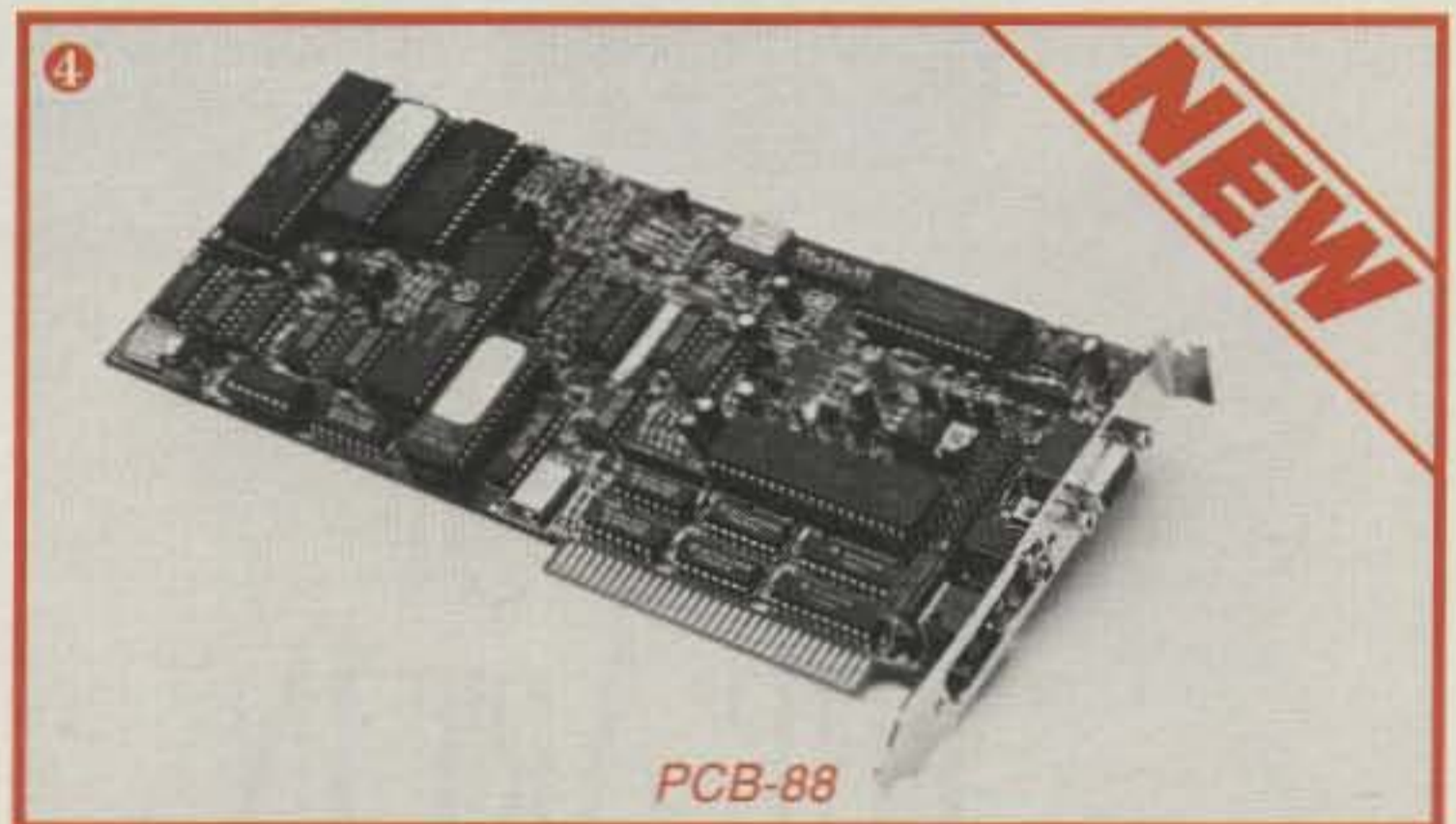
Early on, Kantronics saw a need, and although the first effort didn't give the exact performance they desired, they took

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a different approach and are now producing a model for others to consider. The Kantronics 440 MHz system coupled with their Data-Engine, with the on-board 9600 bps modem, will soon demonstrate why the OEMs should look and plan ahead.

While the Kantronics application is one desired method to be considered, there is another avenue to explore. PacComm has also developed a modem that will work with radios that have "true" FM capabilities. This system requires that the transceivers have a fast receive/transmit transit time. The run-of-the-mill, or COTS (commercial, off-the-shelf) transceiver will not meet these requirements.

Application Modems For 9600 bps

The two modems for 9600 bps that are beginning to see widespread AX.25 packet radio applications are the G3RUH and the K9NG assemblies. The K9NG is being constructed to fit into the TAPR and clones on the modem disconnect header, while the G3RUH is being manufactured

in different configurations for use in an assortment of installations.

In the near future in this column we will begin illustrating the different approaches used to interface the high-speed 9600 bps systems to other transceivers and TNCs. As always, I like to perform the modifications myself so that I may be sure of proper installation and operation for the system I am describing.

As discussed in the March column, the manufacturers may soon begin delivering radios with these connections already in place so we may attach a connector externally. In this manner we will not be confronted with the chore of making the mods ourselves.

One final item before I leave the data-radio topic. I have been watching with interest the new Ramsey 2 meter transceiver kit. The Ramsey runs 10 watts output and boasts an external data input connector to accommodate the new high-speed modem requirements. I'm told by the Ramsey Electronics people that the matching units for 1.25 meters (222 MHz) and 70 cm (440 MHz) will soon

be available at the same price and with the same options.

The price of these transceiver kits is \$129.95, and the enclosure for the units is priced at \$24.95. I've looked at the construction of the prototype unit, and if the performance coincides with the PCB and component layout, then we may have something to look forward to soon. As quickly as I can get my hands on the 220 and 440 MHz transceivers, I'll pass my findings along to you.

SouthNet Packet Conference and Atlanta Hamfest Packet Forum

This month marks the opening of the fifth SouthNet Packet Conference. This June 14 and 15 packeteers from all around the southeast will converge on Albany, Georgia to learn about the new innovations that are taking place in the world of packet radio outside their home LANs. If last year's SPC was any indicator of the growth in the ranks of packet radio, then this year's SPC should be even better.

The SouthNet Packet Conference will play host to many packet TNC manufacturers who will be displaying the latest in packet radio. Another big attraction is the many forums related to packet radio and the new techniques that are being adapted to packet. These forums include networks, high-speed trunking, backbone construction, DX PacketClusters, ROSE networking, and BBS use and implementation. Featured speakers will be specialists on the individual topics. Also included will be demonstrations of the latest packet technology by various user groups and manufacturers. Prizes include VHF/UHF/SHF scanner, twin-band HT, HF, VHF, and data-radio transceivers. VEC exams are also scheduled.

If you are like many who are new to packet radio or if you are a seasoned veteran of packet and you would like to obtain more information, then the SPC is for you. The packet equipment manufacturers and vendors will have plenty of literature on hand, not to mention the free handouts that will be available in the packet forums. For more information, contact John Crosby, K4XA, 912-883-7910.

Another noteworthy event is the packet forum hosted by yours truly on Saturday, July 13 at the Atlanta Hamfest. Free books entitled *An Introduction to Packet Radio*, and the *ROSE Switched Network* will be given out at the forum.

Ham—Broiled or Boiled

The Orlando HamCation was a good hamfest this year, as it has been in the past. The statements here are not intended as criticism, but as an observation about this (enjoyable) annual event.

In 1983 the Orlando Hamfest was held

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at the fairgrounds, and many remember it as the "ham bake." Seems we all felt the "heat" that was to spoil our trek to Orlando that year. After that, the Orlando HamCation moved to the Civic Center downtown. Things improved, and the hams in the southeast began to return after a year or two.

That location was also short-lived, and the HamCation moved again. This time it was relocated to the Orange County Convention Center. After a couple of years at this location, the HamCation was again moved. This time it returned to the scene of the 1983 "ham bake" at the fairgrounds. I was told by one of the hamfest committee persons that the move was for economic reasons. Another commented that "A moving target is hard to hit."

In any case, the elements again played havoc with the HamCation at the fairgrounds. It rained from the time we arrived until we departed. I saw many disappointed fleamarkers who had to close shop (trunks) and shut down because the rain was relentless, and there was no way to display merchandise. I miss the tailgaters at a hamfest if they are not around, and this was one of those times.

I don't wish to make it appear as if the attendance was slack at Orlando. Far from it. It's just that for some reason, the fairgrounds seem to be "snake-bit." On Saturday the crowd was elbow to elbow, and at the packet forum at the Ramada Inn I was happy to see a packed house.

Thanks to Paul McMasters, WB4LOM, for hosting the packet forum and for inviting us to be a part of the presentation. To give you some feel for the number in attendance at the packet forum, we had a supply of 200 books (*An Introduction to Packet Radio, and the ROSE Switched Network*) to give away, and we ran short. The motel also ran short of chairs, and several members of the audience were left standing. Although some late arrivals had to stand, they stayed with us for the full two hours to learn about the happiness that we packeteers enjoy.

While I'm at it, I'd like to express my thanks to Randy of Sierra Technologies and Dennis of DEN-TRONICS for some last-minute help. I had a monitor problem and needed a display monitor for use at the packet forum, and Dennis came through with a CGA monitor for me at the last minute. Thanks, guys, for "saving my bacon."

Keeping Our Tools Clean

At the beginning of this month's column I made reference to the Persian Gulf War. In tune with this topic there was a lot of NTS traffic being handled via the packet BBS network throughout the world. There was also some unscrupulous BBS user who felt he would use the packet BBSes for his own unethical motives. In doing so he tampered with some areas of our free-

dom that caused some sudden reactions from the FCC.

Caught in the thick of this conduct were some good regional BBS SYSOPs who were, in a sense, brutally targeted and received fines because of the presence of certain "Pay-Per-Call" (900 numbers) on their BBSes. In addition, these numbers were, allegedly, cloaked in a commercial activity which profited the originator. The text of the messages were, as in many cases, completely unknown to the SYSOP.

This problem was not caused by a newcomer. It originated with an amateur who had full knowledge of the Commission's rules regarding commercial use of the amateur frequencies.

As I watch the heavy activity on the BBSes here in the southeast, I can see how the SYSOPs are up to their ears in data and files, many of which are not worth the time it took to compile and upload to the BBS. I've also seen the removal of several BBSes from the air-waves since the fines were levied. It is apparent to me that a SYSOP is now at the mercy of the originator of this kind of file.

As I watch the forwarding of mail to and from WA4BRO, KF4XT, WA4PHY, WB4RHO, WD4LYV, W4DPH, W8DUV, and other BBSes that are forwarding in the wee hours of the morning, I'm in total awe as to how Dan, Bob, Sam, Glynn, Wayne, Jim, and Kay can screen all this mail at the SYSOP level. How many times can it be looked at for content and circumlocution present in some of the messages, notices, and files. With the just-mentioned data, they've only just begun! What about the hundreds of ARRL and AMSAT bulletins that flow through the worldwide BBS networks?

The Time Is Now!

If we are to preserve the NTS, bulletins, and message medium for our use and freedom of expression, then we must all look into what is going into the local BBS. This is not to say we should jump into the midst of the BBS files and begin pulling the files during prime-time.

There are times when we may see a file that is not in good taste, or that could be a possible problem for the reader, originator, and the least suspecting "SYSOP"! This problem is not reserved only to packet radio. We see it in the AMTOR, RTTY, and APLINK message systems. The burden is the same regardless of where the problem originates.

For the most part, through the years we amateurs have been "self-policing," and thus we have proven that we can and do handle many of our problems early on. Let's try to assist the SYSOP by bearing some of the load that is evident in the massive number of files in his/her BBS. *We can begin by being aware of what we are originating when we send a file!*

As we enter a new era of amateur radio, we may soon find that we have more users in the packet arena than had been imagined. It is truly obvious to those of us who are deep into this facet of the hobby that our packet radio ranks are beginning to show prominence. The relocation by many of us to the 223 MHz band is proving to be good for our high-speed systems, too. In the not too distant future I foresee a large contingent of users at these UHF frequencies.

We are in this together, so have fun, and Happy Packeting, Buck.

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THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

Telephone Interference Revisited

I opened a can of worms when I discussed telephone interference in my April column! It is a larger problem than I had thought, judging from the flood of mail I received on this touchy subject. A lot of amateurs have this problem—a lot more than I had imagined. The new imported telephones with bells and whistles are particularly prone to interference from a nearby transmitter. Some of them are really bad!

There are a few telephone filters on the market that are advertised to cure the problem. Some of them work and some are ineffective. In particular, I mentioned the Z-100A telephone filter sold by AT&T to unsuspecting amateurs. Here are some comments I received on the subject:

Charles Earp, W3DKT: "After trying to get through to AT&T for a week to someone who would talk about the Z-100A, I finally succeeded in talking to a technical supervisor who was civil, reasonably well informed, extremely defensive and not very helpful.

"He said the Z-100A was designed specifically to attenuate broadcast band interference and that the effective filter was the older model, not made since 1988, and the newer, ineffective filter had been redesigned for cost purposes. He had no answer as to why the two designs had the same stock number or how one could get an older one, if still in stock. He insisted that AT&T did not say the Z-100 was for "ham" interference, but for interference from nearby broadcast stations. He did say a new filter will be on the market in about six months designed to attenuate the higher frequencies.

"He also said the failure to provide adequate protection against RF rectification in the instrument is not a design deficiency, and the cost of instrument modification or addition of a line filter was the user's responsibility, not AT&T's.

"He also said the older, mechanical-type instruments can be modified internally (with no guarantee of success), but not the newer, electronic types."

Thanks, Charles, and good luck with your problems. Charles also says that AT&T has a Purchaser Consumer Mainte-

nance and Repair Branch in St. Louis, MO. The phone number is 1-800-222-3111. They may be able to provide suggestions or assistance with regard to interference problems concerning AT&T equipment.

Al Hansen, W1VY: "In the past I have bought several AT&T Z-100A filters and had good luck installing them on neighbor's telephones. Recently I moved and had to go through the routine again. I bought some more Z-100A and found out they did not work! I opened them up and found to my surprise the reactor was not a toroid but a square, split core with the windings on the center leg. The resistance of each winding is 5 ohms and the core is marked 1722B and 90DJ5.

"Bill, have you contacted AT&T and presented the sad story? This is a big rip-off!

"The Supervisor of the local phone company (Kennett Square, PA) says they have had good luck with a "YO-YO" filter and they will install some for me next week.

"By accident I left one of the Radio Shack telephones unplugged from the line and to my surprise I was S5 in it all by itself! Removing the cable from the dead phone silenced it."

(Al, tell me more about the YO-YO filter!!—ed.)

John Landry, WA2JGE: "Telephone interference is a never-ending problem for us here at WBZ (Radio 1030, Boston). One thing I have found is that very cheap phones seem to have a built-in HF resonance which makes any attempt to fix the problem with line filters impossible. We have had problems with telephone/answering machine combinations in all price ranges, however.

"Here in New England the telephone company will install their own type of suppressor on the outside of the house (number 1524-AM-IND). One has to practically scream at a supervisor to get one installed. Nine times out of ten it does the job at 1030 kHz."

Howard Lawrence, WJ1D: "I've spent much of the past two weeks researching to find a cure for my severe telephone interference problem. The filter design I finally came up with is essentially the same as yours, and it was quite effective. However, I found that several phones required additional filtering in the handset cord in order to reduce interfer-

ence to an acceptable level.

"As I expected, results varied with the telephone device, some being more susceptible to interference than others. One of the worst devices, the AT&T 1523 (an integrated phone system) needed internal work which was beyond my ability.

"A phone call to the AT&T development lab in Indianapolis proved encouraging. The design engineer said that some of the Z-100A filter manufacturers in China and Taiwan had substituted inferior parts which later proved unacceptable by AT&T. I suspect that this is what may have happened with the Z-100A.

Howard promises to update me on the ongoing problem, and is very pleased that the Indianapolis Lab of AT&T seems interested in the problem."

Jim Jorgenson, K9RJ: "My favorite RFI filter is the 'super bead' toroid sold by Radiokit (Box 973, Pelham, NH 03076). These are CHO-SORB EMI Absorbers (part no. 83-10-A636-1000 for ¼ inch diameter cables and part no. 83-10-A637-1000 for ½ inch diameter cables). Similar big toroid beads can be purchased from Amidon and others. Five or six turns of the phone cord (or AC cord) can be passed through the larger bead. I have found these will solve virtually every case of AC-line induced RFI in the house (clock radios, ghetto blasters, stereos, CD players, tape recorders, telephone answering machines, etc.) If the device has a removeable AC cord, I construct a new one with the toroid in line as a replacement for the original one. A little shrink-tubing will dress up the job.

"My worst TVI experience was with my 31 inch Panasonic Prism TV receiver with surround sound. Panasonic refused to help, but I did learn the set is controlled by a 14 MHz microprocessor. This explained how my low power 20 meter signal could cause such bizarre effects as muting the audio and putting the clock-timer alpha-numeric on the screen! I was eventually able to fix this problem (except when using 1 kW on 10 meters) with super-beads on EVERY lead entering the set. No amount of filtering on any one lead was sufficient. A high-pass filter in the antenna coax did nothing at all.

"My next problems are with two 19 inch Sony remote-controlled TV sets owned by neighbors. They hear me on 10 meters even with the set turned off!"

Sheldon Shallon, W6EL: "I have

48 Campbell Lane, Menlo Park, CA 94025

used a simple pi-section filter such as you discussed in the April issue of CQ. For the shunt capacitors I used .01 μ F units, according to 'the more the better' theory. For the series inductors I purchased some resembling a half-watt resistor from All Electronics Corp., Box 567, Van Nuys, CA 91408, phone 1-800-826-5432 (minimum order \$10.00). I used 22 μ H inductors which were self-resonant at 14 MHz along with the .01 capacitors. This combination solved my problem."

In passing, it should be mentioned that the ARRL Handbook notes that section 500-150-100 of the Bell System Practices (Plant Series) manual gives interesting information on telephone RFI in section 471-150-200. Perhaps readers who have problems can gain access to this publication.

For those readers who wish to build their own phone filters, suitable chokes are available from the aforementioned Radiokit company. The chokes are 470 μ H, part number 73F47AF, made by the J.W. Miller Co. A kit of inductors and capacitors to make a telephone filter can be obtained from Richard Measures, AG6K, 6455 La Cumbre Rd., Somis, CA 93066.

Reverse RFI

Jim, K9RJ, points out that in addition to his interference to consumer electronic devices, he finds many devices that interfere with him!

"The worst offenders in my neighborhood are touch lamps. After getting fed-up with frequency-selective bands of S9-plus 20 dB, raspy 120 Hz noise centered on 3505 and 3795 kHz, I got in my mobile and cruised the neighborhood. I quickly found a house 1 1/2 blocks away that had two touch lamps. I convinced the owner that the lamps might be interfering with their TV and she let me take the lamps home for "repairs." Carefully chosen RF chokes in the sensing leads lowered the radiation by 40 to 50 dB. I found the choke values needed to be optimized to minimize the pickup of my signal by the lamp.

"After the first two lamps were silenced, I was able to hear the next layer of touch-lamps, so the whole process is continuing. Someday I may get my last few zones on 80 meters for 5-Band WAZ, but I must first find all the local noise sources!"

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Enough of this dismal talk about interference! Let's take a quick look at an outstanding 10 meter beam. This 5-element job is built on a 25 foot boom. Element spacings, measured from the reflector are 30.75" to driven element, 91.25" to first director, 189.25" to second director,

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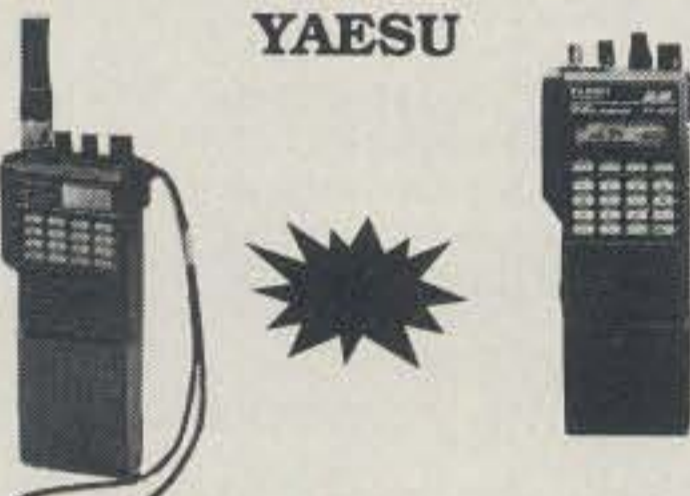
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and 294" to third director. All spacings are center-to-center. Each element is made of a 0.875" center section, 12 feet long. Each tip section, made of 0.75" tubing is as follows: Reflector, 32.5"; driven element, 22.25"; first director, 23.625"; second director, 22.83", third director, 17.75". All dimensions are for elements mounted above the boom.

The driven element is shorter than resonance to accommodate a gamma match. The gamma rod is 0.375" diameter and about 20 inches long. It is spaced 2 inches (center-to-center) from the driven element. The series capacitor is about 46 pF.

Power gain, front-to-back ratio, SWR and input impedance are shown in fig. 1. The beam covers 28.0 to 28.8 MHz with an average power gain of 8.41 dB. Front-to-back is better than 26 dB across the band. SWR is less than 3-to-1 across the operating range.

Not bad numbers for a boom less than 25 feet long! The design was optimized on the YOC program of K6STI.

The Dead Band Quiz (April)

Yes! The movie was *The Third Man*, starring Orson Welles, Joseph Cotten, and Valli. The location was Vienna, in the dark days following World War II. The scarred city was divided into zones of occupation by the successful Allies. The star who never appeared in the picture was Anton

Karas, who played the movie theme on a zither.

This picture must have struck a deep, emotional chord with the readers of this column, many of whom had visited Vienna in the post-war years and some of whom had ridden on the "prater," the giant ferris wheel that was so prominent in the story.

I was overwhelmed at the volume of letters and QSL cards, and I thank all of you, particularly Lane, KC6AST; De, K5HKE; Tye, KB8FJ; Jack, K9GZK; and Paul, W6PYK, all of whom sent me personal notes.

Readers who correctly identified the movie in detail are: Jim, AA4UA; Bob, K1XA; Larry, N5IZY; Wes, K6OZK; Harry, NV7K; Dave, KA7OBU; Kane, WA2DAX; Dan, KF4AV; Terry, KG5WO; Rex, WA9WQS; Milt, AA6ON; Dick, NS0W; John, K3BYV; Nick, WB5BKL; Larry, WB2ZPI; Bill, W7DHD; Dave, N4LBJ; Shel, W4OEL; Ev, KG7DK; Pat, KC1TD; Harris, W5IPC; Hugo, W5VCM; Jim, WB6SYN (nice QSL); Tye, KB8FJ; Dave, K1HRV; Brian, KA9SNF; Jack, W4YCZ; De, K5HKE; John, W1HLE; Mike, W9FKC (good to hear from you); Bob, N2AUD; Garry, WD0HCJ; Jack, K9GZK; John, WA2JGE; John, W1MN; Rodger, KK6TC; Tony, KA6IKD; Harry, WA6YOO; Tony, W1OT; Don, K5AQ; Walt, K7HGZ; Ruddy, W4LNG; Mike, K8KVN; Fleet, N7ICG; Bill, W7QHC; Bill, AA6ZJ; Al, N8MOK; John, W0FEV; Bob, N8RU; David, KA1EAP; Ed, AA4EJ; Ira, W3ZLK; Bill, KB8JIY; Bill,

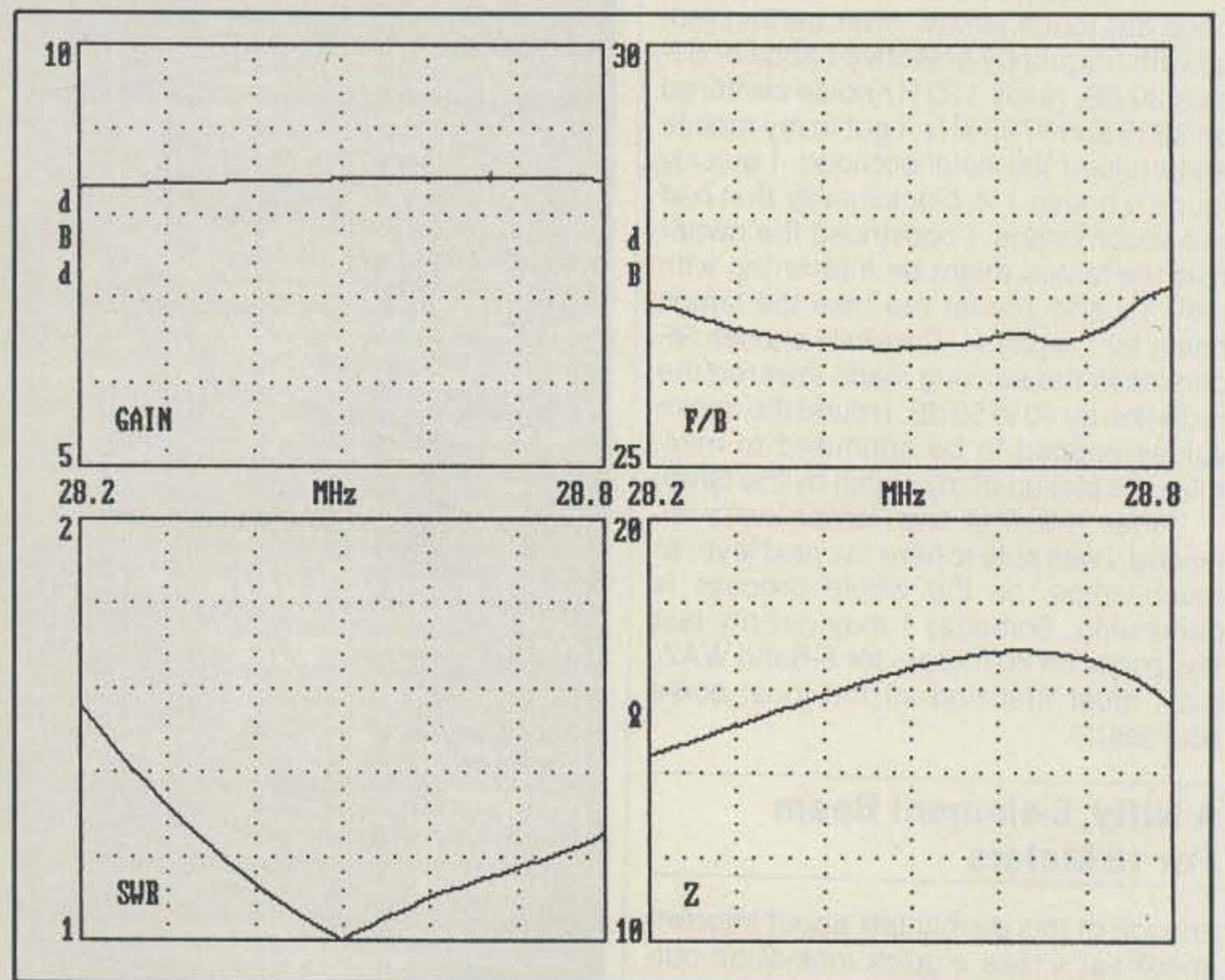


Fig. 1—Plots of 5-element, 10 meter Yagi. Top row (left) is gain, top right is front-to-back ratio. Bottom row (left) is SWR, lower right is input impedance. Frequency span shown is 28.2 to 28.8 MHz. Beam performs well over 28.0 to 29.0 MHz.

W4BGA; Norm, W2SZJ; Bruce, W2GBX; Jim, K1JA; Bill, AB4BQ; Chris, KB6FEI; Tony, N2UN.

Thank you all, and may we meet in Vienna, someday!

A New Dead Band Quiz

OK, you smart readers! You seem to like

old-time movie quizzes. Here's a new one for you!

The date of the action is indeterminate (probably around 1948—my guess). The radio call of the boat is "Able, Sugar, Able, Nan." The call of the Coast Guard station is "Nan, Mike, Able." Frank McCloud is the skipper of the "Santana," which is trying to make Boot Key Harbor

after a harrowing experience which left Johnny Rocco dead (played by Edward G. Robinson).

Name the picture and the leading man and heroine.

Send me your QSL with your best guess, and I'll name the "winners" in an early column. Good luck, and here's looking at you, kid!



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OUR READERS SAY

Use It or Lose It

Editor, CQ:

Yes, this is another "use it or lose it" letter. Did you know that the number of cellular mobile telephones sold each year in the U.S. outnumbers licensed amateurs? "So what?" may be a common response to such a dry statistic. The "so what" is preserving amateur radio frequency allocations through mobile emergency call-ins. Some cellular telephone service companies are asking the FCC for more frequencies. Demonstrated public service (911 calls) can now be their battle cry as well as ours.

I am not complaining that cellular mobile telephone users greatly outnumber amateurs with mobile radios. I am very happy that cellular users make many emergency "911" calls (often a free service). However, if they do and

amateurs do not, guess who loses? Amateurs should make extra effort to use mobile phone patches and other emergency call-in techniques each time there is a need.

Bryan Lundgren, N8MHZ
South Haven, MI

Thanks, George

Editor, CQ:

Many congratulations to George Jacobs, W3ASK, for 40 years of expert and knowledgeable propagation information. A record and achievement that will probably be impossible to beat!

I received my first ham ticket in 1950, 41 years ago, and for the past 40 years I have enjoyed and looked forward to all of his 480 articles. It certainly has added to my knowledge and enjoyment of one of the greatest of hobbies.

Corrections Department

Re: "The Care and Feeding of Nickel-Cadmium Batteries," by W. Max Adams, W5PFG (March 1991 CQ). After correspondence with several of our readers, W5PFG has come up with some corrections to his article. This should clear up any problems you may have. Max says the following:

"In fig. 3 the two K1's are the same part. One is the coil assembly, the other the contact assembly. They are drawn separately for clarity. When the coil is energized, the K1 Normally Open (NO) contacts close.

