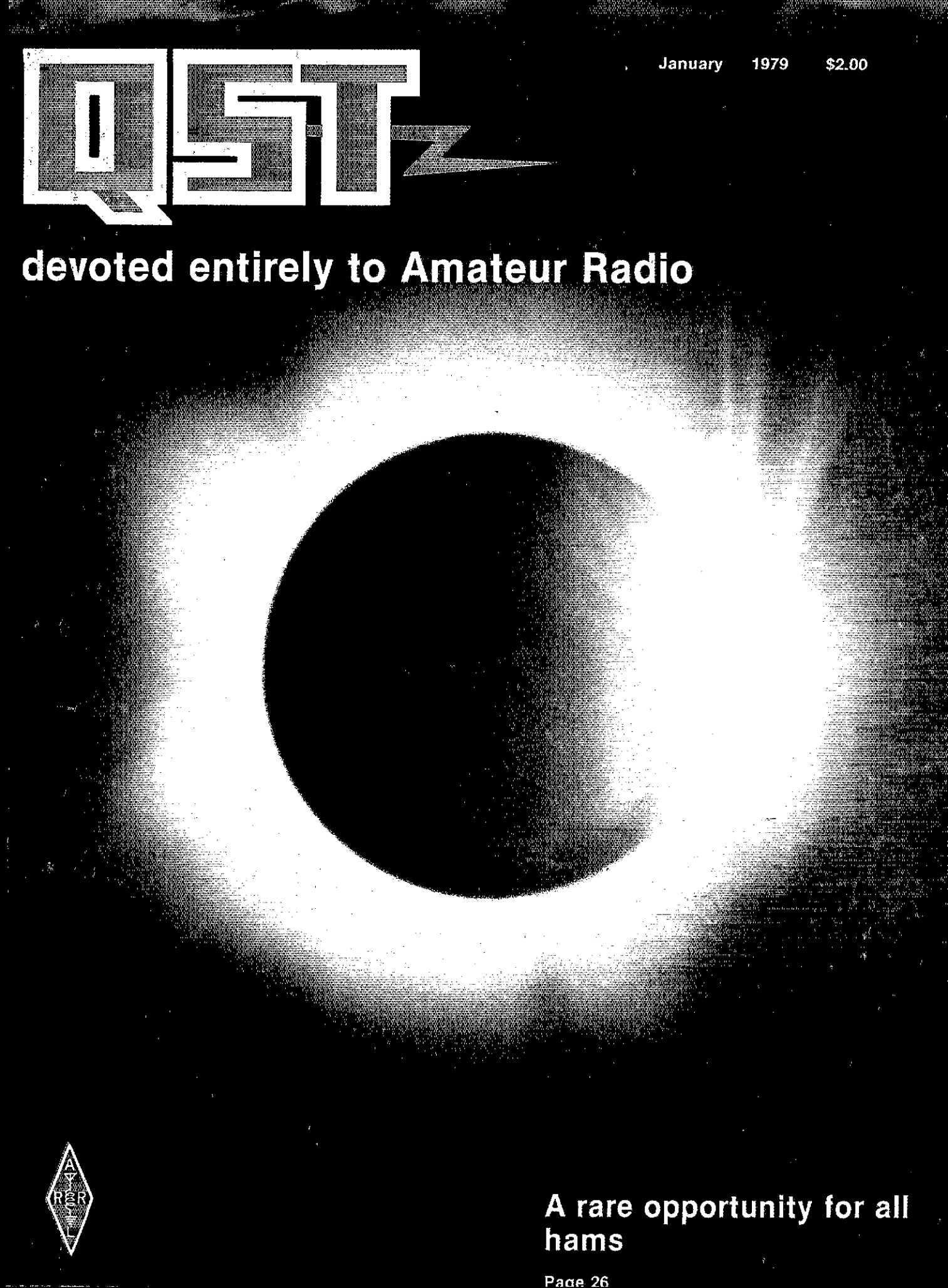
QST

January 1979 $2.00

devoted entirely to Amateur Radio



A rare opportunity for all hams

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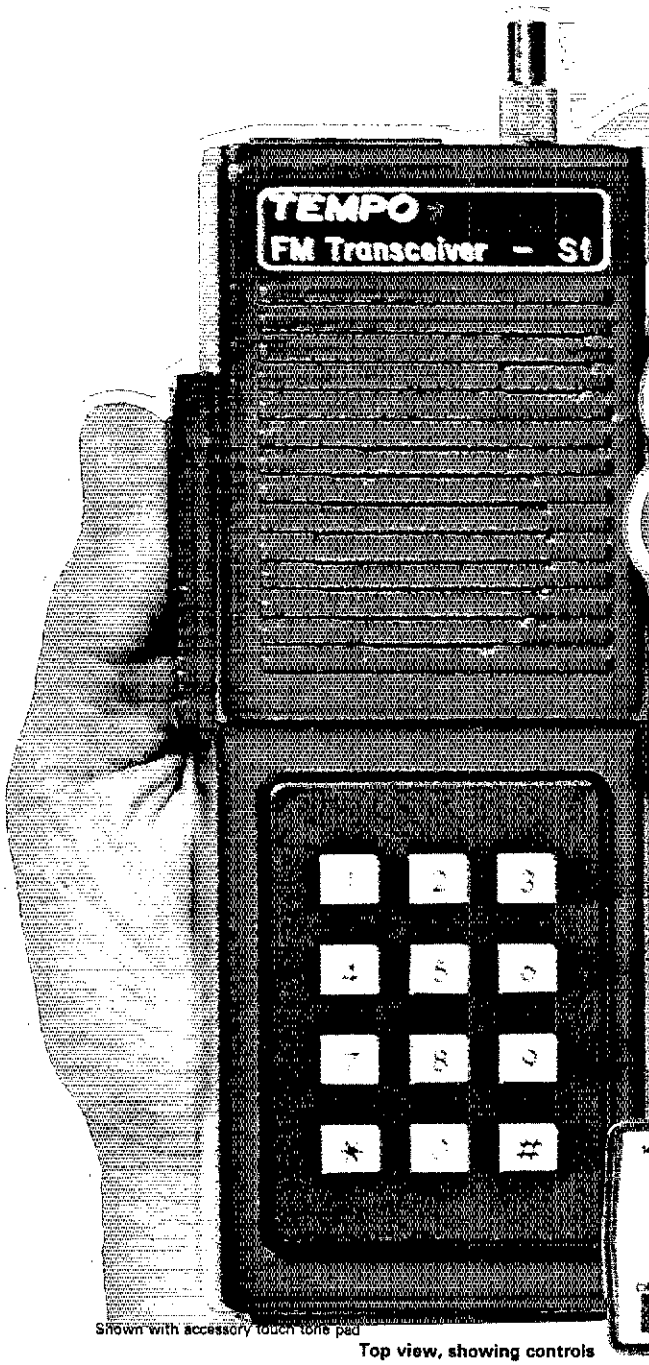
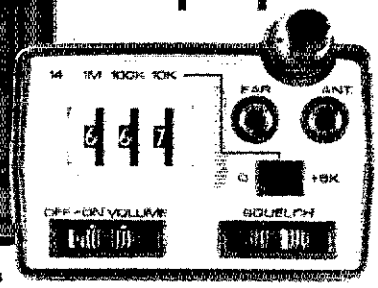


Shown with accessory touch tone pad

800 channels in the palm of your hand

Tempo presents the S1 SYNCOM ...the world's first synthesized 800 channel hand held transceiver



Top view, showing controls

This amazing pocket sized radio represents the year's biggest breakthrough in 2-meter communications. Other units that are larger, heavier and are similarly priced can offer only 6 channels. The SYNCOM'S price includes the battery pack, charger, and a telescoping antenna. But, far more important is the 800 channels offered by the S1. The optional touch tone pad shown in the illustration adds greatly to its convenience and we have available a 30 watt solid state power amplifier designed to give the SYNCOM S-1 the flexibility of operating as a mobile and base station as well.

SPECIFICATIONS

Frequency Coverage:	144 to 148 MHz
Channel Spacing:	Receive every 5 kHz transmit simplex or ±600 kHz
Power Requirements:	9.6 VDC
Current Drain:	17 ma-standby 400 ma-transmit
Batteries:	Ni-cad battery pack included
Antenna Impedance:	50 ohms
Dimensions:	40 mm x 62 mm x 165 mm (1.6" x 2.5" x 6.5"
RF Output:	Better than 1.5 watts
Sensitivity:	Better than .5 microvolts

SUPPLIED ACCESSORIES

Telescoping whip antenna, ni-cad battery pack, charger.

OPTIONAL ACCESSORIES

Touch tone pad, tone burst generator, CTCSS sub-audible tone chip Rubber flex antenna.

Price . . . $349.00 (or with touch tone pad . . . $399.00)

Tempo also offers a complete line of solid state power amplifiers, pocket receivers, the FMH-2, 5 & 42 portables, the VHF/ONE PLUS mobile transceiver, and the FMT-2 & FMT-42 remote control mobile transceiver. All available from Tempo dealers throughout the U.S. Call or write for full information.

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
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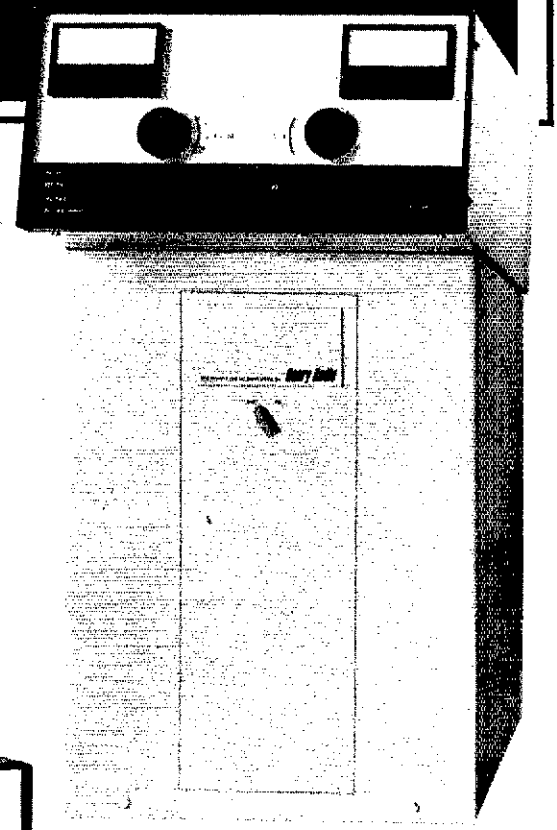
Henry Radio

Prices subject to change without notice.

Henry Radio... because you demanded the best



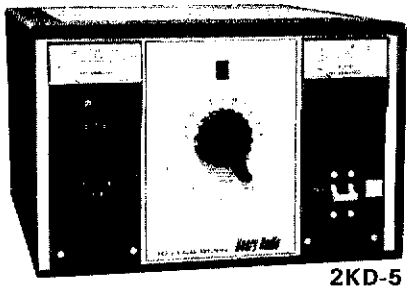
HENRY RADIO'S "WORKHORSE" ... THE 2K-4A

Never has a linear amplifier racked up so many hours of dependable operation for amateurs worldwide ... operating at full legal power ... hour after hour ... under every type of condition imaginable. Because the 2K-4A is built with the very best, heavy duty components available, it can loaf along at full legal power. It offers engineering and features second to no other linear on the market. The 2K-4A will put your signal on the air with greater strength and clarity than you ever dreamed possible.

Operates on all amateur bands, 80 thru 15 meters (export models include 10 meters) • Features two rugged Eimac 3-500Z grounded grid triodes • Pi-L plate circuit with silver plated tank coil • Resonant cathode-pi input circuit for finest linearity & maximum drive (tuneable design permits operation on any frequency from 3.5 to 30 megacycles) • High efficiency torodial filament choke • Built-in SWR bridge and relative RF output meter • Electrical re-set overload relay • Double rugged band change switch with 20 amp contacts and solid straight-through mechanical linkage • Heavy duty bronze gear drive for resonance and load condensers • Conservative, heavy-duty 2800 volt DC supply • Resonant choke input filter for superb voltage regulation • Solid state rectifiers • Maximum legal input all modes: 2 KW PEP SSB, 1 KW CW-AM-FSK • Long life 50 amp mercury power relay • Feed around antenna relay • All aluminum cabinet to elminate magnetic resonance • Double RF shielding.

Price $1095.

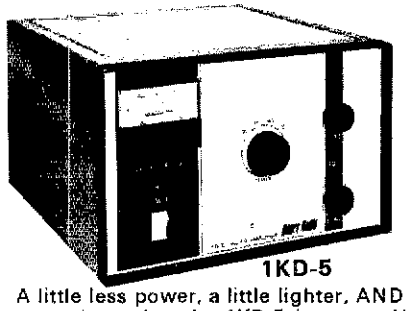
The 2K-4 is still available for export and military use.



2KD-5

Another superb linear from Henry Radio designed and built to perform at peak level month after month, year after year. Operates at full legal power continuous duty on all modes. The 2KD-5 is a 2000 watt PEP input (1200 watt PEP nominal output) desk model RF linear amplifier, covering the 80, 40, 20, and 15 meter amateur bands. Features two Eimac 3-500Z glass envelope triodes operating in a grounded grid circuit • Pi-L plate circuit with a rotary silver plated tank coil for greatest efficiency and maximum attenuation of unwanted harmonics • Full legal input in all modes, 2000 watts PEP input for SSB, 1000 watts DC input for CW-RTTY-AM. Price $895.

Watch our February ads for an announcement of the new Narrow Band Voice Modulation adapter. Henry Radio is proud to have been selected as the exclusive distributor for this exciting new development.



1KD-5

A little less power, a little lighter, AND less expensive... but the 1KD-5 is a true Henry Radio linear amplifier, offering superior quality and dependability. It is designed to greatly boost the strength and clarity of your signal. Its heavy duty components guarantee years of trouble free, dependable performance.

The 1KD-5 is a 1200 watt PEP input (700 watt PEP nominal output) RF linear amplifier, covering the 80, 40, 20, and 15 meter amateur bands (also 10 meters on units shipped outside the U.S.). Features an Eimac 3-500Z glass envelope triode • ALC circuit • DC relay system • Relative RF power meter • Pi-L plate circuit with a rotary silver plated tank coil • Cathode Pi input matching circuits • Conservative power supply with solid state rectifiers.

Price $695.

TEMPO VHF/UHF AMPLIFIERS

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

3K-A COMMERCIAL/MILITARY AMPLIFIER*

A high quality linear amplifier designed for commercial and military uses. The 3K-A employs two rugged Eimac 3-500Z grounded grid triodes for superior linearity and provides a conservative three kilowatts PEP input on SSB with efficiencies in the range of 60%. This results in PEP output in excess of 2000 watts. It provides a heavy duty power supply capable of furnishing 2000 watts of continuous duty input for either RTTY or CW with 1200 watts output. 3.5-30 MHz. Price $1495.

4K-ULTRA*

Specifically designed for the most demanding commercial and military operation for SSB, CW, FSK or AM. Features general coverage operation from 3.0 to 30 MHz. Using the magnificent new Eimac 8877 grounded grid triodes, vacuum tune and load condensers, and a vacuum antenna relay, the 4K-ULTRA represents the last word in rugged, reliable, linear high power RF amplification. 100 watts drive delivers 4000 watts PEP input.

Price $3250.

*Not available for sale to amateurs in the U.S.

Export inquiries are invited.

Export models of Amateur units available for 10 meter operation also.

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

Henry Radio

Prices subject to change without notice

Imagine All The Places You Can Tuck ICOM's Remotable IC-280. (Think small.)

The **IC-280** 2 meter mobile comes as one radio to be mounted in the normal manner but, as an option, the diminutive front one third of the radio detaches and mounts by its optional bracket, while the main body tucks neatly away out of sight. Now you can mount your 2 meter radio in pint-sized places that seemed far too cramped before.

Measuring only 2⅛"h x 7"w x 3⅜"d, the bantam-sized microprocessor control head fits easily into the dash, console or glove box of even the most compact vehicle. Or if those places are already taken by the rest of your "mobile shack," the **IC-280** head squeezes into leftover nitches under the dash, overhead, under the seat or even on the steering column.

But don't be misled by the petite size of this subdivided radio: the **IC-280** is jam packed with the latest state of the art engineering and convenience features. No scaled down technology here!

With the microprocessor in the detachable control head, your **IC-280** can store three frequencies of your choice plus the dial, which allows you to select from four frequencies with the front panel switch without taking your eyes off the road. These frequencies are retained in the **IC-280's** memory for as long as power is applied to the radio, even when power is turned off at the front panel switch. And if power is completely removed from the radio the ±600 KHz splits are still maintained!

The **IC-280** works frequencies in excess of the 2 meter band with ICOM's outstanding single-knob tuning, so you can listen around the entire band without fooling with three tuning knobs. With steps of 15 KC or 5 KC, the **IC-280** puts rapid and easy frequency change at your single fingertip and instantly displays bright, easy to read LED's.

Available Options:

- Touch Tone pad/microphone combination which fits the mic plug on the radio face with absolutely no modification.
- 15' unassembled cable kit for long distance remote mounting of the detachable control head.

IC-280
2 meter FM, 4+ MHz
Mobile Transceiver

All ICOM radios significantly exceed FCC regulations limiting spurious emissions.

Specifications subject to change without notice.

IC-280 Specifications: □ Frequency Coverage: 143.90 — 148.11 MHz □ Operating Conditions: Temperature: -30°C to 60°C (14°F to 140°F), Duty Factor: continuous □ Frequency Stability: ±5.5 KHz □ Modulation Type: FM (F3) □ Antenna Impedance: 50 ohms unbalanced □ Power Requirement: DC 13.8V ±15% negative ground □ Current Drain: Transmitting: 2.5A Hi (10W), 1.2A Lo (1W), Receiving: 0.5/0.4A at rated audio output, 0.45A at squelch □ Dimensions: Main unit: 6⅜"w x 2⅛"h x 10"d (160mm x 55mm x 255mm) □ Weight: approx. 3.2 lb. □ Power Output: 10W Hi, 1W Lo □ Modulation System: Phase □ Max. Frequency Deviation: ±5 KHz □ Spurious Output: more than 60 dB below carrier □ Microphone Impedance: 600 ohms dynamic or electret condenser type, such as the SM-2 □ Receiving System: Double superheterodyne □ Intermediate Frequencies: 1st 10.695 MHz, 2nd 455 KHz □ Sensitivity: 1.2µ at 20 dB quieting, 0.3µ at 12 dB SINAD □ Selectivity: less than -7.5 dB at ±6 KHz, less than -65 dB at ±15 KHz □ Spurious and Image Rejection: more than 70 dB □ Audio Output: More than 1.5W □ Audio Output Impedance: 8 ohms

HF/VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

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THE COVER

Next month's total solar eclipse will give hams a rare chance to study propagation effects. Thanks to Dennis di Cicco/*Sky and Telescope* for use of his striking photo. Page 26.

Contents

DXpedition...The Ultimate Fantasy

Clipper ships sailing to foreign shores. Sixteen amateurs primed for adventure, coming together as the first group in 20 years to set foot on the remote French Island, Clipperton. Their goal: 30,000 QSO's in just 7 days.

If you're like most of us, a rare DXpedition is more a dream than a reality, but the Clipperton Linear Amplifier from DenTron brings the thrill of a DXpedition to you.

The Clipperton-L™ was inspired by the famous DXpedition on which 3 MLA-2500's were used. We built the Clipperton with 4 rugged, economical, 572-B's in the final to provide a full 2KW PEP on SSB and 1KW CW on 15 through 160 meters. With features like hi-lo power selector for equal efficiencies at 1 or 2 KW, a power transformer that is vacuum impregnated, wide spaced tuning and loading capacitors, built-in ALC and an improved whisper-quiet cooling system, the excitement of crashing a pile-up can be yours.

Clipperton-L suggested price $599.50.

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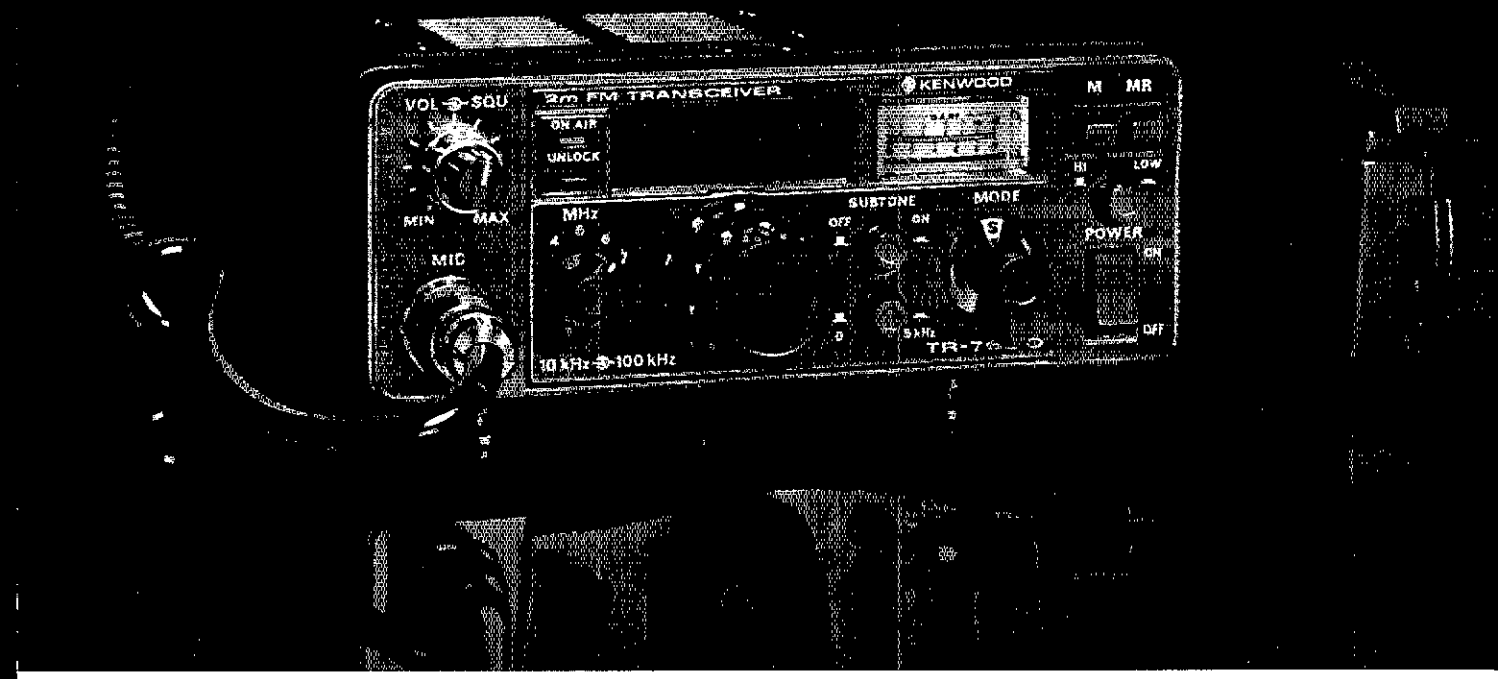
Radio Co., Inc.
2100 Enterprise Parkway
Twinsburg, Ohio 44087
(216)425-3173

Dedicated to making amateur radio more fun.

Instant recall.



Kenwood's TR-7600 with optional RM-76 Microprocessor Control Unit offers a new dimension in channel memory and scanning capability.

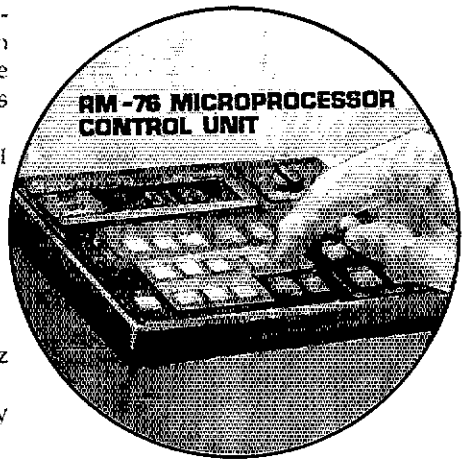
...and, it's a combination that's hard to beat if you're looking for optimum versatility in a 2-meter FM transceiver. Together, the TR-7600 and RM-76 offer you the following:

TR-7600 (only)

- Memory channel...with simplex or repeater (plus or minus 600 kHz transmitter offset) operation.
- Mode switch for operating simplex or for switching the transmit frequency up or down...or for switching the transmitter to the frequency you have stored in the TR-7600's memory (while the receiver remains on the frequency you have selected with the dual knobs).
- Select any 2-meter frequency.
- Even without the optional RM-76, the TR-7600 gives you full 4-MHz coverage (144.000-147.995 MHz) on 2 meters; 800 channels; dual concentric knobs for fast frequency change (100 kHz and 10-kHz steps); 5-kHz offset switch, and MHz selector switch...for desired band (144, 145, 146, or 147 MHz).
- Digital frequency display (large, bright, orange LEDS).
- UNLOCK indicator...an LED that indicates transceiver protection when the frequency selector switches are improperly positioned or the PLL has malfunctioned.
- 10 watts RF output (switchable to 1 watt low power).

TR-7600 WITH RM-76

- Store frequencies in six memories.
- Scan all memory channels.
- Automatically scan up the band in 5 kHz steps.
- Manually scan up or down in 5-kHz steps.
- Set lower and upper scan frequency limits.
- Reset scan to 144 MHz.
- Stop scan (with HOLD button).
- Cancel scan (for transmitting).
- Scan for busy or open channel.
- Select repeater mode (simplex plus transmit frequency offset, minus offset, or one memory transmit frequency).
- Select transmit offset (±600 kHz / ±1 MHz).
- Operate on MARS (143.95 MHz simplex only).



- Display indicates frequency (even while scanning) and functions (such as autoscan, lower scan frequency limit, upper scan limit, error, and call channel).

See the exciting new TR-7600 and optional RM-76 now at any Authorized KENWOOD Dealer!

Subject to FCC approval

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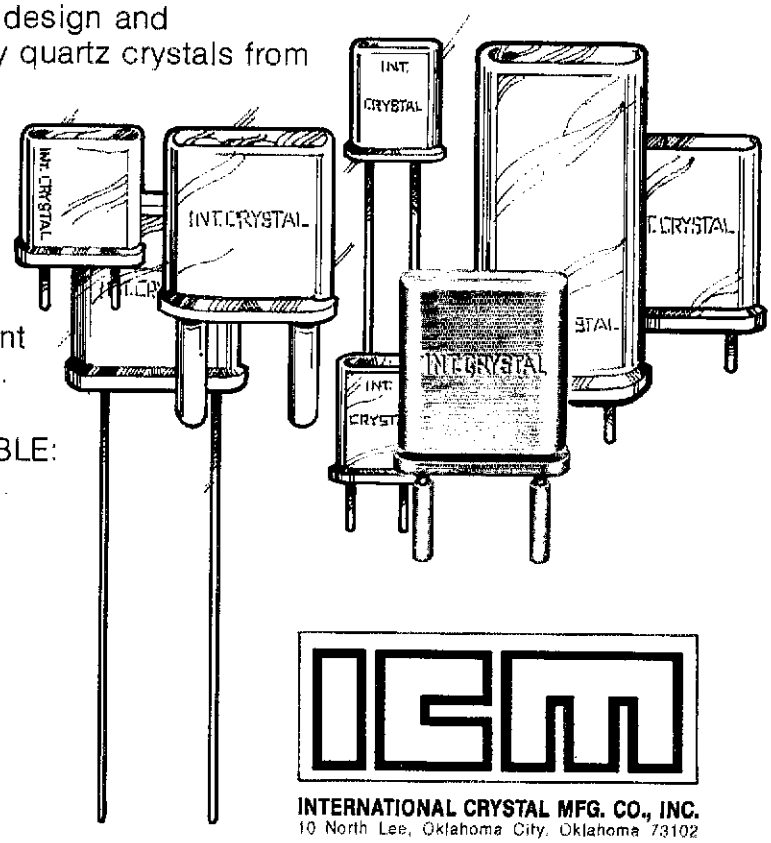

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Pacific Division

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San Joaquin Valley — Charles P. McConnell, W6DPD, 1658 W. Mesa Ave., Fresno, CA 93711 (209-431-2038)
Santa Clara Valley — Jettie B. Hill, W6RFF, 22410 Janice Ave., Cupertino, CA 95014 (408-255-6714)

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Southern Texas — Arthur R. Ross, W5KR, 132 Sally Ln., Brownsville 78521 (512-831-4458)

THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us..."

The American Radio Relay League, Inc., is a noncommercial association of radio amateurs, bonded for the promotion of interest in Amateur Radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worthwhile amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in Amateur Radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut 06111.

Clouds on the Horizon

We have a problem, a serious problem, and we've got to consider whether some of the solutions to problems as seen by others are attacks on the problems themselves or on the symptoms of those problems. And therein lies a vast difference.

In the spring of 1977, the National Radio Astronomy Observatory at Green Bank, WV, and the Naval Research Laboratory at Sugar Grove, WV, petitioned the FCC to require Amateur Radio repeaters in a geographically defined National Radio Quiet Zone to coordinate their license applications with the Director of the National Radio Observatory. (See page 62 of this issue for further information.) The Commission has now proceeded with a Notice of Proposed Rulemaking (SS Docket 78-352), with comments due by February 1. The League's Executive Committee has instructed the staff to vigorously oppose the proposed restrictions.

Now, suddenly (and received via the *Federal Register* too late for details in this issue's "Happenings" column), comes another FCC Notice of Proposed Rulemaking (General Docket 78-365) which contemplates the establishment of somewhat similar "zones of protection" around the 13 FCC monitoring stations. The comment date for this latter docket is January 22, and because the Amateur Radio Service will really have far too little time to be advised of this docket and respond, the League is petitioning FCC for a 60-day extension of time in which to file.

What's involved here? In the case of Green Bank/Sugar Grove, the proposed rules would require Amateur Radio stations to coordinate their repeater installations with the radio astronomy people. The Director, NRAO, would have 20 days to notify FCC of any perceived problem of interference to radio astronomy operations, and then the FCC could take appropriate action.

In the case of the 13 FCC monitoring stations, the present proposal is "advisory" — that is, it is "recommended" that applicants for, say, an amateur license engage in advance consultation with FCC if certain criteria are met. If you were going to run a kilowatt and lived within 10 miles of an FCC monitoring station, it would be "recommended" that you engage in advance consultation with FCC, but the Commission would not screen applicants to determine whether advance consultation has taken place. Perfectly innocuous, you say? Mebbe, but we wonder whether this is another case of the camel's nose in the tent to get warm. Somewhere down the road, we betcha, the Commission would be inclined to make those "recommended" advance consultations mandatory.

FCC monitoring stations are located at Allegan, Michigan; Anchorage, Alaska; Belfast, Maine; Douglas, Arizona; Ferndale, Washington; Fort Lauderdale, Florida; Grand Island, Nebraska; Kingsville, Texas; Laurel, Maryland; Livermore, California; Powder Springs, Georgia; Sabana Seca, Puerto Rico; and Waipahu, Hawaii. How many one-kilowatt amateur stations are within 10 miles of each of those locations? How many 50-watt stations are within three miles?

Is this a state-of-the-art approach? Radio stations of all services are licensed because they operate in the public interest, convenience or necessity. Does the Commission now intend to embark on a course which may eventually lead to a reduction in public service because its monitoring stations are poorly sited? Does that make sense? No, but it's an easy way out, like banning 10-meter amateur linears.

Even more frightening is to look ahead a few years. If we are now to provide special protection for radio astronomy operations, and for FCC monitoring stations, what lies ahead? How about the monitoring stations which feed information to the National Security Agency? How about airport control towers and other FAA communications sites? How about some of the large metropolitan public safety communications sites? Et cetera, et cetera.

Is there to be protection for those sites by limiting the number of radio stations serving the public, or is there a more enlightened approach? Do we have to kill the messenger? — *W1RU*

League Lines...

Warning to VA and WV Hams: The FCC is considering an amendment to the amateur rules which would establish a quiet zone for repeater stations in some areas of those states. See this month's "Happenings," page 62.

Just at deadline, we received word that FCC has also proposed to restrict amateur operations in those areas where FCC monitoring stations are located. See pages 9 and 65 of this issue.

VHF SWEEPSTAKES: The dates given for the January VHF Sweepstakes in the contest announcement in the December issue of QST are incorrect. The VHF SS will begin at 1800 UTC Saturday, January 13, and end at 0400 UTC Monday, January 15.

Deadline extended: The comment deadline for the FCC's Notice of Inquiry aimed at improving the administration of Amateur Radio examinations to handicapped applicants has been extended to March 30, 1979. The reply comment deadline has been extended to April 30, 1979. For more information about General Docket 78-250, see October 1978 QST, page 54.

QST is soliciting contributions of short technical articles on simple Amateur Radio construction projects, especially those where the parts can be bought locally or where the project can be built in a few evenings or a weekend. Also needed are construction articles on vhf and uhf equipment and on special-interest modes -- RTTY, SSTV and ATV. See page 46 of January 1977 QST for more information.

ARRL sponsors rig insurance against losses by fire, theft, lightning, other hazards. (See page 152, December QST.) Policy holders: Note that you're insured for replacement cost; that is, for the face value you declared minus only a 10 percent deductible). If the price on the rig has gone up, consider extra insurance to cover it.

If you are a ham working in the media and would like to lend your assistance and expertise to the League, please contact the ARRL Public Information Office. If you are already in our files and have any updated information, such as change of business address or title, please let us know.

Hamfests/conventions can be registered with ARRL Hq. up to two years in advance to avoid conflicts with other events in your area. All announcements received are sent a postcard acknowledgement. If you don't receive a card within a reasonable time, give us a call.

Are you at the end of your rope with "line noise" interference to your amateur receiver? Most electric utility companies have special teams to work on these problems and should be contacted. Noisy electric power lines and other transmission equipment are considered incidental radiation devices, and the power company must comply with Part 15.25 of the FCC Rules which states: "Operating requirements: Incidental radiation device. An incidental radiation device shall be operated so that the radio frequency energy that is emitted does not cause harmful interference. In the event that harmful interference is caused, the operator of the device shall promptly take steps to eliminate the harmful interference."

Just a reminder . . . Ham Ads are now 70 cents per word, 25 cents per word if you are an individual selling your personal equipment or if the ad is an announcement of a hamfest or convention. Also, when sending in your ad, please type, print or write clearly so our editors and typists won't need new glasses. See Ham-Ads, page 176 for details.

The Art and Science of DXing

Selecting the right frequency, at the right time, may do more for your signal than using a high-power amplifier, a multielement beam or even a rabbit's foot.

By Carl L. Bixby,* W1TKG and James Morris,** K1UJ

When the starting gun sounds for the upcoming ARRL International DX Competition, what band should you start on? Who can you expect to hear? What band has the most consistency for the Sunday morning sked with your retired brother in Hawaii? Now that high-frequency conditions are generally "good," all licensed amateurs have many bands to choose from in planning long-haul contacts across the continent, over the poles, or out into the middle of the ocean. Even Novices may pick from four bands: 80, 40, 15 and 10 meters. But the big questions are: Which is the right band, and when is it open?

Whether you are a gung-ho DXer or a casual weekend ragchewer, the answer can be found in the propagation charts that appear monthly in "How's DX?" (pages 76 and 77, this issue). These provide a monthly update of the latest data from the Department of Commerce Institute for Telecommunication Sciences in Boulder, CO. They are easy to use and can help you fill in the who, what, when and where of successful long-haul operating, especially when used with the latest bulletins from W1AW and WWV.

How to Use the Charts

No propagation prediction can ever be perfect, so these charts show the *probability* of ionospheric support between two points at different frequencies and times. A total of 30 paths have been selected as being typical of those of interest to the DX-minded amateur. Table 1 lists the exact location the generalized areas are based on. Naturally, a path will be reciprocal. Assume, for example, you are in southern California and want to work the Caribbean. The Puerto Rico-to-West Coast chart would be the one for you, just as if one had been separately prepared for West Coast to Puerto Rico.

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**Copy Editor, *QST*

Three factors strongly influence propagation: the season of the year, solar activity level, and station location. The season affects the sunrise and sunset times at both ends of the circuit and, therefore, the amount of daylight and darkness along the signal path. In turn this influences the daily ionization levels, especially at higher latitudes.

But predicting the solar activity level for each individual day is much more difficult. This becomes especially true for *QST* because of a publishing deadline of about two months ahead of when you, the reader, see it. Should you be interested in predicting precisely what the bands are going to be like for an approaching weekend, you can obtain a much more accurate prediction through W1AW and WWV bulletins than we could ever hope to publish. On the other hand, it is possible to make a reasonably accurate prediction of the *median* value of solar activity for the month as a whole. These charts reflect those values.

Table 1

In the monthly feature, the locations of the points on which the curves are based are generalized so as to emphasize that they are useful for more than just one city or state. Here is the list of actual points which are used in the computer run. They were selected as being representative of the amateur population in a geographical area. Some corrections can be made on the basis of latitude; the general rule is, the higher the latitude, the lower the muf. If the muf curve is marginal for the band in question for Washington, stations in Miami have a better chance and stations in Montreal a poorer chance for a band opening.

Generalized Location	*Actual Location*
East Coast	Washington, DC
Midwest	Kansas City, MO
West Coast	San Francisco, CA
Western Europe	London, England
Eastern Europe	Kiev, Ukraine
Japan	Tokyo
Australia	Melbourne
South Pacific	Pago Pago, Am. Samoa
South America	Asuncion, Paraguay
Central Asia	New Delhi, India
Southern Africa	Lusaka, Zambia

Three Curves

Appearing on each chart are three curves: optimum traffic frequency (fot), maximum usable frequency (muf), and highest possible frequency (hpf). A computer program predicts each on the basis of seasonal and long- and short-term trends, as well as propagation by the F2 layer, E layer and sporadic E.

The lower curve shows the fot, which is an estimate of the frequency having ionospheric support on 90 percent or more of the days of the month.

In the middle is the muf. Conditions will allow useful radio communication at this frequency for at least 50 percent of the days and will be exceeded half the time.

At the top is the hpf. For about 10 percent of the time, three days of the month, communications can be supported at the given frequency.

You may notice that all three lines merge into one at certain times of the day. When a line becomes near-vertical, it means that local sunrise or sunset is at one end of the path or another, causing rapidly changing ionization levels. The other single-line condition occurs as a horizontal trace at the top of a given chart. The Boulder computer does not provide graphs above 30 MHz, and today's conditions often exceed that!

What Bands Are Open?

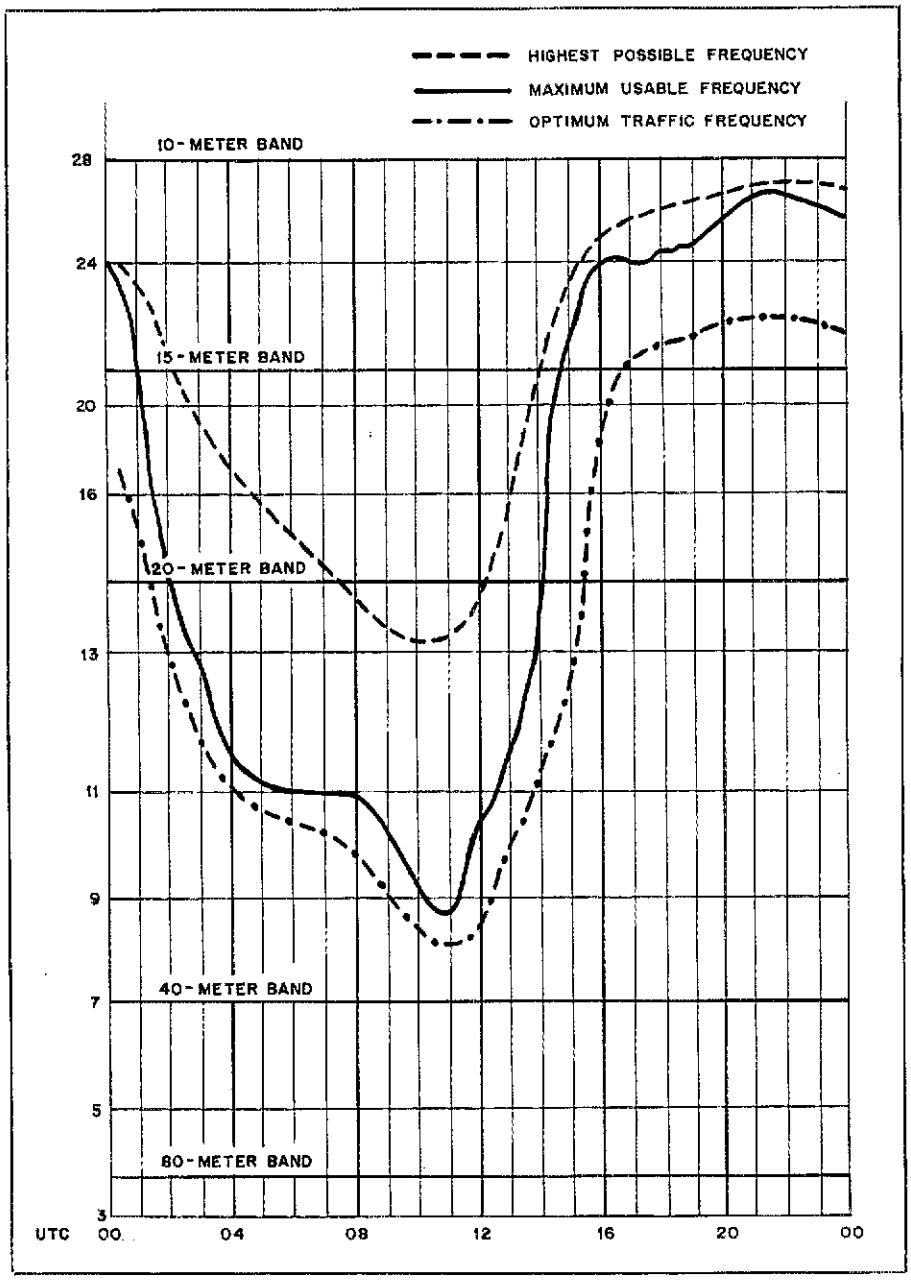
A general rule of thumb for selecting a band is to first find the muf, then take the closest band below that. Signals near the muf have the advantages of (1) being reflected at a shallower angle than at lower frequencies, giving them a longer skip distance; and (2) requiring less effective radiated power (erp) for a given received level, thanks to minimal

absorption. The muf may rise even higher than the median value, thereby providing yet more enhancement of signals, but the probability drops off to 10 percent at the hpf point.

Although the fot presents the highest reliability, it may drop to such a low frequency that *absorption* becomes an important consideration. The further below the muf you operate, the weaker signals will be, since radio waves relinquish energy while traveling through the ionosphere by setting ionized particles in motion. This absorption is greater at lower frequencies, especially 1.8, 3.5 and 7 MHz. It can sometimes be overcome with the brute force approach of an amplifier and gain antenna. Commercial stations often do this, as do some amateurs. Nevertheless, the various bands can be useful to most amateurs seeking DX.

For instance, say you can be on the air only from 1300 to 1400 UTC. From Fig. 1, your best band would be 20 meters. If you are a Novice, you might have a chance on 40 meters, though the muf would climb to 15 meters within an hour.

Fig. 1 — The chart predicting December's propagation conditions for the East to West Coast circuit is typical of the 30 charts published monthly in *QST*. On 10 percent of the days, the highest amateur band that is open will be just below the highest possible frequency (hpf) curve. On 50 percent of the days it will be just below the maximum usable frequency (muf) curve. And on 90 percent of the days the highest band that is open will be just below the optimum traffic frequency (fot) curve. The horizontal axis shows Universal Coordinated Time (UTC); the vertical axis, frequency in MHz.



If, on the other hand, you can be on the air at almost any time, pick the point where the muf curve approaches or crosses a band you can use, then read at the bottom of the chart the time you should throw the switch and start transmitting. According to Fig. 1, the best time to be on 40 for that path would be from 0800 to 1200 UTC; you could work the circuit on 15 from 1400 to 0100.

WWV Information

At 18 minutes after every hour, National Bureau of Standards station WWV, Fort Collins, CO, transmits bulletins on solar activity and the condition of the earth's magnetic field. This information is essentially current and therefore invaluable to anyone concerned with radio propagation. WWV is on the air continuously, using constant power levels and omnidirectional antennas. It should be noted that WWVH, Kekaha, HI, does not carry the bulletin service, but its signals nevertheless provide propagation data. Other time and frequency stations, some of which are listed in Table 2, can be used similarly.

In order of their presentation, the WWV bulletins give the solar flux and A-index for the previous Universal Coordinated Time (UTC) day; the K-index (changed every 6 hours); the state of solar activity and the condition of the earth's magnetic field for the previous 24 hours, and the same factors predicted for the coming 24 hours. Information on all WWV services is available from the National Bureau of Standards, Boulder, CO 80302.

Solar Flux

The *solar flux* is a measure of the sun's radiation at 2800 MHz, taken daily at 1700 UTC in Ottawa. Similar measurements are made on many different frequencies at other observatories. The 2800-MHz flux is given because this value correlates well with the ionization density of the ionospheric F region, with the Zurich sunspot number and the muf.

A steady rise or fall in solar flux will show clearly in radio propagation effects, and also in the observer's view of sunspot activity. Trends either way are important. They often run for several days, during which the associated changes in muf, and in the duration and geographical distribution of openings on frequencies above about 15 MHz, are easily observed. Flux readings of 80 or higher will make the 21-and 28-MHz bands come alive, even near the bottom of the solar cycle.

In the intermediate years of the cycle, as in 1977 to 1979, flux values tend to range between about 100 and 200, the latter being high enough to make even the 50-MHz band worth watching for worldwide communication on the more favored paths. When values above 200 come, the 21- and 28-MHz bands are open almost around

Table 2

Some time and frequency stations useful for propagation monitoring.

Call	*Frequency (kHz)*	*Location*
WWV	2500; 5000; 10,000; 15,000	Ft. Collins, CO
WWVH	Same as WWV	Kekaha, Kauai, HI
CHU	3330; 7335; 14,670	Ottawa, ON, Canada
RID	5004;10,004; 15,004	Irkutsk, USSR*
RWM	4996; 9996; 14,996	Novosibirsk, USSR*
ZUO	2500; 5000	Pretoria, South Africa
VNG	7500	Lyndhurst, Australia
BPV	5000;10,000; 15,000	Shanghai, China
JJY	2500; 5000; 10,000; 15,000	Tokyo, Japan
LOL	5000; 10,000; 15,000	Buenos Aires, Argentina

*Call, from international table, may not check with actual reception. Locations and frequencies appear to be as given.

the clock during the cooler months of the year. Sustained periods above 250, particularly in spring and fall, will bring widespread 50-MHz openings.

A- and K-Indices

The A-index is a 24-hour figure for the activity of the geomagnetic field. It is measured on a scale of 0 to 400 or so, though values of 100 or more are rare. A quiet field (A-indices of 10 or lower) is characteristic of the best propagation conditions. Absorption of wave energy is low at such times, so signals are strong on long paths. This effect is most noticeable on circuits crossing the higher latitudes, where very low K values must prevail or propagation will be very poor or nonexistent. The effect of geomagnetic activity is very slight on low-latitude paths or any circuit crossing the equator. In fact, it is observed that north-south or transequatorial propagation may *improve* briefly at the onset of a period of high A- (and K-) indices, especially on the highest frequency that is usable at all.

The K-index is similar to the A-index, except that it is as near to a current figure as can be given in bulletin form. It is also given on a different mathematical scale in order to make short-term changes more apparent. The information given by WWV is for Fredericksburg, VA. It is likely to be higher for Boston, and lower for New Orleans, as the data are directly related to geomagnetic latitude.

The K-index is given for six-hour periods beginning at 0000, 0600, 1200 and 1800 UTC. It represents the conditions during the last three hours just before the bulletin's time of issue. Thus, it is close to a *now* statement of a factor of vital importance to any user of the hf radio spectrum. It may interest vhf operators as well when the values go above 3. The *trend* is important — a rising trend means degraded hf propagation; values of 4 and up may mean auroral conditions on the vhf bands.

Solar Activity and Geomagnetic Field

Solar activity, as the term is used in the final portion of the WWV bulletins, relates to fast-changing conditions that affect propagation adversely. Activity is given as very low, low, moderate, high or very high.

Geomagnetic field conditions are termed quiet, unsettled or active. These relate roughly to K-indices of 0 to 1 for quiet, 1 to 3 for unsettled, and 4 or higher for active. These three words rather aptly describe the propagation conditions associated with them and with the K-indices. Often any K value of 4 or higher will be associated with a "geomagnetic storm," usually described as "minor" or "major." Either is bad news for the amateur interested in high-latitude hf communication. "Major" may include a total or near-total interruption of all communication on the lower hf bands. It is likely to be accompanied by auroral conditions on the vhf bands, at least in the higher latitudes.

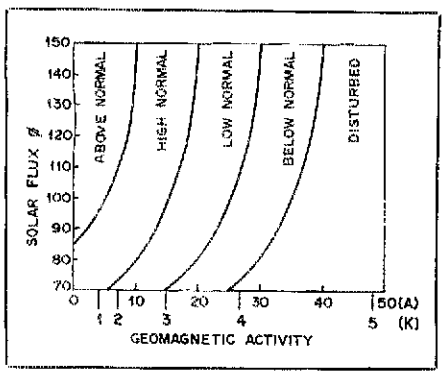
K values are used to derive the A-index for the whole UTC day. The manner in which this is done is rather involved.

Some Complications[1]

All of the above would make the art of predicting hf muf an exact science, were it not for a few monkey wrenches which Old Sol can throw into the works. While the solar flux may indicate a very favorable muf, a fact of life is the immediate effect of a sudden increase in solar-flux level: a dramatic increase in the D-region absorption. A general attenuation of signals below the muf results. D-region attenuation occurs much faster than the F region "warms up," although if the increased sunspot activity is sustained for about three days then increased F-region reflectivity will offset initial increased D-region absorption. Conditions will then show a real improvement, and the lower frequencies will tend to return to normal strength while the muf will be extended.

[1]This section is reprinted from Sartori, "Update Your HF MUF Predictions Daily," *QST*, September 1977, pp. 35-37.

Fig. 2 — Propagation Quality Curve (Jacobs and Cohen, "A Breakthrough in Simplifying Ionospheric Propagation Forecasts," *CQ*, March 1975).



A solar prominence erupts half a million miles into the solar atmosphere, portending various types of interference to terrestrial radio communications. *(photo courtesy of NASA)*

In addition, the effect of solar-flux variations decrease with increasing latitude. Finally, observations have indicated that as solar flux decreases to low levels, the frequency of magnetic storms tends to increase because of the complex nature in which the energy from the sun constrains the earth's magnetic field. Sorry about that.

During periods of very favorable muf associated with an increasing solar-flux level, magnetic storms may adversely affect hf communications. The lower limit of the usable frequencies is determined by ionospheric reflection and absorption, both of which generally increase with decreasing frequency. Two magnetic storm-induced types of absorption are polar-cap absorption (PCA) and auroral absorption. PCA lasts up to several days, while auroral absorption is on the order of hours. PCA occurs most often during the sunspot cycle peak, when there may be 10 or 12 events per year. During PCA, propagation conditions tend to be worse during the day than at night, and poorer at the higher latitudes than at the subauroral latitudes. Attenuations of 15 to 30 dB per hop up to 30 MHz are typical. Low angles of radiation are the best means of minimizing the absorption caused by PCA. In contrast to PCA, auroral absorption is of short duration and often quite localized. Auroral absorptions are generally on the order of a few dB.

Another bugaboo is solar particle radiation, causing the ionosphere (and signals) to vary, as evidenced by fading, flutter and increased noise. Solar particle radiation affects the earth's magnetic field, causing magnetic storms which produce greater attenuation for paths close to the magnetic poles; this is why the 3-hour K-index measured by the Fredericksburg, VA, laboratory and transmitted by WWV is so important. When K is less than 3, little effect on hf communications is observed. When K is greater than 4, storm conditions are indicated, with resultant poorer hf communications. When K is 3 or 4, conditions tend toward unsettled or unstable.

Dealing with Solar Storms

No technique is available for predicting how solar storms will affect hf communications at any particular location and time. However, a subjective method of evaluating the hf propagation quality has been developed based upon many years of hf propagation observations. The propagation-quality graph shown in Fig. 2 is designed to give an evaluation of general hf communications quality based upon the effective current solar-flux level and the geomagnetic activity (storms). The quality of hf propagation is enhanced by an *absence* of solar storms. Daily quality-of-transmission factors may be estimated by using the A- or K-index (preferably the latter) and the smoothed current solar-flux value. Since the data from which Fig. 2 was developed were based on mid-latitude communications, conditions will tend to be more severe at polar latitudes, while the curves will be less steep toward the equator.

While there is no way to *ensure* successful DXing, the *QST* propagation charts, along with the updated WWV and W1AW bulletins, provide a means of determining how to see that the odds swing your way. They aren't foolproof, but they're about the best tool available. As the science of propagation evolves further, you will read about improvements in the system in *QST*. QST

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Sumner, "Chart Your Way to Better DX," *QST*, January 1977.

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Strays

SOVIET RADIO SPORT SATELLITE UPDATE

☐ *Sovetskiy Patriot* of November 22, 1978, contains an article by L. Labutin, UA3CR, concerning the telemetry data transmitted by Radio 1 (RS-1). (Radio 2 is not mentioned.)

Information consists of four characters per channel: first character — ADDRESS; second and third characters — telemetry parameter "N"; fourth character — repeater operation indicator. Full cycle consists of two half cycles of 15 channels, each separated by call sign RS, transmitted twice when repeater is ON, once when it is OFF. First half cycle indicated by letters W (repeater ON) and U (repeater OFF); second half cycle indicated by letters O and K, respectively. On command from control center, shortened cycle, consisting of first seven channels, is transmitted.

Output power is in milliwatts, temperature in degrees centigrade and current in milliamperes. Send telemetry reports to RS3A, P. O. Box 88, Moscow, U.S.S.R. Orbital information appears in "Operating News," *QST*, and W1AW bulletins. Present schedule of operation is repeater ON for general use on Saturday and Sunday; Wednesdays for experiments only. Schedule experiments through RS3A. *Do not use over 10 watts erp.* The repeater will turn OFF automatically if users exceed this power level. — *Bernie Glassmeyer, W9KDR*

RS-1 Telemetry Channels

CH	ADR	Parameter	Measurement Limits	Decoding Formula
01	P	Calibrating	01	—
02	C	Repeater Output Power	60 to 990	10N
03	F	Radiator Temperature	−30 to 80	N
04	Z	Temperature in Command and Telemetry Circuits	−30 to 80	N
05	L	Power Voltage	11 to 18	0.2N
06	B	Stabilized Voltage	8.5 to 9.5	0.2N
07	H	Stabilized Voltage	7.0 to 8.0	0.2N
08	O	Illuminating Xmtr 1	01 to 95	—
09	W	Illuminating Xmtr 2	01 to 95	—
10	K	Illuminating Xmtr 3	01 to 95	—
11	U	Illuminating Xmtr 4	01 to 95	—
12	G	Calibrating	01	—
13	R	Repeater Output Power	60 to 990	10N
14	D	Body	01	—
15	S	Battery Charging Current	0 to 500	10(50 − N)
16	P	Voltage of Battery 1	11 to 18	0.2(N + 12)
17	C	Voltage of Battery 2	11 to 18	0.2(N + 12)
18	F	Voltage of Battery 3	11 to 18	0.2(N + 12)
19	Z	Voltage of Battery 4	11 to 18	0.2(N + 12)
20	L	Body	01	—
21	B	Pwr Computing Circuit Temp	30 to 80	N
22	H	Battery Charging Current	0 to 500	10(50 − N)
23	O	Illuminating Xmtr 1	01 to 95	—
24	W	Illuminating Xmtr 2	01 to 95	—
25	K	Illuminating Xmtr 3	01 to 95	—
26	U	Illuminating Xmtr 4	01 to 95	—
27	G	Illuminating Xmtr 1	01 to 95	—
28	R	Illuminating Xmtr 2	01 to 95	—
29	D	Illuminating Xmtr 3	01 to 95	—
30	S	Illuminating Xmtr 4	01 to 95	—

The YY Special Beginner's Receiver

Simplicity consistent with acceptable performance keynotes this "Yankee Yowler" receiver. Club groups should find this project ideal for "learning by doing."

By Doug DeMaw,* W1FB and Marian Anderson,** WB1FSB

Are you ready to start on your way to receiving your Novice or General class ticket? Want to enjoy building your first receiver along with your studying? If so, *try building this* "YY Special." Coauthor WB1FSB and Marge Tenney, WB1FSN (both working toward General class tickets), decided it would be a great help to relate component parts to their symbols on a schematic diagram. Jean DeMaw, W1CKK, who already has her General ticket, decided, as a refresher course, to join in during lunch hours in the ARRL lab to build this simple low-cost receiver. Technician class Michele Bartlett, N1AGD, also built this same receiver at her home, evenings, with a little help from her OM, K1TX.

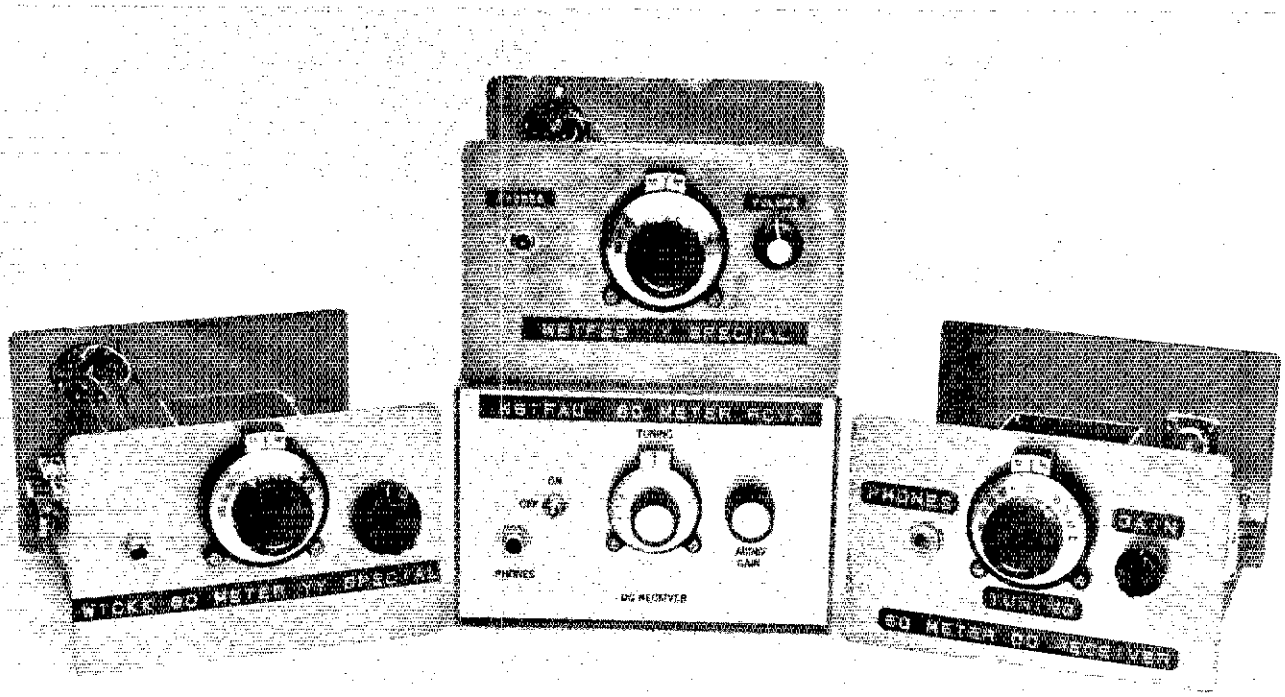
With the aid of coauthor W1FB, the noon-hour work began. Studying the schematic diagram, choosing the right components, winding the toroid cores and soldering (all of which WB1FSB and WB1FSN had never done before) were great fun and very educational.

*Senior Technical Editor, ARRL
**Technical Secretary, ARRL

Circuit Highlights

Only four transistors and one IC are used in the YY Special (Fig. 1). This represents the authors' view of the least parts necessary for acceptable performance. None of the active devices (transistors and IC) are expensive or hard to obtain. All of them can be replaced by comparable substitutes of the RCA SK or Motorola HEP types. The only specialty parts used are the toroid cores, all of

Finished receivers built by three YLs and one OM were gathered for this photograph.



which are available by mail from *QST* advertisers.[1]

A fixed-tuned filter is used at the receiver input. Retuning the front end as the frequency of the oscillator is changed is not necessary. C2 and C3 are adjusted for maximum signal response in the center of the receiver tuning range, and left at that setting.

Because the circuit of Fig. 1 is that of a *direct-conversion* receiver (product detector and tunable BFO) rather than a superheterodyne, an rf amplifier (Q1) has been included to improve the noise figure and reduce the gain requirement of the audio section. Q1 operates as a broadband amplifier with feedback from collector to base. Additional feedback (degenerative) is introduced in the emitter lead of Q1 by virtue of the unbypassed 10-ohm resistor. The advantage of the feedback in this example is amplifier stability under all conditions, thereby making the circuit easy to duplicate by beginners.

Output from Q1 is passed along to the product detector, Q2, by means of an untuned broadband transformer, T1. It has a 1:1 impedance ratio to match the 200-Ω Q1 collector to the source of Q2. The latter is approximately 200 Ω.

Q2 operates as a source-driven detector with oscillator injection on the gate. Audio output is taken across the 1000-Ω drain resistor and direct coupled to the audio preamplifier, Q3. The 0.01-μF capacitor at the drain of Q2 and the 0.1-μF unit at the collector of Q3 serve two purposes: They bypass unwanted VFO energy to ground and roll off the high-frequency audio response to reduce off-frequency interference.

No narrow-band audio filtering is used in this circuit, but if a high order of cw selectivity is desired, an RC active audio filter can be inserted between the arm of R1 and the input to U1. A unit such as the MFJ Enterprises CWF-2 or similar would be suitable. The audio filter would also improve the overall signal-to-noise ratio of the receiver and boost the audio gain slightly.

A 741 op amp is used at U1 to give 40 dB of gain to the detected signal. It is configured to "look" into headphones with impedances from 4 ohms upward.

The VFO is designed to cover approximately 3.65 to 3.8 MHz or 7.0 to 7.2 MHz. The receiver can be built for the 80- or 40-meter band. Table 1 gives data for changes in component values for the two tuning ranges. Injection voltage for the detector is taken from the gate of Q4 to ensure an adequate level for Q2 (roughly 1.5 V rms). The VFO sine wave is very pure at the gate of Q4 — another reason for sampling it at that point in the circuit. D1 of Fig. 1 is used to stabilize the VFO gate bias. D3 stabilizes the drain voltage. These components help assure good VFO operation by reducing drift. C6, C7 and C8 also play an important part in VFO stability. Polystyrene capacitors will yield the best performance in that regard, but silver-mica capacitors may be used if desired, although some degradation in long-term frequency stability of the oscillator will occur.

D2 at J3 of Fig. 1 is included as a safety measure. It functions as a polarity-guarding diode. If the power supply is attached to the receiver with the polarity reversed, D1 will not pass current, thereby protecting the transistors and IC from damage.

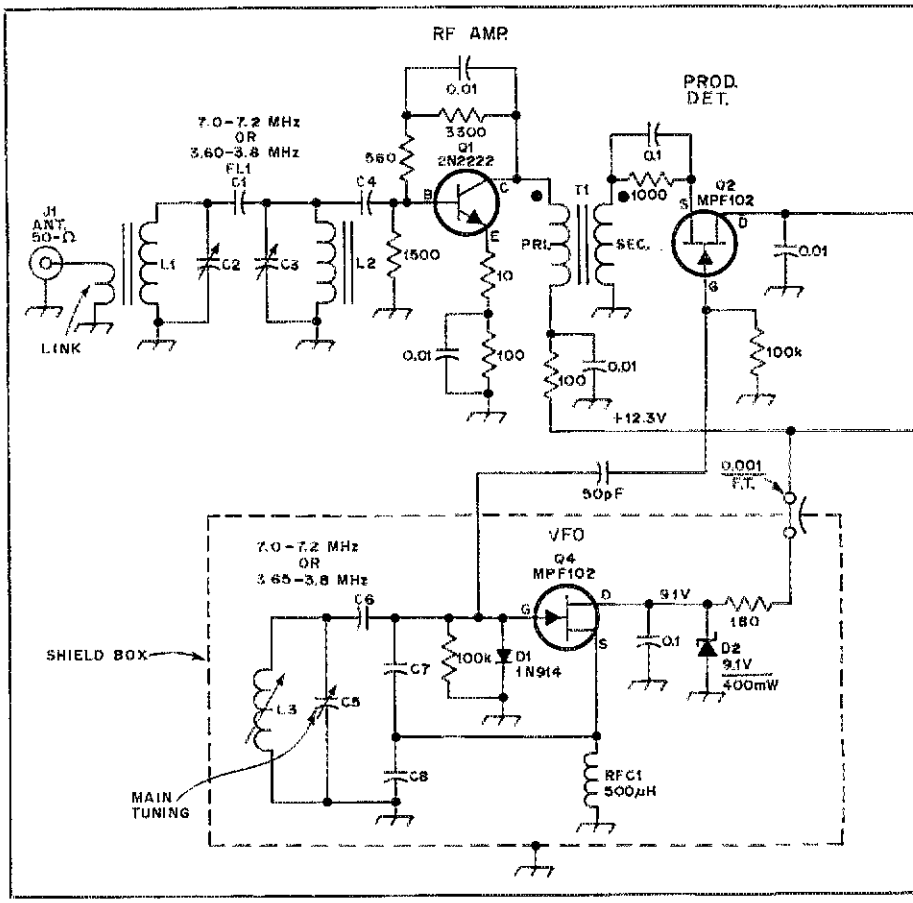


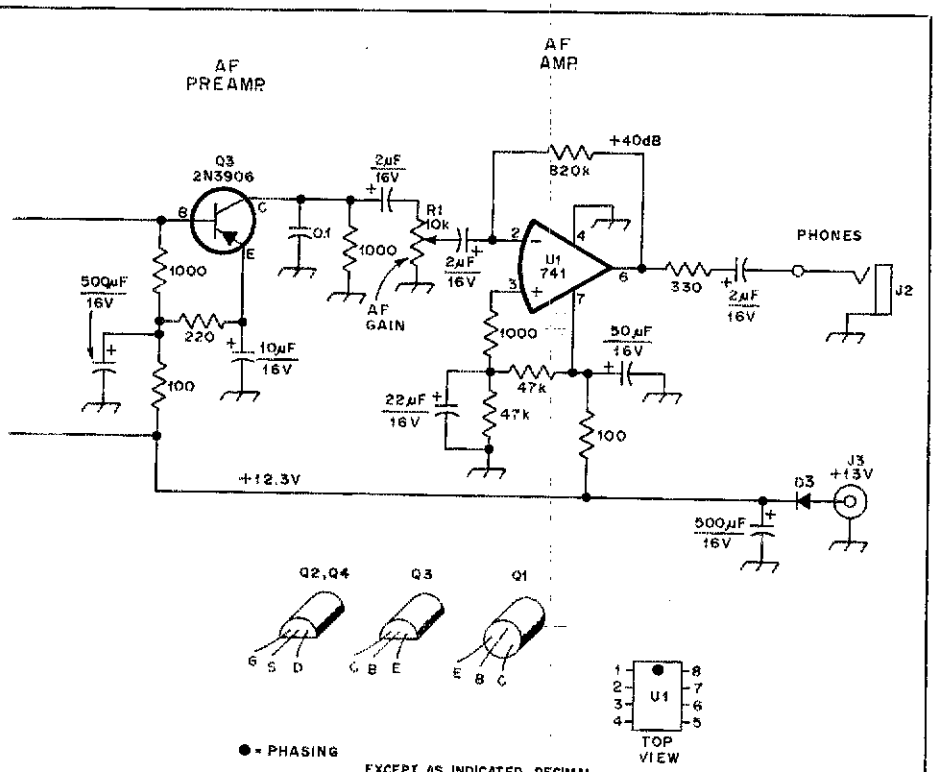
Fig. 1 — Schematic diagram of the simple direct-conversion receiver. Fixed-value capacitors are disk ceramic unless noted otherwise. Polarized capacitors are tantalum or aluminum electrolytic.
D1 — Silicon switching diode, 1N914 or equiv.
D2 — 9.1-V, 400-mW Zener diode.
D3 — 50 PRV, 1-A rectifier diode. Mount between J3 and pc board.
J1 — Coax connector, RCA phono or SO-239 jack.
J2 — Two-circuit phone jack.
J3 — RCA phono jack.

Construction Data

The printed-circuit board has been made larger than need be in order to make assembly less difficult for inexperienced builders. Those with layout skill can compress the circuit to less spectacular dimensions. Pc negatives, etched boards and complete parts kits for this project are available from a supplier.[2,3] Those who wish to make their own pc board, can trace the pattern on a piece of unetched board that has been covered with masking tape. Carbon paper will provide a suitable pattern transfer during the tracing process. An X-acto hobby knife is ideal for cutting away tape from the circuit-board areas that should be etched. If double-sided copper board is used, include a 1/4-inch (6-mm) copper border on *both* sides of the circuit board. The front and rear panels, which are made from pieces of double-clad board, may then be soldered to the pc board (above and below the board) to hold the panels in position.

A rectangular box surrounds the VFO portion of the receiver (see Fig. 2). The walls of this enclosure are also fashioned from sections of double-clad pc board. The side walls are 2 × 2-3/4 inches (50 × 70 mm). Dimensions for the end wall are 2 × 2-1/8 inches (50 × 54 mm). No. 6 spade bolts are used to affix the enclosure to the main pc board. L3 and the 0.001-μF feedthrough capacitor are mounted on one of the walls. VFO tuning capacitor C5 is held in position by means of a section of double-clad pc board which is 2 × 1-1/4 inches in size (50 × 32 mm). This mounting fixture is soldered inside the box walls approximately 1/2 inch (12 mm) behind the front panel (see photograph). A panel height of 3-3/4 inches (95 mm) is used.

[1]Footnotes appear on page 18.



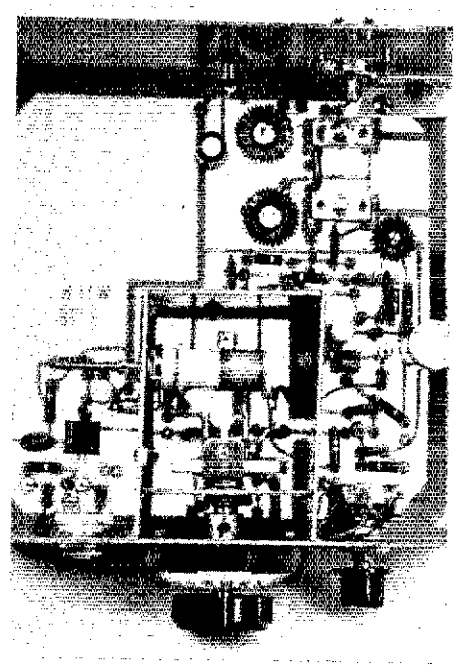


Fig. 2 — Interior view of the receiver. The input filter (FL1) is visible at the upper right. U1 and the related audio-amplifier components are shown at the lower left. A small aluminum L bracket is visible at the extreme upper right. It reinforces the rear panel/main pc board to prevent separation of the two assemblies under stress. Some of the layout has been altered from this prototype version. Follow the pattern provided in Fig. 3.

Fixed-value resistors are 1/4- or 1/2-watt composition. Numbered components not listed below are described in Table 1.

R1 — 10-kΩ audio-taper control.
RFC1 — Miniature 500-µH rf choke, J. W. Miller 70F504AI or equiv.
T1 — 15 bifilar turns of no. 24 enam. wire on an Amidon FT-50-43 toroid core. Twist wires 8 turns per inch before winding on core.
U1 — 8-pin, mini-DIP 741 op amp.

Table 1
Parts Values for 80- or 40-Meter Operation

Band (meters)	*L1, L2* (µH)	*L3* (nom. µH)	*C1* (pF)	*C2, C3* (max. pF)	*C4* (pF)	*C5* (max. pF)	*C6* (pF)	*C7, C8* (pF)
40	2 20 turns no. 20 enam. on T68-6 core. 2 turn link over L1.	4.5 J.W. Miller 42A476CBI or equiv.	5	300 Arco 427 trimmer.	41 Silver mica.	10	220 Poly. or silver mica.	560 Poly. or silver mica.
80	8.7 41 turns no. 24 enam. on T68-6 core. 2-turn link over L1.	9.6 J.W. Miller 42A105CBI or equiv.	7	300 Arco 427 trimmer.	68 Silver mica.	15	330 Poly. or silver mica.	1000 Poly. or silver mica.

C2 nom. capacitance for 40 meters = 240 pF and for 80 meters = 184 pF. C3 nom. capacitance for 40 meters = 198 pF and for 80 meters = 116 pF. The link is wound over the grounded end of L1. Use the same winding sense for the link and the main winding. Spread L1 and L2 turns uniformly around all of the toroid core. C5 is a small variable capacitor with a 1/4-inch (6.3-mm) dia shaft (builder's choice). Hammarlund HF-10 and HF-15 suitable. J. W. Miller's address is 19070 Reyes Ave., Compton, CA 90224. Catalog available. Poly. = polystyrene.

The blank space at the rear of the receiver board is available for mounting accessories such as an RC active audio filter or a converter. The pc etching pattern appears in the "Hints and Kinks" section of this issue and a parts placement diagram is given in Fig. 3.

Testing the YY Special

When power is applied to the receiver, there should be a reasonably loud hissing noise heard in the earphones with the af-gain control advanced for maximum volume. Rough alignment of the front-end filter (FL1) can be accomplished by tweaking C2 and C3 while touching the antenna connection (J1) with a screwdriver blade. Peak the trimmers for maximum "cracking" noise while contact is being made with the screwdriver. Next, align the VFO by placing a length of wire near L3 and connecting the opposite end to the antenna post on a calibrated communications receiver. For 80 meters, set the slug in L3 so that a signal is present at 3.65 MHz on the communications receiver when C5 is fully meshed. The same adjustment is carried out for 40 meters, except that L3 is set for a signal at 7 MHz when C5 is fully meshed.

Final adjustment of FL1 should be done while operating the receiver with an antenna connected to J1. The antenna should present an approximate 50-ohm impedance to the receiver, as FL1 is designed to look into a 50-Ω termination. For all practical purposes a half-wavelength dipole with coaxial feed, or a coax-fed vertical will suffice. The antenna should be resonant for the band of operation. After the antenna is attached, tune the receiver to the center of its coverage range (3725 or 7100 kHz). Locate a weak signal and set C2 and C3 for maximum earphone volume. This adjustment should be repeated four times to compensate for interaction between the tuning adjustments. There will be a slight shift in

VFO frequency as the trimmers are adjusted. This is normal. The YY Special can be set for other segments of the 3.5-MHz band by readjusting L3, C2 and C3. Good reception of ssb signals is possible with this receiver. However, as is true of all simple direct-conversion receivers, single-signal reception is not possible. There will be a response of equal magnitude either side of zero beat. At times, this will increase the QRM problem — especially under crowded band conditions.

Concluding Remarks

WB1FSN built her receiver for 40 meters. The other three were built for 80 meters. When the receivers were finished, the exciting moment arrived when they were tested, and to our delight, all of the units worked the first time they were turned on. Coauthor WB1FSB proudly took her receiver home, hooked it up to the antenna and tuned the band. Phone and cw signals were heard clearly from many states and countries. The sensitivity of the YY Special is such that a 1-μV signal from a generator is plainly audible in the headphones, and for 80 or 40 meters this kind of receiver sensitivity is entirely adequate.

For those wanting a cabinet around their receiver, one can be made inexpensively from pieces of double-sided pc-board material. Sure hope you enjoy building this "YY Special" as much as we did. QST

Notes

[1]Amidon Associates, Palomar Engineers and G. R. Whitehouse Co.

[2]Pc boards, artwork, parts available from Circuit Board Specialists, P. O. Box 969, Pueblo, CO 81002.

[3]Parts only available from G. R. Whitehouse, 11 Newbury Dr., Amherst, NH 03031.

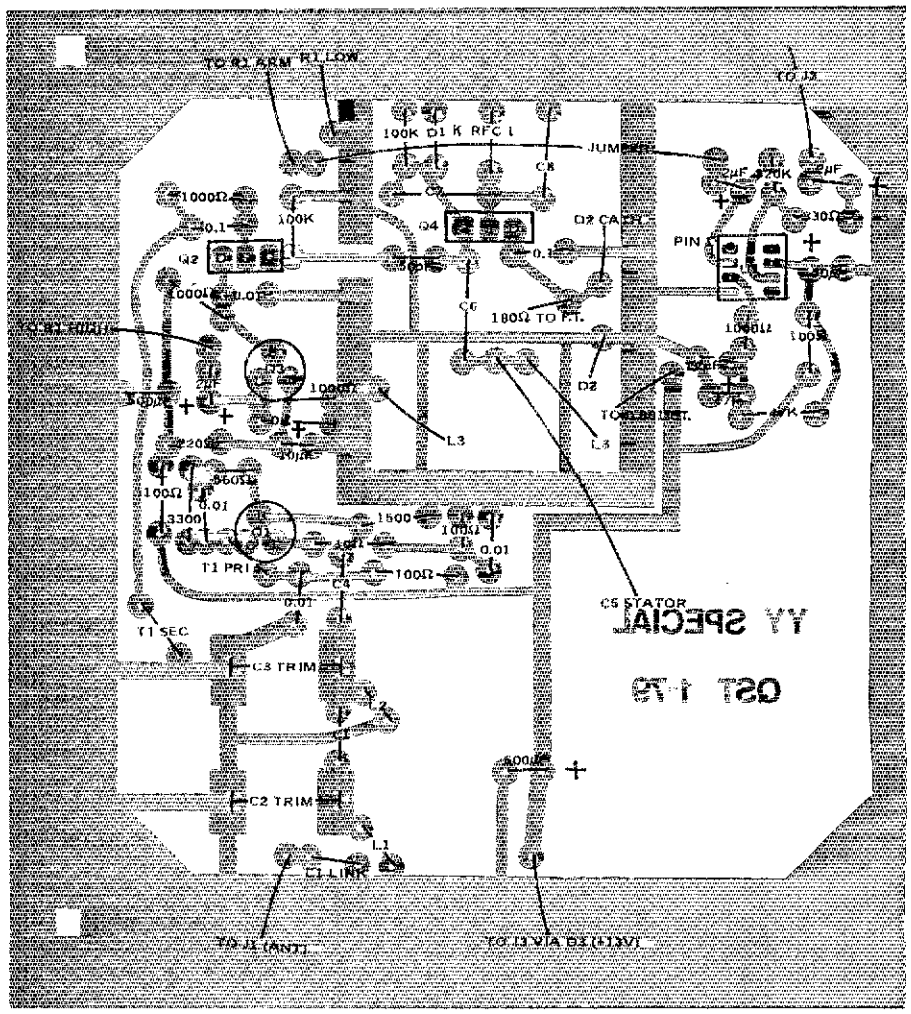


Fig. 3 — Parts-placement diagram for the main receiver board, shown from the component (non-foil) side. The shaded area represents an X-ray view of the copper pattern. (The etching pattern appears in the "Hints and Kinks" section of this issue.) Decimal-value numbers alone represent capacitance in microfarads. Whole-number values with no units represent resistances in ohms; k = 1000. J = wire jumper; K indicates the cathode of a diode. The front and rear panels are soldered to the copper border of the main pc board. The VFO box is affixed to the upper-center rectangle of copper by means of no. 6 spade bolts; one bolt on each box wall.

Strays

OSCARS GO "CAMPING"

☐ Yes, it's true — Amateur Radio satellites are really getting around these days. Another non-Amateur Radio publication has picked up on the popular OSCAR satellites. The October issue of *Campfire Chatter* carried an article by ARRL Public Relations Specialist Bobbie Chamalian, WB1ADL, which was written originally as a news release. The publisher's lead line was "Amateur ('Ham') Radio: CB's Big Brother." — *W9KDR*

QST congratulates . . .

☐ Wilbur J. Kupfrian, W2BVA, elected to the new position of chairman of the board of directors and chief executive officer of Brownian Electronics Corporation of Binghamton, NY. The firm's president, Robert B. Brown, W2EDN, will continue as chief operating officer. Brownian's VHF Engineering Division manufactures vhf and uhf Amateur Radio equipment and accessories.

INTERNATIONAL POLLUTION SOLUTION

☐ Dr. Sidney A. Schwartz, WB2SHB, a hearing officer with the New York State Department of Environmental Conservation, is working with Gerardo Mesa, EA8QU, an official of Fuerte Ventura in the Canary Islands, on a program to recycle solid wastes which can no longer be dumped into the sea where they threaten economically important shellfish beds. Permission to assist in solving the problem was given WB2SHB after he developed information on the situation during a QSO with EA8QU. — *Harry Hovey, WB2OGN*

Fifty years is a long time to belong to any organization, and we're sure glad it was ours! That's how long Liz Zandonini, W3CDQ, has been a member of ARRL. Here she receives her 50-year plaque from Atlantic Division Director Harry A. McConaghy, W3SW, during the recent Gaithersburg (MD) hamfest sponsored by the Foundation for Amateur Radio. *(photo courtesy of Carolyn Dooley)*

What Does Your SWR Cost You?

Basic Amateur Radio: Wondering whether to spend a fine day with the YL or with your antenna? This article may help you decide.

By Stan Gibilisco,* W1GV

No doubt most of us have heard someone tell a story similar to this at a local ham gathering: "I put up a new antenna for 40 meters and it doesn't work. I cut it to exactly 65.69 feet,[1] according to the formula for a dipole, but my SWR bridge reads 3:1!"

For some reason, a good many hams believe that a "high SWR" is a terrible thing, indicative of some serious antenna malfunction. Not long ago there was an excellent series in *QST* entitled "Another Look at Reflections" by M. Walter Maxwell.[2] Those interested in a detailed theoretical discussion should refer to that series. The purpose of this article is to show how to determine the amount of signal you are losing because of your SWR — and more important, whether it is worth bothering about.

Power Loss

There is only one way that power can be wasted in a properly balanced antenna system, and that is in the form of heat.[3] Power may be dissipated in the transmitter output circuit or Transmatch, in the conductors and dielectric of the transmission line, in the antenna conductors, and in objects surrounding the antenna, including the earth and grounding system. All the rest will get radiated. There's simply *nowhere else* it can go!

Standing waves on a transmission line cause an increase in the amount of power dissipated in the line. In the extreme, power may also be dissipated in the tuning network circuitry, but this rarely occurs if the network is designed to handle a high SWR at the power level being used. A high SWR on a transmission line will *not* appreciably increase radiation from the line.

Table 1 shows the loss of the two kinds of transmission line most often used by hams, in decibels per 100 feet, under perfectly matched conditions (1:1 SWR).[4] It is assumed that the line has not deteriorated because of age or adverse environment; in such cases the loss will be greater than indicated.[5]

As an example, suppose we have 65 feet of RG-58/U feeding an antenna on 21 MHz. The matched-line loss at this frequency is approximately 2.0 dB per 100 feet. To obtain the figure for 65 feet, simply multiply 2.0 by 0.65, giving 1.3 dB. Of course, odds are that we will *not* have a perfect match between the line and the antenna. This figure, 1.3 dB, is nevertheless important for determining the additional loss caused by a mismatch.

Determining the SWR

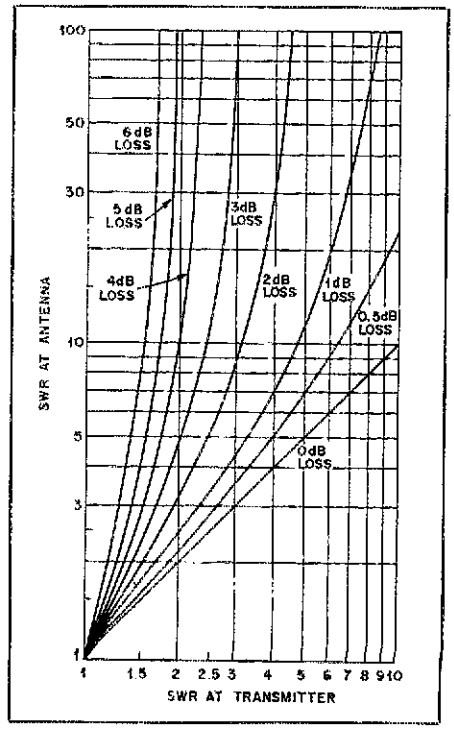
When measuring SWR, one will most likely take the reading at the transmitter output. To get a true reading, however, it should be measured at the point where the feed line is connected to the antenna. Because of line loss, we will see more "forward power" at the transmitter than at the antenna, and also less "reflected power" at the transmitter than at the antenna. These two factors combine to give us a false reading at the transmitter —

Table 1

Approximate matched-line loss in dB per 100 feet for the two most commonly used types of coaxial transmission line.

Coax Type	Frequency (MHz) 1.8	3.5	7	14	21	28
RG-8/U	0.2	0.3	0.5	0.7	0.8	1.0
RG-58/U	0.5	0.7	1.0	1.5	2.0	2.3

Fig. 1 — SWR at input end of transmission line vs. SWR at load end for various values of matched-line loss.



*Editorial Assistant, *QST*

[1]Notes appear on page 20.

the true SWR is higher than this reading. The greater the matched-line loss, the larger the discrepancy. Fig. 1 is a correction graph which will tell you the true SWR if you know the matched-line loss and the SWR as measured at the transmitter.[6] This is certainly more convenient than climbing up to the antenna feed point with an SWR bridge, especially if this point is suspended in midair!

Suppose the 21-MHz installation previously mentioned gives us an SWR reading of 2:1 at the station. Using Fig. 1, we see that the true SWR is about 2.8:1 (this involves some interpolation but extreme accuracy is not essential). That sounds pretty bad, doesn't it? At 21 MHz, using RG-58/U, it must be horrible, right? Well, let's see!

How Much Does It Cost?

Now that we know the true SWR, we're almost ready for the final step. But first it is important to understand one thing: If the additional loss caused by standing waves amounts to less than 1 dB, then from a practical standpoint there is no SWR loss at all. Never mind that 1 dB represents 20 percent of the power! A decibel happens to be the smallest change in signal strength that a listener can detect if he is expecting it. Any change of lesser magnitude is inconsequential.

We use Fig. 2 to determine the loss caused by the line SWR. Since the matched-line loss is 1.3 dB and the true SWR is 2.8:1, less than 0.6 dB additional loss results from the mismatch. This amount is negligible!

The *overall* feed-line loss (the sum of the matched-line loss and the SWR loss) in this system is 1.3 dB + 0.6 dB, or 1.9 dB. If we replace the RG-58/U cable with an equal length of RG-8/U, the overall loss will be approximately 0.8 dB, as the reader is invited to verify. Whether or not this gain of 1.1 dB, which is a just-detectable improvement, is worth the expense is up to the control op to decide.

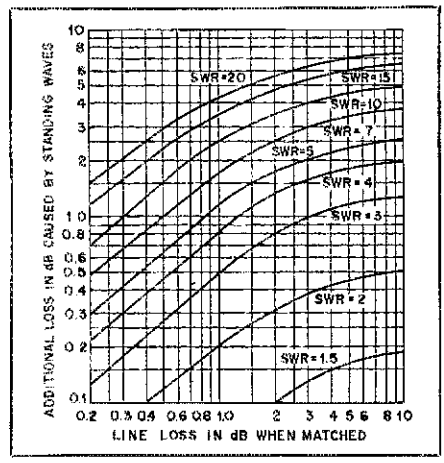


Fig. 2 — Increase in line loss because of standing waves (SWR measured at the load). To determine SWR loss, first determine the matched-line loss for the piece of line in question. Locate this point on the horizontal axis and move up to the curve corresponding to the actual SWR as measured at the antenna. The corresponding value on the vertical axis gives the additional loss in decibels caused by the standing waves.

Some rather surprising facts can be gathered using Table 1 and Figs. 1 and 2. Suppose for instance we are using 50 feet of RG-8/U at 3.5 MHz. How large an SWR, as measured at the transmitter, can be tolerated if one desires to keep the SWR loss to less than 1 dB? Believe it or not, the answer is 9:1! In fact, if you cut an 80-meter dipole for the center of the band, it can be used from 3.5 to 4.0 MHz without significant SWR loss, even with a fairly long feed line.

In closing, it should be mentioned that most modern commercially manufactured equipment is designed to operate with an SWR of 2:1 or less. There is a good reason for this limitation: A high SWR can cause large currents or voltages to appear in the transmitter output network. Under certain conditions there may be sufficient current to cause heat damage to the output coil, or enough voltage to arc across the loading capacitors. Usually the mismatch will render it impossible to obtain enough output for either of these things to happen. But it's a good idea to use a Transmatch under high-SWR conditions (even though it won't reduce feed-line mismatch loss) to keep your transmitter happy and your sleep free from nightmares. ■

Notes

[1]Feet may be converted to meters by multiplying by 0.3048.
[2]*QST*, April, June, August and October 1973, April and December 1974, and August 1976.
[3]With improper balance the line may radiate some power. Depending on the particular installation, this may or may not be considered "wasted."
[4]Additional data for these and other kinds of transmission lines can be found in *The ARRL Antenna Book* and *The Radio Amateur's Handbook*.
[5]A method of testing old coax for matched-line loss was given by L. A. Cholewski, "Some Amateur Applications of the Smith Chart," *QST*, January 1960, p. 28. It also appears in the 1966-1972 editions of the *Handbook*.
[6]*The ARRL Antenna Book*, 1974, pp. 82-83.

Strays

QST congratulates . . .

☐ David Townsend, WB5PJV, who has been named a semifinalist in the 24th annual National Merit Scholarship Program. He will compete for scholarships to be awarded this spring. Active in high school organizations, David plans to major in electrical engineering at Rice University.

QST congratulates . . .

☐ Steve Polishinski, WB9YSD, who received a blue ribbon in the Winnebago County (WI) Fair for a 4-H project book — 35 pages long — entitled "Do Your Own Thing — Ham Radio."

I would like to get in touch with . . .

☐ anyone who can send canceled postage stamps to be used to help rehabilitate persons who have undergone long hospitalization or are invalids confined to their homes. Mettus Wenteler, Middenweg 61, 1711 SK HENSBROEK, The Netherlands.

SAVE TIME — AND POSTAGE!

☐ Think economy — of both time and cost — when writing ARRL headquarters. Put your thoughts or requests addressed to more than one person or department on separate sheets of paper, each carrying your name and return address, and send them along in the same envelope.

HAMS HELP AT ROADRACE

☐ Forty members of the Southcentral Connecticut Amateur Radio Association (SCARA) really got things rolling with a bang as they provided 2-meter fm communications for the First Annual New Haven 20-km Roadrace on Labor Day. When Mayor Frank Logue couldn't get his starter's pistol to fire, Ralph Hirsch, K1RH, assisted by yelling "BANG" into his HT and the PA system to coordinate time clocks and start the 2200 runners. As a crowd of 50,000 watched, SCARA members did their thing on .52 simplex, .01/.61 and .855/.255 by linking start and finish areas, and furnishing primary and emergency traffic nets. A three-man bicycle brigade patrolled the race route and handled two serious medical emergencies with such speed that the ill were inside a hospital within five minutes! — *Richard Kalt, W1FYI*

The cycle patrol that assisted during the First Annual New Haven 20-km Roadrace: (l-r) Paul Landman, WA1JKN; Dr. Bill Lattanzi, WA1BHU and Brad Oestricher, WA1TAS.

Human Engineering the Station Receiver†

In January 1957 QST, a classic article was published by Byron Goodman, "What's Wrong with Our Present Receivers?" Not all the ills have been cured in the ensuing 22 years. This paper points out further areas for circuit improvement.

By Jay B. Rusgrove,* W1VD

In recent years the subject of improved receiver dynamic range has received considerable attention, and rightly so. The commercial and Amateur Radio services have experienced significant increases in band occupancy, which places stringent requirements on receiver performance. Adjacent-channel interference, blocking (desensitization), and spurious signals created within the receiver must be held to a minimum. Through the use of high-level, doubly balanced mixers, spectrally pure local oscillators and proper gain distribution, many present-day receivers exhibit dynamic range figures of 90 to 100 dB.[1] These receivers are suitable for all but the most demanding applications.

Unfortunately, much of the fine work that has been done to improve present-day communications receivers ends with the circuitry just ahead of the intermediate-frequency (i-f) filter. After all, once the receiver passband has been narrowed by the filter, the important work has been done . . . or has it? Are the i-f amplifier, detector, age and audio stages merely routine, or can improvements be effected in these areas? Do currently available receivers extract all of the information to be received? What causes operator fatigue? Are certain depth and spatial perceptions of the human brain/ear interaction being wasted? For the past several years, on a personal-research basis, I have set out to answer these questions by making careful measurements, and while modifying and improving a typical communications receiver. The purpose of this paper is to explore these questions, provide answers and illustrate examples of proven circuits which I have found to improve intelligence recovery from high-dynamic-range receivers.

*Senior Assistant Technical Editor, ARRL

†Adapted from a paper submitted to the Institute of Electrical and Electronic Engineers in August 1978, titled "Human Engineering the High-Dynamic Range Receiver for Improved Intelligence Recovery."

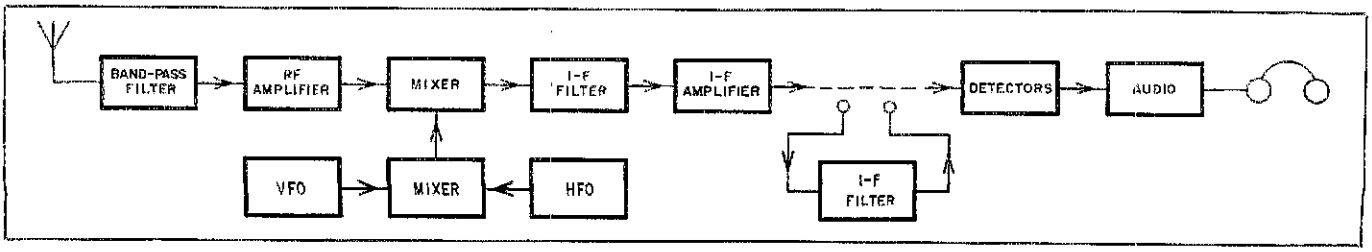
[1]References appear on page 25.

Hiss and Hum — A Subconcious Distraction

The human brain/ear subsystem forms perhaps the sharpest and most flexible filter available. There are at least two important modes in which the brain/ear filter can work — band pass and band reject. Evidence of a band-pass characteristic can be demonstrated easily with a high-quality communications receiver with switchable bandwidths, a signal generator and an experienced radio operator. The receiver is first set at the narrowest bandwidth available and the signal generator is adjusted to deliver the weakest possible continuous-wave (cw) signal that the operator can perceive. Then the bandwidth is increased in steps up to that of the widest filter available in the receiver. More often than not, the operator can still detect the signal, which for all practical purposes, is buried in the noise.

Many communications receivers suffer from excessive hiss and power supply hum. While this may not impair reception of even the weakest signal, the constant subconcious rejection of these sounds can greatly contribute to operator fatigue. An analogy can be drawn to being seated near a movie projector in operation. For the first few minutes of the film the constant "clackity, clackity, clack" of the projector is objectionable to most viewers. Once the brain/ear filter is tuned to reject this sound it is barely noticeable. After long periods of viewing many people complain of fatigue, in some cases accompanied by a dull headache. It is believed that this fatigue is caused by the constant subconcious filtering out of the undesired information. The same behavioral reaction is believed to hold true with regard to hiss and hum in a communications receiver.

Fig. 1 — Block diagram of a single-conversion receiver, the broken line representing a direct connection. Most of the receiver gain is obtained in the intermediate-frequency amplifier, resulting in wide-band noise at the detector input. Inserting an additional stage of filtering ahead of the detector, as shown, is one method of removing most such noise.



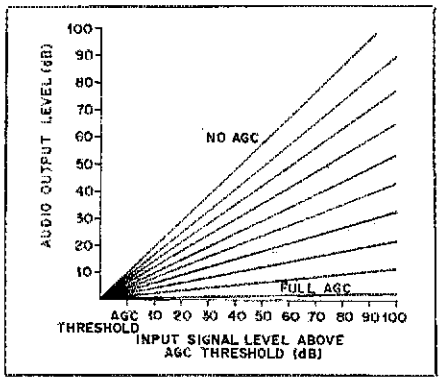


Fig. 2 — With PIN-diode attenuators, it is possible to build a linear, variable-slope agc system with the range of responses illustrated here. Most modern receivers seem to use too much agc.

To determine whether or not hiss and hum in a communications receiver is noticeable and/or objectionable to a series of listeners, a study was conducted under controlled laboratory conditions. For this study, two communications receivers were used, one that had substantially no hiss and hum, and one that had these annoyances. At the push of a button, each subject was able to switch between the two receivers. Both units were purposely tuned to the same frequency where Morse code could be heard. The push button controlled a switching relay so the listener could not tell which receiver he or she was listening to. Twenty subjects, ranging in age from 19 to 50, radio operators and nonradio operators, both male and female, were tested.

The subjects were asked which receiver they would prefer to use for a period of time, and were given the choice of receiver A (with hum and hiss), receiver B (no hum and hiss), or no preference. Eighteen of the 20 chose Receiver B. One subject had no preference and the other chose receiver A. Her reason for choosing that receiver was that the signal received did not have the slight hum modulation that was present on Receiver B. It is interesting to note that the power supply hum in receiver A masked the slight hum on the signal that was audible (at least to that subject) in receiver B. This subject did note that there was less overall hum and hiss in receiver B. While this study is certainly not conclusive, it does illustrate the desirability for reducing all nonessential information at the output of the receiver.

Hiss Reduction

My early attempts to reduce the annoying hiss in a communications receiver were made with various forms of audio shaping and filtering. Although these methods were somewhat successful, when enough filtering had been applied to reduce the objectionable hiss output from the receiver, the voice signals sounded "muffled." This was due to the severely restricted audio bandwidth. It was suspected that there must be a better method.

After careful study of the literature, an excellent article written by Sabin[2] looked as though it might have the answer to this problem. He suggested the use of an additional filter located ahead of the product detector at the second i-f. Since the receiver I was using for my tests did not lend itself conveniently to the addition of another i-f (it already had dual conversion), another filter for the existing i-f, located after the i-f amplifier stages but directly ahead of the product detector, was tried. Some interesting observations and results were noted.

So this idea will be somewhat easier to visualize, consider the block diagram of a conventional single-conversion receiver, as shown in Fig. 1. (For this example the broken line represents a direct connection.) As with any receiver designed for high dynamic range, most of the receiver gain is obtained at the i-f. Input signals to the i-f amplifier are limited to a very narrow portion of spectrum determined by the characteristics of the i-f filter. Amplifier output consists of the amplified signals present at the input, along with a rather strong and broad noise spectrum. The wide-band noise is generated by the high-gain i-f amplifier stage(s). This wide-band noise is discerned as the background noise (hiss) of the receiver. In most receiver designs this noise is greater than high intelligence recovery allows for.

One method for removing most of this wide-band noise is to use an additional i-f filter after the amplifier stage(s) just prior to the product detector. This filter, replacing the broken line in Fig. 1, confines the i-f amplifier-generated noise to that portion of the spectrum which also contains the intelligence to be received. Needless to say, the passband characteristics of the two filters must be well matched.

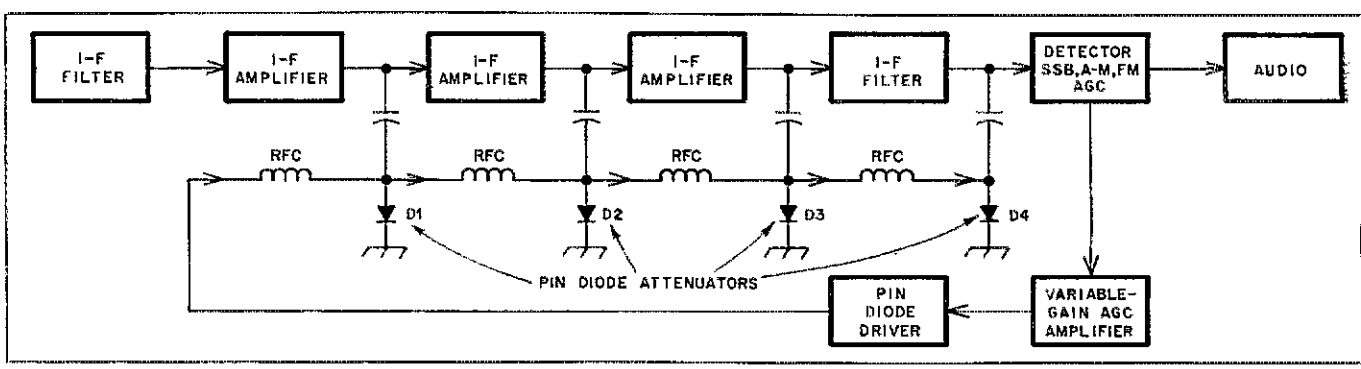
An additional benefit of the extra i-f filter is improved ultimate rejection. Many of the commercially available crystal or mechanical filters are poor in this regard, offering ultimate rejection of less than 100 dB. These figures are often unattainable in practice. The manufacturers' specifications assume ideal shielding and minimum leakage around the filter. Through the use of two i-f filters separated electrically by the i-f amplifier and physically housed in separate, shielded enclosures, ultimate rejection of 140 dB is possible. The problem of poor ultimate rejection is especially pronounced in receivers that make use of heavy agc, since the received-signal dynamic range is compressed greatly by the time it reaches the audio output.

My receiver uses two sets of diode-switched crystal filters, one before and one after the i-f amplifier stages. Bandwidths of 400, 2400, 4000 and 12,000 Hz are selectable from the front panel. Diode switching the crystal filters eliminates the need for long i-f signal leads to and from the filters, which could compromise the ultimate attenuation.

Hum Reduction

With the annoying hiss banished from the receiver, the power-supply hum became even more apparent. Initial inspection revealed that the audio board was located within several inches of, and directly in line with, the power transformer. By moving this board to a position at right angles to the core of the transformer a significant reduction in hum was noted. A small amount of hum remained which was more noticeable as the bandwidth of the receiver was narrowed. Receiver background noise in the

Fig. 3 — Block diagram of the author's agc system. PIN diodes provide for variable attenuation.



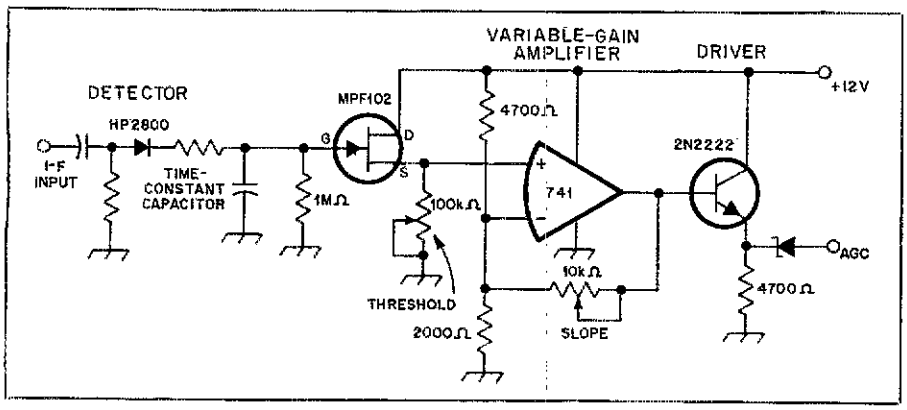


Fig. 4 — Partial diagram of a variable-slope agc system. Audio-derived agc was not tested.

400-Hz bandwidth position was so low as to almost be dominated by the remaining power supply hum.

Inspection of the audio board and associated cabling indicated the use of a single-point ground system. Any attempt to defeat this system, such as additional ground connections throughout the audio circuitry, produced more hum.

Due to size limitations and perhaps economic considerations, the receiver suffered from a lack of filter capacitance. A 15,000-μF computer-grade electrolytic capacitor was temporarily wired in parallel with the existing 3000 μF of capacitance. The hum was reduced to an acceptably low level, and bridging additional capacitance across the 18,000 μF produced no further decrease in residual hum. A 23,000-μF computer-grade electrolytic was later installed on a permanent basis.

As designers of state-of-the-art audio equipment are now finding out, large amounts of power supply capacitance are required for good power supply transient response. The same is true for the high-performance communications receiver. Good transient response allows the amplifier stages to deliver full audio output on instantaneous input peaks.

Automatic Gain Control

It seems as though most receiver design engineers consider agc a necessary evil, so they take the "let's hurry up and get it done" attitude. All but perhaps one or two communications receivers I have had the opportunity to use have suffered from a number of agc "ills." Clicks, pumping, overshoot, inappropriate delay times, and distortion of strong signals are common problems that can be solved relatively easily. A more significant area of concern is that of agc slope — the ratio of input signal to output audio. Some commercial manufacturers take great pride in quoting agc figures of "less than 3 dB change in audio output for a signal input change of 100 dB." This means that once a signal is above the agc threshold level there will be little difference in audio output. A 5-μV signal would produce about the same audio output as one of 50,000 μV! Without a meter to measure agc voltage (corresponding to signal strength), the operator would be unable to discern the strength of a particular signal. While agc characteristics of this sort might be desirable for certain radio services, it is out of place in shortwave, amateur and related communications where a comfortable circuit signal-to-noise and interference ratio is not easily maintained.

Excessive agc results in a communications receiver that sounds "flat" — without depth; lacking "presence," to use an audiophile term. This may explain the phenomenon of why synchrodyne (direct conversion or zero i-f) receivers sound rather pleasing to the ear. Normally, these receivers employ little, if any, agc so it sounds as though signals stand out against an almost noiseless background. It is believed that the use of excess agc wastes an important ability of the brain/ear — that of distinguishing between sounds of different volume levels. Imagine listening to a music or voice passage played through a stereo system which retains only 10 dB of dynamic volume range!

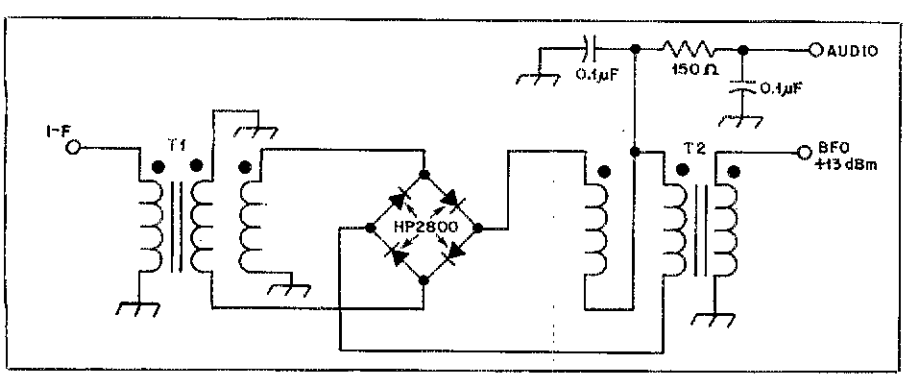
Several attempts were made to increase the "presence" of the experimental communications receiver. One test involved the use of a dBX, Inc., model 117 audio compressor/expander, which was designed primarily for use in high-performance audio systems. This unit has the unique property that signals passed from the input to the output can be compressed infinitely, expanded up to a 2:1 ratio, or compressed or expanded any amount between the two extremes.

The results with the "dBX" installed in the audio system of the communications receiver were rather dismal. Even with the box adjusted to deliver an expansion ratio of 2:1, there was very little difference in the audio output for vastly different signal levels. It was suspected that the agc characteristics of the receiver were so flat that the expander did not have enough dynamic range to expand upon.

These tests indicated the need for an agc system that could accurately control the audio output level of the receiver, preferably in a linear manner. After several failures involving gain control of dual-gate MOSFETs, differential-amplifier ICs and wide-band rf/i-f amplifiers, I investigated the PIN-diode attenuator. The highly linear applied-voltage to attenuation ratio proved to be exactly what was needed. By using the PIN-diode attenuators, it was possible to build a linear, variable-slope agc system. With this system it was possible to adjust the slope of the agc as shown in Fig. 2. As can be seen, the system allows for complete or flat agc (straight horizontal line), or no agc (45 degree line), and variations between. The no-agc line cannot be exactly as shown in the drawing, of course, since the latter stages of the receiver will saturate and produce no additional output when driven beyond a certain level. Actual on-the-air tests involving several radio amateurs have confirmed the suspicion that conventional receivers use entirely too much agc. However, there are limits. Since the receiver will be called upon to handle both weak and strong signals, a certain amount of agc will be necessary to prevent latter stage overload and excessive volume levels in the speaker or headphones.

A block diagram of the agc system used in the author's receiver is shown in Fig. 3. PIN-diode attenuators are used between

Fig. 5 — Circuit for a doubly balanced diode-ring product detector. A detector such as this contributes little noise to the system and offers greater isolation between input and output ports than does a single-ended mixer. See text for winding information on T1 and T2.



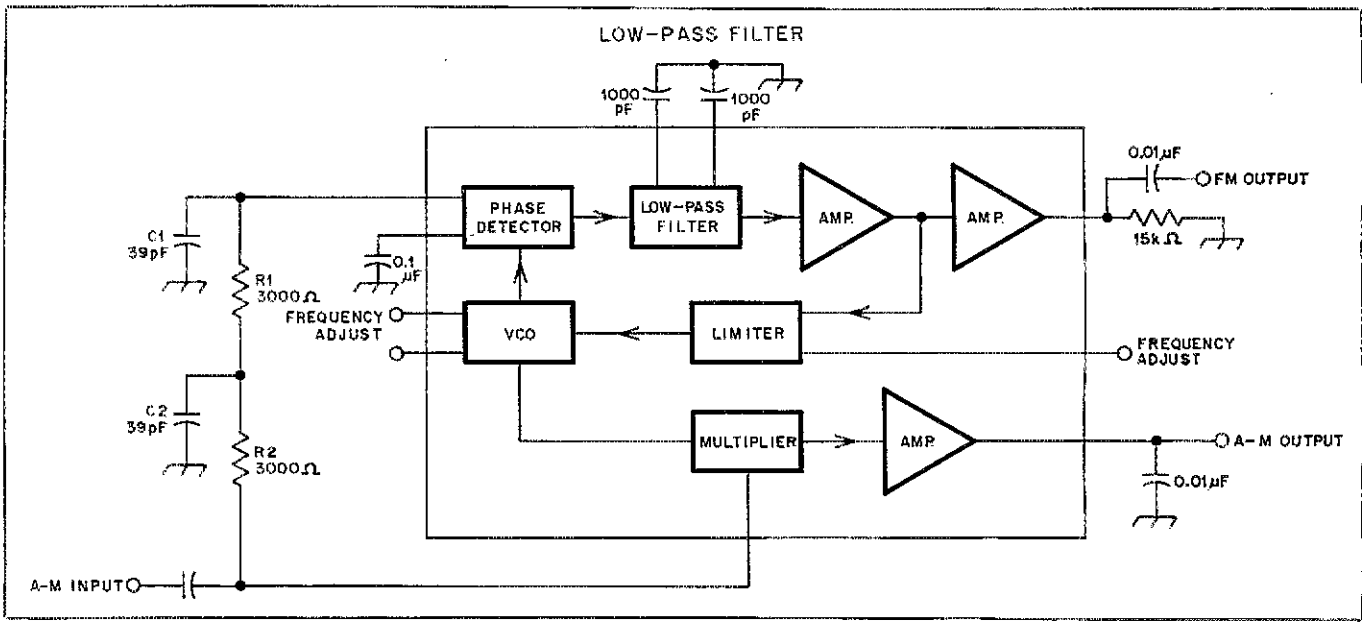


Fig. 6 — Block diagram of a phase-locked-loop fm detector. Active stages shown inside the inner rectangle may all be contained in one integrated-circuit package.

each of the three i-f amplifier stages with one stage of attenuation after the second i-f filter. The addition of D4 was found to be necessary since the age detector is located after the second i-f filter. Because this narrow filter necessarily introduces a time delay into the age system, gain reduction within the i-f amplifier does not occur quickly enough to reduce the level during the first few milliseconds of signal input. This results in a rather prominent click on the leading edge of strong signals within the passband. D4 eliminates this problem. A partial diagram of the variable-slope age system is shown in Fig. 4.

Product Detectors

Since most signals to be received in the hf amateur-band region are either ssb or cw, the need for a good, low-distortion, low-noise product detector was obvious. Of the various types investigated, the doubly balanced diode ring offered the best all-around performance. This type of detector is essentially the same as the familiar diode-ring mixer, in that it is inherently broadband and requires no adjustment. It is well-known for its signal-handling capability and low distortion when provided with adequate LO (in this case BFO) injection. The diode ring contributes little noise to the system. It does, however, have an approximate 6-dB conversion loss that must be taken into account.

A doubly balanced detector offers greater isolation between the LO (BFO) and i-f (audio), and the LO and rf (i-f output) ports than can be obtained with a single-ended mixer. This relaxes the requirements for rf bypassing of the audio port, but more important, it reduces the BFO feedthrough to the output of the i-f strip. This is important because severe IMD can occur should the BFO signal be injected into one or more of the i-f amplifier stages. Also, it is highly desirable to keep the BFO signal out of the age detector — a problem in some very expensive receivers.

Shown in Fig. 5 is a circuit diagram for a doubly balanced, diode-ring product detector. The diodes used in this detector are Hewlett-Packard HP-2800 series hot-carrier units. T1 and T2 are broadband transformers which consist of 10 turns, trifilar wound with no. 32 wire on 0.37-inch (9.4-mm) cores of initial 950 permeability. Optimum LO injection was established at +13 dBm.

FM and A-M Detectors

Although there is limited use of a-m and fm in the hf amateur bands (but considerable hf commercial use), there are instances when it is desirable to receive these modes. For example, most foreign broadcasts in the shortwave bands are of the a-m mode. Also, should vhf converters be used ahead of the receiver there is a definite need for fm capability — especially for those portions of bands that are set aside for channelized fm operation.

The search for a stable, highly linear, noncritical and adjustment-free fm demodulator led to the phase-locked loop (PLL). For fm detection, the PLL can be used as a complete fm i-f strip, limiter, and fm detector. It can be used to detect wide- or narrow-band fm signals with greater linearity than can be obtained with other means.

Shown in Fig. 6 is a block diagram of the PLL fm demodulation system. Once the PLL has locked to an fm signal, the loop VCO will track the instantaneous frequency of the input signal. The filtered error voltage, which forces the VCO to maintain lock with the input signal, becomes the demodulated fm output. The linearity of the VCO voltage-to-frequency transfer characteristic determines the linearity of the demodulated signal. With modern PLL ICs the distortion can be held to less than one percent.

One might say that the a-m detector found me, rather than me finding it. While leafing through the manufacturers' specifications for various PLLs, the Signetics NE561 caught my eye. This particular device contains, in addition to the normal PLL circuitry, an extra multiplier and amplifier stage. The chip is designed for fm detection and synchronous a-m detection. PLL synchronous a-m detection has certain advantages over peak a-m type detection, such as not suffering from severe distortion at low-input signal levels.

A block diagram for the synchronous a-m detection system is shown in Fig. 7. The PLL locks onto the carrier of the a-m signal so that the VCO output has the same frequency as that of the carrier. The demodulated a-m is obtained by multiplying the VCO signal with the modulated input signal and filtering the output to remove all but the difference-frequency component. As may be recalled from basic PLL theory, when the frequency of the input signal is identical to the free-running frequency of the VCO, the loop goes into a locked condition with these signals 90 degrees out of phase. By shifting the input 90 degrees so that it is in phase with the VCO signal and applying the two signals to a second phase comparator, the average dc value (difference-frequency component) of the phase comparator output will be directly propor-

tional to the amplitude of the input signal.

Since the PLL has a certain capture range, the loop has an inherent degree of selectivity centered about the free-running VCO frequency. Because this method of demodulation is essentially a coherent-detection technique which involves averaging of the two compared signals, it offers a higher degree of noise immunity than can be achieved with conventional peak-detector-type a-m demodulators.

With reference to Fig. 7, the input 90-degree phase shift is accomplished with a simple RC lag network. This network consists of R1•C1 and R2•C2. The values of these components are calculated using the simple relationship

$$R1 \bullet C1 = R2 \bullet C2 = \frac{1}{2\pi F_o}$$

where F_o = frequency of operation.

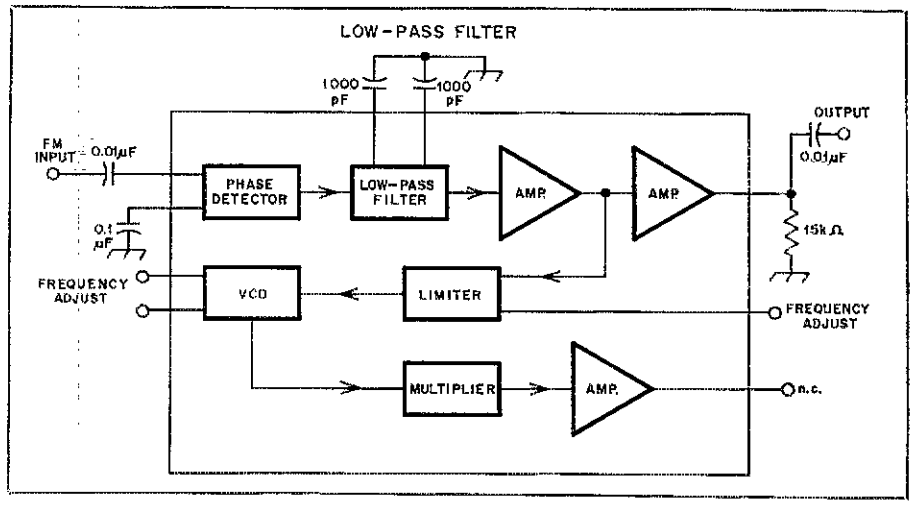


Fig. 7 — A synchronous a-m detector offers improved performance over a peak detector. Note that the active IC elements (inside the inner rectangle) are identical to those of Fig. 6. The author uses a Signetics NE561 for this application.

