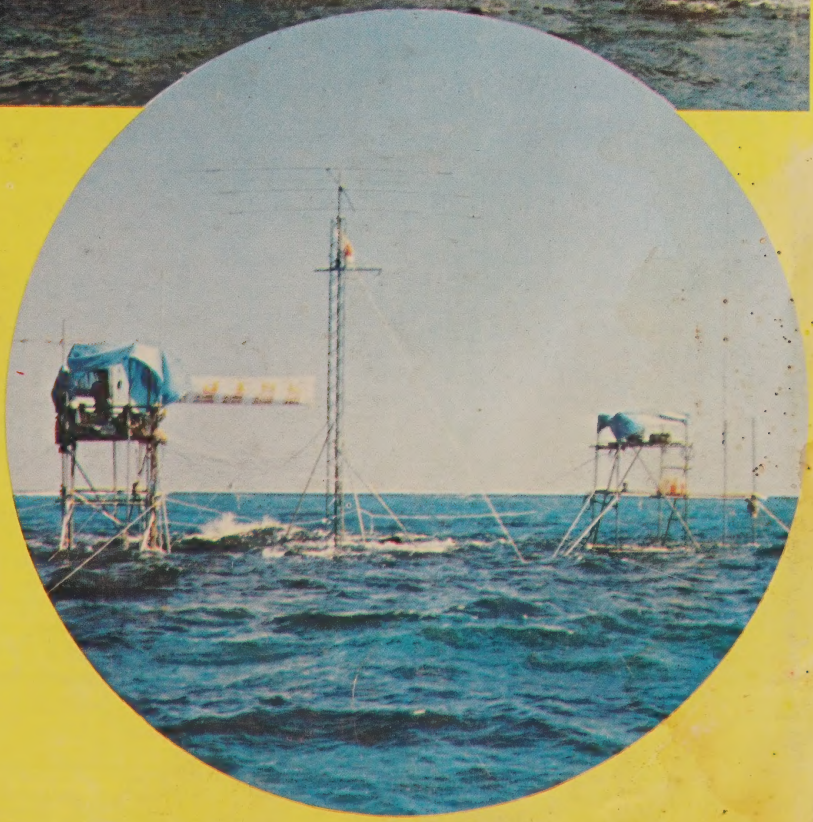
CQ

October/November 1976
$1.00

AMORR1*B***16 11 CO
R N MORRIS
W7JLU
RFD 1 BOX 273 U4
MULINO OR 97042
APR78
*****

These [illegible] tide views of th[illegible]L station, 7J1RL, on Okino Tori-Shima. The operators were JA1HQG, JA1BTH, JA1HQF, JA1IIB, JA1NRH, JF1-IST, JG1GPB, JG1GPP, JA2HNP, and JA9AG. Rigs included a TS-820S, FT-101E, FL-2100B, IC-501 TS-700GII and TR-3200. QSO's and countries worked on each band were 160 meters - 106 contacts - 1 country, 80 meters - 468 contacts, - 6 countries, 40 meters - 624 contacts - 14 countries, 20 meters - 5361 contacts - 70 countries, 15 meters - 820 contacts - 8 countries, 10 meters - 812 contacts - 2 countries and 6 meters - 740 contacts in 1 country.

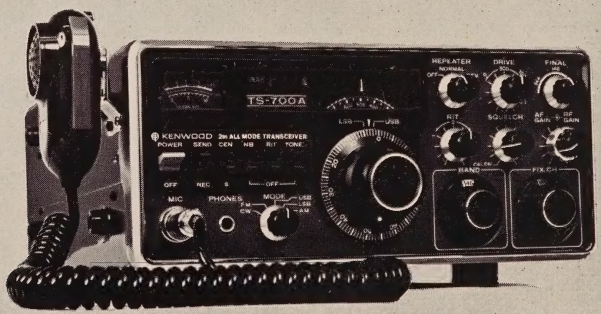


The Radio Amateur's Journal

KENWOOD GIVES YOU A CHOICE FOR 2-METER SSB



KENWOOD'S TV-502 TRANSVERTER PUTS YOUR TS-520 OR TS-820 ON THE 2-METER BAND...SSB AND CW. SIMPLY PLUG IT IN AND YOU'RE ON THE AIR



OR GO ALL THE WAY WITH THE BEST...THE TS-700A

Ever tried 2 meter SSB or CW? How about the OSCAR satellite? Tune the band with a VFO instead of fixed channel crystals and experience DX-ing on VHF. FMers improve your scores...beginners try it for the first time. You don't need a big antenna to do it either...anything from a coat hanger to - - - ? The OSCAR satellites (6 & 7) are waiting for you too! Or go exotic with meteor scatter or tropospheric ducting. The "Sky is the limit" on VHF SSB and CW.

TRIO-KENWOOD COMMUNICATIONS INC.
116 EAST ALONDRA/GARDENA, CA 90248

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...pacesetter in amateur radio

A Message From The Publisher

SUBJECT: The Future of CQ Magazine

It's certainly no secret that during the past two years, CQ has slipped badly in both circulation and advertising. What once was a readership of almost 100,000 active amateurs is now just under 40,000, while our monthly average on advertising pages has dropped almost in half to about 25 or 30 each month.

The reasons for these slips are many. Being a small publisher with a limited staff, we've been forced to throw the bulk of our efforts in those properties which have shown the largest growth potential and actual growth. It's quite obvious that both S9 and CB RADIO MARKETING have prospered; SOLID STATE TECHNOLOGY has remained at a steady level, and CQ has deteriorated from neglect.

But with time, all things change, and Cowan Publishing Corp. is no longer a small publishing venture. Our sales volume for this year will exceed the $4 million mark. We have just acquired another successful magazine titled MODERN RECORDING, together with a highly profitable annual buyer's guide for that industry. With this overall growth we are now sufficiently well organized to take a long hard look at CQ.

I have permitted CQ to coast along for many years as a substantial loss publication for several reasons. One is my own deep-rooted love for amateur radio. Another is the fact that profits from other magazines could permit the loss to be sustained. And lastly, I have always felt that CQ fills a niche in the amateur radio market that the "other" ham magazines have not properly covered. But the time has come for a very real moment of truth. What will we do with CQ next year? It would be so very easy to discontinue CQ from a business standpoint. It would be very expensive and time consuming to rebuild it. So the obvious conclusion you might draw is that we will let CQ fall by the wayside, turning our efforts to more profitable areas.

WRONG!!! My plans for right now are an immediate and mammoth growth program to rebuild CQ to the number one position in the ham radio marketplace. We have the money, the manpower, and know-how to do it. And, by God, I intend to do just that.

Here's how. We have already added to CQ's editorial staff, with more additions to come. We will be gathering additional working hams to meet CQ's editorial growth objectives. Beginning at once CQ's editorial content will be expanded to include a major section of material aimed at the new radio amateur. This material will be all new, original material presented in a manner that the newcomer to our hobby will find both enjoyable and informative.

But simple editorial expansion and improvement is only worthwhile if the readership is built simultaneously. Therefore, we will institute a major newsstand sales effort with 60,000 copies of CQ on the newsstands throughout the country. An additional 5 to 10 thousand copies will be sold each month through CB radio retail stores. We have already achieved this through the resources of our CB consumer and trade magazines. In addition, we will be selling several thousand copies of CQ each month overseas through an exclusive distribution in military audio clubs. We will attempt to recover previous subscribers by sending them sample copies of the "new" CQ for several months at no charge. and finally, we will promote CQ subscriber sales heavily through the benefits of S9, which most of you will recognize as the largest and best established CB consumer magazine in the country. Incidentally, S9 will also carry a major editorial section educating CBers towards becoming hams, so the conversion from S9 to CQ should be substantial.

From all these efforts, CQ's monthly net distribution beginning with the February, 1977 issue should be quite substantial, somewhere between 70,000 and 110,000. To prove this readership to your complete satisfaction, we are now preparing to apply for membership in the country's oldest and largest audit bureau, the Audit Bureau of Circulation. No other amateur publication has done so.

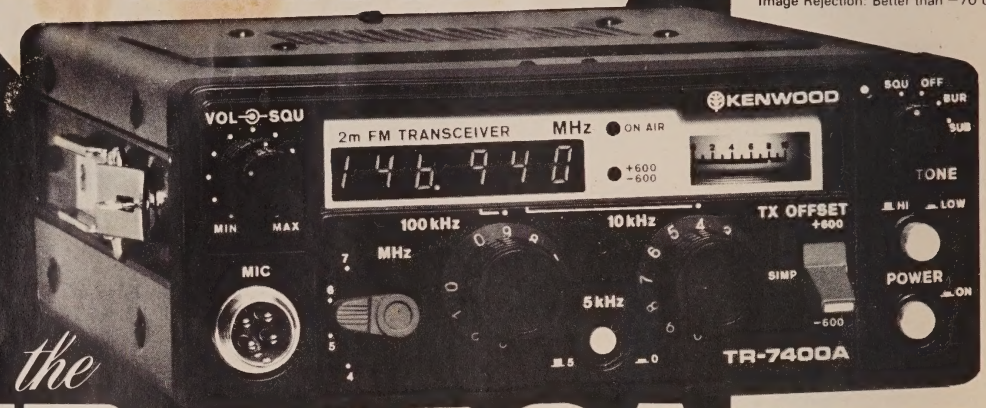
The October issue of CQ will be double dated Oct/Nov to get us back on a publication schedule similar to that of the other magazines in the field. We will then turn out three issues in nine weeks, with the February issue arriving on the newsstands by January 15th. Closing for each issue will be the 10th of the second preceding month. No rate increase is planned at this time.

The amateur radio market is worthy of one truly good independent magazine. CQ used to be just that. Within the next few months it will regain its leadership of the past. This is a promise.

Sincerely yours,

Richard A. Cowan
President/Publisher

ANNOUNCING AN EXCITING NEW 2-METER TRANSCEIVER FROM KENWOOD



the

TR-7400A

Featuring Kenwood's New and Unique CONTINUOUS TONE CODED SQUELCH SYSTEM

4 MHz BAND COVERAGE

25 WATT OUTPUT

FULLY SYNTHESIZED

UNIQUE SQUELCH SYSTEM
The TR-7400A may be used on your favorite repeater, no matter what type of squelch system is used. The continuous tone coded squelch (CTCS) may be used for both transmit and receive or for transmit only. Tone burst operation may also be used.

SYNTHESIZED, 800 CHANNELS
The phase-locked loop (PLL) frequency synthesizer in the TR-7400A divides the 4 MHz bandwidth into 400 channels at intervals of 10 KHz. The frequency may be offset 5 KHz higher with the push of a button, thus providing 800 discrete channels.

REPEATER OFFSET
A convenient front panel switch offsets the transmit frequency of the TR-7400A up OR down 600 KHz for standard repeater operation. This offset circuit uses digital technology to provide a highly stable offset frequency without spurious response. A dual color LED indicates the direction of offset from the displayed receive frequency.

OUTSTANDING RECEIVER PERFORMANCE
Large-sized helical resonators with high Q minimize undesirable interference from outside the 2-meter band. The large helical resonators, 2-pole 10.7 MHz monolithic crystal filter, and MOSFET front-end circuitry combine to give outstanding receiver performance.

TONE PAD CAPABILITY
A jack is provided to allow convenient connection of a tone pad to the TR-7400A.

FINAL PROTECTION CIRCUIT
The final transistor in the TR-7400A is protected from antenna impedance mismatch. Excessive reflected power reduces the amount of drive to the final transistor rather than turning off the final stage. This practical feature allows continued safe operation at a reduced power level whether the antenna system becomes opened or shorted.

Specifications TR-7400A

- Range: 144.00 MHz to 147.995 MHz
- Mode: FM
- 800 Channels: 5 KHz spaced
- Sensitivity: Better than 0.4 uV for 20 dB quieting
  Better than 1 uV for 30 dB S/N
- Squelch Sensitivity: Better than 0.25 uV
- Selectivity: 12 KHz at −6 dB down
  40 KHz at −70 dB down
- Image Rejection: Better than −70 dB
- Spurious Interference: Better than −60 dB
- Intermodulation: Better than 66 dB
- Receive System: Double conversion
- First IF: 10.7 MHz
- Second IF: 455 KHz
- Audio Output: More than 1.5 Watts (8 ohm load)
- RF Output Power: 25 Watts (High)
  5-15 Watts (Low-adjustable)
- Antenna Impedance: 50 ohms
- Frequency Deviation: ±5 KHz
- Spurious Response: Better than −60 dB
- Tone Pad Input Impedance: 600 ohms
- Tone Burst Duration: 0.5 to 1.0 sec.
- CTCS Range: 88.5 Hz to 156.7 Hz
- Microphone: Dynamic, with PTT switch, 500 ohms
- Voltage: 11.5 to 16.0V DC (13.8V DC nominal)
- Current Drain: Less than 1A in receive (no input signal)
- Current Drain: Less than 8A in transmit
- Polarity: Negative ground
- Temperature Range: −20 to +50 degrees C
- Dimensions: 182 mm (7-3/16") wide
  270 mm (10-5/8") deep
  74 mm (2-7/8") high
- Net Weight: Approximately 2.8 kg (6.2 lbs.)

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116 EAST ALONDRA/GARDENA, CA 90248

KENWOOD
...pacesetter in amateur radio

OCTOBER/NOVEMBER, 1976 VOL. 32, NO. 10

CQ The Radio Amateur's Journal

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HAM SHOP 92

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KENWOOD'S TS-520

...worth waiting for!



Why wait any longer for a rig that offers top performance, dependability and versatility . . . the TS-520 has proven itself in the shacks of thousands of discriminating amateurs, in field day sites, in DX and contest stations, and in countless mobile installations.

Superb craftsmanship is evident throughout . . . in its engineering concepts as well as its construction and styling . . . craftsmanship that is a Kenwood hallmark.

Maybe the Kenwood TS-520 is the one you have been waiting for.

TS-520 Specifications

MODES: USB, LSB, CW
POWER: 200 watts PEP input on SSB, 160 watts DC input on CW
ANTENNA IMPEDANCE: 50-75 Ohms, unbalanced
CARRIER SUPPRESSION: Better than −45 dB
UNWANTED SIDEBAND SUPPRESSION: Better than −40 dB
HARMONIC RADIATION: Better than −40 dB
AF RESPONSE: 400 to 2600 Hz (−6 dB)
AUDIO INPUT SENSITIVITY: 0.25μV for 10 dB (S+N)/N
SELECTIVITY: SSB 2.4 kHz (−6 dB), 4.4 kHz (−60 dB). CW 0.5 kHz (−6 dB), 1.5 kHz (−60 dB) (with accessory filter)
FREQUENCY STABILITY: 100 Hz per 30 minutes after warmup
IMAGE RATIO: Better than 50 dB
IF REJECTION: Better than 50 dB
TUBE & SEMICONDUCTOR COMPLEMENT: 3 tubes (2 x 6146B, 12BY7A), 1 IC, 18 FET, 44 transistors, 84 diodes
DIMENSIONS: 13.1" W x 5.9" H x 13.2" D
WEIGHT: 35.2 lbs.
SUGGESTED PRICE: $629.00

VFO-520

Provides high stability with precision gearing. Function switch provides any combination with the TS-520. Both are equipped with VFO indicators showing at a glance which VFO is being used. Connects with a single cable and obtains its power from the TS-520. Suggested price: $115.00.

SP-520

Although the TS-520 has a built-in speaker, the addition of the SP-520 provides improved tonal quality. A perfect match in both design and performance. Suggested price: $22.95.

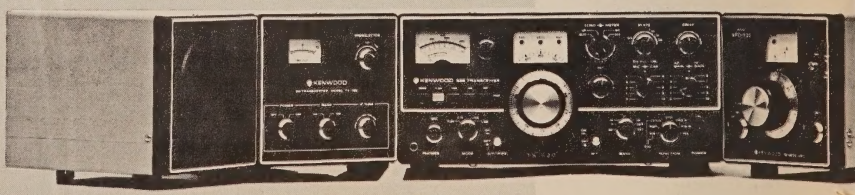
TV-502

TRANSMITTING/RECEIVING FREQUENCY: 144-145.7 MHz, 145.0-146.0 MHz (option).
INPUT/OUTPUT IF FREQUENCY: 28.0-29.7 MHz
TYPE OF EMISSION: SSB (A3J), CW (A1)
RATED OUTPUT: 8W (AC operation)
ANTENNA INPUT/OUTPUT IMPEDANCE: 50Ω
UNWANTED RADIATION: Less than −60 dB
RECEIVING SENSITIVITY: More than 1μV at S/N 10 dB
IMAGE RATIO: More than 60 dB
IF REJECTION: More than 60 dB
FREQUENCY STABILITY: Less than ±2.5 kHz during 1-60 min after power switch is ON and within 150 Hz (per 30 min) thereafter.
POWER CONSUMPTION: AC 220/120V, Transmission 50W max., Reception 12W max. DC 13.8V, Transmission 2A max., Reception 0.4A max.
POWER REQUIREMENT: AC 220/120V, DC 12-16V (standard voltage 13.8V)
SEMI-CONDUCTOR: FET 5, Transistor 15, Diode 10.
DIMENSIONS: 6⅝" W x 6" H x 13¼" D
WEIGHT: 11.5 lbs.
SUGGESTED PRICE: $249.00

CW-520
500 Hz CW Crystal Filter: $45.00.

Prices subject to change without notice

Kenwood offers accessories guaranteed to add to the pleasure of owning the TS-520. The TV-502 transverter puts you on 2-meters the easy way. (It's completely compatibile with the TS-520.) Simply plug it in and you're on the air. Two more units designed to match the TS-520 are the VFO-520 external VFO and the model SP-520 external speaker. All with Kenwood quality built in.



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Zero Bias

When is a country a country? I guess when it's above the water line and the fish aren't biting at your heels. Thanks to JH1VRQ our cover this month shows both high and low tides at Okino Tori-Shima. This bit of liquid real estate has prompted quite a bit of discussion among DXers in recent months. In any event, this is what you worked, heard or just wish you worked.

An Open Letter To The FCC

Gentlemen:

This letter is in reply to a document submitted to you entitled "Comments of the American Radio Relay League on petition of Ameco Publishing Corp."

The document purports to justify an action or, if you will, a "Most Favored Nation" aggreement between the FCC and the ARRL. It also attempts to refute and assuage arguments against this state of affairs by Ameco Publishing Corp.

We find it intolerable that under the guise of an Educational Program a private concern (ARRL) can be granted special consideration from a governmental agency literally at the expense of other private publishing houses.

We further find it reprehensible that the FCC can deny Ameco's position that no conflict of interest occur regarding profit resulting from training courses and/or material to those sponsoring these courses. If, by this denial we are to take it to mean that the ARRL will profit financially from this program (sanctioned by the FCC) even though they are in a non-profit position, then why not simply say it?

The following are extracts from the ARRL "Comments" and **CQ's** answer to these comments.

1. Page 4 states that for many years aspirants for amateur radio licenses have received instruction from individual amateurs and clubs **most of whom have been ARRL members.**

CQ- This may be true enough but it does not follow that even if this is true that there is necessarily a "halo effect" or inbred competency among these instructors or that these instructors are spokesmen or philosophical representatives of the ARRL itself. If I join the Automobile Club of America (AAA) for whatever benefits I can derive, it does not make me a qualified driving instructor nor spokesman or representative of that organization . . . . only a member.

2. Page 4 also contends that electronic dealers and distributors also have given training courses for potential amateurs for many years (Implying that these too were conflict of interest situations which were resolved).

CQ- By attending a series of lectures, programs of study or any other structured learning experience the pupil is not automatically granted sanction or certification for a license. The electronic dealer or distributor nor for that matter the individual or club instructor does not **certify** a license. If any conflict of interest occured it was over the practice of free enterprise relating to consumer goods and not material related to licensing.

3. Page 5 reports that the ARRL draws the analogy that since they publish the **Radio Amateur's Handbook** and that this book helped to win WWII followed by many glowing terms about this book on and on for a full paragraph followed by a cursory sentence that they also developed many training aids. This gives them "unique qualifications", ability and experience to produce this new program. Based on these historical histrionics they say with almost tears in their eyes that Ameco is saying that the FCC cannot come to the ARRL for their advice and assistance.

CQ- I don't recall anyone saying that the FCC couldn't go to anyone for advice or assistance or that the ARRL publications were poor and therefore of no value. What is left unanswered is why the FCC didn't consult with others prior to their May 14th position. Talks with the ARRL were conducted in February or earlier of this year. What about the same consideration given to Ameco, CQ, Howard Sams, John F. Ryder, Radio Publications, Ham Radio magazine, 73, Epsilon Records etc. Surely there are qualified people within these organizations who could have "advised and assisted" just as **nobly.**

4. Page 6 states the ARRL position that the "mail order" license would have been illegal if outside proctors were not used is in itself specious.

CQ- Since International Law only prescribes a knowledge of the Morse code in issuing amateur licenses this part of the examination can be met by the volunteer examiner. The written part of the examination although given by a volunteer **was and is** graded by Commission personnel. They did, and to date still

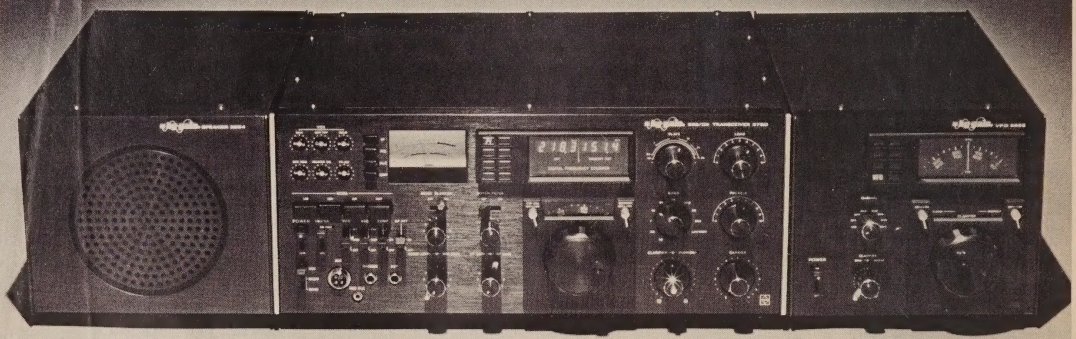
(continued on page 96)

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Hence, the incomparable Hy-Gain 3750 Amateur transceiver. The 3750 covers all amateur bands 1.8-30 MHz (160-10 meters). It utilizes advanced Phase-Lock-Loop circuitry with dual gate MOS FET's at all critical RF amplifier and mixer stages. There's a rotating dial for easy band-scanning and an electronic frequency counter with digital readout and a memory display that remembers frequencies at the flip of a switch. And that's just the beginning.

Matching speaker unit (3854) and complete external VFO (3855) also available.

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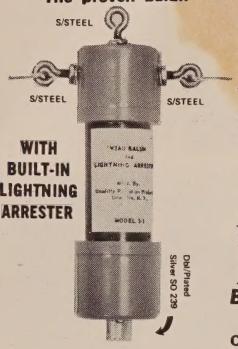
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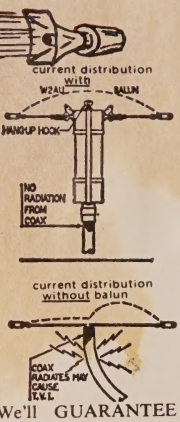


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Comes in 2 models. 1:1 matches 50 or 75 ohm unbalanced (coax line) to 50 or 75 ohm balanced load. 4:1 model matches 50 or 75 ohm unbalanced (coax line) to 200 or 300 ohm balanced load.

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Announcing

• **Pittsburgh, PA** — The twenty-fourth annual 10 meter Ground Wave Contest sponsored by the Breeze Shooters, Inc., will be held on November 27th. All modes permissible. Points are determined on a distance and input power basis with separate awards for leaders in four circular zones centered on the Point in downtown Pittsburgh. Mobiles and Novice/Technician also complete for separate awards. Logs must be postmarked by December 6. Logs and rules available from Richard Evanuik, WA3LUM, 311 Evergreen Ave., Pittsburgh, PA 15209.

• **Jakarta, Indonesia** — The SEANET Convention 1976 will be held in Jakarta Indonesia from Friday Nov 12th to Sunday November 14th. Inquiries can be sent to the National Club, ORARI P.O. Box 2761 Jakarta, Indonesia.

• **Hazel Park, MI** — The eleventh annual Hazel Park ARC Swap & Shop will be held on December 5th at the Hazel Park High School 23400 Hughes. Doors will open from 0900 to 1500 EST. Admission $1.00 other information send S.A.S.E. to Clem Duval, K8HWW, 33727 Brownlea, Sterling Heights, MI 48077.

• **Wellesley, MA** — The Wellesley Amateur Radio Society is celebrating a 25th Anniversary QSO Party. Special events station, NX1US, will be in operation for 42 hours beginning 0100Z November 20 and terminating 1900Z November 21. A commemorative certificate will be awarded to those stations exchanging RS(T) and ARRL section (or RS(T) and country for DX contacts) with NX1US on either phone or cw. Phone Sweepstakes contest exchanges are also valid and welcomed. In order to qualify, stations must submit a completed QSL card and long SASE to Wellesley Amateur Radio Society, 324 Washington St., Wellesley Hills, MA 02181 before December 31, 1976. NX1US will be operating on the following frequencies. Phone: 3.950, 7.250, 14.310, 21.400, 28.600, 146.52; CW 3.720, 7.120, 21.120, 28.120.

• **Massillon, OH** — The Massillon Amateur Radio Club presents it's 15th annual Flea Market and Auction, Friday evening, November 19th at the Amherst Park Civic Center, Massillon, OH. Doors open at 6:30 p.m. Continuous door prize drawings all evening, with Main Prize drawings at 10 p.m. (Need not be present to win) Mobile Check-in station W8NP will monitor 146.52. For brochure and map send a card to M.A.R.C., 1331 Concord NE, Massillon, OH 44646

• **Metairie, LA** — The Jefferson Amateur Radio Club will be holding the New Orleans Hamfest and Computerfest on October 30-31 at the Rummel High School. Forums on computer introduction, software and hardware; AMSAT, emergency communications, RTTY, QRP, novices and beginners, VHF-FM DX, contests, antennas. Swapshops, Prizes. For more information check in

(Continued on page 10)

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Experience the excitement of 2 meters. There's more than just FM repeaters, you know. SSB DX, OSCAR Satellite, CW...and do it all with a tunable VFO. Do it all with the Kenwood TS-700A.