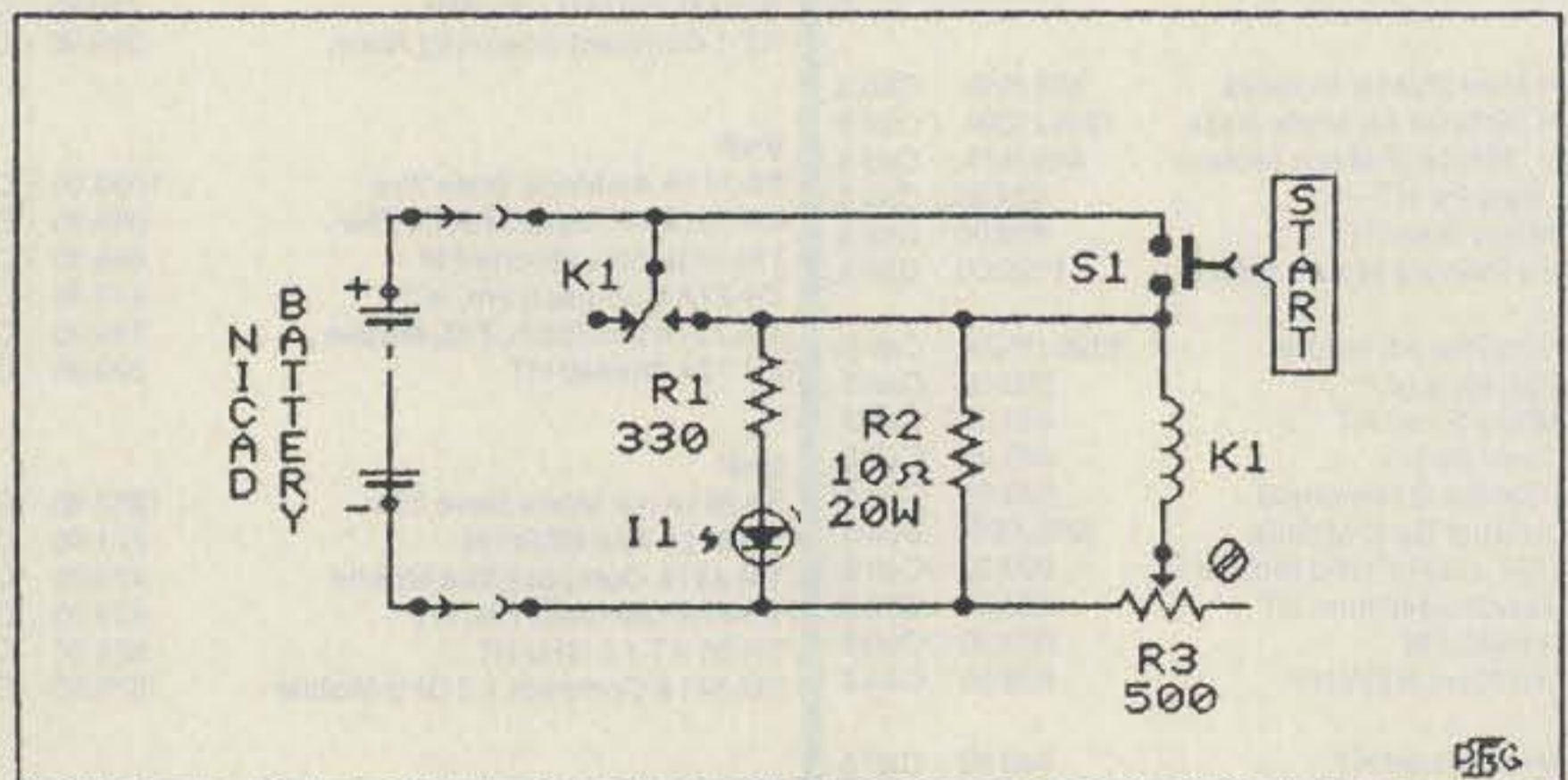
"I built the prototype using an optocoupler, POC1. I found that it worked well on paper, but not too well in real time. Instead of going "snap" it went "SQUISCHOOOSH"! There-

fore, just delete all reference to POC1.

"R3 in the revised unit is R4 in the original device.

"Incidentally, one reader had trouble getting K1 to drop out at less than 11 volts. It seems that the movable arm was making firm contact with the coil armature because of too much spring tension. He loosened the mechanical springs and the unit worked fine. You may want to bend the movable contact down a little, to allow it to be "pressing up" on the movable armature just a slight amount, when the relay is energized.

"I hope this information will help you overcome the voltage depression in your nickel-cadmium batteries."



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Fig. 3- NiCad® battery discharge conditioner. R2 consists of four 10 ohm resistors connected in series/parallel to provide a 20 watt device.

A tip of the hat for all of George's efforts, and much good wishes for the future.

Richard L. Scott, W8FDN
Richmond Heights, OH

Unique Parts Source For The Heathkit SB-610

Editor, CQ:

I was lucky enough to acquire an SB-610 monitor scope that I plan to use to check out and repair CBs and HF rigs. It has a nice wide IF range—455 kHz to 6 MHz. The scope's trace was pulsating and out of focus. I first changed a 1.5 uF filter capacitor that was obviously leaking. This did not cure the ill. Checking the voltage on the focus grid showed it varied + and - 100 volts and thus the selenium rectifier diodes became suspect. Finding replacement rectifiers was problem. The solution was to use color TV focus diodes. These diodes exceed the original ratings (6500 V PIV, 3 ma). Although three times as long as the originals, there is plenty of room to mount them on the existing tie points. Suitable replacements include: GE CR-1, RCA 113397, and GC 16.500. These are still available from most TV parts stores. This fix will work on any scope using selenium rectifiers in the high-voltage circuit.

Ken Kolthoff, K8AXH/0
Plattsmouth, NE

An Obsolete Rut

Editor, CQ:

The letter by N8MHZ in February CQ stirred up a pet peeve of mine—the obsolete nature of

the use of the RST system for reporting CW signals. As noted by N8MHZ, T9 has become an automatic in our signal reports. I wrote to QST about this same thing some years ago, but failed to stir up any reaction, save for a few favorable comments from some other hams.

In the good old days the tone of your CW signal was important, as most of us used some type of home-brew rectifier and filter system for the power supply of our self-excited rigs. At that time your tone was identified as AC, RAC, or DC. However, again as stated by N8MHZ, our modern solid-state equipment practically guarantees a T9 signal.

Having been a ham for many years, I looked back in my old logs and found the "T" to appear initially in early 1934. I presume the whole RST system was the brain child of the ARRL, but have no authentic information to support this. Certainly, at that time the idea was very good, but in these days it has outlived its usefulness. I agree wholeheartedly with the idea of eliminating the RST for CW in favor of RS, as used in SSB reporting.

On the other side of the coin, I heard one of our JT friends on 20 meter CW recently with a tone like a buzz saw. He was knocking USA hams off like crazy, so I listened to about 20 contacts, and would you believe all but one of our boys reported the JT as T9. Actually, T4 would have been quite complimentary! This is further proof of the uselessness of "T." It has become a routine thing with most hams, and I wonder how many really know the significance of T9.

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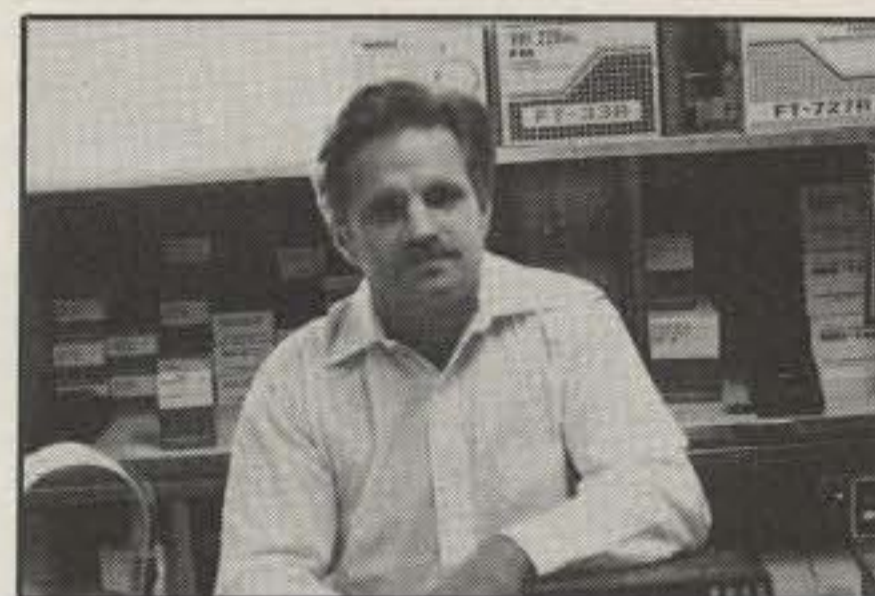
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KF0H	2,021,136
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AD5Q	1,934,544
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W0AIH	10,132,672
K6UA	9,344,712
N6ND	7,876,319
N6DX	5,987,284

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CIRCLE 83 ON READER SERVICE CARD

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Worldwide Amateur Radio Callsigns

This updated version of my January 1980 column was requested by Chris Power, NR4S, of Oak Ridge, Tennessee. This alphanumeric sequence of callsigns enables one to quickly determine an amateur's country from the callsign she/he sends. American callsigns are included to make this list a complete one. An asterisk (*) besides a callsign denotes that DXCC credit applies to that country, which is of interest to many amateurs. The American Radio Relay League (ARRL) issues this award to amateurs who have proven contacts with other amateurs in 100 (or more) countries. A copy of the ARRL DXCC countries list can be purchased (for \$1.00) from the ARRL, 225 Main Street, Newington, CT 06111.

Insignificant additional letters and numbers are not shown in this list. As an example, FE callsigns are used in France, in addition to callsigns starting with just the single letter F, plus a number. Since the FE does not indicate a country (or island) separate from France, FE is not listed. On the other hand, FM is listed because it is used by amateurs at Martinique, which is separated from France and has its own DXCC credit. Similarly, A22 and A24 prefixes are used in callsigns of Botswana amateurs, but there is no significance to the second number, so the listing is just A2.

A listing such as AA-AL means every prefix in that series (AA, AB, AC, etc.). A listing such as TE/TI indicates only callsigns starting with TE or TI; it does not include callsigns starting with TF, TG, etc.

Notice how often a zero (0) appears in callsigns of DXCC credit locations, including some of the rarest ones. There are more than 25 such prefixes (with zeroes in them) which have DXCC credit. I advise you to make an effort to work as many of these "zero" stations as possible.

Wherever a particular callsign is used by most of the amateurs in a country, that callsign is shown following the name of the country/island. As an example, Chile is shown as CA-CE because callsign prefixes starting with CA, CB, CC, CD, and CE can be assigned to Chilean amateurs. However, the most commonly used Chilean callsign prefix is CE, which is indicated following the name of the country.

45527 Third Street East, Lancaster, CA 93535-1802



This is Hirdki, the two-year-old son of Matt Stennett, 7J6CAT/WA4TKG. Matt advises that the picture was not posed. Matt has worked about 50 countries from Okinawa. He is partially proud of having contacted the CQ DX Award Manager, Billy Williams, N4UF. Matt has known Billy for 14 years.

San Francisco Area Amateur Needed

The Matthew Turner Foundation is dedicated to building a world-class sailing ship to expose young people to the adventure of that aspect of marine life. They have received an extensive assortment of older amateur equipment which they want to have set up at their China Basin office. They want to interest cadets in amateur radio, and they hope to attract an amateur to conduct a licensing program. If you are a Bay Area amateur, and if you are interested in setting up the base sta-



Eight-year-old Lisa Eller, KB8KTF, of Holland, Michigan shares a station with her father (Robert Eller, N8KER). They run a Kenwood TS-940S transceiver.

tion and/or conducting licensing courses, please contact Mr. Thomas J. Le Vell, Director, Matthew Turner Foundation, China Basin Building, 185 Berry Street, Suite 159, San Francisco, CA 94107. His telephone number is 415-512-8393 and the FAX number is 415-543-1623. I will be glad to supply my training material to anyone interested in conducting this licensing program.

AA-AL	see W
AH1-AH0	same as KH1-KH0
AL7	same as KL7
* AP-AS	Pakistan
* A2	Botswana
* A3	Tonga
* A4	Oman
* A5	Bhutan
* A6	United Arab Emirates
* A7	Qatar
* A9	Bahrain
* BV	Taiwan
* BY/BT	China (BY)
* CA-CE	Chile (CE)
CE9	see VP8/South Shetland Is.
* CE9	Antarctica Stations; also use AT0, DP0, FT8Y, KC4, LU, OR4, VK0, VP8, Y8, ZL5, ZS1, ZX0, 3Y, 4K1, and 8J1
* CE0	Easter Is.
* CE0	San Felix
* CE0	Juan Fernandez
* CM/CO	Cuba (CO)
* CN	Morocco
* CP	Bolivia
* CR-CU	Portugal (CT)
* CS3/CT3	Madeira Is. (CT3)
* CU	Azores
* CV-CX	Uruguay (CX)
* CY9	St. Paul Is.
* CY0	Sable Is.
* C2	Nauru
* C3	Andorra
* C5	The Gambia
* C6	Bahama Is.
* C8-C9	Mozambique
* DA-DP	Germany (ex-West Germany)
* DU-DZ	Philippines (DU)
* D2/D3	Angola
* D4	Cape Verde
* D6	Comoros
* EA-EH	Spain (EA)
* EA6-EH6	Balearic Is (EA6-EC6)
* EA8-EH8	Canary Is. (EA8-EC8)
* EA9-EH9	Ceuta and Melilla (EA9-EC9)
* EI	Ireland
* EJ	Aran Is. (Ireland)
* EL	Liberia
* EP/EQ	Iran (EP)
* ES	Estonia
* ET	Ethiopia
* F	France

* FG	Guadeloupe	* KH8	American Samoa	* T7	San Marino
* FH	Mayotte	* KH9	Wake Is.	U	Russia
FJ	St. Barthelemy (see FS)	* KH0	Mariana Is.	* UA1/3/4/6	European Russia
* FK	New Caledonia	* KL7	Alaska	* UA1	Franz Josef Land
* FM	Martinique	* KP1	Navassa Is.	* UA2	Kaliningrad
* FO	Clipperton Is.	* KP2	Virgin Is.	* UA9/0	Asiatic Russia
* FO	French Polynesia	* KP4	Puerto Rico	* UB/UT/UY	Ukraine
* FP	St. Pierre and Miquelon Is.	* KP5	Desecheo Is.	* UC	Byelorussia
* FR	Reunion Is.	* LA-LN	Norway (LA)	* UD	Azerbaijan
* FR/G	Glorioso Is.	* LO-LW	Argentina (LU)	* UF	Georgia
* FR/J, FR/E	Juan de Nova and Europa Is.	LU	see VP8/South Shetland Is.	* UG	Armenia
* FR/T	Tromelin Is.	* LX	Luxembourg	* UH	Turkmenistan
* FS	Saint Martin	* LY	Lithuania	* UI	Uzbekistan
FT	same as CE9/Antarctica	* LZ	Bulgaria	* UJ	Tadzhikistan
* FT8W	Crozet	N	see W/U.S.A.	* UL	Kazakhstan
* FT8X	Kerquelen Is.	NH1-NH0	same as KH1-KH0	* UM	Kirghizia
* FT8Z	Amsterdam and St. Paul Is.	NL7	same as KL7	* UO	Moldavia
* FW	Wallis and Futuna Is.	NP1-NP2	same as KP1-KP2	UP	see LY/Lithuania
* FY	French Guiana	NP4-NP5	same as KP4-KP5	UQ	see YL/Latvia
* G	England	* OA-OC	Peru (OA)	UR	see ES/Estonia
* GD	Isle of Man	* OD	Lebanon	* VE	Canada
* GI	Northern Ireland	* OE	Austria	* VK	Australia
* GJ	Jersey	* OF-OI	Finland (OH)	* VK	Lord Howe Is.
* GM	Scotland	* OH0	Aland Is.	* VK9	Christmas Is.
* GU	Guernsey	* OJ0	Market Reef	* VK9	Cocos-Keeling Is.
* GW	Wales	* OK-OM	Czechoslovakia (OK)	* VK9	Mellish Reef
* HA/HG	Hungary (HA)	* ON-OT	Belgium (ON)	* VK9	Norfolk Is.
* HB4/HB9	Switzerland (HB9)	* OX	Greenland	* VK9	Willis Is.
* HB0	Liechtenstein	* OY	Faroe Is.	* VK0	Heard Is.
* HC/HD	Ecuador (HC)	* OZ	Denmark	* VK0	Macquarie Is.
* HC8/HD8	Galapagos Is. (HC8)	* PA-PI	Netherlands (PA)	VK0	see CE9/Antarctica
* HF0	see VP8/South Shetland Is.	* PJ2/4/9	Bonaire and Curacao	VO1	Newfoundland/Canada
* HH	Haiti	* PJ5-8	Sint Maarten, Saba, and Sint Eustatius	VO2	Labrador/Canada
* HI	Dominican Republic	* PP-PY	Brazil (PY)	* VP2E	Anguilla
* HJ/HK	Colombia	* PP0-PY0	Fernando de Noronha Is.	* VP2M	Montserrat
* HK0	San Andres and Providencia Is.	* PP0-PY0	St. Peter and St. Paul Rocks	* VP2V	British Virgin Is.
* HK0	Malpelo Is.	* PP0-PY0	Trindade and Martin Vaz. Is.	* VP5	Turks and Caicos Is.
* HL	Korea	* PZ	Suriname	* VP8	Falkland Is.
HL9	Korea (Americans)	* P2	Papua, New Guinea	* VP8	see CE9/can be Antarctica
* HO/HP	Panama (HP)	* P4	Aruba	* VP8/LU	South Georgia Is.
* HQ/HR	Honduras (HR)	R	see U/Russia	* VP8/LU	South Orkney Is.
* HS	Thailand	* SA-SM	Sweden (SM)	* VP8/LU	South Sandwich Is.
* HV	Vatican City	* SN-SR	Poland (SP)	* VP8	South Shetland Is.
* HZ	Saudi Arabia	* ST	Sudan	* VP9	Bermuda
* H4	Solomon Is.	* ST0	Southern Sudan	* VQ9	Chagos
H5	Bophuthatswana	* SU	Egypt	* VR6	Pitcairn Is.
* I	Italy	* SV-SZ	Greece (SV)	* VS6	Hong Kong
IA5	Tuscan Archipelago	* SV5	Dodecanese	* VU	India
IC	Capri and Ischia Is.	* SV9	Crete	* VU	Andaman and Nicobar Is.
* IM/IS	Sardinia (IS)	* SV/A	Mount Athos	* VU	Laccadive Is.
IT	Sicily	* S2	Bangladesh	VY1	Yukon Territory/Canada
* JA-JS	Japan	* S7	Seychelles	VY2	Prince Edward Is./Canada
* JD1	Minami-torishima Is.	S8	Transkei	* V2	Antigua and Barbuda Is.
* JD1	Ogasawara Is.	* S9	Sao Tome and Principe	* V3	Belize
* JT-JV	Mongolia (JT)	* S0	Western Sahara	* V4	St. Kitts-Nevis
* JW	Svalbard Is.	* TA-TC	Turkey (TA)	* V5	Namibia
* JX	Jan Mayen Is.	* TF	Iceland	* V6	East Caroline Is./Micronesia
* JY	Jordan	* TG/TD	Guatemala (TG)	* V7	Marshall Is.
* J2	Djibouti	* TI/TE	Costa Rica (TI)	* V8	Brunei
* J3	Grenada Is.	* TI9	Cocos Is.	* W	United States of America
* J5	Guinea-Bissau	* TJ	Cameroon	WH1-WH0	same as KH1-KH0
* J6	St. Lucia	* TK	Corsica	WL7	same as KL7
* J7	Dominica	* TL	Central African Rep.	WP1-WP2	same as KP1-KP2
* J8	St. Vincent	* TN	Congo	WP4-WP5	same as KP4-KP5
K	see W/U.S.A., note exceptions	* TP	Council of Europe	* XA-XI	Mexico (XE)
KC4	can be Antarctica/see CE9	* TR	Gabon	* XA4-XI4	Revilla Gigedo
* KC6	Belau	* TT	Chad	XP	see OX/Greenland
* KG4	Guantanamo Bay, Cuba	* TU	Ivory Coast	XQ	see CE/Chile
* KH1	Baker and Howland Is.	TV-TX	see F/France	* XT	Burkina-Faso
* KH2	Guam	* TY	Benin	* XU	Kampuchea/Cambodia
* KH3	Johnston Is.	* TZ	Mali	XV	see 3W/Vietnam
* KH4	Midway Is.	* T2	Tuvalu	* XW	Laos
* KH5	Palmyra and Jarvis Is.	* T30	Kiribati/Gilbert and Ocean Is.	* XX9	Macao
* KH5K	Kingman Reef	* T31	C. Kiribati/British Phoenix Is.	* XY/XZ	Myanmar
* KH6	Hawaiian Is.	* T32	E. Kiribati/Line Is.	* YA	Afghanistan
* KH7	Kure Is.	* T33	Banaba Is.	* YB-YH	Indonesia
		* T5	Somalia	* YI	Iraq
				* YJ	Vanuatu

* YK Syria
 * YL Latvia
 * YN Nicaragua
 * YO-YR Romania (YO)
 * YS El Salvador
 * YT/YU/YZ Yugoslavia (YU)
 * YV-YY Venezuela (YV)
 * YV0 Aves Is.
 Y2-9 Germany/was East Germany/see DL
 * ZA Albania
 * ZC4 U.K. Bases on Cyprus
 * ZD7 St. Helena Is.
 * ZD8 Ascension Is.
 * ZD9 Tristan da Cunha and Gough Is.
 * ZF Cayman Is.
 * ZK1 North Cook Is.
 * ZK1 South Cook Is.
 * ZK2 Niue Is.
 * ZK3 Tokelau Is.
 * ZL/ZM New Zealand (ZL)
 * ZL7 Chatham Is.
 * ZL8 Kermadec Is.
 * ZL9 Auckland and Campbell Is.
 * ZP Paraguay
 * ZR-ZU South Africa (ZS)
 * ZR2-ZU8 Prince Edward and Marion Is.
 ZR3-ZS3 see V5/Namibia
 * ZS9 Walvis Bay
 * Z2 Zimbabwe
 * 1A0 Sovereign Military Order of Malta
 * 1S Spratly Is.
 * 3A Monaco
 * 3B6-7 Agalega (3B6) and St. Brandon (3B7) Is.
 * 3B8 Mauritius
 * 3B9 Rodriguez
 * 3C Equatorial Guinea
 * 3C0 Pagalu Is.
 * 3D2 Fiji Is.
 * 3D2 Conway Reef
 * 3D2 Rotuma Is.

* 3D6 Swaziland
 * 3V Tunisia
 * 3W Vietnam
 * 3X Guinea
 * 3Y Bouvet
 * 3Y Peter Is.
 4F see DU/Philippines
 * 4J1 Malyj Vysotskij Is.
 4K see CE9/Antarctica and VP8/South Shetland Is.
 4N/4O see YU/Yugoslavia
 * 4P-4S Sri Lanka
 * 4U ITU, Geneva
 * 4U UN Headquarters, NY
 * 4W Yemen, North
 * 4X/4Z Israel
 * 5A Libya
 * 5B Cyprus
 5H1 Zanzibar (Tanzania)
 * 5H3 Tanzania
 * 5N/5O Nigeria
 * 5R/5S Madagascar
 * 5T Mauritania
 * 5U Niger
 * 5V Togo
 * 5W Western Samoa
 * 5X Uganda
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 * 7T-7Y Algeria
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 * 8R Guyana
 * 9G Ghana
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* 9I/9J Zambia (9J)
 * 9K Kuwait
 * 9L Sierra Leone
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 * 9M6 Sabah (E. Malaysia)
 9M8 Sarawak (same as 9M6)
 * 9N Nepal
 * 9Q-9T Zaire (9Q)
 * 9U Burundi
 * 9V Singapore
 * 9X Rwanda
 * 9Y/9Z Trinidad and Tobago (9Y)

Photographs Wanted

Photographs of new amateurs in their shacks provide introductions to a few of the newer amateurs. Photograph size is unimportant, but good definition, contrast, and subject matter are important. Color pictures can be used, but black-and-white photographs are preferred. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an SASE if a picture must be returned. A free one-year CQ subscription (or renewal) is awarded to the one amateur whose picture I select as the winner for the month. If you are a subscriber, please enclose the mailing label (or copy) from your latest CQ issue. One award is made each month, no matter how many photographs are printed. DX amateurs, who frequently work the American Novice bands, are also urged to submit photographs.

Printed Aids

Previous Novice columns contain information that is useful to new and aspiring amateurs. Many of these items have been reprinted for distribution to students of licensing courses I instruct. For ease of use, these printed aids have been separated into six categories. These categories are introduction, code, theory, station, operating, and miscellaneous. Outdated items are continually replaced with newer material. Fifteen dollars brings a complete set of current printed aids, including shipping costs. A list of these printed aids will be sent to anyone who requests it and sends a business size (#10) self-addressed and stamped envelope to my California address. Any single item is available at no charge to anyone who supplies a self-addressed and stamped envelope. When a single item is being requested, it is advisable to supply a large (at least 9" x 12") envelope and to include a couple of extra stamps (loose in your envelope) in case extra postage is required. Some items are long. Licensing-course instructors are welcome to revise and/or duplicate these items to suit their requirements.

73, Bill, W6DDB

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205BAS 5 El 20m Beam **Call!**
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A449-6 6 El. 450 ATV Beam
A4S 4 Element Triband Beam
R5 5 Band No Radial Vertical
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Yaesu G500A (Elevation)
Yaesu G1000SDX (Azimuth)
Yaesu G5400 (Az./El.)
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MODEL	MIN. HT.	MAX. HT.	WINDLOAD	PRICE
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MA-770	23'10"	71 FT	10 SQ. FT	2249
MA-850	24'6"	85 FT	10 SQ. FT	3489
TX-438	22'6"	38 FT	18 SQ. FT	919
TX-455	21'0"	55 FT	18 SQ. FT	1385
TX-472	23'8"	72 FT	18 SQ. FT	2279
TX-489	24'4"	89 FT	18 SQ. FT	3959
HDX-538	22'6"	38 FT	30 SQ. FT	1179
HDX-555	22'0"	55 FT	30 SQ. FT	2079
HDX-572	23'8"	72 FT	30 SQ. FT	3559
HDX-589M	24'8"	89 FT	30 SQ. FT	7119

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60	939	1389	1939
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80	1199	1869	2369
90	1289	2039	2579
100	1369	2199	2989
110	1449	2459	3209
120	1669	2619	3429

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HDBX40	40 FT	569.00
HDBX48	48 FT	689.00

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NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for June is:

Thomas J. Campbell, W2EZ
USA-CA All Counties #588, Mixed
10-22-88

"I came into ham radio strictly by accident while I was in the Air Force. I was sand-bagged by a friend into sending code to him so he could get his license, and once that was mastered, taking the written test was a piece of cake. This all happened in 1960 while I was stationed at BIGGS AFB outside El Paso, Texas. At that time I was assigned to bombing and navigation simulators for the B-36, B-47, and B-52. However, the arrival of the ham license meant that I could also put in time at the base MARS station, AG5FHO. I spent the last year of my enlistment in ham-heaven, running phone patches, passing traffic, and upgrading the station.

"I was originally issued the Novice call KN5CAU and have also held the calls K5CAU, K1TFR, and W2ECW. The W2EZ call came strictly by accident. At the time when I upgraded to Extra class, the FCC policy was more relaxed and Extras could request a specific callsign. If it wasn't assigned, you got it. Well, K2TC and W2TC weren't available and the W2EZ call was the next one. I'm not complaining one bit!

"After the service it was back to the University of Hartford for my degree. I subsequently became employed as a field service engineer for a Connecticut-based electro-optical firm working on instrumentation used in chemical laboratories in academic, forensic, industrial, and medical applications. This work requires travel throughout western New York on a daily basis.

"It seems that I have chased counties forever. I actually chased them independently for six years before I learned of the existence of nets. Those weren't wasted years, but they could have been more enjoyable in that I would have known these great hams so much longer. It took me 20 years to get USA-CA All Counties #588, Mixed. After securing the All CW endorsement on 11 April 1990, I was happy to embark on the second time around—this time all SSB.

"My family has shared this effort with me. Elaine and the boys have enjoyed meeting many of the County Hunters at

333 South Lincoln Ave., Mundelein, IL 60060



Thomas J. Campbell, W2EZ, USA-CA All Counties #588.

the conventions. Of course, having three navigators trying to steer me to various counties in Ohio is an experience I'm not willing to keep reliving. Dirt roads do have to come out somewhere! Thank you to my family for putting up with this hobby, and thank you to the many hams who kept me going and got me finished up. These people are the real reason I'm sticking around.—73, Thomas Campbell, W2EZ."

Awards Issued

David S. Lawrence, AA4LY, filed his completely filled Record Book and received USA-CA All Counties #695, USA-CA 3000 #722, USA-CA 2500 #799, USA-CA 2000 #871, USA-CA 1500 #962, USA-CA 1000 #1156, and USA-CA 500 #2489, All 20M SSB Mobile, dated 2-11-91.

Don K. Lovett, K8BXT, did it all in one giant leap, receiving USA-CA All Counties #696, USA-CA 3000 #723, USA-CA 2500 #800, USA-CA 2000 #872, USA-CA 1500 #963, USA-CA 1000 #1157, and USA-CA 500 #2490, Mixed, dated 2-14-91.

Richard L. Mozingo, NU9M, completed all of his paperwork and claimed USA-CA All Counties #697, USA-CA 3000 #724, USA-CA 2500 #802, USA-CA 2000 #873, USA-CA 1500 #964, USA-CA 1000 #1158, and USA-CA 500 #2491, All 20M SSB, dated 2-14-91.

Frank C. Romano, Jr., WA6KHK, recorded the last of his confirmed county contacts and received USA-CA All Counties #698, USA-CA 3000 #725, USA-CA 2500 #803, USA-CA 2000 #875, USA-CA 1500 #966, and USA-CA 1000 #1159, Mixed, dated 2-25-91.

Kenneth C. Staab, WD0EAM, collected a complete set of confirmations and claimed USA-CA All Counties #699, USA-

USA-CA Special Honor Roll

David S. Lawrence, AA4LY
 USA-CA All Counties #695
 All 20M SSB Mobile, 2-11-91

Don K. Lovett, K8BXT
 USA-CA All Counties #696
 Mixed, 2-14-91

Richard L. Mozingo, NU9M
 USA-CA All Counties #697
 All 20M SSB, 2-14-91

Frank C. Romano, Jr., WA6KHK
 USA-CA All Counties #698
 Mixed, 2-25-91

Kenneth C. Staab, WD0EAM
 USA-CA All Counties #699
 All SSB Mobile, 2-25-91

USA-CA Honor Roll

3000		1500	
KJ4LG	721	K8BXT	963
AA4LY	722	NU9M	964
K8BXT	723	KB0FQC	965
NU9M	724	WA6KHK	966
WA6KHK	725	WD0EAM	967
WD0EAM	726		
		1000	
		KQ8J	1154
AA4LY	799	W5QZ	1155
K8BXT	800	AA4LY	1156
DL3DD	801	K8BXT	1157
NU9M	802	NU9M	1158
WA6KHK	803	WA6KHK	1159
WD0EAM	804	WD0EAM	1160
		KA2ELH	1161
		500	
AA4LY	871		
K8BXT	872	KQ8J	2486
NU9M	873	EA1OD	2487
WD9IFE	874	W5QZ	2488
WA6KHK	875	AA4LY	2489
WD0EAM	876	K8BXT	2490
		NU9M	2491
		WD0EAM	2492
		KA2ELH	2493
KQ8J	960	DF2RG	2494
W5QZ	961		
AA4LY	962		

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to CQ is \$4.00. For nonsubscribers it is \$10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from CQ Communications, 76 North Broadway, Hicksville, NY 11801 USA for \$1.25. To qualify for the special subscriber rate please send a recent CQ mailing label with your application. To be eligible for the USA-CA, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated April 2, 1985. A complete copy of the rules may be obtained by sending an SASE to Dorothy Johnson, WB9RCY, USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060 USA. DX stations must include extra postage for airmail reply.



Daki, YU2WJ, holder of USA-CA 500 #2461, All CW.

CA 3000 #726, USA-CA 2500 #804, USA-CA 2000 #876, USA-CA 1500 #967, USA-CA 1000 #1160, and USA-CA 500 #2492, All SSB Mobile, dated 2-25-91.

Henry Petersen, KJ4LG, took the penultimate step in his march by claiming USA-CA 3000 #721, Mixed, dated 2-2-91.

Dr. Leopold Pomp, DL3DD, filed his good application for USA-CA 2500 #801, All CW, dated 2-14-91.

Charles W. Menard III, WD9IFE, claimed USA-CA 2000 #874, Mixed, dated 2-19-91.

Peter J. Kuhn, KQ8J, got off to a good start in the USA-CA program by claiming USA-CA 1500 #960, USA-CA 1000 #1154, and USA-CA 500 #2486, All CW, dated 2-5-91.

David W. Gent, W5QZ, also got off to a good start in the USA-CA program, receiving USA-CA 1500 #961, USA-CA 1000 #1155, and USA-CA 500 #2488, All 20M SSB, dated 2-8-91.

Jack W. Crutchfield, KB0FQC, enhanced his good record by claiming USA-CA 1500 #965, Mixed, dated 2-19-91.

Thomas W. Condren, KA2ELH, received USA-CA 1000 #1161, Mixed, dated 2-25-91.

USA-CA 500 certificates went to:

Peter J. Kuhn, KQ8J, USA-CA 500 #2486, All CW, 2-5-91.