Audio Amplifiers

Communications-receiver audio channels often disguise deficiencies that exist in earlier stages of the receiver. Techniques such as audio "shaping" or "roll-off" are employed in some conventional receiver designs to help eliminate the relatively high hiss levels discussed earlier. The terms "roll-off" and "shaping" should be exposed for what they really are — a form of distortion. Any time a waveform has been modified, it has been distorted.

Shaping and roll-off circuits create a form of distortion called *slew-rate limiting*. Above a certain critical frequency the amplifier cannot faithfully reproduce the input waveform at the output. For amplifiers that use a roll-off commencing at 3000 Hz, the slew-rate limit frequency can be less than 1000 Hz! All audio components applied to the amplifier above this frequency are distorted.

Slew-rate limit measurements for the audio amplifier in the experimental receiver indicated that the amplifier would not be able to faithfully reproduce signals above approximately 800 Hz. Since the receiver had already been cured of the annoying hiss, there was no reason not to "open" the audio channel all the way out to 100 kHz or so. The limiting factors were found to be several capacitors and inductors (some of which were even diode-switched in during cw reception!), placed at various points in the signal path. With these components removed, the amplifier could faithfully reproduce square waves to a much higher frequency than before. One problem was noted — that of a spike on the leading edge of the waveform, which is presumably high-frequency overshoot. The problem was traced to capacitor C shown in Fig. 8. By using formulas set forth by Baxandall,[3] the value of this capacitor was recalculated and optimized through measurements. The modified amplifier is now flat from approximately 10 Hz to 100 kHz.

The results were most gratifying. Instead of signals sounding dull and muffled as they had previously, they now sounded brassy and sharp. One interesting point I have noticed is that female voices on ssb are no longer difficult to tune in and receive. This seems to be a very common problem with most communications receivers. In the past it has been believed that this is caused by the narrow i-f filter used in most receivers. What I have learned suggests that the problem is not the i-f filter, but rather with the poor frequency response of the audio channel.

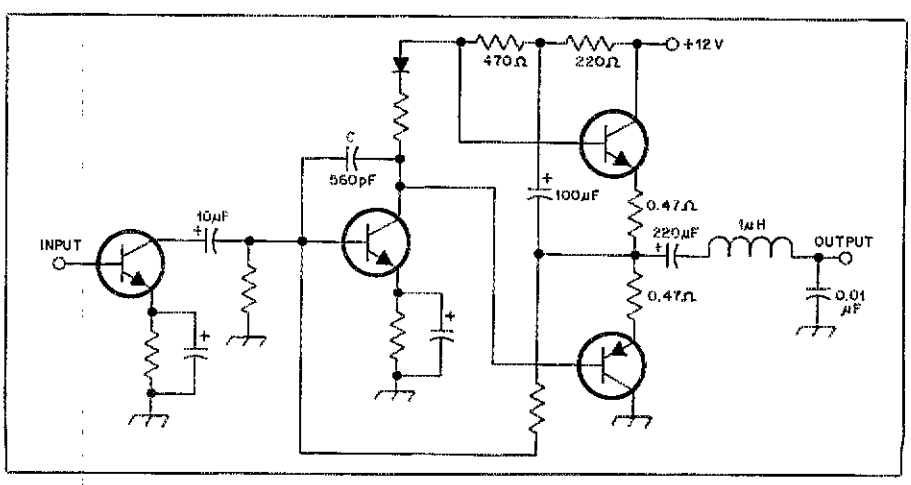
Conclusion

Communication-receiver design has certainly come a long way in recent years. Most of the problems that have plagued our receivers for a number of years (IMD, desensitization and adjacent-channel interference, to name a few) have been remedied. It is hoped that more time will be spent on improved intelligence-recovery systems because, in the end, this is the what it is all about. A receiver can have infinitely good overload characteristics, but if the intelligence-recovery circuitry is poor, the message won't get through. Many design engineers lose sight of this fact, or perhaps they just are naive as to how a good communications receiver should sound. Operator fatigue, wasted brain/ear capabilities, and rather obscure forms of distortion are difficult to perceive at the drafting board. The design engineer needs to develop an ability to perform on-the-air testing, rather than relying totally on laboratory measurements. There is a need for some original thinking — something other than the "follow the leader" attitude. It makes no sense to better the specifications of another manufacturer's product when their figures relate to a totally misconceived idea. QST

References

[1]Hayward, "Defining and Measuring Receiver Dynamic Range," *QST*, July 1975.
[2]Sabin, "The Solid-State Receiver," *QST*, July 1970.
[3]Baxandall, "Audio Power Amplifier Design," *Wireless World*, January 1978.

Fig. 8 — Typical audio amplifier, the type used in the author's communications receiver. The value of the capacitor identified as C was found to require change to obtain a flat response from 10 Hz to 100 kHz, as discussed in the text.



Effects of a Solar Eclipse on the Ionosphere

Some fascinating hf propagation conditions may result on February 26, when Canada and the northern U.S. will be treated to an eclipse of the sun. Don't miss this chance to participate!

By David K. Lewis,* W2HMT

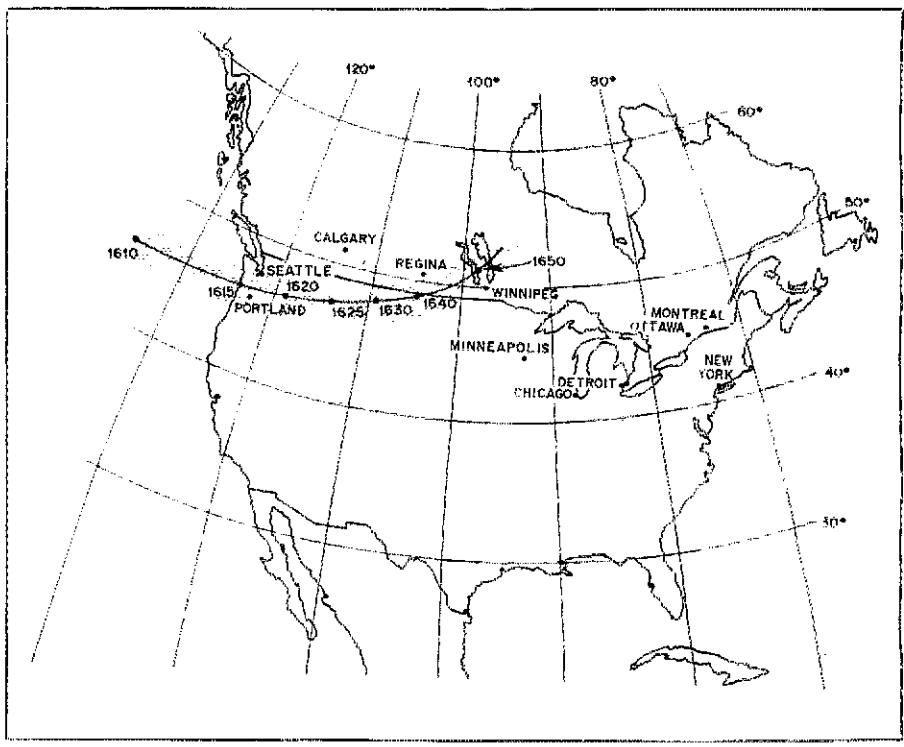
If one were to plot a graph of the number of *QST* articles devoted to long-distance radio-wave propagation vs. time, a cyclic pattern, roughly in phase with the sunspot cycle would be observed. Recent issues have carried articles discussing sunspot cycles and their effects on the ionosphere and propagation,[1] meteor scatter,[2] and auroral-curtain scatter,[3] to cite just a few examples. From all indications, there is a keen and growing interest in propagation among amateurs. However, most articles have been concerned with phenomena that produce DX opportunities at 14 MHz and above. The present article is concerned with a rare but predictable phenomenon that may provide some interesting DX opportunities for 160 and 80/75 meter operators as well: the solar eclipse.

The possibility of experiencing unusual propagation conditions during a solar eclipse was suggested in *QST* not long ago,[4] but without elaboration as to which bands might be most affected. This article describes the probable ionospheric changes caused by a total solar eclipse, and suggests experiments that amateurs might perform to confirm the effects of these changes on hf propagation.[5] The shadow caused by a total solar eclipse will pass over parts of North America on February 26, 1979 (see Fig. 1), providing an opportunity for amateurs to assess the magnitude of propagation enhancement.

Initial Experiment in 1963

This article is the result of an event that occurred in 1963, which I thought insignificant at the time. Since I was in Boston on July 20, a Saturday, I headed north to witness the total solar eclipse that was to be visible over southeastern Canada and Maine late that afternoon. Having heard reports of particularly good propagation conditions on 160 and 80/75 at sunrise and sunset, I took along a couple of battery-operated receivers — an old faithful Zenith Transoceanic SWL portable and a modified Hallicrafters S-38E — and a few hundred feet of hook-up wire — to see what I could hear. In the township of Granby, Quebec, north of the Vermont border, I parked at a point estimated to be in the center of the totality path.[6] Having encountered the usual unpredictable delays, I arrived after the eclipse had begun, less than a half hour

Fig. 1 — Path of totality, at ground level, of the total solar eclipse that will occur on the morning of February 26, 1979. Times given are for arrival of totality, in UTC.



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[1]Notes appear on page 29.

before totality. I hurriedly extended the Zenith vertical antenna, ran about 50 feet (15 m) of wire from the S-38 to a telephone pole and began listening. It was soon apparent that 160 meters was useless because of a very high, steady noise level. On 75-meter phone, the noise level, though high, was intermittent and there was an unusually large number of a-m heterodynes for that time of day and rural location. The band *sounded* as it does after dark. The first solid-copy contact I happened upon was between three VEs, one of whom gave his location as a town north of Toronto, ON. All three signals were quite strong, and were readable despite the noise. Since I had on a number of late evenings worked California stations on 75-meter phone while running 75 watts, this wasn't very impressive. Tuning around during the next five to 10 minutes, a few other signals were heard, but none approaching solid copy. Then totality arrived, and I abandoned my listening to watch the eclipse.

The Eclipse and Its Effects

A total solar eclipse is a captivating experience: the rapidly falling twilight with a 360-degree horizon aglow, the evening calls of the birds, the "diamond ring" effect when only a pinpoint of the solar disk is left uncovered by the moon, and finally the corona (all viewed via a shadow box' to prevent eye damage!). Watching an eclipse is well worth a long journey, even though it lasts only a few minutes.

As the sun reappeared, I went back to listening on 80 and 75 meters, and was immediately struck by the change in the sound of the band. The heterodyne had disappeared and apparent daytime conditions returned. I listened to one cw QSO long enough to determine that it was between two VE2s, then packed up the gear and left.

Looking back on that event, I have mixed emotions. Extensive cloud cover obscured the eclipse from most other ground-based observers that day, and ruined the optical experiments of a number of scientific expeditions involving many persons, months of preparation and considerable expense. Where I was, the clouds parted just before totality, so I was one of the lucky few to see the show. For that I am eternally grateful. On the other hand, I regret that I did not go about the propagation study in a more scientific way. I now wish I had assembled a receiving system more capable of directional reception and noise rejection, listened for a longer time before and after totality, and recorded the calls heard so I could later determine exact locations, antenna configurations and radiated power. Despite my rural location, free of local interference, and low solar noise due to the approaching sunspot minimum, I strongly doubt I could have received the Toronto-area station more than 300 miles (500 km) away on 75-meter phone on a summer afternoon, particularly through what appeared to be high levels of locally generated QRN from electrically active cumulus clouds, without some help from the eclipse. More careful studies during future eclipses may confirm this feeling.

Ionospheric Propagation

Since the days of Marconi, there have been many elegant scientific studies of the physical and chemical properties of the ionosphere and the effects of these properties on radio propagation, including studies carried out within solar-eclipse shadows. A brief survey of these study results provides a probable explanation for my 1963 observations and suggests possibly fruitful future experiments. Radio waves are refracted (bent), and ultimately reflected, by free electrons; the upper atmosphere contains regions at which free electron density becomes sufficiently high, at some times and under certain conditions, to reflect radio signals back to Earth. The returned signal may hit near the point of origin or at some distant location, depending on its takeoff angle and the degree of refraction in the ionized region. Although electrons of solar and galactic origin continually approach Earth, these and other charged particles are largely deflected poleward by the geomagnetic field, often causing an aurora. Thus, regions of high free electron density in the ionosphere over the middle latitudes are generated principally by neutral radiations (photons) which can cause ionization of the molecules present in those regions. Of the three sources of atmospheric ionization — surface radioactivity, galactic cosmic rays, and solar X-ray and ultraviolet photons — only solar emissions have sufficiently high flux and absorption probabilities to generate the necessary electron densities.

The wavelength distribution of solar radiation beamed at the Earth (number of photons plotted against λ) peaks in the visible region of the spectrum and falls off rapidly toward the ultraviolet and less rapidly toward the infrared and radio regions. Planck's constant indicates that the shortest wavelength photons are the most energetic, meaning the *energy* (as opposed to numerical) distribution is skewed toward a peak in the ultraviolet (UV) region. Although the atmosphere looks transparent, and is almost completely so for visible light, nearly all the solar UV and X-ray photons are absorbed at various regions of the stratosphere and ionosphere, producing upper atmospheric conditions which influence climate as well as radio propagation. Each segment of the ionizing radiation spectrum penetrates the atmosphere until it encounters a high concentration of atoms or molecules which have the ability to absorb photons of that wavelength. This results in the formation of more or less discrete regions of high electron density at altitudes of 120-180 miles (200-300 km), 95-120 miles (150-200 km), 55-100 miles (90-160 km) and 30-55 miles (50-90 km), corresponding to the ionospheric F2, F1, E and D regions, respectively. Within each of these regions there is a particular complex set of photochemical and ion-molecule reactions governing the rates of formation and loss of free electrons, and therefore the steady-state electron concentrations within each region. Much is known about the nature of these reactions and their rates, but the fine details of ionospheric processes are not yet completely understood. For this overview it suffices that the predominant source of F-layer density is absorption of far UV (100- to 1000-angstrom-wavelength) photons, E-region electron production is caused largely by X-rays (less than 100 angstroms), and the upper D region is produced by absorption of 1000- to 1100-angstrom UV photons by nitric oxide, and possibly also by excited oxygen molecules. Still longer wavelength UV radiation penetrates to lower altitudes where it causes important chemical reactions to occur (note for example the important photochemistry involving ozone, nitrogen oxides, fluorocarbons and other materials in the stratosphere) around 15 miles (25 km above Earth); but for the present purposes, solar *ionizing* radiation does not penetrate below about 36 miles (60 km). When solar radiation is totally removed, as at sunset, rates of electron depletion vary with total gas density, from an abrupt decay at the highest pressure (D) level, to a decay half-time of many hours at the lowest pressure (F2) level. Besides night/day variations in the electron densities (and heights) of all regions, there are seasonal variations at all levels as well. Sunspots cause enormous variations in the densities of F levels, but have much less influence on D and E levels.

Inspecting the Ionosphere During an Eclipse

What happens during a solar eclipse? Consider some results from three of the many studies that have been carried out during recent total eclipses. On July 20, 1963, a research team at Fort Churchill, MB (where 94 percent of the solar disk was obscured at maximum), fired four sounding rockets to altitudes of 120 miles (200 km) and measured electron densities and temperatures, and solar UV and X-ray radiation.[8] They found that D-region electron density decreased according to the fraction of the sun obscured, with a time lag of three minutes or less, depending upon altitude. The E and F1 densities also decreased with a time lag of about three minutes, but did not decline in direct proportion to the amount of lunar obstruction. The latter observation is caused by the large percentage of solar X-ray emission generated in the corona, which is not blocked by the moon

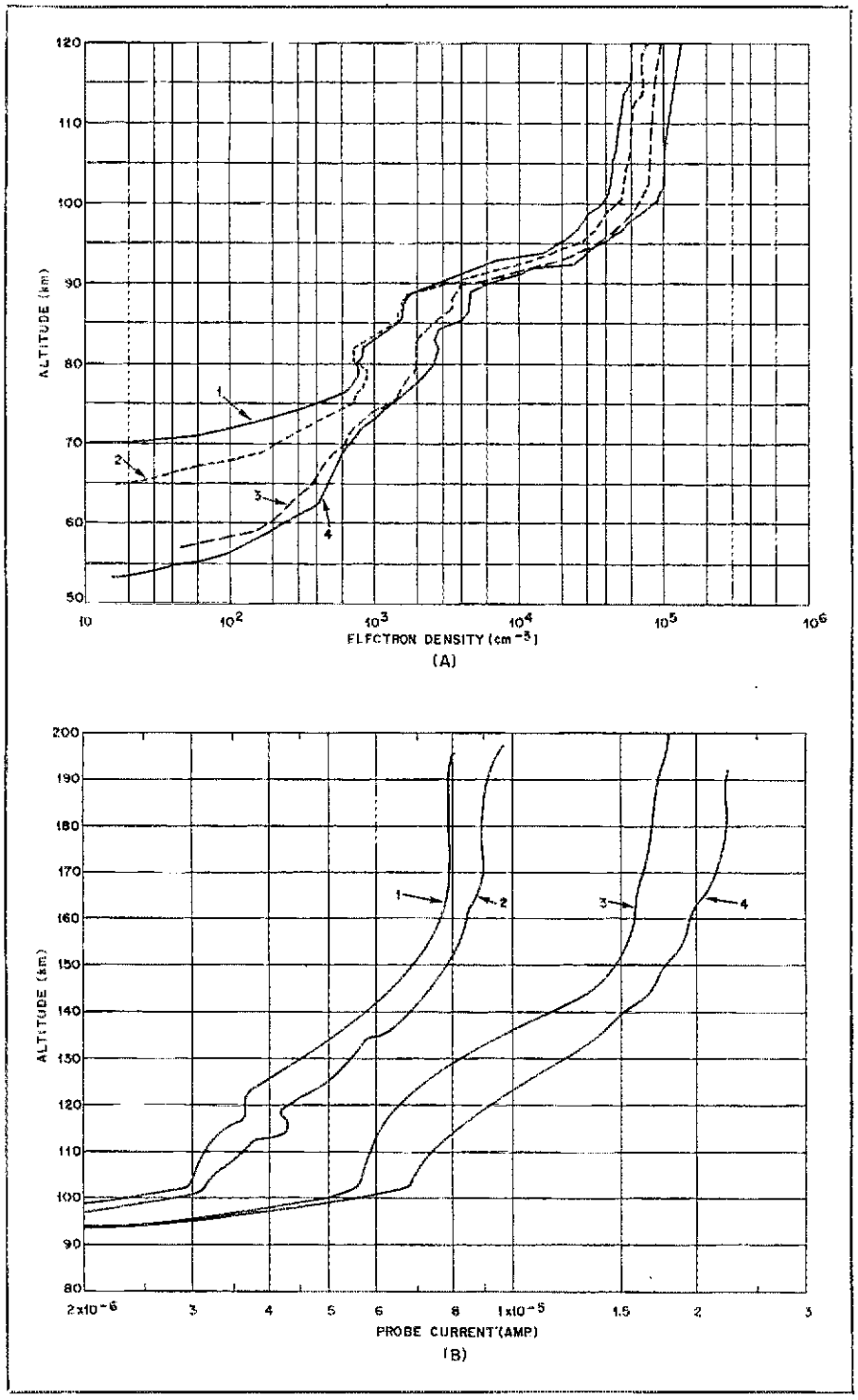


Fig. 2 — Profiles of probe current or electron density (assumed proportional to probe current) vs. altitude recorded during four rocket flights at Ft. Churchill, Manitoba, on July 20, 1963. Shown at A are the ionospheric D and E regions; at B are shown the E and F1 regions. Approximate present totality (percent visible solar disk covered): curve 1, 91; 2, 84; 3, 40; 4, 2.

even when the solar disk is totally eclipsed. (It is this transmitted invisible radiation that makes viewing the sun with the naked eye extremely hazardous, even during a total eclipse.) The surprisingly rapid, though partial, decay of electron density in the E and F1 levels has not been satisfactorily explained, and is a subject of current research. Also, the trough of low electron density that usually forms between E and F1 levels at night was not observed. Fig. 2 shows graphs of electron-density profiles measured by the four rockets. Since the rockets did not attain altitudes above 120 miles (200 km), no measurements of F2 density were obtained. However, changes in this level were expected to be minor because of the length of time required for electron recombination. Another group of scientists, at Urbana, IL, measured the strength of vertically directed 2.66-MHz signals reflected from the ionosphere during the solar eclipse of July 10, 1972. (Sixty-percent coverage of the solar disk was observed at that location.)[9] From their measurements they deduced that a large decrease in electron density had occurred at 45-50 miles (70-80 km), in good agreement with the findings of Smith, et al.

The abrupt removal of high-energy solar radiation from the atmosphere can be expected to have thermal as well as chemical effects. It has been predicted[10] that the cooling associated with the rapid (supersonic) motion of the moon shadow across Earth causes "gravity waves" which interact with the ionosphere and perturb the radio-reflecting regions. Australian scientists measured the angle of arrival of the 2.5-MHz signal from a station 43 miles (69 km) away during the total solar eclipse of October 23, 1976. Their observations led them to conclude that a pronounced oscillating tilt had been induced in the E layer, effective height about 60 miles (100 km), which decayed gradually over a period of 40 minutes.[11] From these experimental observations and many others that have been reported in the literature, it appears certain that a rapid and extensive depletion of the D-layer electron density, and also a significant change in the E and F1 layers, occurs within the shadow of a solar eclipse. By comparison, the F2 layer shows little or no response to an eclipse. Thus, the place to look for propagation enhancement is in bands particularly affected by D- and E-layer behavior. A final factor to be considered is reflectance vs. frequency of radio signals. At higher frequencies, greater electron densities are necessary before reflection can occur. From Fig. 2, one may see that the electron densities are progressively greater at the D, E, F1 and F2 levels. During daylight hours, lower frequency signals (below about 10 MHz) do not penetrate even the D region very well and therefore do not reach the higher altitudes necessary for long-range reflection. At higher frequencies, signals are able to penetrate to higher levels. However, there is a maximum or "critical" frequency above which signals penetrate even the F2 layer and are lost into space. This critical limit varies from well below 30 MHz to well above 50 MHz, corresponding respectively to minimum and maximum sunspot activity, which particularly affects the F2-region electron density. The best DX is often to be had at the frequency just below the critical frequency. At night the low-frequency bands quickly open up to long distances as D-layer electrons are rapidly lost, allowing these signals to be reflected from higher levels. The maximum usable frequency

also drops, but more gradually, since electron loss in the F2 region after dark is a slow process.

How to Find an Effect

Where then should we look for propagation enhancement during a solar eclipse? I would suggest that frequencies most affected by the presence or absence of a D layer, the bands below 5 or at most 10 MHz, are the most likely frequencies to show enhanced propagation. This is, of course, just the region where possible enhancement was noticed during the 1963 eclipse. It seems particularly significant that the greatest enhancement of signals received from transmitter locations west of the receiving site occurred some minutes *before* totality at that site. As the moon shadow moved from west to east across the surface of the Earth, maximum depletion of D-layer electrons (or perhaps maximum E-layer disturbance) may well have been over a land point midway between the transmitter and receiver. The sun angle above the western horizon may also have had an effect on the enhancement of signals from the west. Was the enhancement real? Perhaps we amateurs can duplicate or improve upon such observations next month.

How should we go about testing for propagation enhancement during this eclipse? As shown in Fig. 1, the path of totality will sweep eastward across the northwestern U.S. and curve northeastward across central Canada. For viewers near the Pacific coast, the sun will be only 12 degrees above the eastern horizon at totality, so maximum D-layer depletion (assuming 40-mile [65-km] height) will be over a land point about 180 miles (300 km) to the east. Thus, it might be possible to establish contacts on 160 or 80 meters between stations in the western U.S. or Canada and stations 180-360 miles (300-600 km) to the east, at local times ranging from about 0815 PST to 1015 CST. It also seems possible, though less likely, that signals originating from the central or eastern U.S. or Canada might penetrate through the hole in the D layer, reflect off a tilted E layer, then undergo multiple interlayer reflections, finally being reflected back to Earth in the dark zone to the west. Thus, contacts with the central pacific or eastern Asian areas seem within the realm of possibility. All this on 160 or 80 meters, during daylight hours!

Probably the best way to establish contacts during this possible brief window would be to follow the suggestions of Stewart.[12] Prearranged schedules between two or more stations lying to the east or west of one another near the eclipse path, and a system of brief alternate transmissions at prearranged times coordinated to WWV should be the most likely to yield positive results. It would have been most helpful if a central clearing house could have been set up to collect and evaluate reports of long-distance signals received and two-way contacts completed on frequencies below 10 MHz, on the morning of February 26. Only with the participation of many amateurs at diverse locations and a coordinated system of data collection and evaluation will we know for certain the extent, direction and time duration of propagation enhancement during the eclipse. QST

On Sun-Watching

It's difficult to tell exactly when totality of eclipse occurs, making safety something of a problem for those who wish to watch the sun directly. Better to use a projection system such as that described in the *Handbook* Propagation chapter. Don't yield to the temptation to view the sun directly!

Oregon State University Amateur Radio Club has announced the formation of an eclipse net. Details appear in "Happenings," November 1978 *QST*, page 56. For more information write to the club in Corvallis, OR 97331.

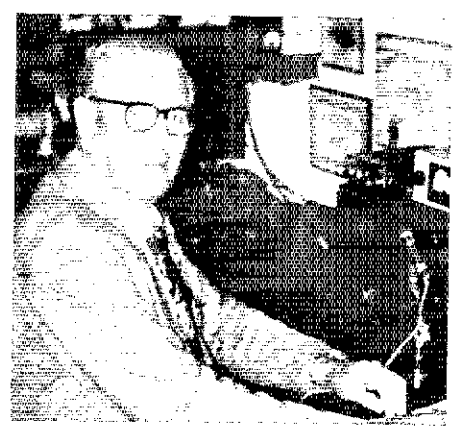
On February 26, Denver Radio club members will aid the Denver Museum of Natural History and the Gates Planetarium, located at the museum. Amateurs will link an eclipse-viewing expedition to Lewiston, MT, with other watchers in Missoula, MT, and Williston, ND. Club members will also provide meteorological updates from the Denver office of the National Weather Service. — *W1XZ*

Notes

[1]Argo, et al, "Radio Propagation and Solar Activity," *QST*, February 1977, p. 24.
[2]Stewart, "VHF DX via Meteor Scatter," *QST*, December 1977, p. 31.
[3]Kearman, "An Introduction to the World Above 50 MHz," *QST*, November 1977, p. 13.
[4]Menzel, "A Total Solar Eclipse and Radio Propagation," Technical Correspondence, *QST*, September 1976, p. 30.
[5]*United States Naval Observatory, Circular No. 113*, USNO, Washington, DC, 1966.
[6]Maps showing the time and path of the lunar shadow were kindly provided by the Harvard College Observatory.
[7]*The Radio Amateur's Handbook*, 54th Ed., 1977, p. 560.
[8]Smith, et al, "Measurements in the Ionosphere During the Solar Eclipse of 20 July 1963," *Journal of Atmospheric and Terrestrial Physics*, Vol. 27, July 1965, p. 803.
[9]Bean and Bowhill, "Analysis of Partial Reflection Data from the Solar Eclipse of July 10, 1972," *Aeronomy Report No. 55*, University of Illinois, Urbana, IL, October 1, 1973.
[10]Chimonas, "Internal Gravity-Wave Motions Induced in the Earth's Atmosphere by a Solar Eclipse," *Journal of Geophysical Research*, Vol. 75, October 1, 1970, p. 5545.
[11]Baulch and Butcher, "Atmospheric Waves in the Ionosphere due to Total Solar Eclipse," *Nature*, Vol. 269, October 6, 1977, p. 497.
[12]See note 2, above.

Strays

Tim Toman, WD9CNX, explains the world of Amateur Radio satellite communications to a few of the 35,000 people who attended an open house program at General Motors' Electro-Motive Division. Held to commemorate the division's production of its 100-millionth diesel locomotive horsepower, the program featured an employee hobby show where this display was prepared and staffed by the Du Page Radio Club. *(Photo by Ron Lome, WA9LFL)*



Arthur Milne, G2MI, a former QSL manager for G-land, and Fred Edwards, W1DJC, renewed an old acquaintance when the latter visited with Art recently in Bromley, England, and took this picture of G2MI at his operating position.

Digitized Speech

Part 1: They didn't appreciate it back in 1937. Too radical, some thought. But pulse modulation, fully compatible with modern digital techniques, deserves a place in the communication technology of today. Pulse modulation — is it for you?

By Stan Lieberman,* WA4SFP

The digital age of electronics has been with us for over a generation, but only recently has the hardware been made available to radio amateurs at a reasonable cost. Now is the time to consider the digital transmission of speech for our hobby. In Part 1 of this two-part article, we see the importance of the pulse as a data-transmission entity and how to detect it. Part 2 introduces several techniques for applying the pulse to speech transmission.

Two earlier articles[1,2] introduced *QST* readers to pulse modulation. These explained how an analog signal could be sampled, quantized and transmitted as a series of pulses. A receiver could decode this string of pulses into the original samples from which the original analog signal (such as speech) would be reconstructed. This, then, is the essence of pulse-code modulation (PCM).

These previous articles elaborated on the original PCM concept, developed in 1937 by R. H. Reeves in Paris, which was subsequently patented.[3,4] PCM was so basically different from the communications techniques used in 1937 that the concept was neither widely understood nor appreciated. Furthermore, the process for generating the PCM signal required hardware with capabilities that were not available at that time.

Fortunately, the hardware is now readily available to the radio amateur, and we should seriously consider adapting digitized speech to our hobby. The purpose of this article is to introduce, in nonmathematical terms, the power of transmitting speech through severe QRN conditions and then to describe various digitizing methods that have evolved to accomplish this with bandwidths that are no wider than those necessary for A3 emissions.

*1560 Glencoe Rd., Winter Park, FL 32789

[Notes appear on page 30.]

At this point you may wonder why we should bother with digitized methods. After all, aren't pulse emissions below 2300 MHz forbidden by FCC regulations? The answer is both yes and no. Isn't cw a form of pulse modulation? Isn't RTTY another form of pulse modulation? The FCC, then, apparently isn't concerned about the form of modulation as long as it doesn't exceed certain bandwidth limitations. P-type emissions are limited to wide-band pulse signals to which the original PCM concept belongs. Therefore, if we could demonstrate that techniques exist where a digitized signal requires no more bandwidth than that required for A3 signals, shouldn't we be allowed use of this powerful method of speech transmission?

The Pulse

The pulse is the basic building block for all digitizing techniques. Pulses can be generated in several ways to transmit messages. Pulse-amplitude modulation (PAM), pulse-duration (or width) modulation (PDM or PWM) or pulse-position modulation (PPM) require some changing (information-carrying) parameter to be detected which generally requires accurate shaping of each pulse. As a pulse is propagated, a number of things can happen to distort the pulse shape and, hence, cause inaccurate copy at the receiving end.

So how can we eliminate this problem? Simple enough! Either we send a pulse or we don't send a pulse. Whether the pulse is square, tall, short, round or pointed matters little. It's either there or it's not there. As long as the pulse is of sufficient amplitude to be detected, that's all that's important. Pulse shape is of secondary value. By using such an on/off pulse system, there is the possibility of detecting signals where the noise is stronger than the signal. Imagine that! Hearing signals with less than a 0-dB signal-to-noise ratio (SNR)! This is the beauty of pulse modulation.

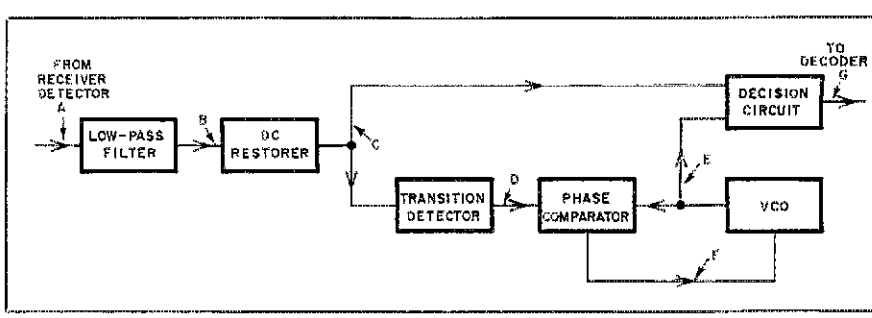
Pulse Detection

Although the shape of the pulses can vary, there must be a way to detect them in a reliable manner. Under good signal conditions (high SNR) detection is easy. Under QRN conditions it is not so easy, but it can be done!

Before we build a pulse modulation system, we must agree to one ground rule. (You did suspect a catch, somewhere, didn't you?) The pulses, or bits, must be transmitted at a fixed rate which is measured in bits per second (b/s).

The following description of a bi

Fig. 1 — The functional block diagram of a bit detector. See Fig. 2 and the text regarding points in the circuit identified with letters.



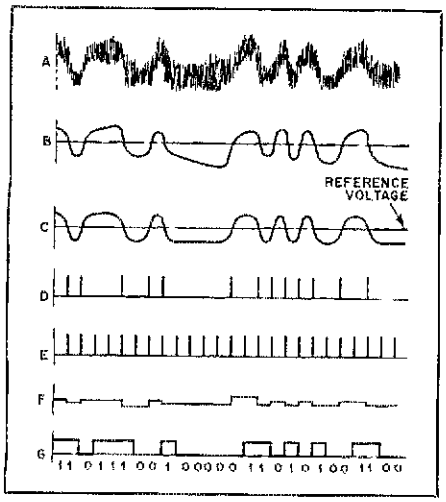


Fig. 2 — Representative waveforms for the bit detector of Fig. 1. The waveform at A corresponds to that at point A in Fig. 1, that at B to point B in Fig. 1, and so forth.

detector will make clear why this condition is necessary. Remember, detecting the noisy distorted bits first is important in order to convert them into the nice, clean pulses that digital ICs subsequently need in order to change them back to a speech signal we can understand.

A Bit Detector

The bit detector is that circuit which identifies the beginning and end of every bit in a serially transmitted pulse train. It does this by generating a clock-pulse signal having the same frequency and phase as the pulse train. Fig. 1 shows the functional block diagram of a bit detector. The receiver detector output, represented in Fig. 2A, shows a pulse train having a peak-to-peak (pk-pk) amplitude that is comparable to the pk-pk amplitude of the noise. This represents a weak signal whose amplitude is about the same as the transmission-channel random noise (approximately 0 dB SNR). This noise is mostly eliminated by a low-pass filter that produces a cleaned-up pulse signal, Fig. 2B. This signal, however, exhibits a varying average voltage which must be eliminated, a job that is delegated to the dc restorer. The dc restorer clamps either the positive or negative swings of the filter to a fixed voltage level to eliminate the bouncing nature of the filter output. The result is that the filtered pulses can be imposed upon a very important reference voltage (Fig. 2C).

Whenever the filtered pulses cross this reference voltage, the crossover is detected by a transition detector which generates a narrow pulse (Fig. 2D) for each crossover. In this way, we know when the beginning or end of a pulse has occurred.

The voltage-controlled oscillator (VCO) is designed to generate narrow pulses at the nominal bit rate of the incoming pulses. These pulses (Fig. 2E) are compared to the transition pulses (Fig. 2D). Should the VCO frequency drift, the phase comparator will generate a control voltage (Fig. 2F) that causes the VCO pulses (Fig. 2E) to track the transition pulses. This process is necessary to assure that the VCO pulses are synchronized to the incoming pulses (Fig. 2C) and allows for slight bit rate variations.

The VCO output (Fig. 2E) also identifies the end of each bit which the decision circuit needs to do the job of deciding whether a 1 or 0 bit is present. In the example of Figs. 1 and 2, this decision is made at the end of each bit period, which explains why the decision circuit output (Fig. 2G) is a reconstructed pulse train that lags the incoming pulses (Fig. 1C) by one bit period.

Decision Circuits

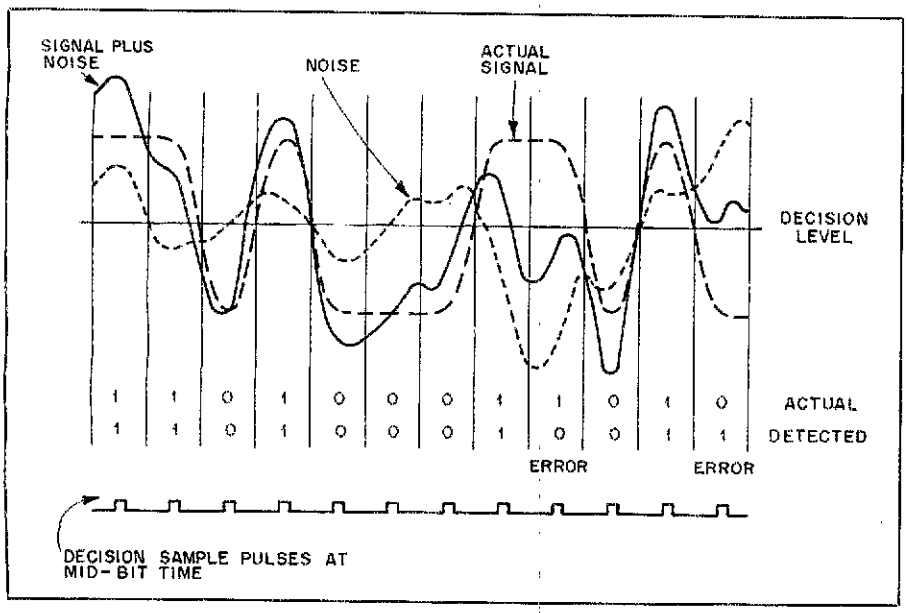
The decision circuit is the most important part of the bit detector. Since the bits are sent at a fixed rate, the decision circuit must decide for each bit period whether a 1 or a 0 bit is present. During good SNR conditions, the process is unhampered. As a matter of fact, the decision is so easily made that we shouldn't even bother with digitized speech in the first place, for good old ssb will do the work with reliability. However, when the SNR gets really low, digital techniques open a new world of communications.

Several decision circuits have been developed. Only two of these are described here — the mid-bit detector and the integrate-and-dump detector.

The mid-bit detector depends upon statistics — namely, what is the chance that the signal is correctly detected at the moment the data stream is sampled? An assumption is made that the noise coming in with the signal is white noise, which means that the average value of the noise is zero. Therefore, the best time to sample the signal is when the pulses should be at their maximum (1-bit) or minimum (0-bit) values. Notice that the word "should" was used, implying a probability (or statistical) function. As a result, the best time for the maximum or minimum value (which would coincide with the best SNR) is during the middle of the bit. Why? Because we don't know whether the previous or following bit had the same or different value (1 or 0) as the current bit. If the previous or following bits are different, this means there was a transition in the signal and because the pulses are heavily filtered, the transition is gradual instead of rapid. Therefore, during the transition period, the pulse amplitude is near the noise value at any given instant and, hence, the SNR is low. So the greatest distance (in time) from the previous or following bits is the middle of the bit being detected. This again, is when the bit value is most likely maximum or minimum and "should" give us the best chance to correctly decide whether we have a 1 or a 0 bit.

Great, you say, that's the way to detect a pulse. But look at Fig. 3 to see how accidents occur — namely, an incorrect bit decision. The mid-bit detector is a good and simple decision circuit, but its major weakness is that the sample period is too brief. If it just happens (another probability remark) that a noise spike is large compared to the pulse amplitude, opposite in value to the pulse, and occurs at the moment of bit sampling, the combined pulse plus noise value could cause an incorrect decision.

Fig. 3 — This graphical representation shows how an incorrect bit decision may occur. The "teeth" at the bottom indicate decision sample pulses at mid-bit time. Value of the signal plus noise relative to the decision level is the bit decision.



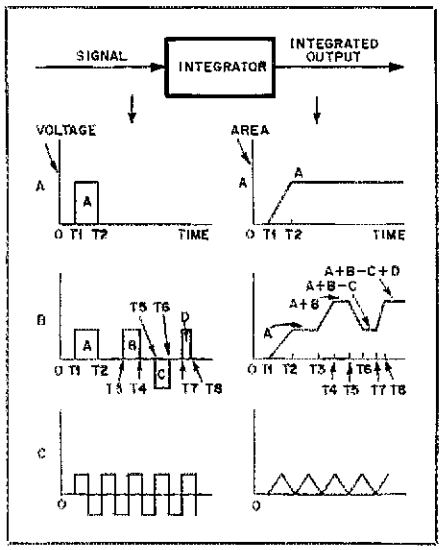


Fig. 4 — The effects of an integrator on the signal.

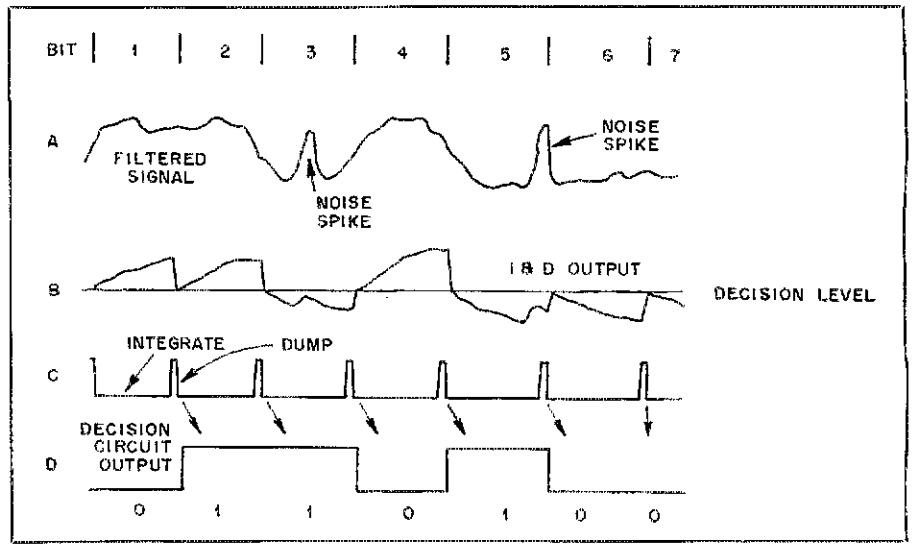


Fig. 5 — How the integrate-and-dump detector works. A noisy pulse train is converted into a reconstructed pulse train.

Is there any way to assure more reliable bit decision? Of course! And this leads us to a slightly more complex circuit but probably the most popular decision circuit — the integrate-and-dump detector (I&D). This circuit samples the pulse noise for almost the entire bit period.

But first, let's understand what we mean by "integrate." Fig. 4 shows how integration works. Let's take a signal and shove it through an integrating circuit (integrator) and see what happens when it comes out.

In Fig. 4A suppose we wish to integrate a signal which is a pulse V volts high and $t_2 - t_1$ seconds wide. The area A of this pulse is determined by the height (voltage) and width (time). When the pulse begins at time t_1 the area is zero. As time progresses, the area gets larger. At time t_2, the pulse stops and so does the increase in area. The integrator output, then, represents the area (volts × time) of the input signal. In Fig. 4B, we see what happens when different pulses are integrated. Note that all the positive pulses (A, B and D) add to the area, while the negative pulse (C) subtracts from the area. In Fig. 4C, the positive and negative pulses (a square wave) add to and subtract from the area equally. At the end of each cycle the integrator output is zero because the positive pulse area is equal to but opposite in polarity to the negative pulse area.

Now, let's see how the I & D detector works. Fig. 5 shows how the I & D decision circuit converts a noisy pulse train into a reconstructed pulse train.

In Fig. 5A, the heavily filtered pulses (bits) from the receiver are sent to the I & D detector. Note that bits 3 and 5 are each experiencing a severe noise spike which alters the integrated area in these bit times, as shown in Fig. 5B. As shown in Fig. 5C, the filtered signal is integrated during most of the bit period. At the leading edge of the dump pulse, the polarity of the bit shown in Fig. 5B is determined. If the voltage is positive, then it is decided that a 1 bit was sent during that time; a negative polarity indicates a 0 bit. The rest of the dump pulse discharges the integrator to 0 potential so that the process can repeat for the next bit.

The only way an incorrect bit decision can be made is when the noise spike has more energy (area) than the bit signal. You can see that, for bit 3, the mid-bit detector would have made a wrong decision because the noise spike occurred during mid-bit time. The reconstructed waveform of Fig. 5D lags the incoming signal Fig. 5A by one bit period because the bit decision (1 or 0) is made at the end of each incoming bit period.

This concludes Part 1, which, I hope, has given an understanding of the problems of detecting a pulse transmitted through a noisy (QRN) communication channel and the reason for bothering to do so in the first place. Part 2 will show how we can use this knowledge of pulse detection to transmit digitized speech. The progressive improvement in narrowing bandwidth requirements as we go from pulse-code modulation (PCM) to differential PCM and finally to delta modulation will be shown.

Notes

[1]Biancomano, "Pulse Modulation — A New Look at Old Theory," *QST*, March 1974, p. 44.
[2]Biancomano, "A Prototype Pulse-Code Modulation System," *QST*, January 1977, p. 24.
[3]French Patent no. 852,183, October 3, 1938.
[4]U.S. Patent no. 2,272,070, February 3, 1942.

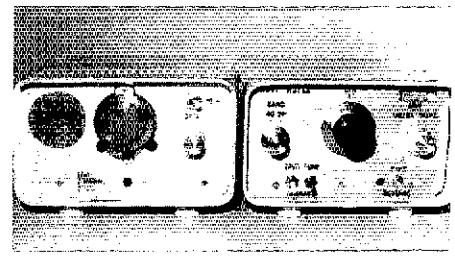
Strays

NEW GROUP FORMING

☐ A new organization for licensed Amateur Radio operators and SWLs is being formed, the Free Mason Radio Amateur International Group. More information may be obtained by writing Justiga, 35, Rue Fongate — 13006 Marseille, France.

HOMEBREW PAIR HAD *QST* GENESIS

☐ When was the last time you heard a fellow amateur lament, "Nobody ever builds ham gear nowadays"? Evidence to the contrary arrives in the mail regularly at ARRL headquarters. Yes, a lot of letters come from zealous builders. But a lot of unsolicited photographs come from hams who are proud of their work — and rightfully so! The photograph is a clear illustration of the masterly job performed by Dick McIntyre, K4BNI, in duplicating and facelifting the "Mini-Miser's Dream Receiver" featured in the September 1976 *QST*, and the 20- and 40-meter cw transmitter which *QST* published in series form from May through August 1978. As shown here, the receiver on the left is flanked by an aesthetically compatible transmitter. Congrats on a nice job, Dick! — *Doug DeMaw, W1FB*



K4BNI's homebrew receiver and transmitter pair makes a distinctive addition to his shack.

The Expanded Tribander

First, add a 40-meter two-element delta-loop beam to your tribander. Then load one loop on 80, and three will get you five!

By John G. Troster,* W6ISQ/N6IQ

All West Coast DX contesters know that the only way to make a respectable score in competition with the East Coast is to have a good "JA run"; that is, to work as many Japanese stations as possible. If a tribander is all that's available, well, too bad! What's needed is a long night of working three-a-minute JAs on 40 and 80 meters. So what does old contester Cam Pierce, K6RU, the grandfather of the multi-multi contest station, do with his 70-foot (21-m) wide city lot and tribander? Why, he expands his tribander to accommodate a two-element delta-loop beam for 40 and loads the driven element on 80, and *voila!* A *very* competitive five-band antenna system.

Admittedly, this delta-loop beam can't compete with the giant 100-foot (30-m) boom, five-element, 40-meter Yagi that Cam built, which was pictured on the cover of July 1963 *QST*. But this "expanded tribander" stalks DX like a tiger, and in the experienced hands of an old contest pro like Cam, it purrs hungrily enough to make the second-level beam fellas run a mite scared.

Construction[1]

It is not intended that interested readers exactly copy this antenna. Our purpose here is to show what can be done with a little imagination and a tribander on a 70-foot lot. Exhaustive constructional information is therefore not provided.

At K6RU the tribander is a Hy-Gain TH6DXX, but any long-boom tribander can be used in this system. There are no electrical alterations to the tribander. The system is illustrated in Fig. 1. The tribander must be mounted on a *self-supporting* tower at least 50 feet high. (One cannot rotate the delta loops through guy wires! Also, the presence of guy wires inside the loop configuration might distort the radiation pattern.)

The tribander's boom is extended 8 feet in both directions, using two 10-foot lengths of 1-inch OD aluminum tubing. The extensions are secured to the boom with TV mast-to-pipe fittings, with an overlap of 2 feet. An extra strut is added from the top of the mast to the outer ends of the boom extensions. Fiberglass quad spreader arms[2] are mounted at the ends of the boom extensions, parallel to the elements of the tribander. Four 12-foot 20-meter spreaders are cut down to eight feet, and two are used at each end of the extended boom.

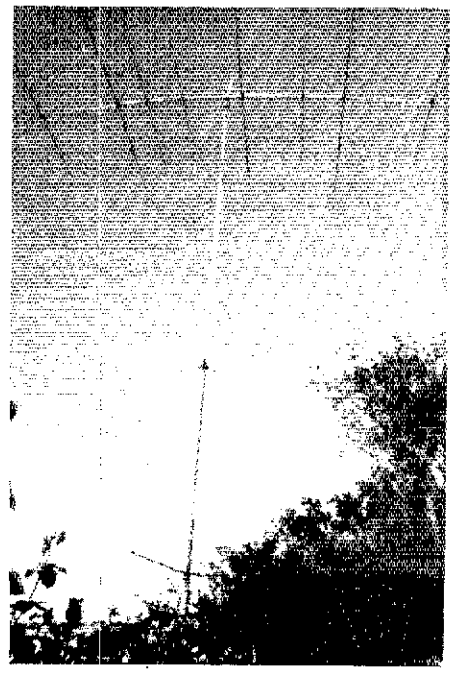
The top horizontal portions of the delta-loop wires are attached to the ends of the spreader arms. "Zip cord" is used for the antenna wire. Pulling the insulation apart down the middle will separate the cord into two easy-to-handle wires — no kinking or tangling.

The horizontal loop wires are allowed to droop about 4 feet below the tribander elements to minimize interaction between the two antennas. Lightweight nylon or 100-pound-test monofilament fishing line can be used to suspend the delta-loop elements from the ends of the tribander's 10-meter director and reflector, as shown. The 10-meter elements, having no traps, can best handle the weight.

The bottom of the delta-loop beam requires a third spreader boom. If possible, it should also be made from fiberglass quad spreader arms. Cam did not have any fiberglass spreaders left after making the other two spreader booms, so he used 1-inch OD aluminum tubing. This meant that the loop wires had to be carefully insulated from the lower spreader boom. The tower was raised before attaching the loop wires to the lower spreader boom. An insulated harness was used to keep the spreader boom away from the tower. At K6RU, the harness was made from aluminum clothesline protected by cable-wrap insulation. It can be seen at the upper right in Fig. 2. As the beam is rotated, the lower spreader boom follows along.

The "stubs" of the driven element and

The 40-meter delta-loop beam is suspended from a TH6DXX tribander. There is no significant interaction between the two antennas. On 80 meters, the driven element operates as a vertical against ground.



*82 Belbrook Way, Atherton, CA 94025

[1]Notes appear on page 35.

the reflector together occupy most of the length of the lower spreader boom. These stubs are necessary because the tower at K6RU is not tall enough to accommodate the vertical elevation of full-size loops. If the tower were higher or the tribander boom extensions were made longer, the stubs could be shortened or eliminated.

The total circumference of each of the two loops, not including stubs, is 130 feet. The reflector stub is 9 feet long. For cw operation, the driven element stub at K6RU is 7 feet 8 inches long; for phone it is 3 feet 8 inches long.

Parallel-wire 72-ohm transmission line extends from the driven element feed point to a 1:1 balun mounted on the tower under the lower spreader boom. (Make sure to allow enough slack so the antenna can rotate!) The balun at K6RU is not mounted on the spreader boom at the driven-element loop termination because of its weight. However, many commercially manufactured baluns are light enough to be mounted at the driven-element termination, eliminating the section of parallel-wire line. The balun may be fed with 52-ohm coax; the resulting small mismatch will not affect performance.

Adjustment for 40 Meters

Once everything is connected, feed a signal into the system and check the SWR. Choose a frequency which best represents your operating preference. (If you don't know what your operating preference is, choose 7150 kHz!) In our case the SWR was 1.04:1. If you're a purist, the driven-element stub can be tapped at various points until the SWR is lowest at the desired frequency.

To tune the reflector, have a local friend fire up his or her station. Turn the loop beam directly away from your friend's station. You may wish to adjust the reflector for only one frequency if you operate mostly one mode, but it is recommended that you use two shorting positions, one for cw and another for phone. The cw short will be approximately 18 inches farther from the loop than the phone short. Adjust the shorts for minimum signal on each frequency, moving the positions about a half inch at a time. Remember to open the phone stub when using cw! Switching between cw and phone may be accomplished either manually or by using remote relays.

Operation on 80 Meters

The 40-meter driven element is used as the 75- and 80-meter radiator. It is operated as a vertical against ground. A series capacitor with a high voltage breakdown rating will be necessary to resonate the antenna within the band. Probably the simplest arrangement, in terms of parts availability, is to use a transmitting type of fixed capacitor in parallel with a 100- or 150-pF transmitting

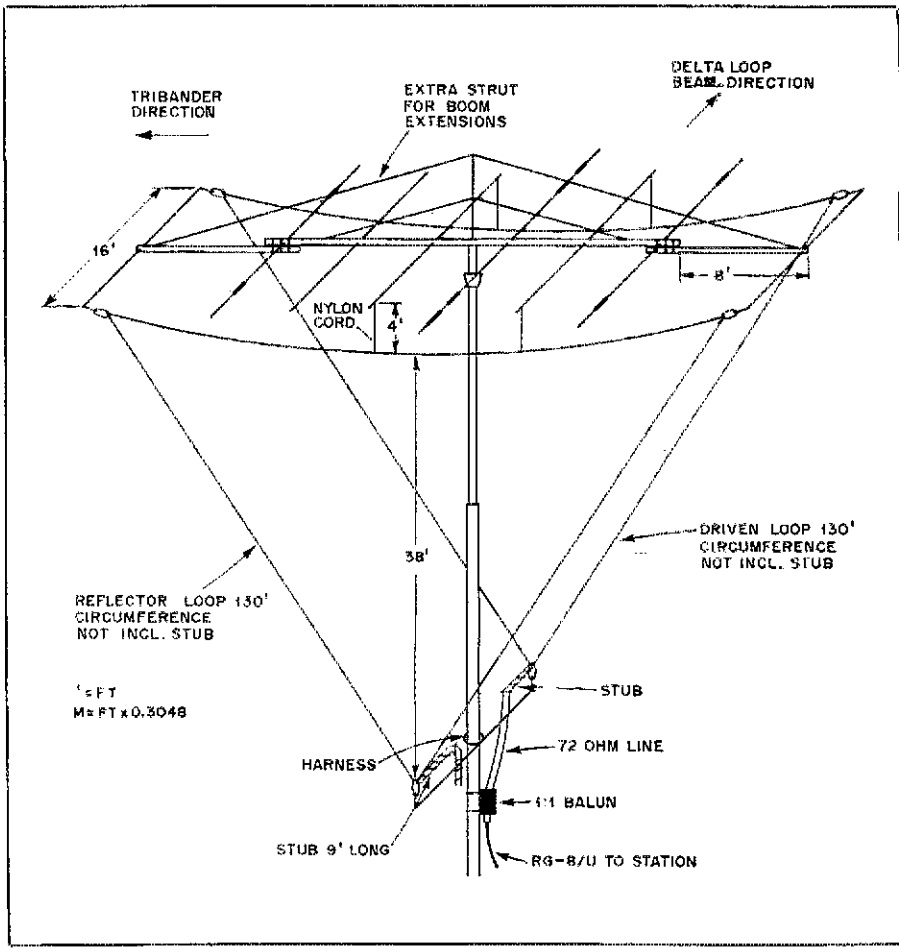
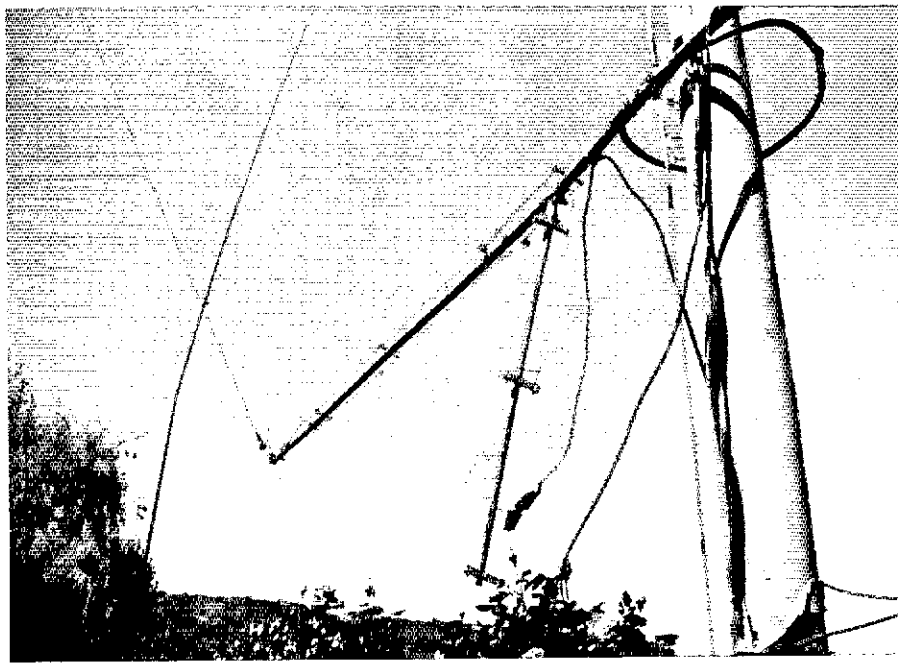


Fig. 1 — Configuration of the delta-loop beam. The delta-loop antenna points at right angles to the tribander. Note especially the four nylon cords which help keep the delta elements in position, and the extra boom strut. If a lightweight balun is used, it can be mounted at the driven-element stub termination, eliminating the need for the length of 72-ohm balanced line.

Fig. 2 — Photograph of lower spreader boom, showing reflector stub and spreader boom harness. The harness is made of heavy wire and is insulated to prevent intermittent contact with the mast.



type variable capacitor. (The size of the fixed capacitor should be chosen to allow you to tune your favorite part of the band.) If you are lucky enough to find a 500-pF variable, it can be used alone.

K6RU uses 16 radials for 80 meters. These radials should be as long and as numerous as practicable. They may twist and turn a bit to avoid obstacles such as bushes and walks.

Conclusion

In the 1978 ARRL CW DX Contest, K6RU made 588 contacts in 46 countries on 40 meters (502 JAs). On 80 meters, 101 contacts were made in 20 countries (80 JAs). The delta-loop beam fulfilled its 40- and 80-meter mission very well indeed!

Here are the plans for our next warm-weather project:

1) Lengthen the tribander's boom extensions to reduce the amount of stub, increasing the efficiency of the antenna.

2) Increase the loop spacing from the present 16 feet to 20 or 24 feet.

3) Tune the reflector on 80 meters so that the antenna may be used as a rotary on this band.

4) Top band! Ahhhh, 160!! A vertical radiator should be no problem . . . but then, why not a rotary?? One of the amateur's oldest dreams . . . perhaps this will take *two* summers . . .

Maybe three will get ya *six* . . . for practically nothing. We'll keep you posted!

Acknowledgement

The writer thanks Mr. Cam Pierce, K6RU, for the idea for this article. Thanks are also extended to Mr. Pierce for designing, building and testing the antenna, taking most of the photographs, and proofreading the manuscript. Inquiries or comments may be directed with an s.a.s.e. to Mr. Cam Pierce, 570 La Mesa Dr., Menlo Park, CA 94025.

Notes

[1]Inches × 25.4 = mm and ft × 0.3048 = m.
[2]Fiberglass spreaders are available from Kirk Electronics, 73 Ferry Rd., Chester, CT 06412.

Strays

How do you keep in touch with your loved ones during a five-month duty tour on the high seas? By Amateur Radio, of course! And that's just what David C. Eastick, VE7DIQ, of Victoria, BC, did this year. He was senior communications technician aboard the Victoria-based Canadian destroyer *Restigouche*. Dave's voyage was highlighted more than 250 times by his ability to talk via phone patch to his wife and family through the cooperation of VE7DGX and others. The Canadian navy is one of the few in the world which operate their own Amateur Radio facilities. Dave's call when he's at sea is VEØNA, maritime mobile.

FD FOR A FRIEND

☐ The Providence Radio Association's Field Day effort this past year was in memoriam to former club trustee WA1RXI, now a Silent Key.

PLEASE WRITE AHEAD, SAYS 4U1ITU

☐ With an ever-increasing number of visitors to Geneva, it has become impossible for the radio amateurs on the staff of the ITU to meet requests to operate 4U1ITU unless they are notified of the visit well in advance. A licensed amateur wishing to operate from 4U1ITU should *write* to the Station Manager, 4U1ITU, Box 6, Place des Nations, CH-1211 Geneva 20, Switzerland, so that the letter will arrive at least *four weeks* in advance of the proposed visit. — *WA6IDN*

BE PREPARED TO QRX

☐ After reading "From Russia with Love" (March 1978 *QST*), I promptly grabbed my Russian QSL file and within three days had my QSLs on their way, air mail, to Moscow for the W-100-U Award. After six months of waiting there was no word on the cards or award. What the article failed to mention was this: When applying for Russian awards, QRX one year to 18 months for a reply to your award application. — *K9UQN*

USE YOUR OSCARLOCATOR FOR RS

☐ Anyone who has an OSCAR 7 overlay for the OSCARLOCATOR can convert it to show the addition of the RS track by setting the present index (ascending node track) of OSCAR 7 on 180° longitude. Plot on the overlay the following points:

Lat. N.	Long. W.	Minutes
0	180°	0
29.6	178.2	10
59.0	172.4	20
82.6	99.2	30
59.5	22.8	40
30.1	16.8	50
0	15	60

Connect these points using drafting tape. The ascending node point will be the same as the OSCAR 7 track. The minutes along the track can also be marked, if desired. — *Roy Welch, WØSL*

I would like to get in touch with . . .

☐ anyone interested in the reactivation of the Auburn University Amateur Radio Club, particularly alumni who are hams. Robert A. Alexander, WA4RRN, c/o Auburn University Amateur Radio Club, James E. Foy Union, Auburn University, Auburn, AL 36830.

☐ any member of the WW I 221st Field Signal Battalion. Norman C. Hall, N2BP, 39 Hillcrest Dr., Wayne, NJ 07470.

☐ anyone involved with the transmission of American Standard Code for Information Interchange eight-level binary computer language on RTTY. Bernard R. Pidoux, F6BVP, 6, Square Claude Debussy, 75017 Paris, France.

☐ anyone who would like to play a moderately good game of chess on just about any band. Rick Wentworth, WB9ZJW, 100 St. Mary's Blvd., Green Bay, WI 54301.

☐ hams in the Midwest, East or South who are kayakers or canoeists to form a net to exchange info on water levels, trip reports, etc. Gary E. Myers, K9CZB, 28W135 Hillview Dr., Naperville, IL 60540.

Max De Henseler, HB9RS/W2, and his charming XYL, Rena, toured ARRL hq. recently. He's a prime mover behind activities at 4U1UN. *(W1YL photo)*

Showdown — FET vs. Bipolar

Pick your favorite front-end device, then sit back and read. You might be surprised at the outcome of this showdown.

By Terry A. Conboy,* N6RY

Judging from the comments I get when I mention that I use a bipolar preamplifier for my hf receiver, it must be something akin to heresy to use anything other than an FET as a front-end amplifying device. Everyone *knows* that bipolars are the ultimate intermodulation distortion generators, right? Perhaps because I have to do everything a different way than anyone else, and partly because I tend to take such absolutes with a great deal of skepticism, I had to prove the opposite can be equally true. Read on and judge for yourself.

Device Characteristics

It is worthwhile to review the characteristics that are normally attributed to the two devices. FETs, whether the junction or insulated-gate (MOS) type when used in the grounded-source configuration, have high input and output impedances, good noise performance, moderate to high gain over fairly narrow bandwidths, and low higher-order intermodulation distortion (IMD) (third and up). Bipolars have medium input impedances (a few hundred ohms, typically) and moderately high output impedances. They also can have good noise figures and give good gain over quite wide bands in some cases. Their distortion performance is usually considered to be mediocre — or worse.

If for no other reason than the fundamental randomness of the universe (aptly described in Murphy's Law), there are exceptions to the above general statements. The second-order distortion performance of FETs is inherently poor, which is why they make such good mixers. This is usually not a big problem, since the matching networks used with FETs are narrow band and tend to remove the out-of-band frequencies that form sum (f1 + f2) or difference (f1 − f2) products that disturb the signals which we want to hear. For instance, a nearby 40-meter signal might mix with a 20-meter signal and destroy your QSO on 15 meters (7.05 + 14.25 = 21.3).

Exceptions also exist for bipolar devices. In the past few years, several devices have been manufactured that have amazingly low distortion. They were originally intended for use in CATV systems, where high-level signals must be amplified over a 4:1 frequency range, without generating significant distortion. The CATV signals pass through several amplifiers on their way from the head-end to the subscribers, so distortion contributed by each amplifier must be kept small.

The Contenders

To provide a real-life comparison, I built two amplifiers and made a variety of measurements on them to get an idea whether the bipolar transistor could indeed match the FET for intermodulation performance. While doing so, it quickly became obvious that the bipolars might have several other advantages compared to the FETs. It's important to remember that the comparisons you will see don't really *prove* anything; they just show how the two devices I selected perform in the circuit configurations used. The transistors are representative of those in common use, so the results are still significant.

FET Amplifier Design

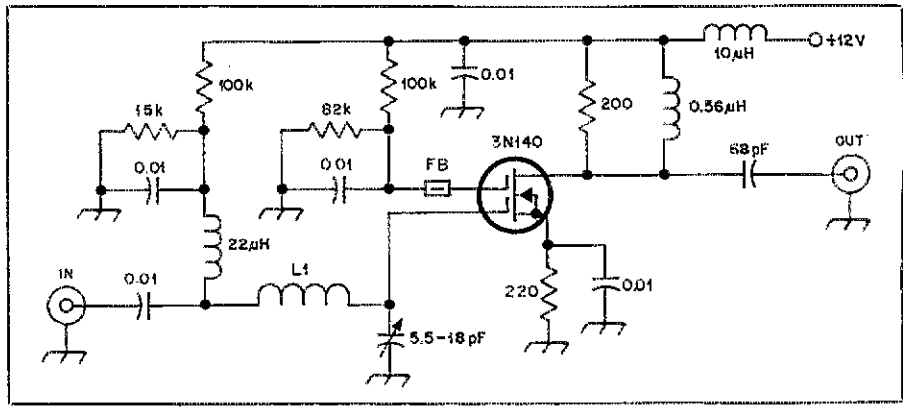
An FET amplifier circuit for 10 meters is shown in Fig. 1. It uses a 3N140 dual-gate MOSFET. This device is similar to the popular 40673, but it lacks the protection Zeners, and tends to exhibit a slightly better noise figure (NF), on an average. The NF improvement is small, and the handling ease of the protected 40673 may easily outweigh the slight improvement in sensitivity.

The input circuit is patterned after the one used by Reisert.[1] It uses a parallel-resonant rf choke to supply dc bias, which is followed by a high-Q L network which steps the impedance up from 50 ohms to about 2300 ohms. This is near the optimum for noise-figure performance with the 3N140, as determined by experimentation. Inductor L1 is wound of 20 turns of no. 20 enameled wire on a powdered-iron toroid. It has a very high Q, about 190, and an inductance of 1.85 μH. (Since the core that I used is not widely available, a suitable substitute might be an Amidon T-50-10 with 25 turns of no. 24.) Because of the configuration of the input circuit used and the low series-equivalent resistance of less than 1.8 ohms, the input network has only 0.15 dB of loss. This loss adds directly to the inherent NF of the device and must be minimized to obtain the lowest noise.

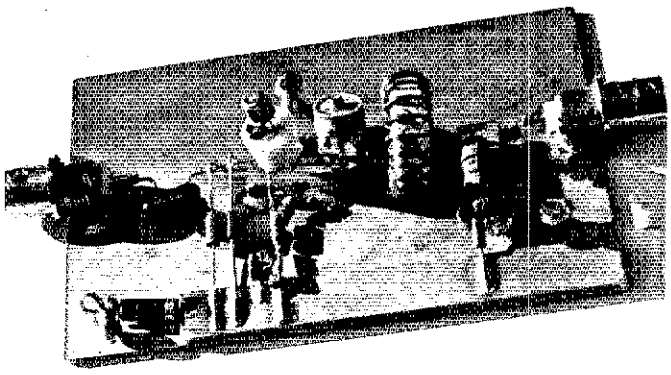
The bias on the MOSFET is somewhat different than is normally used. In most amateur applications, gate 1 is operated at dc ground potential and source bias (like cathode bias in tubes) is used to set the operating drain current. In this circuit, I

[1]References appear on page 41.

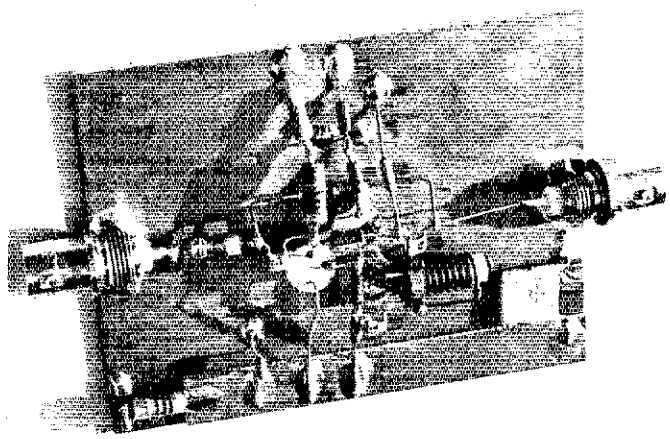
Fig. 1 — Schematic of the experimental 10-meter dual-gate MOSFET amplifier (see text).



*1231 Crestview Dr., San Carlos, CA 94070



Breadboard of the 10-meter MOSFET amplifier circuit.



Breadboard of the wide-band bipolar transistor feedback amplifier circuit.

have instead lifted gate 1 above ground by about 1.5 volts and selected the source resistor to set the drain current to the I_{dss} value. This is the drain current that flows when the source and gate 1 are at the same voltage. Of course you're wondering why I didn't just ground both the source and gate 1 for dc. This does work, but the actual value of the drain current is quite temperature dependent and varies from device to device. Without the feedback offered by the source circuit resistance, the current would vary considerably, changing the gain and possibly the overload characteristics of the amplifier.

The reason for selecting I_{dss} as the bias current is that the gain is highest at this current (where the manufacturer specifies it, naturally) and the distortion is much better than at lower currents.

The second gate is biased about 4 volts higher, as recommended by RCA. All of the biasing resistors are bypassed to prevent gain degeneration. However, bypassing gate 2 usually causes the MOSFETs to oscillate at uhf, so the ferrite bead is added at the transistor to eliminate this tendency. This is by far the best way to stop these oscillations that I've seen and thanks go to W1JR for the trick.

The output matching network is an L network, too, but it is a high-pass configuration. Using a high-pass structure complements the low-pass L network at the input, and provides an overall bandpass response. It also allows convenient shunt feed of dc to the drain of the FET. The network provides a 4:1 impedance transformation, so the 200-ohm drain resistor makes the output impedance of the amplifier appear as 50 ohms. The 200-ohm value was selected to set the gain at about 16 dB, to allow direct comparisons with the bipolar amplifier.

It is of interest that most published circuits do *not* have a 50-ohm output impedance, although they are designed to be terminated with a 50-ohm load. The driving impedance mismatch in such situations can cause problems, especially when driving diode balanced mixers, which can be degraded in insertion loss and distortion performance if not driven by and terminated with well-matched impedances. This is due to reflections of the mixer products back and forth through the bidirectional diode mixers.

Amplifier Construction

The MOSFET circuit was constructed on a solid piece of single-sided copper-clad fiberglass board, as shown in the photo. All of the parts are supported by the components which are soldered directly to ground, such as the bypass capacitors. The power supply bus is a narrow piece of the same copper-clad board which is fastened to the larger board with double-stick tape. The input and output connectors are BNCs, which are soldered directly to the groundplane board.

Circuits built with this type of construction are very easy to put together and modify, yet they often have better performance than with etched-circuit techniques. This is because of the extensive groundplane area. Although it's essentially a breadboard, this method of construction works well for permanent circuits where only one is to be constructed. In these cases, the connectors are removed and new ones mounted in a box. The circuit board is then drilled through at three or four points and just fastened to a wall of the box with small machine screws.

I used a socket for the MOSFET to simplify insertion while protecting the device against static damage. It also made it much easier to try different samples of the transistor.

MOSFET Performance

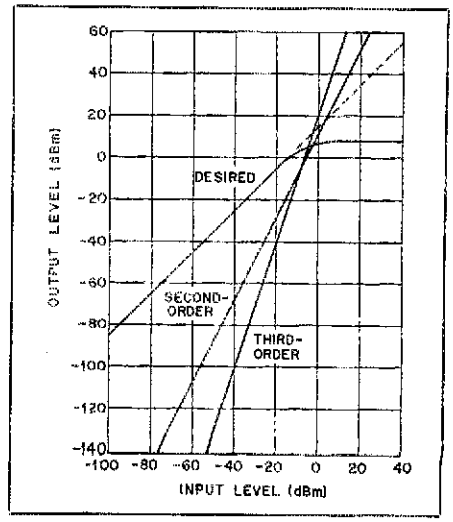
Current drain of the circuit is about 7.5 mA and will vary somewhat with different samples of the same transistor type. The design supply voltage is +12, but is noncritical due to the current-source biasing arrangement.

The amplifier is very quiet, with a noise figure of about 1.1 dB (as measured with an HP 342A NF set). This is more than adequate for even the quietest of locations. The equivalent *noise floor* in a receiver with a 400-Hz bandwidth is −146.9 dBm, which is about 0.01 μV across 50 ohms.

The distortion performance of the MOSFET amplifier is shown in Fig. 2. This shows the relationship between the desired output as a function of the input signal and the unwanted second- and third-order distortion products.

The distortion measurements were made with two equal-level frequencies, one at 28.5 MHz and the other at 29.5 MHz. The second-order product measured with the spectrum analyzer was at 58 MHz, since that frequency passes through the output matching network with relatively little attenuation. It is included for completeness only, since frequencies that would cause second-order products in the 10-meter band would be reduced significantly in amplitude by the input

Fig 2 — Distortion performance of the MOSFET amplifier. The desired output is plotted versus varying single-tone input. The second- and third-order distortion product outputs are plotted versus the level of each of two equal-level tones at the input.



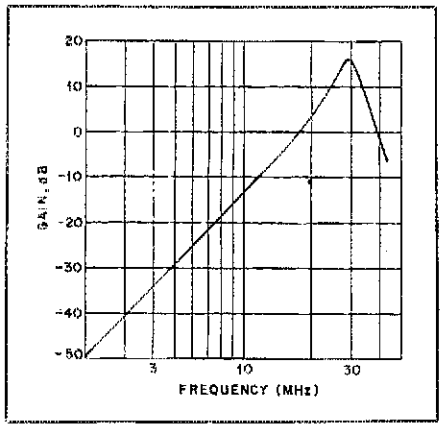


Fig. 3 — Gain response of the MOSFET amplifier.

network. The third-order products were seen at 27.5 MHz and 30.5 MHz. This is the most objectionable distortion mechanism, since two loud signals close together in frequency in the 10-meter band could easily cause interference (2•f1 − f2 or 2•f2 − f1).

The *third-order intercept* is a useful figure of merit for any linear amplifier. It is the signal level, usually referred to the amplifier input, that would produce an equal level of desired output and third-order intermodulation product. In actuality, the distortion curve rises faster than shown, at high signal levels, but the convention is to extrapolate the measurements made at lower levels. At these lower levels, the third-order distortion product rises 3 dB for each 1 dB increase in input level. The desired output curve is also extended out past the compression point. Besides being useful as a standardized means of comparison between amplifiers or receivers, the third-order intercept is used in the calculation of dynamic range.

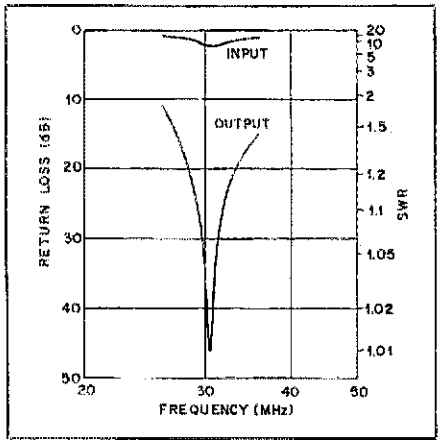
For the MOSFET amplifier, the third-order intercept occurs at an input level of −2 dBm. The *dynamic range*, referenced to a 400-Hz bandwidth, is 96.6 dB. These figures are better than most receivers sold to amateurs.[2,3] See the appendix for explanations and calculations of dynamic range and noise floor.

The frequency response of the amplifier is shown in Fig. 3. The 3-dB bandwidth of the circuit is about 5 MHz, which provides coverage of the 10-meter band, and rolls off rapidly above and below the center frequency (29 MHz).

The final measurements made on the FET amplifier were the impedance matches at the input and output. These are plotted in Fig. 4 as *return loss*. If you are not familiar with return loss, it is merely 20 times the logarithm of the magnitude of the reflection coefficient. It is a much more convenient way of measuring and plotting impedance matches than SWR. However, for those of you who "think better in SWR," some points are noted on the right side of the plot. The output matches best at 31 MHz, due to tolerances of the components used in the output L network, but is still better than 23 dB return loss (about 1.2:1 SWR) over the 10-meter band. The input is another story. The match is never better than 2.2 dB return loss (about an 8:1 SWR) and is only 1.5 dB at the bottom end of the band. This is typical of FET amplifiers in the common-source configuration, since the input impedance of the device itself is an extremely high resistance, and the L-network then looks like a series-resonant circuit with a small amount of shunt resistance across the tuning capacitor. The input impedance is just the series resistance of the input matching inductor combined with the transformed-down impedance at the MOSFET input, which totals on the order of about 6 ohms.

A natural tendency might be to do something to improve the amplifier input match. This would be easily possible by connecting a 2200-ohm resistor to gate 1 of the MOSFET through a small capacitor. This would lower the gain of the circuit by 6 dB, which could be recovered by changing the drain load to 820 ohms and redesigning the output matching network to transform this impedance to 50 ohms. Unfortunately, the other effect of providing an input match in this manner would be to degrade the noise figure. In the case of amplifiers with very high input impedances which are matched by using shunt resistors, the noise figure can be no lower than 6 dB. (The same is true of devices that have very low input impedances that are "built-out" with resistors.)

Fig. 4 — Input and output impedance match of the MOSFET amplifier, given in return loss (20 times the log of the reflection coefficient) and in SWR.



Bipolar Circuit Evolution

The design for the amplifier using bipolar transistors is a bit unusual. It uses negative feedback derived from the current in the input stage and the voltage at the output of the second stage.

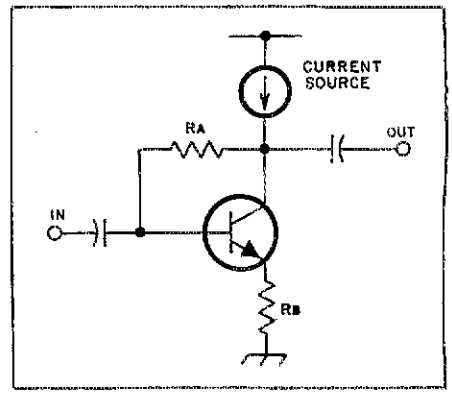


Fig. 5 — Single bipolar transistor feedback amplifier circuit providing impedance match at both the input and output.

The final design was developed from a simpler form shown in Fig. 5. This circuit is the basis of many of the "wideband amplifier" modules sold by commercial manufacturers. It is covered by a patent,[4] and has appeared in many application notes.[5] A two-stage version of the circuit has been described in an amateur magazine.[6]

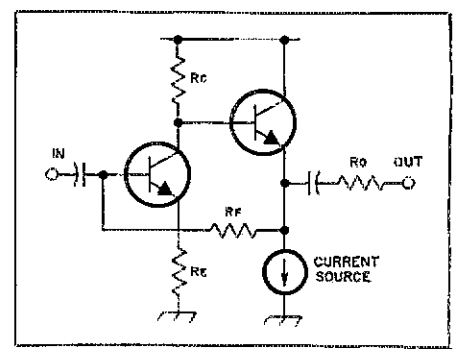
By proper selection of R_A and R_B, both the input and output impedances can be set to match your system and at the same time obtain the desired gain.

$$R_A = Zo(1 - A) \text{ and } R_B = Zo/(1 - A)$$

where Zo is the desired input and output impedance and A is the numerical voltage gain, i.e., A = antilog [(dB gain)/20].

The circuit in Fig. 5 provides fairly good noise figures, low distortion (due to the current and voltage feedback), flat gain over wide bandwidths, and good impedance matches at both the input and output. But it has one serious shortcoming: The amount of feedback is affected by both the driving source impedance and the load impedance. This shows up mainly in the amplifier input and output impedances. For example, in a 50-ohm system, if the output load is actually lower than 50 ohms, the amplifier input

Fig. 6 — Basic circuit for a bipolar feedback amplifier with improved input to output isolation.



impedance will be higher than 50 ohms. The reverse is also true. The same "teeter-totter" effect occurs if the driving source differs from 50 ohms. The result of this effect is interaction between the source and load, which may turn the amplifier into an oscillator when both the source and load have reactive components. This shows up regularly when the amplifier is used between an antenna and the input of a receiver with a narrow-band preselector.

To overcome this limitation, while preserving most of the good features, the circuit in Fig. 6 was conceived. It uses a second bipolar transistor as an emitter-follower buffer. Because the follower has a very low output impedance, it is virtually unaffected by changes in output loading. These changes are prevented from modifying the input impedance presented by the amplifier.

This circuit has only a few disadvantages compared to the single-transistor version. There is a reduction in the bandwidth at the high-frequency end due to the capacitances associated with the input to the follower. The linearity of this circuit is slightly worse because, for the same output power, the voltage swing at the collector of the input transistor is twice that seen in the single transistor circuit. The power consumption and complexity are both greater as well.

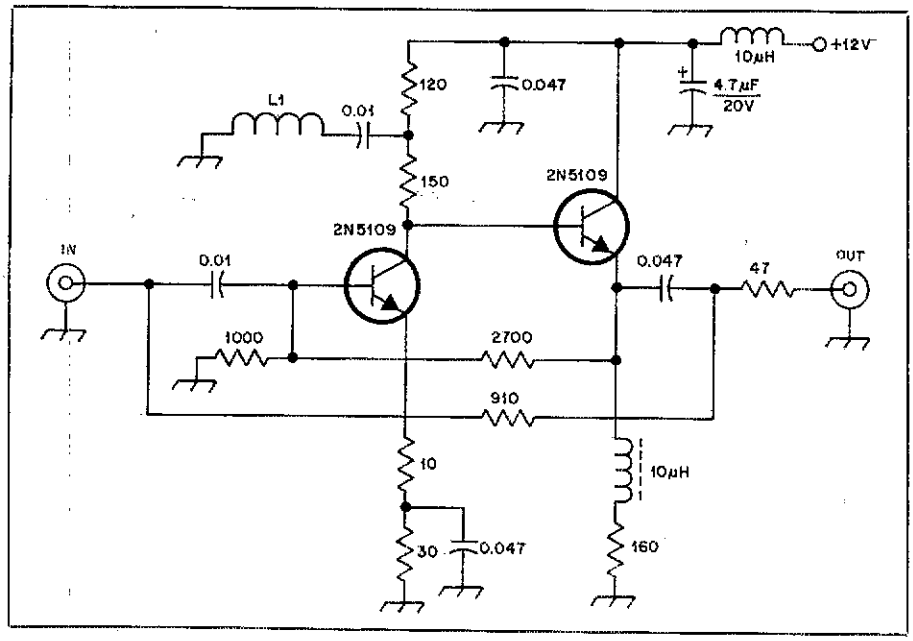


Fig. 7 — Final schematic for the two-transistor bipolar feedback amplifier. Capacitor values are in μF; resistances are in ohms.

Bipolar Amplifier Design

To calculate the resistor values for the amplifier, it is first necessary to select a value for R_E. Note that R_E includes the inherent emitter resistance in the transistor, which is approximately 26 divided by the emitter current in mA.

Then $R_C = 2A \cdot R_E(B + 1)/B$

and $R_F = [(2A + 1)Ro]/\{1 - [2A\,Ro/(B\,R_C)]\}$

where A = overall voltage amplification
B = estimated transistor beta (current gain)
Ro = system impedance

The device chosen for the amplifier was the 2N5109. It is made by both Motorola and RCA, and perhaps others. It has excellent linearity, a nice f_t (about 1500 MHz), low noise, and is capable of 1 watt dissipation at room temperature. The power-handling capability is important since devices designed for use at higher power usually are very linear at reduced signal levels.

For this application, the input transistor was run at a collector current of about 23 mA and the output device at about 36 mA. The inherent emitter resistance of the input transistor is thus about 1 ohm. I chose the external resistance in the emitter circuit as 10 ohms, so R_E is 11 ohms. This value of R_E gives a good compromise between degradation of the noise figure (if R_E is too large) and degradation of linearity (if R_E is too small).

The desired gain for the circuit was 16 dB, which is a voltage amplification of 6.3. The system impedance is 50 ohms and the estimated beta is about 75. The calculated value of R_C is then 141 ohms, which is rounded off to the standard resistor value of 150 ohms. The feedback resistor, R_F, is calculated as 721 ohms.

The final circuit is shown in Fig. 7. Several things have been added which make it appear much more complicated than the basic circuit in Fig. 6. The emitter resistor is made up of the 10-ohm resistor and an additional 30 ohms with a bypass capacitor, which helps to stabilize the dc bias. The collector circuit has 120 ohms and inductor L1 added to offset the effects of the transistor capacitance, which would tend to make the gain roll off with increasing frequency.

The feedback resistor is made up of the parallel combination of the 2700-ohm dc-bias resistor and the 910-ohm ac feedback resistor. If the ac feedback resistor were removed and the 2700-ohm resistor reduced to 680 ohms, the 1000-ohm resistor across the input, which is part of the dc bias, would have to be about 270 ohms. A resistor this small would upset the input impedance and degrade the noise figure of the amplifier. Another advantage of having the parallel resistors is that it allows the net resistance to be varied for optimum input impedance without affecting the dc bias conditions.

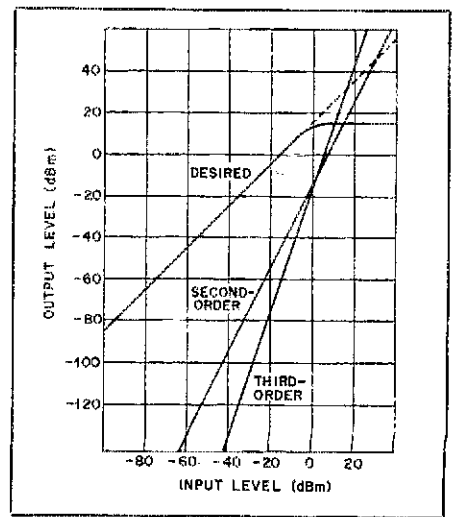
The current source shown in Fig. 6 is simulated with a 160-ohm resistor and a series 10 μH choke. This has the required high impedance to ac signals to prevent loading of the output while still providing the proper dc bias.

Bipolar Performance

The photograph of the bipolar circuit shows the construction method to be the same as used in the MOSFET amplifier. It is stable and shows no tendency to oscillate. Current drain is about 59 mA from a +12-volt source. It could easily be operated from a normal automobile battery, with about 13.5 volts. It will draw more current, but will otherwise perform at least as well as at the lower voltage.

The noise figure of the amplifier is about 3.8 dB. This is typical of the several samples built. This is seldom high enough to cause degradation of the system signal-

Fig. 8 — Distortion performance of the bipolar feedback amplifier.



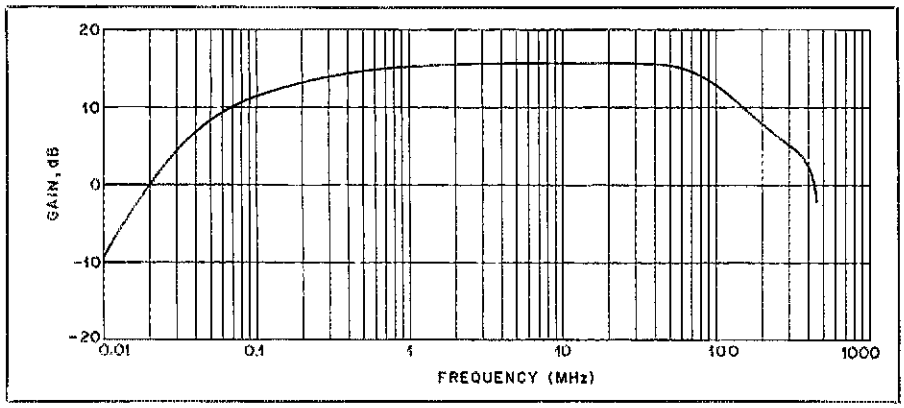


Fig. 9 — Gain response of the bipolar amplifier.

to-noise ratios, due to the normal atmospheric and man-made noise levels encountered. The equivalent noise floor with a 400-Hz bandwidth is −144.2 dBm or about 0.014 μV.

The two-tone distortion curves are shown in Fig. 8. This was measured in the same way as for the MOSFET circuit. The third-order intercept is at an input level of +15.4 dBm. This is 17.4 dB above the intercept for the MOSFET. The dynamic range is 106.4 dB, almost 10 dB better than the FET.

The second-order intercept is of interest in a wideband amplifier since there is nothing to inherently limit the level of out-of-band frequencies. For this circuit, the second-order intercept is at an input of +31 dBm. Although this is better than the third-order intercept, the distortion is potentially more harmful, since the level of a second-order distortion product falls only 2 dB for each 1 dB drop in the level of the two frequencies causing the product. If a second-order "dynamic range" were to be defined, it would be only 87.6 dB. This figure is still better than the third-order dynamic range of the average amateur receiver, and indicates very good overall linearity. The corresponding figure for the MOSFET circuit was 74.4 dB.

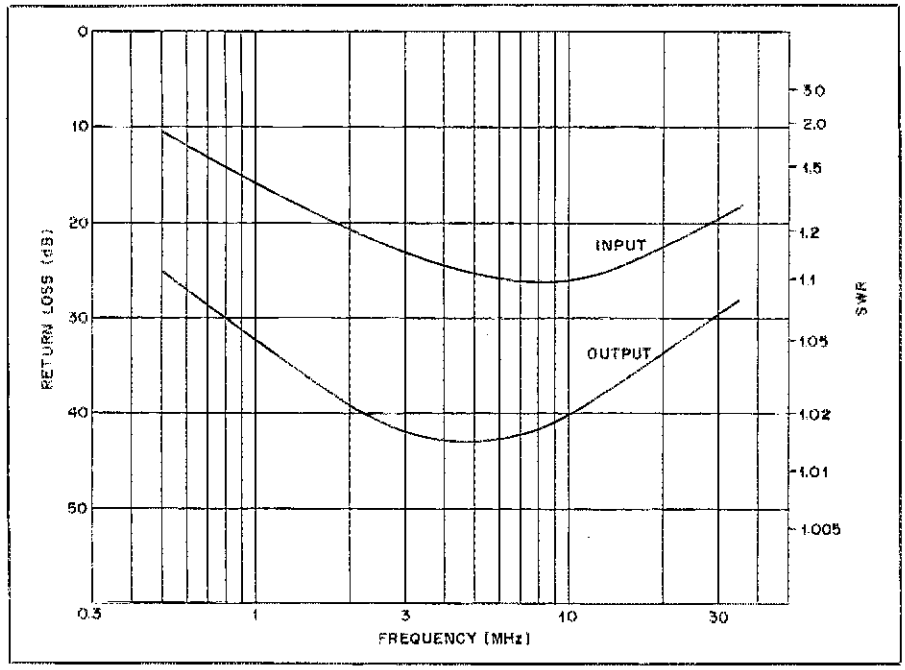
Note that the desired output from the bipolar amplifier limits very sharply. This is seen as a very flat area at the top of the curve in Fig. 8. Compare this to the gradual curvature seen in the FET amplifier characteristics in Fig. 2. This rapid limiting in the bipolar amplifier is a normal characteristic of amplifiers using negative feedback. The feedback "tries" to maintain linear operation of the circuit right up to the point where there is clipping due to saturation or cutoff of one of the transistors.

The frequency response of the bipolar amplifier is shown in Fig. 9. It is flat to within 0.1 dB from 2 to 30 MHz, and is down only 0.3 dB at 54 MHz, making it useful on 6 meters (where the noise figure is about 4 dB). The −3-dB points are at 160 kHz and 105 MHz. The lower cutoff frequency of the amplifier is determined entirely by the size of the coupling and bypass capacitors, and can be changed easily by scaling the capacitors accordingly. The high-frequency cutoff is caused by the capacitances associated with the two transistors, and to a lesser extent by the fall-off in gain of the first transistor. Another effect which tends to reduce the high-frequency gain of the circuit is the parallel capacitance of the two feedback resistors which connect to the input. Even 1 pF in parallel with these resistors causes a noticeable high-frequency roll-off. Most resistors have one- or two-tenths of a picofarad associated with them, and by having two resistors in parallel, the effect is compounded.

In my circuit, I left L1 variable. It is adjustable with a threaded powdered-iron core and is nominally about 0.22 μH. By observing the amplifier response on a swept measuring setup, L1 can be adjusted to provide the flattest response. It could instead by a small molded rf choke of 0.22 μH or a small air-wound coil. The maximum slope you might expect from using a fixed inductor instead of a variable one would probably be about ±1 dB, given variations in transistor capacitances.

The input and output return losses are plotted in Fig. 10. The input match is slightly poorer than the output match, since it is a function of the gain of the first transistor and the reactance of several capacitors. Even so, it has better than a 19 dB return loss (SWR of 1.25:1) on frequencies from 160 through 10 meters.

Fig. 10 — Input and output match of the bipolar feedback amplifier.



And the Winner Is . . .

I'll leave that up to you. Really though, there isn't a winner. The MOSFET circuit obviously is better in noise figure, second-order distortion (because of its narrow bandwidth), and power consumption. The bipolar circuit excels in bandwidth, third-order distortion, and impedance match. But remember, the circuit that surrounds the transistor is often even more important than the device used. There are several degrees of freedom in juggling the circuit parameters. I could have improved the distortion performance of the MOSFET circuit at the expense of noise performance by using a smaller impedance step-up in the input network, and changing the output network to bring the gain back up. If I had wanted lower power consumption in the bipolar circuit, the distortion performance would have had to suffer as a result. The list goes on and on.

Newer devices, such as the VMOS power FETs sold by Siliconix,[7] are going to have a tremendous effect on receiver front-end design. Who knows what other technologies will do for the design of low level amplifiers? The most important thing is to keep your mind open to advances in the art of amplifying devices.

I'd like to thank Ed, WB6CFW, for his

help in adapting my original −20-volt design of the bipolar feedback amplifier to +12-volt operation. Thanks also go to Ken, W7ZUL, for running further field tests on that amplifier with his HW-104, which needed just a bit more sensitivity on 10 and 15 meters.

Appendix

Noise Floor

The noise floor is approximately the level of the lowest detectable signal that a receiver can hear. If a signal at this level is received, the signal-to-noise ratio will be 0 dB, i.e., it is at the same level as the noise. The amount of noise received is a function of the received bandwidth and the effective noise figure of the receiver. A receiver with a 1-Hz bandwidth and a 0-dB noise figure will have a noise floor of −174 dBm, regardless of the system impedance. For each dB of noise figure, the noise floor moves up 1 dB, and each time the receiver bandwidth is doubled, it moves up by 3 dB. The formula for the noise floor in dBm is thus:

Noise Floor =
$-174 + (NF) + 10 \log (BW)$

To convert dBm to microvolts, remember that 0 dBm is one milliwatt at some specified impedance. For 50 ohms, 0 dBm is 223,607 μV. In general,

microvolts =
$\sqrt{Zo} \times$ antilog (dBm/20 + 4.5)

Dynamic Range

The dynamic range of a receiver is the difference in dB between the noise floor and the level of either of two frequencies whose third-order product is at the noise floor. In other words, the distortion product is just detectable when the desired signals are above the noise floor by the dynamic range. The formula is quite simple, given that you know the noise floor in dBm, and the input level that corresponds to the third-order intercept, also in dBm:

Dynamic range =
2 [(third-order intercept) − (noise floor)]/3

Remember that the noise floor is normally a negative number!

It is also interesting to know the second-order "dynamic range" in wide-band systems. This departs from the usual definition of the dynamic range, which applies only to third-order distortion. The "dynamic range" can be calculated from the noise floor and the input level corresponding to the second-order intercept:

"Dynamic range" =
[(2nd order intercept) − (noise floor)]/2

For a more detailed discussion of these topics, consult references 8, 9 or 10.

References

[1]Reisert, "Low Noise Figure 28-30 MHz Preamplifier for Satellite Reception," *Ham Radio*, October 1975, p. 48.
[2]Rohde, "High Dynamic Range Receiver Input Stages," *Ham Radio*, October 1975, p. 26.
[3]DeMaw, "His Eminence — The Receiver," *QST*, June 1976, p. 27.
[4]Seader and Sterret, U.S. Patent no. 3,493,882, "Unit Transistor Amplifier with Matched Input and Output Impedances," February 3, 1970.
[5]Hadley, "Amplifier Gains 10 dB over Nine Octaves," *Engineering Bulletin EB 37*, Motorola Semiconductor Products.
[6]Rhea, "General Purpose Wideband Amplifier," *Ham Radio*, April 1975, p. 58.
[7]Oxner, "Mospower FET as a Broadband Amplifier," *Ham Radio*, December 1976, p. 32.
[8]Hayward, "Defining and Measuring Receiver Dynamic Range," *QST*, July 1975, p. 15.
[9]Fisk, "Receiver Noise Figure, Sensitivity, and Dynamic Range — What the Numbers Mean," *Ham Radio*, October 1975, p. 8.
[10]Burwasser, "Reducing Intermodulation Distortion in High-Frequency Receivers," *Ham Radio*, March 1977, p. 26.

Feedback

☐ In "Hints and Kinks," November 1978 *QST*, page 40, the diagram for my item, "PRV Diode Checking," should have shown the resistor between the oscilloscope and ground as 10 kΩ and not 10 MΩ. Use of the incorrect value might result in damage to an oscilloscope. — *Duane J. Meyer, K9PVY*

☐ In "45th ARRL November Sweepstakes Announcement" (October 1978 *QST*), the captions were reversed under the two photos which appear on page 74. The top photo is really KØKX, and the bottom photo shows K5VRX.

☐ The Air Force command MARS station (Stray, November *QST*, page 34) has moved to Andrews AFB, which is in Maryland, not Virginia.

☐ In the Product Review of the RIW 432-19 (December *QST*, page 34), an error appeared in the first paragraph under the subheading "Performance." The fourth sentence should read, "It worked very well . . . including Virginia (during an opening)." The reference to Es was an error. — *K1TX*

Strays

ARRL FLAG CONTEST

☐ We'd like to have an official flag for the American Radio Relay League, Inc. Something colorful, yet dignified. With the passage of time and suitable publicity it would clearly identify the ARRL. It could be flown at ARRL hq., at your home, on your boat, at ARRL hamfests and conventions, and displayed on member stationery.

A design contest is now open. You all know what flags look like; how some stir you more than others. Let your imagination run free — design an ARRL flag. Have the design in our hands by March 1, 1979. The winner will be announced by March 15, 1979, and will receive a complete set of ARRL publications. The winning design and designer will be publicized in *QST*.

I would like to get in touch with . . .

☐ hams willing to assist the Correspondence Chess League of America to organize a postal chess match with a club in Havana, Cuba. Tyler Kelly, 642 Alvarado St., Apt. 211, San Francisco, CA 94114.

Just upstream from Pearl Harbor, Army MARS station KH6USA/KH6 used a wind-driven generator to supply a continuous minimum of 2 amps during last year's Field Day outing. *(photo by J. R. Williams, KH6JRW)*

QST congratulates . . .

☐ A. Prose Walker, W4BW, who recently received an honor award for distinguished contributions to the International Radio Consultative Committee (CCIR), a body of the ITU.

The CW Filter-Limiter

Digital techniques applied to QRM reduction.

By Milton Trzaska,* WA2QIQ

Noise and crowded band conditions seem to be part of Amateur Radio. Sure, modern receivers have marked improvements over old ones in the selectivity department. But even with today's sharp crystal and mechanical filters and i-f tuning systems, a little additional selectivity and noise suppression often makes the difference between a solid QSO or no copy. The circuit described here will give your station that slight edge over the competition.

I originally built this filter-limiter as a signal conditioner for use with the alphanumeric converter and display described in *QST*, October, November and December, 1975.[1] After using it I found that it also worked extremely well even when copying the code by ear. When I connected the filter-limiter linear or digital output to an audio amplifier and speaker, I found that the benefits of super-sharp selectivity and improved signal-to-noise ratio (SNR) had to be heard to be believed. Static bursts from storms and electrical appliances were almost entirely eliminated and stations operating only 100 Hz away from my listening frequency were not heard at all.

This drastic improvement is achieved in four stages: a two-section active band-pass filter, a phased-locked loop, a digital counter and a gated audio oscillator.

Circuit Description

My receiver, a Heathkit SB-303, produces a 1000-Hz output when receiving cw. Therefore 1 kHz was chosen as the band-pass filter center frequency. The filter may be designed around other center frequencies, with minor component changes, to allow use with other receivers.

The schematic diagram for the filter is shown in Fig. 1. The 1-kHz cw signal, taken from the receiver headphone jack, is applied to U1. U1 and U2, with associated components, are identical band-pass filters. Transistor Q1 amplifies the 1-kHz output to a level capable of driving U3. The selectivity of the band-pass filter network is adjustable from 200 Hz to 50 Hz at the −6-dB points. The network has a gain of 60.

U3 is a phase-locked loop (PLL) that produces the nearly perfect rectangular reponse curve of an ideal filter. In conjunction with U4, the 1-kHz filtered cw signal is converted into a dc voltage. Only two states exist, PLL locked or unlocked, producing +5 or 0 volts output, respectively. The +5 V is identified as the mark signal. The PLL also generates a constant 1-kHz signal, labeled VCO OUTPUT, that is used by the digital circuitry.

Up to this point selectivity has been the primary concern, although an improvement in SNR occurs because of the decrease in audio bandwidth. The purpose of U5, U6 and U7 is to eliminate noise bursts shorter than 8 ms which may get through the PLL.

Assume a 1-kHz signal is applied to the input of the filter-limiter. It passes through the band-pass filter, the PLL locks on it, and the mark signal at the output of U4 changes from 0 to +5 volts. The mark signal turns on gate U5A and the VCO signal passes to the binary counter, U6, which counts until U6 pin 11 goes to +5 volts. This takes eight VCO cycles, resulting in a delay of 8 ms. This +5-volt logic signal turns gate U5B on and gate U5A off. U6 then stops counting. The VCO signal can now pass through gates U5B and U5C, where it appears as a 1000-kHz square-wave signal at the DIGITAL OUTPUT terminal.

Now assume the input signal is removed. The PLL unlocks and the mark-signal voltage drops to 0. The one-shot, U7, is triggered, resetting the counter, U6. The voltage at pin 11 of U6 drops to 0, turning gate U5B off. The VCO signal is blocked and no signal appears at the DIGITAL OUTPUT terminal.

It can be seen there is an 8-ms delay between input and output. Most man-made and atmospheric noise is less than 8 ms in duration, and therefore will not appear at the output. However, this delay is very short compared to most cw characters and will have little effect upon them. The circuit requires +5 volts dc at 80 mA.

Other Center Frequencies

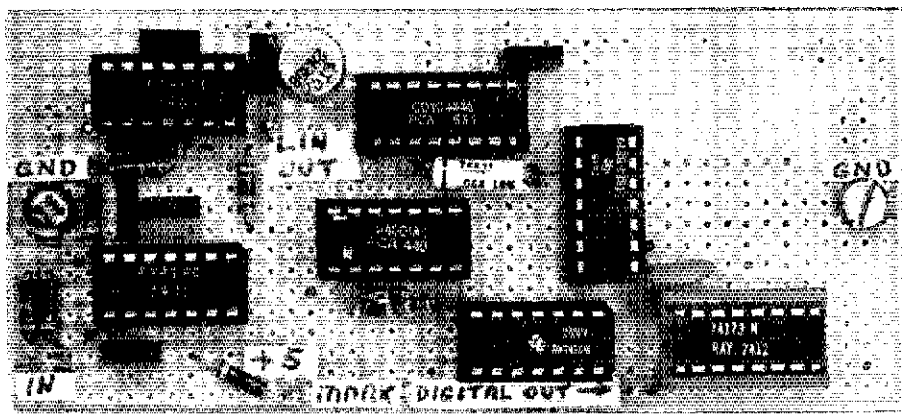
Some receivers use 750 or 600 Hz as the audio frequency when the cw signal is centered in the i-f filters. The filter-limiter center frequency can easily be changed by substituting different values for six resistors and one capacitor.

The six resistors are in the band-pass filter. They are R2, R3, R6, R7, R8 and R11. Note that R2 is equal in value to R7, R3 equals R8, and R6 equals R11 — because U1 and U2 use identical circuits. Use the following equations to determine the new values. If the calculated resistances are odd values use the closest values available.

$$R2 = R7 = \frac{0.794}{(3 \times 10^{-8}) F_c} = \text{ohms} \qquad \text{(Eq. 1)}$$

$$R6 = R11 = 6 \cdot R2 \qquad \text{(Eq. 2)}$$

The filter-limiter is quite compact, considering the job it does to rid your life of QRM. Note that sockets were used in the construction of this unit. The wiring is on the reverse side and is point to point.



*Clarksburg Rd., Clarksburg, NJ 08510

[1]Riley, "A Morse Code to Alphanumeric Converter and Display," *QST*, October, November and December 1975.

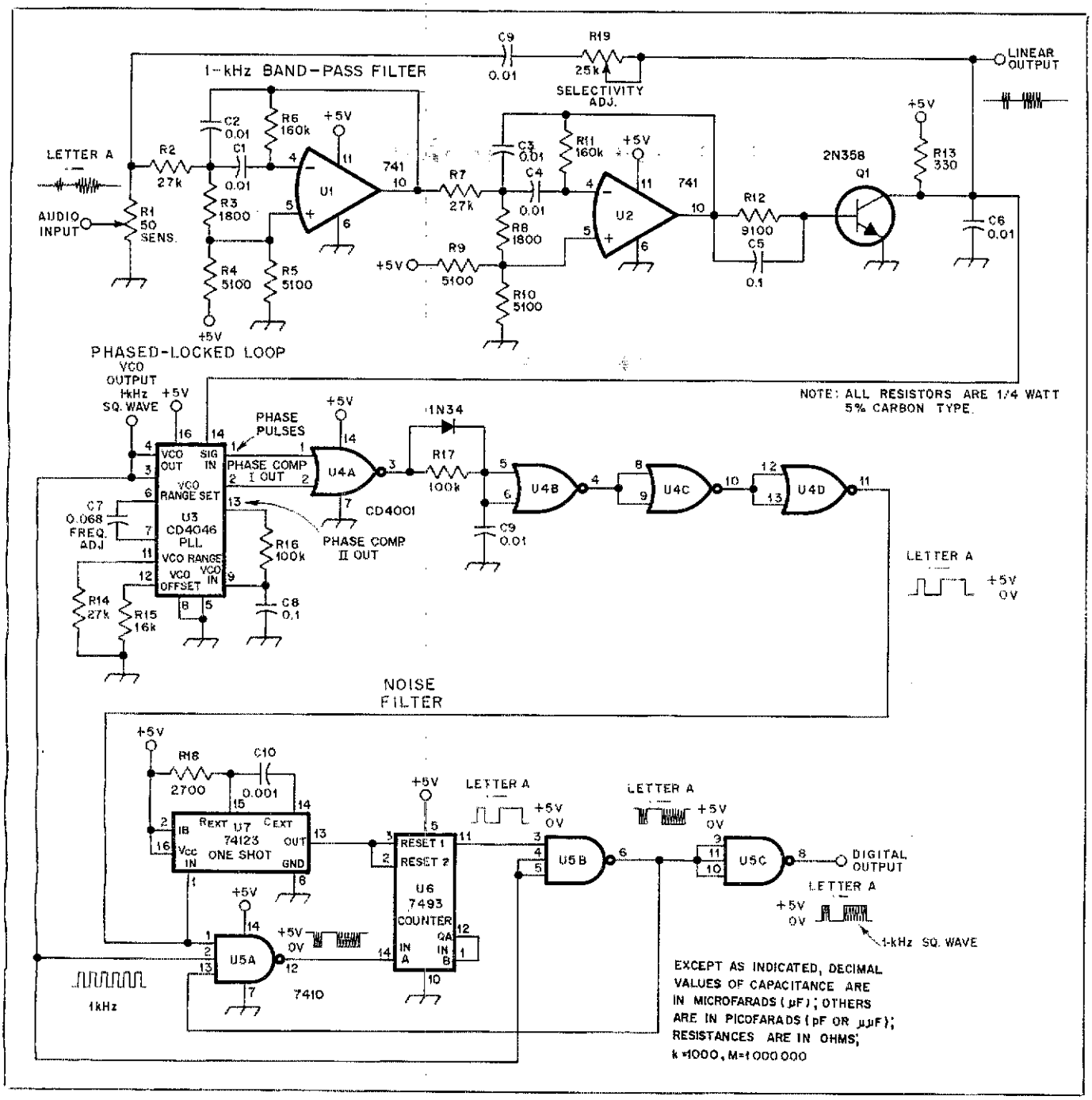


Fig. 1 — The schematic diagram of the filter-limiter. Shown are the waveforms for the Morse letter, A.
Q1 — General-purpose npn germanium transistor, 2N358 or equiv.
U1, U2 — Operational amplifier, 741.
U3 — Phase-locked loop, CD4046.
U4 — Quad 2-input NOR gate, CD4001.
U5 — Triple 3-input NAND gate, 7410.
U6 — 4-bit binary counter, 7493.
U7 — Dual retriggerable monostable multivibrator, 74123.

$$R3 = R8 = \frac{R2 \cdot R6}{100 \cdot R2 - R6} \qquad \text{(Eq.3)}$$

C7 determines the lock-in frequency of the PLL. This should be the same as the band-pass-filter center frequency. It is best to hand select the value because of the narrow bandwidth involved and tolerances on capacitor values.

Increasing the value of C7 will decrease the lock-in frequency and vice versa. Once the proper value is found, an output signal should occur at the DIGITAL OUTPUT terminal when the input signal is within 100 Hz or less of the center frequency chosen.

Construction

Because there are no high amplifier gains or frequencies involved, the circuit layout is not critical.

I used a 2 × 4-1/2-inch (51 × 114 mm) Vectorbord and point-to-point wiring. Components may be mounted on the top or bottom of the board, whichever is most convenient.

The circuit as described here has been based on my operating needs with respect to QRM and local interference. Band conditions vary considerably but the bandwidth and delay can easily be adjusted for individual requirements. The input sensitivity is 50 mV. Care should be taken not to overload the input, or all the advantages will be lost.

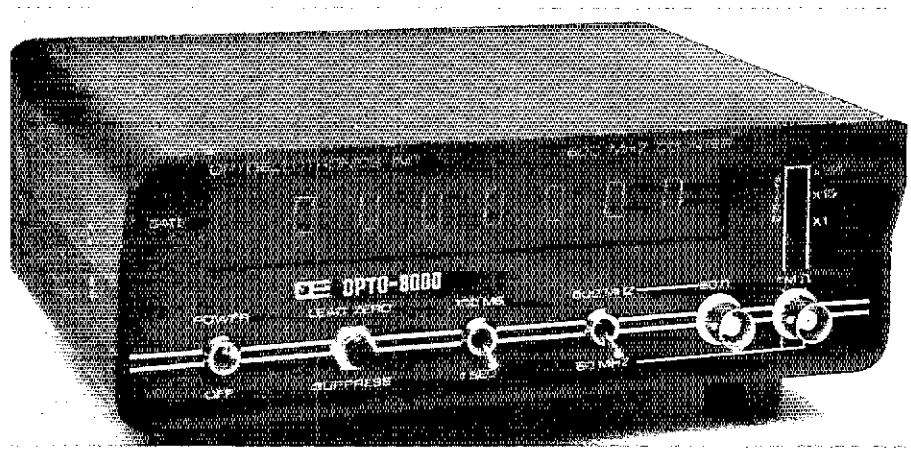
The filter-limiter has been used with a cw code converter and audio source for quite some time. It has proved to be a valuable aid for cw operation. Nothing against QRM or QRN — but who needs them!

Product Review

Optoelectronics OPTO-8000.1 Frequency Counter

As the saying goes, "They just don't make them like they used to." This is true of automobiles and houses, and even to some degree true of electronic equipment. However, with electronic gear, this statement is correct only because the quality of most merchandise in this category is *improving* from year to year. The latest evidence of this truism arrived at Headquarters recently for Product Review: the OPTO-8000.1 frequency counter by Optoelectronics.

The OPTO-8000.1 arrived in kit form and was immediately unpacked. Construction of the kit took about 10 hours for this reviewer, although the assembly can be completed more quickly if less care is taken. Actually, the 8000.1 is quite simple to build, since there is almost no point-to-point wiring involved. The components are practically all contained on two G-10 epoxy, double-sided, solder-masked, tin-plated pc boards. In fact, the only parts not mounted on the circuit boards are the power transformer, fuse holder and voltage regulator, which are all secured to the rear panel.



The OPTO-8000.1 frequency counter, shown here with seven of its eight digits lit. Optoelectronics guarantees the counter time base (a Microsonics TCXO) to be within 0.1 ppm from 17 to 40 °C. Best of all, no external calibration instruments are needed to align the completed kit.

Assembly

Assembly began with the main pc board. I should mention that poth pc boards are screened with part numbers to help keep mistakes to a minimum. Optoelectronics also supplies sockets for all ICs used in the 8000.1. These and the other components were installed in a matter of minutes. The heart of the unit, the temperature-compensated crystal oscillator (TCXO) was then attached to the board. The TCXO, a 5.24288-MHz Microsonics unit, is what gives the OPTO-8000.1 its excellent stability of ±0.1 part per million (ppm) from 17 to 40 °C (63 to 104 °F)!

Next, the display board was filled with parts and installed in the front section of the cabinet. The four switches located on the front panel are attached directly to the display board, with their terminals slipping neatly through holes in the pc board where they are soldered in place. This whole procedure results in an excellent support for the display board. The main pc board is then slid up to the display board so the two are touching. The boards are designed so that all necessary interconnections between the two are made by simply soldering the two together where the foil patterns meet. The attenuator switch was wired with a handful of resistors and capacitors, the power transformer, fuse holder and dc voltage regulator were wired to the main board and the input BNC jacks connected, completing the assembly.

The finished counter can be calibrated quickly without the use of external test instruments, and is guaranteed by Optoelectronics to be within ±0.1 ppm or better throughout the temperature range stated earlier! Minutes after final assembly was completed, this reviewer had the OPTO-8000.1 measuring 144- and 432-MHz signals accurately and with no difficulty.

The stability provided by the Optoelectronics OPTO-8000.1 time base appears to be a breakthrough in the price class of the instrument. In checking through time-base catalogs, I found that most time bases in the 0.1-ppm category cost almost as much as the complete OPTO-8000.1 counter *including* its time base.