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TS-700A Specifications

- TRANSMIT/RECEIVE FREQUENCY RANGE: 144-148 MHz
- MODE: SSB, FM, CW, AM
- RF OUTPUT: CW, FM: more than 10W output. AM: more than 3W output. SSB: more than 20W DC input.
- ANTENNA IMPEDANCE: 50Ω (unbalanced)
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- SIDE-BAND SUPPRESSION: Better than 40 dB
- SPURIOUS RADIATION: Less than −60 db
- MAX. FREQUENCY DEVIATION (FM): ±5 kHz
- REPEATER FREQUENCY SHIFT WIDTH: 600 kHz
- TONE BURST TIME: 0.5-1.0 sec.
- MODULATION: Balanced modulation for SSB. Variable reactance frequency shift for FM. Low power modulation for AM.
- MICROPHONE: Dynamic microphone, 500Ω
- AUDIO FREQUENCY RESPONSE: 400-2600 Hz, within −9 db
- RECEIVING SYSTEM: SSB, CW, AM: Single-superheterodyne. FM: Double-superheterodyne.
- INTERMEDIATE FREQUENCY: SSB, CW, AM: 10.7 MHz. FM: 1st IF: . . . 10.7 MHz. 2nd IF: . . . 455 kHz.
- RECEIVING SENSITIVITY: SSB, CW: S/N = 10 dB or better at 0.25μV. 20 dB noise quieting = Less than 0.4μV. AM: S/N = 10 dB or better at 1μV.
- IMAGE RATIO: Better than 60 dB
- IF REJECTION: Better than 60dB
- PASS-BANDWIDTH: SSB, CW, AM: More than 2.4 kHz at −6 dB. FM: More than 12 kHz at −6 dB.
- RECEIVER SELECTIVITY: SSB, CW, AM: Less than 4.8 kHz at −60 dB. FM: Less than 24 kHz at −60 dB
- SQUELCH SENSITIVITY: 0.25μV
- AUDIO OUTPUT: More than 2W at 8Ω load (10% distortion)
- RECEIVER LOAD IMPEDANCE: 8Ω
- FREQUENCY STABILITY: Within ±2 kHz during one hour after one minute of warm-up, and within 150 Hz during any 30 minute period thereafter.
- POWER CONSUMPTION: Transmit mode: 95W (AC 120/220V), 4A (DC 13.8V), max. Receive mode (no signal): 45W (AC 120/220V), 0.8A (DC 13.8V).
- POWER REQUIREMENTS: AC 120/220V, 50/60 Hz. DC 12-16V (13.8V as reference).
- DIMENSIONS: 278 (W) x 124 (H) x 320 (D) mm
- WEIGHT: 11 kg
- SUGGESTED PRICE: $700.00

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Packed with features like the PRIORITY function . . . Put your favorite crystals in channel 7, and the 7200A switches there with the push of a button . . . no matter what channel you are on. 146-148 MHz coverage, 22 channels, 6 supplied. Completely solid state. Voltage required: 13.8 VDC. Antenna impedance: 50 ohms. Frequency adjusting trimmers on every crystal. RF output power: 10 watts (or 1 watt at low power). Adjustable frequency deviation (factory set at ±5 kHz). Automatic VSWR protection. Receiver sensitivity less than .5 uV for 27 dB. Selectivity: 12 kHz/–6 dB and 24 kHz/–70 dB. Size: 7-1/16" W x 2-3/8" H x 9-7/16" D, 5-1/2 lbs.

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Announcing (from page 7)

on the Jefferson Amateur Radio Club's net at 9 a.m. Sundays on 3950 kHz.

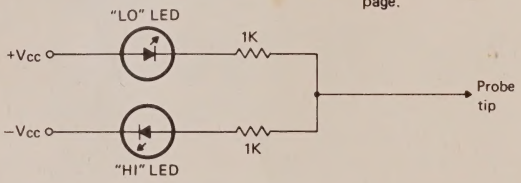
• **Pascagoula, MS** — The Explorer Scout Air Show will have a special event station KM5BSA on during the 19th Boy Scout Jamboree on the air. Plans are to start operations about 2300 GMT Friday, October 15th and run through to about 2300 GMT Sunday, October 17th. KM5BSA will also operate on most amateur frequencies including 2 meter simplex 146.52, six meters through 80 meters on or near the published JOA frequencies. Special bicentennial, red-white and blue certificates will be issued to each station worked plus every Boy Scout present in a station contacted. A business size SASE will be required for conformation and should be sent to KM5BSA, P.O. Box 711, Pascagoula, MS 39567.

• **Merritt Island, FL** — The Society of Wireless Pioneers will conduct a membership on-the-air QSO Party on the weekend of December 18 and 19, 1976. The Party will cover the full 48-hour GMT period and will be the first 'voice' Party scheduled by the Society. The purpose of the affair will be to give members an opportunity to meet one another and to pass along their season's greetings, etc. There will be no formal exhange requirements and no need to submit logs. All members with a phone capability are encouraged to participate. The call will be CQ SOWP. While there will be no certificates awarded everyone who takes part will be a winner by having an opportunity to renew old friendships, establish new ones and to continue a comaraderie developed over the years. Suggested frequencies for the affair are 25 KHZ 5 KHZ up from the low end of the general class phone portion of each amateur band.

CORRECTIONS

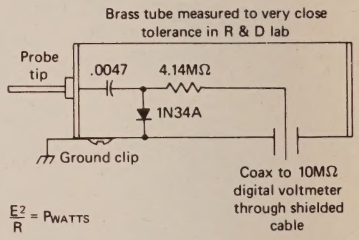
The following are corrected drawings for articles that have appeared in recent issues of CQ.

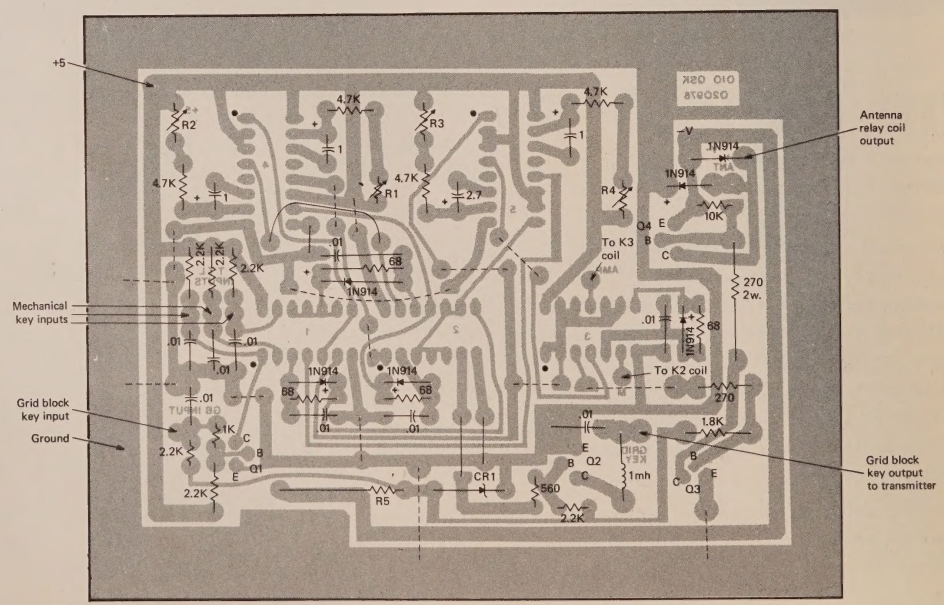
In Joseph Fincutters article "Logic Probes . . . And Now A Simple One!" (August '76, p. 28) figure 1 has the "HI" LED diode reversed. Below is the corrected diagram.



In July, Richard Klinman's article "A Vacuum Relay TTL QSK Antenna Switch (July, p. 39) had two drawing errors. Jumpers (4) were left out of fig. 6 and a jumper from the 1.8 k resistor near Q3 to the 2.2 K resistor below Q1 was left out. The corrected figure 6 is below and corrected figure 4 is on the next page.

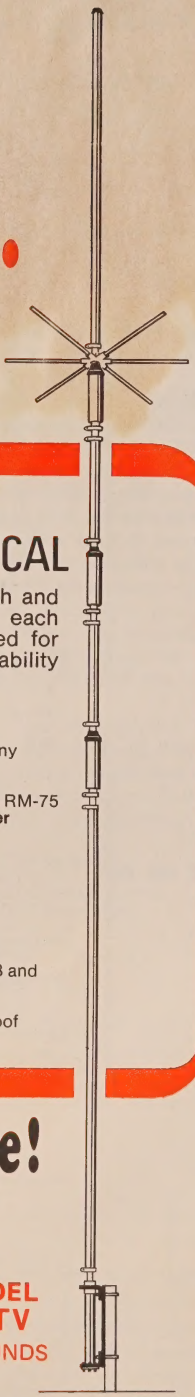
Also in August, the QRP column ran an r.f. probe submitted by WB2OZW (fig. 1, page 66) which omitted the 1N34A diode. Below is the corrected version of that drawing.





LEGEND:
+ Denotes cathodes of diode or "+" side of capacitor.
– – – – Denotes jumpers.
• Denotes pin 1 of IC.

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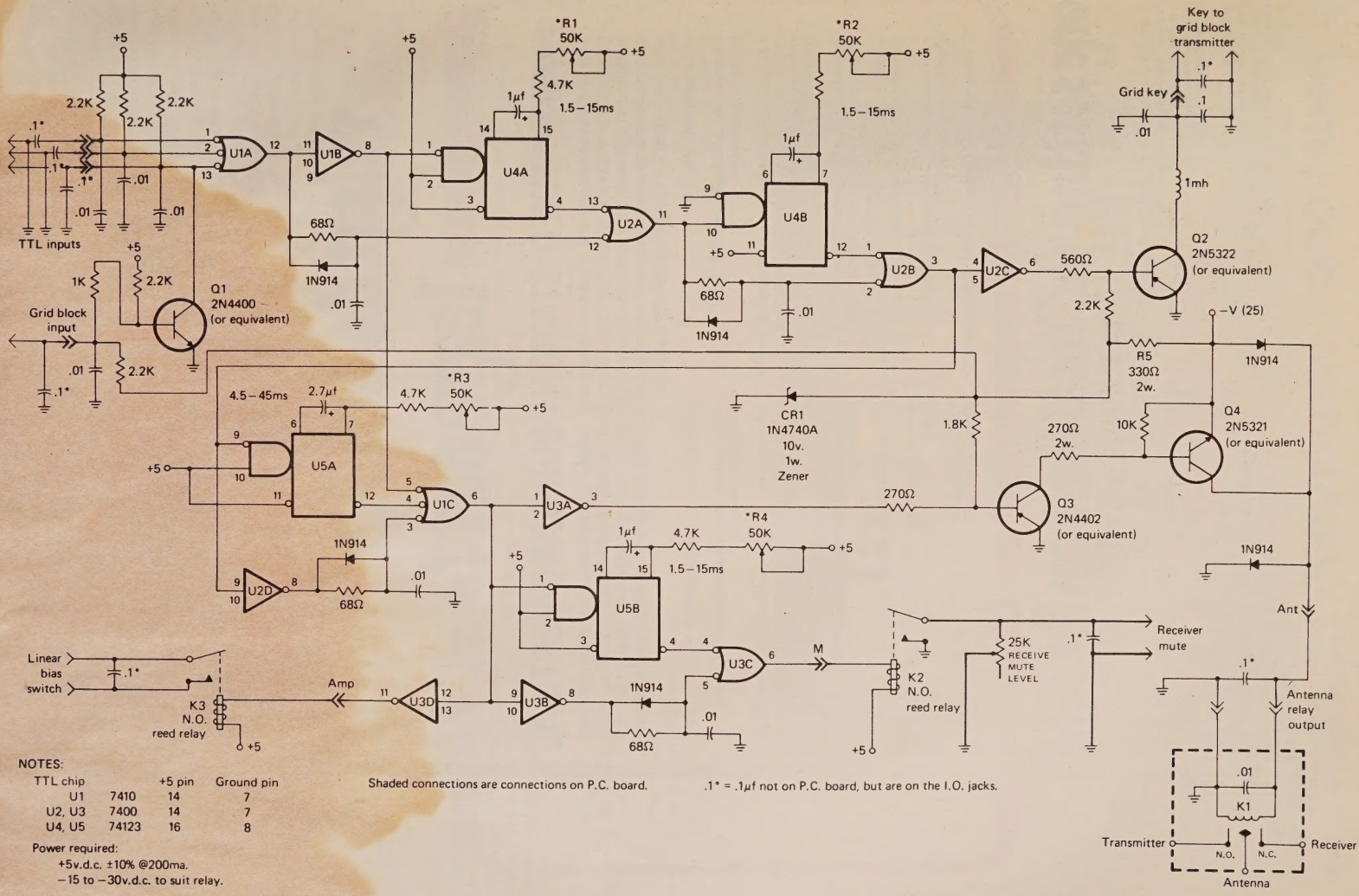
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NOTES:

TTL chip		+5 pin	Ground pin
U1	7410	14	7
U2, U3	7400	14	7
U4, U5	74123	16	8

Power required:
+5v.d.c. ±10% @200ma.
–15 to –30v.d.c. to suit relay.

Shaded connections are connections on P.C. board.

.1* = .1μf not on P.C. board, but are on the I.O. jacks.

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Now you can put our new FC-76 in your line-up and have the capability of reading out your frequency right down to ±100 Hz if you need it. (Or ±1 KHz at the flip of a switch.)

On a big, bright 5-digit LED display anywhere between 5 KHz and 40 MHz.

The FC-76 also features an "Antenna" connector with two-position sensitivity switch for low signal levels down to 50 millivolts.

So you can use the counter as a sensitive test frequency meter, too. One that's good enough to calibrate receivers, realign transmitters, compare dial readings or wherever you need accurate frequency measurement.

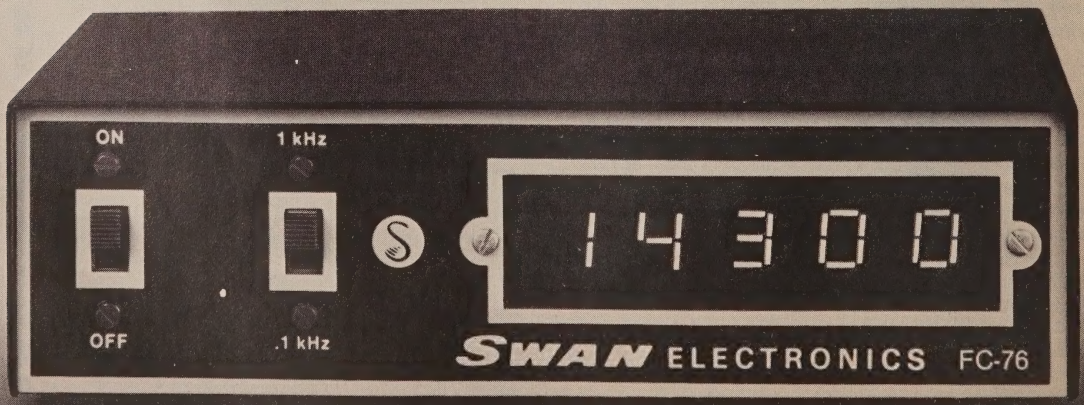
And with built-in 117 VAC power supply plus 13.8 VDC (positive or negative ground) binding posts the FC-76 is all ready for mobile or fixed station duty.

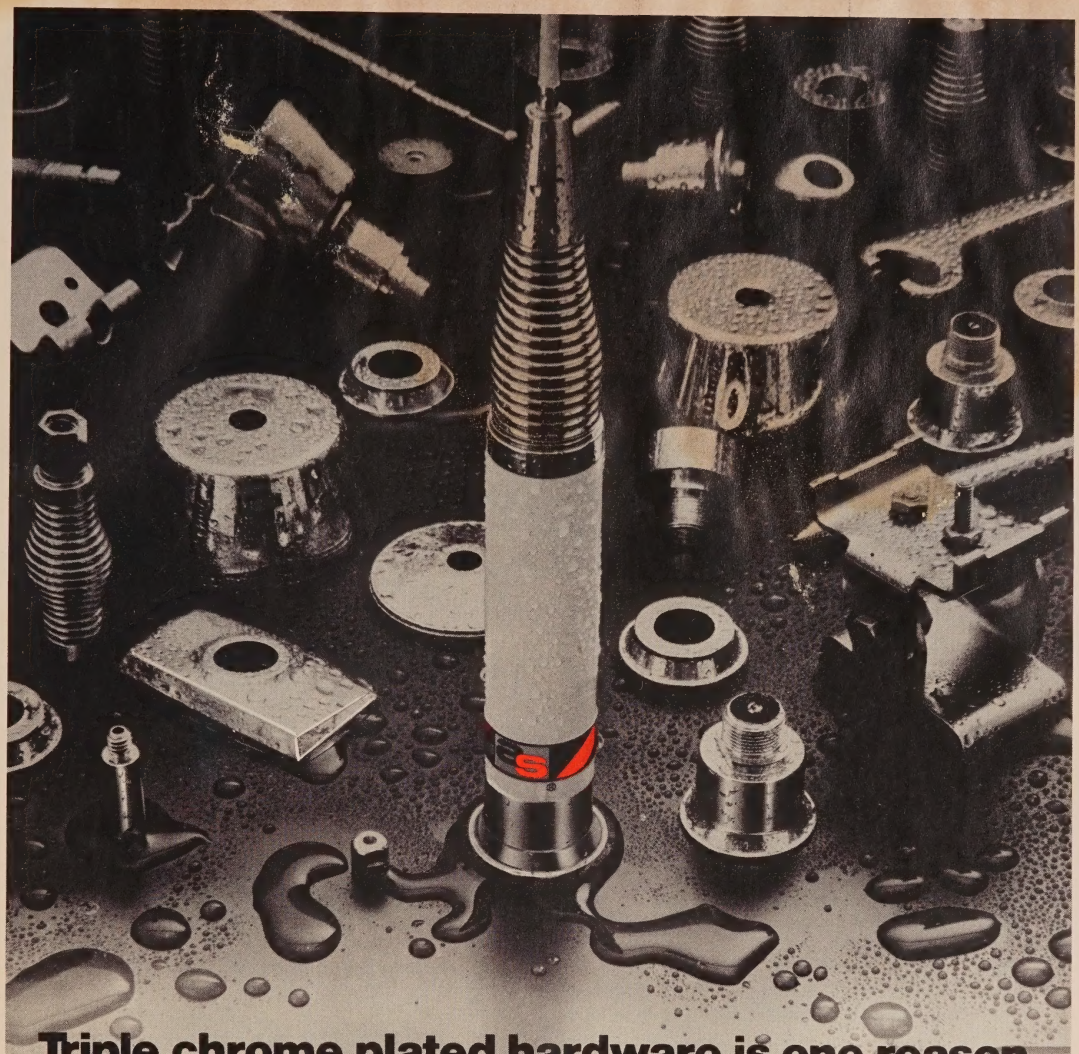
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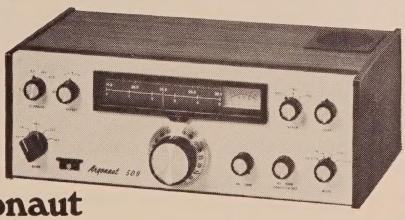
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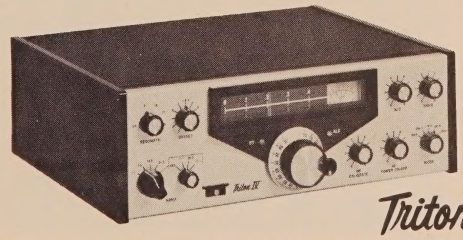
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Destination: Agalega

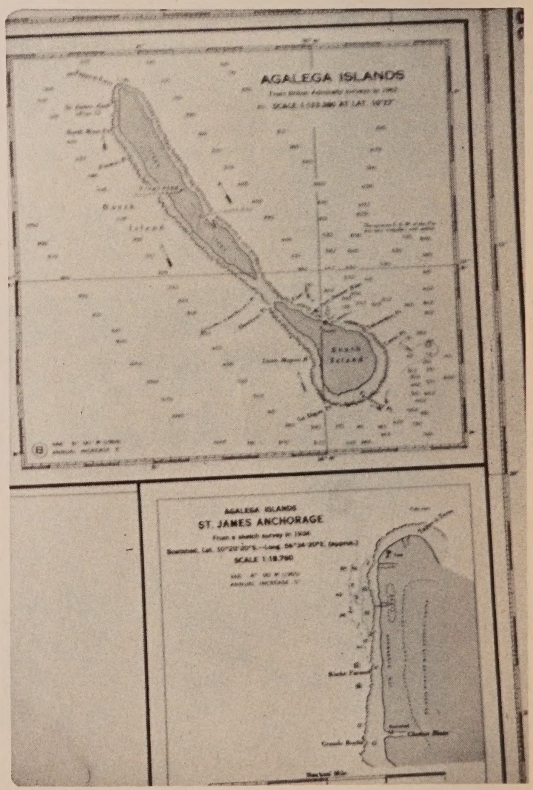
BY LEWIS STRAUSS*, WN3SHX, VQ9HS/3B6

In March, 1976, the Smithsonian Institution, in cooperation with the American Museum of Natural History, New York, mounted an ichthyological expedition to the southwest Indian Ocean. The leader of the expedition was Lewis Strauss, WN3SHX, who received his Novice license shortly before the expedition began. While amateur radio was to serve as the primary means of communication for the expedition, Lewis was also eager to mount a DXpedition to one of the rare islands which dot the Indian Ocean; hence his destination: Agalega.—K2EEK

There I was—brand new, "barefoot," using an Atlas 215X at sea for our very first experience in Amateur Radio! For four weeks our 123 ft. schooner *Dwyn Wen* was to ply the waters around St. Brandon and Agalega, two remote islands in the Indian Ocean which are located almost 1,000 miles east of the African Coast. On board, among others, were an M.D., three Ph.D. ichthyologists, a dive master and a photographer, all of whom had come together in search of those unique fish species which inhabit this portion of the Southwest Indian Ocean.

Since the *Dwyn Wen* was registered in the Seychelles, it was necessary to operate on board using a VQ9 call sign. Fortunately, the Seychelles government, at that time still part of the British Commonwealth, extended reciprocal privileges to American Novices, and so, armed with my WN3SHX license and a form obtained at the Post Office in Mahe, I met with the Licensing Officer of the Government a few weeks before we departed on the expedition. The meeting only lasted a few minutes, and when it was over, I emerged with the Licensing Officer's permission to use the call sign VQ9HS.

With license in hand, I next enlisted the help of



Charts of Agalega and St. James Anchorage on Agalega which are located almost 1000 miles east of the African coast.

*1250 Connecticut Ave. N.W., Washington, D.C. 20036

Carl Reder, VQ9R, for the purpose of installing my station on the *Dwyn Wen*. Carl was only too pleased to help, and quickly jumped into the pre-voyage confusion with a soldering iron, a homemade antenna match, and plenty of good advice. Because amateur radio would be the only means of communication we would have with the outside world during the voyage, and because we would be operating in an area virtually devoid of sea and air traffic, every effort was made to insure that the radio installation was both effective and dependable. That we were successful in our efforts was borne out by the fact that we missed few SEANET sessions, and that we were able to communicate almost daily with amateurs around the world.

As we sailed from Mahe to St. Brandon, I attempted to operate as much as possible so as to familiarize myself with propagation characteristics. For the most part, conditions were less than satisfactory, and while we contacted European, African and Far East stations, no stateside signals were heard. Circuits to Africa were especially dependable, and daily contact was maintained with Carl VQ9R, Jack, ZS5PG, and Sunil, 9J2AB. In fact, the first word to reach the United States of our safe arrival at St. Brandon was relayed by Jack, ZS5PG, to Bob, W4TK.

Not until 10 April was it possible to hear stateside signals on 20 meters and at that time we were able to contact Ted, W4UMF, and Mort, K3EH, on the long path. These gentlemen, by the way, had provided me with considerable information on amateur service, propagation, and equipment and with the guidance I needed to pass the Novice exam.

After assuring everyone of the expedition's success in the waters around St. Brandon (we had, by that time, collected almost 10,000 fish specimens!), I indicated that our next port of call was to be Agalega, and that we would arrive there around Easter. Mort had already proposed that I operate from either St. Brandon or Agalega, and when Ted promised to deliver High Normal conditions around Easter, we set our sights on operating portable-3B6 from Agalega on Easter Sunday.

We arrived at Agalega on the Friday before Easter. Early the following day, I took the ship-brewed dipole down from the rigging, coiled it up and packed it in a metal case together with the Atlas 215X. I also took along my 40 Ah auto battery and other necessities of life such as string, mosquito repellent and a space blanket. With everything safely stowed in a small rubber boat, I made my way in to the rickety dock on Agalega

Agalega really consists of two teardrop-shaped islands, each about ½ mile wide, and lying end to end. In some places the land rises to the commanding height of 15 ft. above the sea! The north island, on which I landed, is 6 miles long, while the south island is 4 miles in length. There are about 200



Carl Reder, VQ9R, who helped to install the station aboard the Dwyn Wen.

temporary laborers on each island who man the coconut plantations. In fact, the entire "economy" of the islands is geared solely to producing copra which is ferried out in large pirogues once a month to a tramp steamer. With the exception of a bit of brush and bushes immediately back of the beach, then, the islands are completely covered with rows of coconut palms, giving the area a park-like atmosphere. As is usual with such islands, these are overrun with roaches, rats and coconut crabs.

Passage down 6 miles of the north island's road by tractor-drawn cart took almost two hours, and the jouncing was so severe that I had to hold the transceiver on my lap in order to prevent it from being damaged. We finally reached a beach at the south end of the island where several little native houses stood, and it was there that I met the plantation manager, Giullemain. He greeted me in a friendly way and we chatted for a few moments. However, after exchanging pleasantries, he excused himself to prepare for the shipment of copra. I then chatted with a Catholic priest visiting from Mauritius. His English was surprisingly good, and he introduced himself as Father Noel. It was not until a few moments later, when we had switched to French and I had addressed him as Pere Noel,



Entering port at Agalega we approached the rickety dock.



The author shown with Khayrattee aboard the Dwyn Wen.

that I realized his name meant Santa Claus!

Later in the day, I was poled across the lagoon separating the north and south islands in a native pirogue. Also "traveling" with me were two drums of fuel, several 100 lb. sacks of rice and some King mackeral, for these are the customary accompaniments when traveling in this part of the world. On reaching the south island, I again boarded a tractor-drawn cart for the trip to this island's settlement. As a result of this trip, I was impressed with the importance of physically strengthened connectors and secure jacks and other fittings when operating under severe conditions.

The settlement on the south island is quite nice, given the area, there being about seven permanent structures in addition to the manager's house, the meteo station, a church and a "guest house." The manager's house and the meteo station each have a generator for their own use, but these only operate for the two-hour period between sunset and 9:00 p.m. Since no motors, refrigerators, etc., run at night, I knew the environment would be noise free.

It was soon obvious that no suitable local antenna was available. Nor would it be possible to work indoors since all rooms are used for sleeping



The islands are almost completely covered with rows of coconut palms giving the area a park-like atmosphere.

and I would not be very popular operating at 2:00 a.m., local time when the 20m band opened to the States. Thus, the decision was made to operate from a low hill near the beach.

I enlisted the help of Khayrattee, a 21 year old meteorological employee (the station has two) and together we raised one end of my ship-brewed 20m dipole into a casuarina tree. A Mauritian of Pakistani origin, Khayrattee was typical of the few semi-educated people one finds around the world in these positions. He knew how to read weather instruments and to transmit the data by radio to Mauritius; however, his knowledge stopped there, and he could provide me with no guidance when it came to radio equipment and communications. Regardless, he was eager to help, and in the absence of a great circle map centered on Agalega, he guided me around until the dipole was sloping to the southwest and about 20° off vertical. Much later I learned about "slopers." Perhaps I could have gained several db with a 45° angle oriented along the short path. With the aluminized "space" blanket spread on the ground, I proceeded to connect the antenna and battery to the Atlas. By now is was 6:00 p.m. local time, everything was ready and I went on the air for a signal check. A Swedish operator answered by call, but QRM from Asiatic stations prevented him from copying my transmissions. Little matter; we were on the air as VQ9HS/3B6!