J. C. Biarje, EA1OD, USA-CA 500 #2487, Mixed, 2-7-91.

David W. Gent, W5QZ, USA-CA 500 #2488, All 20M SSB, 2-8-91.

David S. Lawrence, AA4LY, USA-CA 500 #2489, All 20M SSB Mobile, 2-11-91.

Don K. Lovett, K8BXT, USA-CA 500 #2490, Mixed, 2-14-91.

Richard L. Mazingo, NU9M, USA-CA 500 #2491, All 20M SSB, 2-14-91.

Kenneth C. Staab, WD0EAM, USA-CA 500 #2492, All SSB Mobile, 2-25-91.

Thomas W. Condren, KA2ELH, USA-CA 500 #2493, Mixed, 2-25-91.

Gerhard Jaeger, DF2RG, USA-CA 500 #2494, Mixed, 2-26-91.

Awards Available

Worked EUCW Award. The Worked EUCW Award is offered by the European CW Association. The award is available

to all licensed radio amateurs and short-wave listeners anywhere in the world. Only contacts made on or after 27 April 1991 (the 200th anniversary of the birth of Samuel F. B. Morse) are valid for this award.

Applicants should submit a list of contacts made (or SWLs, stations heard) for which QSL cards have been received. The list must be certified by a licensed amateur who is a member of an EUCW Club, who should state the name of his/her club and membership number. The list must include date of contact, callsign of station worked or heard, band, name of operator, QTH, EUCW Club, and club membership number.



Worked EUCW Award sponsored by the European CW Association.

EUCW clubs are AGCW-DL (Germany), BQRP (Benelux QRP), BTC (Belgium), FISTS (UK), FOC (First Class CW Operators' Club), G-QRP (UK), HCC (Spain), HSC (High Speed Club), INORC (Italy), SCAG (Scandinavia), SHSC (Super High Speed Club), UFT (France), and VHSC (Very High Speed Club).

Separate certificates will be issued for each class of award. The fee for the award is DM10, or US \$8, or 12 IRCs. Applications for the award should be sent to the EUCW Award Manager, Gunther Nierbauer, DJ2XP, Illinger Strasse 74, D-6682 Ottweiler/Saar, Germany. The award manager's decision is final on all applications.

Requirements for the Award: Confirmed CW-only contacts (SWLs, CW stations heard) with 100 different stations who are members of EUCW clubs, over 3 different amateur bands with a minimum of 20 stations worked or heard in each band. The total of 100 stations worked or

heard over 3 bands must include at least 3 members of 6 different EUCW clubs. To encourage activity on the 200th anniversary of the birth of Samuel F. B. Morse, up to 40 stations worked or heard on 27 April 1991 will count as double contacts. All other requirements remain unchanged.

Classes of Award: Standard award—100 two-way contacts made using any authorized transmission power; QRP award—100 two-way contacts made, with the applicant using not more than 5 watts RF output transmission power; SWL award—100 stations heard using any power.

The Sherwood Forest Award. The Sherwood Forest Award is sponsored by The Mansfield Amateur Radio Society in England. It is available to all licensed radio amateurs (on a QSO basis) and short-wave listeners (on a heard basis) who have worked/heard licensed radio amateurs in the County of Nottinghamshire.

The award is worked on a points system. To claim the certificate, a minimum of 30 points must be collected and are awarded as follows: 5 points for working/hearing the Mansfield ARS club signs of G3GQC or G1GQC; 2 points for working/hearing any member of the Mansfield Amateur Radio Society; 1 point for working/hearing any other licensed radio amateur in the County OF Nottinghamshire.

All permitted bands and modes may be worked. Each station may be entered into

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 440-450 MHz
MAX POWER: 200 watts
LENGTH: 17'8"
WEIGHT: 5lbs. 12 oz.
MOUNTING MAST DIA.: 1 1/4-2 1/2"
CONNECTOR: UHF (SO-239)
CONSTRUCTION: Heavy Duty Fiberglass
SCREW-TOGETHER ABS JOINTS

CA-2 x 4Z

Base/Repeater Antenna
GAIN: 146MHz 8.5dB 446MHz 11.9dB
POWER: 200 watts
LENGTH: 15'11"
CONNECTOR: N

CA-2 x 4FX

Base/Repeater Antenna
GAIN: 146MHz 4.5dB 446MHz 7.2dB
POWER: 200 watts
LENGTH: 5'11"
CONNECTOR: UHF type

CA-2 x 4MB

Mobile Antenna w/Fold-over feature
GAIN: 146MHz 4.5dB 446MHz 7.2dB
POWER: 150 watts
LENGTH: 5'
CONNECTOR: UHF type

CA-2 x 4SR

Mobile Antenna w/Fold-over feature
GAIN: 146MHz 3.8dB 446MHz 6.7dB
POWER: 150 watts FM
LENGTH: 3'4"
CONNECTOR: UHF type

CF-416

Duplexer w/Coax
POWER: 146MHz 800 watts
 446MHz 500 watts
CONNECTOR OUTPUT: N-type
146MHz INPUT: UHF
446MHz INPUT: N-type

CF-416N CF-416NE

Duplexer w/o Coax
POWER: Same as CF-416
CONNECTOR OUTPUT: UHF
146MHz INPUT: UHF
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the log only once per claim irrespective of band or mode. There is no time limit for starting or finishing the award.

A list of the current members of the Mansfield Amateur Radio Society, with their call signs, may be obtained by sending an SAE to the awards manager.

A copy of your log entries of QSOs with stations in the County of Nottinghamshire should be certified by two other licensed amateurs and sent to the awards manager of Mansfield ARS along with a fee of 2 pounds, 4 dollars, or 7 IRCs.

All claims and queries should be sent to G. W. Lowe, G0NRA, Mansfield ARS Awards Manager, 25 Manor House Court, Kirby in Ashfield, Nottinghamshire NG17 8LH, England.

Chesapeake DX Club Awards. The Chesapeake DX Club of Maryland is offering three regional amateur radio operating awards to qualified US and overseas amateurs.

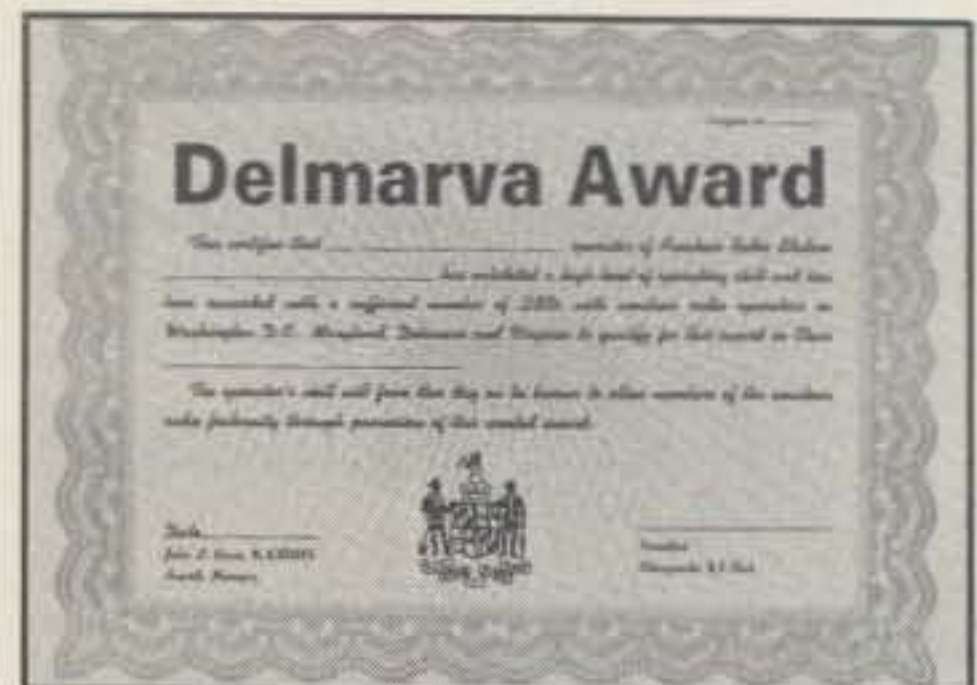
The *Maryland Award* is issued for contacts with at least 10 Maryland radio ama-



The Maryland Award offered by the Chesapeake DX Club for working stations in Maryland.

teurs. There are no band, mode, or time requirements.

The *Delmarva Award* is issued in two classes. Class 1 requires 10 contacts with Maryland amateurs, 10 contacts with Virginia amateurs, 1 contact with a Delaware station, and 1 contact with a Washington, D.C. station (this station must be located within the borders of Washington, D.C.). The US Senate station (W3USS), The Smithsonian station (NN3SI), and the Department of State station (W3DOS) are all easily workable. Class 2 is offered for 5 contacts each with



Delmarva Award by the Chesapeake DX Club for working stations in Delaware, Maryland, Virginia, and Washington, D.C.

Maryland and Virginia amateurs and one contact with either a D.C. or Delaware station. DX stations need 5 contacts with Maryland and Virginia stations and one with either D.C. or Delaware. There are no band, mode, or time restrictions.

The *Maryland Counties Award* is issued to amateurs who have verified all Maryland counties. Again, there are no



Maryland Counties Award available from the Chesapeake DX Club for working all counties in Maryland.

band, mode, or time restrictions. QSLs need not be sent.

The awards are \$2.00 each plus a large (8 by 10, or so) self-addressed, stamped envelope (two units of postage). DX stations should submit 5 IRCs for each award. If airmail is desired, another 3 IRCs should be submitted. GCR is acceptable for all awards.

Send applications to John L. Rouse, KA3DBN, 2703 Bartlett Lane, Bowie, MD 20715 USA.

PZK Awards Program. Awards are available to licensed amateurs and SWLs. All contacts, any band CW, phone, or mixed, are valid for these awards. QSLs need not be sent. However, the GCR list must be certified by the awards manager of your society, or by a radio club, or by two licensed amateurs. The

fee is 10 IRCs each. Send applications to PZK Awards Manager, Monika Wasowicz, SP5NOW, P.O. Box 320, 00-950 Warszawa, Poland.

AC-15-Z Award (All Countries of the 15th Zone). This award is issued for contacts with at least 23 countries or call areas located in CQ Zone 15: OH0, ZA, OE (2 call areas), TK, OK, UR, OH (3 call areas), HA, I, UA2, UQ, UP, 9H, OJ0, SP (4 call areas), T7, IS, IT, HV, YU (3 call areas). Contacts with 4 call areas of Poland are obligatory. All contacts are valid from 1 January 1955.

W-21-M Award (Worked with 21st Meridian). This award is issued for contacts with at least 16 countries situated on the meridian 21 degrees east: OH0, D2, A2, TL8, TT8, OK, UR, UQ, UP, UA2, OH, SV, HA, ZS3, LA, SP, ZS, YO, JW, SM, YU, 5A, 9Q. Contacts with Poland are obligatory. All contacts are valid from 1 January 1955.

Polska Award. This award is available in three classes: Class 1—for contacts with 49 (all) provinces of Poland; Class 2—for contacts with 35 provinces of Poland; Class 3—for contacts with 20 provinces of Poland. All contacts are valid from 1 June 1975. When applying for a higher class, supply the number of your diploma of a lower class and a list of your additional contacts.

Abbreviations denoting WOJEWODZ-TWOs/provinces of Poland are shown in Table I. The applicants are asked to give the abbreviations denoting Polish provinces in alphabetical order.

Notes: The Polska Award can be received if special application is added to the contest log. Only QSOs made within one SP DX contest year are valid for award credit.

73, Dorothy, WB9RCY

BB	Bielsko Biala	SP9	OP	Opole	SP6
BK	Bialystok	SP2	OS	Ostroteka	SP5
BP	Biata Podlaska	SP8	PI	Pila	SP3
BY	Bydgoszcz	SP2	PL	Plock	SP5
CH	Chelm	SP8	PO	Poznan	SP3
CI	Ciechanow	SP5	PR	Przemysl	SP8
CZ	Czestochowa	SP9	PT	Piotrkow Tryb.	SP7
EL	Elblag	SP2	RA	Radom	SP7
GD	Gdansk	SP2	RZ	Rzeszow	SP8
GO	Gorzow Wilk.	SP3	SE	Siedlce	SP5
JG	Jelenia Gora	SP6	SI	Sieradz	SP7
KA	Katowice	SP9	SK	Sierniewice	SP7
KI	Kielce	SP7	SL	Slupsk	SP1
KL	Kalisz	SP3	SU	Suwalki	SP4
KN	Konin	SP3	SZ	Szczecin	SP1
KO	Koszalin	SP1	TA	Tarnow	SP9
KR	Krakow	SP9	TG	Tarnobrzeg	SP7
KS	Krosno	SP8	TO	Torun	SP2
LD	Lodz	SP7	WA	Warszawa	SP5
LE	Leszno	SP3	WB	Walbrzych	SP6
LG	Legnica	SP6	WL	Wloclawek	SP2
LO	Lomza	SP4	WR	Wroclaw	SP6
LU	Lublin	SP8	ZA	Zamosc	SP8
NS	Nowy Sacz	SP9	ZG	Zielona Gora	SP3
OL	Olsztyn	SP4			

Table I—Abbreviations denoting WOJEWODZTWOs/provinces of Poland.

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GAIN: 146MHz 2.8dB 446MHz 4.0dB
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POWER: 200 watts
LENGTH: 17"
CONNECTOR: N-type

■ CX-801

Mobile Antenna
GAIN: 146MHz 2.8dB 446MHz 4.0dB
1200MHz 5.5dB
POWER: 100 watts
LENGTH: 9'3"
CONNECTOR: N-type

■ CX-802

Mobile Antenna
GAIN: 146MHz 2.8dB 446MHz 4.0dB
1200MHz 5.5dB
POWER: 50 watts
LENGTH: 2'3"
CONNECTOR: N-type

■ CX-630TN

Mobile Fiberglass Antenna
GAIN: 146MHz 2.15dB 446MHz 2.15dB
1200MHz 5.5dB
POWER: 20 watts
LENGTH: 1'5"
CONNECTOR: N-type

■ CFX-431

Triplexer w/Coax
POWER: 146MHz 800 watts
446MHz 500 watts
1200MHz 200 watts
CONNECTOR OUTPUT: N-type
146MHz INPUT: UHF
446MHz INPUT: N-type
1200MHz INPUT: N-type

■ CFX-4316

Triplexer w/o Coax
POWER: Same as CFX-431
CONNECTOR OUTPUT: N-type
146MHz INPUT: UHF
446MHz INPUT: UHF
1200MHz INPUT: N-type

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CIRCLE 18 ON READER SERVICE CARD

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Antenna Potpourri

This month we have a wide variety of topics to cover, from antennas to software and such. So let's get started.

Antenna Notes

Mini Delta Mag Mount Antenna. According to information received from "Mac" McGrew, K6RL, his firm, Delta Antenna Products, specializes in "mini delta" antennas for 40 meters through 220 MHz. Mac recently introduced a series of 144 and 220 MHz compact mobile mini deltas. The magnet-mount mobile antennas are designed for compactness, especially to prevent a roof-mounted antenna from hitting your garage door. The objective is to not sacrifice antenna performance when compared with a standard quarterwave whip.

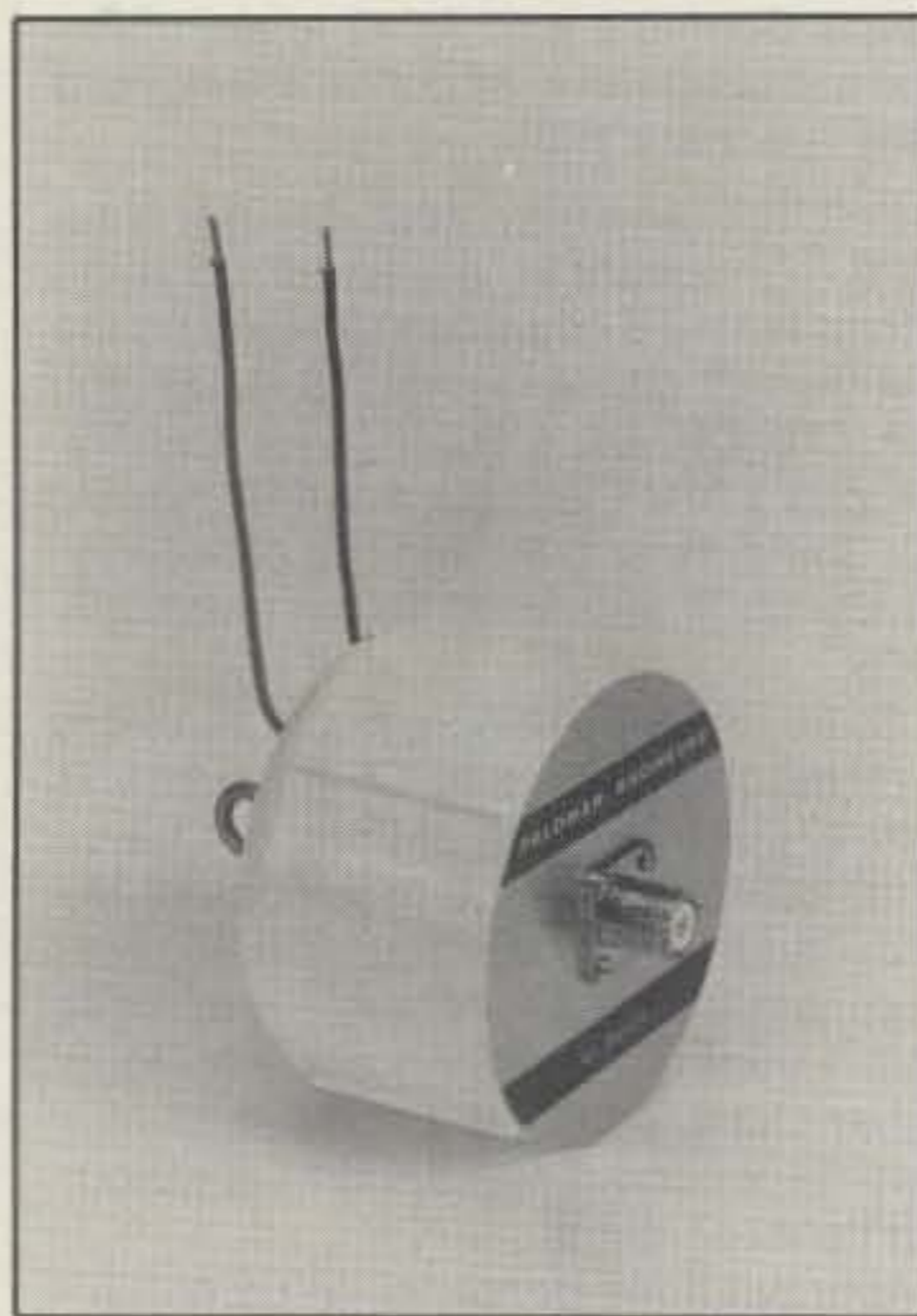
The folded-over antenna has a height of only 12½ inches for 144 MHz and 10½ inches for 220 MHz. Both antennas are fairly "flat" over the entire design band. Each antenna comes with a mag-mount base and 12 feet of coax. Price is \$49.95. For more information, contact Delta Antenna Products, P.O. Box 716, Tehachapi, CA 93581.

Palomar Engineers High SWR Balun. The balun is an increasingly popular antenna accessory, although one the function of which is often misunderstood. The balun is not merely a matching device, but is primarily a device to provide the proper current paths between balanced and unbalanced configurations.

Most of us are aware (often through bitter experience) that ferrite-core baluns, if misused, can be damaged from overload caused by operating the balun with high power into a line having high SWR. Doing so results in a high-impedance condition containing a large reactive component; the balun can also introduce undesirable power loss. While we certainly don't advocate operating a balun under severely mismatched conditions, we note that Palomar Engineers has announced a very heavy-duty balun claimed to operate well under high SWR conditions.

The Model SB-4 has a nominal 1:4 impedance ratio and is designed for use over the 1.8 to 30 MHz range. Power capability is 2000 watts continuous power at up to 10:1 SWR. The balun is weatherproof, epoxy-filled, and sealed with Teflon. An SO-239 coaxial connector and wire leads are provided. A stainless eyebolt also is included for mounting. The balun is 4 inches in diameter and 4 inches high and is priced at \$74.95. For more information, contact Palomar Engineers, P.O. Box 455, Escondido, CA 92033.

Heath IntelliRotor. Heath® has come up with an integrated package for "intelligent" rotor control to make beam antenna rotation virtually automatic. The innovative new product



Here is the recently introduced Palomar Engineers Model SB-4 High SWR Balun. The new product is designed to operate under high SWR conditions as might be encountered in antenna tuners, at the feedpoint of multiband dipoles, and in converting from ladderline to coaxial line outside the hamshack. (Photo courtesy Palomar Engineers)

is the IntelliRotor, designed to put an end to the hassle of rotating your beam manually. Upon keystroke command the device lets you choose from a database of over 400 countries, including their coordinates and time zones, and lets you enter and store your own information if you desire.

In its default mode the 40-character LCD display shows the current time, date, day of the week, and bearing to within one degree. Bearing is also displayed on a compass rose of 16 LEDs, with a resolution of 11.25 degrees. The display also shows country names, a prefix list, target bearing, short- and long-path distances, latitude and longitude, grid square, and the time in the target country.

You use the built-in keyboard to rotate the antenna. Entering arguments are either the country name (just the first few letters are okay), callsign prefix or partial prefix, latitude and longitude, grid square, or bearing in degrees. You can still rotate the antenna manually if you like, and sight-impaired users can have the device announce current bearings in Morse code at 20 WPM.

The IntelliRotor's operation is quite flexible. It may be operated as a stand-alone unit, or it may be used with an IBM PC compatible computer using a serial cable and included soft-

ware. The software can be used either as a transient program or as a terminate-and-stay-resident (TSR) utility so that it can be "popped up" over other operating programs, such as a logger, propagation-prediction program, or other software.

The IntelliRotor is compatible with Ham-M (Series 3, 4, 5, and 6), Ham-II, Ham III, Ham IV, T²X, HDR-300, CDE TR-44, CD-45 (Series 2) or M2, and other rotors. The kit version is \$239.95, and the assembled version is \$349.95 at this writing. For more information, contact the Heath Company, Benton Harbor, MI 49022.

C.A.T.S. Rotor Repair Service. Speaking of rotors... We've mentioned this rotor repair service and parts supplier several times in the column, most recently in the January 1990 issue. We've never had occasion to use their services, but we have received reports from amateurs who have been pleased with the service received from C.A.T.S.

I see in a new flyer C.A.T.S. has expanded its services to include furnishing rebuilt and new rotors of several different manufacturers. They also have introduced several unique products. These include a special QUIK-CONNECT™ locking connector to replace the "infamous" terminal strip in CDE/Hy-Gain rotors, the "Brak-D-Lay" PC board device to provide a seven-second delay time for brake engagement on CDE/Hy-Gain rotors, and the "POSITIONER-1" preset device for all Hy-Gain rotors manufactured since 1974. The latter accessory enables you to select a desired beam heading by turning one control, at which time the rotor automatically moves the antenna to the selected heading and stops.

For more information, contact C.A.T.S., 7368 S.R. 105, Pemberville, OH 43450.

Grove Enterprises Antennas. The recent Grove catalog has a number of antennas and antenna accessories of interest primarily to shortwave listeners (SWLs) and scanner enthusiasts.

For SWLs there's an amplified indoor SWL antenna system centered on the amplified TUN-4 MiniTuner Plus; the 66 foot Skywire dipole, an outdoor antenna system covering 100 kHz to 30 MHz; the unamplified TUN-3 MiniTuner for 100 kHz to 30 MHz use; several lightning protectors; and a multicoupler for efficiently operating two shortwave receivers from one antenna. Grove Enterprises also sells a 4-22 MHz shortwave converter that enables you to receive this shortwave range on a scanner covering 115-141 MHz in AM mode.

Grove also carries a variety of VHF/UHF scanner oriented antenna products. These include a vertically polarized multiband VHF/UHF/microwave scanner beam that can also be used for transmitting up to 25 watts on 144, 220, and 420 MHz; a 30-960 MHz vertical dipole, the OMNI; a wideband discone covering 25-1300 MHz that can also transmit on the 50,

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144, 220, 432, 900, and 1200 MHz bands; several indoor, base, and mobile antennas; a VHF scanner notch filter; and various other accessories.

For a catalog, contact Grove Enterprises, P.O. Box 98, 140 Dog Branch Road, Brass-town, NC 28902.

Radio Works Catalog. Jim Thompson, W4THU's Radio Works catalog is now well over 70 pages, making it one of the most complete source books and catalogs dedicated to the wire antenna enthusiast. The catalog's central focus is on HF wire antenna systems, high-power baluns, and antenna components.

The new products in the catalog include the high-performance Y1-4K Yagi Balun, a new current type balun specifically designed for use with beams. Also included are the Tuner-Loop and TunerLoop II multiband loop antennas; these two antennas are similar, but one is supported vertically and the other horizontally. Both use ladderline feed and the RemoteBalun interface to the user's tuner.

Also new is the so-called G5RV Ultra, a ladderline-fed G5RV for use with the Radio Works RemoteBalun. In addition, there's a new version of the Carolina Windom, the Carolina/4 for 20 through 10 meters that is but 33 feet in length to fit small yards.

The same catalog also lists most everything you might need to install or update your antenna system, including wire, cable, coax, insulators and connectors, adapters, coax switches, Dacron® support lines, mobile antennas, and the like. The catalog is available from The Radio Works, Box 6159, Portsmouth, VA 23703.

Antenna Specialists Amateur Antennas. Antenna Specialists has long been known for its diversified line of base station and mobile communications antennas and accessories. These products are not only for amateur use, but are also for the booming land mobile, cellular, business, aircraft, citizens' band, and marine radio services.

The latest Antenna Specialists catalog lists a variety of 2 and 6 meter, 220 MHz, 70 cm, and 23 cm base station and mobile antennas, including the popular mobile "On-Glass®" windshield-mount antennas. Also included in their catalog are a variety of accessories, including radio couplers, mag mounts, On-Glass reinstallation kits, and RF power dividers for constructing custom-phased antenna arrays.

The On-Glass system is unique in that it allows a two-way communications antenna to be mounted on the glass and transmit and receive virtually unimpeded through the glass. The RF signal is capacity coupled from the impedance matching network mounted inside, through the glass, to the base of the antenna outside. The impedance at the glass interface is high so that no significant signal energy is lost. A low SWR is achieved by adjusting the tuning slug (on some models) on the side of the matching network inside the vehicle. The electrical half-wave design antenna, mounted high on the glass, provides a reasonably uniform omnidirectional pattern and requires no ground-plane. The proprietary "DUO-BOND™" adhesive system combines an all-weather, double-sided, foam tape adhesive for quick "drive away" installation along with a fast curing silicone adhesive for a long-lasting hold. With this system there is no need to drill holes in the glass.

For a catalog, contact The Antenna Specialists Company, 30500 Bruce Industrial Parkway, Cleveland, OH 44139-3996.

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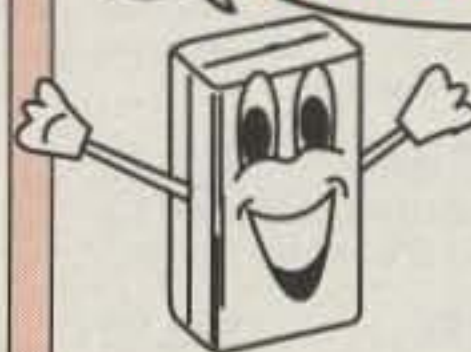
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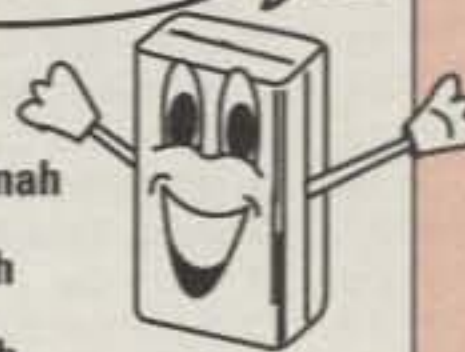
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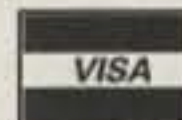
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- #31 17-19 wpm Speed Builder
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CIRCLE 85 ON READER SERVICE CARD

Thoughts on Tower Safety. Over the past few months in amateur magazines ROHNers has been running a public-service-type ad that brings home the very real fact that amateur antenna towers can be injurious or even life-threatening devices if not handled properly.

As the ROHN notes, base plates, flat roof mounts, hinged bases, hinged sections, and the like, are not intended to support the full weight of a single person. Many very serious, even fatal, accidents have occurred because people assumed that situations were safe when in fact they were not.

Frankly, the installation and dismantling of towers is inherently dangerous. ROHN notes that you should use temporary guys of sufficient strength and size when individuals are climbing towers during all types of installation or dismantling. They suggest that temporary guys should be used on the first 10 feet of tower during the erection or dismantling process. Dismantling actually can be even more dangerous than installation, since the condition of the tower, guys, anchors, and/or roof is unknown in many cases. Too, the dismantling of some towers should be accomplished using a crane to minimize the possibility of member, guy wire, anchor, or base failure. This caution suggests that used towers are not always as inexpensive as they may appear if you're injured or killed!

The bottom line: Use common sense and safety precautions when installing or dismantling an antenna system, and consider professional, experienced help for the big jobs. A consultation with a professional tower erector can be very inexpensive insurance against tragedy. And be sure to read the tower manufacturers' catalogs and instruction sheets before erecting or dismantling *any* tower.

Software Topix

DXLOG. In the December 1989 and April 1990 columns we discussed DXLOG, a sophisticat-

ed menu-driven DX tracking and recordkeeping software package for the IBM PC and compatibles. Developed by Drew Smith, K3PA, and Susan Smith, K3YL, the program minimizes the hassle involved in making DXCC and other DX award submissions. Now DXLOG is up to at least version 1.7.

We discussed the program in some detail previously, so we won't go over all its features. Briefly, however, DXLOG provides fast and easy automated data entry with duplicate QSO warning; automatic determination of country, zone, and oblast; automated statistics and reports for all DXCC, WAZ, and Russian oblast awards; award application printouts; beam-heading calculation; several QSL label formats; QSO import from the CT or NA contest programs; and production of various reports such as logbooks, QSLs needed, and countries needed.

Quite a few "bells and whistles" have been added to the program since we last described it. The newest is expansion of the QuickCheck feature to three types of searches: country, callsign, and oblast. Also, several companion products are in the wings, including the handling of new awards programs and a Packet-Cluster system interface with transceiver control.

DXLOG is available for \$44.95 from PAYL Software, P.O. Box 926, Levittown, PA 19058-0926. Either 3½ inch or 5¼ formats are available. A demonstrator disk is \$5, creditable toward purchase.

Fig. 1 shows the DXLOG QSO Input Screen.

Zihua Morse 2.0™. Another upgraded program, this one for the Macintosh™, is Zihua Morse 2.0. We first took note of this Morse code instructional software package in the December 1988 issue. At that time we remarked that we were frequently asked why we didn't feature more Macintosh amateur radio software in the column. The answer at the time was that there didn't seem to be much Mac hamshack software out there. In the mean-

QSO Input Screen

	Prefix	*	Zone
Callsign	<input type="text"/>	<input type="text"/>	<input type="text"/>
Date D/M/Y	<input type="text"/>	Time	<input type="text"/>
Frequency	<input type="text"/>		
Mode	<input type="text"/>		
RST sent	<input type="text"/>	received	<input type="text"/>
Confirmed?	<input type="text"/>		
Manager	<input type="text"/>		
Print QSL?	<input type="text"/>		
Sent QSL?	<input type="text"/>		
Sent via	<input type="text"/>		
Comments	<input type="text"/>		

Fig. 1—Shown here is the QSO Input Screen for PAYL Software's DXLOG V1.7, earlier versions of which we covered previously in the column. The program is designed to provide complete "DX tracking" capabilities for the IBM PC.