The reason such importance is placed on the stability of the counter time base is this: You can measure the frequency of a 600-MHz signal down to the nearest 10 Hz using a prescaled counter with eight-digit readout. However, if the time base is only stable to within 1 ppm, you've got a plus or minus 60-Hz margin of error added to the possible 10-Hz error caused by last digit "bobble." So you can be off by as

The OPTO-8000.1 Frequency Counter

Claimed by Manufacturer	*Measured in ARRL Lab*†
Frequency range: 10 Hz to 60 MHz, 20 MHz to 600 MHz (prescaler in).	9 Hz to 61.7 MHz 10 MHz to 500 MHz*
Time base: TCXO (temperature compensated xtal osc.).	
Stability: 0.1 ppm from 17 to 40°C (63 to 104°F).	See text.
Sensitivity: 25 mV at 144 MHz, 75 mV at 600 MHz.	*With Prescaler:* 10-60 MHz: 25 mV 80-240 MHz: 16 mV 440 MHz: 50 mV *500 MHz: 65 mV *Without Prescaler* 10 kHz-3MHz: 2 mV 30 MHz: 7 mV 60 MHz: 27 mV

Resolution: 1 Hz to 60 MHz, 10 Hz to 600 MHz.
Display: 8-digit LEDs 1/4 × 3/8 inch (6.4 × 9.5 mm).
Gate times: 1 second and 0.1 second.
Attenuator: Three position: 0 dB, 10 dB and 20 dB.
Input connectors: Two BNC type.
Input impedance: 1 MΩ (hf/vhf), and 50-Ω (vhf/uhf); inputs diode protected against overload.
Power requirements: 117 V ac 50/60 Hz (220 V ac 50/60 Hz option available), 9-15 V dc at 000 mA, or optional internal batteries.
Dimensions (HWD): 3 × 7-1/2 × 6-1/2 inches (75 × 190 × 165 mm).
Weight: 2.5 lb (1.1 kg).
Cabinet: Black anodized aluminum 0.090-inch (2.3-mm) thick.
Warranty: Two year (limited), applies only to factory-wired units.
Price class: 8000.1 kit $280, wired $330; 8000 (standard time-base, not TCXO) kit $230, wired $280. 220-V option $10, NiCad battery pack option $20. P-102 Hi-Z probe, $17.

†Test results of measurements made on review unit.
*Highest frequency tested in ARRL lab.

much as 70 Hz, not bad. With a ±0.1 ppm time base, though, the maximum error is reduced to 6 plus 10 or 16 Hz — quite an improvement.

I checked the OPTO-8000.1 against a number of frequency-measuring devices in the ARRL lab. It was impossible to verify that the counter was actually stable to within ±0.1 ppm, however, because the OPTO-8000.1 was as accurate or more accurate than our lab equipment!

Determined to make *some* kind of meaningful measurements, I trotted out to W1AW with the counter to check it against the Rohde and Schwarz XSA-1 frequency standard. (It's rated at ±5 parts in 10^{10}, or ±0.0005 ppm!) With the highest frequency the standard generates (1 MHz), I tested the OPTO-8000.1 for accuracy. When I first tried to get a reading, I forgot that a RTTY bulletin was being aired. The counter displayed some interesting things while it was trying to count the low level XSA output (hard to do with six powerful hf signals being generated in the same room!). After the bulletin was over, I tried again. With the XSA output tied to the high impedance input of the OPTO-8000.1, the display was a single *one* followed by six *zeros*. That was the closest I could come to getting a 0.1-ppm test measurement.

Assembly of the OPTO-8000.1 was an enjoyable task, more so than with most kits. The instructions, although not of the "lead you by the hand" type that has proved so successful for Heath, were nevertheless top-notch quality. Not only does the owner's manual contain schematic diagrams, excellent pictorials and construction instructions, it also provides the new frequency-counter owner with many useful bits of information, such as instrument *usage tips*, sources of specific government and other free literature covering calibration, use of frequency standards, and so on.

Things Worth Mentioning

Only one problem was encountered during assembly of the review unit. The nylon screw and nut, which were supposed to be used to attach the regulator transistor to the rear panel of *the unit*, were missing from the kit parts when the unit arrived. I called the manufacturer, and was informed that a small lot of OPTO-8000.1 *kits* were accidentally shipped with those parts missing. The nut and screw were shipped to me at no charge, of course. In the meantime, however, I became impatient and anxious to try out the box, and after scrounging through the junk box, came up with a screw and nut that would do the job. These were quickly installed and when the counter was turned on, everything worked perfectly.

Two things bothered me about the OPTO-8000.1. First, as with many small test instruments, the unit came with a two-prong plug instead of the desirable (safer) three-wire line cord. Second, the brushed-aluminum case, which is excellently built and thick enough to take any beating it might receive, is anodized a satin black. The color is great, but the anodized finish on the review unit seemed a little too sensitive to metal or other hard objects that came into contact with it, resulting in a few shiny dings and small scratches in the finish. It didn't seem to take much to mar the finish, and perhaps this could be considered a minor flaw.

Construction

However, this slight deficiency in the case is far offset by the overall simplicity of maintenance provided by the OPTO-8000.1 cabinet design. Both top and bottom covers remove easily, leaving the main board completely exposed on both sides for troubleshooting, should it be necessary. The side rails and front and rear panels form an open frame around the main board and other components, allowing almost complete access to any part.

On the outside, the OPTO-8000.1 is all business. The ac line cord is removable so that it doesn't get in the way during dc operation through the rear-panel mounted, Japanese type jack provided. (A dc power cord is also provided with all units.) Four heavy-duty feet are attached to the cabinet bottom by machine screws and nuts, guaranteeing that they won't peel off and get lost like some glued-on ones. A surprisingly sturdy tilt bail spring fits into holes between the two front cabinet feet. It not only provides a solid support for the counter during bench use, but doubles nicely as a carrying handle in the field. The fuse holder, mounted on the cabinet rear, allows access to the fuse without removal of the cabinet top, making replacement an easier task.

Operation

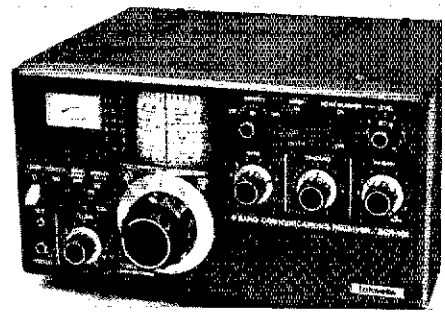
The OPTO-8000.1 operates much like any other frequency counter with built-in prescaler. Two BNC-type input connectors on the front panel accept hf/vhf (10 Hz to 60 MHz) signals at a 1-MΩ input impedance, or vhf/uhf signals (up to 600 MHz) at 50 ohms. Like the review model, earlier models of the OPTO-8000.1 contained a single rf amplification stage, but according to the manufacturer, after a price increase last November, the kits (and wired units) now come with two rf stages, making sensitivity better than that claimed for the review unit — 25 and 75 mV at 144 and 600 MHz respectively. With the red eight-digit readout, the 8000.1 resolution is to 1 Hz at frequencies up to 60 MHz, and to 10 Hz up to 600 MHz. The decimal point is automatic, and a leading-zero suppression switch is located on the front panel. A red LED located at the upper left hand corner of the front panel displays the gate period.

For more information on the OPTO-8000.1, contact Optoelectronics, Inc., 5831 N.E. 14th Ave., Fort Lauderdale, FL 33334. — *Jim Bartlett, K1TX*

THE LAFAYETTE BCR-101 COMMUNICATIONS RECEIVER

The Lafayette Model BCR-101 communications receiver might be suitable for an SWL or the ham who would like a general-coverage receiver to complement his shack. But if you are a new Novice looking for your first rig, this receiver will probably not be satisfactory on today's QRM-saturated Novice bands. For the Novice, there are transceivers with superior receiver sections available and which don't cost a lot more than the BCR-101.

The BCR-101 is all solid-state and has six bands covering 170 kHz through 30 MHz, with the exception of 400-530 kHz. The 170- to 400-kHz band may be of interest to marine and aircraft buffs and those interested in low-frequency propagation. For the upper three bands, which cover 3.5 to 30 MHz, there is a 500-kHz bandspread dial calibrated from zero to 500 and 500 to 1000 in 5-kHz increments. What makes *this* bandspread tuning unusual for a general coverage receiver is the fact that it tunes linearly and at the same rate, regardless



The Lafayette model BCR-101 communications receiver.

of the frequency band being used. The BCR-101 has a tunable BFO, rf and af gain, noise blanker, 500- or 50-kHz crystal calibrator, a-m/cw/ssb selector, and single-signal reception using the narrow i-f passband.

On the upper three bands, the BCR-101 uses a double-conversion superheterodyne circuit with the first i-f at 2.15 MHz and the second i-f at 455 kHz. On the lower three bands, only the 455-kHz i-f is used.

The instruction manual is fairly comprehensive, supplying alignment details and schematic and circuit board diagrams. (Some of the printing on the schematic supplied with our unit is difficult to read.) Although the circuit board diagrams specify component numbers where applicable, a parts list is not supplied.

The unit is handsomely styled and gives one the initial impression that it is intended for amateur use. However, there are some serious performance drawbacks. Most important, the 500-kHz bandspread tuning control covers its entire range in only a bit over three-quarters of a turn, compared to most transceivers now on the market, that cover 20 to 25 kHz per dial rotation. Hence, the BCR-101 bandspread tunes 25 to 30 times as rapidly across signals, and this makes ssb and cw tuning critical. On 80 and 40 meters, the main tuning is actually more vernier than the bandspread! Gearing down the bandspread control would make the BCR-101 a better receiver. Also the main tuning dial has considerable backlash, which makes bandsetting on the higher frequencies difficult.

The i-f selectivity is adequate for ssb reception using the narrow passband, although the skirts are not very steep. For reception in a congested cw band, an audio filter would be a virtual necessity.

Another shortcoming of the unit involves the noise blanker. No setting of the blanker level control provided any improvement in signal readability through the fluorescent light noise present in the ARRL headquarters building. It was also ineffective against the ignition-type noise generated by the antique spark-gap transmitter in the lobby at W1AW! Interestingly, at the minimum blanker setting, both the signal and noise levels increase dramatically.

Perhaps less important are the following: Only a pair of small screws is provided for the 50- to 75-ohm antenna input, rather than an SO-239 or phono pin jack; the BFO tuning must be preset since it affects both the passband *and* the receiving frequency; the concentric main tuning/bandspread dial has the bandspread knob on the outside, an awkward setup since the operator must take care not to disturb the main tuning knob on the inside when moving the outer bandspread knob; the ac line cord

Lafayette BCR-101

Claimed by Manufacturer	*Measured in ARRL Lab*
Sensitivity: 1 μV or better.	0.2 μV or better for 10 dB S + N/N.
Selectivity (−6 dB): 8 kHz (wide), 3 kHz (narrow).	5 kHz (wide), 4 kHz (narrow).
Power consumption: (13.8 V dc) less than 500 mA.	270 mA maximum.

Frequency coverage: Band A: 170-400 kHz; Band B: 530-1500 kHz; Band C: 1.4-4 MHz; Band D: 3.5-7.5 MHz; Band E: 7.5-15 MHz; Band F: 15-30 MHz.
Antenna input impedance: 50-75 ohms unbalanced (Bands A,C,D,E and F). Ferrite loopstick for band B.
Intermediate frequencies: 2.15 MHz (D,E,F), 455 kHz.
Audio output: 2 watts at 10 percent THD (operating into 8-ohm load).
Power requirements: 110 volts, 50/60 Hz ac or 13.8 volts dc.
Dimensions (HWD): 7 × 12 × 9-1/2 in. (180 × 300 × 240 mm).
Weight: 13-1/2 lb. (6.1 kg).
Price class: $250.

is a two-wire type; and there are microphonics, especially at the highest frequencies.

Of merit are the facts that the BCR-101 can be operated off the ac mains or from a 12-volt dc power source and draws less than 500 mA during portable use; it contains an internal speaker; it is small and lightweight; and it is surprisingly sensitive, even on the higher bands. Several European and South American amateur signals were copied 5 × 7 on 15 meters using an 80-meter dipole fed with a long length of RG-58/U. Lab measurements verify that the receiver is indeed sensitive throughout its frequency range, except for the 530- to 1500-kHz broadcast band, where a ferrite loopstick on the rear panel is switched in.

Reception of amateur signals, while not easy enough to make the BCR-101 a superb receiver for hams, is better by far than that provided by most small SWL receivers. Reception is good on the low-frequency band too. If you're a nonham seriously interested in learning about what happens on those mysterious wavelengths above and below the a-m broadcast band (including the ham bands), consider the BCR-101. It is available from Lafayette Radio Electronics Corporation, 111 Jericho Turnpike, Syosset, NY 11791. — *Stan Gibilisco, W1GV*

HORIZON MODELS 15-147 AND 10-FM 2-METER VERTICAL ANTENNAS

The Horizon model 15-147 is a quarter-wavelength vertical groundplane antenna for the 2-meter amateur band. In these days of gain antennas one may ask, "Why a basic groundplane?" This reviewer lives in an area where repeaters are in abundance, and in such an area the typical gain antenna is not necessary for general use. The Horizon 15-147 consists of a machined aluminum base with a quarter-wave driven element and three groundplane radials which are threaded to screw into the base. Assembly, therefore, is quite simple.

The base also houses an SO-239 coaxial connector which is machined into it, the arrangement being very weathertight. The assembled antenna may be mounted onto any standard 1-to 1-1/2-inch (25- to 38-mm) mast with a single clamp, included with the antenna. The antenna comes precut for resonance at 147.00 MHz but the SWR in 50-ohm feed line remains below 1.5:1 across the entire repeater portion of the 2-meter band. Price class of the 15-147 is $16. — *Dave Karpiej, K1THP*

The 10-FM Gain Antenna

But if it's a vertically polarized omnidirectional 2-m antenna with gain that interests you, consider Horizon's 10-FM antenna. This radiator is a coaxial collinear system with the total radiating portion extending about 3/4 wavelength above the four-radial groundplane. Thus, with a half wavelength more radiator section than a simple 1/4-λ groundplane, intuition tells us that this array may be equated to one having two collinear elements, which has a theoretical gain of 1.9 dB over a dipole. Whatever the absolute gain may be, this antenna is a real performer! During on-the-air testing it was located with its lower end just 30 ft (9 m) in the air. With 10 watts of rf at the antenna, repeaters up to 70 and 80 miles (110-130 km) away could be accessed consistently, both in winter and summer. Maybe this is no unusual feat in flat, open country, but consider that New England has hilly and heavily wooded terrain.

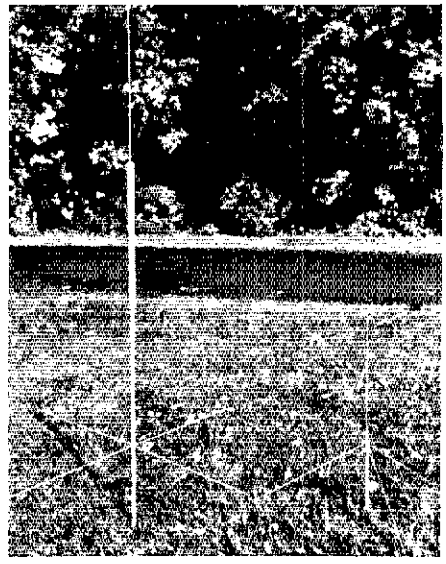
The 10-FM comes from the manufacturer essentially ready for installation. Assembly consists only of screwing the four groundplane conductors into the collar-like tuning sleeve which fits over the lower portion of the base. The antenna is installed atop a mast with two clamps (included). Like the 15-147 antenna, the 10-FM has an integral SO-239 type of connector at the bottom end of the base section.

Antenna adjustment consists of sliding the tuning sleeve and radials up or down on the lower portion of the base section for minimum SWR at the desired center operating frequency. The sleeve is then locked in place with Allen-head setscrews and with the radial conductors themselves. (The radiator section of the 10-FM is factory precut for 147.0 MHz.) The antenna has a broadband response with respect to frequency, and adjustment is far from critical. When the tuning sleeve was adjusted for minimum SWR at 146 MHz (1.06:1), the SWR at 147 MHz was found to be only 1.08:1, and 1.2:1 at 148 MHz. The feed-point impedance is 50 ohms.

The 10-FM uses solid, integral construction, which helps to prevent component deterioration and to provide a long and useful life. The array is designed to withstand winds up to 110 mi/h (180 km/h), something we hope *not* to test under natural conditions! The antenna did survive one of New England's fierce winters, however, coming out looking almost like new. Its power-handling capability is rated at 1 kW. Price class is $50.

The models 15-147 and 10-FM antennas cover the 2-meter amateur line offered by Horizon. Antennas of these same basic designs are also offered for 222 and 445 MHz. In addition, antennas of the two types are available for government and commercial use on frequencies from 140 to 520 MHz. These antennas are manufactured by Horizon Antenna Systems, Inc., P. O. Box 1454, River Rd., Bow, NH 03301, Tel. 603-224-0577. — *Jerry Hall, K1TD*

The Horizon 10-FM coaxial collinear array (left) and the 15-147 groundplane (right), ready for installation. Each antenna is mounted by clamping the section just below the radials to a mast. Both antennas have a machined integral SO-239 type of connector at the lower end of the base, hidden in the grass in this photo.



RCA CA3189E FM I-F SUBSYSTEM IC

Here's a hot item for amateurs who build their own fm receiving gear — the new RCA CA3189E subsystem IC, or if you will, "the works" on a single substrate! The new chip replaces the CA3089E which had a few performance anomalies, especially in narrow-band fm receivers for amateur frequencies.

The features of interest are limiting sensitivity of 12 μV at the −3 dB point; single-coil tuning capability; improved SNR ratio; externally programmable recovered audio level, provides specific signal for control of interchannel muting (squelch). Also provided are specific signal for direct drive of a tuning meter; one-channel step for search control; programmable age voltage for an rf amplifier; internal voltage regulators; externally programmable "on-channel" step width, and deviation at which muting occurs.

Complete data on the electrical function of the CA3189E are contained in the RCA publication, *File Number 1046*. Included are curves of performance, internal schematic diagram, operating data and a recommended pc-board pattern and layout. Additional

technical information is available in RCA technical file *ST-6721*.

The ARRL technical editors would appreciate hearing from amateurs who develop circuits around this new IC. *QST* articles on the practical application of this new subsystem are solicited.

The price class of this device (single lot) is approximately $3. It is available from authorized RCA distributors. Technical data are available from RCA/Solid State Division, Somerville, NJ 08876. — *Doug DeMaw, W1FB*

ASTROLITE MODEL 436B HEADSET

A headset with a built-in microphone is a natural choice for "serious" voice operating, such as contests, traffic nets and DXing. Even casual operators, however, can appreciate the advantages of a unit such as this Astrolite. "Hands-free operating is habit forming. For mobile work such a headset keeps out external noise (check local regulations) and at the same time always positions the mic at the optimum distance.

The plugs pictured were supplied by this user to fit his equipment; otherwise the Astrolite comes ready to wear and use. The headphones may be placed in parallel for single-channel use or may be wired to separate circuits. Broadcast applications of such a headset typically utilize one earphone for program and one for "cue." The headset may be ordered for 200-ohms impedance (standard) or for 300 or 6000 ohms for an additional charge. Frequency response claimed by the manufacturer is 50-15,000 Hz.

The close-talking dynamic mic is 400-ohms impedance. A few transmitters may require a small in-line matching transformer to provide sufficient drive. Frequency range is the same as the headphones, 50-15,000 Hz.

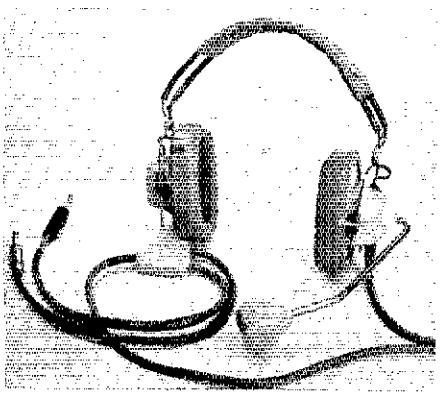
Design of the headset positions the mic to one side of the operator's mouth, providing a constant level and minimizing sibilant sounds. The mic boom is ball-mounted and may be rotated 320 degrees, as well as moved toward or away from the mouth. Mobile operators may prefer the model 433B, which employs a noise-canceling dynamic mic at an additional cost of approximately $31. The headset may be worn with the mic on either the left or right side.

One note of caution: Some states do not permit the use of headphones while driving a vehicle — check your state laws.

Accessory 'phone cushions are available ($4) which accommodate eye glasses, as well as providing warm-weather ventilation where high-level ambient noise is not a problem. The entire headset is light enough that most operators can wear it for long periods of time without discomfort.

Astrolite headsets are imported from England by Television Equipment Associates, Inc., Box 260, South Salem, NY 10590. Price class is $100. — *Lee Aurick, W1SE*

The Astrolite headset and mic boom. (The plugs were provided by the reviewer.)



DAIWA CN-720 SWR AND POWER METER

What the world needs is one more SWR and power meter, right? The Daiwa CN-720 can only be described as unique in the manner in which the information is displayed as well as the unusual flexibility offered by several of its features. Forward and reflected power and SWR are read directly from one meter.

The first thing that strikes you, just looking at the unit, is the presence of *two* needles on the face of the single meter. The needles are mounted at the lower left and lower right of the meter, and read from bottom right and bottom left, respectively. The lower-left-mounted needle indicates reflected power on the scale at the right side of the meter, and the lower-right-mounted needle indicates forward power on the scale at the left side of the meter. Where the needles cross, on the middle scale, *the SWR is indicated directly!* A glance at the accompanying photo will quickly orient you on the three scales described here. It takes only a few seconds to become adjusted to the manner in which the information is presented, and by then, it all seems so natural.

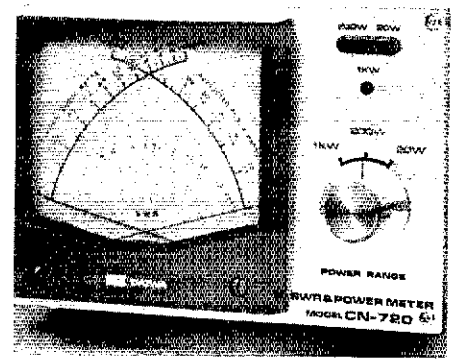
The three ranges of the CN-720 are ideally suited to the various levels used by amateurs: 20, 200 and 1000 watts forward power, and 4, 40 and 200 watts reflected power. Three power-range LEDs indicate which scale is in use. Each LED will light at approximately half the maximum power of that range. At least 10 watts of forward power is required to obtain a meaningful SWR reading.

Additional flexibility is provided, just in case your station isn't yet equipped with multiple, rotary, coaxial antenna selectors. In addition to the customary SO-239 coax connectors for input and output, a third coax connector and a switch are provided, at the rear, to allow switching the output to the antenna or to an external dummy load. At least that is what the manufacturer suggests. However, there is no reason this feature can't be used to select between two separate antennas, for example, an 80/40 meter doublet and a 10/15/20-meter tribander.

The CN-720 is designed for 50-ohm input and output impedances, and may be used from 1.8 to 150 MHz, great for those who work 160 through 2 meters.

The three power scales were compared with a standard laboratory-type meter, and agreement was within five percent on each. On successive scales in the Daiwa meter, agreement was within a needle's width. In other words, with a matched condition, 20 watts of rf power indicates 20 watts on the 20-watt scale and 20 watts on the 200-watt scale. Other power levels may be read with equal accuracy on successive scales.

The Daiwa CN-720 is not your everyday SWR and power meter. Its one-of-a-kind display and flexibility of design make it a useful addition to the ham shack. — *Lee Aurick, W1SE*



The Daiwa CN-720 SWR and power meter. This unit displays forward power, reflected power and SWR all at the same time. The forward power is read from the scale at the left, the reflected power from the scale at the right, and SWR is indicated on the lines in the area between the two power scales.

Daiwa CN-720 SWR and Power Meter

Frequency range: 1.8 to 150 MHz.
Power ranges: 20/200/1000 watts (forward), 4/40/200 watts (reflected).
Impedance: 50 ohms.
SWR sensitivity: 10 watts minimum required for accurate reading.
Dimensions: 7 × 4-3/4 × 5 inches (180 × 120 × 130 mm).
Price class: $165.
Supplier: J. W. Miller Division, Bell Industries, 19070 Reyes Avenue, Compton, CA 90224.

DIRECT CONVERSION TECHNIQUE DC-10A RECEIVER MODULE AND VV-10 VFO MODULE

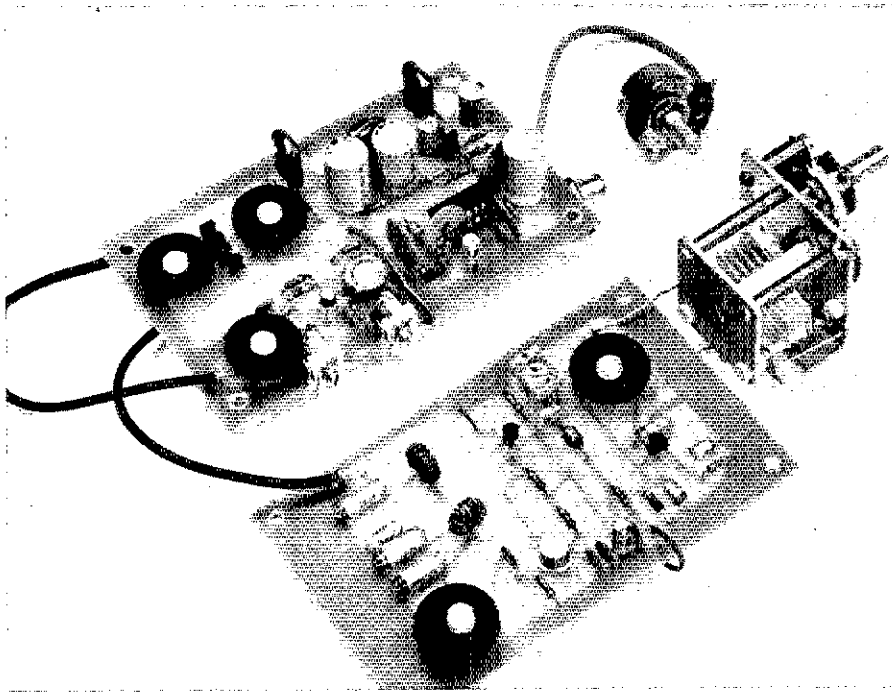
If direct-conversion receivers interest you, these kits from Direct Conversion Technique might be worth considering for your next project. We built the DC-10A, a universal DC receiver module, and the VV-10, a VFO module. Our kits were supplied for operation on 40 meters.

The VFO is a double-buffered, Zener-diode regulated Vackar type designed to deliver 1 V rms into a 50-ohm load. All transformers and rf coils are wound on toroid forms, and the tuning capacitor is a snazzy-looking, gear-driven one that looks quite expensive. However, the whole VFO kit including the capacitor, pc board and other parts is only $30. Not too unreasonable, considering the fact that the VFO can be used both as an LO in the DC receiver and as the keyed oscillator in a matching QRP transmitter.

The VFO came with one FET presoldered on the board. All other components were added in short order, and the output hooked to a 'scope. When the power was applied, the circuit did not oscillate. I checked all the connections again, and then decided to try doing what many purchasers with problems might decide to do — call Direct Conversion Technique.

Wayne Openlander, W9NZB, answered the call. He suggested I send the board back and he would check it out. Less than a week later, the board was returned (no charge) in working order, along with a note explaining the cause of the problem: one bad FET. "Give him an A for service," I thought.

Next, the receiver module was assembled. As



The DC-10A receiver module and VV-10 VFO module are shown here as they looked after assembly. The two boards were installed in an aluminum enclosure for testing.

with the VFO, all transformers and coils in the receiver module are toroidal, and the pc board a single-sided, tin-plated, glass-epoxy job 3 × 5 inches (76 × 127 mm).

After the two boards were completed and tested out individually, they were installed in a homebuilt enclosure and wired for 12-volt operation. As is the case with most DC receivers, the finished unit exhibited very good sensitivity. The leakage from our laboratory signal generator (less than 0.1 μV) was enough to yield a +10 dB S+N/N ratio.

The Circuit

Our receiver module was supplied with tuned-circuit values for operation on 40 meters. The circuit is fairly simple, yet performs better than many I've seen. Some selectivity is provided ahead of the product detector by a dual-gate MOSFET used as a tuned rf amplifier. For the product detector, four MBD101 hot-carrier diodes are used in a doubly balanced mixer configuration providing superior rejection of a-m signals and good interport isolation. A passive audio filter, audio preamplifier and LM380 audio amplifier complete the $40 receiver module.

The manufacturer sells his VFO module with parts for operation on 160, 80, 40 or 20 meters. The receiver kits can be ordered for 80-, 40- or 20-meter operation. Included with the kits are all electronic components, including tuning and volume controls and knobs. The builder has only to supply hardware, antenna connector, speaker and enclosure.

Instructions for the kits, while not as complete as some, should provide enough information for the builder to successfully complete the boards. Included in the instructions are parts-placement diagrams and schematic diagrams for the circuits.

Those of you who are skeptical of DC receiver performance might be interested to know that Direct Conversion Technique offers a 90-day money-back guarantee for anyone who isn't satisfied with their kits.

More information on these two items can be obtained from Direct Conversion Technique, 3132 North Lowell Ave., Chicago, IL 60641. — *Jim Bartlett, K1TX*

PARTS PROCUREMENT CORNER

The J. W. Miller Division of Bell Industries, 19070 Reyes Ave., Compton, CA 90224, has added a number of components to its long list of amateur-interest items. In addition to the almost inexhaustible collection of slug-tuned coils, forms and rf chokes, the manufacturer now sells balun kits, assembled baluns and a large assortment of ferrite rods. Other new products are transmitting-type variable capacitors, bifilar filament chokes, ferrite toroid cores and powdered-iron toroids.

A number of assembled amateur products are also available: TV high-pass filters, transmitter low-pass filters, ac line filters and audio-interference filters. Coaxial switches, an rf speech processor and an SWR/power meter fill out the product line. A catalog is available, *General Catalog No. 79*. List and net prices for all of the Miller components are given in the front of the catalog. Minimum billing is $25 for commercial customers, but we understand that this is not applicable to orders from amateurs if payment is included with the order. — *Doug DeMaw, W1FB*

NEW BOOKS

The Design of Operational Amplifier Circuits, With Experiments, by Howard M. Berlin. Published by E & L Instruments, Inc., Derby, CT, 1977. Softbound volume 6 × 9 inches, 277 pages. Price: $8.50.

Another in E & LI's "Bugbook" series, this book by W3HB provides a laboratory-oriented approach to the study and design of operational-amplifier (op-amp) circuits. As with previous volumes in the application series, the author provides a unique combination of theory and practical circuit applications. In each of the 10 chapters, Mr. Berlin begins by defining terms and stating chapter objectives. In all, more than 35 experiments are used to illustrate the use of op amps as linear amplifiers, voltage and current converters, differentiators and integrators, oscillators, rectifiers, comparators, active filters, and single-supply circuits.

In the first nine chapters, the examples contain bipolar and Norton-type op amps, and chapter 10 introduces the instrumentation amplifier (IA), especially suited for amplification of low-level signals. All experiments are based on one or more of these four devices: μA741, LM318, LM3900 and the Burr-Brown 3660J IA. As each experiment is introduced, the author provides a step-by-step procedure. The theory/application mix is just right; not too fast, too involved, or too brief . . . but a smooth-reading text thoroughly illustrated by scope patterns and block and schematic diagrams.

The author of the book recommends the use of a breadboarding socket of the spring-loaded type for construction of all experimental circuits. All other circuit components are listed, including suggested sources for same. This book is not designed to be a source of all available op-amp circuits, but does explain the design and operation of fundamental circuits used as building blocks in more sophisticated systems. Since the operational amplifier is probably one of the most versatile ICs in use today, this book should be of interest to amateur builders/designers and beginners alike. — *Jim Bartlett, K1TX*

FM and Repeaters for the Radio Amateur, 2nd edition. Edited by the ARRL staff, published by ARRL, Newington, CT 06111. Paperback, 8-1/8 × 11 inches, 176 pages. Price $5.

With nearly half of all active U.S. amateurs on 2-meter fm these days, such mobile rigs and their high-elevation partners, repeaters, are where Amateur Radio is now. However, there is more to vhf fm than just pushing a button and talking. Since first appearing in 1972, ARRL's *FM and Repeaters* has continued to serve an ever-increasing number of hams in this field by promoting one of our basic purposes — advancing the radio art.

And in a few short years has that state of the art ever changed! For diehard cw addicts, dyed-in-the-wool vhf-fm buffs, and newcomers to ham radio alike, the new *FM and Repeaters* book is a must. This new edition not only catches up with all the changes, regulations in particular, but it incorporates a lot of good ideas generated by earlier users.

The new book closely follows the organization of material set by its parent, but there the similarity ends. Included in the theory and construction chapters are new presentations on receivers, transmitters, practical systems, troubleshooting, testing and microprocessor control. Other chapters discuss club organization, surplus gear, tips on buying, and reducing interference. — *Don Waters, WB1CUJ*

Hints and Kinks

UPDATING THE YAESU FT-221R

With the recent opening of the 2-meter subband (144.5-145.5 MHz) to repeater operation, owners of some otherwise excellent transceivers find themselves unable to use their rigs to key machines on the newly activated channels. Notable among those radios is the Yaesu FT-221R. In order to prevent out-of-band operation, only the 146.5-MHz and the 147.0-MHz switch positions permit offset transmission. Yaesu engineers did not anticipate the recent FCC ruling and, as manufactured, the 221R cannot work through repeaters having inputs below 146.0 MHz. The solution I describe below is simple and does not mutilate the radio. As may be seen in illustration A, only two short pieces of wire (and one new offset crystal) are required.

Loosen the top cover by pulling up on the four snap fasteners and carefully pry the cover off. Turn the set upside down on the work table. Remove the side screws and slowly lift away the bottom shell. The four-section band switch will be found just behind the front panel. The second band-switch section from the panel is designated on the schematic diagram as S2B, the third section as S2C.

The solder lugs of each section of the switch (from lugs 1 through 8) start with number 1 on the left *underside* of the wafer (looking from the front panel). Number 2 is the first lug on the left *topside*. Numbers 3 through 8 follow clockwise so that number 8 is on the extreme right topside of the wafer, as you view the switch with the set upside down.

On wafer S2B solder an insulated wire about 1-1/2 inches (40 mm) long to lugs 3 and 7. Lug 3 is not wired at the factory, and lug 7 has a yellow wire soldered to it. On S2C connect lug 3 to lug 6. Again, lug 3 is not factory wired; lug 6 is soldered to a dark blue wire. Be very careful, when soldering, not to melt the insulation of surrounding wires. A helpful idea is to have a friend use two small screwdrivers or similar instruments to separate, and make a path through, the jungle of wiring around the switch while you do the soldering.

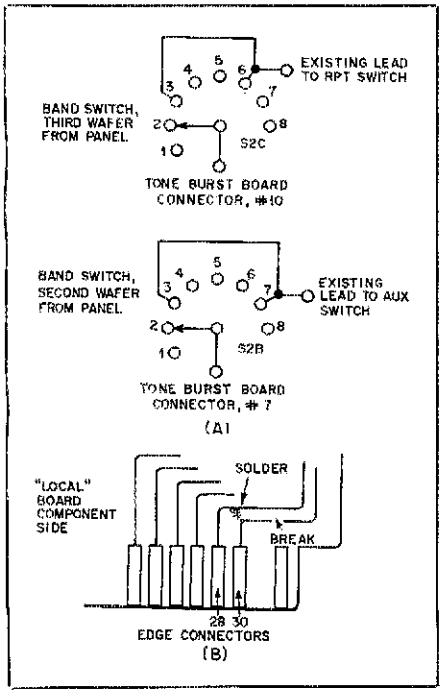
Now replace the bottom shell. Turn the radio right-side up. Remove the black plastic coverplate over the LOCAL board and carefully pull out the board. Just rock and lift it gently out of its edge connector. Plug a 13.9666-MHz crystal (case type HC-25/U) into position 12 on the offset/auxiliary end of the crystal strip. *Do not use socket 9.*

Now refer to drawing B. At the bottom of the *component side* of the LOCAL board find connector contacts 28 and 30. They are contiguous to each other. Immediately above the contact strips very carefully solder (with a low-heat iron) a bonding bridge connecting the printed conductors of 28 and 30. Then, immediately above this solder bridge sever the pc conductor of number 30. Use a razor blade, or X-acto knife. Be sure the 28-to-30 bridge remains intact. Replace the LOCAL board in the chassis-mounted edge-connector. Screw it down tightly.

Turn on the transceiver. Rotate the band switch to 145.0 MHz. Throw the AUX switch to the UP position and the RPT switch to NORM. Key the transmitter (with dummy load) and adjust the trimmer capacitor of crystal 12 (last one on the left, looking from the front panel) until the transmit frequency is 600 kHz lower than the receive frequency. Replace the plastic coverplate over the LOCAL board. Replace the top cover. The set should now operate through the repeaters on the new 144.5- to 145.5-MHz subband.

And *surprise!* You are also able to use the 221R on 1-MHz split repeaters in the 146/147-MHz "oddball" band. Just turn the bandswitch to 146.0 MHz, the AUX toggle UP, the RPT toggle to either NORM or REV, as the occasion requires, and you've got 1-MHz split without the need for an additional crystal. You're actually using one of the factory-wired crystals as an offset rock without impairing the normal function. — *Milton Drake, W2JPN*

These circuit modifications of the Yaesu FT-221R allow operation on the new 2-meter subband and for working through the 1-MHz split frequency repeaters on 146/147 MHz.



MORSE KEYBOARD

While I was building the Morse keyboard described by Al Helfrick, K2BLA, in the January 1978 issue of *QST*, I introduced a few modifications for my own personal use. This little jewel works so well that I just couldn't keep my fingers away from the circuitry. First, I added a tone control. This is a simple variable resistor placed across the 100-kΩ resistor located at U14 between pins 9 and 10. A 500-kΩ potentiometer could have been used as an alternative.

Next came an exact-speed control. The 250-kΩ variable resistor was replaced with a rotary switch and a set of fixed-value resistances chosen for providing specific speeds. To arrive at a resistance needed for a particular speed, I use this formula:

$$\frac{\text{wpm}}{1.2} \times 2 = \text{Hz}$$

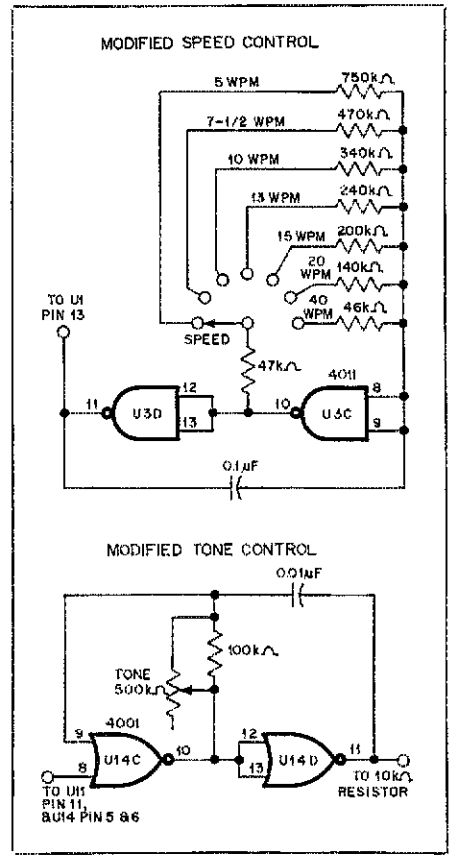
As an illustration of how this works, let's say you want 13 wpm. Then

$$\frac{13}{1.2} \times 2 = 21.6 \text{ Hz}$$

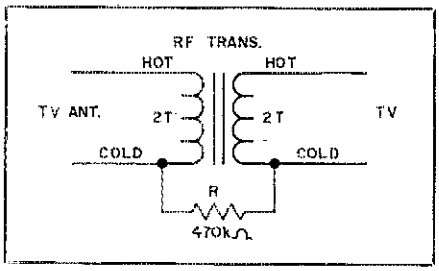
With the aid of a frequency counter, one then varies a resistance attached to the rotary switch until the counter reads 21.6 Hz as measured at pin 11 of U3. Check the amount of resistance needed to obtain 21.6 Hz and that's all there is to it.

The following fixed resistors will serve to provide the wpm as indicated: 750 kΩ — 5 wpm; 470 kΩ — 7-1/2 wpm; 340 kΩ — 10 wpm; 240 kΩ — 13 wpm; 200 kΩ — 15 wpm; 140 kΩ — 20 wpm; 46 kΩ — 40 wpm.

This modification should interest those amateurs who are planning to build or have already built a K2BLA Morse keyboard, including those who prefer the higher speeds. — *Robert A. Shriner, WA0UZO*



This modification of the K2BLA Morse keyboard offers the operator a choice of seven fixed sending speeds. Also shown is a modified tone-control circuit.



A small rf transformer consisting of primary and secondary windings (two turns each) made with no. 16 wire is an effective means of reducing TVI when placed in the feed line to the television receiver. See text.

A SIMPLE TVI FILTER

A small rf transformer inserted in the TV-antenna feed line has a remarkable effect on a TVI problem. So installed, it operates on the fact that vhf TV signals picked up on the TV antenna flow out of phase through the feeder, and the hf interference voltage from a nearby Amateur Radio station reaches the TV set in phase through the TV feeder. TV antennas are too short to work as horizontal dipoles for hf fundamentals, while most TV feed lines are long enough to be vertical antennas. An rf transformer theoretically allows out-of-phase signals to flow and blocks in-phase current.

The transformer consists of a small core and two turns of wire for each of the windings. The core I used was salvaged from an old TV set and it was originally used as the balun from 300-ohm balanced to 75-ohm unbalanced. Bifilar winding with twisted-pair turns is not recommended because capacitive coupling between two windings should be minimized.

I believe almost any rf core with appropriate frequency range will do, and the number of turns of windings is not critical. R is the "leak" resistance for static charges. I recall the good-old "grid-leak" days.

Here at the shack of JA6GW, my XYL can enjoy TV programs with the TV antenna located only 6 m (20 feet) away from my three-element beam. The rig has a full head of steam running the legal limit on 20. — *K. Bill Imamura, JA6GW*

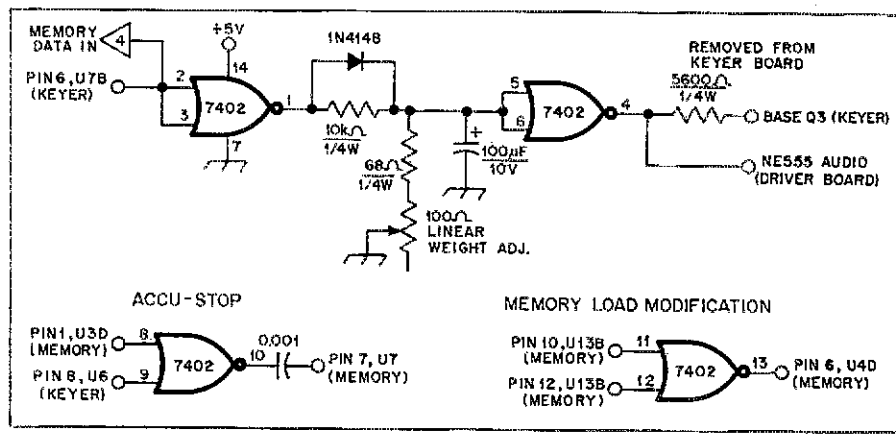
THE ACCU-WEIGHT

This simple modification of the Accu-Keyer circuit provides character weighting by means of a single 7402 NOR gate. Also incorporated is the Accu-Stop feature and the memory-load modification. I've provided a schematic diagram and printed circuit information.* To wire in the weight control, first remove the 5600-Ω resistor connected to the base of Q3 on the keyer board. This makes two holes available for wires that connect to the weight board. Re-install the 5600-ohm resistor to pin 4 of the 7402 IC. The remainder of the wiring is performed according to the diagram.

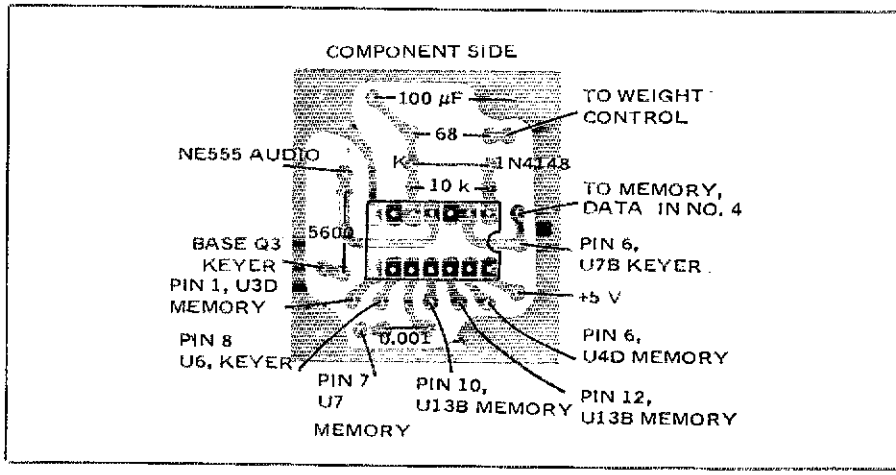
Another modification, shown in an accompanying photograph, illustrates the run, stop and four memory buttons mounted in a Bud cast-aluminum box. The box is attached to a piece of 4-inch square (102 mm sq.), 1/8-inch (3-mm) aluminum channel. The modified piece of channel forms the mounting bracket for both the Bud box and the Brown Bros. CTL key. Attached to the base of the channel bracket is a piece of thin cork sheet. This prevents the key from sliding and scratching the desk.

The resulting increased convenience and functionality, in my opinion, is well worthwhile. One word of caution is in order, however. The wiring to the push-button switches should be shielded individually. Otherwise difficulty will be noted in changing to other memory quadrants. Very small shielded wire (RG-174/U or Beldon no. 8700) is available in 50-ft spools at many electronic supply stores. — *H. K. Landskov, N7RT/ W7KAR*

*A predrilled board is available from the author for $1 plus an s.a.s.e. Write to N7RT, 7303 E. Fillmore, Scottsdale, AZ 85257.

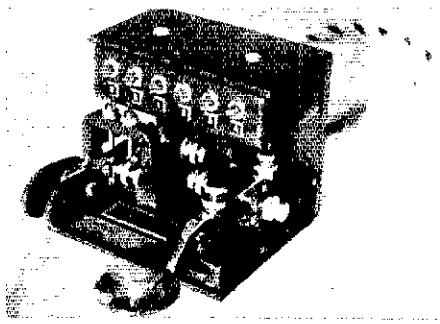


A simple modification for the Accu-Keyer to furnish character weighting. The Accu-Stop and memory-load modification are also shown.



Parts layout for the Accu-Weight. Capacitance is in microfarads, resistance in ohms. The IC is a TTL type 7402 quadruple two-input NOR gate. The etching pattern appears on the next page.

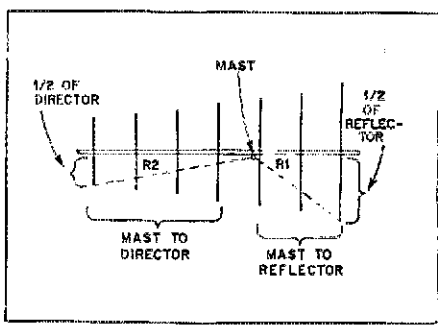
N7RT uses this Bud cast-aluminum box for mounting the run, stop and four memory push buttons that control his Accu-Keyer.



ANTENNA TURNING RADIUS CORRIGENDA

There is an editing error on page 73 of the 10th Edition of *Hints and Kinks for the Radio Amateur*. I am referring to Robert Weinstein's article on calculating the turning radius of a typical three-element Yagi beam antenna. For a beam antenna supported at the midpoint of the

K4MAS furnished this drawing to illustrate his method of determining the turning radius of a typical Yagi antenna.



boom, the formula should have been shown as

$$(\text{radius in ft})^2 = \left(\frac{\text{boom length in ft}}{2}\right)^2 + \left(\frac{\text{reflector length in ft}}{2}\right)^2$$

Thus, the radius becomes the square root of this computation result. If the boom is not supported at the center, however, then two radii must be determined and the larger taken as the turning radius. In applying the formula to the latter situation, let R_1 equal the radius for the reflector end and R_2 equal the radius for the director end. The equations are then stated as

$(R_1)^2$ = (portion of boom from mast to reflector)^2 + (one half of reflector length)^2 and

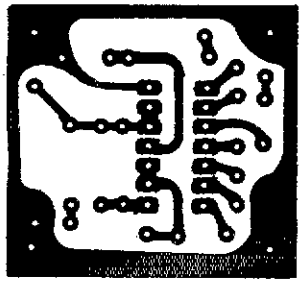
$(R_2)^2$ = (portion of boom from mast to director)^2 + (one half of director length)^2

In the case shown in the illustration, the turning radius is from the mast to the director tip. With most beams, however, the turning radius will be from the mast to reflector tip. — *S. Edward Kane, K4MAS*

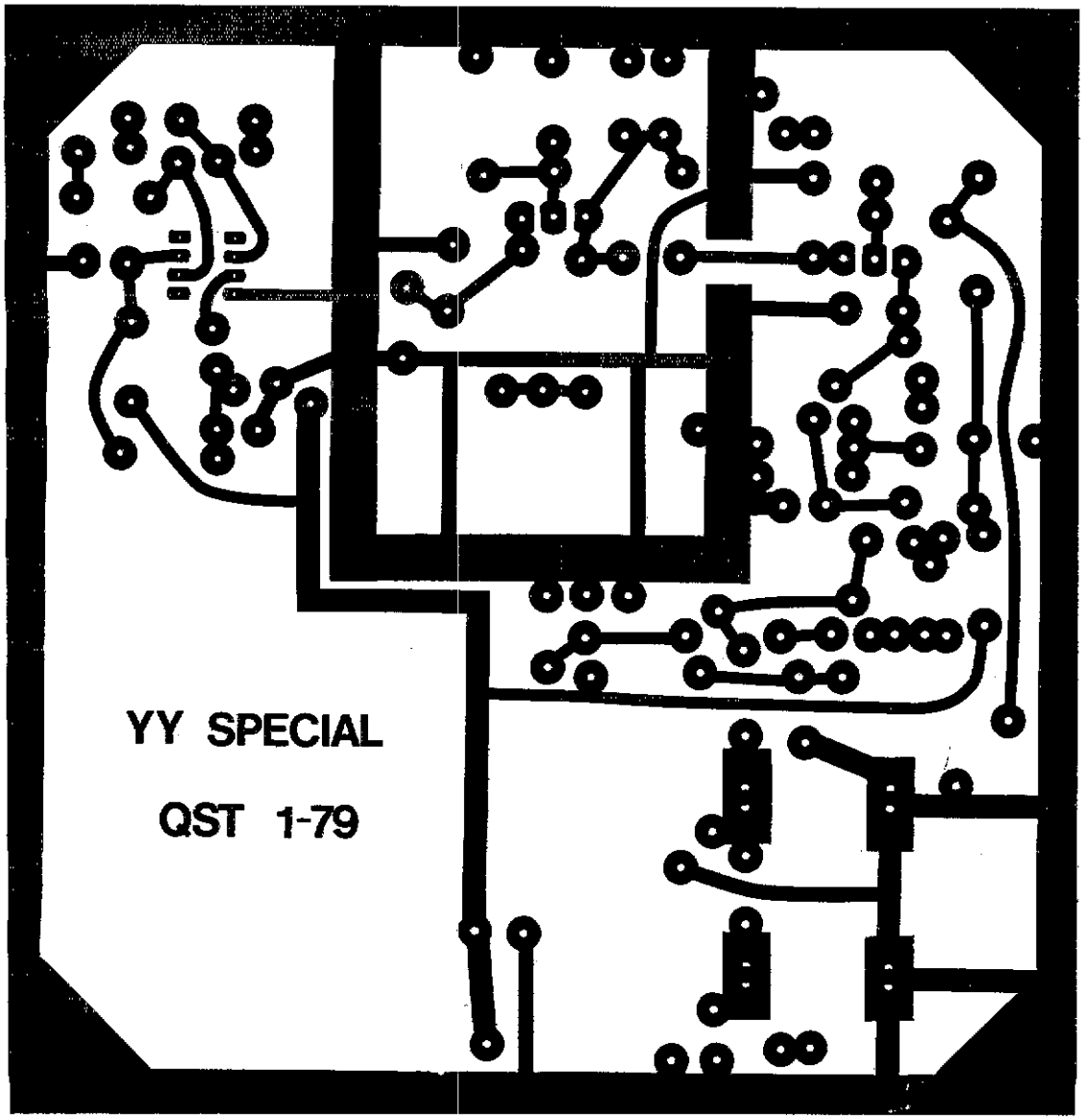
HINTS

☐ The shops listed in the Yellow Pages of the telephone directory as "Electric Motors — Repairing" can be a good source of enameled copper magnet wire. To avoid wearing out your welcome, try to anticipate your needs and buy in quantity. — *M. Evett, W6TQA*

☐ PVC sleeving placed over aluminum tubing used for vertical antennas will prevent rf burns to local wildlife (kids and pets!) while you're on the air. — *Ken Hand, WB2EUF*



Circuit-board etching patterns for projects in this issue. The boards are single sided, shown here at actual size from the foil side of the board. Black represents copper. The small pattern is for the Accu-Weight circuit (previous page), and the large pattern is for the YY Special Beginner's Receiver (see Fig. 3, page 18).



These "Samaritans" Are Flying Hams

The Flying Samaritans provide free medical care in some of the remotest areas of Mexico. Here's their story.

By Wayne Overbeck,* N6NB

Through the static crashes on 75 meters came a disturbing message: An 18-year-old girl was dying in a remote Baja California village, and no one there knew what was wrong with her.

When Nash Williams, W6HCD, heard of the girl's plight, he didn't know what was wrong with her either. But as a longtime leader of the Flying Samaritans organization, he had been through this sort of crisis many times before, and he knew where to turn for help. He contacted a cardiologist near his La Canada, CA, home for basic advice — and then dispatched a Flying Samaritans' aircraft to the village to pick up the girl. Within hours, she was at a large private hospital near Los Angeles.

Diagnosis Serious

Her blood pressure was more than three times the normal reading and she was suffering acute kidney failure. She would need immediate surgery if she was to live, but who would pay for it? She and her family had no money, and one thing the Flying Samaritans cannot do is add to the burden on the taxpayers who support county-operated public hospitals in the United States.

But sometimes there are other ways a person can be helped. Williams contacted the UCLA Medical School's teaching hospital and asked if the girl could be taken as a teaching case — at no charge. The university agreed. The doctors there quickly determined that the only realistic hope for her was a kidney transplant.

Again coordinating the logistics via Amateur Radio, the Flying Samaritans sent a registered nurse back to the Mexican village to conduct tissue compatibility tests on members of the girl's family. A sister was determined to be a suitable kidney donor, and was flown to Los Angeles by the Flying Samaritans.

The transplant surgery was successful, but then there was another big problem: The girl would need ongoing medical tests every few weeks. Could these tests be performed in her home village?

Amateur Radio Provides the Answer

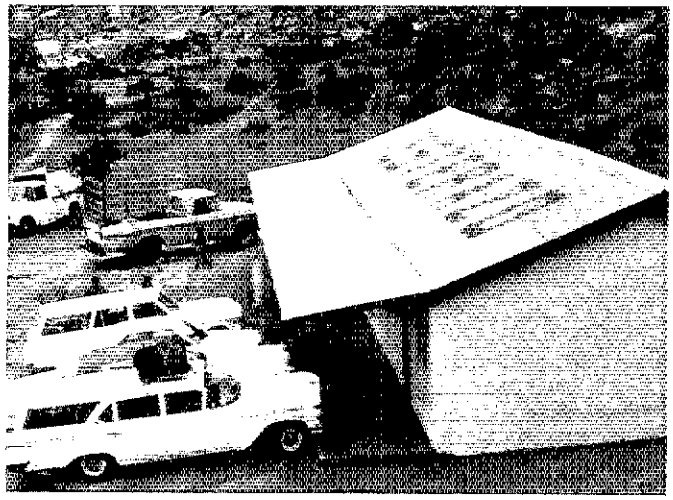
The Flying Samaritans learned from a Mexican amateur that there was a young pharmacist, a biochemistry graduate of the University of Mexico, in the village. He could perform the tests — *if* he had the costly laboratory equipment needed. The Samaritans went to work again. Beckman Instruments was contacted and agreed to provide the crucial piece of equipment, an item valued at thousands of dollars. Beckman also agreed to train the young Mexican pharmacist, and the Flying Samaritans flew him in for his training. As this was written, the pharmacist was completing his training and the patient was preparing to return home, a healthy young woman.

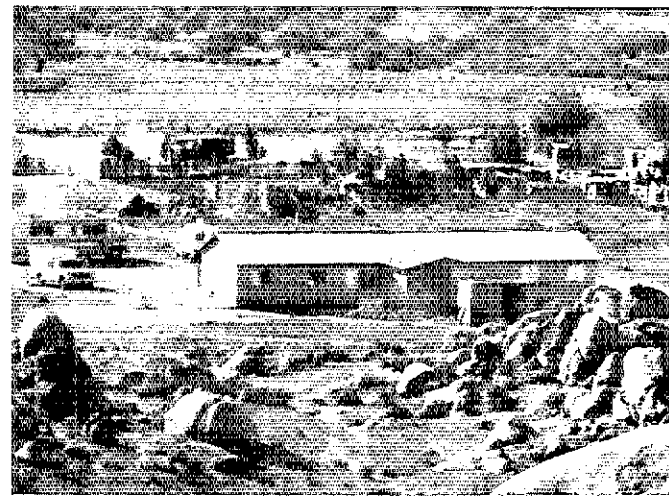
It Began at a Christmas Party

Most North Americans are unaware of living conditions in the remote villages south of the border. But in 1961 a group

*Contributing Editor, *QST*, Pepperdine University, Malibu, CA 90265

The Flying Samaritans usually reach their medical clinics by air — and the sign on the El Testerazo clinic's roof is intended to aid the pilot as he approaches the dirt airstrip nearby. A husband-and-wife team of La Verne College professors supervised the construction of this clinic — and then donated the building to the Samaritans, who fly medical personnel in monthly.





of San Diego residents flew several bundles of toys to a Christmas party for children in the village of El Rosario on the Baja California coast. While they were there, the San Diegans learned there was a desperate need for medical care and educational facilities in El Rosario and other villages like it. They returned home vowing to do something to help.

That commitment led to the birth of the Flying Samaritans. A nonprofit organization with chapters from San Diego to Northern California, the Samaritans are a band of Amateur Radio operators, doctors, nurses, pilots and just plain concerned human beings who devote one weekend a month to the job of helping people in the remote villages of Baja.

The Samaritans' first goal was to set up medical clinics, and the group now operates seven clinics. Each is open once a month with an all-volunteer medical staff, often functioning in a one-room adobe building with no electricity except that provided by the Samaritans' Field Day-style generators!

Dr. Libby Wilson of Downey, CA (right), a cleft palate specialist, talks with a patient at a clinic in a remote Baja California village. Dr. Wilson's volunteer medical service is coordinated entirely by Amateur Radio — there are no telephones within 40 miles! *(photo by Jeffrey Werner)*

A Growing Program

As the Samaritans' program grew, so did its membership. Today, the Los Angeles Foothill chapter alone has 250 dues-paying members, including some 25 physicians and 20 licensed radio amateurs. On clinic weekends this one chapter puts 10 planes in the air!

On each four-place private aircraft there typically will be a pilot, a translator, a physician and a nurse. The team may treat between 60 and 250 patients during the weekend trip.

But the medical clinics are only one of the Samaritans' areas of service. Another is education.

Over a six-year period, a massive volunteer effort spearheaded by Nash Williams, W6HCD, led to the construction of a complete agricultural-technical school in San Vicente, 70 miles south of Ensenada on Baja's Pacific coast. Williams found a well-known architect who would design the school (at no charge) for a projected enrollment of 350 boarding students. Williams lined up contributions from churches and service clubs, and the Samaritans put in thousands of man-hours getting the school built.

Williams particularly praises the Kiwanis Clubs of greater Los Angeles for their support, which has included donations of gasoline-driven generators for several of the Samaritans' facilities in Baja.

When they're not running medical clinics or building schools, the Flying Samaritans aren't exactly sitting idle. U.S. and Mexican members maintain nightly schedules on 75 meters to keep in touch, always standing ready for any emergency in the isolated rural areas of the rugged Baja peninsula.

First at the Scene

Sometimes the Samaritans find themselves at the scene of an emergency rather than on the remote end of emergency radio traffic. Williams will never forget one particular trip he made into the interior of Baja. On this trip he came upon a grisly auto accident in which a prominent Mexican government official had been killed. The official's wife was injured but still alive.

Williams quickly got word of the accident to medical authorities in Ensenada, one of Baja's larger cities and site of a major Red Cross hospital. Then he contacted a Samaritan member in New Mexico, just across the border from the home of the injured woman's sister. Word was relayed to the sister so quickly that she was able to fly to Ensenada before the ambulance got back there!

Not all of the Samaritans' emergency traffic concerns Mexican nationals; often it involves communication liaison to rescue U.S. tourists who are lost or injured in Mexico. In one recent instance, four Californians were lost on the Gulf of California in a small boat — several hundred miles below the border.

After four days, Mexican fishermen spotted the Californians' flares and notified XE2ON, whose ham station was the only means of communication from that isolated part of Baja. XE2ON got the message to the Flying Samaritans' net and the U.S. Coast Guard then made the necessary arrangements to rescue the four marooned California boaters.

The Key: Mexican Hams

Mexican hams have been crucial to the whole Flying Samaritans' operation, Williams says. "Without the Mexican hams we couldn't even announce our clinics," he points out.

Key roles have been played by Jose "Pepe" Lemus, XE2FY (former mayor of Tecate, Baja California, and a mainstay on the Samaritans' net), and Eliodoro, XE2MMX, and "Conchita" Flores, XE2JJI, who provide liaison with the Mexican government to coordinate rescue efforts.

They and dozens of other amateurs on both sides of the border have made it possible for the Flying Samaritans to carry out their program of humanitarian service. All of them can proudly cite the medical clinics, the San Vicente school, and the countless rescue efforts as evidence that they've been using their ham radio stations for a worthwhile cause.

How can other amateurs help in this venture? The Flying Samaritans will probably never have enough volunteer workers, enough aircraft, or enough radio gear to meet the need completely. Further information about the organization can be obtained from Nash Williams, W6HCD, c/o The Flying Samaritans, Inc., P. O. Box 813, La Canada, CA 91011. QST

Strays

PLEASE — DON'T FORGET THAT ADDRESS

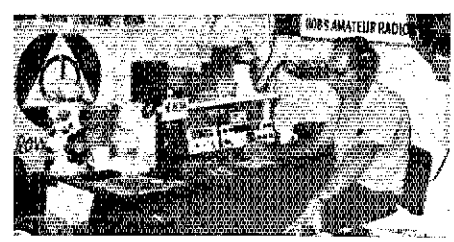
☐ ARRL member stationery is great for Amateur Radio correspondence, but remember to add your QTH *every time* you use a sheet. Letters to ARRL headquarters frequently are missing return addresses. This makes it difficult to respond. — *K1TX*

***QST* congratulates . . .**

☐ Robert Foster, KZ5BA, president of the Canal Zone Amateur Radio Association, on his selection for inclusion in the latest edition of *Outstanding Young Men of America.*

I would like to get in touch with . . .

☐ other amateurs who would like to handle bulk traffic via RTTY addressed to new hams in New England. Charles I. Motes, Jr., K1DFS, 22 Woodside La., Plainville, CT 06062.



WB4RGS pounds key at Rowan Amateur Radio Society booth at the Rowan County (NC) Fair. Sixteen Novice trainees signed up during the program, cosponsored by the Civil Preparedness office.

The Band We Almost Lost

Was the FCC going to give away an amateur band as it had done 20 years ago? Now, forward-thinking commissioners have seen fit to preserve this most promising of vhf bands.

By Harold M. Steinman,* K1FHN

The FCC meeting room was quiet with anxious anticipation on the afternoon of October 12, 1978. There was but one item on the Commission's agenda: the creation of a new personal radio (citizens band) service. The choices before the Commission were

1) Expanding existing citizens band frequencies at 27 MHz.

2) Adding additional frequencies by taking from the 220- to 225-MHz band presently used by the government on a primary basis and the Amateur Radio Service on a secondary basis.

3) Adding additional frequencies by taking from around 900 MHz — a segment presently not utilized by any service.

Many of the spectators at that meeting represented the CB radio industry. What was going through their minds at the time? Were they thinking of the new market potential that the creation of a new personal radio service could offer? Or were they thinking about past market experiences such as the over-inventory of 23-channel CB sets when 40-channel sets hit the market, or the present lack of demand for 40-channel units, forcing the price of sets which once sold for over $100 down to around $40?

Of course, Amateur Radio representatives were also present at that meeting, this author included. I can tell you what was going through my mind at the time: I was wondering if the FCC was about to reward amateurs for their decades of self-policing and compliance with the rules by taking frequencies away from them. I wondered if the Commission possibly could be thinking of placing personal radio frequencies adjacent to Amateur Radio frequencies at 220 MHz, thus repeating the mistake made at 27 MHz and again encouraging the use of high-power amateur equipment by nonamateurs. Of course, in my heart I *knew* that the Commission could not be considering this. It just did not make *sense*! Still, nothing was certain until the final gavel. Eight years of fighting and hoping hung in the balance. . . .

*Washington Area Coordinator, ARRL

Round 1

On February 5, 1971, the Electronics Industries Association (EIA) petitioned the FCC for a new "Class E" citizens band radio service between 220 and 222 MHz. The EIA petition proposed 80 channels of 25-kHz width, 100 watts maximum power.

Amateur Radio knew it was in for a grueling battle and rose to the task.

It is important to note that unless the subject matter is noncontroversial (a minor editorial amendment or a relief of restrictions), the FCC can *not* make new rules or regulations based solely on the receipt of a rulemaking petition. It must first issue a "notice of proposed rulemaking" (NPRM) or a "notice of inquiry" (NOI), which puts the public on alert and allows time for written comments. Usually, the ARRL waits until the NPRM or NOI stage before submitting comments on matters that affect Amateur Radio. This is because many such petitions are dismissed by the Commission for one reason or another. For example, the subject may have been treated already in a recent rulemaking and to raise it again would serve no purpose.

However, after the EIA filed its petition for Class E on 220 MHz, the League did not wait for an NPRM or NOI to be issued. The League immediately filed opposition to the EIA petition partly because of the appearance of published statements that stated, "FCC officials said Amateur Radio users are not greatly opposed to losing the frequencies because they are not used very much." The ARRL's comments made it clear that the 220-MHz band *is* heavily used by amateurs and that frequencies other than those allocated to Amateur Radio could be found for an expanded Citizens Radio Service.

Round 2

On June 6, 1973, the FCC issued both an NPRM and NOI on the subject of "the creation of a new class of Citizens Radio Service and the reallocation of frequencies between 224 MHz and 225 MHz in the 220- to 225-MHz band now allocated for shared use by stations in the Amateur Radio Service and Government Radiolocation Stations for that purpose." Amateur Radio knew it was in for a grueling battle and rose to the task. The deluge of comments from amateurs to the FCC and elected representatives belied any claim that amateurs had no interest in 220 MHz or that they would give up without a fight.

The League filed 72 pages of comments which pointed out that the proposal to reallocate 224-225 MHz from the Amateur to the Citizens Radio Service was based on several unsupported and unproven assumptions:

1) That the frequencies then allocated to the Citizens Radio Service were so overloaded that the purposes for which it was created could not be achieved.

2) That frequencies in the 27-MHz region were either unsuited or unavailable for use by an enlarged Citizens Radio Service.

3) That the 224- to 225-MHz band was either the only band or the best band for an expanded Citizens Radio Service.

4) That a "disciplined" service could be established which would not interfere with the primary Radiolocation Service.

5) That amateurs were making little use of the 224- to 225-MHz band.

6) That Canada and Mexico would not object to a derogation of the treaty that assigns the 220- to 225-MHz band to the Radiolocation and Amateur Radio Services on a coequal basis.

7) That the need for and potential use of the 224- to 225-MHz band by the Citizens Radio Service was greater than by the Amateur Radio Service.

Each of these misapprehensions was refuted systematically in the League's comments.

Round 3

The matter of a CB allocation at 220 MHz hung fire for a while. Then, in late 1974, the Office of Telecommunications Policy* (OTP) sent a letter to the FCC stating that it accepted the concept of Class E on 220 MHz and urged speedy FCC action to create the new service. However, the OTP said that the location of this new service should be 222-224 MHz rather than 224-225 MHz, as the Commission had proposed in its NPRM.

In addition to ARRL's efforts, several individual amateurs wrote letters to congressmen, commissioners and the OTP.

Let's review briefly what had happened after the EIA filed its original proposal in 1971. First, the EIA requested 2 MHz at *220-222 MHz*. The FCC's NPRM of about 2-1/2 years later proposed 1 MHz at *224-225 MHz*. The OTP, a year and a half later, said it wanted the new service at *222-224 MHz*. In response to this apparent uncertainty, the League filed with the FCC a "petition for issuance of a revised notice of inquiry and notice of proposed rulemaking." The League stated that the OTP proposals were so radically different from those in the Commission's original NPRM that adopting them without a further NPRM or NOI affording interested parties the opportunity to comment would violate the Administrative Procedures Act. In addition to ARRL's efforts, several individual amateurs wrote letters to congressmen, commissioners and the OTP. ARRL President Harry J. Dannals, W2HD and General Manager Richard L. Baldwin, W1RU, visited officials in Washington, and so did representatives from *Ham Radio Magazine* and *HR Report*.

The FCC decided finally to delay any further action on Class E until later in 1975. In addition to the Class E docket, the Commission was considering simultaneously two related dockets: Class D CB expansion (at 27 MHz) and amateur restructuring. The Commission said that it wished to consider all three of these related dockets at the same time, and therefore immediate action would be postponed. The amateur community breathed a temporary sigh of relief.

The next action by the Commission on Class E did not occur until October 1977, but the FCC was hardly idle during those intervening two years. In February 1976 it created an internal study group, the Personal Radio Planning Group (PRPG) to study the problem of finding additional frequencies for personal radio. In April 1976 the Personal Use Radio Advisory Committee (PURAC) was established. Its membership consisted of representatives of industry and user groups who were assigned the task of assisting the FCC in its study of personal radio. ARRL participated in PURAC activities. In October 1977 the Commission voted to *terminate* the Class E proceeding for several reasons:

1) FCC tests indicated that a personal radio service in the 220- to 225-MHz region might generate serious interference to television reception.

2) The number of CB licensees had increased dramatically to 10,406,828 as of May 1977.

3) The PRPG and PURAC had been created to study the problems of personal radio.

4) In July 1976 the Commission had provided interim relief from CB congestion at 27 MHz by increasing the number of channels from 23 to 40.

5) In April 1977 the PRPG completed the initial phase of its frequency evaluation study and had concluded that other frequencies as well as 220-225 MHz should be considered as possible locations for a new personal radio service.

Curiously enough, even after eight years of deliberations, the question of whether or not there is an actual *need* for CB expansion has not been satisfactorily answered.

The Commission said that because of these and other developments, the comments received in response to the 1973 NPRM had become obsolete. The FCC also said that it would address the issue of a new personal radio service in some future rulemaking.

Round 4

In May 1978 the PRPG published its final report, which discussed three alternatives for personal radio and weighed the pros and cons for each. These three alternatives are the same as those mentioned in the first paragraph of this article. Did the PRPG report recommend one approach over another? No, the PRPG simply presented the facts. It was up to the Commission to pick one of the alternatives.

And so we come to the climax of this story — what alternative did the Commission pick for a new personal radio service? On October 12, 1978, the Federal Communications Commission directed its staff to prepare a notice of inquiry on the subject of creating a new personal radio service at 900 MHz. Why 900 MHz? The reasons given by the FCC were

1) There would be a better chance of coordination with Canada and Mexico.

2) There would be less interference to television reception.

3) At present, there are no private users of the band.

4) There is no government use of the band.

5) Administration of the service would be less costly.

6) More spectrum is available at 900 MHz.

The editorial had said, "But why not a solution which avoids all the previously mentioned pitfalls and which is a sagacious long-term solution . . .?"

The FCC's choice is remarkably similar to a recommendation made in a May 1977 *QST* editorial that addressed the issue of a new home for CB. The editorial said, in part:

"But why not a solution which avoids all the previously mentioned pitfalls and which is a sagacious long-term solution and which demonstrates good and responsible frequency management? 900 MHz! No existing service would have to be displaced. Dozens and dozens of channels could be made available for future CB needs as yet undefined. There would not be the temptation for CBers to use equipment of illegal power. There would unquestionably be fewer interference problems. It would truly be a personal radio service which would not impinge on other services and which could exist in splendid isolation."

Curiously enough, even after eight years of deliberations, the question of whether there is an actual *need* for CB expansion has not been answered satisfactorily. Then-Commissioner Margita E. White addressed this on October 12 by saying that in her experience the present 40 CB channels are not being utilized efficiently. Commissioner Brown concurred.

In spite of these doubts, it appears that eventually there *will* be a new personal radio service in the 900-MHz region (although the precise frequencies await determination through the formal rulemaking process). Amateurs are grateful that it won't be at 220-225 MHz.

*The OTP is now the National Telecommunications and Information Administration (NTIA).

The Easy Way to OSCAR 8 Mode J

Part 2: Ready for a weekend pass? With a Mode J station you can discover the ins and outs of operating on this newest of OSCAR methods.†

By Bernie Glassmeyer,* W9KDR

Sweeping over virtually all parts of Earth, OSCAR 8 translates Amateur Radio signals from 145 to 435 MHz every Saturday and Sunday UTC. The operators who use Mode J today enjoy a completely new experience in satellite communication. Here is what some of them are saying:

"Using groundplane antennas for uplink and downlink, I got good signals through OSCAR 8 for two-way contacts during ARRL Field Day." — *Fred Merry, W2GN*

"Excellent telemetry copy! Copied 15 minutes and 42 seconds, orbit 2231." — *Frank Weisenmeyer, K9CIS, Richland Community College*

"JAMSAT 100 percent supports one more day of Mode J operation of OSCAR 8." — *Haruo Yoneda, JA1ANG*

"Worked WØEOZ, W6XN; heard W7US, WA6QQQ, WØIT, KØFMR, WA4KVD, WØHCW, K7ZOK and W7DOW." — *John Humphrey, K6WE*

"For Mode J, 11-element Yagi and MM MMT432/28S. Beacon RST 539." — *Giorgio Pitacco, I3LCZ*

"The beacon in Mode A was very weak and in the noise. The beacon in Mode J was good, noise was low, and ssb and cw signals seemed better than those on Mode A." — *Les Wells, K4FFN*

"I heard the signals of OSCAR 8 Mode J for the first time; its signals are stronger than expected." — *Mikiyasu Nakayama, JR1SWB*

With a little operating proficiency, you, too, can have many QSOs during one or more of those 28 weekend orbits.

Where Is OSCAR?

Basic tracking information has been given in a prior *QST* article by WB2CHO,[1] and an OSCARLOCATOR is included with the ARRL publication, *Getting to Know OSCAR — from the Ground Up.*[2] In general, though, North American users can access Mode J during local times of Friday evenings, Saturday mornings and afternoons, and Sunday mornings. Nevertheless, successful satellite operation demands accurate time of day (UTC) and updated orbital parameters. The latest OSCAR 8 parameters are given in Table 1.

On OSCAR 8, at its comparatively low 910 km, these parameters change appreciably because of atmospheric drag and gravitational pull. OSCAR 7's orbit also changed with time, but at the higher (1400 km) altitude, the effect was negligible for the average ham's purposes. So keep up-to-date with W1AW bulletins and "Operating News" in *QST* for the latest orbital

*Satellite Coordinator, ARRL
†Part 1 appeared in December 1978 *QST*, p. 50.

[1]Footnotes appear on page 58.

Mode J Club

Feel left out as a Mode J user? Are you one of a rare breed? Well, now all you Mode J enthusiasts have a chance to enjoy the fruits of your labors in the Mode J Club. Fashioned after the popular Six Meter International Radio Klub, SMIRK, this Mode J Club should make your satellite activity more enjoyable. A large, beautiful, four-color certificate, serially numbered, will be sent when you submit a log of eight complete Mode J contacts. In addition, for only an s.a.s.e. you will receive a newsletter. This publication will try keeping you up-to-date on all the activities of Amateur Radio satellites.

To become a member of this club, first complete eight Mode J contacts. QSL cards are not required. Just list the call sign of each station worked, date, orbit number and station equipment used. Send this information along with $3 in U.S. funds, a one-time charge to cover the certificate and newsletter costs, to Mode J Club, c/o Larry Roberts, W9MXC, AMSAT Area Coordinator, 3300 Fernwood, Alton, IL 62002.

Mode J numbers are assigned to the operator, so if you give a demonstration or use another call sign other than your own, you may still exchange your J number. Once you receive the certificate with the Mode J number, exchange it on the air with other members to qualify for endorsement stickers of 50, 100, 250, 500 and 1000 contacts. To receive an endorsement sticker, follow the same general procedure as for initial membership by listing each Mode J number, call of station worked, date and orbit number. Arrange the Mode J numbers in numerical order (e.g., 7, 14, 25, etc.). Include with your list 25 cents to cover the cost of each endorsement sticker for which you qualify.

In addition to the contact stickers, a special sticker will be awarded to those who give a public demonstration of OSCAR 8 Mode J. For this demonstration sticker list all details of the event, including equipment used.

Put some new life into your hobby and enjoy satellite communications. Join in with those already reaping the rewards of playing a part in Amateur Radio history. New frontiers are on the horizon waiting for discovery; are you ready for the challenge?

Table 1
OSCAR 8 Orbital Parameters

Period: 103.229534 min.
Increment: 25.808348°
Eccentricity: 0.0008316°
Inclination: 98.9635°
Apogee: 910.372 km
Perigee: 898.259 km
Reference orbit: 4203, 1 Jan. 79, 0035:09Z (HMS), 50.9° W. long.

Table 2
AMSAT Nets

Net	Time (UTC)	Day (UTC)	Freq. (kHz)
East Coast	0100	Wed.	3850
Mid-Continent	0200	Wed.	3850
West Coast	0300	Wed.	3850
International	1800	Sun.	14,280
International	1900	Sun.	21,280

information. The AMSAT orbital data calendar will be available for 1979 orbits, including both OSCARs 7 and 8. It can be obtained for $5 U.S. funds or 30 IRCs, $3 for AMSAT members and free on request to AMSAT Life Members. Overseas orders will be airmailed. Orders and payments should be made in U.S. currency to Skip Reymann, W6PAJ, P. O. Box 374, San Dimas, CA 91773. Visa and Master Charge are accepted. Proceeds benefit AMSAT.

Doppler Shift

Like the classic example of a passing train, Mode J will give you a first-class example of the Doppler effect. During an overhead pass, Doppler on OSCAR can change the 435-MHz downlink at a rate of about 1 kHz per minute. It does take some getting used to, but after a few frenzied passes it becomes "old hat."

Most operators compensate for Doppler shift by maintaining the same receive frequency and moving the 2-meter VFO. The main thing to remember is that as the Doppler effect causes the received frequency to decrease, it will be necessary to decrease your transmitter frequency. This is because the band pass of the Mode J transponder inverts signals, which also means that your upper-sideband uplink appears as a lower-sideband downlink. See Fig. 3 for a graphic look at this effect.

Nets and Bulletin Schedules

AMSAT sponsors on-the-air nets which meet regularly to disseminate information about Amateur Radio satellites, as well as general vhf and uhf operating. See Table 2 for details. All properly licensed Amateur Radio operators are welcome to participate.

From the satellites themselves, general interest bulletins are transmitted regularly on the daily reference orbits. In addition, special demonstrations or experiments through OSCARs 7 and 8 can be arranged. Contact AMSAT, P. O. Box 27, Washington, DC 20044, for OSCAR 7 operations, or the Satellite Coordinator, ARRL, Newington, CT 06111, for OSCAR 8 operations. QST

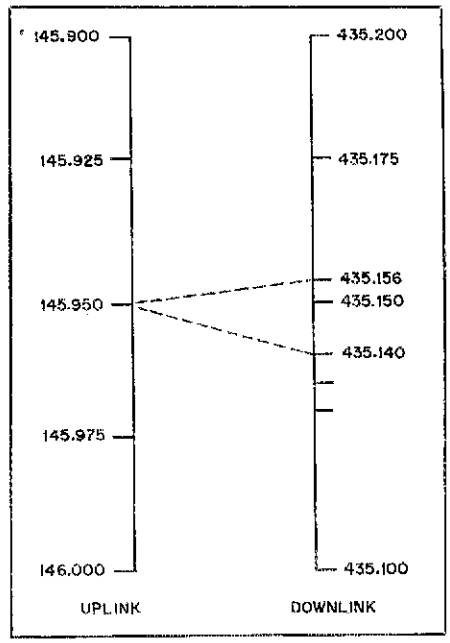


Fig. 3 — To find the relationship of f_d (downlink frequency) to f_u (uplink frequency) use the formula $f_d = 581.106 \text{ MHz} - f_u \pm \text{Doppler}$; f_d and f_u are in MHz.

Notes

[1]Harris, "Tracking the Next OSCAR, Part 2," *QST*, February 1978, p. 38. Photocopy available for 50 cents from ARRL, 225 Main St., Newington, CT 06111.
[2]Available for $3 ppd. from ARRL.

Strays

THE YOUNGEST CLUB?

☐ Billing itself as the youngest Amateur Radio club in the U.S. and Canada, the Montebello School ARC took to the screens for a special 30-minute program on Rockland County, NY, cable television. The show described Amateur Radio, the steps to acquiring a license and the club's activities. The club station, WB2RZP, operates from the Suffern, NY, school under the guidance of trustee Bill Lazzaro, N2CF.

N2CF, also a teacher, is pictured here with some of his fifth and sixth graders, all 10 or 11 years old, who have been aboard since the club was formed a year ago. Twenty-six of the younsters are licensed already!

HELPING OUT ON LAND AND SEA

☐ The 146.52 slot in 2 meters was busy in the Cayuga Lake area near Ithaca, NY, as AB2A, WB2PRE, WA3LLK, WA2FQA, K2OOD and WB2JWD pitched in for two days to assist the Tompkins County Yacht Club with a regatta for teenagers racing "laser" class sailboats. Rigs were operated from the yacht club and from motorboats. The Ithaca area hams also assisted with a walk-a-thon to benefit the Muscular Dystrophy campaign in Cayuga Heights. A crew including WA2FQA, WA2EOW, AA2T, K2MVC and WB2JWD walked and rode along to provide help as needed. — *Mike Brown, WB2JWD*

DILLON COUNTY GOES 10

☐ The Dillon County (SC) ARC conducts an informal net on 28.115 MHz daily at 0100 UTC (2000 EST), according to Edward Hendrix, WD4FJP, activities chairman. Roundtable ragchews, third-party traffic and DX (members can work cross mode) are on the menu. — *WD4FJP*

I would like to get in touch with . . .

☐ hams interested in starting a DX club in the Carolinas. *Gene Tyree, WD4JRS,* 5222 N. Sumac Cir., Fayetteville, NC 28304.

Project Goodwill: A Smashing Success

Groups in Dayton and California, as well as individuals and clubs from all parts of the U.S. and Canada, have seen to it that the benefits of Amateur Radio will reach the developing nations of Africa and Asia.

By Bruce Alan Johnson,* WA6IDN

Are we (the Amateur Radio Service) going to lose next year at WARC? Someone asks us this question almost every day. We answer them much along the lines of our editorial last month ("It Seems to Us," page 9). The Amateur Radio Service, through the 104 member-societies of the International Amateur Radio Union (IARU) has been preparing for this crucial World Administrative Radio Conference for more than seven years, and readers of *QST* are no strangers to WARC and to the fact that the outcome of this international conference in Geneva holds the key to the future of Amateur Radio.

But we've also pointed out from time to time that, like it or not, there are a fair number of developing countries in Africa and Asia who do not hold strong affection for Amateur Radio. Usually it's because they don't understand what it is amateurs do (see "International News," October *QST*, page 59), and how we can help developing countries. After much thought, the IARU WARC team struck upon Project Goodwill as a means of getting amateur gear of simple design into the hands of the indigenous amateurs and students in these developing countries, where equipment is not only unavailable, but totally unaffordable to most people even if it could be found. (The per capita income in many African nations, for example, is less than $200 per year.)

An Enthusiastic Response

To make a long story short, the project has taken fire, and we are overwhelmed with the enthusiastic response shown so far by North American clubs and individual amateurs! As soon as the Northern California DX Foundation heard of the program, they offered a challenge-match fund: They pledged to match each dollar received at the rate of 35 cents, up to $10,000; *50 cents on each dollar thereafter,* up to a total of $8500 of NCDXF funds. Imagine our surprise when the good folks who sponsor the Dayton Hamvention came along and voted unanimously to contribute $10,000! Of course, this quickly ended the NCDXF challenge, and the project's funds grew to nearly $28,000.

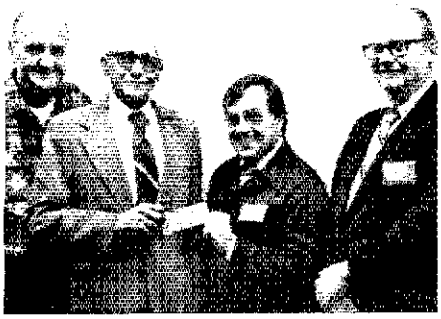
So, more than 600 20-meter amateur stations will soon be on their way to new licensees in many African and Asian nations, and hundreds of eager new amateurs will be helped on their way to the thrill of Amateur Radio by generous, thoughtful amateurs and clubs who literally put their money where their mouths were!

Dick Rauscher, W6ANK, chapter head of the Bay Area Chapter of Ten-Ten International, presents ARRL Director Bill Stevens, W6ZM, their check for $50 to Project Goodwill. *(WA6GBQ photo)*

We thought you might enjoy this random sampling ("soapbox") of comments received with the checks. They tell the story best, anyway!

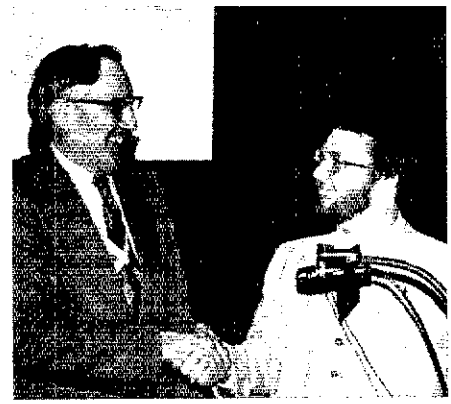
Each year my company makes an award to employees for public service. This year, I was fortunate enough to win $500 for NTS and ARPSC work during the Johnstown flood. So, here's my check for $500. (WD4KUK) Here's my contribution. I believe that your program is consistent with the true spirit of Amateur Radio. I have always felt that Amateur Radio's greatest potential lies in the area of enhancing international goodwill. (AA8M) Over the past 23 years, ham radio has been an important part of my life, and it is nice to know that with this small donation, I can help someone else enjoy it as I have. (N8JR/W8GOE) This program of providing low-cost means for people to become radio amateurs is a fine one indeed, and I support your efforts wholeheartedly. It's the least I can do for a hobby that launched me into a career of electronics engineering and provided me so much pleasure over the past 30 years. (KØGS) Looks like a good idea, and I'll welcome the results. (WØDP) We wish good luck to you in trying to foster Amateur Radio in the Less Developed Countries of the world. (Cary ARC, Cary, NC) This is one small way I can express the enjoyment Amateur Radio has given me. (W8JRN) We are proud to present

*International Services Officer, ARRL



The East Bay Amateur Radio Club was quick to respond to the project. Lyman Wiltshire, WB6SMY, president, smiles approvingly as Treasurer Les Bodin, W6JKY, presents the club's check to ARRL SCM Bob Vallio, W6RGG. ARRL EC Chuck Breeding, K6UWR, observes it all with obvious pleasure. *(WB6WNZ photo)*

this check for such a worthy cause. (Auburn Amateur Radio Assn., Auburn, NY) It is with great pleasure that we donate this money for the good and future welfare of Amateur Radio worldwide. (Buffalo Area DX Club, Buffalo, NY) No acknowledgement necessary. Save the 10 cents plus addressing time ("It Seems to Us," October 1978 *QST*). Ordinary acknowledgements are an unnecessary expense and I wish I could convince my congressman of the same thing! (WD5BEP) It seems to us that if every club would give what they feel they could afford to Project Goodwill, this effort might turn into a real bonanza! (The 3900 Club, Sioux City, IA) We hope that "our" kit will be matched with another so that the recipient will have a complete station and will be able to talk with our club members. (DuPage Radio Club, Clarendon Hills, IL) We feel that this is an excellent way to promote the brotherhood of Amateur Radio internationally. We may not always believe in or agree with some of the political actions of some of these countries, but we do believe in Amateur Radio. (Jackson County ARC, Ripley, WV) The 95 members of the association wish to participate in the League's efforts to foster international friendship and promote Amateur Radio in the LDCs. (Hughes Fullerton Employees Assn., Fullerton, CA) We know of no other place where one may invest such a small amount, and have it immediately attain such a high level of social, educational and diplomatic value. (West Allis ARC, West Allis, WI) We made a profit on the Five County Swap and Shop, and wish to help. (Bay Area ARC, Bay City, MI) We voted unanimously to take this step to help raise support for the WARC preparations. (Mankato Area Radio Club, Mankato, MN) We have authorized the recipient you select to be an honorary member of our club, and we will also send over some League publications. (Victoria Short Wave Club, Victoria, BC) When I read about the IARU xmtr/rcvr kits, I was studying for my Extra. I decided that if I passed the exam, I'd celebrate by contributing one. Enclosed is $50! (AF8L) We thank you for the opportunity to donate to such an extensive and great program of helping these underdeveloped countries know Amateur Radio. (Elgin Amateur Radio Society, Elgin, IL) The members of our club are dedicated to the growth, brotherhood and advancement of Amateur Radio. It is most gratifying for us to be able to actively join you in your far-seeing program. (R.F. Hill ARC, Colmar, PA) This is a great idea for WARC! (WA1ESO) The club voted unanimously and enthusiastically for this program. We thank our League for giving us this opportunity to support our stand in WARC-79! (Sunset Empire Radio Club, Astoria, OR) We believe that this program is one of the finest tools devised for extending the friendly arm of ham radio to those less fortunate than ourselves, and we are happy to contribute our small token of friendship at this time. (Overlook Mountain ARC, Woodstock, NY) I think that this program to help get new amateurs started is a great idea. I thank you for the opportunity to help out. (WA2RVT) Enclosed is our check to help promote the growth of Amateur Radio in Lesser Developed Countries of Africa and Asia. (Young Ladies Radio Club of Los Angeles) This is a fine idea and a great thing for Amateur Radio. I'm sure there has been a lot of time and effort put in by folks who'll never be properly recognized but here's one ham's tip of the hat to them. (W4IZI) Please accept the enclosed check as my contribution to a most worthy undertaking. I look forward to personal involvement. (WA1YMF) Do hope the OM who gets this station will enjoy himself with Amateur Radio as much as I do! (PE1BIF) We would like to support a deserving individual or society that you select. We look forward to hearing who the recipient will be, and assisting him or her in getting on the air. (Ampex ARC, Cupertino, CA) Here's my check. I have been licensed for over 50 years and hope in this way to help someone to a most enjoyable hobby. (W9GAH) Here's our check for the WARC kits. We keep a coffee can on the coffee and doughnut table at all club functions for those who wish to donate their spare change. This adds up! So we'll be sending a check to you each month the program continues. (Palomar Radio Club, Vista, CA) All I can say about this idea is that $50 is not much if it can open the world of ham radio to someone who would otherwise be deprived. (N6FF) Amateur Radio has brought great joy to me and an important sense of accomplishment during a trying period. I'm sure it will do similar things for someone else, as well as provide needed education and experience. (KL7JIZ) I am of the opinion that this is one of the finest programs



Dayton Amateur Radio Association President William G. Ingling, W8SVI (l), seals DARA's most generous $10,000 pledge with ARRL International Officer Bruce Alan Johnson, WA6IDN, on 3 November 1978. *(W8ILC photo)*

ever initiated by ARRL. (VE3JBY/W9) I am going on vacation in two weeks and, like most people, have budgeted my expenses carefully. But I have now deducted $50 from my vacation fund and am sending you this check for Project Goodwill. (W6NKE) I am deeply concerned about the future of Amateur Radio. Please accept my donation to help ensure a favorable outcome of WARC-79. I hope that the majority of amateurs will support Project Goodwill so that Amateur Radio will be better than ever for the rest of the century! (WB6VGA) This donation provides me with a means of sharing some of the enjoyment I have received from Amateur Radio over the past 25 years. This sharing is most special since it means sharing with those who might otherwise never have the opportunity to enjoy Amateur Radio. (N6AFZ) Although $50 doesn't mean much to amateurs in our country, I'm sure that in an undeveloped country it would be a large sum. We would like to suggest that the various Amateur Radio clubs in our country get behind Project Goodwill, and help to purchase these kits. (Lockheed Employees Recreation Club, Burbank, CA)*

See what we mean? And to think that there are still those who ask with a moan, "Oh, where's that good ol' 'Amateur Spirit?' " Alive and well with Project Goodwill! QST

*[Editor's Note: A complete list of contributors will appear in an upcoming issue of *QST*.]

Strays

I would like to get in touch with . . .

☐ hams to join the Young OM's Net on Sundays at 2000 UTC on 14.290, Matthew H. Power, WB1ANT, 145 Grove St., Norwell, MA 02061.

Starting a Message on the Right Foot

Whether a message gets to its destination has a lot to do with how it began. See if you recognize the most common mistakes in originating messages.

By Jim Griffin,* W9NJP

A local ham friend and I were chewing the rag on 2 meters the other night. He was complaining that those NTS guys were sleeping or something. He had sent out a number of messages, but they were never delivered. He had always wondered about those traffic fellows. After all, they would rather relay a bunch of "meaningless" messages than work DX. Absurd! Nothing is better than DX. And now that same crazy bunch can't even deliver a few messages.

Having had much experience in attempting to deliver traffic, I couldn't let his complaints pass. I told him I would stop by and discuss it eyeball to eyeball, as I had a feeling . . .

"Let's take a look at those messages you sent, OM," I said.

"Well, here's a book of 75, Jim."

TNX FOR QSL X MINE ON WAY X 73

NR 104 KA9XXX, CHICAGO, ILLINOIS

NR 105 WD8ZZZ, CLEVELAND, OHIO

NR 106 WD6YYY, SAN DIEGO, CA

Trying to keep my cool, I questioned how he expected them to be delivered with addresses like those.

"Well, they can look up any address in the *Callbook*."

"Say they don't have a *Callbook*. Or since those calls are so new, they would need all the supplements. What year *Callbook* do you have?"

"1971."

"And say conditions are bad, and a Z becomes a G. What else do they have to go by?"

"The city?"

Moving on to the next one, I saw

JERRY, SUZY AND DOGGIE, 110 ELM, CHICAGO, IL 60134 TEL 661-2525 .

"Don't they have a last name?"

"Of course."

"Say the phone number gets messed up? How is someone gonna deliver it?"

"Can't those guys ever get things straight?"

Do you know what QRM and QRN are?"

"They could mail it."

"Why should someone pay *your* postage. You could have mailed it."

Few of the other messages had telephone numbers.

"Where are the phone numbers?"

"Didn't know them. They can look them up."

"Do you know how many phone books Chicago has? I would hate to devote most of my shack to phone books. Plus it takes a lot of my time."

"Yeah, but you don't chase DX, so you have the time."

Thoughts of B+ to his brain passed through my mind. "And you know some people have unpublished numbers. What then? And look at this message. It's to Jack Williams. Is that his real name, or is the number listed in someone else's name?"

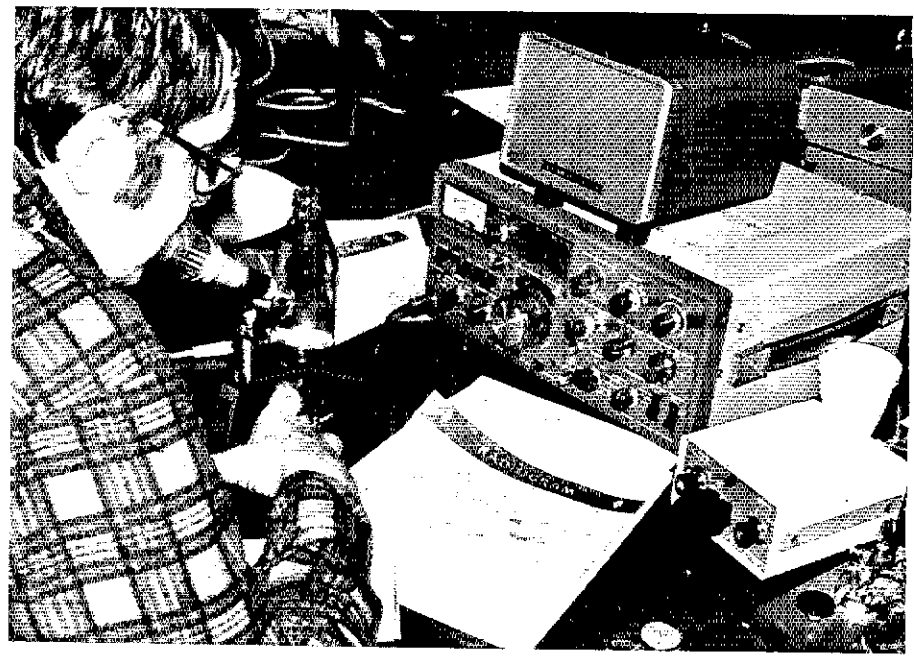
"Well no. His name is Sylvester John Williams, but he doesn't like Sylvester. And the phone number is listed under his father's name, Frederick D. Williams. But you can tell that by the address."

"Williams is one of the five most common names in the country. How many do you think are in the phone book?"

"Overpopulation is becoming a problem, isn't it?"

"Look, OM, let's look at this. Number one, you don't have phone numbers on 99 percent of these messages. Number two,

A complete address and clear enunciation or sending are essential to ensuring that a message will get to its destination. *(W8MPD photo)*



*1221 E. Illinois St., Wheaton, IL 60187

you don't always furnish a complete address — no full names, just first names, or a name that doesn't correspond to the telephone listing. Next, you assume that all traffic men own recent *Callbooks*, whereas yours has cobwebs on it. And some of your routine traffic is not serving the public. Last, but not least, you don't consider the delivery station. And after all that, you expect your traffic to be delivered?"

"Never thought of it that way. Guess those traffic nuts have their own problems with pileups."

"Guess so, OM. Time to QRT."

On the way home, I thought we traffic handlers aren't perfect, certainly. But for a gang which spends all that time doing super PR work for ham radio with those deliveries to John Q. Public, making him aware of Amateur Radio, and a free service to boot — well, we can't be all that bad.

Just wish some of those originations wouldn't make it so frustrating to deliver. After all, for an 8 × 10-inch envelope with 54-cents postage, anyone can get the ARRL Public Service Information package from League hq. QST

Traffic-Handling Aids

Ready to handle some traffic? Then your League has just the things to make it easier. Most message traffic moves through an organized net session, and the ARRL *Net Directory* lists all the nets organized for traffic handling — independent as well as NTS-affiliated. It also has ARRL numbered radiograms, QN signals, reprints of the *QST* articles, "Public Service Begins with You" and "Checking into Slow-Speed Nets," and an application for an ARRL Station appointment. The *Net Directory* is available free for a self-addressed 9 × 12-inch envelope with 41-cents postage.

In *Operating an Amateur Radio Station* are sections on message handling, network organization, Amateur Radio Emergency Service, National Traffic System, Radio Amateur Civil Emergency Service, and the ARRL field organization. The *Public Service Communications Manual* goes into further detail about organizational and operating procedures of ARES, NTS and RACES. Both publications are available free to ARRL members for a 6 × 9-inch envelope with 54-cents postage for first class, 40 cents third class. — *K1UJ*

Strays

RUN COVERAGE BIG SUCCESS

☐ The Chestnut Ridge Radio Club handled communications duties for a five-mile run in Upper Saddle River, NJ, which drew more than 400 participants. Repeater WR2AFR was utilized by K2BZZ (also acting mayor of the community), W2HED, WB2AIU, WB2WGM, WA2GAW, W2FZQ, K2GPL, W2HTW, W2SEN and WA2EZN. — *Roy Duffus, W2SEN*

QST congratulates . . .

☐ the father of WB1CLK, who turned to the books again at the age of 76 and jumped directly from the ranks of SWLs to become the holder of General class license N1AAZ.

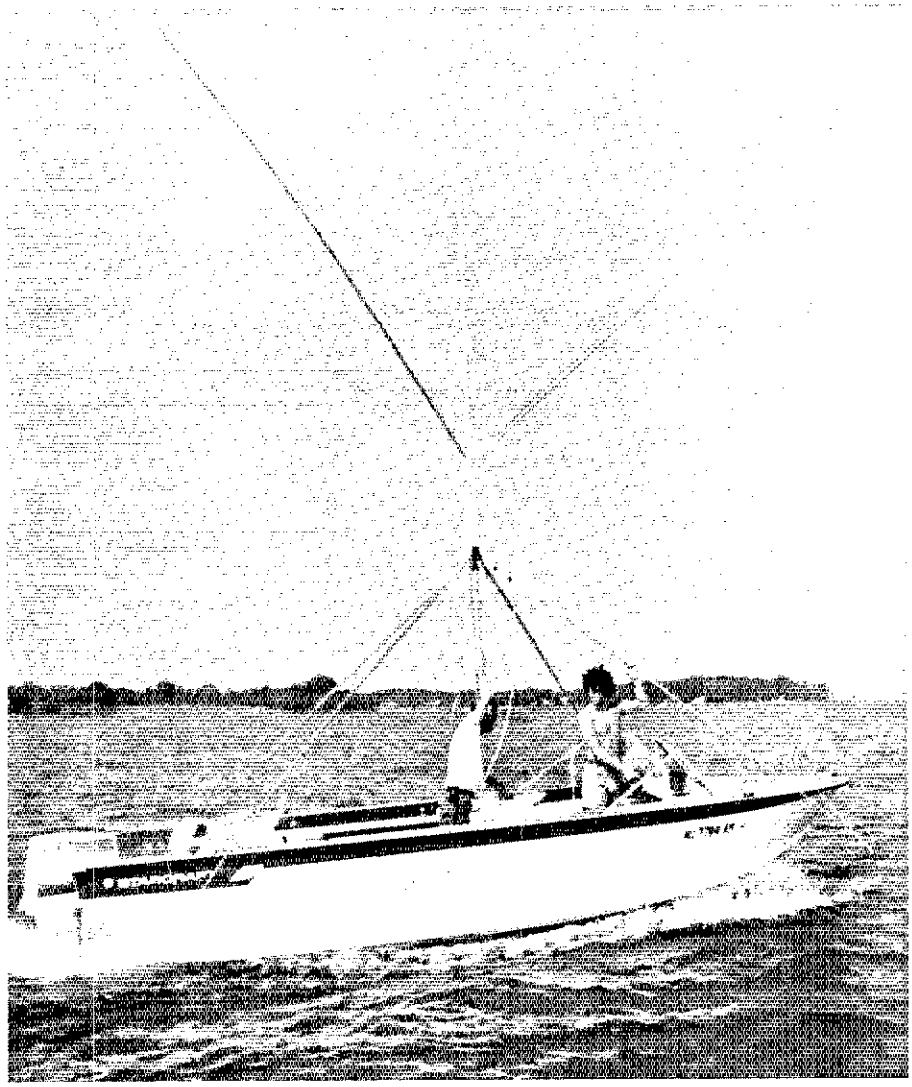
☐ Dr. Wesley Oldham, W4EJU, who has been appointed to a four-year term on the North Carolina Radiation Protection Commission.

I would like to get in touch with . . .

☐ Missouri hams to invite their participation in the new Missouri Emergency Training Net which meets daily at 0030 UTC on 3585 kHz. Code speed for net operation starts at 13 wpm on Sundays and increases two wpm each day up to 25 wpm on Saturdays. Don Wright, WØHH, RFD 2, Box 197-A, Lamar, MO 64759.

☐ anyone who is using separate 110-volt relays to switch 220-volt mains for shack. Myron L. Braun, K8IQB, 802 Howard St., Bellevue, OH 44811.

☐ anyone interested in starting a Disabled American Veterans Net. Clifford Blye, KA4CKL, 4909 Kraft Ct., Dale City, VA 22193.



A Maritime Mobile built for two? Not quite! It's really Jack Howison, WA4QVS, at the wheel and Henry Eddleman, WD4KEN, hanging on for "dear antenna." Faced with moving all his belongings about two miles to his new home in Davidson, NC, Jack didn't relish the idea of taking apart and reassembling his full-size tri-band quad, so . . . Lake Norman just happened to be quite convenient to both the old and new QTHs. Now let's hear from those quad owners who move up into the hills. *(WD4BDR photo courtesy of* The Charlotte Observer)

Happenings

Conducted By W. Dale Clift,* WA3NL

Don't Call Me "Good Buddy": Phase II of the Call-Sign Assignment System

New policies affecting the way FCC assigns amateur station call signs go into effect January 1, 1979. These policies, known as Phase II of the call-sign assignment system, apply until further notice.

The new call-sign assignment system started March 30, 1978, with the creation of call-sign groups corresponding to class of license. (Phase I policies were reported in May 1978 *QST*, page 49.) Groups A, B, C, and D correspond to the Amateur Extra, Advanced, General and Technician, and Novice classes respectively. Each group contains blocks of call signs. Call-sign letter combinations are always selected by the Commission from lists of sequential call signs. See Table 1. *Requests for a specific call sign or format will not be honored, and can result in processing delays.* Phase II continues most of the policies of Phase I by assigning all new, and most changed, call signs according to operator class and mailing address district.

Phase II also continues the policy of allowing any presently licensed amateur the option of retaining his call sign, regardless of any change of operator class or change of address to another call-sign district. In fact, a licensee will automatically retain his present call sign unless he requests, and is eligible for, a call-sign change. An eligible licensee must place a check mark in Item 13A on his or her application, FCC form 610, in order to get a change of call sign.

13A.
☒ REQUEST FOR SPECIAL CALL SIGN
(see instruction 13A)

The major policy changes brought by Phase II are as follows:

Amateur Extra Class licensees, not already holding Group A call signs, may request a call-sign change at any time. However, Extra Class licensees will be assigned Group A call signs *only*. Extra Class licensees no longer have the option to request call signs from other groups.

Advanced class licensees are eligible to request a call-sign change on their applications for license renewal if they do not already hold a Group B call sign. However, applicants must file *no earlier* than 60 days before the end o their current license term. Applicants filin during their one-year grace period are include in this eligibility. Eligible Advanced clas licensees will be assigned a Group B call sig *only*.

A licensee modifying his mailing address to different call-sign district has the option of re taining his call sign, as mentioned earlier, or h may request a new call sign to reflect the ne call-sign district. All amateurs requesting change of call sign because of change of ad dress to another call-sign district will receive call sign from the same group as the *relin quished* call sign, unless he is otherwise eligibl as an Advanced or Extra Class operato However, there is one exception to this policy

CAUTION! Radio amateurs who presentl hold "preferred" call signs due to seniority o other special provisions of the old rules ma lose their preferred status if they request a ne call sign. If such an amateur relinquishes a ca sign from a group he would not be eligible fo under the new rules, he will be given a call sig from the group corresponding to his class o license. For example, some old-timers hol 1×2 call signs, which are Group A call signs but they hold General, not Extra Class licenses If one of these old-timers were to move to new call-sign district and request a new ca sign, he would be assigned a Group C call sign A Group C call sign is a 1×3. See Table 1.

Licensees upgrading to a higher operato class may request a call-sign group change a the time of upgrade. Call signs will be assigne from the group corresponding to the new clas of license.

Secondary station licenses will not be issued renewed or modified. A holder of a secondar station license may request that his secondar station call sign become his primary station cal sign, but this request must be made before th secondary license expires.

*Asst. Manager, Membership Services, ARRL

Table 1
Group A Call Signs

Block no.	Contiguous USA
* 1	K#cc
* 2	N#cc
* 3	W#cc
4-13	AA#c-AK#c
14-36	KA#c-KZ#c
37-59	NA#c-NZ#c
60-82	WA#c-WZ#c
83-92	AA#cc-AK#cc
93	Group B

The following prefixes will *not* be assigned to stations in the contiguous 48 states: AH KH NH NL NP WH WL WP. Pacific-area stations will be assigned AH#c KH#c NH#c WH#c, then Group B. Alaska-area stations will get AL7c KL7c NL7c WL7c, then group B. Atlantic-area stations will be assigned KP#c NP#c WP#c, then Group B.

Group B Call Signs

Block no	Contiguous USA
1[1]	KA1cc
2-23	KB#cc-KZ#cc
24-46	NA#cc-NZ#cc
47-69	WA#cc-WZ#cc
70	Group C

[1]KA prefixes will be assigned only to persons living in the first call district. Other KAs are assigned to U.S. personnel living in Japan.
The following prefixes will *not* be assigned to stations in the contiguous 48 states: KH KL KP NH NL NP WH WL WP. Pacific-area stations will be assigned calls in the format, AH#cc; Alaska-area stations, AL7cc; and Atlantic-area stations, KP#cc. Once these blocks are used up, assignments will be made from Group C call signs.

Group C Call Signs

Block no	Contiguous USA
* 1	K#ccc
2	N#ccc
* 3	W#ccc
4	Group D

Pacific-area stations will be assigned KH#cc NH#cc WH#cc, in that order; Alaska-area stations KL7cc NL7cc WL7cc; Atlantic-area stations NP#cc WP#cc. After these are depleted, Group D will be used.

Group D Call Signs

Block no.	Contiguous USA
1-23[1]	KA#ccc-KZ#ccc
24-41	WA#ccc-WZ#ccc

[1]Except KC4AAA-AAF and KC4USA-USZ
The following call-sign formats will *not* be assigned to stations in the contiguous 48 states:
KH#ccc KL#ccc KP#ccc WC#ccc WH#ccc WK#ccc WL#ccc WM#ccc WP#ccc WR#ccc WT#ccc. Pacific-area stations will be assigned KH#ccc WH#ccc; Alaska-area stations KL7ccc WL7ccc; Atlantic-area stations KP#ccc WP#ccc.

*Call signs using these prefixes are not currently being issued.

PROPOSED QUIET ZONE FOR VA AND WV REPEATERS

Amateur Radio repeater stations in certain areas of Virginia and West Virginia could be affected by a proposed amendment to the Amateur Rules which would require such stations located within a National Radio Quiet Zone to meet special requirements. The National Radio Quiet Zone has already been established for fixed stations in the Business and Public Service Radio Services, which are subject to coordination procedures to minimize possible harmful interference at the National Radio Astronomy Observatory (NRAO), at Green Bank, WV, and the Naval Research Laboratory (NRL) at Sugar Grove, WV.

The quiet zone is an area bounded by 39°15' N. Lat. on the north, 78°30' W. Long. on the east, 37°30' N. Lat. on the south, and 80°30' W. Long. on the west. Under the proposed rule, any Amateur Radio station licensee

proposing to install a new amateur station in repeater operation or to modify an existing station in repeater operation within the quiet zone would have to notify the director of the National Radio Observatory, P. O. Box No. 2, Green Bank, WV 24944. Modification of an existing repeater station would include anything which would change either the frequency, power, antenna height or directivity, or location. The licensee of a new or modified repeater station located within the quiet zone would have to include the geographical coordinates of the antenna, antenna height, antenna directivity if any, proposed frequency, type of emission, and power in his notification to the National Radio Observatory Director. The director would then have 20 days to notify the FCC of any problem caused by the new station or modification. The Commission, if notified, would then take whatever action it deemed appropriate.

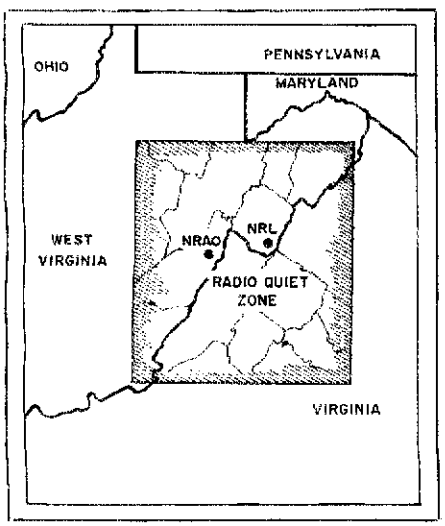
This Notice of Proposed Rulemaking (NPRM) in SS Docket No. 78-352, is the direct result of a petition, RM-2857, filed jointly by the NRAO and the NRL on March 8, 1978. ARRL disputed the petitioners' claims, stating that NRAO and NRL had failed to set forth what present interference they were receiving from amateur activities. The League also cited the petitioners' failure to indicate how amateur operations would interfere with the observatories' work, and submitted that any possible problem might be better remedied by informal cooperation between NRAO, NRL and the amateur community than by a formal rulemaking proceeding.

In response to ARRL's arguments, NRAO and NRL argued that because their work involved monitoring very weak signals over a long period of time, it is extremely difficult to determine the source of man-made interference. Instead, the observatories use calculations for the amounts of man-made radio frequency interference it receives based on the technical data submitted by each new radio operation within the quiet zone. In addition, they argued that their operations are susceptible to interference from Amateur Radio stations because the observatories' monitoring includes the entire spectrum above 100 MHz.

The FCC has now proceeded with this Notice of Proposed Rulemaking, which brings the NRAO and NRL proposal a step closer to being made a part of the Amateur Rules. Interested parties should submit comments concerning the proposal on or before February 1, 1979. Reply comments are due March 1. All comments and reply comments filed in this proceeding should be sent to the Secretary, FCC, Washington, DC 20554.

Affected radio amateurs in Virginia and West Virginia may obtain a copy of the proposal by sending an s.a.s.e. to ARRL, Newington, CT 06111. Please specify Quiet Zone NPRM.

The area covered by the FCC's proposed National Radio Quiet Zone.



ELECTION RESULTS

It wasn't a "cliff-hanger" but there will be new vice directors in three of the League's 16 divisions as a result of the 1978 ARRL elections. Three directors running for reelection reaped enough votes to defeat their challengers. (Earlier, three directors and five vice directors were declared automatically reelected, being the only nominees eligible: Messrs. Zak, Wicker, Holladay, Diehl, Evans, Mayer, Milius and Matthews. (See page 54, November 1978 *QST*, for details.)

Interest ran high in the *Central Division* director election where the incumbent, *Don C. Miller, W9NTP,* was challenged by *Edmond A. Metzger, W9PRN.* Ed had held the office of division vice director for 13 years prior to his bid for the director's post. The final vote showed 3561 for Miller to 2315 for Metzger.

The vice-director post went to *Kenneth A. Ebneter, K9EN,* who tallied 4074 votes to 1751 for *Gary L. Huber, AB9M.* Ken, who is 45 years old, an Amateur Extra Class licensee, is service manager at the Hays Music Store and chief engineer with Kramer Broadcasting. He has filled the posts of SCM Wisconsin Section ARRL from 1961 to 1969 and assistant director Central Division from 1972 to 1978. He has held offices in the Wisconsin Area Teleprinter Society and the Yellow Thunder Amateur Radio Club, Inc., as well as many ARRL leadership appointments. Licensed since 1957, Ken is a Life Member of ARRL and formerly held the call K9GSC.

The *New England Division* reelected *John C. Sullivan, W1HHR,* its director, with a total vote of 2408 to 1426 over challenger *Frank S. Darmofalski, W1FD.*

Maurice O. Carpenter, KØHRZ, who succeeded to the office of director, *Rocky Mountain Division,* upon the death of Charles M. Cotterell, WØSIN, has won election for a two-year term. The final tally was 819 votes for Carpenter to 583 for *Barry S. Newberger, W5KH,* and 290 for *Harlan D. Bercovici, WØMYN.* The 64-year-old Maurice, who hails from Denver, is a retired U.S. Post Office Department employee. He was vice director of the division from 1975-1978; has held offices in the Denver Radio Club; was past squadron communications officer of Ohio CAP, and was Colorado Post Office Net Manager from 1961-1974. He is a member of RACES and Army MARS, holds the ARRL 25-year member service pin and has been licensed since 1932. His former calls are W9RDO and W4RDO.

Lys J. Carey, KØPGM, with a vote of 882 to 800 for *Joe T. Knight, W5PDY,* takes over as vice director of the Rocky Mountain Division. Lys, age 54, holder of an Advanced class amateur license, also calls Denver home. He is employed as a machine shop foreman for Gates Rubber Company and has been active in League affairs, representing the division as an assistant director from 1974-1978. He chaired the finance committee for the 1976 ARRL National Convention in Denver as well as hosting a PRA workshop. Other activities included past deputy director and still member of State of Colorado AF MARS; editor of "The Round Table," member of Board of Directors and past officer of the Denver Radio Club and a member of the Denver Civil Defense. Presently, Lys is chairman of the electricity/electronic advisory board for the Denver Public Schools. A Life Member of ARRL, he has been licensed since 1958.

In the *West Gulf Division,* incumbent *Jack D. Gant, W5GM,* returns to office, having picked up 2270 votes to 1522 for *Carlos F. "Monty" Montemayor, N5EN.*

The vice-director race showed only a 51-point spread between the first- and second-place candidates. The results: *Raymond B. Wangler, W5EDZ,* 1366 votes, to 1315 for *Amelia E. "Milly" Wise, W5OVH,* and 1101 for *O. E. Smith, AE5I.*

Ray, from San Antonio, is a 51-year-old General class licensee, and is employed as a senior research engineer and safety director for the Southwest Research Institute. He is a member of IEEE and AMSAT, and a Life Member of QCWA. In addition, he is active in the Texas VHF-FM Society, Alamo DX Amigos, San Antonio Radio Club and San Antonio Repeater Organization. He has been technical program manager of Air Force MARS, for eight years. A Life Member of ARRL, Ray has been licensed since 1952.