As darkness came, a fisherman approached. He chatted with Khayrattee for a while in Creole, whereupon my new-found friend excused himself to change into ritual clothes so that he could say a prayer over a turtle which was about to be butchered. Later, at dinner, we met the turtle. Incidents such as this were a constant reminder that I was not exactly in my typical home environment.

It was late when I finally retired under the mosquito net covering my bed. After chasing a particularly aggressive land crab away from my shoes, I decided to sleep in my clothes, hoping in this way to be spared a wildlife problem at night. By sleeping in my clothes, I was also assured of being sufficiently uncomfortable so as to stay half-awake for several hours. After all, this "hotel" did not have wake-up service, and I did not want to miss the opening to the States.

It is difficult to describe the bizarre feeling I had on arousing myself about midnight. Not a sound was to be heard, and the crystal canopy of stars overhead was magnificent in its splendor. I was standing in the center of a circular region of the Earth covering more than 400,000 square miles and a population of less than 500 souls. Spraying a cloud of "OFF" on my vulnerable parts and pulling on a hat and long-sleeved jacket, I ventured out into the grass where the rig crouched under a protective blanket. I was not without company, however, for a swing of my flashlight revealed a horde

of interested parties consisting of chameleons, cockroaches, crabs and mosquitos. Just what I needed!

I switched on the Atlas and at about 2130 Z (1:30 a.m. local) found Ted and Mort talking on 14,245 kHz. Occasionally they gave me a call but my transmissions were not being copied. How I wished I had a big multi-element yagi high overhead and a "full gallon" on the ground. Just as I was about to apply some choice adjectives regarding barefoot operations, I heard Ted say, "VQ9HS/3B6, this is W4UMF. Lew, I think I heard you. Give me a long call. Give me a long call." My hand was shaking with excitement as I poured 75 watts back at him for a full minute. The path was open! Well, at least he gave me a 3-1 report.

In the minutes that followed, the band opened to the States better than it had during the entire expedition. We quickly passed messages concerning the health of the expedition members and made arrangements for shipping 10,000 fish specimens back from the Seychelles to Washington.

As propagation improved, Ted suggested working "a few of my friends who are on frequency!" What happened then can only be appreciated by those who have been involved in a DX pileup. Chaos reigned, and one insensitive (?) operator even started to call CQ-DX on the frequency without first checking to see if it was in use. I couldn't help but smile when, lying on the ground 10,000 miles away, I heard the Stateside operators take the skin off his eardrums as they commented on his operating procedures. It took Ted and Mort five minutes to restore order on the frequency.

It was clear, by now, that I would not be able to control the frequency in a "free-for-all" type of operation. My inexperience with matters DX, coupled with the fact that I was operating transceive using low power, a thumb-operated mike and with only a flashlight to illuminate the log, suggested that somebody was going to have to assist me in sorting out the stations. Hence, I asked Ted and Mort to help in whatever way was possible so as to maximize the number of stations worked. This they did with the assistance of Bill (W3ZSR), Steve (K4CFB) and Steve (K4WVT) numerous stations were lined up during the next 90 minutes to exchange reports with me. And therein lay another problem.

I was aware before the Expedition began of the seriousness with which amateurs take their signal reports. However, because of my poor antenna installation, most signals did not even move the S-meter needle. All things considered, I decided to avoid misunderstandings and hard feelings by only giving a readability report. For those interested, however, New England stations were the strongest with lower signal strengths observed for stations to the south and west of W1-land. That stations as far west as British Columbia, Canada, and as far south as North Carolina were contacted, however, attests to the quality of the band opening.



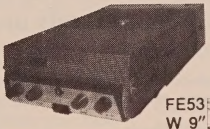
One of the large native pirogues. These are used to ferry the copra out to tramp steamers once a month.

At about 2300 Z or 3:00 a.m. local time, stiff, insect-bitten and bone-weary, I said farewell to the gang on the frequency and regretfully went QRT. In all, 81 stations had gotten through to Agalega, most working me for a "new" country.

Later in the morning, well after sunrise, I made the long, bumpy, return trip to my rubber boat. On returning to the *Dwyn Wen,* I found that most of my colleagues were underwater, doing their thing at 75 feet. Gratefully, I hit the sack, recalling wonderful memories of my DXpedition on Agalega, and thankful for the perfect excuse to miss the morning dive. ■

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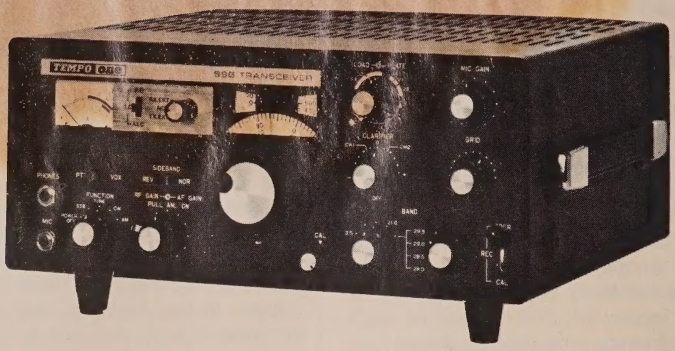
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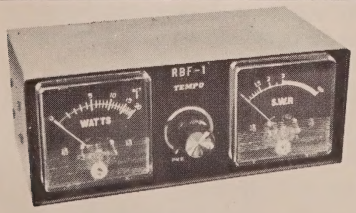
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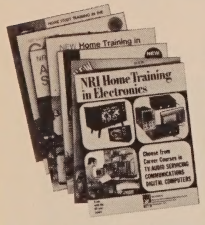
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A MODULAR LINEAR AMPLIFIER

BY RICHARD CALHOUN*, W6DZT

Building homebrew gear similar in size and style to the newer commercial units is a difficult task for the average amateur. The small linear amplifier described points out some of the more common construction problems encountered and several solutions to these problems are presented. The compact amplifier and its matching power supply were designed to be built with tools that most amateurs have. The two units were built in standard LMB cabinets that are sold in many radio parts stores. They are stylish and measure 8×10×5 inches. A modular approach was used to aid in maintaining interest between paychecks and each module is an excellent one or two night project. The 500 Watt amplifier was designed for 40 and 80 meter operation with a 100 watt transceiver used to drive it. The circuit is easily modified for operation on other bands. A matching table top power supply was built to eliminate the usual "under the table clutter" of line cords, relays, cables, etc.

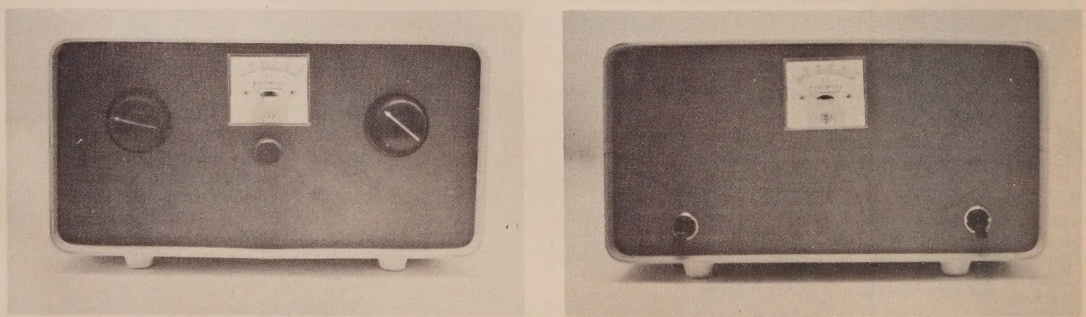
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Amplifier Module Construction

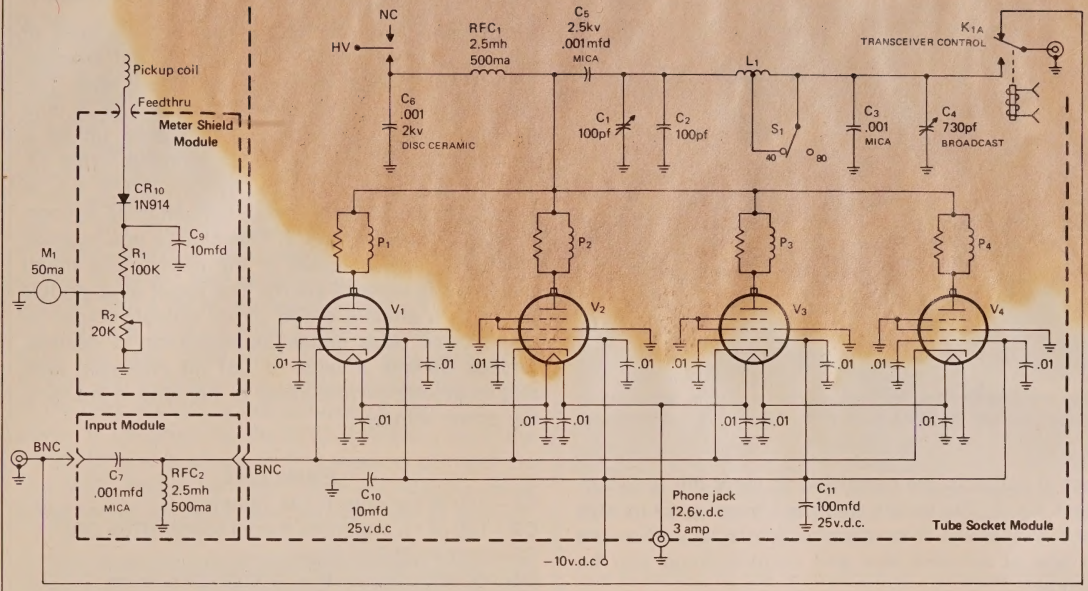
The several amplifier modules are shown in Figure 1. The common mini-box construction is used because of cost and availability. Two of the boxes were cut down in size to fit the available space. This was easily done with sheet metal shears and a flat file. Special attention was given to what types of tools are needed to construct the amplifier. Attention was given to this area not because I think that the amplifier will be duplicated but because limited tools are a real factor in most ham shacks. The bare essentials were available: ¼ inch drill, sheet metal shears, pliers, screwdriver, wiring pliers, hacksaw, rule, soldering gun and drill bits. One new tool was purchased—a sheet metal nibbling tool (about $7). It proved a very handy tool for the chassis work—the file and hacksaw are v-e-r-y slow.

Circuit Description

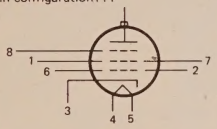
The amplifier modules are shown in the sche-



Front view of the modular linear and power supply. The panels are stark and uncluttered, operation is simple and straight forward.



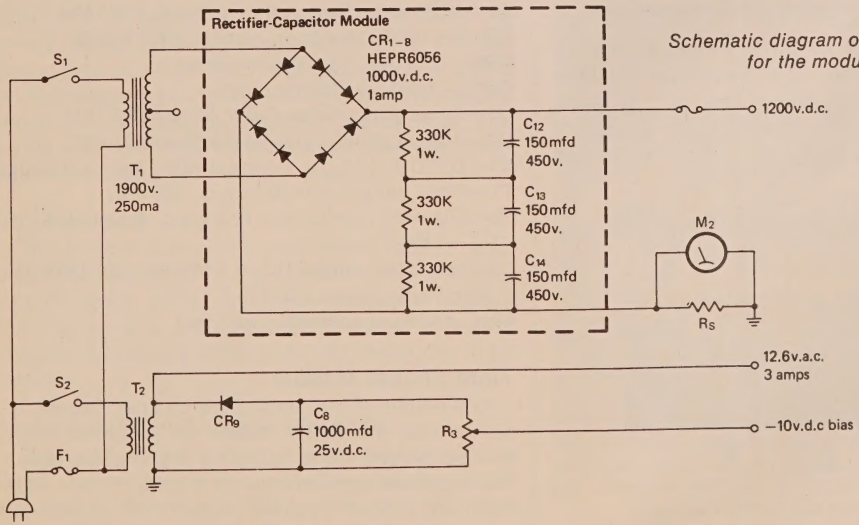
NOTE:
Pin configuration...



Schematic diagram of the modular linear. P 1-4 are 4 turns of No. 14 wire on 47 ohm, 1 watt resistors. All bypass capacitors are .01 mf at 200 v.d.c.

matics in the dotted boxes. The circuit is very simple and conventional. The four paralleled 6JB6A's are connected for grounded-grid operation. However, grid bias is required to make the tubes operate within their plate dissipation rating. The tube heaters are connected in series-parallel for twelve volt operation. Some of the heater voltage is rectified to provide −12 v.d.c. bias for the grids.

The output tank circuit is the usual pi-network. The tank inductor is tapped to permit operation on 40 meters. The bandswitch is a Radio Shack four pole two position wafer switch. The poles and one



Schematic diagram of the power supply for the modular linear.

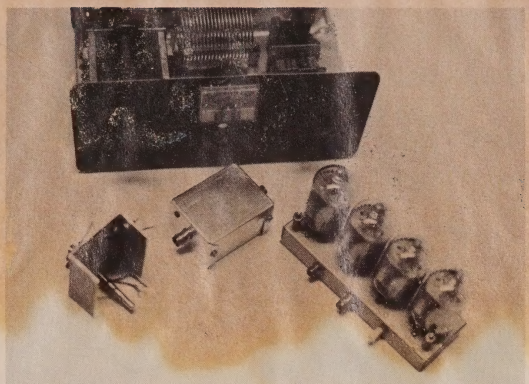


Fig. 1—The three amplifier modules are from left to right; meter shield module, input module, and tube socket module.

set of contacts are paralleled to carry the tank current, fig. 2. The switch was used because of its size and availablity. A ceramic switch is recommended if one of suitable size and current rating can be found.

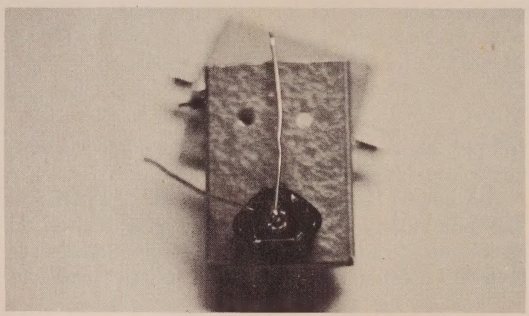


Fig. 2—Bandswitch showing parallel connections.

The amplifier input circuit is untuned. The r.f. choke must be capable of carrying the amplifier cathode current and its impedance must be sufficient to hold the input r.f. voltage above ground to permit the amplifier to be driven. The paralleled grid

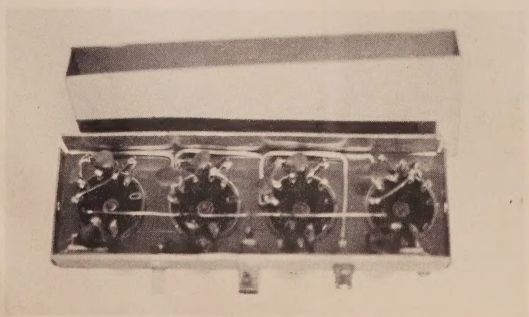


Fig. 3—Tube Socket Module wiring.

circuit offers a fairly low impedance to the exciter and it is easily loaded.

The panel meter in the amplifier is not a plate or cathode current meter. It is a r.f. signal strength meter that monitors the actual r.f. output level. The circuit is a peak responding voltmeter with a long time constant. The r.f. signal is picked up by a couple of turns of wire in the amplifier. This r.f. voltage is converted to d.c. by CR10. The d.c. is stored in C9 and the meter deflection is proportional to the charge in C9. This charge is a function of the RC time constant of the circuit. The meter deflection is variable via R2. The result of using this circuit is a quasi-average power output indication. If the usual peak deflection indication is desired, replace C9 with a value of .001 mf. However, note that a cathode current meter is included in the table top power supply.

Parts List

C1—150 pf variable, 0.1 in. spacing
C2—100 pf r.f. capacitor Model 850SL N750 CRL
C3—.001 mf, 2.5 kv mica
C4—Dual broadcast type 365 pf per section
C5—.001 mf, 2.5 kv mica
C6—.001 mf, 2 kv ceramic disk
C7—.001 mf, 600v mica
C8—1000 mf, 25 v.d.c. electrolytic
C9—10 mf, 15 v.d.c. electrolytic
C10, 11—10 mf, 25 v.d.c. electrolytic miniature
C12, 14—150 mf, 450 v.d.c. electrolytic, Sprague TVA-1719
RFC1, 2—2.5 mh 500 ma r.f. choke
R1—100k ¼ watt
R2—20,000 ohm trimpot
R3—10,000 ohm potentiometer linear taper
L1—B&W Model 40BEL (2 inch dia., 9 tpi, 19 turns, tap at 8t)
S1—4P2P wafer switch Radio Shack 275-1834
CR1-8—1000v 1A silicon rectifier HEP R0056
CR9—100v 100 ma silicon rectifier
CR10—1N914 switching diode
M1—50 ua panel meter Radio Shack 272-1015
M2—100 ua panel meter Radio Shack 22-037
K1—D.P.D.T. 12 v.d.c. contacts rated for 5 amperes
T1—Plate transformer 900 v.a.c., 300 ma.
T2—Filament transformer 12.6 v.a.c., 3 amperes
V1-4—6JB6A tubes
Cabinets LMB model CO-4; LMB No. 00; LMB No 650; Radio Shack 270-235
Misc. parts per schematic and text.

Tube Socket Module

The height of the small LMB cabinet chosen requires that the 6JB6A tubes be mounted below chassis height. While planning the chassis layout, this approach seemed to require extra chassis work. However, it soon became evident that several ad-

vantages resulted. The building of the tube socket module was not difficult because of its size; the unit is well shielded; and it is easily replaced if a new tube of different socket design seems a better way. Also, a goof in cutting holes in the chassis for the tube sockets isn't as threatening in the small minibox as it is on the main chassis. The main chassis deck is part of the cabinet, that is, the front and rear panels are spot welded to the chassis.

The module is mounted below a rectangular cutout in the chassis deck. When the module is mounted, there is an opening at the front of the cutout to permit free air movement throughout the cabinet. Fig. 3 shows the wired module. Two soldering lugs are used on each socket mounting bolt to allow by-pass capacitors to be grounded. The straight bare copper wire running across the center of the tube sockets is the cathode r.f. feed bus. The power is obtained via the BNC connector from the Input Module. A phono jack is used to connect the 12.6 v.a.c. heater voltage. There are 12JB6's made if the series-parallel heater arrangement is undesirable. The miniature jack is used to connect the minus twelve volt bias voltage to the grids. Another phono jack could be used. Care was used in wiring to minimize stray coupling by using short leads and wiring at right angles close to the chassis. The wiring was checked for errors with an ohmmeter before mounting on the main chassis.

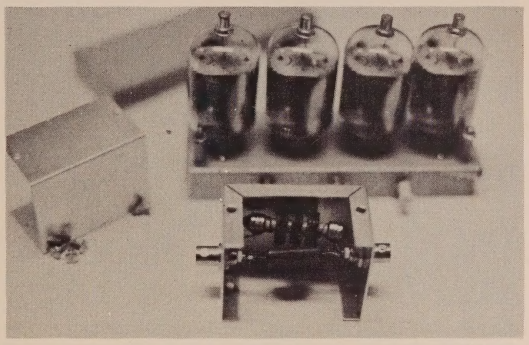


Fig. 4—Input Module in the foreground. Note the 500 ma r.f. choke required to carry the cathode current.

Input Module

This is a box with an r.f. choke and a .001 mf mica capacitor mounted in it, fig. 4. BNC connectors were surplus items; phono jacks could be used instead. The box used is a bit large to fit easily under the chassis. A box with a half inch less height would be better.

Main Amplifier Chassis—topside

The output tank circuit is conventional and is layed out as shown in fig. 5. The bandswitch is mounted on the meter shield module. This half minibox is bolted to the main chassis from the bottom. The tank coil is a modified B&W model 40BEL plug-in coil. The mounting bar and link coil were removed. The ceramic pillars that were part of the mounting assembly were used to mount the coil. The removed link coil wire was straightened and used to connect the output tank circuit components. A quarter inch hole was drilled just below the C4 solder tab and the r.f. output is connected to the antenna relay K1. The u.h.f. connector beside C4 is used as a r.f. feedthru bushing. A jumper wire from this connector to the rear panel antenna connector completes the circuit.

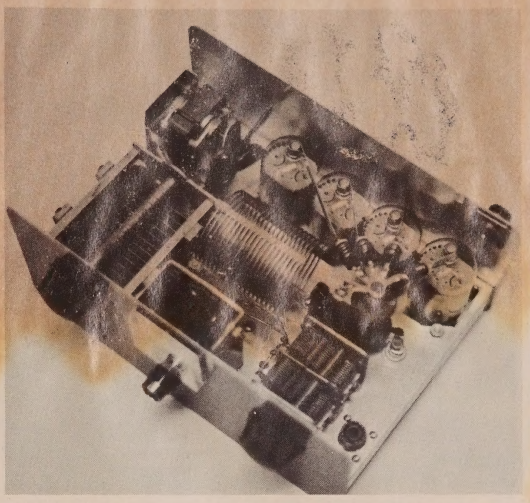


Fig. 5—Amplifier layout. The output jumper between the u.h.f. connector by C4 to the rear panel connector is not shown. C2 and C3 are hidden from view by the r.f. choke.

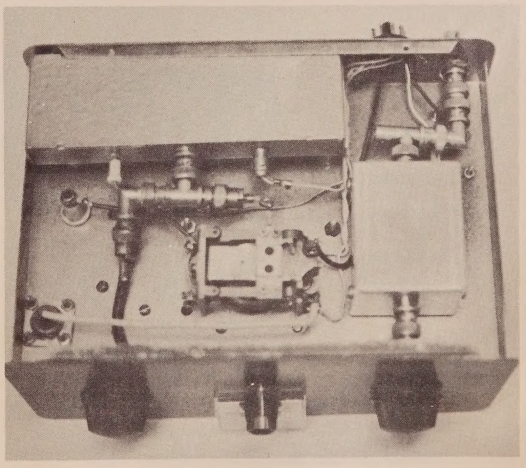


Fig. 6—Bottom layout of amplifier shows input module and tube socket module with antenna relay. Power supply connector and input r.f. connector are in the upper right hand corner.



Fig. 7 — Transformer mounting requires a holddown clamp on topside fashioned from a piece of mini-box.

The homemade plate cap connectors were made from a piece of strip brass available at most hobby shops. Each strip was cut to length after bending one end around a drill bit a size smaller than the plate caps. This is easily done by hand. The parasitic suppressor leads were inserted in a small hole drilled in the brass strips and soldered. Conventional solder lugs were used on the other ends of the suppressors. They are bolted to the top of RFC1. The bolt in the top of the r.f. choke form is removed to allow tube removal.

The tube ventilation fan is a miniature Philmore fan. To fit in the available space, about ¼ inch was cut off of each blade. The physical size of C1 will determine if this is required. Cooling is necessary because of the close mounting of the tubes.

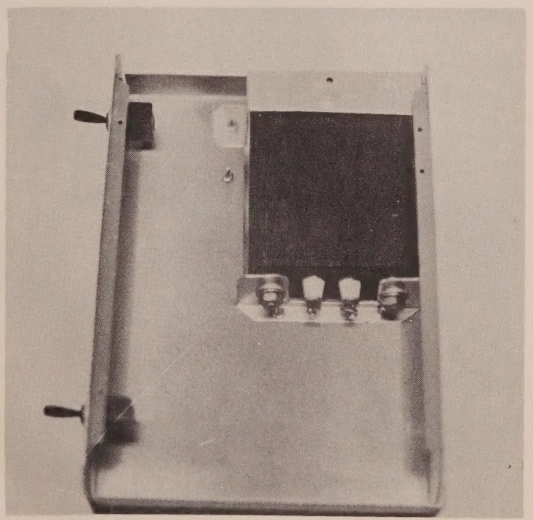


Fig. 8—Transformer mounting shows a cradle bracket at the top of the transformer and a right angle bracket for the mounting studs. Both brackets are made from mini-boxes.

Main Amplifier Chassis—Underside

Fig. 6 shows the layout of the antenna changeover relay, r.f. Input Module, and chassis wiring. The rear panel connector is a 9 pin octal plug and it is used to connect the plate and heater voltages, the exciter control voltage, the 115 v.a.c. fan voltage, and the bias voltage. The BNC connector is the r.f. input connector.

The antenna changeover relay can be a d.p.d.t. relay that will operate from your exciter control voltage. The contacts should handle five amperes. I used a surplus relay that operates on 12 v.d.c. which is the control voltage supplied by my exciter. One set of relay contacts are used to connect the antenna to either the transceiver's receiver or the amplifier's output. The other set of contacts applies the plate voltage to the tube plates.

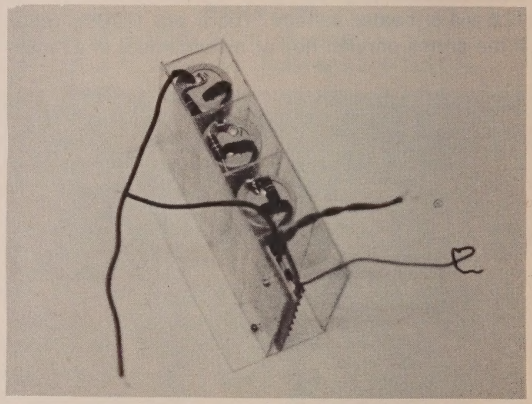


Fig. 9 — Rectifier-Capacitor Module construction. The mounting foot at the bottom secures the unit to the chassis edge.

Metering Circuits

The amplifier field strength meter is adjusted to indicate the approximate average input power. This is done by moving the small pickup coil to a position while operating in the c.w. mode. I adjusted mine to read 20 for an input power of 200 watts as indicated by the cathode current meter.

The cathode current meter is a 100 ua meter stocked by Radio Shack. A shunt was wound from approximately ten feet of No. 20 enameled copper wire. A smaller diameter wire is recommended. A shorter piece would be required as indicated by the wire tables. I wound the wire on a small piece of plastic. The meter indicated 500 milliamperes full scale.

Power Supply

The power supply was built in a matching LMB

cabinet and the size is small for most transformers. To make the transformer fit within the cabinet, special mounting brackets were required. The mounting of the transformer before chassis wiring is shown in figures 7 and 8. As shown, the low profile of the cabinet required that the transformer be laid on its side. The plate transformer shown is a surplus unit, but a similar mounting could be made for a television transformer. The brackets shown were cut from mini-boxes.