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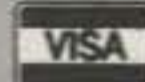
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CIRCLE 115 ON READER SERVICE CARD

time, we've seen the advent of a fair number of Mac programs of interest to amateurs.

Zihua Morse starts the beginner by sending him code characters at a high rate, with pauses between characters to give him time to respond. This method of instruction encourages learning the code by the character sound and keeps the sound constant while increasing overall speed.

The program includes a built-in editor and clipboard. It allows overall rates of from 3 to 14 WPM and character speeds from 12 to 24 WPM with adjustable audio pitch. The program is designed to run on the Macintosh Plus, SE, SE/30, II, IIx, IIci, or IIcx running System 6.0. The non-speech version is \$39.95. Also available is a speech version at \$65; it uses the MacinTalk™ speech synthesizer, in which the program can audibly and intelligently read characters back to the user. For example, the speech synthesizer can say the word "the" as "Tango Hotel Echo," "T-H-E," or simply as "The."

For more details, contact ZCo Corporation, P.O. Box 3720, Nashua, NH 03061.

PC QSL'ing. Of special interest to the SWL, PC QSL'ing is a complete specialized database program for the IBM PC or compatible with 512K RAM. It allows you to store, retrieve, and print verification reports. You can print the reports on regular computer paper, on a US postal aerogramme available at any US post office, or to the screen.

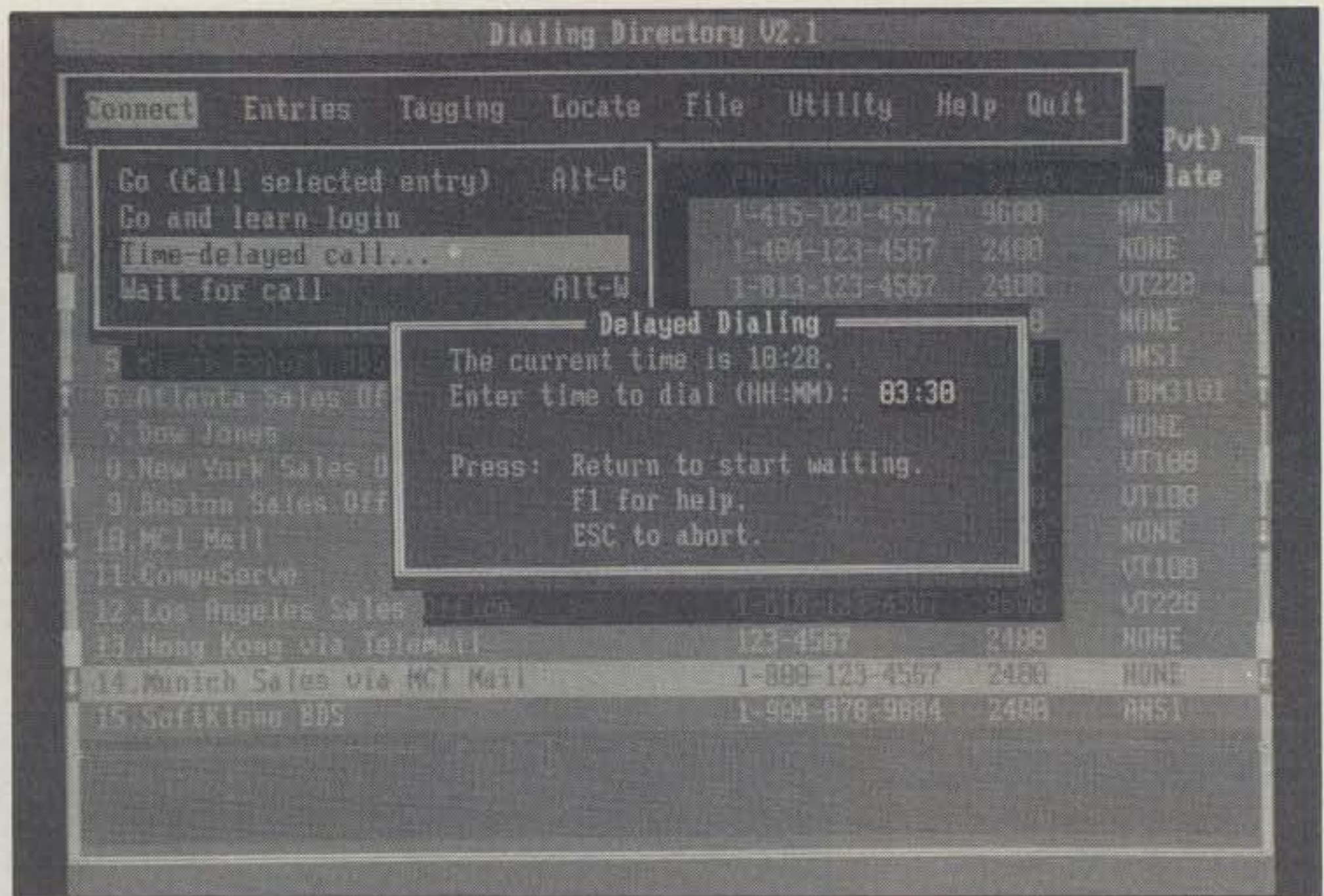
According to the manufacturer, the program makes data entry fast and easy. Information such as your address, receiver, and antenna type are automatically inserted into each verification report to limit the amount of manual data entry required. This information can be changed for a particular report. The program lets you keep a log of all the verification reports you have sent, and the log may also be used as a listening guide to determine what you've heard and when you heard it. Reports can also be archived to floppy disks so you can save reports grouped by month, season, or year. The program includes a mini wordprocessor.

PC QSL'ing is available for \$24 from Ross & Associates, 2600 Woodleigh Road, Haverstown, PA 19083.

Pirated AMSAT Software. On a rather ugly note, we note that the *Westlink Report* and *Digital Digest* both recently reported on an AMSAT news release that pirated versions of AMSAT's software have been appearing on bulletin boards (BBSes) nationwide. Misguided computerists are uploading AMSAT software onto BBSes, from which anyone can download a "free copy." This illegal distribution of copyrighted AMSAT software had reached such proportions that many BBS system operators (SYSOPs) called AMSAT headquarters to see if their popular Instant Track program was now being offered as shareware or had been released to the public domain.

AMSAT is spreading the word that none of their tracking software is shareware or in the public domain. If you see AMSAT software on your favorite BBS, let the SYSOP know about it. The reason, of course, is that the tracking software provides a major source of AMSAT financing to fund the construction, launch, and operation of AMSAT's satellites, which are free for all of us to use and enjoy.

Mirror III® V2.0. For landline BBS work we've been a longtime user of ProComm (the shareware version) and ProComm Plus (the



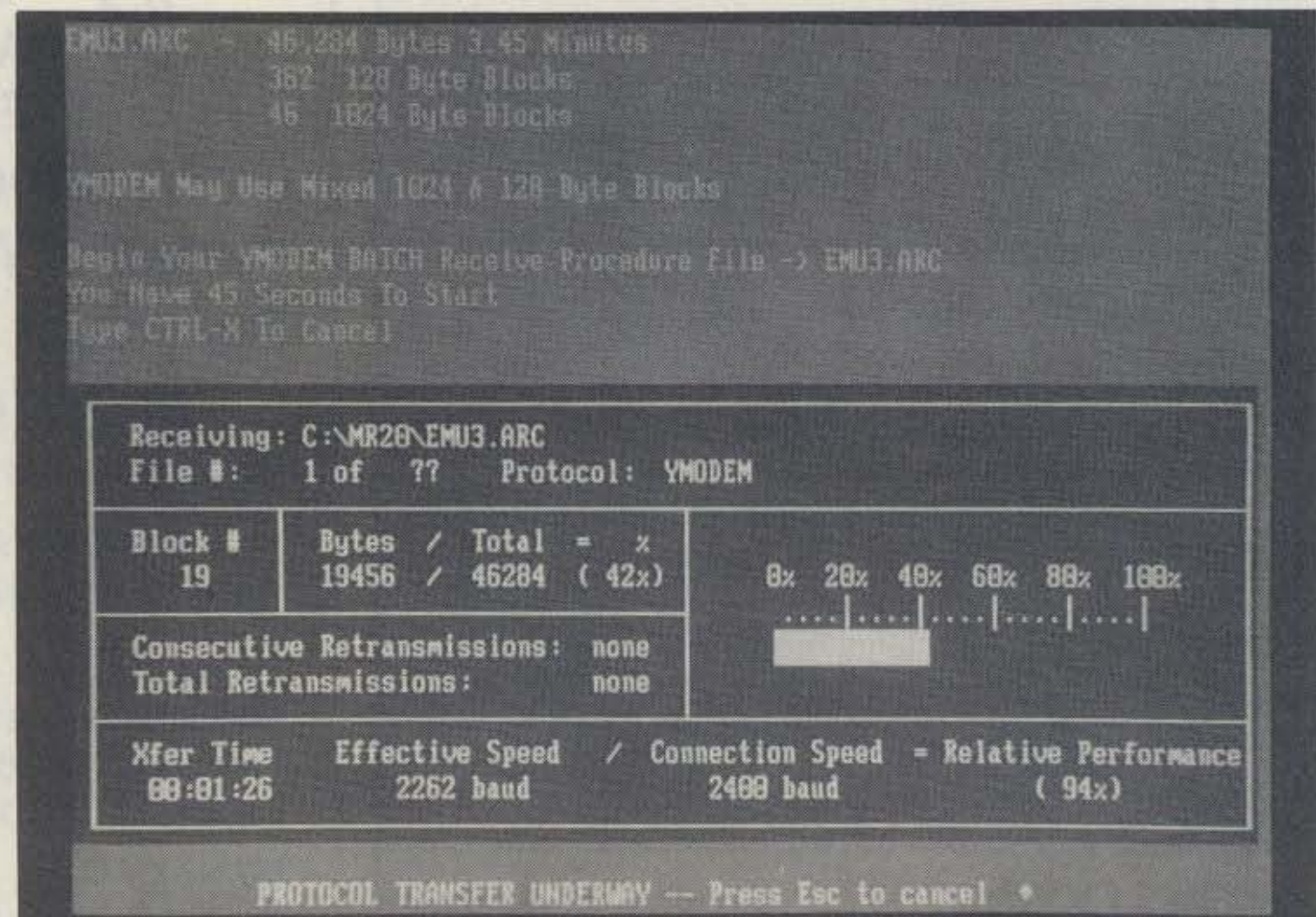
The MIRROR III Dialing Directory features intuitive pull-down menus. The directory may be operated with a keyboard or a mouse. (Photo courtesy SoftKlone)

commercial version), powerful but extremely easy to use, "intuitive" IBM PC communications terminal software packages from DataStorm Technologies. In the meantime, we've also looked at some of the competing communications programs, such as QModem, Telix, and Mirror. The latter program, especially, has intrigued us. We reported on Mirror II in April 1988 and Mirror III in July 1989.

In the two previous SoftKlone™ Mirror reviews, while we marveled at the program's capabilities, we must admit that we were somewhat lukewarm to Mirror as a package suitable for nonbusiness use, especially by casual hobbyist BBS users. The Mirror pro-

gram started out as a clone of the popular (and more expensive) CrossTalk XVI® program which is widely used in business applications. However, Mirror's "user interface" was not nearly as easy to use as ProComm's, and to get anything done using Mirror did require some rather serious study of the user's guide.

Recently, however, SofKlone has come up with Mirror III V2.0. The new program version is a major revision that emphasizes much greater ease of use, with its intuitive Dialing Directory Interface sporting pull-down menus and mouse support. The new version also adds mouse support to the optional Status Screen Interface. A pull-down interface facilitates use



The informative Mirror III file transfer screen provides an easy-to-read display of the status of your file transfer. (Photo courtesy SoftKlone)

of the most frequently used Mirror commands and online sessions.

The new version enhances communications flexibility by adding the popular ZMODEM and XMODEM-1K file transfer protocols, as well as support for the popular MNP 5 data compression protocol. A new file download safety feature prevents you from overwriting an existing file when downloading a file with the same name. Other new features include a backscroll option for viewing text that has scrolled off the terminal screen, enhanced high-speed modem support, and mouse support for the included PRISM™ communications programming language. There's also a new file transfer status screen that displays useful information about a file transfer including transfer time, connection speed, effective speed, and protocol performance data.

In my opinion, and not even considering the program's strong capabilities in a "business environment," Mirror III V2.0 gives ProComm Plus, CrossTalk, Telix, and the others a run for their money. Mirror isn't shareware, however, being priced at \$149 for new users. However, if you have a previous version of Mirror, you can upgrade for a very reasonable \$49.

What did I like and not like about Mirror III V2.0? I'm still somewhat intimidated by the complexity of the Status Screen Interface and the PRISM language, but this isn't Mirror's fault. The Dialing Directory Interface is great, however, and makes using the program a dream. The "learn" keystroke recording feature is particularly welcome, and makes the automatic writing of log-on sequence scripts almost effortless.

On the negative side, the program didn't seem to have a convenient way to designate default file upload and download directories, and the fast, popular ZMODEM file transfer protocol was external, rather than internal to the program. Also, initial program setup could be streamlined somewhat (I still like the ProComm and Telix setup procedures and screens). These are minor complaints, and could easily be remedied in a future program upgrade.

For more information, contact SoftKlone, 327 Office Plaza Drive, Suite 100, Tallahassee, FL 32301.

Short Bursts

Speeding Up Your PC. If you're at all like me, you're always looking for ways to make your PC run "faster, better, smarter." While there's more that you can do with an already fast 80386SX- or 80386-based machine, you still can do a lot to improve PC performance with an XT or an 80286-based PC-AT.

Writing in last December's *Modern Electronics*, CQ's sister publication, T.J. Beyers described a number of relatively simple and inexpensive ways to speed up your PC in his Software Focus column. He highlighted several tips for speeding up hard disk drive, keyboard, and printer performance. As for hard disks, he suggests efficient use of the DOS FASTOPEN and BUFFERS commands, disk caching software, hard disk defragmenter or optimizer software, and virtual (RAM) disks. Turning to the keyboard, he suggests the use of keyboard accelerator software and programming of your keyboard's function keys. Turning to printers, he notes the value of print buffer and print spooler programs.

The screenshot shows the Mirror III V2.0 interface. At the top is a menu bar with options: File, Chat, Transfer, Capture, Printer, Status, and Quit. Below the menu bar, there are two buttons: "Send file(s)..." and "Receive file(s)..." with "362 - 46" next to the latter. The main display area shows "EMU3.ARC" and "Totals: Files ->1 Bytes ->46284 128(byte)/1K blocks ->362/46". Below this, it asks "Do You Want To Abort (Y/N)? NO". Further down, it shows "EMU3.ARC - 46,284 Bytes 3.45 Minutes" and "362 128 Byte Blocks" and "46 1024 Byte Blocks". A message states "YMODEM May Use Mixed 1024 & 128 Byte Blocks". At the bottom, it says "Begin Your YMODEM BATCH Receive Procedure File -> EMU3.ARC" and "You Have 45 Seconds To Start" and "Type CTRL-X To Cancel". On the right side, there is a "Select protocol:" menu with options: XMODEM, XMODEM Batch, XMODEM 1K, YMODEM (highlighted with a diamond), YMODEM Single, YMODEM-G, Kermit, Kermit server, CompuServe B, Hayes, Crosstalk, ASCII/Text, and ZMODEM. At the bottom of this menu, it says "ESC to abort".

Once connected to a remote computer, you can access the MIRROR III online menu system. The online menus provide easy access to program features, including chat mode, file transfers, data capture, and more. The menu system can be operated with a mouse or by using "hotkeys." (Photo courtesy SoftKlone)

There's more in this article than we could possibly digest in this month's column, so you might want to order the December 1990 issue of *Modern Electronics* from CQ Communications (76 N. Broadway, Hicksville, NY 11801) in order to obtain a copy of the article. Last time I checked, back issues were \$2.95. Remember

to ask for the December 1990 issue of *Modern Electronics*, not CQ, and to direct your request to the New York offices and not to me!

Incidentally, many of the software speed-up enhancements described in the article are available commercially through two outstanding products. One is PC Tools Deluxe, basical-



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ly a DOS shell, but also a package that offers a plethora of utility features that take care of back-up chores, disk caching, file defragmentation, file recovery, and much more. It's available from Central Point Software, 15220 NW Greenbrier Pkwy. #200, Beaverton, OR 97006. The other is the PC-Kwik Power Pak from Microsoft Corporation, 15100 SW Koll Pkwy., Beaverton, OR 97006. This highly regarded product includes a RAM disk, print spooler, screen recall buffer, disk cache, and other utilities.

Some Thoughts on Computer Viruses. When we first heard about the dreaded "computer virus" in 1987, we thought that it was some kind of advanced April Fool's Day spoof. We were soon to find out—fortunately not through personal experience—that viruses are for real. Although there is no evidence of an epidemic such that you should be afraid merely to turn on your PC, virus programs do exist. They bear exotic names such as Devil's

Dance, New Jerusalem, Disk Killer, AIDS, Icelandic, Pentagon, and Den Zuk, just to name a few.

The usual computer virus is a cleverly hidden software program that at random intercepts the disk I/O and either corrupts your data or program files, or scrambles your disk directory. Either way, you end up with an electronically ruined disk. Even more devilishly clever is that the virus can secretly write itself to another disk when you do a file transfer between disks. Since the virus itself may be buried in a program, it can even be transmitted over telephone modem links.

Creating a "better" virus has become a challenge for hackers, and there are many virus strains seen on bulletin boards and transmitted through public-domain sources. The hackers who create these routines typically upload them to bulletin boards, and submit otherwise useful programs to public-domain dis-

tributors and other sources in which they have hidden their real "contributions."

The problem generally doesn't occur with commercial software. Companies that produce software for a living obviously have nothing to gain from ruining their own product. You might think that "freeware" and "shareware" are completely safe for the same reasons. However, many such products, which have been modified by hackers, have replaced the originals on some bulletin boards and in public-domain disk collections. Thus, some bulletin boards and public-domain-software distributing houses unwittingly become sources in helping to spread viruses.

Which computers are affected? This is mainly a function of which machines are the most popular. Right now, these include the IBM PC, Macintosh, Apple II series, Amiga, and Commodore 64.

What can you do to protect yourself from catching a computer virus?

1. Write protect your original disks; never copy anything onto the original.

2. When making a copy, check the file sizes before and after the transfer. See if they have changed in size, particularly if they have become larger.

3. Stay away from questionable software sources. Well-established, reputable shareware and public-domain-software mail-order firms are probably okay, since most of them check the disks and files they provide. However, some don't do so.

4. Be very careful. People who write viruses probably are much better programmers than you and I. It can be very difficult for you to detect the virus until it does its damage. Be very wary of passed-around, pirated commercial software, and especially of the copy-protected type where a hacker has removed the copy protection and possibly inserted a virus in its place.

5. If you're really concerned, obtain a virus-detection or disk-protection program and use it to examine new or suspect software that you want to install on your PC. For the IBM PC, a variety of such programs are available, including CHECKUP, SCAN, FLU SHOT PLUS, BOMBSQAD, and SCANRES. Most of these programs are available from shareware and public-domain software sources and include self-checking routines to ensure that they are not themselves infected. Several commercially distributed programs also are available.

6. Read up on computer viruses. They are covered thoroughly in Richard Levin's *The Computer Virus* (Osborne/McGraw-Hill, 1990), and they get extensive coverage in the Mike Callahan/Nick Anis book *Dr. File Finder's Guide to Shareware* (Osborne/McGraw-Hill, 1990).

Note: This discussion of computer viruses was expanded and adapted from an article that appeared in the DYNACOMP computer software catalog, used with permission. Our thanks to DYNACOMP, Inc., 178 Phillips Road, Webster, NY 14580.

Wrapping It Up

That's it for this time, gang. Next time more Antennas & Accessories topics of current interest. See you then.

Overheard: The most useless computer tasks are actually the most fun to do.

73, Karl, W8FX

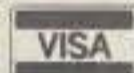
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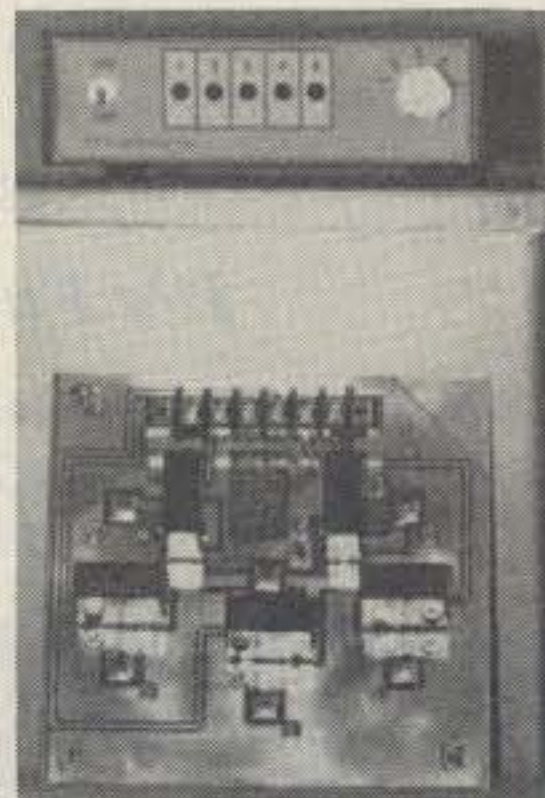
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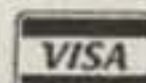
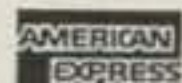
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NEWS/VIEWS OF ON-THE-AIR COMPETITION

World Radiosport Team Championship The Final Results

I am proud this month to publish the final results of the 1990 World Radiosport Team Championship. Anyone who has ever been involved with contest administration can appreciate the tremendous effort required to report what you are about to read. In any event, I think you'll agree the commentary from the WRTC committee and participants speaks for itself.

The Results

The first ever World Radiosport Team Championship was declared a success by competitors, participants, and interested observers from all over the world. For the first time competitors were all located in the same geographic area and had no traditional advantages such as rare call sign, equatorial propagation, or station/hardware superiority. In fact, all WRTC competing teams used similar moderate antennas and 100 watts. Twenty-two teams from fifteen different countries gathered in Seattle, Washington to promote goodwill as well as compete.

The brainchild of Danny Eskenazi, K7SS, the event was planned to coincide with and be a part of the 1990 Goodwill Games. The Committee and the competitors all held their breaths as the contest started, hoping that there would be enough stations for the teams to contact to make the contest interesting. We were overwhelmed by the response and activity! The whole world turned out for what was arguably the amateur radio contesting event of the decade. With the winning team working over 1300 stations and achieving an average rate for ten hours of 130 contacts per hour, there was plenty of activity for everyone. Forty meters at the end of the contest produced the highest rates and biggest pile-ups. With the exception of the RF curtain to Asia, the contest produced activity around the world.

With the contest being held in the middle of the world's second largest amateur population, it comes as no surprise that U.S. stations took most of the single-operator honors with congratulations to HA0DU for breaking the Top Ten. Top honors go to Steve, N2IC/0, for turning in

Calendar of Events

May	25-26	CQ WW WPX CW Contest
June	1-2	RSGB Field Day
June	8-9	South American CW Contest
June	8-10	ARRL June VHF QSO Party
June	9	Portugal Day Contest
June	15-16	All Asian CW Contest
June	22-23	ARRL Field Day
July	1	Canada Day Contest
July	6-7	Venezuela SSB DX Contest
July	13-14	IARU Championship Contest
July	27-28	Venezuela CW DX Contest
Aug.	3-4	YO DX Contest
Aug.	10-11	Worked All Europe CW Contest
Aug.	17-18	SARTG RTTY Contest
Aug.	17-18	Maryland-D.C. QSO Party
Aug.	17-18	New Jersey QSO Party
Sept.	7-8	Bulgarian DX Contest
Sept.	8	North American CW Sprint
Sept.	14-15	Worked All Europe SSB Contest
Sept.	14-15	All Asian SSB Contest
Sept.	15	North American SSB Sprint
Sept.	28-29	CQ WW RTTY Contest

the top score with 3.1 meg points and sweeping first place with NG8D coming in second and K1TO placing third.

The multi-operator, single transmitter category results reflected more DX stations in the results with four Soviet stations in the Top Ten. Congratulations to the crew at K8AZ for their terrific 3.3 meg effort. Also from W8-land, KW8N came in second, with HG5A placing third.

In the multi-operator, multi-transmitter category, the winning team at NX1H won with 1.7 meg points, LY2ZO was second, and N2KW placed third.

The Committee received 944 total logs vying for awards and prizes and is happy to announce that 198 pins (for 30 WRTC contacts) and 762 certificates (for 5 WRTC contacts) will be awarded in addition to the 500 T-shirts. The 500th score was 67,039 points and scores submitted higher than that will receive the coveted T-shirts. By the way, T-shirts will be awarded one per station. This is consistent with awards from other contests. Due to financial limitations, we are unable to award T-shirts to all multi-operators, but they will receive pins and certificates when eligible.

The WRTC Committee extends a very large thank you to everyone who took time to participate in this event and helped to make this one of the most memorable on-the-air activities of all time. A

TOP SCORES WRTC CONTEST

WRTC WINNING TEAMS	
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CORPORATION**

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RS, RM and VS SERIES

SPECIAL FEATURES

- SOLID STATE ELECTRONICALLY REGULATED
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output.
- CROWBAR OVER VOLTAGE PROTECTION on all Models except RS-4A, RS-5A.
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage.
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE

PERFORMANCE SPECIFICATIONS

- THREE CONDUCTOR POWER CORD
- ONE YEAR WARRANTY • MADE IN U.S.A.
- INPUT VOLTAGE: 105 - 125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE: Less than 5mv peak to peak (full load & low line)
- Also available with 220 VAC Input Voltage

MODEL VS-50M

RM-A SERIES

MODEL RM-35M

RS-A SERIES

MODEL RS-7A

RS-M SERIES

MODEL RS-35M

RS-S SERIES

MODEL RS-12S

VRM/VS-M SERIES

MODEL VS-35M

19" X 5 1/4" RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RM12A	9	12	5 1/4 x 19 x 8 1/4	16
RM-35A	25	35	5 1/4 x 19 x 12 1/2	38
RM-50A	37	50	5 1/4 x 19 x 12 1/2	50
• Separate Volt and Amp Meters				
RM-35 M	25	35	5 1/4 x 19 x 12 1/2	38
RM-50 M	37	50	5 1/4 x 19 x 12 1/2	50
RS-4A	3	4	3 3/4 x 6 1/2 x 9	5
RS-5A	4	5	3 1/2 x 6 1/8 x 7 1/4	7
RS-7A	5	7	3 3/4 x 6 1/2 x 9	9
RS-10A	7.5	10	4 x 7 1/2 x 10 3/4	11
RS-12A	9	12	4 1/2 x 8 x 9	13
RS-20A	16	20	5 x 9 x 10 1/2	18
RS-35A	25	35	5 x 11 x 11	27
RS-50A	37	50	6 x 13 3/4 x 11	46
• Switchable volt and Amp meter				
RS-12M	9	12	4 1/2 x 8 x 9	13
• Separate volt Amp meters				
RS-20M	16	20	5 x 9 x 10 1/2	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13 3/4 x 11	46
• Built in speaker				
RS-7S	5	7	4 x 7 1/2 x 10 3/4	10
RS-10S	7.5	10	4 x 7 1/2 x 10 3/4	12
RS-12S	9	12	4 1/2 x 8 x 9	13
RS-20S	16	20	5 x 9 x 10 1/2	18
• Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts				
• Current limit adjustable from 1.5 amps to Full Load				
	@ 13.8VDC @ 10VDC @ 5VDC		@ 13.8V	
VS-20M	16	9	4	20
VS-35M	25	15	7	35
VS-50M	37	22	10	50
• Variable rack mount power supplies				
VRM-35M	25	15	7	35
VRM-50M	37	22	10	50

*ICS—Intermittent Communication Service (50% Duty Cycle 5 min. on 5 min. off)

CIRCLE 41 ON READER SERVICE CARD

huge thanks also to our sponsors who made it possible: ICOM America, Ham Radio Outlet, US Tower, MFJ, Ameritron, the Northern California DX Foundation, and Joe Mullan, W3RLR. Support from Barry Merrill, W5GN; Brent Byers, K4TEA; Ken Byers; and Bamerindus, Brazil was greatly appreciated. Thanks also to Dick Ross, K2MGA, at CQ magazine and Bob Heil, K9EID, of Heil Sound for their support of this unique event. Thank you, all!

On one very sad note, only a few short months after the WRTC competition,

George, UA1DZ, passed away from a heart attack. George was the number one Radiosport Champion in the USSR, and he will be missed by everyone who came into contact with him. The WRTC video has been dedicated to him.

The WRTC video is a 24-minute, professionally produced video that shows not only the competitors, but also the drama and goodwill that made the WRTC such a memorable event. You can obtain your own copy in VHS format for \$25.00 shipped in the U.S. (U.S. \$19.95 plus \$5.05 S/H) or \$40 (U.S.) overseas airmail.

Check with the Committee for other formats (WRTC Committee, c/o Danny Eskenazi, K7SS, 4821 51st SW, Seattle, WA 98116 USA).

Thank you for your participation and interest!

Final Comments

I'm running out of editorial space this month. As always, the deadline for the September column is July 1st.

73, John, K1AR

1990 World Radio Team Championship Results

Following are the results of the 1990 WRTC. In the line scores the first number denotes the overall rank; T,P,C denote T-shirt, pin, certificate winner; followed by call sign and score.

SINGLE OPERATOR AFRICA

Melilla

719 EA9IB 11,220

Tanzania

561 5H3TW 41,949

ASIA

Cyprus

517 5B4MF 58,596

Hong Kong

195 TPC VS8BG 372,274

Japan

395 TC JH7XGN 121,508

417 TC JM1NKT 111,072

438 TC JF8LPB 98,155

523 JH7WKO 55,800

564 C JA9CWJ 41,520

646 C JA1WYQ 21,160

688 C JA8BB 16,544

689 C JI7LZL7 16,302

706 JR8SGE 12,168

757 JA1KFX 7,216

839 JH5OXF 814

844 JG4DDN 486

848 JR9GQP 402

857 JH8JYV 270

864 JG2IGY 112

871 JE9IUZ 36

872 JI4DUN 24

Mongolia

807 JT1BV 2,461

ASIATIC RSFSR

Asiatic Russia

80 T RW9WA 740,821

125 T RZ9UA 535,568

165 T RV9CFA 418,728

234 T UA9XR 305,522

240 T UA9TZ 296,940

268 T UV9WN 256,184

286 T EX0S 226,300

318 TC 4K4POL 186,912

332 T UA0WX 170,892

366 T UA0SR 140,302

386 TC UA9AO 128,320

392 T UA9OP1 123,660

403 TC UA0FZ 117,045

422 T RW9UN 108,450

459 T UZ9FXR 85,850

473 T RW9AB 78,672

519 UC2ACJ/RA9J 58,240

532 C UA0KBC 53,305

566 UA0ABB 41,076

588 C UA0KCI 35,792

681 UA0ALK 16,848

682 UV9FR 16,808

700 UW0SR 14,520

725 RV9WB 10,620

746 UA0DW 8,720

747 UA9SN 8,697

758 UA9APA 6,984

788 UA9LE 3,944

804 UW9AG 2,592

856 UA8TUB5BCP 297

861 UA0SNT 152

Azerbaijan

716 UD6DKW 11,484

Georgia

117 T UF6FJ 557,613

434 T UF6FDR 99,752

765 RF6FM 5,980

Kazakh

310 T UL7LBI 197,346

354 T UL7CW 148,480

376 T UL7OB 130,530

485 T UL7BN 73,206

624 UL7CAC 26,220

419 T UL7FCW 110,526

Kirghiz

200 T UM9MZZ 360,225

Turkoman

97 T UH8EA 676,287

Uzbek

606 UI8QU 32,302

615 UI4L/UA4AO 29,374

EUROPE

Belgium

206 TC ON4AAQ 349,950

423 TC OM7MB 108,297

827 ON6JG 1,281

868 ON8WN 72

Bulgaria

216 TC LZ2TU 337,200

356 T LZ1IA 147,028

428 T LZ1YE 106,197

447 T LZ1HA 93,372

454 T LZ2TF 88,832

470 TC LZ2BV 80,034

479 T LZ1QZ 75,180

692 C LZ2CC 15,893

752 LZ3AA 7,770

780 LZ1DM 4,416

781 LZ3YY 4,300

Czechoslovakia

252 TC OK3CND 278,610

264 T OK1OFM 261,375

284 T OK2KDS 231,770

291 TC OM6MG 222,600

293 TC OK3FON 221,676

462 T OK1MNV 84,370

500 TC OM3YCA 67,039

507 C OK1MZO 63,494

526 OK2BWJ 54,988

547 OK1DJO/P 46,868

586 OM7TEG 36,032

608 OM2HI 31,265

655 OK1FHI 20,286

661 C OK2SG 19,264

664 OK3CWF 18,568

713 OK1FER 11,772

728 OK3CDY 10,560

730 OK1PFM 10,340

749 OK1ZTW 8,526

768 OK3YK 5,700

782 OK1FKL 4,250

832 OK3CAJ 1,152

Denmark

737 C OZ5PA 9,279

England

236 TC G3SXW 302,511

238 TC G3ZAY 302,094

481 TC G4BKI 74,800

584 G4IFB 36,148

593 C G0MFO 34,521

658 C G4BUE 19,600

Fed. Rep. of Germany

359 TC DL4MFM 144,750

Finland

128 TC OH6NIO 524,580

224 TPC OH2BCI 324,519

670 OH5NBJ 18,054

736 C OH2BN 9,408

770 C OH0BDA 5,382

France

522 C FD1NBX 55,818

German Democratic Rep.