In accordance with an action taken by the League's Executive Committee at its meeting in September, the election for director in the Northwestern Division was postponed pending the outcome of litigation in that division by one of the candidates.

Thus, the curtain is drawn on the 1978 ARRL director/vice-director elections. — *Marjorie C. Tenney, WB1FSN*

ARRL WILL SUE FCC

ARRL will take legal action against the FCC over the Commission's action banning the commercial manufacture and marketing of external radio-frequency power amplifiers capable of operation between 24 and 35 MHz. The Executive Committee of the ARRL Board of Directors met November 19, 1978, and reached a decision to go ahead with the lawsuit.

The FCC ban, which was adopted ostensibly to keep power amplifiers from being used on the citizens band, also prevents the manufacture and marketing of amplifiers for use on the 10-meter amateur band. The Appeals Court case number is *ARRL v. FCC, No. 78-1853.* For more information about the amplifier ban, see "Happenings," September 1978, page 51, and May 1978, page 46.

IS A TV'S RF SUSCEPTIBILITY IMPORTANT CONSUMER INFORMATION?

The FCC has begun an inquiry to investigate ways in which it could help consumers choose, install and operate television sets. The official Notice of Inquiry (NOI) in General Docket No.

78-307 is an effort to help consumers get technical information that would help them when purchasing TV systems.

In a recent news release, the Commission pointed out that " . . . it was difficult for consumers to recognize the improvements to television receivers which do not affect characteristics that can readily be seen by the consumer while a set is in the store showroom. If a manufacturer increases costs by a few dollars to make technical improvements, it runs the risk of reduced sales. The FCC said that for these reasons manufacturers have been deterred from making receiver improvements which are not observable in the showroom."

The NOI addresses questions which include the types of information about TV receivers and antenna systems that should be provided to consumers, and the types of information that would help consumers install and operate their TV systems.

The Commission hopes that it will receive comments from the widest possible cross-section of people, especially from consumers and their representatives. For more information, contact the Consumer Assistance Office at the FCC, Washington, DC 20554. Comments are due February 1, 1979, and reply comments are due by March 1, 1979.

RFI SUBJECT OF SPECIAL FCC NOTICE OF INQUIRY DIRECTED AT CONSUMERS

Just at deadline, the FCC voted to adopt a Notice of Inquiry into the subject of RFI. Though the docket had not been released to the public at this writing, ARRL had an observer at the Commissioners' meeting who was able to provide us with the following information:

"On June 14, 1978, at hearings on Senator Goldwater's RFI Bill S-864, FCC Chairman Charles Ferris promised to initiate an Inquiry into the subject of RFI. Today, November 14, 1978, the Commission decided to adopt a Notice of Inquiry (NOI) prepared by its staff looking into this matter.

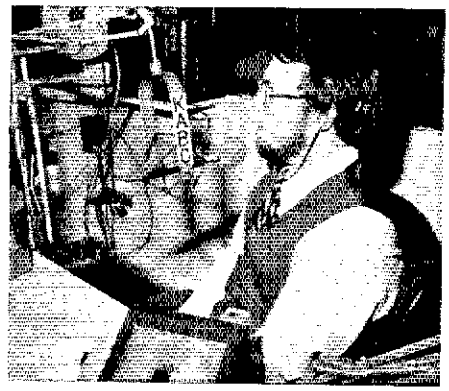
"The NOI will look at mandatory government regulation, voluntary industry self-regulation, and areas in between. It will address the RFI issue into five categories: consumer, manufacturer, engineering, economics and government.

"Erika Jones, of the FCC's Consumer Assistance Office, noted that this NOI would be a model for encouraging public participation in rulemaking proceedings, and would be a vehicle for bringing the problem of RFI to the public. She also noted that a commercial printer would print the NOI in quantity, and that the differing sections would be color-coded so that consumers, for example, could easily find the section that pertained to them without having to wade through engineering information."

The comment deadline for this NOI will be May 1, 1979, and we hope to give this docket detailed treatment in future issues of *QST*.

LEAGUE GIVEN ASSURANCES THAT SPECTRUM USE FEE WOULD NOT APPLY TO AMATEURS

The FCC has called for comments in a Notice of Inquiry (NOI) in Docket No. 78-316, which



Bruce Alan Johnson, WA6IDN, international services officer at ARRL hq., was the only guest on the all-night talk show August 18 over KABC Radio, Los Angeles. Moderator was Ray Briem. Questions from the audience and Johnson's answers covered WARC, interference, emergency communications and other aspects of Amateur Radio. *(photo by Norm Chaffin, K6PGX)*

is concerned with the Commission's efforts to establish a new fee schedule. One part of the NOI, which has raised concern among radio amateurs, is a section that says that one of the ideas under consideration is that if the Commission were given legislative authority to obtain "fair market value" for spectrum use, it might collect such value through the use of spectrum fees, auctions or some combination of the two.

H.R. 13015 is the legislation which could give this authority to the FCC or its successor agency, and ARRL was on Capitol Hill when the matter of granting authority for a spectrum use fee was being discussed. ARRL Washington Area Coordinator Hal Steinman, K1FHN, testified before the House Subcommittee on Communications on September 22, 1978, voicing the League's concerns about this and other proposals. The Subcommittee chairman, Rep. Lionel Van Deerlin, gave the League quick assurance that the concept of a scarcity value was never intended to apply to noncommercial users of the spectrum. For more information about this hearing, see December 1978 *QST*, pages 56 and 57.

A REPEATER IS NOT A REPEATER DURING AUTOPATCH

In last month's "Happenings" we reported the Commission's formal ruling that autopatch on automatically controlled repeaters was prohibited. We also recapped the events leading to this ruling and excerpted a letter from ARRL General Manager Richard Baldwin, WIRU, who pointed out why amateurs had felt that automatically controlled repeaters were an exception to the rule requiring that a control operator be on duty at all times during autopatch operation. The following is the FCC's answer to the ARRL letter.

Federal Communications Commission
Washington, DC

To: Richard Baldwin, ARRL
Newington, CT
Dear Mr. Baldwin:

This refers to your letter of April 19, 1978, on behalf of the American Radio Relay League. You state in your letter that you agree with the intent of the Commission's Public Notice of April 5, 1978, concerning interconnection of Amateur Radio Service stations with the public telephone system, but that you disagree with the Commission's statement in that Notice that Rule Section 97.79(d) prohibits telephone interconnection at automatically controlled stations in repeater operation. You state that the Commission intended in Docket 20112 to permit third-party traffic on a repeater operating under automatic control.

In the NPRM in Docket 20112, released July 25, 1974, the Commission proposed to permit amateur repeater stations, and associated auxiliary link stations, to be automatically controlled. Prior to that time, the rules required that repeater stations either be controlled locally, which means that a control operator was physically located at the repeater site, or controlled remotely, which means that a control operator was some distance from the repeater site and maintained control by means of a wireline or radio control link. Under the Commission's automatic control proposal amateurs were to be allowed to operate repeater stations without a control operator on duty, so long as certain other requirements were met. In paragraph 10 of the Notice, the Commission speculated about certain types of abuses which might arise on automatically controlled repeaters. One example cited involved telephone interconnection: "For instance, if commercial third-party traffic by automatic telephone system interconnection becomes a problem, this function could be discontinued during periods of automatic control."

Unfortunately, the sample abuse directly contradicted the text of Rule Section 97.79(d) found in the Appendix of that same Notice. Section 97.79(d) states: "The licensee of an Amateur station may permit any third party to participate in Amateur Radio communication from his station, provided that a control operator is present and continuously monitors and supervises the radio communication to insure compliance with the rules." There was no discussion anywhere in the Notice that the Commission was considering discontinuing its long standing prohibition on unsupervised third-party communications . . .

We wish also to call to your attention Rule Section 97.3(l), which defines repeater operation as "radiocommunication, other than auxiliary operation, for retransmitting automatically the radio signals of other Amateur Radio stations." From this definition, it follows that when a station is not retransmitting the radio signals of another amateur station, it is not in repeater operation. A station would *not* be in repeater operation if the communications it transmitted originated at a telephone, rather than at another amateur station. Such a station could, of course, be operated under local or remote control, but it could not be operated under automatic control because Docket 20112 permitted automatic control only for repeater stations.

It was not the Commission's intention in Docket 20112 to modify its rules so as to permit unsupervised third-party communications at amateur stations. We regret that erroneous and inappropriate text was included in the Notice which implied otherwise. In as much as the confusion on this issue was caused by an error on our part, we do not believe it would be fair to penalize any amateur licensee who, in the past, unknowingly violated this portion of the

Commission's rules. We would expect, however, that all amateurs in repeater operation will henceforth conduct their communications in strict accordance with 97.79(d).
By Direction of the Commission
William Tricarico (signed)
Secretary

FEE REFUNDS FOR SOME RADIO AMATEURS

How would you like to get a money refund from the FCC? You will be eligible if you are an Amateur Extra Class operator and paid $25 under the old FCC rules for a preferred call sign. The Commission recently announced "Phase I" of its administrative mechanism to process refund claims for all persons charged an amount greater than $20 for a licensing fee between August 1, 1970 and January 1, 1977.

The FCC hopes to announce soon specific guidelines which will explain how to apply for a refund under Phase I. Phase II, which will deal with the smaller fees of $20 or less, is expected to be announced at a later date.

On January 1, 1977, the FCC suspended the collection of all licensing fees after the U.S. Court of Appeals for the District of Columbia held that the fee schedules were unlawful because it was not assessing fees " . . . at a rate which reasonably reflects the costs of services performed or the expense of other value transferred to the payor." Recently, the Commission advised the court that it had collected approximately $90 million in fees in the Phase I category and expected to receive as many as 300,000 claims for refunds which could total as much as $55 million.

Guidelines for applying for fee refunds will appear in *QST* when that information is made available.

FEDERAL COURT INDICTS WB6LHB

A U.S. grand jury has indicted Scott Lookholder, WB6LHB, a Technician class licensee from Granada Hills, CA, on three counts of using indecent and obscene language over the airwaves in violation of U.S. Code Title 18, Section 1464. Lookholder has allegedly jammed repeater stations and used indecent language as "W6JAM."

WAIVER OF MARKETING RESTRICTIONS FOR AMATEUR RF POWER AMPLIFIERS

The Commission's Report and Order in Docket Nos. 21116 and 21117 adopted a ban on the marketing of external radio frequency power amplifiers capable of operation on any frequency from 24 to 35 MHz, and required type acceptance for external radio frequency power amplifiers for use in the Amateur Radio Service. The Report and Order also provided for a waiver of the marketing restrictions for specific models of amplifiers intended solely for use in the Amateur Radio Service which were manufactured and in inventory in the United States before April 28, 1978.

Having reviewed the required information and inspected and measured the performance of the samples submitted to the Commission's Laboratory Division, the Commission has issued a waiver of the marketing restrictions in Sections 2.815(b), 2.815(c) and 97.7(a) until no later than April 27, 1979, for the following rf power amplifiers:

DenTron Radio Co.: MLA-1200, MLA-2500
Heath Co.: SB-200, SB-220, SB-230
R. L. Drake Co.: L-4B
Swan Electronics Corp.: Mark II
Trio-Kenwood Communication, Inc.: TL-922
Yaesu Musen, USA, Inc.: FL 2100 B

In addition, a waiver of the April 28, 1978, marketing cut-off date has been granted to ICOM East, Inc. for their Model IC-50L amplifier until December 16, 1978 and to KLM Electronics, Inc. for their Model PA4-80AL amplifier until January 5, 1979. — *FCC Public Notice*

DOCKET 20092 DISMISSED — NO SPECIAL CALL-SIGN REQUESTS

"The Commission has terminated a rulemaking which had proposed making special call signs available to stations licensed to Amateur Extra Class operators because the rulemaking had no further usefulness," a recent FCC news release announced. The FCC had adopted part of Docket 20092 in 1976, when it allowed Amateur Extra Class licensees to request specific "two-letter" call signs, but it left open for consideration a proposal to allow requests for specific "three-letter" call signs.

In February 1978, the Commission adopted new rules in the First Report and Order in Docket 21135, which imposed a totally new, systematic call-sign assignment program. Therefore, the FCC has terminated all proceedings in Docket 20092 effective immediately.

LICENSE FIGURES

The FCC has issued the following corrected license figures for the end of September 1978: Novice: 62,930; Technician: 68,281; General: 117,805; Advanced: 82,454; Amateur Extra: 21,792. Total of U.S. licensed amateurs is 353,262.

THE FCC'S DOS AND DON'TS FOR AMATEUR RADIO APPLICANTS

The FCC received 14,417 applications (FCC form 610) for individual Amateur Radio licenses during the month of September. Of that number, 2090 were returned to the applicants because they were incomplete, incorrect or improper. Many of them contained simple mistakes that could easily have been avoided if the applicant had read the instructions on the form. The most common of these mistakes are presented below with the hope that prospective Amateur Radio applicants who read this will avoid making them.

Failure to attach license. Each application for license renewal or modification must have a copy of the license attached to the FCC form 610. This requirement is stated clearly not only in the rules (Section 97.47) but also at the top of the form itself. The instruction on the form adds, "If a license has been lost, mutilated or destroyed, the circumstances must be explained . . ." Applicants who are upgrading their licenses should have copies of their licenses with them when they take the examination because the field offices will not forward an application that has neither license nor explanation attached.

Improper address or station location. Items 4 and 5 on the FCC form 610 ask the applicant to specify *both* a permanent mailing address and a station location for fixed operation. The mailing address is what the FCC uses to contact a licensee, and it is part of the license record. The station location for fixed operation describes where the applicant will have his station. They may be identical for some but many should make a distinction between their postal addresses and the geographical locations of their stations. *Both* must be in the United States or in a U.S. territory or possession.

Improper request for special call sign. Since the FCC now assigns call signs systematically, no special call signs are issued, but an applicant must check item 13A on FCC form 610 to request a call-sign change. That request can only be made, however, if the applicant is eligible for the change. Ineligible applicants who complete item 13A or 13B will get their applications returned.

Failure to complete items on reverse of form. Items 17, 18 and 20 are questions requiring yes or no answers. They may not be left blank because the yes or no answers will determine how the application will be processed. Unless the FCC knows whether or not the applicant has a pending application, a previous examination failure or a criminal conviction, the application cannot be processed.

Of course, there are other mistakes that cause returns or delays, but they seem to occur less frequently than those listed here. Most of the returned applications may be resubmitted after the applicant provides what was missing, but there is a way to get the license more quickly. With a good knowledge of the rules and a careful reading of the instructions, any applicant for an Amateur Radio license can provide an error-free application. — *FCC News Release*

NO CRIMINAL CONVICTION QUESTION ON NEW FCC FORMS 610

The FCC has approved a recommendation by its staff to eliminate the criminal conviction question from the Amateur Radio application form. The question, first adopted in 1963, asks: "Have you been convicted in a Federal, state or local court of any crime for which the penalty imposed was a fine of $500 or more or an imprisonment of six months or more within 10 years previous to the date of this application?"

The Safety and Special Radio Services Bureau staff recommended the deletion because no hearing had ever been designated on the basis of an answer to the question, nor had any case involving the use of Amateur Radio to further a crime ever been reported in response to the question. In addition, the Bureau staff questioned whether the question has had any effect on the level of rule compliance in the Amateur Radio Service, and noted that Amateur Radio has provided important rehabilitation for persons re-entering society.

FCC: PROTECT MONITORS FROM QRM

Late news! FCC has proposed protecting its monitoring stations at Allegan, MI; Anchorage, AK; Belfast, ME; Douglas, AZ; Ferndale, WA; Ft. Lauderdale, FL; Grand Island, NE; Kingsville, TX; Laurel, MD; Livermore, CA; Powder Springs, GA; Sabana Seca, PR; and Waipahu, HI, from harmful interference. Amateurs who run a kW within 10 miles of a monitor could be affected. Deadline in General Docket 78-365 is January 22, 1979; s.a.s.e. to Hq. for copy of NPRM. QST

Moved and Seconded...

MINUTES OF EXECUTIVE COMMITTEE
MEETING No. 372
November 19, 1978

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc. met at 0902 EST on November 19, 1978, at the Headquarters offices of the League in Newington, CT. Present: President Harry J. Dannals, W2HD, in the Chair; Vice President Victor C. Clark, W4KFC; Directors Max Arnold, W4WHN, Richard A. Egbert, W8ETU, and Robert B. Thurston, W7PGY; and General Manager Richard L. Baldwin, W1RU. Also present were Vice Presidents Noel Eaton, VE3CJ, and Carl Smith, WØBWJ; Directors Maurice Carpenter, KØHRZ; Jack Gant, W5GM; Paul Grauer, WØFIR; Larry Price, W4RA; William Stevens, W6ZM; John Sullivan, W1HHR; L. Phil Wicker, W4ACY; and Stan Zak, K2SJO; Vice Director Edmond A. Metzger, W9PRN; Assistant General Manager David Sumner, K1ZZ; and Washington Area Coordinator Harold Steinman, K1FHN.

On motion of Mr. Egbert, the Committee recognized the names of 279 individuals who had recently been elected to Life Membership, and instructed the General Manager to list their names in *QST*.

On motion of Mr. Thurston, the Committee approved the affiliation with the League of the following Amateur Radio societies: Alliance College Amateur Radio Association, Cambridge Springs, MD; AVCO Amateur Radio Association, Inc., Everett, MA; Bethlehem and Lehigh Valley ARC, Bethlehem, PA; Brush Mountain Repeater Association, Blacksburg, VA; Chelsea Communications Club, Chelsea, MI; C. W. Amateur Radio Club, Trion, GA; CW Operators, Santa Rosa, CA; Gallatin Ham Radio Club, Bozeman, MT; Kingsborough Community College ARS, Brooklyn, NY; Kootenai Amateur Radio Society, Rathdrum, ID; Lampasas Amateur Radio Club, Kempner, TX; Long Lines ARC of White Plains, White Plains, NY; Lower Yellowstone ARC, Glendive, MT; McAllen High School Amateur Radio Club, McAllen, TX; Metropolitan Repeater Association, Inc., Pinellas Park, FL; Miami County Amateur Radio Club, Osawatomie, KS; Naval Air Station Whidbey Island ARC, Whidbey Island, WA; Panasonic Amateur Radio Club, Secaucus, NJ; Richmond County Amateur Radio Club, Rockingham, NC; Sevier County Amateur Radio Club, Pigeon Forge, TN; Solano County Amateur Radio Society, Fairfield, CA; Student Pace Amateur Radio Club, Hudson, NY; Sturdy Memorial Hospital ARC, Attleboro, MA; Twin City FM Club, Minneapolis, MN; Whidbey Island DX Club, Oak Harbor, WA.

On motion of Mr. Thurston, the following convention dates were approved: South Carolina State, March 17-18, 1979, Greenville, SC; Missouri State, April 21-22, 1979, Kansas City, MO; Georgia State, June 16-17, 1979, Atlanta, GA; West Virginia State, June 30-July 1, 1979, Jackson's Mill, WV; Pacific Division, August 11-12, 1979, Reno, NV; Illinois State, September 9, 1979, Rockford, IL; Dakota Division, October 5-7, 1979, Sioux Falls, SD; Northwestern Division, July 4, 1981, Billings, MT.

In addition, approval was granted for a change of date for the Great Lakes Division convention in Muskegon, Michigan, from April 6-7, 1979, to March 30-31, 1979.

In accordance with previously established Board policy, the General Manager reviewed the status of actions taken on motions adopted at the July Board meeting. In addition to the completed items reported in the Minutes of the September 17, 1978 Executive Committee meeting, action has been completed on Minutes 14(80), 17, 19, 20, 26, 27, 40, 41, 56, 60, 81 and 96. Action is in progress on Minutes 22, 30, 42, 45, 51, 59, 69, 71, 73, 74 and 87. No action has yet been taken on Minutes 21 and 32.

On motion of Mr. Clark, the following Resolution was adopted, in order to bring the language of the pension plan into conformity with action taken at the January 1978 Board meeting.

Resolved: That the Second Amendment to the American Radio Relay League, Incorporated Restated Pension Plan, heretofore considered and discussed be, and the same hereby is, adopted with such changes as may be required by the Treasury Department, such Amendment to be effective as of January 1, 1978, and that a duly authorized officer of the League be, and he hereby is, authorized and instructed to execute said Amendment for and on behalf of the Corporation.

The attention of the Committee was called to a contribution to The American Radio Relay League by Paul Grauer, WØFIR, in the amount of $500, and to a contribution to the ARRL Foundation by L. Phil Wicker, W4ACY, in the amount of $500 (applause).

Assistant General Manager Sumner displayed some of the Project Goodwill IARU kits, and called attention to the contribution in the assembly of kits being made by the United Radio Amateur Club. It was further noted that some $27,000 had been contributed to the Project by individuals and clubs.

At 1043 General Counsel Booth entered the meeting.

On motion of Mr. Clark, the staff was directed to petition the Federal Communications Commission to institute procedures which would permit U.S. citizens overseas to obtain amateur licenses by mail examination.

At 1150 Director Harry McConaghy joined the meeting.

After extended discussion, on motion of Mr. Thurston, it was voted to provide additional financial assistance for the Sleeper antenna case on Cape Cod. On motion of Mr. Arnold, it was further voted to provide additional financial assistance for the Schroeder antenna case in Cerritos, CA.

After discussion, on motion of Mr. Thurston, voted to proceed with suitable action in the court in connection with FCC Dockets 21116/21117, relating to a ban on ten-meter amplifiers.

On motion of Mr. Clark, the staff was directed to file comments on General Docket 78-307, which concerns grading of TV receivers.

On motion of Mr. Arnold, the staff was directed to research Docket 20718, which is a revision of Part 18 of the Commission's Rules concerning ISM equipment, and file comments with FCC if appropriate.

On motion of Mr. Clark, the General Counsel was directed to file suitable comment in General Docket 78-316, which relates to the establishment of a future fee program by FCC.

On motion of Mr. Clark, the staff was directed to file comments vigorously opposing the imposition of restrictive regulations on amateur repeaters in the so-called "quiet zone" surrounding the Green Bank and Sugar Grove observatories, SS Docket 78-352.

On motion of Mr. Egbert, the General Counsel was directed to file suitable comments in Docket 21313, which proposes standards for AM Stereo, following up on the comments in our response to the 8th Notice of Inquiry in Docket 20271.

On motion of Mr. Egbert, the General Counsel was directed to file comments in response to General Docket 78-250, using as a basis the draft response prepared by the staff and which was further modified by discussion.

In connection with a previously directed action to file for Novice privileges on 220 MHz, the General Counsel will review the draft submission prepared by the staff.

On motion of Mr. Egbert, the General Manager was directed to poll the members of Sullivan County, New York, to determine whether they wish to be part of the Atlantic Division or the Hudson Division.

By unanimous consent, the Committee added the name of William Stevens, W6ZM, to the Committee of Tellers counting ballots in the election on November 20, 1978.

During the course of the meeting the Committee discussed, without formal action, the cost of mailing *QST* to members outside the United States, the 1979 National Convention program, the ARRL grant-seeking program, the 1978 financial picture, various matters of litigation involving the League, the schedule for the 1979 January Board meeting, and the date of the next Executive Committee meeting.

During the course of the day the Committee was in recess from 0950 to 1010, and from 1152 to 1304.

There being no further business, the Committee was adjourned at 1538.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

LIFE MEMBER APPLICANTS*
September 16, 1978

William T. Adie, WA7ZVI; John C. Adkin
WA3ITI; John W. Ailes, KH6JRO; John F. Ale
ander, WA7ZTI; Albert Alexy, Jr., WB5BGQ; Joh
David Allen, K4YFC; Mary F. Allsopp, WB5DV
William F. Amon, III, WA4PNS; A. F. Antill
W7FJ; Carroll G. Appleman, W9MKC; Noel Arn
strong, WB5CMB; Gary Arseneau, WA1UT
William A. Avery, N4SK; Edwin R. Baker, W6TW
James A. Baker, W9WPJ; Marcus L. Bales, WØDF
David F. Barber, WB4WKY; Bruce C. Beamar
K1HTN; Donald E. Beaty, K6VH; Loren W. Bee
W8LB; Gordon Becker, WØAIG; Thomas E. Becke
WD5AAI; John M. Beckner, WB4FEN; Tom Beeb
WDØFIX; William S. Beeman, WBØOGB; Larry
Belcher, N4OI; Howard T. Bentley, K5SXU; Kennet
J. Berlo, Sr., WA1YIL; John F. Best, WA1YI
Richard R. Bewick, WB2KSI; Michael W. Bezera
WB4TQD; Howard D. Biederman, VE6ARB; Davi
Biegen, W7KXW; Lee Forrest Blodgett, WØTG
Harry G. Bluestein, N6TE; James E. Boehner, N2Z
Kenneth R. Boyer, K3ZHD; Kenneth C. Brauchl
WA4DNT; Robert H. Breen, W7JRH; William
Britt, WA7HMP; Donald W. Broten, KØQYD; Rog
R. Brown, WD6AJV; J. Michael Brust, WA2UR
Greg A. Buchanan, WB9DNZ; John M. Bulge
N4XW; Tonny Burik, K9JWU; Wayne E. Butle
W4BKY; James D. Campbell, VE2DPT; Clifford
Caplinger, W7PFC; Leslie H. Carpenter, W7E
Alfred E. Case, WB7DXE; Richard F. Charpentie
Jr., KØOKB; Joseph L. Cherry, WA4EYW; Grahar
H. Chesnut, WBØLIW; William L. Childress
WD6FBF; Robert W. Chin, WB1FHT; Virginia Jea
Chittenden, WA2BGE; Cameron E. Clayson, N8V
Lawrence J. Clifford, W3UY; Ronald D. Colangel
WA4CFH; Bernard A. Coler, WA6DMD; Clifford
Collier, WB7PIT; James O. Conrad, W8MQ; Gary
Corn, WB4OMP; Griffith E. Cook, Jr., W7BCM
Paul E. Cooley, WAØYJW; Randall F. Counsman
W4UXW; Lawrence H. Craig, WB7PXW; Andrew
Dachnowicz, W2ZDP; Owen E. Damewood
WB8AJC; Glenn R. Day, WA7TBC; George
DeVault, Jr., WA4IVG; Anthony DeVito, K2O
Jean B. Desautels, K4VGD; Lorraine R. Deschene
WA4LWB; D. R. Dickens, WBØHTV; Orvil
Duecker, WBØOYA; George D. Dunavan, WAØSR
Robert L. Dyson, KØAYO; David N. Ebert, K7RH
Dean S. Edmonds, Jr., K1QCI; Daniel D. Egger
N7DE; Marshall S. Epstein, N4YJ; Wayne
Eskridge, W6LKE; William H. Evans, WB4CSS
Edgar R. Everhart, AB2F; Richard M. Faison
WD4GVI; James B. Faris, AA4TN; Larry Mik
Fariss, WB4STD; Nicholas Federspiel, KBØAR
Lawrence Fields, WD8ITF; Bernard Fineberg
WB5UGJ; Douglas Finke, K9DF; John M. Fisher
K2JF; Roy Victor Fitzgerald, WBØLOU; Terry A
Fleming, WB6LSP; Jack D. Forbing, K9LSB; Joh
D. Fort, WB4TMT; Anthony P. Fortier, WA8EOE
Ruth M. Fowler, WD4FJS; Steven J. Fraasch, KØS
Gilbert A. Franke, WB5RFQ; William Arthu
Frauenhofer, WA2YUO; Robert E. Fromm, Sr.
WB7EGD; Don W. Gallagher, K8WZX; Charles S
Garrigus, W3NRU; David W. Garrison, N4XG; Joh
L. Getz, WA4RIJ; Robert R. Gibler, Jr., WA2JNO
David C. Gingrich, K9DC; Albert A. Girard, VE6OA
J. Thomas Goodwin, WA3FVN; Donald K. Goshay
W6MMU; Stanley R. Grabiec, WB8ZXC; Calvin E.
Graden, W7KKS; David G. Green, WB4KSL; John
R. Gregory, W5RCO; J. Keith Grimson, WB9UQA
James M. Grimson, WB9URX; Karl E. Gruber
K8BCK; Stephen Guelde, W7INH; Henry S.
Guichard, W6VMB/W7HVM; Willard D. Gunter
Jr., WA3YWJ; Samuel P. Habit, K3SIX; Ronald J.
Hallam, WA3TMW; Robert Handel, K2HYM
William H. Harper, K9IW; Marwood D. Harris
KL7AW; Ron B. Harris, K4FUV; Jeffrey W. Hartley
N8II; Dan Hartman, K8BBC; Larry J. Hatley
WB5OYN; Roger L. Haven; Gale L. Hawks
WD4NIB; Henry L. Heaberlin, WD4KWV; David P.
Head, WA8VAQ; Robert V. Hein, Sr., WB2HNE
Gary G. Helton, WB4CSW; Melvin C. Hill
WA4HSE; John Hines, W1ULE; Walter T. Hobby
Jr., WA4FKE; Roger Doyle Hoestenbach, Sr.
W5EGS; Paul G. Hoffarth, WB9FNR

*More Life Member applicants appear on page 78.

Canadian NewsFronts

Conducted By Ron Hesler,* VE1SH

Canadian Forces Affiliate Radio System Created

Since the mid-1950s, an informal network of Amateur Radio stations across Canada has been operating to handle traffic for Canadian Forces military personnel throughout most of the world. This unofficial service has been encouraged and most appreciated by the Department of National Defence.

Unfortunately, several problems over the past two years have delayed the traffic process. Not the least of these has been intentional jamming and the sometimes lack of licensed amateurs willing to volunteer to serve at isolated bases.

Because of DND's desire to continue this worthwhile service and as a result of the problems, it has decided to organize, set up and operate the Canadian Forces Affiliate Radio System (CFARS). Basically, the CFARS program will operate in a similar fashion to the United States Military Affiliate Radio System (MARS) and although the final format of CFARS has not been resolved at this writing, the basic posture will be that:

a) Operating will be on specially allocated frequencies *outside* the present amateur frequencies.

b) Membership will include military installation stations, military amateur club stations and a number of civilian affiliate licensed amateur stations.

c) Military radio voice and operating procedures will be used.

d) All stations while operating within the CFARS program will use special CFARS call signs.

e) Several different radio nets are intended (e.g., Northern Net, Maritime or Ship Net, European Net, Middle East or UN Net, etc.).

Trials conducted in early 1978, which included military amateur stations in the Middle East and approximately 13 civilian amateur stations in Canada operating on a frequency of 13,972.5 MHz, were extremely successful. Tests carried out by the DOC during this trial period proved that frequency tolerances and stability of the Amateur Radio equipment being operated was well within those allowed by regulation.

It will be appreciated that organizing and getting this CFARS program into operation will take considerable time. Implementation of the program will be done in various stages, the first of which commenced in the fall of 1978. The CRRL has been officially advised that the national Amateur Radio societies will be kept fully informed as to the progress and same will be reported on this page in future months.

CRRL INCORPORATION

We are pleased to announce that proceedings have been launched for the formal federal incorporation of the Canadian Radio Relay League and will, most likely, be completed by the time you read this . . . another forward step *in the* democratic evolution of the League in Canada.

It is envisaged that the Board of Directors will consist of the following *elected* officials: president, first vice president, vice president, secretary and not less than three directors. The ARRL president will sit on our Board, as a vice president, in the same fashion as we have always had a Canadian on the ARRL Board. It is a practice which has indeed served the best *interests* of radio amateurs, on both sides of the border, since 1920! In point of the fact, it is expected that our active participation on the ARRL Board will be increased by the addition of our president, even though he, like League vice presidents, will not be a *voting* member. In this respect, the Canadian voting member will continue to be the Canadian ARRL director (CRRL first vice president). Additional information will be forthcoming in future Canadian NewsFronts.

CARF AND CRRL MEET

Early in November, the CRRL hosted a meeting in Montreal attended by the CARF president and vice president, the CRRL director and vice director, and chaired by immediate past RSO President Marv Nash, VE3FON, with RSO President Eric Ilott, VE3FX, acting as secretary. The primary purpose of this meeting was to "identify" the problems which have existed between our two organizations, in an attempt to improve future relations. All participating organizations previously agreed that no publicity on the meeting outcome would be given out independently, but would instead be issued in a release approved by all participating bodies. As approved, a full report will probably be contained on this page next month.

OTTAWA COMMITS $20.4 MILLION TO SPACE INDUSTRY

Early in October, Communications Minister Jeanne Sauve unveiled details of a federal program in support of Canada's high-technology space industries.

The money, to be spent between then and the spring of 1982, will be used to expand and upgrade the Department of Communications' Davida Florida Laboratory, near Ottawa, to provide Canadian industry with a complete and fully equipped national center for the test and assembly of complete communications satellites and space subsystems. The private sector will use the facility on a rental basis.

"The expanded Davida Florida Laboratory will further a priority objective of Canada's space program — that of developing and demonstrating a Canadian capability to act as a prime contractor for the supply of complete satellites for both domestic and export markets," said Mme. Sauve.

An immediate benefit of the program will be that these new facilities will be utilized to assemble Telesat, Canada's third ANIK-C series spacecraft in Canada.

POTPOURRI

☐ We welcome the Powell River Amateur Radio Club as a new ARRL/CRRL affiliate club.

☐ A group of amateurs in Nipigon, ON, are planning to establish on St. Ignace Island what is believed to be the first wind- and solar-powered repeater in Canada; most probably on 34/94. The wind-charged batteries will be kept warm, in winter, by using solar power to supply the degree of heat necessary.

☐ The London Amateur Radio Club reports two new 450-MHz repeaters in the offing in their area.

☐ In view of our understanding that many loran stations in the United States were moving out of the 160-meter band, the CRRL recently suggested to DOC that current amateur operating restrictions be removed in the 1800- to 2000-kHz band. DOC has replied: "DOT has advised that Canadian termination dates for loran-A have not yet been determined, but are likely to follow those recently announced by the U.S. Coast Guard, i.e., December 31, 1979, on the West Coast and December 31, 1980, on the East Coast. However, the Newfoundland stations may continue in service until 1983. Canadian loran-A closure dates should be announced later this year. DOT has requested that present amateur restrictions be maintained until further notice."

☐ Reciprocal application forms for amateur operation in Botswana and Swaziland are now available from the CRRL.

☐ The DOC has requested the opinion of CRRL in respect to future administration of the Morse code test for new and Advanced amateurs. (As recently announced by the Department, they have discontinued the sending portion of the test, retaining only the receive.) The CRRL has informed the Department that we are in full agreement to permitting qualified Amateur Radio clubs to conduct the examination. It was proposed by the League that specific standards be Department-established following which the CRRL would be pleased to undertake the responsibility of the certification of the authorized radio clubs. We have also advised DOC that while we understand the present necessity for the Department discontinuing the sending portion of the test, we would like to see sending reestablished if, or when, the radio clubs were permitted to administer the Morse code tests. It is our belief that this would not be a hardship to the involved clubs and would, in the greater majority of cases, be felt desirable by these clubs. QST

*Director, Canadian Division

Washington Mailbox

Conducted By Michele Bartlett,* N1AGI

Autopatching: Here We Go Again!

It's 1979 — the year of the World Administrative Radio Conference. To mark this auspicious occasion, this and the next installment of "Washington Mailbox" will be devoted to issues of concern to all amateurs: phone patching and third-party traffic.

Q. Would you please go over this new ban on autopatching through automatically controlled repeaters?

A. In the first place, it's not new; it's been in Part 97.79d all along. The rule reads, "The licensee of an Amateur Radio station may permit any third party to participate in Amateur Radio communication from his station, provided that a control operator is present and continuously monitors and supervises the radio communication to insure compliance with the rules."

Many of us thought that when the rule allowing automatically controlled repeaters was proposed, 97.79d would not apply to autopatching through repeaters in automatic control. But in a communique in April 1978, the FCC noted: "This clearly prohibited autopatching and reverse autopatching through automatically controlled repeater stations and required a control operator to be on duty at all times during these (patching) operations." See "Happenings" in December 1978 *QST* for details on events leading to the FCC's formal ruling.

Q. What is an automatically controlled repeater?

A. Automatic control means the use of devices and procedures for control so that a control operator does not have to be present at the control point at all times. (Note that the minute a control operator comes on duty, the station is no longer under automatic control.) Automatic control is allowed only for stations in repeater operation, by the way.

Q. What are the other kinds of control?

A. There are two other kinds of control for Amateur Radio stations. *Local control* is done manually. The control operator is monitoring the operation right at the station transmitter with the associated operating adjustments directly accessible (97.3m1). *Remote control* is accomplished via a control link, either on an amateur frequency above 220.5 MHz (other than the repeater input frequency if the station being controlled is in repeater operation), or through telephone lines, where the repeater is set up to be controlled over the phone (97.3m2).

Q. Who can be a control operator?

A. Any licensed Amateur Radio operator can be designated control operator by the station licensee to be responsible for the emissions from that station. However, for stations in repeater operation, the control op must hold at least a Technician class license, and at least a General for 10-meter repeaters.

Q. Is the station licensee still responsible if he designates someone to be control operator of his station?

A. Yes. The station licensee is responsible for the emissions from his station, regardless of whether a designated control operator is on duty during a violation of the rules. Of course, the designated control operator is held responsible, too.

Q. What other requirements must a control operator meet?

A. The control operator must have immediate access to the station's functions, whether by radio control, telephone or local control. There are two requirements that are of prime importance where designation of control operators for repeaters is concerned. First of all, the date and time period that a control operator (other than the station licensee) was on duty must be entered in a station log, along with the signature and primary-station call sign of that duty control operator. (This may be in the form of a separate log for each designated control op, not necessarily one log kept at the repeater site.)

The other requirement is that the control operator must be able to bring the repeater (not just the autopatch) down, in case of unlawful use. If the repeater is *radio* remotely controlled, the control op must have in his possession a transmitter capable of operating on the frequency selected to control the repeater, which must be above 220.5 MHz and be other than that of the repeater input. Specifically, anything in the amateur bands above 220.5 MHz, except for 431-433 and 435-438 MHz, may be used for auxiliary operation (97.61d and 97.88e). If the control link is something other than a radio link, such as via telephone, he must have *immediate* access to this link.

Q. I guess it's not enough that we have a tape recorder that records all autopatches.

A. No; that would do no good at all in the event of an illegal patch. Nor is it good enough to equip all the users of a repeater with Touch-Tone pads to bring down the repeater.

Q. Does this mean that from now on, the licensee of a station in repeater operation will have to shut off the autopatch function when he knows there will be no control operator on duty?

A. Not necessarily. It's not illegal to have autopatch available on an automatically controlled repeater. It is illegal to *use* the autopatch when there is no control operator on duty (except in the event of an emergency). It's up to the station licensee to insure that the autopatch is not used when no control operator is available. He may do this, if he is a trusting soul, by instructing the users of the machine not to use the autopatch except when a control operator is on duty. But unless it's a closed repeater, this would be hard to enforce. More than likely, the licensee would shut down the autopatch for those periods of time when no control operator is listening.

Q. What about an emergency?

A. Autopatch on an automatically controlled repeater during an emergency is a different matter. But remember, an emergency communication must relate directly to the immediate safety of life of individuals or the immediate protection of property. The value of a genuine emergency communication clearly outweighs the importance of having a repeater control operator monitor the autopatch. However, you had better be able to justify your actions to the FCC.

Q. That's fine, but how can a repeater licensee protect himself against routine autopatch use during periods of automatic control and still keep the autopatch available for use in an emergency?

A. That's a good point. The best compromise solution to this problem would be to disconnect the autopatch during periods of automatic control *except* for an autopatch function to call an emergency response operator. For example, the licensee could disable all autopatch access except for a 911 function.

Q. I don't understand what all the hullabaloo is about. I'm a licensed amateur and I worked hard for that ticket! I belong to the repeater club and I pay my dues on time. Why did I get my license if I can't use it to make an innocent phone call once in a while?

A. We'll leave the matter of innocence — what kind of calls are best avoided — for next month's column. Let's just say there is an increasing incidence of autopatch use to avoid toll charges, to impress one's friends ("Hi, this is Jack and I'm calling you on the radio from my car!"), or to do what could just as easily be done from a pay phone ("Hi, hon — on my way. Need anything?"). According to the FCC, the Amateur Radio Service was never meant to be simply a *convenience* for those who have earned licenses to operate. If you're in doubt about this fact, please reread section 97.1 — Basis and Purpose. To use the words of the FCC in a recent communique, "The present use of telephone interconnection at amateur stations to facilitate third-party communication is becoming increasingly similar to the situation in the Personal and Business Radio Services."

Q. Are amateurs in danger of losing all *autopatch privileges?*

A. It is not outside the realm of possibility that, if telephone interconnection privileges are abused, we may someday find ourselves with a whole new set of third-party regulations — including a prohibition against phone- and autopatching.

[Note: Questions appearing in this column are typical of those asked of the FCC and other agencies. Numbers in parentheses refer to specific sections of the FCC rules.]

*Membership Services Assistant, ARRL.

International News

Conducted By Bruce Alan Johnson,* WA6IDN

Sri Lanka Embraces Amateur Radio

The International Amateur Radio Union has for years been pointing out to developing countries (often through its member-societies) that the Amateur Radio Service isn't just something that might be nice to have; for developing countries it's an essential aid to technological and educational development. The Republic of Sri Lanka — thanks to the enthusiastic persuasions of the Radio Society of Sri Lanka — is the latest developing country to wholeheartedly embrace the idea.

On 1 October 1978 the first pilot training course in Amateur Radio and electronics in IARU history was launched in the capital city, Colombo. Opening ceremonies were held in the Sri Lanka Foundation Institute, made available by the national government. The sponsors? Rather an impressive list: the governments of the Republic of Sri Lanka and the Federal Repbulic of Germany, the International Amateur Radio Union, the Deutscher Amateur Radio Club, and the international divisions of several FRG firms.

A great deal of credit goes to the Deutscher Amateur Radio Club, which is the IARU member-society for the Federal Republic of Germany (FRG). Many months of planning went on before DARC sent a team of instructors to Colombo. In all, 38 students were enrolled in the program, and as you read this it is expected that all 38 will have successfully completed the amateur exams given by the Postmaster General of Sri Lanka.

*International Services Officer, ARRL

More than 400 guests showed up for the opening ceremonies, where the Sri Lankan Minister of State, the Hon. Anandatissa, emphasized the importance of skilled technical training for applicants from developing countries. He added that Amateur Radio in his opinion was an excellent means of training young people in the basics of electronics, and that the resultant corps of trained technical experts in developing countries would inspire further training on the local level by the participants who had themselves completed such a course.

The Minister then offered the Radio Society of Sri Lanka a permanent headquarters for the amateur station generously donated by the government of the FRG.

If you're thinking that there must have been a few obstacles to overcome in an undertaking this large, you're right. Consider this, for starters: The course was conducted in English, which was a second language for the German instructors. And consider the Sri Lankans themselves: While English is taught in the Sri Lankan schools, the difficult Sinhala and Tamil languages are spoken by the majority of Sri Lankans. The Minister of State has asked the new Sri Lankan amateurs to do all they can to help reach those citizens who are interested in Amateur Radio, but who might not work comfortably in English. In fact, he said that by such an effective use of Amateur Radio communications skills, in the three languages of Sri Lanka, the Amateur Radio Service would thereby "justify the need thereafter to reach other people across the world on radio."

On hand to represent the IARU and DARC was Gerd Schnabel, DJ7GS, who stressed the fast-growing space communications industry and the involvement of developing nations in it. "It's no secret," he said, "that even NASA (National Aeronautics and Space Administration) has frankly admitted that their own staff requirements cannot be met easily unless there is a permanent supply of highly trained technicians — technicians who usually begin their training through the American Radio Relay League or one of the several thousand amateur clubs in North America." This need, of course, extends well past NASA, since an increasing number of developing countries are building satellite earth stations and complex broadcast installations.

OK, some might say, this is fine. But what about next year's World Administrative Radio Conference? Well, a country which is already feeling the results of a growing corps of radio amateurs is naturally going to support the needs of the Amateur Service. As Postmaster General and Director of Telecommunications Hon. A. R. M. Jayawardane said a few weeks ago on a visit to IARU/ARRL headquarters, "The government of Sri Lanka will offer all possible assistance for Amateur Radio, and will fully support its position at WARC-79."

Race? Color? Political creed? Religion? Language? The Amateur Radio Service looks right through them to the core of its purpose: to create a corps of self-training technical experts and individuals who work around the clock the world over to promote international goodwill.

Left: The Hon. Nissanka Wijeratne, Minister of Education for Sri Lanka, enjoys his first time on the air from Radio Society of Sri Lanka Hq. station 4S7RS. Upper right: Sri Lankan dignitaries arrive for the opening ceremonies. Shown (l-r): John Amaratunga, 4S7JA, RSSL President; Gerd Schnabel, DJ7GS; B. D. Rampala, 4S7BR; The Hon. A. R. M. Jayawardane, Postmaster General & Director of Telecommunications; The Hon. Anandatissa de Alwis, Minister of State; Bennet Fernando, 4S7BC; Zerney Wijesuriya, 4S7ZW. Bottom right: The proud and hard-working students of the Amateur Radio course. *(DJ7GS photos)*

Correspondence

The publishers of QST assume no responsibility for statements made herein by correspondents.

VOICE FOR NOVICES

☐ I read your editorial in November 1978 *QST* and was very interested in your views. I wholeheartedly support the idea of giving Novices phone privileges in the vhf bands. My own experience as a Novice leaves me with memories of a hobby which was exciting and scary but which became dull and uninteresting after the first hundred QSOs. The dullness did not come from a lack of interest but from routine conversations with faceless dits and dahs. If I had been able to talk using phone I would have felt a little more rapport with the other hams and on-the-air theory study would certainly have been simpler. Local vhf nets could lead to increased club activity, more interest from nonhams in getting into ham radio, and better organization and supervision of Novices; guiding them to higher license classes. — *Don Johnson, WA4MZR, Thonotosassa, FL*

☐ My main fear of Novices on 220 MHz is that many good, serious Novices would find themselves lured away from the necessary code work that would enable them to upgrade. I agree that it would be a good way to fill up the band, but in the long run it would be a disservice to the Novice. I understand that the reason phone privileges were originally traded off was because so many Novices ended up not getting their code speed up. They spent time on their phone activities. I also feel that some people might be encouraged to get a renewable Novice just to get into 220. In other words, get a CB license with a code recognition test since the Novice theory is really nothing. — *A. N. Williams, Jr., WB3GPM, Alexandria, VA*

☐ I would approve a "Basic Amateur" license with present Novice privileges and phone in the entire 220-MHz band on one condition; the Novice code exam be retained and that no credit be given for the volunteer-administered exam when the applicant appears before the Commission to upgrade. As long as there is any possible way to cheat on exams, some individuals will — and forever reflect on the integrity of the amateur. Also, I would approve a petition to the Commission by the League to require positive identification of the applicant when that individual appears before the Commission for examination. — *Jim Beckett, WA2KTJ, Horseheads, NY*

BANTER ABOUT BAND USE

☐ Your October *QST* article, "Hams Five by Nine with WARC Comment" (page 46) was absolutely superb. The SRI International report reconfirmed precious findings of other agencies concerning International Broadcasting. For example, the shortwave listening column of *Popular Electronics*, now discontinued, stated many European broadcasters have dropped their North American service since all they received were technical questions and schedule requests. Radio RSA South Africa conducted a survey among its listeners as to whether shortwave broadcast listening was growing or declining. The majority of responses printed in their newsletter indicated it was declining rapidly due to vastly superior local a-m, fm and TV program sources. Shortwave listening as a primary source of information and entertainment is declining as the number of medium-wave stations grow. In addition, a network of geostationary satellites now links almost all nations of the world with data, voice and video circuits of far greater reliability. It is pathetic that a radio service that has contributed so much public service for so long and also has been so well behaved might now be punished by having vitally needed 75-meter frequency space taken away from it. — *Arthur Hallam, W4LKQ, Miami, FL*

☐ While much of what is said in this article is correct, I note a sort of double standard. No doubt K1ZZ finds nothing wrong with participating in a DX contest and trading QSL cards, but why are SW listeners who do the same thing treated so shabbily? Mr. Sumner apparently is of the belief that 99 percent of all SWLs are hard-core DXers who do not take the time to listen to what comes in, save to log it, report it and, hopefully, verify it. This is not the case. A recent poll done for the North American SW Association reveals that less than 10 percent consider themselves hard-core DXers who don't care much about programming. Firms would not have come out with their new-generation direct-readout receivers if they weren't confident that there was a market. Sure, most broadcasters on SW use a-m, but a comparison of ham radio as advanced economical spectrum usage to SWBC as backward and wasteful is hardly justified. — *Richard Stoller, Old Bethpage, NY*

☐ David Sumner's comments on the waste, inefficiency and greed of the International Broadcasting Service should be praised by all hams. However, one should not discount entirely the value of that service's program material or the size of its audience. Shortwave broadcasting to North America provides a link with home for millions of foreigners and naturalized citizens. For this SWL it provides a refreshing alternative to the mentally debilitating drivel of American television. — *Tom Stough, WB0GIX, Kankakee, IL*

CONTESTS

☐ The CAC (Contest Advisory Committee) has shortened the DX Competition to one weekend. I am definitely in favor of shortening the competition; however, this is the wrong way to go about it for an international contest. What is needed is to have the contest over two weekends, but with a maximum allotted number of hours. At least the low-power op could perhaps outsmart his well-watted neighbor. Also, there is the advantage that a seminormal life could be led in spite of the competition. The other way puts the low-power operator at a disadvantage. He can no longer depend upon the big guns working out of Europe the first weekend. We can't count on at least one good weekend of propagation. — *Brian Alsap, K3KO, Trafford, PA*

☐ On too many weekends there are contests of all sorts. The bands are loaded, making sane QSOs impossible. An individual occupies a frequency for hour upon hour and should one dare inadvertently to operate on "his" frequency he is told in no uncertain terms to move. I cannot think of any redeeming value of the constant promotion of contests. Many of those operators must be totally exhausted, physically and emotionally, after 24 hours of frantic operation. I wonder how it affects their families. If you must have contests, the only fair way to do it is to limit frequencies to be used, use some weekdays rather than weekends, and reduce the number of hours. — *M. A. Cornwall, WB9WNE, Hudson, WI*

POPULATION INCREASE

☐ I could not agree more with Mr. Tregale's statements ("Correspondence," October *QST*). For many years I have watched the standards of entry into our hobby lowered to what I consider the bare minimums. Add to this the continual deregulation and removal of incentives to upgrade one's license by our own regulatory agency, the FCC. Let's curtail this wholesale recruitment of would-be amateurs for the sake of sheer numbers and tighten up our standards. Quantity is no substitute for quality. — *J. G. Botts, K4EJQ, Bloutville, TN*

☐ VK3QQ expressed concern that the lowering of examination standards would lead to large numbers of undisciplined and unscrupulous operators in our ham bands. How does passing a Morse code test and a technical examination insure ethical, moral and scrupulous amateurs? We probably exceed 100 million automobile drivers in this country and I am sure many of us are unscrupulous. However, some semblance of order is maintained because laws are enforced. With larger numbers and increased political clout we may gain further privileges and recognition. The only thing that counts in business is the bottom line. We need numbers and political influence to maintain our very existence. — *Walt Omdal, WB2GHS, Cedar Grove, NJ*

PRESERVE *QST*S

☐ I thought some readers might be interested in a method of keeping old copies of *QST* in long-term storage without deterioration. "What's So Rare as a *QST* from 1915" (August *QST*, page 42) sparked this letter. If a collector wants to preserve old copies it would be well worth the time to put them on film. A good camera and a copy stand will record these issues for ready reference. After copying, the issues should be placed in an air-conditioned room for 72 hours. After this stabilization the magazines are ready for wrapping. Military packing material, MIL-B-22191 Type II barrier material, is ideal. This will allow the cover to show through and is waterproof. The ideal place for storage is the basement, one that has a dehumidifier. Keep the packages out of direct contact with the floor. Remember three important things when storing paper for long periods: stable humidity, avoid temperature extremes, and keep away from light. A collector puts a lot of time and effort into building up a fine collection and by observing these points the collection will provide many years of use beyond what would normally be expected. — *Phillip Hoey, KA3ASK, Silver Spring, MD*

BAD TALK MAKES GOOD SENSE

☐ I think "Bad Talk" ("Operating News," October *QST*) is a great article. I recently secured my Novice license and was appalled at the language used. I am very protective of the Amateur Radio fraternity and will follow George Hart's suggestion. Vulgarity is a serious emotional problem that cannot be solved by education, but can be removed from the airways if the majority who love our hobby can remain silent. — *L. C. Boone, KA8ALA, St. Albans, WV*

☐ When I entered Amateur Radio I believed that amateurs were a cut above CBers. I was told that ham radio was the CB of the future. That may be right. If we don't clean up our act we're doomed to the anarchy of CB. The decline of operator proficiency and respectability is growing in our ranks. Are we our brothers' and bands' keepers or are we our own worst enemies? — *Rick Turcic, WD5HDD, N. Little Rock, AR*

☐ The only thing I can suggest is the old saying, "If you can't say something nice, don't say anything at all." — *Chris Whiteside, N4ARP, Eastpoint, FL*

ABOVE BOARD QSL

☐ The note on page 61 of October 1978 *QST* entitled "QSLing Can Be Dangerous to Foreign Hams" irritated me. Under no circumstances would I work any ham whose government did not approve his operations much less QSL with him. I shall continue to send my card open and above board. This is no clandestine hobby nor shall I be a part of any that is. I object to the generalization the writer used when he said "most of the world" holds us in disrepute. Indifference, perhaps, but not disrepute. For my part the writer has two choices: get off the air or get out of the country. — *H. Stuart Miller, KØOEL, Raytown, MO*

☐ This amateur must be among the one percent of amateurs who are not interested in maintaining a favorable image of Amateur Radio you refer to in "Bad Talk" (October *QST*, page 91). It is sad that some countries prohibit or greatly restrict Amateur Radio, but national and international laws and rules must be observed by the amateur community, especially when a ham is in a foreign country. — *John Broughton, WB9VGJ, Glendale Heights, IL*

The World Above 50 MHz

Conducted By William A. Tynan,* W3XO

After EME, What?

Many moonbouncers have wondered what can be done for an encore after accomplishing all that they want on EME. Others who are not moonbouncers, possibly because they feel that the expense or complication involved is beyond them, may consider what they can do in the world above 50 MHz to approach the accomplishments of EMEers. Dick Knadle, K2RIW, not known as a moonbouncer himself but certainly possessing the technical ability and other qualifications to be one of the top 70-cm EMEers, submits some suggestions on which this column is based. They should provide inspiration to those seeking alternatives to moonbounce. Since Dick is a 70-cm operator, his comments are specifically directed at that band but they are equally apropos for any of our vhf and uhf bands.

One who has achieved WAS, WAC and worked all of the countries there are to work on 432 moonbounce may feel that the band offers no more challenges. Whereupon, they may go on to another band, or even perhaps take up a new hobby. On the other hand, competing for the most states, or the greatest distance using modes other than EME should give such a person, as well as those who have never ventured into EME, a rekindled incentive to strive for new goals.

An often-stated objection to EME goes something like this: "You used to be able to know who was active and had good tropo stations by looking in the states-worked standings." Those well up on the list were usually the ones who had been around for a few years, were experienced in the ways of vhf/uhf propagation, and had good equipment. Now, with EME, a brand-new operator can achieve a good standing in just a few short months, although he may not even have an antenna that is capable of being aimed at the horizon and thus may not be able to work over appreciable distances via modes other than EME.

The hf bands have their 5-Band DXCC which provides a challenge for those who have achieved 100 countries using a combination of bands or have climbed so high on the Honor Roll that there are no more countries to work. For those with less of a DX bent, there is 5-Band WAS. The bands above 144 MHz need awards which do not require moonbounce to obtain, such as with WAS or WAC.

There are a number of extended-range propagation modes yet to be investigated. Such an award might help stimulate the necessary activity to support their exploration, on the other hand. These propagation modes may not get the required attention if EME is considered the ultimate in vhf/uhf accomplishment and the only reason to erect super-sized antennas. The constructors of large antennas should be encouraged to make certain that their arrays can be trained on the horizon. The erp thus brought to bear may shed some light on new modes of propagation so far only barely investigated or still completely unknown. Among these are aircraft reflections, lightning ionization, reflection from large flocks of birds or huge swarms of insects, ionization from jet aircraft, small atmospheric inhomogeneities, Helmholtz instabilities and who knows what else.

Well before Dick's suggestion became known, the ARRL Board of Directors, at its July 1978 meeting, adopted a resolution directing the Membership Affairs Committee to study the institution of an award similar to the 6-meter "600 Award" for accomplishments on frequencies above 220 MHz (see Minute 31, September *QST*, page 48). Suggestions for the makeup of such an award would be welcome and would most certainly prove helpful to the committee in formulating its recommendations.

There is no need to wait for the establishment of a new award, as good an idea as it may be. Inhabitants of the world above 50 MHz have always prided themselves on accomplishment for its own sake, whether or not official recognition was forthcoming. K2RIW's plea for increased emphasis on probing for little-used or -understood propagation modes should be incentive enough for us to get on with it!

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730 or call 301-384-6736 and record your message.

ON THE BANDS

6 Meters — What so many have been waiting for, long-haul 6-meter openings, have finally come to pass. As would be expected, north-south paths opened first, with K4ERO/HC1 providing the first taste of real DX for many 50-MHz devotees. Running just 5 watts to a homebrew transverter and a 4-element beam, John, as of early November, has worked over 150 stations in the U.S. and Canada from his QTH of Pifo, Ecuador, near Quito. An engineer for HCJB, he expects to be there for quite a while. So, if you haven't yet worked him, don't despair! All right, I won't, John.

The other big news is the onset of transcontinental contacts apparently via F2. The day was Tuesday, October 31; the time, 1730 UTC. WA3DMF, here in the Washington area, reports working N6CT and eight minutes later K6PXT. These may have been the first

Sam Harris, W8UKS/W1FZJ/W1BU

He put up *antennas* — bigger, better, higher — *than* anyone. His receiver front ends pushed the amateur state-of-the-art for years. He was the prime mover in the first successful assault on that Mount Everest of the world above 50 megacycles — two-way communication by way of the moon.

Sam never undertook a project at less than full-steam ahead. His extraordinary dedication to the achievement of seemingly impossible objectives brought him the enthusiastic cooperation of scores of avid vhf enthusiasts. Visitors to the Harris hideout in the pine woods near Medfield, MA, tended to get short shrift unless they came prepared to work, in which case they might well end up members of the legendary Rhododendron Swamp VHF Society, builders and operators of W1BU.

Large waves emanating from big antennas at W8UKS, Lorain, OH, signalled the appearance of Sam Harris on the vhf scene in the late 1940s. His *City Slicker* array describing a novel and effective system for feeding large phased arrays marked his first appearance in *QST*, outside the activity reports in the undersigned's vhf column, "The World Above 50 Mc." He compiled the vhf coverage in *CQ* for several years, until he took over the same job for *QST* (at this writer's request) in the summer of 1960. Fittingly, the first Harris vhf column appeared in the September 1960 issue, which featured a cover story on one of the most significant Amateur Radio news events of all time — the first two-way amateur communication by way of the moon. This almost unbelievable feat was pulled off on 1296 MHz, rather than on 144, where EME efforts had been concentrated up to then.

It was no accident that Sam was tapped for an important role in the operation of the 1000-foot hemispherical reflector and associated radio astronomy equipment at Arecibo, PR, in 1965. Nor was it a great surprise to most of us that this superb plant was put into service briefly on 144 and 432 MHz, on two occasions, soon thereafter. Characteristically, it was not long before a smaller version of this great array began to take shape over the garden that Helen, W1HOY, had started in their backyard in Arecibo. That it never quite reached the heights of many previous Harris antenna ventures is the sad part of this story. A series of hospitalizations that began some two years ago finally resulted in the passing of one of the true greats of Amateur Radio on November 6, 1978.

It is utterly impossible to tell the Sam Harris story in a few words, or to understand fully his impact on our world, unless you knew him well and had the opportunity to observe him at work on a favorite project. Surely, he was a classic example of the kind of person who becomes "a legend in his own time." His Amateur Radio career will be a source of inspiration as long as vhf enthusiasts gather to relive great moments in their branch of the communications art. The World Above 50 Mc. was a better place for all of us because he was such a big part of it.

Aside from his wife, W1HOY, he leaves a son, Pat, W1HIV, and a daughter. — *W1HDQ*

50-MHz WAS*

WØZJB	WØWWN	WA6HXW	K5CM
WØBJV	K9ETD	W6NIT	W7INX
WØCJS	WØFKY	K7ICW	W6DPD
W5AJG	W8LPD	K6EJO	WA5IYX
W9ZHL	WØZTW	W6NLO	W6KQG
W9NJT	W6LHV	K7BBO	WA6JUD
W6OB	W2RGV	K6ZXS	WB6VIN
WØINI	W1DEI	K7MUR	K7KV
W1HDQ	W1HOY	K5EFW	K6DYD
W5MJD	W6BA	WA6JRA	WB6NMK
W2IDZ	W1SUZ	WB6WAG	K7YAG
W1LLL	W1AEP	W7FN	K7YAE
WØDZM	W5LFH	WB6IMV	W5TRB
WØHVW	W6NLZ	WB6OKK	K7OFW
WØWKB	W7MAH	K7ZOK	WB6HDB
WØSMJ	W8ESZ	WA6OLE	K7NN
WØOGW	W2BYM	W6PO	K7PXI
W7ERA	W7ACD	K7JJU	K7DVK
W3OJU	K6PYH	K9BDJ	WA5VHN
W6TMI	W4HOB	WA5FPS	K5ZMS
K6EDX	KØJJA	K6IBY	WA5HNK
W5SFW	K6RNQ	K6QAX	WA9DOT
WØORE	W9QWT	WA6OZC	K7DBR
W9ALU	W6EDC	WA6HXM	K7VNU
W8CMS	K6VLM	K7CIN	K6ITZ
WØCY	K6GOX	WB6NKO	WB7DBP
WØCNM	WØEDM	WA7CGS	WA7JEI
W1VNH	W9JCI	W7ZBS	N7DB
WØOLY	WØLLU	WA7FLB	K7GSE
W7HEA	W7RT	WB6HOU	WA7JTM
KØGQG	W7RDY	WA6AOX	W7ZSL
W7FFE	W6KIN	WB6BMB/KH6	WA6SXM
WØPFP	W6OKB	K6QHC	WA9HUX
W6BJI	K6GMX	WA6BOE	W7FU
W2MEU	W7DYD	WB6UWY	K6DTR
W1CLS	K6ZEE	WA6KLR	K5GE
W6PUZ	K6HCP	K7GWE	WB5CHW
W7ILL	K6YIL	WA7BJU	W6XP
WØDXX	K6GMV	K7TUO	WA7RIB
WØDO	K7BAG	WA6NRV	N5KW
K9DXT	W7ZOW	WB5CNZ	WB5WLK
W6BAZ	W7ZPS	K5HVC	WB8BGY
W6ABN	K6EPT	WA7ECY	W7XF
VE3AET	K7KHU	WA7RTA	N5KK
W9JFP	K5SW	VE7AFB	W6HA
WØQIN	WA7FPO	W6SMS	N6HZ
			WA6MHZ

*Listed in chronological order, beginning with award number 1.

F2 contacts across the U.S. for Cycle 21. Right on the heels of this, WA7RTA, OR, hooked up with WB4WXE, FL, at 1740. Other Northwest stations also bridging the continent were WA7BJU and KB7CD. At 1822 UTC, WB2RLK/VE1 QSOed N6CT, K6PXT and K6HSU. The thing that tipped WA7RTA off to the fact that something was happening was his and K7RWT's monitoring of the frequencies between 30 and 50 MHz. When two-way services with southern drawls were heard up to 48 MHz, Art started making some noise on 6. He highly recommends this technique to others looking for 6-meter DX. One who has made a science of muf checking for years is WA5IYX, San Antonio, TX. Pat notes that on October 31 he was hearing paging services on 43 MHz and Canadian two-way systems at least up to 44.5. He assumed that 6-meter transcontinental F2 contacts would take place that day and it turned out that he was right. It is interesting to note that although October 31 was an outstanding day for 6-meter F2, the solar flux was a mere 146. Five days later it was up to 184.

As of mid-November, no North Atlantic 6-meter or 6- to 10-meter crossband contacts have been reported to me but they should be possible with all of the TV signals being reported from Europe. The French sound is around 41.25, while the BBC is at 41.5. Video for BBC Channel 1 is 45 MHz. British Channel 2 is 48.25 audio and 51.75 video. The picture corresponding to the French sound is at 52.4. There are several other European combinations which provide many signals to listen for. TV signals within the 6-meter band have been reported by a number of stations on this side of the Pond. A most fascinating report is provided by WB2RBG/3. Howie, in a 15-meter contact with G3CSE, learned that the G had been hearing East Coast U.S. 6-meter stations on several occasions in late October and early November. There is no reason why crossband contacts cannot be made. In the October column I suggested 28.7 as the 10-meter frequency to use for this purpose. WA5IYX recommends 28.4 as providing a clearer spot for European stations answering possibly with weak signals. The best thing to do is check 28.7 to see how crowded it is. If there is lots of QRM, by all means specify 28.4 or some other clear spot when making your call. In addition to G3CSE, a good crossband possibility is SM6PU. Olof has receiving equipment for 30 to 50 MHz as well as the 6-meter band itself and is eagerly monitoring in hopes of hearing North American 6-meter signals. A former active U.S. 50-MHz operator K4SYP, now living in Spain, has his old converter perking again and so far has heard the ZS6PW beacon as well as a group Bob believes to be U.S. military in Germany. But he says they sound more like the CB gang with 10-4s and so forth. Bob can't answer back on 10 meters but can certainly be expected to send heard reports. WB2RLK/VE1, in addition to reporting the October 31 transcontinental opening, noted contacts the following day with PZ1AE, FY7AS, TI2NA, K4ERO/HC1 and KZ5NW from between 1351 and 1830 UTC. On November 2 conditions were not quite as good as the previous day with some of the same stations in. On that day Bob worked HK3RJ via fm on one of the HK repeater input frequencies. From OK, K5SW reports that he and XYL N5KW contacted most of these stations during roughly the same time period plus LU8AHW at 1900 November 1. At 2000 UTC November 2, KH6NS and KH6IAA were worked. Previously on October 28 at 1611, Sam and Pam landed PY2CSS. From the West Coast, K6RNQ provides an exciting report. It starts out like most of the others, listing QSOs with KZ5NW, KZ5JM and K4ERO/HC1, as well as reception of the TI2NA beacon on October 27. But then he adds a comment that KH6s were in for over two hours that day. Bob also observed that KH6EQI was copyable on backscatter with his beam aimed at 200 degrees until 2300 UTC. On October 31 at 2345 UTC, K6RNQ contacted JR3PSY on backscatter with his beam aimed about 225 degrees while at the same time he was hearing ZL TV audio S9 on 50.75 MHz. If that's not enough, the following day at 2306 UTC, he worked JG1TRW via direct path though with marginal signals.

Through K5ZMS, I have reports of JAs working LUs and probably surpassing the old record of 12,000 miles (19,312 km) set March 24, 1956, by JA6FR and LU3EX. Also via Ray, as relayed to him by K7ICW, I received last-minute word of a 45-minute opening between Guam and the West Coast on November 12 beginning at 2040 UTC. Apparently KG6s JDX, DX and JIH had a field day working stations from VE7 all the way down to southern CA.

As reported last month, the PYs have been hearing the ZB2VHF beacon. PY2XB even called my answering machine from Sao Paulo and played the signals over the phone (sorry that his call was printed incorrectly as TY2XB). In order to stir up a contact, PY2RO finally got in touch with ZB2BL on the 15-meter AMSAT Net and told Jimmy of the consistent reception they were experiencing. After some finagling with equipment on the part of the inhabitants of the "Rock," successful two ways were finally established on October 23 between PY2RO and two Gibraltar stations, ZB2BL and DV.

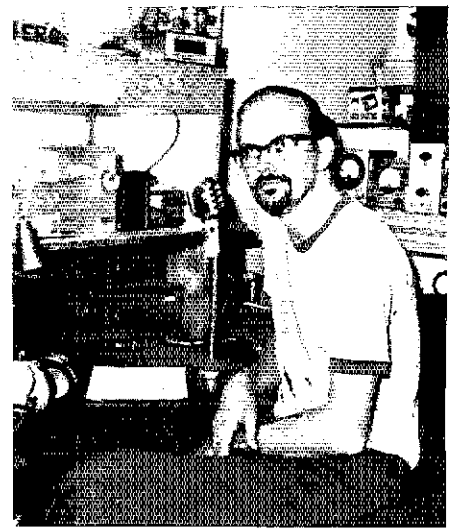
Along with all of this F2 activity, there has been an extraordinary amount of Es this fall. Many sessions have produced good signals with quite stable band conditions. On top of this, with everyone intently monitoring the band, the activity has been high even when no opening is in evidence. All of this has added up to a very interesting fall on 6 meters. But I am sure the best is yet to come!

2 Meters and Higher — The 2-meter EME operation of WA1JXN continues to pile up contacts. In the first half of November, Lance worked eight new stations for two new states bringing his state total to 34 along with five countries. One of the latest to get VT as a result of WA1JXN's activities is the NM husband and wife team of W5FF and K5FF. Lance says he can't believe the activity on 2-meter EME and believes that from the number of four-Yagi stations he has been working, many more are closer to moonbounce capability than realize it. EME has its setbacks too, especially if you live in Anchorage, AK. WIJR passes along the information that WAØLPK/KL7, after piling up a 14-state total, is QRT since high winds did in Jim's antenna. He hopes to be back in operation next spring.

The fall weather along the East Coast produced some characteristically good tropo, enlivening things on 2 meter as well as 70 cm and giving these bands a chance to compete with the goings-on 6 meters has been offering. One particularly good session took place the evening of November 11 (the 12th UTC)! K3HCE, east of Baltimore on the eastern shore of MD, took advantage of this opening to work several FL stations as well as K4KAE, SC. W3OZ, otherwise known as W3TMZ, also MD, netted two new states by completing QSOs with K4KAE and GA station W4ISS. W3IP near Baltimore also worked W4ISS for a new state.

One of the most unusual 2-meter contacts this conductor has had recently was with K3SXA/mm, Region 2, off the coast of NC. Jim is a radio operator on a tanker and expects to do quite a bit of 2-meter work in the months to come as his ship operates between Panama and East Coast and Gulf ports. He runs about 70 watts to a "big wheel" and is especially interested in encountering some TE or FA1 as his ship crosses the Caribbean. He will monitor the sked frequency of 144.18 when in that area. The rest of the time it will be mostly 144.2.

The November issue of the *432 EME Newsletter* put out by K2UYH contains the latest directory of active 70-cm moonbounce stations. The number is up 44 percent over last year. An interesting note concerning the 23-cm band also appears in the same issue. It reports an EME QSO between PAØSSB and W6YFK which took place October 22. Many believe that this is a coming band for EME operation. QST



John, K4ERO/HC1, setting 6 meters afire with his homebrew 5-watter.

High-power vhf amplifier demonstration at the Mid-Atlantic VHF Conference, Willow Grove, PA, September 30. W3HQT (seated) is being observed by N3AHI, K1LOG and others.

Jack Power, W2AXU and Mel Wilson, W2BOC, discuss propagation at the Mid-Atlantic VHF Conference.

Public Service

"I Wish Someone Would Come Along" — Part 2

K5ZDE's article in this section (November *QST*) was very interesting. Perhaps something similar, only from a different perspective, may be helpful, too. First off, I want to qualify things a bit as not to appear to be stealing K5ZDE's thunder or make light of his fine article. I am a sergeant with the Colorado State Patrol and an Advanced class ham. This combination of job and hobby has enabled me to participate in numerous situations, both on and off duty, that involve a citizen making a report to a police agency. It is from those experiences that the following suggestions and criticisms are offered. Perhaps by explaining things from the emergency service side, more understanding will result.

You folks pay taxes; so do I. As taxpayers, we have the right to expect and get top-notch service from police, fire and ambulance services and indeed from *all* public agencies. In reality, however, we are often disappointed. Why? Well, even though police and firemen may have the finest equipment and are highly skilled, we aren't the miracle workers portrayed on "Adam 12" or "Emergency." Why? To begin with, we're human, too. We make mistakes and not being perfect, we do need help. If it is the *right* kind of help, things really *click*. That's where Joe Citizen comes in. More about him later.

The following information is geared primarily for traffic accidents but can logically and quite easily apply to *any* type of emergency:

Obtain a couple of ARRL's Emergency Reference Information cards, CD-209. Your SCM should have them; if not, ARRL hq. does. Keep a card by the phone, near your rig and on the sun visor of your car. Make sure you fill it in.

Perhaps the most crippling problem we face is the lack of information being reported. Either we get nothing at all or an overabundance of useless info. Everybody gets excited during an emergency. It's natural. Realizing this, most emergency service agencies have a format-type report that must be completed by the dispatcher. It takes time, but it saves time in the long run.

Often we'll get a call from a frantic person who doesn't even wait to see if we understand what they want or need. Something like "Send help — bad accident" is what usually comes across. If we're lucky, we may find out where. If not, all we can do is wait for another call. Meanwhile, the situation at the scene worsens. The caller meant well, but didn't do any real good.

Any emergency service officer can tell you that the initial report can and does make the difference between life and death. Being sent to the wrong location or not having the proper equipment can be tragic. The suggestions below can help avoid this. The format is arranged in order of importance. I suggest you try to stick to it as much as possible.

Mobile Operators

Try to stay calm. Don't shout. You know what over-deviation does to a signal. Speak clearly and slowly. If necessary, roll up the window to cut down on background noise. Give your report only when you have a confirmed listener; don't transmit in the blind (you may have forgotten to turn the rig on).

What and Where

Give specific locations, street names or milepost markers, if possible. If none are available, give approximate mileage from the nearest town, or give the location of the nearest unusual landmark such as a building or natural formation. Bystanders are frequently a good source of information if you are a stranger in the area. It's a good idea to write down the info, too.

Tell what it is you are reporting: Example — accident, drowning, fire, etc.

1) Are there injuries? If so, how many people and to what extent?

2) Is an ambulance needed?

3) Is anybody pinned inside a vehicle?

4) Is there a fire, or danger of one?

5) Is traffic blocked?

6) How many vehicles are involved and what type?

7) Is a wrecker needed?

8) If a truck is involved, is it empty or loaded? What type of cargo? Trucks often carry hazardous material.

9) Are there any unusual road conditions? After your report has been transmitted, stay by your radio until you receive confirmation that your report has been relayed to the emergency service agency. There may be additional information required.

Fixed Station or Autopatch Operators

Have a list of phone numbers handy. Use CD-209. Take command of the situation at once if it appears the ham at the scene is falling apart. Remember, he or she is under a lot of stress. Call the report in, using 911 if possible. Otherwise, call the *proper* agency. Valuable time may be lost if your call has to be transferred or information rerouted. Don't forget to give your name and phone number and stay on the phone until you are told no further information is needed. If you are making the call for someone else, let the mobile operator know as soon as his emergency report has been relayed.

Okay, it's pot-shot time. A lot of the readers probably have reported many accidents without having to go through all the stuff I've suggested. Excellent. Do you really know how useful your information was? I bet you don't. Sure the cops got there, so did the ambulance and the victim is now recovered. But how much better would things have gone for everybody had you provided more info? No one can say, but it's an interesting question. Here is some food for thought.

1) Today's medical profession has abandoned the concept of rushing in, loading up and rushing off. Now, when the medics get there, they don't usually leave until the victim is stable. That takes time, especially if they don't know what they've got beforehand. Quite often time isn't available. Give the victim the edge. Relay injury information with the first call. Let the medics be ready to treat a known condition. *You'd* want that edge if it was *you* laying there.

2) Not all rescue squads are equipped with forcible entry or extraction tools. Unless you specifically request them, they might wait for a known situation to come up. I've watched a whole carload of kids go through agony for 20 minutes simply because nobody told us people were trapped. To make matters worse, the gas tank was draining and nobody even thought to call the fire truck until the officer arrived. Criminal neglect?

3) Hazardous material? Let the cops and firemen take care of it. This time, K5ZDE is partially correct. We *should* handle it but we should also know about it beforehand, to get whatever additional specialized gear needed on the way a.s.a.p. Trucks regularly haul stuff that is so poisonous that a few drops on your skin can kill you. It can even zap you right through your shoe soles.

4) Road blocked? Believe me, if you block the interstate in this area for just 20 minutes, things grind to a halt. If it's during the rush hour, you'll probably spend an hour getting things unscrambled and cover 10 more accidents as well. Let us know the traffic situation. With today's divided highways, access is limited and your info report could greatly improve response time.

5) Requesting emergency equipment? If it is needed, ask for it. Try to be accurate with your request. Do you just need a small pumper to help wash glass off the road or do you have a 9000-gallon tanker leaking all over? It will make a difference. Aside from the expense of sending unnecessary gear to the scene, the risk involved for both the public and the emergency services is horrible.

6) Leave the police work to the police. Most of the people who flock to the scene of a wreck mean well, but their energies are sadly misdirected. Most of these people are just there to see what's going on. For some reason, the human animal thrives on seeing others in misery.

To finish this up, I would like to say that the vast majority of citizens are fine upstanding people, but the actions of a few reflect on us all. We have bad cops, too, and unfortunately they are too frequently the only ones we hear about. The amateur community is a fine group and I'm proud to be a part of it. If I've stepped on anybody's toes, *it's nothing personal.* However, if the shoe fits, wear it. — *Roy Wright, WAØSJQ*

*Asst. Communications Mgr., ARRL

PUBLIC SERVICE DIARY

☐ Santa Catalina Mountains, AZ — August 12. WA7CSN was seriously injured when his vehicle turned over on a steep mountain grade. Using his mobile transceiver, he contacted WD8ORQ, who called the authorities to initiate a helicopter rescue. (WA7CSN)

☐ Belize — September 19. While participating in the Hurricane Traffic Net, WB6TXF picked up a request for urgently needed medicine for Belize. He contacted the U.S. Department of State Disaster Center to relay the information and was assured that the medicine would be routed to Belize City. (WB6YID)

☐ *Repeater Log.* According to reports received to date, repeaters and fm simplex frequencies were used in conjunction with 94 vehicular emergencies, four medical emergencies, three fires, two crime reports, one weather emergency and five miscellaneous incidents. Repeaters involved were WR1s ABX ADS, WR2s ADM ADZ, WR5s ABA ABY AIB AJG APK, WR6AII, WR7AEL, WR8s ABC AGR AJL, WR9ABS, WR0s ABT AHP.

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ Albuquerque, NM — September 22 and 26. New Mexican hams were involved in two successful search and rescue operations for lost children in Socorro and Los Alamos. (W5PDY, SCM NM)

☐ San Diego, CA — September 25. After an airliner and small plane collided and crashed in a residential area, local hams provided emergency communications from the first aid station/morgue to Red Cross hq. and the San Diego County Emergency Medical Service office. (W6INI, SEC SDgo)

☐ Webster, MA — October 1, 3 and 8. Area hams participated in the three-day search for a lost boy in a heavily wooded area. The hams provided communications for the search and helped the National Guard to coordinate the effort which, at times, involved over 300 volunteers. (K1PAD, EC Billerica)

☐ SEC Reports. For October, 37 SEC reports were received denoting a total ARES membership of 15,987. This represents a 12-percent increase in reports received one year ago (33) and a 28-percent increase in ARES membership (12,500). Sections reporting were Alta, Ariz, Ark, Colo, Conn, Del, EBay, ENY, EMass, Ga, Ind, Iowa, Kans, Man, Mar/NFld, Mich, Mo, Nev, NH, NLI, NFla, NTex, Ohio, Okla, Oreg, SDgo, SF, SIV, SBar, SCV, Sask, SFla, SNJ, Va, Wash, WVa, WMass, WPa.

NATIONAL TRAFFIC SYSTEM

A summary of the three NTS area staff meetings will be appearing here or in the CD Bulletin in the near future. W9QLW has become the new Chairman of the Central Area Staff; W2JJ was re-elected as Chairman of the Eastern Area Staff.

October Reports

Area Nets

(evening sessions)
(daytime sessions)

1	2	3	4	5	6	7
EAN	31	1647	53.1	1.529	96.2	
EAN	62	804	13.0	.677	92.6	
CAN	31	1052	33.9	.910	100.0	
CAN	62	476	7.7	.310	95.7	
PAN	30	1199	40.0	1.006	95.7	
PAN	31	337	10.9	.270	100.0	
Region Nets						
1RN	89	709	7.9	.492	77.4	83.8
2RN	121	773	6.4	.448	87.3	95.7
3RN	93	424	4.6	.414	99.5	85.7
4RN	124	1384	11.2	.472	73.4	100.0
RN5						
RN6	93	944	10.2	.387	88.7	97.8
RN7	124	874	7.1	.519	99.3	97.8
8RN	90	413	4.6	.330	88.2	92.5
9RN	119	694	5.8	.379	92.0	98.4
TEN*	62	445	7.2	.371	88.7	96.8
ECN	59	335	5.7	.519	84.9	100.0
TWN	92	577	6.3	.330	84.9	95.7
TCC						
TCC Eastern	178[1]	916				
TCC Central	202[1]	636				
TCC Pacific	116[1]	767				
Sections[2]	4297	18355	4.3			
Summary	5610	33961	6.1			
Record	6351	34077	16.4			

*Incomplete report
[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (121): AENB AEND AENJ AENM AENS AENV (AL), ATEN HARC (AZ), BCEN (BC), SCN SDNN (CA), CN CPN NVTN WESCON (CT), BARS FAST FMTN FPON FPTN NFPN PBTN PEN (FL), CGVHFN CVEN GCN GSN MAEN NGSN (GA), IMN MTN (ID/MT), ILN (IL), ITN QIN (IN), KPN KSBN QKS QKS-SS (KS), KSN KTN KYN SEKEN (KY), LAN LRN LSN LTN (LA), CRN EMRIPN EMRI-SS WMPN (MA/RI), MEPN MTN WRIN (MB), MDCTN MDD (MD/DC), AEN CMEN (ME), MACS MITN QMN (MI), MSN MSPN PAW (MN), MEOW (MO), MTN (MS), NCSSBN THEN (NC), WNN (NE), NHN (NH), MCN NJN NJPN (NJ), NLI WDN (NY), BN OPEN OSN (OH), OAN OFON OLZ OTWN (OK), CMN GBN GBSSN LN ODN OLN OPN OSN (ON), 16/76 ARES BSN PAARES (OR), EPA EPAEPTN EPAETN PFN PTTN WPA (PA), QSN WQV/UHF (PQ), SCSSBN (SC), SDN (SD), SATN (SK), TEX TTN (TX), BUN UCN (UT), SVSN VFN VN VNTN VSBN VSN (VA), BEN BWN WIN WNN WSBN (WI), WVN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVG.
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

Peggy Coulter, W9JUJ, has become the new Director of TCC-Central (daytime). Ward Bayless, W9NXG, stepped down due to other commitments. Our thanks for Ward's fine efforts in getting this new phase of NTS underway.

1	2	3	4	5
TCC Eastern	187	95.2	2289	916
TCC Central	217	93.1	1623	836
TCC Pacific	124	93.5	1553	767
Summary	528	93.9	5465	2519

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (October): Eastern Area (VE3SB/N2YL, Directors) — W1s KX NJM OD, WA1s UNC UWF VEI ZAZ, WB1AIU, K1s BA EIR GN PAD SSH XA, W2s CS CQB FR GKZ MTA RQ, WA2s EHT/1 ICB SPL, K2NY, N2YL, W3s FAF PO YQ, WA3WQP, K3s KW NGN, N3HR, W4s MEE SQQ UQ, WA4s CCK YSK, WB4PNY, K4s BKX KNP, N4KB, W8PMJ, K8KMQ, VE3s GOL SB. Central Area (W5GHP/W9NXG, Directors) — AA4KB, W4ZJY, W5s KLV RB, WA5s BHF INJ IQU RKU, WB5s FDP NKC NKD SDD, WD5GNR, K5s GM MC, N5s TC TS YL, W9s CXY DND FC JIJ JUJ NXG, N9TN, W0s AM HI, WA0TNM, WB0ZAL, K0s EVH EZ, N0SN. Pacific Area (K5MAT, Director) — N5s MR NG, W5s JOV KH, K5MAT, N6s GW PZ WP, W6s EOT OA VZT, K6OE, N7AM, W7s DZX EP GHT LYA VSE, K7s HLR IWD, W0KON, K0s BN DJ, WB0TAQ, VE7ZK.

Independent Nets (October)

1	2	3	4
Central Gulf Coast Hurricane	31	120	1802
Clearing House	31	317	560
Empire Slow Speed	31	85	393
Hit & Bounce	31	224	360
IMRA	26	458	871
North American Traffic and Awards	31	59	1004
Washington Region PON	18	22	330
20 Meter ISSB	26	516	634
75 Meter ISSB	31	693	1121
7290 Traffic	45	483	2714

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll October 1978

This listing is available to amateurs whose public service performance during the month indicated qualifies for 40 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each, max. 12; (6) Phone patches, 1 point each, max. 20; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points. This listing is available to Novices and Technicians who achieve a total of 20 or more points.

72
W5KLV
69
W7VSE
67
WD4COL
65
AA2H
64
W4OGG
WA5RKU
61
K1BA
K1BSO
W1TN
WA1ZAZ
W2MTA
WA3NAZ
N5TC
WA6UAZ
W7GHT
WD8JYM
WB8YDZ
W0OYH
WB0ZAL
60
WD4KPG
WB5NKC
59
WB2KDC
WA2SPL
WA4JDH
N4NK
58
AF2L
N5RB
W0HXB
57
WB5SDD
56
W1GUX
W1KX
WA1UNC
VE3GT
K4BKX
VE4PG
WA4UYD
N4WA
W5GHP
WB5LAT
K5TL
W6OA
W6RNL
WD8NKA
K0EZ
55
WB1DXR
WB2RMI
WA4YIU
54
VE1LCR
VE1ST
WB5NKD
53
WB2EAG
WB5KKT
K5OWK
WB8MTD
W8SOP
52
WA4CCK
WB4PNY
WD5DRK
WB6DAB
WA7YCM
W0OTF
50
WB3JGP
AC3N
K5QEW
W6RFF
WD8JYN
WD8NYN
49
WA1MJE
VE1WF
W2XD
VE3DPO
K3ORW
W3PQ
AA3S
WB5IYH
WA6NTI
WB6UZX
K7GXZ
WA7MEL
WB8WTS
W0FT
WA0TNM
47
K4VHT
WD5AHH
WB9JSR
W9NXG
46
WB1CPF
WA1TBY
WA1YMN
K3JL
W4FMN
WB4OXT
WB5EMU
WB6FTY
45
WA4VLT
WD8DMX
44
K1OOG
N1RI
WA2LHV
W2SQ
VE2UN
VE3FHZ
VE3GOL
K4EJ
K4EV
WB4FAS
AA4GA
KB4G
WD4ISN
VE4IZ
K4JGW
WN4KKN
WD4OVR
WA4PFK
WB4QBB
VE4QU
WA4ZPZ
WB5LBR
W5VMP
W6AUC
N6CW
WA7JRC
N8ABA
KB8BZ
K0DJ
N0SN
43
W1BJ
K1CE
N2CR
WB2MCO
K4VHC
WB7PSP
W8YIQ
WB8YRY
42
N3QA
W8VPW
41
WA1VEI
WB2PJU
W4PIM
AF5I
N6WP
AF8A
WD8MCN
40
WA1HYN
W3DP
WD4LUG
N5IB
W6JXK
37
WA1SMY/T
WA2MKQ/T
32
WD4BAJ/T

Brass Pounders League October 1978

BPL Medallions (see December 1973 *QST*, page 59) have been awarded to the following amateurs since last month's listing: WA4CNY, WD4COL, WD4IIO, WB0MTA.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

1	2	3	4	5	6
W3CUL	501	1278	1601	97	3477
W0WYX	55	1244	377	868	2544
WA4JDH		771	753	3	1527
K3NSN	5	755	750		1510
W9ZGQ		597	1	290	888
K0YFK		385	6	379	770
WA2SPL		355	360	20	735
WA3ZRY	60	290	323	27	700
WA0AUX	61	180	449	5	695
W9JUJ	10	338	327	5	680
W7DZX	18	322	330	3	673
W4JL	9	213	407	11	640
W7VSE		298	295	37	630
WB5SDD	5	273	297	22	597
WA0HJZ	31	330	33	190	584
WA4CCK	5	270	294	6	575
W3VR	190	140	229	15	574
WA3WQP	59	226	273	7	565
WA4YSK	13	270	277	4	564
W9JIJ	36	259	250	9	554
W5REC	214	104	224	2	546
K1BCS	94	179	243	22	538
N4NK	27	228	260	19	532
W5KLV	5	288	216	20	529
W0BMA	73	187	192	68	520
WB2RMI	12	240	239	20	511
WB1DXR	45	212	185	67	509
WB4PNY	6	274	220	9	509
WD4KPG	50	250	200	4	504
K0YFK (Sept.)		492		492	984
Multioperator station:					
W4IZ	905	9	763	4	1681

BPL for 100 or more originations-plus-deliveries:

K4BV	211	WA4PFK	116
VE2UN	177	W3BBN/4	109
WA4BZY	159	WD4COL	106
K4KDJ	129	WB0MTA	106
W4KDX	127	K7NTS	104
K1DFS	125	K8AN	104
W6NL	123	WD0AIT	102
W7SQT	120	VE2UN (Sept.)	173
W0OBH	120		

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

How's DX?

Conducted By Clarke Greene,* K1JX

Not Just for New Countries

When one mentions the topic of DX, the image most often brought to mind is that of some ham staying up all night for his one opportunity to scream into his microphone for a QSO with country 294. The appeal of DX is far more widespread and is not limited to the quest for new countries. By the classic definition, working DX means working a distant station; DX being dependent on the circumstances.

DX can inspire thoughts of adventure, such as K7ZZ assaulting Spratly or the operators from Clipperton fighting hostile seas. The excitement of participating, via Amateur Radio, in some of man's great adventures many times overshadows the prospect of working a new country. The active DXer will again have the chance to take part in one man's personal confrontation with the unknown. VE7ZQ now has the floor to describe this modern adventure.

"From May to October 1977 Willy de Roos, VK9XR/mm, sailed his 13-meter ketch *Williwaw* from Falmouth, England, across the Atlantic into the Arctic waters and through the Northwest Passage, arriving in Vancouver, British Columbia, October 18, 1977. Willy became the first man to complete such a voyage in a small sailing vessel and with the exception of a six-week period, the voyage was made single-handed.

"Willy has spent eight months anchored in Vancouver harbor on board the *Williwaw* writing a 500-page book about his historical voyage through the Northwest Passage. The *Williwaw* set sail again from the Royal Vancouver Yacht Club on June 22, 1978, to further adventures and circumnavigate the entire American continent.

"The next voyage for this adventurous sailor/amateur will take him to the island of Tahiti and then on to Valdivia, Chile. From there he will sail to the Antarctic where he will spend the Antarctic winter of 10 months frozen in the ice pack. Willy expects to be in Valdivia for about five weeks during October and the first part of November. During this time he will first take a short vacation and fly back to his home in Belgium for a couple of weeks and then return to Valdivia and prepare his *Williwaw* for the next voyage to the Antarctic.

"Tentatively arriving in the Antarctic between December 15 and 30, Willy is planning to attempt a landing on the island of Peter I, which is located at 68° 47' S., 90° 35' W. If conditions permit, Willy will set up his station on this island and operate from there as long as it is possible; perhaps the complete 10-month period. Willy has been given permission by the Norwegian government to land and operate an Amateur Radio station on this island from January 1 to December 31, 1979, and has been issued the call sign 3YØBZ (QSL via VE7ZQ).

"During Willy's stay in Vancouver, his yacht *Williwaw* was fitted with special equipment for this Antarctic voyage. A complete Kenwood station using the TS-520S and all accessories was donated by Kenwood Corporation and a 203BA monoband 20-meter beam was donated by Hy-Gain (shown in picture mounted on the main mast of the *Williwaw* while in Vancouver). This antenna will be reinstalled when anchored in the Antarctic and used for all 20-meter operations. In addition, a multi-band inverted V will also be installed on the mizzen mast and used for all the other hf bands.

"After wintering in the Antarctic, Willy will set sail out when the ice breaks up the following summer (December 1979). Then he will sail around Cape Horn and, if time permits, sail to the South Sandwich Island and operate from there for a while before crossing the Atlantic and back to his home in Belgium. When this voyage is completed Willy will be the first man to sail completely around the American continent in a small sailing yacht. During his stay in the Antarctic, Willy will be writing the second book of his adventures (that is between QSOs) and he will be writing his third book after returning to his home in Belgium."

Few of us will ever have the opportunity to personally experience an adventure such as Willy's. Where else but in the world of DX can we personally share in such an undertaking?

The modern world offers challenges besides those of the adventurer — overcoming cultural barriers and crossing the philosophical borders of politics, for example. Oftentimes, conquering these challenges has meant a new country for many DXers.

Erik Sjolund, SMØAGD, travels throughout the world as a radio technician for the Swedish Ministry of Foreign Affairs. In October 1978 Erik arrived in Baghdad, Iraq, to perform an installation for the Swedish embassy there. He had prepared an application to the Iraqi Ministry of Foreign Affairs for a request to demonstrate Amateur Radio to Iraqi officials.

Several days passed, but eventually Erik was allowed to make a demonstration on 20-meter ssb. Under official supervision SMØAGD/YI made 15 QSOs on 14.200 MHz. The band was open to Europe, and contacts were made in Finland, Belgium, the Soviet Union, Sweden and Denmark. Lack of activity was not a problem, as this demonstration was made during the 1977 CQ Worldwide Phone DX Contest!

Like many third-world nations, Iraq is very suspicious toward foreigners. Like any small country fearful for its security, Iraq takes whatever precautions it feels necessary to maintain its position. As a result, the first operators from YI-land were destined to be made by Iraqi nationals.

Indeed, late in 1978 some Yugoslavs were in attendance in Iraq for a "Peoples Technic Organization" meeting that included a number of hobby groups interested in technical matters. The subject of Amateur Radio was discussed, and near year's end, a group of Iraqis traveled to Yugoslavia where they took an intensive course in Amateur Radio and are encouraging its growth.

Returning with some amateur gear, the first club station in modern Iraq was set up in Baghdad. Using the call YI1BGD (*Baghdad*), the club members tried their luck on 20-meter ssb, the only band authorized them at first. Because of a relatively poor antenna and low power, the first operators were held with the assistance of a European amateur, so that the Iraqis could gain experience.

Because of the high demand for Iraq and the poor signals, generous offers and donations of equipment were made toward the Baghdad Radio Club. Unfortunately, the suspicions held close to the Iraqi government delayed the expansion of the Amateur Radio program. Although well-meaning, these offers have contributed to uncomfortable feelings on the government's part. Many of the developing countries, such as Iraq, have different needs than those that we in the technically sophisticated societies perceive.

Fortunately, the government in Iraq recognizes the role that Amateur Radio can play in the development of a technologically based society. Their plan is to establish radio clubs throughout the country and train the

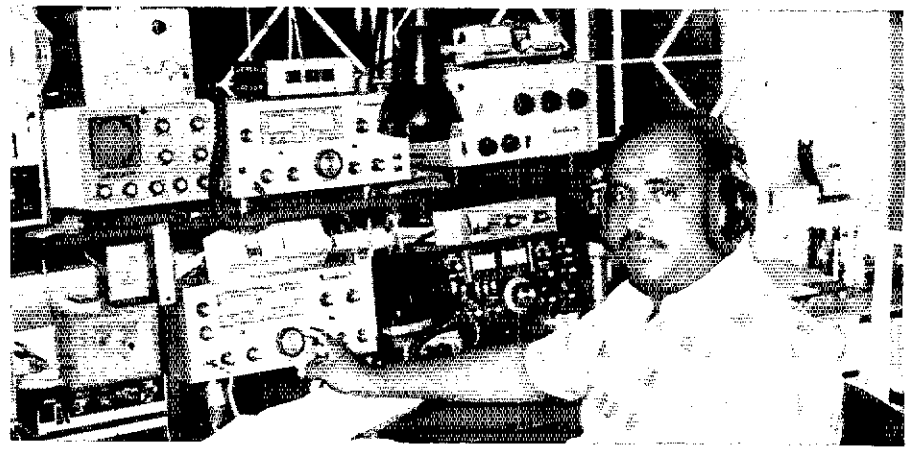
The *Williwaw* shows its 20-meter beam. This is the boat Willy de Roos will be sailing to Peter I Island. Look for VK9XR/mm as he travels there, and 3YØBZ upon his arrival. Willy plans to stay there for a year.

*c/o ARRL, 225 Main St., Newington, CT 06111

members of the clubs in the hobby. Amateur Radio now has a long, promising future in Iraq.

A footnote to the above suggests how the DXer can participate in political adventures such as this in a constructive manner. Reliable sources report that the interest among trained operators at YI1BGD slackened after their initial appearance on the bands. Amateur Radio, per se, had not lost its appeal. Whenever the club members operated, they were constantly harassed, cajoled and ridiculed by a large number of amateurs. Sadly, many of them were from the United States. In their great desire for working Iraq, impatience overcame the good sense of some DXers.

If the members of the Baghdad Radio Club had not been the persistent group they are and they had given up, the government in Iraq might well have closed down Amateur Radio operation — permanently. QST



The operating position at 9P2PV. Andy works at the Connaught Bridge River Station in Klong, Malaysia.

DX PORTFOLIO

HZ1AB is a club station at the U.S. Military training mission at Dhahran, Saudi Arabia. For the last year there have been no licensed hams assigned to the station, so all operation has been by visitors. K8CSG/5 visited recently and assessed the situation.

Bill reports that he found a backlog of 250 cards, mostly from U.S. hams, which had been sent via the *Callbook* address. Virtually all mail had been opened, and IRCs removed. Several sections of the station log were missing also.

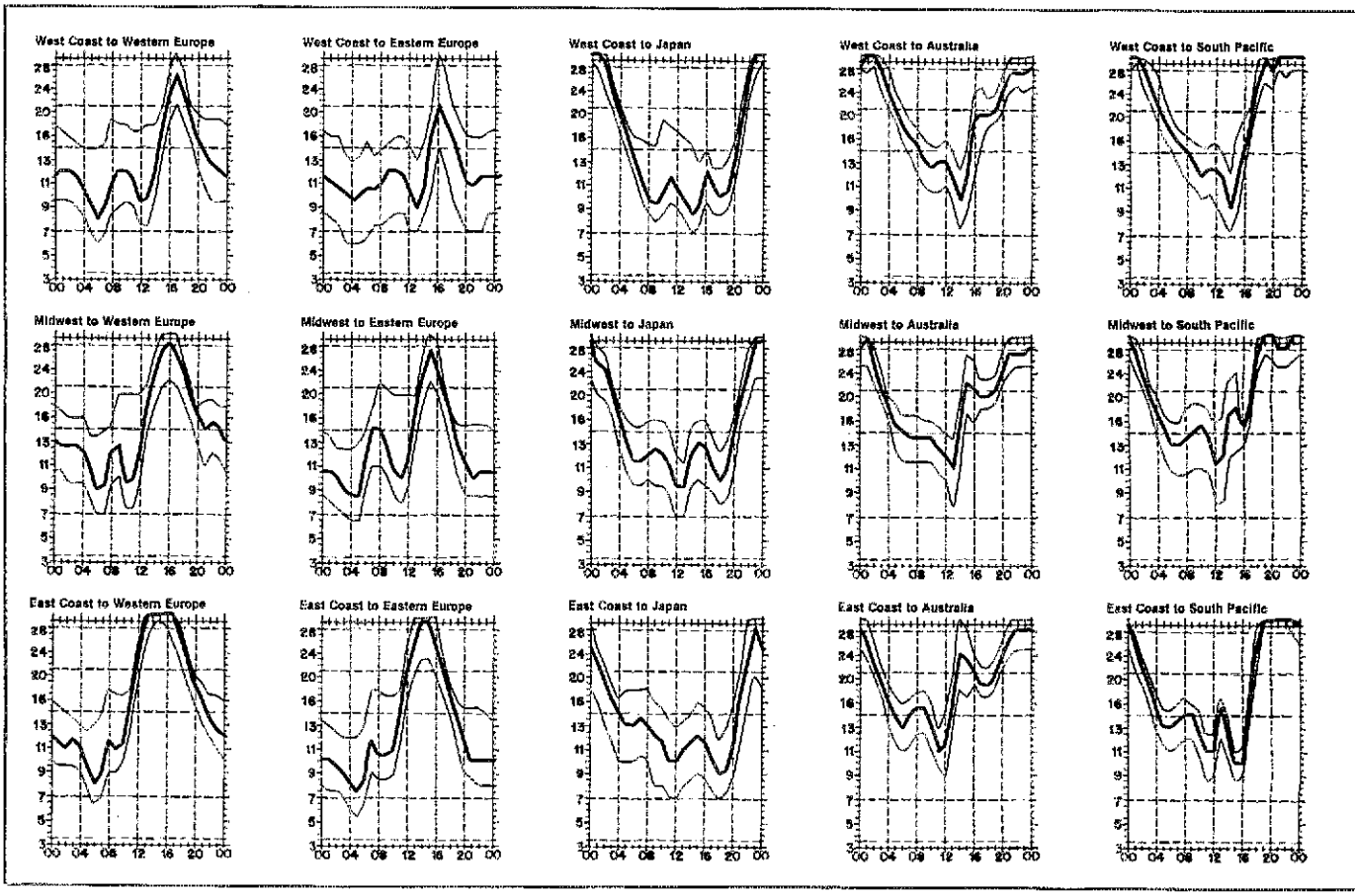
There is still hope provided by K8PYD, the QSL manager. Leo receives copies of the logs, and does a superb job of QSLing both U.S. and DX contacts with HZ1AB. K8CSG/5 brought the unanswered cards from Saudi Arabia and forwarded them to the QSL manager, who will respond accordingly.

Anyone who has not received a reply to a QSL for an old QSO should QSL again to K8PYD, with s.a.s.e. If Leo has the log, you will surely get your card. *(Thanks to K8CSG/5)*

After 20 years without a card, HB9PL still is on the quest for a card from XZ2TH. Apparently, W2CTN was listed as QSL manager for the Burmese station. HB9PL wrote to the widow of W2CTN, Mrs. Cummings replied to Pete that all the logs W2CTN had were destroyed several years ago. This unfortunate situation suggests that anyone with outstanding cards destined for W2CTN should investigate other avenues.

More QSL manager volunteers. The following hams have graciously volunteered their time as QSL managers: N1NA, KA6AIT and WA4JTE. Per the request of W1VV in his final column, in the next month or so information on the hows and whys of being a manager will appear in this column.

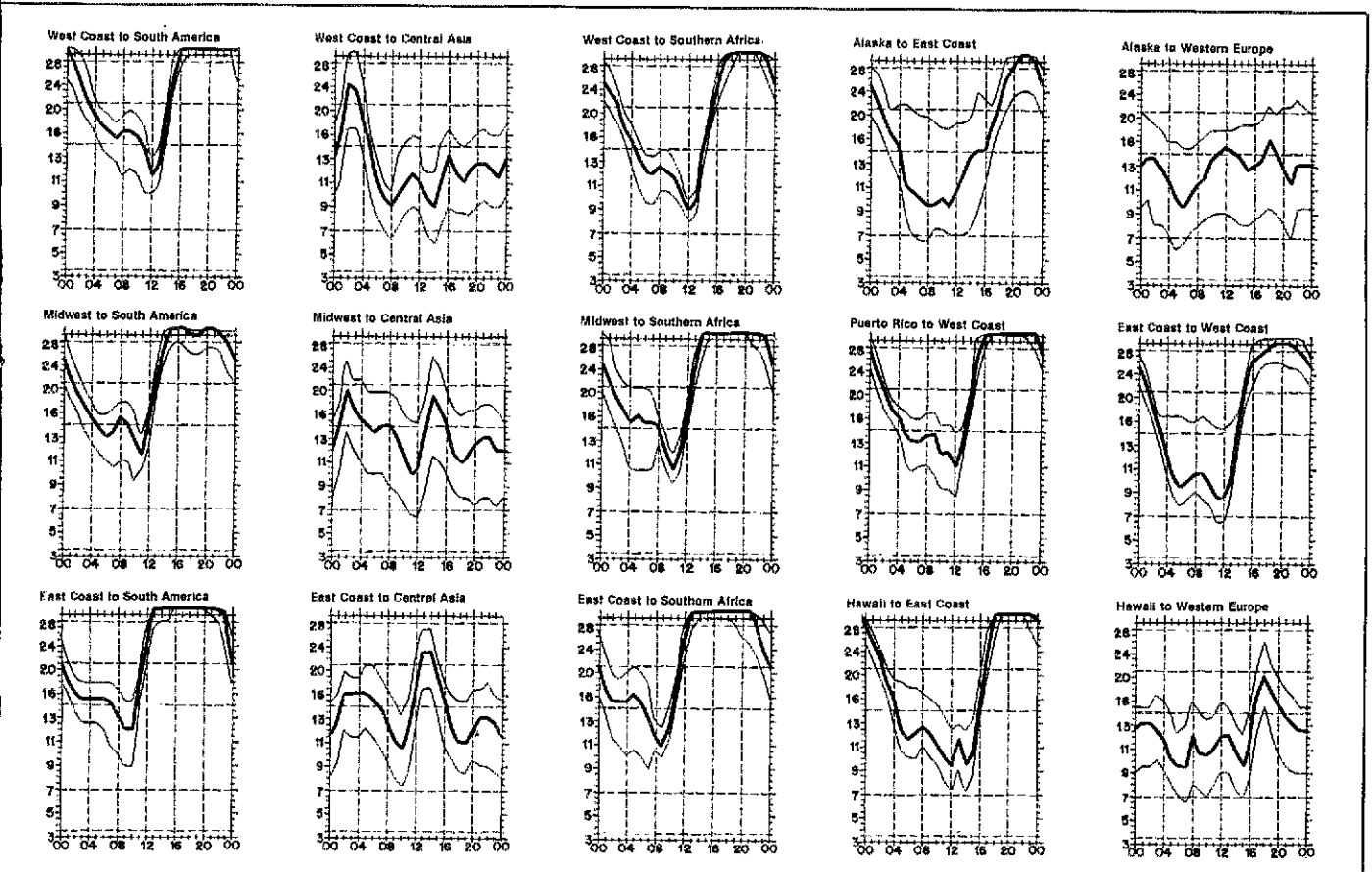
Speaking of QSL managers, over the next couple of columns a rather lengthy list of QSL managers and other addresses will gradually appear. A listing of all the sources will appear with the last installment.



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or hpf). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or muf). On 90 percent of the days of the month, it will be at least as high as the

QSL MANAGERS

A2CBT (DJ0FZ)
A2CDW (VK7UX)
A35BD (ZL1BD)
A35HU (JG1LQB)
A35WL (ZL2BBW)
A4XFC (G4AWJ)
A4XFV (DJ7OM)
A4XGY (K2RU)
AP2UR (W8QFR)
C21ITU (C21AA)
C21KM (WA6AHF)
C31IS (F6CXF)
C31MK (EA3WZ)
C31NO (PA0GIN)
C31PP (DJ2ML)
C31QS (DL7QG)
C31RF (DJ6ZT)
C31RM (DK7BN)
C5ABK (G3LQP)
CE9AT (CE2BIO)
CE0AE (WA3HUP)
CM2HB (ON5YL)
CN8AK (WA3HUP)
CR9ITU (CR9AJ)
CT2BB (W1EP)
CT2CE (WB1DGD)
CT6UA (W3HNK)
D68AD (G3RWU)
D68AF (K5YY)
DG0SAR (DL8FD)
EA0CR (OH2BAD)
EI2VOK/m (HB9BEI)
EL1I (VE1RY)
EL2AE (WB3CQM)
EL2ET (W3HNK)
EL2EU (W3HNK)
EP2MS (W8CXS)
EP2SL (G3XLS)
EP2WR (G3JXE)
F0BAK (PA0TO)
F0CVH (DJ9NT)
F0DUL/FC (DK6AS)
F0EQQ/FG7 (K2QXS)
F0EQQ/FS7 (K2QXS)
F0ERL/FC (DL9VN)
F0ERQ/FC (DJ5LA)
F0LW (PA0MRN)
FB8XS (F5VU)
FG7TD (W5RU)
FG0DWT/FS (F6CTK)
FG0EID/FS7 (K7GEX)
FK8CR (W7OK)
FM7WE (K4FJ)
FP8AA (K2RW)
FP8BH (W1PFA)
FP8DH (K9OTB)
FB8YF (F6DZL)
FP0AG (N4AG)
FP0YY (K9OTB)
FR7BU/p (F6EQN)
FR7ZE (W4LZZ)
G4BKI/VP9 (G4EWU)
GM5CCW (WB8VTK)
GO1FG (I2MQP)
GU5CIA (N6MA)
H44AV (VK3YQ)
H44CD (W4BAA)
HB0NL (HB9NL)
HC1NF (SM6DYK)
HC5EA (K8LJG)
HC5EE (WA8TDY)
HD0E (WA8TDY)
HF0POL (SP2BBD)
HG8RTT (HA8UD)
HH2CQ (K4UTE)
HI8XDJ (K3SWZ)
HK0BKX (WA6AHF)
HK0COP (W9UCW)
HL9WH (W7WQR)
HP3XWB (DL1HH)
HS1ABD (K3EST)
HZ1BS/8Z4 (DJ9ZB)
HZ1JB (W4LZZ)
HZ1RN (ON4SJ)
IH9ARI (I5WWW)
IP9ARI (IT9RAN)
IS0LYN (WB6TZQ)
J28AY (F6ETO)
J3AJ (W3VW)
JT1AN (W7PHO)
JT1BF (UW0NE)
JW7FD (LA5NM)
JY9VK (W1HSS)
K4YT/5R8 (W2GHK)
K0AX/DU2 (WB4OSN)
KA1NC (K4JEX)
KA1IW (K8DYZ)
KG4FW (KG4AN)
KG6SL (WA6AHF)
KG6SW (W7YBX)
KJ6BZ, during 1977 (K0MSP)
KJ6BZ, op. Bill (W5NGE)
KM6FC (K5OA)
KM6FD (WA9CHG)
KP4AM/KP5 (W6WX)
KV4AA (WA6AHF)
KX6BU, op. Jack (W5JW)
KX6MP (WA5FWG)
KZ5GXT (K3SXA)
KZ5RO (WA6IJZ)
LU3ZY (LU2CN)
OE5CA/YK (OE5REB)
OH0AL (OH2AL)
OK2BFP/D2A (OK2TT)
OY5J (WA3HUP)
P29BL (JA2KLT)
P29CC (W2NHZ)
PJ8CO (W8AEB)
PZ1BM (WB6OWI)
PZ2AC (WB4RRK)
S9DX (D4CBX)
ST2HF (G4GFI)
ST2SA, op. San (K5YY)
ST0RK (DL7FT)
ST0YY (K5YY)
SV1JH (DJ9ZB)
TA1ZB (I8YCP)
TF3FG (W3HNK)
TF3YH (WA8AEE)
TG8DX (W3HNK)
TI2APG (W7OK)
TI2WBK (WB1DQK)
TR8GDC (WB4RZN)
TR8RG (DA1CZ)
TT8SM (WB5OOE)
TU2HS (DJ9HD)
VE3BWK/4U (VE3PET)
VK3BKP (JA1OCG)
VK9XW (VK6RU)
VK9ZM (VK4ABW)
VK9ZR, OC 72 (VK2BJL)
VK0AS (VK32AT)
VO1LX/SU (VE3IWI)
VP1EW (WA6UZB, U.S. only; VK4LG, elsewhere)
VP1MM (WB4INC)
VP2ECW (WB4BQZ)
VP2EEN (K4UTE)
VP2EKK (WA3HUP)
VP2ER (WD4BRE)
VP2LBH (K2IGW)
VP2MAJ (VE3IIY)
VP2MAY (WA1SQB)
VP2MH (K8MFO)
VP2SAB (W2MIG)
VP2VER (N6CW)
VP2VJ (VE3MJ)
VP8NP (G3ZKH)
VP8NX (GM3ITN)
VP8QH (G3NKO)
VP8QI (G4CHO)
VP8QS (GW3VEW)
VP9WB (K3QMX)
VR3AK (KH6AHZ)
VR3AR (W7OK)
VS5XU (DL1DL)
VS6HK (W6EL)
VU2GO (SM0GMZ)
VU2LQA (DK6TU)
WB1CIL/HB0 (DA2RM)
WD4ECM/KH4 (KM6BI)
WB4ZNW/DU2 (W1EP)
WB5WIC/3D6 (WD5BOU)
W0DX, Desecheo (W1GNC)
XT2AE (DJ9KR)
YB9ADE (WA7ILC)
YB0ABI (WA2DWE)
YN1Z (WA4ZXC)
YS1ESH (W3HNK)
YS1GMV (W3HNK)
YZ9MG (YU2AKL)
ZB2DX (G3UAZ)
ZB2EA (K3OO)
ZB2EF (F6ELT)
ZB2EI (G4GVF)
ZD8RG (K8VIO)
ZD8SC (K1SC)
ZD9TW (K8NOQ)
ZF1GZ (WB9WKE)
ZF2BC (WD4AXM)
ZF2BP (W4YKH)
ZF2BY (K4VYN)
ZF2CA (W0FLG)
ZK1BD (ZL1SZ)
ZL3HI/c (N2CW)
ZS2MI (ZS1SZ)
ZS6NI (WB9USD)
3B8DU (3B8DA)
3B8YY (K5YY)
3B8ZZ (W2GHK)
3B9ZZ (W2GHK)
3D2AC (WB0ZEP)
3D2ER (W5RBO)
4K1A (UA3DKL)
4L0KR (UK0AAB)
4S7DA (W3HNK)
4S7EA (WB9OQU)
4S7QC (DK8KL)
4S7JD (K4MQG)
4S7JW (DK8KL)
4S7KL (DK8KL)
4S7VZ (DK8KL)
4Z4WE (W5RBO)
5B4HA (K4BF)
5N2AUX (G3RQM)
5N2NAS (WB9MFC)
5U7AG (K1VSK)
5W1AU (W6KNH)
5Z4CW (OZ3PO)
5Z4OL (N4PF)
5Z4RH (WA4WTG)
5Z4RT (I8JN)
6Y5KG (VE3KGK)
7P8BC (K9RD)
7X2BK (WA3HUP)
8P6GD (K5MK)
8P6GM (VE3CDA)
8R1X (VE3IXE)
9G1JX (DL7SI)
9G1JY (DL7SI)
9G1KP (K1MAR)
9G1RU (HB9BFN)
9J2TJ (N8JW)
9K2EZ (WA1ZGR)
9L1CA (WA3NCP)
9L1KB (K4QKW)
9M2FK (YU4HA)
9M2MW (K4BF)
9V1TK (JA6RIL)
9X5AL (SM5HHJ)
9Y4TR (WA5GFS)
9Y4VT (W3DGZ)



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, and September 1977 *QST*, page 35, for a complete explanation. The horizontal axis shows Universal Coordinated Time (UTC); the vertical axis, frequency in MHz. Asterisk indicates long-path circuits. Data are provided by the Institute for Telecommunication Sciences, Boulder, CO. These predictions for January 15 to February 15, 1979, assume a sunspot number of 122, which corresponds to a 2800-MHz solar flux of 166.

LIFE MEMBER APPLICANTS
September 16, 1978 (See also page 66.)

