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Amateur Radio

CQ

SERVING AMATEUR RADIO SINCE 1945
JULY 1982 $2.00

SPECIAL V.H.F. ISSUE

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THE RADIO AMATEUR'S JOURNAL

NEW

TS-930S

"DX-traordinary"... superior dynamic range, auto. antenna tuner, QSK, dual NB, 2 VFO's, general coverage receiver.

A superlative, high-performance, all solid-state HF transceiver, that covers all Amateur HF bands, and incorporates a 150 kHz to 30 MHz general coverage receiver having an excellent dynamic range.

TS-930S FEATURES:

- 160-10 Meters, with 150 kHz–30 MHz general coverage receiver. Covers all Amateur frequencies, plus WARC, on SSB, CW, FSK, and AM. Incorporates general coverage receiver.
- Excellent receiver dynamic range. Typical two-tone dynamic range, 100 dB (20 meters 500 Hz CW bandwidth).
- All solid-state 28 volt operated final amplifier. Lowest IM distortion. Power input 250 W on SSB/CW/FSK, 80 W on AM. SWR/ Power meter.
- Available with AT-930 automatic antenna tuner built-in, or as an option. Covers Amateur bands 80-10 meters, including WARC bands.
- CW full break-in. CMOS logic IC, plus reed relay. Switchable to semi break-in.
- Dual digital VFO's, 10-Hz steps, includes band information.
- Eight memory channels. Stores frequency and band data. Internal battery memory back-up, est. 1 yr. life. (Battery not Kenwood supplied.)
- Dual mode noise blanker ("pulse" or "woodpecker"). NB-1, with threshold control, for "pulse" noise. NB-2 for "woodpecker."
- SSB IF slope tuning, allows independent adjustment of the low and/or high frequency slopes of the IF passband.
- CW VBT and pitch control. Variable bandwidth tuning tunes out interfering signals. CW pitch control shifts IF passband and beat frequency. "Narrow-Wide" filter switch.
- IF notch filter 100 kHz, deep, sharp, better than -40 dB.
- Tuneable, peak-type audio filter for CW.
- AC power supply built-in. 120, 220, or 240 VAC, switch selected. (Operates on AC only.)
- Fluorescent tube digital display, with analog type sub-scale, in 20-kHz steps.
- RF speech processor provides higher average "talk-power."
- One year limited warranty.
- Other features: SSB monitor circuit, 3-step RF attenuator, VOX, and 100-kHz marker.

Optional Accessories:

- AT-930 Automatic antenna tuner.
- SP-930 External speaker with selectable audio filters.
- YG-455C-1 (500 Hz) or YG-455CN-1 (250 Hz) plug-in CW filters for 455 kHz IF.
- YK-88C-1 (500 Hz) CW plug-in filter for 8.83 MHz IF.
- YK-88A-1 (6 kHz) AM plug-in filter for 8.83 MHz IF.
- MC-60 (S8) Deluxe desk microphone, with UP/DOWN switches.

TR-7730

Dyna-"mite"... miniaturized, 5 memories, memory/ band scan.

The TR-7730 is an incredibly compact, reasonably priced, 25 watt, 2 meter FM mobile transceiver, with five memories, memory scan, automatic band scan, plus other convenient operating features. It is available with a 16-key autopatch UP/DOWN microphone, (MC-46), or with a basic UP/DOWN microphone.

TR-7730 FEATURES:

- Dimensions: 5-3/4 W x 2 H x 7-3/4 D, inches. Weighs 3.3 lbs.
- Extended frequency coverage, 143.900-148.995 MHz, in 5 or 10-kHz steps.
- 25 watts RF output power, with HI/LOW power switch.
- Five memories. Simplex or repeater operation, with transmit offset switch. The 5th memory stores receive and transmit frequencies independently, for non-standard splits. Memory back-up terminal on rear panel.
- Memory scan, plus automatic band scan. Locks on busy channel, resumes when signals disappear, or when scan switch is pressed. Scan HOLD or PTT switch on microphone cancels scan.
- UP/DOWN manual scan on microphone, either version.
- Four digit LED frequency display.
- S/RF bar meter. LED indicators for BUSY, ON-AIR, REPEATER operation.
- Tone switch for internal tone encoder (not Kenwood supplied).
- Offset switch ±600 kHz, or simplex. Fifth memory for non-standard offset.

Optional Accessories:

- MC-46 16-key autopatch UP/DOWN microphone.
- SP-40 Compact mobile speaker.
- KPS-7 Fixed station power supply.

TR-8400

Synthesized 70-cm FM mobile rig

- Covers 440-450 MHz, in 25-kHz steps, with two VFOs.
- Transmit offset switch for ±5 MHz. Non-standard offset uses fifth memory.
- HI/LOW power switch selects 10 or 1 watt RF output.
- Similar to TR-7730 in other features, including five memories, memory scan, automatic band scan, UP/DOWN manual scan, four digit display, S/RF bar meter, LED indicators, tone switch, and same optional accessories.
- Basic UP/DOWN microphone supplied with unit.

KENWOOD

TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut, Compton, California 90220

TR-2500

BIG performance, small size, smaller price!

The TR-2500 is a compact 2 meter FM handheld transceiver featuring an LCD readout, 10 memories, lithium battery memory back-up, memory scan, programmable automatic band-scan, Hi/Lo power switch and built-in sub-tone encoder.

TR-2500 FEATURES:

- Extremely compact and light weight 66 (2-5/8) W x 168 (6-5/8) H x 40 (1-5/8) D, mm (inches), 540 g, (1.2 lbs) with NiCd pack.
- LCD digital frequency readout.
- Ten memories includes "MO" memory for non-standard split repeaters.
- Lithium battery memory back-up, built-in, (est. 5 year life).
- Memory scan.
- Programmable automatic band scan allows upper and lower frequency limits and scan steps of 5 kHz and larger (5, 10, 15, 20, 30 kHz ...etc) to be programmed.

CONVENIENT TOP CONTROLS

- UP/DOWN manual scan.
- Repeater reverse operation.
- 2.5 W or 300 mW RF output. (HI/LOW power switch).
- Built-in tunable (with variable resistor) sub-tone encoder.
- Built-in 16-key autopatch.
- Slide-lock battery pack.
- Keyboard frequency selection.
- Covers 143.900 to 148.995 MHz in 5 kHz steps.
- Optional power source, MS-1 mobile or ST-2 AC charger/ power supply allows operation while charging. (Automatic drop-in connections.)
- High impact plastic case.
- Battery status indicator.
- Two lock switches for keyboard and transmit.

Standard accessories:

- Flexible rubberized antenna with BNC connector.
- 400 mAH heavy-duty Ni-Cd battery pack.
- AC Charger.

Optional accessories:

- VB-2530 25 W RF Power amp, BNC-BNC cables, and mounting bracket, supplied.
- MS-1 13.8 VDC mobile stand/ charger/power supply.

Optional accessories:

- ST-2 Base station power supply and quick charger (approx 1 hr.)
- TU-1 Programmable "DIP switch" (CTCSS) encoder.
- SMC-25 Speaker microphone.
- LH-2 Deluxe leather case.
- PB-25 Extra Ni-Cd battery pack, 400 mAH, heavy-duty.
- BT-1 Battery case for AA manganese or alkaline cells.
- BH-2 Belt hook.
- WS-1 Wrist strap.
- EP-1 Earphone.

NEW

TR-9130

All mode (FM/SSB/CW) 25 watts, plus...!!!

The TR-9130 is a powerful, yet compact, 25 watt FM/USB/LSB/ CW transceiver, featuring six memories, memory scan, memory back-up capability, automatic band scan, all-mode squelch, and CW semi break-in. Available with a 16-key autopatch UP/ DOWN microphone (MC-46), or a basic UP/DOWN microphone.

TR-9130 FEATURES:

- 25 Watts RF output on all modes, (FM/SSB/CW).
- FM/USB/LSB/CW all mode. The mode switch, with the digital step (DS) switch, determines the size (100 Hz, 1 kHz, 5 kHz, 10 kHz) of the tuning step.
- Six memories. On FM, memories 1-5 for simplex or ±600 kHz offset, using OFFSET switch. Memory 6 for non-standard offset. All six memories may be simplex, any mode.
- Memory scan. Scans memories in which data is stored.
- Internal battery memory back-up, using 9 V Ni-Cd battery, (not KENWOOD supplied). Memories are retained approx. 24 hours, adequate for the typical move from base to mobile. External back-up terminal on the rear.
- Automatic band scan. Scans within whole 1 MHz segments (ie., 144.0-144.999 MHz).
- Dual digital VFO's.
- Transmit frequency tuning while transmitting, for OSCAR operations.

Optional accessories:

- KPS-7 DC power supply for TR-9130 base station operation. 7 A intermittent, 6 A continuous, protection circuit built-in.
- SP-40 compact mobile speaker. Only 2-11/16 W x 2-1/2 H x 2-1/8 D (inches). Handles 3 watts of audio.
- TK-1 AC adapter for memory back-up (not shown).

- Squelch circuit, all modes (FM/SSB/CW).
- Repeater reverse switch.
- Tone switch.
- CW semi break-in circuit with sidetone.
- Digital display with green LED's.
- Compact size and lightweight. 170 (6-11/16) W x 68 (2-11/16) H x 241 (9-1/2) D mm (inch). 2.4 kg (5.3 lbs.) weight.
- Covers 143.9 to 148.9999 MHz.
- HI/LOW power switch. 25 or 5 watts on FM or CW.
- Transmit offset switch.
- High performance noise blanker.
- RF gain control.• RIT circuit.

KENWOOD

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1111 West Walnut, Compton, California 90220

TS-530S

"Cents-ational"...IF shift, digital display, narrow-wide filter switch

The TS-530S SSB/CW transceiver covers 160-10 meters using the latest, most advanced circuit technology, yet at an affordable price.

TS-530S FEATURES:

- 160-10 meters, LSB, USB, CW, all amateur frequencies, including new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.
- Built-in digital display (six digits, fluorescent tubes), with analog dial.
- IF shift tunes out interfering signals.
- Narrow/wide filter selector switch for CW and/or SSB.
- Built-in speech processor, for increased talk power.
- Wide receiver dynamic range, with greater immunity to overload.
- Two 6146B's in final, allows 220W PEP/180 W DC input on all bands.
- Advanced single-conversion PLL, for better stability, improved spurious characteristics.
- Adjustable noise-blanker, with front panel threshold control.
- RIT/XIT front panel control allows independent fine-tuning of receive or transmit frequencies.

Optional accessories:

- SP-230 external speaker with selectable audio filters.
- VFO-240 remote analog VFO.
- VFO-230 remote digital VFO.
- AT-230 antenna tuner/SWR/power meter.
- MC-50 desk microphone
- KB-1 deluxe VFO knob.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter.
- YK-88SN (1.8 kHz) narrow SSB filter.

TS-660

The TS-660 "QUAD BANDER" covers 6, 10, 12, 15 meters.

- FM, SSB (USB), CW, and AM
- Dual digital VFO's
- Digital display
- IF shift built-in
- 5 memories with memory scan
- UP/DOWN microphone
- All-mode squelch
- Noise blanker
- CW semi break-in/sidetone
- 10 W on SSB, CW, FM; 4 W on AM.

Optional accessories:

- PS-20 power supply
- VOX-4 speech processor/VOX
- SP-120 External speaker
- MB-100 Mobile mount
- YK-88C, YK-88CN CW filters
- YK-88A AM filter.

NEW

TS-130SE

"Small talk"...IF shift, Processor, N/W switch, affordable.

A compact, all solid-state HF SSB/CW transceiver for mobile or fixed base station, covering 3.5 to 29.7 MHz.

TS-130SE FEATURES:

- 80-10 meters including the new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.
- TS-130SE runs 200 W PEP/160 W DC input on 80-15 meters, 160 W PEP/140 W DC on 12 and 10 meters. TS-130V version at 25 W PEP/20 W DC, all bands, also available.
- Digital display, built-in.
- IF shift circuit.
- Speech Processor, built in.
- Narrow/wide filter selection on CW and SSB with optional filters.
- Automatic SSB mode selection (LSB on 40 meters and below, USB on 30 meters and up). SSB reverse switch provided.
- RF attenuator, built-in.
- Final amplifier protection circuit assures maximum reliability. Output power is reduced if abnormal operating conditions occur. For very severe operations, optional cooling fan, FA-4, is available. TS-130S, with FA-4 installed, also available.
- Effective noise blanker.
- Dimensions: 3-3/4 H x 9-1/2 W x 11-9/16 D (inches). Weight: 12.3 lbs.
- Other features: VOX, CW semi break-in with sidetone, one fixed channel, and 25 kHz marker.

Optional DFC-230 Digital Frequency Controller
Frequency control in 20-Hz steps with UP/DOWN microphone (supplied with DFC-230). Four memories and digital display. (Also operates with TS-120S, TS530S, and TS-830S.)

Optional accessories:

- PS-30 matching power supply (TS-130SE).
- KPS-21 power supply (TS-130SE).
- PS-20 power supply (TS-130V).
- SP-120 external speaker.
- VFO-120 remote VFO.
- FA-4 fan unit (TS-130SE).
- YK-88C (500 Hz) and YK-88CN (270 Hz) CW filters.
- YK-88SN (1.8 kHz) narrow SSB filter.
- AT-130 antenna tuner.
- MB-100 mobile mounting bracket.

KENWOOD

TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut, Compton, California 90220

Power up.

40 W, 15 memories/offset recall, scan, priority, DTMF touch-pad

TR-7850

Kenwood's remarkable TR-7850 2-meter FM mobile transceiver provides all the features you could desire, including a powerful 40 watts RF output. Frequency selection is easier than ever, and the rig incorporates new memory developments for repeater shift, priority, and scan, and includes a built-in autopatch touch-pad (DTMF) encoder. A 25-watt output version, the TR-7800, is also available.

TR-7850 FEATURES:

- **Powerful 40 watts power output**
  Selectable high or low power operation. High 40-watt output provides reliable signal for wide area coverage.
- **15 multifunction memory channels, easily selectable with a rotary control**
  M1-M13...memorize frequency and offset (±600 kHz or simplex). M14...memorize transmit and receive frequencies independently for nonstandard offset.
  M0...priority channel, with simplex, ±600 kHz, or nonstandard offset operation.
- **Internal battery backup for all memories**
  All memory channels (including transmit offset) are retained when four AA NiCd batteries (not Kenwood supplied) are installed in battery holder inside TR-7850. Batteries are automatically charged while transceiver is connected to 12-VDC source.
- **Extended frequency coverage**
  143.900-148.995 MHz, in switchable 5-kHz or 10-kHz steps.
- **Priority alert**
  M0 memory is priority channel. "Beep" alerts operator when signal appears on priority channel. Operation can be switched immediately to priority channel with the push of a switch.
- **Built-in autopatch touch-pad (DTMF) encoder**
  Front-panel touch pad generates all 12 telephone-compatible dual tones in transmit mode, plus four additional DTMF signaling tones (with simultaneous push of REV switch).
- **Front-panel keyboard**
  For frequency selection, transmit offset selection, memory programming, scan control, and selection of autopatch encoder tones.
- **Autoscan**
  Entire band (5-kHz or 10-kHz steps) and memories. Automatically locks on busy channel; scan resumes automatically after several seconds, unless CLEAR or mic PTT button is pressed to cancel scan.
- **Up/down manual scan**
  Entire band (5-kHz or 10-kHz steps) and memories, with UP/DOWN microphone (standard).
- **Repeater reverse switch**
  Handy for checking signals on the input of a repeater or for determining if a repeater is "upside down."
- **Separate digital readouts**
  To display frequency (both receive and transmit) and memory channel.
- **LED bar meter**
  For monitoring received signal level and RF output.
- **LED indicators**
  To show: +600 kHz, simplex, or -600 kHz transmitter offset; BUSY channel; ON AIR.
- **TONE switch**
  To actuate subaudible tone module (not Kenwood-supplied).
- **Compact size**
  Depth is reduced substantially.
- **Mobile mounting bracket**
  With quick-release levers.

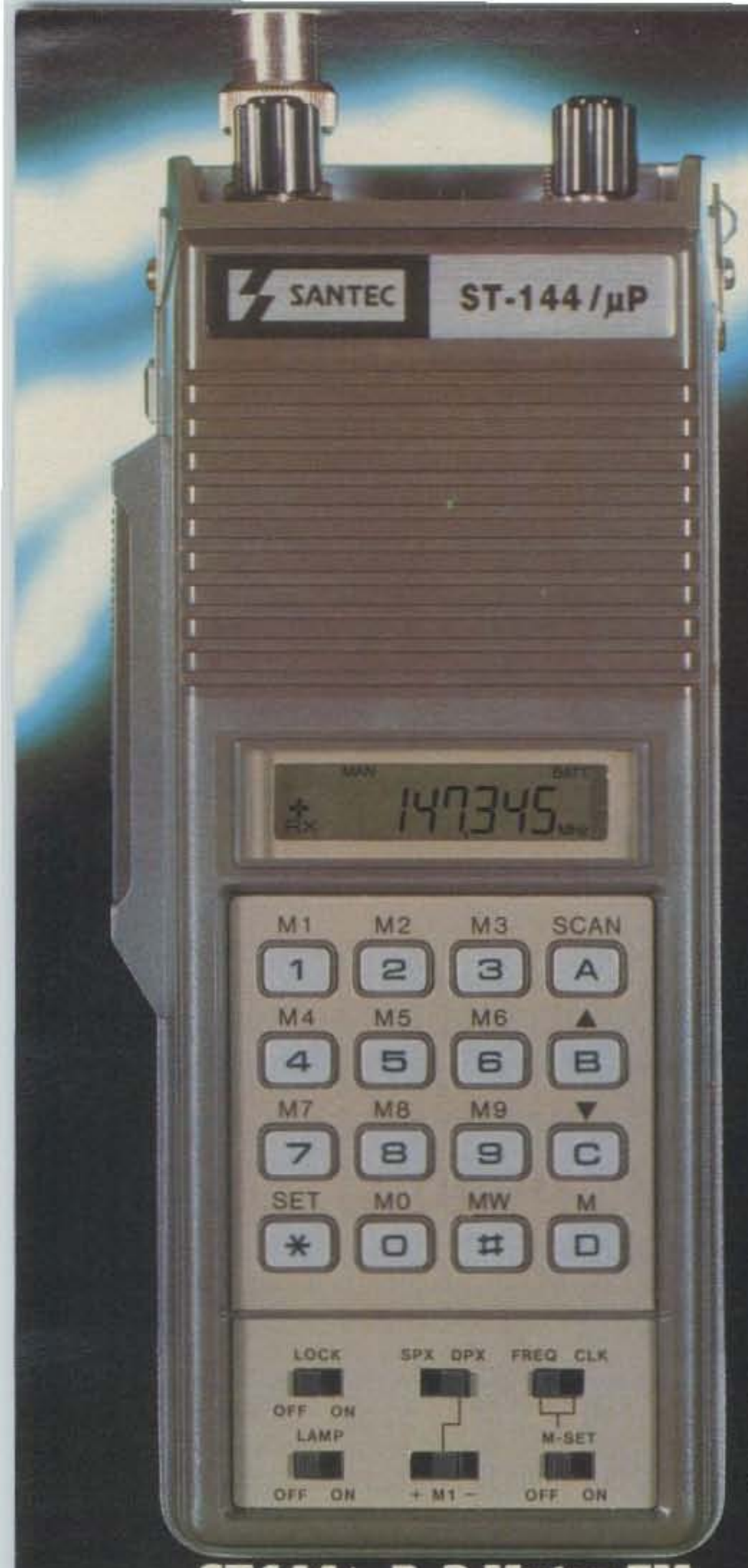
More information on the TR-7850 is available from all authorized dealers of Trio-Kenwood Communications 1111 West Walnut Street, Compton, California 90220.

KENWOOD
...pacesetter in amateur radio

Matching accessory for fixed-station operation:
- KPS-12 fixed-station power supply for TR-7850

Other accessories not shown:
- KPS-7 fixed-station power supply for TR-7800
- SP-40 compact mobile speaker

Specifications and prices are subject to change without notice or obligation.

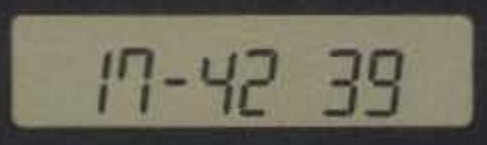


ST-144/μP, 2 Meter FM

It's Time!

■ It's time you got your share of the excitement of full-feature synthesized handheld operations. ■ SANTEC/nology zaps to the lead of the state-of-the-art in 2 meter handhelds with the new ST-144/μP. ■ Only SANTEC hands you all the up-to-the-minute features of this "clockwise" precision jewel.

■ The 24 hour format digital clock on the LCD display is uniquely SANTEC, and it typifies the thoughtful operator-oriented design incorporated throughout the ST-144/μP. ■ Not only does it give you accurate time checks whenever you want, but also it can display the time instead of the frequency, while this handful of radio continues to operate on your "favorite" frequency.



24 Hr Clock provides time of day even while the radio is turned off, or it can be selected by the front panel switch while in QSO.

Full Frequency Display showing offset selected, battery condition and current scan mode. At turnon, the contents of M-1 are loaded into the operating register, and the display looks like this.

The Memory Mode is indicated by the small "M" above "+"; the "5" indicates that the data were stored in Memory 5 before recall. The "+" indicates that the + offset was stored with the frequency.

Memory Scan with "Priority Scan/Auto-Resume" has stopped on Memory 9 to listen for a few seconds.

Transmit is indicated on a minus 600 kHz offset from 146.820 MHz which was stored in M-6. Activity on Memory 6 was found by using the "Search" mode of Scan.

■ The 10 frequencies that you put into the memories are stored with your repeater offsets, and you can have them scanned, searched or instantly recalled at the touch of a button. ■ Memory 1 even gets priority treatment in the memory scan mode. ■ That's timely complexity made amazingly simple: and the high power option of 3.5W (nominal) is simply the greatest reach you've ever held in your hand.

■ "Battery saver" function by the computer to hoard battery power when the frequency is quiet ■ Programmed limits for both ends of bandscan ■ Simplified frequency entry only by keyboard ■ Full capacity, low impedance audio output to drive an external speaker ■ Wide band span for MARS, CAP, AF MARS: 142.00-149.995 MHz ■ Quick-change 500mAh battery ■ Separate level controls for MIC, TT, PL and DEV ■ & so much more that we don't have space to mention ■ SANTEC hands it all over, while others can't even give you the time of day.

All stated specifications are subject to change without notice or obligation.

Accessories for SANTEC Handheld Radios
clockwise from upper left:
- Leather Case (ST-LC)
- Base Charger & Power Supply (ST-5BC)
- Remote Speaker (MS-50S)
- Mobile Charger (ST-MC)
- Speaker Microphone (SM-1)

Sale of the ST-144/μP is subject to FCC certification; approval and availability expected January, 1982.

SANTEC

2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 • INTL TLX 203920 ENCOM UR

Encomm, Inc.
2000 Avenue G
Suite 800
Plano TX 75074

Please send me more information about:
☐ The ST-144/μP
☐ Authorized SANTEC Dealers

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MASTHEAD

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CQ The Radio Amateur's Journal

ON THE COVER: Andy Fenoglio, W9BTL, (on the right) and Ralph Spears, WA9SHH, do some touch-up work on the S.E.A.R.S. repeater antenna in Niles, Illinois. S.E.A.R.S. stands for Sears Employees Amateur Radio Society. Photo by Milt Mann, W9PRH.

JULY 1982 **VOL. 38, NO. 7**

FEATURES

DEPARTMENTS

Zero Bias

AN EDITORIAL

I hate to be an "I told you so," but it's true. You have me to thank for the most outstanding Dayton weather in recent times. True to my words in the April issue, I took an extra carry-on piece of luggage which contained a raincoat, an umbrella, and my down-filled winter coat. Needless to say, this was the exact insurance payment for a truly splendid sunny weekend with temperatures in the 70s. I have to admit, though, that several people came up to me at the *CQ* booth and said that they did the same thing.

From the amount of stuff being carried in and out of the arena and fleamarket area, I would judge that the only one who didn't do much business was the fellow with the army jackets. Dick and I managed to get out from behind the *CQ* booth for awhile and take in the fleamarket for an hour or so. I did wind up with some small tools, a turns-counter dial (which Jack, W2LZX, found for me), and a new touch-tone pad that Pipo Communications was featuring.

We had a full crew out there this year, and it was a good thing we did. I still can't tell exactly how many amateurs showed up, but the tempo was up, and people crowded the *CQ* booth for the entire weekend. I am still amazed at Lew McCoy, W1ICP, and his facility to remember thousands of names and calls. No, it's not just that he can read the call-letter badges faster than I can; it's that he actually remembers them. This was the first Dayton show for our two new staffers, Herb Pressman and Rich Rutledge, W0YZ. In a little briefing before the show we sort of told them what to expect (it is really hard to describe in words) and let them know that of all the Daytons they will attend in the future, this probably will be the smallest, as it sure does grow each year.

On Friday night after the show we had a sort of impromptu retirement party for Kit Kitterer, W6AUF/0, the Marketing Manager of amateur products for Hy-Gain Division: Telex Communications. Those of you who are frequent attendees at Dayton and the many other hamfests and conventions throughout the country have probably run into Kit at his booth over the years and have been regaled by his stories and his ability to field question after question on antennas. He has that gentle knack of teaching with respect for the questioner regardless of age. We'll miss him working the shows, but I know that he'll be showing up from time to time.

On Thursday afternoon, while the rest of the gang went to the arena to start setting up the *CQ* booth, Dick and I went to Franklin, Ohio, to the R.L. Drake Company. Drake is about to celebrate its 40th anniversary in business, and I guess that they are probably the oldest American company manufacturing amateur equipment that is still owned by the same family. Although initially they were not in the amateur business, Bob Drake's love for amateur radio prompted that change of course in 1957 when they brought out their 1-A receiver (designed with s.s.b. in mind). Well, over the years there have been a lot of changes in equipment design and manufacturing facilities. From their beginnings in Miamisburg, Ohio, to their new plant in Franklin is a remarkable step up. At Franklin, Steve Morgan, WA8QNR, Manufacturing Manager, took Dick and me on a tour of some really remarkable work-stations featuring very sophisticated manufacturing equipment. I think that Dick and I fooled him, and Steve thinks that we *really* understood what he so proudly explained in great detail. The Miamisburg facility is still being used for executive and business offices, plus a lab for R&D (which, incidentally, was out of bounds, so I can't reveal a thing). Ron Wysong, K8AY, the Executive Vice President of Drake, spent some time with us going over the history of the company and where Drake was heading in the future. Dick took a number of pictures which we should have ready for a picture story next month or so.

New Equipment

There was enough new equipment on display at this Dayton show to satisfy even the wildest fantasy. Everything seemed to be more elaborate than last year, including the booths. As tired as everyone gets each year from either exhibiting or attending, the one thing missing this year was the marching zombies. That's the point at which most feeling in your body ceases, everything hurts, and your eyes glaze over. You see but don't see as you march continually up and down the aisles, keeping time with that different drummer in your head. At this moment a dealer literally could put out the most exotic (and most expensive) transceiver with a price tag of $3.47 on it, and no one would even notice or take him up on it. Nothing really registers. Even though everyone was just as tired and in pain, people seemed more alert and receptive for the entire show. In the few walk-arounds I took, it was hard to elbow your way into the crowds to see any of the displays . . . even on Sunday.

May and Morse

A lot of the folks at Dayton who were subscribers and those who bought copies of May at the hamfest responded to my Editorial there at the show. Most took it for what it was, but a few chastised me for destroying c.w. and amateur radio (which they took to be synonymous). I have no great desire to kill c.w. *per se.* I'm sure that most of you are aware that *CQ* does sponsor the best and biggest variety of c.w. contests in amateur radio. There are obviously many thousands of amateurs out there who thoroughly enjoy and thrive on c.w. I don't think that anyone (even Wayne) is contemplating the ban of c.w. on the amateur bands. It will still be your choice, as it is now, whether or not to use it.

May Meanderings

The intrepid *CQ* staff takes to the road again in May when we'll be in Birmingham on the 14, 15, and 16th. Dick and I will do this hamfest, while later on in the month Dick and Herb will do the honors at the Knoxsville show (May 21, 22, and 23rd). On May 23rd I will be at the LIMARC Hamfair, a local gathering at Islip Speedway here on Long Island. In June we'll be heading down south to attend the Dallas and Atlanta shows, and if possible we'll head on over to San Diego for at least a day. The people who put on these hamfests seem to crowd them together with no thought (or mercy) for exhibitors who would like to be at them all.

Eureka!

In a little less time than it took to build the great pyramids, and hopefully straighter than the tower of Pisa, the antenna party carries on. The first stage was completed yesterday when the measurements were taken for the Phillystran guyline. This is the non-metallic guyline you've seen advertised on these pages. In the next few days, the special end-fittings will be epoxied on, and sometime after the Birmingham Hamfest and before the Dallas Ham-Com we'll attempt stage two. Even my neighbors can't believe that it takes so long.

73, Alan, K2EEK

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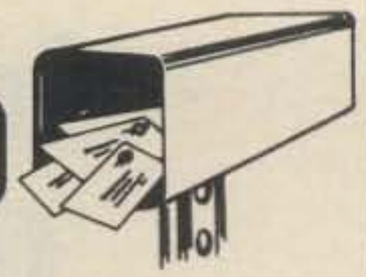

No Poison-Pen Mail Here

Editor, *CQ:*

I just wanted to tell you that the May issue of *CQ* was a delight from cover to cover, and your editorial may well have been the best I have read in any amateur radio magazine. I thought I should let you know just in case you get a lot of poison-pen mail. Your voice and opinions are needed and appreciated.

By the way, Ed Solov's ID timer (*"A Simple ID Timer," CQ, May 1982, p. 24)* is a real beauty and just what the doctor ordered for me. Put it together even before I got this letter off to you.

Fred L. Van Aalst, WD4RAF
Oakland Park, FL

Novice Roundup Coverage

Editor, *CQ:*

I would like to thank you for the fine explanation on the Novice Roundup which Bill Welsh ran in his Novice column just prior to the contest (*CQ*, February 1982 issue).

Bill's explanation was far superior to the one which ran in *QST*, and in fact was the deciding factor in my entering the contest. It was my first contest and didn't produce many points, but I had a ball!

I have enjoyed the Novice column since before I got my ticket, and will continue to do so even after I upgrade. My thanks to W6DDB, and tell him to keep up the good work.

Max H. Adams, KA9JKK
Indianapolis, IN

A Novel of Ham Radio

Editor, *CQ:*

In case you have not run into this book, I felt I ought to mention it for readers of *CQ* and the ham fraternity in general. The book, called *The French Atlantic Affair*, by Ernest Lehman, Warner Bros. Communications Co., Atheneum Publishers, Inc., New York, NY, 1977, is the first major U.S. novel I've read using ham radio as the nucleus of the plot and action. The book has a very entertaining, complex plot about a French ocean liner hijacked by a group of Americans. Many of your readers will be interested in following the authentic ham jargon of 20 meter DX. One word of caution for your readers who are used to *CQ* and *QST* and some of the other magazines: the language of the book is sprinkled throughout with famous four-letter words, etc., which may shock some folks. Outside of that, I heartily recommend the book for all hams.

Robert Foy, K7ZHS
Kirkland, WA

The CQ Hotel?

Editor, *CQ:*

The "CQ Hotel"? It does indeed exist, and here is Skip Walter, AD0H, and his IC-2A in front of the CQ—more completely, the Copper Queen Hotel of Bisbee, Arizona. Bisbee is a former copper mining town, now more popular with tourists and artists. Through the local repeater, WB2RLE was worked in nearby Sierra Vista.

To move on to another subject, it would help those of us who move to receive QSL cards if the address began with the ham's *name* listed in the callbook. Names are more likely to be recognized for forwarding by the post office. Their forwarding addresses catalog doesn't usually list us as "Amateur Radio Station_____" or, especially, "A.R.S._____" (although some of us who move file a separate change of address form under our call sign in the name blank). Naturally, you should file a Form 610 with the FCC showing your new address, but the time delay between that and the next callbook being issued is considerable. I wonder just how many domestic cards I've missed.

C.K. Walter, AD0H
Macomb, IL

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A CQ EXCLUSIVE

CQ INTERVIEWS: MR. RICHARD M. SMITH

Chief, Field Operations Bureau, FCC

BY DR. THEODORE J. COHEN, N4XX

Richard M. Smith is a native of Lebanon, TN, and a graduate of Tennessee Technological University. He began his career at the Commission's Los Angeles field office in 1963, and later served as the Senior Engineer at Baltimore, MD, and the Engineer in Charge at Philadelphia, PA. Smith was promoted to Chief, Investigative Branch of the Field Operations Bureau, Washington, D.C., in 1974, and to Assistant Chief, Enforcement Division, in 1978. He became a member of the Senior Executive Service in 1980 with his appointment to the position of Deputy Chief, Field Operations Bureau (FOB). In August 1981, Smith was appointed Chief of the FOB, the Commission's largest bureau.

Smith has served as the Commission's representative to the Interagency Committee on Search and Rescue (ICSAR), and he is currently Chairman of the Commission's Engineers' Occupational Council. He has received both Outstanding Employee and Sustained Superior Performance Awards, and has participated in a number of management programs sponsored by the Senior Executive Institute.

Smith resides with his wife, Patricia, and son, Douglas, in Haymarket, VA. When time permits, he enjoys flying (Smith is an instrument-rated private pilot) and amateur photography. Smith was also licensed, at one time, as WA4AMX.

Here, then, is CQ's exclusive interview with the new chief of the Field Operations Bureau, Mr. Richard M. Smith.

*8603 Conover Place, Alexandria, VA 22308

CQ: Dick, in the months since you became chief of the FOB, the FCC's budget has been reduced significantly as part of the Administration's overall cutback in Government operations. How have these budget reductions affected your bureau, in general, and its ability to serve the amateur service, in particular?

Smith: It is certainly true that the budget restrictions are severe, and projections indicate that an even tighter financial situation will occur in fiscal year 1983. We have had to cease administering special licensing examinations at hamfests, except in those cities where we have district offices, because of reduced travel funds. We have also curtailed our regular, remote examination schedule. We are continuing to respond to major en-

forcement problems such as those which involve deliberate interference; this work, however, is subject to some delays because it can be preempted by higher priority problems involving interference to radio services necessary for safety of life and property. Because of these budget constraints, we will be increasingly dependent on the amateur community to handle or assist in resolving many of the problem situations which occur in the amateur service. As you know, there is a proposal, pending Congressional approval, that would allow amateur volunteers to provide some assistance to the Commission. This assistance would be helpful in resolving enforcement problems, and it would also allow amateurs to administer examinations to applicants for amateur operator licenses. I believe these initiatives are in the best interests of both the amateur service and the Commission.

"Because of budget constraints, we will be increasingly dependent on the amateur community to handle or assist in resolving many of the problem situations which occur in the amateur service."

CQ: What options are being considered with respect to the implementation of amateur-administered field examinations?

Smith: Implementation details, with respect to amateur-administered field exams, have not been finalized; however, several options have been identified. These options range from allowing any currently licensed amateur to administer any exams for a license equal to or lower in class than the volunteer examiner, to a more structured approach requiring Commission approval of the individual volunteer examiner. In the latter case, the amateur would first have to meet certain minimum requirements which are yet to be established. I personally prefer an approach that would impose the fewest limitations on the proposed volunteer examiner and still maintain the integrity of the licensing program.

CQ: What are your views regarding the Morse code requirement for amateur licenses?

Smith: Well, in view of the state of technology today, I feel that it is legitimate to question the role of Morse code as a requirement for an amateur license. From the results of the 1979 World Administrative Radio Conference (WARC), though, it seems likely that the code requirement will be with us for many years to come. It is difficult for the Commission to determine just what amateurs want to do with the code requirement. We get conflicting inputs. For instance, a recent survey conducted by Florida State University found that a majority of the amateurs polled considered the Morse code requirement to be "absolutely essential." Yet, we have received a number of letters requesting relaxing in the scoring of the amateur Morse code test to allow credit for partially copied words. It becomes a question of whether Morse code ability is a desired skill or just a barrier to limit the number of licensed amateurs. I personally don't believe that all types of amateur operations require Morse code as a prerequisite to receiving a license.

"I personally don't believe that all types of amateur operations require Morse code as a prerequisite to receiving a license."

CQ: Do you believe that a code-free license—say, with v.h.f. or u.h.f. privileges—is needed today, given the availability of the Novice license?

Smith: There are three main interest groups who would probably want to obtain v.h.f./u.h.f. no-code amateur licenses. The largest group might be called "two-meter hams." Their immediate interest in amateur radio is the use of two-meter f.m. repeaters and auto-patch. The second group is best described as "computer hobbyists" who want to experiment with digital communications systems. They view amateur radio as one possible medium for these systems. The third group consists of the "radio-control model airplane enthusiasts." They want to use the six-meter band to fly model aircraft, mainly because they find that other radio control bands are too crowded and susceptible to interference. The Novice class license really doesn't satisfy people in any of these groups because they are not interested in the Morse code. The Private Radio Bureau has indicated that they will be bringing the issue of a no-code license before the Commission in the near future.

CQ: Over the past year or so, the FOB has seen an increase in the number of complaints filed by amateurs regarding the operations of other amateurs. These complaints generally involve malicious interference. Do you consider such problems to be a major concern to the Commission today?

Smith: Complaints of malicious interference in any radio service are of major concern to the Commission. Enforcement in this area is very difficult and time consuming. Building a case usually involves documenting a pattern of behavior or operating practices over a long period of time. Assistance from the amateur community, as envisioned in the proposed legislation before the Congress, could assist us in developing a screening process which would help surface the malicious interference cases. This, in turn, would help us build a good solid case which would eventually result in the imposition of appropriate sanctions and lead to the correction of the problem.

"Complaints of malicious interference in any radio service are of major concern to the Commission."

CQ: Does the increase in amateur complaints about interference from other amateurs suggest that our service is losing its ability and willingness to police itself?

Smith: The increase in amateur complaints about interference from other amateurs probably reflects several things, including a willingness to admit that there are problems, frustration with "legalisms" which complicate the ability to find solutions to these problems, and "growing pains." I think the positive response by amateurs to the legislation pending in Congress adequately demonstrates the willingness of the amateur service to police itself.

CQ: The number of radio-frequency interference (r.f.i.) complaints received by the FCC appears to be leveling off at a little over 80,000 per year (though the number still appears to be on the increase). Is this "leveling off' a fiction which has been brought about by the budget cuts and the resultant inability of the FOB to register and process complaints?

Smith: Actually, the total number of interference complaints received by FOB field offices for all of the radio services continues to grow. However, the increase is much smaller now than it was during the explosive growth period of Citizens Band radio. The fact that we have fewer staff personnel in the field now than we did two or three years ago does not deter complaintants from writing or calling our offices. All complaints received are included in the statistical counts.

CQ: Dick, how significant, overall, do you consider the r.f.i. problem to be?

Smith: I believe that radio frequency (r.f.i.) problems—or, perhaps, a better term: electromagnetic compatibility (e.m.c.) problems—are significant today. Further, these problems may become quite critical in the future as communication technology expands. It is essential that the FCC, the manufacturing industry,

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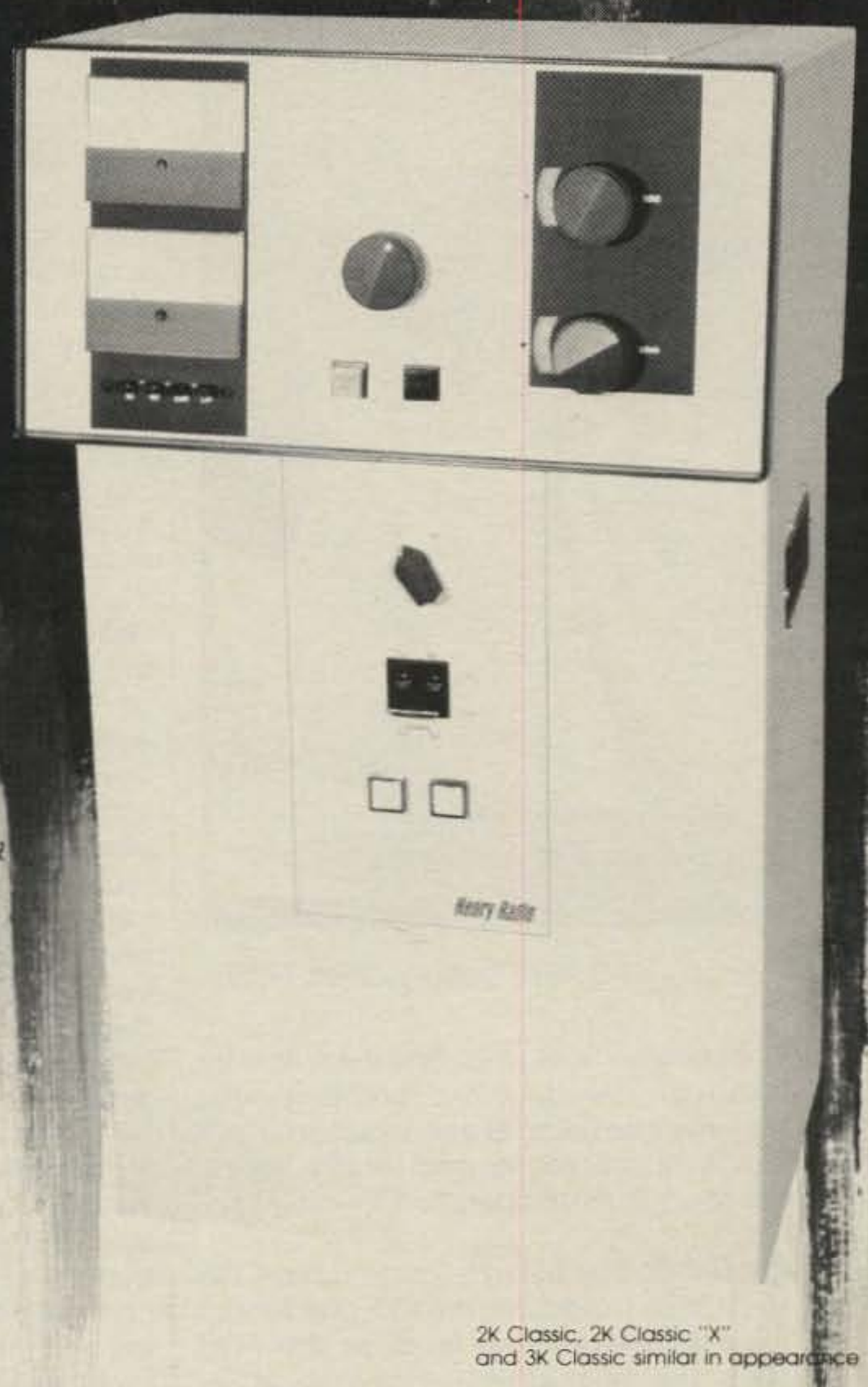

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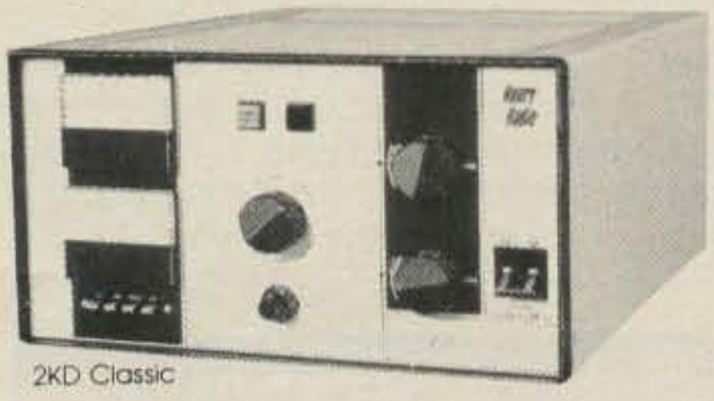

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Arlan van Doorn, Deputy Chief, FOB.

Commission licensees, and the public be aware of potential e.m.c. problems, and that steps be taken to address them in advance of marketing efforts and subsequent equipment operation.

CQ: But do you believe that you have the resources to address the r.f.i. problem as it exists today? That is, does the FOB have the resources nationwide to respond effectively to r.f.i. complaints from the public?

Smith: Ted, if the FOB was solely responsible for resolving all r.f.i. complaints, then the largest army of staff would probably be insufficient. Resolution of r.f.i. problems requires the combined efforts of the Commission, the industry, the public, and the licensees—in effect, all of the parties involved. The FOB does respond in some way to each and every complaint received at the field offices. That response, in many cases, is limited to providing information enabling the complainant to proceed on his own course towards resolution of the problem. In the most difficult interference cases, and in those cases involving high-priority radio services—that is, services which are concerned with the safety of life and property—the FOB attempts to respond promptly and on-site, and works to bring the problem to an early conclusion.

CQ: With respect to television receivers, do you see any indication today that manufacturers are building products which are less susceptible to so-called "front-end overload" than were devices built, say, five years ago?

Smith: Since the question is part of an ongoing notice of public inquiry, I don't care to express an opinion until the comments on that notice have been assembled, and I have had an opportunity to examine the data. As you know, a study conducted by the Field Operations Bureau several years ago disclosed that receivers, linear amplifiers, and transmitter harmonics were all significant factors in CB-related interference to television service.

CQ: Do you favor Federal legislation which would enable the FCC to impose susceptibility standards on television receivers and other electronic home-entertainment devices?

Smith: In general, I believe that the fewer the regulations imposed by the Federal government, the better off we are. However, when problems continue to exist over many years without voluntary resolution by the parties involved, then government regulation may unfortunately be required. I do believe that passage of "enabling legislation" such as that now pending in Congress may provide incentives to the private sector to intensify their efforts in resolving the most pressing electromagnetic compatibility problems we are experiencing today. I also believe that such legislation should make it clear that Congress's intent is to provide the Commission with a number of available options for dealing with r.f.i., thereby reserving the imposition of susceptibility standards on television receivers and other home electronic entertainment devices as a last-resort solution.

"In general, I believe that the fewer the regulations imposed by the Federal government, the better off we are."

CQ: The cable television industry has recently been cited for its failure to minimize signal leakage from (and into) its systems. Yet, the FCC is now considering a proposal to relax its minimum leakage standards. What gives?

Smith: Ted, because Commission rulemaking is now pending on this matter, I am unable to discuss the details of the proposal.

CQ: How much of a problem do you have with incidental radiation from devices such as electric shavers, hair dryers, air cleaners, and so forth?

Smith: We receive approximately 5,000 complaints a year concerning incidental interference from radio frequency devices such as you have named. These r.f.i. sources affect most all radio services to some degree.

CQ: Dick, do you believe that FOB services to amateurs have been (or are) out of proportion to the number of amateurs in the U.S. today?

Smith: No, I do not believe that FOB services to amateurs are out of proportion to the number of amateurs in the U.S. today or out of proportion relative to that received by the other radio services. In fact, the amateur service requires a relatively small percentage of our resources due in large part to the relatively high voluntary compliance exhibited down through the years by the amateur community. The amateur service overall, in fact, is one of our most compliant radio services. The FOB is, of necessity, now operating primarily in a "response mode." That is, we are responding to actual on-going problems of an enforcement or interference nature. We work from a priority list that begins with matters involving national security, safety of life and property, other local state and federal government radio operations, and so forth down the list of the multitude of radio operating services. We are no longer able to carry out significant routine enforcement activities. I expect the situation to continue for the foreseeable future because of budget limitations.

CQ: Do you believe that amateurs are effective in their attempts to make known their needs and desires to the Commission?

Smith: I believe the amateur community can rest assured that great strides have been made in the last year or two in their attempts to make known their needs and desires not only to the Commission, but

Elliot Our, Chief, Enforcement Division.

also to the Congress and the Federal establishment in general. I would think that amateurs should be very, very happy with their current representation in Washington, D.C.

CQ: Along the same line, do you believe that amateurs understand the legislative process and the manner in which an agency such as the FCC must operate within the Government? How could amateurs educate themselves on these matters, and would it be in their best interests to do so?

Smith: Following up my previous answer to the above question, yes, I believe that amateurs, in general, do understand the legislative process and the manner in which the FCC operates. This is a result, primarily, of their very excellent Washington representation and of the work of writers such as you. Regardless, amateurs should continue to educate themselves on matters of a legislative nature by communicating with various amateur organizations and with the Commission's Office of Public Affairs. It is certainly in the amateur's best interest to become familiar with the legislative and administrative processes within which the FCC must operate.

"I believe that amateurs, in general, do understand the legislative process and the manner in which the FCC operates."

CQ: Some within the Commission believe that amateurs want to play "both sides of the street." On one hand, they want their service to be treated as any other telecommunications service. On the other hand, they seek special favors (for example, immediate access to the new 10 MHz band) because of the noncommercial, experimental nature of the service. Do you think we play both sides of the street? Why or why not? Which path should the amateur service take: stand as an equal among telecommunications services or seek consideration as a special service?

"There are unique aspects to amateur operations, and those aspects must, I believe, be treated separately and differently than are most issues encountered in the traditionally more structured radio services."

Smith: Yes, I think amateurs play both sides of the street, as you say. But I hasten to add that I don't think it is necessarily bad to do so. In general, I think the amateur service should be treated as any other telecommunications service; however, there are unique aspects of amateur operations, and those aspects must, I believe, be treated separately and differently than are most issues encountered in the traditionally more structured radio services.

King Hall, Supervisor, FCC Communications and Monitoring Center, Washington, D.C.

CQ: What are your own views of amateurs and of our service? What do you consider our strengths? Our weaknesses?

Smith: I have a great admiration for amateurs as individuals and as a group of radio users. I think your greatest strengths lie in the high levels of excellence and pride in the accomplishments obtained through amateur radio operations. The amateur community has demonstrated tremendous success in voluntarily complying with the regulations under which your service operates. The amateur service has provided tremendous public service assistance, particularly during times of emergencies and disasters. From the ranks of amateurs have come some of our most talented and competent technical experts. All in all, I am very "high" on the amateur service and on the individuals who make up that community. On the negative side, I am concerned about the increasing problems caused by a relatively small number of amateur operators, particularly with regard to the malicious interference experienced in various parts of the country. If these problems continue or increase, they certainly have the potential for doing great damage to the service in the long term.

CQ: Dick, in today's world of competition for spectrum space, what do you believe amateurs must do to retain and expand on their allocations?

Smith: I think amateurs should do exactly as they did during the 1979 World Administrative Radio Conference (WARC) and during the preparations that preceded

that Conference, when they thoroughly stated and justified their case for new allocations. I was very much impressed by the tremendous success of the amateurs in that Conference on retaining and gaining privileges for the worldwide amateur service. I really have nothing more to add except to suggest that that particular experience could very well serve as an example of the type of work that must continually be done to protect the interests of the amateur service.

CQ: It's no secret that broadcasting interests have pushed Congress for immediate initiation of low-power television service. Do you believe that the Commission has had an opportunity to address adequately the interference problems which will result if low-power television stations begin operations in the v.h.f. and u.h.f. bands? And what do you foresee in the way of interference problems which are likely to be encountered in the field as a result of low-power television operations?

Smith: The low-power television service has been approved by the Commission, and, yes, I do believe that the potential for interference does exist when the new low-power television service is implemented. However, the Commission did take note of this matter, and I believe we have adequately provided the necessary policy for dealing with any problems encountered. That policy could best be described briefly as the "last man in" being responsible for interference resolution. Now that is to say, where a new service—a new transmitter—is installed, the new service would be responsible for resolving interference problems which may occur to existing radio installations. I believe this provides the framework for resolution of the problems which certainly, to some extent, will occur.

CQ: A number of amateurs are now experimenting with advanced communication techniques and modulation schemes (e.g., packet radio, spread-spectrum modulation, etc.). What capabilities does the FOB possess to monitor effectively these experiments?

Smith: The new technologies, such as those you mentioned, certainly do provide a number of highly desirable and advantageous characteristics. However, we will lose some ability to monitor the content of radio communications previously monitored with relative ease. Equipment will be required which the FOB does not presently possess; furthermore, in these times of budget constraints, the resources available for new equipment are expected to be very limited. However, on balance, I do not believe it desirable to withhold or constrain the implementation and use of advanced communication technologies. This is particularly important with respect to the amateur service, which traditionally has been a leader in experimenting with new communication techniques. I do believe that advanced communication techniques and modulation schemes may indeed lead to changes in the way the Commission allocates and assigns frequencies, and regulates many of the present radio services. It may even be that in the future, through deregulation, the Commission will be less concerned with content of radio communications. This could lead to a reevaluation of the "block allocation" technique by which the Commission has traditionally established various radio services.

"I favor a liberal policy with respect to the granting of Special Temporary Authorizations, particularly in the amateur service."

CQ: Given what you just said, do you favor a liberal policy with respect to the granting of Special Temporary Authorizations (STAs) to amateurs for the purpose of permitting investigations into advanced communications techniques?

Smith: Yes, I do favor a liberal policy with respect to the granting of STAs, particularly in the amateur service, where experimentation with advanced communication techniques should be carried out. An STA allows these operations to proceed in a timely fashion, whereas a formal rulemaking requires extensive periods of time to complete.

CQ: To date, has the Commission had any problem with respect to the unauthorized use by U.S. amateurs of the new 10, 18, and 25 MHz bands created (but not yet approved for U.S. use) by WARC-79?

Smith: No, I am not aware of any significant problems with respect to unauthorized uses by amateurs in these bands at this time.

CQ: On a lighter note, Dick, and drawing on your experience, what was the most difficult amateur case you ever encountered? The most humorous?

Smith: I have been involved in many difficult cases, and even more humorous cases, involving the amateur service. As you know, Ted, I started working for the Commission as a Field Engineer, and I spent some 12 years in the Field doing enforcement work before coming to headquarters as Chief of the Investigations Branch in 1974. The most difficult amateur cases generally revolve around malicious interference. I remember one case which still is not resolved and which involves an amateur who is the subject of continued complaints of various operating violations. However, due to his "catlike" charmed life, he never seems to be committing any offense when the FCC investigator is parked down the street in a position to obtain the needed evidence. Other amateurs have not been nearly so lucky, and some have suffered the embarrassment of encountering an FCC inspector while bending or breaking the rules. I remember one amateur who had been suspected by his fellow amateurs of operating slightly overpowered during contests. The amateur, being financially well off, had bought a farm-house; in fact, the entire farm was used for an antenna farm. Imagine how surprised he was when, on becoming very warm due to the great amount of heat given off by his two 10 kw power amplifiers, he opened the door for some fresh air and found me standing there with a badge in my hand (his operator's license was suspended by the FCC). Needless to say, I have enjoyed all of my field experiences, and in the case of the amateur service, I have had relatively little difficulty in dealing with the problems I have encountered.

(Left) Emmitt Sheridan, Electronic Technician, FCC Communications and Monitoring Center, Washington, D.C. (Right) John R. Hudak, Chief, Monitoring Branch, Washington, D.C.

"I look forward to working with the amateur radio community in my new position as Chief of the FOB."

CQ: Dick, do you have any other comments before we close?

Smith: Only that I appreciate having had this opportunity to respond to your questions, Ted, and I look forward to working with the amateur radio community in my new position as Chief of the FOB.

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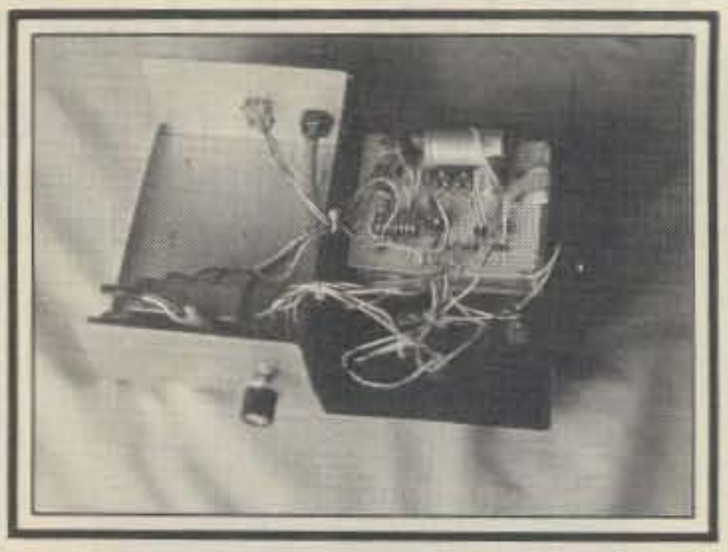
CIRCLE 34 ON READER SERVICE CARD

In true amateur spirit, KC9C, KB9CF, and WB9CZC set out to build an battery charger for the IC-2A that would rival "the real thing."

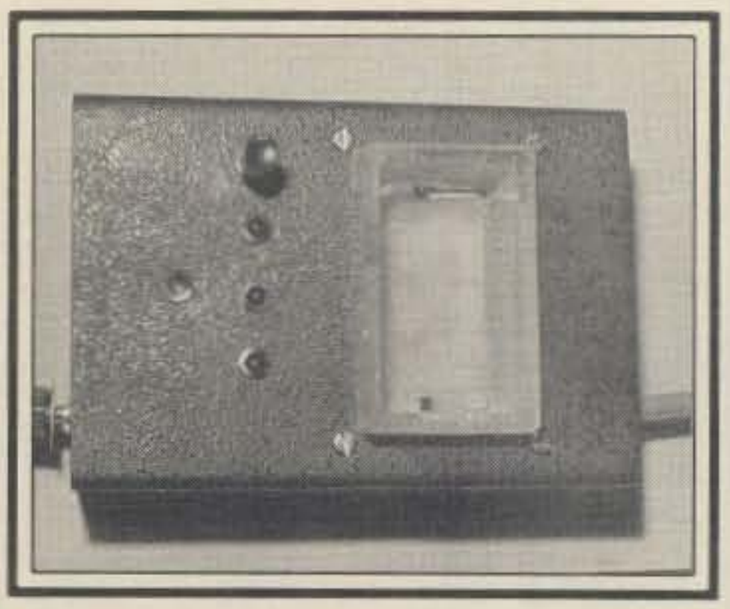
A Cheap Rapid Charger For The IC-2A

BY MARK FORBES*, KC9C, CHUCK HARRINGTON†, KB9CF, AND DAVID AZPELL‡, WB9CZC

The Icom IC-2A has swept the amateur 2 meter market like few products ever have. The reason, of course, is that the IC-2A offers a great deal for a modest price; it is synthesized, very compact, and, perhaps best of all, has a full line of quick-charge battery packs. The only drawback to the IC-2A system is that the accessory rapid battery charger is quite expensive. In true amateur spirit, we set out to design a charger that would do everything that the commercial version can and then some at a very cheap price.



This photo shows the construction details of one of the breadboard models. The pass transistor is mounted to the chassis (with a mica insulator) just to the left of the line cord.



Here is the top of the box showing the contacts inside the plastic pocket.

Introduction

The biggest problem in designing a rapid charger for nickel cadmium batteries is shutting off the current supply when the batteries are just fully charged. If Ni-Cads are allowed to charge beyond the onset of overcharge, permanent damage or destruction can result. This is largely due to the heat buildup. Luckily, the Sanyo Cadnica battery packs contained in the BP-2 and BP-5 accessory battery packs have a built-in thermostat sensor which opens up the charging circuit when the batteries are fully charged and then recloses it when they have cooled sufficiently for trickle charge to commence. With this head start, the charger design was fairly simple.

The charger has four levels of charging so that any kind of Ni-Cad battery can safely be charged in the built-in pocket. These levels correspond to the type of battery being charged: 25 mA is for standard-charge batteries such as those supplied in the BP-3, and for slower charging of other batteries; 150 mA is for "quick-charge" batteries such as those available from Radio Shack for the BP-4 battery case; 450 mA is for fast-charge batteries such as those in the BP-2 and BP-5; trickle (3–5 mA) is for use with any battery to keep it fresh. Two cautions should be advised here. First, when used in the charger the BP-3 must only be used at the 25 mA rate, as the internal protection circuitry is bypassed and damage will result at a higher charging rate. Second, batteries available for the BP-4 will not have a temperature sensor built in, and their charge time (4–5 hours) must be manually timed.

The Circuit

The circuit for the rapid battery charger is shown in fig. 1. Easily found parts have been used throughout, and logical substitution is possible without degrading the performance of the charger. LEDs have been provided to determine the charging rate at a glance.