29 TC Y42MK 1,216,947

313 TC Y33VL 192,365

406 TC Y41YM 115,267

Hungary

8 TC HA0DU 1,805,938

108 TC HA6NF 576,180

110 TC HA3NU 571,650

371 T HA0HW 336,354

375 TC HA5LZ 130,680

413 T HA0NNN 111,780

552 HA6NW 44,370

592 C HA5BA 34,632

628 HA0IR 25,784

714 HA1SN 11,600

733 C HA0NAR 9,744

789 HA0VN 3,885

862 HA0MN 125

Iceland

794 C TF3DC 3,425

Italy

71 TC I2VXJ 805,383

141 T IM8A 492,450

338 T IN3QBR 161,677

351 TC I0ZWT 150,336

391 T IJ9CM 124,659

464 TC IK0HBN 83,160

617 C I0KHP 28,713

636 C I1POR 23,744

656 C IV3EAD 19,800

666 C IK1GPG 18,480

683 IK2LOL 16,783

845 I1VTX 476

ITU Geneva

316 T 4U1ITU 188,064

Luxembourg

426 TC LX1CC 106,839

Poland

803 SP8BAB 2,592

Spain

576 EA3BOX 37,672

Sweden

183 TC SM3EVR 391,458

274 TC SM0DJZ 252,880

382 TC SM3CER 128,865

806 C SM6DEC 2,500

Wales

572 GW0ARK 38,736

Yugoslavia

56 TC YT2GW 920,142

86 TC YU1LA 719,550

221 T YU3HR 328,671

298 TC YZ7AA 211,794

418 TC YU7SF 111,006

582 YU7LS 36,748

EUROPEAN RSFSR

Byelorussia

129 TC UC2ADX 518,922

189 TC RC2CW 383,928

262 TC UC2IO 266,135

301 TC UC2WJ 205,800

404 T UC2DQ 115,960

577 UC1CWH 37,406

European Russia

121 TC UA1ZO 545,610

146 TC RA4HT 473,088

148 T UA1TAT/A 468,160

158 TC UA6ED 443,572

197 TC UA1ZX 364,651

198 TC UZ3PXR 362,362

203 TC UV1AA 353,808

207 TC RW4HW 349,278

217 TC UV3GZ 336,354

225 TC UA3DPX 323,547

244 T UA3RAR 290,928

246 TC UZ3DD 287,504

294 T UZ6AZ 220,315

315 TC UA4HRZ 188,580

319 T RA3NN 185,024

327 TC UA1AUA 176,561

341 T UW3AO 157,896

355 T UA3RJ 147,359

360 T UZ3RV 143,108

365 TC RW3ZC 140,315

368 T UV3AFB 137,356

370 TC RA3EF 137,148

374 TC UA3ABT 133,510

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BP-7	13.2v	500mah	\$23.00
BP-8	8.4v	800mah	\$21.00
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BP-23	8.4v	600mah	\$22.00
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FNB-11	12v	600mah	\$30.00
FNB-12	12v	500mah	\$30.00

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821	UB5EEP	1,732	103	TPC	NT2X	613,760	311	TPC	WB5J	193,224	545	C	AA4W	47,889	755	C	WB8GUC/7	7,648	
838	UB5VK	972	105	TPC	K8MR	594,720	312	TC	WC5D	192,720	546	PC	WA7QQI	47,017	756	C	WT6A	7,452	
NORTH AMERICA																			
Alaska																			
287	TC	AA6DX/KL7	226,270	111	TPC	KI3L/5	569,160	317	TPC	W7JEN	186,930	548	C	N7LGI	46,784	759	C	K2MK	6,951
590	C	NL7C	35,196	112	TC	K4POL	566,820	320	TPC	K1MEM	183,438	549	C	N4XR	46,398	760	C	WC9C	6,591
Canada																			
21	TPC	VE5DX	1,362,307	113	TC	K9UWA	564,665	321	TC	KN4DS	183,008	550	C	K6SMH	45,840	762	C	WA7QCC	6,290
82	TPC	VE3XN	729,495	115	TPC	K2SX/1	558,306	322	TPC	WA4OMO	179,695	553	PC	W2LF	44,201	764	C	AA4BQ	6,227
123	TPC	VE3YI	542,730	119	TC	K1XA	547,440	323	TC	N2VW	179,426	555	C	WV7T/9	43,659	766		N7OT	5,746
175	TC	VE5ZX	404,303	120	TC	WX0B	546,638	324	TPC	WB3DNA	179,204	556	C	W5NR	43,560	767	C	WA7DCW	5,726
187	TC	VG7ARS	385,750	122	TC	K9LJN	543,840	325	TPC	WB2P	177,659	558	C	N3GSC	42,955	769	C	KF7WR	5,668
361	TC	K5TAVE1	143,060	126	TPC	AB4LX	526,930	326	TPC	K1RM	177,312	559	C	KB0ALC	42,420	772		W4KMS	5,174
402	TC	VE3BZR	117,516	131	TPC	W7LVI	518,427	328	TC	W7CB	176,180	560	C	KF0AD	42,084	773	C	WB3BFC	5,000
408	T	VE7EIK	114,569	132	TPC	K0VBU	518,134	329	TPC	W9CA	173,810	562		KF4AV	41,856	774	C	WB7UZO	4,956
429	TC	VE3CRD	104,958	133	TC	W3UM	518,080	333	TC	K4VX	168,683	567	C	KB5KTY	40,761	775	C	ND4D	4,947
503	C	VE7DHF	66,088	135	TC	W6REC	501,030	334	TC	W0IZV	165,452	569	C	WD9BJN	39,962	776	C	N7ABJ	4,800
663	C	VE3NYT	18,928	136	TPC	N5DO	499,670	335	TC	W4XD	164,268	573	C	WA7PVE	38,592	777	C	N6EE	4,746
693		VE7CQD	15,810	137	TPC	W1FEA	498,332	339	TPC	K1ETT	160,113	575	PC	K7DS	38,328	778	C	WB6DSV	4,624
717		VE1MQ	11,312	138	TPC	N6EK	497,964	340	TC	K6SSS	159,210	578	C	K9JS	37,107	779	C	NW8F	4,495
854		VE7EKS	336	139	TPC	WB9Z	494,022	342	TPC	W2HCA	156,206	579	C	KF2X	37,033	783	C	WA9GON	4,131
Costa Rica																			
140	TC	TE2T	492,936	142	TPC	WA8LLY/6	481,520	343	TPC	K3ZJ	156,156	580	C	WB1GQR	36,974	784	C	KN4CU	4,108
Mexico																			
675	C	XE2HWH	17,550	143	TPC	W6UQP	481,168	345	TPC	NQ1W	153,696	583	C	WA2MNO	36,666	785	C	N5DFL	4,050
St. Pierre & Miquelon Isl.																			
219	T	FP/W5WUMU	334,560	144	TPC	WC4E	478,800	346	TPC	W9MMZ	153,440	587	C	W3YEY	35,970	787	C	KA6HSM	3,949
Turks & Caicos Isl.																			
450	T	VP5JM	92,400	147	TC	KO7V	469,792	347	TC	KJ4TI	151,410	594	C	WA3EOP	34,428	790	C	K2TD	3,675
United States																			
2	TPC	N2IC/0	3,103,125	151	TPC	N1CC	462,870	349	TC	W0UVC	150,656	595		KR0U	34,425	791	C	N2CFN	3,612
4	TPC	K3UA	2,312,834	153	TPC	KD7E	457,968	350	TPC	WA3HUP	150,579	596	C	W4TMN	34,399	795	C	K3ZPG	3,336
5	TPC	K1TO	2,275,290	154	TPC	KR1S	453,560	352	TC	WB6JMS	149,838	597	C	W4WIJ	34,291	796	C	WG6X	3,300
6	TPC	KM9P	2,249,394	156	TC	K4BAI	451,140	358	TC	KA0IAR	145,540	598	C	KL7NL/4	34,263	797	C	N7LQU	3,300
7	TPC	K3LR	2,090,048	157	TPC	N8BJQ	449,280	362	TC	WA6FGV	142,020	600	C	N4LJS	33,600	800		WA7SXB	3,232
10	TPC	K4TEA	1,750,029	160	TPC	KU2Q	437,261	363	TPC	KJ6LD	141,856	601	C	W7MCU	33,600	801		AA6EE	3,003
11	TPC	K3WW	1,735,284	161	TPC	W1FJ	436,800	367	TC	K9OSH	139,680	602	C	K9UQN	33,536	802	C	N7OYR	2,727
13	TP	WB3KKX	1,717,828	162	TC	W5XX	430,192	373	TPC	WA7BAY	134,112	603	C	W7AGE	33,075	808	C	WA4QQV	2,450
15	TPC	KZ2S	1,564,280	163	TPC	KD2YP	426,474	378	T	AA4VD	130,368	605	C	W1GG	33,000	809	PC	K5/G3WQO	2,450
17	TPC	N5RZ	1,514,445	164	TPC	KX7L	419,372	379	TPC	W7QDM	129,950	610	C	K6ILM	31,060	810	C	N7KRJ	2,349
18	TC	K3ZO	1,490,594	168	TPC	K7ABV	417,463	380	TC	KF7VB	129,363	611	C	WA1VQN	30,912	811		N4UGX	2,295
20	TPC	KM3T	1,385,058	170	TC	NB9C	414,392	381	TPC	KN7N	129,316	613	C	K5EPE	30,368	815	C	NT6G	2,100
22	TPC	K7UR	1,351,610	171	TC	KG5U	412,976	383	TPC	N4RV	128,520	614	C	K1SE	29,700	816	C	K7LYT	2,040
23	TPC	W0CP	1,350,130	172	TC	K9MMS	409,528	384	TC	W2HG	128,432	616	C	K16YB	29,160	818		WB4CSK	1,960
24	TPC	K6LL/7	1,330,195	173	TC	N2GC	408,528	385	TC	AK1A	128,400	618	C	N6OXT	28,440	819		WA7GFE	1,944
25	TPC	KF0H	1,266,355	174	TC	N9AW	407,190	390	TC	NY1L	125,824	619	C	KC1PR	28,350	820	C	AA5PI	1,800
26	TPC	WB9JKI	1,250,800	176	TC	W5PWG	404,180	393	TPC	WA0QII	122,000	620	C	WA5VBE	27,587	822	C	K1ULI	1,450
27	TPC	W0CG	1,222,376	177	T	KG4W	402,725	396	TPC	WB8BRE	121,329	621	C	N3RW	27,324	823		KM4MM	1,395
28	TPC	K2SG	1,219,074	179	TPC	KI6X	400,304	398	TPC	WB2V	120,900	622	C	W5JDV	26,640	824		WB9BWP	1,386
33	TPC	K1IU	1,160,373	181	TPC	W2FG	392,875	400	TC	K8NI	118,759	625	C	K8QLK	26,180	825		KW3U	1,375
34	TPC	K1XM	1,146,210	182	TPC	WB0O	392,365	401	TC	WB9HRO	117,768	627	C	KG7EM	25,916	826		W0EUG	1,309
35	TC	KD2SX	1,118,345	184	TC	WA3LFY	388,815	407	TC	KE7GL	115,020	629	C	W9LYN	25,515	828	C	KI6OR	1,260
37	TPC	K9ZO	1,077,090	185	TPC	W5GN	386,871	409	TPC	NW7S	114,480	632	C	WD8MCH	24,716	829	C	N7HSH	1,250
38	TPC	K3VV	1,059,080	186	TC	NABV	386,580	410	TC	K4JYS	112,944	633	PC	KC7UO	24,656	830	C	W7YS	1,224
39	TPC	K8HVT/1	1,057,944	188	TPC	KM5H	385,506	411	TC	N7LOX	112,336	634	C	N6TIB/M	24,288	831		KB0HIB	1,200
40	TPC	KR2Q	1,050,280	190	TPC	WA6BIL	383,921	414	TC	NX5H	111,720	637	C	K4HOI	23,391	833	C	N6VR	1,148
42	TPC	W8LT	1,036,854	191	TPC	W9YHM	383,172	415	TC	N0FFZ/9	111,504	638	C	KM3D	22,776	834		K2RO	1,140
43	TPC	K5NA/2	1,021,698	192	TPC	WU4G	381,915	416	TC	N8AA	111,160	639	C	WB8NYV	22,500	835		K2OD	1,134
44	TPC	W1GD	1,011,364	193	TPC	N4GVF	376,110	420	TC	KF5YZ	110,126	641	C	NL7BY	22,380	836	C	NZ7Q	1,101
45	TPC	K6XO/7	1,003,456	194	TC	KA1T	372,674	421	TC	KH6DW/6	108,804	642	C	K8PUJ	22,126	841	C	N3HHE	703
47	TPC	WC7Q	993,450	196	TC	N19C	364,736	424	TPC	N7MYM	107,880	643		N8LMB	22,107	842	C	AB4MG	573
48	TPC	N6TV	980,973	199	TC	WF5E	361,456	425	TC	W9HE	107,160	644	C	KB0BUV	21,660	843	C	WA6AHF	550
49	TPC	K7ZA	974,532	201	TC	WE7G	356,048	430	TPC	K0GT	103,750	645	C	N3HJT	21,504	846		N8AXA	450
51	TPC	K4LTA	958,770	204	TPC	W6BSY	352,933	431	TC	WA4YRN	103,076	650	C	KF5EA	20,823	849	C	W5AFK	400
52	TPC	KR2J	948,420	208	TC	K2PH	349,048	432	TC	KB2DE	102,292	651	C	KS2X/4	20,746	850	C	NV9S	400
53	TC	KA5W	946,546	209	TC	NF7P	348,540	433	TC	K1TMM	100,924	657	C	AA5PA	19,694	851	C	WB5LLM	395
54	TPC	N2RM	944,658	210	TPC	K3ND	347,130	435	TPC	K8YSE	99,000	659	C	AA9F	19,380	852	C	N7LSD	362
55	TPC	W5FO	941,668	211	TPC	NX9T	345,631	440	TC	W6HAL	98,198	660	C	KE7UH	19,320	853	C	K8DFC	350
59	TPC	N6RO	907,816	214	TPC	W6CF	338,451	441	TC	N4MAD	96,894	662	C	NT7E	18,962	858	C	WY0Z	264
60	TPC	K7IDX	903,508	218	TPC	KM1X	334,560	443	TPC	N6HL	94,976	667	C	KE2N	18,468	859	C	KA2GWR	250
61	TC	AA5DX	903,056	220	TPC	N4ROL	332,225	444	TPC	K7LAY	94,300	668	C	WD0AVV	18,436	860		K4RZZ	250
62	TPC	K3DI	891,759	222	TC	WW7O	328,120	445	TC	KI6WF	94,240	669	C	KB7FXO	18,259	863		N4XPE	120
63	TPC	K8MFO	886,704	223	TPC	W8UNB	325,563	446	TPC	WA7OEU	93,708	671	C	W6BKY	17,934	865	C	W7SE/M	111
64	TPC	NN7L	868,687	226	TC	WA5OYU	319,358	449	TC	WA5DTK	92,903	672	C	KB0NJ	17,876	866		W4KM	80
66	TPC	K4PI	842,688	228	TC	W5AT	310,912	453	TPC	W2VT	90,168	673	C	N6CFQ	17,670	867		N2FIR	76
67	TPC	N4ZC	832,708	230	TC	WB4TDH	309,504	455	TC	N6RY/7	88,298	674	C	W5QZ	17,632	869		N7MYA	58
68	TC	W3BGN	832,644	233	TC	N5NA	307,104	456	TPC	K0TVJ	88,150	677		KC7MM	17,270	870		KD4ZO	38
69	TPC	K5ZD/3	832,095	237	TPC	AA1M	302,500	458	TC	KY9U	86,112	678	C	WB7DRP	17,100	873		KA9ZXN	21
70	TPC	K7HBN	819,266	241	TPC	AD4M	294,294	461	TPC	K8WWA	84,500								

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Asiatic Russia**

95 TC	UZ9CWW	692,736
212 T	UZ9SWW	343,408
213 TC	UZ9SWR	342,930
232 T	UZ9QWA	307,224
265 T	UZ9FYR	260,353
276 TC	UZ9KWW	249,639
357 T	UZ9FWW	146,300
452 TC	UZ9IWA	90,405
457 T	UZ9CZM	87,584
607	UZ9CZO	31,824

Kazakh

16 TC	ULBLYA	1,525,248
227 T	ULBGWJ	315,642

**EUROPE
Belgium**

231 TC	ON4AMT	309,225
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Bulgaria

94 TC	LZ5W	696,960
235 T	LZ5A	304,900
805	LZ2KKK	2,500

Czechoslovakia

107 TC	OK1KQJ	585,590
239 TC	OK3KFF	298,688
364 T	OK2OII	141,840
626	OK3KHU	25,920

Finland

19 TC	OH1AF	1,465,767
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Hungary

14 TC	HG5A	1,644,343
114 TC	HA5ROE	559,700
166 TC	HA8KCK	418,050

Italy

303 TC	IV3TAN	203,966
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EUROPEAN RSFSR

Byelorussia

280 T	UC1LWN	235,060
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Estonia

150 TC	ES4XB	464,600
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European Russia

41 TC	UZ4WZA	1,041,323
65 TC	UZ1AWT	862,925
72 TC	UZ6LWZ	799,935
76 TC	UZ4WWA	774,592
109 TC	UZ1AWQ	575,370
118 T	UZ4FWA	551,696
130 T	UZ6LZL	518,793
145 TC	UZ6HWA	474,660
178 TC	UZ1TWW	402,420
229 TC	UZ1QWW	310,401
281 TC	UZ1AWO	234,840
283 T	RZ6AXO	232,832
377 T	UZ6LWA	130,496
436 T	UZ6LXZ	98,560
531	UZ6HYU	53,708
557	UZ3MWA	43,092
568	UZ6LWY	40,700
599 C	UZ3XH	33,966
721	RZ3AWR	10,925
726	UZ6EWF	10,612

Kaliningrad

46 TC	UW2F	997,632
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Latvia

521	YL1WJ	58,000
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Ukraine

31 TC	UB3IWA	1,175,200
32 TC	UB3JWW	1,168,020
159 T	UB4QWW	441,097
248 T	UB4LZA	281,400
263 T	RB4IXY	264,264
289 T	UB4FWW	225,933
515	UB4CWA	60,384
814	UB4U	2,136

NORTH AMERICA

United States

1 TPC	K8AZ	3,361,887
3 TPC	KW8N	2,371,782
30 TPC	N0AX	1,183,050

36 TPC	AG6	1,102,177
58 TC	K5XI	909,414
100 TPC	WZ6Z	638,288
104 TPC	N3BNA	596,224
149 TPC	AA6KX	466,334
152 TC	N4XM	459,888
180 TPC	KZ1L/QRP	398,400
279 TC	W1OP	236,322
299 TC	NO9F	208,464
336 TC	K3UOC	164,160
491 TC	KL7BB	70,737
525 C	K5OJI	55,335
630 C	WB4WOR	25,296
640 C	KB6TOQ	22,464
649 C	N4UMI	21,070

SOUTH AMERICA

Brazil

344 TC	ZZ5WG	154,050
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**MULTI-OPERATOR
MULTI-TRANSMITTER**

ASIA

Japan

855	JA9YBA	315
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**EUROPE
EUROPEAN RSFSR**

European Russia

353 T	UZ6LXM	149,058
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Lithuania

12 TC	LY2ZO	1,719,630
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Ukraine

247 T	UB4CWW	286,884
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NORTH AMERICA

United States

9 TPC	NX1H	1,795,040
50 TPC	N2KW	964,320
331 TC	W4QO	171,600

SOUTH AMERICA

Colombia

255 T	5K3T	269,880
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SOAPBOX COMMENTS

Thanks for very good contest. All QSOs very fine, with my friends from USA and other countries. My T-shirt size if L (I hope rcvd, hi, hi!) . . . UC2ADX. Together we can build a world beyond war! . . . RZ3AWR. Many thanks for the very nice and interesting competition. Such competitions are one of the ways to peace and friendship between all nations and radio amateurs, of course! Hope to participate next time! Best wishes and friendly 73 from Ukraine . . . UT5UGR. Really enjoyed being "a part of history" . . . AA6DX/KL7. Absolutely the greatest operating event I have ever experienced! The contestants were all true champions! Just listening in was like a front-row seat in Radio Olympics! The guys were fantastic! What-a blast! . . . K4TWJ. Contest was one of the greatest thrills I've had in 35 years of contesting! Terrific to be a part of history! . . . K6SSS. I don't know if I did everything like it was supposed to be done, but July 20 was my second day with amateur radio and I was extremely excited to be working a contest . . . KB0HIB. Everything about this contest was excellent—the format, the participation, the conditions, everything! It would be fun to do this every year . . . KJ4TI. Super contest! The free T-shirt prize idea is a perfect solution for recruiting new blood into contesting. People will do anything for a free T-shirt. I hope the other contest committees will take note . . . N4GVF. CW with PTT mike mobile sure is rough . . . N6TIB/M. Great contest, great media, parties, great fun. What a thrill to hear some of the world's best contesters operating a few kc's apart! Let's do it again! . . . NX9T. It was like a treasure hunt trying to find those elusive /WG stations! . . . W1KM. A wonderful contest—win or lose. Everyone wanted to cooperate with each other (US/VE and DX stations). It was indeed a Goodwill Game . . . W5FO. Flew to Seattle, rented a car, and op'd mobile, just for contest! . . . WA0QII. Great fun for a Friday night . . . WA1VQN. I liked the 10-hour format. It's like a 1500 meter event compared to the CQ WW marathon . . . KG6DX.

PIN & CERTIFICATE WINNERS

K5YCP, W2GD, K9MNT.

CERTIFICATE WINNERS

UZ0CWA, ON5KL, RA3NB, UA3ET, KL7UR, KF0DZ, KL7IPV, KB7ZS, W7LZP, K5CTG, W4KYW, K6XT, N7MGY, WA0GUD, KB7IMC, WB6UXK/W7, W0CL, W1OTE, N6NKN, N4XMX, W9OFZ, WB7D, K7ZTM, AE2X, N2HHD, K7AZG, N5QIL, K2CYX, N3GTW, KG8F, K1PVT.

GUEST OPERATORS

4U1ITU: IX1MOL Op.; EX0S: UA0SAU Op.; K3UA: NG8D Op.; OK1OFM: OK1DRQ Op.; OK2KDS: OK2VF Op.; WC7Q: N2AA Op.

STATION OPERATORS

AA6KX: plus packet. KZ1L/QRP: plus packet. 5K3T: HK3OJY, HK3LBF, HK3LEW, HK3HIC, HK3JJH, HK3KQR, HK3JJH, HK3KQR, HK3PLB. AG6D: N1EE, N6KT. ES4XB: ES4MM, ES4AA, ES4DX. HA5ROE: HA5BBC, HA5MY. HA8KCK: HA8FW, HA8FT. HG5A: HA5ML, HA5MK, HA5GF. IV3TAN: IV3TAN, IV3LYZ, IV3CMW, IV3SHF. JA9YBA: JH9VSF, JR0ELG. K3UOC: KA1IPB, NZ1W. K5OJI: KA5BJY, KD5PJ. K5XI: K5RC, K5XI, K7GM. K8AZ: W8KIC, N8AA, K8NZ, WT8C.

KB6TOQ: KB6TOQ, N6WMF. KL7BB: WL7BXM, KL7HFQ. KW8N: NZ4K. LY2ZO: LY2BKZ, LY2BOA, LY2BMX, LYR1-751. LZ2KKK: Cuetanov, Stoyanov. LZ5A: LZ1DD, LZ1LZ, LZ1ZD. LZ5W: Bonev, LZ1PQ, LZ1-I-244, LZ1OP. N0AX: K1CC, UA6HZ. N2KW: WB2QJY. N3BNA: KD3CN. N4UMI: KC4FJX, KB4TXT, N4XCW. N4XM: KD4U, N4XM. NO9F: WE9V. NX1H: WG1G, K1FWE, WB1HBB, K1RX, NI8L. OH1AF: OH1EH, OH1HS, OH1NOA. OK1KQJ: OK1AYP, OK1DXS. OK2OII: OK2BX, OK2PTW. OK3KFF: OK3TMW, OK3TJW. OK3KHU: OK3-13095. ON4AMT: ON6VK. RB4IXY: UB5IUH, UB5IJG, RB4ICJ. UB3IWA: UB5IML, RB5II, UB5IOK. UB3JWW: Gubatenko, Yavorskiy, Horin. UB4CWA: Tkachenko, Zimownow, Kowal. UB4CWW: UB5CQA, RB5CQ, RB5CB, RB5CW. UB4FWW: UB4JFJ, UB5-070-514. UB4LZA: UB5LSL, UB4LEQ, UB4LEP. UB4QWW: UB5-064-866, RB5QRW, UB4QW, RB5QRO. UL8GWJ: UL8GCM, UL7GM, UL8GO, RL7GF, UL7GE. UL8LYA: UL7LEG, UL7-026-177, UL7LO, UL7LEZ. UW2F: UA2FF, RA2FA, UA2FM, UA2FJ.

UZ0CWW: UW0CF, UA0CHW. UZ0IWA: UA0IDX, UA0IBB, RC2CQ/UA0I. UZ0KWW: UA0KJ, UA0KBY, UA0KCL, UA0KZ, UA0KB, UA0KD. UZ1AWO: UA1AAF, UA1-169-900. UZ1AWQ: Onistchenko, Timofeev, Dolzinkov. UZ1AWT: UA1ALZ, UA1CFL, UA1-169-823, UW1AE, UA1-1692-475. UZ1QWW: RA1QDY, UA1QM, UA1QW. UZ1TWW: RA1TE, UA1-144-380, UA1-144-386. UZ3DXH: UA3DCP, RW3DW, UA3DMR. UZ3MWA: UA3MED, U3MA, UA3MDL. UZ4FWA: UA4FZ, UA4-148-363, UA4-148-481, UA4-148-360. UZ4WWA: UA4-095-789, RW4WA, UA4WA, UA4-095-729.

UZ4WZA: UA4WAM, UA4WW, RW4WZ, RW4WO, RW4WR. UZ6EWF: UA1-169-33/U6E, UA6EN, UA6EFW, UA6EFN. UZ6HWA: UA6HSV, UV6HSI, UA6HRZ. UZ6HYU: UA6HCK, UA6HSU. UZ6LWA: UW6LZ, UA6LD. UZ6LWY: UA6LTS, UB5ILW. UZ6LWZ: UA6LV, UV6LPL, UA6-150-1060, RA6LRT, UB5IBG, UB5ITW, UA6-150-1104, UA6LO. UZ6LXM: UW6OE, UV6LIP, UA6LTA. UZ6LXZ: RA6LVA, UV6LGP, RA6LVL, RA6LVL, UA6LRP. UZ6LZL: UA6-150-848, RA6LUX, UA6-150-820, UA6-150-847. UZ9CZM: RA9CFB, RV9CF. UZ9CZO: UA9-154-2007, UA9CAL, RV9CDA, UV9CAZ, UA9-154-2044.

UZ9FWW: Nabokin, Kolchev, Kubyshkin. UZ9FYR: UA9FM, UW9FW. UZ9QWA: UA9QA, UA9RQ. UZ9SWR: Porubaymekh, Khlebnikov, Umansky, Blinov. UZ9SWW: RA9SDE, UA9SJZ, UA9SJY. W1OP: K1PLX, W1GS. W4QO: K4POC, KJ4YM, WV4L, N4TMW, KA9SEJ, K4LDI, N4ZCX. WB4WOR: WN4BBJ, WZ6Z: WR6R. YL1WJ: UQ2GTQ, UQ2GTC. ZZ5WG: PP5JD, PP5TM, PP5WG, PP5ZYZ.

CHECK LOGS

Our thanks for the following check logs: UM8MAU, LZ1HX, OZ2JI, SM0CSX, SM5BDY, EK9ZAA, RA3NC, RA3QUL, RA3RM, RA4LAH, RW3RO, RW6AH, U3AJ, UA1ZD, UA4RZ, UA4YZ, UA6EDW, UA6HON, UA6LAK, UV3DFH, UW3RR, UZ3DWW, UZ4YWS, UA2FBA, RB5FK, RB5QNA, RB5VS, RY1B/UW9SG, UB4GY, UB4WXL, UB5VAA, KB2JJN, KB8DFB, N1GWN, N8LBI, WL7BZE.

RSGB National Field Day

1500 to 1500Z Sat.–Sun., June 1–2

Activity for this CW-only Field Day is not confined to Great Britain. You will also hear some portable activity out of Germany and Switzerland.

Although overseas stations are not directly eligible, they are invited to participate and submit a report of the stations worked.

A certificate will be awarded to the overseas station in each continent that shows the most contacts. Send your logs to: RSGB HF Contest Committee, P.O. Box 73, Lichfield, Staffs., WS13 6UJ England.

South American CW Contest

1500Z Sat. to 1500Z Sun., June 8–9

Sponsored by *Electronica Popular* magazine of Brazil, this is an annual affair the second weekend of June.

It's still a CW contest only, but you can work stations in other continents as well as South America. Use all 6 bands, 1.8 through 28 MHz.

Classes: Single operator both single and all band, multi-operator, single transmitter, all band only and SWL.

Exchange: RST plus a QSO number starting with 001.

Points: Contacts with stations in own country zero points but okay for multiplier credit. Other countries but same continent, 2 points. Countries in other continents, 4 points. Contacts with South American stations, 8 points. (For stations outside of S.A.)

Multiplier: Different countries (DXCC list) plus the different South American prefixes worked on each band.

Final Score: Total QSO points times the sum total multipliers from each band.

Awards: Certificates to the three top-scoring stations in each country in each class.

Use separate log sheets for each band and a summary sheet showing the scoring and other essential information. Include an SAE with return postage for a copy of results.

Logs must be received no later than July 31st and go to: WWSA Contest Committee, P.O. Box 2673, 20001 Rio de Janeiro, RJ, Brasil.

ARRL VHF Contest

1800-0300Z Sat.-Mon., June 8-10

Action will be found on the 50, 144, 220, and 420 MHz bands, and even higher up in the spectrum.

There are two new categories this year: Limited Multi-Op (multi-operator class that combines top four bands) and Rover (combines score from total number of grid squares; Rover may be worked once per grid).