David M. Hoffman, K5BBX; Herbert T. Horton, WA4ZJV; Dwaine H. Howard, WD4ENY; LoRayne Howard, WD4ENZ; Donald L. Howell, W2FIB; James A. Howell, K4VHO; Mark Hubelbank, K1NFD; Charles L. Hudson, WD4ABZ; Frank J. Hudson, WB7VRP; Michael L. Hunt, WB7WEA; Barnett C. Jackson, Jr., AF4O; Allen H. Janssen, W9NZU; Bruce Alan Johnson, WA6IDN; B. C. Johnston, VE4BA; Clyde L. Jolley, KB4E; Claude E. Jones, Jr., WØQU; Gary A. Jones, WB9NJF; C. Kenneth Jones, WB4OPM; Richard D. Jugel, KØDG; Richard S. Kalin, WB0YFO; Harold Kalkstein, W3KF; Jeff Kamenetz, WB9LXH; Bruce D. Kane, W2PI; David Karpiej, K1THP; Hubert B. Katz, WB3BDU; Ronald J. Keller, K9RK; Robert Kellermann, WD9AHI; C. M. Kenrich, AD7C; L. A. Kilpatrick, WA4CEH; William E. Kindred, WA9RAP; Clarence H. King, Jr., K6HPW; John R. Kinsey, WB2CDE; Glenn I. Kirkland, W3SVD; L. E. Kline; Ronald J. Knapp, W9LFH; Roy L. Knudsen, N1RK; Isamu Kobayashi, JAØAD; Ronald J. Koczor, K9TUS; Ronald F. Koperski, W8INR; Edward Korol, VE3EDK; Michael Paul Kosty, WB6SVM; James F. Kovarik, KA6CGG; William Kramsky, WB9VQP; Edward J. Kuebert, K3KA; Peter A. Kugel, WBØTMV; Ray Kushler, K8IWC; John M. Lake, WA9TIM; Z. A. Lando, K6OFI; Dennis Roger Lane, WD4AIN; James J. Larson, WB9WUN; Worthy B. Law, WA4HOH; James E. Lawler, WBØSBZ; Burtis E. Lawton, W2JLO; John W. Lee, K6YK; Daniel W. Leffert, WBØAOR; Richard D. Lindenau, K7OSQ; P. W. Loveland, Jr., N9PU; Harold Luce, W5UHF; John A. Lusk, N5AID; Robin S. Mackay, KH6JSW; John Paul Madacsi; Bob Margolin, K1BM; Andrew L. Marhefka, K3ELP; James W. Marley, W4EW; George W. Marshall, WB4MYB; Gary Mason, WB6AHC; Allen Ray Massie, K3RZR; Yoshio Matsushita, W6JGX; W. A. Maylor; Wayne A. Maynard, WB6BFN; R. W. McBay; Carson McCormack, III; Paul McCoy, WØKCB/WØOZ; Thomas R. McGinley, K7QA; Robert B. McHugh, KB4AJ; Avery N. McLear, Jr., WB2NAP; Gene W. McPherson, W2IDT; Gary I. Medford, N2CW; H. P. Meisinger, W3ZE; David C. Mentzer, WA4SAN; Dennis L. Merritt, WB6UHQ; Marc E. Meyers, WBØHLB; Nelson L. Miles, K3KSS; James A. Miller, K8EIO; James C. Mills, WB4NPO; Michael T. Mockler, WB6FTW; Allen W. Moore, W3ZNB; Howard W. Moore, Jr., K5JIU; William A. Moose, W7CCD; Dwight E. Morris, KL7EUY; Michael W. Morris, WBØRYY; Arthur B. Moulton, WA3UVQ; Charles D. Mount, W4LVC; Nicholas Mueller, WBØPTO; Joseph K. Mulcahey, K1EI; Donald G. Murray, W4WJ/K4FMA; Robert S. Mutchler, WB4OQX; Wallace James Myers, N6QM; Leonard L. Naeger, WBØTPX; David Nelson, WB5IMT; John H. Nelson, WØUZ; Cleo H. Newell, WB4NNV; William E. Newkirk, WB9IVR; Earl J. Niemoth, W9GCH; Albert E. Noe, KL7NO; Vaughn D. Nogle, W5TJT; Jay E. Nugent, WB6YFQ; Brian H. Nyberg, W7CCH; Theodore A. Olcovich, WA6BYX; Carl S. Olson, W6TLA; Roland T. Onffroy, W7JE; Theodore E. Palmer, WA6MUK; Peter L. Parker, VP9GO; Wolff Parmentier, DJ5JH; Clay Partin, N4VG; Douglas C. Paschall, WB4HCM; Richard C. Pendleton, N1DC; Charles E. Perkett; Donald M. Perry, K7QLC; Henry J. H. Perry, GM3KXS/W1; Carl E. Peters, W7IBO; Thomas C. Pienkowski, WD8CXQ; Carlos M. Piralio, KP4EMA; William G. Poissant, WA8AJG; Raymond H. Porter, K7AA; Robert Powers, K2CI; Robert D. Price, WB4VHE; Karl E. Prinsen, WB6CYA; Theodore A. Rachwal, K8AQM; Rodrigo Garcia Ramirez, HP1RGR; Robert J. Ravich, K1VPB; Thomas Redlinger, WDØAWG; John W. Reimer, N6QC; Terry K. Reynolds, WA3QFL; James E. Rhein, K4ZEK; James L. Richey, WA4URR; Hank Richroath, WA5HWI; Jack D. Riggs, N7AM; Sam Ripple, WB9QKF; Don D. Roberts, VE3KVR; Robert L. Roberts, Jr., K3ONU; Stephen E. Robinson, W2FPY; Gary L. Robison, WB5WM; Donald M. Roland, VE1AOE; Jimmy D. Roller, N4IR; Peter A. Romans, W7QLC; Donald G. Rooker, K5SJV; Alan D. Rosen, K6PJG; Eric Rosenberg, WA6YBT; Peter J. Rossi, WA3NNA; Charles J. Rowell, WBØPJS; Werner H. Ruhl, N6ZL; Bruce D. Runkle, WB8ZZJ; R. B. Russell, W4DZZ; William R. Rust, W2UNJ; Steven C. Salmon, K7OXB; Norma E. Samuels, 6Y5YL; Robert F. Sanford, K2MQM; Edmund Schmitzer, K8TU; W. D. Schneider, Jr., WB5NJB; George Schwartze, Jr., K1GS; Robert F. Schweitzer, WB7QNB; Robert A. Scott, VE3GND; William H. Sedore, W3FDP; Richard A. Segalas; Edwin A. Segletes, W3WZC; Charles L. Shaffer, K7NW; Jean C. Shaffer, WB7RFC; Stewart Shaheen, WB5GUG; Robert W. Shakespeare, WB8RXD; George T. Sherman, Jr., K6UYL; Sidney H. Shown, WA4GNY; Stephen C. Skalski, WB2ZOG; Jim Slagle, WB5UHO; Drew W. Smith, K3PA; George W. Smith, Jr., WA7UWC; John C. Smith, K1VNT; Robert M. Smith, WØLD; Frank R. Soloman, Jr., W1WKP; John E. Sowinski, WB8HKK; Kerry L. Sparlin, WA7OJI; Elliott M. Sperling, K3ZVB; David G. Sperry, WA2SHM; R. K. Stamper, K4CFV; John Edward Starkey, W6CNT; James K. Stevenson, WA6EKL; Jeffrey C. Stoll, WD4BPI; Richard P. Stones, WB6VUZ; John F. Strong, WA3YJA; Harold F. Sturm, W4UCF; Ledford L. Sumner, WB4PQL; Thomas R. Sundstrom, W2XQ; Alan C. Svoboda, NØSC; Donald B. Sylvain, WA3WOD; Jesse A. Taft, WD8IRX; Yutaka Tanaka, JH3DPB; John A. Tate, K3KTY; Albert D. Taylor, WB5PZV; Paul D. D. Tessaro, WB8VSQ; Booker T. Thomason, Jr., K9QKW; Benjamin F. Thompson, WA4ANJ; Jonathan L. A. Thorner, WDØCLB; Marc Thorson, WBØTEM; David P. Tkach, WA8OEZ; Gary J. Toomsen, KØGT; Robert G. Trosper, Jr.; Randall Tucker, WB9FSL; Richard G. Tucker, WØRT; Donald E. Turner, WD8KHT; Gene Stewart Tyler, WA4JUO; George H. Venzke, WA9ZKQ; Normand P. Viens, WA1LGP; Ronald C. Viets, WA4SNL; David Voit, WB6TOU; Jack Wacher, W4OBA; Jerald B. Wadley, K7BHE; Victoria J. Walters, WA6KTX; John N. Warker, Sr., WB3CVK; James Warner, WB6SYN; Cyril Weaver, VE3DQA; Kenneth Weber, WA2BDP; Kim E. Wells; Thomas L. Wheeler, Jr., WA5UIL; James W. White, WAØDWU; John C. Whitehouse; Lyle L. Whitsett, W7DDK; Arthur F. Wildblood, W2IB; William E. Wilkey, N8SW; John Calvin Williams, Jr., WB4TFY; Robert M. Wilson, WDØGZM; Steven Donald Wilson, WA6GFM; Edward S. Wilush, K8NJA; David F. Wintz, W3TMY; Gordon Wormser, WB2SIZ; James Richard Wright; R. E. Wright, VE3GQA; Wayne W. Wyatt, WB5QBV; Andrew Yaniw, WA7RWJ; Bradley C. Young, WB4EOY; Paul A. Zander, AA6PZ; Dan Ziegler, WB9CPH; Andrew P. Ziros, WA6HNI; Norman Zoltack, K3NZ.

LIFE MEMBER APPLICANTS
November 19, 1978

Stephen R. Aberle, WA7PTM; Susan Aberle, WB7OSC; John T. Adams, JR., WA4ZEO; Stanley W. Albrechtsen, WB6LAI; Albert M. Ammons II, WA6SRP; Elwood Anderson, WA9OBR; Robert Armstrong, WA4SQL; Don P. Babcock, Jr., N5DP; James Craig Ball, WB7UZV; Robert M. Barrett, WA1ZJG; Everett F. Batey II, WA6CRE; Henry Beechhold, WB2GWE; Richard W. Beers, WD9IIC; Eric M. Benshetler, WA3RKH; Walter F. Beverly III, WA3RDU/WA4HVC; Franklin E. Bigelow, WA7ZEV; Dale G. Birmingham, WB6MMQ; Paul M. Bocci, K9NO; Clyde E. Bonesteel, Jr., WA2ERT; Richard Philip Bono; Virginia M. Boyd, K5ADQ; Colin W. Brace, WA1KWA; Stanley S. Brokl, N2YQ; Gary N. Brooks, WD5EQU; Stephen R. Burgdorf, WA2GTK; John H. Burns, WDØGXT; John Randolph Cage, WB5VIR; J. Richard Campbell, K7DQB; Richard M. Campbell, W8ENY; Richard W. Carr, WA4BIH; Ronald B. Carter, WA2PHQ; James L. Cass, AA6K; Lawrence R. Chiarotti, WDØBYW; Vernon Childs, W3DNG; Dave Christensen, WA9WGJ; Michael N. Clifford, WB6ERG; J. Michael Cook, WA8LPA; Bayard R. Coolidge, N1HO; Delmar R. Core, W4FEM; Ralph W. Cornett, WB6TNS; David L. Cox, WB8FFC; Robert A. Currie, N5AJX; Gene K. Crawford, W7BRU; William L. Cross, K6DYT; John A. Crux, G3JAG; Bryson C. Davis, WB2BFE; Robert V. Davis, KØFPC; John H. Dilks III, K2TQN; Raymond Dopmeyer, WDØBIZ; Thomas B. Drake, KB8AC; William R. Droese, W1DYH; Michael W. Duke, VE7CJK; Frank E. Dulaney; Frank E. Dunn, Jr., WA7NYU; Glen E. Elfers, KH6JPS; Deborah S. Ellis, WD6CKD; George M. Eppler, KL7ILA; Rosana L. Eppler, KL7IFE; James F. S. Eppright, K5RX; Willson J. Eral, WD5EWP; L. A. Erwin, Jr., WA4FDE; Henry T. Espelin, W7WSW; Terry E. Estes, WB4ASZ; David E. Evans, K5SOR; Robert H. Evans, KA5ABS; Douglas E. Fagan, WB4WJQ; Richard Faith, KB4ID; Joseph T. Fenn, WB3AGB; Gary S. Fenstemaker, WBØRAC; Dorothy E. Fenstermaker, WD4KDL; Harold A. Fenstermaker, K4UNJ; Brad Field, W8JJO; John F. Finner, WA4EPI; Dean C. Finney, WD4BGS; Jane L. Flaccus, WB3JMT; N. David Flarity, VE3DVE; Claude Ralph Fontaine, WB4BWG; Weston J. Fowler, KA7BGU; James K. Freeman, K5HXR; Steven M. Fulbright, WD9IRS; Gary Eric Galt, VE3HUK; Claude B. Gambrell, W3UO; Rodney W. Garner, WB4ZWK; Verne M. Garrett, WA9LCM; Gilbert G. Garrett; Michael D. Garton, WB9IJZ; Richard L. Genter, K4BKX; Ruth B. Genter, WA4FDV; John P. Georges, WA2MYU; D. James Gifreda, WB8YUS; Robert A. Gildea, W1ZFI; Stephen A. Gillispie, WB8CGC; Paul S. Goble III, WA2VMS; Charles E. Grauer, WBØVOX; Robert Lee Grauer, WBØVTO; George G. Gribble, WD9EMT; Robert L. Griffith, K1BQ; Robert N. Hackney, WB3AFN; Denise Hagedorn, WBØMPH; Heather M. Hall, WB1ABF; Robert K. Hall, N8AOF; Robert Hamilton, KØIYF; Thomas P. Harrington, W8OMV; June A. Harris, KA4ELK; Patricia T. Harrison, WBØZAL; Ray Nick Hauck, K6QPE; Duane P. Hayes, WBØSMS; Karl Peter Heil, WD9BGA; J. P. Heslin, WA6TRW; Sandra Mae Heyn, WA6WZN; Dale R. Hicks, WØPEQ; Kevin T. Higgins, K1GAO; Robert E. Hilton, WB7ULF; Steven R. 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Owen, AK4E; Michael Owen, VK3KI; Elmer S. Parson, K7GLL; Richard Pelletier, WA1YRB; James A. Penna, WB2LJT; Gerald B. Peterson, W7LEB; L. Rodney Peterson, WB9UWX; Elizabeth A. Phillips, WB1FIQ; Peter G. Phillips; Sam Polonetzky, WB9RDE; Scott Porter, WA1YTW; Wayne K. Porter, WØHXM; D. A. Powell-Williams, VE7MQ; Charles J. Powers, WB3EJE; James S. Pratt, N6IG; Kenneth M. Price, K2TIS; John K. Pringle, W4SF; Jimmie Profitt, WA8EUK; Joyce E. Pugh, WA3WQM; Neil Rabinowitz, WA3ZBK; George Race, WB8BGY; Donald K. Rees, WB3FRL; Ruth Ellen Riddles, WB5DKG; Darrell W. Ringer, K8WV; Victor Rizzardi, WA3YTQ; Robert E. Robinson, Jr., WB8ZVH; Opal Elaine Rodgers, WB3ITS; Dwight Mason Rohr; John G. Rooney, WA1SDJ; Henry Rosche III, WD5DZD; Philip Russo, W3ELS; Edward S. Sadar, VE7DMU; Frank J. Salvato, K5BTT; Mark C. Schmidt, WA6FND; Marjori A. Shaw, N7ALP; Harold D. Sheffer, WA8QGU; Virginia S. Shirer, KAØADV; Jack J. Shulman, W2IWW; Charles Signer, WA9INK; Margaret G. Silvey, WB5KIV; Robert B. Silvey, N5RS; Reid W. Simmons, Jr., AA4N; E. Ray Sinclair, WD6EXD; E. H. Smith, W4NWV; James Dale Smith; Paul L. Smith, WB6FYM; Susan F. Smith, K3YT; Wayne A. Smith, K8FF; Gene E. Sprague, WB7QWC; Jeffrey N. Stah, WB2ZOK; Allan D. Stephens, N5AIT; William J. Stevens, W6ZM; Harvey A. Stringer, K4PQJ; Robert F. Struble, WB8EKU; Arthur R. Swisher, W8VWW; Leon D. Tallman, W1JTI; Gail Tanabe, KAØCGF; David F. Thompson, NØAGD; Guy A. Thompson, W3CND; Francis Tieber, WA9FCN; Martha E. Tieber, WD9HGC; Alan T. Toth, WA3HHC; Glenda A. Trowbridge, WB4NFZ; Warren A. Trowbridge, K4GJD; Charles T. Turner, WA4WDU; Ruth H. Turner, KA8CRJ; J. Th. Van De Water, PAØJWR; Humberto Vega, LU1LAZ; Martha K. Ventolo, KA8AQH; Edward L. Walker, WA6MDJ; Jon Q. Ward, WB7EBO; Carol A. Watkins, KA9CHY; Sherrill E. Watkins, K4OWN; Dan L. Weigel, WBØWKQ; Kenneth C. Williams, W7LQT; Donna Widmer, WBØTPY; Andrew J. Williams, WB3FIY; William J. Williams, WØPNY; Donald E. Williamson, K4HVI; Drew H. Wolfe, WA3KLK; David M. Wren, K8NW; Henry J. Wright, Jr., WB4PYK; Thomas F. Yenny, WB8LOL; Merle Anne Young, K7YFD; David B. Youtz, WB8UCD; Michael Zall, WA4FDI; Roger F. Zaruba, K2RZ.

DX Century Club Awards

The DX Century Club certificate is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL Countries List. There are now 319 countries on the list, and the DXCC Honor Roll (published in the March and September issues) highlights those ops who are within 10 countries of that figure. Each DXCC certificate may be endorsed for additional countries over 100 — in increments of 20 up through 240, increments of 10 through 300 and increments of 5 over 300. This listing contains the call signs and exact country-totals of amateurs who've joined the DXCC or increased their country-totals during the period from October 1, 1976, through September 30, 1978. Think you may be ready for DXCC? Write Headquarters for details.

MIXED

362 W6AM

361 K6ZO W2AGW W2BXA W4EX

360 LU6DJX W1BIH W3KT W7MB W9ZM

359 PY2CK W5KC W6HX W8DAW WØDU WØELA

358 OE1ER VK4QM W3LMA W4OM W5MMK W7KH W8BF ZL1HY

357 DL7AA W1GKK W1HX W3MP W8EWS W8GT WØMLY

356 OH2NB W2AG W2JVU W2QHH W3EVW W4AIT W4BQY W6BZE W8LKH WØBW

355 K6OJ W4AAV W4GD W6EE W6ZO W7PHO W8RT 4X4DK

354 DL1KB G3FKM G5VT IØAMU K3GL W1DK W2LV W2OKM W4TM W6CHV W6GPB W6PT W8DMD W8JBI W8MPW W9JUV

353 DJ2BW G3FXB K4PDV W1HZ W1JR W2AO W2DOD W2NUT W4VPD W5IO W5PQA W6BA W6ID W6RT W6TZD W7LDC W8AH

352 DL3RK K2FL K6DC VE2NV W1MV W2BOK W2CR W2QM W2SSC W3CWG W4ML W4QCW W6EPZ W6KZL W8PHZ W9FKC W9GIL WØSYK

351 DL6EN IT9TAI K4KQ K4SM K4YR W1JNV W2AYJ W3GH W3NKM W5JUF W6CAE W7GN WØQGI WØPGT

350 DL7EN G2BVN HB9MQ HB9TL K6EC KH6CD ON4DM PAØFX W1NU W2AX W2GT W3LMO W7ADS W7ENW 4X4JU

349 K2BK K2LWR K4LNM K5DX LU4DMG SM3BIZ W1AA W1FZ W4EEE W4EO W5FFW W7OF W8ZCQ W9DWQ W9SFR

348 G3AAE PY1HQ W2FZY W2GC W6ET W6YK W8KPL W8OK W9HB

347 DL9OH K6LGF K9AB W1PM W2BHM W2SAW W3AFM W3GRS W4BAA W4WV W6FF W7AQB W9DY

346 I8KDB IT9ZGY JA1DM K6CH K8DR OZ3Y W2BMK W2FXA W2TP W2XX W5FT W5GO W6BS W6RKP W6ONZ W9RCJ YS1O ZL3IS ZS6LW

345 DL1BO K3II K6KII N4SU W1CBZ W2HTI W2IRV W5NO W5QK W5TIZ W6KG WØGKL

344 DL1HH DL7HU I1ZL JA1AG ON4NC PY1HX W2UE W2YY W4IF W4SSU W5ABY W5MMD W5NW W6HYG W6ZM W9GU WØAIH WØNVZ WA2DIG

343 HB9KB K2TQC K2UVU K4RPK K6RQ K9ECE VE5RU W1CKA W4QM W5LCI W8KBT W9BM W9TKV WØLWG XE1AE

342 DL7BA F3AT JA1BK K4EZ K6GA K7GCM PT7YS SMØAJU UR2AR VE3BWY VE3HD W2MJ W2XN W4MCM W6EJ W7CMO W7QK W9TKD

341 DL3BK F9RM HB9MX JA2JW K8ONV OH2QQ PAØLOU VE3AAZ W1WY W4ZD W5WZQ W6ISQ W9CH

340 KH6IJ KP4RK OH2QV W1HH W3DJZ W5GC W5GJ W5HJA W6UQQ

339 DL7AP K1IXG K2FB K2SHZ K4JC K6LU K6RN W1AXA W4NNH W5OB W5QKZ W6EL W6REH W9HJ WØTJ

338 DL1DC JA1BN K4MQG K6WR N6FX ON4PA SM7ANB W1DGJ W2CP W4UG W8CUT W9ZTD WØAUB WA2RAU

337 DL7HZ HB9DX K5AAD K6YRA N4XO OH2BH OH2LA OK1ADM VE2WA W2GKZ W2PV W4AVY W4BFR W6MUR W7LLC W8DA W8ZD WØDEI

336 ON4QJ HB9PL JA1ADN JA1BRK K2PXX K4AIM K8FF K8OHG W2QK W4QQN W6RJ W8ARH

335 DJ5DA DJ7ZG I5UA K4ID K6ZM K8CFU OE1FF UA9VB W6QNA W6QNM W6RGG W9BZW W9KXK WA2RLQ

334 I5ARS K4YYL K6MA PY2PA PY2PE W1QJR W2PN W4DRK W5RDA W6KTE W9KNI

333 JA7AD JA8AA K4IEX K6EV K8DYZ SM7QY UA1CK W1RLQ W2GQN W4KFC W6FW W6OW W7KR W9PN W9QLD

332 DJ2AA DJØKQ DL1CF JA4ZA K2LE K6JG N6AV PY2SO VE3WT W2GK W2NC W5UR W6CF W6EUF W6KZS W8YGR YU1BCD

331 DJ7CX I2KMG I7ZPB JA8ADQ K2YLM K4KG K6QH OH4NS PY2BKO W1FTX W6YA W8JQ W9BTD WA4WIP WB2HXD YV5AHR YV5ANF ZS6YQ

330 DL7BK JA1GC K1RQE K4FJ K4IKR K5GOT K8EJ K9BGM SMØKV VE3MJ W2MZV W4YN W6QL W9FD W9KRU W9LT W9NA WA6OET

329 DL8NU K2JMY SM6AEK WA2EOO

328 DL3OH G3JEC I2SM JA1IBX K1YZW K2UR LA1KI N6DX PY4AP SM6CKS W1SD W4BBP W4MGN W4NL W5TO W6ANB W6KNH W7DY W9AZP W9DC W9OA WØZV YU2DX

327 DJ5LA JA1MIN K4DJ OZ3PO PY4OD SM6CWK WA9NUQ

326 DL7AH JA1MCU K2LGJ K5QHS K6AO KV4FZ OZ1LO SM5BHW VE3NE W1SP W5LZZ W6FET W7AO W7CSW W8PR W9ABA ZS6RM

325 HB9AHA IØJX JA3DY K1DRN K2CL K4CEB K4YFQ K5LIL K5RC K7ABV K9MM OE2EGL OZ6MI SM1CXE W1ELR W1GX W2LL W4JVU W6BVM W6HVN W6YB W9DH W9HLY W9HZ ZL3OY

324 JA2AAQ K1RM K3UZY PY3CB VE3DDR W1HRI W4BRE WØBL WA3ATP WA4MUB

323 DJ4PI DK3PO F8RU I3PRK JA8JL K8MFO K9KA N4TB N4WF PY7APS VK3YL W1YRC W3GE W8CNL W8YA W9OW ZS6IW

322 DL8CM JA8ZO K3AV K4BBF K5ET K8IFF K9RA N9ZN WA5REU WA8NYB

321 G5RP I2DEZ JA2HNP JA6GDG K2BT K8VUR NØOA OE1UZ SM6AFH SM6CVX W1OHA W5IR W7BGH W7JFO WA4FDR WA6GFE WA8ZDF WAØOAH

320 G6RC JA1JRK K3RS K3ZR K9GM N4EA N4MM N5DX OH3SR OK1MP PY2ELV VE3DBT VE6LU W1FJ W1OT W3KA W4GTS W6YO WØGNX WØSD WØTDR WA3HUP WA6DUG WB2EPG WB2YQH YV5AE ZL1AV

319 F9IE K6XP K9PPY PY1DH W1JFL W1VG W6BUO W8DCH W8RCM XE1KS

318 DJ4AX JA1EOD JA1OCA K2AGZ K2OF K3SGE K4BVQ K5UR KØBUR KL7PI OH2BR OK1ADP ON4UN SM6DHU W4EEU W4KN W6MI W7FLA W9RF W9TKR WAØKDI

317 JA1DFQ W1HGA W4FLA W4ORT W6MUM W8HN W8XX W9VNE WØUD WA9LOT

316 DK2BI G3JAG K2OOU K6XW N5RR OH2BAD VE3GMT W3GG W3ZDW W4OEL W6YHT W8OA W8ZCK W9KOD WB8EUN YU1AG

315 I3EVK K6DT K9AWK N6GM PY2DFR SM5WJ VE1KG W2FG W2LW W2SY W3ZN W4DHZ W4FPW W4HHN W4XR W8FAW/4 W8LBM W9AG W9KB W9HZ WB4KZG

314 EA1BC JA2AN K5JW K6AQV K8RWL N4XX W1GME W2FP W9RX

313 DJ6RX I7WL K4IEP K6LAE K6OZL OE7III OE8RT SM5FC VE3GCO W4JD W5HTY W8CFG W9JA WØOAQ WA2BRI ZE4JS

312 I1XK PY5ATL W4BMX W4FX W4GYP W5SP W6EYR W9GW W9IVG YU3EY

311 K1BW K4EWG K6LQA KØBS JA1GTF JA2KLT JA2PJC N4KW OH3NY SM6EOC VE3BX W3KV W4NO W5NBI W6GC WØMYN WA4PFD ZL1HW

310 AA4A CT2AK JA3AAW JH1EIG K3NL K5GO K7NN K8PYD K9JF ON5KD OZ8BZ PP5UG VE4XJ W1AM W3LB W4WG W5XJ W6LQC W8AD W9SS WA4FFW YV5AK

309 DJ3GG DL6KG JA3KM K1KNQ K5LM N6AW W5QLT W7YBX WA4DRU

308 JA1AAT K6PZ N4CC VE7IG W1BFA W2UI W5DJ

307 DL7MD K6SVL W6AI W9KHD WØOQK WA6AUD WB2NYM

306 JA2HGA K2KGB K2NY K3EH K6HTM K6OJO K6UFT LA8LF W5JW WB6DXU ZP5CE

305 K4SMX K5FKD K8IP K9RF N6HR N8AA OE1ZGA W1NG W2QKJ W2VJN W4AST W5EDX W5MCO W7ETZ W9DE W9LW W9RN WA2HIN WA8PYL WAØDUB

304 I7HH K4XI SM7ASN W2BXC W3JXH W9GDI WØCAW

303 JA8EL K4RA W2ZZ W4CRW W4JD W4KNW W5MN WA9VOL

302 JA1CRR N3ED N4WB OK3EA SM3RL W1DA W6CDJ W6ZYC WA1GUH

301 F8SK JA1KF JA3BG K9XJ N4KE OH2XF SP3DOI VE3EDC W1RLV W2BAI W3SO W5IJW W5RO W5TMN W7GRH W7HXG ZS4MG

300 AA4CJ AA4VZ DJ5JH DK3GI JA2AH K4DXO K4GLA K4XL K5KX K5OA K8LJG N4RA OH8SR PY2BW SP6RT W1AB W1EW W1OR W2GA W2MP W2REH W2SUA W3BTX W3NB W4BV W4LBP W6CS W6UY W6VBI W7VRO W8IBX W9LNQ WØCE WØHBH WA8EDC WA9SLD WB5BID WB9EBO YV5CWO ZL1AMO ZL1TY

299 K4GFI K4SB K6IR PAØTAU W7MVC

298 K1JO K4TO W1UN

297 I3LLD K7UR K9CT K9FN KP4CW W4VJH W6SN

296 K9VQK W4PZV

295 K2GBC N9MM W7XA

294 DK9FB JH1VRQ W7TE WA1HFN 9H4G

293 JA8KB K6XT OH2BCV VE4SK W1ESN W6WO WA4NRE

292 HB9IK JA1JAN JA1RWU JA3DWT JA7HZ K2GMO KP4DHD W9VCQ WB6GOV YU1YNP

291 DL1KS DL3ZA EA3NC K1ZSI K3WS K4PI K4TSJ K6GWN K9AJ N4JJ N5XR W1BGY W9VIN WA8TNJ WB2AMO

290 DK9WB DL1LD JA1WVK JA8JO K5GH K5JZY K7BR K8RA KØIFL N2AP VE3IR W1GDQ W1GL W3ODG W4AFS W4TK W6HRB W8QFR W9ZWH WA2CBB WA4YVQ WA6GFY WB2RBG/3 WB6WHN

289 N6GG SM6VR W9LF

288 W7NA WØNAR

287 K6JB SK6AW W1KGH W2IYX W4NHW WØSR

286 K8CSG W1PFA W3AP W5NJ

285 F2NB W5GEL

284 DL1FK I7TGT JAØBNX JF1PJK WA9JCO

283 DL1BS JA3BQE W1GG W2RS W2YD W3GL W6DN YU1ODO

282 I2FO PAØINA SM6EQS VO1AW W1QV W4KA W6TC W8QBG

281 KØGSV SP2AJO WA5ALB WA9VIZ WAØOMA

280 G3KAA JA3BRI K2UO K2UU K2ZRO K3GYD K3ND K3NN K4UTE K4XP K4QPR K4UEE K4SV K5DUT K5KLA K6NA K6NM K8ZR N2DL N3II PY8JO W1AW W2PSU W2VYX W4RNP W4ZR W5QIX W8NPF W9ALI W9MCR W9VA WA1JMP WA4DCP WA4LDM WA4MSU WB2VFT WB4EDD

279 IT9PUG JA3GM K5SSZ N4GG N6JV OE1CP W5JC W6BYH W6VD W9PIO WA9TVM YS1RRD ZP5AL

278 JA3DGC K8IA OH2LU OK1ZL SP9AI W9LF

277 N4VZ W4EZ W6FYM WA2AUB

276 DJ4XA JA6BXA K8CW K9HMB N3UN SM5AQB SM7BBV W6JZU YU4HA

275 W2CC W4HY W4MWT W5IRG W8ZR WA4JTI WA5LUM WB2AIO

274 F9OE HKØBKX JH1HWN N4IA W6HT

273 DJØYD DK3LP N6MB WB4SJG

272 HB9AMO K1UO N2CW PJ2VD VE3II W1EHT W1RED W2TA W7ZHZ W8KNH W9ZA WA1CJR WA3GJZ WB8OFG

271 DJ5GG DK3SF EA3NA G3GIQ JA1BWD K5BZU K9UWA KØSGJ N4CQ WA2BBK YU1NEO

270 EA1FD HB9AQW I2PNB IØDUD IT9WGI JA6EYD K2PP K3LWM K4OMR K4SXD K4ZYU K8NA K9IUF N2AC N4RR N5OK OE1GHC PY5YC SM7DMN VE3CVZ W1LQQ W4CZU W4HG W6OMR W7DH W7DV W7JUO W7PFZ WØGKE WØRV WA4HPF WA8RWU WB4RUA YU2CBM

269 K4IR K7RI N5AI W3YX W9NB

268 JA8CDT JH6HPL K7CVL W2LZX W2TXB W3XX W8GIO

267 G3VBL N4PB W1AJG W7GSP YU3OV

266 DK5WS W1RR W2HUG W4DXI W6TSH W7QS YU3ZV

265 DL6MK HBØLL JA8AQX K4JEY K4LR WA3NGS WB6RIU WB6WIW YV4BK

264 IØZG JA8AYN K3RT K5ETA K6WD PY1DG WA4ENJ

263 DJ4HR K4HRG K9CW N5AX N8JW W6PQZ WB2BNJ YU1BPQ

262 JA2ETQ JA2INS K4IE LU2AFH W3VRT WØWP

261 G2MI JE1BSD KH6IGJ N6BK OH2VZ W3TVB W4IQ WØTRF WB5HVY YU2OB

260 K2LM K4VT K6AG K6ELX K6SP K9WJU KØBJ N4PM N4WX N5DD N8BM W1IUU W3IRE W3RJ W3SQ W4YDD W6MA WØIU WØJS WA3SXH WB4VUP WA5EZQ WB9BGJ WBØHAI

259 DL9TJ HB9KC HI8LC W2TN W3KJ

258 JA1FNA W1IKB W5LW

257 K8KAE VE3BZ W1NB W3AX W7QON

256 DL1ES F9YZ N4HH N4NX WAØCGS

255 GM3AWW K4ILX K4JPD K6IEC N4DW W2QXA W4BG W9IUB WA3EPT WA5YMW YU2HDE

254 CE6BGZ JA7CDV K1TZQ K1UM W7OK WØUO WB4OGW

253 JA8JN K6UD K9BWQ SM5BAU W1CNU W2MIG W4JFE W4RA YU3QI

252 AE4Z DL1LZ G4BUE HB9AGU OH3TH W4DZZ W4LVM W5TWI W7CE W7FP

251 DK3FD F6BWJ JA1ILN JA1XGI JR3BHW K4BYN K6CBL N5FG OZ5VT SM5AJR VE3BHZ VE7BZC W1VV W6BZ W8LU W9UO WA5SDV WB8JEY

250 DJ1BV DL7MQ F6DCQ G3TXF JH1QOJ K1ZZ K6DG K6RK KH6CF KP4AM N1DL N4GE N4NW N8BB PY2BBO VE2YU VE3DU W2HAZ W3DPA W5CPI W8GS WA3LJP WB4FJO WB5DDI XE1FR YU3TDX

249 N2KA W7FR W8CTR WØBX WA8MOA

248 K3RB W1YZL

247 DLØWW JI1WRM W6VW WA3KCY

246 DJ2EH JA7GBS K4YOE K9RL SM5BZH W1MX W2BZL W2HL W9OBF

245 F6ACV IT9JLA VE3AKG WA7ZLC

244 I2VDX OE2VEL W3ACE W6INH W6JD WA8NDL WB4OSN YU3DJK YU3DQ YU3EU

243 N4BP N4TJ W8III W8LZV WØVX

242 K1VSK K2HVN K2MFY K4PY OE3EVA WA9FWY WB4EQQ WB6KIL YU2CAW YU3CM

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239 K3AO K5PP W6OK W7NP WB8FOS YU1ODS

238 KØSVX VE2AFU W8GE

237 K6YK ZE3JJ

236 N6NS PY4AKR WAØLGW

235 K4JYS W2JGR YU3TU

234 W7BJ WB4YHV 4Z4DX

233 JA1FGB K4JS N7RK/6 ZE3JO

232 I2AY JA5PUL JA6SVP W1JDE W8ZNO W9EQP WØLR YU3NR ZP5AO

231 JA2EIV JA2GHO K3GBZ K9UIY VS6AI WA1UAD WA4GQJ WA6TLA 4X4FU

230 AB9E HI8MOG K9HLW KA6RR W1YN W3US

229 K9QXY

228 N3RL YU2OH

227 G3JFF JA6RIL N4QF W3FM WB2QAX WB6ZHD

226 CX4CR DL1RB JA8AJS K6RSY K8RCT K6AYQ WØNB YU1OCV

225 AA4M AA4PP IT9TGO JA2KVD JA6AGS K8KI K9UA KL7RW SM7BIP W1PL W7LR WB5IYB

224 G2AFQ JA5ANP JH1WIX K5TSQ LU1SE N1AC OZ5CV W6JOT W7SF WBØHAD

223 G3DOG JA3GM K8CW LA5ID OK1DH PAØEHF SM5BFC WØFUH WA2BEX WA4VDE WB4MAR WB5EAY YU4VFC

222 DL6TQ JA1BA JA2AYH K1OT K3DR K6ZT KØSVW LA8CJ N4UF N6JT OZ4FF SM5AQD W2GWT WA6EKL WB9SEJ YU1GMN YU2CQ YU3TXT

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220 DJ8CR DK6NN GW3SB HB9HT I5FOS I8RFD K1TN K2IJ K4KBL K5CSK K9ES KØKH N4YO VE3DMC W2BTG W2OXR W2SM W3KH W3UJ W4HU W4TYE W4WXZ W6CQ W8YMB W9MYG WA4OUF WB5OXC/3 WB6JQP WB8LDH WB8LOF

219 DL9EY JA7DOV N4XZ N6DS W6RQ W8UZ

218 HK7UL KØVV SM5BRW VE5YA WA5YRP YU1ELM

217 W6KJG WB4YFC YU3TJA

216 K2SP K5RW K5VT/3 W2MT W7BCV

215 K1NWE VE1AI

214 K2ZLO KØLUZ WA7GVM

213 JA1JKG OK1IQ VE1CD YU2RCZ

212 JA1KJW JA7DRM JR1AIB K2KA W4HYY WA4OOM

211 EA3AEA K5KR K9YBC OH7RF W4AQT W4KFB YU2ACD

210 G3ZQW JA4XH K6OYE N9RB OZ9PP SMØGMG W4OHZ YU2CAL YU3AR

209 HB9AZO I1ANP I6POY JA5FDJ K4IBP K4JNM W2ZXL W9MHS WØDAD/6 WA1TAI WB2RJJ WB8OBA

208 DJ6AU W3BZN WA5HEC WB4HQE

207 JA7JWF JH3DAE K1SF K6ACU W1AGA W9TA WB2FVO YU2RAZ YU3BH

206 I3OBO NØEL W3HER W4NG

205 W6CLM W9KM WA2RJZ YU2QK YU4AAW

204 HB9AMC HB9UE K6OHC K9QVB KØIKZ KZ5EK N2NN N6CN OE8SH PY5WD W2AAU WA2GEZ WA7SLC ZP5RL

203 K6MT N1YL N7MW VE3PG W3GK W8PMT W9LXU WA1TPR WA2WSX WA3JZR

202 DJ5EY DJ9UM DK3VV HB9AXG HB9BGN JA4FM K4PHE K6DR KØCML KØDEQ ON6BC SMØFKD VE4EW W1DYH W1XS WA2DNY WA9MAG WB7DKV WB8KNZ

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199 DK5FJ I5IZ JA2IU K5VRX KP4EBQ W1DQH W7GUR W8BIP WA9CYV ZS2EM

198 DK6WA W8BQE WD8BJK YU2AAU 4Z4GH

196 K4YWZ KØAXU

195 F8QB JA8KSF VE3MV VE7HP YU1NGO

194 K4LRA W2QL YU1MV

193 K1YHM K2IGW K7NHV VE2JQ W1PKW W6TFO YU2ACF

192 N9XX W3WK WØLGW WA3DSD

191 JA8SW K2FJ K1PNS K9GSG

190 DK5VO JA2CMM K1ALP K1RQF W1UQ

189 W1WH W6TJI

188 I5XRR W1HV W1JHU YU2CDL

187 W1BMR WØPT

186 JA1NVB JA1VN W3GTL

185 K2FW W3HAO W8GG XE2MX

184 DF1KM N9RR W3NF W4DGJ WA1CQW

183 K1EM KØKES LU8ADK W1VH W8UVZ WA1KUL WB9SLV WD4BRE

182 I5BOL JA1QER K6ZMB K7EQM N4OT VE3HLC W1LK W2PK W6YMH WØBWJ WØRT WØUC WA7LAG WA9WKA WB4ROY WB9MSV

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180 FG7XA I5AFP IT9BWO IT9TNO JA8DNZ K1LLU K1TO K2TKR K3HBP K4TWJ K5QEA K6SF K9DDA KH6DL KZ5FR N4YY N6OZ N8AC VE3ECP VE3GFN W1PV W2FYS W2IFK W2SEG W3GIA W5CTM W5IB W5ISF W6TPR W7HX W7ISG WØNQ WA2FNY WA4UVG WA5VUW WA8SWM WAØFBQ WB4BAU WB4OPG WB4RFZ WB4WSB

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178 G3VKW JA7DXD K7SFN VE3WW W1GNC WD8AHS YU1OER

177 DL9CC HA5KKN JA6SUO K1NG UVØEX W1RFW WBØYUI

176 JA2DMO JH6XOD N9GT

175 K4BIY K4CTD N4SX OE2JZ W5FL W6OMM W8TIV WA9ITB WB4ZNH YU2RUA

173 K2GI OZ2E WØSI 6Y5MP

172 K1KNM N3GB W4OUN WB9POH

171 DL9PR N6IM

170 CT1BY I2MQP N7UT VE1MX VE7IO W3EV W6IA WAØABU YU4EGZ

169 DK2OY W7ZI YU2ROZ YU3BO YU3FOP ZS6BOK

168 K5VT W2GND W8LJP YU2CDB

166 JA1OHD JA8FBM JA8HQI W2TE W5VSZ W9JI

165 DK5AD/W3 DLØST JA2AXB JA3CSZ N4ZS N6LK NØSS WA1YAX

164 DJ2OW DL3TU I3EGD JH1QJC K2UVV K4UWH N9OK W4WEG W8GMH WØTT WA2HQH WB3HAZ

163 EA6CE HA5DE JA1KQX JH1WDN JR6BU JH1BRG K1BUR K2RN OK1DKR W6MUS W7TS WA5REM WB2FKF WB9EIW YU1AAO YU1NFT YU1OCQ YU4VTU

162 JA1IZ JA1MUZ JH1DXM K1XA K4GFH K6UGS K9KGA K9KV KL7AF N4OH N4ZJ W2ABE W4ZC WAØIDK WB8IJW YU3DKS YU3DR

161 DJ1QX HB9AXB JA1VYE JH6RIM K5KT K9APW K9DWK K9NB N5CB N5MM OK1OAT SP6BAA W1ND W2FVS W4FL W4JIK W9VWV W9YH WØDP WA9BGK YU3FK YU3TXU

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158 K2TJ W5RBB WA9TAA

157 DA1RA K4EJQ WB2LNY

156 JA7GAX ON6OS 3C3GCO

155 JA2BJC K5OR N6KA WA6TYQ

154 EP2LI F9FF GW3CBA KØMOL PY5EX WA6TOO

153 JA2YKA JH2CJW JR1URH K4KH K8ZE K9MIE KØHSC SM5AKT W4UVP W7ZR WA2PCF

152 JH7DNO K2TV K9KT N4YM SV1IO W1ERW W2IQB WA8KME

151 JA7YOJ JH1LMG K6ASI WA5TOS

150 AD5O AF4K JA7BMR JF1HOH K4NFE N4MA W1OPJ W7FY WAØHQV WA7GZA WA7SCN WA9VKN WB2JJN WB5KPN WB9OQU

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148 HA5FA JA1JQY K1LMS PY1ZBJ SM6FKF VE3EJK WA3BGN WB9YXY

147 DK7BJ JA3DAY JR1VMX K1WVX VE7XL W6BL

146 CT1DF DL3TN EA8LS F6DBX HB9OK OZ3YI VE3HHS

145 DJ4OH DM2YLO EA7TV JA3EOP K9PU KØLST N4ZU OZ4CF WB2EOO WB4ADT

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JR1VAY
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HK4DEG
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VE3IR
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WA7UFS
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CT2SH

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WA2AOG
WB3EJP
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WA4ZEC
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WB4JBC
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WA8SWM

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WA6JVD

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JI1SPX
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OE1SIW
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JH1EIG
K8YK
PY2FFA
152
N7MW
W4OUN
151
JA2ETO
K9QXY
OK3JW
SVØWTT
W4AX
150
K4DAS
K9UIY
N4IM
149
JA1KJW
N4NX
148
K4SB
K4UEF
N6KA
147
W2LZX
WA9ITB
146
JA2INS
N4SV
145
DK3ES

OH2BAD
W9FD
144
DL3BK
W3GL
ZP5AO
143
DJ7CX
K6RLY
142
DL1EV
N4HI
VE3BX
W1RR
141
DK5AD
HP1AC
N3RL
N6JV
W3KFQ
W6UY
W9VJW
WA4LDM
140
AC6MUR
DL1LZ
JA1KWV
JR1URH
K4KBL
KH6HC
N8BM
SM5AKT
VE3DU
VE3IR
W2RS
W2TO
WA6TYQ
WB2ZRQ
WBØNOU

139
DJ5DA
K7LX
SM6FKF
138
JA2DMO
K2FL
SM5AQD
VE2EGC
137
DL1ES
W6TFO
136
K1RN
VE3DCI
135
JA1OXY
133
WØAP
132
K2KA
VE3AKG
131
IØWLS
OH3NY
130
DL1QT
JR3PYW
N3ED
N9RR
128
JA1TNV
127
G3TXF
K5VT
LU8ADK
N4SX

WA2JOC
WBØYUI
126
HI8MOG
JA1QER
JF1DSN
JH1RFM
W8UVZ
WA8ZDF
WB9CGL
125
JA6UYF
JA7GAX
K9QVB
W9OW
WA5VUW
124
DF4GV
N4DW
VE3IHF
W2MIG
123
DK7RW
K3NS
W5AP
WA4EWX
122
IT9GLI
JF1VSA
JG1ESQ
JI1WRM
K1TO
KØDEQ
N1RI
121
F6DBX
K5OA
N2MJ

N4YM
OH2BOA
W5OB
W8RO
W9AG
W9DH
WB4TDH
WB8DTT
YV4BK
120
CX4LO
JA1KF
JA1MCU
K2NJ
K3TZV
K8SW
K9CT
KØLST
KØRP
N4OI
W2LMO
W2PQZ
W4WXZ
W9IT
WA4DAN
WA4MCH
WB4RUA
119
JA6OKK
K3NR
W4NGT
W9HR
WØOOK
118
PY5WD
116
DK7SU
OI3CW
JA7GLB

115
I1QJC
PY2BW
JE3CVZ
114
JA7AMA
K4EZL
KL7PI
OZ1AG
YU2OB
113
DK7XX
DL7BO
JA4CTL
K5OR
PJ2VD
WØVX
4X4FU
112
DF3KT
DLØVW
IØDYB
JA5ANP
OH6MN
W1XS
WØNB
111
AC6PT
N4GG
W2SM
W4DGJ
YO3AC
110
DK6AS
HA5LZ
I3HDH
I3WDT
I7USP

JA1DUH
JA1PBR
JA2BJC
JA3CSZ
JH2CJW
K3GJ
N8MC
VE7DTA
W2REH
W3TVB
W5FLS
W6CLM
W9RW
109
EA8NU
JA1DFQ
JA3CWL
N6SI
N8II
VE3EJK
W1OPJ
WB5RCB
108
DL7AR
I8SBU
JA7BMR
K4JYS
N4MT
W1NHJ
W2OB
W3HDH
107
DK5VO
DL8CM
N4TJ
OK3EA
W9WI
WB7ASF

106
DF3FJ
I6AYS
JA1CKE
JA3AOM
JA5CAX
JH6HYC
JA7JAA
JH7IOS
N9ER
ON4JV
SM5BRW
105
CX7BBB
HM2JN
JA1GLT
JA1JQY
JA3GM
JH7LMZ
K1OKT
K4AIZ
K8IP
N5RR
OH6JW
PAØATY
W1EWD
W1HX
W8GMH
ZP5AL
104
DJØYD
DL3IA
HA5KHC
I5IZ
JA1FGB
JA1KQX
JA2KVD
JA3HCN
JA8MPJ

K6RK
K9UWA
KØSVX
SM3GSK
SM5VB
VE2AH
VE3HRP
W1IQ
W1WA
W5FL
W8VW
W9QLQ
WA2IZN
WB5NLC
103
DF2KU
DJ2AA
DJØGD
DK5AD/W3
DK6IS
EP2VW
HB9AHA
JA1FQA
JA2TK
JA3ARM
K6WD
K6ZT
N4PY
N4VM
ON5NT
PAØUGB
W3ODJ
W4BQY
W6HZ
W7IGE
W9PN
WA4GQT
WB5UWF
102
DJ2GW

I4RNL
I5EPM
JA1BWD
JA2IU
JA6GDG
JA7JT
JH3CXL
K3EO
N1RW
N6VR
N8RF
OH1LA
OK1MP
W1LQQ
W2SEC
W3AX
W5MCO
W5SVZ
W5TVX
W5UR
W5UTT
W6IA
W7OK
W8DA
WA1SWV
WB7DKV
101
DL1BS
EA5OR
F6ACD
G3YRM
HB9BBB
I1YRL
I6POY
JA1BGS
JA1ILN
JA7EWS
JH3KAI
JR3ODV
K1YZT

K2TV
K4OAF
K5KLA
K5NW
K9KA
N3KK
N3NN/4
N9TN
NØHY
SM4GLC
SM7EFJ
VE1AJP
VE3ECP
W1JZ
W1ZW
W2IBZ
W3OGY
W4DZZ
W6TOR
W7EEJ
W7XN
WØUZ
WA3GJZ
WA5YMW
WB8RPU
WN2YYT
YU1AG
100
DJØJC
DL9TJ
GM4DKO
HB9ALO
I1LDX
I5IRM
I5SMX
JA1BLM
JA1VE
JH2JBT
K1AO
K1WJ

K2PF
K3QIA
K4IYS
K6YYQ
K8CW
KØDPO
KP4DJE
N4EY
N7MC
N7RO
OE1TKW
PJ8KG
PY2DFR
P29JS
VE6AJF
W1HZU
W3YY
W6ISQ
W6KG
YU1AG
W7KVV
W8KI
W9HFN
WA4JTI
WA4LOF
WA4QMQ
WA5YTX
WB2FFY
WB5NBC
WB6RSE
WB7AEB
WB8ZRV
WBØONN
WD8AHS
4U1ITU

Strays

TEEN NET FORMS

☐ A net for 16-year-old (and younger) California hams has been formed. Contact Dave Birken, KA6ACU, 18347 Germain St., Northridge, CA 91326.

I would like to get in touch with . . .

☐ any Louisiana ham who has earned 5BWAS. Chuck Burdine, WB5IKT, 3003 Forsythe Ave., Monroe, LA 71201.

☐ hams who are former crew members of the USS *Arizona*, to start a net. Clyde V. Pearce, WA6NQG, 1797 Skyline Dr., Lemon Grove, CA 92045.

☐ former members of the 97th Signal Battalion who were stationed in Mannheim, West Germany, or outlying areas who are hams. Mark S. Starin, WA1TZK, 3248 Winton Rd. S., Apt. K-34, Rochester, NY 14623.

QST congratulates . . .

☐ Mr. M. Mili, secretary general of the ITU, recently awarded a medal and diploma of honor by the International Council on Archives.

☐ recently retired Western Airlines Captain Carl Smith, WØBWJ, who shared with three fellow crew members the Air Safety Award of the Air Line Pilots Association for their safe, skillful landing of a nose gear-up airliner at Honolulu on January 7, 1977. Carl, of course, is an ARRL vice president.

☐ the Jet Propulsion Laboratory Amateur Radio Club (CA), recipient of the fourth annual Good Image Award from Henry Ruh, WB9WWM, editor and publisher of *Amateur Television Magazine*. The plaque, featuring a TV camera tube, represents "excellence in promotion of Amateur Radio through the use of video (slow- or fast-scan television). Foremost in JPL ARC's achievements was their 1976 commemorative operation, N6V, of the Viking mission to Mars. — *WA1STO*

Celebrating (in Miami) the 50th anniversary of the Radio Club of Cuba recently were (l-r) Mike Alonso, WB4VMU, who organized the Radio Club of Cuba in Exile; Umberto Forte, WB4TOJ; Alberto Giro, WB4WKO, founding president of the RCC in Havana; Rafael Gonzales, WA4IEE, a former president; and Adulberto Alvarez del Regato, a founding member of the club.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

*W1BV, William Holt, Canton, MA
ex-W1EZW, William H. Edwards, N. Kingstown, RI
W1FZJ, Francis S. Harris, Medfield, MA
W1GOB, Carroll E. Hamilton, Ossipee, NH
W1LEI, Walter E. Rhodes, Milford, CT
W1TXR, William P. Durkin, Stamford, CT
KA2AKZ, Harry F. Martin, Bearsville, NY
W2BUB, Benton H. Marder, Bound Brook, NJ
K2CQG, Roy H. Norby, Mahopac, NY
W2DNE, Frank J. North, New Hartford, NY
W2EYF, Griffith W. Cole, Lanoka Harbor, NJ
W2FQP, Herman G. Brower, Delmar, NY
W2ING, William T. Nystrom, Allendale, NJ
W2KEB/K7NOA, Georgianna F. Mezey, Sun City, AZ
W2NBZ, Peter A. Swolak, Short Hills, NJ
W2NGX, Sol Mesel, Jersey City, NJ
WA2QIG, Robert A. Hyde, Fulton, NY
K2QIV, Stanley P. Thomas, Webster, NY
K2STS, Herman Steitz, Walton, NY
W2YBK, Laurence F. Triggs, Freeport, NY
WB2YFJ, Edwin J. St. Peter, Greensboro, NC
WB2YNR, Leonard J. Cole, Hamburg, NY
K2YSK, Frank Bergerman, Long Beach, CA
W3DJV, Fred J. Kremer, Lansdale, PA
W3NHJ, Bruce T. Leibensperger, Hazleton, PA
WD4BED, Eric M. Storrs, Orlando, FL
K4CDX, William R. Atkinson, Loganville, GA
K4CJJ, William R. Stevens, Alexandria, VA
W4EQG, Earnest M. Curtis, Point Clear, AL
K4FNG, Thomas W. Justice, Sr., Hopewell, VA
WB4HKD, James N. Miner, Columbus, GA
W4HWZ, Oran C. Zaebst, Pawleys Island, SC
K4JBW, Gilbert L. Rossiter, New Port Richey, FL
K4JOK, William S. Lawson, Port St. Lucie, FL
W4KQV, Dr. I. Irving Vics, Bradenton, FL
K4PK, Edward Hallen, Largo, FL
WA4THM, Daniel J. Meade, Delray Beach, FL
W4UMV, Harrison G. Adkins, Sr., Fort Mill, SC
W5MHM, Hugh V. Smith, Plainview, TX
W5NY, Virgil A. Francis, Ft. Worth, TX

*Life Member, ARRL

WA5OLH, John A. Andrews, Wiggins, MS
W5QB, Col. James E. McGraw, San Antonio, TX
W5QOV, Rastus L. Ethridge, Hereford, TX
K6AVL, Harold D. Royston, Vista, CA
WD6CHT, Michael F. McKeown, Ontario, CA
W6CJY, Dr. Jack G. Vogelman, Saratoga, CA
W6CUG, Murray J. Douglas, Concord, CA
K6DI, Alden H. "Het" Rogers, Summerland, CA
W6EPL, Ivan A. Matteson, Santa Barbara, CA
W6GNU, Bramblett M. Miller, Oakhurst, CA
WA6HMI, William C. Bremigan, Santa Barbara, CA
W6HPN, John M. Somerville, Lancaster, CA
W6IOV, James H. Rose, Pismo Beach, CA
W6JLL, William M. Shimer, Madera, CA
WA6MCV, Loren M. Noyes, Glendale, CA
*W6MWI, Dane C. Jordan, Visalia, CA
W6NVZ, Fred C. Massetti, Madera, CA
W6OQZ, Oswald H. Alwes Sr., LaCrescenta, CA
WA6PAO, Frank E. Holm, Victorville, CA
WB6VRI, Emerson Shepard, Elsinore, CA
K6WQ, James W. Crouse, Oakland, CA
W6ZOV, Thomas J. Pritchette, Compton, CA
WA6ZRA, Joseph G. Kemmeter, Santa Maria, CA
W7AT, Frank Beal Mossman, Seattle, WA
W7AZP, George Little, Newport, OR
K7BDI, John E. Morgan, Orem, VT
W7BW, Kenneth E. Carter, Seattle, WA
K7DT, Richard P. Mortell, Bellevue, WA
W7IAB, Chester L. Beck, Warrenton, OR
WB7PHB, Blake M. Grosenbach, Caldwell, ID
WA7TEN, Howard R. Vescelius, Sun City, AZ
K8BJC, David F. Eaton, Decatur, MI
W8CIN, Warren J. Root, Berea, OH
W8DGO, Charles R. Glaser, Shadyside, OH
WA8DTU, Mark G. Urschel, Dayton, OH
W8DUX, Murray T. Erb, Sebring, OH
W8FHU, John Simon, Sr., Rock Creek, OH
W8HLA, Donald G. McGee, Niles, OH
W8IFF, Carmine Picano, Flat Rock, MI
WB8KOL, Charles K. Welch, Kettering, OH
K8KOM, Harry R. McNutt, Toledo, OH

W8SGK, Melvin Emanuel, Medway, OH
WA8TAN, James R. Burrough, Plainwell, MI
WA8TCD, Harry E. Taylor, Lansing, MI
N8TR, Alan G. Fidelman, South Haven, MI
WA8UKJ, John V. Humphrey, Jackson, OH
WA8ZBA, Willard L. Sommers, Bridgeport, OH
W8ZKT, Arthur G. Lofstrom, Iron Mountain, MI
WA8ZVW, Joseph V. Mancuso, Gaylord, MI
W9DCK, Russell C. Murphy, Shawano, WI
WD9DLH, Henry W. Hoeft, Sheboygan, WI
K9ENW, Juhan Raja, Morton Grove, IL
W9GQS, Francis D. Cook, Westchester, IL
WD9GUQ, H. Maynard Dixon, Lodi, WI
WB9HUZ, Henry A. Stats, Oak Park, IL
W9KBC, Robert W. Faulkner, Palatine, IL
W9ODP, Henry J. Boldt, Sheboygan Falls, WI
WA9OUV, Rita A. Milbourne, Worth, IL
W9PTQ, Randall L. Moody, Charleston, IL
W9RZZ, Harry J. Wahlberg, Maywood, IL
K9UMV, Lorraine M. Anderson, Chicago, IL
W9WBB, Andrew A. Schuble, Chicago, IL
W9ZES, John W. Milks, Lafayette, IN
WØBHY, Aaron E. Swanberg, St. Paul, MN
WDØBYD, Myron G. Fairless, Jr., Poplar Bluff, MO
WØDZV, Leo J. Arthurs, Cedar Rapids, IA
WBØHCG, Thomas F. Ramacciotti, St. Louis, MO
KØHNT, Hugo E. Carter, Wood River, NE
KØIWQ, Harold L. Weber, Hooper, NE
WØJYZ, William D. Shadomy, Wichita, KS
WØOFW, Earl W. Roberts, Council Bluffs, IA
WØOGN, Hugh B. Cabeen, Salina, KS
WØOPF, Edgar W. Thompson, Boulder, CO
KØRZH, William D. McCaa, Broomfield, CO
WBØTLC, John W. Graham, Valentine, NE
WØTXK, Irvin I. Simmons, Huron, SD
WØZCW, Gilbert E. Howarth, Oskaloosa, IA
VE1AYN, A.R.L. Clattenburg, Dartmouth, NS
VE1BBQ, Ian Malcolm, Dartmouth, NS
VE7PX/ex-VE5PX, Norman Dixon, Victoria, BC
G2FLK, Toby L. Delvin, Essex, Great Britain
TG7BY, The Rev. Anthony M. Briskey, Livingston, Guatemala
ZL2CW, William H. E. Jensen, Hutt, NZ

Club Notes

Door prizes. For your hamfests, meetings or other club happenings, Radio Shack offers five free copies of *Archer Semiconductor Reference Handbook*, a 144-page book on the handling of transistors and more. Write to: Radio Shack, Department SRH, 1400 One Tandy Center, Fort Worth, TX 76102. Tell them for what event you need the publications.

How about FCC representation at your hamfest or other club function? If the Field Office can't schedule you in, they'll send you materials to display. Write to: FCC, Personal Radio Division, Attn: Public Liaison (Room 5102), Washington, DC 20554.

Neither one of the above items is news. We've mentioned them in *Radio Club News* in the past. But somehow we get the idea no one has taken up either offer.

Your club TVI committee at a standstill? Baffled over an unsolved case? Try the new ARRL *Radio Frequency Interference* book for ideas.

Any club interested in having us check out your "roots"? We keep files on all affiliated clubs of the past and present. Send us a list of all of the possible names your club may have held from years back. We'll check to see if they were your predecessors. If a club was your group's ancestor, we'll combine the files if you wish, and send you copies of your history. Your club may have been affiliated for ages! Let's hear from you.

Need club stationery? We have attractive ARRL affiliated-club letterhead stationery at $3 for a hundred sheets. The rose-colored printing can be overprinted with your club's logo and name. What about membership solicitation brochures? We help out with that, too. This six-page brochure, in two colors of green, goes for $6 for 100 pamphlets. Again, the club logo and name and address can be overprinted on the blank square area on the back page. The topic covered? Why you should join a club. Write! — *Rosalie White, WA1STO*

Strays

REPEATER TROOPS RIDE TO VICTORY

☐ Directed for the fifth year by Brock Roblin, W6RNL, 21 members of the Far West Repeater Association turned out to coordinate communications for the March of Dimes bike-a-thon over California's Highways 101 and 299. Mobiles and handie talkies were used to cover the 40-mile route. — *Mark Nelson, AA6DX*

FAITH REMAINS IN TRAGEDY'S WAKE

☐ Tragedy in the form of fire struck the Norman, OK, home of Walt Kinney, WB5MWP, and his XYL, Sue, WB5MWO, some months ago. Both Walt and Sue suffered second- and third-degree burns, and Walt was overcome by smoke. Extensive hospitalization, which included nine days in the intensive care unit for Walt, brought them through.

They are both together again, but not back on the air yet. Walt is still too weak to get up on the roof and run new coax to their inverted V so they can rejoin their friends of many years on 40 meters. Sue said their faith in those amateur acquaintances was bolstered when they learned a special bank account had been set up for anonymous contributions to help them get back on their feet. Much of the money received was used to pay the cost of a special attendant for Walt in the hospital, so that Sue could go home at night to get much-needed rest. They also bought new oxygen flow gauges and refill oxygen cylinders to replace units lost in the fire which Walt needed every day to go on living.

"We thank everyone for their donations, for all the get-well cards and words of encouragement," Sue wrote recently. "Maybe some day, in some way, we can help someone in return for the help we have received."

Meanwhile, WB5MWP and WB5MWO remain the proud owners of a working, although slightly smoky, Kenwood TS-520. One of their fondest hopes is to be back on 40 meters again.

The 1978 Birminghamfest featured a special license testing program for the handicapped which proved very successful. Pictured, left to right, are Jim Gilliam, WA4VAO, exam committee chairman; Charles Johnson, WD4LQI, one of those who upgraded his license during the special test session; Charles McDavid, K4YNZ, Birminghamfest security committee chairman; and Angelo Ditty, engineer-in-charge of the FCC field office in Atlanta, who made a special trip to Birmingham to supervise the exams. *(N4QB photo)*

YL News and Views

Conducted By Louise Moreau,* W3WRE

It's Only the Beginning

Forty years ago Ethel Smith, K4LMB, saw the need for a formal organization of the growing numbers of women Amateur Radio operators and issued an invitation in *QST* for the gals to stand up and be counted. The answers were fast and eager, and the Young Ladies' Radio League was founded. Before the year ended the first club bulletin was published as *YL News*, but it changed almost immediately to the present title, *YL Harmonics*. The first QSO party held in 1939 has become the annual YLAP which celebrates the anniversary of the club each year, while "33," originated earlier by Clara Reger, W2RUF, was adopted for exclusive YL use.

During the wartime suppression of all on-the-air activities, the club membership kept increasing through the special LSPH licenses for women licensed since Pearl Harbor, and the membership kept in touch through the club journal as more and more YLs became a part of the armed forces.

Following the opening of the amateur bands, the YL population had increased to the point where YLRL was able to sponsor the WAS-YL certificate and, as the years passed, WAC-YL, YLCC and the DX-YL for women operators only, to encourage contact with the increasing numbers of women in other countries. For the membership there was the continuous membership certificate, and finally, in the 1970s, the worldwide picture had reached the point that it was possible to issue the DX-YLCC award, for at last it was possible to verify contact with YLs in 100 DX countries as the Canadian YL Club, CLARA, had found earlier.

The idea of a Leap Year Party was so successful in the 1930s that it developed into the very popular, annual YL-OM contest. The YLRL contest calendar opens the club fall activity with Howdy Days; really a QSO party for the membership to get back into the swing after the long summer vacation, as well as to meet and encourage newly licensed YLs to become more active on the air. Most recently the DX YL to North American YL Contest has been added to the club calendar.

But there were more than contests in the plans of this first of all-YL organizations. The interest in getting to know us better that was shown by DX women, and their eagerness for affiliation with the club, brought about the YLRL "Adoptee Program" that, through sponsorship by a club member or affiliated YL club, a DX woman could become a member and thus avoid the red tape of international exchange. Through this plan some 80 women Amateur Radio operators are club members representing 40 countries.

Concern for the blind was the second permanent activity with the Tape Topics program that made *YL Harmonics* and *QST*'s "YL News and Views" available on tape for all the sightless YLs in the U.S.

In 1978 YLRL started the club's third permanent activity, the YLRL Scholarship Fund.

Forty years ago YLRL started with a handful of female Amateur Radio operators who wanted to know about other YLs. This year the more than 1000 members representing almost 50 countries on all continents will be celebrating the club's 40th anniversary at the YLRL International Convention in Philadelphia, PA, at the end of June, with a theme that looks back over the years and says, "It's only the beginning."

"YL News and Views," representing all woman Amateur Radio operators, extends to the Young Ladies' Radio League best wishes and congratulations on a most successful 40 years.

*YL Editor, *QST*. Please send all news notes to W3WRE's home address, 305 N. Llanwellyn Ave., Glenolden, PA 19036.

YL-OM CONTEST

The annual YL-OM contest dates have been set with the phone contest scheduled for Saturday and Sunday, February 17-18, 1979. The cw contest dates will be Saturday and Sunday, March 3-4, 1979. All rules can be found in "Operating Events," *QST*.

A reminder that all logs should be sent to the YLRL contest custodian, Margaret Williams, WA4FTJ, and not to this column. Our rerouting of the logs causes delay that well could disqualify them.

1979 YL NET DIRECTORY

Daily nets. YLISSB at 1600 UTC on 14.333 MHz; SPARCYL at 1700 UTC on 7.261 MHz. *Monday:* Buckeye Belles at 1400 UTC on 3.950 MHz; Honeybee at 2200* UTC on 3.915 MHz. *Tuesday:* YLISSB at 0030 UTC on 7.275 MHz; Buckeye Belles at 0100 UTC on 3.972 MHz; CLARA at 0130 UTC on 3.775 MHz; Floridoras at 1400 UTC on 3.933 MHz; Jayhawker at 1430 UTC on 3.940 MHz, Coffee Cup at 1500 UTC on 3.915 MHz; MINOW at 1530* on 3.670 MHz; Ironing Board Net at 1700 on 7.235 MHz; CLARA at 1900 UTC on 14.160 MHz. *Wednesday:* YLISSB at 0030 UTC on 7.275 MHz; LARK at 0230 UTC on 7.130 MHz; Yankee Lassies at 1230* UTC on 3.910 MHz; The Harem at 1400* on 3.930 MHz; GAYLARK at 1700 UTC on 3.955 MHz; YL Open House at 1800* UTC on 14.288 MHz; New Englanders at 1900 UTC on 50.650 MHz. *Thursday:* YLISSB at 0100 UTC on 3.926 MHz; YASYL at 1300 UTC on 3.950 MHz; TYLRUN at 1400 UTC on 3.940 MHz; Georgia Peaches at 1400 UTC on 7.275 MHz; YLISSB at 1500 UTC on 21.373 MHz. *Friday:* YLISSB at 0030 UTC on 7.275 MHz; Pinal Mt. YLs at 0300 UTC on 146.13/73 MHz; Working Girls at 0400* UTC on 3.933 MHz; Midwest YL at 1400 UTC on 7.270 MHz; MINOW at 1500* UTC on 3.913 MHz. *Saturday:* YLISSB/VK-ZL System at 0300 UTC on 14.333 MHz; Hawk Roost at 1400 UTC on 3.910 MHz; YLISSB at 1600 on 14.333; Ontario Trilliums at 2000* UTC on 3.770 MHz. *Sunday:* YLISSB at 0030* UTC on 7.275 MHz; Western Pennies (First Sunday) at 1430 UTC on 3.990 MHz.

All these nets, except Honeybee, Jay Hawker, Ironing Board, The Harem, YL Open House, Pinal Mt., Working Girls, Midwest and Western Pennies, issue certificates for participation.

*Net retains the same local clock time all year by meeting one hour earlier during daylight savings time.

50 Years Ago

January 1929

☐ Heralding the new 1929 regulations, Editor Warner asks members for comments on the gear that *QST*'s staff has designed to meet the stricter requirements, and on a system of band subdivision to facilitate international communication.

☐ Ten meters has been available for our use a sufficient number of months to permit Ross Hull to appraise its performance despite minimal activity. W6UF is a major source of information, working (among others) W1CCZ and ZL2AC.

☐ W1CGR says you can avoid the expense of a crystal and still get adequate stability if you use a series-feed Hartley, a heavy tank circuit for the oscillator, and a well-filtered power supply.

☐ W6HM has tried the "1929" receiver described in the November issue and declares it "all it is cracked up to be," able to separate stations which previously were a jumble of signals.

☐ Technical Editor Westman does a rehash of basic antenna knowledge — mostly discussing current vs. voltage feed.

☐ Allen DuMont has devised a remote control system actuated by sound waves — a cigar-box sized enclosure resonates and dislodges a spring copper tab, breaking a circuit and operating a relay.

☐ Stuart Seaton says that in some cases adding capacity at the ends of an antenna can increase its transmitting efficiency.

☐ The San Diego Electric Railway has installed filters to reduce commutator noise to b.c. reception, but can't do anything about the sparking at the trolley wheels.

☐ W8CAU has a simple, but very neat system of filing for his extensive traffic work.

25 Years Ago

January 1954

☐ Three vertical elements in W9LI's backyard provide him switchable directivity on two bands, without the cost and public notice of a huge tower and beam.

☐ Sideband has 9 db. of improvement over a.m. in talk power, says W1DF, which doesn't mean comparisons of input.

☐ W3PNR has a "penthouse" lashup on his car, and the loaded whip mounted atop it gives pleasing results on 75.

☐ W1GKR and W8ZYX describe a c.w. monitor whose transistor is powered from the rectified r.f. being measured.

☐ There are some fairly simple modifications of modern commercial receivers to improve their performance, which W1DX recites for us.

☐ Central Electronics announces its new 20A sideband exciter, which will give the new mode a real boost.

☐ Not that the 75A-1 really needs it, but W3AM has devised a mechanical filter plug-in to add even more selectivity.

☐ A circuit diagram can be a frustrating puzzle or a clear presentation, says W1DX, depending on how the draftsman lays it out.

☐ W1JEQ's current lab production is a three-control, six-band transmitter with an 813 handling a half-kilowatt.

☐ Every ham shack should have an assortment of suitable tools, and W1ICP shows what selection is most appropriate for the newcomer.

☐ W1HDQ has achieved improved sensitivity and stability in his new crystal-controlled converter for 432 Mc. — *W1RW*

Hamfest Calendar

Indiana: The South Bend swap and shop is January 7 at the New Century Center downtown on U.S. 31 across from St. Joseph Bank Bldg. Talk-in on 52 and area repeaters.

Michigan: The 10th annual Oak Park ARC hamfest is January 7 from 8 to 3 in a new location, Oak Park High School, 9-1/2 Mile Rd. and Coolidge. More table space and parking. Prizes. Talk-in on 52. Further info from Dave Lefko, WB8RGQ, 32252 12 Mile Rd., Farmington Hills, MI 48018, Tel. 313-553-9898.

Michigan: The Southfield High School ARC holds its 14th annual swap and shop on January 21 at Southfield HS, 10 Mile Rd. and Lasher. Admission $2. More info, send s.a.s.e. to Robert Younkers, 24675 Lasher Rd., Southfield, MI 48034. Tel. 313-354-8210.

Michigan: The Cherryland Amateur Radio Club will be having its annual swap and shop on Saturday, February 10, at the NW Michigan College Technical Center between 9 A.M. and 4 P.M. For information, contact Greg North, Box 115, Lake Leelanu, MI 49653. Tel. 616-271-6650.

New Hampshire: The Interstate Repeater Society, Inc. will hold its 3rd annual auction and hamfest on February 10 in the Manchester Armory. Starting time is 9 A.M. The armory is located just across the Amoskeag Bridge from I-93. The auction will be held regardless of weather. Bargains galore, commercial exhibits, free admission, free parking. Talk-in on 146.52, 146.25/85, and 224.86/223.46.

Ohio: The Mansfield midwinter hamfest/auction will be held February 11 at the Richland County Fairground, Mansfield, OH. Prizes, flea market, auction. Large heated building. Doors open to public at 8 A.M. Talk-in 146.34/94 MHz. Tickets $1.50 in advance, $2 at the door. For additional information or advanced tickets and tables, contact Harry Frietchen, K8HF, 120 Homewood, Mansfield, OH 44906. Tel. 419-529-2801 or 419-524-1441.

Virginia: The Richmond Frostfest II, sponsored by the Richmond Amateur Telecommunications Society, is January 14 at the Bon Air Community Center. Technical symposium, drawing and homebrew contest: over 18 and under, with framed certificate to winners of most original idea, best mechanical and best electrical construction. FCC exams start at 10 A.M. Mail form 610 to RATS at least five days prior to 'fest. Admission $2.50, indoor flea market with table $2.50, outdoor frostbite tailgate $1. Talk-in on 52, 28/88 and 34/94. Richmond Amateur Telecommunications Society, P. O. Box 1070, Richmond, VA 23208.

Wisconsin: The seventh annual Midwinter Swapfest of the West Allis RAC is January 20, 8 A.M., at the Waukesha County Expo Center. Refreshments and prizes. Admission $1.50 advance, $2.50 at door, reserved tables $3 until January 12. Take I-94 to Waukesha Co. F, south to FT, west to Expo. S.a.s.e. to WARAC, P. O. Box 1072, Milwaukee, WI 52301.

Coming Conventions

January 27-28
South Florida Section, Miami, FL

March 2-4
Southeastern Division, Orlando, FL

March 17-18
South Carolina State, Greenville, SC

March 30-31
Great Lakes Division, Muskegon, MI

April 21-22
Missouri State, Kansas City, MO

May 19-20
Alabama State, Birmingham, AL

May 25-27
New York State, Rochester, NY

June 15-17
Central Division, Milwaukee, WI

June 16-17
Georgia State, Atlanta, GA

June 30-July 1
West Virginia State, Jackson's Mill, WV

ARRL NATIONAL CONVENTIONS

July 20-22, 1979
Baton Rouge, LA

July 25-27, 1980
Seattle, WA

March 13-15, 1981
Orlando, FL

SOUTH FLORIDA SECTION CONVENTION

January 27-28, 1979, Miami, FL

Dade Radio Club again invites you to say goodby to the wintry weather in January and attend the South Florida Convention in Miami. Combined with the 19th Annual Tropical Hamboree for the biggest hamfest in the Southeast, it can be a super vacation. We have everything you will find in Latin America and the Caribbean with none of the customs or currency problems! Free overnight space for RVs (self-contained) and low fares on several new airlines make it especially easy to get here. In the big auditorium, there will be 100 booths of manufacturers, distributors and club exhibits. On the lower level, you will find a giant flea market, and in meeting rooms a variety of technical sessions. Most of the Directors will be on hand following the ARRL January Board Meeting. All this for $3 in advance, $4 at the door. Want more information? Write D.R.C., P. O. Box 350045, Riverside Sta., Miami, FL 33135.

Strays

I would like to get in touch with . . .

☐ any military personnel who have operated from Korea (ROK) within the past three years. MSG J. A. Magness, WD4BVU, 1621 Sunset Dr., Murray, KY 42071.

☐ hams who show purebred dogs, especially terriers, to set up skeds or a net. Mel Granick, WA2SEL, 6 Melanie Ln., Syosset, NY 11791.

☐ hams who collect metal roboter toys produced in late '60s. Jean Binet, In den Haferwiesen 30, 6506 Nackenheim, Germany.

☐ amateurs involved in any way with the art of prestidigitation, for skeds. Steve Fogelman, K3IS, 6935 Greentree Rd., Bethesda, MD 20034.

☐ owners of Ten-Tec Century 21 transceivers, perhaps to form a Century 21 club. David M. Arruzza, WA1UUD, 32 Benz St., Ansonia, CT 06401.

☐ hams who were in the signal or radio gang aboard the USS *South Dakota* BB 57. Craig Crippen, WA9GBP, 1169 26th St. -A, Moline, IL 61265.

☐ anyone who knows of a clean living environment for a person who suffers severe allergic and hypersensitive reactions to almost every known kind of airborne contaminant. Karin F. Berthelsen, 2015 Argyle Ave., No. 17, Hollywood, CA 90068.

Passing time during the filming of a new Disney movie, comedian/writer/actor Stu Gilliam, WD6FBU, shows two pals (Don Knotts and Tim Conway) a thing or two about his new hobby. *(copyrighted photo courtesy of Walt Disney Productions)*

Contest Disqualification Criteria and Club Competition Rules

Here are the ground rules for all ARRL-sponsored contests during 1979.

Various ARRL operating contests held each year are built around rules by which participants must abide. Through the years, means of enforcing those rules in a manner fair to all participants have evolved into a set of guidelines based primarily on recommendations of the ARRL Contest Advisory Committee. Those guidelines are called the disqualification criteria, and are used as the basis for examination of possible rules infractions. The Headquarters Awards Committee provides a recommendation in each case to the communications manager, with whom responsibility for the final decision lies.

What follows are those disqualification criteria, along with rules for club competition in ARRL contests. The disqualification criteria apply to all ARRL operating activities, and the club competition applies to the VHF Sweepstakes, the DX Competition, and the November Sweepstakes. Rules for all contests throughout the coming year will refer the reader to this page concerning rules enforcement and club competition.

Club Competition

Only ARRL-affiliated clubs may participate in the club competition. A member must be listed in the regular score listings before he can be counted for a club.

In order for a club to be listed, two conditions must be met:

1) At least three entries from members of the club must be submitted.

2) All members wishing to be included in the club scores must indicate the club name on their summary sheet *and* the club secretary must send a list of all club members eligible to compete for the club and which level (unlimited, medium, local) they wish to enter for *each* competition. Remember to meet the mailing deadline!

There are three levels of club competition:

1) *Unlimited.* Any club submitting 51 or more *entries* would be in this class. (One station can submit two entries, one on phone and one on cw in the November Sweepstakes and the DX Competition.) All stations and all operators must reside within 175 miles of the club's center. All members more than 50 miles from the club's center must attend at least 50 percent of the club's meetings to be eligible to submit an entry. If, however, he has not been a member for a year's time, he must have attended at least 50 percent of the meetings since he became a member. There would be no attendance requirement for those members within 50 miles. However, to be considered bona fide, a member must be active in club affairs. Members living outside of 175 miles and/or members operating stations outside of 175 miles may not compete in the club competition. The club must be an ARRL-affiliated club.

2) *Medium.* Any club submitting more than 10 but not more than 50 entries would be in this class. There would be the same mileage and attendance requirements as the unlimited class club. The club must be an ARRL-affiliated club.

3) *Local.* Any club submitting 10 entries or less would be in this classification. All members must reside within 20 miles of the club's center. There would be no attendance requirement. Again, the club must be an ARRL-affiliate.

Single- and multioperator station scores may be counted. At a guest-operated single-operator station, both the guest-operator and the station licensee must be members of the same club in order to count the score for that club. At multi-operator stations at least 66 percent of the operators must be members of the same club in order for the score to count for that club.

In conjunction with the 50-percent attendance rule, the club must hold *at least* four in-person meetings per year. A club's entry classification may be changed if, in the opinion of the ARRL Awards Committee, the club has manipulated its number of entries to fall into a lower classificiation (i.e., if a club with 100 members submits only the 50 highest scores, even if more than 50 of its members wish to compete).

It is not within the intent of these rules that a club should vote out a member or a member resign and then be voted back into the club later in order that he can meet the 50-percent attendance rule.

The highest affiliated-club entry will be awarded a gavel in each category (unlimited, medium, local).

The highest single-operator cw score and the highest single-operator phone score in any club entry will be rewarded with a club certificate when at least three single-operator cw and/or three single-operator phone scores are submitted.

Disqualifications

If the claimed score of a participant is reduced by two percent or more, the log may be disqualified. Score reduction does not include correction of arithmetic errors.

Score reductions may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contacts, banned countries, and/or other scoring discrepancies.

An entry with more than two-percent duplicate contacts left in the log or an entry where more than two-percent "rubber clocking" (altering the actual time to increase the operating time so that it is greater than the allowable limit) is detected *will be automatically disqualified.*

If a participant is disqualified, he will be barred from submitting an entry in the next annual running of that specific contest, e.g., disqualification from the 1977 phone SS prohibits submission of an entry for the 1978 phone SS, but 1978 cw SS participation is OK.

The calls of all disqualified participants

will be listed in the *QST* contest report.

Any participant on the border line of disqualification but not actually disqualified, may receive a warning letter.

For each duplicate contact that is removed from the log by Hq., a penalty of three additional contacts will be exacted. The penalty will not, however, be considered as part of the two-percent disqualification criterion.

In all cases of question, the decisions of the ARRL Awards Committee are final.

45th ARRL International DX Competition

The 45th running of the ARRL DX Competition initiates the one-weekend-per-mode contest. You've got to do it in one weekend this time; no chance to catch up.

Now is the time to send for a set of contest forms. An s.a.s.e. with first-class postage will get you one of each.

Remember to mail your entry by April 23, 1979, to be eligible for *QST* listings and awards.

Rules

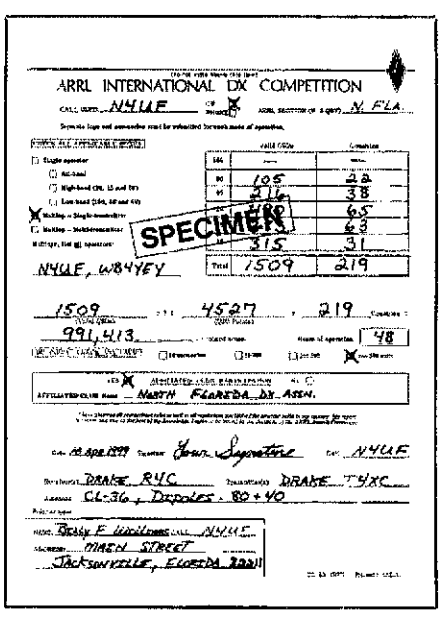
1) *Eligibility:* Amateurs worldwide, operating fixed stations, are invited to participate.

2) *Object:* Amateurs in the 48 contiguous United States and Canada will try to work as many amateur stations in other parts of the world as possible. Other amateurs work W/VE.

3) *Conditions of entry:* Each entrant agrees to be bound by the provisions of this announcement, by regulations of his licensing authority, and the decisions of the ARRL Awards Committee. The ARRL Awards Committee will void or adjust entries as its interpretation of these rules may require. Its decisions will be final.

4) *Entry classifications:* Entries may be made in either or both the phone or cw sections. Cw scores are independent of phone scores. Entries will be further classified as single- or multioperator stations. Single-operator stations are those at which one person performs all the operating, logging and spotting functions. Multiple-operator stations are those obtaining any assistance, such as from spotting or relief operators, or in keeping the station log and records. Single-transmitter, multioperator entries will be recognized as a distinct category from multi-multi. Multi-single stations that make a contact on one band must remain on that band for 10 minutes. The use of electronic or mechanical devices or any other methods of simultaneous operation on two or more bands is prohibited. The use of two transmitters simultaneously on one band is prohibited. *The use of spotting nets (operator arrangements involving assistance through DX alerting nets, etc.) places an entry in the multioperator category.*

Single-operator stations may enter in the all-band, high-band or low-band categories. The all-band class may use any combination of legal amateur bands; the high-band class is for those using only 20, 15 and 10; the low-band class is for those using only 160, 80 and 40. Single-operator stations may enter in only one class and that class must be clearly indicated on your summary sheet. Operation on a band not allowed in your class (i.e., operating on 20 while competing in the low-band class) is permitted although those points cannot count toward your score. For those competing in either the high-band or low-band class, it is recommended that a separate list of any QSOs made on a band(s) not within your class be submitted for checking purposes. Multioperator stations may compete only in the all-band class. Multi-single stations may not operate as multi-multis and trim contacts from the log to fit within the multi-single guidelines.



5) *Contest periods:* There are two weekends, each 48 hours long; one for phone work and one for cw.

6) *Valid contacts:* In the phone section, all claimed credits must be made voice-to-voice. In the telegraphy section, only cw contacts count. Cross-band contacts may not be counted. Three points are earned for each completed two-way exchange. Incomplete QSOs will not count for contest points or multipliers. The same station may be worked again for additional points if the contact is made on a different frequency band.

7) *Exchange:* (a) Amateurs in the 48 contiguous United States and Canada transmit a two- or three-figure number, representing the RS(T) report, plus state or province. (The latter may consist of an appropriate abbreviation.) Example: K5RC might transmit "579 TX" on cw, "57 Texas" on phone. (b) Other amateurs will transmit five- or six-figure numbers, each consisting of the RS(T) report plus three "power" numbers. The power indicator will represent the approximate transmitter power input. Example: LU2AFH, with 500-watts input, might transmit "579500" on cw, "57500" on phone. An input of 1000 watts would be indicated by 000.

8) *Scoring:* W/K and VE/VO stations multiply total points earned under Rule 6 by the number of countries worked on one band plus the number of countries worked on each other band. All other stations multiply total points earned under Rule 6 by the sum of the number of continental states and VE/VO licensing areas worked on each band.

There are 48 continental states plus VO and VE1-VE8, a possible total of 57 multipliers *per band.*

9) *Reporting:* A summary sheet, log sheets and a DX checkoff sheet for each band used (CD-175 or CD-175A or facsimile) are required from all W/VE/VO entrants (except KH6 and KL7). DX entrants (including KH6 and KL7) must

submit log sheets and a summary sheet. Separate logs, summaries and check sheets (when required) are required for each mode used from all entrants. Single-operator and multi-single entries must submit logs arranged chronologically *not* on a by-band basis.

Contest reports must be postmarked no later than April 23, 1979, to be eligible for *QST* listings and awards. Entries that arrive after mid-July may not make *QST* listings. All DX competition logs become the property of the American Radio Relay League and none can be returned.

10) *Awards:* To document the performance of participants in the ARRL International DX Competition, a full report will be carried in *QST*. In addition, special recognition will be made as follows: (a) A personalized plaque will be awarded to the highest single-operator DX phone and cw station (non-W/VE) in each continent. (b) On both phone and cw, a certificate will be awarded to the highest-scoring single-operator station in the all-band, high-band and low-band categories in each country, in Alaska, Hawaii and in each of the contiguous U.S. and Canadian ARRL sections (see page 8 in any *QST*) from which a valid entry is received. In addition, a certificate will be awarded to the highest-scoring multi-single and the highest-scoring multi-multi station in each W/VE call area and DXCC country from which a valid entry is received. (c) A certificate will be awarded to each noncountry winner DX entrant making 1000 or more QSOs on *either* mode.

11) Information on affiliated club competition and disqualification criteria is on page 85, this issue.

1979 Contest Periods

Phone		
Starts	March 3	0001 UTC
Ends	March 4	2359 UTC
CW		
Starts	March 17	0001 UTC
Ends	March 18	2359 UTC

1979 Novice Roundup Announcement

Novice and Technician licensees take note, this is your contest. Achievement certificates are available.

The annual Novice Roundup (number 28, for those who are keeping count) should be among those events circled on your operating calendar. It's a good idea to start to get it all together and finalize your operating plan of attack. All that one needs to know about participating in the Novice Roundup is outlined below. Be sure to read very carefully.

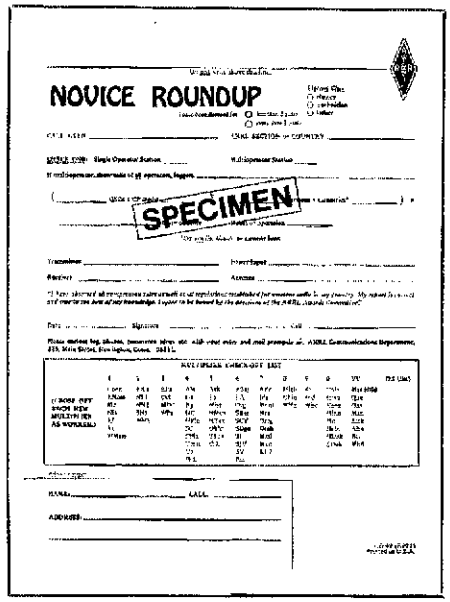
The favorable response to the 200 QSO achievement award level, instituted for last year's NR, signaled "one more time." Again, each and every Novice or Technician (single operator) who submits a *valid* entry of 200 or more QSOs during the Novice Roundup will receive a certificate attesting to same.

In the interest of trying to equalize the competition, there will be two categories within each competitive classification: (1) Those Novices licensed for two years or less will compete *only* against other Novices licensed for two years or less, and (2) Novices licensed for more than two years will compete *only* against other Novices who have been licensed for two or more years. The same applies in the Technician category. ***Be sure to indicate on your entry the length of time you've been licensed.***

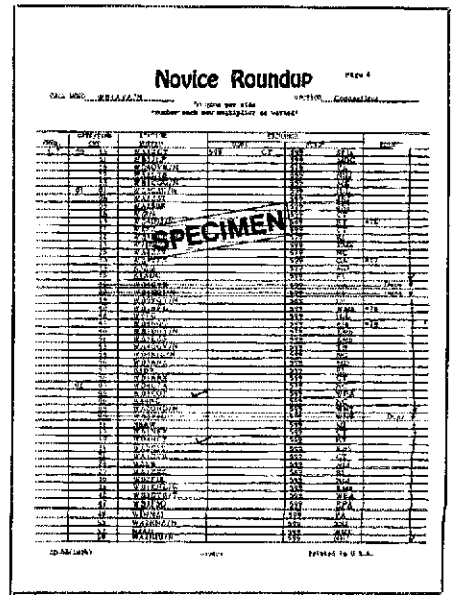
If you have read this far, keep going; the rules follow. Good Luck.

Since Novices are now issued permanent-type call signs, how do you tell the Novices from the others? This is handled rather easily by requiring that Novices sign with a slant bar (dahdididahdit) followed by the letter "N" after their call sign.

If a Novice operates portable from a


NOVICE ROUNDUP

SPECIMEN


Novice Roundup

SPECIMEN

call area other than that indicated by the number in his call sign, the general rule that now applies to all ARRL contestants also applies to Novices. The Novice will sign his call, slant bar, the number of the call area he is operating in, and "N." Example: A Novice, KA1ABC, is portable within the first call area, so he signs KA1ABC/N in the Novice Roundup. Another Novice, KAØBBB, is operating portable in New York (second call area); he signs KAØBBB/2N.

Technician class licensees may participate in the Novice Roundup on the same terms as Novices, but they will be competing against other Technicians and *not* against Novices in their ARRL sections. Techs will sign /T, for purposes of identification, and they may work Novices, other Technicians, and General, Advanced and Extra licensees, all for points. Technicians will be eligible for awards, same as Novices. All licensees other than Novices and Technicians will be working *only* those stations signing /N or /T.

Now that we've decided who can be in the NR (everybody) and who is competing against whom (Novices vs. Novices, divided between those who have been licensed for more or less than two years, and Techs vs. Techs) and competing for what (ARRL section winner awards), the big question is, How to do it?

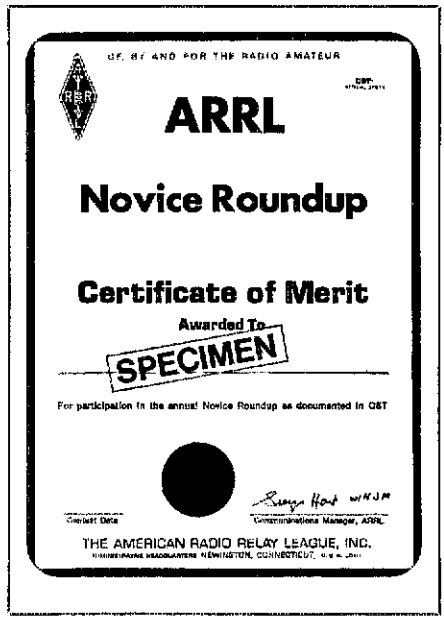
How to Participate

The 1979 Novice Roundup starts at 0001 UTC on February 3 and ends at 2359 UTC on February 11. That means the NR starts on Friday evening, February 2, local time. You may operate 30 hours out of the nine days. Rule no. 2 further details the timekeeping. Entry forms are available from ARRL headquarters; log sheets, summary sheets (one needed) and CD-77 forms (one needed) to keep track of whom you have worked in matrix form. The log sheets have room for 100 contacts each. Send your self-addressed, stamped envelope to Headquarters now and you'll have your forms in time to start the Roundup. The address is ARRL, 225 Main St., Newington, CT 06111.

The idea in the contest is to work as many stations as possible, in as many different ARRL sections and foreign countries as possible. ARRL sections are listed on page 8 of every *QST*. You may work each station *only once*. Keep your contacts as short as possible; send your exchange (RST report and ARRL section) only once and repeat it only if requested. Keep your CQs short, too! Here's a sample:

CQ NR CQ NR DE KA2YYY/N
KA2YYY/N NR K
KA2YYY/N DE WA1XXX/T AR
WA1XXX/T DE KA2YYY/N 579 VT K
KA2YYY DE WA1XXX R 569 EM K
WA1XXX R 73 DE KA2YYY/N NR K

Note that once you have established each other's license class you can drop the /N and /T for the duration of the QSO; brevity is the name of the game!



Scoring and Rules

Count one point for each contact (you may work a station only once, regardless of band); add your ARRL Code Proficiency credit, then multiply by the total number of multipliers (sections + countries) worked. And remember, KH6, KL7, KP4/KV4, KZ5 and VE districts are sections and *cannot* be counted a second time as a foreign country. If you work 100 stations in 31 sections + 3 foreign countries and have an ARRL (not FCC) Code Proficiency credit of 10 wpm from W1AW or W6OWP, then your score is 100-plus-10 × total multipliers (31 + 3) or 34, for a total of 3740 points. For details on the Code Proficiency program, see "Operating Events" on page 91 of this issue. You may work DX stations for contest credit; a multiplier of one is earned for each separate foreign country worked.

Read the rules carefully. Keep a check sheet of stations worked (we have CD-77 available free) so that you don't have duplicate QSOs. Log sheets, CD-77, and a summary sheet are now available from your ARRL headquarters. To aid us in getting these forms to you as quickly as possible, please be sure to include with each request a self-addressed, stamped envelope containing your full name, call and mailing address complete with ZIP code. We suggest 15-cents postage attached.

B C N U in the NR!

Rules

1) *Eligibility:* The contest is open to all radio amateurs in the ARRL sections listed on page 8 of *QST*.

2) *Time:* All contacts must be made during the contest period starting at 0001 Universal Coordinated Time (UTC) on 3 February and continuing until 2359 UTC on 11 February. Time may be divided as desired but *must not* exceed 30 hours total. Off periods *may not be less than* 15 minutes at a time. Listening time *counts* as *operating time*. Times on and off *must* be entered in your log.

3) *QSOs:* Contacts must include certain information sent in the form as shown in the example. QSOs may take place on the 80-, 40-, 15- and 10-meter bands. Crossband contacts are not permitted. Novices and Technicians work any amateur stations; others work Novices and Technicians only. Valid points can be scored by contacting stations not working in the contest, upon acceptance of your RST and section, and receipt of an RST and section/country. A station may be worked only once, regardless of band.

4) *Scoring:* Each exchange counts one point. Only one point may be earned by contacting any one station, regardless of the frequency band. The number of ARRL sections (see page 8 of any *QST*) plus foreign countries worked during the contest is the "total multiplier." Yukon-N.W.T. (VY1/VE8) also counts as a multiplier. A fixed scoring credit may be earned by entrants who hold the ARRL Code Proficiency certificates. FCC code credit *cannot* be used in lieu of the above. If an entrant does not hold an ARRL CP Award, he can apply for credit by attaching to his Novice Roundup report a copy of the qualifying run from W1AW or W6OWP for January or February. CP credit equals the wpm speed indicated on the latest ARRL certificate or sticker held by the entrant. The final score equals the "total points" plus "ARRL Code Proficiency credit" multiplied by the "total multiplier."

5) *Reporting:* Contest work must be reported on forms from the ARRL, or reasonable facsimile. Make sure to include the time, call, RST and section received for *each* QSO. Reporting forms will be sent free upon request. Indicate starting and ending times for each period on the air. Don't forget to indicate how long you've been licensed on the summary sheet. Those without it will be placed in the two years or more category. All NR reports become the property of ARRL and none can be returned. Entries must be mailed to ARRL, 225 Main St., Newington, CT 06111, no later than March 5, 1979.

6) *Awards:* A certificate will be given to the highest-scoring Novice and Technician (licensed two years or less *and* more than two years) in each ARRL section and each single operator Novice or Technician who submits a *valid* entry with 200 or more QSOs. Multioperator or General class licensees and above are not eligible for awards.

License Renewal Information

1) Apply on FCC form 610 and attach the original or a photocopy of your license — a copy is preferable from the amateur's standpoint. FCC form 610 can be obtained from any District FCC Office or from ARRL headquarters (s.a.s.e., please).

2) Mail completed form 610 and photocopy of license to FCC, Box 1020, Gettysburg, PA 17325.

3) Retain copies of everything, if possible, as proof of filing before expiration. If you file before the expiration date of the license, you may continue to operate beyond the expiration date and until the new license arrives. After expiration there is a one-year grace period in which you may renew your license without retesting; however, you must wait until the new license arrives to operate. After the one-year grace period expires, the tests must be taken again. Under normal, uncomplicated circumstances, application should be made approximately 90 days before expiration; however, renewal can be applied for at any time during the term of the license. Advanced class licensees wishing a new 2×2 call should apply 60 days in advance, only.

4) There are some pitfalls that will result in a long delay. They can all be avoided by reading the instruction sheet of form 610 carefully. For instance, you must specify a station location by whatever means necessary to locate it. If you receive your mail General Delivery, you might want to draw a map giving landmarks. Five minutes spent reading form 610 could save up to five months of useless waiting. Do not forget to sign and date the application.

5) Some cases may not be simple and straightforward. If, after having read this material, the instruction sheet for form 610, and the 610 itself, you are still uncertain of what to do, then please drop a note to the Membership Services Department, ARRL, including an outline of your problem and a daytime telephone number if possible.

6) There seems to be some confusion over the difference between the mailing address and the station location. They do not have to be the same. If both are the same, you still must fill in both spaces and the station location must be a geographically identifiable spot and not a box number. The mailing address is the one to which the FCC will send official mail and it is the one that will be listed in the *Callbook*. The station location is where you will be setting up a fixed station.

U.S. Amateur Frequency and Mode Allocations

Power Limits: All U.S. amateurs are limited to 250-watts dc input in the Novice segments. On all other segments, with certain exceptions in the 160-meter and 420-MHz bands, 1-kilowatt dc input is permitted. Also, there are erp limitations for stations in repeater operation. (See 97.67, FCC rules.) At all times the power level should be kept down to that necessary to maintain communications. (Revised as of December 6, 1978)

Bandwidth Limitations

FREQUENCY (OR PHASE) MODULATION: On frequencies below 29.0 MHz and between 50.1 and 52.5 MHz, the bandwidth of F3 emission shall not exceed that of an A3 emission having the same audio characteristics.

TELEVISION: On frequencies below 50 MHz, the bandwidth of A5 and F5 emissions shall not exceed that of an A3 single sideband emission. Between 50 and 225 MHz, single sideband or double sideband A5 may be used and the bandwidth shall not exceed that of an A3 single sideband or double sideband signal respectively. The bandwidth of F5 emission shall not exceed that of an A3 single sideband emission. Below 225 MHz, A3 and A5 emissions may be used simultaneously on the same carrier frequency provided the total bandwidth does not exceed that of an A3 double sideband emission.

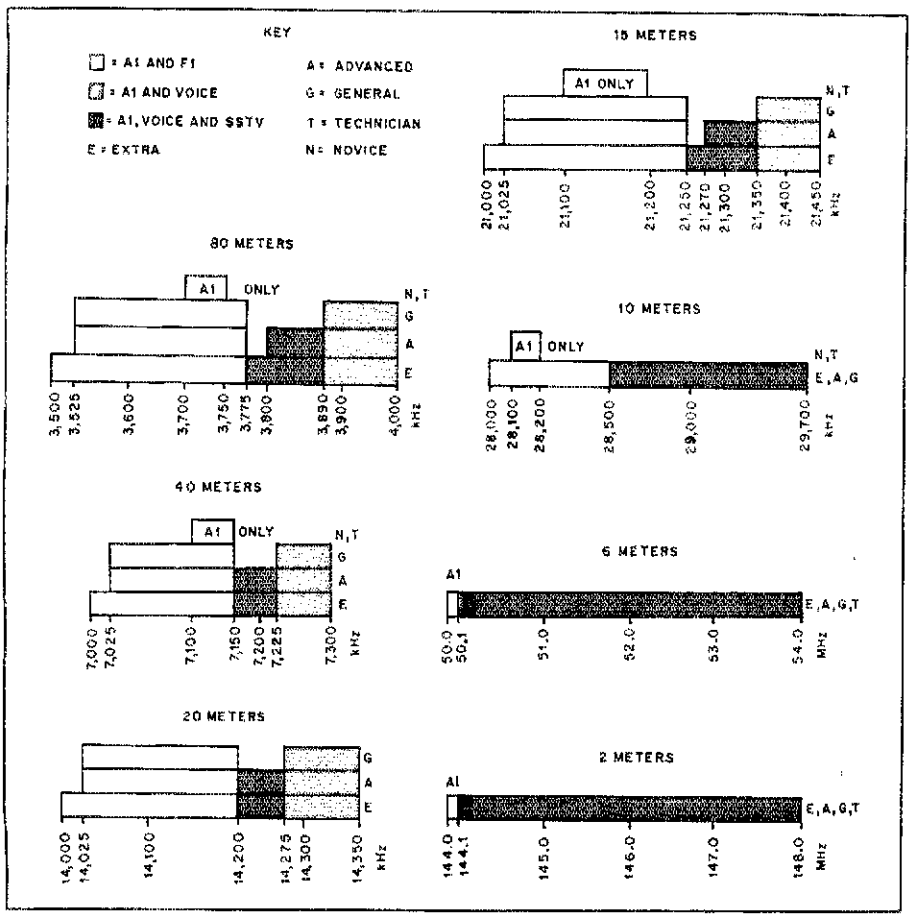
RTTY: When using frequency-shift keying, the shift shall be less than 900 Hz. With audio frequency-shift keying, the highest fundamental modulating frequency shall not exceed 3000 Hz and the audio frequency shift shall be less than 900 Hz.

ALL MODES: The carrier frequency plus modulating frequencies must be contained within amateur allocations and within appropriate subbands.

NOTE: Some amateur bands are shared with other services. Some geographical limitations exist for the 420-MHz band. For details, and for information on specialized modes, see *ARRL License Manual*. For information on repeaters, see the *License Manual* and *Repeater Directory*.

160 METERS: Extra, Advanced and General may use some segments at 1.8-2.0 MHz. Limitations are on a geographical basis; see *License Manual* or request form MS/G-7 from ARRL hq.

Other — All modes, except as noted.



Extra, Advanced, General, Technician

MHz	*GHz***
220-225*	10.0-10.5*
420-450*	24.0-24.25
1215-1300*	48.0-50.0
2300-2450	71.0-76.0
3300-3500	165.0-170.0
5650-5925	240.0-250.0
	All above 300

*Pulse not permitted.
**1 GHz = 1000 MHz.

MAJOR ARRL OPERATING EVENTS AND CONVENTIONS — 1979

(Check *QST* monthly for updates.)

JANUARY

1 SKN (Straight-Key Night)
2 West Coast Qualifying Run
6-7 CD Party, phone
8 W1AW Qualifying Run
13-14 CD Party, cw; VHF SS
26 W1AW Qualifying Run
27-28 Simulated Emergency Test
27-28 So. Florida Section Conv. (Miami)
31 West Coast Qualifying Run

FEBRUARY

2-11 Novice Roundup
6 W1AW Qualifying Run
10 Frequency Measuring Test
21 W1AW Qualifying Run
25 ARRL Hamfest (Davenport, IA)

MARCH

2-4 Southeastern Div. Conv. (Orlando, FL)
3-4 DX Competition, phone
6 West Coast Qualifying Run
10-11 ARRL Hamfest (Lafayette, LA)
14 W1AW Qualifying Run
17-18 South Carolina State Conv. (Greenville)
17-18 DX Competition, cw
24-25 ARRL Hamfest (Fort Walton Beach, FL)
26 W1AW Qualifying Run
30-31 Great Lakes Div. Conv. (Muskegon, MI)
31- Apr. 1 ARRL Hamfest (Kearney, NE)

APRIL

4 West Coast Qualifying Run
7 ARRL Hamfest (Columbia, MO)
7-8 "Open" CD Party, cw
12 W1AW Qualifying Run
21-22 "Open" CD Party, phone; EME Contest (#1)
21-22 ARRL Hamfest (Jackson, MS)
21-22 Missouri State Conv. (Kansas City, MO)
27-29 Dayton Hamvention (Dayton, OH)
29 W1AW Qualifying Run

MAY

1 West Coast Qualifying Run
7 W1AW Qualifying Run
11 Frequency Measuring Test
19-20 EME Contest (#2)
19-20 Alabama State Conv. (Birmingham)
25-27 New York State Conv. (Rochester)
26 W1AW Qualifying Run

JUNE

6 West Coast Qualifying Run
9-10 VHF QSO Party
12 W1AW Qualifying Run
15-17 Central Div. Conv. (Milwaukee, WI)
16-17 Georgia State Conv. (Atlanta)
23-24 Field Day
27 W1AW Qualifying Run
30- July 1 West Virginia State Conv. (Jackson's Mill)

JULY

4 West Coast Qualifying Run; Straight-Key Night
11 W1AW Qualifying Run
14-15 IARU Radiosport Competition
15 ARRL Hamfest (Washington, MO)
20-22 ARRL National Conv. (Baton Rouge, LA)
31 W1AW Qualifying Run

AUGUST

1 West Coast Qualifying Run
4-5 UHF Contest
9 W1AW Qualifying Run
11-12 ARRL Hamfest (Concordia, KS)
11-12 Pacific Div. Conv. (Reno, NV)
18-19 ARRL Hamfest (Petoskey, MI)
23 W1AW Qualifying Run
27 ARRL Hamfest (St. Charles, IL)

SEPTEMBER

2 ARRL Hamfest (Dodge City, KS)
4 West Coast Qualifying Run
8-9 VHF QSO Party
9 Illinois State Conv. (Rockford)
10 W1AW Qualifying Run
15 Frequency Measuring Test
15-16 Radio Expo (Chicago)
25 W1AW Qualifying Run
28-30 New England Div. Conv. (Hartford, CT)

OCTOBER

3 West Coast Qualifying Run
5-7 Dakota Div. Conv. (Sioux Falls, SD)
9 W1AW Qualifying Run
13-14 CD Party, cw
13-14 Tennessee State Conv. (Memphis)
19-21 Midwest Div. Conv. (Cedar Rapids, IA)
20-21 CD Party, phone
21 W1AW Qualifying Run

NOVEMBER

2 Frequency Measuring Test
3-4 Sweepstakes, cw
6 West Coast Qualifying Run
7 W1AW Qualifying Run
17-18 Sweepstakes, phone
17-18 Florida State Conv. (Clearwater)
26 W1AW Qualifying Run

DECEMBER

1-2 160-Meter Contest
5 West Coast Qualifying Run
8-9 10-Meter Contest
13 W1AW Qualifying Run (+40 wpm)
27 W1AW Qualifying Run

Operating Events

JANUARY

1: Straight-Key Night, December, page 90.

3: West Coast Qualifying Run, (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z. This is 9 P.M. PST the night of January 2. Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send to ARRL for grading. Please include your full name, call (if any) and complete mailing address. A large, stamped, self-addressed envelope will help to expedite your award/endorsements.

6-7: CD Party, phone, December, page 90

9: W1AW Qualifying Run, 10-35 wpm at 0300Z. This is 10 P.M. EST on January 8. Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 and 147.555. Other details per the January 3 listing.

13: SARC VHF Contest, December, page 90.

13-14: VHF SS, December, page 80. **CD Party,** cw, **YU-DX Contest,** December, page 90. **Hunting Lions in the Air,** sponsored by the Arpoador Lions Club of Rio de Janeiro, Brazil. From 1200Z on January 13 through 1200Z January 14. Open to all amateurs, cw and phone modes, 80-10 meters. Contact each station once per band and mode. Phone and cw scores will be counted separately. Scoring: 1 point for each QSO on your continent and 3 points for QSOs with other continents. Lions Club stations count 1 extra point and stations who are members of the sponsoring group count 5 extra points each. Total points and supply log showing date, time, call sign, band and mode by May 30, 1979, to Contest Committee, Lions Club of Rio de Janeiro Arpoador, Rua Souza Lima No. 310-Apt. 802, Rio de Janeiro 22.081-ZC-37 Brazil.

20-21: QRP Winter Contest, starting 1500Z January 20, ending 1500Z January 21. Sponsored by the Arbeitsgemeinschaft CW (AGCW-DL) open to all amateurs. Single- and mulitoperator classes. Cw only on 160-10 meters. Call CQ QRP TEST. Exchange RST, QSO number and power input (example: 599001/5). Non-QRP stations send RST, QSO number and QRO (example: 599001/QRO). Add the letter "X" if using crystal control. Score 1 point for each QSO with your own country, 2 points when contacted station is on the same continent and three points for DX outside your own continent. Multiply QSO points times the total of new countries and DX QSOs, crystal-control stations double results. Awards. Logs for each band to be submitted not later than March 3, 1979, to Siegfried Hari, DK9FN, Spessartstrasse 80, D-6453 Seligenstadt, Federal Republic of Germany.

26: W1AW Qualifying Run, 10-35 wpm at 2400Z. This is 7 P.M. EST on the night of January 26. Other details per the January 9 listing.

26-28: CQ WW 160-Meter CW DX Contest, starts 2200Z Jan. 26 and ends 1600Z Jan. 28. Rules same as in previous years (see page 99, December 1976 *QST*), however, there will be more emphasis on penalties and disqualification criteria this year. This is a cw-only contest (no cw to phone). Exchange RST plus a three-figure QSO number starting with 001, and your state or province. It is not necessary for DX stations to send their QTH, their call will identify them. Scoring: For W/K/VE/VO, 2 points per QSO with other W/K/VE/VO stations. All DX contacts are worth 10 points. (DXCC list less W/K and VE/VO.) For all other countries, 2 points per QSO with stations in the same country, 5 points with stations in other countries; except for QSOs with W/K/VE/VO, which count 10 points. Multipliers: For all stations, one for each state, VE province and DX country worked. (KH6 and KL7 are considered DX; the District of Columbia is the same as Maryland. VE1 is divided into three provinces: New Brunswick, Nova Scotia and Prince Edward Island.) The final score: total QSO points multiplied by the sum of multipliers. Three additional contacts will be deleted for each QSO shown to be a duplicate (or false or unverifiable). A second multiplier will be deleted for each one lost by the above action. Disqualification can result if in the opinion of the Committee the penalty total is considered excessive. Disqualified stations and operators may also be barred from competition in all CQ contests for a period of up to three years. Awards. Logs and summary sheets and U.S. rules for 160 may be obtained from CQ by sending a large s.a.s.e. with sufficient postage. Mailing deadline for the contest entries is February 28. Send to CQ 160 Contest, 14 Vanderventer Ave., Port Washington, LI, NY 11050.

27-28: Simulated Emergency Test, December, page 77. **French Contest,** December, page 90. **Airline Hams Contest,** from 1500Z January 27 to 1500Z January 28. Sponsored by the International Association of Airline Hams. Call CQ Air Contest. Members work nonmembers and vice-versa. Suggested frequencies: cw, 3.55 3.725 7.05 7.125 14.05 21.05 21.125 28.05 28.125 and 50.095; phone, 3975 7275 14280 21375 28550 50105 146520 and 146550. Repeater operation is permissible. Exchange RS(T) and consecutive serial number starting with 001, member or nonmember and state, province or country. Members also give IAAH number, airport identifier or flight number if operating aeronautical mobile. Score 4 bonus points for airport contacts and 5 points for aeronautical mobile contacts. Add total number of contacts plus bonus points and multiply total states, provinces and countries worked to arrive at total score. Awards. Logs showing the above information, with one log for each band, should be sent not later than March 1 to Frank Sadilek, WB9OUE, 3818 N. Newcastle Ave., Chicago, IL 60634.

28-29: Classic Radio Exchange, December, page 90.

FEBRUARY

1: West Coast Qualifying Run, (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z. The run takes place at 9 P.M. PST the night of January 31. Other details under the January 3 listing.

3-11: Novice Roundup, details this issue.

4: Ten-Ten International Net Winter QSO Party, 24-hour period starting at 0000Z February 4. Open to all amateurs (nonmembers ineligible for awards). Exchange call sign, 10-X number, ARRL section and name. Members score 1 point for each U.S. contact, plus 1 point for each 10-X member contacted. DX stations count two points as do QRP contacts. Send logs by March 11 to Robert C. Mugherini, WA1AKS, P. O. Box 169, Randolph, MA 02368.

7: W1AW Qualifying Run, 10-35 wpm at 0300Z. This is 10 P.M. EST on February 6. Other details per the January 9 listing.

10-11: QCWA Membership QSO Party, cw, members only, notified directly by QCWA.

11: Frequency Measuring Test, open to all, begins with a callup at 0300Z and 0600Z, Feb. 11. Remember, this is the evening before, Feb. 10, by local time. The periods for measurement start at 0307 (20 meters), 0315 (40 meters) and 0323 (80 meters); for the late run, 0607, 0615 and 0623, respectively. Each measuring period lasts five minutes. Submit your averages for each five-minute period which will be compared with the umpire's averages for each five-minute period. (The umpire is a professional measuring laboratory.) Tell how many readings you took to form your averages. Approximate frequencies for the early run are 14,110, 7065 and 3590 kHz. Late-run frequencies are 14,155, 7055 and 3555 kHz. Your report must be received by February 22. W1AW will start transmitting the official results in a special bulletin on February 23. **Ten-Ten International Net Winter QSO Party** (part 2). Starts 0000Z for 24 hours on February 11. All other details per February 4 listing.

17-18: YL-OM, phone, December, page 90; **2-Land QSO Party** sponsored by the South Jersey Contest Coalition. From 2100Z Feb. 17 to 0700Z Feb. 18 and 1300Z Feb. 18 to 0300Z Feb. 19. Open to all amateurs to work stations in New York and New Jersey. Exchange RS(T), county, state for 2-Land stations; RS(T) and state, province or country for the rest of the world. Each QSO is worth 2 points, and when multiplied by the different multipliers above will give total score. The maximum multiplier for non 2-land stations is 83. Suggested frequencies: cw, 1805 3560 3725 7060 7125 14,060 21,060 21,125 28,060 28,125; phone, 1815 3900 7230 14,280 21,355 and 28,600. Awards. Logs required, if over 200 QSOs please send dupe sheet. Logs should be accompanied by a large s.a.s.e. Send to Darrell Neron, AB2E, 322 South Cummings Ave., Glassboro, NJ 08028.

21: W1AW Qualifying Run, 10-35 wpm at 2100Z. This is 4 P.M. EST on February 21. Other details per the January 9 listing.

24-25: French Contest, December, page 90.

MARCH

3-4: DX Competition, phone, details this issue; **YL-OM,** cw, December, page 90.

7: West Coast Qualifying Run, (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z. The run takes place at 9 P.M. PST the night of March 6. Other details under the January 3 listing.

10-11: QCWA Membership QSO Party, phone, members only, notified directly by QCWA; **Virginia State QSO Party,** sponsored by the Sterling Park Amateur Radio Club. Starts 1800Z March 10, ending at 0200Z March 12. Exchange RS(T), QSO number, county for VA stations and state, province or country for others. Suggested frequencies: cw 60 kHz from the low end of each band and each Novice band; phone, 3930 7230 14,285 21,375 and 38,575. Contact each station once per band and mode. Scoring, 1 point for each QSO. VA stations multiply QSO points times number of different states, provinces and countries; others multiply QSO points times VA counties (maximum 98). Awards. Logs with summary sheet and dupe sheet must be received by April 15. Mail to Virginia QSO Party Box 599, Sterling, VA 22170. **Commonwealth Contest** cw, 1200Z March 10 to 1200Z March 11, open to all members of the RSGB resident in the UK and radio amateurs licensed to operate within the British Commonwealth or British Mandated Territories. Operation only on 80, 40, 20, 15 and 10 meters. Contacts may be made with any station using a British Commonwealth call sign, except those within the entrant's own call area. UK stations may not work each other for points. In accordance with current IARU recommendations, contestants are requested to confine their operations to within the lower 30 kHz of each band. Each completed contact counts 5 points. In addition, a bonus of 20 points may be claimed for the first, second and third contacts with each commonwealth call area. All British Isles stations (G, GB, GD, GI, GM, GU and GW) count as one call area. Separate logs for each band. Each band-log should be separately totaled and should include at the end a check list of call areas worked on the band. Separate band totals should be added together and the total claimed score entered on the cover sheet. Entries may be single or multiband (multiband will not be eligible for single-band awards). Include usual signed declaration. Awards. Entries go to D. J. Andrews, G3MXJ, 18 Downsview Crescent, Uckfield, East Sussex TN22 1UB, England, to be received no later than mid-May.

15: W1AW Qualifying Run, 10-35 wpm at 0300Z. This is 10 P.M. EST on March 14. Other details under the January 9 listing.

17-18: DX Competition, cw, details this issue.