The circuit operation is straightforward and easy to understand. Rectified and filtered voltage from the 24 vac transformer is applied to the LM723 voltage regulator and the NPN pass transistor. The LM723 and pass transistor are set up for constant current supply. When the battery pack is dropped into the charger, current flows only through the "Trickle" LED and to the batteries. The 470 ohm resistor limits trickle current to about 3–5 mA. Only this trickle current will flow into the batteries until the momentary push-button (S2) is depressed. When this happens, the SCR turns on and current flows through the previously determined resistor network, which limits the charging current. Since the resistance through the SCR leg is much less than through the "Trickle" leg, the "Trickle" LED will extinguish.

In the case of the BP-2 and BP-5, the SCR will turn off when the thermal cutout circuit inside the battery pack opens up. When the pack cools and the cutout closes again, trickle current will again flow, since the SCR must be manually turned on again. Thus, you can set a BP-2 or BP-5 in the charger on rapid charge and be assured of a fully charged battery in trickle charge when you come back, be it hours, days, or even weeks later.

Construction

Several prototype chargers were assembled on Vero-board and in Radio Shack cabinets as shown in the photo-

*1000 Shenandoah Dr., Lafayette, IN 47905
†Box 38, Rose Dr., Romney, IN 47981
‡1223 N. 28th St., Lafayette, IN 47904

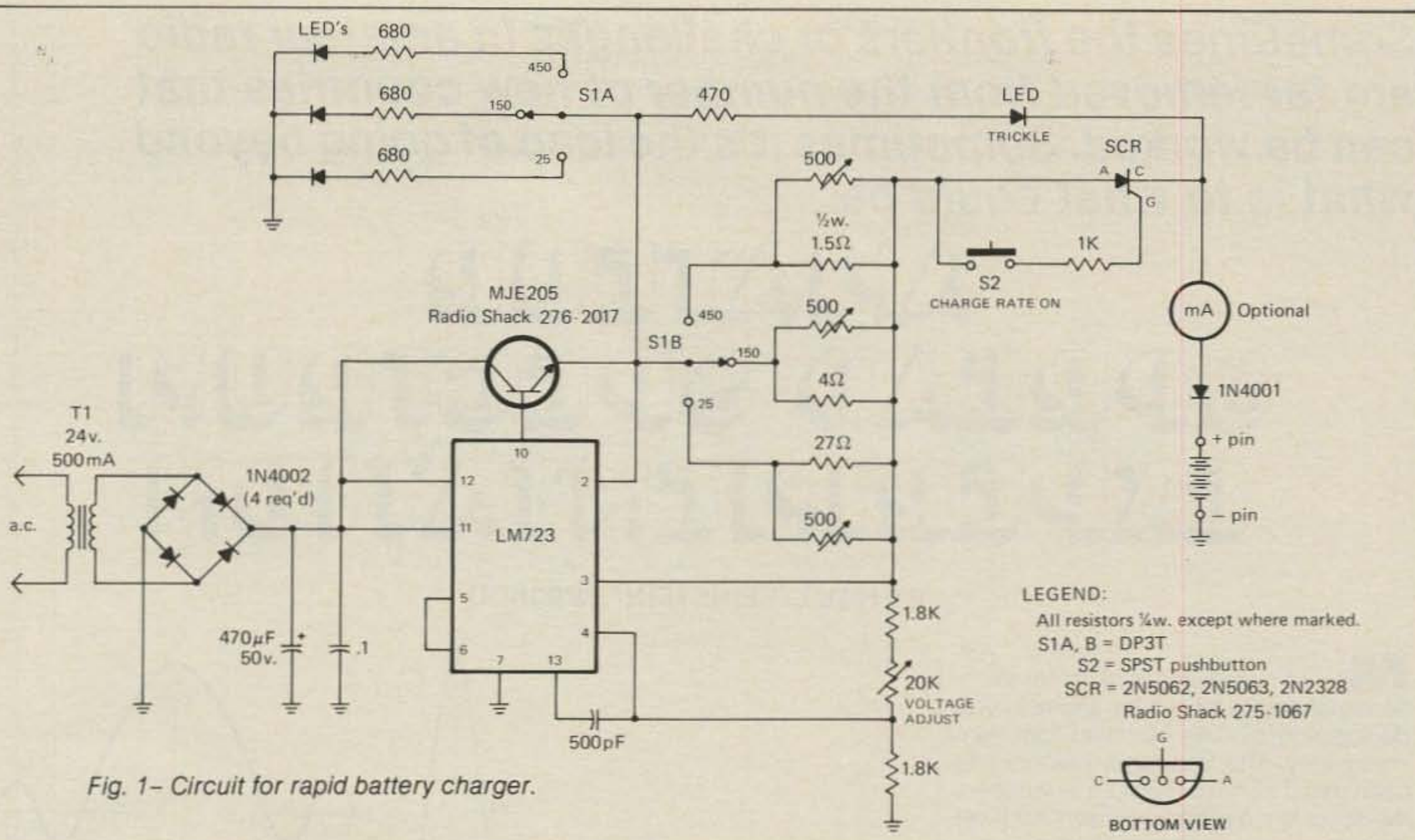


Fig. 1– Circuit for rapid battery charger.

LEGEND:
All resistors ¼w. except where marked.
S1A, B = DP3T
S2 = SPST pushbutton
SCR = 2N5062, 2N5063, 2N2328
Radio Shack 275-1067

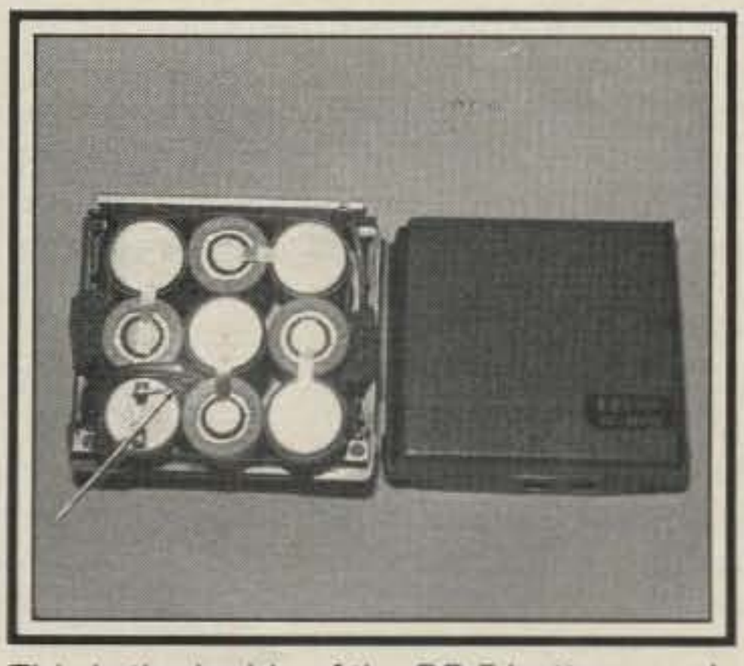
BOTTOM VIEW

Diode bridge (1N4001)	any 1 amp bridge, e.g., Radio Shack 276-1161
MJE205 pass transistor	Radio Shack 276-2017 (TO-220) 2N3055 (TO-3)
SCR	Radio Shack 276-1067 2N2328, 2N5062, 2N5063
1N4002	1N4001, 1N4003, etc.
DP3T switch	Radio Shack 275-1386 (only 3 of 6 positions used)
LM723	Radio Shack 276-1740
Cabinet	Radio Shack 270-252

Table I– Parts substitution list.

This is the finished charger. The IC-2A has the BP-5 battery pack installed, while the BP-3 is shown below the charger.

This is the completed charger.



This is the inside of the BP-5 battery pack. The arrow points to the thermal sensor.

graphs, which were taken by KC9C. Components can easily be packed together for a nice, tight layout. The pass transistor should be mounted (with a piece of insulating mica) to the cabinet itself. Even with the cabinet as a heat sink, it will get fairly warm in the 450 mA charge rate. The circuit is easy to troubleshoot, but if care is used, it probably will work the first time power is applied. Mine did, and that almost never happens!

Conclusion

This project was fun to build, and saved us quite a bit of money over the commercial version. In fact, all parts except the pocket can be purchased from Radio Shack for considerably less than $20.00. As mentioned earlier, most parts can be substituted for with no problem. Table I lists various substitutes which can be used. The resistors in the SCR leg can be substituted as appropriate, since exact charging rates are set with the pot and a milliammeter.

IC-2A pockets, printed circuit boards, and a partial parts kit can be obtained from the authors. Please send a self-addressed, stamped envelope for details and prices. We're sorry, but we cannot reply unless you include an s.a.s.e.

Addendum

A slight problem was encountered just before the article was submitted. If the IC-2A is used with the speaker/mike while charging, a 0.1 uF disc capacitor must be installed between the anode and cathode of the SCR. This keeps r.f. from disrupting the operation of the SCR.

Sometimes the frontiers or challenges in amateur radio are far removed from the number of new countries that can be worked. Sometimes it's the leap of going beyond what is to what could be.

AMATEUR SPREAD SPECTRUM EXPERIMENTATION

BY HAL L. FEINSTEIN*, WB3KDU

Most of the advances in communications technology have been aimed at producing progressively narrower spectrum occupancy. The traditional wisdom has been that if signal bandwidth is reduced, the spectrum has been conserved. If we look around, we can see that many useful and interesting advances are based on this idea.

To reduce noise and interference, a narrow-band system generally uses a filter that "hugs" the signal. This is taken to the extreme in coherent c.w. systems which have a filter so tight that a special reference is needed to help process the signal.

Spread spectrum modulation takes an approach which is 180 degrees opposed to the narrow-band philosophy. Instead of narrow-bandwidth modulation and narrow-band filters, spread spectrum seeks to make its modulation bandwidth very large. In fact, spread spectrum systems usually are designed to have bandwidths much more than ten times the bandwidth of the modulating information. It is not uncommon to find bandwidths of several megaHertz in such systems.

In a world of narrow-band communications, wideband is equated to interference. This is not necessarily the case in a properly designed spread spectrum system. Spread spectrum signals have a property which we might call "signal rarification." This property arises from the fact that a fixed amount of r.f. energy will be spread rather thinly across a large bandwidth, making the energy in any one spot relatively sparse.

Fig. 1 shows the transformation from a narrow-band signal to a spread spectrum signal. First, we start with a standard narrow-band c.w. carrier which has its energy concentrated about a center frequency. Now, by a process to be described later, the signal bandwidth is increased. What happens? The transmitter is now required to deliver power on more than one frequency. Because it has only a fixed amount of power, the transmitter will distribute its power over the entire bandwidth.

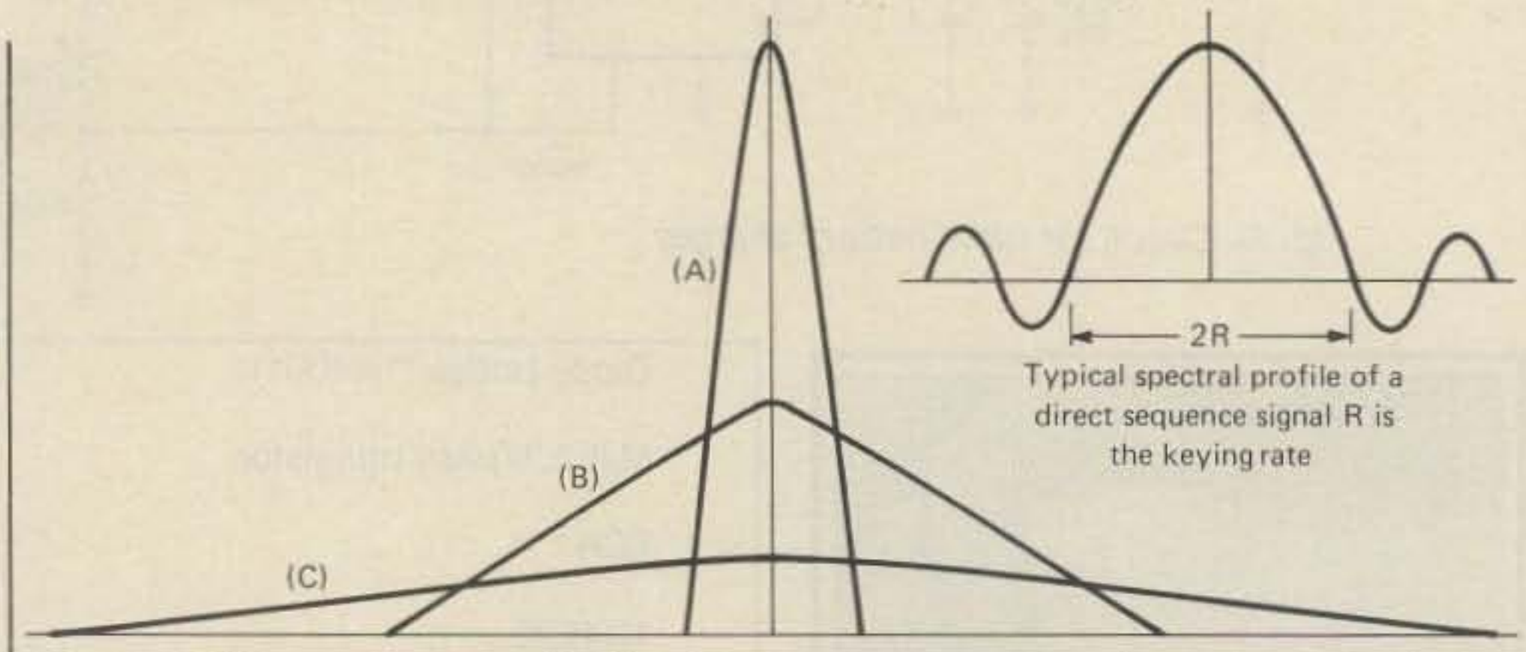


Fig. 1– Width versus power of a direct sequence spread spectrum signal. As the keying rate increases, the bandwidth increases and the peak power falls. (A) A normal carrier with low keying speed, (B) moderate keying speed causes peak power to fall, (C) very high keying speed results in a very wide carrier with small peak power. Notice that the total power remains constant.

As we increase the bandwidth still more, the peak power available to each frequency continues to decrease. At some point, the bandwidth is so wide that someone listening to the signal would say that the signal just went into the noise. In fact, we have spread the signal so thinly that it is below the noise where that listener is. Signals from narrow-band systems should be able to operate in the presence of our spread spectrum signal without any mutual interference.

Of course, we have to have a way of getting our signal back from its spread-out form. This is called "despreading" and will be described later in the discussion of spread spectrum reception. But for now, we have a system which can be made invisible to narrow-band users, using the same band.

Types of Spread Spectrum

There are several ways that a spread spectrum system can dramatically increase its bandwidth. Let's examine the four most popular types.

Direct Sequence mixes a very fast digital keying signal with the desired information.

Frequency Hopping is a standard narrow-band signal the center frequency of which is changed many times a second.

Time Hopping uses pulses with very short key-down times.

Chirp employs a fast swept carrier and is used mostly in radar.

One way to understand spread spectrum is to think of it as a system which transmits two sets of information. First, there is the actual information which we wish to send. Second, there is the process that spreads the signal.

Consider the **direct sequence** form of spread spectrum. This can use frequency-shift keying to cause the spreading. By keying very fast we can get a large increase in bandwidth. So, if we key at one million bits per second, the expected

*c/o AMRAD, 1524 Springvale Ave., McLean, VA 22101

bandwidth will be about 2 MHz wide—twice the keying speed.

We need a simple digital circuit to do the fast keying for us. One such circuit is called the **"linear feedback shift register" (LFSR).** The LFSR produces a **pseudo-random noise (PN)** stream which looks much like true random noise on a spectrum analyzer. The fact that a PN source is used is very important to other properties of spread spectrum.

The PN keying source puts a special signature on the signal which is being spread. The signature codes the signal such that a spread spectrum receiver with the same digital circuit can recognize just this spread spectrum signal from a mass of other signals (or noise) with different signatures.

This property creates a special kind of channel which two or more stations can use if all have the same kind of digital code signature. Codes may be set up by several thumb-wheel switches which modify the operation of the code sequence generators in some agreed way.

The ability of a spread spectrum receiver to select only one particular code and reject all others is an important attribute. Of course, it also rejects all narrow-band signals. The key to numerous spread spectrum systems sharing the same frequency space lies in the large number of different types of codes which can be devised. In fact, the number of codes is unknown, and new ones are being discovered all the time. A code needs to have a special property before we can select it for use. This property ensures that the code will not look like any other code for any long stretch of time. The codes must be studied mathematically. Two types have become popular: the so-called **m-length codes** and the **Gold codes.**

Receiving Spread Spectrum

Thus far, we have concentrated on the transmitting side of a direct sequence spread spectrum system. We should take a look at how a receiver is able to process the spread spectrum signal. Fig. 2 shows a greatly simplified block diagram of a direct sequence system. The receiver portion has many processes which should be familiar to most radio amateurs. The difference comes with an interesting new stage which is called the **correlator.**

The correlator performs an operation similar to detection of a signal. Like a product detector, the correlator requires a local reference which is the same as the PN code sequence generator used by the transmitter. The function of the correlator will be to *despread* the signal and recover the modulation information.

The correlator has three ports. One is a local PN code reference. The second is the raw wideband r.f. which is usually beat down to a low center frequency. The last port is the output port and will contain the recovered transmitted information. The correlator works by making comparisons between the local reference and the incoming spread spectrum signal.

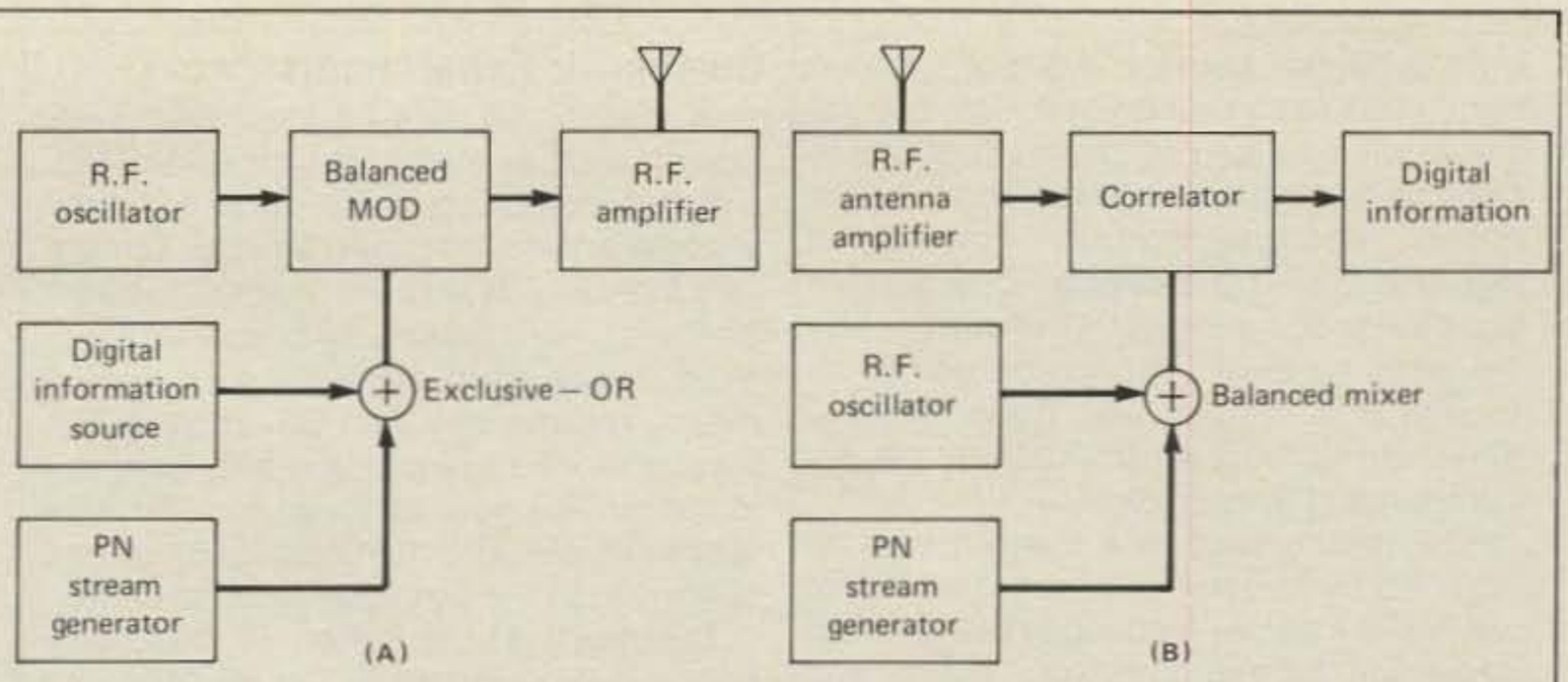


Fig. 2– (A) The functions of a direct sequence transmitter. (B) The functions of a direct sequence receiver.

Interference Rejection

Narrow-band signals and other interference in a properly designed system will be largely uncorrelated with respect to the signature code of the spread spectrum signal. This gives it the ability to reduce the effect of the interference.

Interference which actually gets through the correlator process results from the small amount of "chance" signal which just happens to be at the right frequency at the right time. These types of signals will appear at the output of the correlator as noise. Other spread spectrum signals will be a source of noise as well.

Such noise will grow with the amount of frequency space occupied and the spectral characteristics. What we face in this post-correlator noise is a kind of *packing limit* which says that there is a practical limit to the number of signals that can share. This is especially true if they have characteristics which trick the correlator into thinking that they have the right signature.

At some point, the noise will swamp the information in error just as a weak radio signal is buried in noise. When this happens, communication breaks down in much the same way that band overloading happens with conventional narrow-band services.

All this discussion has centered around the direct sequence system. As can be seen, the direct sequence technique gets its name from the use of the PN sequence directly keying the carrier. As with other types of spread spectrum, there are some serious problems to be overcome in the design of a direct sequence system.

Synchronization

The most important problem is that of synchronization of the transmitter and receiver PN generators. These generators must be in exact step for the system to work. It is a property of the PN streams that a delay of one bit in the correlator will cause the entire signal to be uncorrelated with the local reference. This means that the signal will be rejected as interference.

The ability to properly synchronize the two PN streams is one of the hardest. Quite complex schemes have been devised to deal with this problem. One such technique is called **"dithering."** Using this technique, the PN generator clock is rocked back and forth in speed a very small amount around the known clock speed of the incoming signal. The rocking is not more than half of the clock cycle either way. As the PN speed is rocked slightly forward, the correlator will report a slight decorrelation because the two PN codes are not locked. When the speed of the PN generator is rocked slightly back, the same effect takes place.

Suppose the incoming system speeds up a small amount. Because the receiver is rocking back and forth a small amount, the correlation readings will show an improved correlator output when the local reference speeds up. The output of the correlator is sampled and fed back to a clock-locking circuit which controls the rocking. This feedback will cause the clock frequency to move up or down, depending on where the best correlator output is found.

Because this operation is going on in the thousands or millions of bits per second range, you can see that some precision circuits are needed. Stability is critical to a well-designed system. It is possible to use a slower PN code for direct sequence systems, but there will be a small bandwidth to contend with, less interference rejection capability, and a falloff in other desirable parameters for such a system.

The problem of **handshaking** is also a complex one. This refers to getting the receiver and transmitter PN generators going at the same time. Again, because the systems operate in the microsecond range, this problem is not insignificant. Usually, a solution lies in transmitting a

control signal using a normal narrow-band modulation technique. The control signal will contain precise instructions to the receiver on where and when to begin spread spectrum reception. This kind of signal is called a **preamble**. One system uses the precise instant when the preamble ends to start the system going, although this system was good for only slow rate spread spectrum with the accompanying drawbacks.

The direct sequence system can be jammed by a *noise jammer*. This beast will find the center frequency of the direct sequence spread spectrum signal and generate lots of noise. The noise jammer tries to get as much "chance" noise past the correlator as possible. Rejection of noise and intentional jamming are properties of interest to the military services. There are various ways to get around these problems. The interested reader will find a good description of these techniques in the publications cited in the bibliography at the end of this article.

Near/Far Effect

A rather important phenomenon which is associated with spread spectrum is that of the so-called **"near/far effect."** This arises from the fact that the strength of a spread spectrum signal is above the noise close to the transmitting station and below the noise (this, essentially invisible) starting at some distance from the transmitter. In the near area, a spread spectrum signal plays havoc with narrow-band users in the same area. This is not all bad, because this permits us to use fairly straightforward monitoring and direction-finding techniques to locate an interfering spread spectrum signal.

On-the-Air Experiments

In March 1981 the Amateur Radio Research and Development Corp. (AMRAD), which is a club of over 600 amateur radio experimenters, obtained **S**pecial **T**emporary **A**uthority (STA) from the FCC to begin on-the-air experiments with spread spectrum. There were originally four experiments approved by the FCC, and the STA was amended to include a fifth for three stations. The goal of these experiments was to investigate the usability of spread spectrum in the amateur radio service.

Experiment #1 consisted of frequency hopping experiments in the 80-, 40-, and 20-meter bands using commercial/military frequency hopping gear. These tests were carried out between W4RI, K2SZE, and WA3ZXW in Washington, DC, Rochester, NY, and Annapolis, MD, respectively. These tests allowed many observations to be made in the presence of different conditions in the h.f. bands. Briefly, these tests showed that the frequency hopper worked well in the presence of intermittent c.w. signals, but not as well in the phone portions of the bands when s.s.b. signals are "wall to wall." Another article details the results of this experiment.[1]

Experiment #2 deals with conversion of surplus CB gear for frequency hopping in the 10-meter band. Various groups in Washington, DC, and Texas are interested in this experiment. Construction is underway using CB gear employing type 858 synthesizers with modifications performed on their loop filters to allow faster hopping lock-up.

Experiment #3 is the use of direct sequence spread spectrum in the 420 MHz band. The experiment is geared to use a slow code rate at first, then increase the speed as experience is gained.

Experiment #4 uses direct sequence spread spectrum to improve the multipath performance of **Earth-Moon-Earth (EME)** communications. This experiment is to be carried out by W3PJM using the 84-foot dish at Cheltenham, MD.

Experiment #5 (just added) involves 2-meter tests of a frequency hopping system designed by N5EZV. It uses conventional narrow-band f.m. modulation on a carrier which hops between 16 or more discrete frequencies at rates up to 60 hops per second. These experiments are to be carried out by N4EZV, W4RI, and WB3KDU.

Self Policing

One of the areas of concern is the ability of amateurs to continue to be self policing using this new mode of communications. Spread spectrum is inherently difficult to receive if the receiver is not in possession of the code used by the transmitter. It is also hard to estimate the code by monitoring a spread spectrum signal if the code is complex.

After some discussion, a group of AMRAD members began investigation of ways of receiving spread spectrum without knowing the code used. The goal is to produce a low-cost monitoring system.

Conclusion

The FCC has been a driving force behind amateur radio spread spectrum activity. The FCC is now considering the adoption of rules (Docket 81-414) which will permit spread spectrum emission in the 50, 144, and 220 MHz bands with certain restrictions.

Spread spectrum is a new modulation technique which is only entering the civilian domain. Formerly, it was the province of the military, who took advantage of its signal-hiding, privacy, and anti-jamming properties. But, interest has been growing in the commercial sectors due to spread spectrum's unique spectrum sharing potential. Innovation is required to devise low-cost designs. As the head of a major military electronics company said recently, "We know spread spectrum can be done because we've done it, but can it be done cheaply—that's the real question."

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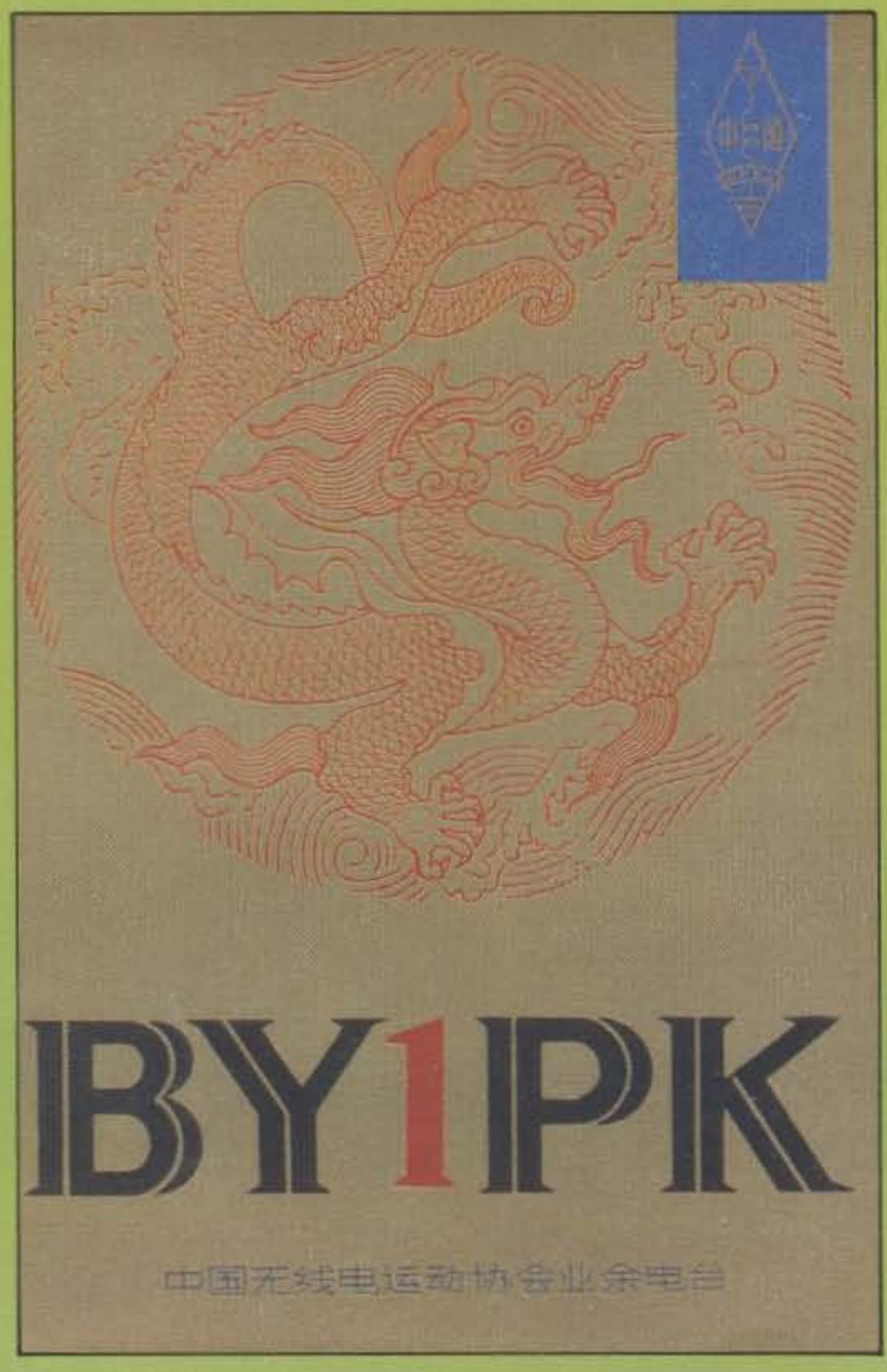
While it may be a little while longer before they're okay in the *Callbook*, they are on the air. China is indeed back on the air and sending out QSL cards much to everyone's delight. These cards were forwarded to us by JH1WIX via W2GT just to show you what to expect. The writing is in Japanese and extends the wish to work JH1WIX again. Beijing is the same as Peking. We will have an in-depth story on how amateur radio had its resurgence in China next month.



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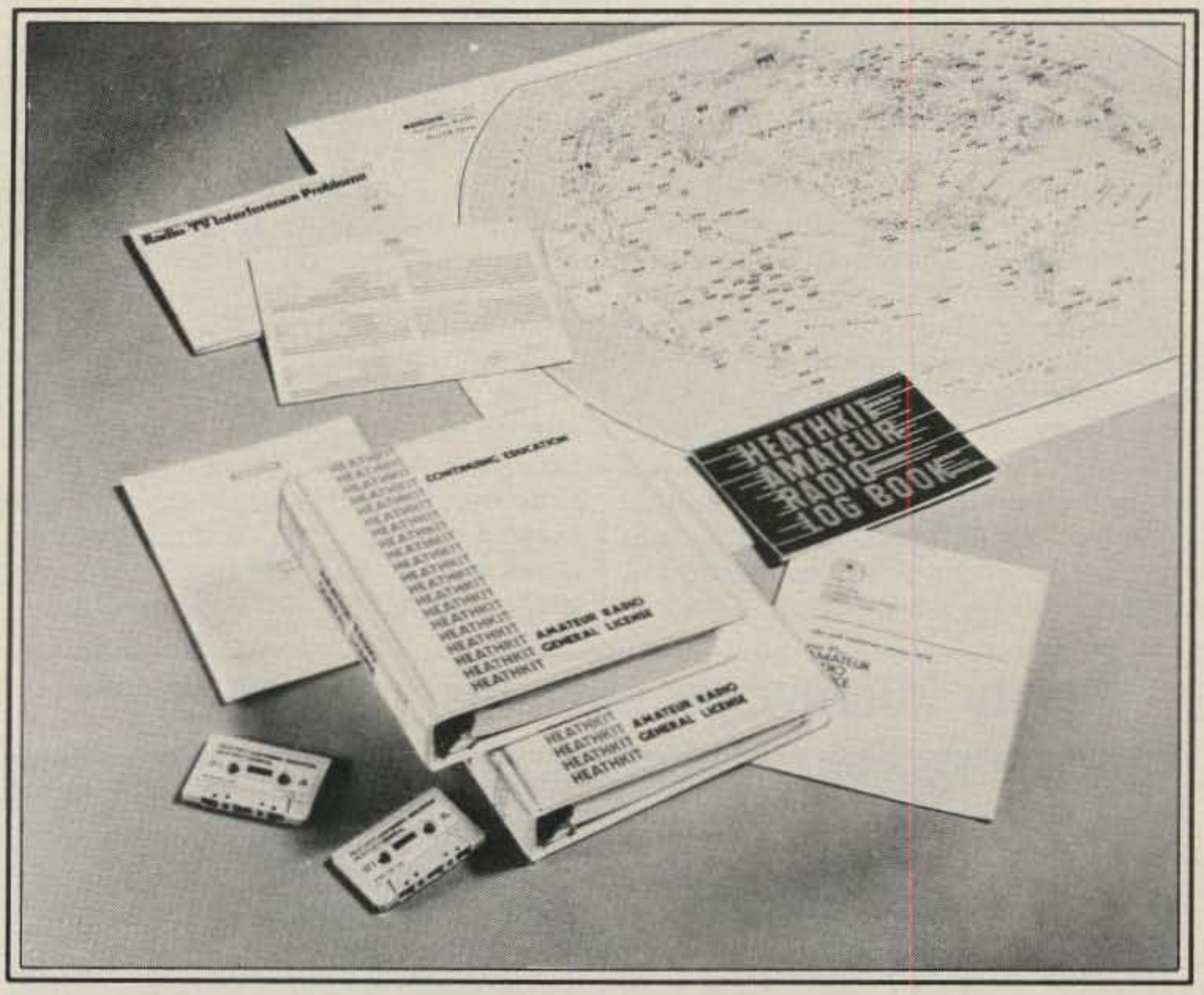
CQ Reviews:

Heath's Amateur Radio General Class License Course

BY J. SCHULTZ*, W4FA, and E. SCHULTZ, N2BVN

A complete, integrated General Class theory *and* code course at a reasonable price and with a money-back guarantee if one fails to pass the Technician or General Class examination? It sounds a bit daring and almost unbelievable to an old-timer who struggled with numerous texts and learning approaches to finally gain his "ticket." But, Heath is offering such a course as part of its Continuing Education series. Actually, the course is a lot more than a simple do-it-by-the-numbers memorization course designed to enable one to pass an examination without knowing the subject matter except, perhaps, for surface details. As we see it, the course is a genuinely well-thought-out one that is designed to guide a participant to progress from basic electrical/electronics fundamentals to the point of being able to intelligently operate an amateur radio station. The course will not make anyone into an electronics technician. However, besides preparing one to pass an examination, it does provide the *background* for anyone to progress in *any* desired direction in amateur radio. Those who go through the course and become intrigued by electronic circuitry will undoubtedly study more on the subject and become passionate home-brewers, experimenters, etc. Those who successfully use the course to obtain their Technician or General Class license, but who find just plain operating on the amateur bands more interesting, may tend, in some eyes, to fall into the category of "appliance operators." But, they certainly will be able to regard themselves as "educated" appliance operators who understand what they are doing and know how and why their equipment functions.



Spread out like this, one can see that the Heath course contains a lot of material.

The XYL used the Heath Novice License Course to successfully obtain her first license (July 1979, *CQ*). The following description of the Heath General License Course is a follow-up review on Heath's latest license course and is based mainly on the XYL's impressions and experiences while presently using the course to hopefully upgrade her license. Probably the impressions obtained while actually using a course give the best insight into the features, both good and bad, of a course. Surprisingly enough, one should not consider the simple passing of an examination, for which a course prepares one, as the primary evaluation of a course. If a course develops interest and confidence in a person that he or she can master a subject, an examination can always be passed. The point is that one gains sufficient interest and knowledge about a subject to last long after the examination is forgotten. Admittedly, there are a lot of fields of study where one cannot afford the luxury of becoming less than purely examination-minded. Fortunately, amateur radio is not one of them.

So, here is how the Heath General License Course looks.

The course comes in two mailings. One rather small box (12" × 12" × 6") contains all the actual course materials, and a mailing tube brings a full-color world call-area map. The "small" box unpacks to reveal quite a bit of material:

1. Two loose-leaf binders containing the actual study materials and end-of-course practice examination.

2. An envelope of FCC-style examination answer sheets.

3. Sealed envelopes containing the answers to the "unit" practice examinations.

4. Two code-practice cassettes with a code-practice workbook.

5. An assortment of FCC forms and materials: FCC Form 610, FCC Examination Schedule, an FCC booklet on radio-TV interference problems, and a copy of Part 97 of the FCC Rules and Regulations (Amateur Radio Service).

6. A station log book for use when one actually has an operating station.

There is little doubt that everything basically is there to take one from A to Z as

*c/o CQ Magazine

far as a Technician or General Class license is concerned, especially for someone working on his or her own. However, one shouldn't become too overwhelmed by the sheer amount of paper. The heart of the course is the two looseleaf binders containing the study materials and the two code-practice cassettes with their associated code-practice workbook.

The two looseleaf binders contain the study materials broken down into nine study "units" and one practice examination "unit." The nine study units are Amateur Radio Operations, Direct Current, Alternating Current, Active Devices, Electronic Circuits, Measurements, Transmitters, Receivers and Station Operation, and Antennas. Each of the units is organized in the same manner, starting off with a brief introduction and a listing of the learning objectives for that unit. Then, there is a unit activity guide which is a simple check list that one can fill in as one progresses through the unit.

The actual study material for each unit is broken down into "sections." Each section is complete in itself in that it presents the study material and then offers a self-review question sheet with the answers given on the reverse of the sheet.

Finally, there is a unit examination which tests one on all the study material presented in a given unit. The answers to each unit examination are contained in a sealed envelope. A nice touch to the unit examinations is that one completes them on an answer sheet copied from the actual FCC-style answer sheet that will eventually be used for the "real thing." So, one automatically becomes very familiar with using the FCC-style answer sheet.

The number of "sections" each "unit" is broken down into varies from about three to six, and there are about three to thirteen study pages per section. For instance, the unit on Amateur Radio Operations has sections such as "What is Amateur Radio," "Amateur Radio Licenses," "Operating Procedures," and "Rules and Regulations." A somewhat larger unit, such as Active Devices, contains sections on "Electron Tube Diodes," "Triodes," "Tetrodes and Pentodes," "Solid-State Diodes," "Transistors," and "Integrated Circuits." A somewhat more uniform breakdown of the units into sections would be desirable from the viewpoint of scheduling one's progress through the course. But, by scanning through the entire course before starting it, one can adjust the time devoted to each unit or section depending on its length.

The study material presented in each section is, unlike in the Heath Novice Course, not of the "programmed" type. However, the text is straightforward and clear. Almost all of the sections contain a good number of illustrations or photographs, so there is a lot less actual text to digest in each section than the page numbers above would indicate. Heath must have used every publicity picture ever taken of their amateur radio equipment, although they are used appropriately to support the text. Well, who can blame them for not wanting to give free publicity to the competition, especially if one is enjoying the course? An undesirable "association" with the competitors' wares might take place! But, seriously, a few photographs or illustrations of historical radio personalities or equipment would have added more balance to the illustrations used.

The final unit contains two each full-size practice Novice and General Class examinations for Elements 2 and 3 of the FCC examination. The inclusion of the Novice Class written examination makes good sense. If one does not have a Novice license and goes directly for a Technician or General Class license, one will have to take Element 2, the Novice written examination, at the FCC before taking Element 3 for the Technician/General Class license. Answers to the practice examinations are given at the end of the unit. A nice touch at the end of this unit is a sample filled-in FCC Form 610 to show how one would normally prepare it if taking the General test at the FCC. It sounds a bit simple, but how many newcomers and old-timers alike have fouled up in filling out a 610!

The two code cassettes and the code practice workbook are designed to start one from zero and work up to 15 wpm. The material on the code cassettes is divided into practice sessions that start with the usual groupings such as E, I, S, etc., and then build up into the other letters and the numbers. Narration on the tapes, particularly at the beginning, explains the purpose of each practice session. Most of the practice sessions, which gradually build up in speed, are mixed letter/number groups which vary in length. At the higher speeds, there are several typical QSO-type practice sessions and two 15 wpm QSO-type practice sections for which the code workbook contains two typical FCC "comprehension" type examinations. A printout of all the practice sessions on the tapes is contained in the code-practice workbook. The tapes certainly give one a flying start in learning the code. There is absolutely none of the usual dot/dash-memorization business or letter/number dit-dah tables.

The emphasis is *solely* on learning the "sound" of the letters/numbers. If one can catch on to this method of starting to learn the code, it will undoubtedly save a considerable amount of time. One is encouraged by the course to learn the code along with the text study materials. But, there is no reason why one cannot separate the two by learning the text materials first for the Technician Class examination and then later the code materials for just the General code test.

As one looks at the course, the inevitable question arises for someone completely new to amateur radio as to whether one should start out directly with this type of course or first with a course such as Heath's Novice course. The answer depends on a number of factors. Undoubtedly, the Novice course is a somewhat simpler way to ease into learning amateur radio with its "programmed" type learning test and emphasis on just building up one's code at low speeds. But, if one has some previous, slight exposure to electronics and reasonably good study habits, the General Class course should be considered as a starting point.

The course normally should be complete enough in itself, although one might wish to supplement it with some minor materials—for instance, with the frequency-spectrum chart which comes with the Heath Novice course, but not with the Heath General course. The chart gives one a very good overview as to how different frequency bands interrelate and how the various amateur bands sandwich in between other users of the frequency spectrum. It is available from Heath as a separate-order item. Also, normally after one's code speed develops a bit, it becomes a great deal of fun to listen to on-the-air QSO's, both for practice and because one can finally understand "what they are talking about." However, if for some reason one can't do this, the purchase of a code-practice cassette which deals only with QSO-type exchanges of the type on which the FCC code comprehension test is based would be advisable. It will give one that extra edge of confidence which normally would be gained by practice copy of a number of on-the-air QSO's.

The course is a large one when viewed as a whole, but it has been broken down into bite-size portions. The key to success when using the course appears strongly to be to program one's study habits so one progresses through the portions at a steady but reasonable pace. The loose-leaf binding format makes it easy to remove sections of each unit if one wants to just have a small packet of study material each day to use while commuting, etc.

The XYL, considering her other activities, has decided on a four-month pace. So far, every indication is that the course can develop in one the interest, knowledge, and confidence needed to pass the Technician or General Class license with ease. Like the guarantee states, "We are extremely proud of the program . . . . If you do not pass the FCC General Class examination, Heath will refund the purchase price." The guarantee is valid for two years.

The General Class License Course, Cat. No. ER-3702, is priced at $49.95, and is available from the Heath Company, Benton Harbor, MI 49022.

If you're out for adventure and a change of pace from operation on the low bands, try a little of "the other 2 meters."

OPERATING THE OTHER 2 METERS

BY C.C. ROSEMAN*, K9AKS

What is "2 meters" anyway? To the vast majority of amateurs in the United States (and within many other countries) 2 meters signifies an amateur radio band which uses f.m. for reliable local communications either through repeaters or in a simplex mode. A majority of amateurs have some type of 2 meter rig. Many hams have small transceivers in their cars for use on the way to and from work, or while driving for other purposes. Their usefulness during emergencies, such as hurricane or tornado watches, is unquestioned. Many other hams carry HTs (handy-talkies). These devices seem to be ubiquitous at amateur gatherings and have seemingly become direct extensions of the bodies and minds of their owners. Still others have 2 meter rigs at home to complement and extend their stations for many purposes, such as emergencies, DX spotting, or just chatting with local friends.

However, there is much more to 2 meters than f.m. Most amateurs do not use the non-f.m. portion of the 2 meter band (or the non-f.m. portion of other v.h.f. bands for that matter). Out there lies a lot of excitement and challenge for any ham who might desire a change of pace from local rag chewing, hectic low-band DX chasing, or the incredible QRM often encountered on the low bands. The normal range of communication on 2 meter s.s.b. or c.w. is considerably more than on f.m., and various types of "band openings" spice things up from time to time. In these few pages I would like to share some aspects of operating 2 meter s.s.b./c.w., hoping to show that the non-f.m. portion of the band offers a variety of operating adventures.

Everyday "DX"

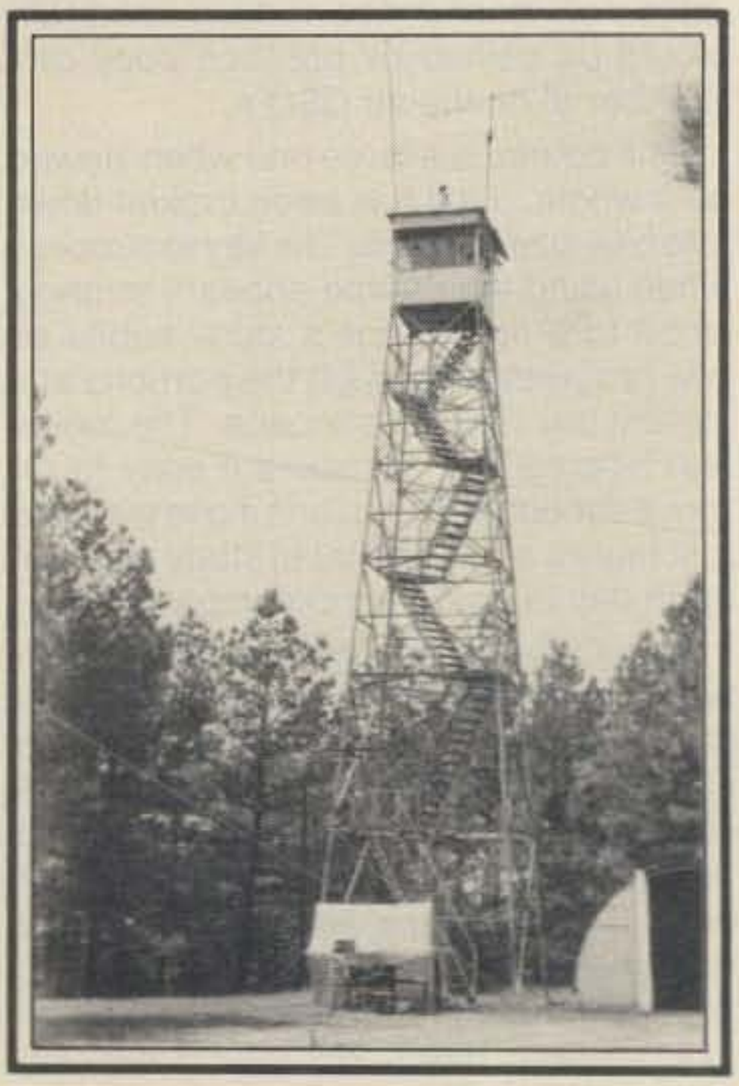
In 1977, I traded my low-band transceiver for a 2 meter multi-mode rig (and had to fight several attempts to have me committed!). I acquired a relatively simple antenna system and soon added a 100 watt amplifier (more about these later). On virtually any day of the year I can work anybody with a comparable station up to about 300 miles from my Urbana, Illinois QTH. This includes a good part of the Midwest (depending upon your definition of "Midwest"): all of Illinois and Indiana, plus parts of Wisconsin, Michigan, Ohio, Kentucky, Missouri, and Iowa. I can also work 10 watt stations out to about 200 miles with good reliability. This gives me a lot of people to talk with beyond my local area.

Emil, W3EP, and his mountaintopping setup. The rig is a Yaesu FT-221 and a solid state amplifier. The antenna system is two 8-element quagis. Emil most often uses only one quagi, a system which takes only a few minutes to set up.

The significantly greater range of s.s.b./c.w. is largely due to the narrower bandwidth of these modes. My typical range tends to be even greater in the summer months and in the evening and early morning hours because of atmospheric conditions. I don't have to worry about tying up a local repeater that others might want to use (although it is common courtesy on s.s.b. to avoid rag chewing on the calling frequency of 144.200 MHz). In addition, I have been able to make a number of friends over the air, have long, interference-free contacts with them, and sometimes see them at Midwest hamfests. Sounds a lot like 75 meters without all the QRM and other hassles.

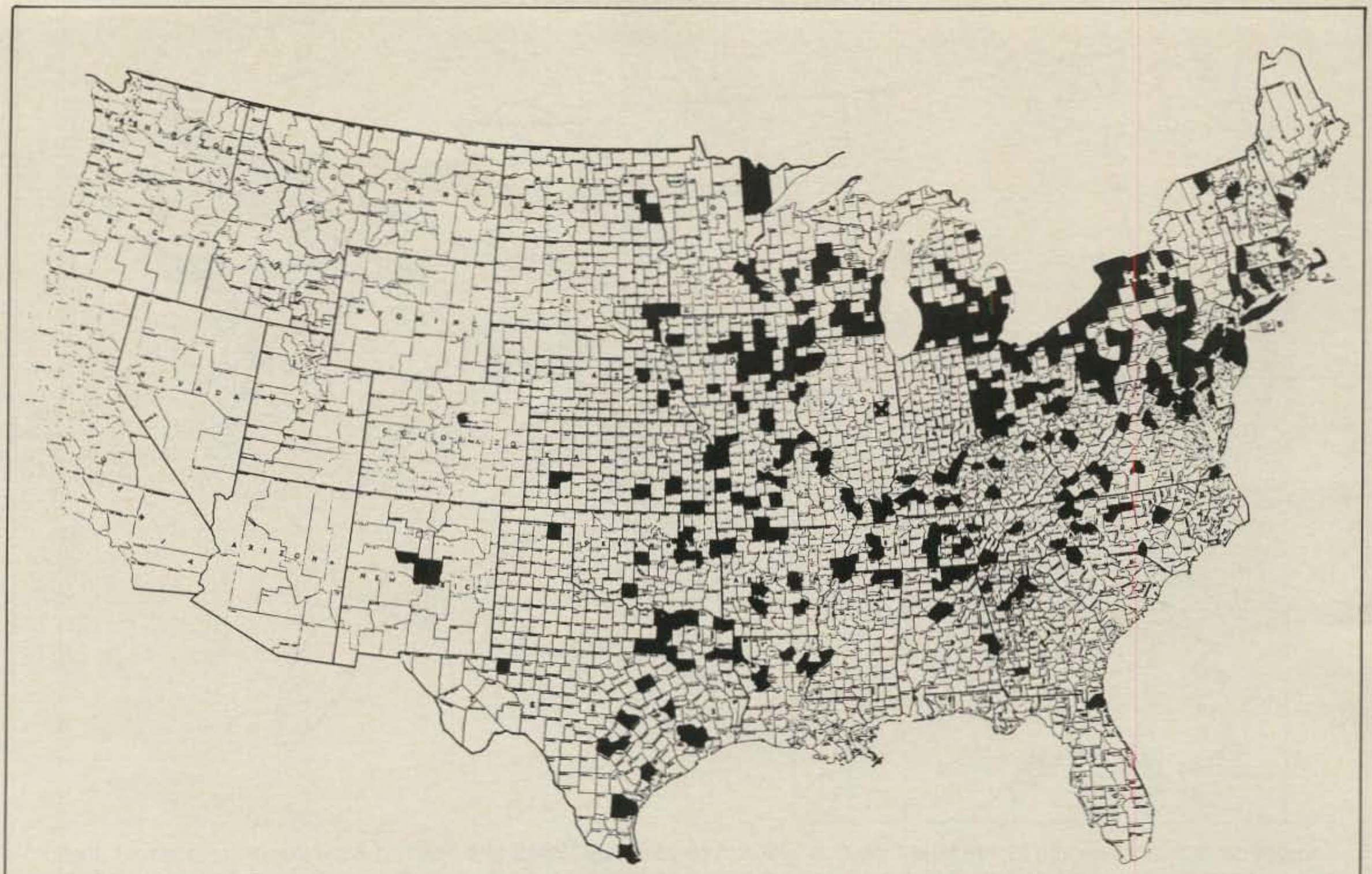
Real "DX"

The everyday stuff provides reliable communication beyond the local area, but the truly exciting aspect of 2 meter s.s.b./c.w. (and v.h.f. in general) comes with the "band openings." There are sev-



The fire observation tower, with a 16-element 144 MHz yagi on top at Woodall Mountain (the highest point in Mississippi). This antenna helped W9IP/5 work 27 ARRL sections on 2 meters in the September 1980 ARRL VHF contest.

*503 East California, Urbana, IL 61801



Counties worked by K9AKS on 144 MHz s.s.b. or c.w. between June 1977 and August 1980. (Not shaded are counties worked in Illinois and Indiana.)

eral types of propagation which extend the range of communication for those of us with modest stations. (For a more complete discussion of these modes, see the *ARRL VHF Handbook*.)

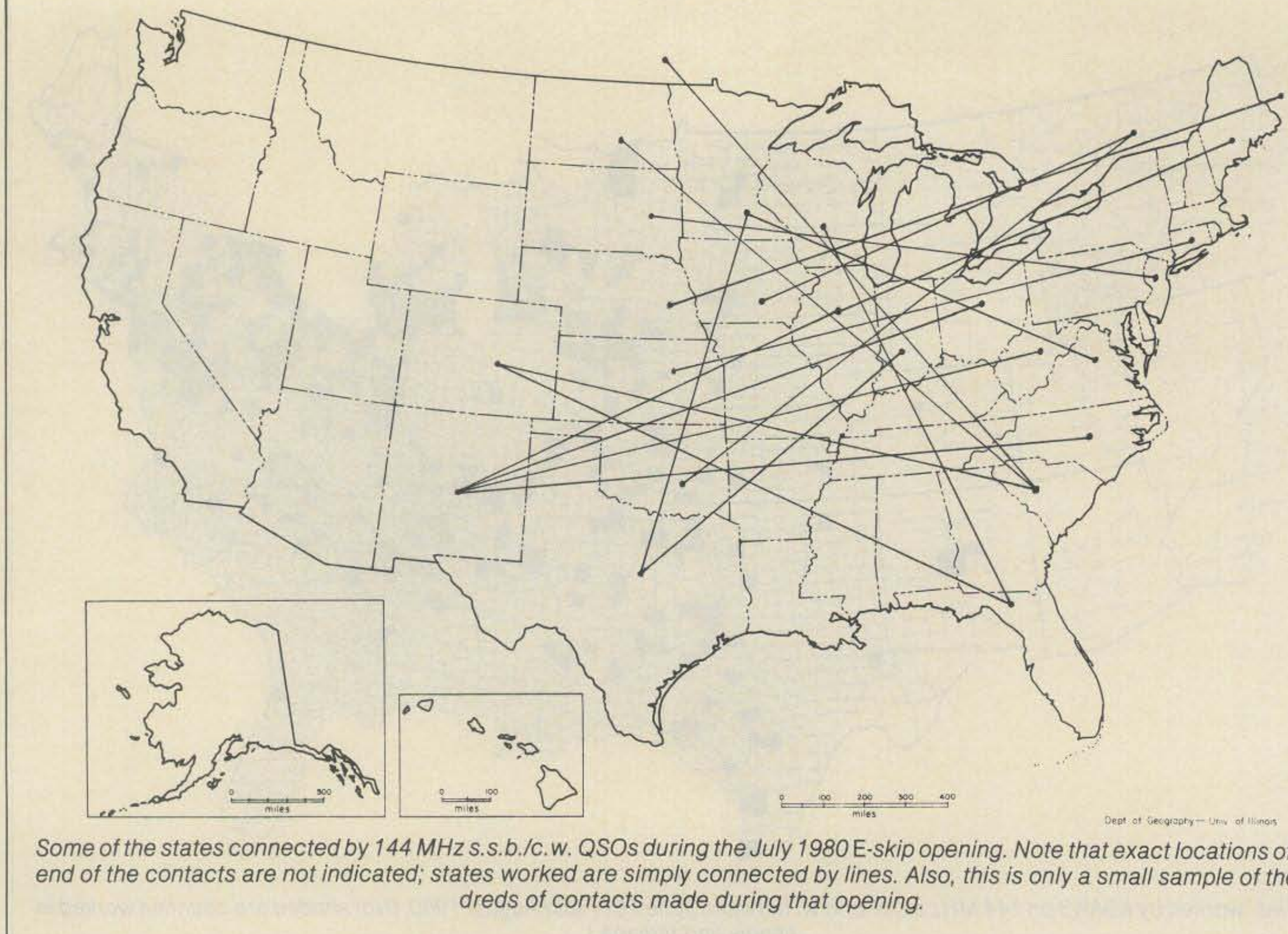
The most common type of such propagation is tropospheric ducting, or simply "tropo." This is a function of the weather and occurs when the temperature and moisture in the air are vertically distributed so as to refract v.h.f. radio signals around the curvature of the earth to greater distances than would normally be expected. You may have heard references to "openings" of this type when your local repeater is clobbered by other repeaters or by signals on the input frequency. ("We're getting some 'skip' today, old man," to borrow the CB terminology so frequently heard on repeaters.)

Tropo occurs under several weather circumstances, but most commonly on the back side (western edge) of large, sluggish, slow-moving high-pressure systems. One or two such openings, each of which might last several days, occur in the middle and eastern parts of North America each year in August or September. Other openings are found to be associated with warm fronts or ahead of cold fronts and may occur at any time of the year. By my count over the last four years, we experience an average of about 25 days of significant tropo each year in the Midwest. The key to planning for these openings is to pay attention to the weather forecast map in the newspaper or on television. Better yet, watch "AM Weather," a morning PBS TV offering which generally gives good predictions for broad areas, and most particularly, has accurate forecast maps showing the anticipated positions of highs, lows, and fronts.

Another type of opening is due to ionization of the atmosphere by auroral disturbances. "Aurora" affects central Illinois an average of more than fifteen days per year, and occurs in Minnesota, Wisconsin, and New York much more frequently. (You folks in the Sun Belt won't encounter much aurora, although I have worked Oklahoma, Arkansas, Georgia, and North Carolina on aurora, so don't give up.) These openings occur in association with solar disturbances and an active or disturbed Earth's geomagnetic field. Therefore, paying attention to the K and A indices broadcast by WWV at 18 minutes past each hour helps to predict aurora. (See Howard J. Sartori, "Update Your HF MUF Predictions Daily," *QST*, Sept. 1977, pp. 35–37, for a description of these indices. Note in particular that such disturbances often produce relatively poor conditions on the h.f. bands, a circumstance which delights to no end some v.h.f.'ers!) Typically, aurora starts in middle or late afternoon and may last up to several hours, although it can come at any time.

To work aurora, you simply point your beam toward the north. Then listen for an ugly-sounding, raspy c.w. signal and peak it with the antenna. Most aurora work is done on c.w. near 144.100 MHz, although s.s.b. is possible during particularly intense openings. I have worked as far west as Denver (900 miles) and as far east as Cape Cod (about 920 miles). Others have routinely managed greater distances than that. During nearly every opening which gets this far south I manage to work Frank, K2OS, in western New York, a distance of about 580 miles.