The scoring varies with the different bands used, and there are certain requirements and restrictions in the rules. Working WAS on 6 meters is a possibility. Complete rules will be found in the May issue of QST.

I recommend that you write to ARRL Headquarters for official forms. Include an SASE with your request to: ARRL VHF Contest, 225 Main St., Newington, CT 06111.

Portugal Day Contest

0700Z to 2400Z Sunday, June 9

To commemorate Portugal Day (June 10), R.E.P. (RDED dos Emissões Portugueses) is sponsoring the 1991 Portugal Day Contest. Contest operation is SSB only and open to participants worldwide.

Operating Class: Single Operator, All Bands.

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The dismantling of some towers should be done with the use of a crane in order to minimize the possibility of member, guy wire, anchor, or base failures. **Used towers in many cases are not as inexpensive as you may think if you are injured or killed.**

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Exchange: Portugal—RS plus two-letter county name. All others—RS plus serial number beginning with 001.

Scoring: DX to DX 1 point; DX to Portugal 2 points; Portugal/Spain to Portugal/Spain 1 point (40/80 meters only). Same station may only be worked on each band for QSO points. Contacts within same country only count for multiplier.

Multipliers: Each Portuguese county (18). DXCC country, and continents (only count multipliers once, not each band). Final score is total QSO points times multiplier.

Awards: Plaques will be awarded to the top five overall scores and each DXCC country leader (depending on the number of entries/country). Certificates will be issued to any entry with more than 50 QSOs.

Use separate logs for each band and include the usual summary sheet with signed declaration. Mailing deadline is July 30th, 1991 to: REP Contest Manager/

DP91, Apartado 2483, 1112 Lisboa Co-dex, Portugal.

All Asian DX Contest

CW: June 15-16 Phone: Sept. 7-8
0000Z Sat. to 2400Z Sun.

This is the 32nd year of this activity sponsored by the JARL. The exchange is between Asian countries and the rest of the world.

Classifications: Single operator, both single and all band. Multi-operator, both single and multi-transmitter, all band only (one signal per band only).

Club stations are classified as multi-operator and each operator will give his age in the exchange.

Exchange: For OMs—RS(T) plus age of operator. For YLs—RS(T) and 00.

Scoring: 3 points for contacts on 160; 2 points for contacts on 80; 1 point on all other bands. (KA contacts do not count.)

Multiplier: For Asians the multiplier is

determined by the number of different countries worked on each band (DXCC list). For non-Asians it is determined by the number of different Asian prefixes worked on each band (CQ WPX list).

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

Keep in mind that non-Asians use Asian prefixes as their multiplier, not countries.

Note: JD1 stations on Ogasawara (Bonin and Volcano) are in Asia, and JD1 stations on Minamitori Shima (Marcus) are in Oceania.

Awards: Certificates to the top scorers, both phone and CW, in each country and each U.S. call area. In each class, both single band and all band, up to the fifth rank, depending on the number of returns. Medals to the all-band continental leaders, both single and multi-operator.

Logs: Keep all times in GMT. Use a separate column for the country or prefix multiplier, and fill in only the first time it is worked. Use a separate log for each band. Include a summary sheet showing the scoring and other information, and a signed declaration that all rules and regulations have been observed.

There is a strict disqualification clause for taking credit for duplicate contacts in excess of 2% of the total on each band, as well as other infractions.

Logs must be received no later than Sept. 30th for the Phone section, and July 30th for the CW section. They go to: JARL Contest Committee, P.O. Box 377, Tokyo Central, Japan.

Asian Country List: A4; A5; A6; A7; A9; AP; BV; BY; CR9; EP; HL/HM; HS; HZ/7Z; JA-JR; JD1; JT; JY; OD; S2, TA; UA/UK/UV/UW9-0; UD6; UK6C, D, K; UF6/UK6F, O, Q, V; UG/UK6G; UH8/UK8H; UI8/UK8A, G, I, L, O, T, Z; UJ8/UK8J, R; UL7/UK7; UM8/UK8M, N; VS6; VS9M/8Q; VU; VU (Andaman & Nicobar); VU (Laccadive); XU; XV/3W; XW; XZ; YA; YI; YK; ZC4/5B4; IS (Spratly); 4S; 4W; 4X/4Z; 70 (S. Yemen); 70 (Kamaram); 8Z4; 9K; 9M2; 9N; 9V; (Abu Ail).

ARRL Field Day

1800-2100Z Sat.-Sun., June 22-23

Without a doubt this activity generates more stateside participation in manpower than any other amateur radio activity. It is mostly a club-organized activity, and requires that the coordinator be knowledgeable about what is required.

Entries are separated into many classes. Rules and requirements are quite extensive and will be found in the May issue of QST. It is advisable that you read them thoroughly.

Official log forms are a must. Direct your request with a large SASE to the ARRL, ARRL Field Day, 225 Main St., Newington, CT 06111.

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450 Ohm	New! #16 19 str, CuClad, Poly, Windows	Call
300 Ohm	New! #18 19 str, CuClad, Poly, Windows	13¢
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72 Ohm Twin	New! #13 7 str, CuClad, Poly Twin	29¢
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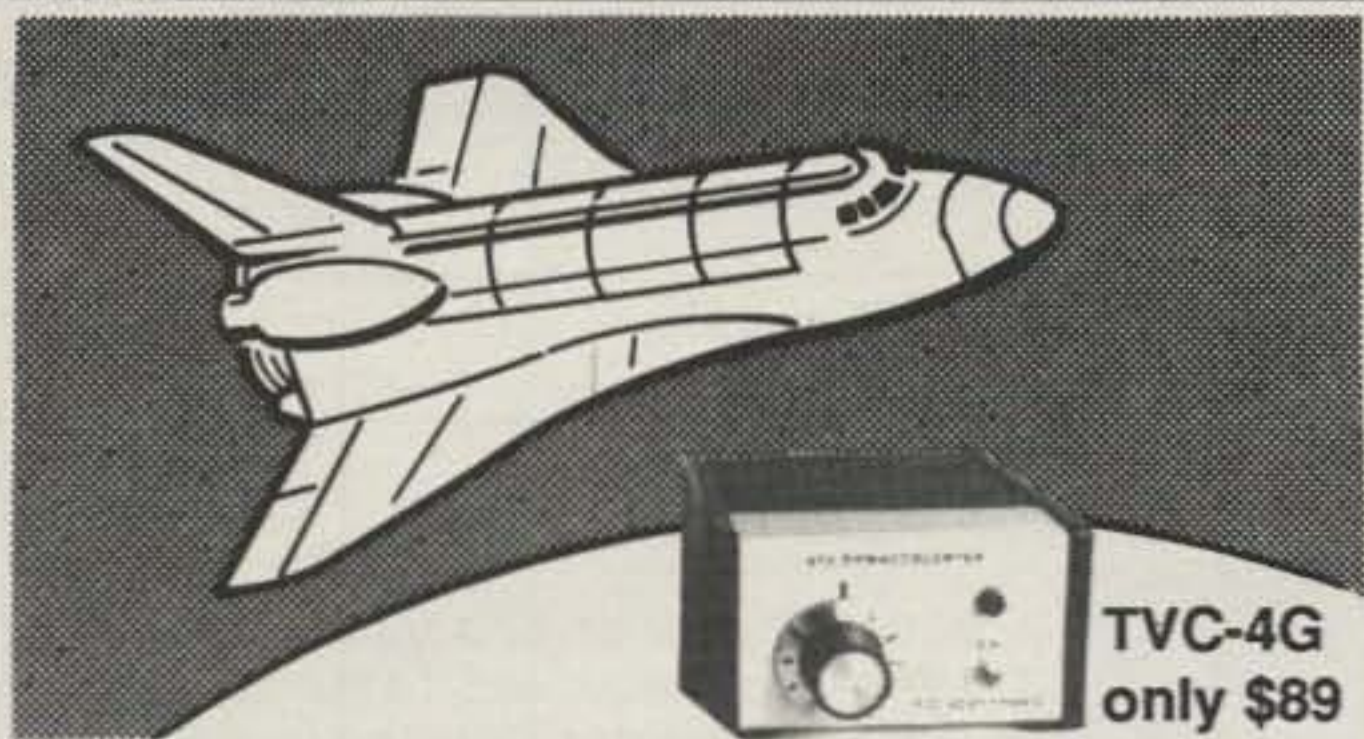
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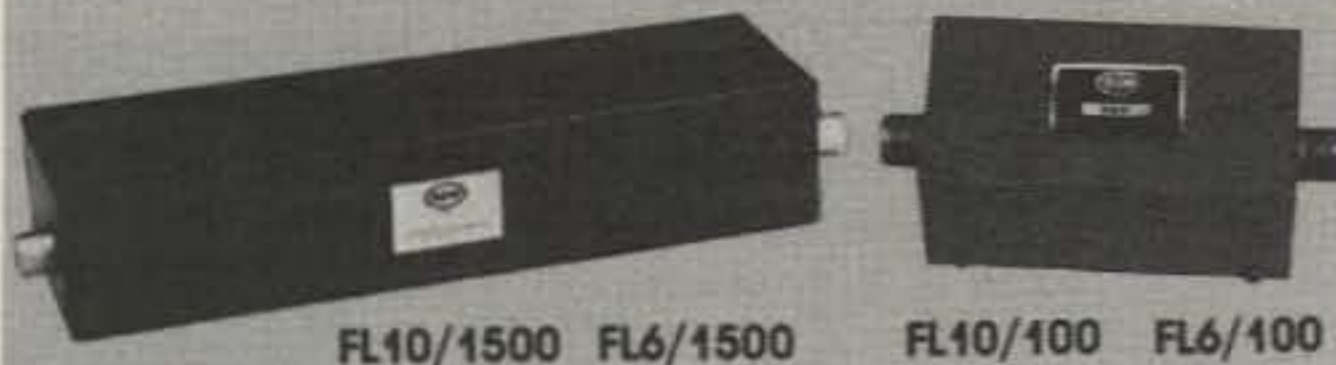
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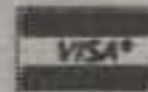


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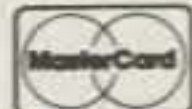
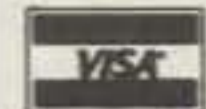
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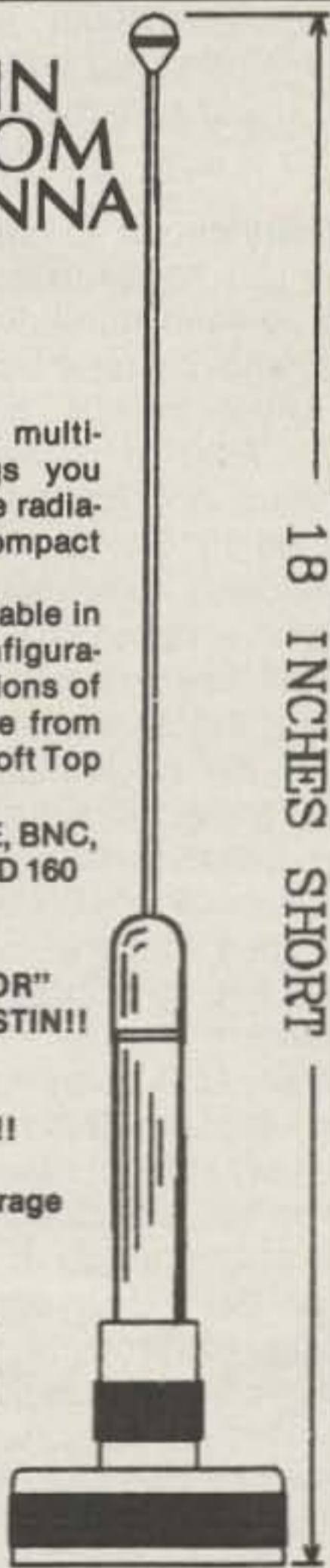
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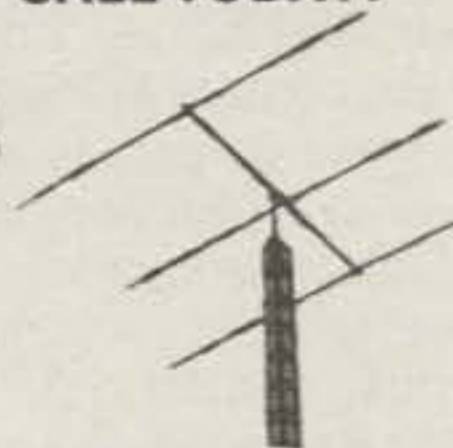
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Operating Split—Why and How

“He’s working split.” “Up, up, up!” “Wrong VFO.” These comments, often appended with various expletives and anatomically impossible suggestions, frequently accompany operations from rare locations. Less-experienced DXers may wonder why a DX operator would want to work “split,” as well as how best to call that station.

“Working split” means simply that the DX station is listening on a frequency other than that on which he or she is transmitting. On CW, the DX station typically listens up 1–3 kHz. On SSB, knowledgeable DX operators specify a particular listening frequency about 5–10 kHz higher than their transmitting frequency, or perhaps a range of 5–10 kHz, again beginning a short distance above the transmitting frequency.

What advantage does working split offer the DX station? One need listen to only a few pile-ups to discover that the calling stations often continue transmitting when the DX station comes back to a given station. When the stations calling cannot hear the DX station, they will often continue to call, call out of turn, or otherwise disrupt the on-going QSO.

By separating his transmitting frequency from that of the stations calling, the DX station is better able to maintain control of the pile-up, and thus is able to work stations more efficiently. In theory the stations calling will always be able to copy the DX station, no matter how many stations are calling out of turn, or transmitting when the DX station is transmitting. (In practice there are often a few stations who, due to lack of knowledge or an inadvertent error, transmit on top of the DX station.) As long as the DX station is “in the clear,” the stations calling can hear (and obey) the DX station, and more of them will have an opportunity to put this rare contact in their logs.

In some cases DX stations use split-frequency operation to circumvent incompatible frequency allocations. For example, on 40 meters amateurs in the US must restrict SSB operation above 7150 kHz. However, stations outside North and South America cannot transmit above 7100 kHz. Thus, for these amateurs to work US stations on 40 meter SSB, they must transmit below 7100 kHz



So you want to be a QSL manager? Bob Johnson, WB9YXY, leans on Ken Claerhout, KE9A/DU3’s December mailing of cards to the ARRL bureau.

and announce a listening frequency in the 7150–7300 range. The same situation can be seen with Soviet 75 meter operators, who cluster around 3642 kHz, listening within the US 75 meter DX subband 3775–3800 kHz. Also, Japanese topbanders are limited to a tiny window around 1910 kHz. Active 160 meter DXpeditioners know they must operate split, listening around 1910 kHz, to work JAs.

Split operation is not always necessary. If the DX station has a commanding signal, and not too many stations are calling at once, there is no reason to operate split. Listen to many contest pile-ups and you will note that good operators at well-equipped stations can manage even a major pile-up without resorting to split operation.

Also, split operation is not without its own set of problems. First, split operation uses up at least twice the bandwidth as “simplex” operation. While not a problem at this stage in the sunspot cycle, when the higher bands are wide open most of the time, the use of excess bandwidth can be a serious difficulty in the crowded DX bands when there are fewer sunspots. Use of excessively wide splits is another possible concern. A few years

ago a DXpedition to a rare South American island announced they were listening “up” on 20 meter SSB. The result was total chaos from 14200–350, disrupting nets, phone patches, ragchews, slow-scan TV, and infuriating amateurs around the world. If the DXpedition cannot handle the pile-up with a reasonably wide split range of 5–10 kHz, the operator should resort to additional means of restricting the number of stations calling—by geography, call area, or last letter of the call, for example.

A poor choice of listening frequency can disrupt communications in progress, and perhaps result in deliberate interference, or at least hard feelings against DXers. Any DXpedition that includes the Slow-Scan TV frequency of 14230 kHz within their listening range may find a strong carrier or their own transmitting frequency, for example. Another example of a poor choice of split frequencies is to transmit on 28495 kHz, within the US Novice/Technician subband, but listen above 28500, where the Novices and Techs cannot legally call.

Sometimes DX stations intentionally pick a transmitting frequency outside the US SSB subband to cut down on the number of stations who call on their frequency before discovering the station is working split. While this concept is a good one, it can lead to serious consequences, as during the Bouvet 3Y5X operation. The FCC sent out more than 200 notices of violation to DXers who accidentally transmitted on 14145 kHz. In fact, an FCC official confided to this writer that the FCC increases its monitoring of amateur bands during DXpeditions to countries on the Most Wanted list for just this reason.

This leads to yet another problem with split operation: DXers who transmit on the wrong frequency. With a modern, “dual-VFO” transceiver, or receiver-transmitter combination, a DXer can listen to either the DX station’s transmitting frequency or to the announced listening frequency. To operate split, the DXer first sets one VFO on the DX station’s transmitting frequency. After all, the DXer must be able to hear the DX station to know when to call. The DXer then sets the second VFO on the same frequency, switches over to split operation, switches to the second VFO, and tunes for the listening frequency. Next the DXer flips back and forth between the two VFOs to

The WPX Program

Mixed

1496	VE6LB	1500	KS1J
1497	DL3ECK	1501	NR4S
1498	JE1RRK	1502	JF2LUF
1499	KD9HT		

SSB

2231	A6FW	2234	NR4S
2232	HK3JJH	2235	HB9BGV
2233	KE7UH		

CW

2681	HB9BGV	2683	G4ZME
2682	PA3CBU		

VPX

268	10-711-RM	269	W0-20276
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WPNX

262	N1IBQ		
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Endorsements

Mixed: 450 VE6LB, JE1RRK, KD9HT, KS1J, NR4S. 500 VE6LB, JE1RRK, KD9HT, KS1J, NR4S. 550 VE6LB, DE1EWH, KS1J, NR4S, OZ-DR2044. 600 VE6LB, DE1EWH, KS1J. 650 VE6LB, DE1EWH, KS1J. 700 VE6LB, DE1EWH, KS1J. 750 VE6LB, DE1EWH, KS1J. 800 KS1J. 850 KS1J. 900 KS1J. 950 KS1J, KU0A. 1000 KS1J, OE1-0140, KU0A. 1050 KS1J. 1100 KS1J, W9IAL. 1150 IK2ILH. 1200 KS0Z. 1250 YU4BR. 1300 YU4BR. 1400 WB2YQH. 1450 N2AIF. 1500 N2AIF. 1550 N2AIF. 1600 N2AIF, SM6CST. 1650 N2AIF. 1700 N2AIF. 1750 W8UMR. 1850 YU3EO, W8UMR, N4UH. 1900 YU3EO. 1950 YU3EO. 2000 YU3EO. 2350 I1EEW. 2400 IT9TQH. 2450 IT9TQH, IN3ANE. 2500 IT9TQH. 2550 IT9TQH. 2600 IT9TQH. 2650 N9AF. 2700 N9AF.

SSB: 350 HK3JJH, W3YN, TY2FG, NR4S. 400 HK3JJH, W3YN, TY2FG, KZ5ZD. 450 HK3JJH, TY2FG. 500 OZ1DYI, KH3JJH, TY2FG. 550 HK3JJH, KW0U, TY2FG. 600 HK3JJH, I3CRW, W9GCH. 650 HK3JJH, I3CRW, W9GCH, KP4CZ. 700 HK3JJH, I3CRW, KP4CZ. 750 KB8DAE, WA4PMF, I7VEZ, HK3JJH, I3CRW, KP4CZ. 800 I7VEZ, HK3JJH, K2EEK, I3CRW, KP4CZ. 850 I7VEZ, KF4FP, HK3JJH, I3CRW, KP4CZ. 900 I7VEZ, HK3JJH, I3CRW, KF7RU, KP4CZ. 950 N2AIF, I7VEZ, HK3JJH, I3CRW, EA5FCO, KP4CZ. 1000 N2AIF, I7VEZ, HK3JJH, I3CRW, WB2PCF, KA0ZFX. 1050 N2AIF, HK3JJH, I3CRW. 1100 N2AIF, HK3JJH, I3CRW. 1150 N2AIF, HK3JJH, I3CRW. 1200 HK3JJH, I3CRW. 1250 HK3JJH, I3CRW. 1300 HK3JJH, AC3T. 1400 I2TZK. 1550 K4CKS, I2EOW, KD9OT. 1600 K4CKS. 1700 F2VX. 1800 F2VX. 1900 F2VX. 1950 F2VX. 2000 F2VX. 2050 F2VX. I1EEW. 2100 F2VX. 2150 NJ0C, F2VX. 2200 IT9TQH, F2VX. 2250 IT9TQH, F2VX. 2300 IT9TQH. 2350 IT9TQH. 2400 IT9TQH. 2450 IT9TQH.

CW: 350 PA3CBU, G4ZME. 400 PA3CBU, G4ZME. 450 PA3CBU, G4ZME. 500 W4TYU, PA3CBU, G4ZME. 550 PA3CBU, G4ZME. 600 DE0KHF, PA3CBU. 650 DE0KHF, LA6GI, PA3CBU. 700 DE0KHF, PA3CBU. 750 DE0KHF, PA3CBU. 800 DE0KHF, PA3CBU. 850 DE0KHF. 900 DE0KHF, OZ5EDR. 950 DE0KHF, OZ5EDR. 1000 DE0KHF, OZ5EDR. 1050 I1EEW. 1200 N2AIF. 1250 N2AIF. 1300 N2AIF. 1450 W8IQ, SM6CST. 1500 SM6CST. 1700 W8UMR. 1800 K8MFO. 1850 K8MFO. 2150 IT9TQH. 2200 IT9TQH. 2250 IT9TQH. 2300 IT9TQH. 2350 IT9TQH. 2400 IT9TQH. 2950 N6JV.

10 Meters: IK2AEQ, TY2FG, KE7UH, W9GCH, IK7DBB

15 Meters: KU0A, W9GCH, IK7DBB
20 Meters: W4TYU, W9GCH, IK7DBB
40 Meters: IK7DBB
80 Meters: IK7DBB

Asia: IK2AEQ, IK7DBB
Africa: G4MVA, IK7DBB
No. Amer.: YU3EO, TY2FG, KE7UH, IK7DBB
So. Amer.: WA4PMF, IK7DBB, AC3T, I2TZK
Europe: YU3EO, W4TYU, IK7DBB
Oceania: VE1RJ, WM0G, IK7DBB

Award of Excellence: I1EEW, I8RFD.

160 Meter Endorsement: I1EEW.

Award of Excellence Plaque Holders: N4MM, I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MJ, DJ7CX, DL3RK, W8YSJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA4TYM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GG, VK9NS, DE0DXM, DK4SY, UR2**, AB9O, FM5WD, I2DMK, W4BQY, I0JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, H18LC, KA5W, K0JN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, W8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMO, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KB0G, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, VED7WJ, YB0TK, VE7WJ, VE7IG, K9QFR, F4N2A, N2AC, W4UW, NX0I, W9NUF, N4NX, SM0DJZ, DK5AD, WB4RUA, DK5AD, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD.

Award of Excellence Plaque Holders with 160 Meter Endorsement: AB9O, FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, H18LC, KA5W, UR2**, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OU, W5AWT, KB0G, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YB0TK, W8ILC, W1BWS, VE7WJ, K9QFR, NN4Q, W4UW, K9QFR, NN4Q, W4UW, NX0I, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DE0DXM, VE7IG, K9BG, I1EEW.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ U.S.A. Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

The WAZ Program

Single Band WAZ

10 Meter SSB

381	N2KW	384	SM0JOO
382	DU9RG	385	K9EL
383	K9FD	386	FD1OZF

20 Meter SSB

833	K7OH	835	4X4JO
834	WB4UHN	836	OA4QV

40 Meter SSB

69	DU9RG		
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80 Meter SSB

57	JA4JBZ		
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10 Meter CW

106	N2KW	108	LA9ABA
107	DK9KX		

15 Meter CW

202	K9EL		
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17 Meter CW

2	K2TQC		
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20 Meter CW

394	JA3DTM	396	K9EL
395	G4MVA	397	K7JYE

30 Meter CW

1	JG6MQI		
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40 Meter CW

133	VE7DX	135	K9EL
134	WL7E		

80 Meter CW

28	PA0LVB		
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RTTY WAZ

60	JR1IJV	61	KN3P
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Phone WAZ

600	K5AVH		
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All Band WAZ

SSB

3706	K4HDX	3715	G3KLL
3707	AA0M	3716	VU2SMN
3708	K7LYT	3717	FD1NBU
3709	YC5OH	3718	WBAXI
3710	OZ1BLZ	3719	PA0JMJ
3711	OZ2MW	3720	KD2Q
3712	W7EYE	3721	JA6GT
3713	W6HCU	3722	IN3AHS
3714	N8DJX		

CW/Phone

6959	AA4JN	6970	PA3CBU (CW)
6960	KI9T	6971	LA2IE
6961	OZ5LN (CW)	6972	F6CXJ
6962	WW6J	6973	KA7WDM (CW)
6963	ON4ACG (CW)	6974	VK6ZH (CW)
6964	LA4BQ	6975	JA4BTD (CW)
6965	W1FYI	6976	HA4AHS (CW)
6966	W9YRZ	6977	WC5D (CW)
6967	K2ONP	6978	N4JQQ
6968	W7EYE	6979	W3DNA
6969	WS9U	6980	AA4EL (CW)

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (75 cents) size 4 1/2 x 9 1/2 to the WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Rd., Sudbury, MA 01776. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is \$4.00 for subscribers and \$10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

determine the exact location of the previous QSO, while continuing to monitor the DX station. The DXer tries to set the second VFO exactly on the frequency of the last contact, because the DX station's receiver must be set to that exact frequency. The DXer then flips back to the first VFO to listen for the "QSL, QRZ" from the DX station, whereupon, our DXer lets fly with his call sign. If, however, our DXer failed to turn the split switch on, he will transmit on top of the DX station, possibly out of band. The call is wasted, of course, as the DX station isn't listening on his own transmitting frequency. Further, the other DXers in the pile-up will get upset, as transmitting on top of the DX station may prevent their hearing the DX station

come back to their call. Finally, if the DX station's transmitting frequency is out of the US subband, this improper transmission may result in a QSL from the FCC!

This skill of flipping back and forth between two frequencies is one of the most useful, but difficult to master, of all the DX craft. Even experienced DXers occasionally transmit a short call on top of a DX station in the heat of battle. Many DXers could benefit from making a short checklist and posting it next to the rig to help ensure that all switches are properly set before transmitting.

Sometimes DXers transmit on the DX station's transmitting frequency because they don't take the time to determine where he is listening. This violates one of

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5 Band WAZ

As of February 28, 1991, 310 stations have attained the 200 zone level.

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JR6PGB	LA4HW
JA1UQP	JA7FWR

The top contenders for 5 Band WAZ are:

N4WW, 199	RT5UY, 199
SP9PT, 199	K7UR, 199
K6YRA, 199	K9EL, 199
PY7ZZ, 199	NA0Y, 198
DL9WW, 199	I8IGS, 198
K0CS, 199	VE7DX, 198
KB0G, 199	W0PGI, 198
ZS6BCR, 199	VE7AHA, 198
HA8XX, 199	SM6AHS, 198
UA4RZ, 199	K1ST, 198
AA4KT, 199	W1JR, 198

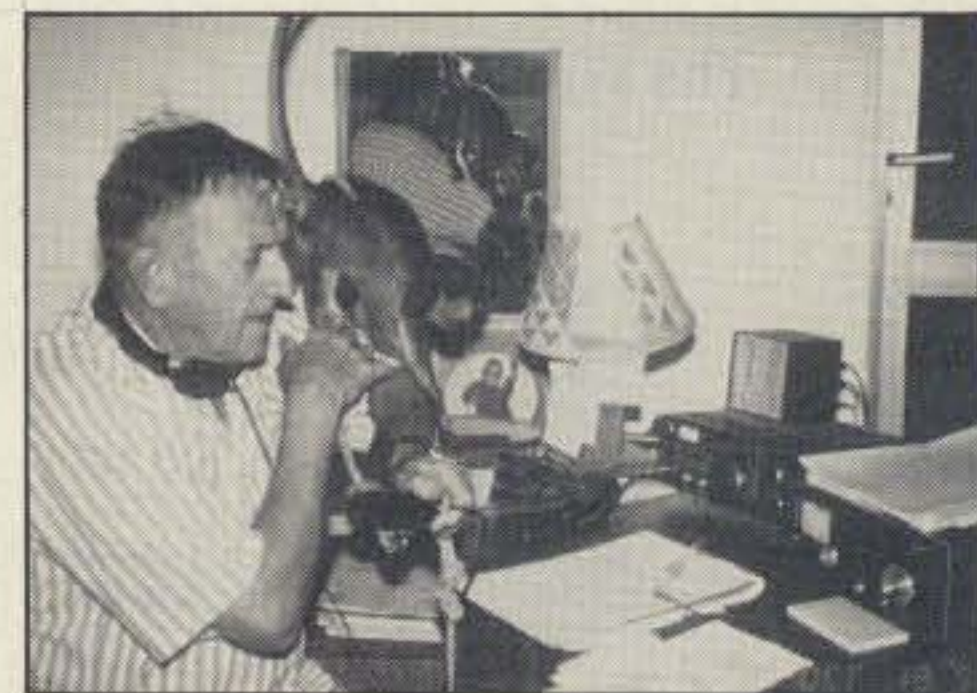
704 Stations have attained the 150 zone level as of February 28, 1991.

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (75 cents) size 4½ x 9½ to the WAZ Manager, Jim Dionne, K1MEM, 31 De Marco Rd., Sudbury, MA 01776. Applicants should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is \$4.00 for subscribers and \$10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

the cardinal rules of DXing: Listen First. An astute DXer will listen on the DX station's frequency first for possible "simplex" operation. If he doesn't hear any stations calling, he will then start tuning up the band, listening for the pile-up. There is really no excuse for jumping on the DX station's frequency without first listening, or even for asking "Where's he listening?" Listen first!

There are two other solutions that can totally eliminate the problem of transmitting on the wrong VFO. The expensive, high-tech approach is to buy one of the state-of-the-art, true dual-receive rigs, such as the ICOM IC-781, Kenwood TS-950, or Yaesu FT-1000. Then you can listen to the pile-up, listening frequency, and the DX station's transmitting frequency at the same time, and never accidentally transmit on the wrong one. (You still have to set all the controls properly, of course.)

The low-tech approach is to wire an outboard receiver to your rig. Set this receiver on the DX station's transmitting frequency. Since the transceiver is set on the listening frequency, you can't possibly transmit on the wrong frequency. This final approach is also the solution to the last problem of split-frequency operation: not everyone is equipped for it. Many DXers use less-expensive rigs which lack a "second VFO," and thus cannot oper-



Eric Biorck, WZ6C, monkeyed around on the bands from western Sudan, operating /ST4. Eric has started a four-year tour in Bangladesh S2 and hopes to be very active. QSL to W4FRU.

ate a SSB split of more than a couple of kHz (the range of the RIT). An inexpensive out-board receiver can provide these DXers with split-frequency capability, while simultaneously eliminating the chance of getting an unwanted QSL from the FCC.

DX Events in June

Islands On The Air (IOTA) enthusiasts should watch out for KL7AF early in the month. He's planning a return visit to Sitkinak Island (NA-53) for about three days, weather permitting. He has also set his sights on Barrens Island and Chirikof Island in the Semidi group (NA-??) later in the summer. The winds at Chirikof have been clocked at more than 120 mph, so this IOTA DXpedition is very dependent on favorable weather!

Four Soviet DXers plan their own IOTA DXpedition to Solovetskiye Island (EU-??). Look for **RZ10A/A**, **UA10ID/A**, **UZ10WA/A**, and **UA10BA/A** June 2-9. QSL this operation to Serge S. Sadakov, RA10A, P.O. Box 48, Arkhangelsk 163040 USSR.