Rectifier-Capacitor Module

This module is shown in figures 9 & 10 and the clear plastic container was built from sheet plastic available at building materials stores. It is easily cut with a knife and the special glue-solvent makes a strong bond with good strength. This assembly method was used because it offers a safe way to mount the series connected capacitors while keeping within the low profile of the cabinet. Space was

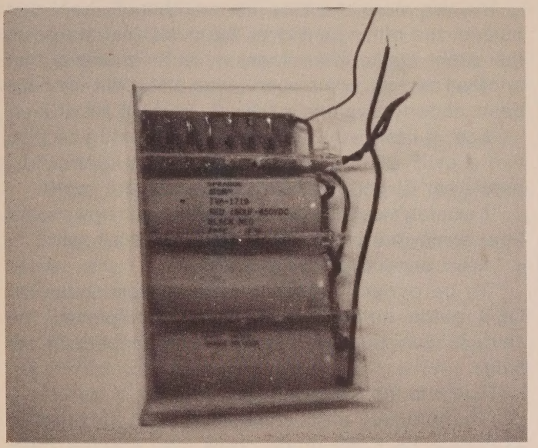


Fig. 10—Rectifier-Capacitor Module includes the silicon rectifier bridge terminal board. Note holes were drilled between partitions for the wiring.

also available in the module for the bridge rectifier terminal board. The bleeder resistors were mounted across the capacitors. The meter shunt was not mounted in the module but instead on a terminal strip just below the panel meter, near the filament transformer. The RC time constant of the capacitors and the bleeder resistors is very long—about four minutes for a safe level. Use a *well* insulated tool to short out output voltage before touching the parts within the power supply. The output voltage is over 1200 v.d.c. and the 50 mf output capacitance is sufficient for s.s.b. talk power. In the steady state c.w. mode, the voltage drops to slightly over 1000 v.d.c. at 400 ma.

Performance Testing

Continuity and insulation tests were made before applying line voltage to the power supply. Once

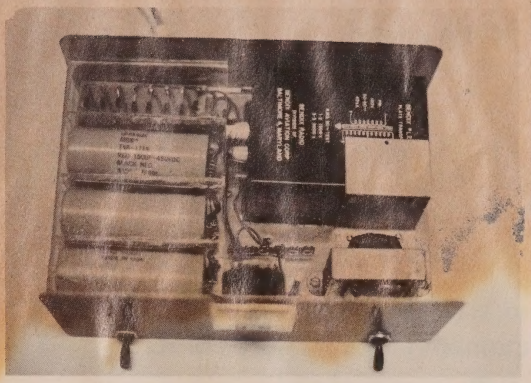


Fig. 11—Power Supply layout showing the Rectifier-Capacitor Module, terminal strip, and filament transformer.

convinced no smoke should occur, the filament-bias line switch was thrown and the fan rotated and the tubes lit up. So far, so good. At this point I measured the bias voltage to be −20 v.d.c. at the top end of the bias pot. I set the bias pot wiper to the top end for the time being. Next, I discovered that I needed a cable to connect the transceiver to the amplifier and had to make one up. After this chore, I touched the filament transformer and found it to be very hot. I replaced the economy three ampere transformer with an American made 3 ampere transformer and it operates only slightly warm. The next step was to turn on the high voltage. This supply operates essentially open circuit until the mike switch is pressed to activate the antenna relay. No difficulties were encountered and a healthy 1200 v.d.c. was measured. A dummy load was connected to the amplifier output jack and initially only 250 ma. could be drawn by the amplifier. Three turns were

(continued on page 89)

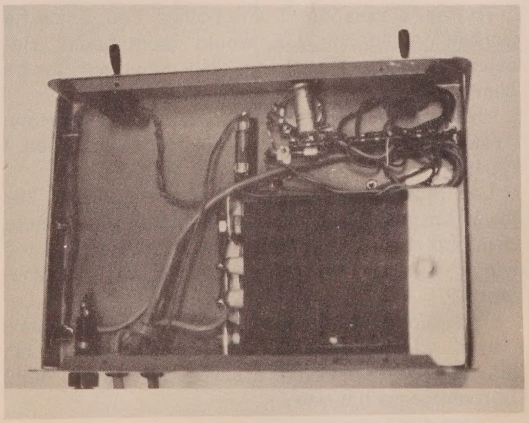


Fig. 12—Bottom view of wired Power Supply. The bias supply. The bias supply circuit is located next to the high voltage fuse in the center of the chassis.

Harv and Lou (mainly Harv) work on Lou's code speed.

AN INTERMITTENT TEN

BY AL D'ONOFRIO*, W2PRO

"Go ahead," said Harv, annoyed at friend's reluctance to try his hand at the key, "give him a call when he finishes."

"He's sending a little too fast," said Lou, puffing nervously on his pipe. "And there's some QRN and QSB, too, and . . ."

"If the guy were calling CQ any slower he'd be backing up. And there's not a bit of crud or skip in there, so quit stalling."

Harv took a deep slug of his beer, plainly enjoying his old buddy's verbal squirmings. The two men, who had both started in amateur radio when a 6L6-807 was a respectable homebrew, exchanged mental telepathic shots.

"Drop dead, you c.w. chauvanist." Harv just smiled and sipped his beer.

Readjusting the pitch control, Lou lamented the deplorable mess that amateur radio has sunk to—from his original class B ticket (once flunked the exam, too). Then afterward, that "theory" to get his class A, and then that reclassifying to an Advanced ticket, and finally this humiliating fine mess of his having to earn still another ticket, all for that confounded Extra license.

To Harv's question of why bother, Lou, since he worked only phone, Lou would shoot back: "Because it's there, like that big mountain to be climbed."

"He's crawling about 13 w.p.m. now," said Harv. "You mentioned you were up to 15 solid, as I recall."

Lou, not looking up and somewhat biting his lower lip into little pieces, mumbled: "You misunderstood me . . . it's more like an intermittent ten w.p.m., but very, *very* often a solid 13 . . . sometimes."

"You did say intermittent?" Harv asked, obviously moved with concern, peering over the top of his glasses, "you mean like a solid seven and a half? Sort of like my hat size?"

"Why don't you go . . ."

"There," snapped Harv, "he just signed; Give him a call; I'll help you."

"I missed his call. Really, with all the belching hot air from you tonight, I . . ."

The two men, one atop the workbench, beer can poised; the other bent over the desk, just stared at the silent Hallicrafter speaker, both knowing that another person, somewhere, was also bent over his desk, eagerly awaiting a friendly reply to his CQ.

"Lou, if I told you his call letters, would you give him a call? at 13 . . .?? Do I hear any other bids, gentlemen?" boomed Harv, scanning the room.

"I wouldn't call him at any speed just now," said Lou, somewhat beyond the slings and arrows.

"What are you talking about?"

"To be perfectly frank, because I don't have my QSO guide notes. They're here someplace," he said, fumbling through some folded papers at his side.

"Too late; he's answering a W4 now."

"Ah, here they are," chirped Lou, greatly relieved at finding his QSO guide notes, and placing them squarely next to his straight key.

Harv, a bit perplexed, peered over his friend's shoulder at the notes, and, unbelieving, softly sighed. Neatly printed were:

(1). tnx om (yl) fer ur fb cl = ur rst 599x hr in NYC = my name is Lou = nw bk to u om (yl) ar his cl de cl K

(2). . . . tnx om = wx hr (fb, lousy, vy cold) = my rig is . . .

(3). . . . tnx om = ur rig snds fb hr = . . . gess I wl get second cup of coffee (xyl just came in, fone is ringing, dog wants out (hpe cu agn om (xyl) vy 73 cu agn sk . . .

Looking heavenward and tossing his empty beer can into a nearby box, Harv backed away to his former seat on the workbench, and with true pathos, opened up the last remaining can in the six pack. A full minute must have passed before Harv broke the silence: "Is that what c.w. QSO's look like to you? Three formula acts printed on a piece of paper? . . . How sad, truly, Lou, how . . ."

*1537 Central Park Ave., Yonkers, N.Y. 10710

"Are you still here?" droned Lou, with an exhausted air of saintly forbearance.

Come to think of it, with old Harv having spent the better part of 35 years or so on c.w.—strictly c.w., mind you—and with Lou, just the opposite on phone, from two to 160, why it's truly a wonder that the two grizzlies were even speaking to each other since they both left Halsted High. It was this "Extra" thing that brought them a little closer, especially Lou's inviting Harv over tonight for "no particular reason." But old Lou was a fighter—he'd take a shot at that code stuff even though it loomed like Mt. Everest in a snow storm.

"You got guts, Lou," belched Harv, extracting a lone beer from the old GE refrigerator near the cellar wall, the shack being tucked snugly in one corner, near the oil burner. This was hardly a pretentious shack, but very efficient from a radio man's point of view, a little like those do-it-yourself operating console tables one sees in amateur magazines, where the lead sentence often implies "first steal some boards that sort of match."

"Did you ever have any QSO's on c.w. with that formula setup?" asked Harv, handing a brew of beer to his friend.

"Of course I've had QSO's . . . certainly, many."

"How many, roughly speaking."

"Oh, a few, here and there, you know. They were extremely interesting ones, too; yes, very . . ."

"Why, this opens up a whole new field of high-speed c.w. communication," said Harv, with a twinkle in his eye.

"How so?"

"Well, instead of spending all that time sending out formula openers and closers, with asides about a second cup of coffee and other such important information, we can now reduce all of that to a number code, like the one used in c.w. nets—like 27 OM (or YL) FB 9 (which means 599X, of course) Hr New York = 22 is Lou = wx 12 (or 24 if windy) = Vy 73 to 36 (you and yours)."

"Very efficient," said Lou, dryly.

"Certainly. And that whole bit about coffee becomes QRT OM 55, or is 55 about the dog's barking . . . no 25 is the barking . . . well, you could use both for an added touch of drama, and toss in a 92 for the XYL at the door with packages."

"Very funny."

"Yes sir, fast and snappy. Reduce QRM by 99 percent."

A small, curling black cloud seemed to spiral upward from Lou, morosely sipping his beer, in deep thought.

"Okay, wisenheimer," broke Lou, "what's the answer? How does a phone guy get to copy good enough for that Extra?" The two looked at each other: "I'm listening."

"There're several ways to increase your copying speed; I know they all work, in vary degrees. Some

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3002		8		18	0.72
3037		10		18	1.10
3003		16		20	3.0
3038		24		22	6.75
3004		32		24	12.0
3005	5/8"	4		16	0.275
3039		6		18	0.620
3006		8		18	1.10
3040		10		18	1.70
3007		16		20	4.50
3041		24		22	10.0
3008		32		24	18.0
3009	3/4"	4	3"	16	0.620
3042		6		18	1.40
3010		8		18	2.50
3043		10		18	3.90
3011		16		20	10.0
3044		24		22	23.0
3012		32		24	40.0
3013	1"	4		16	1.0
3045		6		18	2.40
3014		8		18	4.10
3046		10		18	6.60
3015		16		20	17.0
3047		24		22	38.0
3016		32		24	68.0
3017	1-1/4"	4	4"	14	2.30
3048		6		14	5.0
3018		8		16	9.0
3049		10		18	14.0
3019		16		18	36.0
3050		24		22	81.0
3020		32		24	145.0
3051	1-1/2"	4		14	3.10
3052		6		14	7.0
3053		8		16	12.5
3054		10		18	20.0
3055		16		20	50.5
3056		24		22	110.0
3057		32	10"	24	200.0
3021	1-3/4"	4	4"	14	4.20
3058		6		14	9.40
3022		8		14	16.50
3059		10		16	26.0
3023		16		18	67.0
3060		24		22	150.0
3024		32		24	270.0
3061	2"	4	10"	12	15.0
3025		6		12	33.0
3026/3900		8		14	59.0
3027/3907-1		10		16	92.0
3062		16		16	238.0
3063	2-1/2"	4		12	22.5
3029/3905-1		6		12	51.0
3030/3906-1		8		14	90.0
3031		10		16	140.0
3064	3"	4		12	32.0
3033		6		12	71.0
3034		8		14	125.0
3035		10		16	198.0

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guys have become real good c.w. hotshots over the years."

"Yeah. I know you've been to some big towns when you were a seafaring man and heard you some big c.w. talk."

"Yup, sure have," drawled Harv, playing out the scene. But I'll just over a few of the basics. You listening?"

"Go ahead."

"Well," said Harv, "for openers, ask yourself this simple question: why am I knocking myself out trying to learn all this c.w. stuff? Why, to pass that 20 w.p.m. Extra examination, right? not to become any c.w. hotshot, right?"

"Right. I want that Extra ticket like anybody else. They can then keep their c.w. QSO's to themselves after that."

A shot of pain ran through Harv realizing the low level of esteem Lou obviously had for c.w. "Well, maybe when you up to 20 w.p.m., you may just change your mind about the world of c.w."

"I doubt it. In fact I doubt if I'll ever make 20 w.p.m. good enough for that Extra ticket . . . so go ahead, proceed, professor. How do I learn enough for that extra?"

"Ok . . . Ok! First, stop depending upon these formula cards to help you increase your copying speed. Throw them away." To that, Lou tossed them into a basket nearby.

"The first thing you got to do—and this is serious business—is to develop the right positive frame of mind that you're going to get that ticket, inch by inch, maybe not next week, or even next month, but someday out there you're going make that 20 w.p.m. speed, and even a few w.p.m. to spare. Get the picture?"

"Like mind control or autosuggestion?"

"Maybe . . . but it's important in learning anything." Harv hesitated a moment, groping for the next right nugget of instruction: "Good, then comes the most important part of all, and that's making a good, positive c.w. training schedule, one that you can work and live with for a while . . . like a guy, say a boxer, in training.

"How do I do that?"

"Easy. Our old friend W1AW cranks out the kind of c.w. that is made to order. Copy them faithfully, everyday, seven days a week . . . got it?" He watched Lou's eyes: "All you do is check their practice runs listed in *QST* . . . and then be there!"

"Yeah, well . . ."

"You copy them at least once a day, their bulletins, their practice runs, everything .Saturate yourself in code . . . good code . . . maybe for two one-half hour sessions for openers."

"Yeah, but sometimes W1AW and I can't get together, then what, wise guy?"

"You got that import tape cassette job, right? Then tape the stuff when you're copying W1AW, and any body else you hear sending clean code.

"Then what?"

"You play it back after a week and it'll sound like brand new code. A couple of cassettes and you'll have all the code you'll ever need. But if you want more, then you can buy cassettes from ARRL, too . . . did you know that?"

"No."

"Sure. And with the cassette, you can take your code right along with you to the office . . . practice copying code during your lunch hour, using an earpiece . . . not the best of conditions, but it'll do the job. Even ten minutes of regular practice like this will help greatly . . . coupled with whatever else you can copy in the evening. The point is to get about an hour's worth of practice every day, using whatever devices you can think of."

"I never thought of taping my own before," mused Lou, scratching his chin slowly.

"A tape recorder is a good way to start learning to copy behind, too. Instead of writing it all down, spend a few minutes during each session just listening and visualizing the letters. It's a difficult trick that gets surprisingly easier with continued practice. Some guys call it by different names—Candler system, phantom copying, whatever. But copying it all in your head is the beginning of a whole new world of pleasurable c.w. . . . ask any good c.w. guy, he'll he'll tell you."

"Well, I don't know . . . I've tried everything else."

"Lou, books have been written on what I've just told you—a positive frame of mind, a faithful training schedule . . . and time. Try it."

"I like it," chirped Lou, smiling "What do I have to lose? Positive thinking I've always had . . . a tape recorder I've got . . . and a little time . . . about an hour a day, you say?"

"An hour's plenty," Harv answered, obviously elated at the fresh new spirit of true confidence he was seeing in his old chum. "Lou, it'll be fun. Look, let's make a sked on 7.050 for Saturday morning, say at ten. We'll go slow." Harv was beaming at his new convert.

"Slow, like a nice intermittent ten, OK?' the two agreed; laughing. "Say, Harv why don't you grab another six pack there from the refrig, on the bottom, next to the batteries."

One didn't have to say it twice for Harv. "I always keep my batteries in the cooler, too. Say, you got some imported stuff in the back. Want that instead."

"Sure. This is an occasion. I'm finally fired up enough for the first time to go after that ticket and get it . . . yes, sirree."

"And a nice c.w. sked this Saturday to get the ball rolling," said Harv, reaching his arm in and tenderly extracting the pack.

His friend, unshakened at the thought, gingerly plucked the QSO formula cards from the trash carton "Next Saturday at ten, you bet." ■

SEVENTH INTERNATIONAL YLRL CONVENTION

YLRL 37th Anniversary

BY LOUISA B. SANDO*, W5RZJ

In this year of our country's Bicentennial Celebration, it is only fitting that the Young Ladies Radio League also should celebrate its birthday — the 37th. Some ninety YLRLers did celebrate the occasion at the Seventh International YLRL Convention held June 10-12, 1976 at Holiday Inn West, Houston, Texas. Our hostesses were members of the Gulf Area Young Ladies Amateur Radio Klub (GAYLARK).

Although formal activities did not get under way until Friday, June 11, many YLs arrived on the 9th and the following day, with the help of Martha, WA5WKE, three car loads of us made a tour to the island city of Galveston for a look at the Gulf of Mexico and a seafood luncheon at Gaido's. The return trip was via NASA. Because of the communications aspects and since some of the YLs work on components used in the space program, NASA was of special interest. En route to the motel we crossed the Houston Ship Channel, a 50-mile man-built waterway connecting Houston with the Gulf and making Houston the 3rd largest seaport in the nation. We also made a quick stop at the San Jacinto Battleground, where Texas won its independence from Mexico. Its monument is the world's tallest monumental column. Nearby we could see the *Battleship Texas,* veteran of two World Wars.

By evening the majority of the YLs had arrived and registration was in full swing. Throughout the evening there was a get-together and informal entertainment in the hospitality and banquet rooms.

On Friday morning we boarded a Gray Line bus for a tour of downtown Houston, with its multi-billion dollar skyscrapers; through Allen's Landing Park, site of Houston's founding 140 years ago; through miles of America's most beautiful homes, the River Oaks Area; the Texas Medical Center, with its six hospitals; and finally a tour of the world-famous Astrodome.

That evening the GAYLARKs hosted a lovely reception honoring the YLRL Officers and past presidents. Current officers present were WA6ISY, Myrtle, president; W7FFG, Beth, V.P.; WA2FGS, Rose Ellen, Rec. Treas.; WA8VXE, Rosemary, Disb. Treas., and WA4BVD, Carrie, Editor-Publisher of *YL Harmonics.* Past presidents included WB2YBA, Chris (1975); WA4BVD, Carrie (1973); WA6AOE, Maxine (1968), W1ZEN, Onie (1962); W7NJS, Beth (1958); W7HHH, Bea (1952-53); W3CDQ, Liz (1944-45).

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YLRL Forum

On Saturday morning the business meeting got under way with a welcome by K5JKV, Annie, chairman. Annie promptly introduced WA5MPM, Frances, the prize chairman, and several prizes were drawn. W3CDQ, Liz, was recognized for being the longest licensed YL—since 1922. Diane Green, ZS6GH, received an award for having traveled the greatest distance to the convention — from Johannesburg, South Africa!

The meeting was turned over to WA6ISY, Myrtle, YLRL president, who conveyed our thanks to GAYLARK for sponsoring the convention. Various matters were discussed, including life membership,



Current and past presidents of YLRL at Houston: L. to r., WA4BVD, Carrie (1973); WA6AOE, Maxine (1968); W7NJS, Beth (1958); WB2YBA, Chris (1975); W7HHH, Bea (1952-53); WA6ISY, Myrtle (1976). Present but not in the photo — W1ZEN, Onie (1962) and W3CDQ, Liz (1944-45).



WA5JKV, Annie, convention chairman, pins a "Yellow Rose of Texas" on WA6ISY, Myrtle, YLRL's president for 1976. WA5MPM photo.

mini-YLRL conventions that might be held at intervals between the larger ones, funds to help a club get started with a convention, and the need for signatures of five members for a YL to run for office.

WB2YBA noted there are 200 copies of the YLRL Directory on hand and it was suggested YLs might buy them ($2.00 each) for gifts.

K5MXO, Margaret, asked if YL contests could be held on weekends since many of the YLs work during the week. W1YL, Ellen, felt that although all weekends are scheduled for one contest or another, there was no reason why YLRL couldn't share a weekend date.

Myrtle announced that she is sponsoring a new trophy, in memory of W6NZP, Evelyn Scott, who became a Silent Key recently. It will be for the DX YL with highest score for low power and probably will be for the YLRL Anniversary Party.

WA6ISY also announced that WA4BVD, Carrie, is resigning as Editor of *YL Harmonics,* a position she has held for 4 years. Carrie received a standing ovation for the fine issues she has published.



ZS6GH, Diana Green, the "Galivanting Ham" from Johannesburg, S.A., visits with WA5JKV, Annie Smith, convention chairman. Photo by K5OPT.

K6KCI, Irma, noted that W6NAZ, Lenore, is in a high position in public relations for ARRL. Irma suggested that we all talk up amateur radio in our other clubs and groups and get good publicity for amateur radio and more members for YLRL.

A roll call was taken by districts, with all 10 stateside ones represented, plus VE3 and 4, as well as ZS. ZS6GH, Diana, brought greetings from the South African Women's Radio Club. Diana has been president of SWARC for most of the years of its existence and also is editor of the club's paper, *YL BEAM.* Diana is no stranger to many North American amateurs, having toured Canada and the U.S. in 1947 as Diana Tuck. (At that time your reporter was W2O0H working as Asst. Editor of *CQ,* and it was our pleasure to entertain Diana in N.Y.C.) Diana also has talked with many amateurs on the air, entertains many in Johannesburg, and keeps up with a fantastic number of penpals all over the world. Evidence of her keen interest in amateur radio and in people may be noted by the fact that of the YLs at the convention, 17 also are members of SAWRC! Diana has been an amateur since 1938. Her OM is Reg, ZS6J, and they have a grown son, Irvine. The family had spent a month in England before the men returned home and Diana became ZS6 "Galivanting Ham."

YLRL Luncheon

At noon we gathered in the banquet room for a buffet luncheon. Following the invocation by WA5MPM, K5JKV, introduced the GAYLARK members. Annie read a letter from K4LMB, Ethel Smith, whose leter to *QST* in 1939 (she was then W7FWB) started YLRL on its way. She also read one from VE3GJH, Cathy, noting that the Canadian YL Club, CLARA, will be celebrating its 10th anniversary this year with a convention in Toronto.

Tables were decorated with "Gay Larks" (little ceramic birds) and flowers and at each place was a gift from the Los Angeles YLRC.

Guest speaker was W1YL, Ellen White, Deputy Communications Manager of ARRL. Ellen entertained us with a slide story of ARRL Hq. and staff.

WA5MPM again distributed many prizes. The YLs of MINOW donated a $100 check (won by W8UAP) and another of $50 (won by WA5KRI). Another $50 check was given by WB5BTF and won by WB5GIN. Other beautiful prizes included cross-stitched items made by WA4BVD—a sampler won by K5MIZ and pillow won by WA7FFG. Many other prizes had been made by the YLs—paintings, ceramics, afghans, shawls (one won by WA4BVD and one by ZS6GH), pillows, macrame, sweaters and jewelry. The members of WRONE donated some lovely silver bowls. Other prizes included portable

FM/AM radio (from Buckeye Belles — won by WA7LTN), purses, cheese board, Callbooks, plant moisture meters, books, many items hand made by K9QGR/7, and a YLRL plate from Floridoras (won by W7GGV).

YL-OM Banquet

It semed no time at all before we were back together for the YL-OM Banquet. Following the dinner there was recognition of long-time amateurs (only one OM predated Liz, W3CDQ (1922) by one year). K5MIZ, Alverta, and several YLs put on a skit depicting an "angel" gathering amateurs for an "Apollo" flight. W1YL read a letter from S.W. Division Director, W5EYB, and reported on the latest FCC actions concerning various classes of amateur licenses. WA5KRI, Deanna, told us she would be the only YL among 8 operators going to South America for two months to handle communications for the Amigos.

At this time GAYLARK members "passed the hat" for contributions to up-date our book, *CQ YL*. ($96 was collected; there will be a notice in Ham Shop in *CQ* and in *YL Harmonics* when the supplements are ready for mailing.)

Prize chairman Frances went to work again with her GAYLARK helpers, and how many prizes there were — every YL attending received at least one. Members of WAYLARC donated an American flag which had been flown over our nation's Capitol, which was won by WB6ERF. A plaque depicting eagles, from Floridora, was won by WA0TNI. A hand-woven tablecloth presented by TASYLs was won by W6YZV. A red, white and blue afghan made by K5UKK was won by K7UJV. WA5ZDI won the desk set donated by NYC YLRC, and W8HUX won the tote bag donated by Buckeye Belles. A silver compote from the YL Club of Los Angeles went to WA5WYD, and a ceramic "people lover" from BAYLARC went home with K6KCI. Carl & Sue (WA5FVH) Hutton had donated a number of silver bowls. Other prizes included a pillow, Callbooks, shawls, paintings, wind chime, sweaters, purses, digital alarm clock, electric griddle and sand painting (from W0PCD, won by K6QPG). The main prize, a hooked rug depicting an eagle and the YLRL girl-on-the-globe, made by K5MXO, was won by W6QGX. This was most fitting since Harryette had made the large hooked rug which had been awarded at the previous convention.

Eyeball QSOs continued far into the night and Sunday morning GAYLARKs furnished coffee and rolls in the hospitality room for those who were not already on their way home or heading for other vacationing.

Throughout the convention K5SKF, the GAYLARK station, was on the air from the registration room,

(Continued on page 86)

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Here's some food for thought when you start to contemplate a new antenna.

LONG, LONG DIPOLES

BY JACK R. ROTHWELL,* VE7TK

This article is intended to stimulate thought on the use of long antennas, no matter what band you may operate.

The simplest and most widely used antenna today is the half wave dipole because it is easy to erect, low priced and resonant at 70 ohms thus eliminating the requirement of an antenna tuner.

It can be improved upon, retaining all the good features, except that more space will be required.

The two antennas to be described, the one and a half wavelength dipole and the one wavelength off center fed dipole, will give extremely good performance on any band.

The coaxial feed line should be adjusted to at least a ½ wavelength. In basic figures typical lengths would be:

1.815 MHz. = 180′
3.850 " = 84′4″
7.250 " = 44′9″
14.25 " = 23′9″
21.25 " = 15′3″
28.60 " = 11′4″

or multiples of the above.

Recommended reading on feed line lengths is K7GCO's article in the May 1974 edition of *CQ*.

Both antennas are fed at their 70 ohm point. The height above ground will affect the impedance just as it does with the half wave dipole. A chart showing radiation resistance versus height is shown in fig. 1. Similar charts will be found in the *ARRL Handbook and* Wm. Orr's *Radio Handbook.*

These charts show a steep drop of impedance from ¼ wavelength to less in height. The reason for this is that the charts are for heights over perfectly conducting ground. In actual practice the drop is not so steep.

Many amateurs think that the ground surface is true ground but this is not correct. Obstacles on the surface such as cement and asphalt driveways, buildings and other similar objects affect the position of true ground. Underground water, large rocks, gravel and hard pan also have an affect, thus true ground can vary from a few feet to many feet under the surface. Most amateurs have problems at their city QTH's getting their antennas up high, so on 160 and 80 Meters under this circumstance you will probably find the impedance closer to 50 ohms.

The 1½ wave, besides being an excellent horizontal antenna, also gives a good account of itself as an inverted "V", and the ends may be brought closer to the ground than with the ½ wave version.