A third type of opening, sporadic-*E* or "*E*-skip," only graces 2 meters with its presence on two or three days a year in any given location. *E*-skip is the basic type of opening which occurs on 6 meters, most often in June and July of each year, and is the same as "short skip" on 10 meters. When the MUF (Maximum Usable Frequency) for *E*-layer reflections reaches 144 MHz, excitement reigns. On July 17, 1980, for instance, a good portion of the eastern two-thirds of North America was favored by intense *E*-Skip. Hundreds, probably thousands, of contacts



Some of the states connected by 144 MHz s.s.b./c.w. QSOs during the July 1980 E-skip opening. Note that exact locations of each end of the contacts are not indicated; states worked are simply connected by lines. Also, this is only a small sample of the hundreds of contacts made during that opening.

were made over distances ranging from 700 to well over 1500 miles (see the accompanying map). Illinois was in the middle of it all; several of us here worked both directions: southwest to New Mexico and Texas (as far as 1050 miles) in the afternoon, and northeast to New Brunswick, Quebec, and New England (as far as 1200 miles) in the evening. At one point in the late afternoon, I heard Lee Fish, K5FF (a very active and accomplished v.h.f.'er), near Albuquerque wish out loud over the air that her husband (W5FF) would hurry and get home from work. She wanted him to take over the incredible pileup she was facing. She was working, it seemed, everybody in a wide region bounded by Illinois, Pennsylvania, and the Carolinas.

Most avid v.h.f.'ers pay close attention to the MUF during the summer. When 6 meters is open, they often look at TV channels 2 through 6 (56–88 MHz), the f.m. broadcast band (88–108 MHz), or services between 108 and 144 MHz, attempting to detect any trend which might bring it up to 144 MHz. By the way, *E*-skip *has* been worked on 146 MHz f.m. It is better on s.s.b./c.w., however, because weaker signals can be worked and because at times the MUF is above 144 MHz but still below 146 MHz.

A fourth, and final, type of opening available to amateurs with modest stations is meteor scatter. At quite predictable times during the year (for example, during the Perseids meteor shower, usually peaking near August 12 or 13, and the Geminids shower on or near December 13) ionized meteor trails provide the mechanism for bouncing signals over long distances (up to about 1400 miles). One doesn't usually rag-chew on meteors, however. Most typically, sequenced calling is used (15 seconds each way is the standard in North America). Fragments of the sequenced transmissions are pieced together until full calls plus signal report (or location) are heard and acknowledged. When you are lucky, you get a 10 second, 20 second, or longer burst, which allows you to work several stations in quick succession or "rag-chew" with one station. I have worked as many as three stations during one burst, but I know more experienced v.h.f.'ers who have worked *2 minute* bursts—bursts so long that they practically turned off the rig out of boredom! A look at the schedule of meteor showers in the *ARRL VHF Handbook*, plus regular checks of *Sky and Telescope* magazine, will provide hints as to when to "look" (both radio-wise and visually) for meteors.

The other major mode of propagation used by v.h.f. experts is literally beyond my reach: EME, or "moonbounce." I simply do not have the power or antenna gain to overcome the loss on an earth-moon-earth signal path. The only exception is the possibility that I could work a station with an antenna so large (for example, a large dish) that the gain of that antenna would make up for my relatively small antenna and low power. To learn more about EME, a good start would be to read the excellent section on the topic in the *1981 ARRL Handbook*. Also, for a better understanding of moonbounce, as well as the other important modes of communication on v.h.f., it is a good idea to contact an experienced v.h.f.'er; there is at least one in practically every area of North America.

Getting On The Other 2 Meters

These days it is really quite easy to get on 2 meter s.s.b./c.w. If you are contemplating the purchase of an f.m. rig, only a few more dollars (plus some intelligent searching) could find you an "older" multi-mode rig such as the Kenwood TS-700A or the Yaesu FT-221R. There are plenty of these rigs on the used market, and you will get your f.m. plus s.s.b. and c.w. Of course, these older rigs don't have fancy scanning options, digital readout, etc., but they are good, basic v.h.f. rigs and are used by many experienced v.h.f.'ers as the rig about which a big station is built. Besides, all those fancy options do not work DX by themselves; operating skill is the more important ingredient.

In addition to the basic rig, you need only a rotator and antenna. TV rotors

K9AKS operating 2 meter s.s.b. for W9IP/5 in September 1980. The temperature outside of the tent was over 100° F.

work fine, and Yagis of the 8, 11, 14, and 16 element varieties (by Cushcraft, KLM, and others) are commonly available on the used market. If you are poor like me, you can borrow one (thanks W9UD), or you can build your own (a good, simple "quagi" design is presented by Wayne Overbeck in "The VHF Quagi," *QST*, April 1977, pp. 11–14). Adding an amplifier helps considerably, but is not necessary for some interesting DX. WB9TPV, for instance, has worked 31 states using a 10 watt "barefoot" rig. There are solid state amplifiers in the 50 to 160 watt range available on the used market, too.

In 1977 I traded in my low-band rig for a TS-700A, added a simple preamp (which is needed in some of the older rigs), and later added a solid state amplifier. My borrowed antenna is a 14 element British-made "parabeam" (which is similar to a quagi), and was initially placed on a tripod on the roof of the house (about 35 feet up). Later the antenna went up to almost 70 feet on a tower.

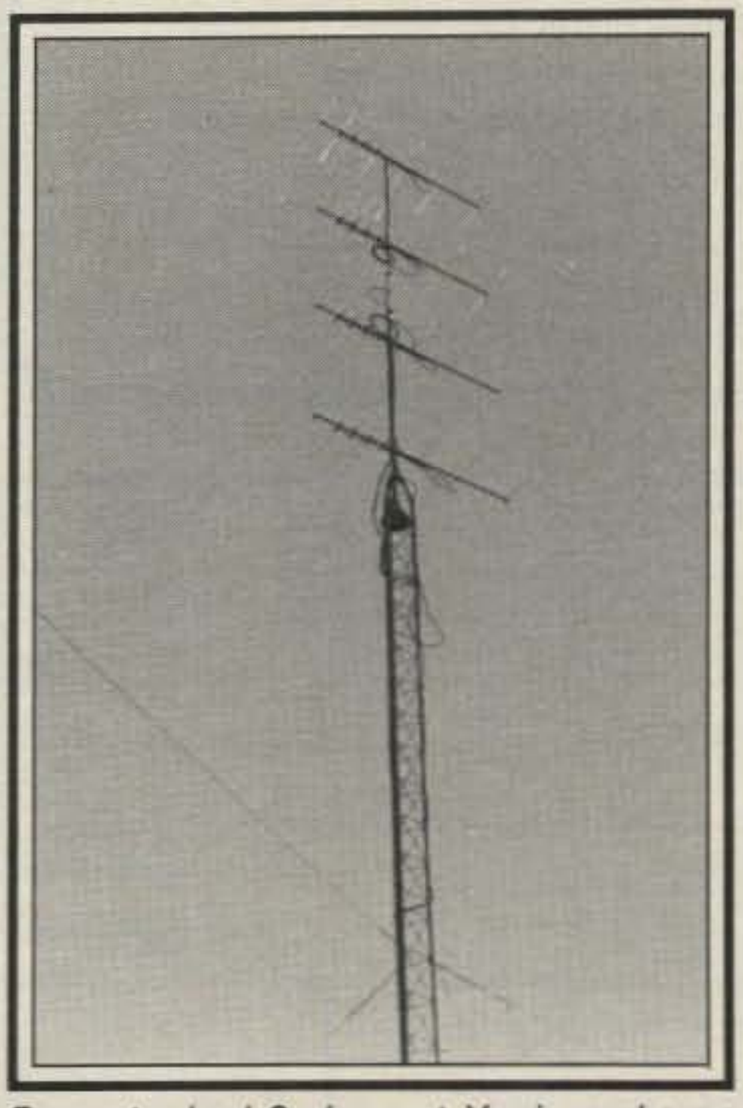
Success On The Air

Beginning in June of 1977, I first got on the air with my little rig and amplifier (known to the old timers as a "box and a brick"). Like many amateurs I needed an operating goal—something to shoot for. The most common goal on 2 meters and higher frequency bands is to count states (Bill Tynan's "World Above 50 MHz" column in *QST* regularly publishes a "states worked" list.) Without moonbounce capabilities, I could never work all 50 states and, realistically, no more than about 45 from this locality. It requires a central location for the potential of working all 48 contiguous states without the use of moonbounce. Ed, WØSD, has done it from his eastern South Dakota QTH. For those living on either coast, the potential number of states without EME might be no more than 30 or so. I concluded that state-hunting was not for me, partly because WAS was not attainable, and partly because I wanted more frequent gratification than working an occasional new state.

I considered counting longitude/latitude grid squares, which are commonly used in Europe for multipliers in contests and for locational identification in general. I rejected this idea, although if I were to start over, I probably would use them since they are sure to come into general use in North America (and already are used in the ARRL UHF Contest). Instead, I opted to count counties. They are nice little units of territory, and everyone knows the name of the county in which he or she is located (whereas your average amateur probably doesn't know his or her grid square!). It is possible to work new ones quite frequently to keep interest up, and (importantly) good county maps of the United States are available from Rand McNally and other map publishers.

I set up 500 counties worked as my goal. Now, while you big-time low-band county hunters are laughing uncontrollably, let me explain the challenge of working a "mere" 500 counties on 2 meters. First, many counties in the U.S., probably more than half, have no active 2 meter s.s.b./c.w. operators. Second, band openings are often quite limited in geographic coverage. Only a few new ones might be available during a given opening. Third, there are no organized county-hunting nets. One simply gets on and listens a lot for new counties.

My goal was finally accomplished on August 25, 1980 when I worked KBØHB in Warren County, Iowa, for number 500. (Interestingly, I had previously worked Duane for a new county when he was WBØHBN in North Dakota.) The results of my efforts are indicated on the accompanying map, which shows all of those counties worked outside of Illinois and Indiana (note the X for my location). Within those two states I was able to work only 112 of 194 possible counties, an indication of the fact that there is a lack of activity in many nearby counties, especially in southern Indiana and Illinois. On the map are the remaining 388 counties, of which 263 are more than 300 miles from me,



Four stacked 8-element Yagis make an effective 2 meter array at W9UD.

and 127 are more than 500 miles away.

The map reveals a lot about the characteristics of 2 meters. There is an obvious influence of population; I probably worked most of the counties with large cities or suburbs within 700 miles. Heavily populated states are well represented: Texas has 24 counties worked, Pennsylvania 28, and New York 19. The map also reveals that band openings tend to favor certain directions. For me the southwest and east are favored on tropo, whereas northwest and northeast, of course, are favored on aurora. The extreme locations worked, as indicated on the map, were via a variety of modes: Colorado on aurora; New Mexico on *E*-skip; Texas on tropo and *E*-skip; Florida on meteor scatter; and New England on meteor scatter, *E*-skip, and tropo.

Mapping new counties as you go is interesting as well as enlightening. You learn how band openings evolve over time. For example, during a tropo opening on December 15 and 16, 1978, the band was first open to Arkansas, Oklahoma, and Texas; then it gradually shifted toward the east, until 24 hours later Georgia was being worked. Mapping also reveals the areas to which the band has not been open. During my three years and three months in search of counties, the band at one time or another was open at least 700 miles in virtually every direction. But for the first year or so there were major gaps in the map. It was interesting to watch the map gradually fill-in as time went by.

County hunting on 2 meters does have its ups and downs. On April 3, 1979 I worked 22 new counties in 4 hours. But on the other hand, during a 4 month period (February through May 1980) I worked only three new counties, partly because I was out of town for awhile, and partly because the band conditions were poor.

Mountaintopping and Other Adventures

Speaking of ups and downs, mobile operation and mountaintopping can provide great adventure on the other 2 meters. One of the advantages of owning a "box and a brick" is that I can simply plug my rig into the car and take off to operate anywhere the car can go. Using a simple 5/8 wavelength whip, I can work people up to 100 miles away quite easily while traveling. When I stop the car on a hill or mountain, I simply assemble an 11 element Cushcraft beam and put it on a 15 or 20 foot mast, bracing it against the side of the car. The entire antenna system fits into the trunk of my car, since the beam comes apart into three pieces and I use 5 foot sections of steel masting.

Finding a "mountaintop" is probably easier than you think. Obviously, the great v.h.f. sites are on the spectacular mountains. (See Wayne Overbeck, "Mountaintopping in America: A Travel Guide," *QST*, July 1980, pp. 46–49 for a nice review of some of the better v.h.f. sites.) I can attest to the spectacular results that are possible, having operated from Mt. Equinox in Vermont, along with a few other high mountaintops. But don't despair if you don't live near one of the biggies. I have discovered many excellent v.h.f. sites in all parts of the U.S. and would venture to say that within 100 miles or so of anybody is a first-class v.h.f. operating site. For instance, Belmont Mound in southwestern Wisconsin is about 600 feet above average terrain. That makes it a good site, but it is even better because of the 64 foot observation tower on top. It is ideal if you remember to bring a battery to power the rig, and if you don't mind climbing six flights of stairs with the rig and antenna. Another excellent site is Woodall Mountain in northeastern Mississippi. It is particularly good because Mississippi is a relatively "rare" state on v.h.f., and you can work easily into parts of the Midwest and East which normally cannot reach Mississippi. Also, if you go there, don't forget to take a supply of oxygen—it is the highest point in the state at a dizzy 806 feet above sea level! I won't go on with the list of good sites, but remember, they would include river bluffs that might favor communication in one direction, as well as any hill that has a fire observation tower.

Another related v.h.f. adventure is in operating v.h.f. contests from "exotic" hilltop locations. (See Roseman, "Mountaintopping Midwest-style," *QST*, May 1979, p. 53; and Whitehouse, "250,194 Points is Worth the Effort, *CQ*, January 1981, pp. 12–16.) The activity levels are considerably higher than usual during contests and being in a relatively rare ARRL section can attract a lot of attention. I can recall in an operation on a hilltop in northern Arkansas during the June 1978 contest running a pileup of Iowa, Illinois, and Indiana stations. It was like being in a rare country during a DX contest. The pileup may not have been quite as big, but it was exciting.

Getting Out of the FM Rut

A new adventure awaits those who want to explore 2 meters beyond the local repeaters and the HT-in-hand. In addition to the operating adventure (band openings, state or county hunting mountaintopping, contests), there are unlimited challenges in designing, building, and testing v.h.f. equipment and antennas. There is also just plain interference-free communication at distances much greater than offered by f.m. A good way to start is to do some reading (start with the *ARRL VHF Handbook*, and look at the last few years of the "World Above" column in *QST*). Then find an experienced v.h.f.'er who can advise you on proper operating procedures, how to look for openings, what equipment to get, and so forth. Try it—you might like it. CQ

A chance amateur radio contact and an interest in the state of Tennessee prompted W8HTM to host VP8PO's vacation fantasy to the U.S. It wasn't too much longer after VP8PO had immersed himself in our culture that the entire world was learning about his home . . . the Falklands.

VP8PO/W

A Falkland Islander's Odyssey In The U.S.

BY JOHN R. HARVEY, Ph. D.*, W8HTM

About a year ago when VP8PO came to the United States on vacation, it was he who soaked up our history, geography, and points of cultural interest. At the same time he imparted some knowledge of his home in the Falklands and shared a sense of the place with the many friends he made here. Now his home is everyday news, and at this writing in early May, the undeclared war moves on between Great Britain and Argentina over the Falkland Islands. We trust and hope that VP8PO and his family are safe, and that by the time this article reaches you in print, the conflict is resolved amicably and VP8PO is once again on the air. —K2EEK

It was a Thursday night, cold and rainy. The evening news on the tube was depressing. The world, it seemed, was in its usual mess. Boredom. What to do? Why not work some DX and maybe make a new acquaintance? We listened in to see what was on 15 meters. Aha! The band seemed to be open to the south and west. There were a VK and a JA. We listened for a few minutes to the Family Hour to see if there was any good DX checking in. A strong, familiar voice came on the frequency announcing the start-up of the net. It continued, "Are there any Caribbean or South American stations wishing to check in? Please call now."

A weak signal with a distinctive voice responded, "Victor Pappa Eight Pappa Oscar." Hmm, let's see, VP8PO . . . have we ever worked the Falkland Islands? A quick check of the DX work sheets indicated a negative. The die was c We called in and got on the net list . work him . . . a good way to spend the evening!

John, W8HTM (left), and Ron, VP8PO/W (right), atop Buffalo Mountain in Tenn.

The first thing to do was to get the rig fired up, point the antenna south, and when they got to my call area, call in. Oh, there it is! They're asking for check-ins from my area. "Whiskey Eight Hotel Tango Mike," I shouted, and sure enough, the net manager listed me. It was a good omen.

At 0101Z it was my turn to call him. "Victor Pappa Eight Pappa Oscar, this is Whiskey Eight Hotel Tango Mike. Your signal is five by seven here in Tennessee. My name is John," I said. The station responded, "You're five by eight here in Port Howard. My name is Ron. If the net doesn't mind, I'd like to make a sked to talk further with the Tennessee station." *(pause)* The net control asked everyone to stand by. Ron continued, "John, can you get on tomorrow night at 2400Z? I would like to talk to you about Tennessee." I responded in the affirmative and made sure of the time and frequency and then turned it back to the net.

What an evening—worked a new country and got a chance to really get acquainted with VP8PO! Now a puzzle: what in the world can I tell Ron about God's country?

On Friday evening the working conditions were excellent. The triband yagi at 19 meters was rotated to the south, and the linear was turned on. At 2359Z on 21.339.6 MHz *(a trusty clock and frequency counter)* that weak signal with the distinctive voice called, "W8HTM this is VP8PO." I responded, and after the signal report exchange Ron began to tell me about himself and his interests. He had come to the Falkland Islands from the United Kingdom 19 years before as a carpenter. He was married and had four children. He had always wanted to visit the United States. He was interested in Civil War history, American Indians, country music, and the state of Tennessee. He elaborated further about his station, which consisted of a low-powered transceiver and an antenna made from a piece of wire from an old coil up about 20 feet high. It was about 120 feet long. Amazing, this signal from near the South Pole. With no more than the bare essentials, Ron was working the world.

*1504 Woodridge Drive, Johnson City, TN 37601

After a few brief exchanges, Ron elaborated. "John, after all these years on the island, I'm coming to the United States to see Nashville in June. Would you check on the motel situation there for me, and if they are not too expensive make a reservation for me? Also, I want to go to the *Grand Old Opry.*" I responded that I would be happy to check on the situation and get back to him at another QSO a week from then, same time and frequency.

The next day I began to visit with people about this interesting situation. A telephone check to the motels in the area disclosed two problems. The first one was that tickets to the *Grand Old Opry* were sold out a year in advance. The second was that all the inexpensive motels were booked solid. Murphy's law was working again!

A visit with a professor at East Tennessee State University who was active in an organization called *The Partners of the Americas* disclosed some of their activities to improve relationships between the peoples of North and South America. One of these activities was their host family concept. A host family in a country will house, feed, and enjoy meeting people from the other country. He suggested that we might find a host family in the Nashville area who would enjoy hosting Ron McCormick.

I had an alternative and it was time for another conversation with VP8PO. During this QSO, the hotel-motel situation was discussed and the alternative of a host family was offered. Ron was delighted with the idea of living with a Tennessee family for a few days. He mentioned that he would be arriving in the U.S. on June 1st after stopovers in South America.

Following this QSO, several thoughts came to mind. This friendly voice from the bottom of the world, wouldn't it be nice to host him for several days in east Tennessee? Maybe Ron would like to operate a ham radio station while in the U.S., and I could help him get a reciprocal license. Could a host family in Nashville get him a ticket to the *Grand Old Opry*?

On the evening of the 3rd of March, the airways cracked with enthusiasm. I said to Ron, "A host family in Nashville will be glad to have you stay with them, and they have not only obtained a ticket to the *Grand Old Opry* for you, but they have also arranged for you to go back stage after the performance to meet the stars." I also suggested that he might like to come to my QTH for a few days and apply for a reciprocal amateur radio operating permit from the FCC. He was delighted with all of these ideas and proceeded to change his plans accordingly.

A letter from the ARRL with forms to apply for the reciprocal operating permit from the FCC soon arrived, and VP8PO followed by sending a copy of his license to be forwarded with the application. Things were getting in motion.

Ron sporting his VP8PO suitcase.

Ron McCormick, VP8PO, being made an honorary citizen of Johnson City, Tennessee, by Mayor John Love.

VP8PO visiting Bob Brown, WA4HAA, at Rush Electronics.

It was becoming springtime in Tennessee as I prepared to work VP8PO at the usual Thursday night schedule. This time, however, Ron's signal was very weak. The seasonal band change had begun. I barely heard him say, "John, can we QSY to 20 meters?" After quite a few repeats the frequency was understood, and the QSY found VP8PO readable but very weak. We agreed to a weekly QSO on 20 to verify details for his trip and the next QSO found things working out very well. I had arranged for Ron to visit East Tennessee State University, to be interviewed for the newspaper, and to receive the keys to the city from the mayor.

In early May it became considerably more difficult to have good QSOs with Ron. The QRN, QRM, poor propagation, plus his weak signals seemed to add a mystique to the upcoming visit. Ron was not discouraged by the poor band conditions. He continued to repeat and repeat important information to me about his needs and travel plans. Other amateur radio operators began to assist in the exchange of information between us. One night a long-distance telephone call from a ham in Vermont came to me to verify some information on times of arrival and flight numbers . . . wonderful things, ham radio and friends.

At 2300Z on Thursday, May 19th, the 20 meter band was in pretty good shape, but QRM and QSB were giving us trouble. Fifteen was tried, but was found to be in bad shape. After several repeats, Ron understood that I had received his reciprocal operating permit from the FCC and that the ARRL had sent me a very nice letter with information on operating in the U.S. "But what's this Ron is saying to me? Can't quite make it out," I muttered. "Something has changed in his plans." I turned off the AGC, put on the audio filter, and cranked up the gain. It came through. Only words and phrases could be understood. Repeating these to Ron, I asked him to say Roger each time if I had it correct. Finally the message was pieced together. Ron was arriving a few days earlier than planned on May 30th at 1325Z on Delta flight 160 at Knoxville.

The airport was very busy on this Saturday. The flight information indicated everything on schedule. Standing at the gate with the plane still unloading baggage was a tall, lean, distinctive gentleman. I said to him, "VP8PO, Ron, I'm John, W8HTM."

It was easy to identify Ron as he carried his suitcase from the terminal. Large letters in white on the side read "VP8PO." The conversations in the car on the trip back were excited and seemed to be flying back and forth on every subject. Ron remarked how beautiful Tennessee was with its lush green vegetation and huge trees.

At the home QTH Ron got settled in and proceeded to tell us about *the land of che'*. He explained that *che'* was a word used in the Falkland Islands to mean pal or friend. Yes, I could believe it. VP8PO seemed to be *che'*. Ron told us about the 200 islands, two of which are large islands—East Falkland and West Falkland. He said that the coastline is deeply indented and has good harbors. The surface everywhere is hilly except in the southern half of East Falkland. The highest points are up about 2,300 feet. There are no large inland waters. A characteristic feature of the treeless moorland scen-

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ery is the grass for grazing sheep and the "stone runs"—long rivers of angular quartzite boulders. The islands have a total land area of about 4,600 miles. The annual rainfall is about 25 inches, with only about 6 inches of snow in the winter. The maximum temperature in the summer reaches 70° F, and the minimum in the winter is about 0° F. The main feature of the Falklands weather is the wind, which blows constantly.

After supper, it was time for VP8PO/W to try 20 meters. Ron got the rigs fired up and set for SSTV and began to send the familiar audio tones which spelled out CQ CQ SSTV . . . Ron in Tennessee. His first contact was an Oklahoma station which exchanged information on equipment and pictures of all kinds, including some keyboard lettering and funny pictures of frogs, witches, and ham radio operators. Ron was proud to be the first VP8 on SSTV. After awhile, it was time to QRT, check the mahogany knothole for the news, and get some sleep.

The next day was exploring day. A drive and climb to the top of Buffalo Mountain and a look out from the fire tower was "breathtaking," Ron exclaimed as he peered out towards the Blue Ridge Mountains. "I would sure like to have an amateur radio station up here," he said as he looked out towards Virginia. "A 2 meter rig would sure perform here," he noted, as he was explaining that 2 meters is used without repeaters for local communications in the Falklands.

Then followed visits to East Tennessee State University and the mayor's office, where Ron was made an honorary citizen of Johnson City.

After sightseeing and shopping in a country-western store, Ron was ready to work some DX. He mentioned that he had never worked an Alaskan station, and just like magic, a KL7 appeared on 20 meters. Ron contacted him and they made a schedule for the late fall so that VP8PO could work Alaska "from way down there," as Ron put it. Following this, Ron turned the yagi to 164° and called his XYL, VP8TB. The band was noisy with lots of QRM and QRN. Ron could hear her amongst the din, but her station's low power and the piece of wire for the antenna couldn't quite cut it. He understood that she could read him 5 by 8 and that she had something important to tell him. He asked her to try again the next night at the same time and frequency.

The next day at 2300Z it was time for VP8PO/W to again contact his XYL. After several calls and no discernable answer (the noise level was S-7), I mentioned to Ron that his signal probably was getting through and perhaps he could give his end of the QSO several times and then listen. He tried this, and after several repeats and no response he was about to give up. Suddenly, a woman's voice came on saying, "This is VP8NY, Maude. Ron please stand by, I'm in contact with your wife on 2 meters from Port Stanley. You might like to know that your signal is coming in here 5 by 9." Then, Maude's voice came back on, but as she was relaying the message the QRM came up. It seemed impossible to hear.

A strong signal suddenly came on frequency from a VP2M saying that he would relay the message to Ron. After several minutes the station relayed that Ron's XYL was in Port Stanley at the hospital. Their daughter had given birth to a baby girl and she was in satisfactory condition. It was thrilling to hear all of these fine amateur radio operators helping one another and maintaining this contact for VP8PO/W.

On Wednesday, it was time to move on to Nashville where Ron was to join his host family. As we drove, I noted that Ron seemed to have become like a brother. He remarked that he felt as if he were part of our family. The truth was that I really considered him as part of the family. After all, the Family Hour on 15 meters had introduced us and had helped make this wonderful experience possible.

The people of the host family in Nashville were very friendly to us. As we left Ron, I felt tears in my eyes as I said goodby and hugged him. He said, "73, *che'*."

CQ Reviews:

The Yaesu FT-208R 2 Meter Hand-Held Talkie

BY DAVE INGRAM*, K4TWJ

Hand-held talkies have become an integral part of many radio amateurs' paraphenalia. In addition to their obvious use during hamfests and emergencies, these little gems are particularly attractive to amateurs who are engaged in brief local travels or who encounter airport terminals and rental cars during business or pleasure trips. The first generation of talkies was comprised of essentially fixed-frequency units which were "crystalled up" for one's local activity. Their out-of-town use was thus limited. However, second-generation talkies included frequency synthesizers which provided operations on almost any frequency one encountered.

The third generation of f.m. hand-held talkies has definitely arrived, and the performance capabilities of these units are truly phenomenal. One such outstanding talkie is the recently introduced Yaesu FT-208R 2 meter f.m. unit. Boasting features such as 800 channel operation, programmable limited band scan, 10 programmable memories, priority channel activation, special repeater offsets, 2 tone encoder, a cheerfully beeping microprocessor controller, and flickering LED's for receive/transmit modes, this handful of modern electronics can literally snag one's interest from across a busy room. The unit is rated at 2.5 watts high power, 300 milliwatts low power, and includes a 450 mah Nicad battery pack for reasonably extended operating periods. An internal lithium cell is used for independently maintaining memories, and its estimated life span is 5 years. Judging by the quality construction, workmanship, and balance of the talkie, its lifetime should easily exceed that period unless it is severely abused. In order to discuss the FT-208R in less than 10 pages, we will assume you are generally familiar with second-generation talkies such as the FT-207R, TR-2400, etc.

The Yaesu FT-208R 2 meter HT shown across the first page of this review's manuscript.

New Features and Improvements

The FT-208R is noticeably different from its FT-207R predecessor in several respects. However, some of the FT-207R's popular features have been retained. Frequencies are entered in a conventional manner via the front-panel keyboard, and repeater offsets are handled by a top-mounted switch. Unusual frequency splits of any separation can be programmed by using memory zero and the offset switch's **M** position. A bottom keyboard switch selects scan functions for either busy or open channels, and a frequency step switch selects either 5 or 10 kHz scan increments. The previous LED frequency readout has given way to an LCD counterpart (with a right-side-mounted switch for lamp illumination as desired), and a popular 5-second-dwell scanner replaces older "search only" functions. This form of scanner stops on a busy channel for approximately 5 seconds, and then proceeds to the next busy channel unless it is halted by a keyboard activation or keying the push-to-talk. Getting accustomed to this type of scanner may take a few minutes, but its effectiveness is soon appreciated. Busy repeaters often hold a scanning rig on one frequency for long periods of time, causing one to miss additional action. This scanner automatically breaks those ties and moves on to the next channel after 5 seconds, keeping track of substantially more activity than otherwise possible.

*Eastwood Village #1201 South, Rt. 11, Box 499, Birmingham, AL 35210

Assuming the unit is scanning (either memories, full, or programmed segments of the band), the first push-to-talk activation stops scan while subsequent activations cause the talkie to transmit. Of course, if the unit is not scanning, each P.T.T. keying sets the talkie transmitting. An audible beep is produced with each keyboard activation and also each time the scanner stops on a busy channel. A green LED also illuminates on incoming carriers, while the frequency readout's decimal flickers to indicate scanning functions. The combination of lights and beeps is quite impressive; the thing even beeps with each keyboard entry during autopatching!

The FT-208R's case is very well fitted and comfortably snug; there are no loose back sections, and the push-to-talk doesn't flop within its metal bracket. That bracket, incidentally, is part of the talkie's framework, which circles the unit's case and top, acting as a counterpose for the rubber ducky antenna. Although the metal adds slightly to the talkie's weight, I've noticed slightly better range with the FT-208R than with similar wattage units.

Operating the FT-208R

On-the-air activities with the FT-208R are the epitomy of pleasure. Frequencies may be entered via the keyboard or stored and recalled from memory as desired. Each operation is rig-acknowledged with beeps from the microprocessor. The rig can even be operated blindly, if desired, by counting beeps.

Priority channel operation is accomplished by placing one frequency on **dial**, recalling another frequency from memory, and tapping **#** on the keyboard. The rig will automatically check priority channel activity every few seconds and switch operation to that frequency when a signal is received.

Restricted band scanning is accomplished by first setting the rig for priority channel monitoring and then tapping the keyboard's **Up** or **Down** buttons. The **Up** button sets scanning between memory and dial frequencies except those between memory and dial.

On-the-air audio reports have been extremely good (most amateurs say it's the best sounding rig I've owned, and I've owned quite a few). My only complaint is that mike location (top left of speaker area) places the rubber ducky's prime radiating area squarely at eye level. I'm presently evading that situation by talking louder and toward the unit's frequency display area.

Conclusion

The FT-208R is a doggone good talkie with numerous bells and whistles and solid construction. The battery current drains of 20 ma squelched, 80 ma receive, and either 350 ma (low power) or 720 ma (high power) yield quite acceptable operating periods per charge. the FT-208R's battery compartment is slightly rounded on its four corners, requiring a different pack than that used with the FT-207R. Since battery voltages are identical, I suspect that '207 packs could be "butchered" and cells mounted on a heavy paper form with a layer of tape for holding them in place. That arrangement should provide the necessary ¼-inch corner clearance needed.

In addition to the charging terminals and jack on the talkie's bottom, another jack is included for bypassing its battery pack and d.c. powering the rig from an external source. We rigged a simple d.c. regulator circuit (similar to the one shown on page 54, November 1981 *CQ*) for use during extended mobile operations or when batteries are low. That arrangement permits constant and dependable talkie use without rig modifications.

All aspects considered, the FT-208R is well worth its cost—particularly during times of emergencies or impromptu travels. Once accustomed to a talkie, you actually feel undressed without one.

The Yaesu FT-208R retails for $359.00. For more information, write to Yaesu Electronics Corporation, 6851 Walthall Way, Paramount, CA 90723, or circle number 101 on the reader service card.

Step back in time to a point not so long ago and dwell for awhile on the wonder and excitement that was 6 meters during the 50's.

"Where Have All The Gonsets Gone?"

A V.H.F. Reprise

BY BILL PASTERNAK*, WA6ITF

The August 1980 issue of *73* magazine carried an article about amateur equipment of the 1950's written by C. Stewart Sillmor, W1FK. For me it was a trip back to my teens . . . to my "Novice days." The days before, the days of yore. For those of us who were around in the 50's and early 60's it was akin to reliving our past—a true delight.

Alas, it had something missing. While W1FK brilliantly covered the world of equipment for 28 MHz and below, nary a word pertained to the world above. Although mention was made of some "all-band equipment" that had the "ability" to operate on some of the v.h.f. bands, there was little if anything on the "specialized state-of-the-art" equipment being specifically manufactured with the v.h.f.'er in mind. There were companies devoted to v.h.f. in part or in total, and that's where this story begins.

When I became a ham in 1958, there were very few specialized pieces of v.h.f. equipment on the market. In those days, v.h.f. meant the 50 MHz band, better known as 6 meters. Since I have a stack of QSL cards from that era, I decided to take a peek and see what I would find. Having quite a collection of such QSLs (numbering into the 100's), I felt it might be easier if I just grabbed a random sampling. This was easy, since my method of filing QSLs back then was by date received. The QSLs at the front of the shoebox were the earliest.

The year was 1959. I found that I had 26 QSL cards starting in September. Of those, most either cited the use of a Gonset Communicator, or a home-built "under 15 watt" transmitter coupled with a commercially-built 6 meter converter and some sort of general-coverage receiver. On v.h.f. there seemed to be no resemblance to receivers used, other than most were vintage, and Hallicrafters was the predominent name. In this regard, model numbers such as S-20R, S-40B, and SX-28A abounded. Since none of these receivers had the ability to hear 6 meters directly, a v.h.f. to h.f. converter was used. Some of you might remember names like Techcraft, Ameco, International Crystal, L&W, Tapetone, and Filter King, to name a few.

Of the converters, the most popular one seemed to be the Techcraft model CC-50, and this with good reason. It had enough gain and a good enough noise figure to hear anything that might happen onto the band. Second to Techcraft came Ameco's CB-6, with the rest trailing behind in a close third place. For those of you who want numbers, of my first 26 QSLs received, 17 were from owners of some model Gonset Communicator, while the rest were "combination stations" as described. My first station fell into the latter category. Being just out of high school and sans funding, I found myself with very little recourse other than to build at least part of my own station. I already owned a Heathkit Model AR-2 "shortwave receiver." From a friend of that era whose name now escapes me, I procured a used L&W converter for a pittance. Well, I could at least hear 6 meters. In fact, I could hear it in many places on my receiver, since this particular combination lacked a property known as "image rejection." The AR-2 had no S meter, nor did I have the money to buy a meter to install. This was a dilemma.

Back in the late 50's, if you lived in New York as I did, there was always an answer to such problems. It was fondly known as "Radio Row" to the insiders—Cortlandt Street to the rest of the world. For a dime, one could ride the subway from anywhere in the city to this magic spot in lower Manhattan. Upon emerging from the "underground," you were greeted with store after store that specialized in but one thing: radio and electronic parts, some of which would defy description by today's standards. One of those items available for about 29¢ was a device known as an "Electron Ray Tube." Sometimes they were called "Magic Eyes" or "Cat's Eye Tubes," but whatever you wanted to call them, they had but one purpose in life: to act as tuning indicators in radio receivers. Some surplus transmitters also utilized these devices, but for the most part, they were receiver tuning indicators.

There were a number of these tubes made. Most had 6 volt filaments and were designed for use in Grandpa's Atwater Kent. However, during WW II a need arose for a 12 volt version with an octal base. Out of this need came the 1629. My guess is that the armed forces procurement department went a bit overboard in ordering these buggers. They were in every surplus house at the same price: 29¢ plus tax. Just add a few resistors, one capacitor, and connect same to receiver's a.v.c., B+, and ground. Power up the filament, and each time a station was tuned in the eye would close.

The 1629 was my salvation. Why? Well, the folks at Heathkit had done something a bit strange. The AR-2 was akin to the National SW-54 and Hallicrafters S-38 series of receivers, except that it was operated from a power transformer. This meant that it was isolated from the a.c. line. But for some reason I will never know, Heath engineers chose to use 12 volt rather than 6 volt tubes in its design. The latter were in vogue in that era. As I reflect back, I wonder if in their infinite wisdom they somehow saw hundreds of kids doing exactly as I did—installing a 1629 "Electron Ray Tube" tuning indicator in a cigar box seated atop the receiver's fabric-covered wooden cabinet.

I now had the capability of hearing everything from the BC band through Channel 2 TV. Great, but I still needed a transmitter. In those days I spent a lot of my spare time hanging around a business establishment known as Rose Radio on Bay Parkway in Brooklyn. The gentleman who owned it was named Sol Rosenthal, and you might say that he was my "pre-ham-radio Elmer." Rose Radio was not your everyday garden-variety radio store. In fact, it was a combination radio-TV repair and photographic supply house.

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I first wandered in while in junior high. I had a rather intense interest in photography as well as electronics, and I used to purchase film, flashbulbs, and chemicals with which to process film. In time I became fascinated by the "back room." This was Sol Rosenthal's real domain. It was where he worked, and over the course of many years it was where I got my basic training in electronics. By the time I finished high school, I could rip apart and overhaul anything from a simple 5 tube table radio to a complex 16mm optical sound projector or audio tape recorder. I had also become quite knowledgeable in television repair, since through Sol's guidance I not only learned how to locate and repair a problem, but I also learned the theory as to why this circuit or that functioned as it did. Maybe that's why I found college so boring. I already had a trade. I had been taught by a true master, and I spent much of my college time daydreaming of things the future might hold for me.

It was in this era that I made two decisions: first, that I wanted to become a ham, and second, that if I ever had a dream, I would work toward making it come true. By the time I graduated from Lafayette High School, I had my amateur ticket, a thriving part-time radio-TV repair business, and a rather unique transmitter for 6 meters built from parts scavenged from defunct radios and TVs in Sol's store. In fact, I built that first transmitter on the display case with Sol supervising every step. Maybe that's why it worked from day one and only quit for one evening when the final tube went "southwest."

Let me describe this gem for you. From some "horse trading" with Charlie, WA2AKX, I procured the cabinet, front panel, and chassis from a defunct Heathkit AT-1 transmitter. Power for what I was to build came in the form of a transformer, tube-type 80, and socket from a discarded Philco a.m. radio. I also salvaged the filter choke from the Philco, but I had to pop for a pair of 40 mfd, 450 volt electrolytic capacitors to complete the supply. The latter set me back 99¢ each. The rest of the transmitter parts came from yet another clunker: a Dumont RA-109 TV set. The tube lineup was like this. A type 6AB4 functioned as an oscillator trippler from 8 MHz to 25 MHz (actually, 8.5 mc, but we "v.h.f. types" simply called it 8 mc, since who knew from Hertz?). From the plate circuit of the 6AB4, 25 MHz r.f. energy was coupled to the grid of a 6BQ6 TV sweep tube. The modulator used a 12AT7 twin triode as a two-stage R-C preamp driving a 6SW7 "d.c. reference" type controlled carrier screen grid modulator. With 260 volts on the plate of the final, slightly under 1 ma of grid current (the meter from the AT-1 had come with the front panel, as had the variable capacitors which I modified for tuning), I was able to load up to a whopping 100 ma of plate current, or 26 watts input. Alas, it may have been 26 in, but if it put out 3 watts, that was stretching things. Besides, that was "26 watts in during tune." At first, this meant whistling into the microphone while trying to "dip and load." Then, after a few weeks of this I discovered that a "fixed resistor" could be switched into the final screen to facilitate a quieter tune up.

You might wonder how I knew that I was only putting out a pittance of power in relation to the input. First, I was well aware that type 6BQ6 tubes were never intended for service at 50 MHz. Second, the ancestry of this one was unsure at best. I found it in the RA-109, but the set had been standing for years with a tag marked "lacks width." The 6BQ6 was the probable cause of the lack of width. Finally, if nothing else, I knew that running as a "doubler," my maximum efficiency would be about 30%. To check this theory, I loaded the finished transmitter into a 7 watt lamp. At 100 ma plate current in tune, it lit the bulb a dull red. A Heath Sixer that I had a few years later did about the same, or better.

Antenna-wise, all I had were two dipoles, both facing "east-west," and both indoors, as my father would not permit me to erect an antenna on the roof. What can be worked with such a setup? How about Orlando, Florida, on my very first CQ! This was 1959, and 6 meters was as hot as a pistol back then. Actually, using this as a starter, plus subsequent equipment of higher quality, I came close to WAS on 6 meter a.m. prior to going 6 meter s.s.b. Many early DX contacts were made with the setup just described. My total initial investment in this station was under $20, and best of all it helped kindle a spark in Sol. Within a year of "our" completing this rig, he became WA2MSX.

If there was one 6 meter rig I always dreamt of owning, it was a "Black Widow." The only way I can describe the Black Widow is to say that in an era of tube-type construction, Rogers Electronics had found a way of cramming a "hot" double conversion superheterodyne receiver and a 50 watt plate modulated transmitter into half a shoebox. Only one ham of that era and place owned one. Harlan, K2AAL, had by far the loudest mobile signal in N.Y.C. You could hear him in Brooklyn from the Bronx or even Long Island! No Gonset, except maybe a G-50, could compete. As I learned after "defecting" to Los Angeles, the Black Widow was a very popular radio out here, although it seemed to lack prominence in the rest of the nation.

The true 6 meter DXer only used one transmitter. It was called the Johnson Viking 6 & 2. It used a type 5894 dual tetrode as a push-pull final, and required both an external power supply and modulator to function. While E. F. Johnson recommended that it be used in conjunction with a Viking I, II, Valiant, or Ranger, I never met anyone who did. The true DXer would never consent to this. Usually he procured a supply meant to power the Heath line of mobile equipment from the 110 v.a.c. and provided audio from an Eico modulator. To this he would add either a Globe or Viking 6 & 2 v.f.o. for a "cool" 100 watts in on either band. If he wanted to run "high power," then the 6 & 2 was usually used as a driver for Push-Pull 4-400A's, and the Eico modulator would then drive a pair of 811 A's or 813's in Class B. Around 1961 high power with Class B audio was extremely popular along the east coast.

Speaking of the G-50, and other Gonset v.h.f. equipment, Gonset was one of the early leaders in v.h.f. equipment, because they offered a lot of performance at a price most of us could afford. They started with a series known as the "Communicator I." If you have never seen one at a swap meet or auction, let me describe it. The original Communicator was a gray metal box that held three sub-chassis. There was the power supply that would run from a.c. or a 6 volt auto ignition system. (Later versions worked from 6 volt or 12 volt ignition systems by performing internal wiring changes.) The receiver used a television-type r.f. amplifier and mixer tube into a three-stage dual-conversion i.f. A type 6002 performed the duties as a ½-wave noise limiter, and a type 6V6 tube was audio output and transmitter modulator. Gonset provided a receiver i.f. output jack so that a communications receiver could be used as the i.f., and the Communicator's front end would then become a tunable converter. Very few hams ever used this option, though it worked quite well. *(I can vouch for this, as I used my SX-71 as the i.f. for my Communicator—K2EEK.)* The last chassis was the transmitter. It ran a "cool" 7 watts or so with a type 2E26 final. Heising (choke coupled) plate and screen modulation was applied to the final amplifier.

Remember the "Magic Eye Tube" I discussed earlier? The Gonset Communicator I and II series used this as a tuning indicator for both the receiver and transmitter. It was great in the house, but almost useless mobile except at night—sort of like trying to read an LED readout in sunlight. Usually you tuned the transmitter in a shady spot under a tree and then tuned the receiver by ear. The Communicators were all crystal controlled, and in those days all you did was get a crystal for the favorite frequency in your area. In New York, it was 50.4 MHz. (In earlier years it had been 50.250 MHz.) In fact, the Communicator I had provision for but one crystal. The Communicator II had provision for four switch selected crystals, although it was basically a simple update of the I series.

The big change came with the most popular Communicator of all—the Communicator III. It was about the same size as the earlier models, but it had a slide-rule dial, a hotter receiver, and a more powerful transmitter. It also featured a real "S" meter for tune up and received signal strength, making mobile tuning far easier. If memory serves me correctly, it boasted six switch

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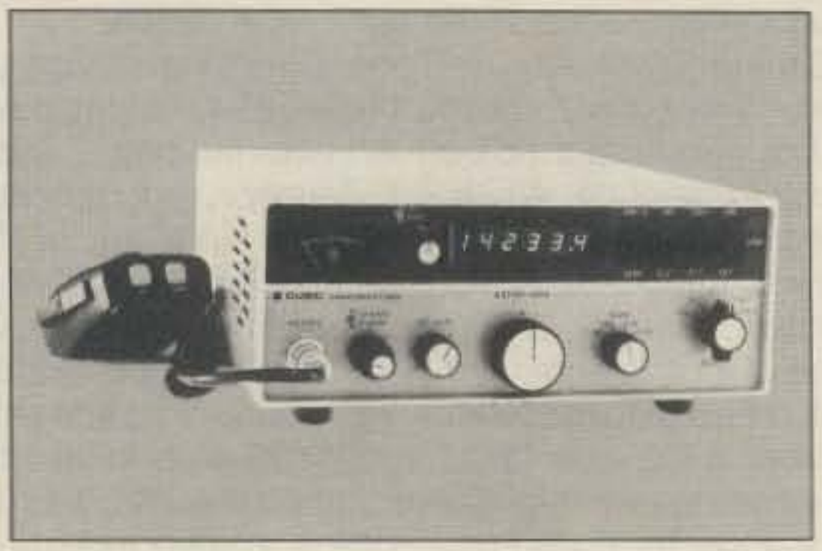

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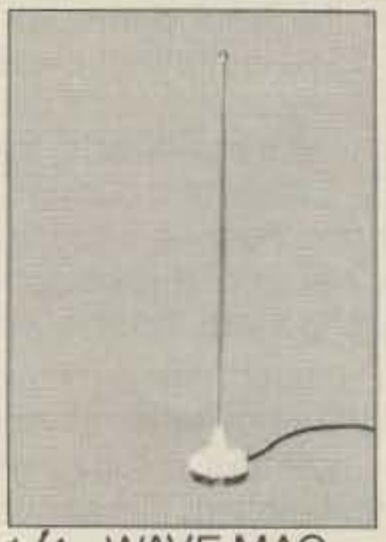

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selected crystal transmit positions, plus a nice off-white case with blue knobs. There were versions of the Communicator I, II, and III for 2 meters as well, although in my part of the country there was little operation on that band. The last Gonset Communicator manufactured was the series IV, and this was a total departure from previous models. Its design was "a slim-line approach" which meant easier under-dash mounting. It had higher transmitter output and push-pull plate modulation. Gonset produced models of the Communicator IV for three bands: not only 6 and 2, but the first commercially available 220 MHz amateur transceiver was the 1¼ meter version of the Communicator IV. Even today some of these radios show up on 6, 2, and 220, although they have been converted to f.m. operation either by rewiring or by use of the matching series v.f.o. which featured an n.b.f.m. input and modulator.

If there is any single piece of equipment that was "right for its time," it was the Heathkit Sixer transceiver. Many call it "the rig that made 6 meters." For an original price of about $30, you could buy an easy-to-assemble transceiver kit that would get you on 6 meter a.m. with a whopping 5 watts input and a superbroad super-regenerative receiver. The original Sixer used third overtone crystals land made the rig easy to spot. Audio response was basey, and the radio slid around a lot. The most common "fix" was to convert the triode half of the 6AU8 single-tube transmitter into an electron-coupled oscillator using 8 MHz crystals and triple in the plate circuit to 25 MHz. The pentode half then functioned as a doubler-amplifier. True, efficiency was lost, and 1 watt out was about your limit after this conversion, but at least you stayed on frequency. Besides, if you could hear someone on the Sixer's super-regenerative receiver, chances are you could work them even at the 1 watt level.

The other big modification was to remove the Heathkit emblem and install a front-panel crystal socket. In the original design the crystal was mounted inside the radio, which meant removing the chassis to gain access to the crystal. Some people cut holes in the cabinet to do this. I myself modified many of my friends' Sixers (also "Twoers and Teners") to front-panel crystal-socket operation. Tune up was accomplished by use of a neon lamp in the final amplifier plate circuit. You simply tuned for the brightest glow, and the lamp blinked with modulation.

Just about every v.h.f. operator of that era owned a Sixer or its 2 meter counterpart, although these days they are naught but collectors items. When used with the optional vibrator supply, they were great mobile rigs. The super-regenerative receiver was all but immune to ignition noise, and the receiver was so broad that if there was a station on the band at all, chances were that he would be in the receiver's passband. I added a PTT relay to mine, and used it mobile for a good number of years. I even won a few 6 meter T-Hunts with it.

Speaking about mobile operation, I could not end this without mentioning the famed Halo antenna. In the early days of v.h.f. mobile, Halo-type antennas were quite common. The most popular of these was the Hi-Par Saturn 6. It was a three-ring capacitively loaded affair, and you mounted it to your rear bumper with a hitch that could pull a small trailer. It was a horizontally polarized antenna that resembled a basketball hoop. I can vividly remember one morning in 1965 when I was coming down from my apartment and noted that a group of local kids had turned my precious fine-tuned Halo around and were using it for a game of basketball. On another occasion, a friend found his neighbor's laundry hanging from his "single ring" Cushcraft version.

Today v.h.f is predominently f.m. Transceivers are tiny, and crystal control is a thing of the past. Antennas are slim and vertically polarized. Everything is channelized, and repeaters sit atop mountains, buildings, and towers to relay our signals far and wide. The old days were a challenge, and as I sit here with a Polycomm 6 atop an answering machine, I can only reminisce and remember the days when v.h.f. was fun and not factionalized as it is today. Maybe someday we can get back to the "old days," or at least rekindle some of the comradery and spirit that abounded back then.

WA0YJX shows us how to add a bit more versatility to the ICOM IC-255A.

How To Add Resume-Scan To The ICOM IC-255A

BY GEORGE E. BLACK*, WA0YJX

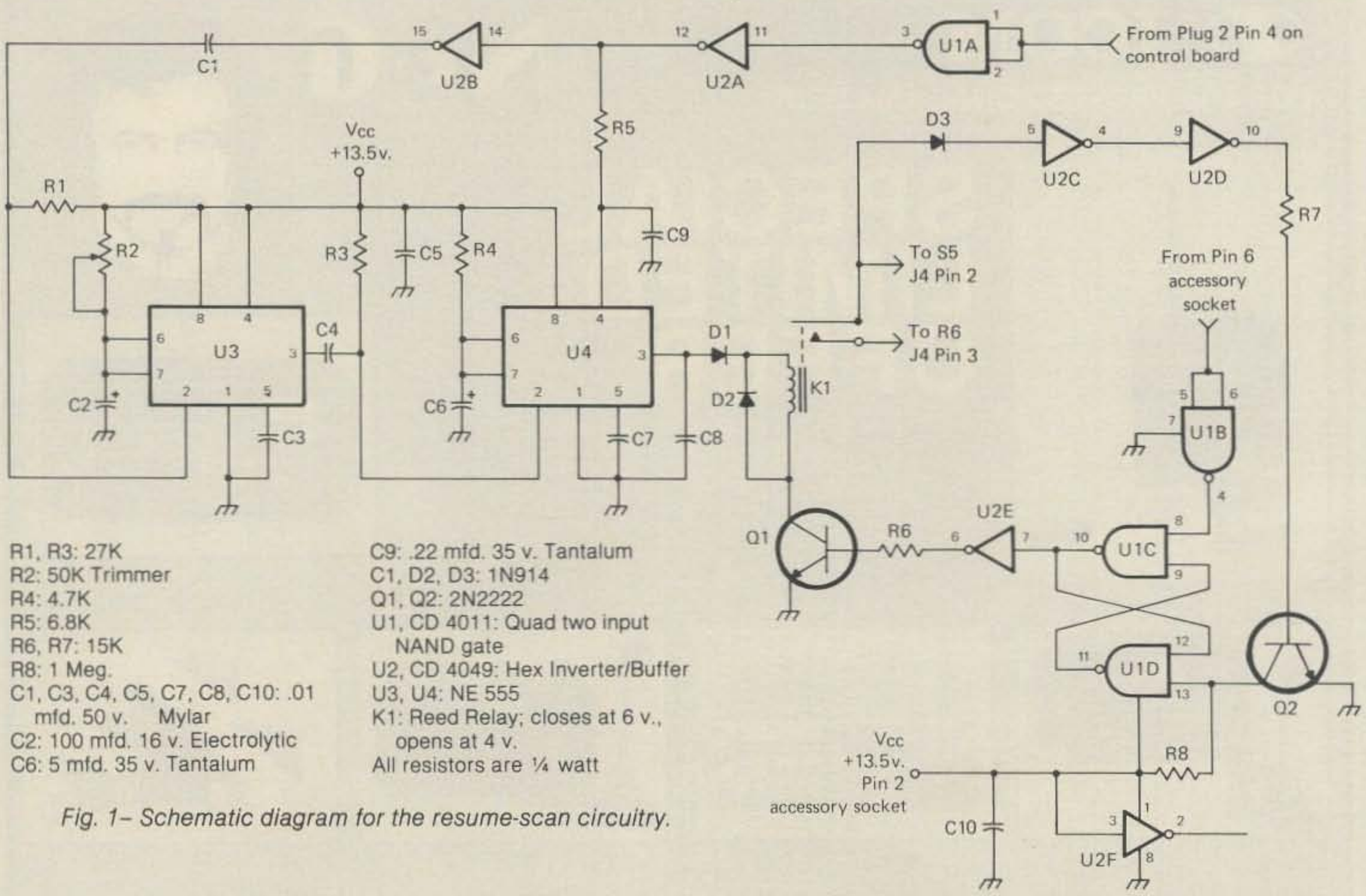
After using the ICOM IC-255A as both a mobile and a home station, it became apparent that the scan feature would be more useful if it would automatically resume scanning after an incoming signal disappeared. There is a modification using a single diode to provide resume scan; however, it resumes *immediately* as soon as the incoming signal is gone, with no delay to catch the reply transmission. I discarded this idea, as I wanted an adjustable time delay and also did not want to alter existing circuitry.

After a little thought I decided to try designing the circuitry to meet my requirements, including a total disable feature in case I wanted to monitor a single frequency. Of course, it also had to be small in size, as there is not much extra room inside the case. Fig. 1 is the result of my efforts. The idea should be adaptable to other receivers and transceivers that lack the resume-scan feature.

*325 E. Main, Adrian, MO 64720

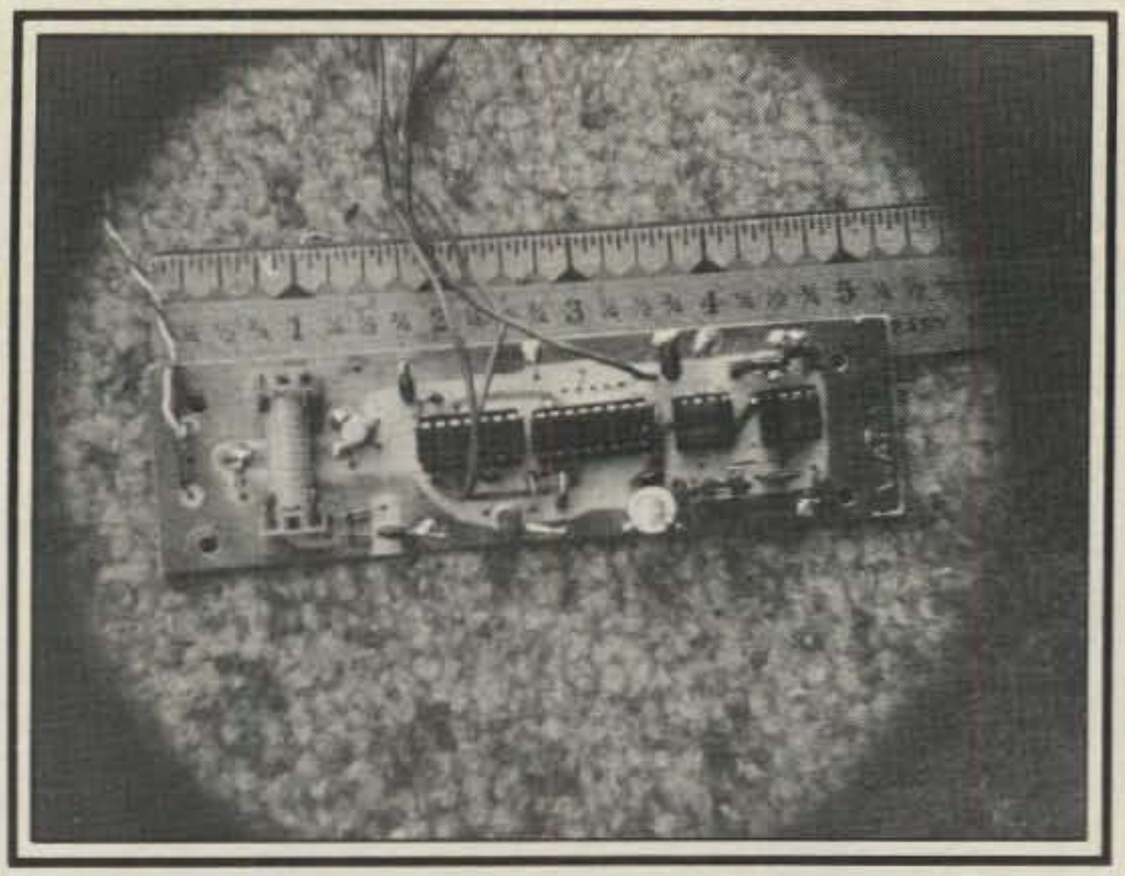
How It Works

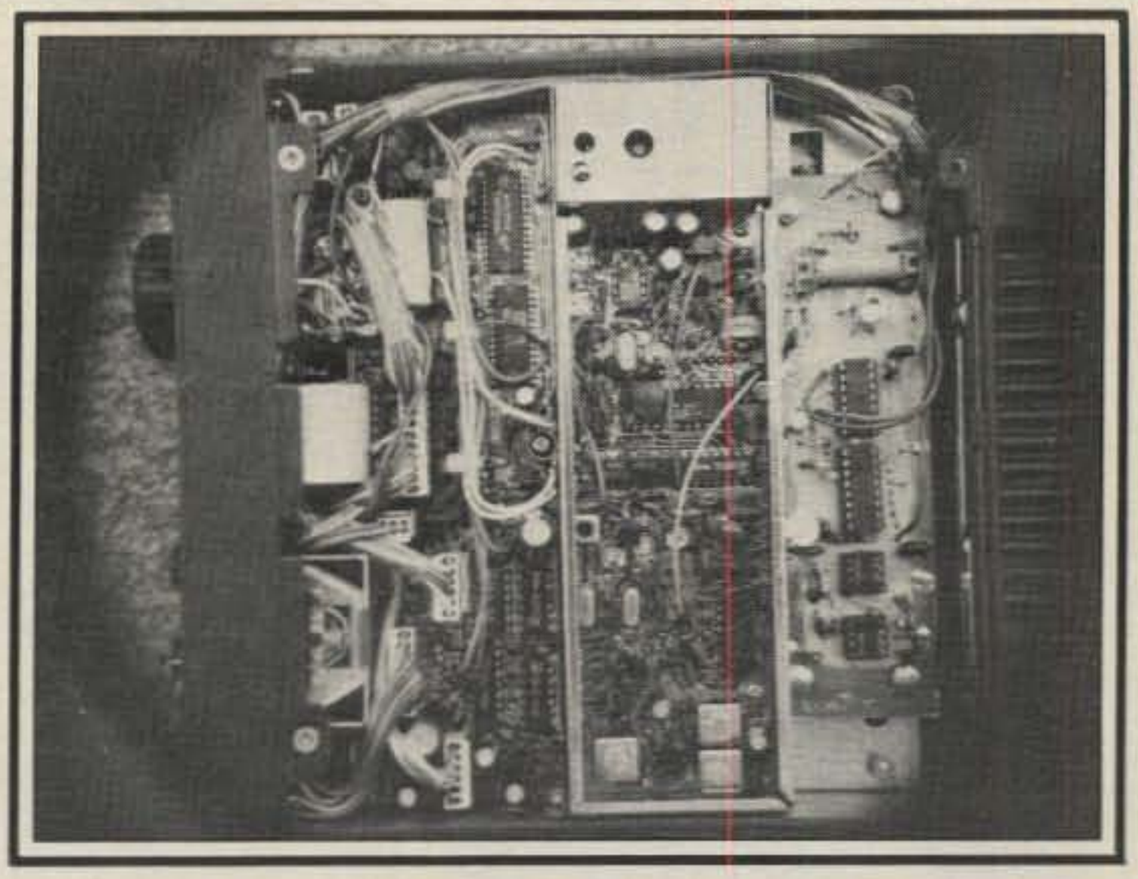
The voltage present at the cathode of the LED receive indicator is used as the trigger voltage to initiate the timing cycle. Plus 9 volts, or logic 1, is present while the receiver is squelched, dropping to +0.1 volt, or logic 0, with a received signal. With a signal present, the logic 0 is applied to pin 4 of U4, inhibiting it, which prevents accidental start of scan in the middle of the received transmission. When the signal disappears, a logic 1 is applied to pin 4 of U4, enabling it. At the same time a logic 0 appears at pin 15 of U2b. This starts U3 timing. After a delay set by the time constant of R2 C2, the output of U3 goes to logic 0, triggering U4, which now generates a positive pulse of approximately 16 milliseconds, which is applied to reed relay K1 to close the contacts with are in parallel with the scan start switch. If a signal is again received before the time delay of U3 activates the pulse generator, this again will apply a



R1, R3: 27K
R2: 50K Trimmer
R4: 4.7K
R5: 6.8K
R6, R7: 15K
R8: 1 Meg.
C1, C3, C4, C5, C7, C8, C10: .01 mfd. 50 v. Mylar
C2: 100 mfd. 16 v. Electrolytic
C6: 5 mfd. 35 v. Tantalum
C9: .22 mfd. 35 v. Tantalum
C1, D2, D3: 1N914
Q1, Q2: 2N2222
U1, CD 4011: Quad two input NAND gate
U2, CD 4049: Hex Inverter/Buffer
U3, U4: NE 555
K1: Reed Relay; closes at 6 v., opens at 4 v.
All resistors are ¼ watt

Fig. 1– Schematic diagram for the resume-scan circuitry.