VHF DXers will get shots at a couple of



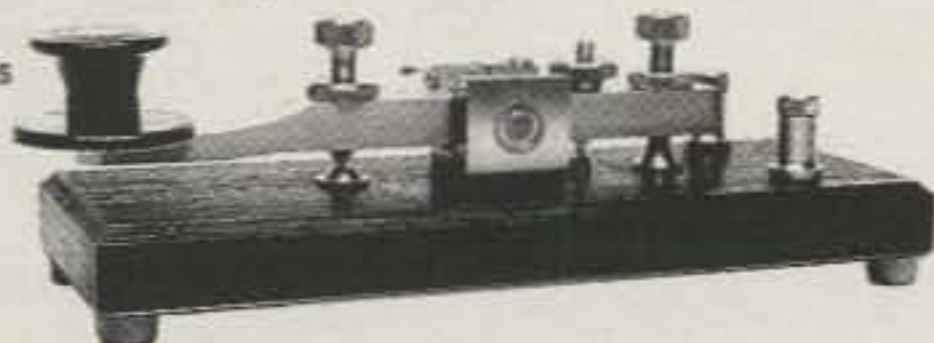
Florence, F6FYP, operated as TJ1YL from Cameroon in February. Florence and husband Sylvio, F6EEM/TJ1CW, plan a return trip to the African country to train local amateurs. QSL to F6EEM or via the French DX Foundation.

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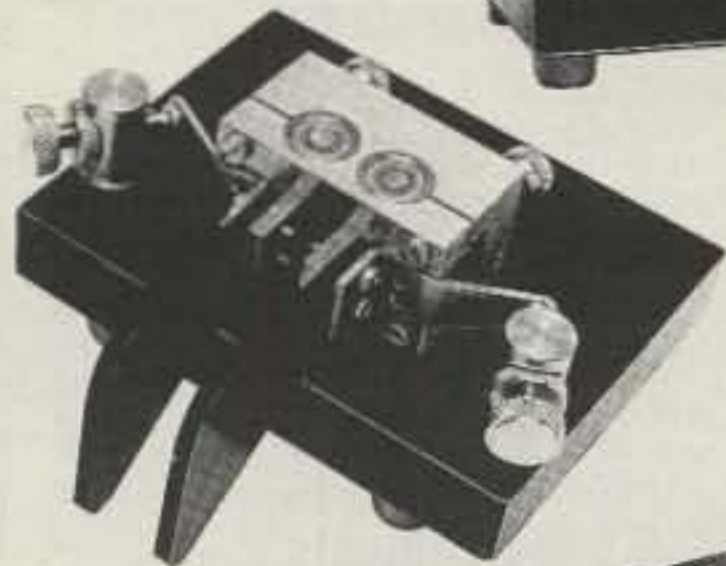
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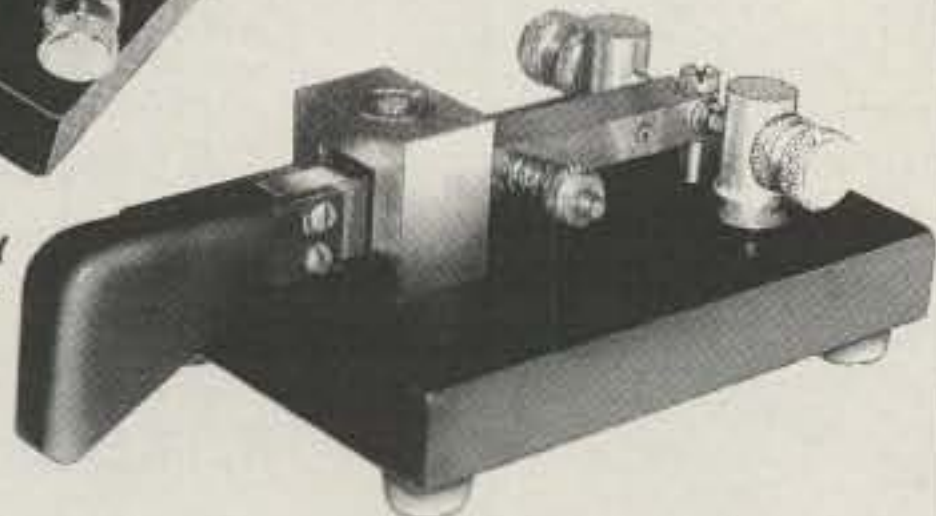
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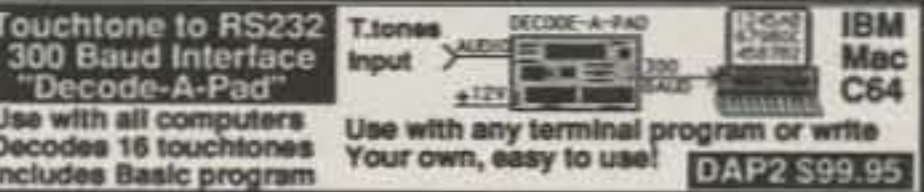
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Peripheral devices



Duplexer (HS-790) HF~146/446MHz
SWR meter (MR-1000) 3.5~160MHz
mobile base for mounting station (FM-101)

Dual-band antennas

● WX series (For base station)

MODEL	FREQUENCY	GAIN	LENGTH
HS-WX1(N)	146/446MHz	4.5/7.2dB	5'11"
HS-WX2(N)	146/446MHz	6.0/8.0dB	8'8"
HS-WX4(N)	146/446MHz	7.8/10.8dB	13'9"

● HG series (For automobiles)

MODEL	FREQUENCY	GAIN	LENGTH
HG-400	146/446MHz	3.2dB(446MHz)	1'2"
HG-800	146/446MHz	2.7/5.1dB	2'6"
HG-1000	146/446MHz	3.0/5.5dB	2'11"
HG-1100	146/446MHz	3.5/6.0dB	3'5"
HG-1500	146/446MHz	4.5/7.2dB	4'10"
HG-600B	146/446/900MHz	1.9(446MHz) /3.6dB(900MHz)	1'1"
VM-720B	146/446MHz	3.0/5.5dB	3'06"

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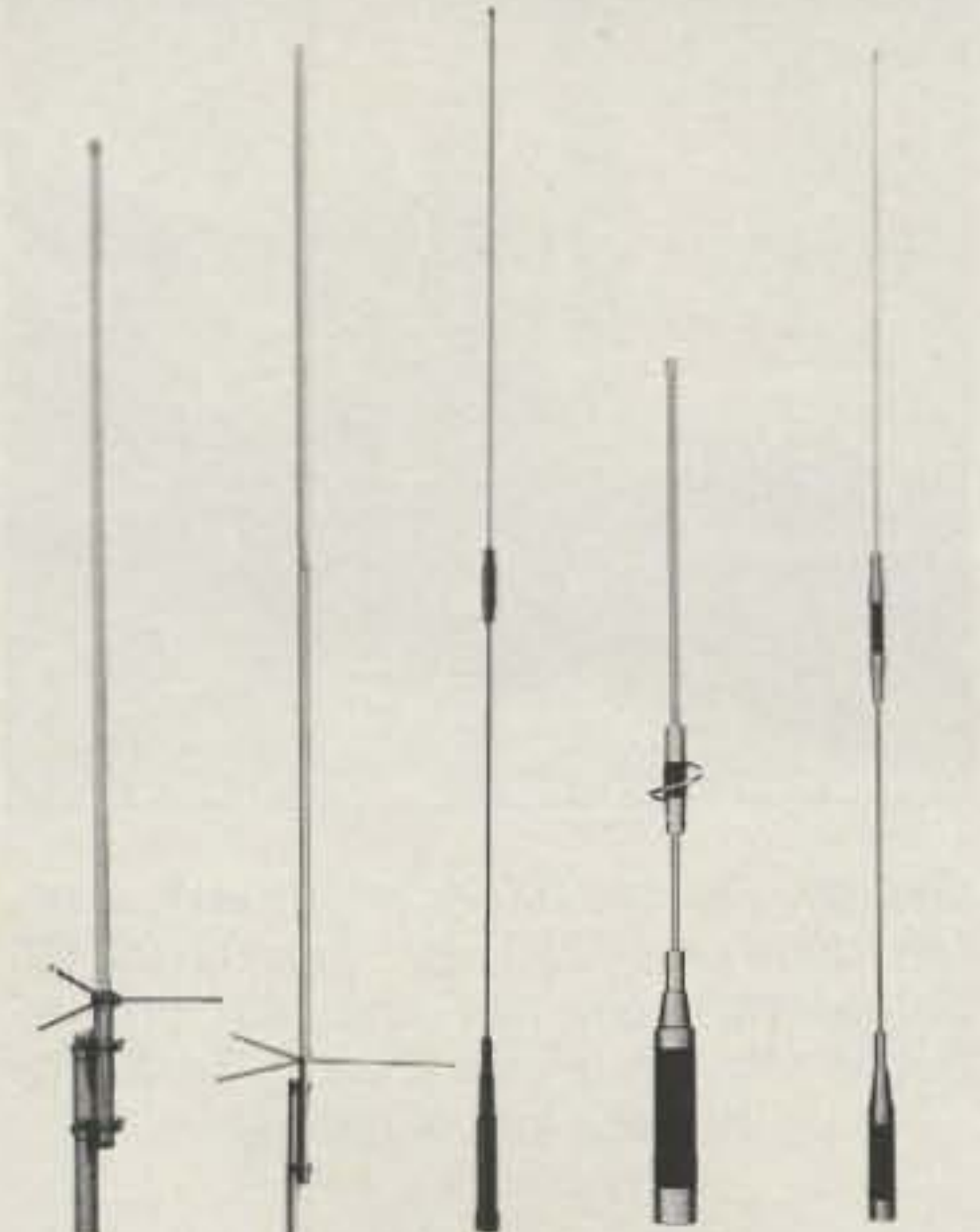
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Telex: 3722581 HOKDOL J



HS-WX1 HS-WX4 VM-720B HG-400 HG-1000

The WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, file will be made inactive. Lifetime Honor Roll fee is \$4.00 (U.S.) for each mode, with no fee for additions.

MIXED

4112	YU2AA	2324	YT7DX	1752	4N7ZZ	1393	NV9S	1058	KA5TOF
4019	F9RM	2313	IN3ANE	1740	N7JM	1392	AC2J	1041	I5ZTC
3611	K2VV	2312	I2UIY	1740	W8UMR	1390	G4OBK	1040	W9IAL
3024	EA2IA	2311	I1EEW	1704	I2EOW	1382	W7CB	1035	VE3NUP
3009	K6JG	2308	I6SF	1698	K9LJG	1360	WB2YQH	1032	IK2FCZ
2992	VE3XN	2288	W1BWS	1698	K2OLG	1351	YU7DR	1032	K9BQL
2955	YU2TW	2270	SM7TV	1695	DK5AD	1329	F1HWP	974	F6CDJ
2877	K6XP	2228	YU2NA	1680	HA0IT	1313	YU4BR	958	W3KH
2850	W4BQY	2219	K9BG	1664	WE2L	1286	AI6Z	931	NJ1T
2805	N6JV	2201	HA0DU	1645	W6OUL	1280	PY2DBU	901	W5ASP
2761	PY1APS	2178	YU7BPQ	1640	WA1JMP	1276	I0AOF	878	WB2PCF
2740	N4NO	2177	4X4FU	1589	YU2CQ	1236	AK0G	860	WM0G
2740	K0BLT	2064	IT9QDS	1584	I1ZEU	1195	JA1WJ	850	I1ZQD
2664	YU1AB	2061	K5UR	1579	SM6CST	1192	KS0Z	848	IK2BHX
2657	WA8YTM	2058	I2MOP	1566	KB0G	1191	YU1PJ	827	YU7FT
2651	N4MM	2042	SM6DHU	1557	I1WXY	1185	VE7EIK	823	W4USW
2650	N9AF	2041	YT3AA	1550	YT7WW	1179	WD9IIC	816	RB5MP
2631	PY4OD	2035	SM0AJU	1544	WB8ZRL	1174	WB3DNA	792	N6IBP
2630	W9DWO	2004	KF2O	1533	YU3NU	1162	DF4ZL	786	WK0B
2606	I2PJA	1996	W2FXA	1516	DF6EX	1158	LZ2JE	765	W6LC
2534	IT9TOH	1994	HA8XX	1496	VE3FXR	1155	K3UA	732	N3KR
2508	SM3EVR	1988	W0SFU	1470	W9IL	1155	I2EAY	693	IK2ILH
2485	PA0SNG	1982	UA3FT	1463	WB4RUA	1146	YU3PG	663	VE7CBH
2387	KA5W	1955	I1POR	1440	YB0TK	1140	KI3L	658	VE3OMM
2375	I8YRK	1895	KL7AF	1435	LA7JO	1095	5H3RB	656	IK2BLA
2374	YU7SF	1843	W4UW	1413	YU7RU	1075	NX9H	638	DL6UQ
2357	N2AC	1811	I2DMK	1405	VE1RJ	1065	YV7QP	636	5Z4BH
2325	YU7BCD	1752	K9QFR	1405	N2AIF	1064	G4SDJ	602	W9GCH

SSB

3941	F9RM	1979	I2UIY	1489	4X6DK	1108	LU7HJM	922	G4OBK
3485	I0ZV	1971	KA5W	1479	XE1OX	1106	IK7DBB	910	KB0G
3107	K2VV	1942	W9DWO	1448	KL7AF	1090	AG2K	908	K8MDU
2989	ZL3NS	1898	PY4OD	1403	I2TZK	1084	K8LJG	907	N6CGB
2837	VE1YX	1884	WF4V	1386	EA2AOM	1076	W0ULU	902	NG9L
2733	K6JG	1858	YU7BCD	1385	IK5ACO	1070	I8LEL	899	KC2FC
2647	K2POA	1844	WA4QMO	1381	CT1BY	1067	IT9JKY	891	NE6I
2560	K6XP	1822	HA8XX	1371	CT1AHU	1066	LU8DY	886	K9BQL
2490	WD8MGO	1795	W3ARK	1357	N6FX	1056	G4SDJ	881	VE3FXR
2458	I2PJA	1770	EA8AKN	1352	KK0LK	1049	WA2FKF	856	K2EEK
2405	N4MM	1766	I5ZJK	1332	F1HWP	1046	I2WZX	855	AI6Z
2388	I0AMU	1762	K5UR	1324	YU7SF	1038	FE6FNA	850	IK2AEO
2381	IT9TOH	1744	EA3AQC	1309	KE6KT	1031	W5ILR	844	IT9ONV
2358	W0YDB	1738	YU2NA	1267	N2AC	1025	W3GXX	829	KA9TOF
2345	CT4NH	1713	KF2O	1260	K2POF	1019	CT1CQK	829	KB4HU
2267	ZP5JCY	1711	W4UW	1233	K9LJN	1010	EA1AK	805	K3UA
2234	I6ZJC	1688	CT4UW	1219	WB8ZRL	1010	CT1DIZ	762	WM0G
2221	OZ5EV	1673	EA4KK	1211	CX6BZ	1004	K3IXD	749	EA3FHT
2215	I8YZP	1654	I8KCI	1204	I8WYD	999	IK2DUU	707	I6KYL
2194	EA2IA	1647	HR1KAS	1201	YV1CP	994	KA0ZFX	699	KA9MOM
2166	W4BQY	1635	K9QFR	1190	AB9O	988	W5ULU	697	A41JV
2150	I4ZSQ	1633	KC8YM	1179	IK8GCS	987	WB6SRK	697	YV7QP
2119	PA0SNG	1622	K5RPC	1167	KB0C	985	I7VEZ	695	NM5Y
2117	I4CSP	1617	PY4OY	1162	HK6BER	983	I3ZSX	654	YU1PJ
2096	N4NO	1603	SM0AJU	1145	PY4VX	969	HP6AYV	650	SM6CST
2090	WA8YTM	1572	I1POR	1138	N2AIF	961	KF7RU	646	KB8DAE
2072	NJ0C	1568	KD9OT	1134	WN5MBS	944	W5AWT	643	SV0FC
2067	I8YRK	1566	I2EOW	1125	HA0IT	944	5Z4BP	627	KA5RNH
2039	I2MOP	1555	LU8ESU	1121	IK2AVH	941	KB2DE	609	VK5NVW
2024	I1EEW	1541	WE2L	1115	DK5WO	926	K8ZZU	605	TU2UI

CW

2969	K2VV	1698	KA5W	1342	F6HKD	1088	DL3HBX	881	YU1PJ
2884	WA2HZR	1667	VO1AW	1338	G4UOL	1086	OZ5UR	874	N4IR
2783	N6JV	1637	K5UR	1329	HA0IT	1075	AK9Z	867	KA1CLV
2714	ON4OX	1633	IT9VDO	1329	LA9XG	1047	I1EEW	857	W9IAL
2554	VE7CNE	1586	KA7T	1321	KF2O	1046	NF5Z	849	IS0FIC
2497	N4NO	1543	I2UIY	1320	I7PXV	1043	G4OBK	837	NE6I
2345	IT9TOH	1515	N4YB	1303	N2AIF	1042	W5AWT	837	JJ1FSK
2319	PY4OD	1510	DJ4XA	1295	I8YRK	1035	SM5DAC	808	WE2P
2287	W3ARK	1509	VE7DP	1243	G4MVA	1033	KQ8J	801	IK2ECP
2258	K6JG	1471	YU2NA	1243	KB0G	1029	AI6Z	766	AH6JF
2240	EA2IA	1452	SM6CST	1227	G3VQO	1029	IK3GER	729	JA0BSL
2208	YU7SF	1444	KL7AF	1222	YU2CQ	1021	VS6UW	712	PY4WS
2201	W4BQY	1444	T14SU	1206	W6OUL	1012	YU3PG	707	W4UW
2166	W9DWO	1438	YU3NU	1205	I2IWM	1000	I2EAY	695	RB5MP
2166	K6XP	1438	I2DMK	1194	VE3FXR	999	HA5LZ	695	WB5MTV
2123	N2AC	1433	N6FX	1190	HA8XX	988	VE4CE	646	JO1QUB
2063	I6SF	1419	SM0AJU	1187	OK1CZ	959	WB8ZRL	633	K9OFR
2024	I1YRL	1404	VE1RJ	1186	DJ1YH	933	K3UA	629	W8LRY
1990	WA8YTM	1392	W8IQ	1183	LA9XG	923	YU4BR	628	AA6AY
1926	4X4FU	1389	W9PWM	1179	K8LJG	910	NJ1T	606	KA5TOF
1922	LZ1XL	1371	G4SSH	1161	ZS6BCR	885	N4RNR	603	NU7V
1852	YU7BCD	1369	K9LJN	1121	G3EZZ	883	IK0ADY	600	VE3OMM
1758	N4MM	1348	W1WAI						

CQ DX Awards Program

SSB

1847	VU2CVP	1853	CT1CDP
1848	YC0MCA	1854	HJ3MCM
1849	YV5IVB	1855	CT1AHU
1850	K3GYS	1856	W4USW
1851	N4WPG	1857	OA4QV
1852	HA5NK	1858	WB/DL2SCA

CW

821 F1MNV

SSB Endorsements

320	WA4ECA/320	275	YV5IVB/282
310	VK4LC/319	275	VU2CVP/278
310	KB4HU/319	250	CT1AHU/255
310	KA9ABC/317	200	HA5NK/240
310	I8XTX/317	200	K2EEK/232
310	DU9RG/316	200	OA4QV/213
310	OE2EGL/316	150	W4USW/173
310	K8NWD/312	150	YC0MCA/158
310	KZ4V/310	150	CT1CDP/154
310	W0ULU/310	28 MHz	YC0MCA
300	KB1JU/304	28 MHz	WB/DL2SCA
275	K3NEE/294	3.5/7 MHz	HJ3MCM

CW Endorsements

320	K6LEB/320	300	KZ4V/304
310	N6CW/318	275	KB9XG/278
310	EA2IA/314	200	KM5R/226
310	I5XIM/314	3.5/7 MHz	KM5R
310	IT9ZGY/313		

RTTY Endorsement

200 N6CGB/201

Total number of active countries is 322. A new CQ DX RTTY award is now available. The basic award fee for subscribers to CQ is \$4. For non-subscribers, it is \$10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are \$1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.



George Shpack, UZ6AZW/RA6AW, is often found on 14250 kHz from 03-0900Z Saturdays, from this antenna farm in Sochi, on the Black Sea. (Thanks to W1HZZ for the photo.)

DXCC countries in coming weeks. Five operators from the Carolina DX Association will operate from the western tip of Bermuda Island in grid square FM-72 June 5-11. Look for **WA4VCC**, **K4MQG**, **AA4SC**, **AA4R**, and **WD4R**, all **/VP9**. They'll be on 6 meters, 2 meters, and the amateur satellites, as well as the HF bands, including the new bands. On 6 meters watch 50085 kHz, as well as the 6 meter international coordination frequency of 28885 kHz. During the ARRL VHF QSO Party June 8-10 the group will operate as **WA4VCC/VP9**. QSL to operators' home callsigns. Somewhat farther north, F6GOX will join a scientific team on an expedition to Greenland July 1 to August 31. He'll operate as **OX91REF** on SSB and CW. He'll also run a beacon on 6 meters. Check 50100 kHz for "VVV de OX91BCN QTH 74N 24W PSE QSL F6AJA." On HF try 3790, 7042, 14120/195, 21295, and 28495 kHz on SSB, and 1830, 3510, 7010, 14010, 21010, and 28010 kHz on CW.

Mexico Convention

The Asociacion de Radioaficionados de la Republica Mexicana holds its 19th convention July 11-13 at Zacatecas, Mexico. In addition to the amateur radio activities at the headquarters Aristos Hotel, there are several walking and sightseeing tours of the historic area, and maybe even a bull fight. For more information, contact the group at P.O. Box 624, CP 88500, CD Reynosa, Tamps, Mexico.

Costa Rican Prefix Change

The following was received from Costa Rican authorities.

"The Costa Rican Law #6995 of July 22, 1985 has been declared unconstitutional by the Costa Rican courts. The 1954 law relating to amateur callsigns has been reinstated.

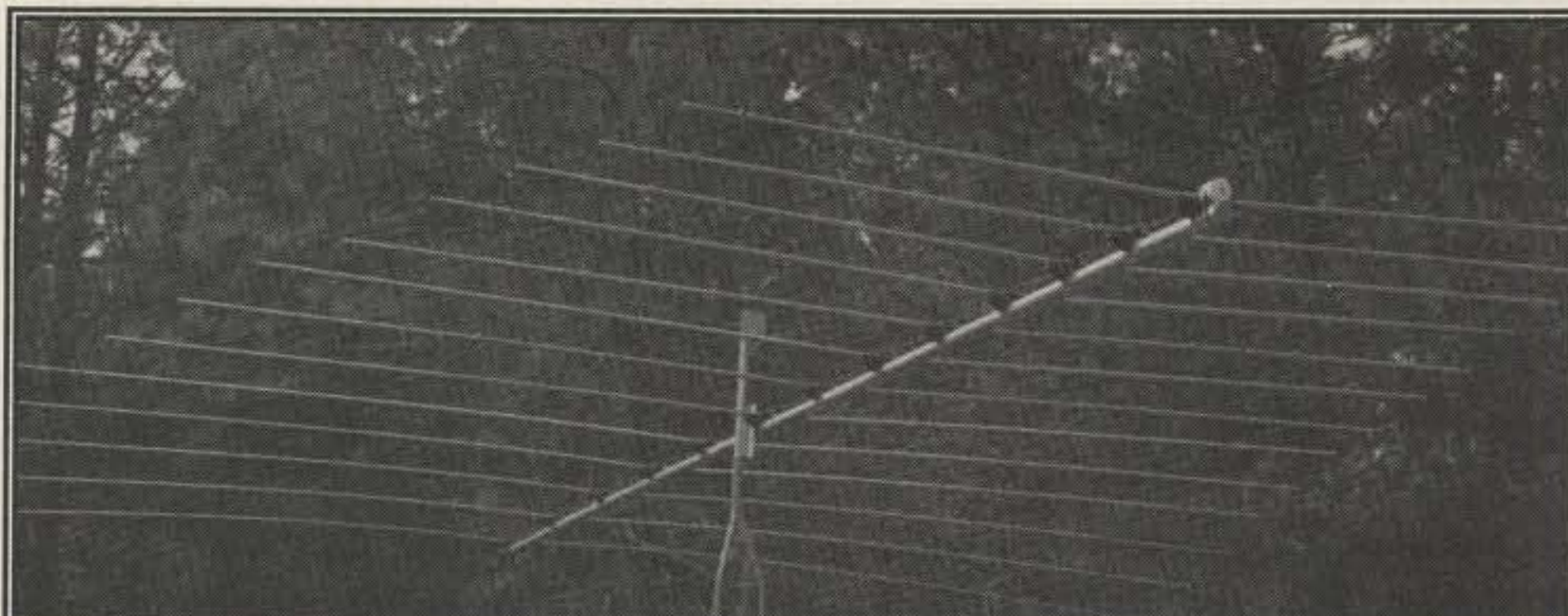
"Under the 1954 law the following prefixes are the only ones which are legal for Costa Rican (TI) amateur operation: T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, which are followed by 2 or 3 letters. The prefix assignment is T12 to T18 for provinces, T19 Cocos Island, T10 Radio Clubs, T11 for special events.

"The use of the TE prefix is illegal under present law. The TE prefix is strictly a commercial station assignment and is not to be used by amateurs. Nor are any TI prefixes which have two or three numbers with or without a following letter(s) suffix legal for amateur use.

"Prefixes such as T150, T154, T1100, etc., are now illegal for amateur use as well as any TE prefix."

Therefore, effective 1 April 1991, these prefixes will no longer be acceptable for the WPX Award.

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CIRCLE 49 ON READER SERVICE CARD

DIGITAL METERS

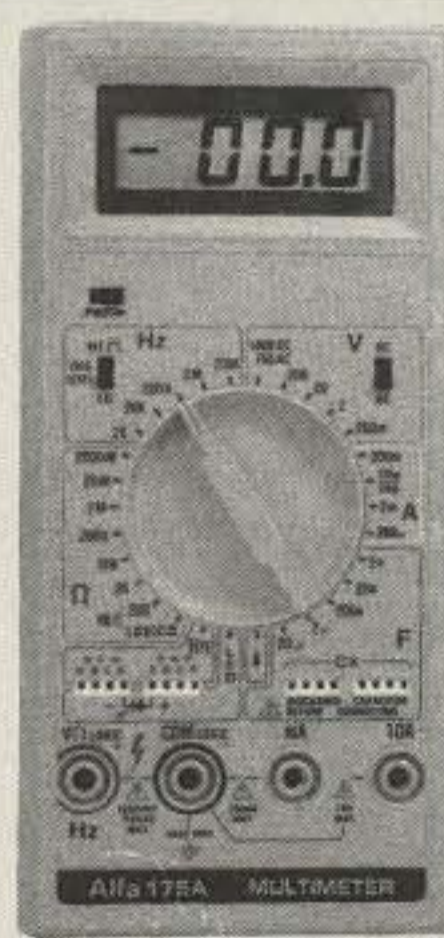


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Most Versatile DMM**

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- Capacitance: 1pF - 40 μ F
- Temperature: -40 - 302 $^{\circ}$ F
- Frequency: 1Hz - 4MHz
- Logic test: 20MHz
- Diode test
- Continuity beeper
- Volt, current, ohm
- 3999 count display
- Peak hold
- Auto power off



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**20MHz
Frequency
Counter**

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1 Hz - 20 MHz
- Logic test 20 MHz
- C: 1pF - 20 μ F
- .1 Ω - 2000 M Ω
- Volt, current, continuity
- LED, diode, hFE tests

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CIRCLE 66 ON READER SERVICE CARD

Those prefixes which have been claimed for either Regular WPX or Honor Roll prior to 1 April 1991 will remain credited. They will be removed from Honor Roll credits under Honor Roll rules A and B, after the two-year grace period allowed under current WPX rules expires.

QSL Notes

Charlie, **KY0A**, reports that he is *not* the QSL manager for YO3CD. He has *some* of the stateside logs from the **VU7NRO/APR** Laccadive operation in Feb.-Mar. 1989.

Some new callsigns in Argentina: **LU1CQ** is ex-LU1BTL; **LU3CQ** is ex-LU3AJW; and **LU7CQ** is ex-LU1BAB.

K1RH is no longer QSL manager for **TF3CW**. QSL TF3CW direct. Ralph also notes that the **SU1EE** and some **9Q5EE** logs are temporarily unavailable due to computer problems. Please be patient and don't re-QSL.

Dim, **UZ3MWD**, says his address in the *Callbook* is wrong. His correct address is Box 80, Yaroslavl 150000 USSR.

Frank Smith, AA7FM, reports that all the **OJ0/KF7PO** and **OJ0/N7BG** direct QSL cards have been mailed, as of Jan. 31.

WB4FNH reports he is the QSL manager for **ZF2BR**, **VK3CAT**, **WB4FNH/OE3**, and **4U1VIC** for the period June 22-27, 1990 *only*.

QSL the special Canadian prefixes of **VX2FSU** and **VX2DRN** (Jan.-Feb. 1988); **CF2FSU** and **CF2DRN** (Mar.-Apr. 1990); **XM2FSU** and **XM2DRN** (Sept.-Nov. 1990); and **CG2FSU** and **CG2DRN** (Feb. 1991) to the respective home calls: VE2FSU and VE2DRN.

Many DXers report that it is easier to get a **V31BB** QSL card, since V31BB passed away. Contact Gordon Silverman, N3ADC, 77 Homestead Road, Levittown, PA 19058.