Typical overall lengths for the center fed 1½ wave dipole at random selected frequencies are as follows:

1.815 MHz. = 773′6″
3.850 " = 364′6″
7.200 " = 195′
14.25 " = 98′6″
21.25 " = 66′
28.60 " = 49′

The formula is; Length in Feet = $\frac{1404}{\text{Freq. in (MHz.)}}$

While the 1½ wavelength dipole is a fundamental frequency antenna, by coincidence the 21 MHz. dimensions work out to be a ½ wave dipole for 7 MHz. This fact has been exploited to the fullest, particularly by Novices.

Another long dipole that will perform very well is the 1 wavelength. In order to be resonant at 70 ohms it must be fed off centre with ¾ wavelength

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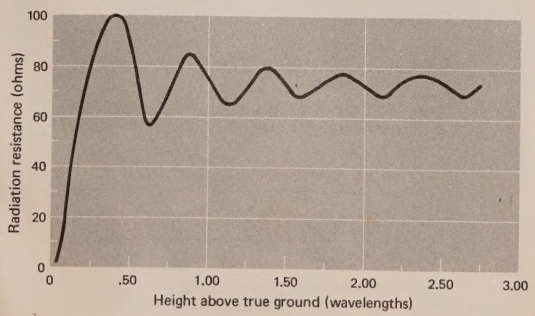
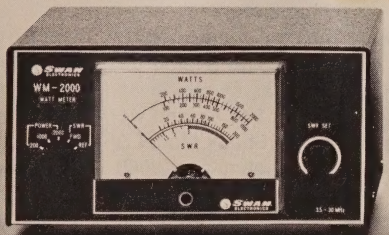


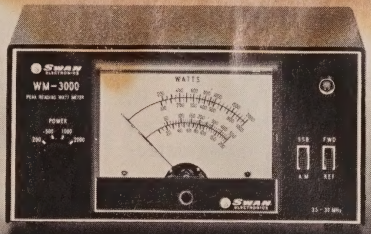
Fig. 1—Radiation resistance versus height.

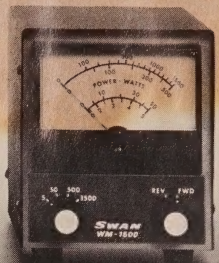
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on one side and ¼ wavelength on the other side.

At the present time "sloper" antennas are very popular, particularly on 40 meters. The 1 wave will provide outstanding results as a sloper. The slope angle should be kept between 45 and 60 degrees. As the slope angle is decreased from 45 degrees, the antenna tends to become a horizontal radiator and as the slope is increased over 60 degrees, it gradually becomes a vertical radiator.

The height above ground applies to the feed point in the sloper configuration and fig. 2 shows the proper erection method with the longest element closest to the ground surface. This basically is to give more height to the feed point. The coax cable should be kept at right angles for as far as possible to help keep the s.w.r. low.

Typical lengths for the 1 wavelength at random selected frequencies are as follows:

Freq. (MHz.)	Overall Length	Dim. "A"	Dim. "B"
1.815	515'6"	386'9"	128'9"
3.850	243'	182'3"	60'9"
7.200	130'	97'6"	32'6"
14.25	65'8"	49'3"	16'5"
21.25	44'	33'	11'
28.60	32'9"	24'6"	8'3"

Formulas are:

$$\text{Overall Length in Feet} = \frac{936}{\text{Freq. (MHz.)}}$$

$$\text{Dimension "A" in Feet} = \frac{702}{\text{Freq. (MHz.)}}$$

$$\text{Dimension "B" in Feet} = \frac{234}{\text{Freq. (MHz.)}}$$

The off center fed 1 wavelength dipole is a fundamental frequency antenna. The center conductor of the coax should feed the ¾ wave section of the antenna or dimension "A".

It should be noted that the foregoing formulas

(continued on page 86)

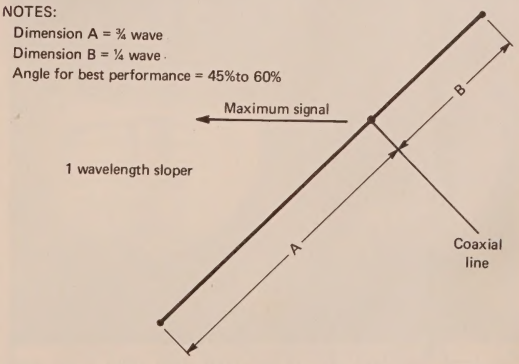


Fig. 2—Basic sloper configuration. The longest element goes closest to the ground.

Try This For Selectivity

BY ROBERT W. VREELAND,* W6YBT AND RUSSELL A. RITSCHMAN,* W6ASF

During the past few years there has been a revival of interest in direct conversion, receivers. The original 1907 model "beats" receiver (Frederick K. Vreeland Patent 1245166) was long ago replaced by the regenerative receiver. Now a product detector and a stable v.f.o. have replaced the regenerative detector. In regenerative receivers the selectivity was rather poor. Modern direct conversion receivers solve this problem by the addition of a high quality audio filter. Best results have been obtained using complicated multi-pole active filters. As a result, what began as a simple circuit has become a complicated one.

We were delighted to find an article on mechanically resonant headphones in a recent edition of an amateur radio magazine. Here at last was a simple solution to the audio selectivity problem! The fact that the article was written for April fools made no difference; after all, both electrically resonant and mechanically resonant head-phones had been used during World War I (Frederick K. Vreeland Patent 1224342).

Our first selective head-phone used a 6.5mm wide × 24mm long resonant reed cut from 0.015" thick steel shim stock and riveted to a 0.030" thick aluminum diaphragm as shown in fig. 1 (left). This assembly resonated at 840 Hz and worked very well in Calectro and Radio Shack Model SF-20 imported head-phones. Both 8 ohm and 2000 ohm phones were tried and found to work equally well. These phones have a magnet consisting of a center rod and an annular concentric ring. The complete magnet looks very much like a cup core. Trimm featherweight phones with a "C" core and a two winding magnet did not work at all. It is important to use phones with a cup core style magnet so that the end of the resonant reed can be positioned over the center rod of the magnet. A longer reed or one cut from thinner stock will resonate at a lower frequency.

*45 Maywood Drive, San Francisco, CA 94127, P.O. Box 894, Menlo Park, CA 94025

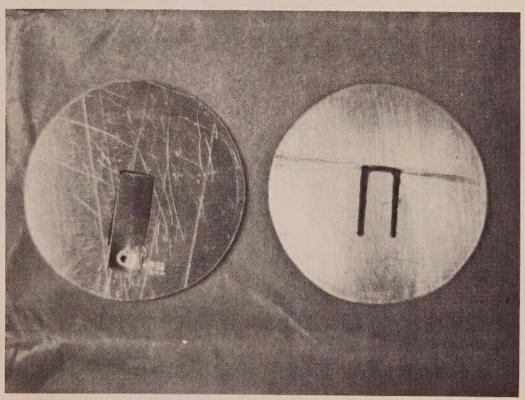


Fig. 1—A resonant reed is cut from steel shim stock and riveted to an aluminum diaphragm (left). Alternatively, the reed and the diaphragm can be cut from the same piece of steel shim stock (right).

The reed and the diaphragm can be cut from the same piece of 0.015" thick steel shim stock as shown in fig. 1 (right). This construction has the advantage of not requiring riveting but requires careful work with a jeweler's saw. The reed is 15mm long × 7mm wide and resonates at 760 HZ.

If steel shim stock is not available, the top of an ordinary tin can will work just as well, but at a lower frequency. This material is only about 0.010" thick, so the reed must be shorter (10.5mm long and 5mm wide for approximately 1000 HZ resonance).

For sharper selectivity, we use a 25mm diameter diaphragm with a 13.5mm long × 6.5mm wide reed cut from 0.015" steel shim stock. The diaphragm is allowed to touch the annular ring of the magnet so that it is held in place by the magnet. It is then surrounded by the aluminum ring (fig. 2). Finally the original diaphragm and fiber washer that came with the phones are installed and the cover is screwed on. The assembly is extremely selective at 1000 Hz. It works well with most signals but has a slight tendency to "ring" which may make high speed c.w. slightly difficult to copy.

For ultra lightweight portable service at 1100 Hz we use the modified Calrad earpiece shown in fig. 3. This modification requires cutting off the rolled rolled over edge of the metal cap from the earpiece in a machine lathe. A 17.5mm diameter 0.010" thick diaphragm with a 10mm long × 5mm wide reed is



Fig. 2—For optimum selectivity a small steel diaphragm is surrounded by a concentric aluminum baffle. Head-Phones with cup core style magnets (right) work best.

cut from a piece of tin can top. The earpiece is re-assembled and held together with two stainless steel rings and 2-56 screws. This modification should be attempted only by those who have a machine lathe and skill with miniature construction.

An 8 ohm Radio Shack all plastic earpiece can be modified for 1300 Hz resonance by snapping off the cover and installing a 12mm diameter diaphragm with a 7mm long × 3.5mm wide reed. The diaphragm and reed are in one piece cut from 0.0075″ thick steel shim stock. This produces an extremely sharp, resonance with noticible ringing.

In operation we have found these resonant headphones to provide the same order of selectivity as a complicated active filter. ■

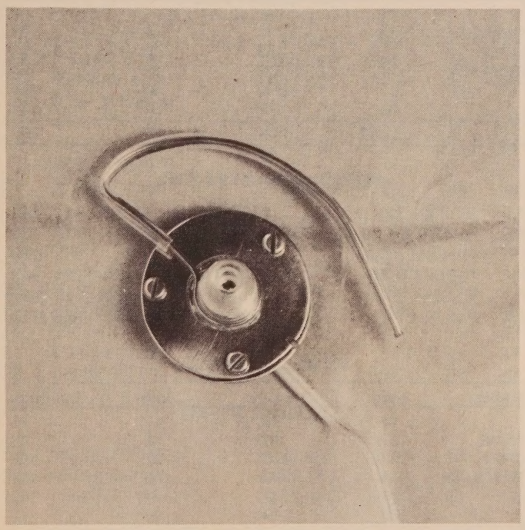


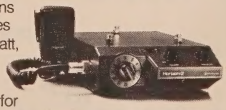
Fig. 3—A modified Calrad miniature earpiece. Note the two stainless steel clamping plates which are pulled together by 2-56 machine screws.

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CQ World-Wide DX Contest All-Time Phone Records

BY FRED CAPOSSELA, JR., K6SSS, DIRECTOR, CQ W.W. DX CONTEST

In the records listed below, boldface listings denote world records. Number groups after calls are: year of operation, total score, contacts, zones, and countries. All-band and Multi-Operator records include a band-by-band breakdown of the world leader in each category.

Single Operator/Single Band WORLD RECORD HOLDERS

1.8	**XJ3BMV ('75)**	**8,640**	**274**	**6**	**10**
3.5	**KV4FZ ('75)**	**275,319**	**1297**	**23**	**80**
7.0	**HR1RF ('72)**	**399,542**	**1349**	**28**	**93**
14	**CV4C ('73)**	**1,233,128**	**2518**	**37**	**130**
21	**CW4CR ('70)**	**1,196,085**	**2462**	**39**	**126**
28	**KG6SL ('72)**	**933,577**	**2467**	**33**	**94**

AFRICA

1.8	No Entrant				
3.5	CN8HD ('75)	140,651	663	15	56
7.0	EA8CR ('74)	253,528	639	31	103
14	CR6WW ('74)	1,058,446	2152	35	132
21	CR6NO ('73)	658,668	1706	34	97
28	CR6CN ('72)	650,160	1737	31	95

ASIA

1.8	4X4UR ('74)	1,188	35	3	9
3.5	VE3MR/4X ('71)	197,106	742	22	69
7.0	VE3MR/4X ('72)	215,840	643	27	88
14	4W1GM ('74)	705,602	1566	34	123
21	JA1RJW ('69)	379,136	1197	37	91
28	4X4JU ('69)	570,836	1522	34	99

EUROPE

1.8	PAØHIP ('74)	5,200	249	4	16
3.5	I3MAU ('75)	113,535	778	18	69
7.0	OH5NW ('75)	167,751	798	29	80
14	OH2BH ('75)	981,815	2098	37	142
21	G3HCT ('69)	832,016	2124	37	112
28	DL4PM ('68)	614,544	1858	34	84

NORTH AMERICA

1.8	**XJ3BMV ('75)**	**8,640**	**274**	**6**	**10**
3.5	**KV4FZ ('75)**	**275,319**	**1297**	**23**	**80**
7.0	**HR1RF ('72)**	**399,542**	**1349**	**28**	**93**
14	KV4FZ ('71)	1,208,180	2680	40	153
21	VE3MR ('69)	550,212	1292	39	117
28	KP4AST ('70)	630,180	2010	31	104

OCEANIA

1.8	KH6CHC ('73)	272	12	5	3
3.5	ZL1AMO ('75)	48,384	295	21	35
7.0	VK6CT ('73)	135,810	521	29	61
14	VK6HD ('72)	706,251	1483	37	132
21	KG6AQY ('70)	749,529	2353	32	72
28	**KG6SL ('72)**	**933,577**	**2467**	**33**	**94**

SOUTH AMERICA

1.8	CX3BH ('73)	18	4	2	4
3.5	YV4AGP ('72)	72,666	388	18	48
7.0	4M1BI ('72)	155,664	604	26	69
14	**CV4C ('73)**	**1,233,128**	**2518**	**37**	**130**
21	**CW4CR ('70)**	**1,196,085**	**2462**	**39**	**126**
28	CV4CR ('75)	668,624	1745	30	101

Single Operator/All Band

AF	**ZD3X ('74)**	**6,653,881**	**4611**	**115**	**372**
AS	XU1DX ('74)	2,607,750	2711	133	342
EU	EA4LH ('72)	2,744,119	2399	125	344
NA	KV4FZ ('70)	4,961,551	4362	128	369
O	KH6RS ('72)	5,331,072	4739	128	256
	(Opr. K2SIL)				
SA	FY7AK ('75)	6,636,348	4586	126	372
	(Opr. F5QQ)				

WORLD RECORD

Station	Band	Contacts	Zones	Countries
ZD3X	1.8	10	5	5
Opr.	3.5	225	12	34
OH2BH	7.0	288	19	57
(1974)	14	1184	27	96
6,653,881	21	1771	26	89
	28	1133	26	91
	Total	4611	115	394

Multi-Operator/Single Xmtr

AF	EA8CR ('75)	4,673,005	3027	120	403
AS	OD5HC ('74)	4,606,547	3375	109	364
EU	DLØWU ('75)	4,208,312	3237	111	367
NA	VP2M ('75)	5,792,750	5344	122	371
O	KG6SW ('73)	2,662,968	2928	113	195
SA	**PY2CAB ('74)**	**6,959,474**	**4495**	**130**	**397**

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	—	—	—
PY2CAB	3.5	13	5	7
(1974)	7.0	48	18	23
6,959,474	14	1535	39	154
	21	1993	36	127
	28	906	32	86
	Total	4495	130	397

Multi-Operator/Multi-Xmtr

AF	ZD3X ('72)	14,501,872	8571	141	455
AS	4Z4HF ('71)	6,106,290	3994	125	409
EU	OH5SM ('69)	11,593,925	6771	153	526
NA	PJØMM ('68)	7,037,658	6406	134	343
O	KS6DH ('72)	5,488,856	5304	116	242
SA	**PJ9JR ('74)**	**19,469,094**	**10043**	**142**	**519**

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	36	7	15
PJ9JR	3.5	663	18	63
(1974)	7.0	1104	26	102
19,469,094	14	3804	35	157
	21	2032	31	109
	28	2404	25	73
	Total	10043	142	519

Club Record: Potomac Valley Radio Club ('74) 53,869,662

CQ World-Wide DX Contest All-Time C.W. Records

Single Operator/Single Band WORLD RECORD HOLDERS

1.8	KV4FZ ('73) 21,320	220	11	29
3.5	KV4FZ ('75) 190,082	789	24	77
7.0	KP4AST ('73)..... 447,421 (Opr. WA4PXP)	1479	32	95
14	CX4CR ('75) ..... 935,025 (Opr. CX9BT)	2303	34	103
21	CW9BT ('72) 696,133	2068	31	82
28	CX1AAC ('70) 681,636	1711	36	93

AFRICA

1.8	No Entrant			
3.5	CN8DW ('70) 15,759	153	9	26
7.0	5A1TW ('64) 227,814	918	22	64
14	CR6IK ('74)..... 925,386	2021	38	116
21	TJ1AW ('70) 549,888	1447	35	93
28	CR6IK ('69)..... 498,800	1439	36	80

ASIA

1.8	4X4NJ ('74)..... 4,818	76	6	16
3.5	4X4NJ ('75)..... 103,572	584	14	49
7.0	4X4FA ('64) 174,505	781	25	60
14	HL9KH ('63) 339,920	910	37	103
21	KA6AY ('72)..... 284,688	920	30	78
28	HZ1AB ('68) 132,390	578	21	55

EUROPE

1.8	PA0HIP ('74) 12,704	328	9	23
3.5	YU3DBC ('74) 135,408	853	22	69
7.0	UT5BP ('75)..... 200,720	903	33	97
14	SM4CMG ('71) 367,356	1172	38	100
21	G3HCT ('70) 317,312	924	38	96
28	DL4AAP ('57) 253,680	728	36	84

NORTH AMERICA

1.8	**KV4FZ ('73) 21,320**	**220**	**11**	**29**
3.5	**KV4FZ ('75) 190,082**	**789**	**24**	**77**
7.0	**KP4AST ('73)..... 447,421** (Opr. WA4PXP)	**1479**	**32**	**95**
14	KV4FZ ('70) 908,514	2315	36	117
21	WA8LYF ('70) ..... 286,767 (Opr. K8HLR)	756	35	94
28	K1JGD ('68) 158,510	520	28	82

OCEANIA

1.8	KH6CHC ('73) 2,845	62	8	7
3.5	ZL3GQ ('75) 52,218	331	21	33
7.0	ZL1AMO ('74) 174,867	770	25	52
14	VK6HD ('75) 469,320	1325	32	88
21	VK6HD ('71) 531,354	1576	32	82
28	VK8UG ('67) 320,008	1048	32	72

SOUTH AMERICA

1.8	YV1OB ('75) 10,860	127	10	20
3.5	YV5AW ('73)..... 74,144	445	17	39
7.0	CV4DL ('75) ..... 230,040 (Opr. CX1BBL)	1020	24	57
14	CX4CR ('75) 935,025	2303	34	103
21	**CW9BT ('72) 696,133**	**2068**	**31**	**82**
28	**CX1AAC ('70) 681,636**	**1711**	**36**	**93**

Single Operator/All Band

AF	ZD3X ('73) ..... 3,524,826 (Opr. OH2BH)	3404	96	251
AS	UK9ABA ('70) 1,719,663	1366	124	327
EU	OH5SE ('69) 1,419,186	1374	124	298
NA	KV4FZ ('69) 2,719,152	2867	127	287
O	KH6RS ('72) ..... 2,748,307 (Opr. W6MAR)	2990	121	190
SA	9Y4AA('69)..... 3,088,968	2623	123	279

WORLD RECORD

Station	Band	Contacts	Zones	Countries
ZD3X	1.8	—	—	—
Opr.	3.5	176	13	32
OH2BH	7.0	391	20	44
(1973)	14	1057	24	70
3,524,826	21	1170	21	60
	28	610	18	45
	Total	3404	96	251

Multi-Operator/Single Xmtr

AF	CT3/OZ5DX ('75)..... 3,474,000	3023	94	292
AS	OD5IQ ('74)..... 3,970,912	2966	120	344
EU	UK5IAZ ('72)..... 2,112,240	1885	140	380
NA	KP4EAJ ('74)..... 2,683,525	3343	109	250
O	FWØAA ('74) 1,149,644	2082	80	114
SA	**FY7AK ('75) 4,197,364**	**3670**	**98**	**288**

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	2	2	2
	3.5	248	17	51
FY7AK	7.0	825	18	56
(1975)	14	992	24	73
4,197,364	21	1382	22	73
	28	221	15	33
	Total	3670	98	288

Multi-Operator/Multi-Xmtr

AF	ET3FMA ('67) 1,387,680	1476	105	231
AS	VU2IRA ('70) 2,273,616	2128	125	307
EU	OH2AM ('68)..... 4,118,688	3277	155	412
NA	W4BVV ('70) 5,552,352	3056	168	456
O	KS6ER ('73) 1,415,650	2136	102	123
SA	**PJØFC ('70) 11,586,428**	**7090**	**150**	**401**

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	92	8	8
	3.5	668	17	46
PJØFC	7.0	1338	26	75
(1970)	14	1974	34	109
11,586,428	21	1641	34	84
	28	1377	31	79
	Total	7090	150	401

CQ World-Wide DX Contest
All-Time U.S.A Records

Tabulated below are the record-high scores achieved by U.S. contesters in the CQ World Wide DX Contest. All-Time World-High scores are shown on pages 40 and 41. Number groups following calls and bands are: year of operation, total score, contacts, zones, and countries.

PHONE

Single Operator/Single Band

1.8	W8LRL ('75) 2,871	89	11	18
3.5	W1EBC ('75) 77,420	330	22	76
7.0	W3PHL ('75) 110,799	337	29	88
14	W4AXE ('70) . . . . . 595,725 (Opr. WA4PXP)	1068	39	156
21	W2AH ('72) 485,605	1129	34	111
28	W2SKE ('68) 429,976	1030	34	108

Single Operator/All Band

Station	Band	QSOS	Zones	Countries
	1.8	—	—	—
	3.5	50	18	28
W6RR	7.0	164	22	33
(1972)	14	297	32	87
2,350,964	21	949	31	86
	28	360	31	81
	Total	1820	134	315

Multi-Operator/Single Xmtr

Station	Band	QSOS	Zones	Countries
	1.8	—	—	—
	3.5	192	20	66
W3WJD	7.0	84	24	58
(1974)	14	794	36	132
2,440,167	21	414	29	109
	28	85	18	55
	Total	1569	127	420

Multi-Operator/Multi-Xmtr

Station	Band	QSOS	Zones	Countries
	1.8	4	3	3
	3.5	127	19	46
WA2ZAA	7.0	228	29	78
(1969)	14	936	39	138
6,743,880	21	1183	38	126
	28	1012	33	103
	Total	3490	161	494

CW

Single Operator/Single Band

1.8	K1PBW ('74) 9,750	94	14	25
3.5	W1MX ('72) . . . . . 80,410 (Opr. WA1CQW)	329	22	64
7.0	W5WZQ ('75) 229,548	722	31	80
14	W4AXE ('68) . . . . . 396,414 (Opr. WA4PXP)	836	39	123
21	WA8LYF ('70) . . . . . 286,767 (Opr. K8HLR)	756	35	94
28	K1JGD ('68) 158,510	520	28	82

Single Operator/All Band

Station	Band	QSOS	Zones	Countries
	1.8	—	—	—
	3.5	138	20	46
W3WJD	7.0	215	28	70
(1972)	14	295	36	88
1,527,500	21	323	30	81
	28	150	20	51
	Total	1121	134	336

Multi-Operator/Single Xmtr

Station	Band	QSOS	Zones	Countries
	1.8	13	6	9
	3.5	110	20	47
K1DIR	7.0	419	27	79
(1972)	14	334	33	84
1,985,310	21	319	27	75
	28	206	20	59
	Total	1401	133	353

Multi-Operator/Multi-Xmtr

Station	Band	QSOS	Zones	Countries
	1.8	14	4	5
	3.5	173	25	56
W4BVV	7.0	665	33	86
(1970)	14	810	38	122
5,552,352	21	909	37	107
	28	485	31	80
	Total	3056	168	456

Club Record: Potomac Valley Radio Club ('75) 53,869,662

CQ Reviews: The Heathkit HR-1680 Receiver

BY HUGH R. PAUL*, W6POK

Someone once said that what this country needed was a good nickel cigar. I have said for a long time that what the amateur radio operators of this country need is a good amateur band receiver at a price almost every new amateur could afford. The trend to transceivers has resulted in the near demise of commercial receiver production. Those available on the market start at about $500 and go up. The current increase in the amateur population is quickly drying up the supply of good used amateur receivers. Any of the older breeds that are in good condition are going for a minimum of from $150 to $200. Those who have considered building their own receivers often become discouraged when they discover how costly parts have become. What's a fellow to do?

Heathkit recently announced their HR-1680 solid state, amateur band only receiver at a price of about $200. When I read the specs I began to get interested. Could this be amateur radio's nickel cigar? After having built one, tested it and operated with it, I can say "yes."

The HR-1680 covers 80 through 10 Meters with the exception of that portion of 10 Meters above 29 MHz. It operates from 117 v.a.c., 220 v.a.c. or 11.5 to 15 v.d.c. It offers switch selection of upper or lower sideband and c.w. In the c.w. mode an active audio filter may be switched in to provide selectivity rivaling that of a good crystal filter.

Other features include a good 100 kHz crystal calibrator, a provision for external muting control and injection of a sidetone for c.w. monitoring.

The cabinet and front panel design is similar to the HW-104 transceiver. The dial and S meter glow red when the receiver is turned on, but are nearly invisible behind the dark decorative face plate when the receiver is turned off.

The HR-1680 is a dual conversion design employing twenty one transistors, four IC's and 38 diodes. Construction is on four main circuit boards of good quality, with parts identification silk screened on the top of each board. The v.f.o. board is visible in the lower left corner of the interior photograph. The other boards, from bottom to top, are the front end, heterodyne frequency oscillator/crystal calibrator and the audio amplifier/voltage regulator.

The r.f. amplifier and 1st and 2nd mixer stages employ dual gate field effect transistors. The first i.f. consists of a band pass filter, which passes 8.395 MHz to 8.895 MHz. This filter consists of three sections, with trimmer adjustments on the first and last sections. All of the tuned circuits in the front end of the receiver are diode switched as are the crystals and tuned circuits in the heterodyne frequency oscillator. The result of this design approach is twofold. It reduces the band switch assembly to a single wafer and eliminates the stray capacity and inductance problems that normally result from wiring the tuned circuits to a multiwater band switch. This is important in a kit receiver if uniform performance standards are to be achieved regard-



Front view of the Heathkit HR-1680 receiver. (Photo by Sandra K. Paul.)