(Left) The completed resume-scan board. (Right) The resume-scan board installed in the ICOM IC-255A. (Photos by WA@SIH)

logic 0 to pin 4 of U4, preventing a pulse being applied to K1.

U1c and U1d are used as an RS latch in conjunction with inverting buffer U2e to control Q1. On transmit, a logic 1, obtained from pin 6 of the accessory socket, applied to pins 5 and 6 of U1b results in Q1 turning off. This prevents K1 from operating. Successive transmissions will have no further effect on the state of Q1.

When the scan start button is activated manually, positive pulses are applied to the input of U2c, turning on Q2. This provides a momentary logic 0 applied to pin 13 of U1d, the reset terminal of the RS latch. This turns on Q1, allowing K1 to operate.

Construction

It is possible to build everything on a piece of perf board using sockets and wire wrap, but a printed circuit board is highly recommended. Fig. 2 shows the layout of the top and bottom of the double-sized board. All components are mounted on the top of the board with the exception of one jumper wire. You may have to adjust the spacing of the holes for mounting the reed relay to fit the unit you have at hand. The CMOS chips should be handled with extreme care; both hands should be connected to the common ground of the board while removing the IC from its conductive foam and inserting it into the socket, carefully noting the pin 1 orientation of the IC. Of course, you do not insert and remove solid state devices while power is applied unless you enjoy buying and installing replacement devices. The unused input of U2f is connected to Vcc; the unused output floats.

Vcc is + 13.5 volts obtained from pin 2 on the accessory socket. Ground connection is made through the four mounting screws from the ground foil of the board, which is mounted on ¼-inch nylon spacers into the threaded holes ICOM conveniently provides on the top side of the metal chassis just in front of the P.A. module. The connections to the accessory socket are made by threading the hookup wire through the holes alongside the socket and connected to pins inserted into the socket. The protective rubber cover may now be replaced.

The other connections to existing circuitry are made by flattening the end of the connecting hookup wire to a very thin edge and inserting it into the appropriate plug holes as shown in fig. 3. Connection to the LED cathode is made at plug 2 pin 4 on the control board. The connection from the relay contacts to the scan start switch is made at J4 pin 2 and J4 pin 3 on the control board. Use your schematic and circuit-board pictorial diagrams to locate the connection points. If you do this carefully, it will make a tight connection that will not work loose. The new wiring is dressed along one side of the chassis together with the existing wiring harness.

One of the leads of capacitors C8, C3, C2, C9, one end of one of the jumpers, and the emitter lead of Q1 do not have

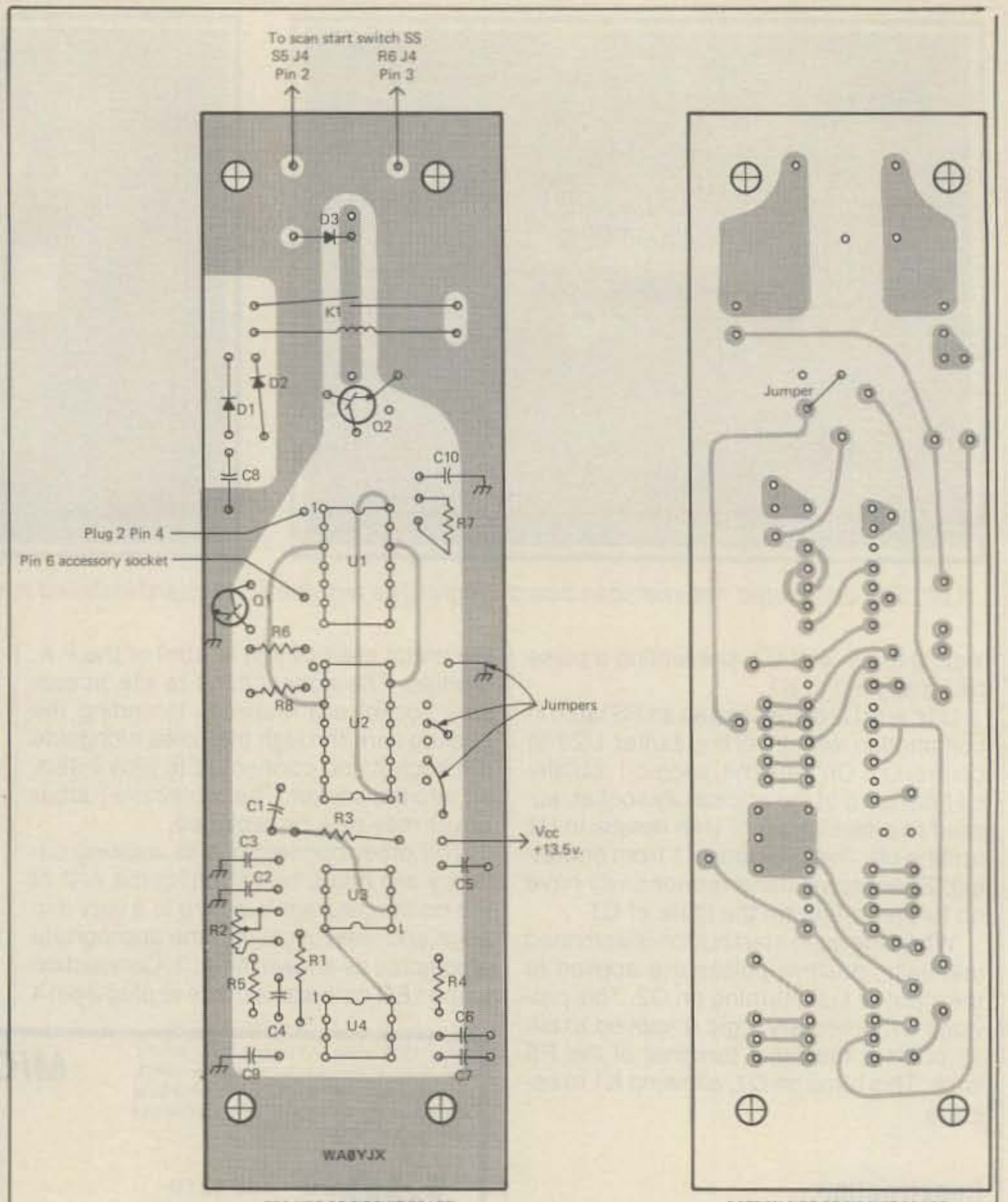


Fig. 2– PC board layout and parts placement for the resume-scan modification.

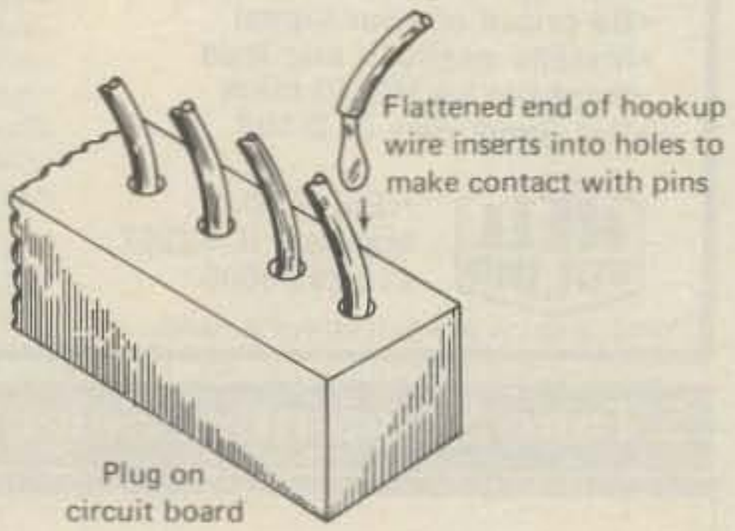


Fig. 3– Details of the non-solder connections to the IC-255A control board circuits.

holes drilled for them. They are soldered directly on top of the ground foil. Be sure that all connections on both sides of the board are soldered and that there are no solder bridges between conductors. *Double check* all solder joints and wiring connections, preferably with a magnifying glass, before power is applied. Set R2 near the middle of its range initially. This should give about a 5 second time delay before scan resumes, adjusting it later to give the delay you desire.

Operation

When the ICOM IC-255A is turned on, it will begin scanning after the delay determined by the setting of R2, provided you have programmed it correctly. If Memory 1 and Memory 2 have been programmed to the same frequency, the **VFO/Memory** switch must be in the *Memory* position to scan. With no signal being received, you can stop scan by pressing the **Scan Stop** button, but it will resume scan again after a signal has been received. If you tap the transmit key momentarily, it *will not* resume scan until the **Scan Start** button is pressed. This may not be the best or even the simplest way to obtain the objective stated at the start, but it does provide the features and flexibility I wanted. As a bonus, the entire circuit can be removed, returning the transceiver to its original pristine condition if you so desire later.

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THE AMERICAN RADIO RELAY LEAGUE
225 MAIN ST., NEWINGTON, CT 06111

a monthly feature by

A. EDWARD HOPPER, W2GT

Awards

NEWS OF CERTIFICATE AND AWARD COLLECTING

The July Story of The Month as told by Russ is:

E. Russell Fish, W7KWI
All Counties #314, 2-12-81

"I am 35 years old, 6 feet 5 inches, 215 pounds, and single (with the exception of one dependent, a cat named Rusty). I have been a law enforcement officer for the past 6½ years with the Washington State Patrol, and am currently Watch Commander in the communications facility located in Bellevue, Washington.

"I was first licensed in 1959 as K7INA in Seattle, Washington. I moved to Denver, Colorado, in 1969 and operated as W0NKX until 1974. I then moved back to Washington and have operated as W7KWI ever since.

"My station equipment includes a Kenwood TS-520, a Collins 30L-1 linear, and a Wilson 3-element beam on a 45 foot crank-up/tilt-over tower.

"When I first joined the state patrol, my badge number was 314. Since then I have been promoted and now have a different badge number, but #314 is still somewhat special to me for that reason. Glad the 'luck of the draw' worked for me.

"I started hunting counties on July 2, 1977 at the invitation of Dave, W6CCM, who I was QRM'ing during the YLISSB QSO Party. I've been on the net almost exclusively ever since. Many thanks to *all* for all their help."

Awards Issued

Wes Lynn, WA0YFQ, added USA-CA-3000 and All Counties endorsed All S.S.B. to his fine collection.

John Beale, KD0U, waited until he had them all and sent for USA-CA-500 through All Counties, endorsed All S.S.B., All Mobile to Mobiles.

Marcia Baulch, WA2AKJ, added to her fine collection USA-CA-2500, 3000, and All Counties endorsed All S.S.B., All Mobiles, All 20.

Sister Alverna O'Laughlin, WA0SGJ, also waited until she had them all and collected USA-CA-500 through All Counties, Mixed.

P.O. Box 73, Rochelle Park, NJ 07662

Taroh Yagi, JH1WIX. Note his different awards, including WAZ and USA-CA with 1000 Gold Seal #1 to Japan and now 1500 #1 to Japan.

Jim Sjoberg, AG9S (ex-WA9MSW), followed the pattern of waiting for them all and obtained USA-CA-500 through 2500 endorsed All S.S.B., All Mobiles, All 14 MHz; USA-CA-3000 endorsed All S.S.B., All Mobiles; and All Counties endorsed All S.S.B.

Margaret Williams, KI4W, found time to win USA-CA-1000 through USA-CA-2500 endorsed All S.S.B., All 20, All Mobiles; and USA-CA-3000 and All Counties endorsed Mixed.

Howie Bromberg, K1VSJ, added All Counties endorsed All 14, All S.S.B., and All Mobile to Mobiles to his hard-earned collection.

Ace Burdett, N9CHU (ex-KA9AHH), picked up USA-CA-3000 endorsed Mixed.

John Alexander, W8GZF, acquired USA-CA-3000 endorsed Mixed.

Jim Grandinetti, WA2SRM, obtained USA-CA-2500 endorsed All S.S.B.

Peter Heftler, N8BLO, claimed USA-CA-500 through USA-CA-2500 endorsed Mixed.

Jim Blackwood, N8AIL, was issued USA-CA-500 through USA-CA-2000 endorsed All S.S.B., All Mobiles; and USA-CA-2500 endorsed Mixed.

Werner Brill, DL9YC, applied for USA-CA-1500 endorsed Mixed (#1 to Germany).

Taroh Yagi, JH1WIX, qualified for USA-CA-1500 endorsed All A-1 (#1 to Japan, and his USA-CA-1000 was also #1 to Japan).

Frank Roney, KO2Q (ex-W2YWK), gained USA-CA-1500 endorsed Mixed.

Karel Karmasin, OK2BLG, received USA-CA-1000 endorsed Mixed.

Scott Lehman, N9AG (ex-WA8TGX, K8AG), got USA-CA-500 and 1000 endorsed All 2XC.W., All Mobiles.

USA-CA-500 certificates, endorsed Mixed, were requested by:

Heinz Reese, DJ2EA.

Frank Novak, KJ2N (ex-WA2ZWH, OK1KPP).

Manfried Schultz, DL2HQ.

USA-CA-500 certificates, endorsed ALL A-1, went to:

John Nelson, KA6HXJ.

Shukyur Yusufov, UD6CN (#6 Award to USSR; #1 to UD6).

Special Honor Roll
All Counties

#363 Wesley S. Lynn, WA0YFQ 3-8-82.
#364 John S. Beale, Jr., KD0U 3-8-82.
#365 Marcia Baulch, WA2AKJ 3-11-82.
#366 Sister Alverna O'Laughlin, WA0SGJ 3-15-82.
#367 James R. Sjoberg, Jr., AG9S 3-19-82.
#368 Margaret H. Williams, KI4W 3-29-82.
#369 Howard Bromberg, K1VSJ 4-2-82.

Awards

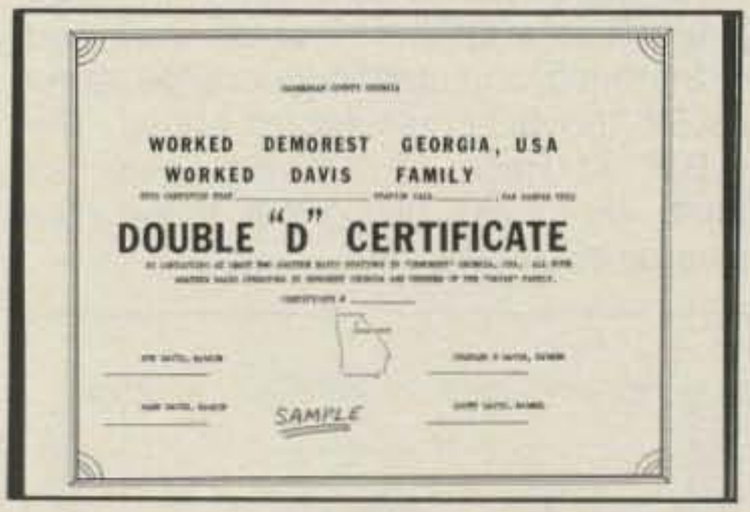
Thank You Award: Issued to any amateur radio operator of the world who submits complete information, including the manager's name, call sign, and address, on an award that is *not* listed in the current or past issues of the *Worldwide Awards Directory* or in any major amateur radio magazine. The award submitted must be available to all the amateur radio operators of the world and must not have an expiration date. One shot awards, such as satellite launchings, Ground Hog Day, and special events, are not acceptable. S.a.s.e. please. Send to the International Paper Hangers Club, *c/o* Larry Kebel, KB0ZP, 736 39th Street, West Des Moines, Iowa 50265.

USA-CA Honor Roll

3000		2000		OK2BLG	699
WA0YFQ	391	KD0U	504	WA0SGJ	700
KD0U	392	WA0SGJ	505	AG9S	701
WA2AKJ	393	AG9S	506	N8BLO	702
WA0SGJ	394	N8BLO	507	KI4W	703
N9CHU	395	NI4W	508	N8AIL	704
AG9S	396	N8AIL	509	N9AG	705
W8GZF	397				
KI4W	398	**1500**			
		KD0U	567	**500**	
		DL9YC	568	DJ2EA	1695
2500		WA0SGJ	569	KD0U	1696
KD0U	449	AG9S	570	WA0SGJ	1697
WA2SRM	450	N8BLO	571	AG9S	1698
WA2AKJ	451	KI4W	572	N8BLO	1699
WA0SGJ	452	N9AIL	573	KA6HXJ	1700
AG9S	453	JH1WIX	574	UD6CN	1701
N8BLO	454	KO2Q	575	N8AIL	1702
KI4W	455			N9AG	1703
N8AIL	456	**1000**		DL2HQ	1704
		KD0U	698	KJ2N	1705

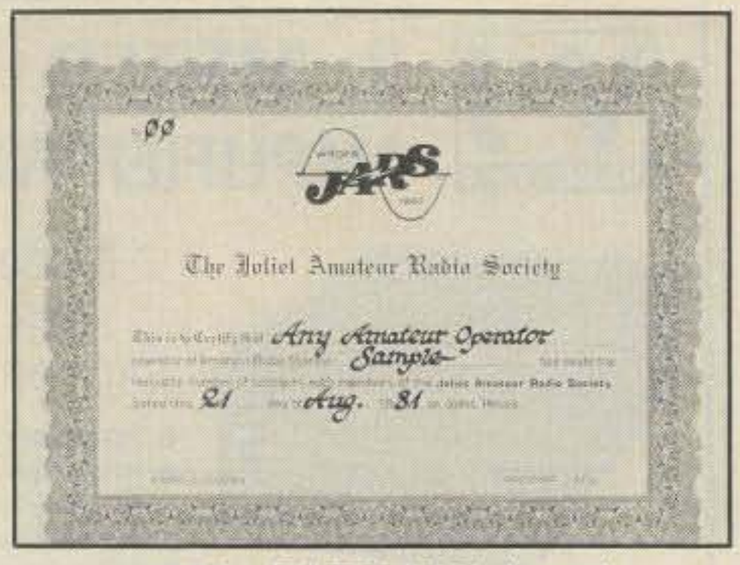
S.A.T.A.N. Award.

S.A.T.A.N. Award: This group was formed to help promote 6 meters, and they use 2 meters to coordinate it. Six points are required to receive the award: charter members count two points, all others one point. Send full log data, and one dollar to: Frances Gideon, WB8WXZ, 610 Orchard Drive, Albion, Michigan 49224. Charter members are WB8WXZ, WD8MJQ, WD8DSV, WD8ARH, KA8AEV, K8MSW, WD8BGY, KR8L, K8WKZ, and K8EFS.



The Davis Family Double "D" Award.

Double "D" Certificate: Offered by the "Davis" family, all four members of which are hams: Charles S. Davis, KA4RBN (OM), Advanced; Sue Davis, KA4TJE (XYL), Novice; Scott Davis, KA4RGL (18, son), Novice; Mark Davis, KA4TJF (15, son), General. They are the only active hams in Demorest, Georgia, a small town about 90 miles northwest of Atlanta. To receive the award, work at least two *D*emorest and/or *D*avis hams. Send a business size s.a.s.e. and your QSLs to: Charles S. Davis, KA4RBN, P.O. Box 382, Demorest, Georgia 30535.



JARS (JOLIET ARS) Award.

JARS Award: Issued by the Joliet Amateur Radio Society, Joliet, Illinois. Illinois stations must contact 10 JARS members; continental U.S. stations must contact 5 JARS members; DX stations must contact 2 JARS members. No repeater contacts. An updated membership list is available on request for an s.a.s.e. or 2 IRCs. Send log information and $1.00 (DX stations may send 3 IRCs) for the award to Paula Franke, WB9TBU, Certificate Chairperson, P.O. Box 873, Beecher, Illinois 60401.

White Rose Award.

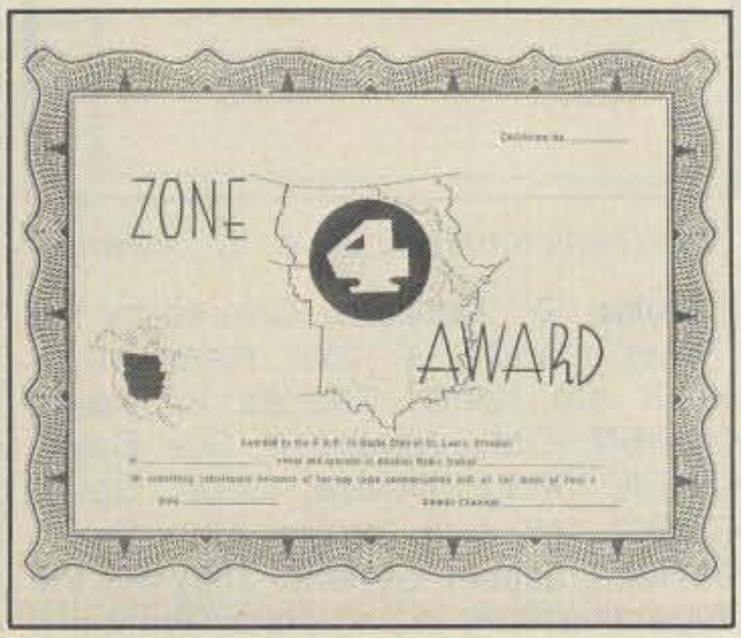
White Rose Award: Issued by the York Amateur Radio Club of York, Pennsylvania. Requirements: 3rd U.S. call area, 10 QSOs; rest of U.S., 5 QSOs; rest of the world, 2 QSOs. QSOs must be with stations in York, Pennsylvania, or with any York amateur radio club member, any band, any mode. Send the required QSL cards (if cards are not available, will check logs back one year) to White Rose Award Manager, Royal M. Gibson, W3LUD, 219 Wynwood Road, York, Pennsylvania 17402. There is no cost. *(Thanks to Bill, W3AMQ, for the data.)*

The Swedish Highlanders Award (SHA): This award is offered to every ham who has contacted (Swedish hams must contact 5) different Swedish Highlanders (members of the radio clubs in Eksjo and Nassjo). Contacts after January 1, 1964 count. No special band or mode limits. The Highlanders must be located in Jonkopings Lan (Laen). Contacts via repeaters will not be counted. When you next hear an SM7 (or SK7) give him a call. He might be one of the Highlanders. To get the award, send a certified list of QSOs plus 15 IRCs or similar value in Swedish crowns or US dollars to Award Manager, P.O. Box 87, S-575 00 Eksjo, Sweden. Do not send QSLs. Stamps will not be accepted as the fee. *(Thanks to Nancy, KC4IK for this data.)*

St. Louis Award (S.L.A.): Issued by the O.B.P. #1 Radio Club of St. Louis, WØWJ, for contacting a total of 10 stations in the city of St. Louis and/or St. Louis County. Cost of this *and* **Zone 4 Award** is 50¢ (for DX only 3 IRCs, or for air mail 5 IRCs) and can be endorsed *once* for single band *and* mode on original application or can be endorsed later for 1 IRC. The 10 cards are required to be in your possession for each award. Apply with a list of the cards which has been certified to be true by another amateur and yourself. Address all applications to Arthur A. Jablonsky, WØBK, 1022 N. Rockhill Road, St. Louis, Missouri 63119.

St. Louis Award.

Zone 4 Award: Issued for working one station in each call district of Zone 4 on the WAZ list. Required call areas are VEs 3, 4, 5, and 6; W/K 4 (Kentucky, Tennessee, or Alabama only), 5, 7 (Montana or Wyoming only), 8 (Ohio or Michigan only), 9, and Ø, for a total of 10 cards. Cost, rest of the rules, and custodian are the same as for the St. Louis Award above. The O.B.P. #1 Radio Club of St. Louis has been kept busy giving out these nice awards since late 1961.



Zone 4 Award.

Isle of Eight Flags Award: Issued for working *two* stations on Amelia Island, Florida, any band or mode 160–10 meters after 1-1-75. Amelia Island is the only place in

Isle of Eight Flags Award.

the United States that has been governed under eight different flags: France 1562–1597; Spain 1597–1735, 1748–1763, 1783–1821; Great Britain 1736–1748, 1763–1783; Patriot's Flag 1812; Green Cross of Florida 1817; Mexico 1817; Confederate 1861–1862; United States 1821. Send log data and $2.00 or 8 IRCs to Vance LePierre, W5IJU, 2618 McGregor Blvd., Fernandina Beach, Florida 32034. As you probably remember, Vance also sells *The International Directory of Awards*, cost $8.00.

All Alaska Counties Award (AACA) (Judicial Districts).

All Alaska Counties Award (AACA): The Moose Horn Amateur Radio Club (MHARC), Kenai Peninsula, Alaska, is happy to make this award available to licensed amateur radio operators throughout the world, provided their country represents a legitimate contact for amateur radio operators per the DXCC list. Certificates will be issued with endorsements as to mode and band in the following categories: Class 1 - C.W.; Class 2 -A.M.; Class 3 - S.S.B.; Class 4 - RTT; Class 5 - Mixed Modes; Suffix - A - One Band; B - Mixed Bands. Thus, an endorsement for S.S.B. all 20 meters would be Class 3A.

Requirements are four contacts in Alaska as follows: one confirmed QSO in each of the four judicial districts of Alaska, to include one QSO with any member of the Moose Horn Amateur Radio Club, and contacts must be after August 15, 1961. To apply, send *list* (not QSLs) of confirmed contacts certified by two licensed amateur radio operators, one official of a recognized amateur radio club, *or* a Notary Public. Please include $1.00 or 3 IRCs to cover airmail return. Send applications to Certificate Manager, Ken Smith, KL7JFY, P.O. Box 1682, Soldotna, Alaska 99669, USA. AACA members include: KL7EJM, EK, EKN, EKO, FG, GIC, GJY, GNP, HHF, HQK, IEL, IFX, IN, ISO, ISP, IQQ, IQP, IZH, JDR, JFY, JL, KJ, LB, LE, NH, AL7BU, WL7ACQ, AEG, AJF, H, WB9NES, VE6NH/KL7.

Notes

Here is data on confirmed 2-way c.w. county contacts as of 1 January courtesy of George, WB0ODS (c.w. is *not* dead):

W8RSW	All	W8YL	2485
W2MEI	All	W4POA	2400
KA5A	All	K3ZMI	2368
W1JTD	3072	W3PYZ	2323
W3HQU	3069	N6QA	2256
N2RT	3024	W2CUE	2248
W3ARK	3014	N9DR	2145
KB0YU	3011	W1TEE	1980
WB0ODS	2988	W5VGF	1922
W1AQE	2950	W2EZ	1887
AE7K	2950	N2CW	1713
W2RPZ	2855	N9AG	1693
WA4EBE	2851	N0CKC	1636
K6CR	2752	WA0NZA	1541
K3DEJ	2704	W8BZY/4	1471
W7GHT	2664	W2EMW	1457
W1SBU	2611	WA2EYA	1423
N5QQ	2570	N6UH	1378
K9WA	2559	KA1HB	1277
W0FBB	2510	K7EQ	1242
W8WVU	2494	K8KIR	1223

Hope all who wanted to go to the 1982 National MARAC-ICHN Convention in San Diego, July 7th to 11th, got all the necessary data from W6CCM. Remember you do *not* have to be a member of MARAC to enjoy the convention.

An information packet on County Hunting and MARAC (Mobile Amateur Radio Awards Club, Inc.) can be obtained by sending a business-size s.a.s.e. to N0AGW, Jon D. Fogdall, 7120 126th Street Court, Apple Valley, Minnesota 55124.

There is an interesting article, courtesy of Raleigh, W7PXA, on how the counties of Washington got their names. I'll try to mention a few each month until I name them all. *Adams* is one of the presidential counties named for John (not John Quincy) Adams. The territorial legislature worked itself up to a county-creating frenzy in 1883, establishing 7 within 33 days. Four, including Adams, were founded November 28, 1883. *Asotin* is the Indian word for eels, eel creek, or lot of eels. The county was created October 17, 1883. *Benton* was named after Thomas Hart Benton, a senator from Missouri from 1820 to 1850. He was known as "Old Bullion" because he opposed paper money. Benton county was created March 8, 1905. *Chelan* is an Indian word for deep water or bubbling water. Chelan was supposed to be named Wenatchee county, but wasn't. It was created March 13, 1899. More next month!

73, Ed, W2GT

CQ Reviews:

The Heil Sound EQ-200 Microphone Equalizer

BY JOHN J. SCHULTZ*, W4FA

Most amateurs appreciate the fact that achieving maximum "talk-power," especially on s.s.b., can be a rather elusive goal. A common tendency, however, is to treat each element in the speech amplification, processing, modulating, filtering, etc., chain as a separate entity rather than try to tailor the overall response of a transmitter from the microphone to the last stage in the transmitter which can influence the transmitted audio. However, if one does want to control the overall transmitted audio, there is no question that one has to start with the first element in the chain—the microphone. Besides being a simple transducer, the microphone has to "match" an individual's voice characteristics to the response characteristics of a given transmitter. To make the situation even more problemat-

*c/o CQ magazine

The EQ-200 is housed in a shielded metal enclosure and requires a 9 volt internally mounted battery for power. The jacks for microphone input/output as well as the on/off switch are on the rear panel.

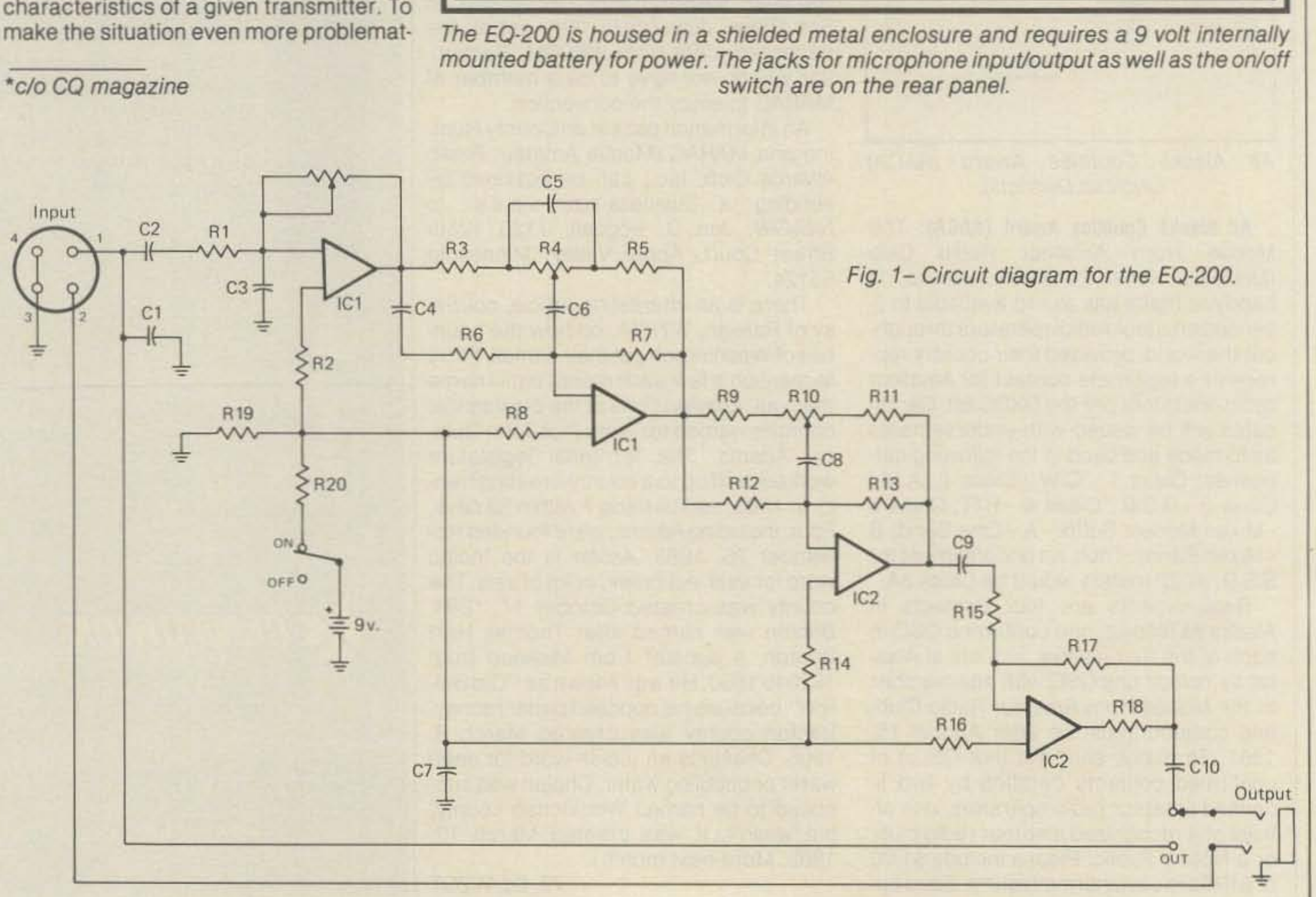


Fig. 1– Circuit diagram for the EQ-200.

Model: EQ-200
Series: 210
Maximum input level: 500 mv RMS
Input impedance: Nominal 100 K ohms
Distortion: .09 percent
Frequency response: 200 Hz–10 kHz
Equalization: LO plus or minus 12 dB at 490 Hz; HI plus or minus 12 dB at 2800 Hz
Filter Q: 12 dB per octave
Power: 9 v d.c. battery; #522 or equivalent
Weight: 14 oz.
Dimensions: 4" × 4¼" × 1¼"
Finish: Cedar Rapids grey, peabody black

Table I– Specifications for the EQ-200.

ic, one has to consider that very few microphones were designed from the ground up for s.s.b. communications. Most "speech type" microphone cartridges, especially the dynamic types, were originally developed for paging and various industrial uses.

Many amateurs have spent countless hours experimenting with different microphones to find the one that works best with their individual voice characteristics to produce "talk power." Some amateurs seem to come up with "winners," while others never do because of the obvious time and cost factors involved in such an approach.

An alternative approach is to use a good-quality microphone along with some external means to tailor its response to an individual's voice. That is where a product like the Heil EQ-200 Microphone Equalizer comes into play. The equalizer doesn't, of course, directly change the microphone's characteristics, but by adding frequency response tailoring immediately after the actual microphone, one can achieve the equivalent of trying an infinite number of microphone responses as related to one's own voice characteristics.

The circuit diagram of the EQ-200 is shown in fig. 1. It consists basically of four operational amplifiers. The first one functions as a microphone preamplifier stage with about 100 K ohms input impedance and an adjustable gain of 0–20 dB. The second stage is a filter stage centered at 490 Hz. The stage can be set for a flat response or for a cut down about – 12 dB or a boost of about + 12 dB. The third stage is similar except that its filter is centered on 2800 Hz and provides a boost or cut of 12 dB. The last stage is a regular line amplifier stage to provide for output isolation.

The specifications for the EQ-200 are shown in Table I. Bench checks showed that it easily meets the technical details of the specifications.

Physically, the circuitry is contained on a PC board which is housed in a quite attractive gray/black metal enclosure. The PC board, by the way, has mounting holes prepared for a two-tone generator for s.s.b. tuning using 800 and 1800 Hz

No-57-58

oscillators. The kit of parts for the two-tone generator option costs $7.00.

The unit is powered by a 9 volt battery which is internally mounted in the enclosure. The circuitry only draws a few milliamperes, so a battery should last for quite a few hours (providing one remembers to turn it off—see below).

In operation, the unit provided excellent results with several different types of microphones. Even some "communications type" dynamic microphones which sounded "flat," "dull," or "mellow" with the author's voice could be made to sound quite "crisp" and "clear." Even a crystal D-104 microphone which the author had settled on as *the* microphone for his voice characteristics could be made to sound "better" in the sense of more apparent talk power. The very low distortion of the unit also helps a great deal to provide a very clean sounding output. All in all, after using the EQ-200 one starts to wonder why such circuitry is not included by manufacturers as a standard item in speech processing units or even in basic transceivers. Of course, there is no way that one can quote a dB figure for improvement using the EQ-200. But, one only has to listen to different stations to visualize the improvement possible in readability when one's transmitted audio has "presence" and good high-frequency articulation.

A very practical example of what can be done with the EQ-200 and which also shows how thoroughly Heil Sound has gone into the subject of voice communications concerns mobile operation. They studied the audio from many mobile stations and came to the conclusion that they all sounded about the same regardless of the rig or microphone being used. Using an audio analyzation setup, they discovered that *all* of the mobiles had a + 6 to 8 dB hump in the response curve from 400 to 800 Hz. But why?

They then took a pink noise generator with capable speakers and placed it in different vehicles from a van to a Honda Civic. All of the vehicles exhibited a resonance from 400 to 800 Hz with about a 6 dB peak in that range! Obviously, if one could eliminate that peak and emphasize the higher frequencies, one should produce a much more effective sounding signal from a mobile installation. To check this out, they took out a TS-120S in a van and tested it with and without an EQ-200, the EQ-200 being set for about − 6 dB on the 490 Hz filter and + 8 dB on the 2800 Hz filter. The result using the EQ-200 was dramatic with much better speech articulation and talk power.

Another interesting result that has come out of Heil Sound's research is that most s.s.b. signals have little, if any, audio energy above 1800 Hz. At least that was the case for 80% of 200 s.s.b. signals they analyzed across five bands. So, even by just filling out more of that upper octave of bandwidth by using an audio equalizer, one is bound to gain something in the way of increased talk power.

The instruction booklet for the EQ-200 (which is quite complete and provided various hints for good microphone techniques) suggests turning the EQ-200 off when it is not needed. Since the author never felt the EQ-200 was not needed, it was never turned off. The result was, since the EQ-200 does not have any battery "on" indicator, that batteries were constantly being purchased, since the unit was being left on after the rest of the station was shut down. This small fault can be corrected by any prospective user by adding a small, low battery drain LED as an "on" indicator. One should be careful, however, if one tries to add a flashing LED circuit. The switching transients from such circuitry could find their way into the sensitive microphone preamplifier and deteriorate the performance of the EQ-200.

The Heil Sound people deserve a lot of credit for coming up with something new in amateur radio that, to use a corny pun, is going to be talked about for some time to come.

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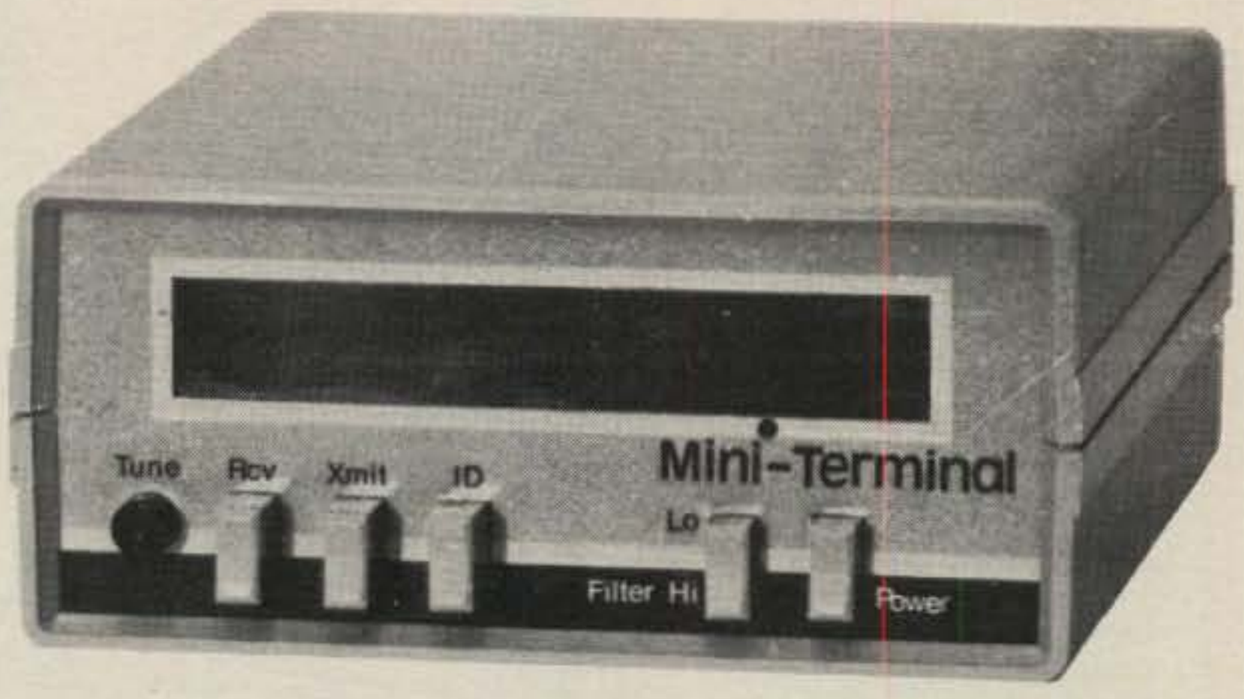

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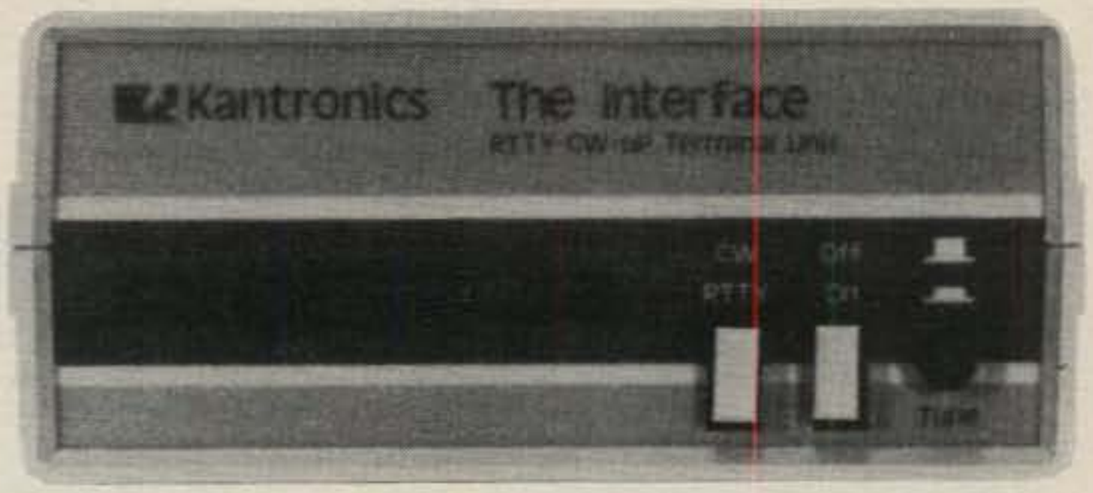

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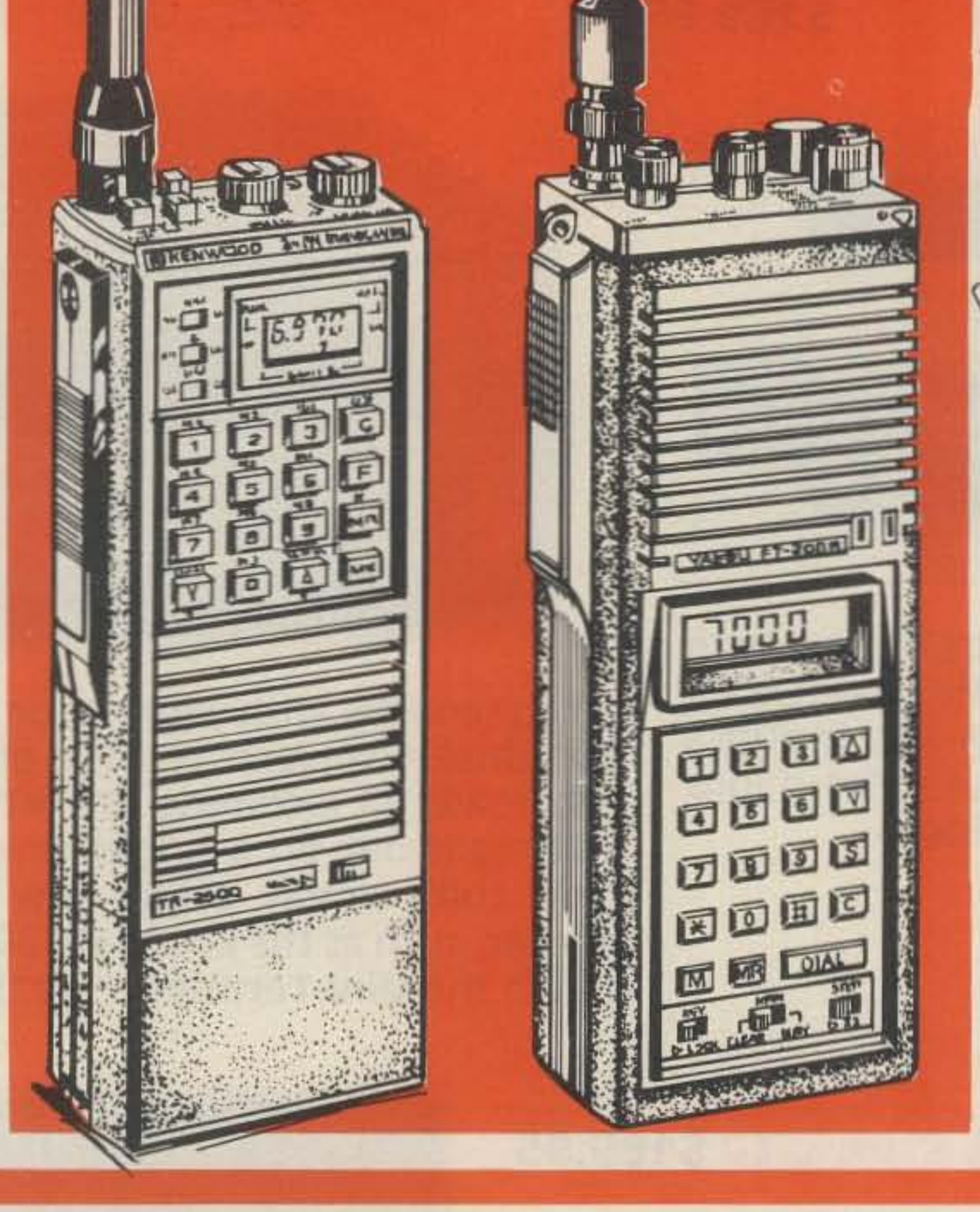

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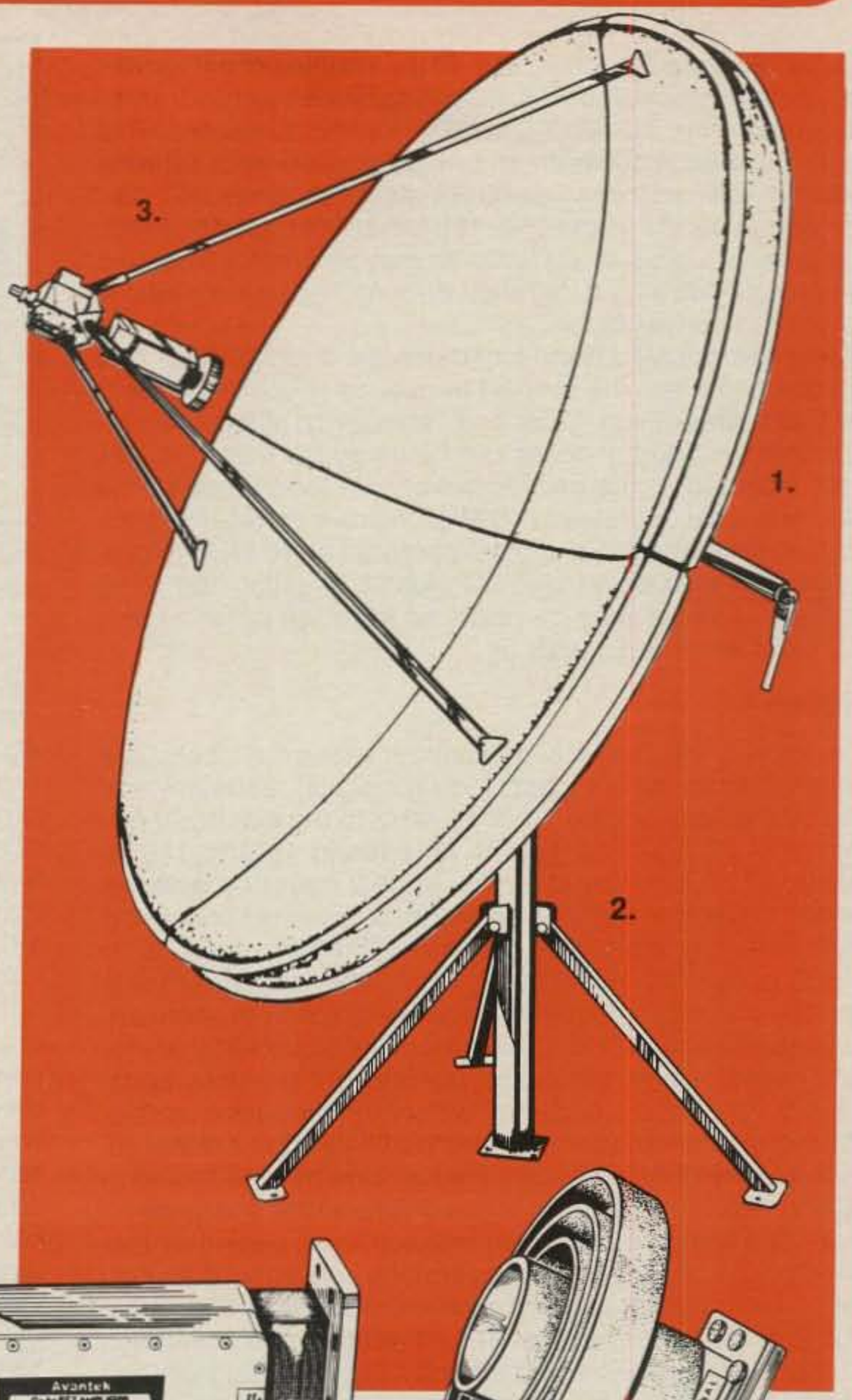

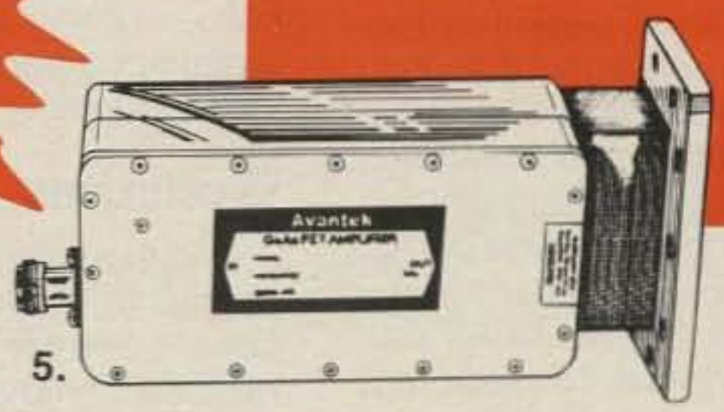

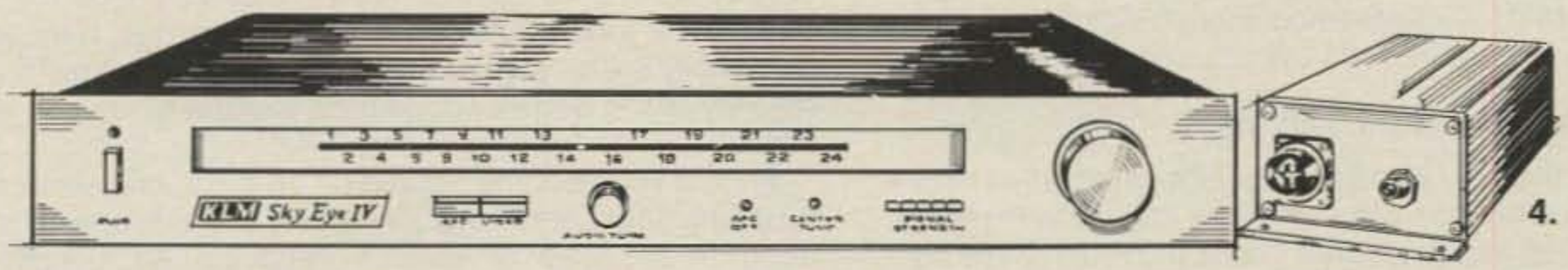

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CQ Reviews:

THE MFJ-312 DUAL-BAND V.H.F. CONVERTER

BY DAVE INGRAM*, K4TWJ

If you're interested in adding some new avenues of enjoyment to your 2 meter activity, MFJ Enterprises has an item worthy of consideration: the MFJ-312 Dual-Band V.H.F. Expander. This little gem connects between an f.m. transceiver and antenna (or power amplifier) to provide direct reception of the 160–164 MHz weather band and the 154–158 MHz public service band. All the 2 meter rig's special features may be employed, and a front-panel switch allows "straight through" operation without removing the converter.

Essentially, the MFJ Band Expander is a dual MOSFET unit which downconverts the desired frequency spectrum to the 2 meter band range. High "front end" sensitivity, plus diode protection from accidental doses of r.f. energy from the 2 meter rig, are included in the unit. A two-crystal local oscillator is used: one crystal operates at 10 MHz to provide 154–158 MHz coverage, while the other crystal operates at 16 MHz to provide 160–164 MHz coverage (144 plus 16 equaling 160 MHz, etc.). The converter may be powered from the same 12 volt supply used with the 2 meter rig.

The MFJ-312 dual-band v.h.f. converter. The unit may be powered by a 12 volt source or a 9 volt battery which can be internally mounted as described in the text.

Operation

Operation of the Dual-Band Expander with a full "bells and whistles" 2 meter rig is a blast. The rig's digital readout is employed by mentally adding 10 or 16 MHz to the displayed frequency: 144.20 equaling 154.20 MHz (band 1), and 146.55 equaling 162.55 MHz (band 2), etc. If the 2 meter rig features expanded coverage, the MFJ converter's range is likewise expanded. Assuming converter use with a 2 meter rig similar to the '7800, both weather and public-service bands may be scanned and/or placed in memories as desired. Since the converter's bypass switch allows capacitive feedthrough of 2 meter signals, numerous monitoring capabilities are possible. Local police, fire, ambulance, and wrecker frequencies, for example, can be stored in memories 1 through 5, while local 2 meter repeaters and weather broadcast frequencies may be stored in remaining memories. During times of crisis, the sharp-eared amateur can follow all public-service activities, plus relay that information to assisting 2 meter operators. Talk about being "in on the action"! I might add that carrier-dropout scanning 2 meter rigs are desirable over 5 or 10 second timer-scanning rigs when monitoring public-service bands (it's darn aggrevating when a rig takes off scanning other frequencies during a particular "high point" of activity). Although I've accidentally transmitted into the converter a couple of times, the unit safely protected itself, while its reflected low impedance caused the 2 meter rig's s.w.r. sensor to clamp r.f. output. That obvious "jolt" (in the form of a low-reading output indicator) quickly alerts one to use the converter's bypass switch.

Operation With Hand-Held Talkies

After enjoying the MFJ Band Expander's capabilities with a '7800, I began plotting the best way to use the unit with my frequency-synthesized handie. A brief check proved that the converter worked great when powered by an ordinary 9 volt battery, so the next move involved finding room inside the unit's case for that battery. Two small PC-board-mounted disc capacitors near the rear area were bent flush with the board, providing just enough room for squeezing the battery into the case. That tight fit eliminated the need for mounting brackets. I should also mention that battery and power-lead placements in reference to the converter's oscillator or r.f. circuits didn't affect frequency and/or stability. This thing's built solid! Rather than using my (BNC) rubber ducky with the converter, I rigged a 19-inch pull-up whip with a PL259 and connected it to the MFJ unit's input. A short piece of coax between the converter's output and the talkie's antenna connector "rounded out" the setup. The handie-converter arrangement proved to be a superb combination capable of operating almost anywhere on a moment's notice. The capability of receiving police/fire calls, weather broadcast, and 2 meter repeaters on a single handie has to be experienced to truly be appreciated. Recently, for example, we followed a major accident in the city from police calls, wrecker dispatching, paramedic communications, and ambulance/hospital activities, while also relaying information via 2 meters.

Conclusions

The extra receiving capabilities provided by MFJ's Band Expander truly allow one to use a 2 meter f.m. rig to maximum benefit. The only problem we've encountered is deciding which rig should enjoy the converter's benefits. Fortunately, the fabricated plug-in whip and internal 9 volt battery allow the converter to move easily between fixed 2 meter rigs, handies, etc. I personally prefer firing up the 2 meter rig during early morning for previewing weather conditions along with area repeater activities.

Should you become "hooked" on the public-service eavesdropping game, several publications are available listing operating frequencies of various services. Additionally, Radio Shacks in various areas of the country often carry complimentary sheets listing local public services and their frequencies.

The MFJ-312 v.h.f. converter sells for $59.95. For more information, write to MFJ Enterprises, Box 494, Mississippi State, Mississippi 39762, or circle number 100 on the reader service card.