JR1AIB now has the **YI1BGD** logs for

QSL Information

3D2QH to SM3CER
3D2WZ to G3WZ
3DA0BJ to AA4RL
3X1SG to ON6BV
4K1A to UZ1PWA
4K1F to UA1AFM
4K2BDA to UA9MA
4K2BDU to UA9MA
4K2OIL to UA9MA
4K4/UA0KBZ to UA0KBZ
4K4QD to RA1QQ
4S7EF to N1HBF
4U/OH7XE to OH7XE
5B4A8H to OE4KHB
5V7DP to KA1DE
5W1IU to JA1WHG
6Y5DA to VE4JK
7Q7RM to K6KII
7S30WG to SM3CVM
7X2CR to IS9LYN
7Z1AB to WB2WOW
8P6NX to W0SA
9H3JR to DJ0QJ
9J2B0 to W6ORD
9J2WS to 9L1WS
9L/HB9AU to HB9AU
9L1US to WA8JOC
9M2HB to AA6BB
9M2NA to VE3CHZ
9M6HF to WE2K
9M6OI to DJ4OI
9M6UY to DK7UY
9M8AJ to AA5AZ
9M8GB to DJ1UJ
9M8WB to DK7UY
9Q5TE to 5M0BFJ
9Q5UN to OH3GZ
9U5QL to YASME
9V1YQ to K2QBV
9X5NH to DJ6EA
A22GH to G3KMQ
A7/VE7DGM to DA2CF
A7/VE7GCK to VE7GCK
A71AM to DJ9ZB
A71CD to WA4JTK
A92FL to WD4DCY
BV2DA to DL7FT
C30CAG to F6GIN
C30ERA to F6GIN
C31SD to CT1AMK
C56/G3YJH to G3YJH
CQ4DX to CT4DX

CR8CQK to CT1CQK
CU2DX to CU2AA
D68JM to WV4F
DU7/N7ET to N7ET
EA8/G0HRC to G4VIX
ET2A to WB2WOW
FK8FU to NA5U
FM/F6HMQ to F6HMQ
FM5WD to W3HMK
F00IGS to F6EEM
F04NR to F6ELE
F04NS to FD1PLR
FT4WC to F6GVH
FY5FP to ON4ZD
HF0POL to KB6GCX
HK0/N3JT to W2GHK
HK0KY to WB9NUL
HL9EN to N5PYG
HZ1HZ to N7RO
J28NU to F6FNU
J37M to W9VW
J39BS to WB2LCH
J6LTA to NI4M
JA9AG/V85 to JA9AG
JH0BBE/JDI to JH0BBE
JW0GB to WB4ZBI
JW1MFA to LA1MFA
JW9VDA to LA9VDA
K1RH/1HB to K1RH
K8MFO/6Y5 to W8TPS
KC4USV to W6RPD
LU7FJD to LU9FHF
LX2PA to PA3DK
0D5MM to HB9CYH
0D5SK to KB5RA
0H0BBF to OH2BBF
0X1CW to TF3CW
0X3EW to KB5LRO
P29AC to VK8AC
P29CG to N9FIV
P29DK to KE4EW
P29SC to WB1GWB
PJ8MM to K1MM
PY8RC to PY5MM
RB5FF to UO5WU
RB5LUK to UB4LWA
RH8E to W5BWA
RH8Y to UH8EA
RH1E to RC2AR
RJ8J to UJ8JMM
ST0DX to WB2WOW
ST2/PABGAM to PA0GIN

SV00V/9 to WB4TDB
SV00V/9 to WB4TDB
SV2ASP/A to SV2UA
T20AA to N4FJL
T21CE to DJ9ZB
T22YL to DL5UF
T300Q to DL5UF
T30DR to DL2GBT
T30DS to DJ9ZB
T30DT to DL9MFU
T30NAD to JO1CRA
T31AF to DL2MDZ
TA2/FR6F0 to WA2NHA
TG9TSS to K3BYV
TJ1BJ to K4UTE
TJ1CW to F6EEM
TK5XN to YU1FW
TL8MB to F6FNU
TR8JWH to G4TWT
TY1DX to IK6FHG
TY2LS to IK8DOI
TZ6VV to N0BLD
UF0FWW to UF6FFF
UF6DZ to UB5PS
UF6V8Z to WF2S
UG6CAW to F6GIN
UH1E/RA3QJ to RA3QK
UH8EA to W5BWA
UI8ZAA to K9FD
UI9BWF to UA3TT
UL7EZ to KE9RY
V31DX to KA6V
V31GM to K8CMO
V47RF to WA2SPL
V51E to K8EFS
V63JC to KC6JC
V73BY to KX6BU
VE3SNL/A7 to DA2CF
VK0ML to VK5AH
VK0ML to DJ5CQ
V05AW to VO1AW
VP2EXX to KC8JH
VP2EY to HB9SL
VP2V/VE5RA to VE5RA
VP2VI to AB1U
VP2VM to KU2Q
VP5VAA to WS4E
VP5VDI to K1RIF
VP8CDJ to GM4KLO
VP8CEM to GM4KLO
VP8GAN to GM0LVI
VP8GAV to GM0LVI

VQ9AB to WB4ECR
VQ9WM to K7IOO
VS6WW to K6KQN
VU2GI to N2HOS
WE6C/BV2 to WU6X
XF0C to XE1BEF
XQ0X to CE3ESS
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ZX0RN to PY2MXX
ZX7TR to PS7AB
CU3LF to Mike Lazaroff, PSC Box 1687, APO NY 09406
CX4PA to CX4PA Carlos, Box 64145, Rivera, Uruguay
UA9KBE to Vale, Box 4, Salehard 626602, USSR
UA9YN to Gena, Box 1358, Barnaul 656014, USSR
UB5KDD to Sam, Box 32, Rovno 23 266023, USSR
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UL7LF to Serge, Box 13, Rudny 7 Kazakhstan 459120, USSR
UL8LWF to Valery, Box 7, Kustanay 458000, USSR
YL2PO to Laimon, Box 150, Jelgana, Latvia 229600, USSR
UC2WAZ to Boris, Box 8, Vit-ebsk 210023, USSR
UA3NU to German, Box 33, Kostroma 156007, USSR
YL2MR to Stan, Box 122, Riga, Latvia 226080, USSR

operator Ali for the following dates: Feb. 12-27, 1987; May 12 to Aug. 14, 1989; and Sept. 25, 1989 to Oct. 7, 1990. ON7LX has operator Sami's log for QSOs before Sept. 28, 1990.

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KB5RA, QSL manager for **OD5SK**, has a new address: Box 915552, Longwood, FL 32791.

Cards for **9M8FH** go to N5FTR, who was still waiting for logs in February.

Joanie, KA6V, is QSL manager for the **V31A** operation in the ARRL CW test.

Jim Hurt, KC8MK, QSL manager for **ZC4WK**, has answered all the direct requests, as well as any cards via the bureau. He can confirm any ZC4WK QSO.

QSL the 1990 **EK0KBZ** Big Circle dog-sled DXpedition direct only to Box 485, Cape Schmidt, Magadan Oblast 686830, USSR, with two IRCs. They don't get cards via the USSR bureau.

Via VU2DK, we understand that there have been some problems with the mail going to VU2-land, including tampering and pilferages. He suggests stations QSLing direct to VU2 should take extra care in enclosing an SASE and protecting the contents of the envelope (including using good-quality stationery so that nothing will be seen or torn in transit).

73, Chod, VP2ML

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- 14 orders filtering
- dual message banks
- PTT/VOX output mode
- 8-ohm monitor output
- 14 status LEDs
- adjustable mic gain
- auto-incrementing serial number w/user's voice
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- each message has own programmable repeat option
- adjustable message repeat pause, up to 20 sec
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THE SCIENCE OF PREDICTING RADIO CONDITIONS

Sunspot Cycle Progress

The Royal Observatory of Belgium reports a mean sunspot number of 168 for February 1991. Daily values ranged between a high of 223 on February 21 and a low of 117 on the 6th. February's mean value results in a 12-month running smoothed sunspot number of 140 centered on August 1990. This is the same level as reported for July 1990. While it is too early to tell, it is possible that Cycle 22 is entering another plateau phase.

A smoothed sunspot number of approximately 123 is forecast for June 1991.

A small increase was reported in the 10.7 cm solar flux level. The Algonquin Radio Observatory, Ottawa, Canada, reports a monthly mean of 236 for February 1991. This results in a smoothed value of 194 centered on August 1990, an increase of 4 points over July's value.

Table I is a listing of smoothed sunspot numbers observed to date for Cycle 22 and a forecast of activity expected through 1992. This is based on data provided by the Solar-Terrestrial Physics Division of the National Geophysical Data Center, Boulder, Colorado.

The progress of Cycle 22 from its birth in September 1986 is shown graphically in fig. 1. The data has been prepared by Hirman and Greer at the Space Environment Services Center, NOAA, Boulder, Colorado.

Summertime Propagation Conditions

June marks the changeover from equinoctial to summertime propagation conditions on the HF bands. Solar absorption is expected to be at seasonally high levels, resulting in generally weaker signals during the hours of daylight when compared to reception during the winter and spring months. Thunderstorm activity, and the associated level of static, increases considerably during June and the summer months, and higher static levels should be noticeable on all HF bands, particularly the 40, 80, and 160 meter bands.

Maximum usable frequencies during the daytime hours are considerably lower during June and the summer months than during the other seasons, and considerably higher during the hours of darkness.

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for June 1991

Propagation Index.....	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 5, 7, 19, 30	A	A	B	C
High Normal: 1, 3, 6, 13-14, 18, 21, 24, 27-28	A	B	C	C-D
Low Normal: 2, 4, 8-9, 12, 17, 20, 22-23, 26, 29	B	C	D	D-E
Below Normal: 10, 15-16, 25	C	C-D	D-E	E
Disturbed: 11	C-D	D	E	E

Where expected signal quality is: A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S0 and S3, and with considerable fading and noise.

E—No opening expected.
3 dB per S-Unit.

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 good (B) on June 1, good-to-fair (B-C) on the 2nd, good again (B) on the 3rd, good-to-fair (B-C) on the 4th, excellent (A) on the 5th, etc.

This changeover should have its greatest impact on the 20 meter band, which during other seasons is a near-optimum daytime DX band, but during the summer months becomes the optimum DX band during the hours of darkness.

Sporadic-E propagation peaks during June and the summer months, increasing the number of short-skip openings possible on the HF bands, and often making possible openings up to 1300 miles and sometimes beyond on the 6 and 2 meter bands.

This month's CQ Propagation Charts contain DX predictions for the period June 15 through August 15. Short-Skip Charts for June for openings between 50 and 2300 miles and from Hawaii and Alaska appeared in last month's column.

June Forecast

While fewer east-west openings are expected, 10 and 12 meters should contin-

ue to provide excellent daytime propagation, particularly on north-south paths to Central and South America, Africa, Asia, and the Pacific areas. Conditions should peak during the afternoon hours. Short-skip openings, primarily as a result of sporadic-E ionization, should be possible between approximately 500 and 1300 miles. While sporadic-E openings occur most often during the hours of daylight, some may occur at night as well. Some F2-layer openings for distances beyond 1300 miles should also be possible, mainly during the afternoon hours.

The 15 and 17 meter bands will likely be the optimum DX bands during the daytime hours of June. They are expected to open shortly after sunrise, peak during the afternoon hours, and remain open for DX through the early evening hours. During this span openings should be possible to most areas of the world. Conditions will favor paths towards Central and South America and Africa during most of the daylight hours, with signals peaking towards Europe during the late afternoon, and towards Asia and the Pacific area during the late afternoon and early evening. Don't be surprised if on some days these bands remain open for DX to as late as midnight! Short-skip openings ranging between 500 and 2300 miles should be possible throughout the daytime hours and well into the evening.

The 20 meter band should open to some area of the world or another for the entire 24-hour period on most days of the month. Signals should peak in all directions just after local sunrise. Intense solar absorption, however, will reduce DX openings considerably from about mid-morning through the early afternoon hours, although fairly good openings still should be possible towards the Caribbean area, Central America, and the northern tier countries of South America. By late afternoon, however, signals should begin to increase considerably, peaking towards the east and the south during the early evening hours. During the hours of darkness propagation should be possible to almost all areas of the world, with signals peaking towards Asia and the Pacific after midnight. Exceptionally high signal levels may often be noted during nighttime openings on this band. Short-skip during the day should extend from 250 to 2300 miles, and during the hours of darkness from 500 to 2300 miles. During

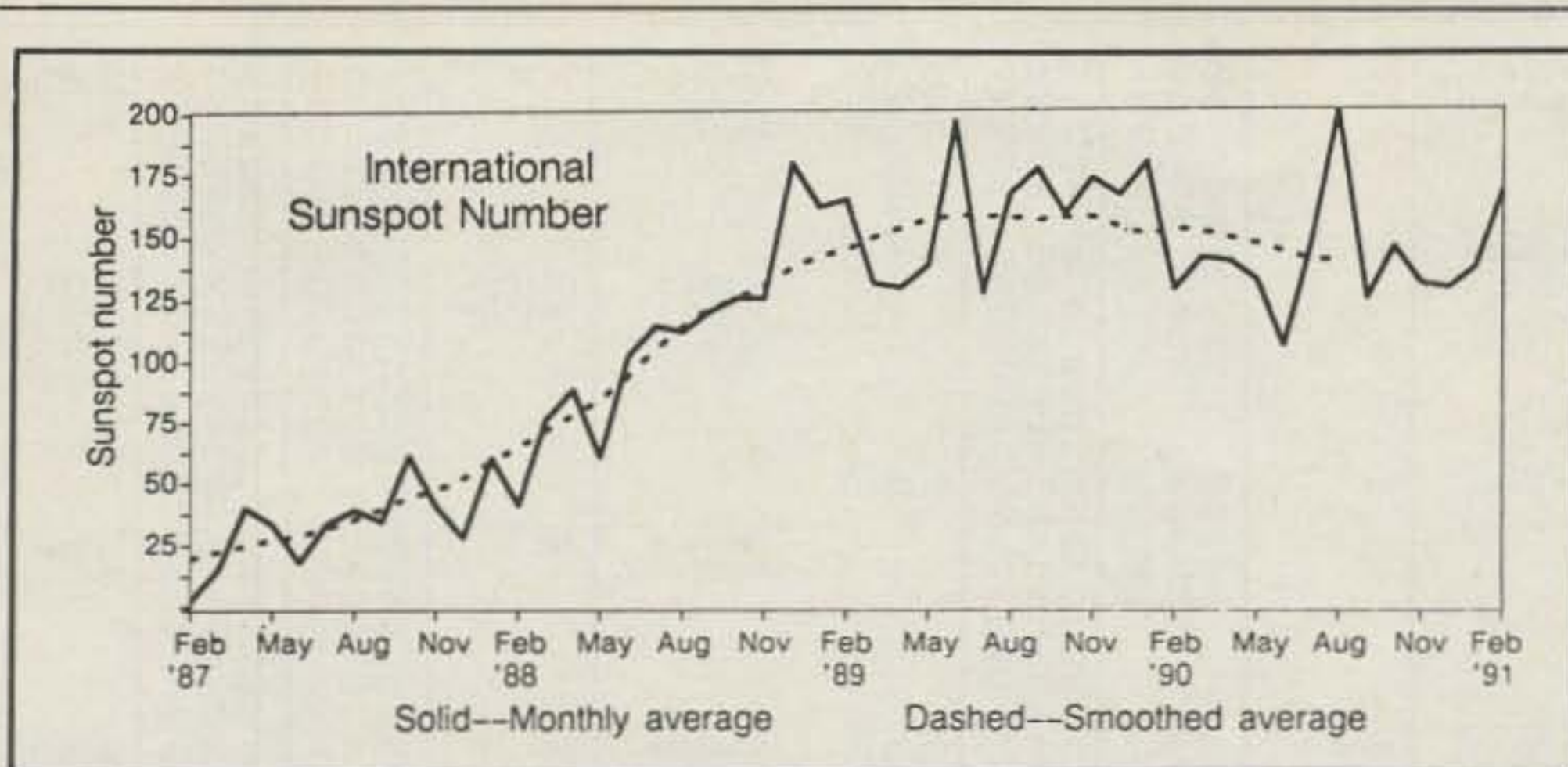


Fig. 1—Progress of Sunspot Cycle 22 since its birth during September 1986.

the late afternoon and evening hours conditions may often peak for both short and long skip, resulting in an exceptionally high level of interference.

The 30 and 40 meter bands should continue to provide good DX conditions during the hours of darkness despite the higher static levels mentioned earlier. These bands may not sound as good as they did during the spring months, with some of the long inter-hemispheric openings gone, but the DX will be there, and signals often will be exceptionally strong. Look for openings towards Europe and Africa as early as sunset. Signals should peak towards the east and the south before midnight, and towards the south and the west after midnight. The best bet for DX towards Asia and the Pacific area would be an hour or so before daybreak. Short-skip should be possible out to about 750 miles during the daylight hours. During the hours of darkness short-skip should extend out to the 2300 mile limit.

Look for some DX openings on 80 meters, following the same east-south-west pattern as on 40 meters, during the hours of darkness. Signals should peak from an easterly direction before midnight and from the west before sunrise. Expect considerably higher noise levels and

much weaker signals on this band compared to 40 meter openings. Daytime short-skip openings will be limited to approximately 250 miles due to intense solar absorption, but at night openings should extend out to beyond 1800 miles.

Not much DX is expected on 160 meters until the fall, when static levels should subside and solar absorption decrease. An occasional opening, however, towards the Caribbean, Central America, and the northern tier countries of South America may be possible during the nighttime hours. At best, however, openings will be weak and noisy. Fairly frequent nighttime short-skip openings should be possible over a range of approximately 1000 miles. It is very unlikely that any daytime skip openings will be possible on this band due to very intense solar absorption.

Expect plenty of *short-skip* openings on the shortwave bands this month. For distances less than 250 miles, try 40 and 80 meters during the day and 80 and 160 meters at night. For openings between 250 and 750 miles, 30 and 40 meters should be best during the day, with 20 meters a close second. Try 80 meters at night, with 40 meters a second choice. *Twenty* meters should be best for day-

Month	1986	1987	1988	1989	1990	1991	1992
January		18	58	142	151	129	112
February		20	65	145	153	127	109
March		22	71	150	152	126	106
April		24	78	154	149	125	103
May		26	84	157	147	125	100
June		28	94	158	144	123	98
July		31	104	159*	140	121	96
August		35	114	158	140	118	93
September	12	39	121	157	138	115	91
October	13	44	125	157	134	114	87
November	15	47	130	158	131	114	83
December	16	51	138	153	129	113	77

Table 1—Progress of Sunspot Cycle 22 and predictions for 1990, 1991, and 1992. Predicted values are shown in italics. * Denotes apparent peak of Cycle 22.

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9120	20 meters	9106	6 meters
9117	17 meters		

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HOW TO USE THE DX PROPAGATION CHARTS

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

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings.

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

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

4. Times shown in the charts are in the 24-hour system, where 00 is midnight, 12 is noon, 01 is 1 AM, 13 is 1 PM, etc. Appropriate daylight time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 KW PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels the propagation index will increase by one level; for each 10 dB loss it will lower by one level.

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

June 15-August 15, 1991 Time Zone: EDT (24-Hour Time) EASTERN USA TO:

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

Central & South Asia	Nil	09-10 (1) 10-12 (2) 12-13 (1) 17-19 (1) 19-22 (2) 22-23 (1)	17-20 (1) 20-23 (2) 23-03 (1) 03-06 (2) 06-08 (1)	19-21 (1) 04-06 (1)
Southeast Asia	Nil	10-14 (1) 14-16 (2) 16-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-19 (1) 19-21 (2) 21-23 (1) 23-02 (2) 02-03 (1)	04-06 (1)
Far East	Nil	09-10 (1) 10-12 (2) 12-18 (1) 18-20 (2) 20-22 (1)	06-07 (2) 07-09 (3) 09-10 (2) 10-12 (1) 18-21 (1) 21-23 (2) 23-02 (3) 02-04 (2) 04-06 (1)	04-06 (1)
South Pacific & New Zealand	16-18 (1) 18-20 (2) 20-22 (1) 14-17 (1)**	09-11 (1) 14-16 (1) 16-18 (2) 18-19 (3) 19-21 (4) 21-22 (3) 22-00 (2) 00-01 (1)	18-20 (1) 20-23 (2) 23-01 (3) 01-04 (4) 04-05 (3) 05-06 (2) 06-09 (3) 09-10 (2) 10-12 (1)	01-03 (1) 03-05 (2) 05-06 (3) 06-07 (2) 07-08 (1) 04-06 (1)*
Australasia	18-19 (1) 19-21 (2) 21-22 (1)	10-12 (1) 17-18 (1) 18-20 (2) 20-22 (3) 22-23 (2) 23-00 (1)	21-23 (1) 23-01 (2) 01-03 (3) 03-05 (4) 05-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 16-18 (1)	03-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
Caribbean, Central America & Northern Countries of South America	09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 12-14 (1)**	08-09 (2) 09-12 (4) 12-14 (3) 14-21 (4) 21-01 (3) 01-03 (2) 03-08 (1)	06-07 (3) 07-10 (4) 10-11 (3) 11-15 (2) 15-17 (3) 17-03 (4) 03-05 (3) 05-06 (2)	19-20 (1) 20-21 (2) 21-23 (3) 23-03 (4) 03-04 (3) 04-05 (2) 05-06 (1) 22-23 (1)* 23-24 (2)* 04-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	10-14 (1) 14-16 (2) 16-17 (3) 17-18 (4) 18-19 (3) 19-21 (2) 21-22 (1) 12-15 (1)**	07-08 (1) 08-11 (2) 11-15 (1) 15-16 (2) 16-17 (3) 17-23 (4) 23-01 (3) 01-02 (2) 02-03 (1)	10-16 (1) 16-18 (2) 18-19 (3) 19-02 (4) 02-04 (3) 04-07 (2) 07-09 (3) 09-10 (2)	20-21 (1) 21-22 (2) 22-02 (3) 02-04 (2) 04-05 (1) 22-03 (1)*
McMurdo Sound, Antarctica	15-17 (1)	16-18 (1) 18-21 (2) 21-22 (1)	17-19 (1) 19-22 (2) 22-03 (3) 03-05 (2) 05-06 (1) 07-09 (1)	02-05 (1)

Time Zones: CDT & MDT (24-Hour Time) CENTRAL USA TO:

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

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

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

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

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

*Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.

**Indicates best times to listen for F-2 layer openings on 6 meters.

For 12 meter openings interpolate between 10 and 15 meter openings.

For 17 meter openings interpolate between 15 and 20 meter openings.

For 30 meter openings interpolate between 40 and 20 meter openings.

time openings between 750 and 1300 miles, with 30 and 40 meters best at night, backed up by 80 meters. Between distances of 1300 and 2300 miles use 20 meters during the day, with 17 and 15 as a second choice. Thirty and 40 meters are expected to be best for this distance range at night. Frequent short-skip openings, resulting from an expected seasonal increase in sporadic-E ionization, should also be possible on 10, 12, 15, and 17 meters over distances ranging between approximately 450 and 1300 miles. As its name implies, sporadic-E ionization can occur at any time, but it is usually most prevalent between 10 AM and 2 PM and again between 6 and 10 PM local daylight time.

VHF Ionospheric Openings

The big VHF news during June will very likely be sporadic-E propagation on 6 meters. Fairly frequent openings are expected over a range between approximately 900 and 1300 miles. During intense and widespread sporadic-E ionization two-hop openings well beyond 1300 miles may be possible. An occasional sporadic-E opening on 2 meters is also possible during June, particularly when ionization is very intense, and over distances between approximately 1100 and 1300

miles. While June is not usually a good month for F2-layer propagation on 6 meters, an occasional DX opening may be possible. The best time to check for 6 meter DX openings is during the afternoon hours, on days when conditions are expected to be High Normal or better. Occasional openings should be possible towards Latin America, southern Africa, the South Pacific, and Australasia.

Not much meteor-type ionization is expected during June, but some may occur during the *Herculids* and *Scorpiids* showers on June 3 and 5. While these are minor meteor showers, it may be worthwhile to check the VHF bands for unusual short-skip openings on these days.

There is also a greater tendency for VHF ionospheric openings on days that are expected to be Below Normal or Disturbed. Check the Last Minute Forecast at the beginning of this column to find those days during June that are most likely to be in these categories.

A seasonal decline is expected for trans-equatorial (TE) propagation on 6 meters during June, but an occasional opening may still be possible between southern tier states and deep Latin America. The best time to check for TE openings is between 8 and 11 PM local daylight time.

73, George, W3ASK

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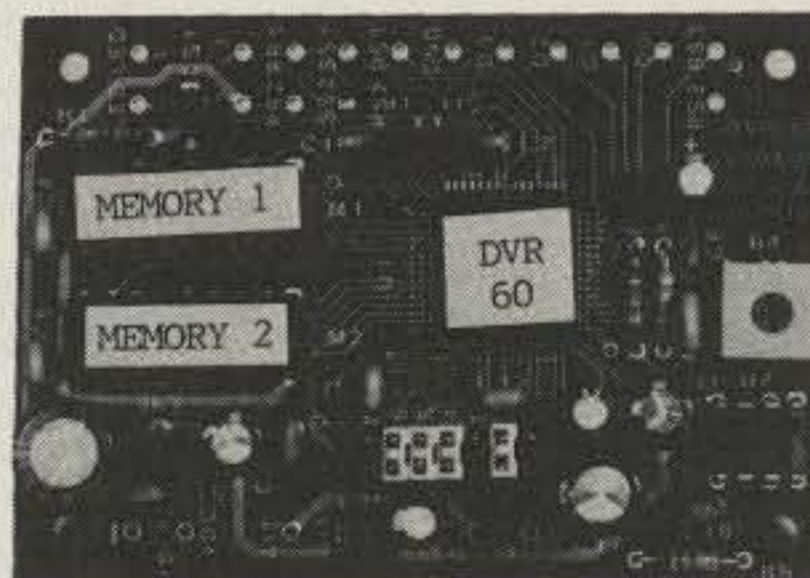
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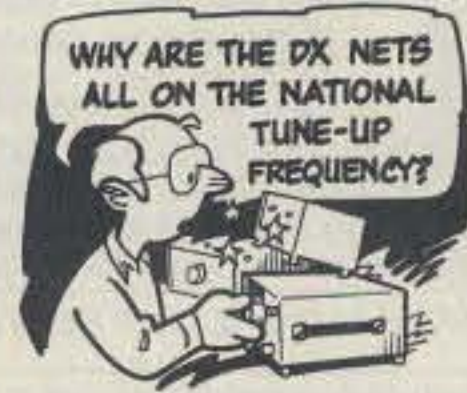


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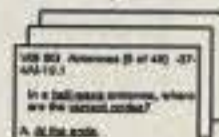
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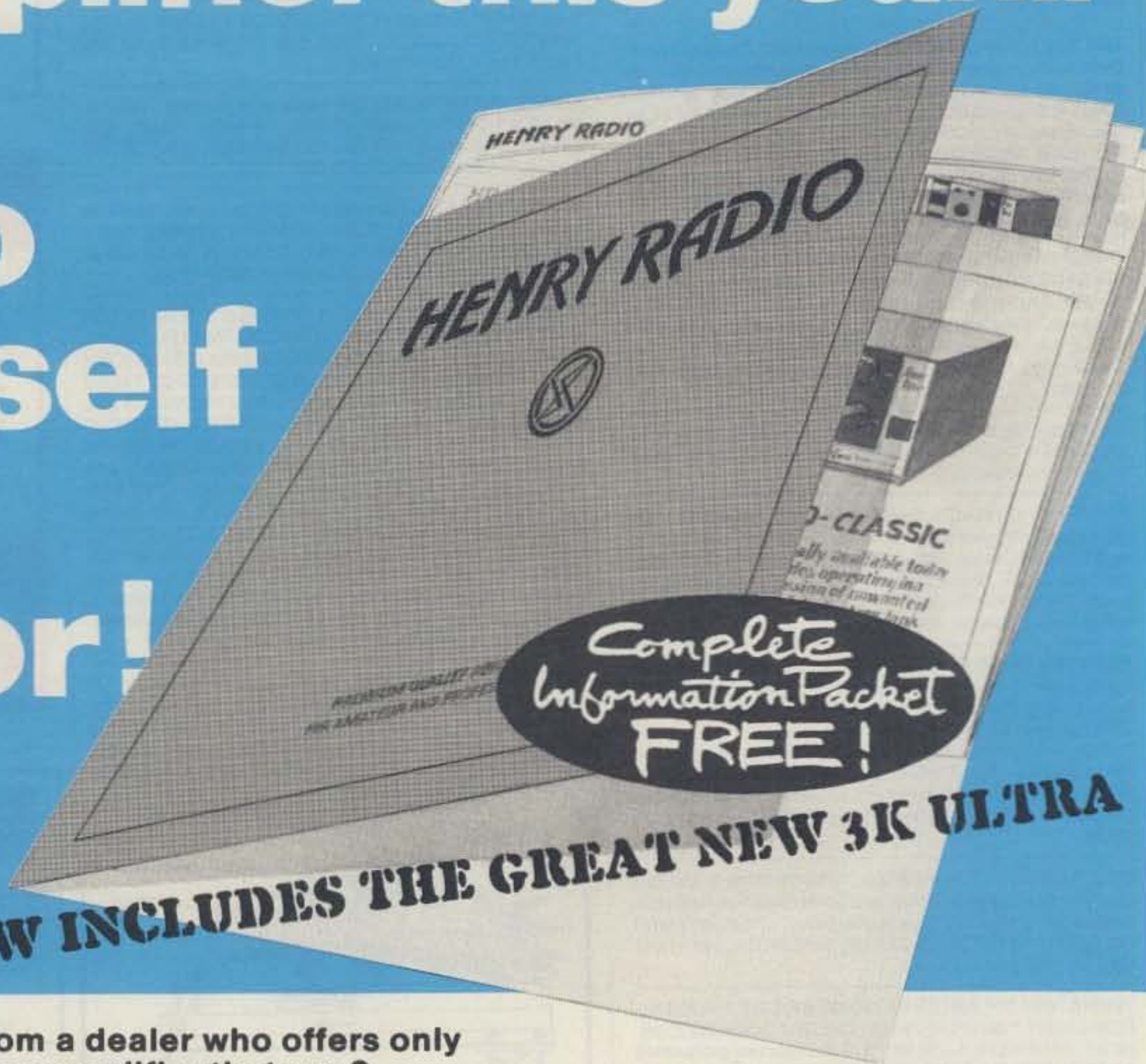
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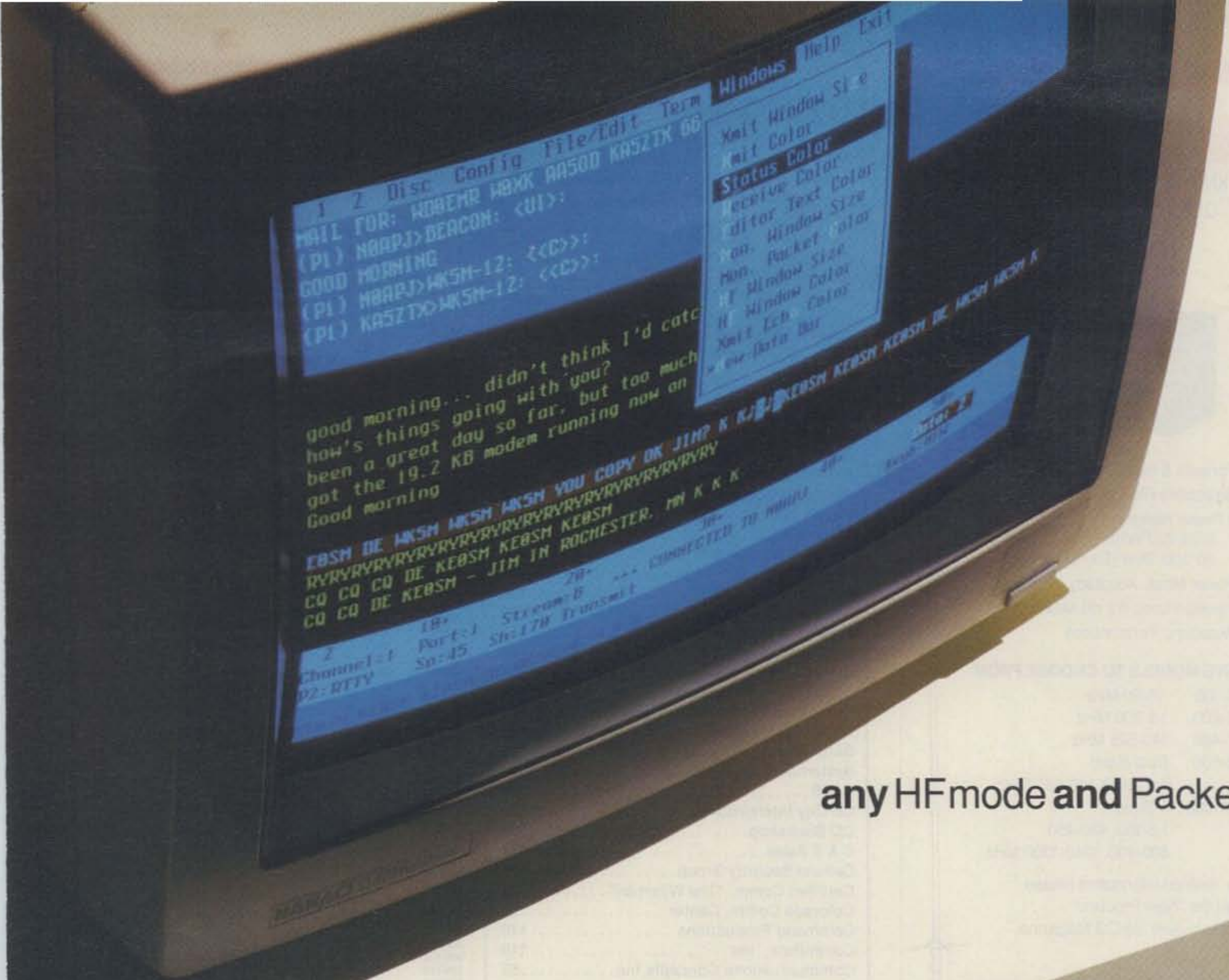
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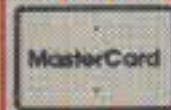
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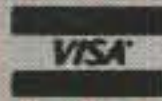
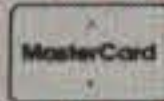
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