*291 Macalester Drive, Walnut, CA 91789

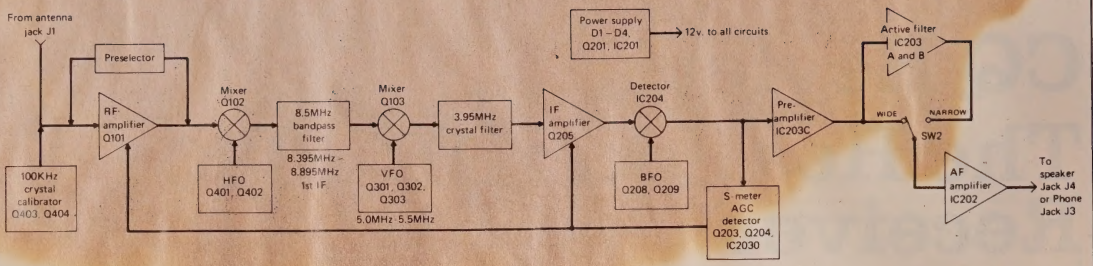


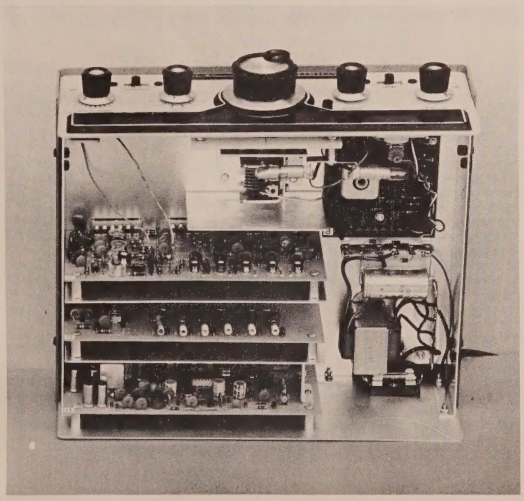
Fig. 1—Block diagram of the Heathkit HR-1680 receiver.

less of the experience of the kit builder.

The v.f.o. tunes from 5 MHz to 5.5 MHz and is injected at the second mixer. The resulting i.f. frequency is 3.395 MHz. Stability and linearity of the v.f.o. is excellent. Extra care in alignment of the v.f.o. resulted in a tracking error across each band of less than 2.5 kHz. The dial readout is calibrated in 5 kHz segments and Heathkit claims a readout accuracy of better than 2 kHz across any 100 kHz band segment, when calibrated at the nearest 100 kHz point on the band. I found I could interpolate to within 1 kHz over any 100 kHz segment after calibration at the nearest 100 kHz point.

Selectivity in the second i.f. is determined by a four pole crystal filter with a published specification of a minimum bandwidth of 2.1 kHz at 6 db down and 7 kHz maximum at 60 db down. The shape factor of the filter in the receiver I built proved to be very close to the published specs.

Selection of upper or lower sideband is by means of a slide switch labeled "Mode". This switch determines which of the beat frequency oscillators is in use. Each oscillator is crystal controlled and very accurate as to frequency.



Top view of the receiver showing the open construction. (Photo by Sandra K. Paul)

A.g.c. is audio derived and is applied to the r.f. amplifier and the 3.395 MHz i.f. amplifier stages The release time constant in the fast mode is 100 microseconds. In the slow mode it is 1 second. Attack time for either mode is less than 1 millisecond. On very strong signals the a.g.c. needs a little help from the r.f. gain control if some distortion is to be avoided. This is not to imply that the front end overload characteristics are poor. Strong local signals immediately adjacent to the receiver passband create only minimal intermodulation. There is no de-sensing or a.g.c. pumping as a result of these strong adjacent signals.

One of the outstanding features of the HR-1680 is the two stage active audio filter, which can be selected by the function switch. When the output from the audio preamp is routed through the filter to the audio power amplifier, the audio response is narrowed to a minimum of 250 Hz at 6 db down and a maximum of 7 kHz at 60 db down. The result is single signal c.w. copy that rivals the quality you would expect with a good crystal filter.

When the receiver is tuned so that the frequency of the c.w. beat note falls within the passband of the audio filter (750 Hz), there is absolutely no change in signal level when switching the filter in and out. No crystal filter can make that claim.

The IC audio amplifier supplies about 2 watts of audio into an eight ohm load, at less than 10% total harmonic distortion. Audio quality is excellent and there is plenty of it.

Heathkit rates the sensitivity of the HR-1680 at less than .5 microvolt for a 10 db signal-plus- noise to noise ratio. Testing showed that this figure was not optimistic. Sensitivity was .5 microvolt or better, depending on the band.

Image rejection is better than the 50 db claimed as is the i.f. rejection figure of 60 db. The latter is achieved with the help of two traps for 8.5 MHz and 3.395 MHz, located in the front end. A third filter

(continued on page 89)

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TEMPO SSB/ONE

SSB adapter for the Tempo VHF/One

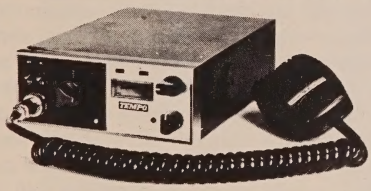
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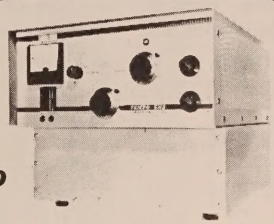
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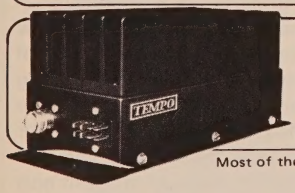
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10W	80W	80A10	$149
30W	80W	80A30	$159

UHF (400 to 512 MHz)			
Drive Power	Output	Model No.	Price
2W	70W	70D02	$270
10W	70W	70D10	$250
30W	70W	70D30	$210
2W	40W	40D02	$180
10W	40W	40D10	$145
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Prices subject to change without notice.

Shades of James Bond. Now we can look at them looking at us and see what we look like.

Sleuthing The Russian Weather Satellite

BY LINDSAY R. WINKLER,* W7AVE

Late in January W7AVE was alerted to the presence of a weather-satellite-like signal "with a different sound" by Ken, WA5NQE, who with some very fancy equipment, monitors satellite frequencies on Saturdays and University holidays down Texas way. Ken suspected that we might find on closer inspection a label reading "Made in Russia". A request for frequencies and times brought a prompt reply from Ken which read in part:

"I spent almost all day last Saturday listening for the "Russian" to come over to get times and frequencies etc. . . . Below is the time table:

DATE	AOS	TIME	LOS
2/7-76	1:55P		CST
"	3:37P		CST
2/8-76	1:47P	—	2:03P CST
"	3:29P	—	3:44P CST
2/9-76	1:41P	—	1:57P CST
"	3:27P	—	3:38P CST
2/10-76	1:36P	—	1:52P CST
"	3:22P		CST

As you can see, the orbits are about 1 hour 42 minutes apart. The frequency as best as I could measure it is 137.3 MHz ±20 kHz."

Ugh!—137.3 MHz and crystal control on the receiver. Brainstorming brought out our old "first" satellite receiver—a somewhat modified BC-1000A backpack, f.m. transceiver left over from World War II, and hitched it to a Vanguard converter and preamplifier. But converter frequency way off — a search in the surplus crystal box and a 46 meg job —*voila,* a NOAA as big as life—calculate 200 kHz lower and set the dial, and wait—satellites are like "time and tides", they do not appear on order.

By this time ten days had elapsed since Ken had sent the satellite skedual. Inspection of his data showed that the satellite was roughly six minutes earlier each day so six minutes was subtracted from the time given by Ken for each day since the last he had sent. The time was converted to universal time and read 2023Z for 2/19-76.

Needless to say we were on time, but the satellite naturally wasn't there! Plus four, five—even our whetted imagination could not hear anything in the f.m. rush coming from the receiver—six, seven and zip, zip, zip, as beautiful a sync signal as ever! What's wrong with our calculations?—accumulated error of course—the factor that time has shown should have been used really was 5 minutes 22 seconds. Turn on the tape recorder! — wups, three minutes without the 30 Hz reference—now it goes!

The signal was obviously the more or less standard 120 line-per-minute (LPM) speed while the most readily available printout device was the 240 line helix/blade job left over from ESSA 8. Now to speed up these 120 lines to 240 we would have to double the speed in our dual track tape recorder. With the 120 line video on the right track we simultaneously recorded 30 Hz on the left track so that doubling the speed we would get 240 lines from the video on the right track and 60 Hz from the left. The latter was necessary to be amplified and used to turn the printing helix. This is a basic method which with intelligent variation will work with most any printout system.

Fax on and it begins to print—Is it in Russian—No, pictures—a universal language—a little skew (tilting of the margins) but a developing picture of the west coast (fig. 1), just discernably protruding from under the day's blanket of clouds covering the western part of the country. This culmination of our quest took 16 minutes to tape the satellite and half that time to print it out (speed doubled for print out) or about 25 minutes in all[1].

Now, to get it all down to routine. Checking the

*Route 1, Box 209, Walla Walla, WA 99362

[1] Ken produced a "two-tone negative" of a pass on Feb. 13 but did not mention it till after the above was in manuscript.

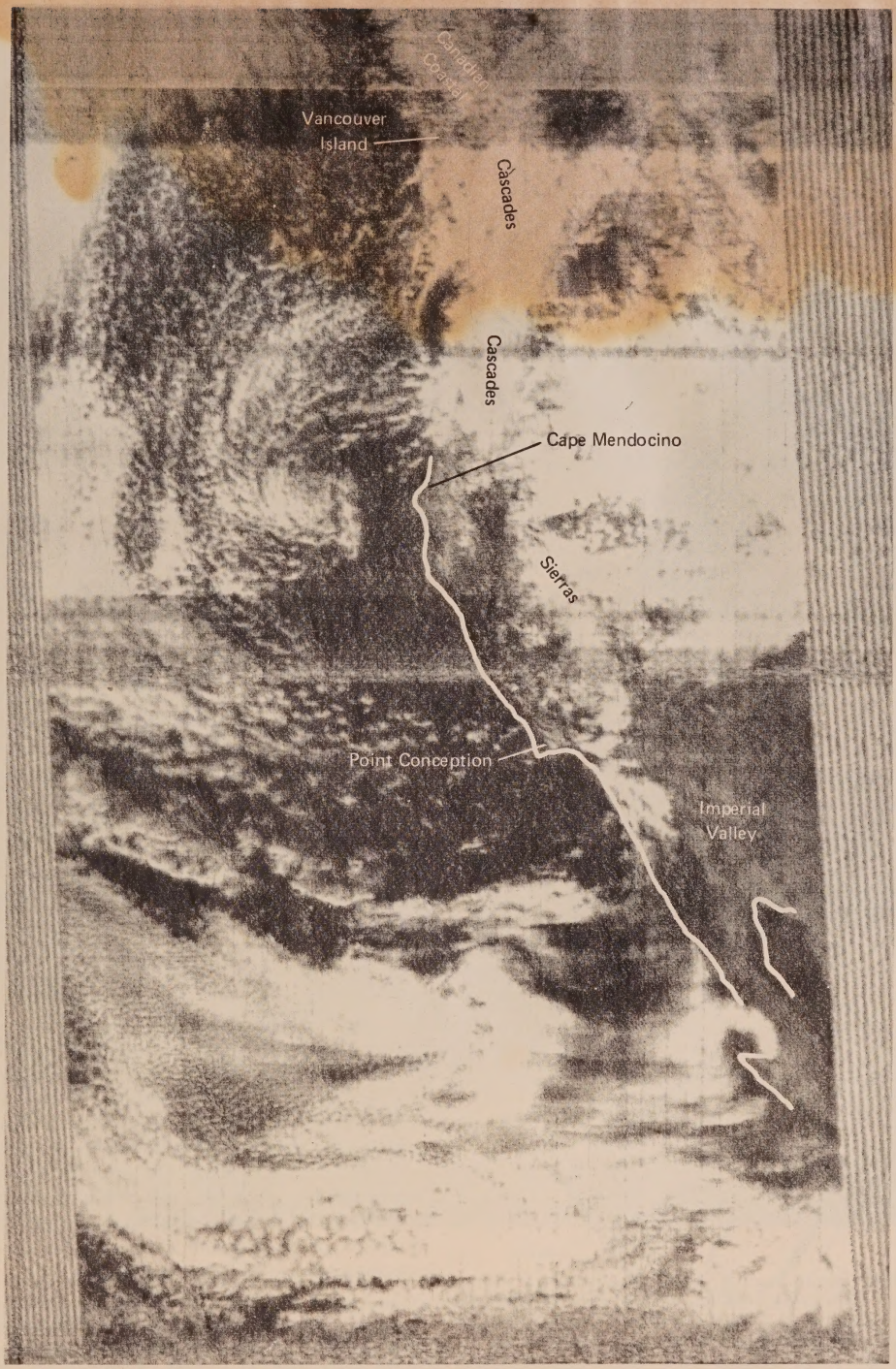


Fig. 1—The first positive picture taken from the Russian satellite shows the west coast. The bank of clouds angling to the north west are over the Canadian coastal range with Vancouver Island in the angle and the American Cascades further south. The California coastline is visible as is also Baja California.

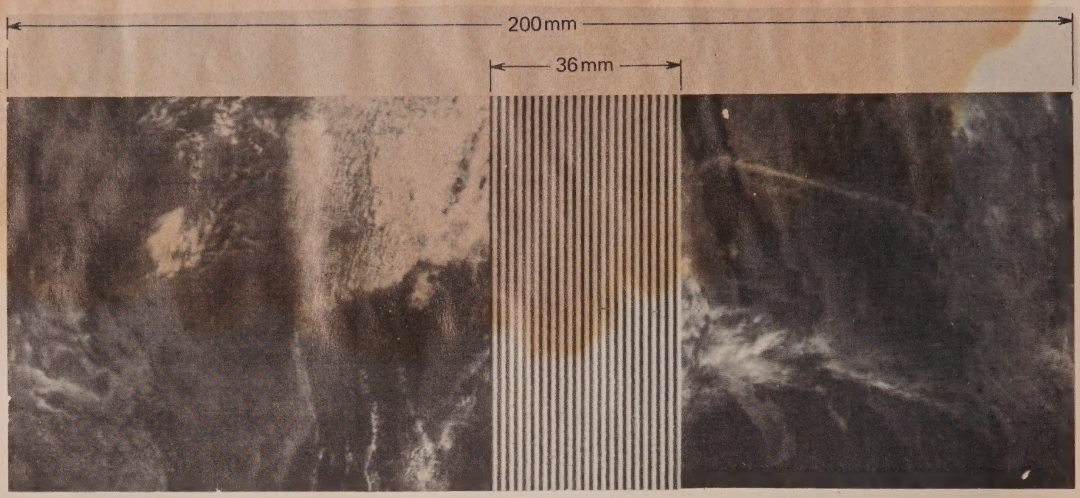


Fig. 2—In this picture portion the sync is printed in the middle of the picture for study of the sync train. Some nice geography is also present. The gulf coast to the left and Baja California and the Mexican coast to the right. The frequency of the sync train was determined by the following ratio after most careful measurements: Sync train width/ picture width = number of sync cycles/ x or 36/200 = 23/x. Solving for x we get the number of sync cycles in one picture line or one-half second. Multiplying by two gives us the number of sync cycles of square wave per second or 255..55554 Hz when taken to the absurd to emphasize the non-exactness of the frequency which may have a bearing on the reason for the number of lines being 23.

latest "Satellite Situation Report" from NASA showed that the latest Russian weather satellite, METEOR-23 had been launched on Christmas day 1975, had a period of 102.4 minutes or 1 hour 42.4 minutes—good for Ken! An inclination of 83.1° means that the pictures produced from this satellite will have a different tilt than those from our ESSA 8 and NOAAs.

The period and the change from day to day are the all-important factors in making a "practical" satellite schedule for an "unknown" satellite but knowledge of the inclination is also very important. To determine the first two factors judicious listening is the prime method. A good beam antenna is the best way to determine the latter.

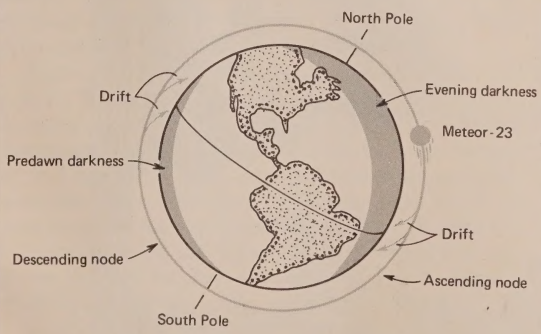


Fig. 3—Diagram illustrating the drift of the satellite out of the early evening darkness into the daylight of late afternoon while the descending node moves into the predawn darkness.

Ken and I now had a working schedule but there was a lot more we needed to know about this satellite. When it comes to precise measurements the man with the measuring equipment is the one to call in. At this point a picture and tentative data went off by fast mail to W6KT, Virgil, in California. We had worked together throughout the years of our acquaintance on other sleuthing jobs and his measuring equipment is tops. Thus he was the logical third man in our team.

Virgil, also crystal controlled, moved the i.f. frequency of his receiver 200 kHz to get the METEOR channel. Fixing on the frequency of the wobbulating f.m. signal was difficult, made more so by the Doppler shift (changing frequency of approaching and receding transmitters) but was finally confirmed as 137.3 mHz. The subcarrier at 2720 Hz seems unrelated to other frequencies in use in contrast to what we are used to in the American satellites. The frequency of the sync pulse is 255.5 Hz square wave determined as illustrated in fig. 2 and is composed of 23 black and white lines (could this 23 be an identifier for the satellite as well as for sync?) and occupies 18% of the total picture[2].

[2] The sync train lends itself to line synchronization for scope or TV tube readout. A tuned circuit similar to that used by Spillane for NIMBUS III which also had a sync train (*QST*, Aug., 1969, p. 51) or an active filter can separate out the sync train. The resultant pulses can then be used to reset the horizontal sweep after each scan without the need for complicated count downs and there is no phasing problem.

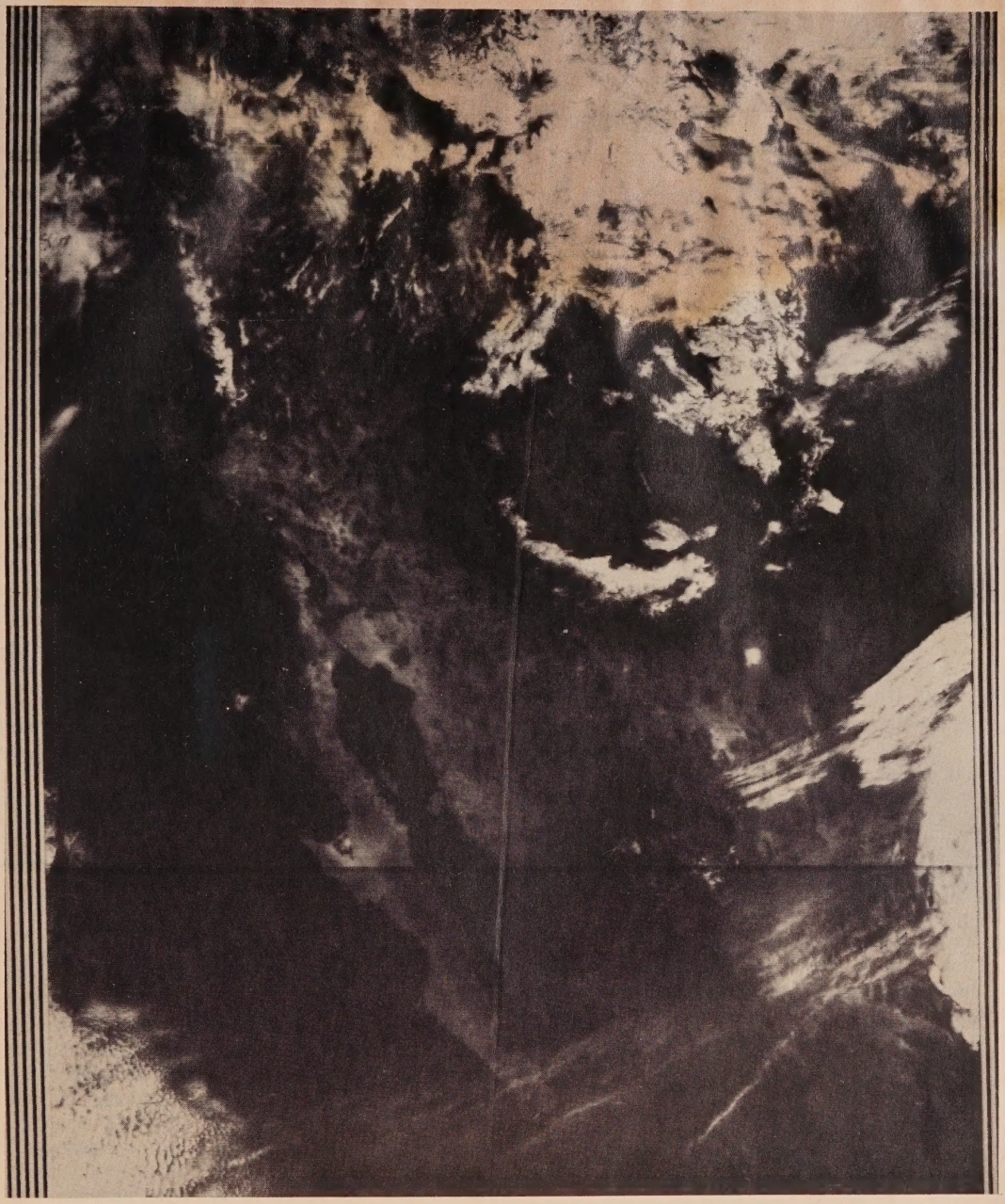


Fig. 4—A shot of the west coast from METEOR-23 to illustrate the superb ground detail of the pictures. The Sierra mountain range bordering the central valley of California is embellished by Lake Tahoe near its northern end. The very obvious pear-shaped, jet black object to the east of the Los Angeles area is the Salton Sea, formed around 1905 by a breakthrough of the Colorado River but maintained by irrigation drain off and thus may be considered "work of man". The large area to its south which reaches to the Mexican border is the Imperial Valley and derives its contrast with the surrounding sandy desert from the intensive agriculture of the area. Many other landmarks may be seen by comparing this picture with a good atlas. W6KT took this picture on a perfected drum following the general pattern of W4MKM (McKnight, April, 1968, p. 28.) and using essentially the same procedure as used for Fig. 1.



Fig. 5—A shot portion showing the much greater expanse covered by the American satellites of the NOAA series. The portion of the pass shown covers from Queen Charlotte Island off the Canadian coast to the tip of Baja California. This portion is roughly the same as covered by the much longer Meteor picture of Fig. 4. Note the grand view of the weather in this picture. This also is from the W6KT drum. About 7 years of concentration on perfecting this drum has certainly paid off. The newcomer can hardly expect these results, however, even from W6KT's drum. It is the work of an artist with the tools of a craftsman.

As time went on and more and more pictures were taken it became more and more apparent that METEOR-23 has a large daily westward drift. This means that it gets earlier every day and will finally drift off into the early morning darkness. This is not true of our American satellites. Though they have some drift their orbits are so designed that we have an overhead pass one day, one on either side of us straddle fashion the second day and an overhead again on the third day and so on *ad infinitum.* The drift of METEOR-23 may be intentional and once one gets used to it may be the preferred mode but at present writing we doubt this.

Thus when this finally comes to press the orbits of the descending (south bound) will have drifted westward into darkness (last visual transmission was 4/7-76 and it lasted only 4 minutes at latitude 46°). What then? The answer is simple. We will begin using the ascending node (north bound) of the satellite (fig. 3) now transmitting infrared telemetry in the darknes of early evening as it too drifts but into daylight at 5 minutes a day. On March 24, 1976 W7AVE at latitude 46° picked up METEOR-23 at 1546Z or 07:46 a.m. local time sending visual pictures with his beam pointing north. Again that evening the satellite was received on a beam pointing south, still well in darkness at 0320Z sending IR telemetry[3]. At five minutes a day you can figure roughly when and which mode will best suit your purposes. The drift factor for one week is a minus 37 minutes 34 seconds. The seconds may be disregarded if you remember accumulated error. It will be interesting to see our country with an evening perspective and afternoon shadows replacing those of morning.

Now what about the pictures? They are superb —a couple of hundred miles closer! The imagry

[3] No attempt has been made to relate acquisition time to the equator crossing time since it seems near meaningless with this satellite.

Table 1 — METEOR 23 Data

Frequency	137.3 MHz
Mode	F.M.
Subcarrier	2720 ± Hz A.M.
Max signal	White
Line rate	
Visual	120 L.p.m.
Infrared	20 L.p.m.
Sync	23 lines 255.5 Hz**
*Period**	102.4 sec.
*Inclination**	81.3°
*Apogee**	900 Km (540 M)
*Perigee**	840 Km (504 M)
Drift	322 sec./day
Pass length	16 min. max.
Progression	25.6°/revolution

*From data in Satellite Situation Report. NASA, Dec. 1975.

**23 lines or 18% of the total picture seems excessive (NOAA carries 7). This suggests that the number may be an identifier for the satellite. It may also reflect a commitment to line sync readout systems for use in underdeveloped countries.

(fig. 4) rivals that of the American satellites which are not designed to see the earth surface but for the meteorologist and scientist. If you want to see a grand view of the cloud cover extending from horizon to horizon as seen from over 800 miles up, or to separate the low fog and stratus clouds from the high, cold clouds which bear the real bad weather then by all means the American pictures (fig. 5) are more useful and more sophisticated. If on the other hand, you want only to see the land masses clearly, get a look at land marks and are satisfied without temperature measurements except at night and a strip-view of the earth only about 1500 miles wide, then the Russian satellite will give you what you want and easier. The superb quality of the pictures need worry no one—these are no spy pictures—large artificial lakes, dammed up rivers and in some cases air pollution are almost the sole "works of man" which can be seen—"Ain't we somethin!"

One peculiarity of the Russian satellites that is quite disconcerting at first is the abrupt changes in bias aboard the satellite to compensate for the changes in lighting as the satellites move over the earth from equator to poles. Why they do this abruptly rather than gradually is unknown. It was true of METEOR 10 which was not seen on this side of the world.



Fig. 6—A "first-shot" of the Russion IR telemetry taken on a slowed drum—W6KT's version.

W7AVE's northern location allowed him to pick up the signal while the satellite was still in the dim twilight above the arctic circle. He soon noticed that there was some sort of a signal before turn-on but its nature was blurred by the noise so he checked for an IR signal at night. Sure enough, a loud signal on 137.3 MHz at about 8 p.m.—lasted over 15 minutes and was back in 1 hour 42 minutes. It sounded completely different from the daytime signal. It had a slow rate—20 sync pulses per minute and a warbling note on the subcarrier that could easily be followed on the VU meter. The infrared transmissions of the NOAA satellites are much faster—48 lines of which the IR portion occupies only about a third.

Now to get some kind of picture out of that signal and determine something of its capabilities. A phone call to Virgil—and both went to work jerry-rigging equipment to the slow speed. One of the results is shown in fig. 6. Reminds one of the pictures from the 24 line scanning discs of the TV of the 20's but it has the meteorological data, complete with grey scales to aid in interpretation. No, not a work of art—just practical.