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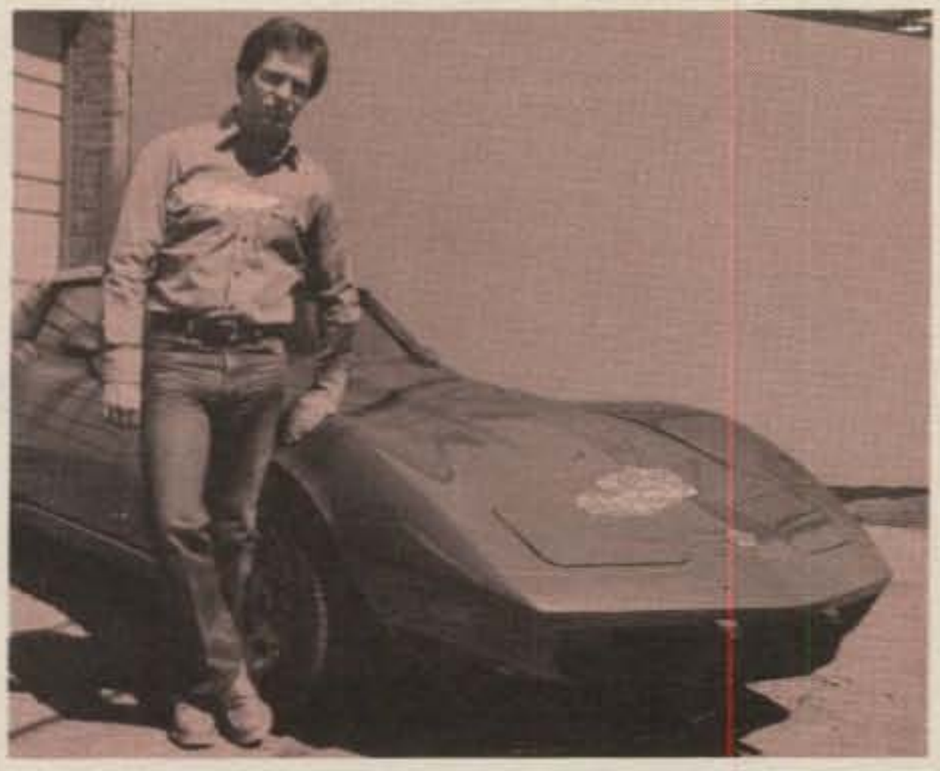

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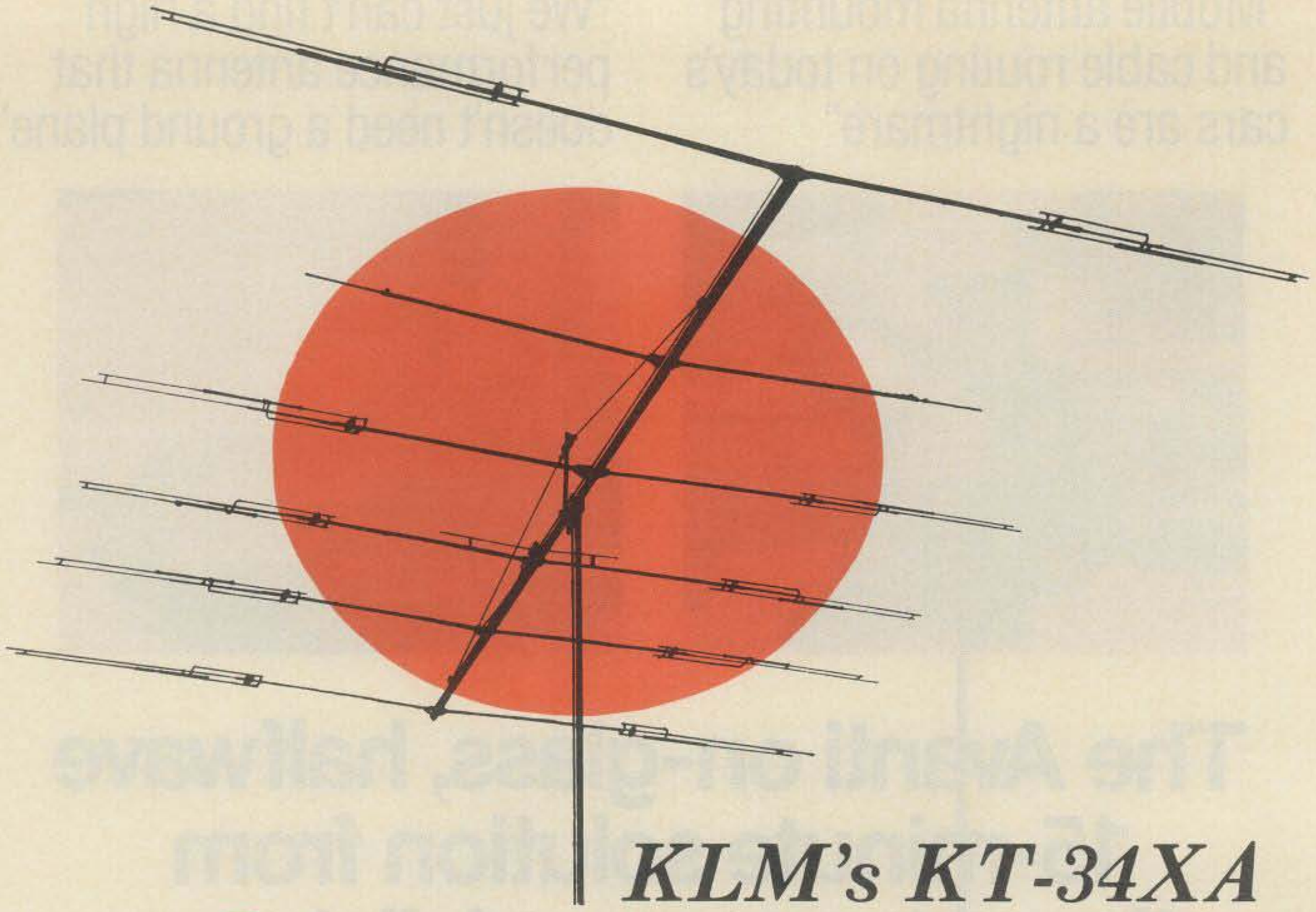

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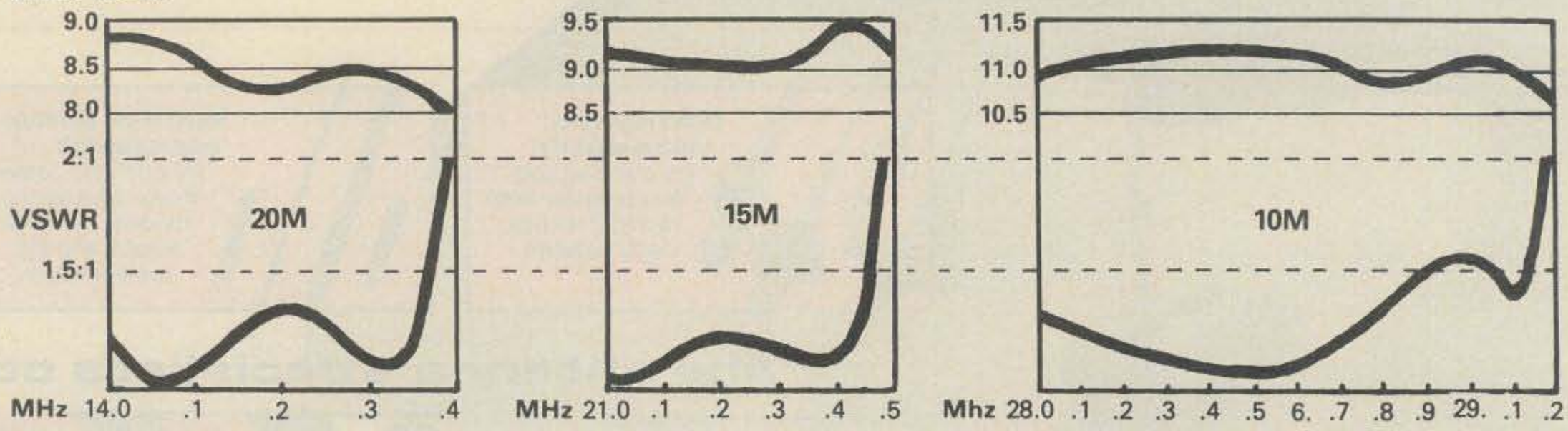
KT-34XA GAIN vs. VSWR



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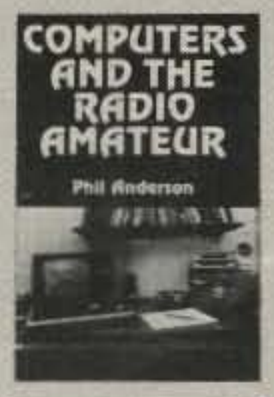

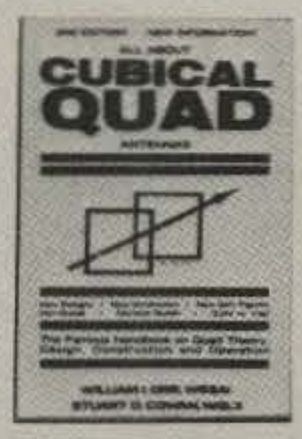

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Antennas

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

The Transmatch Revisited

In the February 1978 issue of CQ, author W8FX presented a comprehensive review of transmatch operation and use in his article, "Matching Your Way to DX: A Look at the Transmatch." In this series, he expands and updates his 1980 article with timely information on these helpful devices, and provides some useful advice on their application in the hamshack.

Receivers can benefit from a properly designed and installed antenna tuner as well as transmitters and transceivers. Inexpensive MFJ randomwire tuner matches high- and low-impedance antennas (25–200 ohms) to coaxial cable. Used for transmitting, the little unit handles 200 watts r.f. output. (Photo courtesy MFJ Enterprises)

Efficiency in your antenna starts with the transmitter. You need to be assured that your set is properly tuned and is connected to the proper transmission line load impedance for which the set was designed. The transmatch is a popular device to help ensure that maximum power is transferred from your rig to the antenna, where it counts.

The antenna tuner, or transmatch, can accord your operations a new versatility, doing yeoman duty as a "matching interface" between the transmitter and the antenna. The transmatch can enable an antenna designed for peak performance on one segment of a band to operate well over an entire band. The same device can allow effective multiband operation with a simple antenna, often a hastily-strung random length of wire or a temporary indoor antenna. The transmatch can also reduce undesirable harmonic radiation from a transmitter, and add needed front-end r.f. selectivity on receiving.

Transmatches can be confusing. However, they are actually simple devices, a special kind of adjustable r.f. transformer that can be used as a step-up or step-down mechanism as necessary. The transmatch is connected to the transmitter (or transceiver) output—the transmission line to the antenna is routed through it. Its purpose is to couple the known output impedance of the transmitter (usually 50 ohms) to the not so precisely known transmission line end impedance so as to get the final amplifier in the transmitter to efficiently "take a load"—that is, to develop all the power the set is capable of and to transfer it with a minimum loss to the antenna.

In this article, we will first define the transmatch; we will go on to discuss transmitter matching considerations and basic tuners. In following columns in this series, we will dig into advanced transmatch designs, consider possible harmonic problems, discuss transmatch installation and adjustment techniques, and present some design and selection considerations.

Let's begin with some definitions.

The Transmatch Defined

This popular accessory goes by a host of names. Various antenna matching networks are known as antenna tuners, antenna couplers, transmatches, and even "Matchboxes," after the immensely popular commercial product of the same name originally manufactured by the E.F. Johnson Co.

Actually, calling the transmatch an antenna *tuner* is something of a misnomer, because the device really doesn't *tune* the antenna itself. It functions rather as a device that transforms the electrical characteristics of the antenna system with which it is used into values that are compatible with the transmitter, transceiver, or receiver with which it is used. The designation "tuner" would be appropriate only if the matching network were located at the antenna feedpoint, or if used to tune the overall antenna system (radiator and feedline) to resonance at the operating frequency.

The correct name for the device depends on what is being done with the equipment. But the term "transmatch"—signifying a "transmitter-transmission line matcher," or "matching the transmitter to the line," and coined by former ARRL staffers Lew McCoy and George Grammer—is as good a name as any. In fact, the name has become generic to practically any type of coil-and-capacitor r.f. matching network.

Although various manufacturers place various "bells and whistles" on their offerings, all such devices contain capacitors and inductors, which when adjusted correctly, match the r.f. source impedance to that of the load. The basic transmatch, then, is an adjustable device made up of tuned circuits that are designed to tune out the reactance on the transmission line and serve as an r.f. transformer to take the unknown load that the antenna system presents and convert it to a known load impedance, usually 50 ohms.

Matching at the Transmitter

Most modern transmitters have a final amplifier that is designed to work into an unbalanced (coax) 50–75 ohm load. It isn't enough to feed just *any* antenna with coaxial cable. The antenna *itself* must present a 50 ohm impedance to enable the transmitter to "see" the low-impedance load it was designed to work into. Many antenna systems—and the "systems" include both the antenna and the transmission line—yield complex, reactive impedances that can make it difficult or impossible to load properly. These impedances depend on many factors, including basic antenna types, operating frequency, length and type of transmission line, antenna height, and proximity to other objects. A purely resistive load can be achieved only with a resonant antenna; for multiband operation, multiple antennas are required. Usually, practical considerations prevent use of a separate antenna on each band on which opera-

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tion is desired, so "compromise" multiband antennas which have varying feedpoint impedances are used. Even many well-designed single-band antennas cannot attain a uniformly low s.w.r. across an entire band.

If you try to feed your 50 ohm set into a high-s.w.r. coaxial line, or worse yet, directly into a balanced or single-wire line, the resultant mismatch will cause the whole system to lose efficiency. With many newer transmitters there is no means to adjust the coupling or loading circuit in the final amplifier stage to compensate for the complex impedance that is present. Not only does it become impossible to load your transmitter properly, but in the case of sets with solid-state finals, the stage may simply "cut out" so that no power reaches the antenna, or it may even become damaged if the s.w.r. exceeds some particular value, such as 2:1 or 3:1. In some broadband, "no tune" transceivers, the output power is a direct function of the s.w.r. as seen by the set; while tune-up is eliminated, a higher-than-normal s.w.r. will cause the output to be reduced to an unacceptable low level. The older-type transmitter typically operating in class "C" mode and having a vacuum-tube final amplifier and classic pi-network tank circuit is much more tolerant of a high-s.w.r. antenna system as its load; and generally speaking, a transmatch is not always required to match a nominal 50 ohm coaxial feedline to the transmitter.

Bear in mind that the transmatch cannot change the impedance of the transmission line. That characteristic is fixed and depends on the line itself. Nor can the transmatch change the s.w.r. *at the antenna.* What the transmatch does is to act as a sort of catalyst to enable the transmitter to load into the transmission line, whatever the impedance *actually* may be. It's still up to you to try to get a good match at the antenna, to tune up the antenna as best you can, and to install it in the clear. The tuner makes it a lot easier to work with coax-fed antennas such

Many transmatches incorporate some method of determining s.w.r. The Murch transmatch shown here takes a different approach: it includes a relative r.f. output meter, located at the upper right of the photo. (Photo courtesy Murch Electronics)

A classic tuner design is the Drake MN-2700 matching network. The tuner is intended to match a variety of antennas, and includes antenna/dummy-load switching and a built-in forward/reflected power meter. The 2 kw unit covers 160–10 meters; an accessory balun is available for feeding balanced antennas. (Photo courtesy R.L. Drake Company)

as trap dipoles and beams, quads, and verticals; the transmatch also makes it possible to load into multiband antennas fed with open-wire tuned line (perhaps the simplest all-around band-hopping antenna design), 300 ohm folded dipoles, and high-impedance antennas of various types.

While the transmatch will allow you to connect an antenna to your transmitter that would otherwise present a difficult load, the transmatch *cannot improve the performance of the antenna system that it feeds.* The transmatch can allow for—at least as far as the transmitter is concerned—a poorly matched antenna. But since the right place to correct the mismatch is at the antenna's feedpoint, the best the transmatch can do is to make the whole system "look like" a 50 ohm system. Whether the antenna actually works well is another question!

As a general statement, some kind of antenna tuning device is usually in order, even if you carefully cut your antennas to frequency and direct-feed them with coax. The transmatch allows flexibility in moving from one part of the band to another (few antennas will show a perfect s.w.r. across an entire band), cuts down on harmonics (more on this later), and its known-impedance link to the transmitter provides the ideal place to install an s.w.r. bridge and low-pass filter.

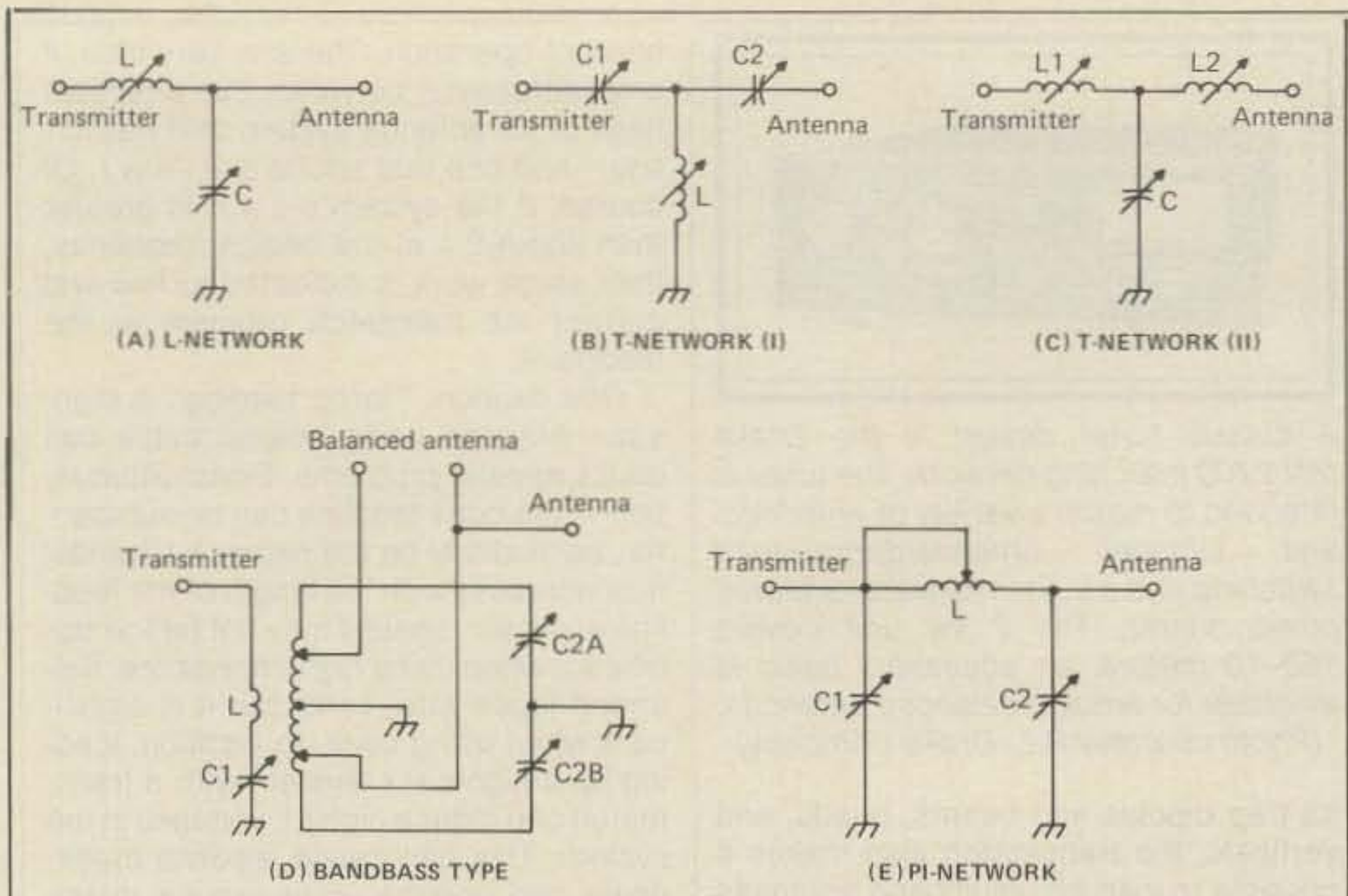
Frequently, transmatches are used as bandwidth-extending, coax "line flatteners." Since the typical half-wavelength dipole exhibits a proper match only at or near the frequency for which it has been cut, the s.w.r. rapidly rises when the operating frequency is moved above or below the antenna's resonance point. The transmatch can enable the transmitter to properly load across the entire band. However, note that it *may* be a waste of time to install and bother with transmatch adjustment if the *maximum* s.w.r. to be encountered on the antenna system is about 2:1 or less; all you would be doing is adding another gadget (with its small, but measurable insertion loss) that has to be tuned as you change frequency and/or band of operation. There is very little, if any, difference between the effectiveness of an antenna system that has 1:1 s.w.r. and one that sports a 2:1 s.w.r. Of course, if the system's s.w.r. is greater than about 2:1 at the design frequency, then some work is indicated to find and correct the mismatch problem *at the feedpoint.*

One caution: "force feeding" a high-s.w.r. antenna using coaxial cable can cause several problems. Signal attenuation in the coax feedline can be substantial, particularly on the higher h.f. bands; this increases with the length of the feedline and s.w.r. Losses may not be too significant when using high-impedance, balanced (open-wire) lines, but it *is* significant when using coax. In addition, loading up a high-s.w.r. system with a transmatch can induce high r.f. voltages in the system. This can cause feedline breakdown and possibly even arcing in the transmatch LC and switching networks, possibly resulting in damage.

The transmatch is very popular with amateurs who live in apartments and who otherwise would be unable to get on the air if they could not find a way to load a random length of wire strung out a window or taped around the walls of the room. A good transmatch is worth a fistful of dollars in portable land emergency use, where one may not be able to install a proper antenna. The same goes for h.f. mobile work, where the loading coils used with short whips may enable resonating to your favorite operating frequency, but leave you with a very narrow usable antenna bandwidth and a high s.w.r. that prevents proper transmitter loading.

What about loss? Installing a transmatch in your antenna system should not introduce a great deal of r.f. loss, as long as the active components and basic design are of high quality, the mismatch that has to be handled isn't too great, and the device is properly tuned. A good transmatch using air-wound coils should have very little insertion loss, nominally around 5% or less. Working into a well-matched 50-ohm load should result in slightly lower loss, while working into a very high s.w.r. load could send losses into the 7% range or higher. However, as the tuner now becomes the r.f. "focal point" of the station, it must be connected to a good r.f. ground—especially when working with single- and random-wire antennas—lest excessive power be lost to a poor ground path. This means that heavy, large-diameter wire or braid should be run to both the transmatch and the transmitter, and should be terminated at a cold water pipe and/or direct earth connection.

While transmatch losses, *per se,* are generally low, *overall* losses can rise dramatically if a toroidal balun is used in conjunction with the transmatch, depending on the type of core material used, frequency of operation, and mismatch (if any) that is involved. These losses can



(A) L-NETWORK (B) T-NETWORK (I) (C) T-NETWORK (II)

(D) BANDBASS TYPE (E) PI-NETWORK

Fig. 1– Basic matching circuits as described in the text.

easily run to double-digit numbers. One may have to put up with such losses in order to load certain types of antennas, such as multiband tuned-feeder dipoles, but the price can sometimes be too high. A bandpass (link coupled) transmatch is often preferred for such use.

Basic Matching Circuits

There are probably as many different transmatch designs as there are antennas. There are a variety of series- and parallel-tuned circuits, L, T, and pi-networks, link or bandpass couplers, and of course, the immensely popular so-called "ultimate" or "universal" transmatch.

Matching networks—transmatches—can be conveniently grouped into five different types for our purposes, although other groupings could be devised. The five most common are (1) the L-network, (2) the T-network, (3) the bandpass type, (4) the pi-network, and (5) the "ultimate" type. Fig. 1 shows the first four of these. We'll reserve the "ultimate" transmatch for a subsequent column.

The **L-network,** simplest of the five and shown at fig. 1 (A), is most used to match the low-impedance (50 ohm) transmitter output to the high impedance of a single- or random-wire antenna. The LC circuit effectively "tunes out" the reactance of the antenna to provide a satisfactory impedance transformation between the resistive output impedance of the transmitter and the resistive component of the antenna's input impedance. For the most part, low-cost single-wire matchers are of the L-network type. This type of network is "reversible," in a sense: if the desired match is to be made to an extremely *low-impedance* antenna, such as an h.f. mobile whip, then the transmitter and antenna connections can be reversed. In this instance, the output of the transmitter is connected to the capacitor side of the LC network, while the antenna is connected to the inductor side (refer to fig. 1).

More versatile in matching capability is the **T-network,** two examples of which are shown in fig. 1 at (B) and (C). The T-network has three variable elements that may be adjusted for best match (minimum s.w.r.). By using three elements (instead of the L-network's two), it's possible to do a better job of juggling the relative reactances and resistances involved for obtaining a good match. Note that in arrangement (B), the two capacitors are "above ground" and must be so insulated, although one side of the variable inductor can be grounded. On the other hand, the version shown at (C) has one side of the capacitor grounded, a more conventional approach. However, two variable inductors are required with both ends isolated from ground. The T-network is the ancestor of the popular ultimate transmatch.

Another common transmatch circuit is the **bandpass type,** also shown in fig. 1 at (D). This type of transmatch is popular for use between coax and balanced (open-wire) feeders. It requires no balun, since it also works to transform operation from a "balanced" to an "unbalanced" condition. The link coil forms a resonant circuit with the series matching capacitor at the operating frequency; the output inductance and dual tuning capacitors also tune to resonance at the operating frequency. The two coil taps are adjusted so that the balanced feeders show a good match to the 50 ohm transmitter impedance. A single-wire type of antenna can also be used with this type of transmatch by connecting it to one of the coil taps shown. Although adjustment of the link and the coil taps are somewhat inconvenient, this design has a big plus: it characteristically has a "bandpass" type of response, meaning that frequencies below and above the operating frequency are attenuated. Needless to say, this consideration is desirable from a harmonic-reduction and t.v.i. standpoint—particularly if an old-time class "C" rig is being used.[1]

Another popular type of matching network is the **pi-network,** sometimes known as the lowpass type, shown in fig. 1 at (E). The pi-network has a generally limited matching capability over the entire 160–

Remember these basic facts about antenna matching and transmatches:

1. You'll get best results if your antenna's impedance is purely resistive, with this resistance equaling transmission line impedance and transmitter output impedance.

2. A transmatch helps to correct for the fact that an antenna will seldom present a perfect match to a transmission line over a band segment, or from band to band. The accessory allows you to convert the resultant impedance to that for which the transmitter was designed. It cannot improve the antenna's basic efficiency, however.

3. A transmatch *can't* alter the antenna's impedance or the actual s.w.r. (standing wave ratio) on the transmission line, nor can it alter the characteristic impedance of the line. However, it *can* correct the s.w.r. on the line to the transmitter to enable it to "take a load."

4. S.w.r. provides a measure of the mismatch of the antenna system. It is the ratio of the load impedance to the transmission line impedance. An s.w.r. of 2 to 1 (2:1) or less is usually considered to be a good match. High s.w.r.'s can waste power.

5. Many modern transmitter/transceiver circuits must work into a 50–75 ohm load. If the set doesn't "see" such a load, it won't be able to deliver its advertised power to the antenna, and may even be damaged. It will work best when properly loaded and matched.

6. Use of a transmatch will usually enable the transmitter to work into a low (1:1) s.w.r. load. The line between the transmatch and the transmitter is ideal for installing a lowpass filter for t.v.i. suppression.

7. The transmatch will help reduce harmonic output on transmission as well as image response and cross-modulation on reception. An improvement of 7–10 dB is typical.

8. Baluns and r.f. transformers are useful specialized devices that can make matching a great deal easier for certain kinds of antennas, such as those showing fixed impedance loads. Beware of inexpensive, cheaply constructed devices—they can introduce considerable power loss in your antenna system.

9. A transmatch actually may not be needed if you use single-band coax-fed antennas that normally present few matching and harmonic-radiation problems.

Fig. 2– Basic transmatch facts (from CQ, *February 1980).*

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[1]*Harmonic suppression isn't the "big deal" it once was, since today's rigs run class AB1, AB2, or B, and they exceed FCC specs for harmonic radiation. Therefore, the primary purpose in using a transmatch is to facilitate matching and loading; harmonic suppression is a freebie.*

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10 meter range using reasonable component values. However, this type of transmatch is excellent for harmonic attenuation. The pi-network was very popular in Novice-type transmitters of 50s and 60s vintage. It has seen a resurgence in a simplified configuration as a sort of "line flattener" to smooth out small s.w.r. variations on coax-feed systems.

The **ultimate transmatch,** as we have indicated, is based on the "T" design; it's a highly versatile type of matcher that is capable of handling a wide range of antenna types and impedances. Harmonic handling capability can be along high-pass or bandpass lines, depending on exact tuning and loading conditions. More on this and related types next time.

Wrap-Up

In this first part of a multi-part series, we have defined the transmatch, discussed transmitter matching, and looked at several basic transmatch designs. We will continue the series with advanced transmatches, installation and adjustment techniques, and design/selection/harmonic considerations. In the meantime, note the "transmatch facts" shown in fig. 2.

73, Karl, W8FX

Antenna of the Month: Palomar Engineers PT-2500A Antenna Tuner

Palomar Engineers' new tuner works from 160 through 10 meters, handles 2000 watts continuous, and works with coax, single-wire, and balanced lines. Relatively conventional features include a front-panel switch for selection of dummy load or a variety of transmission lines, 1.8–30 MHz frequency coverage, wide-range impedance matching capability, etc.

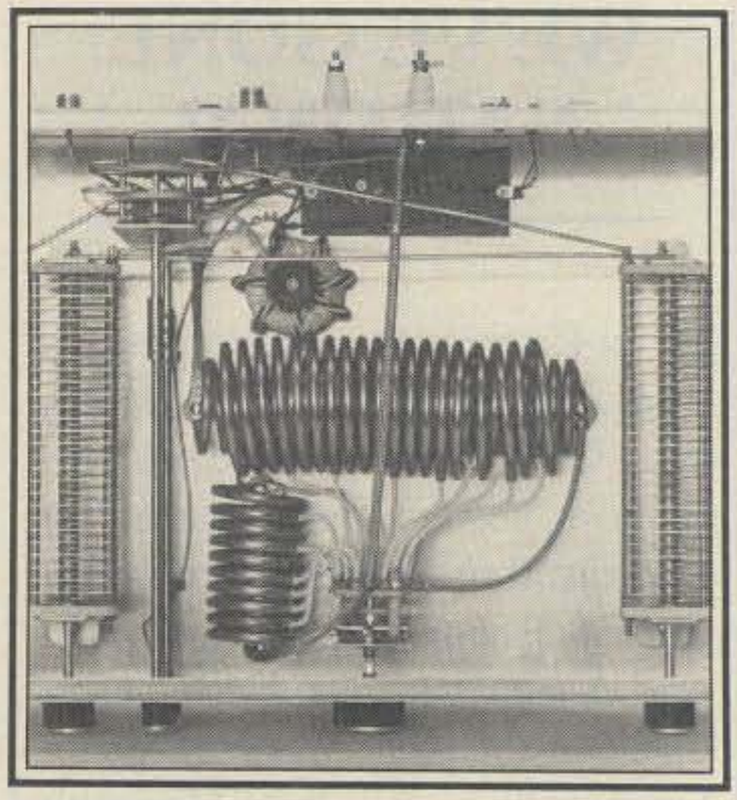
However, recognizing that one of the biggest problems with tuners is getting them tuned up, the unit has a built-in 50 ohm noise bridge that allows tuner control adjustment without transmitting, minimizing the danger to the transceiver's final tubes or transistors when loading up "unknown" impedances or rapidly switching bands. In the "tune" position of the operate-tune switch, the noise bridge is activated and the tuner controls are adjusted for a deep null as indicated on the transceiver's S-meter or aurally. When nulled, the tuner looks like a perfect 50 ohm resistive load, and the s.w.r. on the cable from the transceiver to the tuner is 1:1. Of course, a conventional s.w.r. bridge/power meter may be used for backup and correct tuning confirmation. Although the unit is relatively expensive, in the $300 + price class, it may be of interest to the serious s.w.l., as it provides a means of precision antenna matching not requiring a source of transmitted r.f.

The rugged interior of the PT-2500A evidences quality construction, emphasizing high power-handling capability and low-loss design.

All tuners lose some r.f. power "in the process," so to speak; mostly, these losses occur in the inductance coil and in the balun core. As a result of an examination of these losses by Palomar's Jack Althouse, K6NY, the main inductors were constructed of ¼-inch copper tubing, rather than the usual #12 wire. This allows a several-fold increase in the r.f. current-carrying capacity of the inductor, while minimizing loss. Also, the r.f.-ferrite balun has been moved from the output, where it would almost never "see" its design impedance, to the input, where it is much more likely to work into its intended load. This technique is said to reduce losses in the balun (which can be quite significant), as well as to help retain the balun's "balancing characteristic" to allow it to do the job it is supposed to do.

The copper-tubing inductors and balun can be noted in the photo of the PT-2500A's interior. The noise-bridge PC board is at the upper center of the photo. (Photos courtesy Palomar Engineers.)

Palomar Engineers PT-2500A antenna tuner.



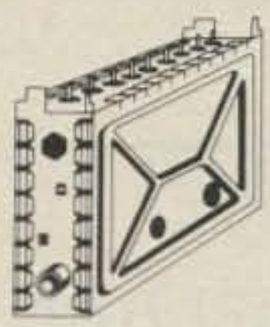
Rugged interior of the PT-2500A.

7+11 SWD PARTS KITS

MITSUMI VARACTOR UHF TUNER

Model UES-A56F

$34.95

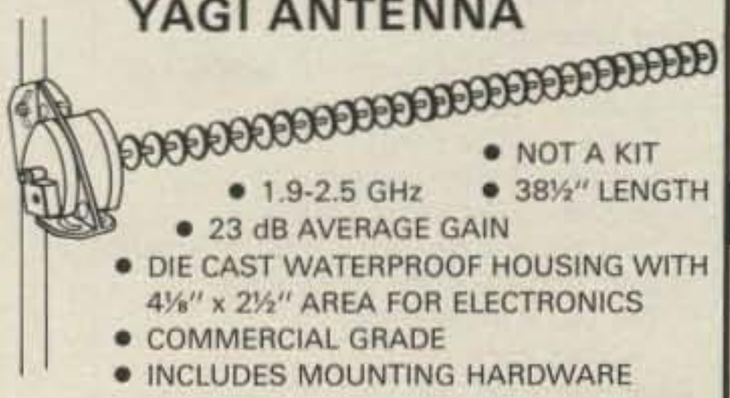


Freq. Range UHF470 - 889MHz
Antenna Input 75 ohms
Channels 14-83 Output Channel 3

KIT NO	PART NO	DESCRIPTION	PRICE
1	VT1-SW	Varactor UHF Tuner, Model UES-A56F	$34.95
2	CB1-SW	Printed Circuit Board, Pre-Drilled	18.95
3	TP7-SW	P.C.B. Potentiometers, 1-20K, 1-1K, and 5-10K ohms, 7-pieces	5.95
4	FR35-SW	Resistor Kit, ¼ Watt, 5% Carbon Film, 32-pieces	4.95
5	PT1-SW	Power Transformer, PRI-117VAC, SEC-24VAC, 250ma	6.95
6	PP2-SW	Panel Mount Potentiometers and Knobs, 1-1KBT and 1-5KAT w/Switch	5.95
7	SS14-SW	IC's 7-pcs, Diodes 4-pcs, Regulators 2-pcs Heat Sink 1-piece	29.95
8	CE9-SW	Electrolytic Capacitor Kit, 9-pieces	5.95
9	CC33-SW	Ceramic Disk Capacitor Kit, 50 W.V., 33-pieces	7.95
10	CT-SW	Varible Ceramic Trimmer Capacitor Kit, 5-65pfd, 6-pieces	5.95
11	L4-SW	Coil Kit, 18mhs 2-pieces, .22μhs 1-piece (prewound inductors) and 1 T37-12 Ferrite Torroid Core with 3 ft. of #26 wire	5.00
12	ICS-SW	I.C. Sockets, Tin inlay, 8-pin 5-pieces and 14-pin 2-pieces	1.95
13	SR-SW	Speaker, 4x6" Oval and Prepunched Wood Enclosure	14.95
14	MISC-SW	Misc. Parts Kit Includes Hardware, (6/32, 8/32 Nuts, & Bolts), Hookup Wire, Ant. Terms, DPDT Ant. Switch, Fuse, Fuseholder, etc.	9.95
When Ordering All Items, (1 thru 14), Total Price			139.95

UHF ANTENNAS and ACCESSORIES

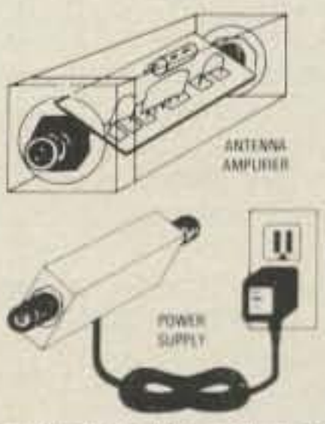
MDS-AMATEUR-ETV 32 ELEMENT YAGI ANTENNA



- NOT A KIT
- 1.9-2.5 GHz
- 38½" LENGTH
- 23 dB AVERAGE GAIN
- DIE CAST WATERPROOF HOUSING WITH 4⅛" x 2½" AREA FOR ELECTRONICS
- COMMERCIAL GRADE
- INCLUDES MOUNTING HARDWARE

MAE-1 32 Element YAGI Antenna **$19.95**

ZYZZX VHF-UHF WIDEBAND ANTENNA AMPLIFIER



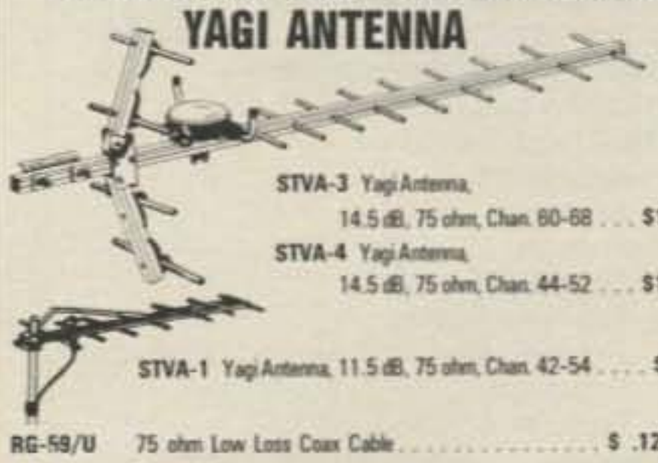
MODEL ALL-1
50 MHz — 900 MHz
12 dB GAIN ± 0.5dB

A Revolutionary New One Stage HYBRID IC Broadband Amplifier

This unit is not available anywhere else in the world. One unit serves many purposes and is available in Kit or Assembled form. Ideal for outdoor or indoor use. I/O impedance is 75 ohms. Amplifier includes separate co-ax feed power supply. Easily assembled in 25 minutes. No coils, capacitors etc. to tune or adjust.

ALL-1 Complete Kit with power supply **$24.95**
ALL-1 Wired and Tested with power supply **$34.95**

Our New STVA 14.5 dB GAIN, 14 ELEMENT CORNER REFLECTOR YAGI ANTENNA



STVA-3 Yagi Antenna, 14.5 dB, 75 ohm, Chan. 60-68 ... **$16.95**
STVA-4 Yagi Antenna, 14.5 dB, 75 ohm, Chan. 44-52 ... **$16.95**
STVA-1 Yagi Antenna, 11.5 dB, 75 ohm, Chan. 42-54 .... **$9.95**

RG-59/U	75 ohm Low Loss Coax Cable	$ .12 p/ft
F-59	Coaxial Connectors, ea	.39
MT-1	Special UHF 75-300 ohm Matching Transformer, ea	1.45

Switch to Bambi!

Electronically

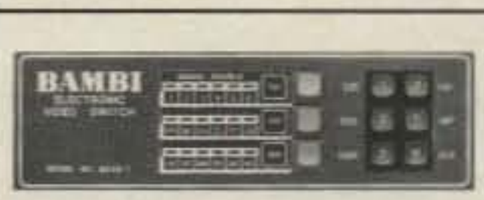
Bambi Electronic Video Switch ... makes switching of your VCR/VTR, Pay TV Decoders, Cable TV, Video Discs, Video Games, Closed Circuit TV, Antennae and Microcomputer as easy as pushing buttons.

The Bambi Electronic Video Switch is an electronic switching network which can accept up to six different sources of video signals and provide the flexibility of directing the inputs to any or all of the three outputs.

Now you can eliminate ... the drudgery of disconnecting and reconnecting your video equipment each time you use it ... the tangled mess of cables which are impossible to trace out ...not being able to use more than one function at a time.

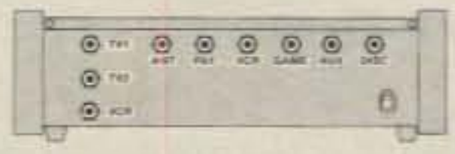
Bambi lets you enjoy using your video equipment the way it should be ... electronically and on line at the push of a button.

Model BEVS-1 **$129.95**



Bambi's front panel was designed with the user in mind. Computer styled construction, with soft-touch keyboard (rated for over 10 million operations), arranged in matrix form allows easy input/output selection without refering to charts. Functions selected through the keyboard are immediately displayed on the 18 LED status indicators.

Check the quality of Bambi against that of much higher priced competition. All solid state electronic switching provides low attenuation (3dB), wide frequency response (40-890 MHz), and excellent isolation between signal sources (each I/O section individually sheilded for 65dB min. isolation).



Bambi's Specifications:

Input/Output Impedance	75 ohm
Signal Loss	3dB ±1dB
Noise	4dB ±1dB
Input Return Loss	12dB min.
Isolation	65dB min.
Power Req.	117VAC 60 Hz, 2W
Dimensions	10¼ W x 6⅝ D x 3⅛ H
Weight	4½ lbs

SWD-1 VIDEO CONVERTER FOR CABLE TV

The SWD-1 Video Converter is utilized on cable TV systems to remove the KHz's signal from a distorted video (channel 3 in/out) and also pass thru the normal undistorted/detected audio signal. Rocker switch selects operating mode to remove KHz's distortion from the video or pass all other channels normally. Simple to assemble—less than 30 minutes. Pre-tuned. Input/output Channel 3. Impedance 75 ohms, 117VAC.

SWD-1 Video Converter Kit **$69.95**

VTR ACCESSORIES

SIMPLE SIMON VIDEO STABILIZER

Simple Simon Video Stabilizer, Model VS-125, eliminates the vertical roll and jitter from "copy guard" video tapes when playing through large screen projectors or on another VTR. Simple to use, just adjust the lock control for a stable picture. Once the control is set, the tape will play all the way through without further adjustments. Includes 12V power supply.

VS-125 Video Stabilizer, wired **$54.95**

SIMPLE SIMON VIDEO SWITCHING BOX

The Affordable Video Control Center

Excellent in isolation and no loss routing system. Simple Simons VSB-300 Video Switching Box enables you to bring a variety of video components together for easy viewing/dubbing. Also you gain the ability to record one channel while viewing another. Unit includes two F-type quick connector ended cables.

VSB-300 Video Switching Box, wired **$19.95**

7+11 PWD PARTS KITS

INTRODUCING OUR 7+11 PWD PARTS KITS

NEW

Kit No	PART NO	DESCRIPTION	PRICE
1	1VT1-PWD	Varactor UHF Tuner, Model UES-A56F	$34.95
2	2CB1-PWD	Printed Circuit Board, Pre-drilled	18.95
3	3TP11-PWD	PCB Potentiometers 4-20K, 1-.5K, 2-10K, 2-5K, 1-1K, and 1-50k. (11 pieces)	8.95
4	4FR-31-PWD	Resistor Kit, ¼W, 5% 29-pcs, ½ W 2-pcs	4.95
5	5PT1-PWD	Power Transformer, PRI-117VAC, SEC-24VAC at 500ma.	9.95
6	6PP2-PWD	Panel Mount Potentiometers and Knobs, 1-1KBT and 1-5KAT with switch	5.95
7	7SS17-PWD	IC's 7-pcs, Diodes 4-pcs, Regulators 2-pcs Transistors 2-pcs, Heat Sinks 2-pcs	29.95
8	8CE14-PWD	Electrolytic Capacitor Kit, 14-pieces	6.95
9	9CC20-PWD	Ceramic Disk Capacitor Kit, 50 WV, 20-pcs.	7.95
10	10CT5-PWD	Varible Ceramic Trimmer Capacitor, 5-65pfd, 5-pieces	4.95
11	11L5-PWD	Coil Kit, 18mhs 3-pcs, 22μhs 1-piece (prewound inductors) and 2 T37-12 Ferrite Toroid cores with 6 ft. #26 wire.	6.00
12	12ICS-PWD	IC Sockets, Tin inlay, 8 pin 4-pcs, 14 pin 1-pc and 16 pin 2-pcs.	2.95
13	13SR-PWD	Enclosure with PM Speaker and Pre-drilled Backpanel for mounting PCB and Ant. Terms	14.95
14	14MISC-PWD	Misc. Parts Kit, Includes Hardware, (6/32, 8/32 Nuts & Bolts), Hookup Wire, Solder, Ant. Terms DPDT Ant. Switch, Fuse, Fuseholder, etc.	9.95
15	15MC16-PWD	Mylar Capacitors, 14-pcs and Silver Mica Capacitors 2-pieces	7.95
When Ordering All Items, (1-15), Total Price			159.95

SIMPLE SIMON ELECTRONIC KITS,™ Inc.

Calif. Orders:
3871 S. Valley View, Suite 12
Dept. C
Las Vegas, Nevada 89103
Tel: (702) 322-5273

All Other Orders:
11850 S. Hawthorne Blvd.
Dept. C
Hawthorne, Calif. 90250
Tel: (213) 675-3347

Available by Mail Order Only
Send Check* or Money Order. Minimum Order: $16.95. Add 10% Shipping and Handling on orders under $40.00. For orders over $40.00, add 5%. Minimum Shipping and Handling $2.00. **Cat. $1.00**
— VISA and Mastercard Acceptable —
*Check orders will be held 30 days before shipping.

Please send all reader inquiries directly.

a monthly feature by
BILL WELSH, W6DDB

Novice

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Shortwave Listening—Part III

Parts I and II of this series on shortwave listening provide the introduction, plus coverage of the legality of eavesdropping, variety of transmissions, radio waves, and selecting listening frequencies.

Publications

Many books are available to help you learn about listening on the air. If you are new to shortwave listening, you will enjoy listening to whatever station you happen to hear as you tune across the bands. However, you will probably become much more selective in your listening habits after a little while; that is when you will want exact information about where and when you can listen for specific broadcasts from particular areas. Many s.w.l. publications quickly go off the market because station information frequently changes. The following list of related publications is quite accurate; however, you are advised to request current price and availability data directly from the indicated cognizant organizations before ordering anything. If your request is sent to a group in your own country, the usual s.a.s.e. (self-addressed and stamped envelope) should suffice to expedite the response. If your request is sent to a group in another country, three IRCs (International Reply Coupons) usually suffice. IRCs are available from post offices.

Book Sources

The following organizations have s.w.l. publications. Many of these publications are also available at local radio and electronics stores. Addresses are provided to enable you to directly request complete listings plus current availability and price information.

Allied Electronics
401 East 8th Street, Fort Worth, TX 76102
request catalog

2814 Empire Ave., Burbank, CA 91504

American Radio Relay League (ARRL)
225 Main Street, Newington, CT 06111
Antenna Book
Radio Amateur's Handbook
Understanding Amateur Radio
many others—request list

American Shortwave Listeners' Club (ASWLC)
16182 Ballad Lane, Huntington Beach, CA 92649
ITU Frequency lists:
List of Broadcasting Stations Below 5950 kHz
List of Coast Stations
List of Fixed Stations
List of Ship Stations
Proper Reporting Guide
SWL (monthly bulletin)

Argus Books, Ltd.
Argus House, 14 St. James Road, Watford, Herts, England
The World DX Guide

Association of North American Radio Clubs (ANARC)
1500 Bunbury Drive, North Whittier, CA 90601
ANARC Club Directory
ANARC Newsletter
How to Choose a Receiver

Bernard Babani, Ltd.
The Grampians, Shepherds Bush Road, London W6 7NF, England
Long Distance Television

Bampton Books
Franklyn, Deymans Hall, Tiverton, Devon EX16 4LL, England
request list of broadcasting books

Hank Bennett
P.O. Box 3333, Cherry Hill, NJ 08034
The WDX Monitor Program

British Broadcasting Corporation, Monitoring Service
Caversham Park, Reading RG4 8TZ, England
World Broadcasting Information

Cooperative Book Service of America
Reading, MA 01867
can deliver any U.S.A. book worldwide

CQ Publishing, Inc.
76 North Broadway, Hicksville, NY 11801
The Shortwave Propagation Handbook
plus many other books - see CQ Book Shop

Arthur T. Cushen
212 Earn Street, Enwood, Invercargil, New Zealand
World in my Ears

Danish Shortwave Clubs International (DSWCI)
Box 428, Penns Park, PA 18943
Tropical Band Survey (1.6–5.95 MHz)

Davis Publications, Inc.
380 Lexington Avenue, New York, NY 10017
Communications World

DX Philately
P.O. Box 15, S-301 02, Halmstad 1, Sweden
DX Philately

DX Service, Ltd.
Box 40, SF-02211, Espoo 21, Finland
Finnish DX Diary

DX Team Berlin
Postfach 61 04 26, 1000 Berlin 61, West Germany
Shortwave Frequency List

Electronics Australia
Box 163, Beaconsfield, 2014 New South Wales, Australia
Electronics Australia (monthly magazine)

Bruce F. Elving
P.O. Box 24, Adolph, MN 55701
FM Atlas and Station Directory

European DX Council
P.O. Box 4, St. Ives, Huntingdon PE17 4FE, England
Handicapped Aid Programme (HAP)
Landlist
Newsletter
QSL Survey
Receiver Information Bank
Reporting Guide

Bernd Friedwald
Merianstrasse 2, D-3588 Homberg, West Germany
Horubersicht International
International Listening Guide
International Programme Guide

Funk Post Service, Ehapa Verlag G.M.B.H.
Postfach 1215, D-7000 Stuttgart, German Federal Republic
Funk (monthly magazine)

Gilfer Associates
P.O. Box 239, Park Ridge, NJ 07656
Guide to Broadcasting Stations
Guide to RTTY Frequencies
Logging Sheets (3-ring binder size)
Reception Reporting Forms
Shortwave Broadcasts to North America
SWL Address Book and Updater
The World in my Ears
—plus others

Grove Enterprises, Inc.
Route One, Brasstown, NC 28902
Communications Monitoring
Confidential Frequency List
Federal Frequency Directory
How to Build Hidden Limited Space Antennas That Work

Watson-Guptill Publications
1515 Broadway, New York, NY 10036
World Riadio & Television Handbook

G2DYM Aerials, Ltd.
R. Benham Holman, Cobhamden Castle, Uplowman near Tiverton, Devon EX16 7PH, England
Indoor and Invisible Aerials for SWLs

Ham Radio Bookstore
Greenville, NH 03048
request list

Handler Enterprises
P.O. Box 48, Deerfield, IL 60015
Radio Communications Guide

Heath Company
Benton Harbor, MI 49022
request catalog

International Radio Club of America
P.O. Box 26254, San Francisco, CA 94126
IRCA Almanac (two volumes)
IRCA Foreign Logs
IRCA Reprint Subjects:
Antennas
Domestic
Foreign
General
Old Time Radio
Receiver Modifications and Construction
Receivers
General
Principles of Broadcast Band DXing
Technical Guide

International Telecommunications Union (ITU)
(see American Shortwave Listeners' Club)
IPC Magazines, Ltd.
Postal Sales Department, Lavington House, 25 Lavington Street, London SE1 OPF England
Gerd Klawitter
Ochtruper Str. 138, D-4430 Steinfurt, West Germany
List of Time Signal Stations
Roger Legge
P.O. Box 232, Maclean, VA 22101
USSR High Frequency Broadcast Newsletter
Longwave Club of America (LWCA)
Box 33188, Granada Hills, CA 91344
Longwave Beacon Guide
Mail-A-Prop
54 Westview Crescent, Geneseo, NY 14454
request list
Rand McNally & Company
P.O. Box 7600, Chicago, IL 60680
South American Handbook
Modern Book Company
19-21 Praed Street, London W2 1NP, England
request lists of books on Communications, Filters, and Radio (3 IRCs each)
National Radio Club
P.O. Box 164, Mansville, NY 13661
Antenna Reference Manual
Broadcasters Guide to DX (English or Spanish)
Domestic Log
Getting Started in Medium Wave DXing
Latin America Log
Night Antenna Pattern Book
Receiver Reference Manual
Reprints:
Antennas
Domestic DX
Foreign DX
Product Summary
Propagation
Receiver Reviews
Receiving Equipment and Techniques
Station Lists
Sunrise-Sunset Map
U.S.A. Map
North American Short Wave Association
45 Wildflower Road, Levittown, PA 19057
DXing According to NASWA
Popular Electronics
P.O. Box 2774, Boulder, CO 80321
monthly magazine (also Radio Electronics)
Public Library
check each likely subject index for useful books
Radio Nederland Wereldomroep
P.O. Box 222, 1200 JG Hilversum, Holland
Booklist
Receiver Shopping List
RTTY (radio teletype) List
Radio Nuevo Mundo
5-6 Nukui-Kita, Koganei-Shi, Tokyo 184, Japan
Latin American DXing
Radio Publications, Inc.
Box 149, Wilton, CT 06897
Better Shortwave Reception
Radio Shack
1500 One Tandy Center, Fort Worth, TX 76102
request catalog
Radio Society of Great Britain (RSGB)
Publication Sales, 35 Doughty Street, London WC1N 2AE, England
Radio Communications Handbook
also, request list of publications
Howard W. Sams & Company, Inc.
4300 West 62nd Street, Indianapolis, IN 46268
Short-Wave Listener's Guide
also, request list of publications
San Diego DXers Club
1826 Cypress Street, San Diego, CA 92154
Shortwave Hobby Equipment Review
Charles Scribner's Sons
Vreeland Avenue, Totowa, NJ 07512
From Spark to Satellite
Short-Wave Magazine (monthly publication)
Publications Dept., 34 High Street, Welwyn, Herts AL6 9EQ, England
request list of books
Speedx
P.O. Box E, Elsinore, CA 92330
A Guide to Soviet Broadcasting
Basic Information Pamphlets
BIP-1 The Why and Wherefore of Verification
BIP-2 Calibrating Receivers with Sliding Dials
BIP-3 Using the SINPO Code
BIP-4 Basic Shortwave Antennas
BIP-5 Basic Propagation
Foreign Language Report Guide
Logging Report Forms
Sunset-Sunrise Booklet
Utility Guide
Tab Books, Inc.
Blue Ridge Summit, PA 17214
Easy Way to Service Radio Receivers
Home-Brew HF/VHF Antenna Handbook
How to Tune the Secret Shortwave Spectrum
The Antenna Construction Handbook for Ham, CB, & SWL
The Complete Handbook of Radio Receivers
The Complete Shortwave Listener's Handbook
The Fascinating World of Radio Communications
The SWL's Manual of Non-Broadcast Stations
Understanding and Using Radio Communications Receivers
44 Electronics Projects for Hams, SWL's, CB'ers, and Radio Experimenters
U.S. Government Printing Office
Superintendent of Documents, Washington, D.C. 20402
request appropriate lists of publications
U.S. Postal Service (local office)
International Postal Rates & Fees (Publication 51)
Universal Electronics, Inc.
1280 Aida Drive, Reynoldsburg, OH 43068
World Press Services Frequency Manual
Voices, Inc.
P.O. Box 226, Helsinki 17, Finland
Voices
Gerhard Werdin
Niederbeckstrasse 43, 4000 Dusseldorf 30, German Federal Republic
Afro-Asian-Pacific Tropical Band Survey
University Radio Station WUOT
Knoxville, TN 37916
Review of International Broadcasting

Interference Handbook

Radio Publications has added the *Interference Handbook* to its list of books that are useful to amateurs, CBers, and s.w.l.'ers. If you want a list of their publications, you can request it by writing to Box 149, Wilton, Connecticut 06897. The *Interference Handbook* is sold by *CQ*, Ham Radio Outlet, Henry Radio, Radio Publications, and others.

As an ex-chairman of the Greater Boston TVI Committee, I have some familiarity with the subject of interference. This book provides simple but complete explanations of the causes and cures related to interference. It is a very good publication for people who are new to radio and know very little about interference.

Tapes

There are many sources of tape recordings that are of interest to shortwave listeners. A few of these tapes are listed in this article to give you some idea of typical subjects. One should write for current information regarding cost, availability, and additional tapes. As usual, enclose an s.a.s.e. (domestic) or three IRCs (foreign).

European DX Council (EDXC)
P.O. Box 4, St. Ives, Huntingdon, Cambs PE17 4FE, England
6 Coolbreeze Avenue, Pt. Claire, Quebec H9S 5G4, Canada
Canadian HAP
EDXC Berne 1981
Famous Radio Hoaxes
HAP Identification Signals of the World
Hitch-Hiker's Guide to DX'ing - Parts I and II
New Year's Nonsense from the Netherlands
Secret Local Radio
Shortwave Pirates - Parts I and II
The London Underground - Parts I and II
Finnish DX Association
DX-Palvelu OY, P.O. Box 40, SF-02211, Espoo 21, Finland
Latin America on the Air
Grove Enterprises, Inc.
Route One, Brasstown, NC 28902
Sounds of Shortwave
G2DYM Aerials, Ltd.
R. Benham-Holman, Cobhamden Castle, Uplowman near Tiverton, Devon EX16 7PH, England
A Guide to Aerials for SW Listeners
Quietus Cassette Net
2308 Garfield, Suite 304, Minneapolis, MN 55405
Electronic Avocations

Trans-Island Productions, Ltd.
P.O. Box 24, Douglas, Isle of Man, England
Long Live Shortwave
WDX-Hank Bennett
P.O. Box 3333, Cherry Hill, NJ 08034
WDX Monitor Program

Clubs

There are many shortwave listener's clubs, and they are located in several countries. Some cater to specific interests, and their names often indicate their specialties, such as the Longwave Club of America, which specializes in reception of signals below the standard a.m. broadcast band. The following list includes the name and mailing address of each organization that has come to my attention. I am sure there must be more groups, and I have not intentionally left them off this list. If you want information about the activities, requirements, publications, and services offered by these organizations, contact them directly in writing. When writing to an American group, enclose a self-addressed and stamped envelope (s.a.s.e.). When writing to a foreign group, it is wise to enclose three International Reply Coupons (IRCs). Club membership can significantly increase your knowledge and enjoyment of shortwave listening.

ADDX, Postfach 15 01 24, D-4000 Dusseldorf 1, West Germany
ADXB-DL, Postfach 443, D-3000 Hannover 1, West Germany
ADXB-OE, Postfach 11, A-1111 Vienna, Austria
AGDX, Postfach 51 05 60, D-5000 Koln 51, West Germany
American Shortwave Listeners' Club (ASWLC), 16182 Ballard Lane, Huntington Beach, CA 92649
Amitie Radio, 12 Rue Camille Dartois, B.P.56, F-94002, Creteil Cedex, France
Association of Illinois DXers (AIDX), 1413 Garden Hills Drive, Champaign, IL 61820
Association of North American Radio Clubs (ANARC), 557 North Madison Avenue, Pasadena, CA 91101
Atlantic States DX Association (ASDA), 1137 E. 12th Street, Brooklyn, NY 11230
Australian Radio DX Club (ARDXC), P.O. Box 227, Box Hill, Victoria 3128, Australia
Benelux DX Club, Postbus 1306, 6501 BH Nijmegen, The Netherlands
British DX Club, 55 Boundary Road, Worthing, West Sussex, BN11 4LL, England
Canadian International DX Club, 6815 12th Avenue, Edmonton, Alberta T6K 3J6, Canada
Canadian SWL International, 980 Georgina Bay, Thunder Bay, Ontario, P7E 3H7, Canada
Club DX Quebecois (CDXQ), 12073 Poincare, Montreal, Quebec H3L 3M1, Canada
Club Ondes Courtes Du Quebec (COCQ), Case Postale 267, Gaspe, Quebec G0C 1R0, Canada
Dansk DX Lytter Klub, Box 392, DK-8100 Arhus C, Denmark
Danish Shortwave Clubs International (DSWCI), Greve Strandvej 144, DK-2660, Greve Strand, Denmark
DX Listeners Club, Box 1284V, Oslo 1, Norway
European DX Council, P.O. Box 4, St. Ives Huntingdon, Cambs PE17 4FE, England
Finland's DX Club International, Richard Wood, English Dep't., S.E. Missouri State University, Cape Girardeau, MO 63701
Gat c/o R. Novarino, Casella Postale 108, I-10100 Torino, Italy
GECE, Apartado 4031, Madrid, Spain
Handicapped Aid Program (HAP), 6 Coolbreeze Avenue, Pt. Claire, Quebec H9S 5G4, Canada
ICDXC, Altenbergerstrasse 31, D-5216 Niederkassel 3, West Germany
IDXK, P.O. Box 3, SF-55801 Imatra 80, Finland
Indian DX Club International, G.P.O. 646, Calcutta 700 001, India
International Radio Club of America, P.O. Box 17088, Seattle, WA 98107
Italian DX News, c/o G. Villani, P.O. Box 10, 1-80100 Napoli Centrale, Italy
Japan Broadcast Listeners Federation, 6F DAI Roku Central Building, 19-10 Toranomon Ichome, Minato-Ku, Tokyo 105, Japan
Japanese Shortwave Club, P.O. Box 29, Sendai 980-01, Japan
Japan Shortwave Club, P.O. Box 1665, C.P.O., Tokyo 100-91, Japan
KDKC, Postfach 150 088, D-4000 Dusseldorf 1, West Germany
KWFR, Postfach 1180, D-4650 Gelsenkirchen, West Germany
Longwave Club of America, 45 Wildflower Road, Levittown, PA 19057
Miami Valley DX Club (MVDXC), 4666 Larkhall Lane, Columbus, OH 43229
Minnesota DX Club (MDXC), 5212 Drew Avenue S., Minneapolis,MN 55410
MWSC, Postfach 45 07 67, D-5000 Koln 41, West Germany
Nagoya DXers Circle, 2-51 Kasumori-Cho, Nakamura-Ku, Nagoya 453, Japan
National Radio Club (NRC), Membership Center, P.O. Box 118, Poquonock, CT 06064
NERCI, 1 Alt Avenue, Maghull, Liverpool L31 7BO, England
Newark News Radio Club, 215 Market Street, Newark, NJ 07101
New Zealand Radio DX League, P.O. Box 1313, Invercargill, New Zealand
North American Short Wave Association, 45 Wildflower Road, Levittown, PA 19057
Ontario DX Association (ODXA), 3 Camrose Crescent, Scarborough, Ontario M1L 2B5, Canada
Play DX, Via Davanzati 8, I-20158 Milano, Italy
Quebec DX Club, C.P. 34, Quebec City, Quebec, Canada
Radio Club World, P.O. Box 803, I-35100 Padova, Italy
Radio Communications Monitoring Association (RCMA), P.O. Box 4563, Anaheim, CA 92803
Radio DX Club de France, 23 Rue Auger, Apt. 6076, F-93500 Pantin, France
Radio Nederland Wereldomroep, P.O. Box 222, 1200 JG Hilversum, The Netherlands
San Diego DXers Club (SDDXC), 1826 Cypress Street, San Diego, CA 92154
SDXL, PL454, SF-00101 Helsinki 10, Finland
Society to Preserve the Engrossing Enjoyment of DXing (SPEEDX), P.O. Box E, Elsinore, CA 92330
South African DX Club, P.O. Box 145, Milnerton, 7405 Cape Province, South Africa
Southern California Area DXers, 3809 Rose Avenue, Long Beach, CA 90807
Southern Cross DX Club, Box 336, Adelaide, South Australia 5001, Australia
Southern DX Association (SDXA), P.O. Box 213, Alexandria, TN 37012
St. Louis International DX Club (SLIDX), 9720 Vickie Place, St. Louis, MO 63136
Sveriges DX Forbund, Box 3108, S-103 62 Stockholm, Sweden
Sveriges Radio Klubb, Box 5083, S-102 42 Stockholm, Sweden
SWLCS, Postfach 1132, D-6688 Illingen, West Germany
Union Of Asian DXers, 32/4A Malwatte Road, Dehiwala, Sri Lanka
United DX Club International, 1 Palet Niketan, Govind Mitra Road, Patna 800 004, Bihar, India
University of Manitoba DX Club (UMDXC), c/o Aaron Hywarren, 217 Dalhousie, Drive, Richmond Fort, Winnipeg, Manitoba R3T 2Y9, Canada
Washington Area DX Association (WADXA), 606 Forest Glen Road, Silver Spring, MD 20901
World DX Club, 17 Motspur Drive, Northampton NN2 6LY, England
World DX Monitor (callsigns), Hank Bennett, P.O. Box 333, Cherry Hill, NJ 08034
World Shortwave Listeners' Club (WSWLC), 80 Hartsdale Avenue, White Plains, NY 10605
Worldwide DX Club, Postfach 1214, D-6380 Bad Homburg 1, West Germany
Worldwide TF-FM Association, P.O. Box 202, Whiting, IN 46394

A typical s.w.l. award.