24-25: CQ World-Wide WPX SSB Contest, full 48-hour period UTC. Only 30 hours of the 48-hour contest period permitted for single-operator stations. The 18 hours of operating time may be taken in up to five periods anytime during the contest and must be clearly noted in the logs. Multiops may utilize the full period. Two-way ssb only, all bands 160 through 10 meters. Competition categories: single op all band; single op single band; multiop all band only, single transmitter, only one signal permitted and multi-transmitter, one signal per band permitted. Exchange RS plus serial starting with 001. Multitransmitter stations use separate numbers on each band. Points: contacts between stations on different continents count 3 points on 20-15-10 meters, 6 points on 40-80-160 meters. Contacts between stations in the same continents but not in the same country count 1 point on 20, 15 and 10 meters, 2 points on 160, 80 and 40. (Exception: Contacts between different North American countries count 2 points on 20, 15 and 10; 4 points on 160, 80 and 40. This applies only to North American countries. Multipliers are prefixes, to be counted once only. A prefix is considered to be the two- or three-letter/number combination which forms the first part of an amateur call, as in W1, AB2, 4X4, 5A1, etc. For single op: score is total QSO points from all bands multiplied by the number of different prefixes worked; for single band score, QSO points on that band multiplied by the number of prefixes. Scoring for multiops is the same as the all-band scoring for single ops. A station may be worked once on each band for QSO point credit. However, prefix credit can be taken once only regardless of the band. Awards. Usual disqualification criteria. Entries must be received by May 1. Send to CQ WPX SSB Contest Committee, 14 Vanderventer Ave., Port Washington, L.I., NY 11050.

Operating News

Better Operating for the Beginner

One day in the life of a newer amateur (KA1LID) could very well sound something like this:

"Gee, I'll bet 15 meters is open . . . ah! There's a clear frequency, I'll just tune up the ol' rig." (tunes)

"Some lid just spent the last three minutes tuning up on top of us, Ted. Try that again, would you please? W6FKI, this is K5SXO."

"Oops, better QSY. This one is better, and . . . Hey there's a CQ!"

"CQ Africa, this is K1XA standing by."

"K1XA, this is KA1LID calling."

"KA1LID, please QSY, EL1A this is K1XA, hi."

"Boy what a stuck-up guy; wouldn't even give me a signal report. Oh well, I'll tune around some more. Hey! there's Sam."

". . . and KA1OP now tuning the frequency."

"KA1OP, this is KA1LID calling."

"KA1LID this is KA1OP. Hey, you knucklehead, cut down your microphone gain, you're overloading my receiver."

"This is KA1LID. Sorry, Sam, I don't know how. Besides we aren't bothering anyone else."

"This is KG4OO. You are interfering with a QSO up 1 kHz; please either QSY or reduce power."

"OK breaker, KG4OO clear, KA1LID, this is KA1OP; stand by and I'll give you a call on the phone."

"Heck, why use the phone? Oh well. (ring, ring) Hello, oh, hi, Sam."

"You know, you've only been on the air for five minutes and already you have nearly everyone on the band mad at you."

At that point, friend Sam told Johnny the facts of on-the-air courtesy. Complaints received at ARRL headquarters in recent months suggest that there are quite a few "Johnnys" around these days. So, let's examine what Sam might have told our new amateur, and see how we can supply this information to a new ham so that he gives a better impression by his operating habits.

All of the behavior exhibited by KA1LID violates one or more FCC rules. To begin, the old adage to listen before transmitting, which is covered by paragraphs 97.78, 97.123 and 97.125 of the FCC rules, seems to have fallen by the wayside with our recent rapid growth in the Amateur Service. Listen carefully for a few *minutes* before even asking if the frequency is available (on cw, by sending the American Morse character "C," didit dit, or on phone by asking, "Is this frequency in use?" This is W6BML.). Tune-up should be accomplished with a dummy load, and antenna tuners should be preset prior to asking if the frequency is clear. Once any on-the-air tuning is begun, it should last no more than 30 seconds. When tune-up is completed, the question as to frequency occupancy should be repeated before making any calls. One would think that the number of "pre-tuned" rigs available today would reduce this problem. However, listening for a short time on the bands points out the need to review our manners in this respect.

Directional calls should be answered only by stations in the area to which the call was directed. An exception to this would be in the event of a bona fide emergency. One might also respond to a directional CQ to advise the station calling of a station in the desired calling area which is on that band at the time. United States and Canadian stations should not answer a CQ DX call by another in the U.S. or Canada except for the bona fide emergency call situation. While calling "CQ DX" is not the best practice, answering such a call when you are not "DX" is by far the worse practice.

With the not-so-long-ago energy crunch it is distressing to see the scramble for power continuing among U.S. amateurs. The power that is needed to maintain communications is far less than the maximum power allowed U.S. stations. FCC rule 97.67b is explicit in this respect. The deplorable practice of running full power with your rig while talking across town or making a stateside contact, or even while working DX when conditions are good and getting better, should be discontinued. The proper line of thought is that if you establish communications with full power, you should reduce power to the minimum needed to maintain satisfactory communications. In many cases hams are able to reduce power from the kW level down to 5 watts output on ssb for DX as well as for domestic contacts. Not only does this save on your electric bill, it permits more stations to use the available spectrum.

W1AW Operating Schedule (October 29, 1978-April 29, 1979)

PST	CST	EST	UTC		MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
6 A.M.	8 A.M.	9 A.M.	1400	*	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]		
7	9	10	1500	+			Cw Bulletins[3]				
8	10	11	1600	*			RTTY Bulletins[4]				
1 P.M.	3 P.M.	4 P.M.	2100	*	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Slow[1]
2	4	5	2200				Cw Bulletins[3]				
3	5	6	2300				RTTY Bulletins[4]				
4	6	7	0000		Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[1]	Fast[2]
5	7	8	0100				Cw Bulletins[3]				
6	8	9	0200				RTTY Bulletins[4]				
6:30	8:30	9:30	0230				Phone Bulletins[5]				
7	9	10	0300		Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Slow[1]
8	10	11	0400				Cw Bulletins[3]				
9	11	12	0500				RTTY Bulletins[4]				
9:30 P.M.	11:30 P.M.	12:30 A.M.	0530				Phone Bulletins[5]				

[1]Slow code practice on cw bulletin frequencies, 8 minutes each session; 5, 5, 7-1/2, 7-1/2, 10, 13, 15 wpm.
[2]Fast code practice on cw bulletin frequencies, 8 minutes each session; 35, 30, 25, 20, 15, 13, 10 wpm.
[3]Cw bulletins, 18 wpm, on: 1.835, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08, 147.555 MHz.
[4]RTTY bulletins 60 wpm/170-Hz shift on 3.625, 7.095, 14.095, 21.095, 28.095 147.555 MHz.
[5]Phone bulletins on 1.835, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.
Please note that all footnoted frequencies are approximate.

Normal W1AW visiting hours are 3:30 P.M. to 1 A.M. seven days a week (local Eastern Time). The station address is 225 Main St., Newington, CT 06111 (about seven miles south of Hartford). Note: ARRL office-visiting hours are 8 A.M. to 5 P.M. Monday through Friday. Maps with local street detail are available upon request. If you wish to operate when visiting, you must have your original operator's license with you. The best time for visitors to operate is on weekdays between 1 and 4 P.M. local time. (Schedules can also be arranged to work W1AW.) The station will be closed January 1. *Staff:* Chief Operator/Asst. Communications Mgr. C. R. Bender, W1WPR; Chris Schenck, W1EH.

In a communications emergency, monitor W1AW for special bulletins as follows: *phone* on the hour, *RTTY* at 15 minutes past the hour, *cw* on the half hour.

To improve your fist by sending in step with W1AW (but not over the air!) and to allow checking the accuracy on certain tapes, note the UTC dates and *QST* text to be sent in the 0300 practice from the issue of *QST* two calendar months past: January 5, It Seems to Us; January 11, World Above; January 15, League Lines; January 18, Public Service; January 22, Happenings; January 31, Operating News.

Sometimes 100 watts is 100 times the power required. Reduce power whenever possible, while maintaining satisfactory signal levels for communications.

This column attempts to serve as guidance for good operating habits. Unfortunately, we can only touch on the problem areas that abound just a kHz or so away from your QSO. Perhaps we all need to think our practices through and pass good operating behavior along to the newer folks if we are to have an enjoyable hobby: free of heterodynes, double transmissions and broad, overpowering signals. WARC-79 cometh and the future of Amateur Radio may indeed rest on what the world thinks of the sounds found on the amateur bands. — *Jim La Porta, NICC*

SCM ELECTION NOTICE

To all ARRL members in the Alberta, Nevada, Rhode Island, Northern New Jersey, San Joaquin Valley, Canal Zone, Utah, Maryland-DC and New Hampshire sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition.* No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (CD-129) are available on request from ARRL headquarters but are not required. The following form is suggested:

(Place and date)

Communications Manager, ARRL
225 Main Street, Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.
(Signature . . . Call . . . City . . . ZIP . . .)

SCM candidates must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, March 9, 1979.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on April 2, 1979, returns counted May 22, 1979, and SCMs elected as a result of the above procedures will take office July 1, 1979.

If only one valid petition is received for a section, that nominee shall be declared elected, without opposition, for a two-year term beginning July 1, 1979.

If no petitions are received for a section by the specified closing date, such section will be resolicited in July 1979 *QST*, and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

You are urged to take the initiative and file a nominating petition immediately.

REPEAT SCM NOMINATING SOLICITATIONS

Since no petitions were received for the Saskatchewan and Nebraska sections as a result of notices in July and August 1978 *QST*, nominating petitions for these sections are herewith resolicited. See the above notice for details on how to nominate.

SCM APPOINTMENTS

In the Orange Section, Fried Heyn, WA6WZO, was appointed to complete the term (until April 1, 1979) of William Heitritter, WB6AKR (resigned). In the Colorado Section, Robert Poirier, KØDJ, was appointed to complete the term (until October 1, 1979) of Clyde Penney, WAØHLQ (resigned).

	OSCAR 7			OSCAR 8			SOVIET RS		
DATE (UTC)	*Ref. Orbit*	*Time (UTC)*	*Long. W.*	*Ref. Orbit*	*Time (UTC)*	*Long. W.*	*Ref. Orbit*	*Time (UTC)*	*Long. W.*
1 Jan.	18884	0123:57	81.6	4203A	0035:09	50.9	800	0149:28	358.6
2 Jan.	18896	0022:18	66.5	4217A	0040:22	52.2	812	0154:10	1.3
3 Jan.	18909	0117:35	80.1	4231X	0046:34	53.5	824	0159:52	4.1
4 Jan.	18921	0016:56	64.9	4245A	0051:47	54.8	835	0003:10	336.6
5 Jan.	18934	0110:13	78.5	4259A	0057:00	56.1	847	0008:52	339.3
6 Jan.	18946	0010:34	63.4	4273J	0101:12	57.4	859	0013:34	342.6
7 Jan.	18959	0104:51	77.0	4287J	0106:25	58.7	871	0017:16	344.7
8 Jan.	18971	0003:12	61.8	4301A	0112:37	60.1	883	0022:58	347.5
9 Jan.	18984	0058:29	75.4	4315A	0117:50	61.4	895	0027:40	350.2
10 Jan.	18997	0153:46	89.0	4329X	0122:03	62.7	907	0031:22	352.9
11 Jan.	19009	0052:06	73.8	4343A	0127:15	64.0	919	0036:04	355.6
12 Jan.	19022	0146:24	87.4	4357A	0132:28	65.3	931	0041:46	358.4
13 Jan.	19034	0046:44	72.3	4371J	0138:41	66.6	943	0045:28	1.1
14 Jan.	19047	0140:02	85.9	4385J	0143:53	68.0	955	0050:10	3.8
15 Jan.	19059	0039:22	70.7	4398A	0005:52	43.5	967	0055:52	6.5
16 Jan.	19072	0134:39	84.3	4412A	0010:05	44.8	979	0001:34	9.3
17 Jan.	19084	0033:00	69.2	4426X	0015:18	46.1	991	0104:16	12.2
18 Jan.	19097	0127:17	82.7	4440A	0021:30	47.4	1003	0109:58	14.7
19 Jan.	19109	0027:38	67.6	4454A	0026:43	48.7	1015	0114:40	17.4
20 Jan.	19122	0121:55	81.2	4468J	0031:55	50.1	1027	0118:22	20.2
21 Jan.	19134	0020:16	66.0	4482J	0036:08	51.4	1039	0123:04	22.9
22 Jan.	19147	0115:33	79.6	4496A	0041:21	52.7	1051	0128:45	25.6
23 Jan.	19159	0014:54	63.5	4510A	0047:33	54.0	1063	0132:27	28.3
24 Jan.	19172	0108:11	78.1	4524X	0052:46	55.3	1075	0137:09	31.9
25 Jan.	19184	0008:32	62.9	4538A	0057:59	56.6	1087	0142:51	33.8
26 Jan.	19197	0102:49	76.5	4552A	0102:11	57.9	1099	0147:33	36.5
27 Jan.	19209	0001:09	61.4	4666J	0107:24	59.3	1111	0151:15	39.2
28 Jan.	19222	0055:27	75.0	4580J	0113:37	60.6	1123	0156:57	41.9
29 Jan.	19235	0150:44	88.5	4594A	0188:49	61.9	1134	0000:16	14.4
30 Jan.	19274	0049:05	73.4	4608A	0123:02	63.2	1146	0005:58	17.2
31 Jan.	19260	0143:22	87.0	4622X	0128:14	64.5	1158	0010:40	19.9
1 Feb.	19272	0043:43	71.8	4636A	0133:27	65.8	1170	0014:22	22.6
2 Feb.	19285	0138:00	85.4	4650A	0139:40	67.2	1182	0019:03	25.3
3 Feb.	19297	0036:20	70.3	4663J	0001:39	42.7	1194	0024:45	28.1
4 Feb.	19310	0131:38	83.9	4677J	0006:51	44.0	1206	0028:27	30.8
5 Feb.	19322	0030:58	68.7	4691A	0011:04	45.3	1218	0033:09	33.5
6 Feb.	19335	0124:16	82.3	4705A	0016:17	46.6	1230	0038:51	36.2
7 Feb.	19374	0024:36	67.2	4719X	0021:29	47.9	1242	0043:33	39.5

Have you listened to OSCAR 8 yet? It is available to anyone with a good-quality, 10-meter or 70-cm receiver. To track it, you'll need an OSCARLOCATOR and the above reference-orbit information (also available on W1AW bulletins). It orbits the earth every 103 minutes; the morning and evening passes occur at approximately the same times each day. Decoding the telemetry from the beacon is a simple matter using the ARRL OSCAR telemetry forms, available from Hq. for an s.a.s.e. When you return it, we'll send you a colorful OSCAR 8 QSL card.

To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.440 MHz on Mode A, 145.960 MHz on Mode B, during O 7 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays; Mid States at 0200 UTC; West Coast at 0300 UTC, all on 3850 kHz lsb); (international net at 1800 UTC Sundays on 14,280 kHz usb).

Notes

1) The times and longitudes are for the satellites' first equator crossing each day, which is called the reference orbit.
2) Due to spacecraft problems, OSCAR 7 will not be maintained in any specific mode.
3) All Monday orbits are reserved for QRP use only. Use a maximum of 10 watts erp. Wednesdays are reserved for special experiments. Schedule O 7 experiments through AMSAT, O 8 experiments through ARRL. At no time exceed 10 W erp using RS-RS.
4) The OSCAR 7 Mode B and OSCAR 8 Mode J transponders invert signals. Upper sideband into the uplink becomes lower sideband on the downlink.
5) O 7 progresses an average of 28.737647° W. per orbit in a period of 114.945255 minutes. O 8 progresses an average of 25.808409° W. in a period of 103.229831 minutes. RS period is 120.29461 minutes. RS progresses 30.0737° W.
6) O 8 modes of operation are Mondays, Tuesdays, Thursdays and Fridays — Mode A. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D. RS transponders are on Saturdays and Sundays for QSOs. Wednesdays are for experiments only.

Spacecraft Frequencies

Spacecraft	*Uplink*	*Downlink*	*Beacon*
O 7			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.502 MHz
Mode B	432.125-432.175 MHz	145.975-145.925 MHz	145.972 MHz
O 8			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.100-435.200 MHz	435.095 MHz
RS			
Mode A	145.880-145.920 MHz	29.360-29.400 MHz	29.401 MHz

Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq.

Station Activities

SCM ≤ AREC ≤ ORS ≤ OVS ≤ SEC ≤ OBS ≤ TCC ≤ OO ≤ NTS ≤ WAC ≤

CP ≤ A-1 OPR ≤ EC ≤ DXCC ≤ CLUBS ≤ RM ≤ OPS ≤ RCC ≤ PAM ≤ WAS

CANADIAN DIVISION

ALBERTA: SCM, Sydney T. Jones, VE6MJ — SEC: VE6XC. Net Manager: VE6AFO. VE6AK is presently in hospital undergoing surgery but should be back home soon. VE3EHF now living in Calgary and using the call VE6CEY. Bill is new appointee as OTS. VE6BCR is proud owner of new Yaesu FT901DM. VE6BBL is new net mgr. for the recently formed CW net on 3680 MHz 2030 local time. This is a slow speed net and all amateurs are welcome to participate. VE6AOF has headed south to avoid the long cold winter. VE6YN was heard complaining about the S9 line interference while working his brother in VE7-Land. Traffic: VE6AMM 41, VE6AVV 27, VE6CEY 26, VE6BBL 11, VE6XC 7, VE6BIM 5, VE6ZV 5, VE6JH 4, VE6MJ 4, VE6XD 2, VE6YW 2, VE6AYM 1.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst. SCM: VE4JP. SEC: VE4TR. NMs: VE4NM VE4TE VE4VJ VE4IZ. Glad to report VE4EF is recovering from an accident. VE4GB has gone south for the winter. The space odyssey was a great success and the Winnipeg Radio Club made a lot of new friends at a booth they operated during this event. All nets now improving on check-ins and more traffic than ever before is evident. MEPN QNI 1133, QTC 69, 31 sess. MTN QNI 200, QTC 57, 30 sess. MMN QNI 346, QTC 33, 31 sess. WRIN QNI 97, QTC nil, 4 sess. Traffic: VE4PG 117, VE4IZ 67, VE4QJ 33, VE4QU 26, VE4TE 23, VE4ID 21, VE4HR 18, VE4LU 18, VE4CR 17, VE4IX 16, VE4JP 14, VE4NM 14, VE4FK 10, VE4JA 7, VE4AAD 6, VE4AED 6, VE4DS 6, VE4ADS 5, VE4LB 5, VE4XN 5, VE4OW 4, VE4AAF 3, VE4IF 3, VE4AX 2, VE4MG 2, VE4OE 2, VE4RO 2, VE4TK 1.

MARITIME-NFLD.: SCM, Aaron D. Solomon, VE1OC — A/SCM: VO1FG. SEC: VE1DI. NM: VO1JN. APN Mgr.: VE1WF. Silent Keys: VE1BLU VE1QG. Hosp. VE1AFA. Home: VE1QU. Congrats to Editors: VE1WB-Trans-Border; VE1RI-Cape Breton AM, VE1UT-N.S. Amateur; VE1FQ-HARC Bull. New ex. at Fundy ARC; RTI ARC; ARCON; IRG; NSARA. HARC involving members in Public Service & Emergency. Mar. Wx Net 18 yrs. in operation. VE1AAC NCS. Congrats. DOC ops. at Sable Island call VE0MTA. Sep. Country. VE3IQ/1; VE1BBS VE1BMJ have new beams and towers. NSARA now meets Mon. 2200Z 3763 kHz. VO1HL has new Eq. VO1EN is Lester Berry Mem. Rep. on Signal Hill. Smallwood FD trophy; Sterling Trophy award to VO1AA/A. Ernest Ash Award to VO1GP. VO1CA instr. classes. DOC TRC 24, 25 detail new exam procedures GRR Part II. APN sess. 30, QNI 94, QTC 60/53. Traffic: (Oct.) VE1WF 164, VE1LCR/RO 72, VE1ST 42, VE1OC 20, VE1ASW 18, VE1AVL 13. (Sept.) VO1HL 2.

ONTARIO: SCM, Larry Thivierge, VE3GT — Asst. SCM: VE3GOL. The 10th annual RSO Convention was a success thanks to a solid effort by the London ARC. The Convention, held in London attracted amateurs from as far away as Jamaica, South East Africa, the U.S. as well as Kenora, Montreal, Windsor and all other areas of Ont. The RSO amateur of the year and winner of the Clifford Marsh Memorial trophy was VE3BZF. The award was presented by VE3DWH. The CRRL amateur of the year was VE3GOL. Ron Hesler, VE1SH made the presentation. Congratulations! The new pres. of the RSO is VE3XE. Oakville ARC's bulletin "Hot Bananas" won the President's Award for Club Publications, congratulations to VE3HGJ and his volunteer staff for an excellent club bulletin. VE3GFN has upped his DXCC total to 180 while VE3GCE has made the magic 100. VE3FGU, with a new four-element yagi enjoying DX openings on 10 meters. Bruce ARC, who won the Rusty Brennan trophy for Field Day has a new executive composed of VE3s IYD ASH and bulletin editor VE3CTQ. VE3EFX running an excellent series of weekly articles on amateur radio in the Port Elgin and Kincardine newspapers. The latest edition of the CJ Directory expected shortly. New executive of the Nipissing FM Assn. are VE3s DPI JHN CJM and FLX. The Great Lakes Autopatch Assn. formed to put up and run an autopatch repeater for the Soo and area. Ottawa Valley-MRC members enjoyed a visit to the DOC monitoring station at Almonte. After 12 years of on the air contacts, finally met VE1QE who brought up some dulce. After 4-1/2 years VE3FHQ turning the reins over to VE3FCU. Thanks for your support Glenn. If you check into one of our formal traffic nets, don't be surprised if you're asked to handle written formal traffic. VE3GOL appointed STM for Ont. West Side, Toronto's oldest ARC celebrated their 40th anniversary recently. To the many stations that offered their help at the CNE — many thanks, from VE3ZH. To all, the very best for 1979. Traffic: (Oct.) VE3GOL 375, VE3KK 301, VE3SB 296, VE3HGJ 257, VE3GJG 176, VE3DPO 175, VE3JIR 159, VE3ISW 153, VE3GFN 149, VE3GT 106, VE3GYD 67, VE3HSF 57, VE3GNW 49, VE3EWD 46, VE3FZG 46, VE3CYR 45, CF1IFP 43, VE3FHZ 35, VE3FGV 27, VE3HCS 27, VE3JRT 24, VE3DVE 23, VE3ATR 22, VE3JKC 22, VE3EHL 20, VE3EBC 19, VE3ANJ 12, VE3GRO 10, VE3IMR 8, VE3FGU 7. (Sept.) VE3GFN 120, VE3JGX 21, VE3AWE 9, VE3FHQ 9.

QUEBEC: SCM, Ed Sieb, VE3BAQ — VE2FJB newcomer now active in Lac St. Jean region. VE3AUH feeling well and is active on 80 meter nets. VE2EMU is a consistant ttc. handler. VE2AT repeater has a very FB ttc. net daily at 7.45 EST; VE2MO Net Control. Code and Theory classes in progress at VE3CTR ARC. VE2s FSC FYD FSE very active newcomers, are close friends, and helping each other with their antennas. VE2UN again made BPL Maine op, WB1EZI/VE2 very active, helps contribute to a consistently excellent ttc. and public service record; made PSHR twice in 2 months. Montreal ARC has a Digital Communications seminar every Mon. at 20.00 EST, West Hill High School. Traffic: (Oct.) VE2UN 362, VE2EC 25. (Sept.) VE2UN 367, VE2DXU 110, VE2EC 20.

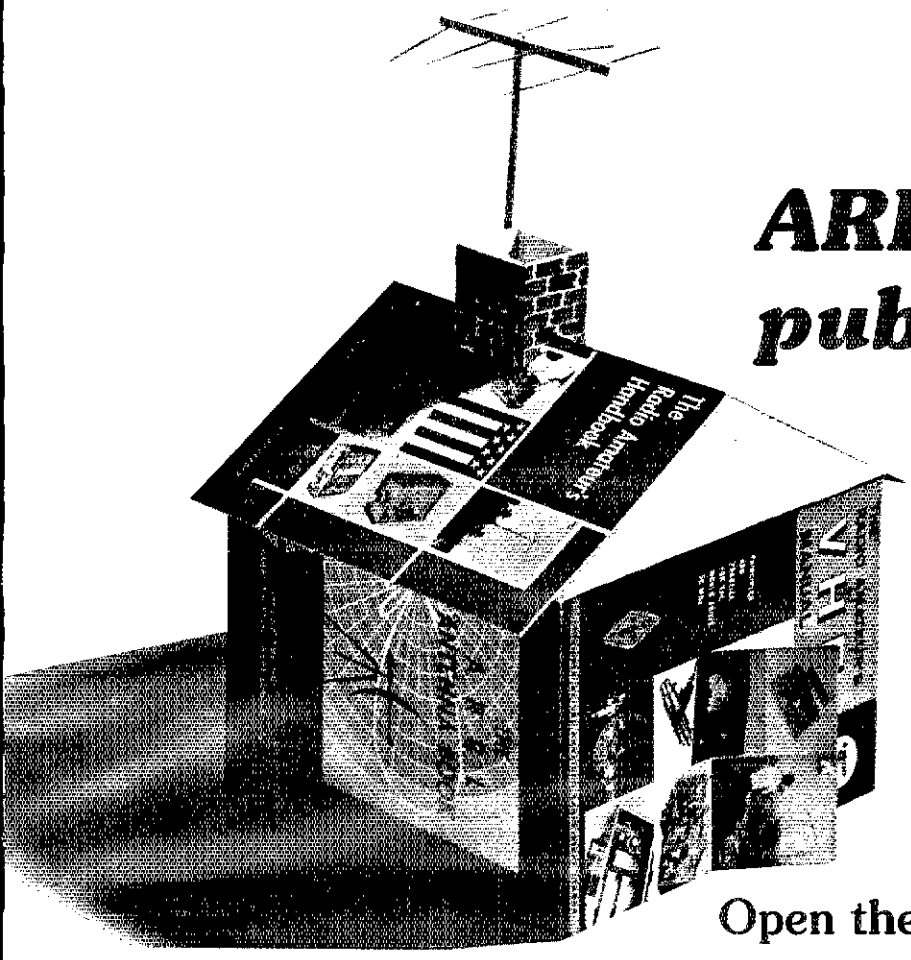
SASKATCHEWAN: SCM, P. A. Crosthwaite, VE5RP — VE5CU who has worked for the Amateurs in Saskatchewan for so many years has stepped aside in order that he may enjoy his hobby as an Amateur. Bill is a valuable ham and we are going to miss him in the area as an Asst. Dir. and SEC. VE5AAE says Moose Jaw will be hosting the 1979 Hamfest. Coteau Range Community College is putting on a class in Short Wave Radio operation which will prepare the students to pass the DOC Amateur exam. Traffic: (Oct.) VE5AAE 99, VE5HG 43, VE4RP 16, VE5WM 15, VE5ABK 6, VE5AAT 4, VE5BO 4, VE5RB 4, VE5ACS 2, VE5YZ 1. (Sept.) VE5AAE 43, VE5HG 21, VE5ABK 17, VE5RP 16, VE5QY 15, VE5WM 14, VE5ACS 4, VE5NJ 3.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STM: W3WD W3OQ. PSHR: W3PQ 49. K3JL 46. With EST returning, Delaware Nets are again experiencing severe QRM due to long skip. Some newer operators seem not to realize that most receivers give more selectivity with the AF fully advanced, and the RF backed off to give the proper audio volume. Former WB3KPX is now N3AKC and a prime DTN/MDD liaison. DTN regular, W1IDR gives us complete phone coverage of Mass. EC WB3ENF with WB3FOE WB3FUP and WB3EOU are reorganizing the New Castle Co. ARES. DEPN QNI 52, QTC 9; DTN QNI 366, QTC 77. Traffic: (Oct.) W3PQ 226, W3OQ 70, N3ND 44, W3DKX 41, K3JL 30, WA3WIY 22, WB3DUG 18, N3AKC 14, W3WD 14, WB3GOI 13, WB3FUP 7, WB3ENF 3. (Sept.) N3AKC 96, WB3FUP 9.

EASTERN PENNSYLVANIA: SCM, G. S. Van Dyke, Jr., W3HK — SEC: WA3PZO. NMs: K3KW K3NGN W3VA W3IAZ. Net repts.: EPA QNI 615, QTC 301; PFN QNI 367, QTC 776; PTTN QNI 380, QTC 165; EPAEP&TN QNI 399, QTC 125; AREC (2) QNI 10. OVS repts W3CL N3EG W3GOA WA3BJO K3YD. OO repts K3NSN W3CL WA3RPG W3KEK. OBS rpts W3VA W3CL N3AIU WA3RPG. PSHR: WB3JGP W3DP N3HR AA3B AA3C N3AIU. BPL: W3CUL K3NSN W3VR WA3ZRY WA3WQP. W3CUL & W3VR handled ttc from 5 fairs and still had time for picking tomatoes! WA3WQP is not busy enough he started a TCC sked on Sat. WB3JGP finally got that WAS. W3VA thinks he has mastered his keyer! Congrats to W3IVW for his work getting the Tamaqua Rptr. on air. K3NB won the Ohio QSO Party! N3AIU has rig problems. A lot of stations report 10 wide open. PTTN welcomes K3WN & WB3JEJ. KA3BMH under wing of N3HR soon to be on ttc nets. RF Hill No. 1 in 78 FD-10A. W3WRE says 3 more keys! W3EU has wood left over after trimming trees so his antenna would work. Allentown gang actively preparing for July Fest. Two nets I missed above: RRN QNI 1410, QTC 86; RRZN QNI 120, QTC 30. New officers Central Penn ARC: WB3AMO, pres.; WB3HCO, vice-pres.; WB3HBM, secy.; WA3CLP, treas.; W3SCB, trustee. Hope you all were on your good behavior and Santa brought you all the new gear you asked for! Welcome to AA3C as new EC for Lancaster Co. and thanks to outgoing WA3ONK for a job well done. By the way have you signed up with your EC? Club papers are really tops. Keep well. Traffic: (Oct.) W3CUL 3477, K3NSN 1510, WA3ZRY 700, W3VR 574, WA3WQP 565, W3BI 334, K3KW 240, WA3THT 240, K3NGN 230, WB3JGP 133, W3IPX 105, WB3JZA 101, W3FAF 95, W3DP 94, WB3BKV 78, N3AIU 75, AA3B 73, AD3X 58, WB3JYZ 53, W3VA 52, N3HR 29, WB3GZV 25, WB3CAI 18, N3GP 15, W3ID 11, N3CD 10, WA3YDC 10, W3CL 9, WA3YOE 9, WA3CKA 8, WA3VIL 8, W3ADE 7, N3EG 7, W3BUR 6, WA3BJO 4, W3HK 3, K3AI 1, AA3C 1, W3EU 1, W3GOA 1, W3KEK 1, WA3RPG 1, W3WRE 1, K3YD . (Sept.) WA3CKA 10, K3YD 3.

MARYLAND-DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — ARES men keep reporting to your EC, and get the word to W3HJH our SEC. We need the info regularly. The PON nets met at 1715 local time on 3905 kHz except Sun. The MEPN meets nightly at 1800 local on 3920 kHz. The MDD meets at 1900 and 2200 local daily on 3643 kHz. All of you are welcome. WB3IVO makes an OB M-F at 153OZ on 7060 kHz. W3ECN is admiring his LM plaque. W4MLR/3 and K2SCU/3 send in OO reports. W3WBY reports the Green Mountain front five are W4MLR, pres.; W3MZG, VP.; K3KWV, treas.; W3RMQ, secy.; WA3WTQ, tech. dir. W3CDQ was doubly blessed at Gaithersburg — The ARRL fifty year plaque, and a balun door prize. WB5FTX/3 has auto copy Morse and RTTY connected to his PET microcomputer. N3RL is off to France for a couple of weeks. WB3EPN is busy with



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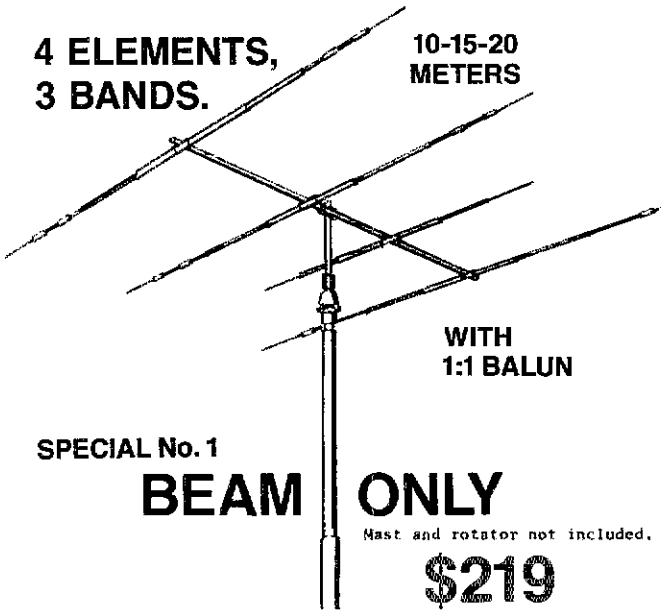

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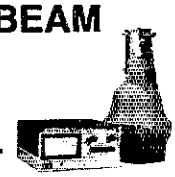

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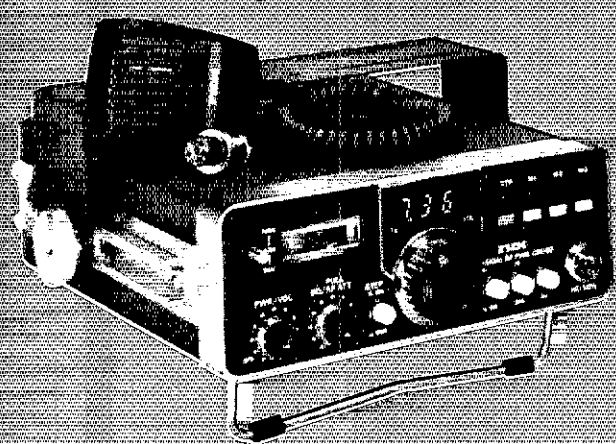


25 WATTS OUTPUT!

3 MEMORY CHANNELS!

SINGLE CONTROL TUNING!

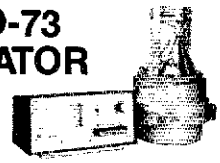
Digital readout, 800 channels. Tunes in 10kHz steps, has 100kHz "speed-up" button. Simplex ±600kHz, ±600 kHz. 13.8VDC. Supplied w/mic, mounting bracket.

REGULAR PRICE, $389.00

INTRODUCTORY PRICE **$349**

PREPAID U.P.S. BROWN

ALLIANCE HD-73 ROTATOR



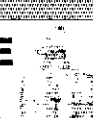
$109

HAM X ROTATOR

Reg. $349.95

$249

ALLIANCE U-100 ROTATOR



$39.95

(Regular $59.95)

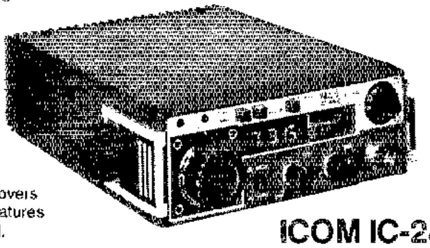
HAM III ROTATOR

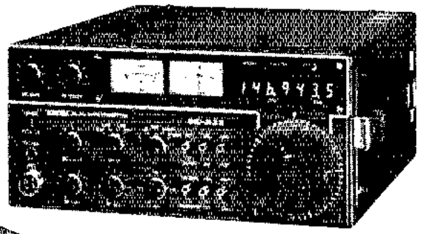
$129.95

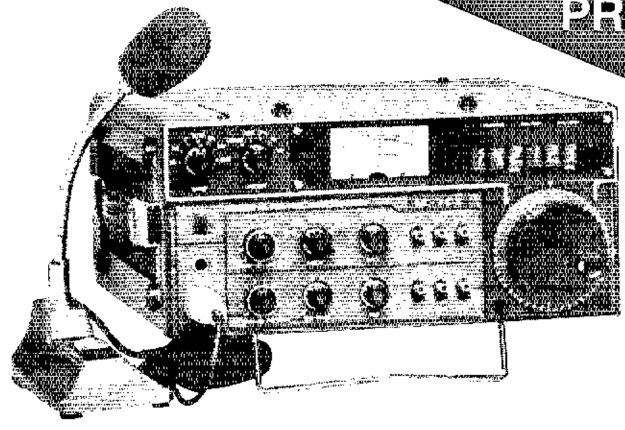
FREE SHIPMENT ALL ROTORS U.P.S. (Brown)

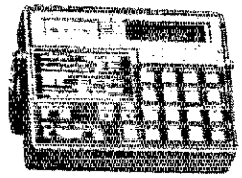
PHONE ORDERS, FREE **800-854-6046**

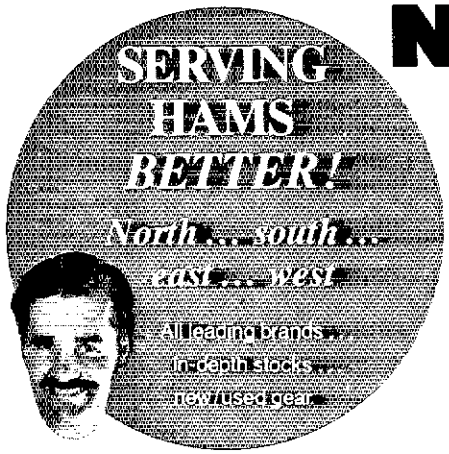
CALIFORNIA CUSTOMERS PLEASE CALL OR VISIT STORES LISTED ON RIGHT HAND PAGE











Bob Ferrero, W6RJ/K6AHV, Jim Rafferty, N6RJ other well known hams give you courteous, personalized service.

NOW...FREE PHONE!

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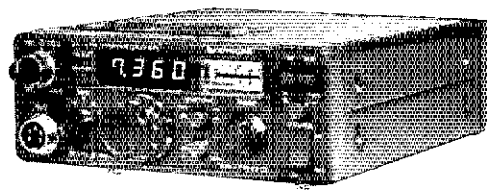
PLUS FREE SHIPMENT ALL ITEMS U.P.S. (Brown).



KENWOOD TR-7600

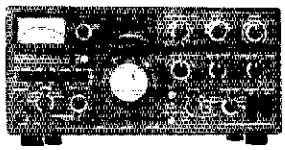
Radio plus choice of one of the following:

1) -ASTRON RS-4 4A. power supply. ($38.50 retail)

2) cash discount (call for prices)

$375

KENWOOD TS-820S



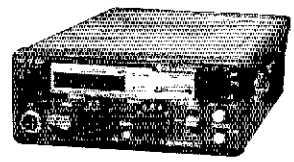
New price, 8-15-78, **$1249** while stocks last,

BONUS free Ham Radio Outlet Econo-Keyer (Regular $34.95)

$1098

KENWOOD TR-7400A

New price 8-15-78 **$449**



PLUS An ASTRON RS-12A 12VDC/115VAC supply Reg. $59.95

SHURE #444 MIC. $35.95

OVER THE COUNTER (Mon. thru Sat. 10AM to 5:30PM) MAIL ORDER, phone, write

ANAHEIM, CA. 92801
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1 mile east Knotts Berry Farm

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Prices/specs subject to change without notice. Calif. residents add sales tax

New 10 meter horizons!

Introducing:

"HIGH-END FOR TEN" GEAR

CHANNELING

Channel	Freq.		Channel	Freq.
1	28.91 MHz.		1	29.31 MHz.
2	28.92 "		2	29.32 "
3	28.93 "		3	29.33 "
4	28.94 "		4	29.34 "
5	28.95 "		5	29.35 "
6	28.96 "		6	29.36 "
7	28.97 "		7	29.37 "
8	28.98 "		8	29.38 "
9	28.99 "		9	29.39 "
10	29.00 "		10	29.40 "
11	29.01 "		11	29.41 "
12	29.02 "		12	29.42 "
13	29.03 "		13	29.43 "
14	29.04 "		14	29.44 "
15	29.05 "		15	29.45 "
16	29.06 "		16	29.46 "
"A" 17	29.07 "	"B"	17	29.47 "
18	29.08 "		18	29.48 "
19	29.09 "		19	29.49 "
20	29.10 "		20	29.50 "
21	29.11 "		21	29.51 "
22	29.12 "		22	29.52 "
23	29.13 "		23	29.53 "
24	29.14 "		24	29.54 "
25	29.15 "		25	29.55 "
26	29.16 "		26	29.56 "
27	29.17 "		27	29.57 "
28	29.18 "		28	29.58 "
29	29.19 "		29	29.59 "
30	29.20 "		30	29.60 "
31	29.21 "		31	29.61 "
32	29.22 "		32	29.62 "
33	29.23 "		33	29.63 "
34	29.24 "		34	29.64 "
35	29.25 "		35	29.65 "
36	29.26 "		36	29.66 "
37	29.27 "		37	29.67 "
38	29.28 "		38	29.68 "
39	29.29 "		39	29.69 "
40	29.30 "		40	29.70 "

HIGHLIGHTS

Freq. coverage: 28.91-29.7MHz.
Channels: 80 switchable.
Chan. segments:
"A": 28.91-29.3MHz.
"B": 29.3-29.7MHz.
Freq. derivation:
PLL freq. synthesizing. (Quartz xtl. 0.003%).
Operating voltage: 13.8 VDC ±15%.
Max. operating pwr: 30.3W (13.8VDC @ 2.2A).
Trans pwr out: 10 watts.
Modulation: F3. ±5kHz dev.
Rec. sensitivity: 0.5uV for 20db quieting.
Squelch: Adjustable (0.5uV threshold
Equipment supplied:
Mic. w/coil cord/plug, mtg. bracket, pwr cord.

Prices/specs. subject to change.

NEW! IN DEMAND!
COMTRONIX, ham communications innovators, introduce **FM-80**, a complete FM mobile transceiver with 10 watts output and **80**, 10kHz-spaced channels on the "high end" of 10 meters (28.9 to 29.7MHz.)

Now, with **both frequency modulation and channeling techniques** available on 10, enjoy the same type of low-noise communications so popular on 2 meters and up . . . but with an exciting **plus** . . . **DX!**

If you've been missing the fun and excitement of local, national and DX contacts on 10's "high end" let an **FM-80** correct the situation at once.

If you're a rock-bound pioneer, **FM-80** can be what you've been waiting for. With it, call and contact on 29.6MHz then switch instantly to any of 79 other channels for a QRM-free contact. And **hear** what's going on . . . DX . . . repeaters. Monitor any ham FM station, 28.9 to 29.7MHz (in 10kHz multiples). **FM-80** is for simplex operation only. However, COMTRONIX engineers hope to have a conversion kit soon with transmit offset for repeater use.

The photograph, channeling table and brief highlights should provide sufficient details to consider **FM-80** as an investment in added operating enjoyment. Its pricing represents excellent value.

COMTRONIX is presently formulating its national marketing organization and invites inquiries from established dealers/distributors.

FM-80 is now available at all **Ham Radio Outlet stores.** (Check QST ads for addresses) or direct from **COMTRONIX.**

$269
Calif. residents please add tax.

COMTRONIX, Inc.

3233F COFFEY LANE, SANTA ROSA, CA 95401 (707) 528-7670

comments on Docket 78-250. W3ZNW is glad EST is back again. N3IT makes the early morning nets. WA3WTK puts Denton on the map. W3HJH wants to count and display his received frequencies, and wants to foist an old live ground hog on W3FA. K3ORW hopes the MEPN goes to daily operations. N3QA raised his antenna and his signal levels improved. N3SJ is busy hopping between MARS and the nets. WB3CES is ready for winter. WA3EHK has a rising traffic trend. AD3H has passed about every exam the FCC gives. Congrats on Telephone First and Telegraph Second. WØVJD,3 has application forms for OTS. WB3GZU is reaching the top as a trafficer. W3PQ had full reporting for a change. N3CL experienced his first SS. K3IU and K3KU are old timers in the SS. W3FZV can be found Tue. on MDD. W3QYL is interested in RACES. With the nets: Net/Mgr Sessions/TFC/QNI Avg. MEPN/AA3S 21/71/25.1. 100 percent W3HJH, K3ORW and K3RIJ. Others WA3EHK W3FA W3LDD WA2YFM and WA3ZRY. MDCTN/K3ORW 18/60/17.5. Top Honors to WA3ZRY W3DKX K3YUC K3ORW and AD3H. MDD/W3PQ 62/169/6.5. Top Brass W3QQ W3PQ and N3OA. WR PON/W3DFW 18/23/18.3. MDC PON/W3OYY 4/11/20.3. Traffic: (Oct.) WB3IVO 188, N3CL 142, WB3GZU 138, W3FA 70, AD3H 69, N3QA 64, WA3EHK 29, K3ORW 29, AA3S 28, WØVJD/3 28, N3SJ 14, WB5FIX/3 12, N3IT 10, W3FZV 8, WB3CES 7, WA3WTK 7, N3RL 6, W3HJH 5, W3EGN 4, W3WBY 4. (Sept.) N3CL 219.

SOUTHERN NEW JERSEY: SCM, Raymond F. Clancy, WB2GTE — SEC: W2HOB. ARRL GM W1RU. Directors W3SW, W3KT attend SJRA club meeting with W2BAY W2GJS WA2KOK plus about 400 members. W1RU talked about the League and WARC '79. WB2BVV nw AB2E sez to remember the Two-Land QSO Party Sat. Feb. 17 to Feb. 19 0300 GMT. K2KBT moves to VT. WB2EVL N2FC N2CW nw OTS. Upgrades to Extra: WA2GDZ WA2ZYU WB2BZY Techs: KA2s BVT BWI BWK BVR BVU CFP. Advanced WB2PKG, Novice KA2CQS. WA2MEQ OO wins years subscription to callbook for meritorius reporting. WB2EYF moves to QTH block from beach. WA2PSM Silent Key. K2UL now on 2M. K2VX NJPN mgr. AA2H encountered stricken passenger on train platform, called police on 2M Rptr and help arrived in 3 mins. to take the passenger to Princeton Medical Center. FB! K2BR makes 1000 contacts on Miss America contest. N2FZ draws cartoons. KB2FR flys Aero-Star. Salem Co. RC has picture story of FD. K2QIJ and Burlington Co. hams supply communication in Sandy Lane Motorcycle Enduro in Chatsworth for 21st year. A simulated train wreck at the PATCO Haddonfield station was serviced by the Camden Co. Net, Red Cross, and co. CD unit. EC WA2ONW assisted. NJN, sess. E 31, QNI 412, QTC 169, QSP 149, mins. 568; sess. L 31, QNI 314, QTC 179, QSP 134, mins. 565; NJPN, sess. D 31. QNI 225, QSP 589, sess. E 31, QNI 183, QSP 725. Traffic: K2BR 200, AA2H 177, WB2EVL 36, K2KBT 23, WB2HKZ 9, K2UL 6, WB2VUN 2.

WESTERN NEW YORK: SCM, Lonnie J. Keller, WA2AOG — STM: W2MTA. Welcome to new appointees WB2ABD WB2AIO W2AET WB2BEJ WA2CBU N2CU WB2GTB K2IGW AF2K WA2MBM WA2PCF WB2PJU WA2SON WB2YQH & WA2ZKD! BARRA provided communications for the annual Can-Am Skylon Marathon Oct. 21 and now have their WR2ADR antennas at 800 ft on Grand Island. Lockport ARA's new officers are WA2ZVL WB2BGA WB2ZSV AE2T and WB2JBH. Don't forget their Jan. 27th annual auction/swapmeet. ARATS holds their licensing classes each Wed. night - contacts are WB2JQK and W2PVL. W2RCK now in sunny FL as N4LR. WA2KGS and WA2KGR have been relocated to WI. Congratulations to newly upgraded WA2NIW KA2BJP WB2TLZ and WB2JXF. Want to learn traffic handling? ESS is a 10 wpm traffic and training net that meets daily at 6:00 PM EST on 3590 kHz. Mgr. is W2WSS. 73 to W2FR as permanent NCS of EAN after many years of dedication and service. Thanks, Howie! W2AET and W2OBM meet at 223.50 MHz Tue. at 7 PM EST and encourage other Central NY VHFers to join them. Use it or lose it! K2KWK resends ARRL and W1AW bulletins as well as much other useful info over WR2ABF and WR2AEI in Rochester (19/79 & 28/88) Sun. at 8:45 PM. Welcome to W2UP who will be in WNY while attending SUNY Upstate Medical School in Syracuse. WA2LJI now KB2DK. K2IGW operated through Oct. as VP2LBH on St. Lucia. After 20 years in the DX chasing business, K2TQC worked country no. 347 (the last one on the DXCC list)! Congrats! KA2CFK is ex-WA1TZK from CT. Happy 10th anniversary to WR2AEI, 28/88 in Rochester. WB2PSI should have a 7-30 MHz rotatable log periodic up by the time you read this. Don't forget the new Two-land QSO party Feb. 17-19. Contact AB2E for details. AF2K and WA2CBU operated from ZB2-Land the first part of Nov. W2HBC has joined W2OBM and W2AET on 223.5 MHz, with WB2JKF now on from Newark — Tue. at 7 PM local time. W2AV has a new 144 MHz EME array. WB2FPI is working the DX with a new tribander. Traffic: (Oct.) WA2ELD 156, W2RUF 147, W2MTA 99, WA2MFV 81, WB2PJU 81, AF2K 31, WA2AOG 30, W2ZOJ 18, WA2AIV 14, K2ZR 13, W2AET 4, WA2NPQ 4, WB2FPI 2. (Sept.) W2ER 80, W2AET 2. (Aug.) WA2HSB 177, K2GWN 76, WA2ZJP 66, W2FR 54, WB2WCE 19.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — SEC: W3VUP. Asst SEC: WA3LJW. STM: W3YQ. NMs: W3YQ K3LL W3NEM W3KUN W3MML.

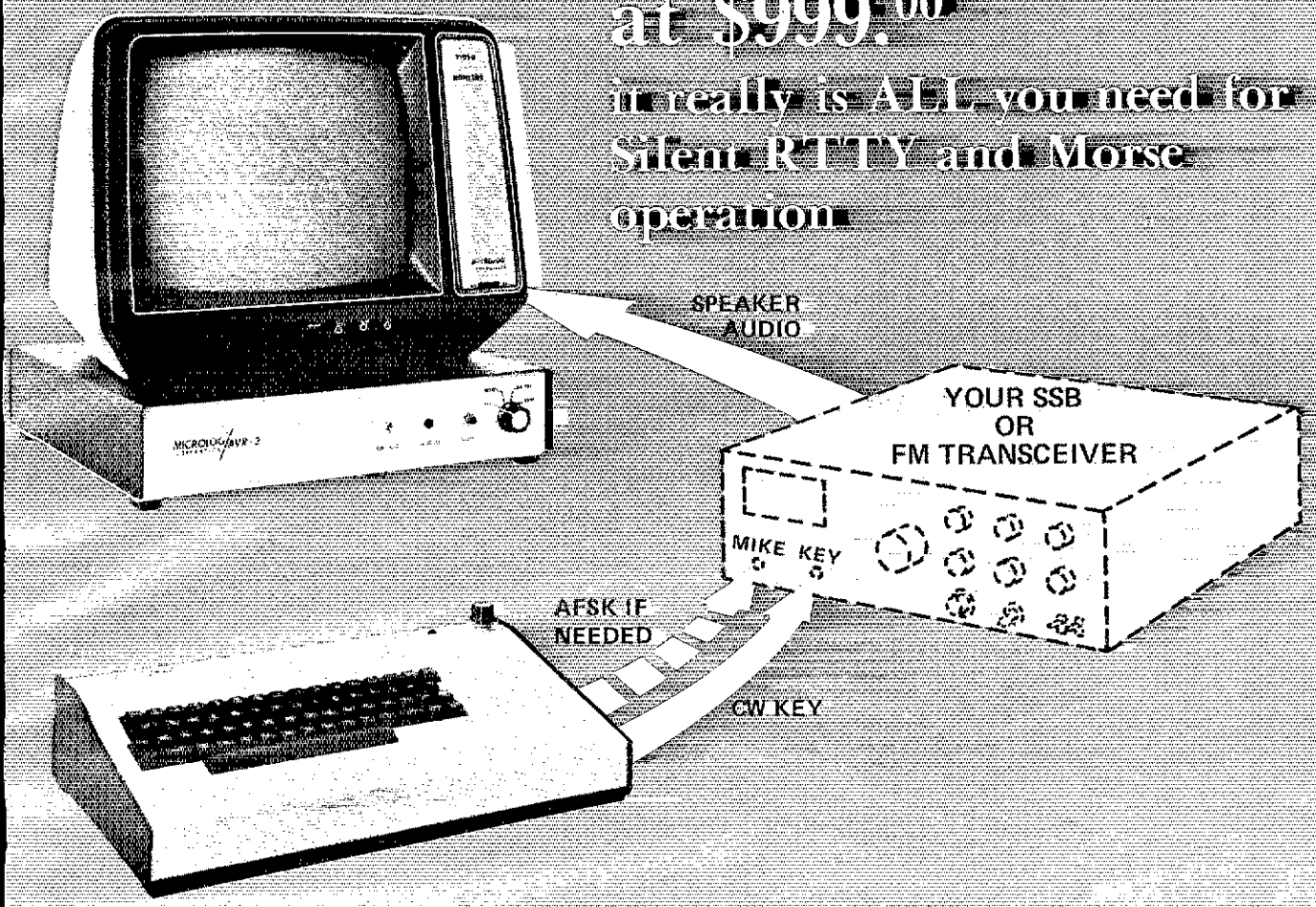
Net	kHz	Time/Day
WPA CW Tfc	3585.0	7:00 PM Dy
WPA Phone & Traffic	3983.0	6:30 PM Dy
PA Traffic & Training	3610.0	6:30 PM Dy
WPA RACES	3990.5	9:00 AM Su

New appointments W3YQ as Section Traffic Manager. All amateurs are asked to cooperate with him. K3FOW is new EC for Armstrong County. I would like to thank all the amateurs for their cards and prayers during my recent hospital sojourn. I am rapidly improving. Silent Keys are WB3FWY W3DUB and W3KPI. Our sympathies are with their families. New Novices are KA3BCX (father) and KA3BQE (son) team, KA3BPQ and KA3BGU. New Techs KA3AIZ WB3LJR WB3JNT WB3FXV. Generals N3AJW WB3HWB WA3ZJM WA3ZPL, N3AIK (WB3JBA). Advanced WA3ZMS WB3JGD WB3LEA. Extras AB3V (WB3CEP) AD3T (WB3GTH), also KA3BEN ? Novice. Congrats to all. Hats off to W3NR who is doing a fine job for Erie County CD, he also writes a weekly column for the Erie PA Times and runs regular schools for Novice to Advanced and Extra class training. Get involved, join your local ARES and RACES groups belong to both. You could perhaps help your family besides your neighbors. WPA CW sess. 31, QNI 460, QTC 138. WPAP&TN sess. 31, QNI 312, QTC 94. WPA 2MTN sess. 31, QNI 547, QTC 108. Traffic: W3EGJ 194, N3FM 103, WB3DKT 90, WB3HGL 88, W3YQ 83, AC3N 73, W3SMV 67, K3SMB 55,

The MICROLOG System Package

at $999.00

it really is ALL you need for Slow RTTY and Morse operation



System includes:

AKB-1 Programmable Memory Keyboard with the following options	**$299.00**
Random Code	50.00
RTTY Baudot	50.00
RTTY ASCII w/ Digital Speed Selection	50.00
AFSK Modulator*	50.00
AVR-2 Digital Receiving System with the following options	**369.00**
RTTY (4 Baudot Speeds Plus ASCII)	50.00
AFSK Demodulator	45.00
Video Monitor	**169.00**
	$1132.00
Save Approximately 12%	—133.00
PACKAGE PRICE	**$999.00**

Additional options available

**If your transceiver has frequency shift keying input, deduct AFSK Modulator and $50.00.*

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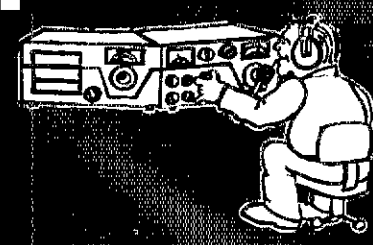
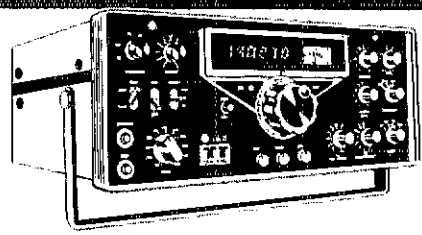


1-800-633-3410

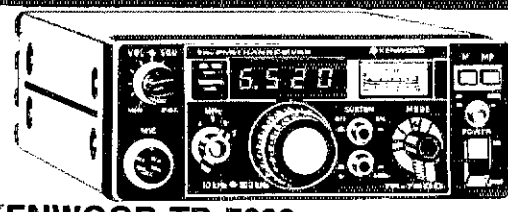
IN ALABAMA CALL 1-800-292-8668 9:00 AM TIL 5:30 PM CST



TEN-TEC Omni D transceiver

Totally solid state, covers 160 to 10 meters, digital readouts, VOX and PTT, built-in squelch, built-in 4-pos. CW/SSB filter, 2 speed break-in, power input 200 watts with 50 ohm load, 100% duty cycle, basic 12 VDC operation power supply required for 117 VAC operation, and more! Optional power supply 252M available.

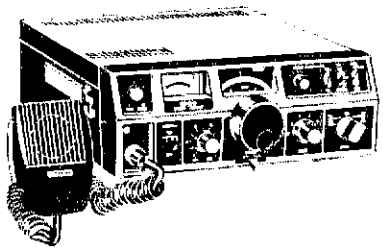
1069.00 list. Call for quote.



KENWOOD TR-7600
The radio that remembers

Full 4-MHz coverage (144.00-147.995), 800 channels, 10 watts RF output/1 watt low, memory channel w/simplex or repeater offset, & LED. With the optional RM-76 select any 2m freq., store freq., auto stop on first busy or open channel, scan memories, operate on MARS, and set upper and lower scan freq. limits.

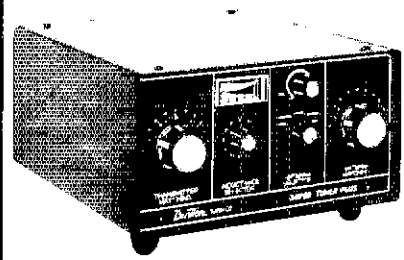
375.00 list. Call for quote.



YAESU FT-7
HF transceiver

The NEW FT-7 features: • Frequency coverage: 10 thru 80 meters • Sensitivity: 0.5 micro volts for S/N 20 dB • Emissions: LSB, USB, CW • Input power: 20 watts DC • Completely solid-state, single knob tune-up • 100 KHz calibrator built-in •Semi-break-in with sidetone • Receiver offset tuning • Extremely compact for isntallation under dashboard.

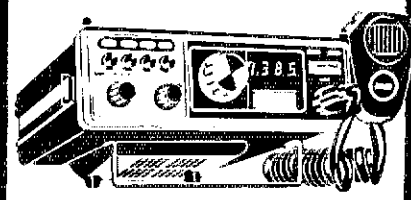
499.00 list. Call for quote.



DENTRON Super Tuner Plus

1000 watt CW and 1200 watt SSB, continuous tuning from 1.8 to 30 MHz, selectable antenna functions, alternate output, and coaxial tuning.

149.50 list. Call for quote.



YAESU FT227RA
"Memorizer"

Finger tip control on keyboard mic lets you scan the 2 meter band for a clear or busy channel. 4 memories, provision for 800 digital PLL channels 144-148 MHz, channel memory, 4 digit LED freq. readout, and selectable 10 watt Hi/1 watt Low output.

399.00 list. Call for quote.

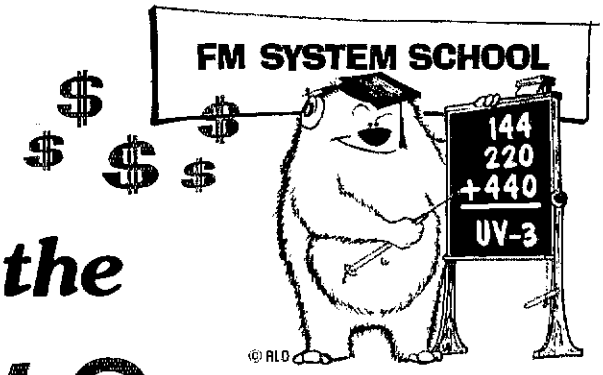
VISA

Long's Electronics

master charge

MAIL ORDERS: P.O. BOX 11347 BIRMINGHAM, AL 35202 • STREET ADDRESS: 2808 7TH AVENUE SOUTH BIRMINGHAM, ALABAMA 35233

Remember, you can Call Toll Free: **1-800-633-3410** in the U.S.A. or call **1-800-292-8668** in Alabama for our low price quote. Store hours: 9:00 AM til 5:30 PM, Monday thru Friday.



Dollar thoughts to consider about the

DRAKE UV-3

UHF-VHF MULTIBAND FM SYSTEM

Only $795 for 3-Band UV-3

(That's just $265 per band —and fully synthesized on all three!)

*How does the cost of the Drake system **really** compare to alternative methods of getting on 144-220-440 MHz fm?*

A First of all, there is no direct comparison possible, because the Model 1346 Drake UV-3 is the only rig in the world offering 144-220-440 MHz fm in a single box —and it is fully synthesized on each band.

B The nearest comparison would be to add the suggested list prices of three separate units of competitive fm rigs presently available. It would work out approximately as follows (and you would end up with three separate units to power):

2 Meters (Synthesized to 5 kHz)	$ 449.00
220 MHz (Synthesized to 5 kHz)	449.95
440 MHz (23 channels, crystal)	349.00
Crystals (Assuming 20 per 440 MHz radio)	120.00
Total competitive price	**$1367.95**

But wait—even at those higher competitive prices you'd still be missing these features included in the UV-3:

1. Full synthesis on all three bands
2. Extra diode-programmable fixed channels on each band
3. Priority scan feature on each band
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CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM: Harry Studer, W9RYU. SEC: W9AES. NMs: WA9KFK and WB9JSR. Cook County EC: W9HPG.

Net	Freq.	Times/Day	Tfc	Sess.
ILN	3690	0030/0400 Dy	265	62
Ill Phone	3915	2245 Dy	814	31
NCPN	3915	1200/1700 Dy	201	50
IEN	3940	1400 Su	no	report
W9VEY Mem. Stn			8	

K9EEA has a new TR7 and K9BVE a new Triton. WB9JSR put up a 48 ft tower with a tribander. Ex-WD9FYA now N9ALI. A new repeater in Moline with 146.64 input and 146.04 output will soon be in operation with the call K9VB/RPT. Our sympathy to the family and friends of W2IOP, formerly W9IOP/W8IOP who recently passed away. Larry was an avid DXer and Editor of CQ Magazine in the fifties and held positions with various manufacturers. The Central Ill. chapter of the QCWA held their semi-annual dinner at Peoria and Henry Klaus was host at the Klaus Radio, Inc. W9IPQ of Chicago is general chmn. of the 1979 National QCWA Convention which will be held in Chicago on Sept. 7, 8 and 9. W9LIG is resting well at the St. Margaret's Hospital in Spring Valley. he is past pres. of the Starved Rock Radio Club. W9QLZ and XYL has returned from a vacation in Central Europe. Commonwealth Edison's RFI Team, W9QBL, WB9EAV, Tim Scanlon and Art Surges presented and discussed techniques to track down sources of RFI and TVI at the Oct. meeting of the Joliet ARS. Father Moran showed films of Nepal at the Lake Forest College and many members of LaMars were present. WA9TWW K9ZWU K9ZWV WD9BBG WD9GDA WA9MJJ K9USW and WA9HER were elected officers of the Six Meter Club of Chicago for the coming year. MidComs of St. Louis gave a demonstration of their equipment products at the Sangamon Valley RC in Springfield. New officers include: W9NFO W9NTG WB9SLM and WB9QXA. W9TGN passed his Extra Class exam while attending the National Convention in San Diego. K9MHJ and W9CSP joined Silent Keys. Our sympathy to their families and many friends. WA9IGG N9ACX and W9LYN were elected by acclamation to head the Moultrie AR Klub for the next term. The WARC Transmitter-Receiver fund at this date had the following contributors, Sangamon Valley RC, Egyptian RC, Hamtesters RC, Central Ill. of Bloomington, Northern Ill DX Assn. and the Starved Rock RC. WB9YCJ back from marine boot camp. K9EI joined part time faculty at Richland Community College in Decatur teaching FCC commercial licensing class. K9SW now active 160 meter cw. W5KLV reports that the CAND for Oct. passed 476 messages during 62 sess. and that the 9RD was 96.8 percent with Ill. stations W9JIJ and W9NXG checking in. The Ninth Region Daytime Net had 57 sess. with 162 messages handled and 97 percent Ill. participation with W9JIJ K9MUH W9BKE WD9DSG and W9HOT (reporting). W9JIJ is the only BPL recipient for the month. Traffic: W9JIJ 554, W9NXG 254, K9PNG 196, WA9KFK 143, WB9JSR 131, W9OK 124, N9TN 119, W9KR 92, W9HOT 71, W9OBS 63, N9DR 56, K9EEA 51, K9BVE 50, W9LNQ 42, K9SW 34, W9HBI 30, WA9BFV 28, WA9AQN 18, W9PRN 18, WD9DSG 16, W9OYL 13, WA9JJE 12, W9YCE 12, N9MX 11, WD9EBQ 6, WD9GYL 1.

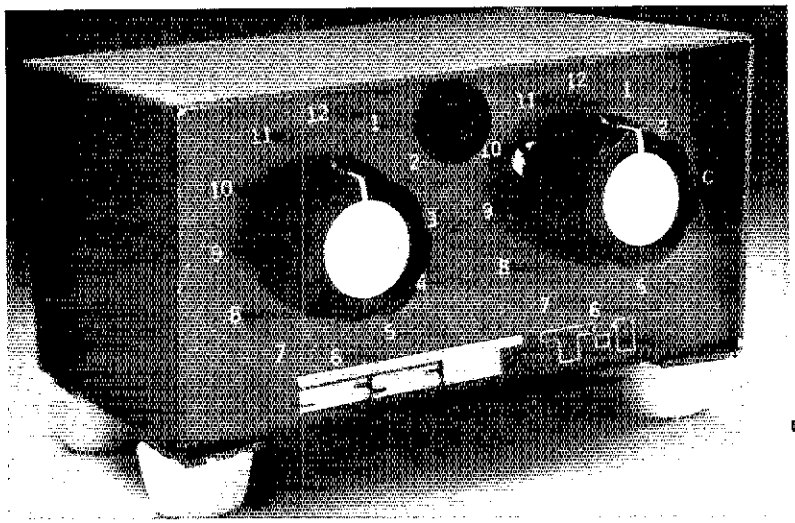
INDIANA: SCM, J. M. Keil, W9LTU — SEC: W9UMH. Net Managers K9CGS (ITN), W9JUJ (QIN), WB9YXN (ICN) W9PMT (Hoosier VHF). Net times in UTC and Freq. in kHz.

Net	Freq.	Time/Day	QNI	QTC	Sess.
ITN	3910	1330/2130/2300 Dy	3632	341	93
QIN	3656	1400/0100/0400 Dy	946	385	92
ICN	3737	0015 Dy	108	34	27
IPON	3910	1300 Su	134	4	5

Oct. net reports. ECs please notice the annual report forms in your SET material. It is a requirement of your appointment to fill them out and send them in. This year's SET exercise will be a "simulated" Blizzard. Everyone should know how to simulate a blizzard by now. I would like for every amateur to originate two messages during the SET weekend. One to your SCM or SEC and one message to a friend. Contact your EC to find out what your local SET activity will be. Nov. 1st '78 W9JUJ took over as manager of Daytime TCC for Central Area. Congrats. Congrats also to WB9IHH on receiving his Extra. IRCC has contributed $50 toward a transmitter-receiver kit for a less developed country. Perhaps some more Ind. clubs could. Tried building something lately? The new ICs make it extremely easy. Perhaps easier than they look on paper. I find in building a 2m FM receiver they work the first time. Early SS reports, W9JOO missed only VE8, others heard on cw W9RE W9TG W9FC K9WWT WB9PIR WB9OCP W9QLW and others I missed I'm sure because I couldn't find an Ark station either. Hoosier VHF Net report for Oct. QNI 942, QTC 27. Sept. QNI 802, QTC 24. Traffic: (Oct.) W9JUJ 680, W9FC 273, WB9UYU 130, W9DKP 104, WB9IHH 102, W9TG 92, N9AEI 76, W9QLW 68, W9EI 62, W9XD 53, WA9OCF 52, W9HUF 32, W9PMT 31, K9FZX 23, N9PS 20, WD9FIC 17, W9UEM 16, W9IOH 15, WA9OHX 14, WA9TJS 14, W9EGV 12, AA9U 10, K9PPZ 10, K9CGS 8, W9CMT 6, K9FG 6, K9TKE 2, W9BDP 1. (Sept.) W9EI 137, WB9UYU 98, W9TG 55, K9FZX 30, W9PMT 30, K9FG 11.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9FZC. NMs: W9AYK K9UTQ W9IEM WB9KPX WB9ICH K9KSA K9LGU K9EN. Nets, freq. time, QNI, QTC, Mgr.: BWN, 3985, 1145Z M-S, 712, 650, W9AYK. BEN, 3985, 1700Z Dy, 515, 103, W9IEM. WSBN, 3985, 2230Z Dy, 981, 227, K9UTQ. WNN, 3725, 2215Z, 25, 2, WB9ICH. WSSN, Summer Vac. WIN-E, 3662, 0000Z Dy, 341, 147, WB9KPX. WIN-L, 3662, 0300Z Dy, 290, 118, K9LGU. WRN, 3662, 0030Z S, K9EN. Wi ExPO, 3925, 1701Z M-F, 568, 30, WA9NIX. WSBN, BWN certificate to WA9ZTY. New Novices in Oshkosh area KA9CGK KA9CGL KA9CGM KA9CKY KA9CLQ. Oshkosh AHc has 14 in general class studies. Novices in Watertown area KA9CPV KA9CPW. WB9FTC now AE9H. ARES conference held in Wisconsin Rapids Oct. 14 was a success. Watch for it next Oct. 20, 1979. Groundhog party was a huge success. WD9AZF now AB9L. W9GTJ and WB9WRW in hospitals we wish them a speedy recovery. D9RN can use more check-ins and traffic. WD9CQC has Extra Class. W9ZGO made BPL. WB9VVH has tech license. WB9QNK WD9JIE have their Generals. New Novice in Iola KA9CPA. WB9ULC now AD9X. WB9KPX received 25 wpm code proficiency certificate. WB9IKS now Advanced. Support

SST T-1 RANDOM WIRE ANTENNA TUNER



All band operation (160-10 meters) with any random length of wire. 200 watt output power capability—will work with virtually any transceiver. Ideal for portable or home operation. Great for apartments and hotel rooms—simply run a wire inside, out a window, or anyplace available. Efficient toroid inductor for small size: 4-1/4" x 2-3/8" x 3", and negligible loss. Built-in neon tune-up indicator. SO-239 connector. Attractive bronze finished enclosure.

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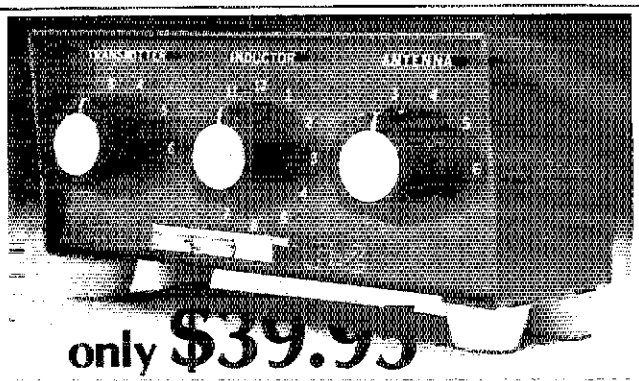

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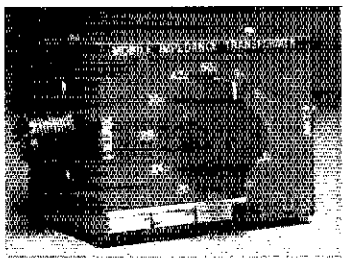

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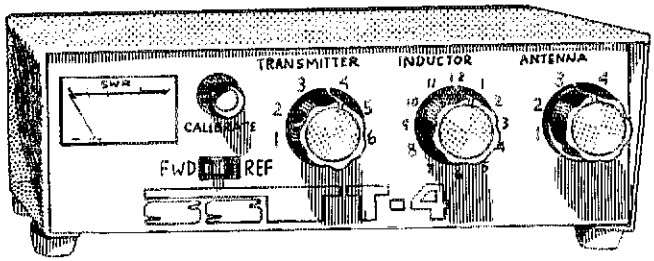

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- All bands--1.8-30 MHz.
- SWR meter built in.
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FUNCTIONAL STYLING. The "look" you requested. "Clamshell" aluminum case clad in textured black vinyl. Complementary nonreflective warm dark metal front panel. Extruded satin aluminum trim bezel and tilt bail. Convenient controls. Fully shielded. And everything in a larger, easier-to-use size: 5¾"h × 14¾"w × 14"d.

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8-BANDS. The world now and in the future. OMNI covers 160, 80, 40, 20, 15, and 10 meters now (crystals included for all present Amateur bands, 1.8-30 MHz). And it has convertible 10 MHz and "AUX" band positions for the future.

BROADBAND DESIGN. Permits changing bands without tune-up, without danger of out-of-resonance damage to the final stage.

ANALOG OR DIGITAL READOUTS. OMNI-A features an analog dial with 1 kHz dial markings. OMNI-D has 0.43" LED readouts with the 5 most significant in red and the 6th in green to show 100 Hz increments.

BUILT-IN VOX AND PTT. Smooth VOX action with 3 easy-to-adjust front panel controls. PTT control is available at both front and rear panel jacks; an external microphone switch may be used.

BUILT-IN SQUELCH. Unusual in an hf rig, but handy for tuning or monitoring for a net or sked.

BUILT-IN 4-POSITION CW/SSB FILTER. 150 Hz bandwidth with 3 selectable skirt contours for optimum CW reception.

8-POLE CRYSTAL FILTER. 2.4 kHz bandwidth, 1.8 shape factor.

SEPARATE MODE SWITCH. Permits using *all* filters in *any* mode.

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OPTIMIZED RECEIVER SENSITIVITY. Ranges from 2 uV on 160 m to 0.3 uV on 10 m (10 dB S+N/N) to achieve ideal balance between dynamic range and sensitivity.

GREATER DYNAMIC RANGE. Typically exceeds 90 dB to reduce possible overload from nearby stations. Also includes switchable 18 dB PIN diode attenuator for additional overload prevention.

WWV RECEPTION. On the 10 MHz band switch position.

FRONT PANEL CONTROL OF LINEAR/ANTENNA BAND-SWITCHING. Auxiliary bandswitch terminals on back panel for simultaneous control of external relays or circuits with the OMNI bandswitch.

BUILT-IN PHONE PATCH JACKS. Provide interface to speaker and microphone audio signals for phone patch connection.

BUILT-IN "TIMED" CRYSTAL CALIBRATOR. In the OMNI-A a pulsed 25 kHz calibrator desensitizes the receiver and provides an automatic 5 to 10 second "on" time for easy two-hand dial skirt adjustment.

BUILT-IN ZERO BEAT SWITCH. Permits placing your transmitted signal exactly on the listening frequencies of CW stations.

BUILT-IN SWR BRIDGE. The "S" meter electronically switches to read SWR every time you transmit to provide a continuous antenna check.

FRONT PANEL MICROPHONE AND PHONE JACKS.

ADJUSTABLE AUTOMATIC LEVEL CONTROL. For setting output power level from low power to full output, for retaining low distortion at desired drive power to linear amplifier.

SEPARATE RECEIVING ANTENNA CAPABILITY. Rear panel switch and jack connect receiving section to common antenna or separate receiving antenna. Also acts as receiving antenna by-pass when used with instant break-in linear amplifiers.

BUILT-IN ADJUSTABLE SIDETONE. Variable pitch and volume.

DUAL COMPRESSION-LOADED SPEAKERS. Larger sound output, lower distortion, no external speaker needed.

POWER INPUT. 200 watts when used with 50 ohm load. Proven, conservatively-rated, solid-state final amplifier design with full warranty for first year and pro-rata warranty for 5 additional years.

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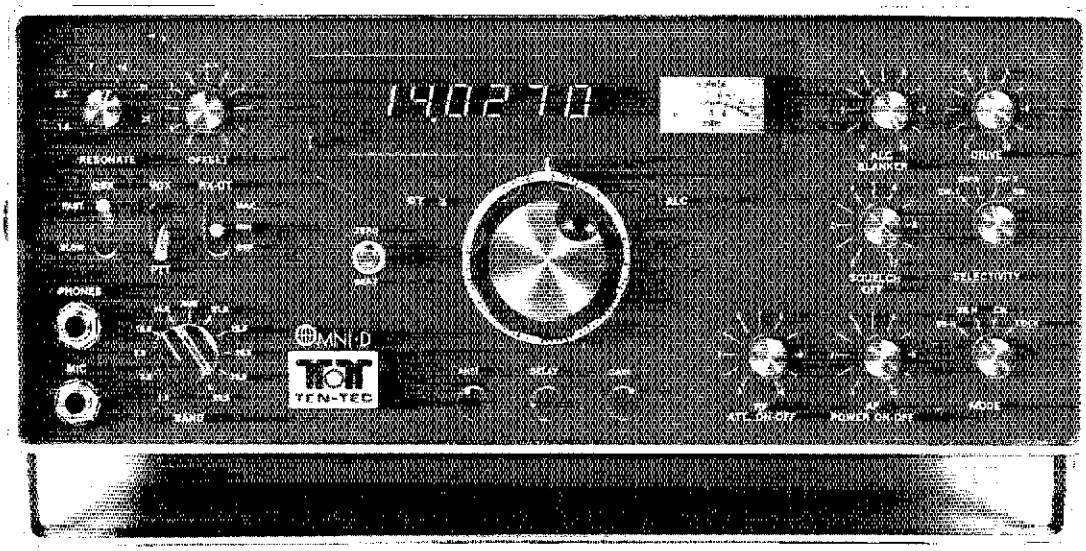

all of the Wisc. nets, they all could use more QNI and QTC. Traffic: (Oct.) W9ZGO 888, W9DND 200, W9SFL 144, W9IEM 130, AD9X 123, WD9CQC 115, K9FHI 106, AE9H 94, W9DM 82, WD9DHF 60, W9IHW 60, WB9KPX 56, W9AYK 54, K9UTQ 53, K9LGU 52, WB9ESM 51, K9AKG 42, N9CP 39, WB9YPY 38, WB9ICH 37, K9UU 36, WB9MPF 35, WD9AJA 31, WB9JSW 31, K9JPS 30, WB9ABF 28, W9FDY 26, W9TXB 26, W9LDO 24, K9AO 24, W9UW 23, K9ANV 16, W9YYL 14, WB9RRU 9, WB9YPZ 6, WD9DTT 6, WA9GYF 5, W9ZBD 5, W9VBQ 3, WA9WYI 3. (Sept.) WB9KPX 126, WB9ULC 59, W9YCV 37, WB9RRU 9.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WB@HOX -- SEC: W@SA. Minn. Nets.

Net	Freq.	Time	QNI	QTC	Mgr.
MSN 1	3685	6:30 P	362	103	N@HY
MSN 2	3689	10:15 P	136	47	K@PIZ
MSPN N	3945	12:05 P	325	30	WB@JYT
MSPN E	3929	5:45 P	644	134	W@DUW
PAW	3925	9-12/1-5	3017	176	WA@YVT
MWX	3925	6:15 P	290	217	WB@UKI
MSSN	3710	5:30 P	156	12	WB@ZAL

Congratulations to new Novice, KA@CME. Also our congratulations to new EC appts: WB@LRK WB@RIL K@TS KN@USQ and new STM, WB@ZAL. We're sorry to see W@VB and WB@JYT give up their appointments but realize that work does come first, hope to continue to hear them on the air though. As this goes to press the good fellows are getting my tower and antennas all secure so I should be in good shape. Traffic: WB@ZAL 279, WA@TFC 164, WA@YVT 109, W@DUW 107, N@HY 99, W@HKS 94, WB@UKI 84, K@PIZ 71, WB@NZB 55, WD@BFF 53, K@CSE 45, WD@GYQ 40, WB@PKG 38, WB@QEU 37, WB@JYT 32, WD@FSL 28, WB@UIP 27, K@TS 24, W@RKV 22, WA2FG/@ 20, N@AHA 19, K@ZBI 11, WB@SYT 9, K@FLT 6, K@II 5, K@GNI 3.

NORTH DAKOTA: SCM, Lois A. Jorgensen, WA@RWM -- The YL Weather Net started Nov. 1st for report to Weather Service Forecast Office. New radio club is Hawk Nest Repeater at Carrington, they also are giving radio classes. WA@YSF had a group of Boy Scouts at his QTH to work JOTA and worked 5 countries. Congratulations on K@FRP and W@SRH on their DX. Congratulations to WB@BPC now KB@CH on his Adv. K@ATK WA@CRH and WD@DFT will be on RTTY soon from Carrington-Fessenden area. W@CDO has good signals with his new TS520S and EMA linear.

Nets	kHz	CST/Days	Sess.	QNI	QTC	Mgr.
Goose River	1990.0	0930 Su.	5	54	2	W@CDO
DATA	3995.5	1830 Dy	28	240	12	WB@WSC

Traffic: WA@RWM 22, W@CDO 5.

SOUTH DAKOTA: SCM, Lydia S. Johnson, W@KJZ -- Asst. SCM: W@DVB. SEC: WA@TNM. NMs: W@HO, W@MZI W@ZWL WA@TNM WA@UEN WA@VRE K@TVJ. The Weather Net meets daily, except Sun. 7 A.M. on 3960. Noon & Evening Net meet on 3955. SDN CW net nightly at 0100 GMT on 3650. Officers for the Signal Hill ARC W@HP, pres.; WB@RQJ, vice-pres.; W@DVB, secy.; W@KJZ, treas.; Bill Veith, pro. chmn. The Bear Mountain repeater frequency has been changed to 25-85 says WA@BWF. S.D. YLs active on the nets are W@s DVB MZI KJZ ZWL VVA; WA@s VRE RWK RWM; WB@s KUE OMF UBX WON; WD@BMR. WA@TNM made PSHR with total 49 points. New OBS is K@JV. The Black Hills ARC considering hosting the annual State Hamfest in 1979. SEC WA@TNM credits the NTS and S.D. nets for the successful first reunion of his ship's crew members and families after 35 years of separation. AD@V is conducting evening code and theory clases for the Novice at Lead High School. S.D. operator in CAND is N@ABE. Nets: Morning, QNS 536, QTC 56. Evening QNS 364, QTC 33. NJQ Noon QNS 684, QTC 38. SDN CW QNS 89, QTC 44, sess. 31. Traffic: (Oct.) K@FRE 122, WA@VRE 80, W@HOJ 78, W@DVB 74, WA@UEN 63, WA@TNM 52, WD@BMR 28, W@KJZ 22. (Sept.) WB@OMF 16.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU -- SEC: WA5VNV. NMs: AD5D W5MYZ W5POH WA5ZWZ. Nets: kHz, Time/Day, QNI, QTC, Mgr. ARN, 3995, 0030/Dy, 1160, 98, AD5D. OZK, 3760, 0100/Dy, 126, 21, W5MYZ. APN, 3937, 1200/M-S, 920, 68, W5POH. M-Bird, 3928, 2230/M-F, 634, 24, WA5ZWZ. SCARC, 28.7, 87, 3, WD5HDC. NEAEWN, 146.28/88 163, 23, WB5WJH. Stations active during flood in Pulaski & Saline Counties: WB5LRP WD5IRB WD5BKP WA5BHW W5TJI WD5VDA WA5YHN K5RAG W5KL WB5HXK W5DHH W5RW, WD5FBY WB5WNU WB9FLW WD5HNR W5IGM WD5ENG WA5VNV AE5L WA5LOC WB4ZCW W5UVW WA5KJT W5RXU WA5ROP K5HQY K5MEA WB5RVC WB5URE WD5GTT WB5BIV WB5GKW WA5DLV WA5ZVW W5FD WB5OBQ W5THJ WA5IBZ WB5RHC W5FJ WB5IBZ WB5OEW W5EEJ W5VAD W5LKU W5EKD W5EIJ WB5OBF WB5QQV K5AJM WB4IZP WB4NNW WB@WKR. OZARK club participated in SET in Baxter Co. Oct. 29th. W5BBV new EC Fulton Co. PSHR Sept. AE5L 28, Oct. AE5L 12, W5POH 43. Traffic: (Oct.) AD5D 35, W5POH 28, W5UAU 26, WB5WJH 22, WB5GWU 17, K5BIL 14, K5DW 11, WB5WWA 4, AE5L 3, W5KL 2, WB5GQH 1. (Sept.) AE5L 43.

LOUISIANA: SCM, S. T. "Tom" Losey, Jr., K5TL -- Asst. SCM: K5DPG. SEC: WB5IYH. STM: N5YL. Net Mgrs. W5GHP N5ES N5IB N5RB WB5IYH. Lowell Otto worked LU3ZY on 20-meter ssb. This made the last country he needed for DXCC. Congrats! WA2NYR/5 of Leesville ARC reports that first class of 12 Novices all graduated and new class of 24 students now beginning. Congrats to New Iberia ARC for 1st place finish in class 1A of this year's SET procedure and to Delta DX Assn., Thibodaux ARC & Lafayette ARC for their 4th, 7th, and 11th place finishes. W5GHP has assumed temporary Net Mgr. of LAN. A new repeater link has been put together covering New Orleans and surrounding cities and Baton Rouge to the north. WA5IQU with WB5BHI doing the electronics mostly responsible. Working Committees now in full swing for 1979 National ARRL Convention in Baton Rouge. All Clubs urged to get members Pre-Registrations in soon as possible.

Net	Freq.	Time/Day	QNI	QTC	Mgr.
LAN	3615	7 & 10 PM Dy	480	159	WB5EMU
LTN	3910	6:30 PM Dy	602	108	N5ES
LSN	3703	7:30 PM M-F	186	31	N5IB
LRN	3587.5	6:30 PM Su & W	22	19	N5RB
RACES	3993.5	8:100 AM Su			WB5IYH
LEN	3910	9:00 AM Su			WB5IYH

Traffic: (Oct.) W5GHP 252, WB5EMU 158, N5RB 103, K5TL 70, WB5OOM 48, WB5LBR 47, WB5USS 32, N5IB 31, K5BLV 29, WB5IYH 22, WA5PRI 11, W5YN 6, WD5GJB 3, WB5IKT 1. (Sept.) WA5IQU 102.

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MISSISSIPPI: SCM, E. Ed Robinson, III, W5XT — SEC: WB5FXA. W5EPW reports the Ackerman Repeater and the Tombigbee Repeater are back on the air. Increasing club activity in Jackson area and plans for 1979 Hamfest underway. Tnx WD5IKD. WA5IDF reports MSN cert. to WD5FMW and NCS endorsements to WB5ZAG and WB5TRZ all with much improved MSN activity. Activity notes from the Oxford area include upgrades to General WB5SXP WB5VKG WD5CRB WD5IGL and both WB5RMG and WD5BUS now Advanced. Also hear W5NCB planning freighter trip to South Africa. Please keep supporting our nets. CGCHN (WD5BDC) sess. 31, QNI 1802, QTC 120. MSBN (K5WSC) sess. 31, QNI 2147, QTC 61. MTN (K5OAF) sess. 31, QNI 141, QTC 51. MSN (WA5IDF) sess. 31, QNI 64, QTC 9. MN (WA5JWD) sess. 26, QNI 503, QTC 12. Capital AEN (WB5SNB) sess. 5, QNI 68. Jackson Cty. AEN (WD5DCI) sess. 24, QNI 280, QTC 6. Traffic: K5OAF 105, W5EDT 51, WB5GNR 50, K5AKM 40, WB5SNB 34, WA5JWD 28, WA5OKI 22, W5XT 22, WA5IDF 14, WD5CDK 8, K5FI 5, WD5BEX 4, W5XX 4, WB5NGF 4, N5RN 2.

TENNESSEE: SCM, O. D. Keaton, WA4GLS — Asst. SCM: WB4PRF. SEC: WB4DYJ. STM: W4ZJY. WB4YBL rec'd. section Net Certificate. Sullivan County which takes in both Bristol and Kingsport had a very successful simulated emergency. The exercise was conducted by the East Tenn. Asst. SEC and the Sullivan County EC. All ECs are urged to direct this kind of training. SET coming up this month so the ECs are requested to get in touch with the SEC, WB4DYJ for instructions since there will be a Section-wide exercise this year; then be sure that you report your SET activity to ARRL and your SEC immediately after the SET is over. Certificate of Merit has been awarded to: K4TKQ WB4TVZ W4EBT WA4KSO WB4SEJ WD4GYL WB4OBE WA4AQH WB4FME WB4YSN WA4WGT WB4EOE WB4NLT K4DIC K4SEQ WD4GYT WD4ORB WD4NYQ K4PDH W4KMH WD4NCG K4RPS. The TN/late session reports good attendance, contact N4UC for details. The phone nets report 165 sessions, 5239 QNI and 811 QTC. The cw nets report 75 sessions, 553 QNI and 219 QTC. Your SCM is looking for news items to put in this column, load me down with them, unusual happenings, special events, new equipment, rare contacts, etc. I will be coming to your area to talk to you about the needs of VHF/UHF to survive so come out and hear about this great opportunity. Join your favorite club, then support it with your attendance and then encourage your club to join the Tenn. Council of Amateur Radio Clubs. Traffic: WA4NIF 216, K4JGW 215, WA4PRF 164, K4CNY 156, N4UC 103, WB4BKF 95, W4OGG 64, KB4G 54, K4XE 34, K4VM 29, WA4DKC 28, W4PFP 26, WA4GLS 25, WB4GZF 22, K4WOP 21, W4TYV 19, WB4GWA 15, WB4ZSZ 12, W4VJW 8, W4EWR 6, WA4WVW 5, W4PSN 4, W4RUW 3, WA4IQL 2.

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted Huddle, W4CID — SEC: WB4ZML. Oct. Nets:

Net	QNI	QTC	Net	QNI	QTC
KRN	428	52	KYN	206	43
MKPN	985	100	K6N	104	23
KTN	1330	241	6DARES	37	2
KPON	49	3	5DARES	52	4
SEKEN	25	0	4DARES	31	5

4th District ARES Net Mgr. WA4JAV reports a good response to the net's emergency drill in Oct. WD4AIN has passed his Advanced Test. W4CDA reports the Danville Club has been given a room in the Boyle Co. Courthouse for DES use. Communications equipment is being installed to make it into an op-center. RO K4TXJ reports Jefferson Co. RACES very active. EC K4AVX has secured ant. space on the Letcher Co. Courthouse for DES service. The annual SET/Section meeting will be held Jan. 21 in Louisville. Monitor the nets for time and location. Traffic: K4TXJ 198, K4DZM 120, WA4AVV 118, WB4NPD 65, W4CID 44, WB4ABE 41, K4AML 38, WD4ITJ 34, WA4FAF 31, WA4YPQ 30, WA4JAV 30, W4HKT 28, W4IQZ 24, KB4CF 21, WD4CQF 18, WA4IUH 18, WB4RIT 16, K4HOE 15, W4CDA 15, WD4LXX 14, WB4AUN 13, WB4ILF 9, WA4AGH 7, AI4T 7, K4AVX 6, N4AOI 2, WA4JTE 1.

MICHIGAN: SCM, Stanley J. Briggs, W8MPD/K8SB — Asst. SCMs: WA8DHB W8SOP. SEC: WA8EFK. STM: WB8MTD NMs: K8LNE KB8AI K8RV K8KMQ WB8YDZ WB8ZNS.

Net	Freq.	UTC/Days	QNI	QTC	Sess.
QMN*	3663	2300/0300 Dy	1142	279	91
MiTN*	3953	0000 Dy	580	235	31
GLETN	3932	0200 Dy	1155	222	31
MACS*	3953	1600 Dy	900	204	31
UPEN	3922	2200 Dy	737	98	36
WSSBN	3935	0000 Dy	838	69	31
MNN*	3722	2230 Dy	329	66	30
BR	3930	2230 M-S	420	31	24
MEN	3930	1400 Su	194	6	5
SEMTN	147.69	0315 Dy	67	14	12
Mi6M	50.7	0000 Dy	69	0	8
			577	22	41

VHF PAM Report 8 local nets:
*NTS Section nets. The Michigan Section has two of the top ten Official Observers in the whole ARRL field organization: K8JH and WB8IKJ. WB8IEK WB8KEN and K8KMQ provided communications for a large celebration and parade for Bishop Kenneth Povish at St. John Vianney Church. The Plymouth Stu Rockefeller ARS logged 285 miles of halloween spook patrol. We welcome the new affiliated club in Mich.: The Bay Area Amateur Radio Club of Bay City. Simulated Emergency Test will be Jan. 27 & 28. Plan to participate with your local ARES or RACES group or on a section net. I am sorry to report the following Silent Keys: WA8GSS WA4WLB (ex-WB8MZG) WB7WBU (ex-WA8FSU). Reports from OOs: K8AIT WB8IKJ & K8JH. OVS report: WB8RNY & K8HXW. Reports from OBS: N8AG KB8AI WD8EAQ WB8DJS WD8IXV K8NKB W8SOP & AC8Y. The Ivory Olinghouse, W8ZBT Field Day award presented each year by the Motor City Radio Club goes to the Cherryland Area ARC for their 1978 FD performance. The award will be presented at the Muskegon convention. Field appointments: OO W8SOP WA8RNB. OTS: WD8BKM WD8EAQ WB8HSN WB8IEK WD8MCN WB8SYA. Traffic: (Oct.) WB8MTD 245, WB8YDZ 168, W8MPD 164, WD8NYN 147, WA8DHB 127, K8DD 118, WB8ZNS 117, KB8BZ 112, N8AKY 110, WA8QAF 93, K8LNE 91, K8RV 90, K8DTG 86, WD8IEW 85, N8ABA 84, WD8NKA 82, WB8LRT 71, WB8POL 71, W3GQJ/8 65, WD8KZX 52, W8DSE 50, KB8AI 44, K8DYI 42, W8VPW 42, W8YIQ 39, WD8DMX 35, AC8Y 36, W8SOP 35, K8ZJU 31, W8NOH 30, WD8MCN 29, W8HIN 28, W8QFQ 26,

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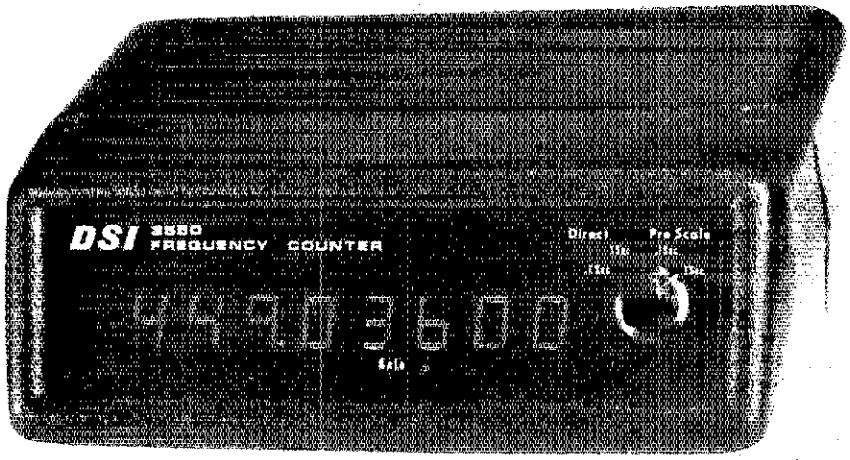

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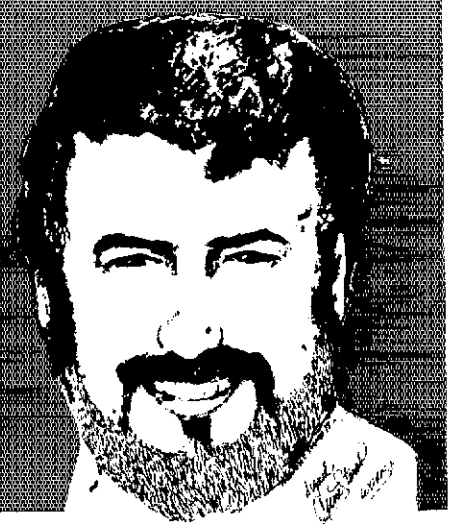

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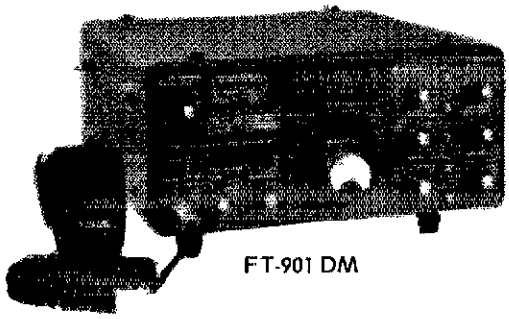

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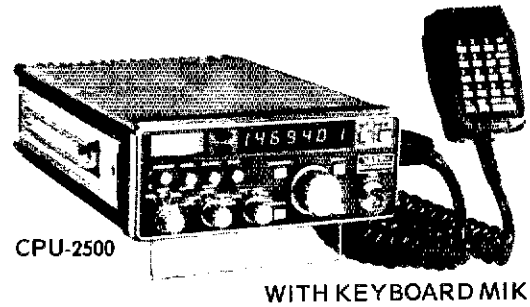

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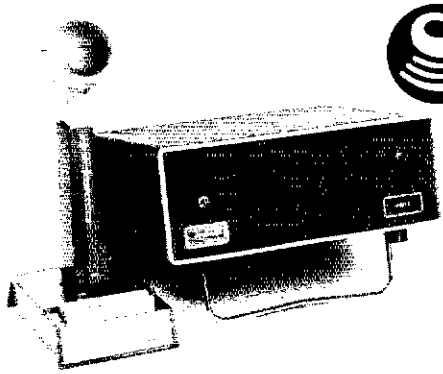

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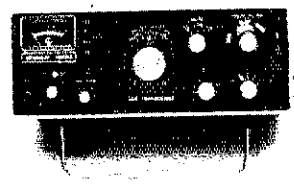

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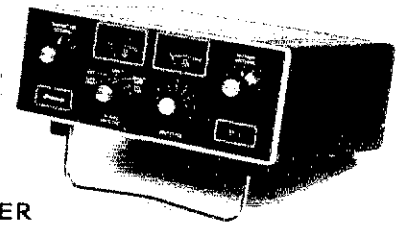

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OHIO: SCM, Harold C. Chapman, WB8JGW — Asst. SCMs: W8FU WA8MCR W8TP N4VY. SEC: K8AN. NMs: N8CW W8DIL WB8KWD K8OZ WA8SSI WB8WTS.

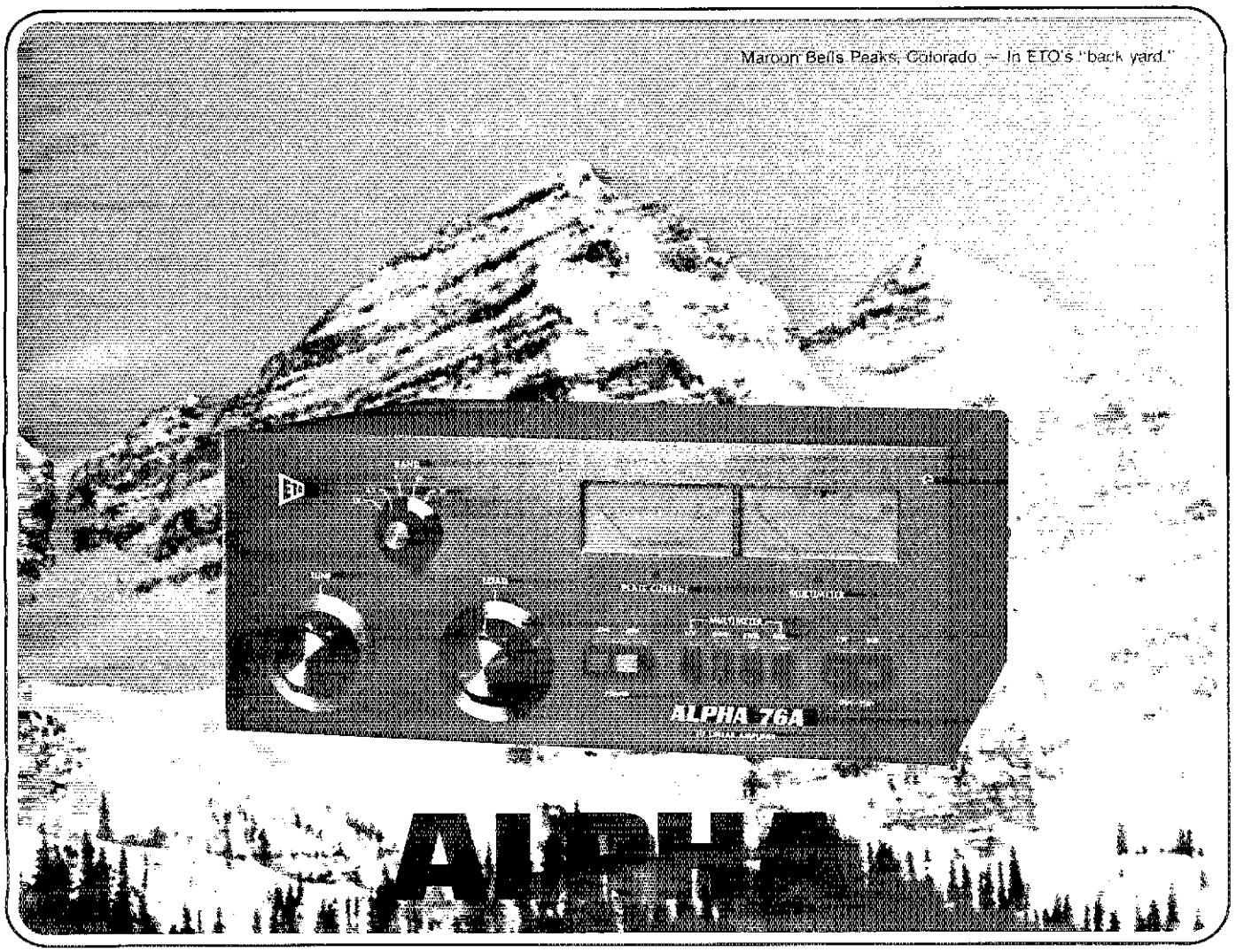
Net	Sess.	QNI	QTC	Times	Freq.
ONN	(no report)			2330	3.708
BN	61	518	219	2345/0300	3.577
OSSBN	93	2304	575	1530/2115/2345	3.9725
OSN	31	240	88	2310	3.577
O6mN	31	324	32	0200	50.150
BNR	31	107	232	2300	3.605
ONN	30	126	101		3.708

After the past two winters it could be considered anti-climax but Simulated Emergency Test (SET) 1979 is creeping up on us; scheduled for Jan. 27-28. The purpose of SET is to discover our strong points and our limitations; to help amateurs gain experience in communicating under simulated emergency conditions; to provide a public demonstration to agencies we serve, and through the news media — of the value to the public of Amateur Radio, particularly in time of disaster. For you newcomers SET is just that — a test of our service under simulated emergency conditions. For you old hands it's a chance to dust off the emergency power equipment and put it to a good test. For ALL of us it's a chance to participate in the highest volume traffic period of the year; this includes originations on your part or from your area; accepting traffic for your area; acting as liaison from one net to another; acting as NCS on nets in which you participate; and/or just generally assisting your EC. If you don't know who your EC is contact K8AN or myself. Monitor the section or local nets for any special session announcements. Hopefully Mother Nature will permit a normal SET and we can really overload NTS. THIS YEAR ONLY we will have a second SET in Oct. future SETs will be held in Oct. rather than Jan. WB8GGR appointed to fill 8th Region vacancy on EC Advisory Council. Appointments: OES: K8DL W8ERD AD8I K8LT K8ND WB8NTR K8PE WA8RUT WB8VLR; OO: AD8I K8PE WB8STQ W8XT; OVS: K8ND. Local net reports: Van Wert Co. Emerg. Net, QNI 29, QTC 1 in 4 sess.; BRTN, QNI 221, QTC 29 in 31 sess.; TSHAC, QNI 380, QTC 47 in 25 sess. Upgrades WD8MGP to Extra/AF8A. Traffic: (Oct.) W8PMJ 216, WB8KWD 214, WB8WTS 212, K8AAZ 201, K8BYR 168, K8OZ 118, WA8MCR 111, W8QZK 96, W8DIL 95, WB8OMO 90, W8MOK 85, N8CW 82, N4VY 78, K8FE 71, W8TH 69, WA8HGH 68, WB8UBR 67, WB8OFR 66, WD8MTV 61, WB8JGW 60, WB8SRC 58, WD8QMP 56, WA8SSI 52, WA8GMT 44, WB8SIQ 44, W8TP 44, K8AN 43, WD8DTG 34, N8TM 30, WB8TRK 30, W8WEG 29, W8JMD 28, WA8RQQ 28, WB8PIY 27, KB8FS 26, AF8A 25, WB8MRL 24, WB8QHV 24, K3RC 23, W8UQY 23, WD8KBW 22, W8LZE 20, W8MGA 20, WB8CJU 17, K8CKY 16, WB8KKI 16, WA8MHO 16, K8DL 15, WB8GGR 15, WD8NAD 14, WB8UJM 14, WB8YTI 13, K8HLJ 12, K8IKD 12, WD8KFN 12, WA8TBX 12, WB8VLR 11, WB8VZX 11, N8JR 10, K8GYX 8, W8RG 8, K8SYS 8, WB8AJC 7, WD8MKC 7, K8PE 7, W8UPH 7, WB8BZD 6, W8LWY 6, WB8UJL 6, AB8P 5, WB8AYM 4, W8BHL 4, WB8GVI 4, W8ZM 4, WD8EKI 3, W8IM 3, K8KWO 3, W8DYF 2, W8LT 1, WB8QXN 1. (Sept.) K8AN 104, WA8MCR 63. (Aug.) WB8KKI 89.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Guy L. Olinger, K2AV — SEC/ ASCM: WB2VUK. ASEC: K2AYQ. STM: WA2SPL. NM: W2CS W2WSS. Nets: NYPON 5 PM 3913; ESS (slow) 6 PM 3590; NYSPTEN 6 PM 3925; NYS 7 & 10 PM 3677; SDN 9:30 PM M-F 147.66/06. Had to order a hundred section net cert's for ENY stations in various nets. Wow! Westchester County ODES held a drill called "Com-Link" with mobiles representing all the towns & villages checking in on 615/015. FB job! Congrats to new Novices from Linton SHS: KA2BUF KA2BUG KA2BUH KA2BIU KA2BUM KA2BUN. 'YJR reports using a chopped CB ant with great results on 10. WB2COY transmits bulletins RTTY MWS 7 PM on 805/205 Kingston. 'AV Soapbox: In applying for membership in WECA, I received a letter stating their public service aims, requesting I meet with membership committee to see if I would support these aims. Amen, folks! I wonder what would happen if the FCC did this for license applicants? Think on it. One parting shot . . . pass around a little Season's Cheer. Go dig up some Season's Greetings traffic and bury NTS in it. Season's Greetings to all. October PSHR: WA2MKQ WA2SPL WB2EAG WB2KDC. Traffic: (Oct.) WA2SPL 735, W2YJR 195, WB2KDC 121, WA2OTC 85, WB2EAG 81, K2AV 65, W2BIW 54, WA2ENM 54, N2EF 53, K2HNW 51, WA2EQW 48, WA2ZSG 42, WA2MKQ 39, WA2CJY 18. (Sept.) WA2ENM 29. (Aug.) WB2EAG 50.

NEW YORK CITY — LONG ISLAND: SCM, John H. Smale, K2IZ — SEC: K2HTX. NM: WB2EUF. The following are major AREC/RACES Nets in this Section, please check in to your local one: Bronx 28.64 MHz, 50.35 MHz, 146.88 fm. Kings: 28.64 MHz, 50.35 MHz, 146.88 fm, Richmond: 146.88 fm, New York: 29.5 MHz, 146.88 fm. Queens: 29.5 MHz, 50.52 MHz, 145.62 am/fm. Nassau 28.72 MHz, 145.68 am, Suffolk (West) Hunt. 28.73 MHz, 145.59 am. Smith: 28.65 MHz, 147.21 fm, Babylon: 21.430 MHz, 146.085/685 fm, Islip: 28.65 MHz, Suffolk (East) 146.82 fm, Brookhaven: 146.115/715 fm. Riverhead: 3730 kHz cw. Note: Net times between 2000 and 2100 local on Mon., for any further info, contact your local EC or K2HTX. The only thing bad about the 1978 HARC Convention was that it was over so fast and the two years passes so slowly between them. It was a real pleasure to meet and talk with everyone again and I hope to see everyone soon. WA2HVM now has a Tempo S1 Syncom. Please send all reports and such to WA2UWA from now on. Paul is the new SCM as of Jan. 1. New officers for great South Bay ARC are: WA2PUG, pres.; WB2ZSE, vice-pres.; WB2PXA, treas.; WB2INI, secy.; WA2HQB WB2DQH WB2COO, committee men. Congrats to N2DO and XYL on their new YL. WA2FGB is in St. Mary's Hosp. in Rochester, Minn. He operates on 14.345 MHz at 1900 local along with WA2TQT and WB@ZFG. Congrats to



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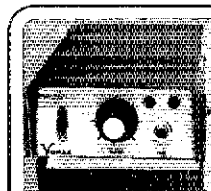

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240 160m converter	110.00
241 Xtal oscillator	35.00
242 External VFO	179.00
244 Digital display	197.00
245 150 Hz CW filter	25.00
249 Noise blanker	29.00
Ten meter Xtal ..... each	5.00
1102 Snap-up legs ..... pair	1.00
570 Century 21 70w CW Xcvr	299.00
574 Century 21/Digital	399.00
670 Century 21 Keyer	29.00
276 Century 21 Calibrator	29.00
274 Century Digital Mod Kit	90.00
247 Antenna Tuner	69.00
277 Antenna Tuner/SWR Bridge	85.00
509 Argonaut 80-10cm 5w Xcvr	369.00
206 A Crystal calibrator	29.00
208 External CW filter	29.00
210 AC power supply	34.00
210/E 110/220 vac ps	39.00
215P Microphone w/plug	29.50
KR1A Dual paddle assembly	35.00
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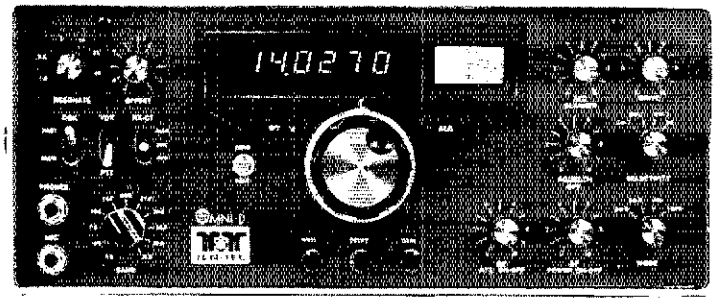
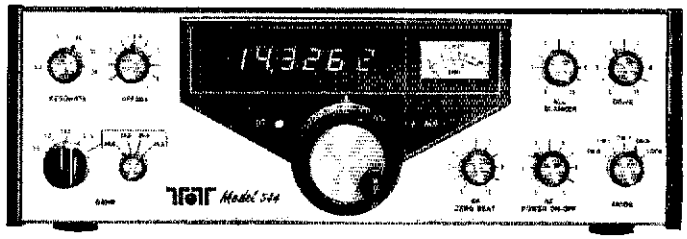
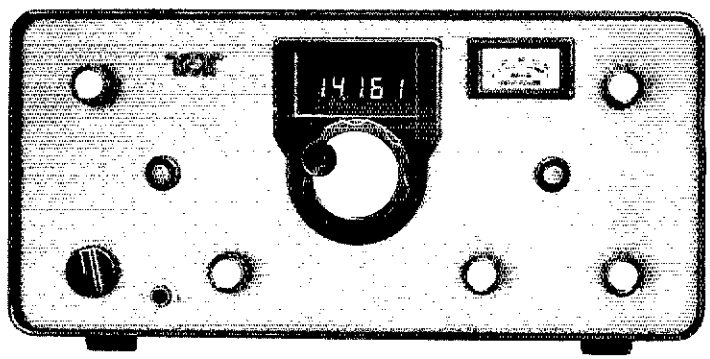
KR5A Single paddle keyer, DC	39.50
KR20A Single paddle keyer, AC/DC	69.50
KR50 Dual paddle Ultramatic, AC/DC	110.00







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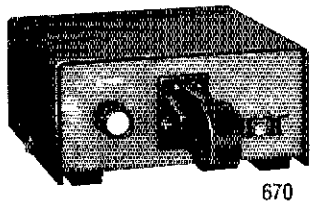
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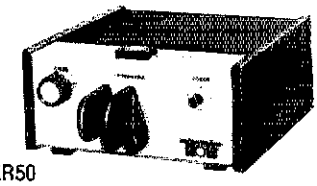
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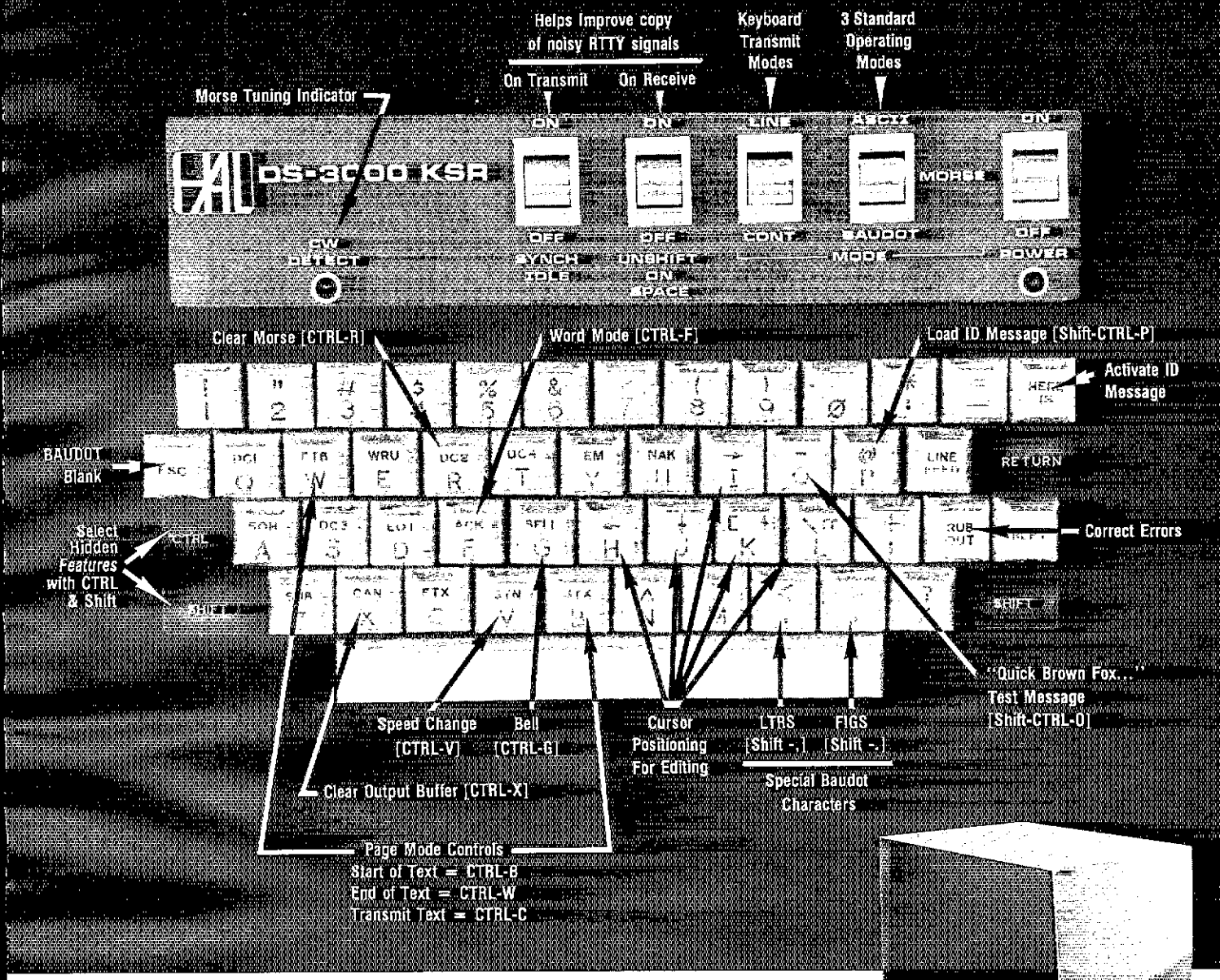

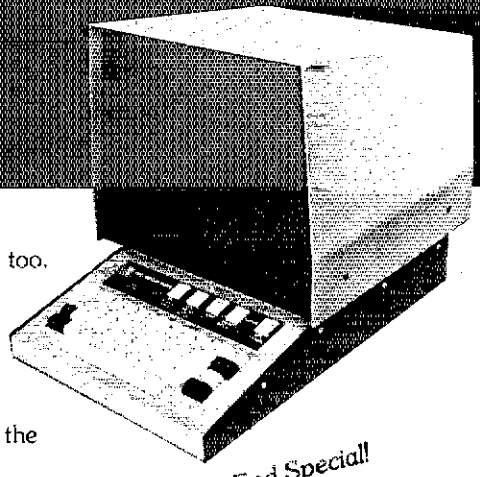

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WA2PYU who upgraded to Gen. and WA2FYF to A
vanced. WB2LOU is now EC for Brookhaven ar
WB2YUJ is now EC for Islip. WB2UAZ now N2AH
WB2UBB now N2AHG. WB2DCJ now out of hosp. alor
with an excuse to complain about his back, he had
herneated disc. Once again, amateurs from many club
in the section helped out with the NYC Marathon. Mo
details will be printed as they become available. K2UB
home recovering from injuries received in a traffic acc
dent, his address is 1414 41 St, Brooklyn, NY 11218,
call him at 212-853-1517. WA2KEQ, WB2QFC ar
WA2RAH upgraded to Advanced. AB2T used to b
WB2WTZ and WA2PQV now N2ANP. W2FIB passed h
Extra. A log of club stations helped with the Boy Sco
On-The-Air Jamboree. Look for further details in QS
Traffic: K2IZ 8, K2VL 6, WB2DCJ 2.