And that is what you have in Table I—not the precision of the National Observatory but practical information on obtaining and using the transmissions of the Russian direct read out weather satellites of the METEOR series. ■

SEND IN EARLY FOR ALL CQ CONTEST FORMS AND LOG SHEETS

Addendum to 1975 CQ DX Contest Results

PHONE
TROPHY WINNERS AND DONORS

Single Operator, All Band

World
Station FY7AK
(Opr. Ron Delcourt, F5QQ)
Donor: Bill Leonard, W2SKE

U.S.A.
Station W7RM
(Opr. Chip Margelli, K7VPF)
Donor: Potomac Valley Radio Club

Canada
Station XJ3HUM
(Opr. D. W. Dudley, VE3BVD)
Donor: Jack Baldwin, VE3BS

Europe
G. Beasley, G3LNS
Donor: W4BVV Operators

Carib./C.A.
Louis C. Skoczek, WB9AJF/6Y5
Donor: Don Wallace, W6AM

Africa
Charles Jones, 6W8FP
Donor: Gordon Marshall, W6RR

Asia
Norman Styer, EP2SN
Donor: *Japan CQ Magazine*

Oceania
Katashi Nose, KH6IJ
Donor: No. Calif. DX Club

Single Operator, Single Band

World
Rafael Ponce de Leon Z., CW3BR
(14 MHz)
Donor: No. Jersey DX Assoc.
(K2HLB Memorial)

Canada
Station VE7BC
(Opr. R. T. Kaye, VE7LB)
Donor: Gene Krebiel, VE7KB

Carib./C.A.
Alan Otway, 8P6AH
Donor: Pedro Piza Jr., KP4AST

So. America
Mario Pablo Rebufello, CV4CR
(28 MHz)
Donor: Brazil DXers

U.S.A.
Vincent R. Sgroi, K1JHX (21 MHz)
Donor: So. Calif. DX Club

Multi-Operator, Single Transmitter

World
Station VP2M (Oprs. VE7SV, VE7BD, K7JCA, W7EXM, VP2MF)
Donor: John Knight, W6YY

Canada
Station XJ3AA
(Oprs. VE3ABG & VE3FFA)
Donor: Calgary Amateur Radio Assoc.

Multi-Operator, Multi Transmitter

World
Station DL0PG (Oprs. DK2QL, DK3BJ, DJ9IE, DJ5KY, DJ9TQ, DK1QV, DK1FW, DJ1FC, DK7QC)
Donor: Radio Club Venezolano

Expedition

Station VP2M (Oprs. VE7SV, VE7BD, K7JCA, W7EXM, VP2MF)
Donor: Stuart Meyer, W2GHK

Score Corrections

PHONE

Corrections

JA1JIO	7	5,017	64	13	16
K4JNM	A	62,823	181	35	94
WB60MF	14	73,793	236	31	78
XJ3AA	MOST	791,824	1285	64	178
	(Oprs. VE3ABG & VE3FFA)				

Additions

K7GEX	A	148,560	415	40	80
W5NOP/5	MOST	746,171	731	104	295
	(Oprs. W5NOP, K5YMY, W5WQI, WA5KND)				
W8NGO	MOST	402,954,	513	75	206
	(Oprs. W8NGO, W8CLR, W8SRK)				

Note: ZL1AMO score of 48,384, on 3.8 MHz is a new Oceania record.

C.W.

Corrections

JA3ONB	1.8	555	14	7	8
	(Top JA on 1.8 MHz)				
W2NIN	21	47,564	186	24	68
WB5DTX	7	(Operated by W5BJA)			

Additions

DKØFA	21	14,204	104	21	46

Note: YZ1QBC score of 131,216 on 21 MHz puts him 6th World High.
Apologies to Committee member Larry Brockman, WA6EPQ, who somehow got thanked as WA2EPQ.

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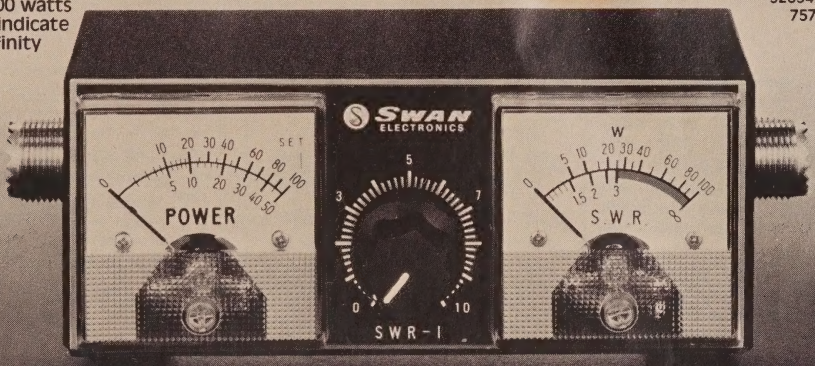
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C.W. TROPHY WINNERS AND DONORS

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Station CX4CR
(Opr. Manuel Castelo, CX9BT)
Donor: No. Jersey DX Assoc. (W2JT Memorial)

Europe 14 MHz
Station YZØSPJ
(Opr. Marijan Miletic, YU1PCF)
Donor: G2LB Memorial from Friends

U.S.A.
David R. Blaschke, W5WZQ (7 MHz)
Donor: No. Illinois DX Club

Single Operator, All Band

World
Station EA8CR
(Opr. Ville Hiilesmaa, OH2MM)
Donor: Larry LeKashman, W2AB

U.S.A.
Glenn Rattmann, W6MAR
Donor: Frankford Radio Club

Europe
Inaki Alcorta, EA2IA
Donor: W3AU Operators

Carib./C.A.
Chester Moore, KP4EAJ
Donor: Don Wallace, W6AM

Africa
Charles A. Unglesbee, 5L2T
Donor: Gordon Marshall, W6RR

Asia
Alex M. Konnikov, UI8LAG
Donor: *Japan CQ Magazine*

Oceania
Katashi Nose, KH6IJ
Donor: Maui Amateur Radio Club

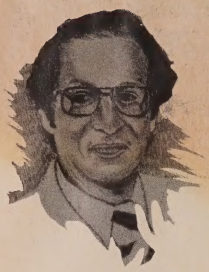
Multi-Operator, Single Transmitter

World
Station FY7AK
(Oprs. F2QQ, F5QQ, KP4TIN)
Donor: Anthony Susen, W3AOH

Multi-Operator, Multi Transmitter

World
Station W3WJD (Oprs. W3WJD, K3YUA, WA3LRO, W3DQG, W3JGI, WA3MHD)
Donor: Hazard Reeves, K2GL

World
Station CT3/OZ5DX
(Oprs. OZ1LO, OZ5DX, OZ6KT)
Donor: Don Miller, W9WNV (K2HLB Memorial)



Math's Notes

BY IRWIN MATH, WA2NDM

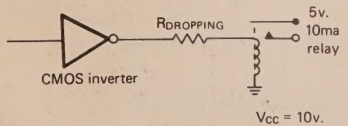
In our July column, you will recall, we introduced the new CMOS low power logic family and gave some examples of CMOS use. Since several manufacturers have begun offering the same functions as the very popular TTL logic family in CMOS, we thought that we would devote this month to a discussion of how to interface various types of readouts with these low power devices.

As you will recall, the CMOS output stage appears as a 400 ohm (or so) resistance to Vcc when producing a logic "1" output and a 400 ohm (or so) resistance to ground when producing a logic "0".

Keeping this fact in mind, we can easily utilize this output to drive, for example, a relay. In fig. 1 we have a typical CMOS inverter, operating from a 10 volt supply, driving a 5 volt ten milliampere reed relay such as the Magnecraft W101MY-32. Note the use of a dropping resistor to be sure that the relay is not overdriven. After the value of this resistor is calculated, the voltage and currents should be checked in actual operation since the assumed 400 ohm internal resistance of the CMOS inverter is only approximate. This circuit operates the relay on a logical "1".

If one wishes to trigger the relay on a logical "0", the circuit of fig. 2

*5 Melville Lane, Great Neck, NY 11020.



$$R_{DROPPING} - 400\Omega \cong \frac{V_{CC} - V_{RELAY}}{I_{RELAY}} = \frac{5}{.01} = 500\Omega$$

$$-400\Omega = 100\Omega$$

Fig. 1—A CMOS inverter driving a relay as discussed in the text. Be certain to check the actual relay voltage when the inverter is on as the 400 ohm value is only approximate.

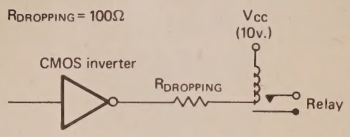


Fig. 2—Circuit used to drive a reed relay on a logical "1" output.

should be used. All calculations are the same as in the first example. Note that even though the minimum current specification for many CMOS devices is only 8-10 milliamperes (at 10 volts), the additional output current can usually be supplied by the devices. Also, since these chips are short-circuit proof, the extra few milliamperes will not harm them.

In addition to the W101MY- series, Magnecraft also has a W102MY- series which may be used with an appropriate dropping resistor. Other relay manufacturers offer similar, low power reeds, and should be checked for alternate devices.

When a visual output indication is desired, the CMOS chip can, in many cases, drive a low current light emitting diode readout in the same manner we have just employed to drive the relay. This is shown in fig. 3. Calculation of the current limiting resistor in this application, is governed by the maximum current that the CMOS chip can safely handle and the parameters of the individual L.E.D. or readout. For best results in this type of operation, low power LED's or a pocket calculator type readout device should be used.

The output current capability of most CMOS chips is quite adequate to drive external transistors as well as relays or LEDS. Fig. 4 shows the inverter driving PNP or NPN transistors. The value of the base limiting resistor, Rb is determined by the base current required to switch the desired current through the load, R1 and the current gain of the transistor.

In fig. 5 we show a method that

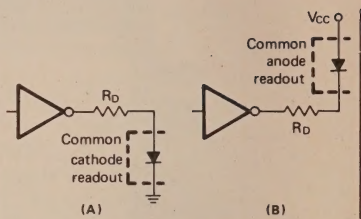


Fig. 3—LED or LED readout driving method.

can be used instead of external transistors, when driving incandescent readouts such as the RCA Numitron series or similar filament type equivalents. Here, resistors are employed to "preheat" the filaments of the various segments and take some of the higher current load off the CMOS inverter. These resistors should be chosen so that the glow from the filaments is just below the threshold of visability or extremely dim with

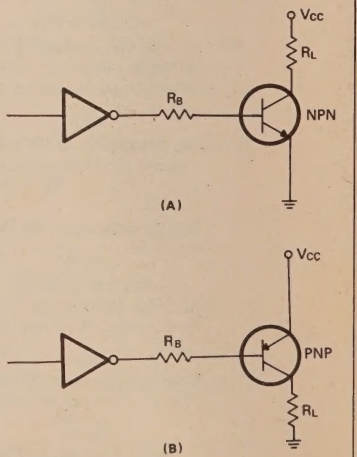


Fig. 4—CMOS driving NPN or PNP transistors. In (A) the transistor conducts when the inverter output is high. In (B) the transistor conducts when the inverter output is low.

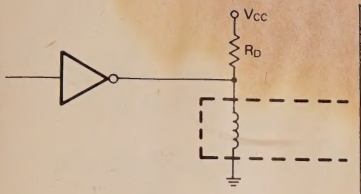


Fig. 5—A method for driving incandescent readouts such as numitrons etc.

the inverter producing a "0" or low output. When the inverter then produces a "1" or high output, the additional current will illuminate the filament.

If gas discharge readouts such as Nixies, planer displays, and the like are your choice, you will have to use an external transistor as shown in fig. 6. The CMOS chip can simply not handle the high voltage required by these devices and the extra transistor is necessary.

Finally, in fig. 7, we come to the fairly new liquid crystal display de-

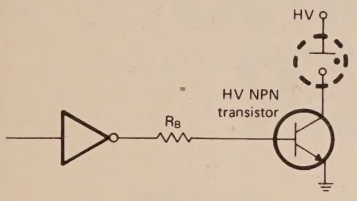


Fig. 6—A method to use when driving gas discharge type readouts such as nixes, etc.

vice. Since the voltage and current requirements of these are very low, the CMOS chip can drive them directly as shown. In (B) of fig. 7 is a method of interfacing square wave driven liquid crystal displays. Some manufacturers recommend this form of excitation instead of pure d.c. as it greatly lengthens the life of the readout.

Many other types of output devices can be interfaced with CMOS integrated circuits by methods similar to the ones given here.

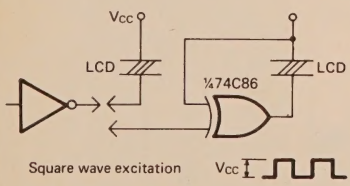


Fig. 7—A circuit for driving liquid crystal displays utilizing either direct d.c. drive or square wave drive (equal to V^cc) for added life.

I would like at this point to once again request that readers writing to me please enclose stamped, self-addressed envelopes with their letters. The volume of mail has been fairly high in the past few months and, as I would like to answer all letters promptly, this measure will at least save me some time. Thank you all for your encouraging comments and kind words and remember, most of the topics for this column come from your requests.

73, Irwin, WA2NDM

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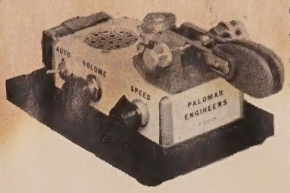
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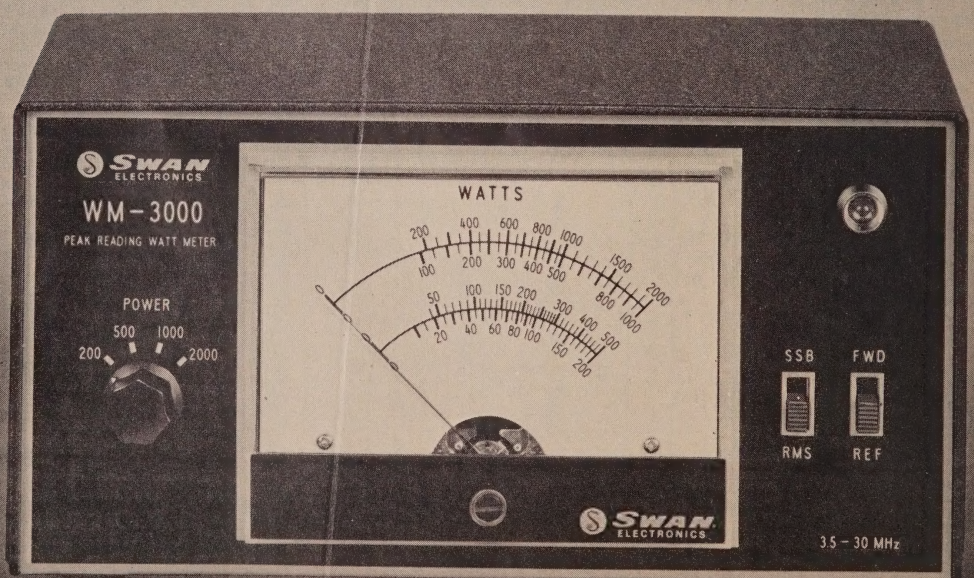
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Novice

BY HERBERT S. BRIER, W9EGQ

Technicians In The Novice Bands

Psychologically, being able to work in the Novice bands again may be more valuable to older Technicians than to more recently licensed ones. Being able to use them after operating phone almost exclusively brings the pleasures of working new states and countries and making new friends, as well as helping you pass the General class code test. If you have not used c.w. for a long time, dig out your old recorded code course and review its first few lessons to refresh your memory on the code alphabet, numerals, and simple punctuation. Then connect a key to your code-practice oscillator and brush up on your sending before bursting forth on the Novice bands. If you have a tape recorder, by all means, make a recording of your own sending.

Undoubtedly, the best way to increase your copying speed is regular practice copying sending a trifle too fast for 100 per cent copy. But not when you are actually making contacts! The aim then is to exchange information accurately. Unwritten rule "one," therefore, is *send at the speed you wish to be sent to.* Do not worry; you will still get plenty of high speed practice while tuning around for stations you wish to work. Copying unfamiliar call signs and addresses is always excellent practice. Besides being unfamiliar, the material is usually sent twice giving you an opportunity to check your copy for errors.

Copying W1AW Code Practice Transmissions

If you have a receiver capable of tuning in the Novice bands, it will also tune in the W1AW Code Practice transmissions on 3580, 7080, (14080), 21080, and 28080 kHz. These transmissions are sent mornings, afternoons and evenings every day of the year, except for a few National holidays, at speeds from five to 35 words per minute on the schedule of fig. 1. By copying W1AW at the first speed above the one you can copy comfortably, ten minutes daily copy will gradually improve your copying ability. The program will also keep you listening to good code, in contrast to the code often heard in the Novice bands. Do not merely listen to the sending; write it down. Otherwise, you may find yourself able to understand what you hear but not be able to write down two consecutive words. Although the FCC will probably start grading elementary amateur code receiving tests by means of multiple-choice comprehension questions by winter, until you have firm news to the contrary, you better prepare for the General code test on the assumption that you will have to write down what you hear.

Key or Keyer?

If your aim is to qualify for the General class code test in a minimum amount of time, stick to a "straight" key until you pass the test. Otherwise, when you change from straight key to bug or electronic keyer, there probably will be a period when your sending will not be very good on either straight or electronic key. At speeds above 10 w.p.m., however, it is physically easier to send code on a keyer than on a straight key. Also, if the sender has a good sense of timing, after adequate practice, his sending on the electronic keyer will probably be better than on the plain key. Without rhythm, however, electronic keyers are nothing but bad news to the operators trying to copy them.

On the v.h.f phone bands, where many transmitters and receivers are crystal controlled on the same frequency, many contacts are made by one operator saying something like, "Is there anybody on frequency? This is W9EGQ," and somebody else



Edward Rothschild, WN6RAP, 2725 Monte Mar Terr., Los Angeles, CA. 80064, was just a broth of a boy when he got his Novice license— about 68. From the start, his equipment would make the eyes of the average amateur glisten: Collins 32S-3 transmitter, Collins 75S-3B receiver, Collins KWM-2 transceiver. Mosley 3-element triband beam atop a 50-foot tower, and a 40/75 trap dipole. Since getting his General license, (WA6RAP), he had added a couple of 1000-watt amplifiers, and RTTY and SSTV equipment, and a Hy-Gain TH-6-DXX beam. We are sending Eddie a 1-year subscription to CQ Magazine for sending us this winning picture in our Monthly Photo Contest. If you would like to try your luck, send a clear picture (preferrably "black and white") of you at the controls of your amateur station and some details of your radio career to Photo Contest, Herbert S. Brier, W9EGQ, 409 So. 14 St., Chesterton, Indiana 46304. Non-winners will be published as space permits.

*409 So. 14th St., Chesterton, Ind. 46304.

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replies, "Go ahead, W9EGQ. This W9EGV." On the crowded lower-frequency bands, however, every station has a continuously-tunable receiver. To attract calls, you send, "CQ CQ CQ CQ DE W9EGQ W9EGQ K," repeated once or twice at a speed between five and 10 w.p.m. and listen for an answer like "W9EGQ W9EGQ DE WN1ABC WN1ABC AR" on or near the calling frequency to which you will reply, "WN1ABC DE W9EGQ," and send WN1ABC a signal report and your location and name; then stand by for WN1ABC's initial remarks with "... WN1ABC DE W9-EGQ K." Once the preliminaries are completed, the operators may talk on any subject they wish, closing their final sign offs with "SK," meaning "This contact is ended."

Whether you make contacts by calling CQ or by calling individual stations is not important. But, on the average, you will have to call them to work the more-sought-after stations. They get so many replies every time they stand by or call "CQ", they seldom call individual stations. And the really "rare" stations are hard to raise when you call them, because the competition is so heavy. Discounting these stations, though, unless you have a better-than-average location and antenna, you will probably make a greater percentage of "hits" calling individual stations than by calling "CQ".

Qualifying For a WAS Certificate

When you have assembled the 50 cards or other evidence that you have worked the 50 states, prepare a list of the states followed by the call letters of the station whose card or other evidence that you are submitting as proof of contact with each state. Carefully inspect each card submitted to make sure that it actually confirms a 2-way radio contact with your station by call letters and the date of contact. Mail the cards, list, and application for the WAS (Worked All States) certificate to: American Radio Relay League, Inc., 225 Main St., Newington, CN. 06111. Include $1.00 for the return of your cards. Novices do not have to be ARRL members to qualify for WAS certificates. Other U.S. and Canadian amateurs do.

W1AW Code-Practice Schedule

When[1]	Speed
9:00A, M W F	5 7½ 10 13
9:30P, T Th S Sn	20 25 w.p.m.
4:00P, M-F	10 13 15 w.p.m.
7:30P, Daily	
9:30P, M W F	35 30 25
9:00A, T Th	20 15 w.p.m.

Frequencies: 1.82, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08, 145.588 MHz.

[1] EST in winter, EDT other months. Subtract 1 hr. for Cen., 2 hr. for Mount., 3 hr. for Pacific time.

Introduction: "QST QST QST DE W1AW W1AW W1AW" for several minutes at slow speed.

News And Views

As its heavy workload apparently precludes the FCC Amateur and Citizens Radio Division from implementing the proposed new no-code v.h.f. amateur phone license for many months, in its summer meeting the ARRL board of directors voted to renew its petition that the FCC authorize 50-watt Novice phone operation in segments of the 144 and 220 MHz bands.

Art Geyer, K8SWW, W0JSW, WR8-AAA, ZF1AG, FPØAG, 860 S. Main St., Milford, Mich. 48042, alerts us of his annual trip to the Cayman Islands (ZF1AG) during the first two weeks of December. On these trips, Art makes a special effort to work Novices. He hopes especially to work more Novices on 10 meters than in previous years. If you work ZF1AG and want his QSL card, send your own card and a stamped envelope addressed to yourself to Art's Michigan address. If the cards check, your ZF1AG card will quickly arrive. To show that all DX-peditions are not a resounding success, Art left Michigan on a Sunday night in July for a trip to St. Pierre Island (FP) and tried for three days and nights to fly from Sydney, Nova Scotia to St. Pierre, which was completely fogged in. On Tuesday, he flew to St. Johns, Newfoundland, paid a taxi fare of $147.00 across Newfoundland and took the ferry to St. Pierre. Paul, FP8DH, got Art through customs where he got the call FPØAG. After this difficult start, he worked many Novices, including Mark, AK1UYU, for the third time from the third country. He also worked AH1INE (Hawaii) and AL7IKO (Alaska) to make Bicentennial WAS #642, all Novice, all on 40 meters! ... They get younger all the time! **Neil Rapp, WN9VPG,** Vincennes, Indiana, is five years old and will start first grade in school this fall. But he is a graduate of the "Old Post Amateur Radio Society" Novice class. His first contact was with Silver Springs, Md. **Chuck Bamford, WN4-DBK,** 3709 Prado Place, Fairfax, Virginia 22030, packed a lot of activity into his 9-month career as a Novice culminating in passing his General class exam. Using a Drake-TRC transceiver exciting a Hustler 4-BTV vertical and an inverted V for 80 meters, he has 30 states and six countries confirmed. He asks, "Who says 'Verticals don't work'?" Besides being the president of the "W. T. Woodson H.S. Radio Club." Chuck has been active in exhibiting amateur radio to various groups such as CB clubs, the local library, the Smithsonian Institute NN3SI (with help, of course). He also single-handedly worked 260 stations on Field Day.

If you plan to partipate in the "SS" Contest the weekend of November 7 (C.W.), we suggest that you write now for your official forms. They are free and makes scoring easier than it is if you prepare your own forms. Send your request to SS Forms, American Radio Relay League, Inc., 225 Main St., Newington, Conn. 06111. Include a large addressed reply envelope with 35 cents postage with your request.

As always, we invite you to send your "News and Views," entries for our Monthly Photo Contest, and other material for the Novice column to: Herbert S. Brier, W9EGQ, Novice Editor, CQ Magazine, 409 South 14th St., Chesterton, Indiana 46304. All Classes of amateurs are invited to write, but this month we extend a special invitation to Technicians operating or contemplating operation in the Novice bands.

73, Herb, W9EGQ



ADRIAN WEISS, K8EEG, ON

QRP

Operating The DX Contest With QRPP

The winter season is upon us and brings with it improved propagation and a series of DX contests which offer QRPp operators an opportunity of experiencing the QRPp thrill at its keenest. The challenge of rubbing shoulders with the QRO boys is open combat for rare DX, or even the more mundane variety, is the ultimate test of the QRPp operator's special virtues—patience, endurance, guts and savvy. It also provides the opportunity to learn those virtues! But the exhilaration at each successful contest contact makes the experience well worth the effort. Quite frequently, even the veteran QRPp DX'er will emerge from a rapid-fire string of DX contacts shaking his head and muttering in ecstasy, "I just can't believe it, wow!" Invariably, persistence adds new countries to a growing DXCC list. And, moreso than non-DX operation, the DX contest tests an operator's susceptibility to the ravages of frustration. Extended "dry periods" lead him to frantically check every connection in the station, to run out and look over the antenna, tune and retune, all the while feeling a turmoil in his gut and muttering "what the hell is wrong? I should have worked at least some of those lousy $#@%¢&'s."

It may come as a surprise to most readers that the DX contest—the natural habitat of the KW's—is a perfect environment for the QRPp operator who is interested either in working DX or in developing his skills and knowledge. The following is intended to provide QRPp operators with some background on successful DX contest operation.

Myths vs. Reality

Pictures that accompany "DX contest results" stories create the impression that, in order to even be heard in a DX contest, a high power linear and a gigantic antenna at dizzying heights are essentials. This is not true. During the past few years, an increasing number of QRPp stations have entered DX contests with quite impressive results—some have worked in the above 50 countries bracket, most in the around-30 countries range, and many under that mark. What may surprise readers is the consistent success of QRPp s.s.b. in the DX contest.

Actually, DX contests provide very favorable conditions for QRPp. The presence of a great number of stations from all parts of the globe over an extended time period provides the QRPp operator with the opportunity to call and recall a particular station, a factor which greatly increases the chances of making contact as propagation optimizes for that particular station. This opportunity usually exists only during a DX contest. The QRPp operator interested in working DX should take advantage of contest conditions.

Station and Antenna

Most QRPp stations have succeeded in DX contesting with modest antennas such as dipoles, verticals, and two or three element yagis or quads, which are at affordable heights. An exotic antenna would, of course, help, but it is not essential. Considerations regarding efficiency of the antenna mentioned in earlier columns apply in readying the antenna system for DX contesting.

The station ideally includes a transceiver capable of both s.s.b. and c.w. operation on the 20-15-10 meter bands. Full break-in capability is a great asset, but not essential. Until I got an Argonaut in 1974 or so, all of my DX contesting was done with separate receiver-transmitter combos and manual break-in. While this type of operation required considerably more manual dexterity and timing then did the Argonaut, results weren't appreciably worse. My nerves were a lot more frazzled at the end of a contest though!

One must bear in mind the proper perspective regarding QRPp DX contesting. The QRPp station is in the contest primarily to just work some DX, and not to rack up a megamillion score. The fact that an operator using a single band c.w. transmitter and separate receiver, with manual switching etc., manages to work a meager 15 countries is a significant achievement in itself!

Propagation

An understanding of propagation is important to any form of operation, but especially in reference to QRPp involvement in DX contesting. KW's and multi-element beams are capable of nullifying non-optimum propagation effects through sheer brute power. Not so with the QRPp signal, which depends heavily upon good-to-optimum propagation, both because of the inherent power level, and the difference between it and most other QRO signals on the band. The best results are obtained when a "pipeline" opens to a given area of the world. K6GKU, a QRPp DX'er whose professional work entails a study of propagation, has been examining data on the "pipeline" phenomena, the characteristics of which are best made apparent by low power signals on long distance paths.