Awards

There are many awards and certificates the s.w.l.'er can achieve, and most of them are sponsored by s.w.l. clubs. The accompanying example shows a typical s.w.l. achievement award.

Part III, Conclusion

This completes the third part of this article about shortwave listening. Part IV covers equipment and accessories suppliers, and receivers.

73, Bill, W6DDB

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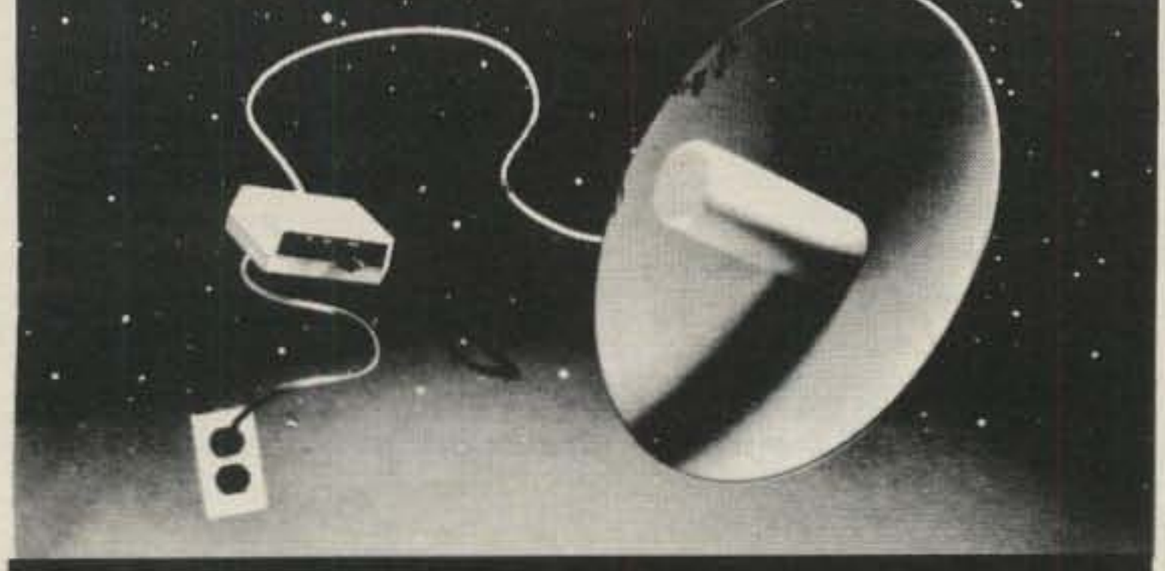

The Saturn V is a deep fringe microwave receiver for homeowners that are outside of the service area of local pay TV stations (i.e., HBO, Showtime). It is normally used within line of sight of a transmitting tower in a 50 mile range and is simply attached to your TV antenna mast. This unit is completely ready to install including all cable and mounting hardware. It is designed to be installed by the homeowner.

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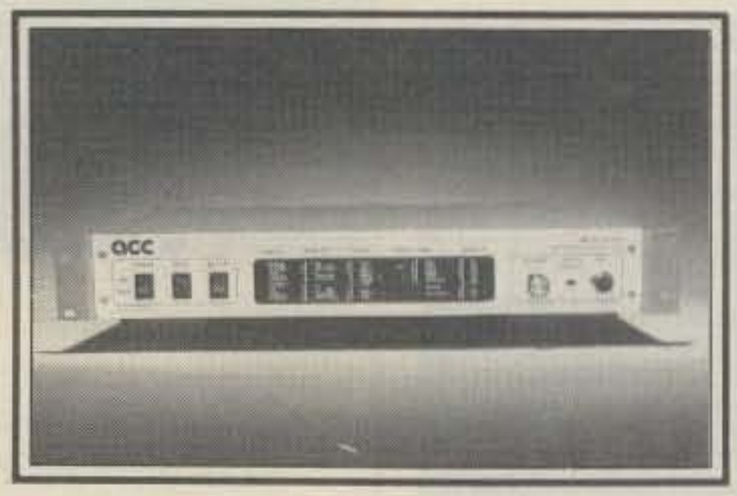
CIRCLE 21 ON READER SERVICE CARD

CQ SHOWCASE

Advanced Computer Controls RC-850 Repeater Controller

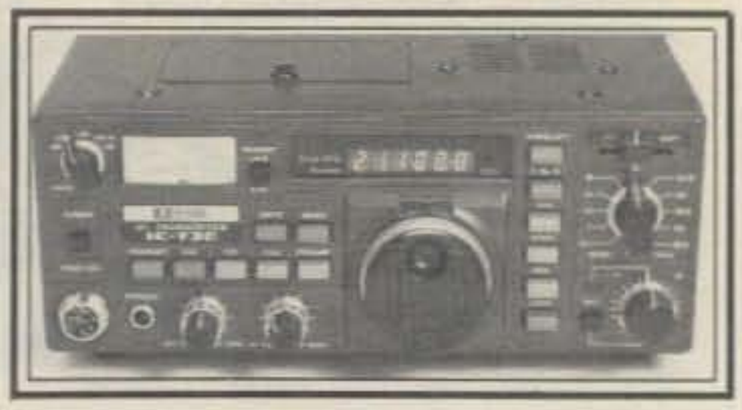
Advanced Computer Controls has introduced its microcomputer-based RC-850 Repeater Controller, which brings a new level of flexibility and capability to f.m. repeaters. The controller's characteristics are remotely configurable by the repeater owner with highly secure Touch-Tone commands. No hardware or software changes are required to modify control operator and user codes, ID and tail messages, Morse code speed, pitch, and level independently per function, multi-set courtesy tone characteristics, repeater timing, and more. Remote configurability allows the repeater owner to customize his repeater to sound as he wishes, permits changes at any time, and eliminates dependence on the manufacturer to make changes over the life of the repeater. Configuration parameters are stored in a non-volatile memory which requires no batteries for data retention.



The controller uses CMOS logic and low power analog circuitry extensively to minimize power consumption. It interfaces easily to commercially available and home-brew RF equipment. The controller is rack mountable, or may be operated table-top. For more information, contact Advanced Computer Controls, 10816 Northridge Square, Cupertino, CA 95014, or circle number 109 on the reader service card.

ICOM IC-730 H.F. Transceiver

ICOM has announced the IC-730 compact solid-state h.f. transceiver. The IC-730 is designed for the budget-minded ham, priced at $829. The IC-730 includes the following features: 9.5"W × 3.7"H × 10.8"D; 10–80 meter frequency coverage including all three new WARC bands; fully synthesized tuning for stability in mobile operation (1 kHz, 100 Hz, 10 Hz steps); dual v.f.o.'s built in; 8 frequency memory storage (one frequency per band); fully solid state; i.f. shift standard; and attractive styling.

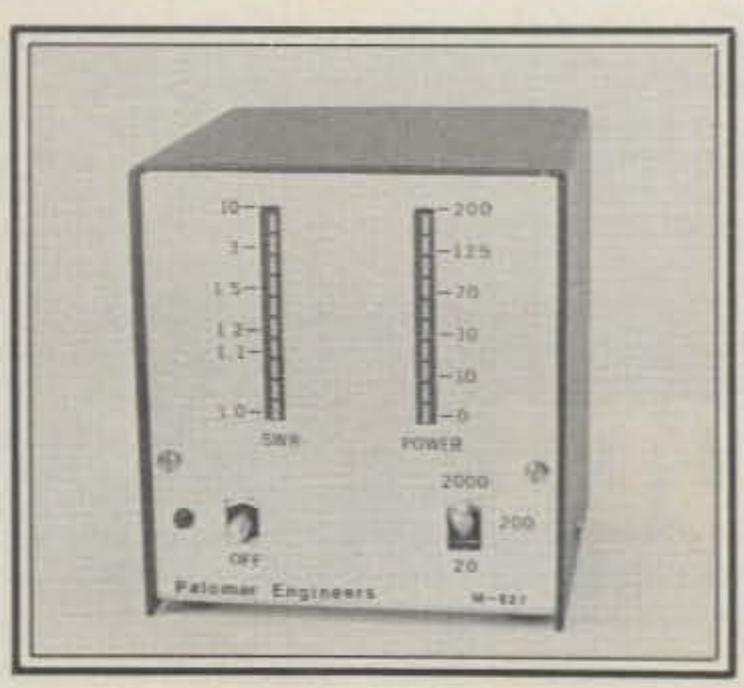


For more information, contact ICOM America, Inc., 2112 116th Ave., N.E., Bellevue, WA 98004, or circle number 108 on the reader service card.

Palomar Engineers Automatic S.W.R. Meter

Palomar Engineers has introduced the new M-827 S.W.R. Meter. This new meter computes s.w.r. automatically and displays it on a light bar. The "sensitivity" knob has been eliminated, s.w.r. reading is always correct regardless of power level, and the light bar follows changes instantly. A second light bar displays power. Unlike the analog panel meter it replaces, it follows with the speed of light so you can see all the s.s.b. peaks. Frequency range is 1–30 MHz. Power ranges are 20, 200, and 2000 watts. The s.w.r. scale is 1 to 10 with a logarithmic response that gives improved resolution where you need it. The M-827 is 4" × 4" × 5" with a brushed aluminum control panel, baton switches, and a black vinyl cover. The light bars are 2" long with a bright red display.

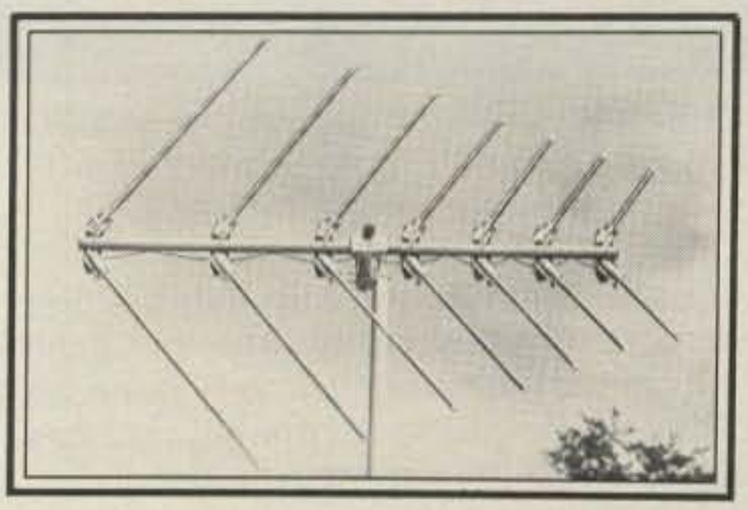
The M-827 S.W.R. Meter sells for $97.50. For more information, contact Palomar Engineers, 1924-F W. Mission Rd., Escondido, CA 92025, or circle number 105 on the reader service card.



HF Signalling Dual Tracking Power Supply

HF Signalling's Model 515 Dual Tracking Power Supply is designed for modern solid-state applications where both linear OP-AMP and digital IC circuits are encountered. Output voltage is variable from ±5 V to ± 15 V d.c., and each output is rated at 1 amp continuous to comply with power requirements of complex digital and analog devices. All outputs feature automatic current limiting and short-circuit protection as well as reverse voltage protection. The Model 515 is manufactured with controlled tracking to within 20 mv and has a load regulation better than 0.3% from no-load to full-load on all outputs. The large meter allows easy voltage calibrations.

The Model 515 carries a 120-day warranty, and sells for $140. For more information, contact HF Signalling, Inc., P.O. Box 17510, Kansas City, MO 64130, or circle number 102 on the reader service card.



Grove Low-Power, Wideband Transceiver Antenna

Originally designed as a highly directional base-station receiving antenna, recent tests using low-power transceivers in combination with the ANT-1 "Scanner Beam" antenna have provided remarkable results, maker says. Forward r.f. signal radiation was increased up to six times that of transmitter input power. Average v.s.w.r. throughout the v.h.f./u.h.f. bands was a low 1.6:1. Because of its highly directional design, forward signal radiation was able to be "targeted" toward more distant repeater or base stations, thereby increasing the range of low-powered hand-held transceivers.

For more information, contact Grove Enterprises, Inc., Dept. A, Brasstown, NC 28902, or circle number 106 on the reader service card.

No-81-82

The SPARC repeater is now ready and willing to assist you on your next vacation to the east coast's "Casino City."

SPARC's "Slot" Machine

BY VINCE LUCIANI*, K2VJ

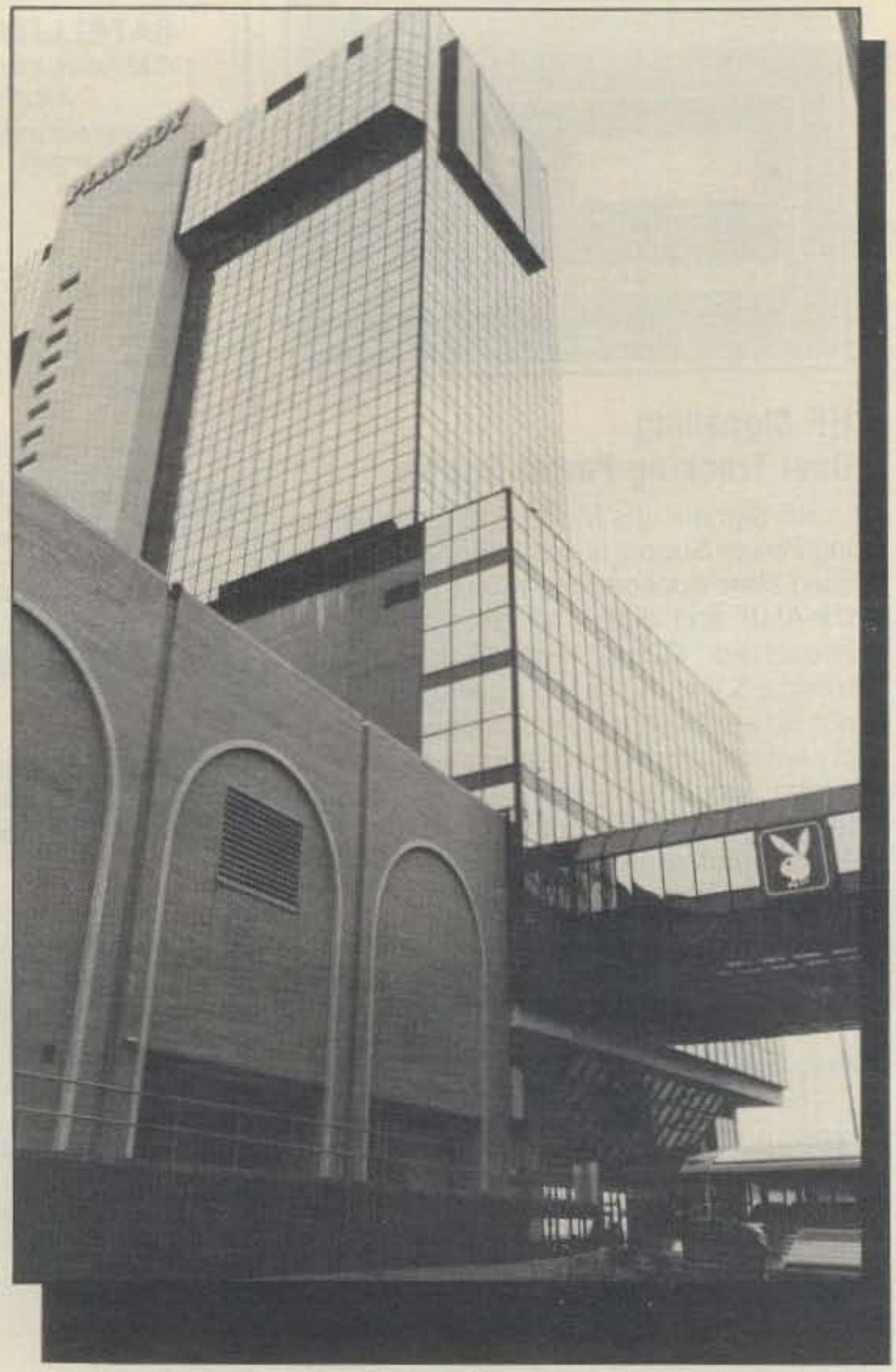


Fig. 1– "It's way up yonder, 320 feet above the beach, directly over the Y in PLAYBOY." (Photo by the author.)

"Welcome to the Jersey Shore. You are in communications with the SPARC repeater . . ."

Thus begins the message tape from the Shore Points Amateur Radio Club's .985/.385 2-meter repeater station, now snugly, contentedly located high atop the exotic Playboy Casino-Hotel in downtown Atlantic City (fig. 1).

Equipped with autopatch and emergency power, the SPARC machine—variously referred to as the Slot Machine, Rabbit Repeater, Bunny Broadcaster, and sundry other cutesy tags—was transferred to its current location last September. It is now ready, willing, and able to assist you on your next vacation in finding your way about America's oldest/newest resort.

Radio amateurs are everywhere, of course, so it should come as no surprise to learn that the Playboy repeater site was ably arranged for by Bob Greblunas, WA2YAV, who is financial consultant to Playboy.

One of the voices on the message tape is that of professional announcer at Atlantic City AM radio station WMID, Mike Brophey, N2DBY.

Installation of the repeater (new call-sign WA2ESD) at its super vantage point 320 feet above sea level (and ground level; they are both the same here) presented no significant problems to the crew of Nate Rosenthal, N2ADD; Charlie Rabey, N2CCR; Bob Stebbins, N2AAC; and Chuck Hewitt, WA2FQF.

One early potential problem had to do with getting the giant 26-foot Super Stationmaster antenna to the roof. It didn't come apart too readily, nor would it fit in the elevator. A hand-over-hand "Armstrong" hoist up the long side of the building was planned until the Government solved the problem by refusing permission to install a radiator that tall on Playboy's roof. The building happens to be near to Bader Field. While SPARC may have considered the repeater to be of more importance, the Government had the muscle. The loudenboomer stayed behind.

(Bader Field, by the way, was the first "airport" in the world by virtue of having first coined the name "air port" because of its seaside location. It thereby qualifies as the oldest official airport around.)

Fig. 2 shows (left to right); the replacement antenna and 450 MHz link antenna, WA2FQF, and N2AAC. (N2ADD declined immortality by handling the photographic chores, and Charlie Rabey, N2CCR, not shown, also assisted.)

Visible through the driven element and first director of the link antenna in fig. 2 is Atlantic City's "far out" casino, Harrah's. "Far out" in location, that is. It is the only casino in town which is not located at the Boardwalk and, in fact, is not even on the Monopoly Board.

Fig. 3 shows the repeater cabinet safely installed inside the elevator room at the very top of the building. The rack houses a 40-watt solid-state Motorola Railroad Micor repeater; in the middle is an old, tube-type GE 450 MHz rig used for the autopatch link (to be replaced one day); and at the bottom is the home-brew logic control box.

Although the installation team swore they had spent neither time nor coin on

*733 W. Duerer St., Egg Harbor, NJ 08215

Fig. 2– SPARC installation team makes final adjustments to repeater antenna. (Left to right) Bot Stebbins, N2AAC, and Chuck Hewitt, WA2FQF. Taking photo was Nate Rosenthal, N2ADD. Also not shown, but a member of the team, was Charlie Rabey, N2CCR. Peeking between elements of the lower 450 MHz link antenna is Atlantic City's "far out" casino, Harrah's. Far out, that is, in their being the only casino in town not to be located at the Boardwalk. In fact, they aren't even on the Monopoly board.

Fig. 3– SPARC's own Slot Machine. N2AAC handles flood of incoming welcoming calls.

the machines far below, the machine on top took about 6 hours to set up. The location at the 24th floor was two floors above the last elevator stop, hence everything had to be hand-carried the remaining route. No one complained. It was still infinitely superior to climbing a tower of the same height.

The probability of such installation being accomplished without Murphy's intervention was, of course, a flat zero. Fortunately, the only play on Murphy's Law was in the discovery that one of the new $10 commercially prepared hardline connectors was bad. A bit of on-the-spot ham ingenuity took care of the matter.

Despite the repeater having been QRT 3 months, calls swarmed in the moment it was fired up from Playboy's. Locals (and some not so local) were pleased to hear SPARC's new signal back on the air.

Contacts are now regularly made nearly to Philadelphia (about 40 miles), and I can ker-chunk the machine from my living room 17 miles away using the "Eye-Cat-Two" HT. All in all, the signal is quite good even without the big inhaler left behind.

Fig. 4– On the Boardwa-a-lk in Atla-a-ntic City. See text for scene identification.

As time permits, the club plans future improvements to enhance system performance, particularly with an eye toward emergency communications and public service needs in the event of local disaster.

N2ADD was sufficiently impressed with the view from the Playboy roof to have taken a photo which may yet cast him into immortality—first, because fig. 3 is a classical synopsis of the new Atlantic City casino scene; and second, for a reason to be mentioned later.

Fig. 4 looks out over Atlantic City in a northeasterly direction. The lineup of new Atlantic City establishments in this view (and correlated to your Monopoly Board) are:

1. Adjacent to Playboy's (which is off Florida Avenue) is Convention Hall, alongside which is what may look like a barren lot, but, to its visionary owners, it is the future Trump Plaza Casino.

2. Alongside the Trump Plaza site is the partially constructed Penthouse Casino (Missouri Avenue) on which construction has halted due to funding problems.

The "Penthouse Caper" made news awhile back when the hardy woman who owns a boarding house in the middle of the Penthouse block facing Pacific Avenue held out for top dollar to be bought out. Penthouse offered her $1 million cash, a free lifetime suite at Penthouse, and free Cadillac limo service to anywhere. She held out for $4 mil. Penthouse thumbed her down and neatly built around her.

The boarding house remains intact, a chunk out of the Penthouse facade. This is a "must see" for visitors, this niche in the Penthouse decor which some call a thorn.

3. Caesar's Casino, off Arkansas Avenue, was the second game in town to open its doors to Eastern gaming aficianados. You can tell where they are; they, like hams, put their IDs on the shack wall.

4. Next to Caesar's is the future Benihana Casino (formerly the Shellbourne Hotel). Rocky Aoki's venture off Michigan Avenue is on rocky financial ground, too.

5. Bally's Park Place Casino carries the most famous QTHs on the Monopoly Board: Park Place and Boardwalk.

6. Resorts International, off North Carolina Avenue, was the first and, for a full year, only game in town. They grossed a cool quarter billion in their first few years, which convinced the others that ACY-town was, indeed, worth looking into.

7. At the upper left (vertical stripes) is the Sands Casino (Indiana Avenue). Originally opened as the Brighton Casino, it was sold to a group of investors from Texas.

8. To the left of the Sands is shown part of the Claridge Hotel Hi-Ho Casino. Named after its counterpart in London, their motif is strictly English down to their bobby-attired security personnel.

9. Shown reaching out from the Boardwalk is N2ADD's best claim to fame: the last known photograph of Atlantic City's famed Million Dollar Pier. While September 27 was, coincidentally, the last official day of the Atlantic City beach season, it was also the last official day of the Million Dollar Pier. It burned down to the ground—rather, down to the beach. (This had nothing to do with the ERP of the SPARC machine.)

10. Central Pier is identifiable in the background by its Sky Tower. Steel Pier is in back of Central Pier.

Not shown are the other two casinos:

Golden Nugget and the Tropicana.

Contrary to daily news format by which editors place the best first, our best has been saved for last—fig. 5! That's the author and "friend" QSO'ing on the SPARC Slot Machine. (Notice the wilted rubber ducky antenna.)

The geometrically precise bunny is Renay Rogers, cocktail waitress at the casino and Playmate Bar. Renay was famously cooperative in this, her first venture into amateur radio.

The author's rumored quote—an ambition to be Hugh Hefner for awhile—was unfounded. He merely remarked at having discovered the fountain of youth in that he felt younger with each photo taken alongside this Bunny Broadcaster.

Not to worry. The author's favorite photographer was along . . . the XYL, Marie. Particularly appreciated was her photographic composition talents by which she several times directed the OM to move in closer. Such are the trials of being a writer; if Cousteau can swim beneath polar ice caps for his material, can an amateur radio writer do less?

"Welcome to the Jersey shore . . ."

Author Vince Luciani, K2VJ, is author of the popular book, Amateur Radio, Super Hobby! *(available from CQ Book Shop). Reviewers have described this book as an entertaining description of what amateur radio really is, who the people in it are, and how to join.* —K2EEK

Fig. 5– Bunny Broadcaster, Renay Rogers . . . and friend.

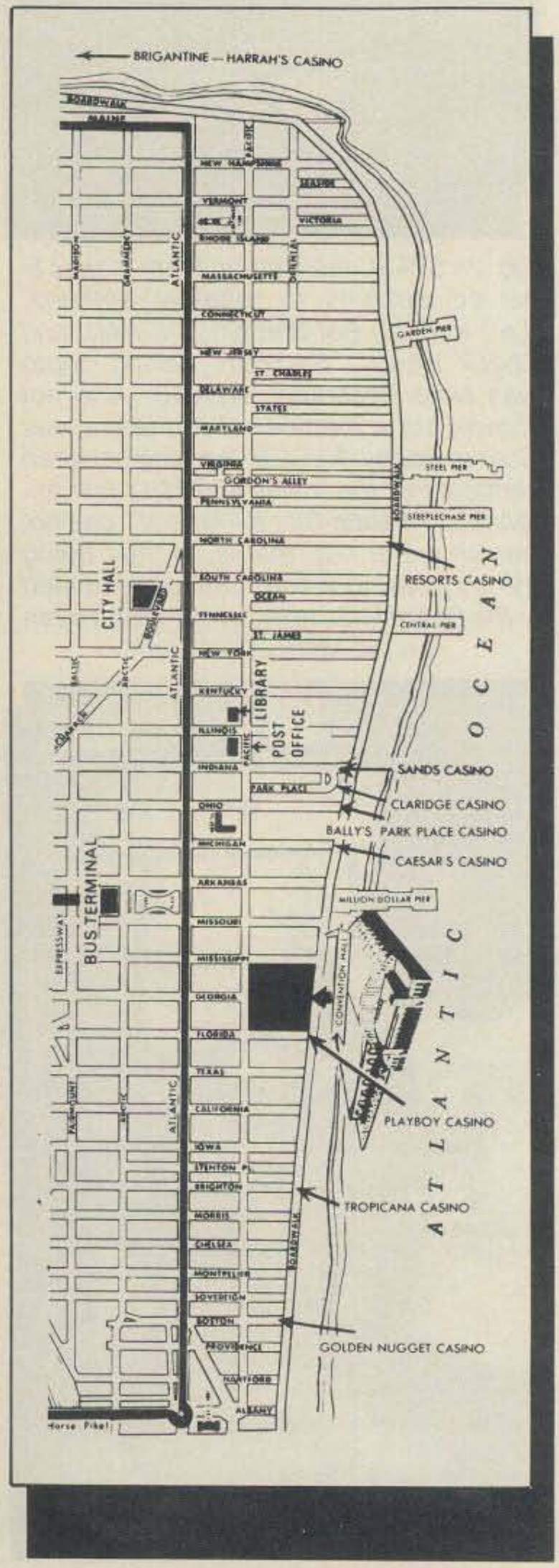


Fig. 6– Downtown Atlantic City, where the games are.

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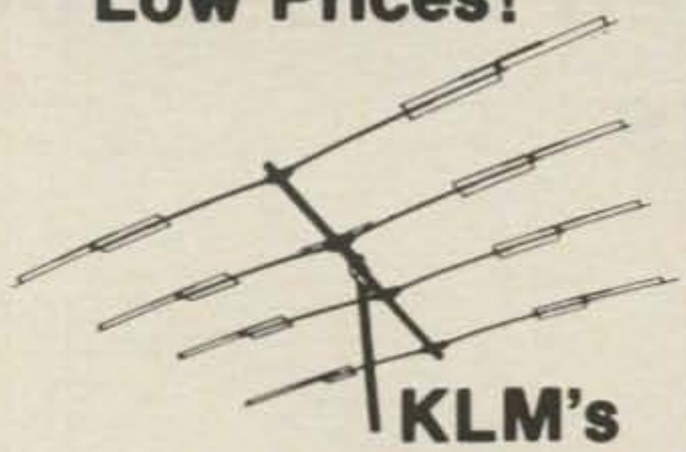

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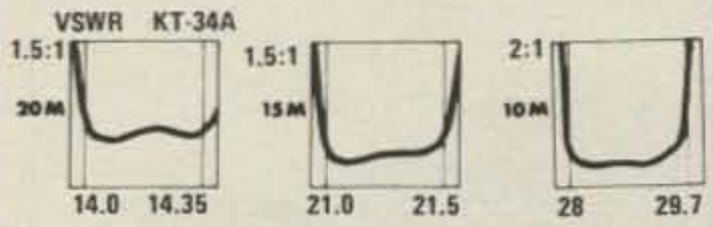

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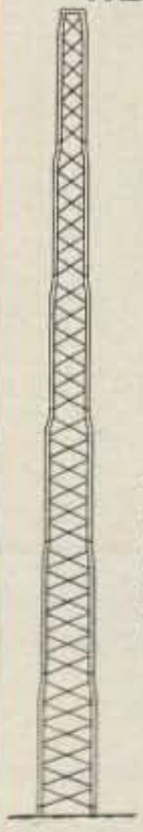

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15-4CD	4-El. 15 mtr. Beam	$ 99
10-3CD	3-El. 10 mtr. Beam	$ 69
10-4CD	4-El. 10 mtr. Beam	$ 89
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203BAS	3-El. 20 mtr. Beam	$119
153BAS	3-El. 15 mtr. Beam	$ 72
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A failing memory is not necessarily a sign of age. It simply could be worn-out batteries. W2LH perks up the memory of his PCS-2000 easily and economically.

A Simple Battery Modification To Improve The Battery Life In The Azden PCS-2000 Memory Circuits

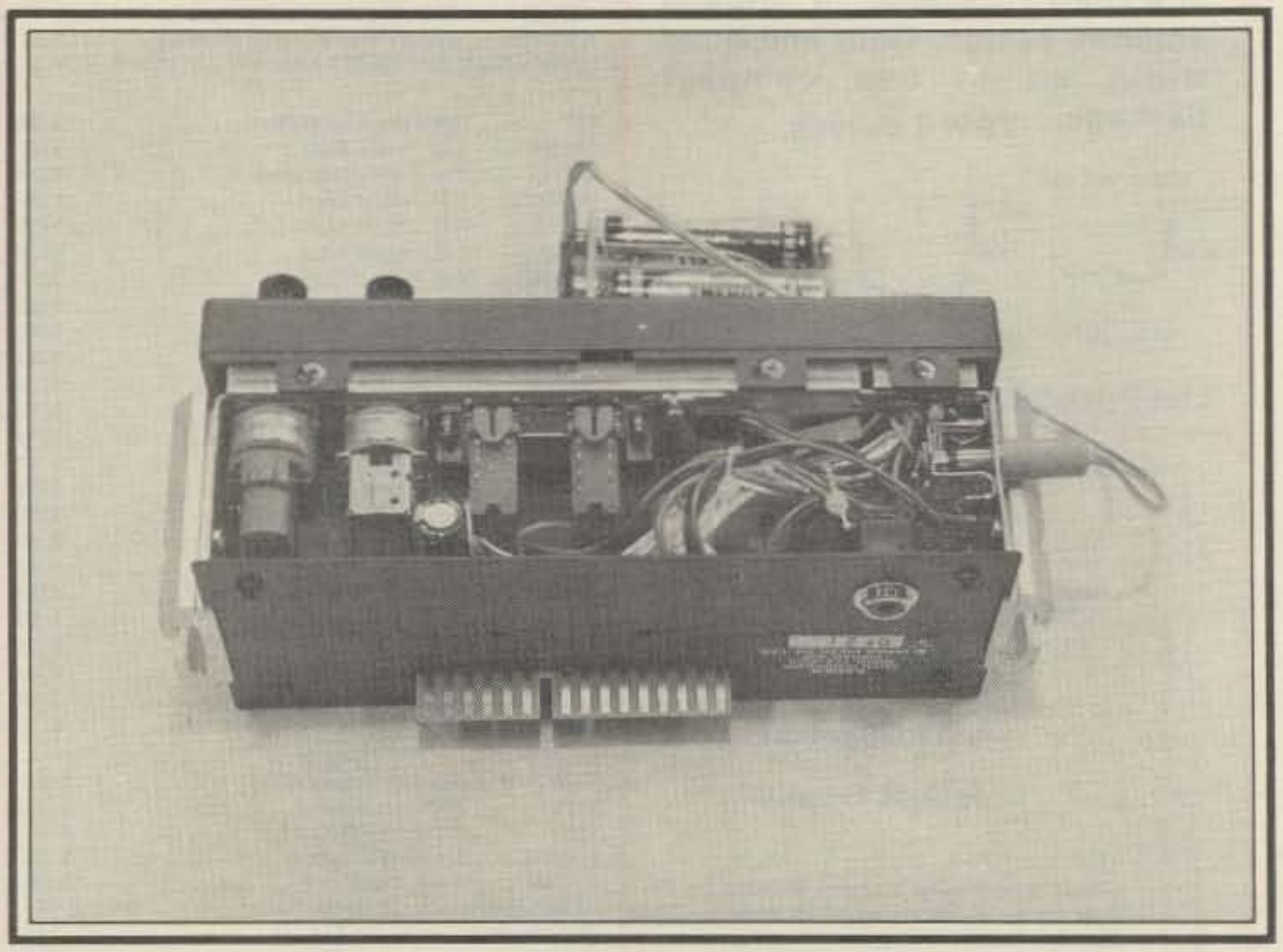
BY ARTHUR GREENBERG*, W2LH

The Azden PCS-2000 is a fine 2 meter transceiver with 25 watt and 5 watt capability—an exciting unit with many features for mobile or fixed station use.

However, it does have one minor deficiency which is easily corrected. For the memory circuit, the 2000 uses three RS-76 silver oxide cells which are not rechargeable. Replacing them is simple enough, but their cost is quite high—around $9.00 for the three. You cannot even be sure that the new ones will last the six months as specified in the manual.

The modification proposed will make it possible simply to use three AA alkaline batteries which should last more than a year, while not altering the operation of the PCS-2000. The original RS-76 batteries can be reinstalled, if desired, and the three AA cells can be set aside.

If your Azden PCS-2000 does not hold its memory, here is the simple modification. All of the changes are made in the control portion of the unit which separates from the main transceiver section by loosening the two clamps and nuts at the sides. The control unit will pull away easily. Remove the two Phillips head screws holding the top cover and the two holding the bottom cover. Remove the covers and the three batteries will be observed on the top side toward the left and behind the word "Azden." If you turn the control unit over, you will see an open area behind the microphone receptacle. A small rubber grommet can be mounted a half-inch forward of the cover screw hole. Use a grommet that requires a quarter-inch hole for mounting. Carefully drill a ⅜-inch hole on the right side of the bottom cover so that it permits the cover to be put back in the usual manner and expose the rubber grommet.



In this particular modification a small power receptable (Radio Shack #274-1415 with matching plug #274-1551) is used in place of the grommet. How elaborate you want to get with the modification is up to you. (Photo by W2RP.)

An 18-inch piece of 22-gauge speaker wire is used; one wire is copper and the other is tinned for polarity. Bring the wire through the new grommet and route it along the bottom front up through an available space for connection to the battery holder. The coppered wire, when cleaned, will readily solder to the positive front lip of the battery holder. The tinned wire can be soldered to any common ground point for the negative connection.

This concludes the wiring in the Azden. The wires can be routed through the grommet and the ⅜-inch hole in the bottom cover, and the covers can be replaced. The control unit can then be put back into the transceiver housing. The other end of the 18-inch speaker wire can be soldered to a battery holder that holds three AA cells. We used a GC electronic or Calectro D3-058 holder which cost less than a dollar. Make sure that the coppered lead goes to the positive connection and the silvered to the negative connection. Place three AA alkaline cells in the holder. Tape or rubber band the holder to the PCS-2000 at the bottom by the speaker. The Azden PCS-2000 is now ready for use. CQ

*Box 311, Park St. and Hulse Ave., Wading River, NY 11792

Announcing

● **The following hamfests, etc., are slated for July:**

July 10, **Nittany ARC Ham Festival,** State College, PA. Contact Nittany ARC, P.O. Box 614, State College, PA 16801.

July 10, **8th Annual Ontario Hamfest,** Milton, Ontario, Canada. Contact Mike Cobb, VE3MWR, P.O. Box 836, Burlington, Ontario, Canada L7R 3Y7.

July 10, **South Milwaukee ARC Swampfest,** Oak Creek, WI. Contact South Milwaukee ARC, P.O. Box 102, South Milwaukee, WI 53172.

July 10–11, **Annual South Dakota Hamfest,** Rapid City, SD. Contact Black Hills ARC, c/o Rudy, WB0PWA, 4822 Capitol, Rapid City, SD 57701.

July 10–11, **19th International Hamfest,** International Peace Gardens between Dunseith, ND, and Boissevain, Manitoba. Contact WD0GMD, International Hamfest, P.O. Box 53, Epping, ND 58843.

July 10–11, **Maple Ridge ARC Hamfest 82,** Maple Ridge Fairgrounds, 30 miles east of Vancouver. Contact Maple Ridge ARC, Box 292, Maple Ridge, BC, Canada V2X 7G2.

July 11, **Batavia Hamfest,** Alexander, NY. Contact Batavia Hamfest, c/o Genesee Radio Amateurs, Inc., Box 572, Batavia, NY 14020.

July 11, **Two Rivers ARC Hamfest,** McKeesport, PA. Contact Gregory A. Lesko, WB3IZJ, 324 East 17th Ave., Homestead, PA 15120, or call 412-464-0550.

July 17, **Straits Area ARC Hamfest,** Harbor Springs, MI. Contact Bernie Slotnick, KB8RE, 630 Ann St., Harbor Springs, MI 49740.

July 17, **Sheboygan County ARC Lakeshore Swapfest,** Wilson Town Hall, south of Sheboygan, WI. Contact SCARC, P.O. Box 895, Sheboygan, WI 53081.

July 17–18, **Silver Anniversary Breakfast Club Hamfest,** Palmyra, IL. Contact Quad-Co Radio Club members WA9ARY, K9CIL, W9KIC, or K9UCC.

July 17–18, **Lane County Ham Fair,** Eugene, OR. Contact WA7MOK, 2456 Corral Ct., Springfield, OR 97477.

July 18, **LaPorte County Summer Hamfest,** LaPorte, IN. Contact LaPorte ARC, P.O. Box 30, LaPorte, IN 46350.

July 18, **Zero Beaters ARC Hamfest,** Washington, MO. Contact Rich Noelke, WA0NUI, Rt. 3, 10 Richard Dr., Washington, MO 63090.

July 18, **8th Annual Hall of Fame Hamfest,** Louisville, OH. Contact Butch Lebold, WA8SHP, 10877 Hazelview Ave. NE, Alliance, OH 46601, or call 216-821-8794.

July 18, **17th Annual Wood County Ham-A-Rama,** Bowling Green, OH. Contact Wood Co. ARC, c/o S. Irons, P.O. Box 73, Luckey, OH 43443 (s.a.s.e.).

July 23–25, **Oklahoma State ARRL Convention, Ham Holiday 82,** Oklahoma City, OK. Contact CORA Ham Holiday 82, P.O. Box 15013, Del City, OK 73155.

July 24, **Ski Country ARC Swapfest,** Glenwood Springs, CO. Contact Frank, WA0BBI, P.O. Box 280, El Jebel, CO 81628.

July 24, **5th Annual Noarsfest,** Wellington, OH. Contact Noarsfest 82, P.O. Box 354, Lorain, OH 44052.

July 24, **Mt. Beacon ARC Hamfest,** Poughkeepsie, NY. Contact Walt Cotter, WA2ZCN, North Hillside Lake Rd., Wappingers Falls, NY 12590 (s.a.s.e.), or call 914-226-6636.

July 25, **Wheeling WV Hamfest,** Wheeling, WV. Contact ISRAC, Box 240, RD 2, Adena, OH 43901.

July 25, **BRATS Maryland Hamfest,** West Friendship, MD. Contact BRATS, P.O. Box 5915, Baltimore, MD 21208.

July 25, **Amateur Radio Public Service Assoc. of St. Joseph County, Michigan, Swap and Shop,** Centreville, MI. Contact Dennis Cutler, N8DDU, 3051 Z Ave., Vickesburg, MI 49097.

July 25, **Delgado Community College ARC Swapfest,** New Orleans, LA. Contact Jim Wolfe, Delgado ARC, Delgado Community College, City Park Campus, New Orleans, LA 70119.

July 30–31, Aug. 1, **Amateur Radio Council of Arizona Hamfest,** Flagstaff, AZ. Contact Wm. Oliver Grieve, W7WGW, 4301 N. 31st Ave., Phoenix, AZ 85017, or call 602-246-0200.

● **These Special Event Stations will be on the air in July:**

KA3CNX, Lions Club, Greensboro, MD, July 3, 4, 5, 1300–2100 GMT, on 7.270 and 21.420 ±QRM. QSL to KA3CNX (s.a.s.e.).

WB0NIU, Winona, MN, ARC, July 3, 1500–2100Z, on 7.245, 14.290, 21.365, and 28.650 MHz. QSL to WB0NIU, 3655 6th St., Winona, MN 55987.

W0KEM, Hannibal, MO, ARC, July 3–4, 1500–2100 UTC, on phone 7.245, 14.290, 21.400, c.w. 7.125, 21.125 MHz. QSL to W0KEM, 2108 Orchard Ave., Hannibal, MO 63401 (s.a.s.e.).

W3QQR, Laurel, MD, ARC, July 4, 1200–2400Z, on phone 7260, 14285, 21400; c.w. 14065 on half hour. QSL to LARC, P.O. Box 259, Annapolis Jct., MD 20701.

K7YPT, High Plains ARC, July 4–5, 0000–0000Z, on phone 28550, 21300, 21360, 14250, 14300, 7250, 3850, 3900; c.w. 50 kHz up from lower band edge; Novice middle of band. QSL to K7YPT, P.O. Drawer T, Torrington, WY 82240.

K9JLK, Bonfield, IL, July 4–5, 1300Z–*(no time given),* on 223.50, 144.250, 146.520, 50.115, 28.600, 21.400, 14.325, 7.275, and 3.8 to 3.9 MHz. QSL to WB9WOC.

WD2ALL, Waterville Central School ARC, July 10, 1300–2100Z, on 10 kHz from lower General class phone band edges, 10 kHz from lower Novice band edges. QSL to Waterville Central School ARC, c/o Kraig Pritts, Madison St., Waterville, NY 13480.

KC7LK, Hermiston, OR, July 10–11, 1600–0400Z, on phone 80-10 meter General class; Novice c.w., and 147.03 on 2 meters. QSL to Lloyd Umphres, P.O. Box 604, Stanfield, OR 97875 (s.a.s.e.).

W9UDU, Racine Megacycle Club, July 10–18, 1100–2300Z on 10th, 11th, and 17th, 1100–2000Z on 18th, on General portion of phone bands 10–15 and 20 meters. QSL to W9UDU, c/o American Red Cross—Lakeshore Counties, 4521 Taylor Ave., Racine, WI 53405 (s.a.s.e.).

K8DD, Eastern Michigan ARC, July 16, 6–10 p.m. EDST, on phone 10 kHz inside lower edge on 75, 40, 15 meter General class bands, c.w. 10 kHz inside lower edge of Novice bands. QSL to K8DD, 1640 Henry, Port Huron, MI 48060 (s.a.s.e.).

K8QYL, Reservoir ARA, July 17–18, 1300–0400Z, and 1300–1900Z again on the 18th, on phone 3940, 7260, 14285, 21360, 28590, c.w. 50 kHz up from bottom of band at beginning of odd hours. QSL to K8QYL, P.O. Box 268, Celina, OH 45822 (s.a.s.e.).

W8DN, Reservoir ARA, July 24, 1300–1800Z, on phone 3940, 7260, 14285, 21360, 28590. QSL to W8DN, P.O. Box 268, Celina, OH 45822 (s.a.s.e.).

WN7ODD and **N7CSH**, Central Oregon Radio Amateurs, July 24, 0600–1800 PDT, on phone 10 kHz up from bottom of General bands, c.w. 15 kHz up from bottom of Novice bands. QSL to CORA, P.O. Box 723, Bend, OR 97709 (s.a.s.e.).

W8UMD, Treaty City ARA, July 24–25, 1600–1600Z, 40 and 20 meters 10 kHz up from bottom of General band, and 40 meter Novice. QSL to TCARA, Box 91, Greenville, OH 45331 (s.a.s.e.).

VE3SAS, Salvation Army Scouts, Victoria Lake, Northern Ontario, July 31–Aug. 8, on 80–10 meters phone and c.w. Looking for other Boy Scout stations. QSL to Dave Digweed, 12 Frederick St., St. Catherines, Ontario, Canada L2S 2S2 (s.a.s.e.).

Western Kentucky DX Club, July 24–25, 1600–2400 GMT each day, from KY counties Monroe, Allen, Butler, Logan, Breckenridge. Check into County Hunters Net and QSY. QSL to Larry Smith, WA4QQV, c/o Western KY DX Club, P.O. Box 986, Bowling Green, KY 42101 (s.a.s.e.).

a monthly feature by

THEODORE J. COHEN, N4XX

dateline... Washington, D.C.

THE INS AND OUTS OF THE WASHINGTON SCENE

CQ Interviews Mr. Richard Smith, Chief, FOB, FCC

In this issue, readers will find a far-ranging interview with the new chief of the FCC's Field Operations Bureau, Mr. Richard Smith. As Chief of the FOB, largest of the organizational units within the Commission, Smith is responsible for the administration and enforcement of regulations and treaties relating to all non-government radio communications. The interview covers a wide variety of topics, including the President's budget and its impact on both the Bureau and amateur radio, amateur examinations, enforcement, radio-frequency interference (r.f.i.), and the use by amateurs of advanced communication techniques. You won't want to miss a word of this important and timely interview, for it contains useful information on a multitude of issues which now face the amateur service.

Radiolocation Devices Interfere With West Coast 420–450 MHz Repeaters

While full details are not yet known, it appears that radiolocation devices used for offshore gas and oil exploration off the west coast of the U.S. have been interfering with the operation of several amateur repeater and remote base systems in the 420–450 MHz band. In fact, some of the repeaters were virtually put off the air until the units were moved.

It appears that the radiolocation devices in question may be operating legally within the 420–450 MHz band on a Secondary basis. However, FCC Rules require that telecommunication services operating on a Secondary basis cease operation when services operating on a Primary basis experience interference from the former.

Commission field offices on the west coast are now investigating this problem.

8603 Conover Place, Alexandria, VA 22308

Operator Of Unlicensed Station Fined For Jamming Amateur Repeater Station

The Commission's Field Operations Bureau, acting under delegated authority, fined Donald L. Rhoads of San Francisco $750 for deliberately interfering with the operation of an amateur 2-meter repeater station located on nearby Grizzly Peak.

Rhoads, who was not licensed, falsely identified his station by using a callsign belonging to a licensed amateur operator. He also transmitted obscene, indecent, and profane language, as well as music and party records. These operations jammed the repeater and prevented its use by authorized amateur operators.

Engineers from the Commission's San Francisco District Office, using sophisticated direction-finding equipment, traced the jamming signal to Rhoads' apartment and closed down the illegal station.

Amateurs Win Important Victory In Cable T.V.I. Case

As reported in *The Westlink Report*, pressure from amateurs in Lompac, CA, has forced Teleprompter to move their cable channel "E" service (145.25 MHz, in the 2-meter amateur band) to channel "O" (247.25 MHz). Severe interference to and from amateur 2-meter repeater operations caused by signal leakage on the CATV system has been a continual source of annoyance to amateurs and viewers alike, and has resulted in the filing of numerous complaints with the FCC.

While Teleprompter indicated that the move from channel "E" was voluntary, they reserved the right to reoccupy the channel when the signal-leakage problem was resolved. The CATV operator did say, however, that if this channel was used again, the company would coordinate its implementation with local amateurs.

Meanwhile, FCC investigations into amateur complaints about both the Teleprompter operation in Lompac and Sonic Cable TV's operation in San Louis Obispo, CA, found these CATV systems not to be in compliance with FCC Regulations. Consequently, the two companies were issued "Letters of Non-Compliance" which required them to provide the Commission with written replies within 15 days as to the steps they have taken to correct the CATVI situations cited.

Amateurs are urged to file complaints with both the FCC and the ARRL when CATVI is experienced. Of particular concern is interference to or from operations on the following frequencies:

Cable Channel	Visual Carrier Frequency (MHz)
E	145.25
K	223.25
UU	421.25
VV	427.25
WW	433.25
XX	439.25
YY	445.25

For a detailed discussion of CATVI, readers are referred to Dickinson's article, "Entertainment and Interference: The Two Faces of CATV," *QST*, February 1982.

Low-Power Television . . . An R.F.I. Disaster In The Making

Voting to increase competition in the television broadcast industry, the FCC, in March 1982, approved the creation of a new low-power television service. With more than 6,500 applications already on file, it is expected that thousands of new stations will come on the air within the next few years to serve small geographic areas throughout the country.

The new stations will be allowed to operate on any available v.h.f. or u.h.f. channel, and will be limited to 10 watts of power for v.h.f. operations and 1,000 watts of power for u.h.f. operations. Few regulatory restraints would be imposed on the new stations, many of which are expected to be operated by minorities to serve the needs of their communities.

The new low-power TV stations are expected to have a viewing range of about 8 miles as compared to a viewing range of 60 miles and more for conventional TV broadcast stations.

The Commission's Private Radio Bureau (PRB) has already gone on record as being concerned about radio-frequency interference (r.f.i.) problems which may accompany introduction of the new service. Concern centers on potential interference with ambulance, fire department, and police communications. Interference problems, according to the PRB, could be particularly acute in large cities.

Amateurs, too, are bracing for an increase in the number of cases of alleged television interference (t.v.i.). With viewers expected to watch low-power TV broadcasts at ranges in excess of those over which service would normally be provided, poor picture quality, coupled with the inability of most TV receivers to operate near an amateur transmitter, is expected to exacerbate an already serious r.f.i. problem nationwide.

The FCC is currently studying the interference problems expected when the low-power TV stations take to the air. Given a knowledge of r.f.i. problems as they exist today, however, some observers are already predicting that the new service may not receive allocations in a few major cities.

FCC Applies "Last Man In" Rule To F.M. Broadcast Stations Causing R.F.I.

In a decision that could have far-reaching consequences for all telecommunication services—including the amateur service—the Commission voted to release a Notice of Proposed Rule Making (NPRM) regarding resolution of blanketing interference problems caused by f.m. broadcast stations. The proposed Rule specifically states that f.m. broadcasters new to an area are responsible for correcting r.f.i. problems (within a specified zone) that may result from their operation. If adopted, this would be the first time that the "last-man-in" rule is applied to f.m. broadcasting.

Action by the Commission in this matter is the result of an ever-increasing demand for spectrum space and the resultant interference experienced by services sharing allocations or operating in adjacent portions of the r.f. spectrum.

It should be noted that problems with f.m. broadcast interference to Ch. 6 television operations have repeatedly attracted the attention of the Commission. Recent cases of such interference in Florida and Virginia (including one in Key West, FL, where someone blew up the tower of an f.m. station alleged to have caused interference to Ch. 6 operations) attest to the severity of the problem and the need for Commission action.

RTCA Addresses Interference To Airborne Systems

Lest amateurs think they are the only ones experiencing r.f.i., consider the plight of the airborne aviation community. So serious is the problem concerning f.m. broadcast interference to airborne ILS and VOR guidance systems, and to v.h.f. communications, in general, that the Radio Technical Commission for Aeronautics (RTCA) recently reviewed various aspects of the problem and issued recommendations in the matter. The RTCA document was developed by a committee of aviation experts which was chaired by H.L. Leaming of Aeronautica Radio, Inc. (ARINC) and L.S. Gallemore of Trans World Airlines, Inc.

Comments On Spread-Spectrum Inquiry Mixed

Comments received on the FCC's inquiry into the use of spread-spectrum modulation techniques by amateurs (General Docket 81-414) were mixed. As expected, comments from the Amateur Radio Research and Development Corporation (AMRAD) were most supportive of a proposal to permit amateur Extra and Advanced class licensees to use spread-spectrum modulation techniques in the 50, 144, and 220 MHz bands. The ARRL's response, while somewhat less than enthusiastic, still supported the Commission's efforts to introduce spread-spectrum techniques into the amateur community. The majority of comments received from individual amateurs, however, were negative.

The negative response from individuals surprised some observers in Washington, DC, who look to amateurs in the field to support the basic purpose and intent of the amateur service.

It is possible that the lack of support for the introduction of spread-spectrum modulation techniques into the amateur service results from a lack of understanding of the techniques involved. If true, this places something of a burden on spread-spectrum enthusiasts to educate the community on the benefits that can derive from implementing such advanced modulation techniques.

ARRL Supports Commission's Efforts To Introduce Spread-Spectrum Modulation In The 50, 144, And 220 MHz Amateur Bands

In its response to General Docket 81-414 (in the matter of amendments of Parts 2 and 97 of the Commission's Rules and Regulations to authorize the use of spread-spectrum techniques in the amateur service), the ARRL, in general, supported the FCC's forward-looking proposal. However, the League cautioned that suitable safeguards must accompany the introduction of these techniques.

Uppermost in the mind of the League were concerns regarding message privacy, and the possibility of interference to other amateur stations and other users of the spectrum. With regard to the former, the nature of spread-spectrum modulation prevents the use of conventional monitoring techniques to ensure that the transmissions do not involve business or other non-amateur communications. As regards the latter, the ARRL voiced concern regarding interference between spread-spectrum and conventional emissions (though the League did note that the interference potential of spread-spectrum emissions to conventional modes is less than that of co-channel, narrowband emissions).

In addressing the Commission's proposal to include provisions for spread-spectrum modulation in its Rules, the ARRL suggested that the FCC would assume a lesser administrative burden simply by issuing Special Temporary Authority on a case-by-case basis rather than undertaking revisions to its Rules and Regulations. Noted the League: "Operation by Special Temporary Authority does have the advantage of placing the results of the work in the public record, (and specifically) in the form of the report which must be filed with the Commission at the conclusion of the operation."

Other League comments on the proposal addressed areas such as station identification, class of license required for spread-spectrum experimentation, exclusion of the exclusive c.w. bands at 50 and 144 MHz from use by spread-spectrum experimenters, and the limitation of spread-spectrum communications to domestic use only.

The full text of the League's comments can be found in *QST*. Copies are also available for viewing at the FCC's headquarters in Washington, DC.

FCC Commissioner Discusses Commission's Changing Role Toward Consumer Electronics

In remarks delivered to the Electronic Industries Association, Commissioner Anne P. Jones noted that the FCC's Laur-

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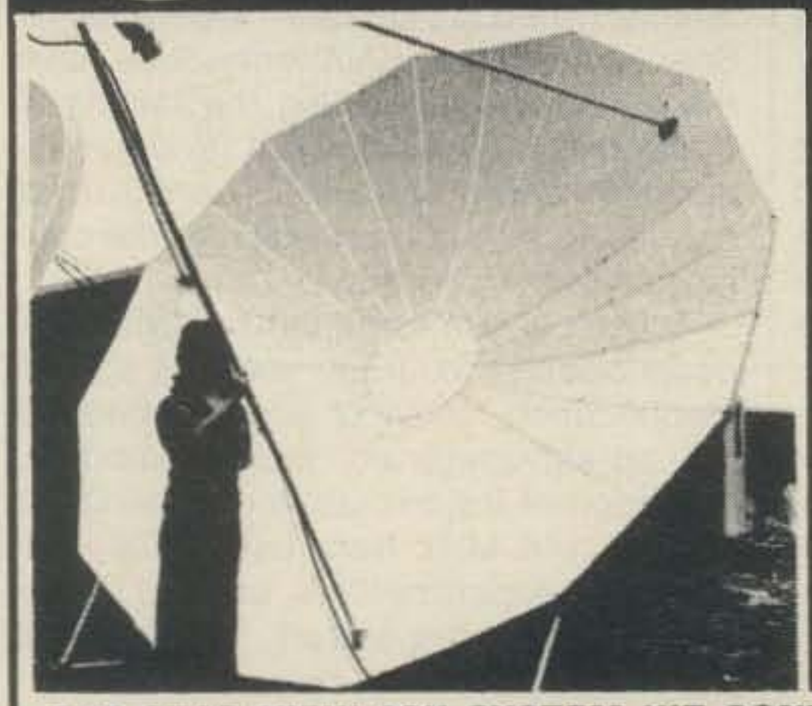

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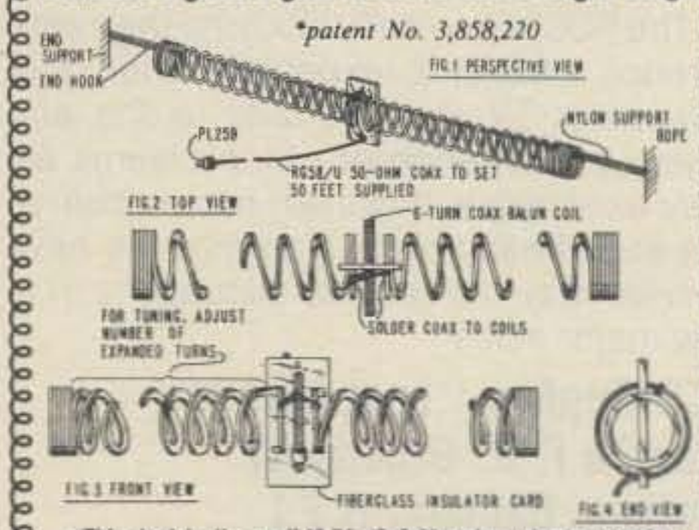

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CIRCLE 115 ON READER SERVICE CARD

CIRCLE 8 ON READER SERVICE CARD

el Lab faces a staff cut "equipment authorization area" alone from the present level of 25 persons to no more than 5 by the end of 1983. Equipment authorization involves approval and certification procedures which ensure that new products meet specified standards for minimizing interference to other equipment.