NORTHERN NEW JERSEY: SCM, Bob Neukomm
WA2MVQ — SEC: WB2VUF. STM: W2XD. NMs: K2X
K2VX, NJSN WA2LHV.

Net	Mgr.	Freq.	Time/Days	Sess.	QNI	QS
NJN	W2XD	3695	7:00 P Dy	31	452	185
NJN	W2XD	3695	10:00 P Dy	31	314	176
NJSN	WA2LHV	3735	7:00 P Dy			

Old Bridge Trash and Traffic Net meets daily o
147.72/12 at 2000 local hours and off to great start wit
QNI 27, QSP 13 at first session and has NTS liaison an
affiliation. Union County Emergency and Traffic Ne
meets 7:30 P daily at 146.685/085. Tri-County Radi
Assn. has following new officers: WA2WJY, pres
W2AMS, vice-pres.; WD2AGX, secy.; WA2VMH, treas
W2IHA WB2RNJ WA2MTT WB2CFB & WA2WD
trustees. W2IHA awarded Life Membership in TCRA an
started his amateur career back in April, 1935. K2JU ha
a TRS-80 and wants to hear from other NNJ hams wit
similar microprocessors in their shacks. WB2MCO i
Navy MARS at NNN0UWG. WB2HSG operated fro
Presbyterian Church County Fair working both DX an
tfc. with the help of AA2H and W2ZEP. K2AM again ac
tive on the low-bands with an inverted "L" — XYL
WA2KBD with a new Jr. Op. and they've added a ne
FM-28 to the shack. W2KB promoted to Attorney in O
fice of General Counsel for Public Svc Gas & Elec. N2G
has a new TS520S/VFO and XYL KA2CND active o
80/10 cw and they have a borrowed Robot SST
WA2OVE has a new TA-33. WA2LWU very active on th
3905 Century Club and has received his first certificate
Old Bridge Traffic/ Training Net QNI 280, QTC 62/57
695 minutes with 15 sessions. 2-mtr. tfc is looking up –
other repeaters pse note. Members of BARA hav
helped on several recent Marathons. RAVEN held thei
monthly meeting at the Oakland EOC with excellent a
tendance. It is hoped that a similar 2-meter traffic net b
established in Bergen County to handle the traffi
resulting from the spring flooding of the Saddle Rive
interested hams wishing to help please contact W2CC
ECs in major Bergen County cities are needed. Exceller
OO report received from W2TPJ. Lots of chirpy sig
reported. Nice to have heard WB2ELF on nets while a
home on weekends from RPI. Nice letter received fro
N2MW who is attending MIT. Traffic: WB2RMI 511, AF2
140, WA2LHV 77, WA2MVQ 75, W2XD 67, W2SQ 61
WB2MCO 54, N2CR 50, WB2HSG 47, WA2OVE 36
W2ZEP 35, N2NS 33, W2SWE 32, N2GJ 30, WA2NPP 20
WB2KLF 19, K2ZFI 17, WB2KAK 7, W2KB 5, W2UM 5
W2AM 4, W2CC 4, W2CVW 4, WB2JVE 4, N2TM 2.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, W0LFF — Presented charte
to Humboldt Club, watched the Cedar Rapids Hamfes
grow, and attended the fine Midwest Convention, bus
month. WD0FOY secy. of Sooland Rpt. Assn. Easter
Iowa DX Assn. has W0SML, pres.; K0LUZ, veep; K0AT
secy-treas. WA0YYL in 6-Land, and W0YOY wit
WA0NNC in Tucson. Congrats on upgrades to WB0ZQ
and WD0AYT General; WB0YUI WB0SEL WA0EYV
WD0BDY WB0BGH and WB0CHP Advanced, an
WA0DGZ Extra. WB0CPR organized a Jamboree on-the
air from W0AK, club station for DMRAA sporting a nev
TS-820. W0SS gets call book for being in OO top ten
Two new repeaters on 7.75/.15, K0ZQ/R at Atlantic an
WB0PUJ/R at Oakdale, Cass Co. RPT Assn. has K0ZC
pres.; WB0SFJ, veep; WB0YXR, secy-treas. Ft. Dodg
10M Net on 28,840 T-T at 0130Z. New equip: WB0URA
Argonaut, N0AHJ TS-820, WB0PYD TS-820S, WB0RM
FL2100, W0SJ TR33C, WB0YXR W0PPF TH6DXX
WB0YXR and son WD0BSJ will have local QRM when
XYL and two other sons receive their tickets. Bi-State
VHF Teleprinter Soc. now has 38 members. WB0QCL
has 7 countries on 50 MHz. W0KLC recovering from le
amputation. W0OJD had 162 contacts with 47 station
while mobile on vacation. WA0OZL new veep of Ceda
Valley Club. WB0TXL flushed out the fox on 2M in Ceda
Rapids in short order. WB0MMT given a plaque and cert
for his contribution to Amateur Radio. Muscatine 31/9
is running full blast now at 60 watts. WB0NSS awarded
certificate of appreciation for his help with the Iow
Code Net. Happy New Year. Iowa 75M, 1830Z, 3970, M-S
1273, 119, 26, WA0VZH; Iowa 75M, 2330Z, 3970, M-S, 989
73, 26, W0YLS; Tall Corn, 0030/0400Z, 3560 Dy, 320, 108
62, W0YLS. Traffic: WA0AUX 695, W0YLS 121, W0SS 106
N0SM 73, AE0R 49, W0LFF 27, WD0GDL 20, WB0PYD 12
K0OFI 8, WB0ENL 7, W0BW 6, K0GP 4, W0SR 4.

KANSAS: SCM, Robert M. Summers, K0BXF — SEC:
W0KL. Net Mgrs.: W0FT W0OYH WB0SZS WD0FBP.
Hiawatha ARC assisted in Local Halloween Festival fo
11th time. WB0ZBR upgraded to General at Midwes
Division Convention. W0CY of Salina was presented the
Raymond E. Baker Award as KS Amateur of the Year.
W0PB Hiawatha, KS was presented the Quarter Century
Wireless Assn. Golden Anniversary Award in Concordia,
on Aug. 12. Central States Traffic net report for Oct. QN
1164, QTC 74. KS Weather Net QNI 724, QTC 389. QKS
QNI 464, QTC 208, KPN QNI 257, QTC 24. KSBN QN
1037, QTC 127. QKS-SS QNI 52, QTC 11. New manager o
the Slow Speed Net, WD0FBP would like to have a few
more QNI each night as well as a few more experienced
ops to provide some of the liaison needed from time to
time. Sorry to hear that N0SN is leaving the state, he will
be missed, especially in the tfc. nets. Traffic: W0OBH
256, N0SN 176, W0OYH 148, W0HI 94, W0CHJ 85, K0EZ
85, WB0LKA 77, WA0LBB 69, WD0FBP 63, W0FDJ 51,
W0FT 47, W0AM 38, W0RBO 34, K0BXF 22, WB0ZBR 18,
W0PB 17, W0ZUX 17, W0KL 15, W0BLI 12, W0NYG 10,
K0YTA 9, K0FPC 7, W0OFR 6, N0IN 4, K0MXJ 4,
WA0OWH 3, K0GZL 2.

MISSOURI: SCM, L. G. Wilson, K0RWL — Asst. SCM:
Joe Flowers, W0OTF. SEC: WB0FKY. The FCC office in
Kansas City was moved as of Oct. 1, 1978 to 8800 E. 63rd
Street. WB0OCW is sporting a new TS-520S. There was a
fine article recently in the Lee's Summit Journal about
WB0TDZ and his involvement with Amateur Radio. Con-

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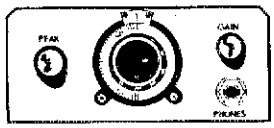

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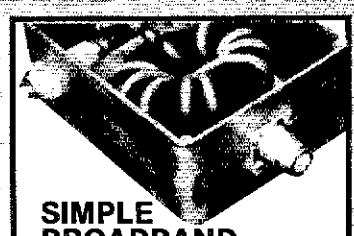

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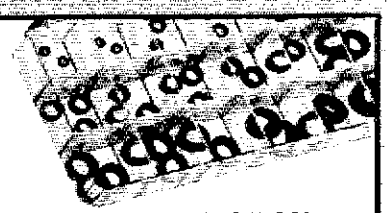

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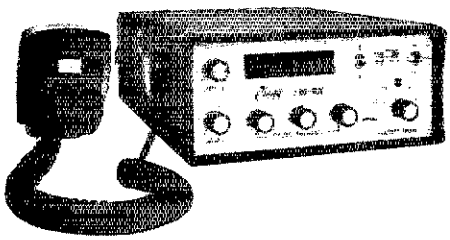

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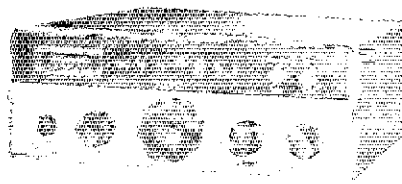

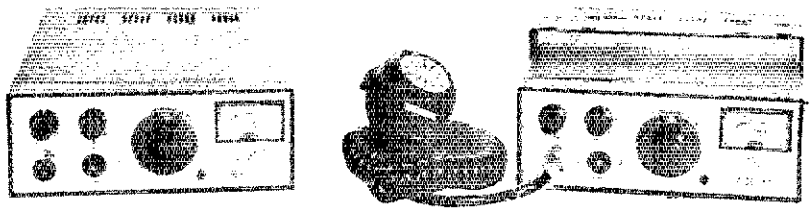

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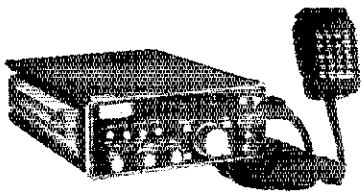
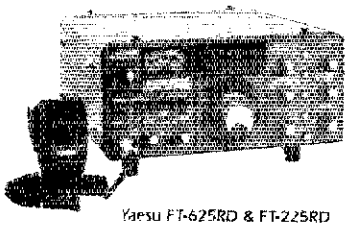
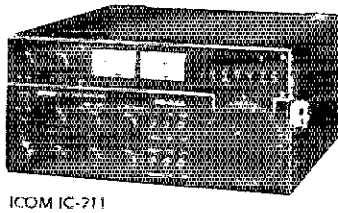


Yaesu CPU-2500R



Yaesu FT-625RD & FT-225RD

WILSON Mark II



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9 Power XFMR
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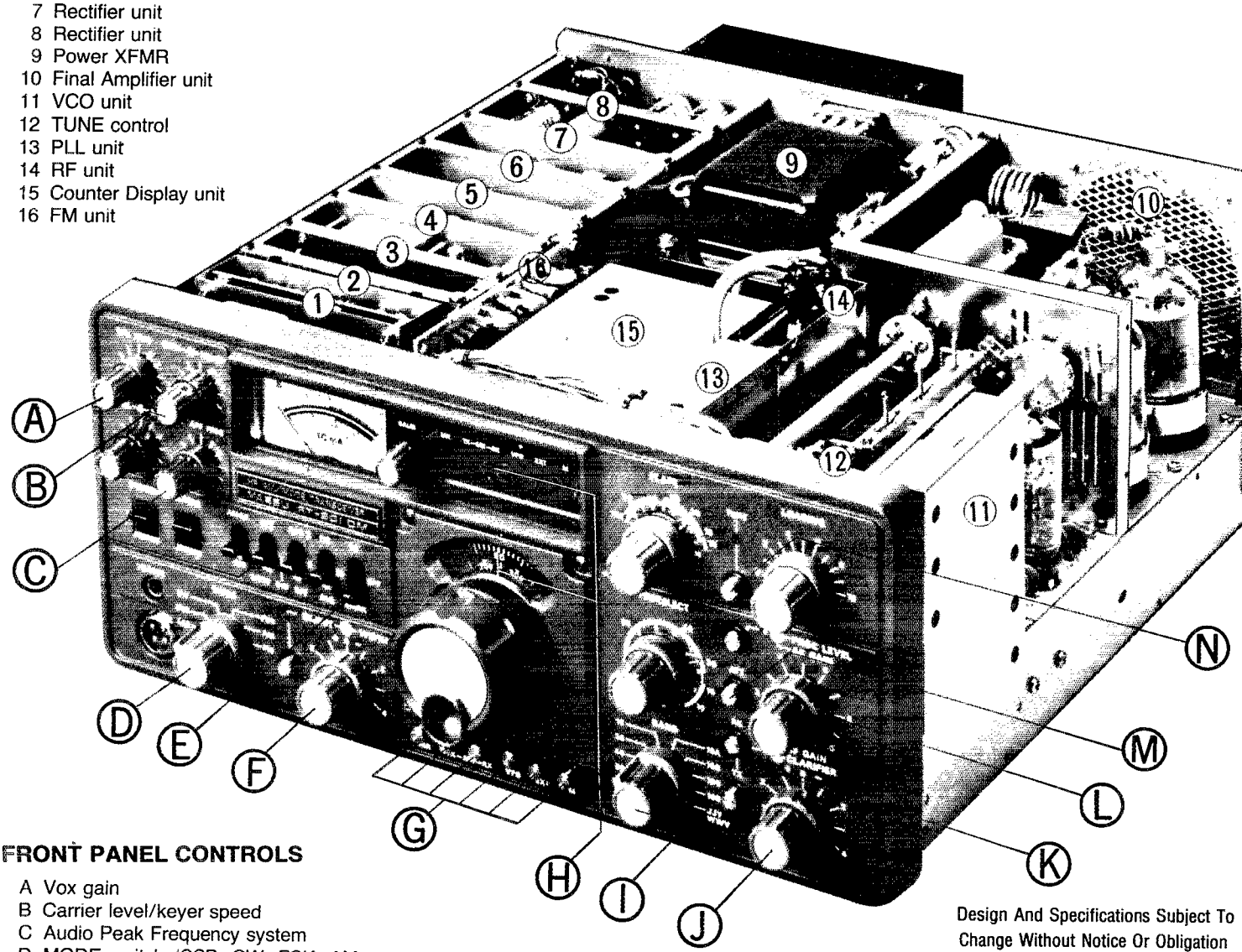
11 VCO unit
12 TUNE control
13 PLL unit
14 RF unit
15 Counter Display unit
16 FM unit



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A Vox gain
B Carrier level/keyer speed
C Audio Peak Frequency system
D MODE switch (SSB, CW, FSK, AM, FM)
E Crystal calibrator/Noise blanker
F Rejection tuning/variable IF passband tuning
G Frequency memory system
H Digital plus analog frequency readout
I Band switch (160-10 meters + WWV/JJY receive)
J Clarifier control
K RX/TX Clarifier selector
L RF Processor level
M RF attenuator
N TUNE control (Places transmitter in "TUNE" condition for ten seconds, then returns to "receive" condition to protect final tubes from excessive key-down time)

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gratulations to WBØOQV who recently got 5BWAS a DXCC. Our deepest sympathy to WBØCKI on the loss his father.

Net	QNI	QTC	Net	QNI	QT
METN	115	33	MON	221	17
HBN	319	13	MON2	118	4
MEOW	310	90			

With the coming of fall, activity around the area is rea speeding up. The last 2 or 3 weekends have seen ante nas and towers going up and down like mad. Rigs are b ing worked on, repairs being made and everyone is ge ing up for the contest season. I would like to take th opportunity to thank all the hams who have worked hard helping me get my new tower and TH3MK3 up. Yo help is much appreciated. Congratulations to the follo ing new licensees: Novice: KAØs CDB CDE CDG CD CDV CDY CEE CEO CER CEU CEW CEY CFA CFC CF CFI CFL CFM CFQ CJX CJY CJZ CKA CKC CKQ CK CLA CLD CLF CLI CLK CLL and CLM. Tech: NØA WBØYLI WDØCDD WDØGNN and KAØAVG. Genera NØALD. Advanced: WBØMUU and WDØEVM. Extr WBØMPH. Traffic: WØBMA 520, WØHH 337, KØNK 22 WØBV 119, WØOTF 102, WBØVHN 87, WØOUD 67, KØSS 40, WØQAU 38, KØSI 28, NØWM 24, WØGBJ 14, KØRW 10.

NEBRASKA: SCM, Ed O' Donnell, WBØGWR — WØA was re-elected as pres. of the Neb. Chapter of th OCWA. The Lincoln ARC held a well attended radio au tion, Nov. 12. MEMO: There will be two SETs in 1979. Th dates are Jan. 27-28 and Oct. 6-7. The Crete ARC he their annual steak fry in the evening of Nov. 16. N reports: Cornhuster Net, QNI 979, QTC 22; Mid-Net ARES 2Mtr. Net, QNI 220, QTC 5; Nebr. Morning Phon Net, QNI 1176, QTC 33; Nebr. ARES 75 Mtr. Net, QNI 20 QTC 1; Nebr. Storm Net, QNI 968, QTC 24; Pawnee AR 2Mtr FM Net, QNI 157, QTC 0; O'Niel 2Mtr Net, QNI 6 QTC 2; Platte Valley 2Mtr Net, QNI 65, QTC 0; PM Ne QNI 237, QTC 46; OCWA Net, QNI 54, QTC 0; Weste Nebr. Net, QNI 478, QTC 16. Traffic: WØFQB 124, WØVE 69, WAØCBJ 61, KØBRS 36, WØHOP 29, WØVYX 2 WØGEQ 22, WAØPCC 13, WAØQEX 13, WØZNI 11, WØEL 10, WBØGWR 9, WØHTA 8, WØLJO 6, WØNIK 6, WBØGM 2, KØSFA 1, WAØLOY 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, William J. Pace, W1ID — SE W1XX. STM: WB1AIU. NMs: K1EIC K1EIR WA1EL WA1LOU.

Net	Freq.	Time/Days	Sess.	QNI	QT
CN	3640	1900/2200 Dy	58	313	259
CPN	3965	1800 M-S	31	463	138
		1000 Su			
Nugmeg	28/88	2130 Dy	31	437	148
WESCON	78/18	2030 Dy	31	613	83

High QNI: CN — W1KV W1EFW K1FG AA1G. CPN W1NQO AD1O K1TZU K1BSB. Dir. W1HHR says thank for nice Conn. showing at Boxborough. WB1AIU our ne STM urges us all to "get the Holiday traffic starte early." WA1LOU, our newest NM running WESCO ECARA beginning new novice course. SARA repor great success at flea-market. K1VSC on special duty recent search for lost 4 year old in Webster, MA. Co grats to FARA News on their recent award for best Class B category. New Conn. Weather net being o ganized at request for assistance from Channel 3 T State wide net will fill in wx information gaps throug 2-meter repeater service and pump directly into Hartfo via RTTY in time for 6 and 10 PM daily telecasts. W1X has appointed N1ADE new EC for Greater Waterbu area. Computer buffs WA1LOU N1ID K1TGX WA1UF WA1VNX outdoing each other with new applications, i cluding K1TGX's complete logging and QSL generatio Excellent edition of SARA Squelch Burst with sever well done technical articles! First annual DXpedition W1AW took place in early Dec. This was an effort b local hams to give W1AW QSOs to hams around th world. Scheduled during the Conn. QSO Party, the effo was for a full round-the-clock week end. PVRA adds new repeater covering the New London-Norwich area WA1IXU sporting new 220 repeater in the Waterbu area with reported excellent coverage. Amphenol W1ER spoke on RF connectors at CARA Dec. meetin WA1YKR W1EQD WB1GBH now big DX guns with ne Mosely beams. WB1AVE proud of his new three-elemen quad atop a home-brew rotatable tower made of a aluminum light pole. WA1ZMK going great guns wit traffic and long haul phone patches. K1EUW "ol reliable" for WESCON. W1VS had problems with 2-mete rig. W1WEE keeping skeds on 2-meter am. W1XK fres from his multi-million point DXpedition on St. Marti looking for new worlds to conquer. ECARA/K1MUJ an TSARC provided communications for motorcycle e duro in Plainfield, CT. W1VTU of Ch. 3 busy gearing th TV station for 2-meter operation. Traffic: (Oct.) K1G 226, W1OD 141, W1EFW 139, K1DFS 135, WB1CPF 12 WB1AIU 105, K1OQG 95, WA1HYN 82, WB1DGR 5 W1BDN 57, K1KV 55, W1JA 49, K1XA 49, WA1ZMK 4 AA1G 46, WA1LOU 35, WB1AFH 32, K1VYQ 31, WA1RL 29, K1AQE 23, WB1FQI 13, W1BDI 11, W1JSD 7, W1QV W1CUH 5. (Sept.) WB1AFH 25.

EASTERN MASSACHUSETTS: SCM, Frank Bake W1ALP — Asst. SCM: WA1OWQ. SEC: W1AOG. STM WA1ZAZ. Please note that if you want to contact any o us, we are on Fri. nights at 7:30 to 8. PM on 147.30, th Weymouth repeater. I want to thank the Conventio Committee for the very nice "Plaque" marked: For 3 Years of Devoted Service To His Fellow Amateurs. It wa presented to me at the annual banquet of the Massaso ARA by our Director John Sullivan, W1HHR, thank again fellows. W1KJ W1SGF are Silent Keys. AA1P is ex W1ATD. Endorsements: ECs: W1PJ W1ALT WA1IQ W1UBC. Appointment: OTS: WB1GEX. Endorsed as OT K1VR W1DMS WA1VMU. NEEFN had 65 QNIs, 14 QT AD1R is ex-K1NOJ. K1UR new Editor of "The Spar Gap" Wellesley ARS. Officers of the So. Shore Repeate Assn.: WA1ZAK, pres.; WA1YMD, vice-pres.; AC1N secy.; WB1GOG, treas. WA1YMD has a new fre counter. K1VR, ex-W1NJL teaching at Colby College i ME. W1GXT wrkd K8WW on 432 MHz cw. W1IPZ on 75 2.T-9 Club met at WA1IZF's QTH. K1OBL moving to FL Foxboro Co. ARC provided communications for 26 mil marathon in Nov. K1TK settled at College. W1DMD work ing into Europe & Asia with 3 watts. South Shore AR had meeting. WB1ANT 15 yrs. old now Extra. WB1DX made BPL. WA1YMN K1CE helped in Webster search HHTN QNI 270, QTC 81. W1NF still QSO's W1MZ/MM WA1FNM has beam for 10. K1PNB has a class i Leominster school. WB1EVP on low bands. WA1YM holding Novice classes at his QTH. EM2MN had 43 QN 32 QTC. WA1IFE has IC230. W1SDC now retire W1WZQ active on 15 & 20 cw, has Drake "C" line. K1T

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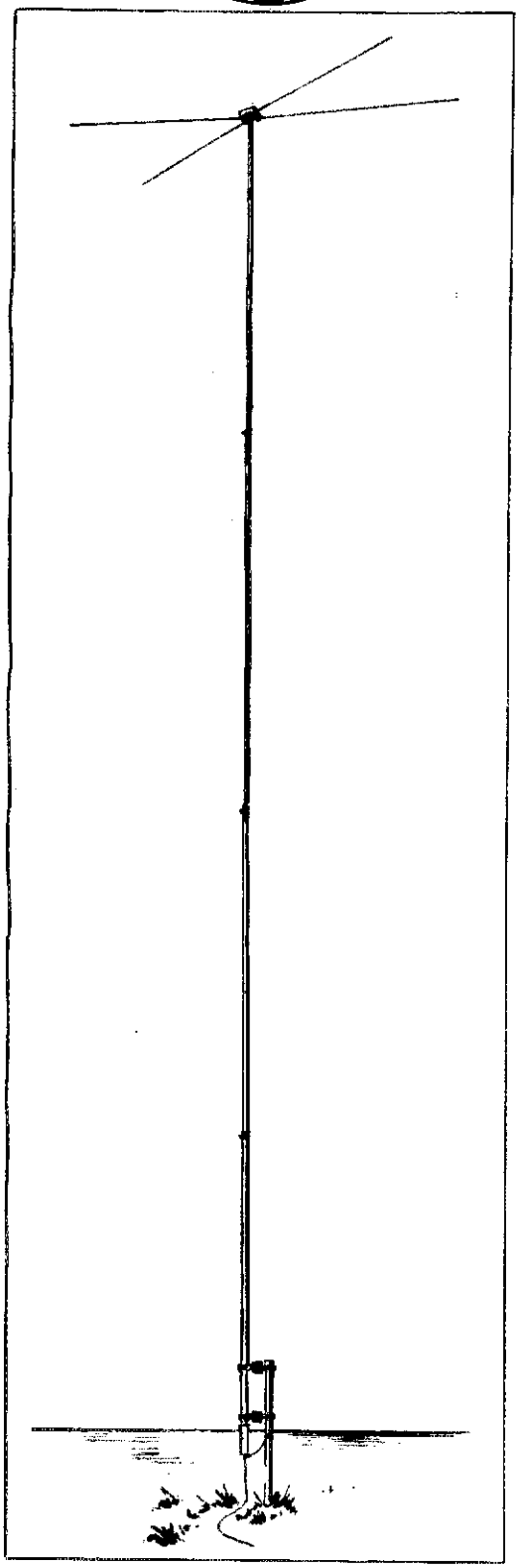

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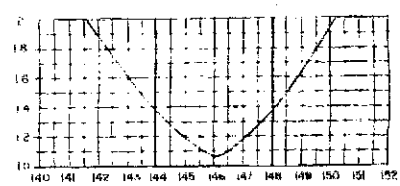

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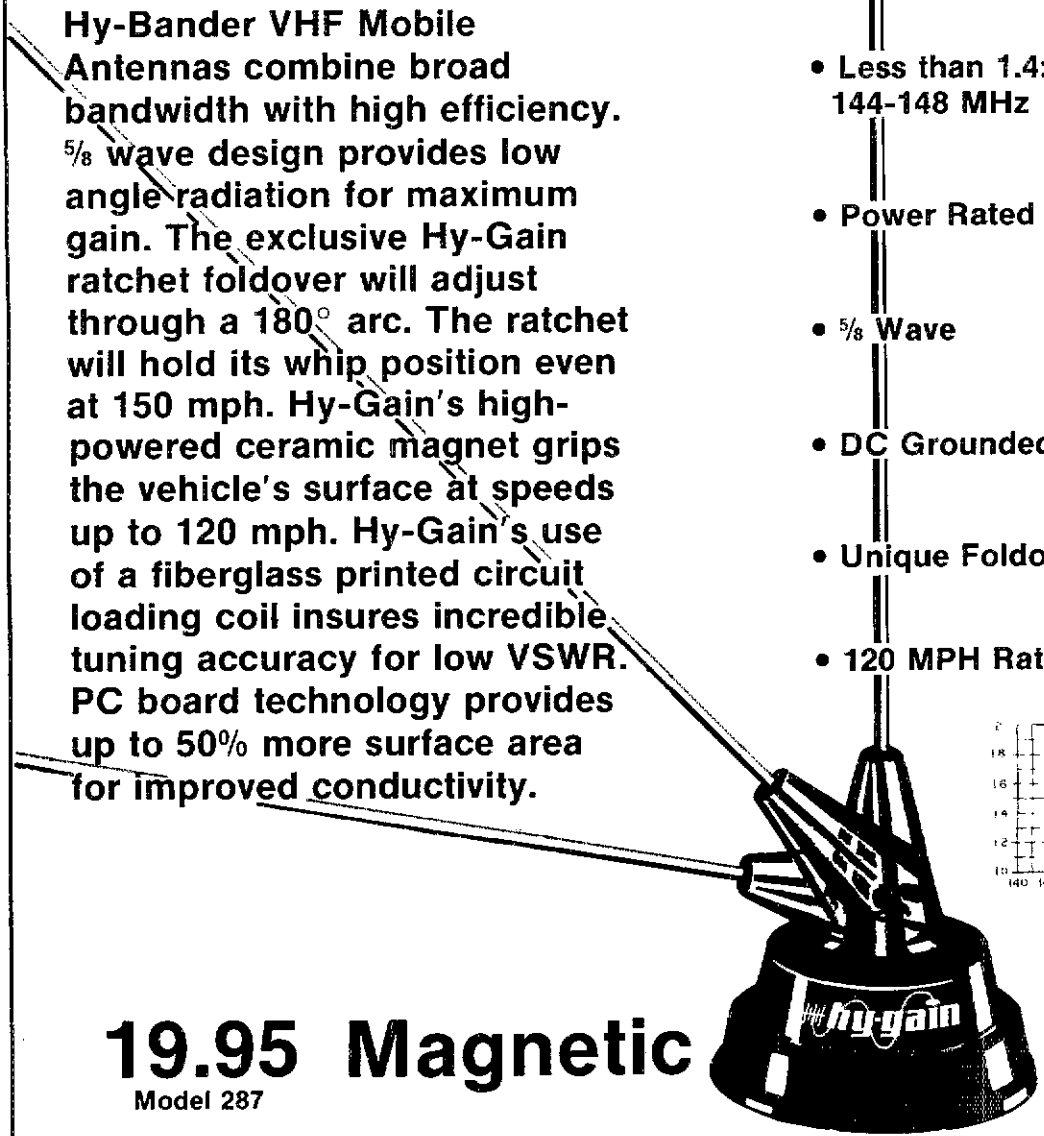

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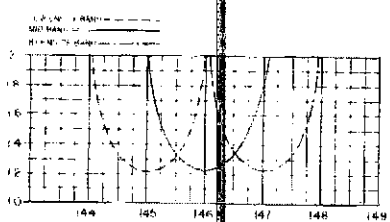

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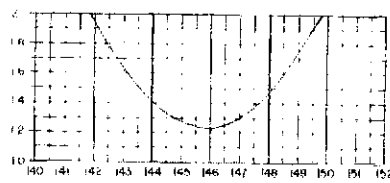

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temporary EC for Wellesley. K1VTE on at U.S. Coast Guard base in Boston, a Radio Club. EMRI had 448 QNI, 279 QTC. K1CE is asst. NM of HHTN. W1LID still down in Nogales, AZ and on 20. W1HY back from trip out West, has new HW-2036. WB1DXR made BPL. EM2MN had 190 QNI, 64 QTC. EMRIPN had 413 QNI, 215 QTC. W1OKQ a Silent Key. WB1GEX has HR-2B on 2. W1CT & W1HZ spoke at the Lexington ARC. W1BVL still working on 178 kHz. K4FBU, ex-1CAA-ex-W2CAA a Silent Key. K1FSU gave a very nice talk on "The History of Electronics at the MARA. K1EJX now the licensed pilot. W1JR spoke on antennas at the Chelmsford ARA. Officers of Framingham ARA: K1AZE, pres.; WA1UEH, vice-pres.; K1YHM, secy.; WA1VFJ, treas. Quannapowitt RA had Auction. K1DGG now General. K1NZO moved to Methuen. K1CE attending Lowell Univ. Chelmsford ARA & Billerica ARS conducting Novice classes. WA1SXU in NYC at a computer conference. N1AGH moving W4-Land. AB1N now Extra. W1CGR on Amateur TV. W1AEC on EMRISS. WA1WGE conducting code class. WB1ASD on 2 ssb. SEC W1AOG received reports from: WA1BLG WA1HPS W1BHD K1NFW W1XA W1ZMO. WA1DHW says the EASN again on air, on 3726 at 1755, 1930. Traffic: (Oct.) WB1DXR 509, W1PEX 321, WA1ZAZ 316, K1BA 238, WA1TBY 208, WA1YMN 170, K1CE 157, WA1EYY 155, WA1UNC 142, K1BSO 80, W1FJJ 79, WA1VEI 78, W1DMH 66, W1DMS 65, WA1LAD 57, W1NF 54, K1ES 41, W1ATX 25, K1LCQ 22, WA1FNM 20, K1PNB 14, K1BZD 13, W1AOG 12, WA1YMD 11, WB1EVP 11, W1SR 9, WA1YMD 7, W1QMZ 4, WB1GEX 4, WA1YGJ 3, WA1VMU 1. (Sept.) K1BA 226, K1ES 67, K1CE 62, WA1YMD 11, WA1YGJ 4, N1EE 4.

MAINE: SCM, Bill Mann, W1KX — SEC: WA1YUW. SET Jan. 27-28. Check Maine nets for details. Bangor, Oct. 21 — Pine State ARC at Hobby Show, Airport Mall. Auburn, Oct. 22 — comms. for AAU Foot Race by several area hams. Cornville, Oct. 28 — emerg. topics discussed at WA1MUX's. WA4UJJ recd. letter of thanks from high Navy Official for ham's part in P3 crash. Aroostook ARA recd. special ARRL New England Div. Dir. Award at N. E. Convention for their fine newsletter. Emerg. Net session every Wed. at 2000 local time on 146.04/64, Bangor area. Maine Novices invited to New England Novice Net, 3720 kHz, daily at 1800 local. Streaked Mtn. rptr. and building set for winter. Oct. rpts.: Sessions/OTC/QNI. CMEN 13/25/235. MPSN 5/8/106. MSN 11/6/38. BYN 26/25/898. Traffic: W1KX 115, W1HDC 64, WA1QFX 53, WTBJ 51, WB1AOD 50, N1RP 36, WA1SMY 17, WA1JZP 12, K1TZH 12, W1GU 10, W1AHM 8, WA1MUX 6, K1CZ 4, WA1JCN 3, N5YX/1 2, WA2MEQ/1 1, N8AFN 1.

NEW HAMPSHIRE: SCM: Robert C. Mitchell, W1SWX/W1NH — SEC: K1RSC. NMs: N1NH & W1TN. Happy New Year. Seen on the highways & byways: W1BXM W1GUX N1JH K1MPQ WA1SOO & WA1RYW. The Derry gang's swap net is on Tue. at 9 PM on 25/85. WA1SHR has new 70-ft. tower. K1RSC has ICOM IC230. W1NHJ & WA1YZO now Advanced. K1XR says 150W mobile really sucks up the juice. D1RN certs issued to WB1ALR WB1ELP & W1TN. The White Mountain ARC, Moultonboro, has 20 members & meets 2nd Tue. of the month. W1BYS back in FL. KA1ADE now Tech. WA1UNN has 2 new TR-7400As. AA1Y, ex-WA1SLV sends warm greetings to NH friends from Scottsdale, AZ. W1TN airs official bulletins on the various nets. Congrats to the Port City ARC for their outstanding display of Amateur Radio at the Newington Mall. Yours truly & XYL visited and observed the enthusiasm of some hams viewing & asking questions bout this tremendous presentation by the club. K1XR N1CB K1MFQ WA1RLO WA1YTW & WB2OYS assisted in the massive search for the lost child in Webster MA. Traffic: K1BCS 538, W1TN 203, W1GUX 52, W1BYS 19, WB1ALR 6, WA1PEL 6, W1SWX 4.

RHODE ISLAND: SCM, J. Titerington, W1EOF. SEC: AB1D. The emergency setup under our new SEC is shaping up. It will take time but he can use a lot of help, so if interested, please contact Jack at 60 Slater Ave., Prov. R.I. WA1CSO reports for RI-E Mass. Tfc, 2-mtr. net, sess. 22, QNI 174, Tfc 41. N1RI says month was slow but operated CQ-WW DX Test from VT, portable. New Sub Signal Club is going great & has special meeting with W1HHR, W1JFF W1EOF AB1D and N1DM as special guests. Fidelity ARC features a lecture at each meeting like last year. WB1EJZ is new General. N1DM announces both Apple Valley ARC and Sub Signal ARC new members of R.I. Federation of Amateur Radio Clubs. Traffic: N1RI 25, W1EOF 18.

VERMONT: SCM, Bob Scott, W1RNA — SEC: W1VSA. W1KJG leaves for W4-Land to go aboard at Melbourne Dec. 5-6. W1UXK & WB1GTO did FB with HW-8 battery pwr. & dipole on 40 during FD. N.E. SWOT net ops on 144.220 MHz Mon. 2000. Jay Peak repeater has net Mon Sat 1900, 146.745 MHz. VT SSB net looking for VT mbrs — 3.909, 1800. WB1ABQ worked 34 DX countries on 10 cw in 5 weeks. W1KJG reports he is glad he kept old Deforest Honeycomb coils — using on 160-190 kHz. N.E. SWOT 2/7/0; VTPN 5/81/8; VT RFD 5/96/18; GMN 26/490/69; Carrier 26/529/56. Traffic: K1BQB 106, WB1ABQ 43, AA1E 16, W1RNA 9, W1KJG 5, WB1BZR 2.

WESTERN MASSACHUSETTS: SCM, Bill Lowe, W1TN — SEC: WA1DNB. STM: W1KK. NM: WA1MJE. SCM spent 4 weeks vacation in W4-Land, missed Sept reports and NE convention, but did attend a well planned mtg. of HCRA. W1BVR temporarily QRT with antenna problems. SEC in new QTH. STM doing well with WMN. Congrats to W1DOY and WB1CHO on Extra Class. Lower class licensees note — handicapped WA1OPN (blind and deaf) is Advanced Class preparing for Extra. WB1CSL now free of Novice bands. N5IR (ex-WA1UGN) now in TX sends 73 to all. Traffic: (Oct.) WA1MJE 227, W1KK 154, K1SSH 86, W1TM 52, W1DOY 44, W1ZPB 30, K1IJV 23, K1PUG 23, WA1OPN 17, N1CC 10. (Sept.) K1SSH 148, W1TM 135, WA1MJE 69, W1ZPB 44, W1DOY 33, W1BVR 31, WA1OPN 14, K1PUG 8, N1CC 2.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — The Kodiak Club has a new emergency generator donated by KL7GCH. The Anchorage Club has a new 34/94 xmtr. With the new rcvr this makes a good repeater. A nice letter from ex-KL7HDX and XYL who are making plans to return to KL7 Land. KL7IEL reports they are installing a new UHF repeater on the Kenai. SEC KL7IKX back in town and planning a big winter activity for ARES. KL7JDI reports KL7FQO KL7FJW KL7CO AL7AM and KL7JDI participated in the YLAP contest. The ASN had 1478 ck-ins and AKCPN had 859 ck-ins. The AK DX Assn. growing very fast and working lots of rare DX. Several stations lost their ants. in a very heavy wind storm this month. KL7HOV our NM for ASN is retiring after 30 years o

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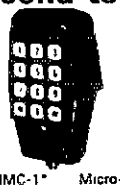

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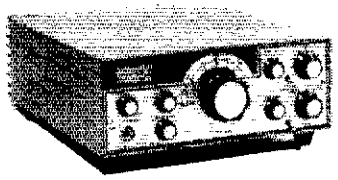

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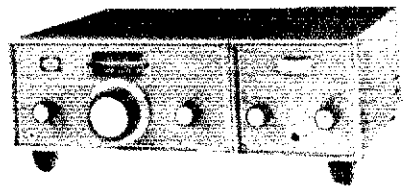

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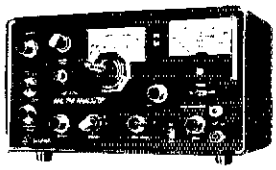

FEATURES: Extremely stable local oscillator for easy measurement of HF, VHF, and UHF bands employing negative feedback, to insure extremely high stability ● Easy to read, accurate linear scale ● Direct off the air signal measurement capability. **OPTIONAL 12v DC Power Kit - $12.** ***FULLY CERTIFIABLE FOR COMMERCIAL USE.***

SPECIFICATIONS: Frequency: 1.8MHZ-520MHZ/3 range select (A,B,C,EXT), A range: 26.5 MHZ-40MHZ, B range: 48MHZ-60MHZ, C range: 140MHZ-156MHZ (generous overranges), EXT. range: 1.8 MHZ-520MHZ (Need Signal Generator) ● Input level: (1) Through type input level: IW-200W (RF Input Terminal), (2) Direct input level: More than 80db/50ohm impedance ● Amplitude modulation: 0-100% ● Frequency diviation: 0-20KHZ ● Accuracy: +/-3% of full scale ● Intermediate frequency: 10.7MHZ ● RF Attenuator: 0-60db variable ● Audio Signal oscillator: (1) Audio Frequency—1,000HZ (1 KHZ), (2) Output level—More than 1V RMS (variable) ● Power Source: AC117 ● Dimensions: H-5½" (140mm), W-10¼" (260mm), D-7¼" (184mm) ● Wt.: 7lbs.

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- In/Out Switch
- Commercial Grade Construction
- 160-10 Meters
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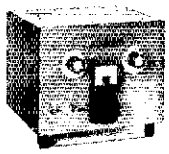

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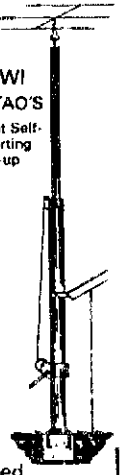

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$19 Shipping Anywhere USA

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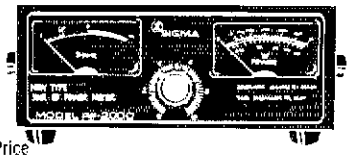

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Introductory Price

Cal PWR Scales 200W-2000W Freq Range 3.5-150 MHz. Please do not confuse the RF2000 with similar appearing lower priced units. RF2000 is an individually calibrated professional quality instrument. Unequaled at many times the price. Size 7" (w) x 2 1/3" (d).

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ATLAS 210X-215X and 350-XL

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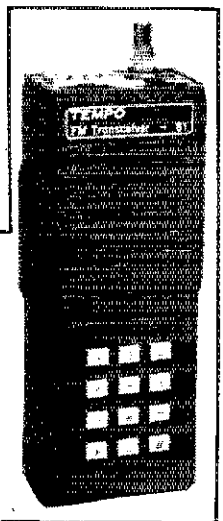

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work in AK. He sure deserves a rest. The DX will sure get it now. Traffic: KL7JDH 58, KL7JDI 54, KL7JFJ 12, KL7AF 1.

IDAHO: SCM, Lem Allen, W7JMH — Thanks for the bulletin from Hayden Lake about KARS doings. Congrats on your FD score from Coeur D' Alene Mountain. Kudos to K7MM on the progress of Novice students. New 146.37-97 repeater now on the air. Congrats on ARRL affiliation. NAMPA 147.96 repeater now on. W7IWU having fun with HW-8. K7CXG trying skeds with daugher WD5JHK, new Novice. W7OZJ has new FT 101-E. K7OQZ has new Alda. N7AHF has new beam. W7HZL rebuilding Viking Valiant. WB7BWX now N7APC. W7ENQ, Moscow, elected chmn. of Evergreen Chapter QCWA.

Net	Sess.	QNI	QTC
FARM	28	1062	16
CD	22	596	18
IMN	19	141	65
Mt. Harrison	5	122	6
Mini-Cassia	4	18	1

Bone up and participate in the SET in Jan. Traffic: W7GHT 272, W7JMH 178, KN7WLF 18, W7LLM 16, W7KDB 8.

MONTANA: SCM, Robert Leo, W7LR — Greetings to AB7Q, now in W1-Land. W7IDK now Extra, WB7UYN WB7UOB General Class. W7IDK updating RACES station & holding AREC net. WB7AZJ held good SET in Bozeman area. W7DB continues good OBS work. K7CCZ announces state SET with ARRL SET Jan. 27, 09-12 hours. This is under DES, Disaster & Emergency Services, formerly CD. Liaison from each 4 MT districts with Helena state EOC is on 3947. K7ELW W7LUN WB7QVA Laurel update 2-meter gear. Welcome to WB7STG to 2 mtrs. IMN Oct. QNI 141, QTC 65. WB7WBA & W7JMX won their class in Gt. Falls to Jackpot Nev. air race, & did aeronautical mobile too. Repairs underway on Red Lodge area repeater & tower wind damage. Traffic: W7IXD 36, W7JMX 8, W7LBK 6, W7LR 4, WA7KMP 2, W7HAH 1.

OREGON: SCM, Dale T. Justice, K7WWR — Asst. SCM: K7JF. SEC: W7HLF. New appointments: WA7SSO as EC for Benton-Linn Counties. WA4HRG and W7XI as OOs. WB7DIP made 33 OBS transmissions. Net reports: BSN had 36 traffic and 563 check-ins during 31 sessions. 1676 net had 25 traffic and 482 check-ins during the month. The Portland Area ARES net had 20 traffic and 493 check-ins during 20 sessions. The NW SMIRK net had 4 sessions with 16 check-ins. N7DB reports six meter openings to many areas during Oct. The ARES (5 PM) net had 70 traffic and 381 check-ins during 31 sessions. The new manager for the 1676 net is WA7FZN. Reported Spook Patrols were held by the Portland Area ARES in Hillsboro and TERAC (Tek Radio Club) at Tektronix complexes. Traffic: W7VSE 630, K7NTS 264, WA7IHS 187, WB7RAP 45, W7HLF 38, WB7OIJ 10, K7WWR 10, W7GUH 8.

WASHINGTON:SCM, Bob Klepper, W7IEU — May you all have a Happy and Prosperous New Year. NTN QNI 1427, QTC 73; WARTS QNI 2888, QTC 142; NWSSB QNI 734, QTC 38; WSN QNI 462, QTC 151. W7BCS made 160 QSOs in 6 hrs. in cw portion of CD party. New EC for Thurston Cty is K7KXF. K7YB new EC for Stevens Cty. Washington Emergency Services Telecommunications (WEST) net meets Mon. 7:30 PM on 3987 kHz. SEC WA7RWK reports over 800 ARES members in Section. KA7BGH WD4MAY WB7RYM WB7UOP and WB7VMB upgraded. K7NIH recovering and should be back on air soon. W7RCM and wife honored by Clark Cty ARC as best Bunny hunting team. N7ML demonstrated Autopatch to North Seattle ARC. K7MF had good coverage on two during trip to Denver. WB7PTR heard on WR7AFJ riding her "peddle power mobile" when not operating from the dark room between film baths. WA7OJI N7IT both off WSN while away at college. W7YGU reports good copy on W1AW Bulletins. WB7QWC enjoyed trip to Hq. and operating W1AW was highlight of trip. K7MF working on 40 & 80 mtr. antennas. West Seattle ARC making a history and interest survey of club members. New officers of Island Cty are: KA7ACU, pres.; W7LFO, vice-pres.; WB7NFG, secy-treas. WB7BFK back on air at new QTH with help from Island Cty ARC and Whidbey NAS members. Whidbey Island DX Club recently formed for those interested in DX and contests. EC K7VSZ has appointed K7IYN asst. EC for South Whidbey Island. Northwest Novice Net (NNN) meets Wed. 3720 kHz 7:30 PM. New Directors of NTN are W7FS W7TK W7JJU W7ZEV. RC of Tacoma manned booth at Western Wash. Fair, took 102 members wrkng 3 shifts to cover 17 days and 60 people signed up for classes. A quick recovery to WB7AJR from a recent stroke. WA7TWE WA7YOK WB7SIZ upgraded. MBARC had successful display of and about Amateur Radio in the Bellingham Mall. W7GB starts Novice Classes first week of Jan. PSCARC Net has been cancelled. WARNS again active on 3940 kHz Sun. at noon. K7NC assumed chairmanship of TVI committee for WWDX Club. WR7AIN covers 90% of WWDX membership since moved to new location, look for DX info Net, Wed. 8 PM. WB7AKB WB7CFH W7GCI WA7IPR helped with Benefit Run for patients at Western State hospital in Tacoma. WA7BBD enjoyed trip to Midwest using 2 mtrs. W7ERH improved signal on 75 with inverted Vee, also helped during the big Nor'wester Pro Auto Rally. Don't forget SET on the 27th and 28th. WA7RWK and myself will be on 3930 both days. Traffic: W7DZX 873, W7AK 342, K7GXZ 119, W7BUN 117, K7RBR 68, WA7YCM 59, N7AJ 48, W7IEU 47, W7LG 43, WB7PSP 42, WA3WPY 37, W7EBU 34, W7APS 20, WA7PHD 19, W7GB 18, WA7BDD 15, WB7EBP 13, W7ZEV 13, W7BCS 8, WA7EDQ 6, W7IXF 4, WB7CFH 2.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — Asst. SCMs: K6UWR W6ZF VE2AQV/W6. SEC: K6UWR. PSHR for Oct.: W6OA WA6NTI WB6UZX W6JXK. LCARS planning Christmas party. WD6EIZ new EC for Solano Co. W6GIP new Extra. UCARC participated in a "Goblin Patrol" on Halloween aiding the Berkeley PD using 2-meter handhelds under the direction of their new officers: WB6LJM, pres.; WA2KJH, vice-pres.; KA6AKI, secy.; N6IG, staengr.; N6KL & WD6CMU, dir. W6ZF's West Coast Bulletin, 3540 at 8 PM on 1st & 3rd Mon. each month, provides all the latest news. N6XN preparing for Napa Valley emergency drill in Dec. N6GZ also preparing for an emergency drill in Vallejo. WA6YXV/RPT 144, 220 & 450 24-hr. open operation. WA9KFW, NBARA pres. returns to sea duty in Jan. W6SJA new NCS for NVEN on 147.78/18, WR6AFU. W6DNY sending keyboard cw while recovering from surgery. SBARA meets 3rd Wed. at Irvington High. Alameda Co. RC (RACES) participated in American Cancer Society bike-a-thon and a County CD

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☐ LM1800N	FM Stereo w/PLL Demod
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☐ LM558V	Dual 741
☐ SN7401	Quad 2 Input NAND, O.C.
☐ SN7403	Quad 2 Input NOR, O.C.
☐ SN7406	Hex Inverter, buffer, driver
☐ SN7410	Triple 3 Input NAND
☐ SN7420	Dual 4 Input NAND
☐ SN7440	Dual 4 Input buffer
☐ SN7450	Expan 2-wide, 2-in AND-OR-INV
☐ SN7451	Dual 2-wide, 2-3-Input AND-OR-INV
☐ SN7453	4-wide, 2-in, AND/OR Invert
☐ SN7455	2-wide, 4-in, AND/OR Invert
☐ SN7464	4-2-3-2-Inp, AND/OR Invert
☐ SN7470	Edge triggered JK Flip Flop
☐ SN7472	JK Master Slave Flip Flop
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☐ SN74164	8 bit serial shift register
☐ SN74195	4 bit parallel access shift register

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☐ 18-PIN DIP (# 2378)	6 for 1.19	12 for 1.20
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☐ SN7403	.25	.26	☐ SN7474	.59	.60	☐ SN74156	.39	.40
☐ SN7404	.19	.20	☐ SN7475	.69	.70	☐ SN74157	.99	1.00
☐ SN7405	.19	.20	☐ SN7480	.19	.20	☐ SN74158	.99	1.00
☐ SN7406	.19	.20	☐ SN7482	.29	.30	☐ SN74161	1.25	1.26
☐ SN7410	.25	.26	☐ SN7483	.99	1.00	☐ SN74163	1.39	1.40
☐ SN7416	.35	.36	☐ SN7486	.49	.50	☐ SN74164	.79	.80
☐ SN7420	.32	.33	☐ SN7488	.79	.80	☐ SN74165	.99	1.00
☐ SN7421	.49	.50	☐ SN7489	3.49	3.50	☐ SN74166	1.99	2.00
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☐ SN7430	.29	.30	☐ SN7492	.79	.80	☐ SN74177	.79	.80
☐ SN7437	.19	.20	☐ SN7493	.69	.70	☐ SN74179	1.99	2.00
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☐ SN7443	.59	.60	☐ SN7496	.29	.30	☐ SN74190	1.99	2.00
☐ SN7444	.19	.20	☐ SN7498	.79	.80	☐ SN74191	1.75	1.76
☐ SN7446	1.25	1.26	☐ SN74107	.29	.30	☐ SN74192	.85	.86
☐ SN7450	.19	.20	☐ SN74113	.39	.40	☐ SN74193	.99	1.00
☐ SN7451	.19	.20	☐ SN74114	.25	.26	☐ SN74194	1.25	1.26
☐ SN7453	.19	.20	☐ SN74121	.59	.60	☐ SN74197	.75	.76
☐ SN7454	.29	.30	☐ SN74123	.69	.70	☐ SN74199	1.50	1.51
☐ SN7455	.19	.20	☐ SN74126	.99	1.00	☐ SN74200	3.50	3.51
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☐ FND-503, .5" red, com cathode, 7-seg. (#2949)	1.50	2 for 1.51
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☐ LM308V	.29	.30	☐ LM377N	2.25	2.26	☐ LM741H	.30	.31
☐ LM308H	.69	.70	☐ LM380N	1.39	1.40	☐ LM747H	.59	.60
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☐ LM340K-24	1.49	1.50	☐ LM565H	1.00	1.01	☐ LM75453	.69	.70
☐ LM340T-5	1.49	1.50	☐ LM567	2.39	2.40	☐ LM75491	.80	.81
☐ LM340T-6	1.49	1.50	☐ LM703N	.59	.60	☐ LM75492	.80	.81
☐ LM340T-12	1.49	1.50	☐ LM704H	.19	.20	☐ LM75494	.60	.61
☐ LM340T-15	1.49	1.50				☐ PA263	1.50	1.51
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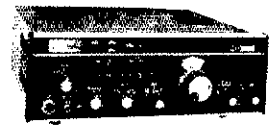
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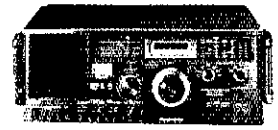
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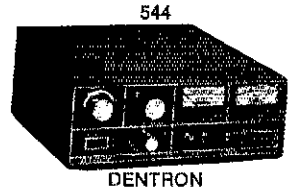
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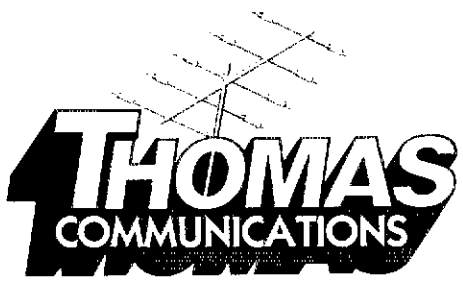

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drill. MDARC membership at 321! They meet 3rd Fri. at Grace Pres. Church, Walnut Creek. NCN meets daily at 1900 and 2030 PST on 3630 and 1930 PST on WR6ADC, 144.81/145.41. Traffic: W6OA 233, W6JXK 113, WA6NTI 63, WB6UZX 37, WD6BMX 13.

NEVADA: SCM, Leonard M. Norman, W7PBV — SEC: K7ZAU. The Nevada 10-10 Silver Dollar Certificates have been in great demand. If good conditions hold up on 10 meters they may have to make another printing, contact W7OK for details. W7PRM is modernizing his camp trailer getting ready for summer vacation. W7MWF and YL-K6HIT/7 have a new mobile vehicle, equipped with new ham gear. K7ZOK attending college class reunion in W3-Land. W8PHJ/7 has a new mobile vehicle a "trick-van" to pull his Airstream trailer. WB7OOE moved to W6-Land. Ex-K7RBM, now AD7K and YL-WD9CKM have a new house and AD7K is a new OBS station active on QRP. Traffic: W7ILX 148.

PACIFIC: SCM, George Morton, N7HR/KH6 — Typhoon Rita mobilized Guam hams. KG6JIC K7JRC N3AGE KA6CLY AC2C KG6JHW KG6NAC KG6ADE KG6JAR & K7BSC. Pacific inter-island net used to coordinate freqs. for ttc. in & out of Guam. Too, Army & Navy MARS were activated for the emergency. The 2-meter net was very useful during power outage which struck most locations for several hours. Battery powered repeater used to assure essential comms between hospital, Red Cross Hq., Govt House & Police Dept. Most regretably, two Navy Seabees lost their lives lowering an antenna in the high winds when a gust blew the antenna into a 440 V AC line. The storm passed with minor damage, some flooding and a few trees down. Thanks to all who guarded the freqs. during the storm emergency period. Well done to the Hams on Guam! KH6YL one tricky vixen in isle fox hunt. She hid behind the mammal exhibit at Honolulu Zoo! KH6DFG keeps track of champ surfer, daughter Lynne in Australia for competition, via VK3TA. Traffic: KH6BZF 28.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — Asst. SCM: W6NJU. The J. I. Sabin Pioneer RC provided communications for the Bike Ride Against Diabetes. W6SX (ex-K2SSX/DA1AX) is a new OTS in Loomis. WD6BFG is now KB6AN and WD6BLC is N6AQR. W6BIL has a new Kenwood TS820S and a Yaesu FL2100B. Bil's grandson, WB6HVU (Novice) is using an HW 16 and has compiled about 50 countries and WAC! This month the section was represented on NTS by W6s CFQ DEF and RSP; K6RPN KB6CL WA6HYO WA6UKW and ZZK; WB6s KFL VWF WAY and YKN. K6ZY is playing with 41 V rigs on 2 meters. WB6TXC has his 25G tower half up. K6XB is now an OVS station. Amateur and commercial classes have started at Highlands High School. Traffic: W6RSP 108, W6DEF 29, W6SX 2.

SAN FRANCISCO: SCM, Mark L. Nelson, AA6DX — SEC: N6KM. Northern Calif. Contest Club reports Cal. QSO Party an extreme success. The effort was headed by WB6DSV. WA6QXV, EC for Mendocino, has appointed WB6EUG Asst. EC. Congrats! N6VA is using a Triton IV. WB6AMP has a new OTS appt. and awaiting Xmas tfc! W6SOU is "Mo-Ped mobile!" Business is keeping N6SF busy, but Rusty's there is the contests. RCCC pres. is WB6QPG, vice pres. WB6SYQ, S/T WA6TOE. The RCCC went to Trinity Co. for CQP as AA6DX/6, WD6EQG is working towards windmill power — no PG&E at new QTH. WA6JUD now AI6V. EC WA6KWM is looking for AREC volunteers for Humboldt/Del Norte. WA6CAL moved to Redding. WA6TOE is in antenna heaven with new rural home. Traffic: W6NL 284, W6RNL 205, W6IPL 199, K6TP 164, K6PB 160, WB6AMP 116, W6GGR 10, WB6RTE 8, WA6QXV 4.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. ECs urgently needed in Amador, San Joaquin and Tulare Counties. Are there some Public Service minded amateurs out there to do the job? Please let me know. Pres. of the Porterville ARC is K6YRY. Officers of the Central Valley RC are WB6VGZ, pres.; WA6RXF, vice-pres.; W6BYH, secy-treas.; K6OGL, pub. rel. The club meets the 2nd Thurs. in Delano. Tulare County ARC meets the 4th Thurs. at the Court House in Visalia. Bakersfield amateurs helped with a bike-a-thon. Kern Co. amateurs helped in a hospital drill. The SARA repeater now 144.79/145.39. K6PMG now in Angels Camp and is on NCN. The following SJVers made NCN Honor Roll for Sept: K6CPO WA6JDB WB6DAU W6WPV and W6DPD. WD6BJK has a TS520. WB6QYM a Swan 750cw. W6XP a TR7400A. WB6KUO a 30L-1. WA6VIS a TS520s. WA6YAK built a cw keyboard. W6WME is AJ6X. WB6DAU is N6AWH. KA6CYN a new Novice. CCATS putting up a new repeater. Plan now for the Annual Fresno Hamfest on May 11-13, 1979. Contact WB6KUO for details. I wish every one a Prosperous New Year. Traffic: (Oct.) N6AMA 14, W6DPD 13, WA6YAB 11, K6PMG 4, WA6GJV 2. (Sept.) WA6GJV 2.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. NM: W6RFF. K6RTU reports the SPARK repeater on the air 144.63/145.23. NPEC will hold a pot-luck party at QTH of W6QIE. EMARC will purchase ARRL xmtr/rcvr kit. Other clubs take note as this is a worthwhile project. Nominations for PAARA officers are: K6SEM, pres.; VE3FZK, vice-pres.; WA6LNV, secy.; WB6LML, treas.; K6MPN KA6BEU W6YPM, dir. K6FS will represent PAARA at CCRC meetings. New members of PAARA: KA6ATG KA6CUG KH6DZB WA6FSQ K6WD. W6WQD has moved to VA. N6AU was portable from the corner of 3 counties for the Calif. QSO Party at an altitude of 9800-ft. New EC appts. W6GJZ and WB6LVD. W6ASH busy with EC and emergency work. 25 stations participated in the March of Dimes Walk. W6ZM held directors meeting to get proposals and discussions to take to Hq. in Jan. W6OII active in CD party, and keeps busy on several nets. Appointment endorsements for the following: W6ASH WB6HBL W6MMG N6NK N6NK W6OII and W6CBX. N6NK visited RFF and demonstrated his repeater functions with a hand held rig. W6AUC works into five different nets. The NCN Honor Roll included K6AXT WB6AYJ KA6BZO WA6JWK W6KZJ WA6MIV WA6NMQ W6ROY W6RFF WA6WEQ N6YE W6YBV K6YKG and W6YTV. Good NTS coverage for the section! WA6VAL now Advanced class. Congrats. The Electronic Museum's antennas were all repaired for the winter. EMARC needs instructors for their Novice and General classes. Any HELP? Call WA6VAQ. Over 40 stations gathered points for the NCCC during SS. WA6JQC active on several 2 mtr. emergency nets. Traffic: (Oct.) W6YBV 227, WB6IZF 116, W6RFF 87, W6AUC 58, W6KZJ 13, W6OII 8, W6ASH 6. (Sept.) N6AU 5.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Bill Parris, AA4R — SEC: K4CJZ. STM: N4UE. Plans are beginning to firm up for

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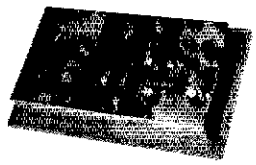

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- Deluxe vhf model for applications where space permits • 1-1/2 x 3" • Models avail to cover any 4 MHz band in the 26-230 MHz range • 12 Vdc • 2 stages • Ideal for OSCAR • 20 db gain • Diode transient protection • Easily tunable

P8 Kit $10.95
P16 Wired $21.95
Specify Band

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P15 Kit $18.95
P35 Wired $34.95

- Covers any 6 MHz band in UHF range of 380-520 MHz
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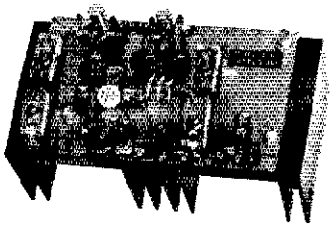
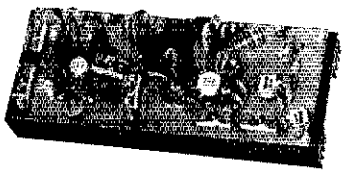


LPA 2-15 Kit $59.95
- 15W out (linear) or 20W (class C) • Solid State T/R Switching • Models for 6M, 2M, or 220 MHz



LPA 2-45 Kit $109.95
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C432-4	432-436	144-146
C432-5	435-437	28-30
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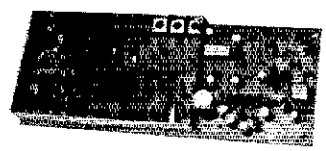

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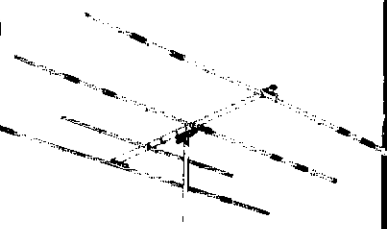

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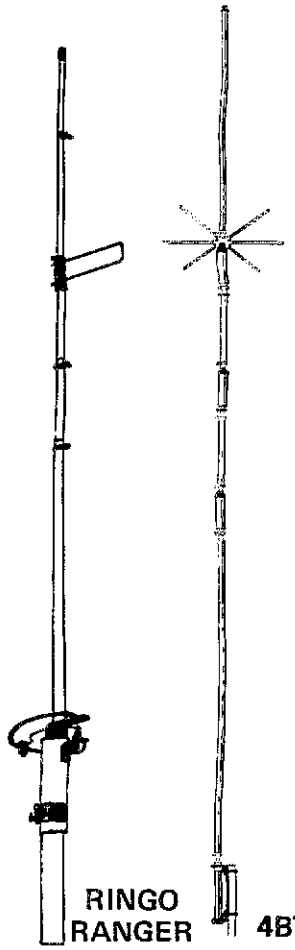

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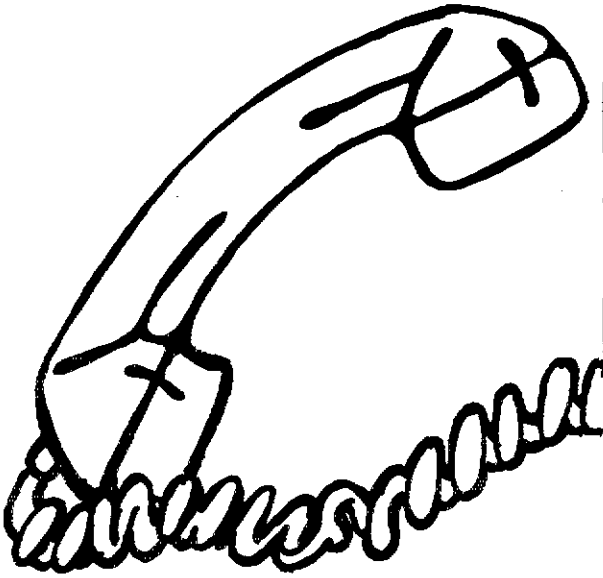

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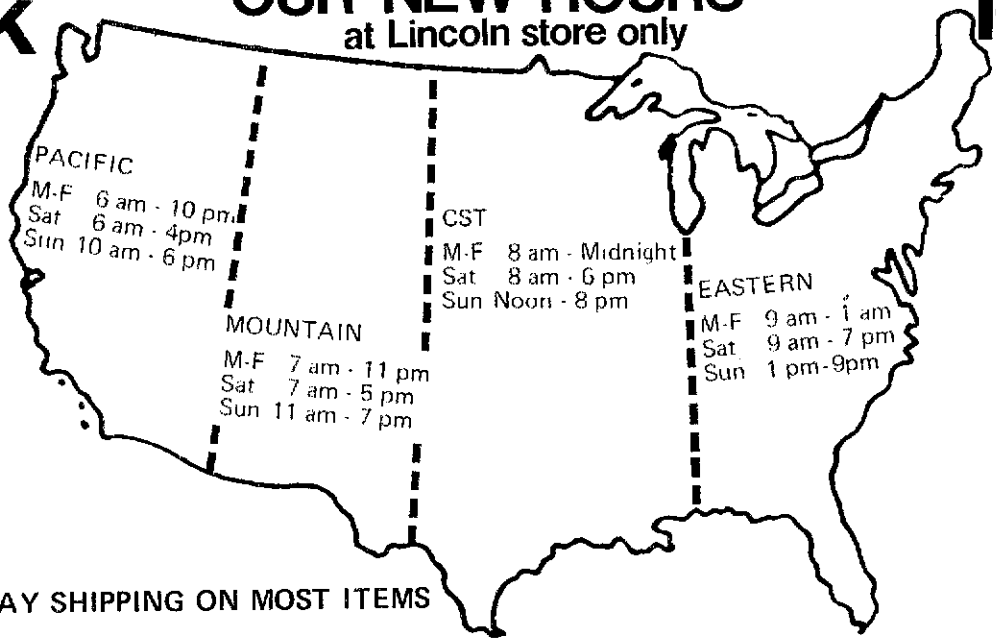

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the Annual SET to be held the last weekend of thi month. Be sure your club is active — contact your EC now. New officers of the Brightleaf ARC (Greenville) in clude WA4MOK, pres.; KE4I, vice-pres.; WA4VDJ, secy treas. All traffic nets were very active in Dec., thanks to your support and assistance. Look for a number of club and groups in the VHF Contest this month; get on and give them a contact. Raleigh ARS now has 150 members and still has a superb monthly Newsleter, keep up the good work. AA4L reports Research Triangle Chapter o QCWA now forming. Alamance ARC (Burlington) con ducted a demonstration on Amateur Radio at a loca Boy Scout Camporee — good attendance and interes shown. W4WXZ and W4RQ gave a program on Amateu Radio at the VA Hospital in Asheville, too. Large Novice and General classes underway in Raleigh, Charlotte and Asheville. WA4SRD reports continued support o various contests including CD Party, YLRL Party, and WWDX Contest. WD4CNS now NCS on CNN too, how about joining CNN and give them your support WA4ACP and W4BUZ continue to provide multiple outlets for Bulletins and K4BE was active in the last Fre quency Measuring Test. Congrats to WA4YSK on achiev ing BPL for the second month in a row. North Carolina ARRL State Convention now set for Mar. 24-25 in Charlotte at the Metrolina Hamfest. What type programs do you want to see at the Convention this year? Let's start planning them now. New appointees this month in clude KB4IZ EC Guilford Co. & W4TY OTS. Traffic: (Oct. WA4YSK 564, WB4MXG 154, W4EAT 128, W4OFO 124 K4VHT 98, N4UE 70, WB4ZIQ 68, K4MC 67, AA4R 54 WD4FJM 50, W4EHF 49, WA4UTC 40, K4FTB 38 WA4SRD 35, AA4RW 33, W4FMN 29, WB4VQZ 24 WB4WII 22, WB4CYN 22, WA4UYS 21, W4ACY 20 WB4OXT 18, WA4WFY 18, WD4CNS 16, WD4KSI 15 K4AIH 13, WD4CNQ 13, K4TTN 12, WA4CUD 10 WD4LMM 7, WD4NTE 7, K4AI 4, W4WXZ 4, W4IZI 1 (Sept.) N4ZH 86, K4AIH 2 (Aug.) K4AIH 4.

VIRGINIA: SCM, Rick Genter, K4BKX — Asst. SCM W4YE. SEC: WB4ZNB. STM: N4NK. W4ZM celebrated his 79th birthday and is still active in nets and putting on his spark-gap demonstration. K4JH/4 is busy interfacing his Heath H-8 computer and winterizing shack. WA4SBC placed well in June VHF contest. WB4KIT submitted his 98th consecutive report! Anyone care to beat that record? WB4PNY and W4SHJ attended the Eastern Area Staff meeting in Newington. N4RF had a good meeting with George Hart at Headquarters. WA4STO is new EC for Shenandoah Co. ECs, K4ITV W4PXA and WA4JYF ac tive with ARES drills. WA4LJI conducted a novel ARES drill; a reinactment of hurricane Camille flood under "prepared conditions." WA4FTJ WN4AZY and WB4NNL upgraded to Extra! W4HIR rpeorts it is good to be active again. WA4CCK is moving up to replace WB4PNY as 4RND manager. Joyce is moving up to the EAND managership. We are proud of you both. W4JK takes over as manger of the VSBN, replacing WB4DQZ. Many thanks Roy for a job well done. Our EC/NM meeting in Richmond was a big success based on attendees' reports. Any central VA or Valley club interested in spon soring an open, section-wide LO meeting in the spring should contact Asst. SCM, W4YE. WA4WOG is building a Heath 2036. W4UG was re-elected as our Roanoke Div. Vice-Director. W4WWQ reports this was LARC's 19th year of helping local police during Halloween. WA4JUO is traveling the country. N4ATT WA4FTJ and WD4GVU are establishing ARES nets. WB4FDT spoke to Rich mond ARC on FCC. WA4NTP to put up OSCAR antennas and tracking system for Pentagon ARC. Your SCM visited the Hampton Roads RA and the Northern VA ARA in Oct. W4HU was voted by Hq. as one of the top ten QOs in the country. Congrats and Tnx, John. BPL: W3BBN/4 WA4CCK K4KDJ N4NK WB4PNY. Traffic: (Oct.) WA4CCK 575, N4NK 532, WB4PNY 509, W4JK 485, K4KDJ 294, W3BBN/4 278, K4BKX 260, K4KNP 257, W4SQQ 208, W4UQ 201, WD4DBK 157, WA4YIU 108, K4GR 106, WA4LJI 105, W4LXB 101, N4RF 87, WB4DQZ 84, WA4ONR 77, W4YVG 72, WA4UYD 69, K4EJ 68, WA4FDV 67, W4HIR 66, W4NWM 58, WA4FTJ 52, N4ZO/4 50, WA4STO 47, WD4OVR 36, W4SUS 35, W4SHJ 33, N4ATT 28, N4FM 28, WB4KIT 28, WA4RXY 27, N4LE 24, WA4ISA 22, WA4NTP 20, WA4YJF 18, WA4QOI 18, WB4ZWT 14, N4BBX 13, W4OKN 13, N4AOP 12, W4OOL 12, K4ITV 10, W4WWQ 10, W4KXE 8, WA4WOG 8, WD9HFO/4 7, K4SPS 7, WD4KUK 6, WB4MAE 5, W4YE 5, W4JUJ 4, N3RCI/4 4, WB4FNW 3, WD4GVU 2, K4LEF 2, WA4WPO 2, AG4D 1, W4DM 1. (Sept.) WA4ONR 75, WB4KIT 63, K4JM 57, WA4QWC 38.

WEST VIRGINIA: SCM, Donald B. Morris, W8JM — Asst. SCM: K8KT. SEC: WA8NDY. NM: W8YP WA8WPW WD8JYM. Kanawha ARC WV and 8th dist. FD winners 1978. WV State Amateur Radio Council Dec. meeting held at Jackson's Mill. For info about Council contact K8KT. Novice Net participation badly needed. Installation dinner for new officers to be held in Jan. by KARC. Informative presentation was given to HUNT TRI-STATE ARA by Vic Clark, W4KFC. W8CKY new communications officer for OES.

Net	Freq.	Time (Z)	Ck-In	Tfc.	Sess.
Hillbilly	14290	1700 Su	159	74	5
Phone	3990	1700 Dy	450	15	28
Phone	3990	2300 Dy	1082	114	28
WVN	3567	2400 Dy	189	41	28
Novice	3730	2215 Dy	140	28	31

Traffic: W8YP 65, WA8WPW 64, WD8DHC 59, WD8JYM 44, WD8LDY 35, W8HZA 28, W8CKX 21, WB8VAZ 21, WD8JYN 18, WB8SAW 12, W8FG 9, WD8KKV 9, N8AJC 7, WB8AKQ 7, K8KT 7, K8QEW 6, K8ZDY 6, K8MHR 5, N8JC 5, N8ALU 4, WA8RUZ 4, WD8CDQ 3.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Robert W. Poirier, K0DJ — SEC: W0GOW. STM: WB0MCL. NM: WB0ZQG K0CNV. W0WYX hopes to relay avalanche data to the U.S. Forestry Service by way of the Weather Net this winter. New appointments: N0ACW EC for Eagle County, WB0MCL STM and W0GOW SEC, all ECs please take note. K0CI forced to cut back on his activity due to his studies and his participation in a marching band. W0GW active from the Weather Bureau during the Turkey Creek fire this fall. Newly elected officers of the PPRAA were: WB0MHP pres.; WA0AEH, vice-pres.; WD0BTF, secy.; WB0SDW, treas. Congrats to WB0MTA for BPL originations and deliveries, all of which were handled for a local hospital. W0ETT again active from his new house and reports a rhombic now operational from his mountain cabin. Net tfc. Oct.: Hi Noon 31 sess., QNI 1314, QTC 103, informals 241; Columbine 26 sess., QNI 1148, QTC 147, informals 277, QNF 1381; CWN 31 sess., QNI 217, QTC 265, QNF 982; SSN 31 sess., QNI 156, QTC 56, QNF 577. Traffic: (Oct.) W0WYX 2544, K0YFK 770, WA0HJZ

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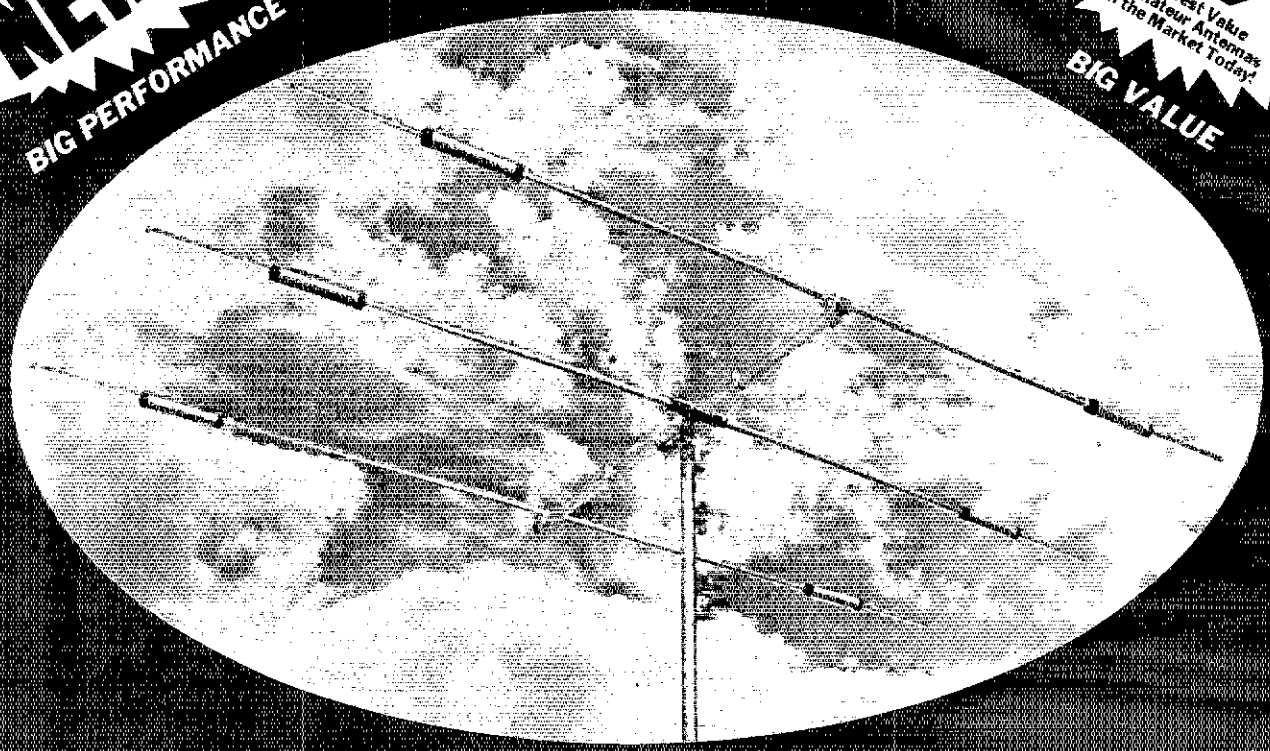

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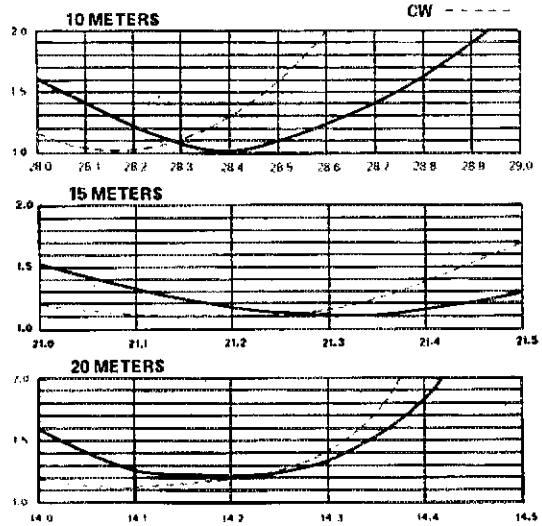

SPECIFICATIONS

Band MHz	14-21-28
Maximum power input	Legal limit
VSWR at resonance	1.3:1
Impedance	50 ohms
Boom (O.D. x length)	2" x 14'4"
No. elements	3
Longest element	27'4"
Turning radius	15'9"
Maximum mast diameter	2" O.D.
Surface area	5.7 sq. ft.
Wind loading at 80 mph	114 lbs.
Assembled weight (approx.)	37 lbs.
Shipping weight (approx.)	42 lbs.
Direct 52 ohm feed or balun maximum wind survival	100 mph

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HT-40 Transmitter 49
SX-99 Receiver 99
SX-117 Receiver 189
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SB-301 Receiver 229
HR-10-B Receiver 69
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SB-102 Trivcvr 379
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SB-644 VFO 129.50
SB 230 Linear 359
SB-104 Transceiver 625

ICOM
IC-21 2M FM Xcvr $299
IC-230 Demo 369
IC-22A 2M FM Xcvr 185
IC-30A 432 MCFM 269

Johnson
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Lafayette
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92200 Transmatch $149
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NCX-5MK11 Transcvr 299
NC-303 Receiver 199
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NCX-500 Transceiver 199
NCX-3 Transceiver 169
NC-190 Receiver 149
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Regency
HR-2B 2M FM $169
HR-220 FM 220 MC 185
AR-2 2M Amplifier 85
HR-25 2M FM 225
HR-6 Meter FM 189

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SB-34 Transceiver $249
SB-33 Transceiver 189
SB-144 2M FM 175
SBZ-LP Linear 179

Standard
SRC-146 HT $149
826 M Trnscvr 195
SRC-144 395
SRC-851T 250

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FM-1210A 2M 249
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350C Xcvr 299
600R Receiver 339
600T Transmitter 399
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CL-220 Trncur 220 MC 179
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RX-10 Receiver 69
S-30 Signalizer 29
Triton II 479

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FT-401 Xcvr $499
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FT 2 Auto 2M FM 249
FT-101B Xcvr 549
FL-2100B Linear 295
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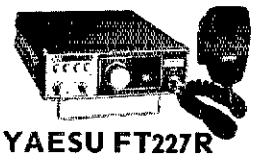
The inventory quantities of the items shown in this list vary. There may be one or several of any item. Some items may be sold by the time you read this ad. It is also likely that we have items in stock that are not listed, as a result of the many trades we make each day. We reserve the right to sell accessories and power supplies with matching transceivers and transmitters. Please allow up to 10 working days to ship your order so that we may check and service the gear you purchase.



YAESU FT227R
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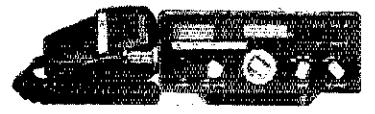

MIDLAND 13-510
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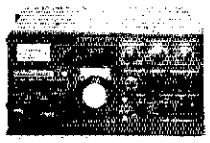
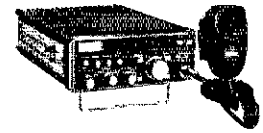


KENWOOD
TS820 — $1055.00
TS820S — $1249.00

YAESU
FT101E — $799.00
FT101EE — $759.00
FT101EX — $699.00



YAESU CPU-2500R
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584, WBØMTA 385, KØDJ 264, WBØTAQ 202, WDØAIT 170, WØRE 111, ADØA 106, WØGO 86, WØHXB 83, NØACW 75, WAØYNP 70, WØNFW 62, WØMDT 48, WDØDNM 28, WBØYKH 18, WDØHNF 4, WØGW 2. (Sept.) KØYFK 984, WØNXB 263, WBØMTA 236, WBØTAQ 235, NØACW 33, KØCI 24, WØMYB 12, KØSPR 2. (Aug.) WBØTAQ 495.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NMs: W5JOV K5KPS. Southwest Net (SWN) meets daily on 3585 kHz, at 20:00 local time. New Mexico Roadrunner Net (NMRRN) meets daily on 3940 kHz at 1800 local and handled 145 msgs with 1156 stations reporting in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 140 msgs. with 760 check-ins. W5VYC doing FB job reporting ARPSC activities from around the state. Pse send Jim your ARPSC reports. N5IA reports Jacks Peak Remote Base is now operational and he is working Socorro Rpt. on 07/67 with good signal. W5JOV on vacation. NM looking forward to N4KB summer visit (ex-W5RE). Traffic: W5UH 415, W5DAD 274, W4JOV 193, WD5AHH 112, WA5MIY 10.

UTAH: SCM, Carl R. Ruthstrom, W7GPN — SEC: WA7ZBO, WB7ECL upgraded to Advanced with call KB7DC. N7AOM new in SLC and heard on 2 meters. W7OCX had FB trip to east coast. W7BPS W7QNV and W7UTM are on air with new IC-701 transceivers. BUN members total 74, had 31 sess., 1335 check-ins, traffic 52, consuming 601 minutes. UCN had 31 sess., 142 check-ins and traffic of 59. WA7ADK now equipped and active on OSCAR 7 and 8 modes A, B and J. W7GPN and XYL spent short vacation in AR. Met W1ATE/5 and W5UQ who will be scheduled periodically to keep in touch with W7GPN's brother. K7HLR transmitting code practice on 146.58 nightly at 1930 MST except Thur. Speeds are 5, 7-1/2, 10, 12-1/2, 15, 20, 25 and 30 wpm. WR7ACM has new 6 dB antenna and duplexer. SLC Primary Childrens Hospital now equipped with 2-meter fm. Traffic: K7HLR 215, WA7JRC 112, WA7MEL 36, KB7DC 24, W7OCX 8.

WYOMING: SCM, Chester C. Stanwaity, W7SDA — SEC: WB7EIN. NMs: WA7WFC K7KSA. A new repeater (SCR1000) hopefully went up at Rock Springs the weekend of Nov. 11th and 12th weather permitting. Frequency 146.25/146.85. SEC WB7EIN reports the Shy-Wy Radio Club members helped him get the State E.O.C. station on the air this coming 18th of Nov. K2QLT/7 now N7AOC. WB7TJP has upgraded to Advanced Class. WA7MGA is moving to AR. W7TZK about ready to move into new home. K7SLM is now General Class. WB7NHR reports the Wyoming Cowboy Net held 22 sess. with 636 QNI, 11 QTC. Traffic: W7SQT 382, W7LYA 258, K7VWA 60, WA7SGG 22, K7SLM 10.

SOUTHEASTERN DIVISION

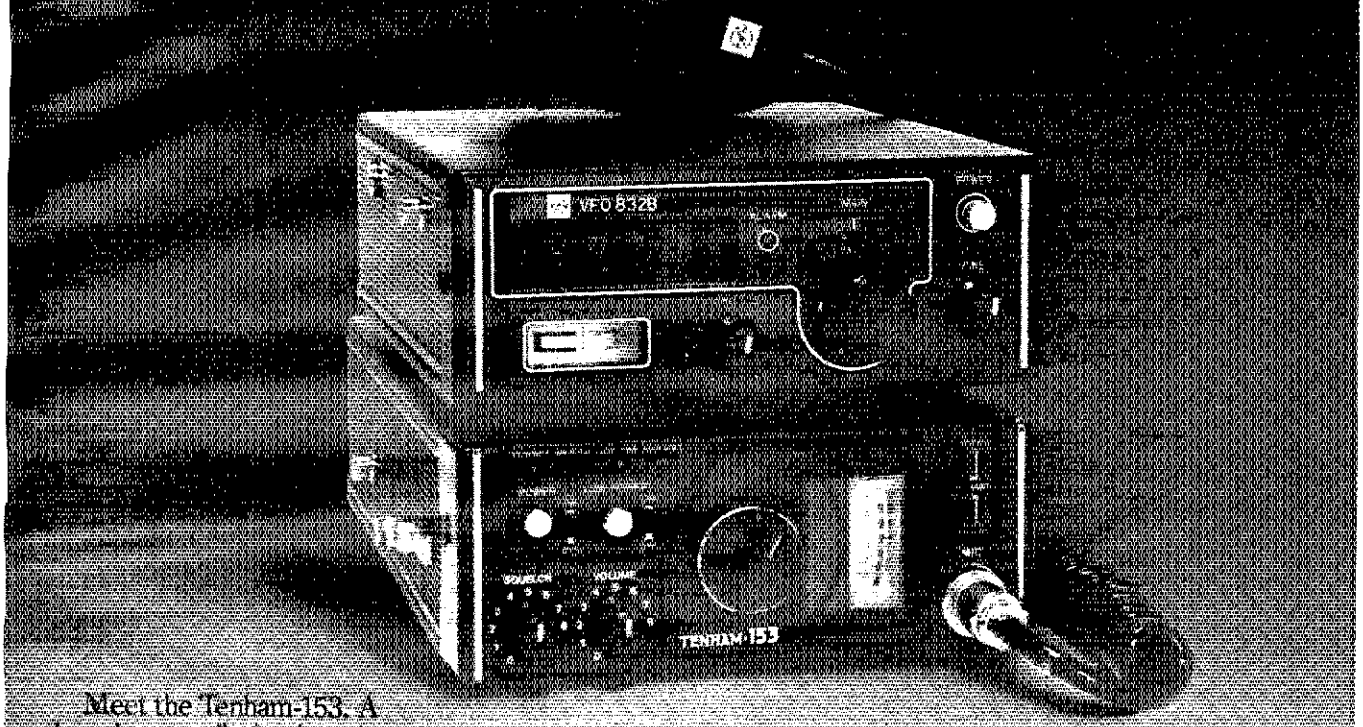
ALABAMA: SCM, Frank S. Brown, W4LNN — SEC: K4WYT. STM: WA4JDH. New appt. WA4ZPZ OTS. Twin Base ARC election results: WB4OZN, pres.; KA4AOK, vice-pres.; KA4BNE, secy.; KB4GQ, treas.; WA4YCM, Sr. dir.; WD4BSX, jr. dir. Montgomery ARC to celebrate 40th birthday with dinner, old time pictures and antique equipment will be furnished by W4AUP and W4EW. WD4BXS WD4BTX find hidden xmtr in 37 mins. and 12 miles to win first prize. Glad to have K4UMD back from hospital. W4EF receives nice write-up in local paper covering his 55 years of active amateur activity. KB4GQ N4AWW receive SNCs. WA4JDH WA4ZPZ WN4KKN made PSHR. AENM Oct. report QNI 2387, QTC 136. AENR (6 Mtr.) Oct. report QNI 55, QTC 1. BARC appoints 19 committee chmn. to lay the ground work for the 1979 Birminghamfest. W4WDR accepts overseas assignment. Look for him on 14.280 and 21.360 at KX6BQ. Approval given for installing 147.78/18 repeater on 1500-ft. tower near Montgomery. W4SAJ now on two meters with new HR-2B. AENB net report Oct. QNI 213, QTC 119. Good to have WA4FYO as NCS on AENM again. HARC QRM club have white elephant sale. Daily code practice now available from Montgomery on 146.91 using W1AW format at 5, 9, and 13 wpm. WA4PRY will be at the key. W4CLP has his eye on the Yaesu FT-901. Traffic: WA4JDH 1527, WN4KN 357, N4MD 215, WA4ZPZ 84, K4AOZ 82, WA4FYO 38, W4LNN 37, W4DGH 18, WB4TKU 14, WB4ZNL 12, WB4EKJ 10, WB4KSL 10, WB4AYO 8, WB4TVY 4.

CANAL ZONE: SCM, Alvin Sholk, KZ5AS — The Novice, Technician and General Class examinations will be given at the Panama Canal Training Center the second Sat. of each month at 0800 hours. The Advanced and Extra Class exams will be given the last Sat. of each month. Contact the License Bureau for further information. KZØDX was on the air for the CQWWDX contest and made in excess of 4500 QSOs, tnx to KZ5JM KZ5ED KZ5FR and KZ5UN.

GEORGIA: SCM, A. H. Stakely, K4WC — SEC: K4SWJ. NMs: K4JNL WA3NAZ. Congrats to WA4BZY making BPL; to WA3NAZ K4EV WB4FAS AA4GA K4VHC and W4PIM making PSHR. Well deserved congrats to K4VHC named Amateur of the Year by GSBN at meeting in Macon. Congrats to WB4BPX making Technician. CVEN No. 1 QNI 39. CVEN No. 2 QNI 997, QTC 73. Cntrl GA VHF QNI 98, QTC 11. NGSN QTC 43. WB4ZOJ worked portable at craft fair in Villa Rica. RTTY net got going Oct. 20; meets Thur. on 3.620 at 2030E. New officers GSBN WA4BZY, pres.; WB4ZVX, veep; WB4NBZ, secy.; W4HON and K4VHC directors. New officers Atlanta RC, KB4IT, pres.; WA4SSU, veep; W4NJP, secy.; K4NYK, treas.; WA4HNL, act. mgr.; W4GTS, editor; K4JSR, rptr mgr.; W4PPT, training dir.; W4BCD, hamfest chm. Need QSL mgr for an HH5 — contact KB4IT or SCM. W4JM moving to FL. WA3NAZ taking flying lessons. K4EV providing comm. at road races at Savannah. WB4FAS got 6 new countries. AA4GA working DX on 10. K4SWJ got married but now back on air. Hi! W4BTZ still sending out QC notices. We need some more to do same. Contact SCM. WB4HXE experimenting with CB 10 mtr base ant. WA4PUP now EC for Coweta and Heard. WA4BZY got Salvation Army Disaster Plan promulgated. Great job. Columbus ARC officers: AK4T, pres.; K4JNL, veep.; N4ATI, secy.; WD4CCE, treas.; WD4AMR, act. mgr.; WD4IRQ, hamfest chm.; WA4QHN and WB4MLE, engineering. New calls: N4AYP N4AYS N4AZV K3KG. Welcome W4CVY with WD4IRQ and AK4T in control participated in Jamboree on the air for Cub Pack 120. Traffic: (Oct.) WA4BZY 366, W4FOE 213, K4VHC 171, WB4FAS 156, K4WC 146, W4PIM 133, WA3NAZ 111, W4GH 101, K4EV 79, AA4GA 57, WB4SPB 31, W4BIA 30, W4HON 27, WA4PUP 24, K4SWJ 17, K4BAI 7, K4NM 6, W4FIZ 4, AK4T 4, WB4TEK 4, N4AYP 2, WA4VMV 2. (Sept.) W4WXA 94, K4SWJ 20, WB4TEK 8.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH — SEC: AA4FG. STM: N4WA. NMs: WD4LUG WB4PGB. New appts.: WD4HXS EC Dixie Co., W4MGO as OTS.

Introducing the Tenham-153 two-meter FM radio.



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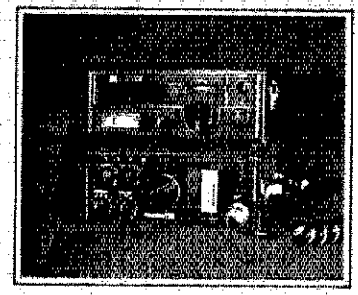

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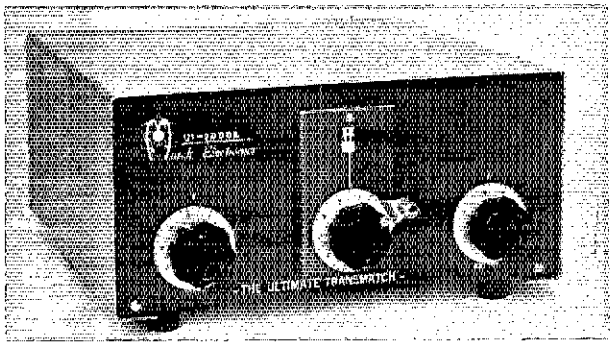

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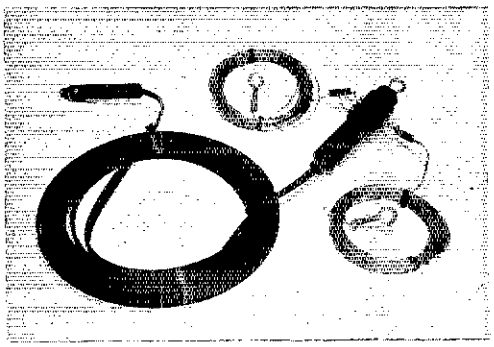

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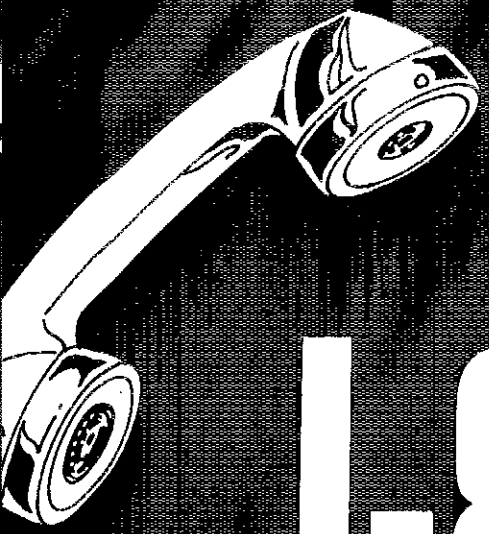

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WA4VRY as OTS/OES. WA4ZOY & WD4HYF earned SNC on N-PN. New calls: WB4FHT now KB4DF; WA4MEL now KE4N; W4NGT now KD4Z; WD4LTR now KC4N WD4ODD now N4AXG. Upgrades: WA4BII WB4FHT t Extra; KA4DWE WD8LPB to General. WB4DVM & W4RH visited ARRL Hq. WB4VZI & WB4UKB joined 2m RTT crowd in Pensacola. WA4PMU worked a JA7 using converted CB rig. PARC station W4ZBB added ar HW-101 and HF dipole; much work has been done o clubhouse interior. New Panama City ARC officers WB4OGE, pres.; WD8LPB, vice-pres.; WD4FIY, secy WD4FJE, treas. A large crowd enjoyed the installatior dinner Nov. 3. Chipola ARC operated a station in Bo Scout Jamboree and held a picnic & xmtr. hunt — all th same day! TARC Newsletter carried an interview wit Prose Walker, W4BW, by KA4DCF. W4OQX/W4KFA hel an unannounced ARES drill, simulated tornado i Alachua Co. W4FP back on traffic nets, but QTH limit antenna size. NOFARS radio info booth at Fair manne by W4JL KB4B WB4HRG WB4DHI and many others. I ness kept N4PL off traffic nets for a while. New DBAR officers: WA4OQQ WA4MYG WB4QAC N4PL an WA4ZTT. Daytona Beach planning hamfest for Ma 12-13. S.E. Volusia ARC recently formed in New Smyrn Beach area. Contact KD4Z for info. FL Net Bulleti should be going to every FL member; be sure to sen K4YX your postage donation. Traffic: (Oct.) W4IZ 168 W4JL 640, W4MGD 428, K4BV 422, N4WA 248, WD4LU 168, WD4HIF 165, WA4CRI 161, W4FZX 151, WB4GH 133, KB4T 128, WB4RIS 116, WA4OEM 106, KB4B 10 WB4TZR 88, K4KUU 74, K4RNS 71, W4KIX 69, WB4DT 56, WB4QBB 56, WA4EYU 50, WD4IIO 48, W4LDM 4 W4DTV 46, WA4VLT 42, WD4NYY 41, W4RH 40, AA4F 36, K4OER 29, W4MVG 25, K4TTO 22, WB4VAP 15, W4F 12, W4DFU 8, WA4QWX 8, WB4WOO 6. (Sept.) N4KF 10 W4FP 27, WA4STZ 28. (Aug.) WA4STZ 22.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston K4SCL — Asst. SCM: W4KGJ. SEC: AA4WJ. New a pointments this month: K4SCL STM, WA4ESX OE WD4ISN OTS. Dade Emergency Net has new manage WA4VGN. W4IYT is planning to stay in Miami after cu rent job ends Nov. 30th. Hope he can continue publici tion of Florida Skip and ARES work in Dade Count W4BK had a nice visit at Barry Goldwater's QTH in Sco tsdale, AZ. Dean Blake, ex-WA4ZQZ, now active KD4Q. Congrats on new Extra. He is also looking for ta scan stations within range of Tampa. AA4WJ worke DM3WJ on 10 meters. N8GG/4, St. Petersburg, has ne IC-225. WB4AID reports FMTN using some RTTY for tra tic. W4QM is going to sea as radio officer, so we wi miss him as Mon. night NCS on QFN. Good luck. W4KD has reactivated University of Tampa ham club and mad BPL originating traffic on parents weekend. N4K reports condx on EAN greatly improved. Hopefully, th summer conditions will not come back until next sur mer. K4NAN reports radio amateurs providing safe communications for Suncoast Power Regat hydroplane races in St. Pete Oct. 7, 8 and 25th we W4GPL K4CNB WA4EDL K4NAN K5IHH N4NL W4EG K4KXC and WD4KGY. Earning BPL certificates in Oc were WA4PFK W4KDX and WD4COL, all for 100 or mo originations plus deliveries, and WD4KPG doing it th hard way with a count of 504. Traffic: (Oct.) WD4KP 504, K4SCL 409, WA4PFK 404, K4EUK 390, WB4WY 383, K4ZK 378, WD4COL 332, WA4SCK 323, WA4NE 315, WD4ISN 274, W4MEE 268, W4KDX 255, W4WYR 23 WB4FVV 169, WB4NJU 144, WA4JPV 126, W4NTE 12 W4DVO 118, W4GPL 107, WB4AID 93, N4KB 77, W4KM 75, AA4WJ 68, WB4CDQ 63, W4YCL 60, WA4EIC 5 WA4RLV 55, WB4PIB 51, W4ESH 46, W4BK 36, W4IF 35, W4GDK 34, N4TW 32, W4IYT 25, K4BLM 23, W4Q 23, WB4SNX 20, WD4BAJ 19, WB4GSV 19, WB4KYE W4KGJ 17, W4TJM 13, WA4OGV 12, K8PXM 12, N4AU 11, W4SMK 10, N8GG/4 6, WB4LXH 6, W4MML 4. (Sep W4NFI 6.

WEST INDIES: SCM, Jose R. Lebron, KP4JL — I am t new SCM for this Section. I will try to do as well KP4AM, with the help of all the Section membe KP4BSO updated to General. There are many new fac on two meters. The RCPR class program has be revised. As soon as a Novice class ends an updati course will start. I have many positions open for OO O EC, etc. Members interested please contact me. I w list the appointments as they are made. I need feedba from all West Indies memberrs. I would like to appoi an Asst. SCM in KV4-Land as well as in the South Western part of KP4-Land. KP4DPA's open autopatch 146.01-146.61 is doing a fine job. Please make good u of it and help support it. Let me wish all hams a Me Christmas and a Happy New Year.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Marshall Lincoln, W7DQS — NM W7UQQ WA7KQE W7EP. The Hualapai ARC, to coun a complaint that the Club "never DOES anything," ran its newsletter a list of everything the Club DOES do a reminder to members. Could your club use this ide Club members recently operated gear belonging to t late Andy Devine (WB6RER), who had lived in Kingma during "Andy Devine Days." W7KAX, Mohave Cou EC, has prepared a new emergency plan and telepho tree for the ARES. He says amateur radio is to be used the next hospital emergency drill. Many Arizo amateurs, too numerous to list, participated in the O 28 Red Cross communications exercise. W7LTF of t Superstition ARC is looking for a 6BY5GA tube restore an old rig. The Club is designing a QRP rig, to called the "SUPERstition station," and to create terest, is asking for design ideas from members. N7XL credited with foiling a jailbreak at Stafford by calling t sheriff's office via WR7AGL autopatch and reporting t escapee's location until officers arrived. With regr K7NOA, YL of K7NIY, is reported as a Silent K KA7BZM reports spontaneously assisting with co munications at an Air Force fighter crash in Tucs through K7CC/RPT. Nets: SWN 221, Cactus, 105, AT 72. Traffic: W7EP 223, K7UXB 67, K7NTG 48, WA7K 37, K7NMQ 23, WA7VLA 7, K7JKM 5, W7DQS 2.

LOS ANGELES: SCM, Perry Masterson, W6RHS — N appointments for the LA section are as follows: S W6INH. Net Mgr. K5DY/6. OBS W6RIQ and WB6BK the recent fire in our section pointed out some sh comings in the emergency operation presently used amateurs. As a result, several clubs and associatio are taking a closer look at the problems. Please co dinate with the SEC your plans and ideas. For a y now pleas have been made in this column for assistan and help. By the way, I received many good repo regarding the help provided. I also received some do do it again type reports. It seems that some ra operators transmitted wrong info, misrepresen themselves to gain access to restricted areas. The n

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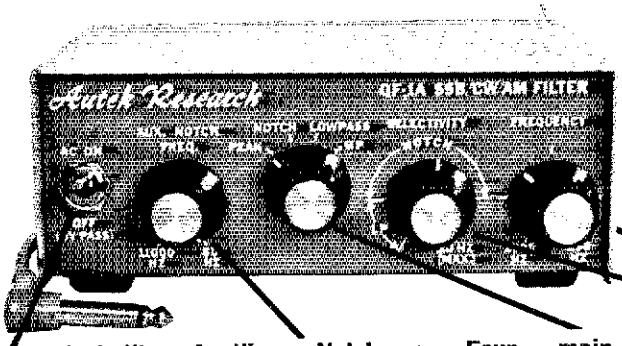

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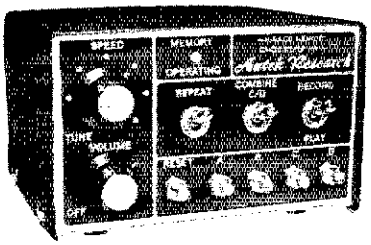

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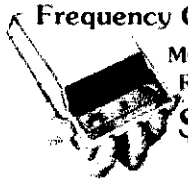

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2SB

TYPE	25-UP	10-24	1-9
2SB 22	.30	.35	.40
2SB 54	.20	.27	.30
2SB 75	.35	.40	45
2SB 175	.20	.27	.30
2SB 186	.20	.27	.30
2SB 324	.30	.35	.40
2SB 337	.70	.80	.90
2SB 405	.30	.35	40
2SB 407	.80	.90	1.00
2SB 434	.80	.90	1.00
2SB 435	90	1.10	1.20
2SB 463	.90	1.10	1.20
2SB 473	80	.90	1.00
2SB 474	.70	.80	90
2SB 492	.60	.70	.80
2SB 507	80	.90	1.00
2SB 528D	.70	80	.90
2SB 595	1.10	1.40	1.50
2SB 596	1.10	1.40	1.50

2SC

TYPE	25-UP	10-24	1-9
2SC 281	30	.35	.40
2SC 372	.20	.27	.30
2SC 373	20	27	30
2SC 380	.20	.27	.30
2SC 394	20	.27	30
2SC 458	20	.27	.30
2SC 495	45	.55	60
2SC 509	.35	40	.45
2SC 515A	.80	.90	1.00
2SC 517	2 50	2.70	3.00
2SC 535	.30	.35	40
2SC 634A	.35	.40	.45
2SC 696	1.00	1.20	1.30
2SC 710	.20	.27	.30
2SC 711	.20	.27	.30
2SC 730	3 00	3.20	3.40
2SC 732	.20	.27	.30
2SC 735	.20	.27	.30
2SC 756	1.50	1.80	2.00
2SC 756A	1.50	1.80	2.00
2SC 781	1.90	2.10	2.40
2SC 784	.30	.35	.40
2SC 799	2.00	2.20	2.50
2SC 828	.20	.27	.30
2SC 839	.30	.35	.40
2SC 867	3.20	3.40	3.70
2SC 867A	3.20	3.40	3.70
2SC 897	2.00	2.20	2.50
2SC 930	.20	.27	.30
2SC 945	.20	.27	.30
2SC 983	.50	.64	.70
2SC 959	1.10	1.20	1.30
2SC 1000BL	.35	.40	.45
2SC 1014	.50	.64	70
2SC 1018	.60	.70	.80
2SC 1030C	1.80	2.10	2.40
2SC 1061	.70	80	.90
2SC 1079	3.40	3.55	3.90
2SC 1096	.45	.55	.60
2SC 1098	.50	64	70
2SC 1111	2.10	2.50	2.80
2SC 1124	.80	.90	1.00
2SC 1172B	3.20	3.60	3.95
2SC 1173	50	.55	.60
2SC 1226	.50	.55	.60
2SC 1226A	.50	.55	.60
2SC 1239	2.20	2 70	2.90
2SC 1306	1.30	1 45	1.60
2SC 1307	1.90	2.10	2.40
2SC 1318	.35	.40	.45
2SC 1383	.30	.35	.40
2SC 1384	.35	.40	.45
2SC 1419	.60	.70	.80
2SC 1675	.20	.27	.30
2SC 1678	1.10	1.25	1.40
2SC 1728	.70	.80	.90
2SC 1730	.45	.53	.59
2SC 1760	.70	.80	90
2SC 1816	1.50	1.75	1.95
2SC 1856	.50	.64	70
2SC 1908	30	.35	.40
2SC 1909	1.80	2.00	2.25
2SC 1945	4.50	5.00	5.60
2SC 1957	.60	.70	.80
2SC 1970	2.10	2.50	2.80
2SC 1978	5.40	6.00	6.60
2SC 2028	.50	64	.70
2SC 2029	1.50	1 80	2.00
2SC 2076	.50	64	.70
2SC 2091	.90	1.10	1.20
2SC 2092	1.80	2 00	2.25
2SC 2166	1.40	1 60	1.80

2SD

TYPE	25-UP	10-24	1-9
2SD 72	50	.64	.70
2SD 234	.60	.70	.80
2SD 235	60	.70	.80
2SD 261	.35	.40	.45
2SD 287	2.50	2.70	2.90
2SD 313	.60	.70	.80
2SD 315	.60	.70	.80
2SD 325	.60	.70	80
2SD 427	1.80	2.00	2.25
2SD 525	.90	1.10	1.20
2SD 526	60	.70	.80

FET

TYPE	25-UP	10-24	1-9
2SK 19BL	.45	.55	.60
2SK 23	70	.80	.90
2SK 30	.40	.45	.50
2SK 33	.60	.70	.80
2SK 55	.60	.70	.80
3SK 22Y	1.40	1.60	1.80
3SK 39	.90	1.10	1.20
3SK 40	.90	1.10	1.20
3SK 41	1.30	1.45	1.60
3SK 45	1.30	1.45	1.60
3SK 48	3.40	3.55	3.90
3SK 49	1.30	1.45	1.60

IC

TYPE	25-UP	10-24	1-9
AN 214Q	1.30	1.70	1 90
AN 239	4.20	4.40	4.90
AN 247	2.50	2.70	3.00
AN 274	1 50	1.75	1.95
AN 313	3.00	3.20	3.40
AN 315	1.80	2.00	2.25
BA 511A	1.80	2.00	2.25
BA 521	1.90	2.10	2.40
HA 1151	1.50	1.75	1.95
HA 1156	1.60	1.80	2.00
HA 1306W	2.00	2.20	2.50
HA 1322	2.50	2.70	3.00
HA 1339	2.50	2.70	3.00
HA 1339A	2.50	2.70	3.00
HA 1366	2.50	2.70	2.90
HA 1366W	2.50	2.70	2.90
HA 1366WR	2.50	2.70	2.90
LA 4031P	1.80	2.00	2.25
LA 4032P	1.80	2.00	2.25
LA 4400	1.90	2.10	2.40
LA 4400Y	2.00	2.20	2.50
LA 4420	2.00	2.20	2.50
M51513L	2.00	2.20	2.50
STK 011	3.80	4 00	4.40
STK 013	7.60	8.00	8.80
STK 015	4.20	4.40	4 90
STK 435	4.50	5.00	5.60
TA 7045M	2.00	2.20	2.50
TA 7060P	.70	.80	.90
TA 7061P	.90	1.10	1.20
TA 7062P	1.10	1.25	1.40
TA 7089P	2.00	2.20	2.50
TA 7202P	2.50	2.70	2.90
TA 7203P	2.50	2.70	2.90
TA 7204P	2 00	2 20	2 50
TA 7205P	1 60	1.80	2.00
TA 7310P	1.30	1.45	1 60
TBA 810SH	1.90	2.10	2.40
TC 5080P	5.00	5.20	5.80
TC 5081P	3.00	3 20	3.40
TC 5082P	3.40	3 55	3.90
UHIC 002	4.20	4.40	4.90
UHIC 004	4.20	4 40	4.90
UHIC 005	4 20	4.40	4.90
UPC 20C	2.10	2.50	2 80
UPC 563	1.90	2 10	2.40
UPC 575C2	1.30	1.45	1.60
UPC 576	1.90	2 10	2.40
UPC 592HZ	.70	.80	90
UPC 1001	1.90	2.10	2 40
UPC 1008C	4.20	4.40	4.90
UPC 1020H	1.90	2 10	2.40
UPC 1025H	1.90	2.10	2.40
UPC 1154	2.00	2.20	2 50
UPC 1155	2.00	2.20	2.50
UPC 1156	1.90	2.10	2 40
UPC 14305	3.00	3.20	3 40
UPD 861	8.00	8 40	9.50
UPD 857	8.00	8 40	9.50
UPD 858	6.00	6.30	7.00
PLL 01A	3 00	4.20	4 60
PLL 02A	5 00	5.30	5.90
PLL 03A	7.60	8.00	8.80

DIODES

TYPE	25-UP	10-24	1-9
1S 84	45	.55	60
1S 332	.35	.40	45
1S 953	.16	.18	20
1S 1007	.35	.40	.45
1S 1209	.35	.40	.45
1S 1211	.35	40	.45
1S 1555	20	.22	25
1S 1588	20	.22	25
1S 1885	.16	.18	20
1S 2076	20	22	25
1S 2093	.35	.40	45
1S 2473	16	18	20
1N 34	.12	.13	15
1N 60	.12	13	15
10D 1	.30	.35	40
10D 10	45	55	.60
V06B	.30	.35	.40

ZENERS

TYPE	25-UP	10-24	1-9
WZ 071	.20	22	25
WZ 075	20	22	25
WZ 090	20	22	25
WZ 120	20	22	25
WZ 192	20	22	25

MISC.

TYPE	25-UP	10-24	1-9
SG 613	5.20	5 40	5 95
78L05	.90	1 00	1 10
MPS U31	1 50	1.70	1 90

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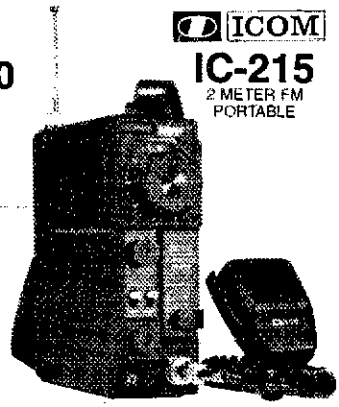

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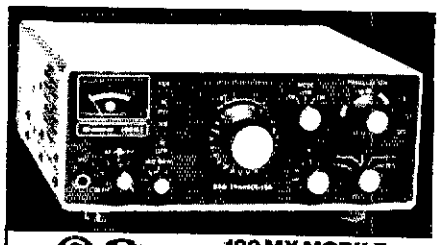

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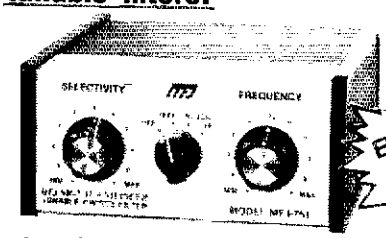
Instantly zero in SSB/CW signals with tunable peak, notch, lowpass filter. MFJ has solved problems that plague other tunable filters.