Given that the Laurel Lab staff will not be able to continue their intensive equipment-authorization efforts as in the past, Ms. Jones stated that " . . . the Commission will depend largely on Manufacturer testing and notification to the Commission of compliance with its technical requirements."

The Lab, in fact, will basically become a repository of manufacturer filings on the r.f. emission levels of their new products. From the manufacturers' point of view, this is good, for it will reduce the time it takes to bring a new product to market. From the consumer's standpoint, however, this could be very bad news, since potential interference problems arising from home consumer devices would not be known until these devices are marketed, sold, and in use.

Ms. Jones recognized this danger, noting: "By the time complaints might begin to arise, hundreds or even thousands of devices could be in everyday use, and rooting out all the equipment causing r.f. interference would be extremely difficult. In the meantime—perhaps a period of months or even years—the interference might limit consumer, business, and government use of both new and previously existing equipment.

"We all know that any business has its sharp operators. In a time of economic uncertainty and increased financial pressure, testing may be short-changed. The pressures to derive income to cover product development costs may lead to testing shortcuts which could create interference."

In concluding her remarks, Ms. Jones stated: "From now on, your problem (i.e., the consumer electronic industry's problem) will not be FCC-created delay, but rather how best to keep your own technical house in order in circumstances of diminished government oversight. While the public and the press focus more on such controversies as deregulation of radio and television programming, the real test of industry responsibility may come in the areas of technical design and quality control."

Commission Officially Dismisses Petitions For Access To New H.F. Bands

Acting under delegated authority, the Chief of the Private Radio Bureau, Mr. James McKinney, dismissed four petitions for rulemaking in the matter of operating privileges for amateurs in the new h.f. bands at 10, 18, and 25 MHz. These new allocations for the amateur service resulted from actions taken at the 1979 World Administrative Radio Conference (WARC) in which amateurs were given exclusive allocations at 18.068–18.168 MHz and 24.890–24.990 MHz, and a shared secondary allocation at 10.1–10.15 MHz.

In his notice to dismiss the four petitions (including one filed by the ARRL), McKinney noted that the U.S. Senate must ratify the WARC treaty before the Commission can proceed with the rulemaking necessary to make the bands available to amateurs. Even following ratification, however, amateurs will have to wait for the Fixed-service operations in the bands to be relocated.

The date set for availability of the frequencies to amateurs worldwide is 1 July 1989. And while McKinney noted that the Commission plans to advance this timetable considerably for U.S. amateurs, no purpose would be served by developing operating guidelines on emission modes and operating privileges in advance of when the allocations will become available.

Commission Deletes Portions Of Amateur Rules

At the regular Commission meeting held 1 April 1982, the FCC Commissioners voted to delete portions of the Amateur Rules dealing with frequency measurement and power supply filtering.

Specifically, the Commission deleted Part 97.74, which dealt with measurements of the emitted carrier frequency and the requirement to check such measurements. Three reasons were given for dropping the Rule:

1. The Rule was not specific (i.e., quantitative); hence, it was unenforceable;

2. The Rule imposed a cost burden on amateurs, since those using transceivers would have to purchase extra equipment to make the necessary measurements.

3. The Rules already contain Part 97.63, which requires that emissions be confined within bands allocated to the amateur service.

As regards the so-called "power supply rule," the Commission deleted Part 97.71 for the following reasons:

1. The state-of-the-art in d.c. power supplies today is such that all transmitters have well-filtered power sources;

2. Part 97.73 addresses the same matter, but this Rule specifies quantitatively the purity of emission standards to be met.

FCC Terminates Docket And Petitions On Telegraphy Matters

In March, the Private Radio Bureau (PRB) recommended to the Commission that Docket 78-250 (re the administration of telegraphy exams to handicapped personnel) and two rulemaking petitions (re 1. telegraphy exams for deaf applicants, and 2. elimination of the telegraphy requirements and c.w. bands) be terminated.

Mr. James McKinney, Chief, PRB, noted that the FCC has done everything possible to meet the needs of the handicapped. Further, according to McKinney, the handicapped, in general, do not want to be given special treatment.

As to the matter of eliminating the telegraphy requirement and the c.w. bands, termination of the outstanding docket in this matter clears the way for an in-depth review by the Commission of the whole question surrounding creation of a code-free license. It is likely, in fact, that

preliminary discussions between the PRB and the Commissioners regarding such a license will have taken place by the time this issue has gone to press.

Budget Reductions Could Curtail WWV Solar And Geomagnetic Data Broadcasts

The President's FY83 budget, submitted to Congress earlier this year, contains a decrease which may have an impact on users of the services of NOAA's Space Environment Laboratory (SEL) and its Space Environment Services Center (SESC). At the proposed level of support, it would not be possible for NOAA to support many of the present activities of SEL; in particular, all space-weather research and related systems development would have to be terminated when the new budget is implemented.

If funding levels are reduced in accordance with the President's proposal, real-time, solar-terrestrial services currently provided by SESC would have to be curtailed. These services include, for example, 24-hour/day alerts and forecasts, the WWV broadcasts of the geophysical alerts, and the weekly "Preliminary Report and Forecasts of Solar Geophysical Data."

The Space Environment Laboratory would appreciate comments from its users about the impact of the reductions of services outlined above. Additional comments about the minimum level of services required by users will be helpful in establishing the service priorities during FY83. To submit your comments, write to Dr. Donald J. Williams, Director, Space Environment Laboratory, NOAA, Boulder, CO 80303.

The loss of the WWV broadcasts at 18 minutes past each hour would have a significant impact on amateurs who are involved in ionospheric propagation analyses. Accordingly, in addition to any comments forwarded to Dr. Williams, we would encourage amateurs to write to the Congress in this matter and to state their views to the two committees which will be reviewing NOAA's FY83 budget. Write to The Honorable Lowell P. Weicker, Jr., Chairman, Senate Appropriations Committee, 1213 Dirkson Office Building, Washington, DC 20510. Also write to The Honorable Neal Smith, Chairman, House Appropriations Committee, H-218 Capitol Building, Washington, DC 20510.

CCIR Begins 1982–1986 Cycle Of Work

Mr. H.T. Blaker, Chairman of U.S. CCIR Study Group 8E (amateur; terrestrial and space), recently announced that work would begin on the 1982–1986 cycle of work. The CCIR is that technical arm of the ITU which develops the technical bases used in the Union's deliberations on spectrum allocations.

It should be noted that the Terms of Reference of Study Group 8 have been modified to include the Amateur Satellite Service; this service was formerly included in Study Group 2.

Those intending to participate should give thought to the Study Group's future activities. Specifically, the chairman seeks guidance on how the Study Group can be of service to "developing countries" and how the Group can contribute most effectively to efficient spectrum utilization.

Those individuals wishing to participate in the Activities of U.S. CCIR SG-8e are urged to write to Mr. H.T. Blaker, Chairman, U.S. CCIR SG-8, Rockwell International, Suite 1200, 1745 Jefferson Davis Highway, Arlington, VA 22202.

Individuals wishing only to monitor the Group's activities should send their names and addresses to Mr. Frank L. Rose, Federal Communications Commission, OST/ASD/TSB, Washington, DC 20554.

FCC Issues Liability Notices For Unlicensed Anti-Castro Radio Operations In Miami, FL

In response to a complaint from the International Frequency Registration Board (IFRB, a part of the ITU) and complaints from U.S. amateur operators, the Commission has issued notices of apparent liability for unlicensed radio operations in the Miami, FL, area. The transmissions, identified as "the Voice of Alpha 66," were broadcasting anti-communist and anti-Castro information in the 7 MHz amateur c.w. band.

The illegal transmissions, broadcast in Spanish on 7040 kHz, were traced by the FCC's Miami Field Office and Fort Lauderdale Monitoring Station to the Miami area, and specifically to three houses.

Three official Notices of Apparent Liability for $750 were issued for violations of the Communications Act. And although this matter is currently being handled as an administrative action by the FCC, further unlicensed operations may be referred to the U.S. Department of Justice with a request for criminal prosecution. Prosecution by the Department of Justice could result in a $10,000 fine and/or a one-year jail sentence for each violation.

FCC Rejects Move To Alexandria, VA

The FCC, in March, rejected a proposal from the General Services Administration (GSA) to consolidate the Commission's operations into one building in Alexandria, VA. Rejection of the proposal was based on potential inconvenience to the FCC's 1,960 employees and to the public. With no alternatives available for a new headquarters, the Commission also terminated its efforts to consolidate its operations. The agency currently operates out of four office buildings in northwest Washington.

a monthly feature by

FRANK ANZALONE, W1WY

Contest Calendar

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Coverage of last year's California DX Convention by Larry Brockman, N6AR, in the May issue was most interesting, proving that a good picture is worth a thousand words. Larry used 16 photos to prove his point.

The one of Herb Becker, W6QD, brought back nostalgic memories of that meeting in a pub in lower Manhattan in New York City some 35 years ago. The caption of the photo credited W6QD as being the first *CQ* WW DX Contest Chairman. Actually, Herb should have been given more credit; he, along with Larry LeKashman, W2AB (W2IOP), were the founders of the *CQ* Contest. (That was a little before your time, Larry.)

Also recommended reading in the May issue is Hugh Cassidy's DX Column. The local QRPers are always making that trip up the hill seeking Hugh's sage advice. This time the Local One had him stumped. Reading his proposal, with tongue in cheek, I too had that beady-eyed smile by the time I reached the conclusion of the story.

Some time later, however, I asked myself, "Why not? Why not have your amateur radio identity engraved in granite?" Many headstones in cemeteries bear fraternal emblems, military service, and other identification. So why not your amateur radio call letters with which some of us have been associated for over 50 years? The name Frank Anzalone will be remembered by my family and friends, but W1WY covers a lot more territory around the world and should be remembered for at least five years after it appears under "silent keys" and is later reissued to someone else.

So tell your Local friend to count me in, Hugh, and add my application to the other eleven he has already signed up.

73 for this time, Frank, W1WY

Venezuelan Contest

Phone: July 3–4 C.W.: July 24–25
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

This is a world-wide-type contest; therefore, work other countries as well as YV stations.

There are four categories: single operator, single and all band, and multi-operator, single and multi-transmitter. Also s.w.l.

Exchange: RS(T) plus a QSO number starting with 001.

Points: Contacts between stations in different countries 2 points. Between stations in the same country zero (0) but permitted for multiplier credit.

Multiplier: One for each country, each YV call area, and each U.S. call district worked on each band.

Final Score: Total QSO points from all bands multiplied by the sum of the multiplier from each band.

Awards: There is a large variety of awards.

Plaques: To the top scorers in each category.

Medals: To the top station in each of the following areas: North, Central, and South America, Caribbean, Bolivarian countries, Europe, Africa, Asia, Oceania, and s.w.l.

Certificates: To all stations having contacted the following totals: (a) 15 YV's plus 10 different countries, for stations in North, Central, and South America, Caribbean, and Bolivarian countries. (b) 10 YV's 10 countries for Europe and Africa. (c) 5 YV's plus 10 countries for Asia and Oceania. (d) S.w.l.'s reporting 50 complete QSO's including at least 10 YV's.

Include a summary sheet with your entry and the usual signed declaration.

A remittance of $2 or its equivalent in IRC's is requested with each certificate application.

Mailing deadline is Sept. 15th for phone, and Oct. 15th for c.w. entries. Mail to: Radio Club Venezolano, P.O. Box 2285, Caracas 101, Venezuela.

IARU Radiosport

Starts: 0000Z Saturday, July 10
Ends: 2400Z Sunday, July 11

This is a worldwide competition, all bands, 160 through 2 meters, single and multi-operator.

There are three categories: c.w. only, phone only, and mixed c.w. and phone. Multi-operator use mixed mode, single transmitter only.

Each station may be worked once per band regardless of the mode. Crossband contacts not permitted except via Oscar, which counts as a separate band.

Single operator stations are limited to 36 hours of operating time. Off times must be at least 30 minutes and indicated in your log. There is no time limit for multi-stations, but operation must remain on the same band for at least 10 minutes.

Exchange: RS(T) and your ITU zone.

Points: One point for QSOs with stations in your own zone, 3 points if station is outside your zone but on the same continent, and 5 points if on a different continent.

Multiplier: Sum of different ITU zones worked on each band.

Final Score: Total QSO points from all bands times the sum of the multiplier from each band.

Calendar of Events

*	July	1	Canada Day Contest
†	July	3-4	Venezuelan Phone Contest
	July	10-11	IARU Radiosport Contest
	July	12-18	Fiesta Mayor Torredembarra
	July	17-18	A5 WW SSTV Contest
	July	17-18	International QRP Contest
	July	17-18	Colombian Contest
†	July	17-18	SEANET C.W. Contest
	July	24-25	Venezuelan C.W. Contest
	July	24-26	County Hunters C.W. Contest
	Aug.	7-8	European C.W. Contest
	Aug.	14-15	SEANET Phone Contest
	Aug.	14-16	New Jersey QSO Party
	Aug.	21-22	Alaska QSO Party
	Aug.	21-22	SARTG RTTY Contest
	Aug.	21-22	A5 UHF FSTV Contest
	Aug.	28-29	All Asian C.W. Contest
	Aug.	28-29	Occupation QSO Party
	Sep.	5	Bulgarian C.W. Contest
	Sep.	11-12	European Phone Contest
	Sep.	11-12	Cray Valley SWL Contest
	Sep.	11-12	G-QRP Activity
	Sep.	19	North America Sprint
	Sep.	18-20	Wash. State QSO Party
	Sep.	18-19	Scandinavian C.W. Contest
	Sep.	25-26	Scandinavian Phone Contest
	Sep.	25-26	Delta QSO Party
	Oct.	2-3	California QSO Party
	Oct.	2-3	VK/ZL/Oceania Phone Contest
	Oct.	9-10	VK/ZL/Oceania C.W. Contest
	Oct.	9-10	California QSO Party
	Oct.	16-17	Pennsylvania QSO Party
	Oct.	16-17	ARCI QRP C.W. Contest
	Oct.	**30-31**	**CQ WW DX Phone Contest**
	Nov.	13-14	European RTTY Contest
	Nov.	**27-28**	**CQ WW DX C.W. Contest**

*Covered last month.
†Not official.

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Awards: Certificates to the top scorers in each category, in each ARRL section, ITU zone, and DX country. Achievement awards are available for making 250 and 1000 QSOs and/or contacting 50 or more zones. In case of multiple award levels achieved, only the highest award will be issued.

U.S. and Canadian entries are requested to use official log and summary sheets which may be obtained from the ARRL. Also request forms CD-77, CD-175, and the ITU zone list. A large s.a.s.e. with at least 37¢ postage will get you a good supply.

All entries worldwide go to: IARU Headquarters, Box AAA, Newington, CT 06111 U.S.A. Mailing deadline is August 30th.

Fiesta Mayor Torredembarra

Starts: 0000Z Monday, July 12
Ends: 2400Z Sunday, July 18

Rules as received were rather hazy. Following is a condensed, edited version.

Special QSL cards, awards, and trophies are being awarded for participation in this week-long celebration of the "Fiesta of Torredembarra."

Exchange: RS(T) and QSO no., starting with 001.

Scoring: Contacts with stations in Torredembarra 1 point, rest of the province of Cataluna 2 points, other Spanish stations 3 points, rest of Europe 4 points, rest of world 5 points.

C.w. contacts have double point value. Add 2 additional points if you work any of the 3 special calls for the occasion: ED3FMT, EE3FMT, EF3FMT.

Contacts can be made with the same station on different bands and again on different days.

Awards: Acknowledge Torredembarra contacts with a QSL card and you will receive a special QSL card in return. Stations making 50 or more points will receive the "Semana Fiesta" award. There are 3 trophies for top scores in three categories: the World, Spain, and s.w.l.

Scoring for s.w.l.'s is same as indicated above. The reports should indicate the time and date in GMT, frequency, and calls of both stations in QSO.

Mailing deadline for all entries is July 31st and go to: "Fiesta Mayor Torredembarra," P.O. Box 47, Torredembarra, Tarragona, Spain.

A5 World Wide SSTV Contest

Starts: 0000Z Saturday, July 17
Ends: 2400Z Sunday, July 18

This is the second time around for this SSTV Contest sponsored by *A5 Amateur Television Magazine.*

The rules, scoring, etc., look very complicated to me, but what do I know about SSTV? Mike Stone, WB0QCD, assured me that you SSTVers will have no problems. (If you do have problems, have Mike explain it to you.)

All exchanges, of course, must be in "video" form.

Each 2-way contact in same country is worth 5 points, and 10 points if it's with DX out of country. In addition, there is a graduated scale of bonus points as follows:

Mugshots 1 point, Slow-speed 2 points, Quad-frame 3 points, Motion SSTV 4 points, High resolution 5 points, and Color 10 points. Contacts on 6, 10, and 15 meters, double the above value, and times 3 if on 40 or 80 meters.

There is an additional bonus of 25, 50, and 100 points if you work 25, 50, and over 100 DX stations.

The same station may be worked on each band for point credit, but cross-band contacts are not allowed.

Following are suggested frequencies of operation: 3845 and 3990, 7220 and 7290, 14230 and 14340, 21340 and 21440, 28680 and 50150.

All entries will be awarded Gold Certificates. The three top scores will receive 3 and 1 year subscriptions to *A5 ATV Magazine.*

Log forms, etc., are available by sending a large s.a.s.e. to address below, and while you're at it, have Mike send you detailed rules.

Mailing deadline for entries is August 1st to: Contest Manager, *A5 ATV Magazine,* P.O. Box H, Lowden, Iowa 52255-0408.

International QRP C.W. Contest

Starts: 1500Z Saturday, July 17
Ends: 1500Z Sunday, July 18

This is the first international QRP contest under the sponsorship of the World QRP Federation. The WQF is an organization of QRP Clubs from around the world, including the DL-AGCW and the U.S.-based QRP ARCI.

Classes: Single operator and multi-operator.

A—Fixed station to 2 watts input.
B—Fixed station to 10 watts input.
C—Portable station to 2 watts input.
D—Portable station to 10 watts input.
E—QRO stations over 10 watts input.

Multi-op stations are permitted to operate the full 24 hours. Single operator entries must be off the air at least one 8 hour period.

Exchange: RST, QSO no., and class (559001/2D). Add X after RST if crystal control.

Points: One point if QRP to QRO contacts, 2 points if QRP to QRP. A station may be worked on each band for QSO and multiplier credit.

Multiplier: One point between stations in same country, 2 points if another country but same continent, 3 points if another continent. All call areas within a country are counted as multipliers (10 for W, 8 for VE, etc.).

Bonus: QSO points and multipliers are doubled for crystal-controlled stations with a maximum of 3 crystals per band. Contacts with crystal-controlled stations count double points.

Final Score: Total QSO points from each band times multiplier points from each band. Add total score on each band for final score.

Frequencies: 1810, 3560, 14060, 21060, and 28060 kHz.

Awards: DL-AGCW will provide awards for fixed station winners and QRP ARCI for portable winners on a world-wide and country basis.

Fixed stations send their logs to Siegfried Hari, DK9FN, Spessertstr. 80, D-6453 Seligenstadt, West Germany.

Portable stations send logs to William W. Dickerson, WA2JOC, 352 Crampton Drive, Monroe, Mich. 48161.

Submit within 6 weeks of conclusion of the contest.

SEANET DX Contest

C.W.: July 17–18 S.S.B.: Aug. 14–15
0001 GMT Sat. to 2359 GMT Sun.

The aim of this contest is to publicize the hosting of the 11th SEANET Convention in November. (The NET meets daily at 1200Z on 14320 MHz.)

The same station may be worked only once per band. Cross-band or cross-mode contacts are not allowed, and multi-stations are limited to one signal at the same time.

Classes: Single operator, single and all band, multi-operator, all band.

Exchange: RS(T) plus a 3 figure QSO number starting with 001.

Scoring: For stations outside the SEANET area.

(a) Contacts with stations within the NET area with the following prefixes: DU, HS, YB, 9VI, 9M2, 9M6, 9M8. Twenty points if on 160; 10 points if on 80 or 40; and 4 points if on 20, 15, or 10 meters.

(b) Contacts with stations in other NET areas: 10 points on 160; 5 points on 80 and 40; and 2 points if on 20, 15, or 10 meters.

(c) Contacts between stations outside the NET area have no value.

(d) A multiplier of 3 points for each NET country worked.

Final Score: Total QSO points from all bands times the sum of the multiplier points.

Awards: Commemorative certificates to all qualified entries. Trophies to top scorers will be presented at the SEANET Convention in November.

The usual disqualification rules will be observed and strictly enforced.

All entries must be received by October 31st and go to "Eshee," 9M2FK, P.O. Box 13, Penang, Malaysia. Include one IRC for a copy of the results.

List of SEANET Area Prefixes: A4, A51, A6, A7, A9, AC3, AP, BV, BY, CR9, C21, DU,

EP, HL/HM, HS, H44, JA/JE/JF/JG/JH/JI/JR, JD1, JY, KA, KC6, KG6/KH2, KH6, KX6, P29, S2, S79, VK, VQ9, VS5, VS6, VS9K, VS9M/8Q6, VU2, VU (Andaman, Nicobar, and Laccadive Islands), XU, XV5, XW8, YB, YJ8, ZL, 3B6, 3B8, 3D2, 4S7, 4W1, 5Z4, 9K2, 9M2, 9M6, 9M8, 9N1, and 9V1.

Colombian Contest

Starts: 1800 UTC Saturday, July 17
Ends: 1800 UTC Sunday, July 18

This year's contest will commemorate the 172nd anniversary of Colombia's independence.

Exchange will be on a world-wide basis, all bands 1.8 through 28 MHz, both phone and c.w.

There are four classifications: Single operator, single and all band, and multi-operator both single transmitter and multi-transmitter.

Exchange: Non-HK's—RS(T) plus a 3 figure QSO number starting with 001.

HK's—RS(T) plus number 172 (indicating the years of independence).

Scoring: Non-HK's—QSO with HK stations, 10 points. With other DX stations, 3 points. With stations in the same country, 1 point.

HK's—QSO with DX stations, 5 points. With other HK's 1 point.

Multiplier: Number of DXCC countries worked on each band.

Final Score: Sum of QSO points from all bands multiplied by the sum of different countries worked on each band.

Awards: A silver cup to the overall world winner, and 8 silver plaques for 1st and 2nd place in each of the four classes mentioned above. No mention was made of any certificates, but it is assumed that they will be issued for each country.

A minimum of 100 QSO's must be shown when applying for an award. Only one contact per band with the same station, and no cross band or cross mode.

Use a separate log sheet for each band, indicate the country only the first time it is worked, and include a summary sheet showing the scoring, etc. The usual disqualification rules will be enforced.

Mailing deadline is August 30th to: L.C.R.A., Contest Manager, Apartado 584, Bogota, Colombia.

County Hunters C.W. Contest

Starts: 0000Z Saturday, July 24
Ends: 0200Z Monday, July 26

The County Hunters invite and encourage mobile and portable operation from the less active counties during this contest.

The same station may be worked on each band for QSO points. Portables and mobiles changing counties may also have repeat contacts. Stations on county lines exchange only one number, but each county is counted as a multiplier.

Exchange: QSO no., category (P—portable or M—mobile) RST, state, province or country, and county for U.S. stations.

Scoring: QSOs with a fixed station 1 point, 3 points if it's a portable or mobile. Multiply total QSO points by number of U.S. counties worked. Mobiles and portables calculate their scores for contacts made within a state.

Frequencies: 3575, 7055, 14070, 21070, 28070. It is requested that P or M stations use frequencies below 7055 and 14070; others spread out above.

Awards: Certificates in three divisions.

F—Top fixed or fixed portable in each state, province, or county with 1000 or more points.

P—Top score in each state by a portable operating from a county other than its normal location with 1000 or more points.

M—Top scoring mobile in each state operating from 3 or more counties, with a minimum of 10 QSOs in at least 3 counties.

There are also trophies for the single operator Portable and Mobile in the U.S. Additional awards will be made where deemed appropriate.

Stations with 100 or more contacts must include a check sheet of counties worked. Enclose a large s.a.s.e. if results are desired.

Mailing deadline is Sept. 1st to: C.W. County Hunters Net, c/o Jeffrey P. Bechner, W9MSE, 673 Bruce Street, Fond du Lac, Wisc. 54935.

a monthly feature by

HUGH CASSIDY, WA6AUD

DX

NEWS OF COMMUNICATIONS AROUND THE WORLD

Tomorrow, Oh 'twill never be
If we should live a thousand years!
Our DXing is all today, today . . . .

To grow in years is to realize that there are many unanswered questions, most of them packaged in the newer QRP types. Last week one of these was up the hill to try some questions on us.

"Tell me something about this 'long path' I hear them talking about on the bands," this one said. "How does it work and when do you know you are getting through?"

This was not the first time such a question had come up. Years ago we were asking the same questions and were told that the long path is simply the reciprocal of the short path. When we later worked Don Miller on Heard Island with the beam at 310°, we began to wonder.

Being questioning types ourselves, we saved the question until we could talk to one of the local educated types. This was one with a handful of advanced degrees, who had been head of research at a major refinery and was at one time a colleague of Dr. Ernest Lawrence at a nearby university. He was also a mathematician to boot and held a WB6 callsign.

We told how we had worked Heard Island on what to us was an unusual path, and asked just how that had occurred. There was a short moment of thought, and we were then advised that this was possible, that the long path was not necessarily a reciprocal of the short path and that he would work it all out mathematically for us in just a moment.

We held up our hands at that proposal. "We're only DXers," we explained, "and while we are sure that you could prove it with your mathematics, we probably wouldn't understand the explanation." Perhaps it was back then that we began to think that if you have to ask the questions, you probably won't understand the answers.

"You have to understand that most of the projections for a great circle are usually based on the assumption that you are on the surface of a sphere," our local advised us. "Your radio paths are not on the surface of a sphere, but rather are inside

77 Coleman Dr., San Rafael, CA 94901

FK8s hard to find? Here they are in bunches. This group was operating during the New Caledonia Field Day last year. FK1 is the Novice version of a call if you were wondering. Bourail was the FD site. (Photo via KA3A)

the various layers and energy fields above us and around the earth. These are not necessarily spherical, but possibly are more a doughnut shape, like the Van Allen belt, for example. So your signals are not bounding off the surface of a sphere, but can be reflected off at various internal angles due to the shape of the fields. Thus, the long path for a signal may not follow the reciprocal of the short path."

We passed along some of our accumulated knowledge to the QRPer, this one nodding his head in agreement. "It sounds right," he said, "but that beam heading you had when you worked Heard Island. How do you explain that being so far off?"

We had to work a knuckle into a teary eye at that question. For though the years have been many and long, the memory of our first Heard contact is still fresh. And though there were photos of the abandoned cable station, photos of ice-covered Big Ben and a lot of other little pieces of documentation, there had been none with Don in the foreground. "Incredible!" we thought at the time. "Unacceptable!" had been the decision at the ARRL DXCC desk. There apparently were more strange things than just the path.

We were thinking at this time that perhaps we had answered a day's quota of questions, but we had not. "All that sounds right," our local QRPer advised us in kindly judgment, "but how about the short path and the odd things you sometimes encounter there. I remember times when I had conditions where the path to East Africa or the Indian Ocean was open and the signals coming in were good. But I still have a heck of a time getting through. With a clear shot across the bay, nothing but water in front of me, and the mountains twenty miles downwind, I should bang through. But I don't. Why?"

We hesitated to field this one, for as most DXers eventually learn, there are things that you know to be true but you cannot prove, such as the W6s knowing that the W1s and W2s are able to work anything at anytime and always get the best crack at DX. But the W1s and W2s believe it is the W6s who work everything and with louder signals and bigger antennas. Many think that all of this is solid fact, more so depending on where your QTH might be. But those who have studied the matter know that it is really the W5s who work everything easily and casually, while all the other call areas have to struggle. But right now we had this question before us, and though we thought we knew the answer, we hoped that he would not ask us to prove it. But we had to try.

"Your short path usually is more of a true great circle path, but not always," we started off, "and the closer it is to an equatorial east-west path the more it is as expected. But what were you trying to work?"

The QRPer was right in there with the typical shoulder shrug. "It was some months ago, but I was trying to work an FB8 on Amsterdam Island. His signal was good, others were working him, and I put the beam right on him but never did get through. Band conditions were superb. I should have worked him but I never did. Why?"

The easy answer would be that the station called never heard him, but QRPers are never satisfied with answers like that. "Let's look at the great circle paths," we started in. "You know what the forward lobe of your signal should look like, don't you? And if you draw a great circle on the side lines of your lobe, you will get two lines which diverge from your QTH, both of these circles going all the way around the earth, their plane passing through the center of the earth. Right?"

The QRPer nodded his head at that so we plunged ahead. "And if they diverge going from your QTH, what happens after they pass the halfway point?" We were wondering if the QRPer would come up with an answer to that one. Suddenly there was a light that was beautiful to behold, radiant in its intensity, and noble in its realization. "Why they'd start coming back together, wouldn't they?" he said, and we had to nod our heads in agree-

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20m436 4 el 20 meter beam	108lb.	12.0
This is a custom antenna		
20m536, 5 el 20 meter beam	113lb.	13.5
20m546, 5 el 20 meter beam	n/a	n/a
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20m646, 6 el 20 meter beam	176lb.	17.0
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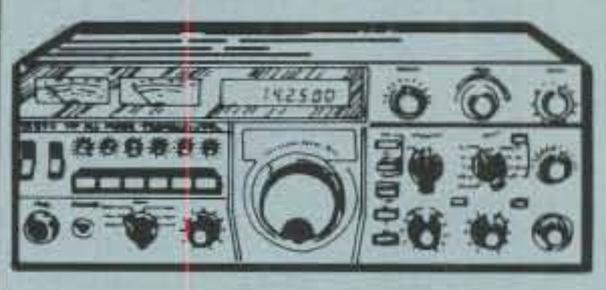

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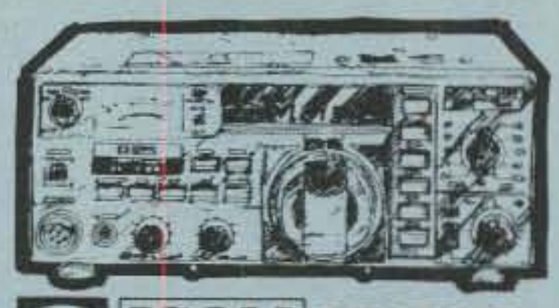

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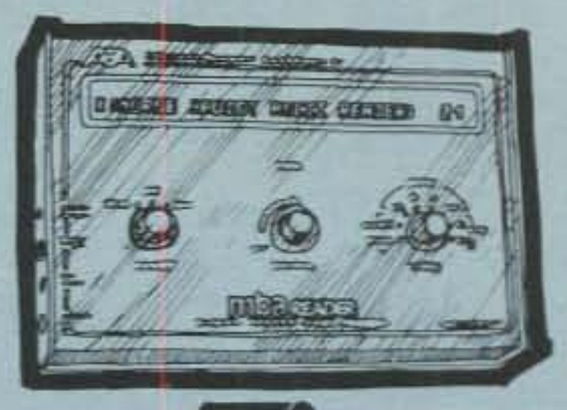

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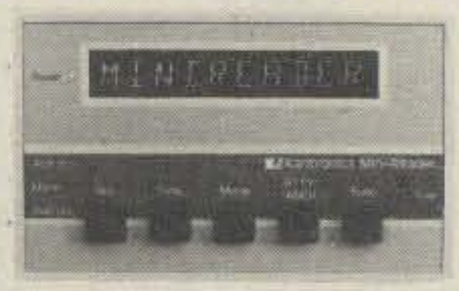

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ment, mostly because that was what we had long thought ourselves.

"And halfway around the world, or about 12,000 miles from your QTH?" we asked, leaving the thought uncompleted and open, but not for long. The QRPer jumped into the breach.

"Why? Wouldn't they be coming back together, and instead of my signal expanding, wouldn't it be contracting?"

We had come this far and were ready to quit right there. We expected that perhaps next he would want us to prove it. We were not wrong nor long in waiting. "But can you prove it?" came the question, and we were the ones who shrugged our shoulders.

"No, we cannot," we said. "But at other times when we were trying to work a station halfway around the globe and were not getting through when we thought we should have, we would try moving the beam in small increments—maybe a click or two in one direction, then a click or so in the other direction if we did not catch the station, working the signal first one way and then the other until we got through, often finding that somewhere along the way the station would hear our signal. We can't prove the idea, but it did seem to work. And if it works, maybe it's right."

Certainly at this point we should have felt we were home free, but our QRPer was not out of questions. "Tell me," this one pursued, "how does one learn all the angles to DXing? There sure seem to be a lot of them."

We had to smile at this one, for we had a ready answer that covers a lot of DX situations. "Just listen," we said, "just listen. Smart DXers always do!"

VP2K

Pat Connell, N0BNY, will be there July 11th to 18th and plans to work a lot of c.w. on all bands with some s.s.b. on 10 and 160, and maybe a bit of RTTY to boot. Pat will be in the St. Kitts area on honeymoon. QSLs go to 2770 South 13th Street, Omaha, Nebraska 68108. This is also the true-blue route for N0BNY, the CBA in error.

Svalbard

Andrzej Zielinski, JW0P, has been heard from Svalbard, being part of a Polish arctic expedition. The JW0P call was issued by the Norwegian government to commemorate 50 years of Polish polar research. Andy's home call is SP2BHZ.

The accompanying photos show him at the operating position at JW0P and the buildings on the base there. Located 77° north, the climate is harsh, and the scenery is all snow and ice and mountains, definitely arctic in nature and bleak. So far they have only been able to keep wire antennas up. Polar bears are common and avalanches frequently thunder on the surrounding mountains. North of the Arctic Circle, Svalbard has a long period in winter when the sun does not rise above the southern horizon. Many who have spent periods in the Arctic and sub-Arctic regions say that often this is a period difficult to endure.

There is a crew of twelve and the family dog, Bonzo, located at JW0P. Andy previously spent time at HF0POL in the South Sandwich Group, located on King Georges Island. In January of this year the cruise vessel World Discoverer managed to get through the ice to near the HF0POL site and was visited by the crew. They were expecting to be rotated shortly, but were low on some personal supplies, getting cigarettes, vodka, wine, beer, and chocolate bars from the ship's stores.

JW0P QSLs from December 1, 1981 go to SM5DQC. S.a.s.e. or s.a.e. needed.

The WPX Program

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981	VE3BFK	984	AI9R
982	JG1IMM	985	PA0LIE

S.S.B.

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1485	IS0USU	1491	WN5MBS
1486	WB3HTK	1492	N2AIF
1487	JF3KNQ	1493	JA3BBG
1488	AF3R	1494	AG9S

C. W.

2139	WB8ZRL	2143	NI4Y
2140	OZ5EDR	2144	LA5BS
2141	WB4FKM	2145	AI9R
2142	WD9GSU		

WPNX

206	WD4CNZ	207	KA8IPG

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Mixed:	450 VE2FOU, VE3BFK, AI9R. 500 VE2FOU, VE3BFK, AI9R, VE5AE. 550 VE2FOU, DK9MC, AI9R. 600 VE2FOU, I5HOR, DK9MC. 650 AC6V, DK9MC. 700 DK9MC. 750 DK9MC. 800 DJ5VQ. 850 WB8ZRL, OK3IF, DJ5VQ. 900 W1BWS, DJ5VQ. 950 DJ5VQ. 1000 I2DMK, VE7IG. 1350 W9FD. 1400 W9FD. 2000 W2NC.
S.S.B.:	350 OE8MOK, IS0USU, I2TZK, WB3HTK, WA8KMK, KB2DE, WN5MBS, AI9R, AG9S. 400 OE8MOK, IS0USU, I2TZK, KK5P, WD5ABG, KB2DE, WN5MBS, AI9R, AG9S, KC9DS, I8HZT, KB2DE, WN5MBS, AG9S. 550 OE8MOK, IS0USU, KB2DE, DJ5VQ, AG9S. 600 OE8MOK, IS0USU, KB2DE, JH5GQO, DJ5VQ, AG9S. 650 I5JHW, OE8MOK, KB2DE, IS0USU, I2DMK, JE2HCJ, DJ5VQ, AG9S. 700 IS0USU, I8LEL, I2DMK, K8LJG, I8IGS, XE1XF, AG9S. 750 WB8ZRL, IS0USU, I8LEL. 800 IS0USU, I8LEL. 850 I2JSB. 900 I2JSB. 950 I2JSB. 1000 I2JSB, WA4OIB. 1100 W2CC, F6DZU. 1150 F6DZU. 1200 F6DZU.
C.W.:	350 WD4NMD, AI9R. 400 WA2CNF, WD4NMD, KA8EBG, AI9R. 550 VE2FOU, AG0A. 600 AK9Z. 700 N6UH. 750 N6UH, KL7AF. 800 N6UH, I2DMK. 1250 W9FD. 1300 W9FD. 1400 N2AC. 1600 WA2HZR.
10 meters:	IS0USU, OK3IF, KB2DE, N4IB, AG9S, DJ5VQ.
15 meters:	K9TI, DJ5VQ, IS0USU, KB2DE, N4IB.
20 meters:	K9TI, DJ5VQ, VE2FOU, IS0USU, W0ULU, AG9S, I8IGS.
40 meters:	K9BG, DJ5VQ, VE2FOU.
80 meters:	K9BG, DJ5VQ, AG9S.
160 meters:	KC4OV, W5UR.
Asia:	JE2HCJ, AG9S, IS0USU, K9BG, PA0LUS, I8IGS.
Africa:	K9BG, DJ5VQ.
Europe:	I8IGS, W0ULU, JE2HCJ, VE5AE, AG9S, VE3BFK, K9BG, WD4NMD, LA5BS, KB2DE, OZ5EDR, IS0USU, IT9VDQ.
No. America:	AG9S, KB2DE, JE2HCJ, DK9MC, VE5AE, OE8MOK, IS0USU, K9BG, WD4NMD.
So. America:	K9BG.
Oceania:	K9BG, JE2HCJ, DJ5VQ.

Current Plaque Holders: K6JG, N4MM, W4CRW, K5UR, K6XP, K2VV, VE3GCO, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON1QX, YU2DX, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, I0JX, WA1JMP, K0JN, K4IEX, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ.

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 WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

Oman

ROARS is the Royal Omani Amateur Radio Society, D.A. Jelly, A4XIJ, being the editor of the club newsletter and secretary of the society. Some may think A4s a bit on the rare side, but A4XGY is reported as having over 12K QSOs in the last five or six years. One that he remembers is an 80 meter long-path contact with AA6AA.

Licensing in Oman is handled by a ROARS licensing committee which also handles matters involving customs or regulatory discussions with the authorities. Class A license in home country or compliance with local licensing rules is required for an A4 license. S.w.l.'s are given a copy of the regulations, a log book, and a Morse code tape when they are accepted into the organization.

There is an 'A4 Ragchew Net' on the books, which is supposed to meet daily on 14315 MHz at 1230Z. It is not a sure thing, but it may be a place to watch for the wary A4 stations. While we are in this Indian Ocean quadrant, you might also listen for VU Net, 14105 kHz daily at 1530Z; Africa/Asia Round Table, 14165 kHz daily at 1700Z; Arabian Knights Net, 14250 kHz Friday at 0500Z; and SEA Net, 14320 kHz daily at 1200Z.

Trinidad/Tobago

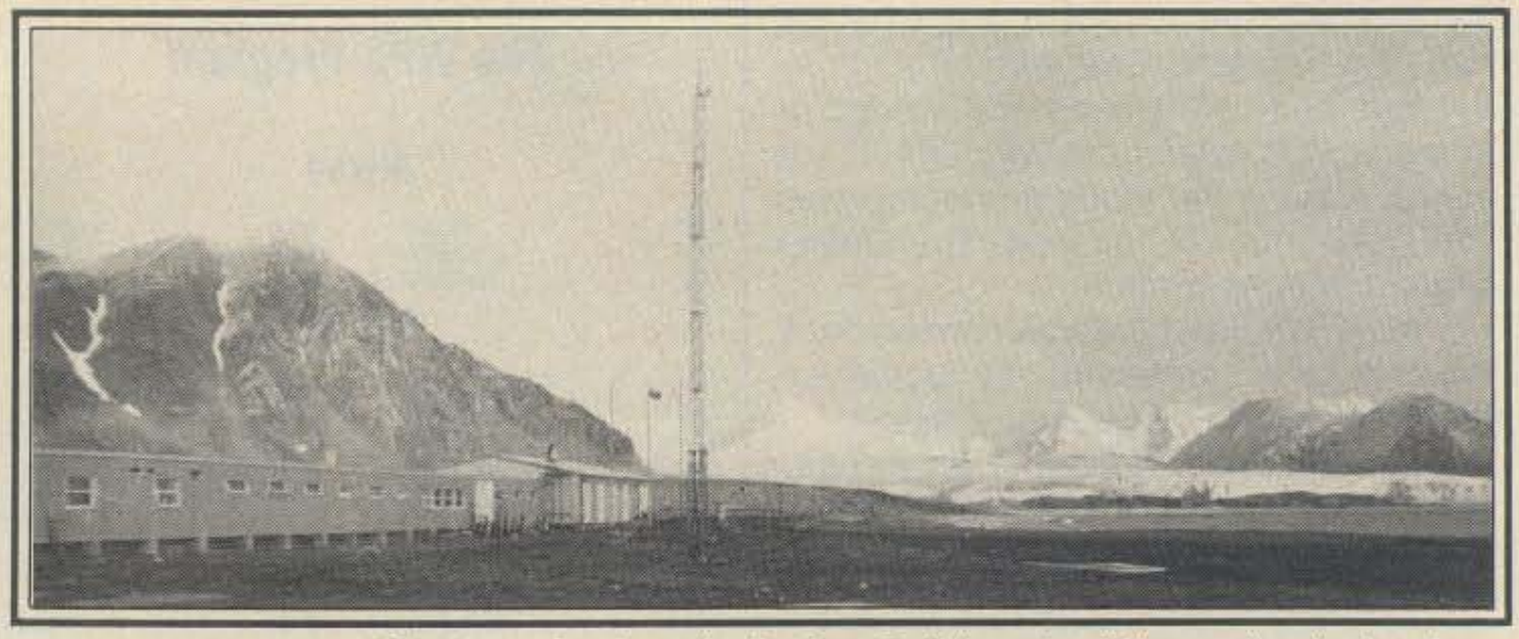
The Trinidad and Tobago Radio Society is operating 9Y5O to commemorate 50 years of amateur radio in the islands. Actually, this is the prefix. You may hear stations signing 9Y5ONP, and possibly even 9Y50. This special prefix will be used until the end of 1982.

While we are on this side of the street, the strange, exotic, and sometimes confusing callsigns that suddenly pop up can vex and frustrate the Deserving DXer, one often being caught in the dilemma of suspecting that the unusual prefix may cover something good, but perhaps not as good as hoped.

Go to the ITU allocations in the back of the *ARRL Handbook* and you can often nail down a strange prefix. Another good reference is *CQ*'s wall chart "Amateur Radio Countries of the World," which is 23" × 35" and is available from *CQ* for $2.95. The chart is a ready reference for a lot of needed information. Along the way you might even learn, as a lot of other DXers have already learned, that it is not necessarily what you know, but knowing where to find the answer that puts you out in front. Or maybe reading a book while others are working the DX . . . .

Southern California DX Club

The host club this year for the big International DX Convention at Visalia in April,



Downtown Hornsundfiord on Svalbard with the Polish scientific station in the foreground. Within 13° of the North Pole, the base is the location of JWØP. (Photo via K1CC)

Andrzej Zielinski at the operating position of JWØP on Svalbard. His home call is SP2BHZ, and Andy has previously been an operator at HFØPOL in the Antarctic. There are twelve in the crew at this 77°N scientific base. Prowling polar bears are often a problem. The JWØP is a special call issued by Norway to mark the 50th anniversary of Polish arctic research. (Photo via K1CC)

the Southern California group, also has some new officers: President, Jim Stevenson, KM6B; Vice-President, Neil Kaltman, K6SMF; Secretary, Joe Locascio, K5KT; and Treasurer, Don Moses, W6UY. The call of the Secretary is absolutely right. This may explain why the Five-landers are reputed to be working everything. They are always close to where the big action is.

Pacific DXpedition

George Adkins, AD1S, and N5DLM, with some past efforts under their belts, are looking for action next month starting August 4th and including four different operations in the western Pacific.

The plan is to open from KC6, Federated States of Micronesia, on August 4th and operate to the 8th on all bands, 10 through 80 meters, c.w. and s.s.b. On the 8th of August they will move on to KC6, Republic of Belau, and operate from Koror on Palau Island. They will operate in this former Western Caroline group until the 11th, when they move to Saipan in the Marianas signing KHØ. In Saipan until August 14th, they will make their last stop at Majuro in the Marshall Islands. QSLs will go to George W. Adkins, AD1S, Box 32735, Oklahoma City, Okla. 73123.

Ski Brozowsky, N6ADI, reports that although it took six months to clean up the demand, all QSLing for VR1BE or VR1BE/KH1 has been kept current, and should you be tardy in applying for either, you might get moving, as the logs will be disposed of at the end of this year.

VR1BE was Ed Bennett, who was working for Global Marine on Canton Island. He operated under his British license until July 79. He also operated VR1BE/KH1 from the same locale, but not having a U.S. reciprocal license, the value of these for DXCC is doubtful. Ski advises that if you intend to get a VR1BE QSL, go direct; he will not wait for the bureaus.

The Colvins

The long trip bringing a lot of DXing out of the Caribbean had the Colvins in the Netherland Antilles in April signing W6QL/PJ2. During recent months Lloyd and Iris operated 8P6QL, 9Y4KG, W6QL/8R1, W6KG/PZ1, FYØFOL, and W6QL/PJ2. During the multi-stop trip, they made over 56K QSOs.

The Colvins will return to the states after the PJ2 stop. You probably can catch them at some of the major amateur events during the summer months. QSLs for all their efforts go as always to YASME, Box 2025, Castro Valley, Calif. 94546.

A Number of Errant Notes

The Irish Radio Transmitters Society is celebrating its 50th anniversary this year. Maybe we have said it before, but we will mention again that any DXer can hardly celebrate any occasion without a bit of Jameson's Irish Whiskey. And if you have to know why, just keep in mind that Guglielmo Marconi's mother was a Jameson, a member of the family who still continues to make things more tolerable for DXers.

Should you still be looking for a QSL for 5W1BZ, who was active on 6 to 160 from June 1978 to November 1980, go to P.B. Lake, 12 Brasenose Place, Gawa, Wellington, New Zealand. This is ZL1AIZ, and he would like you to send s.a.e. or s.a.s.e. It might also help to note that ZL1AIZ was 5W1BZ, and the above is his certified ad-

The WAZ Program

10 Meter Phone

190	K3VCZ	193	KA3ANG
191	JR3RVO	194	W8CAE
192	JL1EEI		

15 Meter Phone

124 ..... JE1MGE

20 Meter Phone

399	YB7AAU	402	W6TFO
400	WB6ICJ	403	KB8DB
401	W9FNN		

80 Meter Phone

17 ..... N2KK

10 Meter C.W.

34 ..... N4WJ

15 Meter C.W.

65	LA4XX	66	VE7APE

20 Meter C.W.

163 ..... K5KV

All Band WAZ

S.S.B.

2409	VE3MRS	2419	AJ1L
2410	K6CID	2420	WA0LMK
2411	N7AIF	2421	GI3YDH
2412	N6BAK	2422	DL4EP
2413	VE3FEA	2423	DK4AP
2414	VS6CT	2424	DF1EG
2415	CX3AN	2425	W6KON
2416	N4BVP	2426	DJ5RP
2417	W1DYH	2427	HK3TF
2418	K5MLG	2428	9H4M

C.W. and Phone

5337	KC5CZ	5343	TU2DF
5338	KA1K	5344	K9ZZ
5339	AA4KT	5345	K2LS
5340	N4LA	5346	DJ6OY
5341	WB9ZBG	5347	VE2DPJ
5342	K2MRB	5348	GI4DQO

Applications and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (37 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. 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 C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

dress, although other places may show something different. Most of Peter's operation was c.w., and although he has tried to clean up all the demands, there still may be someone looking to clutch a 5W1 QSL in his eager hand.

Monaco has a new address for its radio society, ARM, and it is 24 avenue Prince Pierre, M C, Monaco, Principaute. This is the short route for your 3A2 QSL. It might also help to note that the updated rules for the Monaco Award call for contacts with three true-blue 3A2 amateurs, and DXpeditions do not count. Contacts after January 1, 1980 are counters, and you can get the full information by writing to 3A2LF, the secretary of ARM, at the address given above.

Although the cycle is slipping, some are still trying to get the most out of it, and a new 6 meter net has been formed. This is called the 6 Meter National Side-banders Net, and it meets at 50.125 MHz from 0100Z to about 0330Z. Anyone wanting to test the band and to join in is welcome.

Franz Langner, DJ9ZB, VK2BJL, and Fernando, EA8AK, plus possibly others,

Lloyd and Iris Colvin at the W6KG/PZ1 operating spot last March. In the background is Poly, PZ1AP, and his son Raymond. The Colvins returned to California in early spring after six months of operating and 50K QSOs at 8P6/9Y4/8R1/PZ1/FY0 and PJ2. Before long you'll probably hear them out again in another DX spot. (YASME photo)

were aiming for Mellish Reef back in May. If you heard VK9ZR you will know that everything went as planned.

Mellish Reef is just over 600 miles off the Australian east coast, about 500 feet long and 150 feet wide, and 6 or 7 feet above high water, give or take a bit. The local inhabitants are mostly birds, with a few turtles, crabs, and the like. The first effort from Mellish some years back brought what seemed to be an unending dispute when the crew involved had some bitter words among themselves, resulting in the national society in those antipodean parts asking the ARRL not to give credit for the operation until there was further advice and consultation.

So many DXers sat around with their VK9JW QSL card in hand and waited. Nothing came. Then some inquiries brought the information that the one who had originated the letter to the ARRL could not be located. No one knew much about the case, and no one at all wanted to take any action in the matter. Meanwhile, John Martin, VK3JW, who had organized the effort, was dancing from one foot to the other in frustration, while queries from the ARRL brought little information. After following up a number of blind leads, the ARRL finally decided to go ahead and give DXCC credit. The big hangup all along was the letter on hand from a member of the IARU, but there was no follow-up or even anyone who wanted to touch the matter. DXing is always not a sea of serenity.

Bob Meurer, KH6IMX, who operated from Midway last December and into January, says that the QSLing is rather well cleaned up, and this includes both this year-end trip and the previous one back in July. Bob says that he again will be out to Midway and is also looking at a possible Kure side trip.

Midway is independent of the Hawaiian Islands, and that is the basis for DXCC status. Kure is just beyond Midway, and although it is not very distant, the independent status of Midway and Kure being considered part of Hawaii also makes Kure a DXCC counter. Should you not understand this the first time by, don't worry excessively. All these will be understood in time, and more so when you have them confirmed for DXCC. It is very easily understood then.

Anyhow, KH6IMX QSLs go to Bob Meurer, 86-334 Kauaopuu St., Waianae, Hawaii 96792. Bob said that about 17% of the incoming QSLs have errors, confusion on the date/GMT being the main problem, and many apparently reaching 0001Z but not changing the date.

KH6MD has been working on an extensive compilation of DX information for the serious DXer. Early in the spring of this year he was still polishing it, but it does seem that it will be something that will condense a lot of DX information into a small area, including the relative rarity of the country named. Drop him a line if you want more information. By the time you digest all the information contained in his "DX Notes," you'll be a bit wiser.

Back in April we ran the information on VK2DPN, Philip Greentree, he being the first to ever attain WAZ Mobile. Phil has moved onwards and upwards, shouting 'Excelsior!' all the way and is now the first to gain WAZ 10 meters/Mobile. VK3NDY, the WAZ checkpoint in Australia, has verified the cards. All contacts were made under the DXCC rules of the Wireless Institute of Australia, these being in many areas more strict than the ARRL DXCC rules. In this instance he had to operate within 150 miles of his home QTH. Leo Haijsman, W4KA, who handles the WAZ work, had to voice his startled praise for the effort of VK3DPN in working WAZ. Leo voiced the belief that " . . . this guy must be on the bands day and night." Check the story on Philip Greentree in the April DX Column.

DK4SV, Endre Toth, notes that the 160 operators are not allowed to use much s.s.b. in West Germany, but all are good listeners in the 1800–2000 kHz area. Endre would like the top band operators to remember that in DL-land their 160 frequencies are 1815–1835 kHz and 1850–1890 kHz. Actually, 1832–1835 kHz is named for s.s.b., but what does one do with 3 kcs? Usually very little. Thus, more than one DL-station would appreciate your listening for their c.w. signal in the narrow bands allowed them. All of this came to us in basic German, but we think we got the thought. If you are looking for more 160 thoughts, send an s.a.s.e. with postage for two ounces to W1BB, and ask Stu for a copy of his top band bulletin.

I0RIZ has completed work on a 5 Band WAZ, this being Dr. Ing. Gianni Rizzi in downtown Rome. He has also been heard as ZL1RE and ZL1AGM. We'll have the full report on another difficult task completed before long.

Bob Mantell, K3BYV, wants to emphasize that for PZ5DX an s.a.s.e. must be sent to him direct, as cards sent via bureaus are a sometime thing with the chance of success rather slight. The PZ5DX operation ran from June 22nd to July 3rd back in 1981, and Bob would like to close the file on this one. If you have been long waiting for his QSL, go direct to the CBA in any callbook since 1979. Bob will be back in PZ-land this fall, again to operate PZ5DX. A check with the Surinam authorities indicates that his license there is still good, and if you heard any station signing PZ5DX since July 3, 1981, it probably is Slim.

If you don't know who Slim is, stick around, as most DXers will get acquainted with him sooner or later . . . and regretfully. A note came through recently from Fred Laun, currently signing K3ZO/HK3 in Bogota, who noted an advertisement in the local magazine for " . . . Servicio Electronico" by Joe Slim and Cia. Fred suspects that he has found where Slim hangs his hat when he is not engaged in his world travels. Sooner or later we felt some DXer would locate Slim's QTH.

Dieter Konrad, OE2DYL, in Salzburg, last year handled the QSLs for the Pacific operations of OE1ETA and OE2VEL in their 5W1/ZK2/T30/T2 multi-QSO efforts. After doing the paper work for a couple of years, Dieter suspects that often rare DX is found on nets or reasonable facsimiles of them. He has an updated "DX Nets Around the World," and for five IRCs he will send you a copy; only three IRCs are necessary if you are in Europe. Dieter says " . . . it is high living on ham radio if you are able to work a rare station or a new country!" Find out about high living on DX from Dieter Konrad, Bessarabierstr 39, A 5020, Salzburg, Austria.

If you need the list of his QSL Manager's action, the calls are VP2ARS, OE2VEL/HB0, OE2VEL/KH6, OE2VEL/KH8, OE2BVG/KH6, OE6BVG/KS6, A35EL, A35XX, 5W1DD, 5W1DO, C21NI, ZK2EL, ZK2TA, T30BF, T30BG, T2VEL, T2ETA, CR9EL. Keep in mind that C21NI is a club call and that action on this trip was only for four days. Try to make sure that you have the right effort.

IG9-Lampedusa Island was due a couple of weeks back, as I0YKN and I0OCD were planning to open on June 6th and operate 10 through 40 until the 20th. The operators were Nuccio and Christine Meoli. QSLs will be handled by I0SSW, who a year back also handled the cards for the Ponza Island-IB0 effort.

Jim Langdon, currently signing J3AE in Grenada, says he gets a bit warmer than the ambient temperature down that way when stations work him and then ask for his callsign. It gets a bit warmer when queries on his QTH are added. Jim feels that the prefix should narrow down his whereabouts. The final clincher is the one who breaks in to ask for QSL information, the feeling being that if you listen, he

Winner of the 29th 5B WAZ, Walter Geyrhalter, DL3RK, is known to many DXers for his long service with the DARC DX-MB *DX bulletin. A school teacher, Walter likes high-speed c.w. A long-time Awards Manager for DARC and CQ magazine checkpoint in Europe, the 5B WAZ was gained using only a ground plane and a Windom antenna.*

and other DX stations in pileups will give the information at intervals. "If only they'd listen!" Jim says. Seems that we've heard that elsewhere, and we think that it is a chance to quit on that up-beat note.

29th 5B WAZ Award

The premise has often been expounded that DXers are the top echelon in amateur radio. Years ago at an amateur convention we heard one speaker say, "DXers are the top of the heap . . . and they know it!" We never disagreed.

It is thus even more of a pleasure to note the winner of the 29th 5B WAZ Award, Walter Geyrhalter, DL3RK, of Kaufbeuren in West Germany. Long active in amateur radio activities, Walter has also been tied in with the publication of the German DX bulletin, *DX-MB,* this also being printed in an English version as *DX-News Letter.* All this is an activity of the German radio society DARC.

Walter was first licensed in 1949. He is a teacher and is married with a grown daughter and son. He likes high-speed c.w. and works mainly in that mode, although he does try s.s.b. at times. He was first on the air with a BC348 and a homemade transmitter. Things have improved over the years, and he now operates an FT277b and a TS530S. As others have also noted, 80 meter WAZ was the final hurdle for the 5B WAZ Award.

Walter has been the DARC Award Manager since 1965 for WAE, EUD, and EU-DX-D. For the last 20 years he has been one of *CQ* magazine's awards checkpoints.

His antennas are surprisingly modest for such success in working 5B WAZ. He has a ground plane for 10–80 meters plus a Windom for 10–160 meters. The only Yagi showing on the picture of his QTH is definitely a TV type.

We have known Walter since the mid-sixties through amateur radio DX publications. Thus, the pleasure gained from writing up another 5B WAZ award is immeasureably heightened by noting an old friend, a dedicated DXer, and a leader in his own country. We have long thought that DXers are the true internationalists. We think that instances such as this prove the point most emphatically.

5 Band WAZ

Standings as of April 1, 1982

All 200 zones worked:

1. ON4UN, John Devoldere (Belgium)
2. K4MQG, Gary Dixon (U.S.A.)
3. SM4CAN, Kent Svensson (Sweden)
4. AA6AA, Steve Orland (U.S.A.)
5. W8AH, Albert Hix (U.S.A.)
6. W6KUT, E. A. Andress (U.S.A.)
7. EA8AK, Fernando Fernande (Spain)
8. LA7JO, Stig Lindblom (Norway)
9. EA3SF, Fernando Blenert (Spain)
10. OH1XX, Hannu Nieminen (Finland)
11. EA8OZ, Julio Rosello (Spain)
12. W0SD, Edward Gray (U.S.A.)
13. K0ZZ, Gary Knutson (U.S.A.)
14. ON6OS, P. Michiels (Belgium)
15. OK3TCA, E. Melcer (Czech.)
16. K6SSS, Fred Capossela (U.S.A.)
17. ZL3GQ, Peter W. Watson (New Zealand)
18. OK3CGP, Stefan Melcer (Czech.)
19. SM0AJU, Leif Lundin (Sweden)
20. OZ3PZ, Preben Thomsen (Denmark)
21. I3MAU, Reno Mauri (Italy)
22. I2ZGC, Gianni Zillio (Italy)
23. 4Z4DX, Dov Gavish (Israel)
24. N4KE, Ron Blake (U.S.A.)
25. K5UR, Rick Roderick (U.S.A.)
26. K9AJ, Michael McGirr (U.S.A.)
27. SM3EVR, Tord E. Julander (Sweden)
28. LA5YJ, Bjorn Hugo Ark (Norway)
29. DL3RK, Walter Geyrhalter (W. Germany)
30. N4WJ, Frank McCormick (U.S.A.)
31. G3MCS, W.R. Hawthorne (England)
32. SM5AQD, Hakan "Hawk" Eriksson (Sweden)
33. W0MLY, George McKercher (U.S.A.)
34. I0RIZ, Gianni Rizzi (Italy)
35. ON5NT, Ghislain Penny (Belgium)

The top 11 contenders for 5 Band WAZ:

1. CT1FL, 198
2. DL6RX, 198
3. EA8QL, 197
4. K1MEN, 196
5. W8GT, 195
6. N4RR, 192
7. NE7IG, 192
8. LA9GV, 191
9. TG9NX, 191
10. N6DX, 191
11. F6DZU, 191

146 Stations have attained the 150 zone level

QSL Information

One should never give up on a needed QSL. Live in hope. Back in 1967 Larry Kleber, K9LKA, worked Ray Vasper, VS9HRV, on Kuria Maria. Along the way, however, the card was misplaced, only to be found in September 1981 when Larry was changing QTHs. Happy after the 14-year wait, he fired off the card for DXCC credit. Back it bounced. The contact had been on c.w., and the card was clearly endorsed for s.s.b.!