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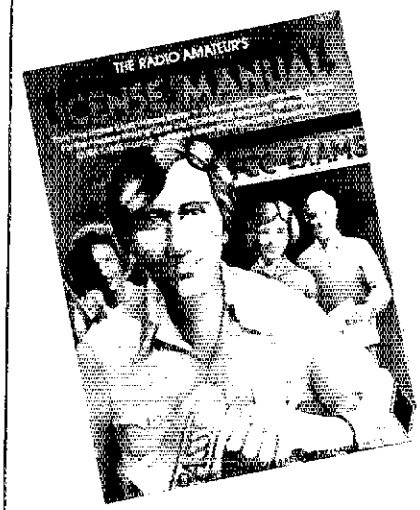

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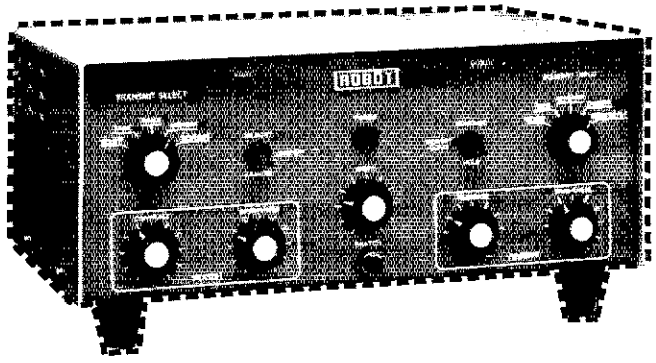

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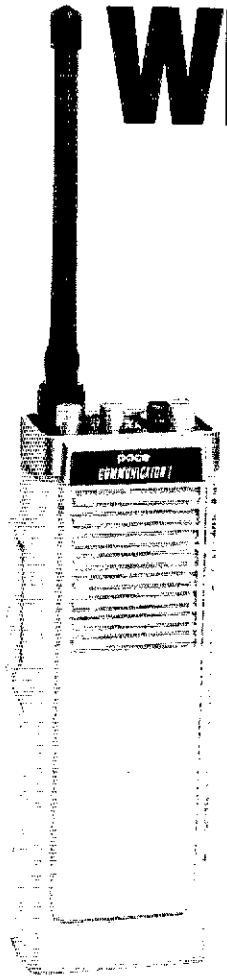

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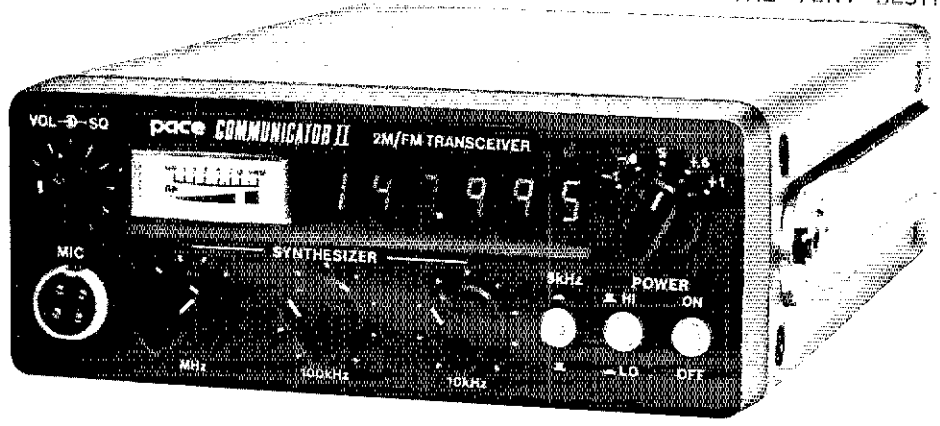

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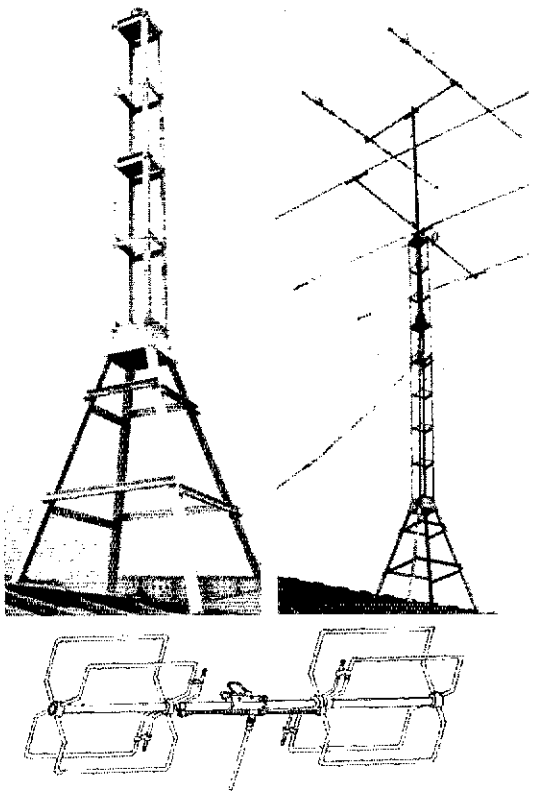

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Finally here are strong, sturdy antenna towers that are simple to assemble, light weight, strong and can be used on your roof top, or packed up and used in the field.
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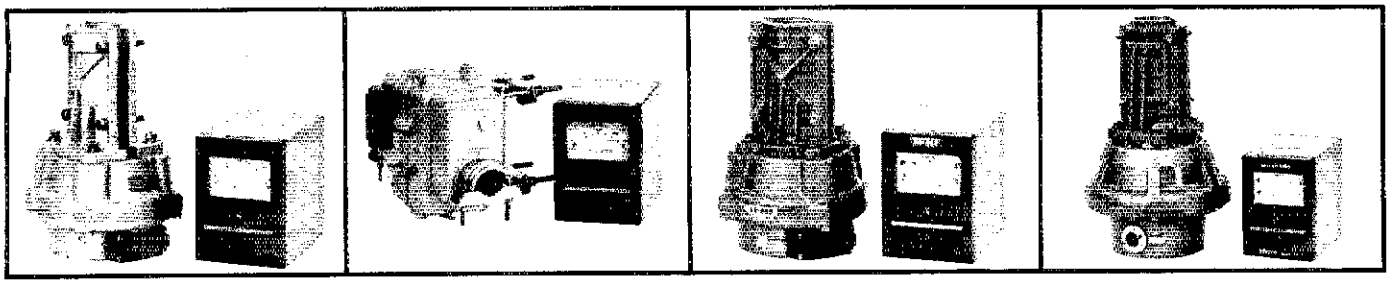

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SET will be upon us soon. Let's all use this test to improve our emergency skills and improve relationships with the local political agencies who have command and control. Lot of nice reports from the membership this month. Lots of antenna work going on. As the propagation improves, it seems that the traffic reports increase. Lots of good DX being reported as well. W6RIQ reports 10 meters almost like old times with both AM and SSB. Some newcomers on the bands have not heard AM before. Can you believe that? I must be getting old. There are 54 affiliated radio clubs in our section. Of this number, I received 4 reports for the month of Oct. Let me hear from you good or bad. Maybe I can help. By the time this is in print, the Christmas holidays will be upon us. May I wish you all a Happy Holiday season and good operating for the new year. Traffic: AD6M 211, W6QEO 163, W6INH 154, N6PZ 109, W6OAE 82, K6CL 37, K6EA 29, W6BWG 24, WB5EKU/6 23, WB6YID 20.

ORANGE: SCM, Fred Heyn, WA6WZO — ASCM: K6KNC. SEC: AE6N. NMs: K6JT W6CPB. ECs: WB6ARK K6GGS W6LKN W6WPP and WA6WYS. The ARRL SW Division convention for 1979 will be held Oct. 19-21 at the Sheraton-Anaheim Hotel (less than one mile from Disneyland). The convention will be headed by chmn. W6RE. On Oct. 30 the OCCARO held a joint club meeting at which the newly elected SW Division Dir. W6EJJ and Vice-Dir. WB6UIA were introduced with W6EJJ giving a fine accounting of ARRL happenings as main speaker. The new officers of the Fullerton Radio Club are: WB6DCC, pres.; WD6DNN, vice-pres.; W6MBA, secy.; WD6FOA, treas. Congratulations go to WA6TEY on receiving the 1978 "Ham of the Year" award at the AARA annual banquet; also WB6ARK received a special "appreciation" plaque for his fine service to the club throughout the year. Asst. EC WD6AQK reported the outstanding ARES effort put forth in the Laguna Beach land slide disaster of Oct. 2nd in which over 25 homes were lost; during the following seven day slide crises over 450 man hours with over 2500 pieces of traffic were handled by 35 hams. Many of the hams also provided first aid, transportation and damage evaluation (plus helping NBC-TV set up!) EC WB6ARK reported the fine job done by 24 ARES members during the Brea Canyon brush fire of Oct. 23-24; both WB6WXE and WB6LXZ remained on site for 15 hours. The great job done by ARES hams in the above situations must in part be due to the cooperation and training thru the American Red Cross; also AARA and SOARC club's support and training of ARES members is considerable throughout the year with their providing of communication for various walkathons, bikeathons, tennis toumaments, and road races as well as their support of repeaters and ARES nets. Please report individual and net traffic totals to WA6WZO; he can be contacted thru the Section League Officials net — first Sun. of each month at 10 AM on 3965 kHz as well as at (714) 549-8516. Traffic: W6RE 128, WB6DAB 39, W6CPB 18.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — ECs by district: Northern, WB6HFE (757-9365); Eastern WA6UFY (448-0324); Southern WA6UAZ (437-1956); Central W6INI (273-1120); Imperial WA6LAW (353-0793). It's not too late to get involved in the Simulated Test. Check Dec. QST for info. If you are not an ARES member, contact one of the above ECs. The Palomar Club's flea mart continues to be a success. It's now first Sun. of each month at the SWAN Electronics parking lot. WB6PVH has retired as net manager of DRN6. Thanks for your many years of dedicated service, Warren. AA6EE won first place in Calif. in the 1978 Minn. QSO Party. Also the Mass. QSO Party. Upgraded: KA6BZG to Advanced, WA6FKG to General. W6VCE reports success in locating 2-meter jammers. New OTS: N6BB WA6ZZL. N6ACJ has new Atlas 350XL. Santa brought W6INI a new FM-2015R. The San Diego Teleprinter Society is latest addition to ARRL Affiliated Club list. New ARES members by district: (Central) KA6BZG WD6EYY WD6FPJ WB6FYF WB6IVN K6OBP; (Eastern) K6KOI WA6WVR; (Southern) WD6FHR WD6FTS WD6GVO K6TWO. Traffic: (Oct.) WA6AMK 283, WA6UAZ 247, N6GW 167, N6AT 68, WB6PVH 58, N6RD 56, WA6ZZL 51, W6HUJ 45, N6BB 11, W6UQF 8, WB7SUA 4, WA6UFY 4. (Sept.) K6LKW 10, W6UQF 6.

SANTA BARBARA: SCM, D. Paul Gagnon, N6MA — WA6EJO spoke on LASERS at the Ventura Co. ARC. New VCARC officers are K6VMN, pres.; WB6GNS, vice-pres.; WD6BCN, secy.; N6AFI, treas. Their club station K6MEP was active from Pine Mt. for the CQ WW DX test with K6VMN WA6IJZ N6VR WA6DJS AB6R and WB6GNS. WA6QKF and WD6EZY motorhomed across the U.S. this summer. New 220 Club of Santa Maria officers are WA6EZZ, pres.; WB6GRW, vice-pres.; WD6FGV, secy.; K6SZS, treas.; W6KPS, trustee. WD6FPO spoke at Conejo Valley ARC on semiconductors. N6NB spoke at SBARC on antennas and W6QKI spoke on his Clipperton DXpedition. New Novices: KA6s CUA TCJ CQT CDU CXI; WA6HUM, KA6CJJ KA6DLU. New Techs.: WD6EVT KA6CCM WD6EYB WD6CSB. Generals: WD6DNE WD6BAA, N6AUN N6AWL WB6EMY. Advanced: WD6GDE WA6EYG. New Extra: AJ6Y (ex-WA6BLS) WA6DSL N6AJA new EC for Santa Barbara replacing WA6TUO who devoted many hours to ARES. The Ventura Co. ARES activated for the Malibu fire and supported the Red Cross under leadership of W6RIC WB6RVA and AI6O. W6ZRR K6SZS and WB6JKM sent over 90 bulletins. WA6EQT recovering from surgery. N6WP is mgr. of SCN. W6RIC is the new SEC. WA6MBZ and WB6SJV are members of SCN VHF session. SET late in Jan. Please check in on your local net. Santa Barbara North Co. 3917; South Co. 3939; San Luis Obispo 3921; Ventura Co. 3931. N6AJA W6RIC WB6BWZ and WA6KAC are your ECs. Section ARES net meets on 3935 at 7 PM on Wed. PSHR: WA6LBO 37, N6WP 41, K6YD 22, N6MA 20. Traffic: W6KON 251, N6WP 206, WA6MBZ 182, K6YD 80, WA6LBO 36, N6MA 18, N6FB 3, WB6JKM 2.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Ted Heithecker, W5EJ — Asst. SCM/SEC: K5PC. NMs: W5GN AE5I. As we start the new year, here is the list of Leadership Officials in the N. Tex. Section: ECs: K5QKM WD5EEI WB5VCW WB5DUQ K5JJP WB5WOE W5NGX W5CBT WD5AFP KB5CM K5PC N5OX WB5ULA WB5MAT WA5GYP AE5B K5ZVZ K5ZNF WB5MDT W5ZNN WD5EPY WB5KTD WB5MTN K5WZE AE5U WB5TVP WD5EPC W5BCB WB5IUT WA5KZA WA5TZB WA5DFP W5CUI K5HT K5HBU W5GY WD5EXR WB5OXE W5KOW WB5LAT WB5HSL K5DOI WB5WYI W5YK WB5TKU K5HSZ WD5GFP N5AE WA5HWI WB5ORE WA5WYI AE5C WB5UHO WD5BJY K9ING/5 WB5SVS K5MWC WB5QZB WB5RPU WA5UTA WA5QQY. OBSs: K5SR K5LHL WB5LAT WB5GII W5YK. OOs: W5QPX W5TI K5PC WA5ZNZ W5UGM WA5UBK AE5C W5ARV N5FW. OTSs:

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has SWR and dual range wattmeter, antenna switch, efficient airwound inductor, built in balun. Up to 300 watts RF output. Matches everything from 1.8 thru 30 MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.

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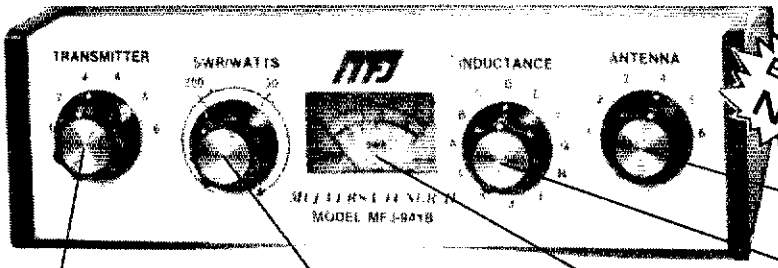
NEW, IMPROVED MFJ-941B HAS . . .
- More inductance for wider matching range
- More flexible antenna switch
- More sensitive meter for SWR measurements down to 5 watts output



NEW LOWER PRICE

$79.95

Transmitter matching capacitor. 208 pf. 1000 volt spacing.

Sets power range, 300 and 30 watts. Pull for SWR.

Meter reads SWR and RF watts in 2 ranges.

Efficient airwound inductor gives more watts out and less losses.

Antenna matching capacitor. 208 pf. 1000 volt spacing.

Only MFJ gives you this MFJ-941B Versa Tuner II with all these features at this price:

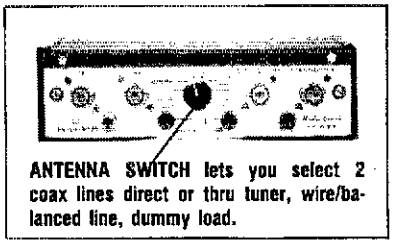
A SWR and dual range wattmeter (300 and 30 watts full scale) lets you measure RF power output for simplified tuning.

An antenna switch lets you select 2 coax lines direct or thru tuner, random wire/balanced line, and tuner bypass for dummy load.

A new efficient airwound inductor (12 positions) gives you less losses than a tapped toroid for more watts out.

A 1:4 balun for balanced lines. 1000 volt capacitor spacing. Mounting brackets for mobile installations (not shown).

With the NEW MFJ Versa Tuner II you can run your full transceiver power output — up to 300 watts RF power output — and match your transmitter to **any** feedline from 160 thru 10 Meters whether you have coax cable, balanced line, or random wire.



ANTENNA SWITCH lets you select 2 coax lines direct or thru tuner, wire/balanced line, dummy load.

You can tune out the SWR on your dipole, inverted vee, random wire, vertical, mobile whip, beam, quad, or whatever you have.

You can even operate all bands with just one existing antenna. No need to put up separate antennas for each band.

Increase the usable bandwidth of your mobile whip by tuning out the SWR **from inside your car.** Works great with all solid state rigs (like the Atlas) and with all tube type rigs.

It travels well, too. Its ultra compact size 8x2x6 inches fits easily in a small corner of your suitcase.

This beautiful little tuner is housed in a deluxe eggshell white Ten-Tec enclosure with walnut grain sides.

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NEW MFJ-945 HAS SWR AND DUAL RANGE WATTMETER. NEW LOWER PRICE

$69.95

Same as MFJ-941B but less 6 position antenna switch.

NEW MFJ-944 HAS 6 POSITION ANTENNA SWITCH ON FRONT PANEL. NEW LOWER PRICE

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Same as MFJ-941B but less SWR/Wattmeter.

NEW MFJ-943 MATCHES ALMOST ANYTHING FROM 1.8 THRU 30 MHz. NEW LOWER PRICE

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Same as MFJ-941B, less SWR/Wattmeter, antenna switch, mounting bracket. 7x2x6 in.

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MFJ-900 ECONO TUNER MATCHES COAX LINES/RANDOM WIRES. NEW LOWER PRICE

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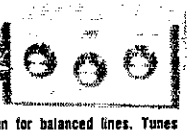

Same as MFJ-901 but less balun for balanced lines. Tunes coax lines and random lines.

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AT NO EXTRA CHARGE: all Mark Series Radios now will include a switch for you to control the power of operation. This will enable you to use the high power when needed, then later switch to low power to conserve battery drain for extended operation.

IN ADDITION: all Mark Series Radios now have an LED Battery Condition Indicator conveniently mounted on the top plate. A quick peek will reassure you of a charged battery in the radio.

Wilson hand-helds have been known world-wide for exceptional quality and durable performance. That's why they have been the best selling units for years.

Now the Mark Series of miniature sized 2-meter hand-helds offers the same dependability and operation, but in an easier to use, more comfortable to carry size . . . fits conveniently in the palm of your hand.

The small compact size battery pack makes it possible to carry one or more extra packs in your pocket for super extended operation time. No more worry about loose cells shorting out in your pocket, and the economical price makes the extra packs a must.

– NOW SWITCHABLE –

MARK II: ≃ 1 & 2.5 watts

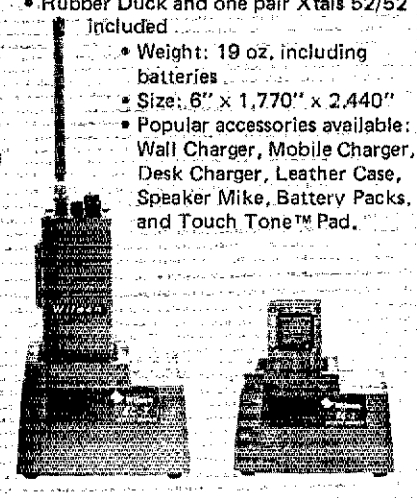
MARK IV: ≃ 1 & 4.0 watts

SPECIFICATIONS

- Range: 144-148 MHz
- 6 Channel Operation
- Individual Trimmers on TX and RX Xtals
- Rugged Lexan® outer case
- Current Drain: RX 15 mA
  TX - Mark II: 500 mA
  TX - Mark IV: 900 mA
- 12 KHz Ceramic Filter and 10.7 Monolithic Filter included.
- 10.7 MHz and 455 IKz IF
- Spurious and Harmonics: more than 50 dB below carrier
- BNC Antenna Connector
- .3 Microvolt Sensitivity for 20 dB Quieting
- Uses special rechargeable Ni-Cad Battery Pack
- Rubber Duck and one pair Xtals 52/52 included
- Weight: 19 oz. including batteries
- Size: 6" x 1.770" x 2.440"
- Popular accessories available: Wall Charger, Mobile Charger, Desk Charger, Leather Case, Speaker Mike, Battery Packs, and Touch Tone™ Pad.

Conveniently located on top of the radio are the controls for volume, squelch, accessory speaker mike connector, 6 channel switch, BNC antenna connector and LED battery condition indicator.

Optional Touch Tone™ Pad available.



Illustrated is Wilson's BC-2 Desk Top Battery Charger shown charging the Mark Series Unit or the BC-4 Battery Pack only.

To obtain complete specifications on the Mark II and Mark IV, along with Wilson's other fine products, see your local dealer or write for our Free Amateur Buyer's Guide.

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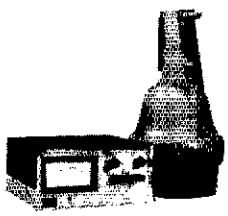

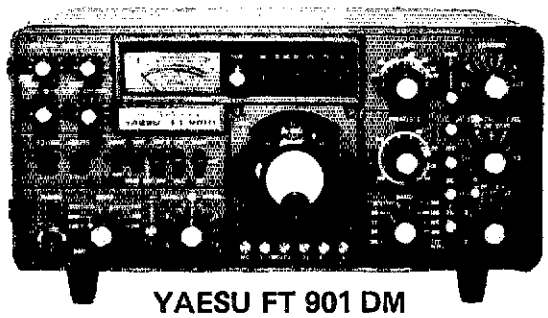

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R4-A RCVR	275.00
T4-X Trans	275.00
MS-4 Spkr	19.00
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DC-4 DC Supply	85.00
MN-4	119.00
TR4-C	450.00
TR4	389.00

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IC 22S 2M FM	209.00
245/SSB	399.00

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T-599D Trans	250.00

HEATHKIT

SB-300	189.00
HW32A & P.S. 20M	150.00
SP 102 & P.S.	399.00

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Galaxy V, VFO & AC & DC P.S.	389.00

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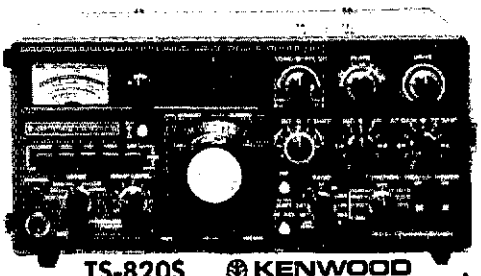
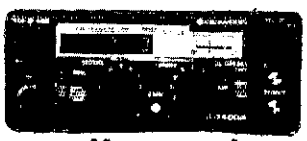
Cushcraft/ATB-34 Triband	185.00
HyGain 204BA-20M	175.00
HyGain DB 10/15 10 & 15 M	110.00



TS-820S KENWOOD
Deluxe 1.8 - 30 MHZ Transceiver



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IC-245/SSB 2M all mode	575.00
IC-211 2M all mode	725.00
IC-701 Dig HF XCVR	1349.00
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KENWOOD

TS 820S Xcvr	999.00
TS 520S Xcvr	599.00
TR 7400A 2M FM	349.00
TS 820	879.00
TR 8300	285.00

TEN-TEC

544 Dig Xcvr	715.00
540 Xcvr	579.00
570 CW Xcvr	249.00
547 Dig Xcvr	339.00

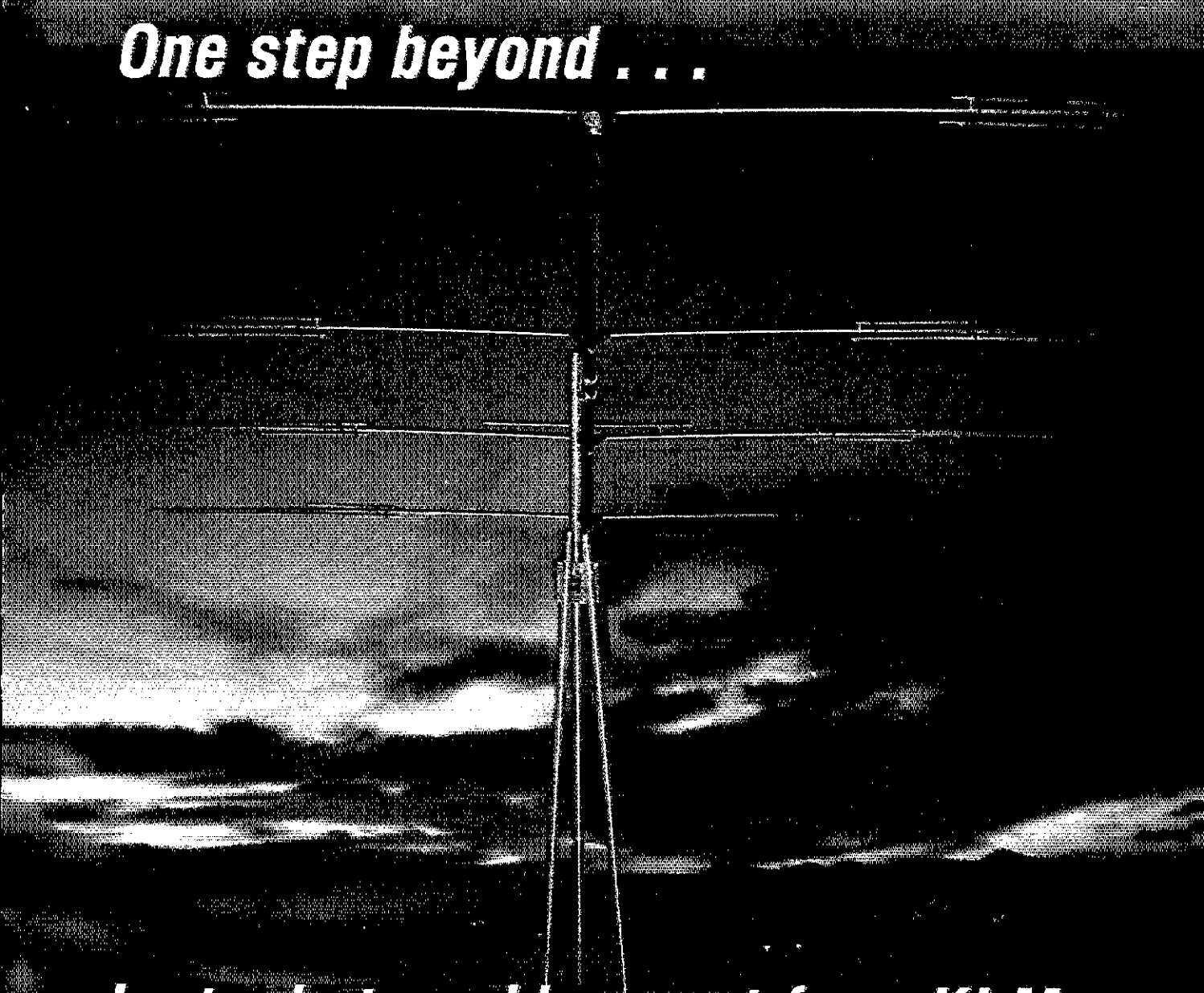
WILSON

Mark II 2M hand held	199.00
Mark IV 2M hand held	209.00

YAESU

FT 901DM	1175.00
FT 901DE	999.00
FT 901D	999.00
FT 101F	645.00
FT 101EE	589.00
FT 101EX	529.00
FT 301	585.00
FT 301D	699.00
FT 227RA - Scanner	339.00

One step beyond . . .



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W5YR WA5ZNZ WD5COF WD5JLF W5HY W5YK K0PVI/5 K5MC WA5PPF AA5J AE5I WB5RPU WB5LAT WB5MTN W5VMP WD5AAT. OVSs: WB5WOE WA5ZNZ K5IS W5UGM WB5LAT AE5C WB5GII WB5UHQ. OESs: Who wants to be OTS No. 1 for N. Tex.??!!! (See your local EC) If you would like to be of service to your fellow amateurs and the League, your application for any of these positions is welcomed. W5QPX was in the top ten of all OOs last year; was awarded sub. to Callbook by Hq. Congrats. WB5GII planning "QRP" repeater for Amarillo. Also the Panhandle Tfc. & Emerg. Net was listed incorrectly in the new Net Dir. as Panhandle Ama. Radio Net. Correct freq. and time is 3933 kHz daily at 0000Z. New Andrews Co. repeater: 146.25/.85. WB5DUQ and Lub. ARES working on WX Net to be in service by next spring, with NCS at WX Bureau, with multi-county coverage. How about a Terry Co. vol. for EC to help Ronny out with this!? WB5MTN back on the air with new twr/ant. New club in Wise Co. (Tri-Cty ARC) with EC WD5EEI first pres.; congrats! Mt. Pleasant ARC getting new VHF Engr. rptr. for Xmas & ant. and hellax. (146.34/.94). W5YK new OBS for CEN Net. EC/WB5WOE had radio disp. at E. Tex. St. Fair netting a new Novice class. New Beaver, OK rptr. (146.01/.61) tie's in N. Tex and OK. ARES activities in panhandle. Lake Country ARC rpts. much upgrading: WD5BVV to AF5Q, WB5YVI to AF5S, WA5ALB to AE5B, WD5ITM to Tech. WD5KDT to Tech. & new Novices: KA5ART KA5CBX. Congrats to all and W5GXU, their "Elmer." PSHR for Oct.: WD5DRK AE5I W5VMP WB5LAT WB5SDD K5SOR. Traffic: WB5SDD 597, WB5BKM 255, W5VMP 153, AA5J 149, K5PC 107, WB5LAT 82, K5MC 77, K5SOR 63, W5INJ 51, WD5AAT 48, AE5I 47, W5CTZ 39, WA5EZT 28, WD5DRK 14, N5BT 10, WB5GII 8, WB5OXE 8, W5YK 8, WA5ZNZ 4.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Asst. SCM: W5REC. SEC: WA5MLT. NMs: K5CAY WD5ETD WB5KKT WA5MLT WA5OUV W5RB. The above named NMs can always use more help with their Nets in all phases from "just checking in" to taking a regular turn as NCS. How about it? N5KW having trouble caring for a new daughter and working 6-meter DX at the same time. Some excellent reports form our OVSs show some good activity on the VHF Bands, particularly in 2M SSB. A number of new stations on 2M ssb in the Tulsa area. K5BSC off to a good start with 15 states worked and 10 confirmed in a very short time, all on 15 cw. KA5CWT new in the War Acres area. Enid class going strong. Excellent turnout at Beaver Hamfest. Really happy to see the growth and activity in the Panhandle. Beaver repeater should be on the air now with another in the mil at Guymon. Texoma had the usual large crowd, plenty going on; good programs and lots of time for "eyeballing." Really enjoyed the SWOT meeting. By the time this is printed, the holidays will be past, so a belated Season's Greetings from your SCM & XYL. Did you help with holiday traffic? Traffic: (Oct.) W5REC 548, K5JGZ 388, WB5NKC 338, WB5NKD 225, W5RB 149, WB5KKT 106, W5UYH 86, W5BYC 70, W5SUG 44, WB5EAY 38, K5OWK 38, WB5ELG 36, WA5OUV 34, W5VOR 34, K5CAY 25, WD5ETB 25, WA5FSN 24, WB5OCZ 23, KB5EK 20, W5FKL 8, W5YJ 8, WB5NMZ 3, WB5OYU 3, W5JJ 2, WB5UCM 1. (Sept.) WB5EAY 21.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR — Asst. SCM: N5TC. SEC: WB5LHK. Net Managers-at-large: N5TC WA5RKU. WA5RKU has moved to Lufkin.

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621 6/2/220 Xmtr	$ 69
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350XL/Dig Xcvr	$899
350XL/Braille dial	799
350-PS AC supply	159
OMK-XL Mobile mt	49
200-PS AC supply	69
B & W	
361 Codax keyer	$ 29
BRIMSTONE	
144 2m FM Xcvr	$239
CLEGG/SQUIRES-SANDERS	
66'er 6m AM Xcvr	$ 69
Thor 6 6m Xmtr (RF)	39
417 AC supply/mod	39
418 DC supply/mod	35
Zeus VHF transmitter	169
Interceptor VHF Rcvr	119
SS Booster	39
22'er FM 2m FM Xcvr	149
FM-27B 2m FM Xcvr	179
031 AC supply	49
HT-146/charger	169
COLLINS	
75A-2A Rcvr/3 filt	$199
75S-1 Ham Rcvr	299
75S-3 Ham Rcvr	485
75S-3B Ham Rcvr	695
75S-3B Rcvr (round)	795
75S-3C Ham Rcvr	795
32S-1 Transmitter	349
32S-3 Transmitter	699
32S-3 Xmtr (round)	795
30L-1 Linear	495
62S-1 VHF conv	695
312B-4 Console	249
KWM-2 Xcvr	595
KWM-2/rej tuning	619
KWM-2 Xcvr (round)	895
KWM-2A Xcvr	795
KWM-2A Xcvr (round)	995
399C-1 VFO	199
351D-2 Mob mount	75
516F-2 AC supply	149
516E-1 KWM-1 DC PS	75
MP-1 DC supply	119
PM-2 Port AC PS	95
COMCRAFT	
CPS-6 AC supply	$ 49
DENTRON	
160-10AT Tuner	$ 89
160-10AT 3kw Tuner	159
Jr. Monitor Tuner	49
DRAKE	
2B Ham Rcvr	$179
R-4 Ham Rcvr	269
R-4B Ham Rcvr	339
R-4C Ham Rcvr	449
4NB Blanker	49
FL-250 Filter	35
FL-500 Filter	35
FL-1500 Filter	35
MS-4 Speaker	19
SW-4A SW Rcvr	225
SSR-1 SW Rcvr	249
5NB Blanker	49
DSR-1 SW Rcvr	995
TR-3 Xcvr	299
TR-4 Xcvr	389
TR-4C Xcvr	449
TR-4CW Xcvr	475
34PNB Blanker	75
2NT Transmitter	99
T-4 Receiver	175
T-4X Transmitter	339
T-4XB Transmitter	375
T-4XC Transmitter	449
AC-3 AC supply	65
AC-4 AC supply	89
DC-3 DC supply	65
DC-4 DC supply	85
MN-4C Matcher	119
MN-2000 Matcher	175
TR-22 2m FM Xcvr	129
AC-10 AC supply	39
DYCOMM	
500D 2m ampr	$ 49
GLB	
400B Channelizer	$ 99
GALAXY/GLOBE/WRL	
AC-400 AC supply	$ 75
DC-35 DC supply	65
SC-550 Speaker	19
R-530 SW Rcvr	695
GENAVE	
GTX-10 2m FM (Fla)	$ 99
GTX-200 2m FM (Fla)	129
GONSET	
GC-105 2m AM Xcvr	$ 69
901A AC supply	39
HALLICRAFTERS	
HT-32A Transmitter	$199
PS-150-12 DC supply	49
MR-150 Rack mt	15
SR-400 Cyclone	375
SR-400 Cyclone II	425
SR-400 Cyclone III	499
P-500AC AC ps	75
HA-20 Remote VFO	125
SR-2000 Xcvr/AC ps	495
SR-42 2m AM Xcvr	49
HAMMARLUND	
HQ-180A SW Rcvr	$349
S-200 Speaker	19
HX-50A Transmitter	199
HK-1 Keyer	29
HEATHKIT	
SB-300 Ham Rcvr	$199
SB-301 Ham Rcvr	249
SB-303 Ham Rcvr	269
SB-600 Speaker	29
HX-10 Transmitter	175
SB-401 Transmitter	249
SB-102 Xcvr	349
HP-23A AC supply	54
SB-104 Xcvr	499
HP-1144 AC/spkr	89
VF-1 VFO	29
HW-202 2m FM Xcvr	99
HW-2036 2m FM Xcvr	199
HWA-2036 AC supply	24
IB-1100 Freq counter	159
IB-1103 Freq counter	299
ICOM	
IC-502 6m SSB Xcvr	$189
IC-202 2m SSB Xcvr	199
IC-22 2m FM Xcvr	139
IC-22A 2m FM Xcvr	159
IC-22S 2m FM Xcvr	189
IC-230 2m synth Xcvr	229
IC-215 2m FM Xcvr	159
IC-3PA AC supply	59
JOHNSON	
Kw matchbox/SWR	$189
KLM	
Multi-11 2m FM Xcvr	$179
Multi-2000 2m Xcvr	369
Echo II 2m SSB Xcvr	199
PA10-160BL 2m amp	169
KENWOOD	
TS-900 Xcvr	$499
PS-900 AC supply	89
R-300 SW Rcvr	179
TR-7400A 2m FM Xcvr	289
MIDLAND	
13-509 220 FM Xcvr	$119
13-505 2m FM Xcvr	149
13-510 2m FM Xcvr	269
13-520 2m FM HT	119
NATIONAL	
NC-155 SW Rcvr	$119
NC-300 Ham Rcvr	169
P & H	
LA-500 Spitfire amp	$125
PS-1000 AC supply	75
P-1000B DC supply	75
REALISTIC	
Dx-150 SW Rcvr	$ 89
SP-150 Speaker	9
REGENCY	
HR-2 2m FM Xcvr	$ 99
HR-2A 2m FM Xcvr	109
HR-2B 2m FM Xcvr	129
HR-212 2m FM Xcvr	119
HR-312 2m FM Xcvr	149
HR-2S 2m FM Xcvr, ac	149
HR-2MS 2m FM Xcvr	149
HRT-2 2m FM HT	89
AR-2 2m FM amp	69
ROBOT	
70 Monitor	$239
80 Camera	239
80A Camera	249
61 Viewfinder	189
SBE	
SB-34 Xcvr	$239
SPECTRONICS	
DD-1 Dig (Yaesu)	$119
DD-1K Dig (Kenwood)	119
DFD/K Dig (Kenwood)	119
SC-250 Counter	149
STANDARD	
146A 2m FM HT	$169
826M 2m FM Xcvr	99
SWAN	
117AC AC supply	$ 65
117B AC supply	69
P-1215 AC supply	49
PS-20 AC supply	95
260 Cygnet Xcvr	289
270B Cygnet Xcvr	299
350 Xcvr	249
500C Xcvr	339
500CX Xcvr	369
700CX Xcvr	459
750CW Xcvr	499
512 DC supply	59
117XC AC supply/spkr	95
117X Basic AC ps	65
14C DC module	49
508 Ext VFO	125
600R Custom Rcvr	375
ICAF Notch/peak	19
TV-2B 2m Xvtr 6m if	275
FM-1210A 2m FM	119
VX-2 VOX	29
FP-1 Phone patch	39
DD-76 Digital disp	119
TPL	
502B 2m FM amp	$ 99
1202C 2m FM amp	139
TEMPO	
Tempo One Xcvr	$299
AC/One AC ps	89
VFO/One VFO	89
VHF/One 2m Xcvr	199
2002 2m linear	595
TEN-TEC	
Argonaut Xcvr	$199
210 AC supply	19
250 AC supply	39
206 Calibrator	19
Century/21 Xcvr	199
670 Keyer	24
Triton II Xcvr	399
262G AC supply	99
KR-40 Keyer	75
KR-50 Keyer	89
S-30 Signalizer	29
VARITRONICS	
FDFM-2 2m FM Xcvr	$ 69
FM-20BM Booster	39
PA-50A 2m amp	49
WILSON	
1402 HT/TTP	$199
1405 HT/batt	199
1405 HT/TTP	229
BC-1 Charger	25
WC-14 Charger	12
YAESU	
FT-101EX Xcvr	$529
FR-101S SW Rcvr	359
FR-101 DIG Rcvr	469
FL-101 Transmitter	425
F1DX-560 Xcvr	399
SP-401 Speaker	19
FT-301 DIG Xcvr	699
SP-120 Speaker	19
FRDX-400 Ham Rcvr	249
FRG-7 SW Rcvr	249
YP-150 Dummy/watt	59
YC-355D Counter	169
DC-200 DC supply	75
FTV-650 6m Xvtr	129
FTV-250 2m Xvtr	189
FT-2 Auto 2m Xcvr	199
200R 2m FM Xcvr	239
FT-2FB 2m FM Xcvr	149

(1) This list was prepared from an inventory taken on the date shown above. The quantities vary. In some cases there are several of one item, others, maybe only one. Due to the lead and distribution time of this publication some of the items may have already been sold by the time you see this ad. On the other hand, due to the number of trades we are involved in each day, some items are in stock that are not listed. When ordering state more than one choice, if possible. (2) AES reserves the right to sell power supplies and accessories only with matching transmitters or transceivers, depending on our stock situation. (3) To insure quality, our used gear is serviced and made ready for shipment after we receive your order. Please allow 5 to 10 working days delay in shipping your order. (4) No trades on used gear.

The following are NEW Close-outs, Overstock merchandise, New displays, Demos, etc. Most are factory-sealed, all carry New warranties. Limited quantity. First come, first served. Most Close-outs available at Milwaukee only. Terms of sale: Payment in full with order, Mastercharge, or Bankamericard (Visa); no trades.

	reg.	NOW
ATLAS		
210X/NB Xcvr	$810	669
220CS AC supply	155	129
CDE	reg.	NOW
CD-44 Rotor	$134	79
HAM-III Rotor	169	129
T2X Tailtwister rotor	299	239
QT-1 3A 12vdc supply	49	19
CIR	reg.	NOW
Astro 200 Xcvr	$995	795
DENTRON	reg.	NOW
MLA-2500 Linear (with 10m)	$899	799
MLA-1200 Amp/ps (w/10m)	558	499
4V 40-10m vertical	84	59
80-10AT Wire tuner	59	55
MT-2000A Ant tuner	199	169
MT-3000A Ant tuner	349	299
160-10M Monitor tuner	299	239
DRAKE	reg.	NOW
TR-4CW Xcvr w/RIT	$799	599
34PNB Blanker - TR-4CW	100	95
RV-4C VFO/spkr (Fla)	170	149
MMK-3 Mt for TR-4CW	10	9
R-4C Receiver	699	599
T-4XC Transmitter	699	599
AC-4 AC supply	150	119
MS-4 Speaker	33	27
2CQ Speaker/Q-mult	49	45
7072 Hand microphone	19	15
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OO's reporting this month: K5DL WB5CIT K5MEN. OVSs reporting this month: WB5CIT WA5QCP. WB5CIT reports 147.45 MHz output for Texas Intercity Relay System (TIRS) now in operation at Blanco. WA5TWF reports an AM group meets each Sat. 1800Z and at 0500Z on Sun. on 7160 kHz; AM and SSB QNI welcomed. OO K5MEN enjoyed CW CD Contest. OO WA5QCP having fun with two radar intrusion detectors found at salvage yard in Albuquerque. 7290 Traffic Net elected officials: K5HZR, Net Manager; N5FN, Asst. Net Mgr.; W5KLV, secy.; W5TYS, treas. The 7290 Traffic Net and Texas Traffic Net will hold joint picnic at Kerrville State Park in April. OTS K5RVF enjoyed National Convention and two weeks in KH6-Land. OES W5SPD quite active on traffic and emergency nets with 29 check-ins for Oct. Asst. EC K5EWJ and 15 Brazoria County Hams were on hand to help following the pipeline explosion in Pearland but were not needed; the important thing is that THEY WERE THERE. The CHARRO club will host a swapfest-hamfest-flea market in Brownsville Jan. 14 1979; the site is directly across the street from Gladys Porter Zoo, and is a public playground; swapfest will be held indoors, with all outdoor activity being at personal initiative and weather. Traffic: (Oct.) W5KLV 529, N5TC 202, K5HZR 174, WA5RKU 128, K5GM 91, WB5MMI 36, W5BHO 25, K5QEW 24, WA5HVT 19, W5KR 14, W5SPD 6, WB5UYV 3, K5DG 2, K5RVF 2. (Sept.) N5TC 224, K5HZR 183.

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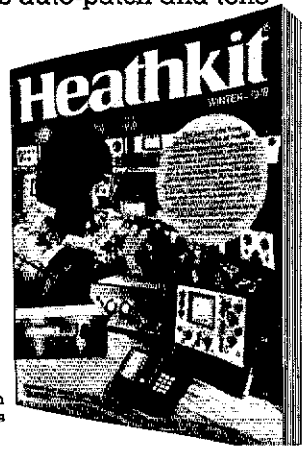

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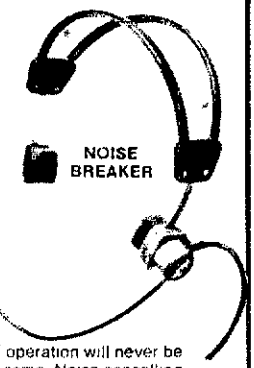

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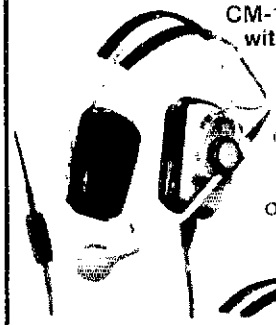

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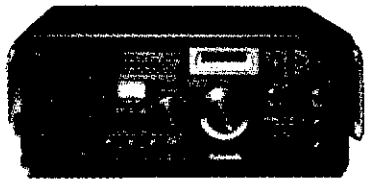

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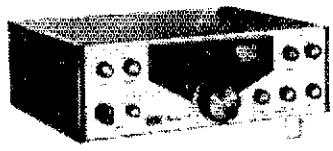
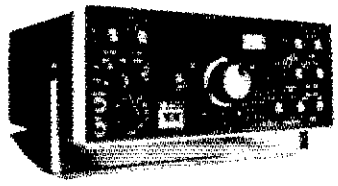


544

540



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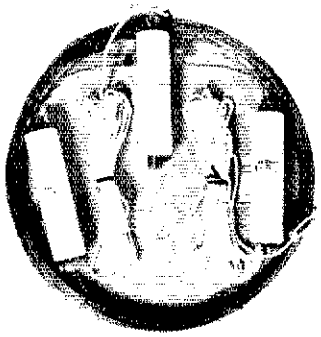

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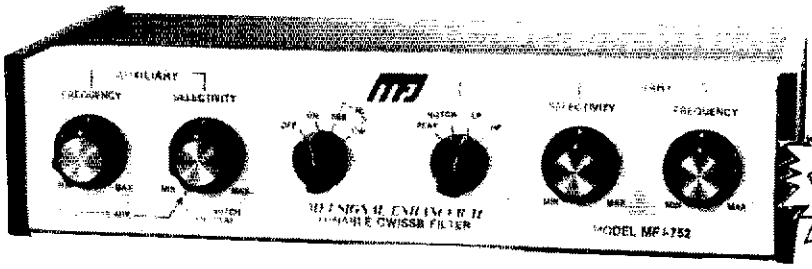

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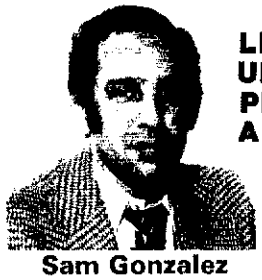

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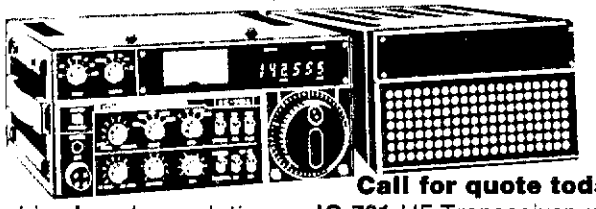

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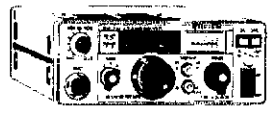

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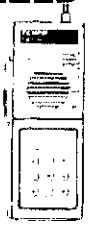

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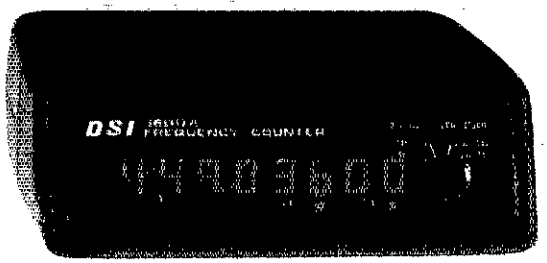

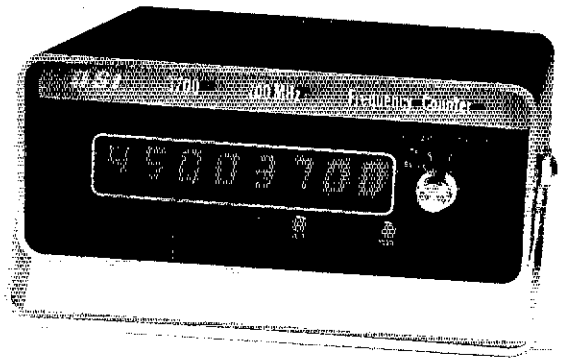

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3600A OWNERS: Update your 3600A frequency count a 3700 includes . . . **.2 PPM** proportional oven, rugged thick aluminum cabinet, order 3600-A - 3700. Unit mus returned to DSI factory for modification.

DSI — GUARANTEED SPECIFICATIONS — MADE IN USA

Model	Frequency Range	Accuracy Over Temperature	@ 146MHz	@ 220MHz	@ 450MHz	Number of Readouts	Size of Readouts	Power Requirements	Size
3700	50Hz - 700MHz	Proportional Oven .2 PPM 0° - 40°C	10MV	10MV	50MV	8	.5 Inch	115 VAC or 8.2 - 14.5VDC	3"H x 8"W x 6"D
3600A	50Hz - 600MHz	Oven .5 PPM 17° - 37°C	10MV	10MV	50MV	8	.5 Inch	115VAC or 8.2 - 14.5VDC	2¼"H x 8"W x 5"
3550W	50Hz - 550MHz	1 PPM 65° - 85°F	25MV	25MV	75MV	8	.5 Inch	115VAC or 8.2 - 14.5VDC	2¼"H x 8"W x 5"

— ALL UNITS ARE FACTORY ASSEMBLED, TESTED AND CARRY A FULL 1 YEAR WARRANTY —

• NO EXTRA COSTS •

FREE Shipping anywhere in U.S.A. and Canada.
All other countries, add 10%.

Strongest warranty in the counter field.
Satisfaction Guaranteed.

See Your Dealer or

Call Toll Free: (800) 854-2049
DSI INSTRUMENTS, INC.
California Residents, Call Collect: **(714) 565-8402**
VISA • MC • AMERICAN EXPRESS • CHECK • MONEY ORDER • COD
7914 RONSON ROAD, #G, SAN DIEGO, CA 92111

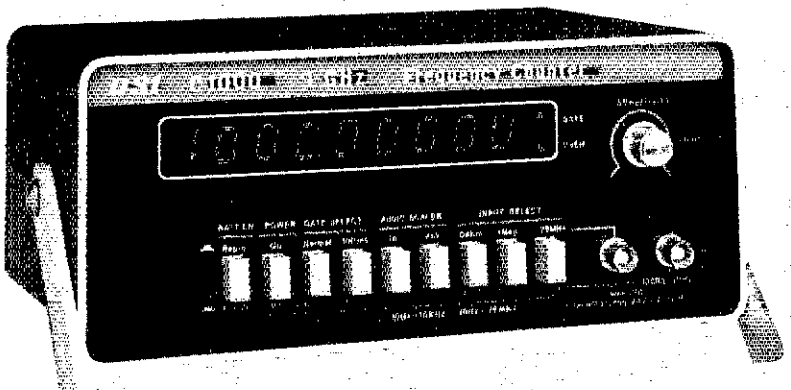
Model 3700 ..... **$26**

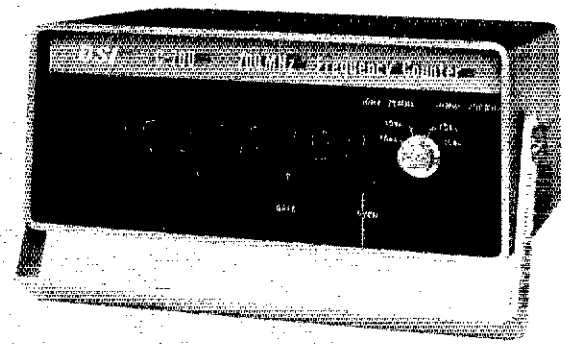
3600A - 3700 Factory Update (3600A Only)
Includes Labor & Re-Calibration ..... **$ 9**

Model 3600A **$19**

Model 3550W **$14**

Option 03 20-Hr. Rechargeable
Battery Pack ..... **$ 2**





MODEL C1000 10Hz to 1GHz

$499.95

- **INCLUDES BATTERY PACK**
- **AUTO ZERO BLANKING**
- **AUTO DECIMAL POINT**
- **10MHz TIME BASE**

Accuracy . . . that's the operational key to this rugged advanced design Model C1000 1GHz frequency counter . . . a significant achievement from DSI. That's because you get . . . **.1 PPM** 0° to 40°C proportional oven time base . . . Built in 25DB preamplifier with a 60DB adjustable attenuator . . . x10 & x100 audio scaler which yields .01 Hz resolution from 10Hz to 10KHz equivalent to 10 sec. & 100 sec.Gate Time . . . Selectable .1 & 1 sec. time base and 50 ohms or 1 meg ohm input impedance . . . Built-in battery charging circuit with a Rapid or Trickle Charge Selector . . . Color keyed high quality push button operation . . . All combined in a rugged black anodized (.125" thick) aluminum cabinet. The model C-1000 reflects DSI's on going dedication to excellence in instrumentation for the professional service technician, engineer, or the communication industry.

MODEL C700 50Hz to 700MHz

$369.95

- **INCLUDES BATTERY PACK**
- **AUTO ZERO BLANKING**
- **AUTO DECIMAL POINT**
- **10MHz TIME BASE**

ALL NEW! All UNPARALLELED DSI QUALITY! The model C 700 700 MHz frequency counter features . . . **.2 PPM** 0° to 40° C proportional oven time base . . . 25db preamplifier with a 60db adjustable attenuator. Built in battery charger with a rapid or trickle charge selector . . . Combined in a rugged (.125" thick) aluminum cabinet makes the C700 ideal for the communication industry and professional service technician.

3600A OWNERS: Up date your 3600A frequency counter to a C 700 includes, new back board, **.2PPM** proportional oven, 25db preamplifier, rugged .125" thick aluminum cabinet, order 3600A-700. Unit must be returned to DSI factory for modification.

DSI — GUARANTEED SPECIFICATIONS — FACTORY ASSEMBLED — MADE IN USA

Model	Frequency Range	Proportional Oven Accuracy Over Temperature	50Hz To 75MHz	75MHz To 500MHz	500MHz To 1GHz	Number Of Digits	Size Of Digits	Power Requirements	Size
C700	50Hz to 700MHz	.2PPM 0° to 40°C	50MV	10MV	NA	8	.5 Inch	115 VAC-BATT 8 to 15VDC	3"H x 8"W x 6"D
C1000	10Hz to 1GHz	.1PPM 0° to 40°C	20MV	1MV	>50MV	9	.5 Inch	115VAC-BATT 8 to 15VDC	4"H x 10"W x 7½"D

— All Units Are Factory Assembled, Tested And Carry A Full 5 Year Limited Warranty —

FREE

Strongest warranty in the counter field.
Satisfaction Guaranteed.

FOR MORE INFORMATION

Call Toll Free: (800) 854-2049
DSI INSTRUMENTS, INC.
California Residents, Call Collect: **(714) 565-8402**
VISA • MC • AMERICAN EXPRESS • CHECK • MONEY ORDER • COD
7914 RONSON ROAD, #G, SAN DIEGO, CA 92111

Model C 700	**$369.95**
3600A-700 Factory Update (3600A only) Includes Labor & Re-Calibration	**$199.95**
Model C 1000	**$499.95**
Opt. 01 1.3 GHz (C1000 only)	**$ 99.95**
Opt. 02 .05 PPM 10MHz Double Oven 0° to 50° C Time Base (C1000 only)	**$129.95**
Ant. 210 Telescopic Ant./BNC Adapter	**$11.95**

News Update from DRAKE

TR-7 Delivery Status

We have received many comments that Drake TR-7's are so rarely found on dealer's shelves it raises the question, "Why can't I readily get one?"

First, don't blame your dealer. He is glad to sell them as he gets them. But therein lies the problem—he has more demand than units.

Second, we wish we could supply his demands more quickly, but we had no way to anticipate the record-breaking call for the TR-7. We have been shipping units since our ad first appeared, and in fact we are now shipping more TR-7 units than we ever shipped of the TR-4 series.

Third, if you have not yet found an unsold TR-7 please bear with us as we are steadily increasing production, consistent with maintaining Drake high quality. Certain other items of the TR-7 system are already in stock, so please check with your dealer.

These thoughts of interest are provided by Drake,

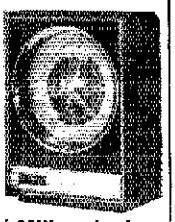
"The Newsmakers"

To receive a FREE Drake Full Line Catalog, please send name and date of this publication to

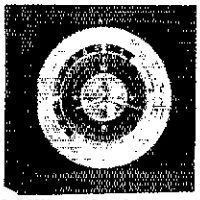
R. L. DRAKE COMPANY DRAKE®

540 Richard Street, Miamisburg, Ohio 45432 • Phone (513) 866-2421 • Telex 288-017

$349.00
Temp S1 SYNCOM
(or with touch tone pad . . . $399.00)



$39.95
Howard Miller clock
Model 622-340



$69.95
Howard Miller clock
Model 622-337

KDK FM 2015 R $439.00
SHIPPING INCLUDED / CA add 6% tax

The Radio Place

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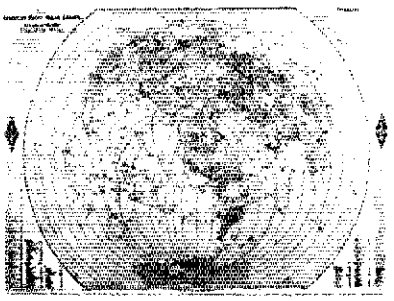
Sacramento, CA 95818

(916) 441-7388



WORLD MAP

A big 30 x 40 inches; printed in eight colors. Continental boundaries plainly marked. Each country prefix shown on the country and in a marginal index for easy reference.

The ARRL World Map is your best buy in operating convenience. $3.50 postpaid anywhere in the world.

THE AMERICAN RADIO RELAY LEAGUE, INC.
NEWINGTON, CT. 06111

2-METER FAVORITES

RUBBER DUCKIES


HM-4

Model HM-4. Has 5/16"-32 thread Fits Motorola HT's, ICOM IC215 and Standard 146A $7.00

Model HM-5. Same as above, but with PL-259 connector $7.00

Model HM-226. Same, with TNC connector for Wilson 1405 . . . . . $16.00

Model HM-227. Same, but with BNC connector termination $11.00

Model HM-228. With F connector for Wilson 1402 & Tempo $10.00


HM-5

ADD $1.00 to each order for shipping.

SPECTRONICS, INC
(312)848-6777 1009 GARFIELD ST. OAK PARK, ILL. 60304

TRIPOLE MULTI-BAND

The TRIPOLE™ antenna covers the 160, 80, 40, 20, 15, 10 and 6 meter bands without retuning or a tap change. 40 to 120 ft length. 2 KW PEP. Twinverted V and horizontal without an antenna tuner. Neat appearance, built-in balun, rugged, aids mast or tower guying. A best choice for an all-around amateur station antenna.

Guaranteed. Kit T80-K $54.95; Assembled T80-A $69.95 Prices postpaid cash. TX residents add 5% sales tax.

Call or send card for information on TRIPOLE antennas and feedline kits. Order direct or ask your dealer.

"best"

Universal Radio Co. Dept. UI
P. O. Box 26041
El Paso, Texas 79926 (915) 592-1910

Ham-Ads

Please Note New Ad Rates

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 70 cents per word. A special rate of 25 cents per word applies to hamfest and convention announcements, to individuals seeking to dispose of or acquire personal equipment, and to other advertising which, in our opinion, obviously qualifies for the individual rate.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received December 21 through January 20 will appear in March *QST*.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permited in *QST* advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information. Q.C.W.A. Inc. 1409 Cooper Drive, Irving TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

FREE Sample copy Long Island DX Assn. bulletin. Latest DX news. Business size s.a.s.e. to the L.I. DX Assn., P. O. Box 173, Huntington NY 11743.

CERTIFICATE for proven two-way radio contacts with amateurs in all ten USA areas. Award suitable to frame and proven achievements added on request. S.a.s.e. brings TAD data sheet from W6LS, 2814 Empire, Burbank, CA 91504.

TROPICAL Hamboree — January — Miami. Take a sunshine break in mid-winter at the Tropical Hamboree & South Florida ARRL Convention. Meet your own Division ARRL Director here for the Board Meeting. Enjoy a real vacation in a tropical Latin city with no passport or currency hassle plus a big hamfest and manufacturers' show. Write Date Radio Club, Box 350045, Miami, FL 33135 for full information.

ROCHESTER Hamfest & NY State ARRL Convention, May 25-27. Add you name to mailing list. Send QSL to Rochester Hamfest, Box 1388, Rochester, NY 14603. Phone 716-424-1100.

1979 CLASSIC Radio Exchange: Jan. 28-29, 2000Z-0300Z. Info s.a.s.e.: K8SJ, 2386 Queenston, Cleveland, OH 44118.

INDIANA: South Bend Swap & Shop January 7, 1979 at New Century Center downtown on U.S. 31 Oneway North across from St. Joseph Bank Building. Halt acre in one large room at ground level. Food, museum and Art Center in same building. Four lane highways to door from all directions. Talk-in: 52-52 & area repeaters. Contact: K9IXU.

RADIO Expo '79 September 15th and 16th, 1979, Lake County Fair Grounds, Routes 120 and 45, Grays Lake, Illinois. Manufacturers displays, flea market, seminars, ladies programs. Advance tickets, $2. Write EXPO, P. O. Box 305, Maywood, IL 60153. Exhibitors inquiries: Expo Hotline 312-345-2525.

QSL Cards

TRAVEL-PAK QSL Kit — Send call and 25c; receive your call sample kit in return. Samco, Box 203, Wynantskill NY 12198.

DELUXE QSLs, Samples 25c. Petty, W2HAZ, P. O. Box 5237, Trenton NJ 08638.

DON'T buy QSL cards until you see my free samples. Fast service, economical prices. Little Print Shop, Box 9848, Austin TX 78766.

$2.70 per 100 (1 m order). 45 styles incl. 2-colors. 125 cards min. order. 10 day delivery. Send 30c stamps for 1979 catalog. VP5QED Press: Box 1523-Boca Raton, FL 33432.

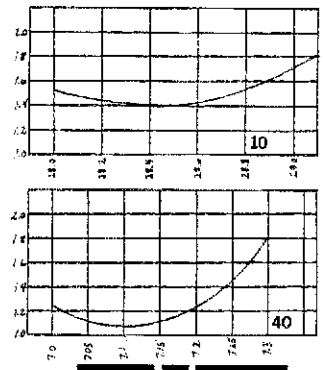
DISPLAY and protect your QSLs with 20 frame plastic holders. Seven for $3.00 prepaid. TEPABCO, Box 198T Gallatin TN 37066.

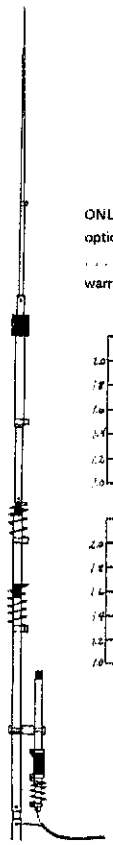
FREE Samples — Stamp appreciated. Samcards, 48 Monte Carlo Dr., Pittsburgh, PA 15239.

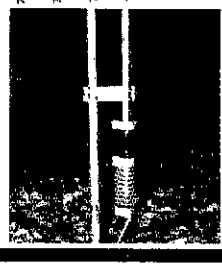
160-10 Automatically!

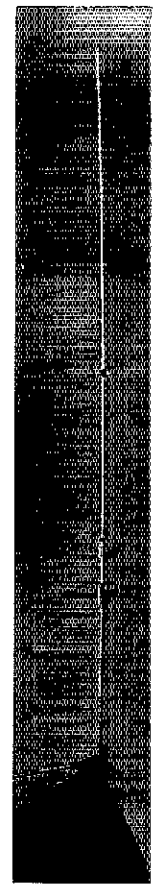
The HF5V-II+TBR-160 System.

ONLY THE HF5V-II VERTICAL GIVES YOU THE CHOICE: 80-10 meter operation with the antenna alone, or 160-10 meter operation with the antenna and optional TBR-160 unit. COMPARE: Easy to install and adjust . . . 26 ft. tall . . . 80+ mph wind survival . . . no guys needed . . . stainless steel compression clamps . . . aircraft alloy tubing . . . low angle of radiation for superior DX performance . . . only one feedline required . . . mounting post included . . . 90 day factory warranty (Write for details) . . . At your dealer or factory direct . . . post card for catalog. PATENT PENDING.









A PRACTICAL ANTENNA SYSTEM THAT REALLY WORKS — FOR A FRACTION OF THE COST OF A TRI-BAND BEAM AND TOWER! Other models from $68.00.

HF5V-II $98.00
TBR-160 $34.50
UPS PPD. CONT. US.

BUTTERNUT ELECTRONICS COMPANY
Route 1 Lake Crystal, Mn. 56055 Phone: (507) 947-3126

Dealer inquiries invited.

CALL COLLECT NOW
(314) 961-9990

MID COM ELECTRONICS, INC.

2506 S. BRENTWOOD BOULEVARD
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9 to 9 Monday thru Friday
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CALL NOW FOR THE BEST DEAL EVER ON THE FOLLOWING LINES:

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. . . AND MANY MORE.

New Receiver Audio Filtering Processor

DXER

How many times have you lost a weak DX contact because of strong carrier interference? The 1040R exclusive 3-band continuous coverage SSB Filter will eliminate monotone carrier interference. Perhaps you enjoy rag chewing QSOs. You can now have them with your 1040R.

CW OPERATOR

DXer or rag chewer alike will appreciate the unparalleled fingertip control over an 8-pole 45 or 105 Hz bandwidth filter. Even if you have a CW filter the 1040R will improve your selectivity. Just flick the switch and your contact will jump out of the pack with your 1040R.

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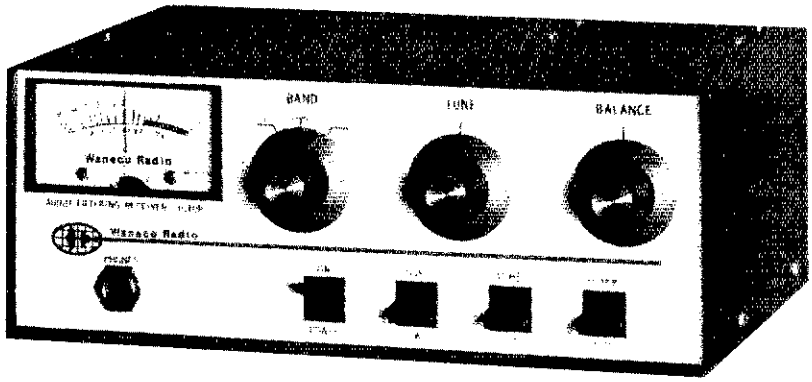
Exchanging signal reports, giving audio A/B comparisons, reporting on your friends' speech processors is one of Amateur Radio's most pleasant past-times. For the first time accurate audio level reports are possible with the audio level strength meter in the 1040R.

Model 1040R

PLUGS INTO YOUR EXISTING AUDIO OUTPUT

1 yr. warranty



$185. prepaid. USA

Delivery from stock.

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BANKAMERICARD

■ Up to −70dB noise separation ■ 45/105 Hz bandwidth CW audio filter ■ Audio speech level strength meter ■ Built in loudspeaker with 3-way audio distribution ■ Continuous coverage notch filter 100 to 12,000 Hz.

Write or phone for complete specifications.

Dealer inquiries invited.

Waneco Radio

Post Office Box 491, Hawthorne, CA 90250 ● (213) 675-2797

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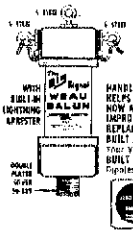
Famous "W2AU" Balun



MODEL 1:1 or MODEL 4:1 **$14.95**

HANDLES FULL 2 KW PEP AND THEN SOME. Broad Banded 3 to 30 Mc
HELPS TVI PROBLEMS By Reducing Coax Line Radiation
NOW ALL STAINLESS STEEL HARDWARE, 50 Ω/H Double Silver Plated
IMPROVES F/B RATIO By Reducing Coax Line Pick-Up
REPLACES CENTER INSULATOR. Withstands Antenna Pull of Over 600 Lbs.
BUILT IN LIGHTNING ARRESTER. Helps Protect Balun — Could Also Save Your Valuable Gear.
BUILT IN HANG UP HOOK. Ideal for Inverted Vees, Multi Band Antennas, Dipoles, Beam and Quads.

MINIMUM ORDER $10.00

CABLE

8U FOAM, hi density braid, 50'	$11.95
8U FOAM, hi density braid, 100'	22.00
RG58A/U, stranded center, 100'	9.95
RG58, 2 ft. w/PL259 on each end	3.05
RG58, 3 ft. w/PL259 on each end	3.35
RG58, 6 ft. w/PL259 on each end	3.82
RG58, 12 ft. w/PL259 on each end	4.48
RG58, 50 ft. w/PL259 on each end	7.84
GUY WIRE, steel/plastic, 100 ft.,	4.95

COPPER WIRE

#14 STRANDED 100' spool,	$5.95
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AIRPLANE style, porcelain ins., wt. .2 lb.	2/$ .99
DOG BONE style porcelain ins., wt. .2 lb.	3/ 1.25
NAIL KNOB style, stand off ins., wt. .1 lb.	4/ 1.20
HY GAIN #15 center insulator, wt. 1.5 lb.	5.95
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MOSLEY dipole center insulator, wt. 1 lb.	4.25

CONNECTORS and ADAPTORS

PL259, UHF male conn. 2 for	$1.59
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UG175, Adapts RG58 to PL259 2 for	.59
UG176, Adapts RG59 to PL259 2 for	.59
PL258, UHF double female	.99
DM-SP, UHF double male conn.	1.69
M359, 90 deg. UHF elbow conn.	2.10
UG83U, BNC male for RG58	1.49
UG14, BNC female chassis mtg.	.99
M358, UHF "T" connector	2.10
UG255, Adapts UHF female to BNC male	2.89
UG273, Adapts BNC female to UHF male	1.59

SPECTRONICS, INC.

1009 Garfield St., Oak Park, Illinois · 60304

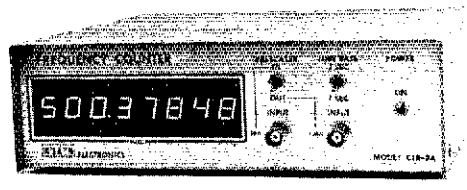
(312) 848-6777

"THE PROFESSIONALS"

NEW MODEL CTR-2A ● 500 MHz & 1 GHz COUNTERS

NEW Period Measurement

1 us to 1 sec.



NEW Built-in Pre-Amp

10 mv @ 150 MHz

The New Model CTR-2A Series Counters are designed and built to the highest standards to fulfill the needs of commercial communications, engineering labs and serious experimentors. With an accuracy of + .00005% (oven option) the CTR-2A can handle the most critical measurements and is about half the cost of other commercial counters.

If you need a reliable counter at an affordable price, the CTR -2A is the answer.

- Built-in Pre-Amp 10 mv @ 150 MHz
- 8 Digit .3" LED Display
- High Stability TCXO Time Base
- Built-in VHF-UHF Prescaler
- Automatic Dp Placement
- TCXO Std. ± 2 ppm
- Period Measurement (Optional)
- Input Diode Protected
- 12V-DC Operation (Optional)
- Oven Controlled Crystal (Optional) ± .5 ppm
- Selectible Gate Times - .1 & 1 sec.

500 MHz Kit CTR-2A-500K	$249.95
500 MHz Assembled CTR-2A-500A	349.95
1GHz Kit CTR-2A-1000K	399.95
1GHz Assembled CTR-2A-1000A	549.95

OPTIONS . . . .

02) Oven Crystal	$49.95	05) 10 sec. Time Base	$ 5.00
03) .43" LED	10.00	06) Period	15.00
04) 12 V-DC	10.00	07) Handle	10.00

PROBES Hi-Z $15.00 ● Low Pass $15.00

DAVIS

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DAVIS ELECTRONICS 636 Sheridan Dr., Tona., N.Y. 14150 716/874-5848

HAM REPEATER AUTOPATCH

Offer your club *COMPLETE* emergency communications

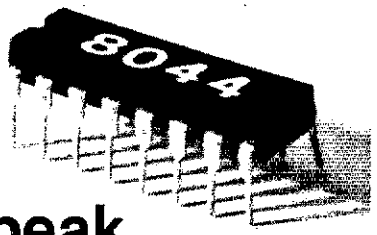
Commercial quality, gold plated contacts, plug in, epoxy glass PC boards. 12 volt DC or 115 volt AC operation – Power supply included. Four digit access – Single digit releases – field programmable. Hybrid network – No switching required. FCC certified telephone line coupler. Auxiliary "In Use" contacts supplied. Land line "call-in" signalling control contacts provided.

Price complete **$498** + $3 shipping & handling. Master Charge, Bank money order, or certified check acceptable.

Accessories: CES-300 powered tone pad – **$59** BUS-COM Soft-touch® telephone powered mike/pad element – **$34.95.**

MONROE ELECTRONICS, INC.
411 Housel Avenue, Lyndonville, N.Y. 14098

CURTIS LSI's help you



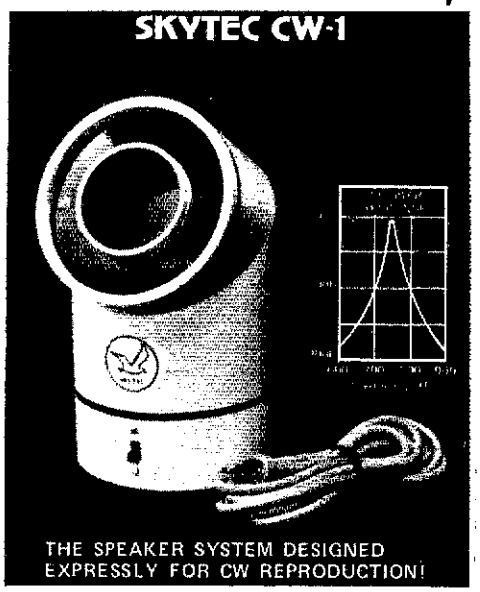
speak MORSE

★ **8044; Keyer-On-A-Chip*** (Replaces 8043). **$14.95**
Apr '75 HR, Feb '76 QST, Radio Hdbk '75, Apr Hdbk '77-78
★ 8044-3; IC,PCB,Socket,Manual 24.95
★ 8044-4; Semi-Kit 54.95
★ 8045; Morse Keyboard-On-A-Chip IC . . . 59.95
★ 8045-1; IC,PCB,FIFO,Sockets,Manual . . 89.95
★ 8045-2; Semi-Kit 159.95
★ 8046; Instructokeyer-On-A-Chip IC 49.95
★ 8046-1; Semi-Kit 79.95
★ 8047; Message Memory-On-A-Chip IC . . 39.95
★ 8047-1; IC,PCB,RAM,Sockets,Manual . . 69.95
(add $1.75 on above for postage and handling)
EK-430; CMOS Keyer* (Feb '76 QST) 124.95
IK-440A; Instructokeyer* (Mar '76 QST) 224.95
*now with dash memory as standard
System 4000 Ham Computer (see Jan '78 QST) (write)

Curtis Electro Devices, Inc.
Dept. Q (415) 964-3136
Box 4090, Mountain View, CA 94040

CW OPERATORS,

SKYTEC CW-1



Using a resonant acoustic filter, the CW-1 combines good "single frequency" selectivity with a pleasant tone shaping characteristic, giving the most comfortable listening ever attained for lengthy CW operation.

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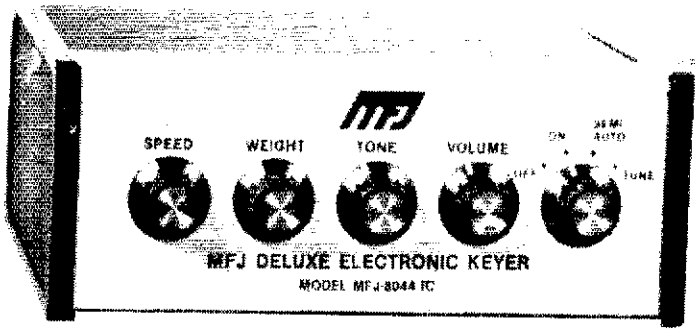

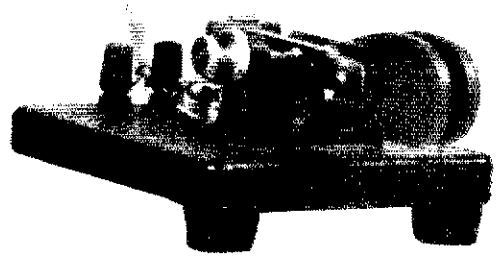

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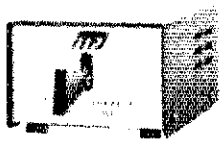

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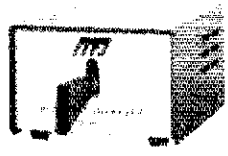

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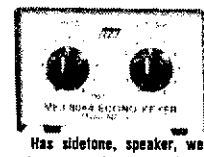

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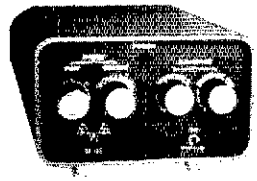

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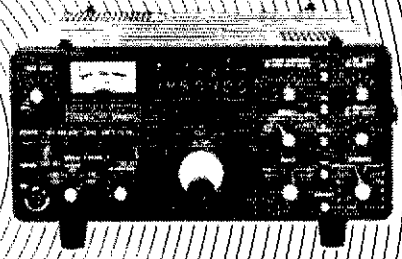

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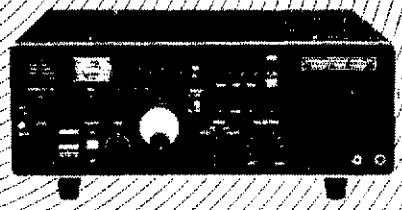

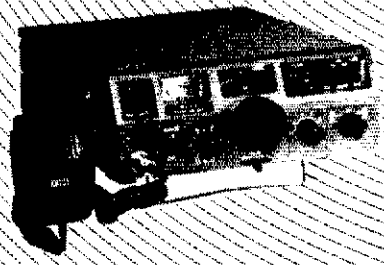

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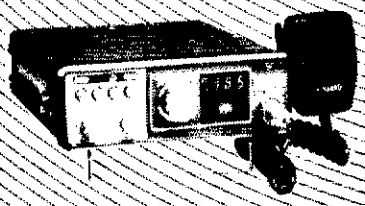

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WANTED — information on stolen ICOM-245 ssb/cw serial 2093. $100 reward. K4RS 804-464-5768.

COLLINS S/Line, round, mint, 326-3 w/DX-Eng. procesor, 75S-3B, 1.5 and 0.5 filters, Skytech Tubesters, 516F-2, 312B-4, cables, manuals, $2300. W4QAW, Rte. 1, Box 69, Ashburn, VA 22011 703-777-8104.

WANTED: SB-200 or SB-230 amplifier. WB2BEV 212-377-5759.

NEED six type six boy able seven heptodes. Sell HP-400 VTVM $95. Also 100 antique electron tubes. Large s.a.s.e. twenty eight cents for list. Fitch, W3AW, 9406 Evans, Phila. PA 19115.

SELL: TS-820S, digital with remote VFO, speaker, cw filter, noise blanker, mint condition — $895. Atlas 210X, with noise blanker & ac console — $549. SB-200, extra finals, $280. Dentron Super Tuner, $90. TS-700A, $545. Tempo 100AL10 2 meter linear, with Henry PS1220S power supply $225. All excellent condition. All with manuals. SB-100 with HP-23 ac power supply, $200. Ray Tell, WØNYC, Spring Valley, MN 55975. 507-346-2605.

YAESU FT-301 ssb transceiver, 160-10 meter, all solid state, 200 watt, mint, $625; Heathkit HW-17 two meter am transceiver, excellent, $40. WB4OTQ, 305-777-1217.

XTAL filters and xtals (KVG-9 MHz-new), 4 digit freq. counter module with HP-6082-7300 readouts. Everything 40 percent off. KB6CT, 2216 Monterey, Hermosa Beach, CA 90254.

WANTED — Wabco 5TM-1 test meter unit. For Wabco's "3R" line of transceivers. Contact Dave, WB9AOU, 956 N. 200 W., Valparaiso, IN 46383, 219-762-1346 eve.

HELP! Need a schematic for a Tennelec Memory Scan MS2. Bill Dias 2 Spaulding Lane Saugerties, NY 12477.

TEMPO One with p.s. speaker, mint, $395; Galaxy V with p.s. speaker, mike, excellent — $260; Murch transmatch, mint, $120; Heath (B/H) digital multimeter IM-1210, mint, $70; U-ship. WB4KSP 919-793-4325.

FOR SALE: Drake C-Line, exc. cond. $1000. Late model w/nb, xtals for 10 & 160m, filters 1.5 & .5. K1UO. Tel: 207-234-7175.

EZ WAY — RBX50 G/wander ground post $825, winch $175, all mint, U ship. Zani, 131 Scottsdale Dr., Coraopolis, PA 15108. 412-457-7597.

HW-101 mic, p.s., spkr, cw filter, ph patch capabilities, manuals $350. Drake 2C — 2CQ n.b. manuals, $225. Call 904-249-7541. WD5INA/4. I ship.

DRAKE TR-3 ac/dc $400. KA6ATN, Paul, 707-869-0578.

QSTs Solid 4/46 to date. Mint. Also many issues '35 thru '41. ARRL Handbooks '34, '36 thru '39, '67, '53. Radio Handbook '38, '39, '40, '42. McDonald, 5231 Horton, Mission, KS 66202. 913-722-2677.

WANTED: Desk matching Johnson Desk Kilowatt amplifier. WA4GGL, Box 766, Dahlgren, VA 22448.

SELL National SW54 $60, NC303 $225. CE 200V $225. Clegg Zeus xmtr $175, SSTV Robot 400 mint $550. Old battery radios for new collector. Early radio mags, books, catalogs. S.a.s.e. please. W2GHF, 45 Allen Dr., Woodstock, NY 12498. 914-679-8723.

WANTED — Drake L-4B. Send details to N2AKD, Bob Codner, 7822 Vernon road, Clay, NY 13041.

TELREX TB6EM inverted V antenna new $50 — Palomar RX noise bridge $25 — Shure 430 mike/stand $30 — Electro-Voice 665 mike/stand $20 — Shure SR90D hand mike $8 — Millen 90652, grid dipper $100 — Drake TV-42 low pass filter $8 — Autek QF-1 $25, Heath dummy load $15 — Heath fone patch $25 Atlas VX5 VOX $30. Cliff Alsop, 5927 Primrose, Indianapolis, IN 46220. 317-255-4860.

HAMMARLUND Service, 14 years factory experience. Will align your receiver to original specifications. Also service Hammarlund/Gutercom and Aerotron 2-way equipment. Service Data $7.50 per set. Buying "junk" Hammarlund equipment for parts. Wayne Cordell, K4HCS, Blue Ridge Communications, Route 4, Weaverville, NC 28787. 704-645-7070.

SELL: Ham station for beginner. Includes: SB-300, DX60A, HG-10B VFO, mic, speaker, 50' RG8/U, antenna switch, connectors and manuals for everything. $100 plus shipping. 813-867-3884 evenings. KP4DAQ/4.

WANTED: Several 2-wire watt-hour meters in operating condition. W3QQ Box 3022, Newport DE 19804.

SSTV — Sell, Robot 70A monitor, 80 camera, macro lens and calibration tapes, asking $400. Bob WA2QVI, 24 Sheraton Oaks, N. Little Rock AR 72116 501-835-5748.

ATLAS 210X w/nb and ac console for which I paid $810 and $145 respectively. Will sell for $750 or best offer. Rig and console never used due to landlord. Bought in July 1978. David Rybsztajan,1828 E. 52 St., Brooklyn, NY 11234. 212-258-7169.

SWAN 750CW new and unused with p.s. $700. U.P.S. switching to solid state. W1GWA, Dennis, 144 Golden Hill Street, Bridgeport, CT 06604, 203-334-4837.

MINT Argonaut 509 w/ac p.s. $270. Mint HR-1680 w/spkr, $175. Mint HG-10 VFO, $75. Cain, 2464 Hand Rd., Niles, MI 49120.

VFO-520-S $115, Vomax $135, KLM 10-140B $135. Many other accessories. S.a.s.e. for list. W5VJG/4, RT4, Box 600, Gadsden, AL 35904. 205-442-1952.

ATLAS 180, ar117 power supply. Never mobiled, looks and works fine. $400. WA6YDO, Box 1026 Pinecrest, CA 95364. 209-965-3336.

HEATH HW-101, $275. HP-23B, $40. Yaesu FT-101B, $525. Both perfect. Shipping extra. W3IYQ. 215-355-2641.

ROHN 60 ft. self support tower — SSV60. Excel. cond. $350. K2IBW 914-634-8448.

SELL: Yaesu FV-101B external VFO, Spectronics DD-1 digital display. Scott, WD9DHK — 1-414-675-6644.

FOR SALE: HQ-180AC receiver $300. Gonset GSB-100 ssb transmitter $150. K7MAG 703-371-5955.

FOR SALE NCX-3 $125. Swan 270 $250. 75A1 $75. 640A $50. RBC $60. RAX rcvr $25. K2LFG, Atlantic Highlands, NJ 201-291-0936.

KLM 2700, $450. Heath HW-2036 w/Micoder (partially assembled), $260. K3KMO, Box 60, Damascus, MD 20750. 301-774-3481.

SWAN 500CX, 117XC, VX-1, $450. I ship. WB7BOB, 13026 Tall Tree, Spokane, WA 99216. 509-928-7524.

2-B rcvr with 160, CB, MFJ filter, calib $150. HW-100, filter, HP-23A $175. BC-221B, supply, manual $25. Ac VTVM $30. Davis 50 MHz counter with 500 MHz prescaler $125. Johnson T/R switch $10. Heath ultrasonic cleaner $25. Various meters cheap. All FOB. S.a.s.e. W8KV.

HELP us save lives! The Civil Air Patrol needs Johnson ssb adapter to put Valiant 1 into service. The large Valiant 1 VFO knob is also needed. Please submit price to: Capt. Gene R. Pfeiffer, Box 386, Medford, NY 11763.

QST 1957 to 1975 complete. Excellent condition. Make offer for all or part. Doug Passey, 1577 Maple, Cleveland Hts., OH 44121.

HEATH HW-7 with power supply. $95 postpaid or collect. WB1ERA, 98 Queens Terrace, Southington, CT 06489.

TWO WRL 40-80 Duo-Bander ssb transceivers with power supplies, $150 ea. GE 2m fm 110 V xcvr $25; Motorola 2m fm 12V xcvr. $35. Two 10-80m adjustable mobile antennas $20 ea. K5FXT, Bill McLeckie, Drawer T, Naples, TX 75568.

75A4 WITH 2.5, 1.5, .5 and .2 kHz filters and various modifictions $400. CE 100V fair condition $200; CE100V with factory 160 emters $300. General Radio 916-A rf impedance bridge $150. Nems-Clarke 108-E rf phase monitor. N4ZO, 803-237-9212 or 5115 Parker Pawleys Island, S.C. 29585.

JUNK Box — $20 plus shipping wt. 14#. Also complete NRI Amateur Training text books — excellent material for Novice to Extra — $25, plus shipping wt. 12#. H. J. Boyd, 5 South Live Oak Rd., Hilton Head Island, SC 29928.

DENTRON Trim-Beam, balun, rotator $90. Murch multiband antenna $28. Heath SWR bridge AM-2 $10, All good. Pick-up. W2AM, 212-377-1850.

FOR SALE: Tektronix T922 oscilloscope, mint condition. $650. WB9WAI 312-432-2998.

COLLINS KWS1 $600, Hallicrafters SX101A $100, W6ULZ, 213-347-3058.

CHRISTMAS Bargain — Infotech cw keyboard (with memory) and decoder unit, both working excellent and in good condition, ready to use with a standard TV. Schematics and all cables included. $470 or trade with a linear amplifier. Please call KA1AQM at 617-851-5338.

CENTRAL Electronics 20A mint $50; Central Electronics 10B with VFO and DX100 linear $75. 6-volt automobile inverter p.s. suitable for Yaesu, etc. $35. Hammarlund HQ-170 $150. DX-150B rcvr $80. Spare parts for above. All items FOB 422 Belay Ave., Santa Rosa, CA 95401. WB6TMY.

SELL: HQ110AC — $100, DB23 — $20, HAL 311 keyer — $35, MFJ 1601OST — $40. J. Mead, K2JT, E. 50 Harmon Dr., Paramus, NJ 07652.

WANTED: ICOM IC-31 uhf-fm base station. Write Steve, WB3GUS, 662 7th Ave., Swarthmore, PA 19081.

MORSE Code tapes ideal for schools or clubs. Narrated. 0-15 wpm in one-wpm steps. All character speeds 13-15 wpm. Used in technical school. A truly painless program. 30-tape set $45. 7" reel or cassettes. Limited supply. W9SIA, 15933 Grove, Oak Forest, IL 60452.

HALLICRAFTERS FPM-300 MKII 250 watt ssb/cw 80-10m transceiver. Mostly solid state, built-in speaker and ac/dc supply, $375. Prefer not to ship. WA5GOT, 1536 Terpsichore, New Orleans 70130. 504-529-3062.

FOR SALE: Heath SB-104A, factory aligned, with matching speaker and power supply, SBA-104-1, SBA-104-2, SBA-104-3, desk mic, mobile mic. All perfect: $799. SB-230 kW linear. Perfect, never used: $450. HR-1680 receiver, factory aligned: $150. Alan Rose, K2RHK, 212 877-8539.

YAESU FT227R memorizer, 2 meter synthesized, with heath autopatch mike mint condition $300. WB1DXL, 37 Franklin St., Lewiston, ME 04240.

KENWOOD two meter TS-700S all mode digital $500. Hayden Montgomery, Route One, Box 479, Coker, AL 35452. 205-339-1558.

COLLINS linear power amplifier, type 204C-1 10 kW (PEP), or 5 kW (AV). 4 to 25 MHz, 50 ohms, 0.2 watt excitation, 3 phase 225VAC with 4CX500A output tube and Collins amateur exciter type 310B-3 15 watts, 3.5 to 32 MHz, 73 ohms, 120 VAC. Each with manual. Offers invited. Louis Lucas, Box 4422, Santa Barbara, CA 93103.

DRAKE TR4C-AC4-MS4 mint condition $529. Mosley TA32 tribander. Rotor, bearing, $129. Genave GTX-100-PS $149. 803-871-5707. WA4MOF Box 1686, Summerville, SC 29483.

SALE: Mint condition: HQ-170C receiver; Hallicrafters HT-46 ssb/cw transmitter. $160 each. Firm. Will ship. B. Onachila, WB2OFQ, 66 Hathorn Blvd., Saratoga, NY 12866. 518-584-9048.

SALE. Dentron MT3000A antenna tuner, $250; Heathkit 5-function phone patch, $100; Yaesu YO-100 scope, $100; D-104 preamp mike, $25. All mint. Rusty WA2JKW, 74 Milnor, Lackawanna, NY 14218. 716-822-1996.

DRAKE DC-4 power supply, $90; Dentron Jr. Tuner, new, $65; Hustler 4BTV/75/80 vertical, $80. James Beard, WB5WLW, 9305 Newlondon, Shreveport, LA 71118.

WANTED, KWS-1 w/p.s. $450, 75A4 $350, R390A $300, KWM-1 w/p.s. $250, mint only, will pick up. T. Kanai, JA3OEW/W3, Packard Lab., Lehigh Univ., Bethlehem, PA 18015.

COLLECTORS item — Double button carbon microphone - mint - make offer — W2DVN 212-939-5371.

SRR11A 14 kHz to 600 kHz GM-550 WWV rec. with scope $60. T-282 100W xmtr 200 to 400 MHz. J. Murray, 265 NE 173 St., N. Miami Beach, FL 33162.

COMPLETE RTTY setup — Plug it in and go — Model 19 printer, Model 14 tape distributor, Model 14 reperforator, terminal unit, afsk oscillator, loop supply, General Fireproofing desk, light, and about 80 picture tapes all for $225. Call Dave, K3KD, 215-754-6286.

HELP needed by Ol' Timer to find an element-to-boom support clamp insulator for my old Telrex full spaced 3-element 20-meter beam Model 20M56-112. Bill Seaver, 12 Gold, New London, NC 28127.

SELL custom 144 MHz 2kW two stage linear 8874/8877 in one table-top cabinet. Separate rf in and out per stage so can use separately or cascade. Fine flexible unit for tropo, moonbounce, etc. $425 firm plus shipping. Brown, W6HB, 1930 9th St., #C, Los Osos, CA 93402.

DRAKE SPR-4, calibrator, MS-4, mint $425. Dennis Filka, KA8CWC, 6324 Mandalay Dr., Parma Hts., OH 44130. Phone 216-884-1175.

SPEECH processor, complete kit per ARRL ssb manual, $29. K2VAH.

HEATH HW-101, ac power supply, Turner desk mike, SWR bridge, manual, $285, UPS prepaid. WA7QWF 801-969-4383.

COLLINS KWM2/waters rejection tuning s/n 11915, 30L1 s/n 27322, Mp-2, 351D-2, MP-1, D-104 mike, package $1,150. W2JOL Clifton, NJ 07013, pick up 201-778-0882.

KENWOOD twins nearly new T-599D & R-599D (6 mtrs) S-599, original cartons, will warranty for 60 days, $825. DSI freq. counter 3240HH $70. Heathkit HW-7 QRP $50. N6AJA 1-805-687-5720, Box 30521, Santa Barbara, CA 93105.

GROUNDED grid filament chokes 30 amp — $5; 60 amp — $9; plate chokes 800 mA $4, 2 amp $6; PPUSA48. William Deane, 8831 Sovereign Rd., San Diego, CA 92123.

WANTED: Johnson Valiant and Heathkit SB-10 or Central Electronics 20A. State condition and price. I have a PMR-7 and repairable AF-67 with PSR-812 AC/DC power supply with manuals. Make offer. I also have a repairable RCA Carfone converted to 2 meters with ac power supply. Make offer. WBØGDA, R.R. 2, Box 89, Essex, IA 51638. 712-379-3230.

RTTY — Bandpass active filter 2125/2295 Hz kit $11.95; W/T $16.95, postpaid. S.a.s.e. for info. Nat Stinnette Electronics, Tavares, FL 32778.

SAVE Money Today! Cushcraft — A147-11, $29.88; ATB-34, $222.25; ARX-2, $31.; ICOM IC245/ssb, $621; IC211 $758; IC701, $1425; IC280, $429. Ten-Tec — 540, $601; 544, $747. Similar savings on most major lines. All freight paid, all with mfg. warranty. Texas residents add 5 percent sales tax. Write today. RF, P. O. Box 16276, Ft. Worth, TX 76133.

WANTED: QST in permanently-bound (sewn-in) volumes. Maroon or red, bound six issues per book, two books per year. Need 1971, 1968, and most before 1966. Neil Friedman, N3DF, 2301 E Street Northwest, Apartment A-701, Washington, DC 20037.

WILSON 1402SM, touchtone, nicads, desk charger, case, crystals. $275. K4GVW, 615-367-0767.

WILSON 6 el. 15m monoband antenna. Never used, in original carton. $140 + shipping. R. Benatti, 92B-3 Cynthia Lane, Middletown, CT 06457. 203-346-4174.

TR4CW, AC4, MS-4. Also 75S3 and speaker. Make offer. W4AVY. 408 Lance Lane, Birmingham, AL 35206.

HEATH: SB-400 xmtr, SB-300 rcvr with 6-meter converter, manuals, cables — $300 including UPS shipping. K2HWE, 21 Lillian Dr., Scotia, NY 12302. 518-399-1494.

HW-101 W/400 Hz filter, HP-23B, HS-1661, mobile mike, HM-102. Complete station. All manuals. Factory aligned. Mint. $425. Phone 608-798-2732 after 5 P.M. CST. AD9X.

MAXI-TUNER. Mint. #185. Phone 608-798-2732 after 5 P.M. CST AD9X.

SELL: Kenwood TS-520 with MFJ preamp, $525. Kenwood TS-700A with outboard double preamp $460. Wilson WE-800 $375. Autek QF-1 active filter $40. Alltronics-Howard teletype converter/tuning scope $75. All like new. Joe, WB1GEW. 203-421-4549.

HRO-50, $300; HRO-50 coils, $25-50; SB-620 monitor scope, $150. Contact George James, 7407 Castle Trail, San Antonio, TX 78218. 512-655-3934.

FOR SALE: Collectors item, E. F. Johnson Viking Avenger. Their last amateur ssb product. A-1 shape. Both power supplies. Listed in 1969 WRL catalog. Make offer. KØJM/WAØJUM phone 605-845-7508.

SELL: Hallicrafters FPM 300 - realigned, $300 UPS collect. Write WB2FZE, P. O. Box 671, Miller Place, NY 11764 or 516-744-0634.

DRAKE TR-4C transceiver, AC-4 power supply, speaker 34 PNB noise blanker, RV-4C remote VFO, manuals, original boxes, all in excellent condition, I ship, $595. Bank Check only. K1PNL — P. O. Box 273, Forestville, CT 06010. 203-582-4167.

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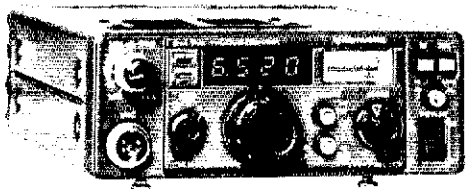

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VHF Engrs. blue line amps	Stock
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NCX-5 MK II complete with power supply, good condition, $325. K7KOT, 1642 Browns Pt. Blvd., Tacoma, WA 98422. 206-927-5456.

FOR SALE or trade: FT-101E mint cond. 1st certified check or money order for $600. You ship, or trade for HW-101 mint cond. (a must). Eric Carter, Sr., RT. 3, Box 223, Athens, TX 75751. 214-675-8648 or 675-8603.

SELL Kenwood R-300, $150, certified check. list for s.a.s.e. Martin, 252 Paoa Place, 7-1, Honolulu, HI 96815.

FOR SALE: R390A receiver excellent condition, prefer pick-up but will ship if necessary, price $490 firm. TR4, RV4, & AC4 in excellent condition, price $525. Phone 203-561-1465 (ARS K1QEN)

QUAD builders — blizzard/hurricane proof your antenna. Fiberglass vaulting poles. Incredible strength. S.a.s.e. for info. K5WSE, Box 20-AA, San Antonio, TX 78201. 512-699-9260.

SURPLUS RT-68 6M fm xcvr for sale. For details call 617-448-6079 evenings or write George Noyes, W1XE, Townsend Road, Groton, MA 01450.

KENWOOD TS-700A with 144/145 repeater sub-band and PM-1 preamp. mint $475. Two Chushcraft A147-20T with stacking boom and harnesses, mint, $100. Will ship. WD5KAD, 9902 S. Irvington, Tulsa, OK 74136. 918-299-9645.

QST — December 1915 — First issue — original autographed by C.D. Tuska — Reprint $5. ea. May 1919 reprint $1.50 ea. Back issues — 1923 to 1925, $4 copy — 1927 to 1936, $3. 1937 to date $1 ea. Quotes on package deals and few old 1916 to 1922 issues. W3ZD 215-675-4539.

FT-101EE with fan, cw filter, YD-844 desk mike $570. Will ship. K2CRT 516-265-8708.

KENWOOD receiver, R599A, immaculate, $295, firm. Louis DeMania 518-372-5108.

REGULATED power supply bargains. Computer quality, internal cooling, overload protected. All use 60 cycle ferro-resonnt transformers. Stability 0.03 percent ± 1 mV. 20 V.D.C @ 12 amps. $175. 30 V.D.C. @ 12 amps — $200. 40 V.D.C. @ 21 amps — $250. 8 V.D.C. @ 20 amps. — $95. ± 15 V.D.C. @ 20 amps — $325. John, W2YIG, 22 Vera Ave., Plainview, L.I. NY 11803. 516-WE1-3398.

DRAKE R4C, T4XC, AC4, 4NB, filters (500, 6000), 19 access. xtals, manuals $1100. WØLS, 303-449-2500, Myron Pogue, 3770 22nd St., Boulder, CO 80302.

FOR SALE — Tempo One AC One w/spkr $375. Collins 351D-2 mobile mount w/cables, (2)MP-1 dc supplies $325. Steve Perez, WB4ZJE, 941 Middleton Rd., Jacksonville, FL 32211. 904-724-7121.

HEATHKIT SB-401 transmitter, SB-303 receiver, speaker, cables, manuals, filter, $500. Mike, WB2YAZ, 914-229-7920.

FR-101D and FL-101, new condition $1050. Includes speaker, all crystals, filters, converters, processor, microphone, spare set of new tubes and dustcovers. Will ship. W7LJI 503-686-8879.

SBE Opti/scan, mint condition, 1 year old. $300 or best offer. It's not broke; I am! Call 408-724-9608 nights 0430-0630 UTC leave message for Kevin Cornwell. Will ship anywhere in the U.S.

WILSON Mark II handheld with battery pack and leather carrying case. New — $250. KØCKX 319-354-4478.

DRAKE TR-4 with HP-23B power supply, both excellent; $410. TR-4 only: $375. Want Telrex 10M, 15M, 20M monobanders and Drake RV-4C, L-4B. Arch Lynch, 1-405-262-3363.

DRAKE TR4CW complete with noise blanker, ac, dc power supplies and MC4 console. Top condition. $800 will ship. Barney, W8DPH, 5619 North Glen Rd., Cincinnati, OH 45211. 513-574-5436.

COLLINS: 75S3B (winged) $750; 32S3 (round), $850; 516 F-2 (round), with spkr, $125, mint. Lloyd Bartlett, KØCIX, 85 Wildwood Lane, St. Louis, MO 63122. 314-966-3173.

SPR-4 recently returned from Drake for installing TA-4 transceive adapter. RY-4 radio-teletype adapter, SCC-4 crystal callbrator, and complete alignment. Fully crystalled for 23-500 kHz ranges, includes 160-10 meters WWV, MARS, CB and others. Ac and dc power cords low frequency loop, extra crystal selector dial, two manuals, factory package. $500 firm. Will deliver within 300 mile radius. KBUYQ, 1097 Beechmeadow Lane, Cincinnati, OH 45238. 513-451-2159.

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WANTED: Heath SB-600 speaker. State condition, price WAØCUL, Box 335, Buffalo, SD 57720. 605-375-3544.

TWO packages. Heathkit SB-230 linear, spare 8873 tube $485. SB-104A transceiver, power supply/speaker SB-644 remote VFO, $535. All excellent with manuals UPS collect. Have Drake Twins, SB-220. WA2DX 201-635-9580.

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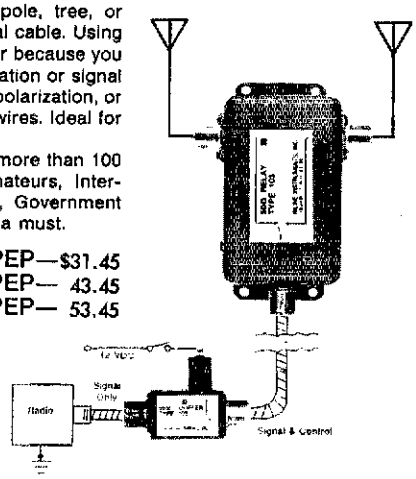

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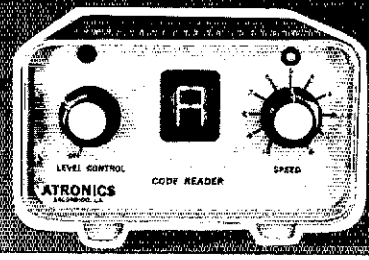

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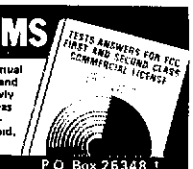

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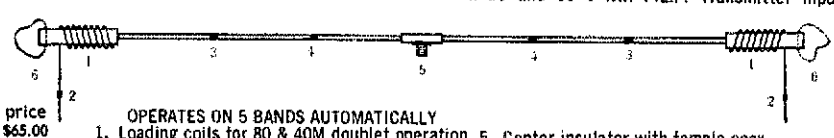

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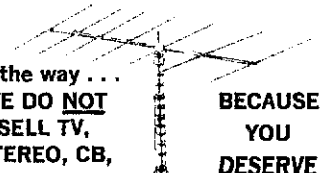

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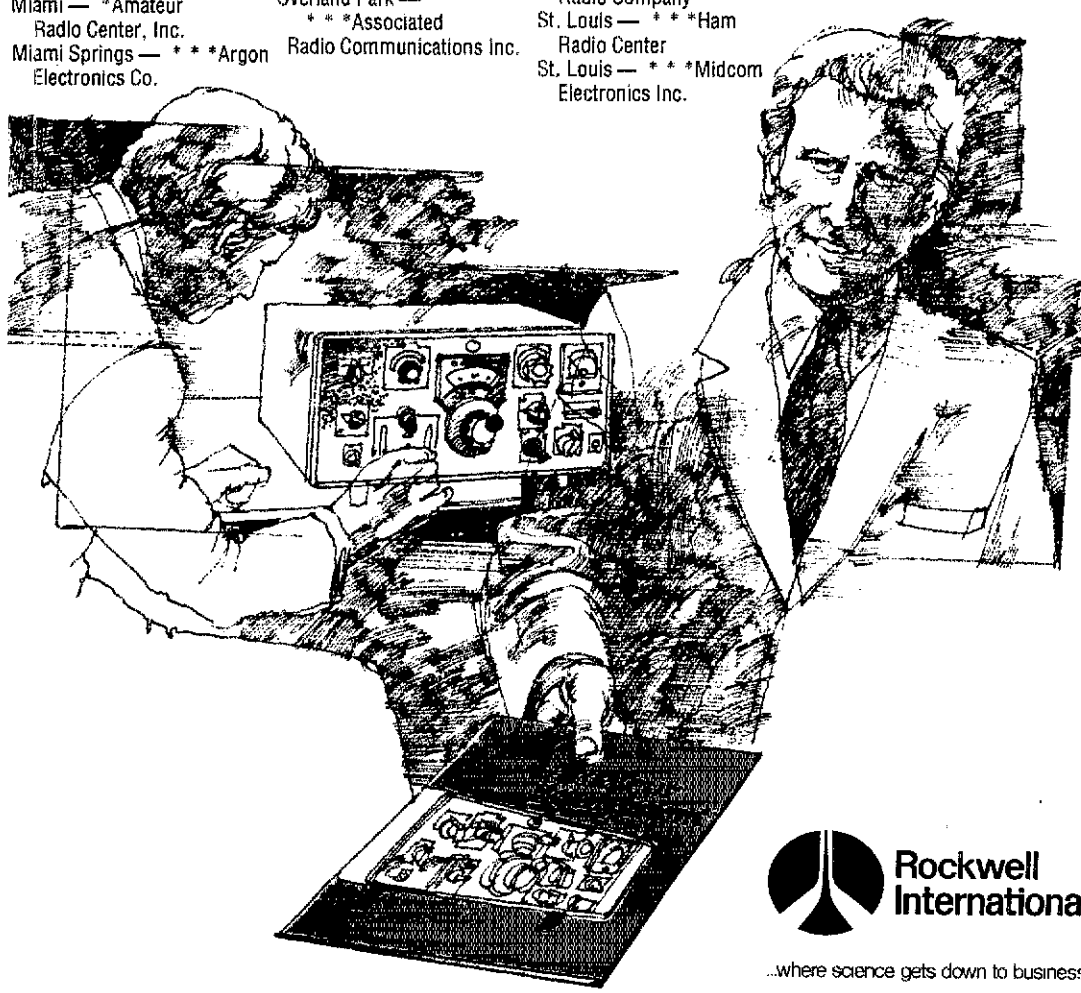

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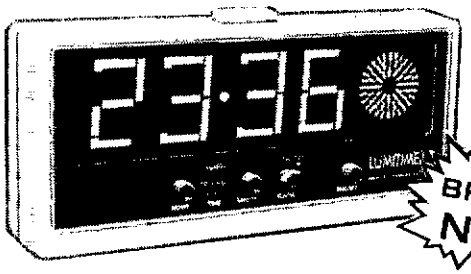

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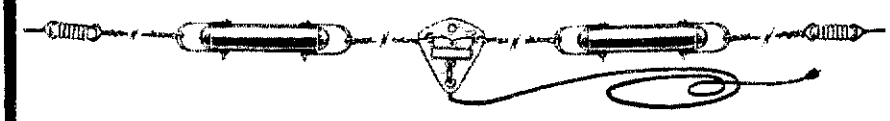

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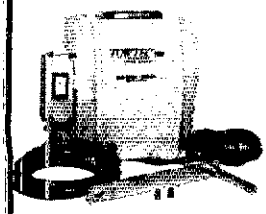

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HEATH SB-101, HP-23A speaker, mic, $350. Heath HW-2036, TT pad, HWA-2036-3, $250. KB9CI, 1135 Forest, Brookfield, WI 53005. 414-786-7027.

DRAKE linear L-4B mint, $795. WB5OGL, P. O. Box 561, Houston, TX 77411.

YAESU FTV-650B 6 meter transverter $175. Autronics code reader $125. W9AHN, 317-452-4575.

FOR SALE: Collins winged 75S3, 32S3, 516F2, 312B4, 62S1, $2300. 51S1 and 55G1 round, absolutely mint, $1800. Round KWM2A, PM2, $1200. CC2, $60. 351D2 new, $90. 136B2, $75. Round 516F2, $150. BTI LK 1000 table top amplifier, floor type power supply $575. Phasemaster VFO Matic $50. Cubex heavy duty 4 element tri-band Quad 30' boom, $300. Paul Neveu, W1CKA, 60 Northwestern Dr., Bristol, CT 06010. 203-582-4885.

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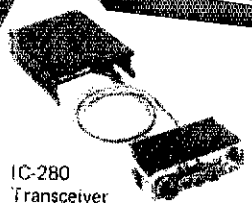

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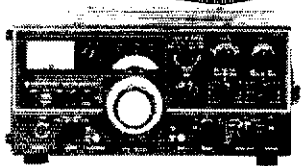

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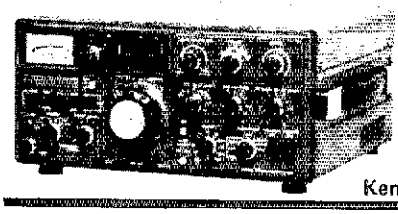

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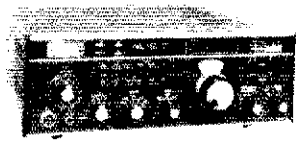

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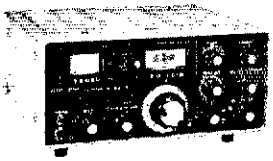

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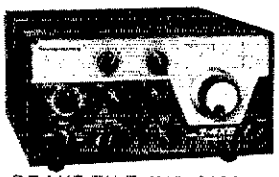

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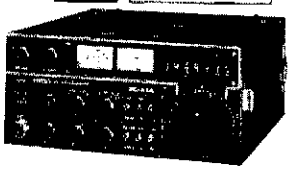

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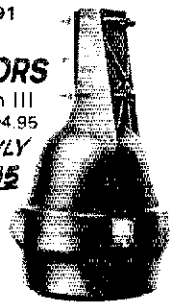

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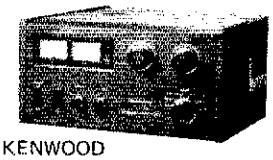

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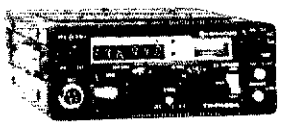

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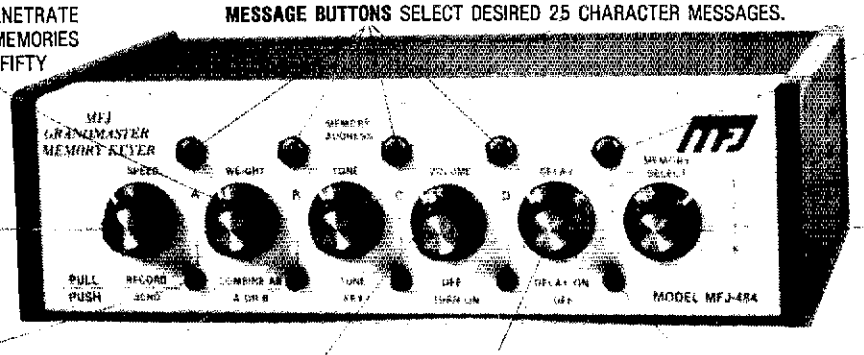
At $139.95 this MFJ-484 GRANDMASTER

memory keyer gives you more features per dollar than any other memory keyer available — and Here's Why . . .

WEIGHT CONTROL TO PENETRATE QRM. **PULL** TO COMBINE MEMORIES A AND B FOR 1, 2, OR 3 FIFTY CHARACTER MESSAGES.

MESSAGE BUTTONS SELECT DESIRED 25 CHARACTER MESSAGES.



RESETS MEMORY IN USE TO BEGINNING.

SPEED CONTROL, 8 TO 50 WPM. **PULL** TO RECORD.

MEMORY SELECT: POSITIONS 1, 2, 3 ARE EACH SPLIT INTO MEMORY SECTIONS A, B, C, D (UP TO TWELVE 25 CHARACTER MESSAGES). SWITCH COMBINES A AND B. **POSITION** K GIVES YOU 100, 75, 50, OR 25 CHARACTERS BY PRESSING BUTTONS A, B, C, OR D.

LEDs (4) SHOW WHICH MEMORY IS IN USE AND WHEN IT ENDS.

TONE CONTROL. PULL TO TUNE.

VOLUME CONTROL. POWER ON-OFF.

DELAY REPEAT CONTROL (0 TO 2 MINUTES). **PULL** FOR AUTO REPEAT.

LED INDICATES DELAY REPEAT MODE.

NOW YOU CAN CALL CQ, SEND YOUR QTH, NAME, ETC., ALL AUTOMATICALLY.

And only MFJ offers you the MFJ-484 Grandmaster memory keyer with this much flexability at this price.

Up to twelve 25 character messages plus a 100, 75, 50, or 25 character message (4096 bits total).

A switch combines 25 character messages for up to three 50 character messages.

To record, pull out the speed control, touch a message button and send. **To playback,** push in the speed control, select your message and touch the button. That's all there is to it!

You can repeat any message continuously and even leave a pause between repeats (up to 2 minutes). **Example:** Call CQ. Pause. Listen. If no answer, it repeats CQ again. To answer simply start sending. LED indicates Delay Repeat Mode.

Instantly insert or make changes in any playing message by simply sending. Continue by touching another button.

Memory resets to beginning with button, or by tapping paddle when playing. Touching message button restarts message.

LEDs show which 25 character memory is in use and when it ends.

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PLUS A MFJ DELUXE FULL FEATURE KEYER.

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Dot-dash memories, self-completing dots and dashes, jamproof spacing, instant start (except when recording).

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Weight control lets you adjust dot-dash-space ratio; makes your signal distinctive to penetrate QRM.

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- **Combine memory switch**
- **Repeat, tune functions**
- **Built-in memory saver**

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- **Tune function**
- **Built-in memory saver**

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1 dial set frequency (± 600 KHz)

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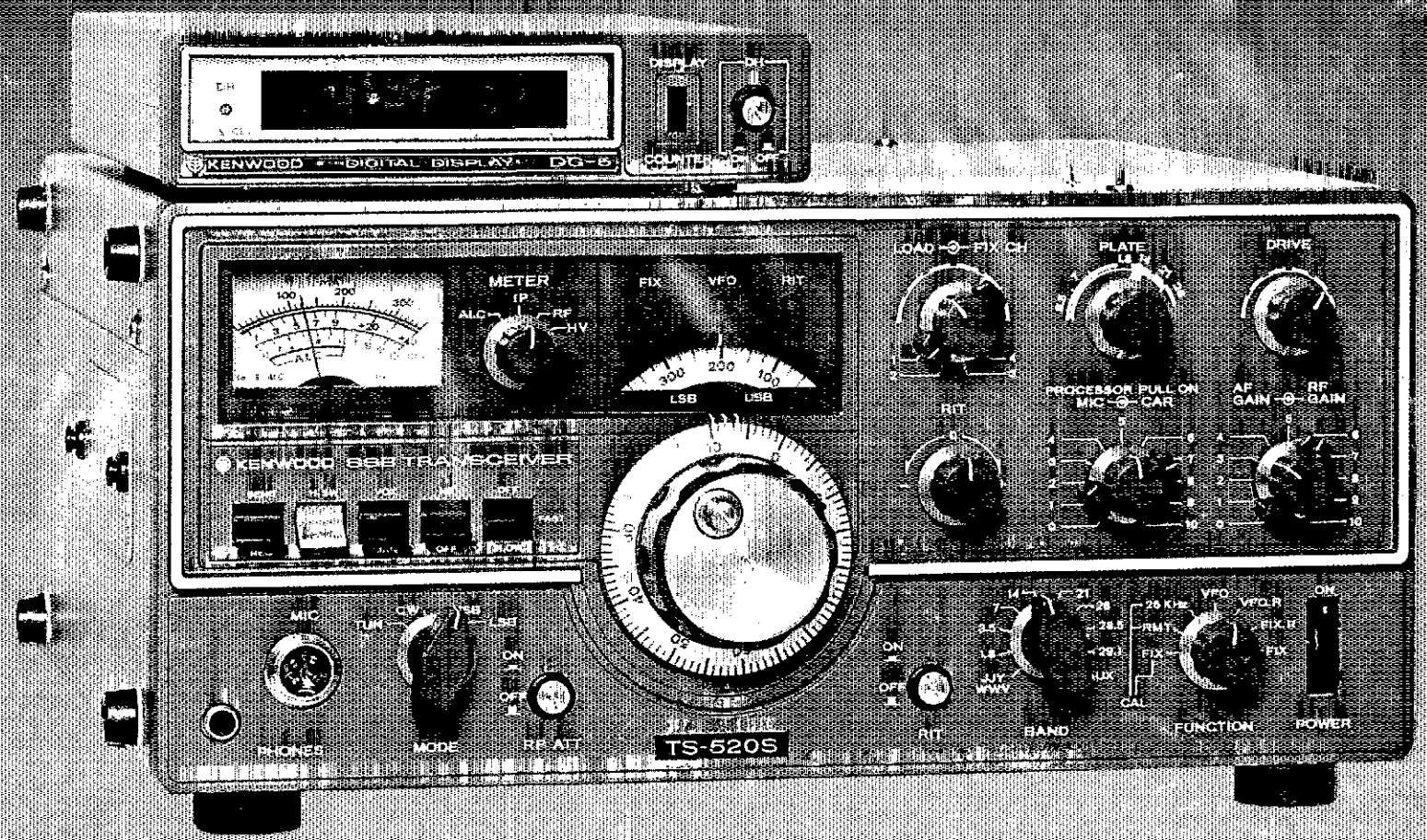

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