Crushed, desolate, and desperate, Larry sought ways to get a true-blue QSL and ran a brief in the *Long Island DX Bulletin.* It worked! W6DN saw the note, ad-

CQ DX Awards Program

S.S.B.

1112	IØRIZ	1116	WN5MBS
1113	NI4Y	1117	VE7AFY
1114	K4XO	1118	WB6GFJ
1115	VE3MRS	1119	FO8DF

C.W.

528	WB3KAM	532	W9OFV
529	DF4PA	533	VE4AEX
530	NI4Y	534	LA4XX
531	K4XO	535	W4YDL

S.S.B. Endorsements

310	IØAMU/318	275	KB8DB/276
310	VE3MR/317	275	IØRIZ/278
310	K4XO/311	250	AG9S/250
310	WØYDB/310	200	N8BJQ/247
300	VE3FJE/304	200	W9OFV/240
300	VE3MRS/302	200	FO8DF/201
300	4Z4DX/301	200	VE7AFY/200
300	I8LEL/301	150	NI4Y/167
300	W2CC/300	28 MHz	K4XO
275	AI5I/293	28 MHz	WN5MBS
275	W7FP/291	28 MHz	KB8DB
275	WB6GFJ/286	3.5/7 MHz	KB8DB
275	WD9IIX/285		

C.W. Endorsements

300	K4XO/306	3.5/7 MHz	K4XO
28 MHz	K4XO		

With the addition of SMOM, the total number of active countries is now 319. 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 s.a.s.e. 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.

vised that he had recently gotten a card, and suggested a card to Ray's current CBA G3VIY.

Son of a gun! Larry tried this, and after an impatient wait of several weeks, the true-blue Kuria Maria QSL card showed. If you are wondering about Kuria Maria, it was deleted on November 30, 1967. Work it now and it counts for Oman. But Larry believes that there may be others wondering how to get a Ray Vasper QSL for his many operations around the Arabian peninsula in years long gone. His current address is Ray Vasper, Vale Close House, 31 Oakland Road, Forest Town, Mansfield, Notts NG1S OEJ England. Apparently, the CBA also works, although it differs from the foregoing.

Skip Skaptason, VE4SK, notes that the postage rate in Canada is being raised, and for a letter from Canada to the U.S. the rate is 35¢ and not the 17¢ of yore. From Canada to overseas spots such as Europe the bite has gone to 60¢ from 35¢. Note all of this when you try to figure out what goes on an s.a.s.e.

W9LNQ has long sought and sought in vain the handle for a 4W1AA QSL back to 1963 when Bob worked the station. Now he'd like to see if it pays to advertise . . . again!

CO2OM to Box 4940, Habana 4, Cuba
EA8VV to POB 123, Las Palmas, Canary Islands
HP5FI to POB 153, Chitre, Panama
J73PD to POB 3, Roseau, Dominica
LA2EX/9L1 to POB 558, Freetown, Sierra Leone
LU4DTX to POB 400, Bahia Blanca, Argentina
TU2JD to 01BPV245, Abidjan 01, Ivory Coast
VP1MK to 2770 South 13th Street, Omaha, Nebraska 68108
WH0AAB to JO1CRA Hideharu Aimono, 2644 Tsuruda, Utsunomiya City, Tochigi, 320 Japan
C31XP to DJ7ID
CO7AM to EA1QF
CP6IM to WB1DQC
EA4AXW to K5BDX
CX4CC to DX3BBH
EA6BH to DL7FT
HK3A to HK3AFD
HK0EHM to WD9DZV
HP2XSG to WB2DCP
F0BLZ/FC to I4BFY
KN2M/J6L to KA2NIQ
TI2JIC to AG1K
V2AN to KA1JP
VO2CW to VE3ICR
VP2KBS to W2GHK
VP2MHT to W2HTW
VP2MMP to NØDH
WB0MKR/KH3 to KB2RV
ZD8JGN to W9CN
YJ8VU to DK5EX
3D2VU to DF7CC
3V8DX to G3SVK
4Z4KX to VE3IXE
4X6FY to KT2D
5N0KUY to JI1IMI
9Y5OVU to W3EVW

Planning a big DXpedition? Expecting a lot of incoming QSLs to be answered? VE2FOU has stepped up, ready to help shoulder the burden as a QSL Manager. Pierre is looking for stations in Asia, Africa, or the far Pacific. Write to Pierre A. Goudreau, 586 Quellet Blvd., Thetford Mines, Quebec G6G 4X3 Canada.

73, Cass, WA6AUD

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsements involving the issuance of a sticker is $1.00. The basic award fee is now $4 for *CQ* subscribers and $10.00 for non-subscribers. Please attach your latest *CQ* mailing label to qualify for the $4.00 rate.

C.W.

W6PT	319	N6AV	314	W4OEL	305	K1MEM	295	K9QVB	281
DL7AA	318	K6JG	312	W2GT	304	WA8DXA	294	N5DX	280
ON4QX	317	K9MM	312	DL3RK	303	JA1GTF	285	W4BV	280
W3GRS	317	K4CEB	311	K3FN	301	WØSR	285	OK1MP	279
W9DWQ	317	W4BQY	310	DJ7CX	300	WØIZ	285	WB4RUA	279
K6EC	315	N6CW	309	N6FX	298	SM3EVR	284	W1WLW	276
N4PN	315	K4XO	306	N4MM	298	JH1VRQ	281	I3OBO	276
W6ID	315	W1NG	305						

S.S.B.

K2FL	319	ZL3NS	315	N4KE	309	AI8S	297	N3RL	281
W6EUF	318	VE3GMT	314	N6AV	309	VE3GCO	297	VE3IUE	280
W4UG	318	SM6CWK	314	DL6KG	309	W6DN	297	WD0BNC	280
K6WR	318	I8YRK	314	W2SUA	309	W1LQQ	297	KB8O	280
W3GRS	318	F2MO	314	YV5DFI	308	K8CMO	296	I8KCI	280
W9DWQ	318	OZ3SK	314	VK4VC	308	I6PLN	295	XE1OX	280
IØAMU	318	K4MQG	314	WØSR	307	WA4LOF	295	KP4EQF	280
W3NKM	317	N4WF	314	XE1J	306	IØMBX	295	N2AQH	280
DL9OH	317	K9MM	314	XE1KS	305	WD8MGQ	293	K1VHS	280
K8DYZ	317	SM6CKS	313	LU1BAR/W3	305	AI5I	293	WD8MOV	279
W6REH	317	EA4LH	313	WA4WTG	305	W2FGY	293	WB4UBD	279
XE1AE	317	YV1KZ	313	W1NG	304	JA5PUL	292	WA2VEE	279
W4EEE	317	W4DPS	313	OK1MP	304	WB1DQC	292	K8HV	278
W2TP	317	OE2EGL	313	G4CHP	304	ZL1BIL	291	IØRIZ	278
W9JT	317	DK2BL	313	VE3FJE	304	W7FP	291	K3MWV	277
WA2EOQ	317	WØSD	313	WA4JTI	303	I3OBO	291	KC8JH	277
W9QLD	317	WØSFU	313	N2SS	302	XE1NI	289	WB3DNA	277
ZS6LW	317	W6YMV	312	K8PYD	302	YU2RTW	288	WA6TOO	276
I4ZSQ	317	I5WT	312	N5FG	302	K9UAA	288	K1WJ	276
F9RM	317	W3GG	312	VE3MRS	302	VE3IPR	287	WA4TLI	276
VE3MR	317	ZL1AGO	312	W6FET	301	W4BQY	286	XE1CI	276
I8KDB	317	N4MM	312	K9SM	301	WB3HAZ	286	KB8KW	276
TI2HP	316	YV5AIP	311	4Z4DX	301	WB6GFJ	286	KB5FU	276
VE3MJ	316	K5OVC	311	K9BWQ	301	AE5B	285	KB8DB	276
I8AA	316	VE7WJ	311	I8LEL	301	CT1UA	285	WØKU	276
W9KRU	316	K4XO	311	W2CC	300	WA4DAN	285	K9QVB	276
W3AZD	316	W6RKP	310	HP1JC	300	WD9IIX	285	W8ILC/QRPp	276
W3CWG	316	K6XP	310	9H4G	300	TG9EP	284	WA0TKJ	275
K6EC	316	W8ILC	310	K1UO	300	K9HQM	284	VE4AT	275
VE2WY	316	K9RF	310	DJ7CX	300	SM4CTT	284	KØGT	275
K6JG	316	I3LLD	310	K5DUT	300	I2MQP	283	K8VFV	275
DJ9ZB	316	K8LJG	310	JH1VRQ	300	W8IMZ	282	IØSSW	275
IØZV	315	W9SS	310	LA7JO	299	KKØC	282	W6MFC	275
K6YRA	315	OE3WWB	310	W7OM	298	KA8T	282	KB9KD	275
W4SSU	315	WØYDB	310	I8ACB	298	W8JXM	282	KB3OQ	275
K9LKA	315	N6AW	310	IV3YRN	298	I5BDE	282	I5EFO	275

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a monthly feature by

GEORGE JACOBS, W3ASK

Propagation

THE SCIENCE OF PREDICTING RADIO CONDITIONS

The Sunspot Index Data Center at the Royal Observatory of Belgium, the world's official keeper of sunspot records, released the *official* monthly mean sunspot numbers for 1981. They are shown in Table I.

Jan.	114.0	Jul.	143.8
Feb.	141.3	Aug.	158.7
Mar.	135.5	Sep.	167.3
Apr.	156.4	Oct.	162.4
May	127.5	Nov.	137.5
Jun.	90.9	Dec.	150.1

Table I– Official monthly mean sunspot numbers for 1981.

The highest daily sunspot count observed during 1981 was 263, reported for December 11th. The lowest level was 44, recorded on June 3rd.

Table 2 shows the progress of Sunspot Cycle 21, which began during June 1976. The values shown are 12-month running smoothed sunspot numbers, rounded to the nearest whole number. Solar cycles are based upon such smoothed numbers. The values take into account the official monthly mean numbers reported for 1981.

The Royal Observatory of Belgium reports a monthly mean sunspot number of 153.7 for March 1982. This results in a provisional smoothed sunspot number of 143, centered on September 1981, as the present sunspot cycle remains stalled at this level.

A smoothed sunspot number in the range of 125 is forecast for July 1982.

July Propagation

During years of low solar activity, July and the summer months marked the beginning of the summer doldrums for DX on most of the h.f. amateur bands. This should not be the case this summer. With the continuing high level of solar activity, exceptionally good DX conditions should be possible on many of the h.f. bands.

Both *15* and *20* meters are likely to share DX honors during July. Excellent worldwide openings are forecast for *15* meters throughout most of the daylight hours, and through the evening hours as well, often to as late as midnight. Openings should follow the sun, peaking towards Europe and the east during the late afternoon, towards the south during the early evening, and towards the South Pacific and the Far East a bit later in the evening. *Twenty* meters should remain open for DX to some area of the world or another for almost the entire 24-hour period. Optimum conditions are expected for an hour or two after sunrise, and again during the late afternoon, early evening, and through much of the hours of darkness. During the hours of darkness, *20* meters should be the best band for DX openings to most parts of the world.

Don't count out *10* meter DX this summer! Because of the continuing high level of solar activity, some exceptionally good DX openings should be possible to many areas of the world during the daylight hours and into the early evening as well. Conditions should peak towards Europe and the east during the late afternoon, towards South America an hour or two later, and towards the South Pacific and the Far East during the early evening hours. Openings towards southern and tropical areas are favored, but some more northerly openings may also be possible.

During the hours of darkness, in addition to *20* meters, look for some good DX openings to many areas of the world on *40* meters. However, seasonally high static levels will often make this band noisy. High static levels will likely also make DX propagation difficult on *80* meters, but some fairly good openings should be possible during July between sundown and sunrise. Don't expect much DX on *160* meters due to the high static level and increased solar absorption experienced during July. Some openings, however, may be possible to the Caribbean area and the northern tier countries of South America about an hour or two before sunrise. An occasional opening may also be possible towards the South Pacific from the West Coast of the USA just before dawn breaks.

A point to remember about peak conditions on *40*, *80*, and *160* meters: they tend to occur when it is just breaking daylight on the eastern end of a path.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for July 1982

	Expected Signal Quality (4)	(3)	(2)	(1)
Propagation Index				
Above Normal: 1, 8, 16, 21, 28	A	A	B	C
High Normal: 4-5, 7, 15, 20, 22, 24, 27, 31	A	B	C	C-D
Low Normal: 2-3, 6, 9, 12-14, 19, 23, 25-26, 29-30	A-B	B-C	C-D	D-E
Below Normal: 10-11, 17-18	B-C	C-D	D-E	E
Disturbed: None	C-E	D-E	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9 + 30 dB.**

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

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

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

E—No opening expected.

HOW TO USE THIS FORECAST

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

2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be excellent (A) on July 1st, good-to-fair (B-C) on the 2nd and 3rd, good (B) on the 4th and 5th, etc.

For updated information, subscribe to bi-weekly MAIL-A-PROP, David D. Meisel, Editor, 54 Westview Crescent, Geneseo, NY 14454.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1976						12	13	14	14	13	14	15
1977	17	18	20	22	24	26	29	33	39	46	52	57
1978	61	65	70	77	83	89	97	104	108	111	113	117
1979	124	131	137	141	147	153	155	155	156	158	162	165
1980	164	163	161	159	156	155	153	150	150	150	148	143
1981	140	142	143	143	143	142	140*	142*	143*			

**Provisional, subject to slight change.*

Table II– Progress of Sunspot Cycle 21.

11307 Clara St., Silver Spring, MD 20902

Check last month's column for a detailed band-by-band DX propagation forecast for July. This month's column contains Short-Skip Charts for July and August 1982, and charts centered on Hawaii and Alaska.

Short-Skip Openings

Sporadic-*E* propagation generally peaks during July and the summer months and this should result in a considerable increase in short-skip openings on almost all h.f. amateur bands, and on *6* and *2* meters as well.

Fairly regular short-skip openings can be expected on both the *10* and *15* meter bands during the hours of daylight over distances ranging between approximately 500 and 1300 miles. Frequent *F*-layer reflection, or double-hop sporadic-*E* openings, could extend the range out to approximately 2300 miles. Fairly frequency sporadic-*E* openings should be possible during the hours of darkness as well. Excellent short-skip openings are expected on the *20* meter band almost around the clock over distances ranging between approximately 250 and 2300 miles. Look for a peak in conditions during the late morning and again during the late afternoon and early evening hours.

Excellent daytime short-skip openings are forecast for *40* meters over distances ranging between approximately 100 and 600 miles. After sundown, the range should lengthen considerably, with excellent conditions for openings between 250 and 2300 miles. Good *80* meter short-ship openings should be possible during the daylight hours for distances up to about 300 miles. Openings should be possible out to the short-skip limit of 2300 miles during the hours of darkness. While no *160* meter ionospheric openings will be possible during the daylight hours of July, expect some openings on this band between sundown and sunrise for distances up to approximately 1300 miles, and at times somewhat beyond this range. Seasonally high static levels will at times make reception difficult on *40, 80,* and *160* meters.

V.H.F. Ionospheric Openings

Short-skip openings on both *6* and *2* meters, resulting from sporadic-*E* propagation, should reach a peak during July. Openings on 6 meters should fall within the 600–1300 mile range, but some may extend to as far as 2300 miles. During periods of intense sporadic-*E* ionization, the skip may also be considerably shorter than 600 miles. During many openings, signals may reach exceptionally strong levels. Be sure to check the *2* meter band during intense *6* meter openings. As a rule of thumb, when the skip on *6* meters is shorter than approximately *600* miles, there's a good chance that *2* meters will open over a similar path. *Two* meter

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distances column of a particular Meter band (10 through 160 Meters) as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (10 through 40 Meters) for a particular geographical region of the continental USA as shown in the left hand column of the Charts. An * indicates the best time to listen for 80 meter openings.

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

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

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

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. etc. On the Short-Skip Chart appropriate *daylight time* is used at the *path midpoint*. For example, on a circuit between Maine and Florida, the time shown would be EDT; on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are HST. To convert to daylight time in other USA time zones, *add* 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone, and 6 hours in the EDT zone. *Add* 10 hours to covert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA *subtract* 7 hours in the PDT zone; 6 hours in the MDT zone, 5 hours in the CDT zone and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

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

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

CQ Short-Skip Propagation Chart
July & August 1982
Local Daylight Savings Time At Path Mid-Point
(24-Hour Time System)

Band (Meters)	Distance Between Stations (Miles)			
	50-250	250-750	750-1300	1300-2300
10	Nil	08-10(0-1)* 10-14(0-3)* 14-18(0-1)* 18-22(0-2)* 22-08(0-1)*	08-10(1)* 10-14(3)* 14-18(1-2)* 18-22(2-3)* 22-08(1)*	08-10(1-0)* 10-14(3-1)* 14-18(2-1)* 18-20(3-2) 20-22(3-1)* 22-08(1-0)*
15	Nil	08-10(0-2)* 10-14(0-3)* 14-18(0-2)* 18-20(0-3)* 20-22(0-2)* 22-08(0-1)*	08-10(2)* 10-14(3)* 14-18(2)* 18-20(3)* 20-22(2)* 22-00(1-2)* 00-08(1)*	08-10(2) 10-14(3) 14-18(2-3) 18-20(3-4) 20-22(2-3) 22-00(2) 00-08(1-0)
20	10-01(0-1)*	07-10(0-2)* 10-18(1-4)* 18-22(1-3)* 22-00(1-2)* 00-07(0-1)*	07-10(2-4) 10-18(4) 18-22(3-4)* 22-00(2-4)* 00-02(1-3)* 02-07(1-2)*	08-10(4) 10-16(4-3) 16-00(4) 00-02(3) 02-07(2) 07-08(4-3)
40	08-10(2-4)* 10-15(3-4) 15-20(4) 20-22(2-4) 22-00(1-3) 00-08(1-2)*	08-10(4) 10-12(4-3) 12-17(4-2) 17-18(4-3) 18-22(4) 22-02(3-4) 02-05(2-4) 05-08(2-3)	09-10(4-1) 10-12(3-1) 12-17(2-1) 17-18(3-1) 18-21(4-3) 21-05(4) 05-06(3-4) 06-08(3) 08-09(4-2)	09-18(1-0) 18-19(3-0) 19-20(3-1) 20-21(3-2) 21-22(4-3) 22-06(4) 06-07(3-2) 07-08(3-1) 08-09(2-0)
80	06-12(4) 12-16(4-3) 16-00(4) 00-06(3-4)	07-08(4-2) 08-10(4-1) 10-12(4-0) 12-16(3-0) 16-18(4-1) 18-20(4-2) 20-22(4-3) 22-07(4)	07-08(2-1) 08-10(1-0) 10-16(0) 16-18(1-0) 18-19(2-0) 19-20(2-1) 20-21(3-1) 21-22(3-2) 22-05(4) 05-06(4-3) 06-07(4-2)	07-19(0) 19-20(1-0) 20-21(1-0) 21-22(2-1) 22-04(4-3) 04-05(4-2) 05-06(3-1) 06-07(2-1)
160	18-19(0-1) 19-20(1) 20-22(3-2) 22-00(4-3) 00-06(4) 06-08(3-2) 08-09(1) 09-10(1-0) 10-18(0)	19-20(1-0) 20-21(2-0) 21-22(2-1) 22-00(3-2) 00-04(4-2) 04-06(4-3) 06-08(2-1) 08-09(0-1) 09-19(0)	21-22(1) 22-01(2-1) 01-04(2) 04-06(3-2) 06-07(1) 07-08(1-0) 08-21(0)	21-23(1-0) 23-01(1) 01-06(2-1) 06-07(1-0) 07-21(0)

*Predominantly Sporadic-E Openings

HAWAII
July & August 1982
Openings Given in Hawaiian Standard Time

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	13-16(1)	06-09(1) 09-12(2) 12-16(3) 16-18(2) 18-20(1)	13-15(1) 15-17(2) 17-18(3) 18-22(4) 22-00(3) 00-02(2) 02-04(3) 04-06(2) 06-08(1)	18-20(1) 20-00(2) 00-02(1) 21-00(1)**
Central USA	12-14(1) 14-16(2) 16-17(1)	05-06(1) 06-12(2) 12-14(3) 14-16(4) 16-18(3) 18-20(2) 20-21(1)	06-08(2) 08-14(1) 14-16(2) 16-18(3) 18-00(4) 00-02(3) 02-04(4) 04-06(3)	20-21(1) 21-22(2) 22-01(3) 01-02(2) 02-03(1) 20-22(1)** 22-00(2)** 00-02(1)**
Western USA	10-12(1) 12-14(2) 14-18(3) 18-20(2) 20-21(1)	06-07(1) 07-08(2) 08-10(3) 10-18(4) 18-20(3) 20-22(2) 22-00(1)	05-08(4) 08-10(3) 10-13(2) 13-15(3) 15-22(4) 22-00(3) 00-05(2)	18-19(1) 19-20(2) 20-02(4) 02-04(3) 04-05(2) 05-06(1) 19-20(1)** 20-22(2)** 22-02(3)** 02-03(2)** 03-04(1)**

ALASKA
July & August 1982
Openings Given in GMT

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	Nil	21-00(1) 00-02(2) 02-03(1)	12-15(1) 22-00(1) 00-02(2) 02-04(3) 04-05(2) 05-06(1)	07-10(1)
Central USA	Nil	20-00(1) 00-03(2) 03-05(1)	13-16(1) 22-00(1) 00-03(2) 03-06(3) 06-07(2) 07-09(1)	08-12(1)
Western USA	01-04(1)	17-22(1) 22-00(2) 00-02(3) 02-04(4) 04-05(2) 05-06(1)	13-14(1) 14-15(2) 15-19(3) 19-01(2) 01-03(3) 03-06(4) 06-08(3) 08-09(2) 09-11(1)	07-09(1) 09-12(2) 12-13(1) 09-12(1)**

**Indicates best time for 80 Meter openings. Openings on 160 Meters are likely to occur during those times when 80 Meter openings are shown with a propagation index of (3).

#See explanation in "How To Use Short-Skip Charts" in the box at the beginning of this column.

Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter openings, use the preceding Short-Skip Propagation Chart.

openings are likely to range in distance between 1000 and 1300 miles.

The combination of widespread sporadic-*E* propagation in the northern hemisphere, and seasonally high *F2*-layer values in the southern hemisphere, where it is winter, may produce an occasional DX opening on *6* meters between the USA and locations such as southern Africa, the South Pacific, Australasia, and South America. The best time to check for such openings would be the afternoon hours.

The *Delta Aquarids* meteor shower, scheduled to take place during the last five days of July, should make possible some meteor-reflection-type openings on the v.h.f. bands. Approximately 20 meteors an hour should enter the earth's atmosphere as the shower near its peak, which is expected on July 28th or 29th.

Some v.h.f. ionospheric propagation may be possible during periods of radio storminess. Check the Last Minute Forecast at the beginning of this column for the days in July that are expected to be Below Normal or Disturbed. Auroral ionization, often associated with major radio storms, can produce unusual ionospheric openings on both *6* and *2* meters for distances up to approximately 1300 miles.

July is the poorest month of the year for trans-equatorial (TE) openings on *6* meters. It is unlikely that any will occur, but it may still be worthwhile to check between 8 and 11 p.m. local daylight time, particularly in the southern tier states.

73, George, W3ASK

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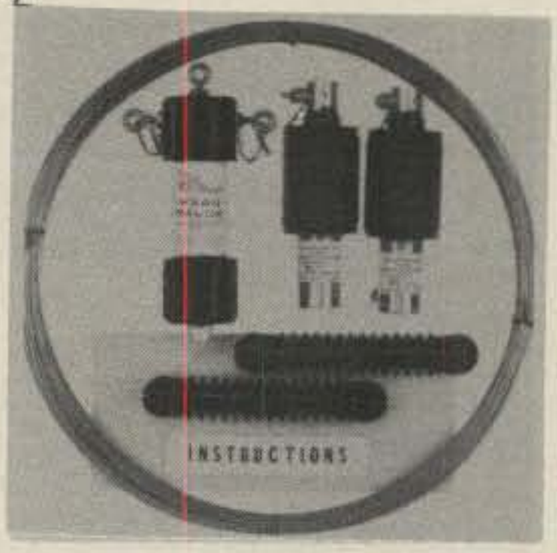

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a monthly feature by
DAVE INGRAM, K4TWJ

The World of Video

A LOOK AT THE WORLD AROUND US

Popular Video Systems

The letters of interest and words of inspiration on this video column are beginning to pour in, and we sincerely thank everyone for the outstanding support. The expressed avenues of interest particularly favor Slow and Fast Scan TV, so we'll lean heavily in that direction during coming months. Information concerning "on the air happenings" is also a prime request, so let us hear of your activities (and see photos of you and your setup!). How did you get started in SSTV? Have you found any unique ways to keep r.f. out of tape recorders? Do you arrange gear in a way different than the usual? Why? What DX have you worked (or missed) lately? Have you checked into any DX SSTV nets or acquired any DX SSTV awards? The list is endless. Take a few minutes away from behind that monitor or soldering iron and share your pleasures with all of us. We're anxious to see/hear your ideas/activities.

SSTV Basics

We've received a number of requests for basic getting started and "how to" information on SSTV installation and use, so let's begin this month's column with an expansion of the "newcomer discussion" we originated a couple of issues ago. Now let's not hear any grumbles from you old timers on this; there's substantially more operations involved here than merely cabling a '400 to one's rig and letting loose with Slow Scan signals. Think back to your first days of SSTV and you'll surely agree.

First of all, SSTV is a 100 percent duty cycle mode capable of literally boring a hole in the band or cremating one's finals, whichever happens first. Seriously, though, decreased r.f. power levels are quite necessary during SSTV transmissions. These reductions should be accomplished by decreasing transmitter audio input levels rather than by lowering transmitter loading or detuning output drive. The commonly practiced power reduction is approximately 50 percent. Thus, if your wattmeter indicates an r.f. carrier output of 500 watts, that level should be held to not over 250 watts during SSTV transmissions. Most of the time, I, personally, operate SSTV at yet lower levels than previously mentioned. I've proved for many years that this arrangement works by contacting Slow Scanners around the world while running between 50 and 100 watts output. My L4-B amplifier has repaid me tenfold with a long and reliable lifespan. The extra power is still available if needed; however, such "loafing" conditions are quite beneficial. Try this technique yourself and study the results. You'll surely be impressed.

Here's Thursday night net control, Tom, N7AON, at the helm of his elaborate SSTV setup in Utah. Top shelf hosts Alpha amp, Dentron tuner, and SSTV-display TV set. FT901DM is flanked by Robot 400 on bottom shelf. Table behind Tom holds Apple SSTV setup.

The most logical approach to SSTV communications involves intermixing Slow Scan and s.s.b. transmissions in a "show and tell" manner. This operation is preferred over solid SSTV transmissions which leave viewers pondering context of pictures. Describe complex views before transmitting them. We recently worked an SSTVer in Florida, for example, and frankly I couldn't tell the difference between views of a swamp and pictures of his mother-in-law until he described them. Transmitting 3 frames (24 seconds) of each picture is usually sufficient for getting across a particular view. Keep SSTV programs rolling at an interesting pace, and you'll quickly acquire the title of a devoted Slow Scanner.

A tape recorder is particularly useful for quick transmission of station id's, mugshots, gear, etc., while leaving the station camera available for other views as desired. Simply connect the SSTV camera, station receiver, or scan converter's SSTV output to the recorder's input through a 1 megohm ½ watt resistor for impedance matching. The recorder's output can be impedanced-matched to transmitter input by the circuit shown in fig. 1. Frequency response of the recorder isn't particularly critical, but tape speed must be constant and well regulated. Reel-to-reel machines are preferred, but capstain drive-cassette units which operate at 1⅞ ips are far more popular. When selecting a recorder, try to obtain an a.c. powered unit with adjustable speed control (one such unit is presently manufactured by Sony). If a battery-operated recorder must be used, construct a simple power supply for powering the unit, or keep a close eye on battery voltage. Pictures tend to develop skew lines when speeds vary. As a matter of convenience, record station views, id's, etc., in short lengths on separate tapes and end label them for quick reference (record each tape's program on both sides to eliminate rewinding after use). Rack the tapes in a desk-mounted lazy Susan and enjoy effortless SSTVing.

This SSTV picture, received via 20 meters, was superimposed with letters from character generator of K4FJK.

**Eastwood Village No. 1201 So., Rt. 11 Box 499, Birmingham, AL 35210*

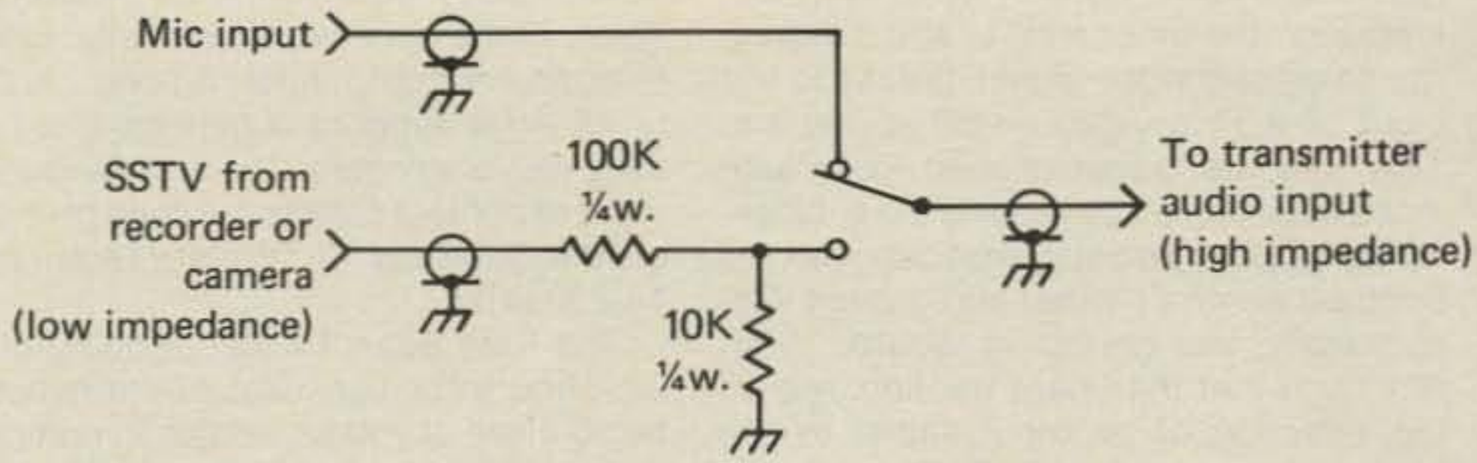


Fig. 1– Simple arrangement for connecting SSTV signal to s.s.b. transmitter as discussed in text.

Slow Scan TV is a tremendously exciting mode with unlimited communications capabilities. Its most beneficial applications involve expanding audio contacts (through the addition of video), rather than merely generating increased SSTV activity. If you're involved in unusual activities or employ unique skills, items, etc., share these knowledgeable areas and views with us by SSTV. Eventually the world will be a better place with us in it.

Video Tape and Disc Systems

Another area of requested information concerns basic details on popular video tape and disc systems. Quite interestingly, many video-related amateurs are often tagged as mild-mannered authorities on such home entertainment units. Although we may be involved with half a dozen types of video systems, it's still difficult to stay abreast of this rapidly changing field. Maybe this month's column can shed some light in that direction with a few brief facts on presently popular video systems. If sufficient interest in a specific area is shown, we'll expand that topic in later columns.

The two most common formats of video tape systems are Betamax (older) and Video Home System, or VHS (newer). Standard Beta machines play 1 hour, while standard VHS machines play 2 hours (using a conventional video cassette). When Betamax realized they were being time-outmoded by VHS, they shifted to half speed (Beta 2) and thus acquired 2 hour record times. VHS retaliated with a similar "half speed move," producing a VHS 4 hour machine. Beta again retaliated with a Beta 3 machine (3 hours). Again VHS retaliated similarly, producing a 6 hour machine (VHS 6). Thus, two totally incompatible systems are presently popular: Beta 1, 2, and 3, and VHS 2, 4, and 6 hour systems.

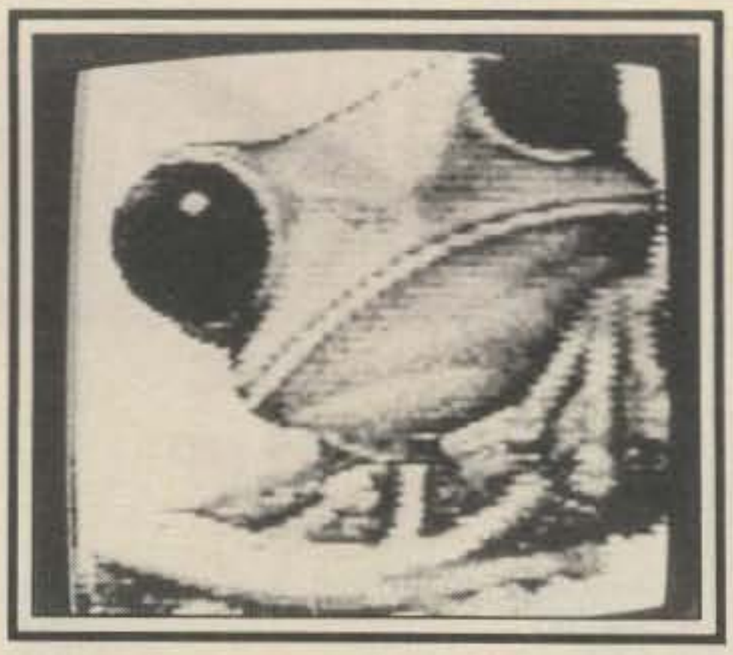
The video tape market also joined the action with double- and triple-length tapes. This means, for example, a double-length tape could be used to record 4 hours at Beta 2, or 8 hours at VHS 4 (remember, though, that the tape cartridges are not interchangeable). At the present time, triple-length tapes are experiencing the same drawbacks as their notorious

Harold, W6MEB, in Torrance, California, "shooting a pict 're" to the gang on 434 MHz FSTV. View relayed via W6ORG repeater.

audio tape equivalents; long periods of transport deck heat cause it to stretch, pull, and bind.

All of the presently marketed video recorder/players perform in a reliable and efficient manner, reducing old-time worries of purchasing "bad systems." Remember, however, to check desired video tape sources before investing in a particular unit to ensure full compatibility. Beta 3 tapes, for example, will not replay correctly on a Beta 1 or 2 machine; VHS 4 recorded tapes will not replay on VHS 2 units, etc. Some of the more recent units include capabilities of operating at two speed ranges, but that third range may be lost. Check closely before investing.

Another recent video innovation worth watching (no pun intended!) is the high-resolution videodisc systems introduced by RCA and Pioneer. Bearing only a mild similarity to audio discs, these platters contain over 30,000 groves on each side and are rotated at speeds in excess of 450 rpm. There are two videodisc formats, and the two are not interchangeable. The "Pioneer format" employs an optical-information disc and LASER beam pickup, while the "RCA format" uses a capacitance-information storage disc and precision capacity needle pickup. The optical system produces minute reflections of the LASER scanning beam, these reflections being picked up by a photodiode array and consequently turned into equivalent video voltages according to LASER beam displacements. The



Some rather strange mugshots have been frequenting 20 meters SSTV recently. We're really not certain of this character's identity, but he's rumored to jump at any and all DX.

capacitance storage system uses the videodisc proper as a constantly changing dielectric in a capacitor. One "plate" of this capacitor is the turntable's metal deck/transport; the other "plate" is comprised of an extremely small pickup needle (which is front-fitted with a diamond edge for long life). As the videodisc rotates, capacitance changes are sensed and converted to conventional video signals. V.h.f. oscillators are usually included in circuitry of either videodisc system, thus permitting simple connections to a viewing TV set via its antenna terminals.

If you would like to obtain maximum resolution from a video system, try "sidestepping" the tuner and i.f., and directing the baseband video signal directly to the input of a TV's video amplifier section. This may be accomplished "old-fashioned audio style" by feeding a d.c.-blocked signal (.01 mfd capacitor) between the contrast control's wiper and ground. Occasionally, this control is located in an emitter rather than base section, requiring direction of an input signal to the video detector's output. Simply remember to watch stage biasing, and few video-insertion problems should be experienced. The increased definition will depend on i.f. bandpass, an often "short-changed" area in less expensive TV receivers.

Tidbits

The general-class SSTV gang appears thus far to have a rough go on 20 meters, but some very good pictures have been viewed when signal strengths are relatively high. The SSTV Net, along with most general activity, has moved from 14,340 kHz to 14,295 kHz (Net meets 1800 GMT Sundays). The Net is proving instrumental in general class SSTV operation, and deserves everyone's support. Have you checked in yet?

The annual SSTV contest sponsored by W1JKF, myself, and *73 Magazine* (second full weekend of March) was an outstanding success this year. Activity reflected SSTV growth, the innovations of color, and a noticeable friendship rather than heavy competition among contestants. A fair amount of general-class activity was also noted. The first announcement of contest results will soon be made on the Saturday SSTV Net (1800 GMT; 14,230 kHz).

The Fast Scan TV Net is doing quite well, and some very useful information is being aired. If you would like to compare notes with other FSTVers or just hear what's happening around the states, check with this gang on 7290 kHz Saturdays at 1700 GMT.

The first full-color 8 second SSTV pictures were exchanged on 20 meters during early March 1982. The first communication reports came from Jim Thomas, WB4HCV, and Sam Mormino, WA7MOV. Technical details are being kept quiet until their grand debut at Dayton (this column is being written during early April). Several real-time color systems are in the works, with both frequency multiplexing and time multiplexing being investigated. Whatever evolves, rest assured that your Robot 400 can be modified to handle it. PC boards will probably be available also.

There's more information than available space, gang, so we'll continue this discussion next month. See you on 20 SSTV.

73, Dave Ingram, K4TWJ

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FOR SALE: Yaesu FRG-7 with Gilfer 3 kc/s selectivity modification (new) $225. Heath IM-2410 frequency counter (new, factory checked) $100. Dave Day, 2711 Beech, Bakersfield, CA 93301, or call (805) 325-6546, 5–8 p.m. PDT.

QSLs & Rubber Stamps - Top Quality! Card Samples and Stamp Information 50¢. Ebbert Graphics D-2, Box 70, Westerville, Ohio 43081.

1925 GREBE RADIO: Will trade for Hammarlund receiver, any model. Pasternak, Box 492, Eastport, NY 11941.

COUNTY MAPS: 3 ft. by 2 ft. showing 48 states and all counties. $2.50 each. Bill Runser, 3000 Mt. Royal Blvd., Glenshaw, PA 15116.

WANTED: R644/URR 20-237 MHz Receiver as offered/shown by Fair Radio, Dec. 79 CQ, p. 97. T.J. LeVell, Box 446, Lakehead, CA 96051.

PLAYBOY RESORT at Great Gorge, McAfee, NJ: The place to relax and enjoy. See all the manufacturers' and dealers' exhibits. Attend the vital and informative forums. Renew old acquaintances and make new ones. All at the ARRL Hudson Division Convention, October 30–31. Send SASE now for complete details to HARC, Box 528, Englewood, NJ 07631.

A5 MAGAZINE . . . covering all modes of Specialized Communications including FSTV, NBTV, MSTV, SSTV, RTTY, FAX, MICROWAVE, EME and more. Our 15th year of publication! 6 issues only $7.50 US, $10.00 DX. A5 MAGAZINE, P.O. Box H, Lowden, IA 52255 (WBØQCD).

VIC-20 COMPUTER SOFTWARE: RTTY, Morse, Antenna, DXCC & WAZ Files—more. RAK Electronics, Box 1585, Orange Park, Florida 32073.

QSLs WITH CLASS! Unbeatable quality, reasonable price. Samples $1.00 refundable. QSLs Unlimited, P.O. Box 27553, Atlanta, GA 30327.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept C, Berwyn, IL 60402.

QSL ECONOMY: 1000 for $13. S.A.S.E. for samples. W4TG, Drawer F, Gray, GA 31032.

OLD TIME RADIO transcription discs wanted. Any size, speed, subject. W7FIZ, Box 724, Redmond, WA 98052.

YAESU OWNERS: Join your International Fox-Tango Club—now in its eleventh year. Calendar year dues still only $8 US, $9 Canada, $12 airmail elsewhere. Don't miss out. Get 1982 top-rated FT Newsletters packed with modifications monthly, catalog of past modifications, free advertisements, technical consultation, FT Net (Saturdays, 1700Z, 14.325 MHz), more. Go Fox-Tango! To join, send dues to FT Club, Box 15944, W. Palm Beach, FL 33406.

OVERPRINTED: 1981 Fox-Tango Club Newsletters. Sixty loose-leaf pages packed with modifications and information on Yaesu rigs. Only $6 while they last. Also a few 1980 sets at $5. (Overseas add $3 each, airmail.) N4ML, Box 15944, W. Palm Beach, FL 33406.

WANTED: Information on the "Gonset 2Mtr. Sidewinder" Model 900A. Anyone with parts for this unit or where they can be had. Would be willing to purchase a non-opts unit for parts. Peter Mitroff, VE3DSW, 8 Marsten Dr., St. Catharines, Ontario, Canada, L2N 3C7.

ROHN TOWERS: Wholesale direct to users. All products available. Write or call for price list. Also we are wholesale distributors for Antenna Specialists and Regency FM radios. Hill Radio, P.O. Box 1405, 2503 G.E. Rd., Bloomington, IL 61701, phone (309) 663-2141.

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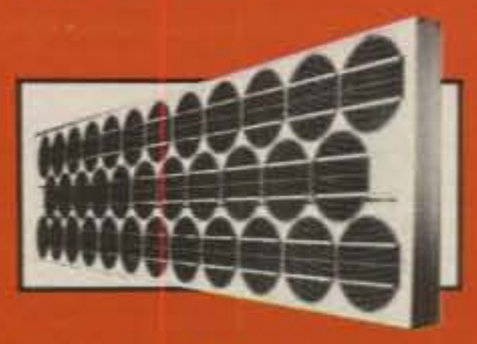

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WANTED: AN/URA-17 Converter-Comparator. C.T. Huth, 146 Schonhardt St., Tiffin, OH 44883.

I.D. BADGES: Your name and call on your state's outline. Send $1.50 to D. Mollan, WB7FDE, 7805 N.E. 147 Ave., Vancouver, WA 98662.

WANTED: Knight 2 tube battery DXer radio circa 1953. G. Fasse, 11320 Darla Ct., Warren, MI 48089.

SALE: Tet HB43SP Broadband 4 element tribander. Initially assembled but never used. In carton with all parts and instructions, mint, $160.00. Hy-Gain 18 AVT/WB 5 Band vertical with roof mounting kit and radials, instructions, used 6 months, $50.00. Heathkit IM-28 VTVM, leads, solid state tube replacements in sealed carton, manual, good condition but may need some adjustment, $40.00. One set 1980 US and DX callbooks $14.00, and 1981 US and DX callbooks $16.00. WB5LUU, James, (512) 278-5990.

WANTED: Mint Murch Ultimate Transmatch Model UT-2000B. James L. Hensarling, WB5LUU, 903 Cherry St., Uvalde, Texas 78801.

SAFETY BELTS: Professional lineman. $30 and up. Free info. Avatar, W9JVF, 1147 N. Emerson, Indianapolis, IN 46219.

WORLDWIDE AWARDS DIRECTORY: Complete information on over 400 different worldwide awards. $12.95. Larry Kebel, KBØZP, 736 39th Street, West Desmoines, Iowa 50265.

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THE FINDLAY RADIO CLUB HAMFEST is celebrating its 40th anniversary on September 12, 1982. At the Hancock Recreational Center Arena, N. Main St., I-75 Exit 161. 6:30 AM to 5:00 PM. Tickets $2.00 advance, $3.00 at entrance. Exhibit tables are $5.00 per table. Flea market Trunk Sales $2.00 per space. Open Saturday for setups and evening entertainment. Talk-in 147.75/15, check-in 146.52/52. For reservations and tickets send S.A.S.E. to : Findlay Radio Club Hamfest, P.O. Box 587, Findlay, Ohio 45840.

5VDC runs subassembly, decodes modulated/unmodulated CW. Both serial/parallel ASCII. Furnishes four control signals. $169. Telecraft Laboratories, Box 1185, E. Dennis, Mass. 02641.

TANK RADIO RECEIVER: Model B.C. 603 with schematic diagram on set. $50 or best offer. R. Garcia, P.O. Box 375, Yonkers, NY 10704, phone 914-237-4388.

POLICE-FIRE-AIRCRAFT SCANNERS: Bearcat, Regency. Bearcat 100 Handheld Programmable—$298.99. Regency D-810 50 Channel Scanner—$299.95. Frequency Directories. Shortwave Receivers. Sony, Kenwood, Yaesu, Panasonic. ICF-2001—$299.95. True Discount Prices & Free UPS Shipping in the Continental U.S. Write: Galaxy Electronics, Box 1202, Akron, Ohio 44309.

$33,000 ANTENNA 80–160 thru 10. Collins built discage featured on cover of Oct. 81 CQ. Will trade for Alpha 77. N7DF, Ft. Duchesne, UT 84026.

ICOM IC701, $575; IC202S/Nicads, $175; Drake R4B/T4XB/MS4AC, $450; T4XC/MS4AC, $375; Atlas 210X, $350; 210X NB, $40; Yaesu FT-202R/TTP/NC1, $135. Bob, WA6ERB/5, 504-393-8161(e).

COLLINS mechanical and crystal filters wanted for cash or trade for other Collins filters. John, WB8IPG, 26316 Falmouth Dr., Warren, MI 48089.

OFFICIAL COLLINS Documentation Wanted: Technical correspondence, service bulletins, catalogs/brochures, engineering specifications/revisions for amateur gear and accessories, mechanical filters, etc. Will pay for high-quality Xerox copies or round-trip postage to copy on my machine. Gerald Fasse, W8UCI, 11320 Darla Ct., Warren, MI 48089.

HEATHKIT SB303 (3 Filters) $275; SB401 $225; SB620 $140; SB614 $125; SB630 $90; HM102 $30; MFJ-949B $110. KA8IDX, 313-625-0856 evenings.

WANTED: First Edition, 1928, The Radio Manual by Geo. Sterling; Old Wires and New Waves by Alvin Barlow, 1936. H.L. Schultz, Jr., 610 Young Rd., Erie, PA 16509.

WANTED: Heathkit HG10B VFO, must be working. J.G. Swaney, 1570 King Arthur, Streetsboro, OH 44240.

SALE: 2KW Linear, 4-400A Finals, PS 3000V 1-amp. B&W 5100B Xmtr, Nat'l NC-303B, Model 19 RTTY. High quality, good price. W1GSM, 419-354-1908.

WANTED: HRO-60 coils. Have B, C, D, AC. Need all others. Give lowest price and condition. K8AC, 7991 Lutz NW, Massillon, OH 44646.

SELL: NEW TUBES—6146-8, 6293-4, $3 each. Also many types of receiving tubes, $.50 each. Stamp brings list. Mike Stasiak, 3819 White Ave., Baltimore, MD 21206.

WANTED: To purchase a Kenwood SP-520 speaker to complete my Kenwood station. Top price paid for mint quality unit. N4FEI, Joseph H. Lanford, Route One, Box 28, Woodruff, SC 29388.

DESPERATELY NEED: Donation of public address amplifier for Senior Citizen Center. Will pay shipping, K2VGV.

WANTED: Knight-Kit RF Z-bridge and Knight-VFO any condition. Will correspond. Write to WA4VWG, Joseph L. Vesey, 203 Lovers Lane Rd., Albany, GA 31701.

CLEANING SHACK: HQ-129 and 6 meter converter—dirty, $50. Military version of Super-Pro, w/ps—$75. Howard, WD9CJV, (219) 925-2772.

FOR SALE: 600 new Radio-T.V. Tubes, $600; 1,000 used Tubes as is $50. T. Wojciechowski, 101-45 94th St., Ozone Park, NY 11416.

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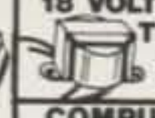

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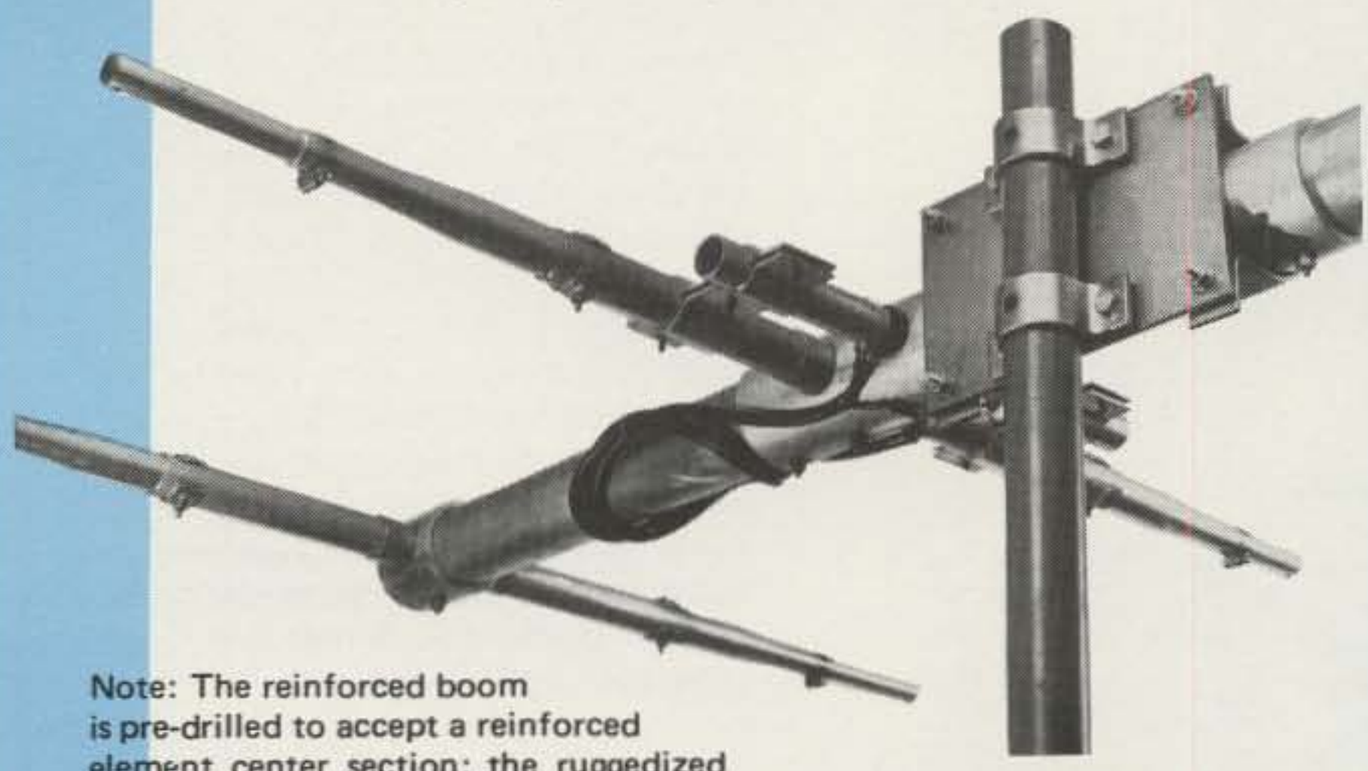

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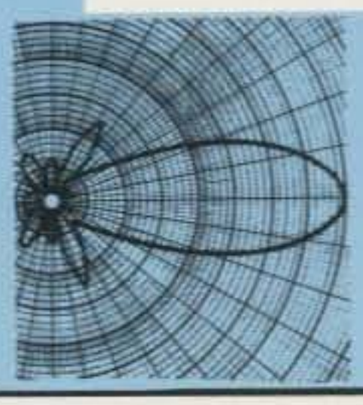

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New Yaesu FT-102 Series
Transceiver of Champions!

The long-awaited new generation of Yaesu HF technology has arrived! New research in improved receiver filtering and spectral purity is brought to bear in the competition-bred FT-102, the HF transceiver designed for active Amateurs on today's intensely active bands!

Unique Cascaded Filter System
The FT-102 utilizes an advanced 8.2 MHz and 455 kHz IF system, capable of accepting as many as three filters in cascade. Optional filters of 2.9 kHz,1.8 kHz, 600 Hz, and 300 Hz may be combined with the two stock 2.9 kHz filters for operating flexibility you've never seen in an HF transceiver before now!

All New Receiver Front End
Utilizing husky junction field-effect transistors in a 24 volt, high-current design, the FT-102 front end features a low-distortion RF preamplifier that may be by-passed via a front panel switch when not needed.

IF Notch and Audio Peak Filter
A highly effective 455 kHz IF Notch Filter provides superb rejection of heterodynes, carriers, and other annoying interference appearing within the IF passband. On CW, the Audio Peak Filter may be switched in during extremely tight pile-up conditions for post-detection signal enhancement.

Variable IF Bandwidth with IF Shift
The FT-102's double conversion receiver features Yaesu's time-proven Variable Bandwidth System, which utilizes the cascaded IF filters to provide intermediate bandwidths such as 2.1 kHz, 1.5 kHz, or 800 Hz simply by twisting a dial. The Variable Bandwidth System is used in conjunction with the IF Shift control, which allows the operator to center the IF passband frequency response without varying the incoming signal pitch.

Wide/Narrow Filter Selection
Depending on the exact combination of optional filters you choose, a variety of wide/narrow operating modes may be selected. For example, you may set up 2.9 kHz in SSB/WIDE, 1.8 kHz in SSB/NARROW, then select 1.8 kHz for CW/WIDE, and 600 Hz or 300 Hz for CW/NARROW. Or use the Variable Bandwidth to set your SSB bandwidth, and use 600 Hz for CW/WIDE and 300 Hz for CW/NARROW! No other manufacturer gives you so much flexibility in selecting filter responses!

Variable Pulse Width Noise Blanker
Ignition noise, the "Woodpecker," and power line noise are modern-day enemies of effective Amateur operation. The FT-102 Noise Blanker offers improved blanking action on today's man-made noise sources (though no blanker can eliminate all forms of band noise) for more solid copy under adverse conditions.

Low Distortion Audio/IF Stage Design
Now that dynamic range, stability, and AGC problems have been largely eliminated thanks to improved technology, Yaesu's engineers have put particular attention on maximizing intelligence recovery in the receiver. While elementary filter cascading schemes often degrade performance, the FT-102's unique blend of crystal and ceramic IF filters plus audio tone control provides very low phase delay, reduced passband ripple, and hence increased recovery of information.

Heavy Duty Three-Tube Final Amplifier
The FT-102 final amplifier uses three 6146B tubes for more consistent power output and improved reliability. Using up to 10 dB of RF negative feedback, the FT-102 transmitter third-order distortion products are typically 40 dB down, giving you a studio quality output signal.

Dual Metering System
Adopted from the new FT-ONE transceiver, the Dual Metering System provides simultaneous display of ALC voltage on one meter along with metering of plate voltage, cathode current, relative power output, or clipping level on the other. This system greatly simplifies proper adjustment of the transmitter.

Microphone Amplifier Tone Control
Recognizing the differences in voice characteristics of Amateur operators, Yaesu's engineers have incorporated an ingenious microphone amplifier tone control circuit, which allows you to tailor the treble and bass response of the FT-102 transmitter for best fidelity on *your* speech pattern.

RF Speech Processor
The built-in RF Speech Processor uses true RF clipping, for improved talk power under difficult conditions. The clipping type speech processor provides cleaner, more effective "punch" for your signal than simpler circuits used in other transmitters.

VOX with Front Panel Controls
The FT-102 standard package includes VOX for hands-free operation. Both the VOX Gain and VOX Delay controls are located on the front panel, for maximum operator convenience.

IF Monitor Circuit
For easy adjustment of the RF Speech Processor or for recording both sides of a conversation, an IF monitor circuit is provided in the transmiter section. When the optional AM/FM unit is installed, the IF monitor may be used for proper setting of the FM deviation and AM mic gain.

WARC Bands Factory Installed
The FT-102 is factory equipped for operation on all present and proposed Amateur bands, so you won't have to worry about retrofitting capability on your transceiver. An extra AUX band position is available on the bandswitch for special applications.

Full Line Of Accessories
For maximum operating flexibility, see your Authorized Dealer for details of the complete line of FT-102 accessories. Coming soon are the FV-102DM Synthesized VFO, SP-102 Speaker/Audio Filter, a full line of optional filters and microphones, and the AM/FM Unit.

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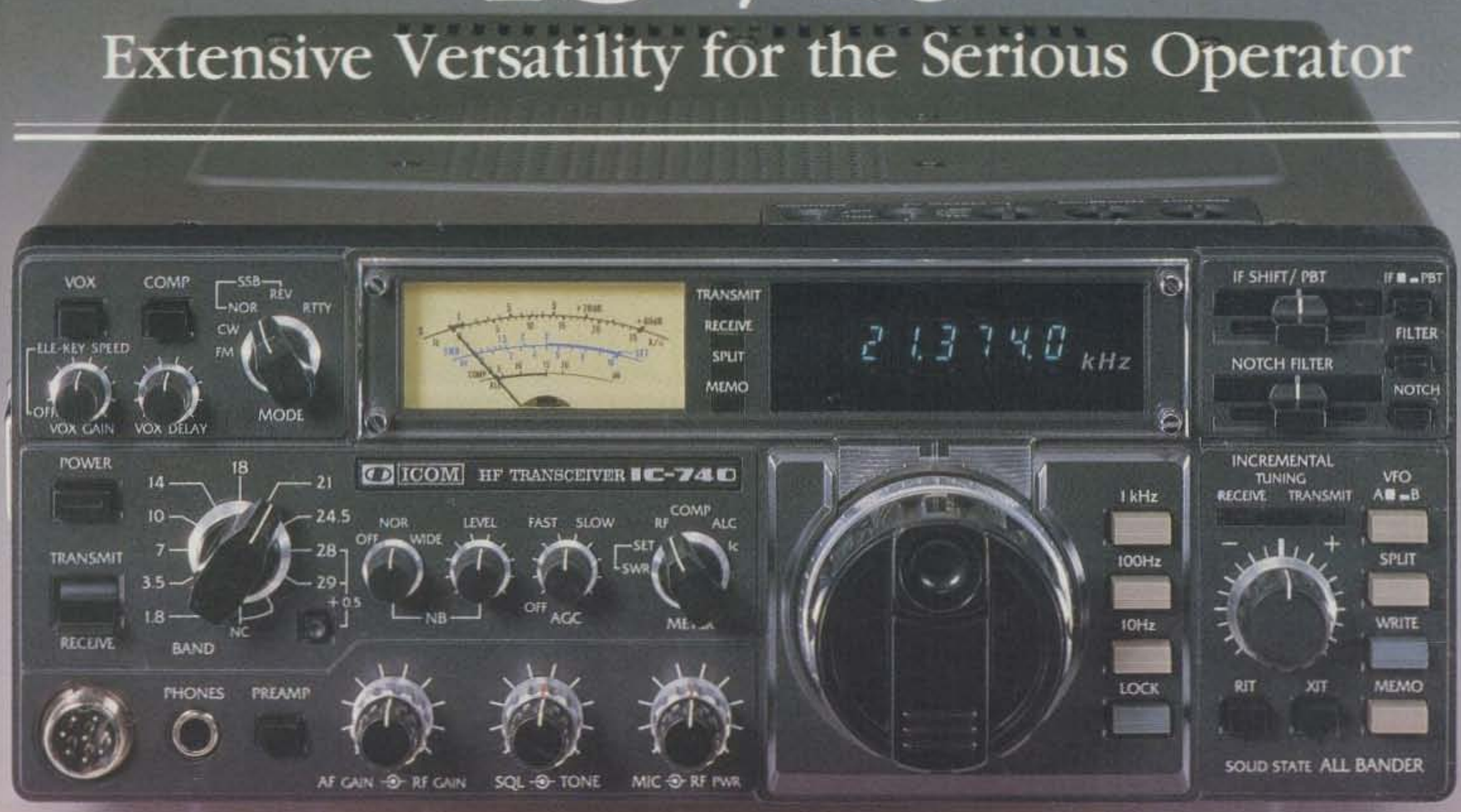

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- 3 - 455KHz Filters for CW
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