At this stage, it seems clear that long distance paths exhibit optimum propagation in one direction only. This could be due to the fact that the height and density of the F2 reflecting plane follows the movement of the sun's ionizing rays from east to west. As a result, the optimization of a path in the east-west direction precedes the optimization of the same path in the west-east direction. What this means, in practical terms, is that the signal from an eastern European station (say YU2) will reach and maintain a peak level to the midwest USA (say W0) for

*83 Suburban Estates. Vermillion, SD 57069.

sometime before the signal from WØ begins to build and peak at YU2. Hence, during the period of the peaking of the YU2 signal in WØ, signals from W0 will not yet have built to a peak in YU2. That build-up, it seems, begins as the YU2 signal begins its decline in the midwestern USA. Furthermore, it appears that, while the peaking area of the YU2 signal moves westward across the USA, the peaking area of a signal from the USA moves eastward across Europe and into Asia.

Several QRPp stations have reported observing this phenomenon without knowledge of each other's experience. Seasoned QRO DX'ers have been aware of the movement of peak areas, judging from variations in signal reports. However, the QRPp data seems more reliable since it is usually binary in nature, *i.e.,* contacts vs. no-contacts. To cite an example or two, K4OCE (1970) mentioned his puzzlement during the *CQ* WW Contest over the fact that, during one several hour period, he had been working S5-6 level Europeans while futilely calling about 30 Russians who were at an S7 or better signal level. After a while, the signal strength of the Russians dropped about two S-units, and he was able to rack off a couple dozen rapid contacts with them. I've had similar experiences; in fact, I've come to rely upon the above explanation of propagation as an operating formula: call to the area which has been at a peak level and is beginning to drop in signal strength from that peak level. And when the pipeline opens, the only limit seems to be the skill and endurance of the operator. For example, during the second half of the 1974 ARRL CW Contest, the Europeans were booming in like locals, but I diddled around with weaker SA and Caribbean stations because I had no luck at all in sporadic calls to EU. Once the EU stations began their fade, I turned the quad on them and worked 19 in a row in the following time sequence: 2034 - 2035 - 2044 - 2048 - 2053 - 2058 - 2059 - 2102 - 2111 - 2115 - 2116 - 2120 - 2121 - 2126 - 2134 - 2158 - 2201 - 2206 - 2224. By the end of the run, the few Europeans remaining were very weak. In this case, the path held for nearly two hours, and I was working them as fast as I could find them.

To summarize, the above suggests that the QRPp DX contester should pay close attention to the signal levels from a given area as an index of when the path to that area will optimize for him. When signals begin to drop off, go after the area until it begins to click. Bear in mind that the path may never optimize sufficiently for more than a few contacts. But in order to be in on the fun if it does, one must persist in making periodic calls to an area during a several hour period while the path is open from the other end.

Techniques

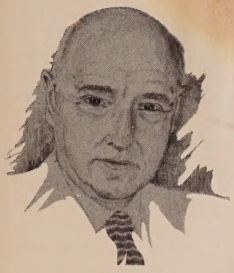
Every successful operator has developed his own unique composite of operating techniques through experience in contests. Some of these techniques are consciously applied, while others have proceeded to the level of conditioned responses. Techniques fall into two categories: "active responses" and "passive analysis." Active responses include the manipulation of equipment in searching out, calling, and contacting other stations. Passive analysis entails scanning and judging the circumstances that determine an appropriate active response. In my opinion, the latter category is most important, for it is in the passive analysis mode that an operator's knowledge of the multiplicity of factors involved in successful communication lead him to the selection of active responses most likely to succeed. But the two must function in tandem in any operating technique. In the following paragraphs, I'd like to attempt to provide some general insight into how the two modes function together in successful operations.

First, there are some general requirements that apply irregardless of circumstances that should be mentioned.

1.) **Familiarity with one's equipment.** The manipulations involved in operating station equipment should not interfere with the process of concentrating upon and making contacts with other stations. Such matters as tuning, adjusting filters, frequency, interference suppression systems, etc., should be mastered to the point where they require little or no attention. For example, through practice, one should be able to tune a desired station to, or near to, the center frequency of a c.w. filter so that if it is necessary to switch into a very sharp position (such as the 80 Hz position of the MFJ CWF-3), no retuning of the incoming signal is necessary. Or again, switching incremental tuning on and off between receive and transmit modes ought to be an automatic response by the operator. Likewise, one ought to know exactly where one's transmitted signal will be in relation to the other station's frequency—this is a matter of familiarizing oneself with the offset between zero-beat and transmit frequency in a typical transceiver. 2.) *C.W. Proficiency.* This requires a close familiarity with the code-forming device, be it hand key, bug, or electronic keyer. Clean code is essential to intelligibility. One must be able to shift rapidly from one code speed to another without losing a sense of character formation and spacing. 3.) **S.S.B. Proficiency.** A knowledge of one's voice characteristics, and the ability to use one's voice in its most intelligible range is important. Likewise, attention to enunciation, fluency in the use of standard, effective phonetics, and understanding of the speech characteristics of the mike and transmitter audio system are very important. Intelligibility is the main consideration, and seasoned operators usually have found their most effective combination of enunciation, speed of delivery, use of phonetics, and voice levels. 4.) A listing of beam headings for ready reference is necessary if a rotable antenna is used. Preparation for contest work can include memorizing the headings for specific areas and call signs.

In addition, certain "rules" apply in regard to specific DX stations, depending on the preferences of that station. Principal among these is the specified response frequency which is usually removed from the DX station's frequency by several kHz. The station's purpose in requesting calls on a frequency other than his own is quite simple — it removes on-frequency QRM from calling stations and permits the stateside station to hear his rapid response clearly. For example: "CQ DX DE ZD3X UP3 BK" invites responses 3 kHz up. Call him near that point—otherwise he won't even hear you, because that is where he is listening. Secondly, some DX stations work through call areas and prefixes in sequence. For example: "QRZ WB4 DE ZD3X BK". The station will ignore calls from any other prefix than the specified. Actually, this type of situation is ideal for QRPp operators, who can sit back and wait until no one else is left! Unfortunately, there are always a few no good LIDS around who persist in calling out of sequence, causing QRM for everyone and murderous desires in many. Thirdly, avoid the urge to barge in while a stateside station is sending his report to the DX station. Many DX operators will ignore calls from stations who barge in and only cause QRM. In fact, I'd urge all DX operators not only to ignore these clods, but to castigate

(continued on page 90)



In Focus

BY BILL DEWITT, W2DD

What's New?

Thousands of amateurs still do not understand that YOU CAN VIEW AMATEUR SLOW SCAN TV (still pictures) ON A CONVENTIONAL TV SET-MONITOR. Regular readers of this column are aware that scan conversion has made possible this more appealing means of viewing SSTV, but the word just doesn't seem to get around! It is to me an amazing fact that every day I encounter amateurs who are completely unaware of our present day capabilities. Yes, you CAN see slow scan pictures on a B and W screen, bright, complete, and you can hold them there as long as you wish.

About two years ago, there were very few amateurs using the slow to fast scan converters needed for TV-set viewing of slow scan pictures. You could count the digital scan converters in use on one hand. There were only a few storage tube converters around.

Robot Research sold approximately 100 of their Model 300 Storage Tube Scan Converters in about nine months. Robot's new Model 400 Digital Scan Converter is reported to be selling very well. In addition, there have been a number of W0LMD and WB9LVI-designed digital scan converters built during the past year. So, it's from a few to scores or hundreds in a very short period. My guess is that as more and more hams understand what is possible with presently available gear, we can expect a several fold further increase in the number of SSTV stations. For a look at an off-the-screen photo of a test picture displayed on a TV monitor via Robot's Model 400 Scan Converter, see fig. 1.

To round out this comment, I should mention that Jim Thomas, WB4HCV, writes that he is still contemplating the production of his Charge-Coupled-Device scan converter. The production of the HCV-2CS converter is dependent upon financing and manufacturing arrangements that were not complete at this writing. Jim is continuing the operation of Sumner Electronics from his new address, P.O. Box 651, St. Simons Island, Ga. 31522, so if you're interested in the large letters modification for your HCV keyboard or other items, you can reach him there.

**2112 Turk Hill Road, Fairport, N.Y. 14450*

Color Slow Scan Anyone?

Don Miller, W9NTP, is still working on the problems of slow scan color. (Pictures of Don's color scan converter appeared in this column, July 1976 issue.)

Don is anxious to receive color transmissions from as many slow scanners as possible. He can supply a limited number of operatore with the Red, Green, and Blue filters necessary for sequential color transmissions. Making the transmissions is a relatively simple project. One has only to place the color filter over the lens, adjust the camera or lights for good image quality, and repeat for each individual filter. Three or more frames of each color should be transmitted to W9NTP, who will store a good frame of each primary color in his scan converter memory. This data will then be read out of the memory in such a way as to control the guns of a conventional color TV set. The result is a complete color still picture.

If you want to take part in an interesting experiment, why not drop Don a line? His address is Box 95,



Fig. 1—Test picture displayed on a conventional TV monitor via Robot Research's new Model 400 Digital Scan Converter.

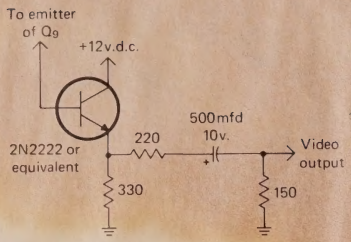


Fig. 2—Single transistor video amplifier used in conversion of the Philco B311 series TV sets for monitor use.

Waldron, Indiana, 46182.

As Assist From Russ Sievert, W8OZA— An Inexpensive TV Monitor

Russ Sievert, W8OZA, of Columbus, Ohio, is well known for his efforts in helping amateurs get started in SSTV. Russ has come up with an excellent suggestion for a low priced monitor. Read Russ' letter and see how you can acquire a good little monitor without breaking the bank.

Russell F. Sievert—W8OZA
1411 Lonsdale Road
Columbus, Ohio 43227

Dear Bill,

Now that Robot has announced their new 400 scan converter I think we will see a big increase in the number of slow scan addicts going the slow to fast route. The majority of 400 buyers will no doubt also be buying some form of black and white monitor. For some strange reason when you take the tuner and i.f. strips out of a receiver and call it a monitor the price automatically doubles or triples. (Probably an extension of the law of diminishing returns.)

Your readers may be interested in my solution to the problem. I use a 9" B/W Philco television receiver that is very easily modified to operate as a receiver/monitor. The set is commonly available and is currently selling in one of the Columbus discount stores for $68.00 plus sales tax. Model numbers to look for are in the B311—series. All of these models seem to have very similar chassis and the enclosed modification schematic applies to them all. Sams Photofact Folder 1164 covers the B311BWH.

From reading the advertising data on the 400 I also assume that it will "frame grab" a picture from a standard commercial TV transmission. If that is the case then schematic of fig. 2 is for modifying the Philco to give video output.

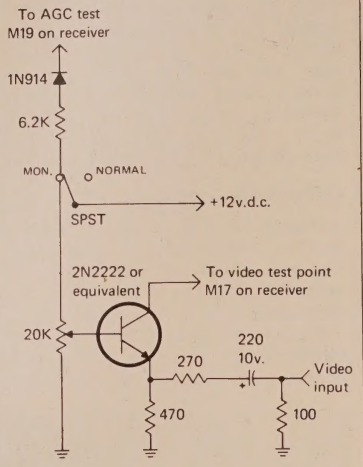


Fig. 3—Further modification of the Philco B311 series receivers for use on 12 volts D.C. instead of 110 A.C.

As an added bonus, for the price of a 3 pole 3 position slide switch and a 2 pin connector the set can also be modified to work on 12 volts D.C. or 14-16 volts D.C. for use in a car or a boat. The necessary information is on the schematic, fig. 3.

If any of the SSTV gang would like to have one of these units and can not find them locally I will be happy to buy one for them and ship it via prepaid UPS for a total charge of $80.00. The approximately $5.00 extra charge will hope-fully encourage those that are interested in buying locally.

Buyers will have to provide their own copies of Sams. I cannot supply copies of the schematic.

73's, Russ, W8OZA

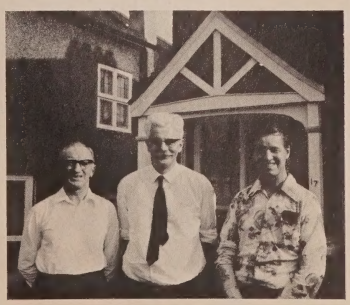


Fig. 4—G3WW had his trusty camera handy when K6IV visited him. That's Ron Johnson, G3GRJ on the left, Howard Waton, G3GGJ, in the center with Clarence Munsey, K6IV founder of Robot Research.

SSTV Goes To High School!

Correspondence from two science teachers tells of SSTV equipment in use at amateur radio stations operated by high school radio clubs. In each case, there is an interest in bringing students into closer touch with not only physical phenomena (like sunspot activity, skip, etc.) but also people to people experiences involving language differences.

I feel that the initiative shown by teachers and students is unique and warrants special attention, so in an early issue we'll have a complete story on this.

Jordan Makower, WA2BRV, at the Pearl River High School, Pearl River, N.Y. and John F. Kienzle, WA2UON, at the Maple Hill High School, Castleton, N.Y. are the science teachers mentioned above, you'll hear more about them and their amateur radio club friends soon.

Albatross SSTV Contest

Results of this contest will be published as soon as available. Judging by the high level of action during the brief interval available for my participation, there should be some pretty high scores. A serious family illness kept me on the run to and from a local hospital that weekend.

Cop MacDonald's Latest Project, The Human Side Of SSTV

Practically everybody on slow scan remembers Cop MacDonald, the inventor of SSTV. I don't think anybody can remember all of the station call signs he's had during the last ten years—but more to the point is the question, "What's Cop doing these days?"

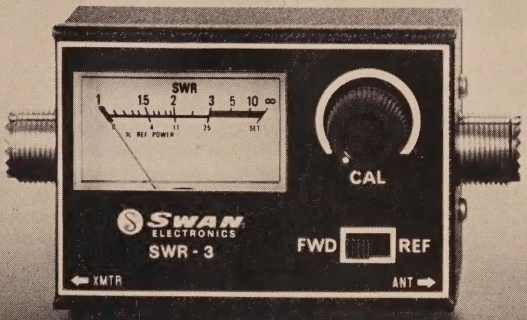


Fig. 5—There's more to this picture than meets the eye! G3MWV, of Cromer transmitted his QTH to a W6 who taped it and re-transmitted it to G3HLV during a 20 meter QSO. The photo was made by G3MWV as he saw the re-transmitted video on HIS monitor!

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Cop is now signing VE1BFL and he's located on Prince Edward Island, (East Coast of Canada). "Cop's Column," which preceded "In Focus" often referred to the more practical and stimulating uses of SSTV. I am sure that it was and still is Cop's hope that amateurs would broaden their span of knowledge and develop new interests through the use of slow scan. He pictured exchanges of ideas and concepts through the use of a medium ideally suited for the display of information difficult to present via the spoken word. He urged the use of combined audio-visual means of real communication rather than brief swaps of reports and names.

So, what's the new project? I believe that it is an extension of an old one dear to Cop's heart: his letter, quoted verbatim below tells the story.

"I'm still very much interested in exploring and developing the human side of SSTV; In using the mode to stretch each other's minds and to help facilitate a genuine dialog-at-a-distance. During the past three years a growing group of hams has been meeting in s.s.b. rountables to share thoughts on some of the major issues of the day. Topics have included ENERGY, RESOURCES, THE FUTURE, ALTERNATIVE MODES OF LIVING, AND THE SEARCH FOR GREATER PERSONAL AND SOCIETAL SANITY. Craig Roberts (WB5-HKO) and I would like to hear from anyone interested in trying some similar get-togethers using slow scan. If interested, write to Cop MacDonald, VE1BFL, 99 Fitzroy Street, Charlottetown, P. E. Island, Canada."

Don't QSL Via The Bureau!

WHAT? Well, don't QSL via the bureau if you're sending a COCONUT to confirm a QSO! Peter Kuehn,

(continued on page 90)



Fig. 6—A good example of a well arranged SSTV station is shown in this photo submitted by Paul Capetz, W6PLI of Glendora, CA. Paul built the nicely packaged keyboard visible at the right on his desk.



WILLIAM I. ORR, W6SAI, ON

Antennas

A swirl of leaves swept against the window of the radio room and the antenna atop the tower trembled gently in the increasing blasts of the wind. It was still afternoon, but the days were getting shorter and the nights colder.

"Winter will soon be here", said Pendergast, interrupting my thoughts. "Better get all your guy wires in shape and the antennas tied down for the wintry weather. Everyone says snow will come early this year". He shivered elaborately and settled down in his operating chair.

"That reminds me," I replied. "Here's an interesting little chart that I found in the January, 1934 issue of *I.R.E.* That was the month I got my ham license, so I was looking through the back issues to see what was going on in the world of shortwave radio at that time. Look at this graph (fig. 1)".

Pendergast peered over my shoulder at the drawing. I continued,

*48 Campbell Lane, Menlo Park, CA 94025.

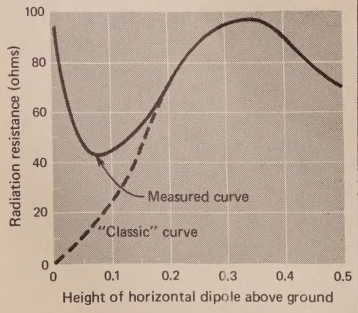


Fig. 1—Radiation resistance as a function of height for a dipole above ground of good conduction. "Classic" curve is for perfectly conducting ground. Real-life measurements show that radiation resistance exhibits much higer values than assumed for antenna heights less than 0.2 wavelength. Increase in radiation resistance is probably due to ground losses.

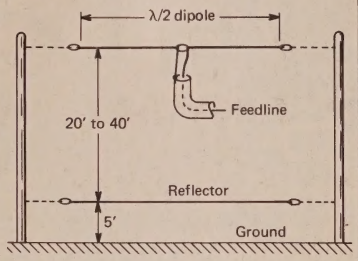


Fig. 2—Ground losses may be reduced by placing a reflector wire beneath the dipole. Length of the reflector is about 5 percent longer than that of dipole. Dimensions shown are for 80 meter band.

"This data was run by engineers of the *Bell Telephone Laboratories* on a dipole antenna suspended over a good, earth ground. Compare it with the curve for perfectly conducting ground, such as a copper screen! This explains why it is possible to feed a low, 80 or 160 meter dipole with a 50 ohm coaxial line and get a reasonably good impedance match and a low value of s.w.r. at antenna resonance.

"For example, an 80 meter dipole with an average height of 20 feet above the ground is about .08 wavelength high. According to theory the radiation resistance of such an antenna is only about 18 ohms. Thus, the best value of s.w.r. at resonance is 50/18, or about 2.8-to-1. Most of my 80 meter dipoles erected over the years have run much closer to 1.5-to-1, or even better than that. Now, according to this chart, a dipole placed at .08 wavelength above a good ground really exhibits a radiation resistance of about 54 ohms. And that would give an s.w.r. figure of only 1.1-to 1."

"Gee, that's great", enthused my friend. "Ho, ho, all the Handbooks are *wrong*, including yours!"

"Not so fast," I replied. "Although the article doesn't state it, I'll bet a lot of the so-called "radiation resistance" at the lower antenna elevations is really *loss resistance.* The earth is an imperfect conductor and, when in close proximity to the dipole, some of the radio energy is bound to be lost because of the resistance of the earth to r.f. currents. So this curve really tells us that at heights of less than about 0.2 wavelength, or heights of less than 50 feet or thereabouts, the ground losses associated with an 80 meter horizontal antenna rise rapidly. This corresponds to heights of 25 feet on 40 meters and 100 feet on 160 meters".

"Bah!", exclaimed Pendergast with a frown. "Are you telling me that a dipole won't work at heights of less than 0.2 wavelength?"

"Not at all", I replied. "This interesting graph merely tells you that ground loss exists when the horizontal antenna is in close proximity to the ground and that the radiation resistance—or input resistance, if you prefer, plus the ground loss resistance adds up to provide a total figure in the vicinity of 50 ohms. As a result, the low dipole provides a somewhat better s.w.r. figure at resonance than one is led to believe from studying the theoretical case".

"The graph tells you even more than that", I continued. "At an an-

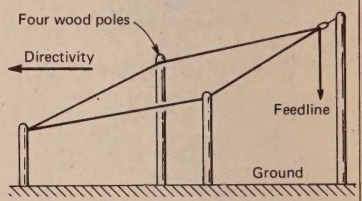


Fig. 3—The tilted Quad loop of WA4BAX. Dave uses this antenna on 80 meters. Tilting the loop picks up about 3 db in the favored direction and drops the signal about 3 db in the reverse direction. Length of wire in the loop is 1005/f (MHz). W4TYH uses an antenna like this about 50 feet high with a 5 percent larger square reflector beneath it to reduce ground loss.

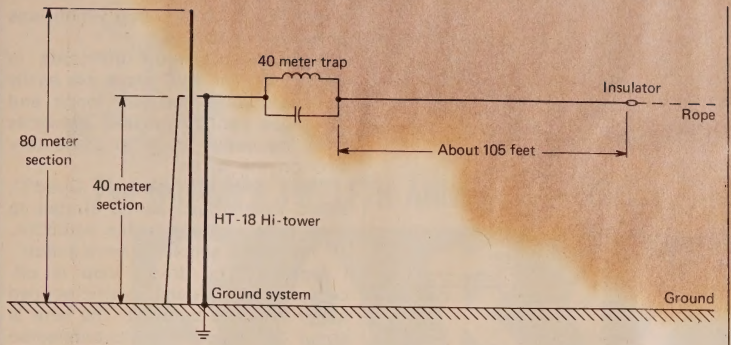


Fig. 4—The add-on 160 meter antenna of W2GHK/4. Hi-tower has 40 meter trap added at top of 40 meter section (tower) and single wire resonates system to 160 meters. Stu used a Hy-gain trap but a substitute can be made of a 100 pF, 5 kV ceramic capacitor (Centralab 850SL-100N). Coil can be 9 turns No. 12, 2½ inches diameter, 6 turns per inch (B&W 3029). Spread end turns to resonate trap on bench to 7.1 MHz before installing in antenna.

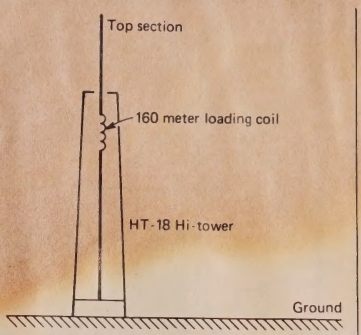


Fig. 5—W5UTV puts his Hi-Tower on 160 meters by adding a loading coil to the 40 meter section. He placed a surplus coil about 3½ inches in diameter in series with the 40 meter wire and adjusted the number of turns to provide resonance at 1805 kHz. Later, he extended the top section to make antenna 65 feet high. Eight radials, 130 feet long are used in addition to a ground screen and 8 ground rods. Al adds about 200 pounds of rock salt to the soil once a year to improve the ground. He says the rock salt is "guaranteed to kill the weeds even if it doesn't make you louder!"

tenna height of 0.1 wavelength, for example, the observed value of radiation resistance is about 45 ohms Theory says it is only 21 ohms. The difference, or 24 ohms, represents loss resistance. Antenna efficiency is thus 21/45 or 46 percent. Just about half your power is lost in warming the ground."

Pendergast sighed heavily. "Well, if you can't get your antenna up in the air at the lower frequencies, you'll just have to accept the ground losses. I wonder if a ground screen under the antenna would do any good?"

"From the data, I would imagine it would", I replied. "But it would have to be quite large. One stunt that some 80 meter operators have done is to place a *reflector* beneath their antenna (fig. 2). The idea is that the reflector beams the energy upwards, away from the lossy ground beneath the antenna. The idea might have some merit to it".

"Pretty sneaky", murmured my friend. "Anything else on the subject of low frequency antennas?"

"Yes", I replied. "I received a note from Dave, WA4BAX recounting his experience with an 80 meter "Lazy Quad". He slopes it in the direction he wishes to work (fig. 3). This antenna was popularized by Clarence Moore, W9LZX, the inventor of the Quad. It was described in *CQ* some time back. Dave tilts his antenna and picks up about 3 db in the desired direction, although he can work DX in any direction. He also says that W4TYH (Gene) uses an antenna like this at 50 feet, but with a 5 percent larger square reflector *beneath* it. He's worked into VK and ZL with it, so it sounds like a good DX antenna for 80 meters."

"How about vertical antennas for the low bands? Any ideas?", asked Pendergast, as he made a sketch of the Lazy Quad in his notebook.

"Yes", I replied. "I got a nice note from W2GHK, Stu. He's got a *Hy Gain* "Hi-Tower" and operates it on 160 meters (fig. 4). Basically, the Hy-Tower consists of a 40 meter, ¼-wave vertical in parallel with a ¼-wave, 75 meter vertical. The 40 meter section consists of three 8 foot sections of tower (24 feet) plus a short length of tubing attached to the tower top to achieve resonance. The 75 meter section consists of 27 feet of telescoping tubing coming out of the top of the tower to make a total height of 51 feet. The tubing is attached to a wire run down the inside of the tower to the feed point at the base. This assembly works well on the lower bands and decoupling stubs are attached to the tower for the higher bands, up to 10.

"The W2GHK modification consists of installing a 40 meter trap *(Hy-Gain)* at the top of the tower section, as shown in the drawing. This provides a mechanically stable attachment. The other end of the trap is connected to 105 feet of wire run parallel to the ground to form an inverted-L antenna for 160 meters. The wire can be trimmed to "zero-in" on your pet frequency. Stu says he had no trouble getting the s.w.r. down to near-unity with the s.w.r. reading rising to more than 1.5-to-1 over 100 kHz.

"When the trap is connected to the top of the tower, the s.w.r. does not change on any of the other bands. The only effect noticed was that the

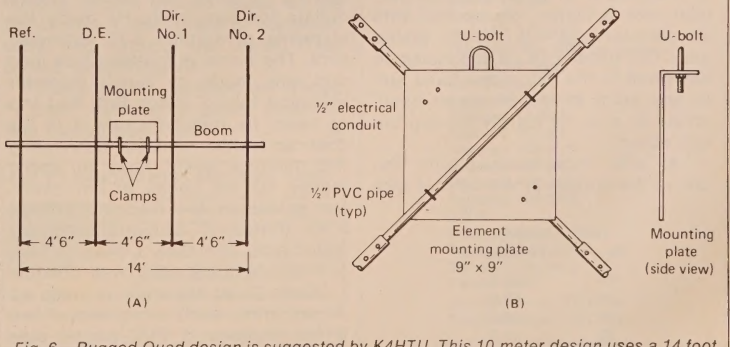


Fig. 6—Rugged Quad design is suggested by K4HTU. This 10 meter design uses a 14 foot boom. The element mounting plates are 9" × 9" squares of aluminum hung from the boom by galvanized U-bolts. A similar plate is used to bolt the boom to the support mast. Each element arm is made up of two 6-foot lengths of plastic PVC pipe pressed onto a three foot length of electrician's metal conduit. This makes an arm about 13'6" long. The arms are cross-mounted on opposite sides of the element mounting plate by means of U-bolts. Overall layout of the Quad is shown at (A) and a typical mounting plate is shown at (B). A gamma match is used on the driven element.

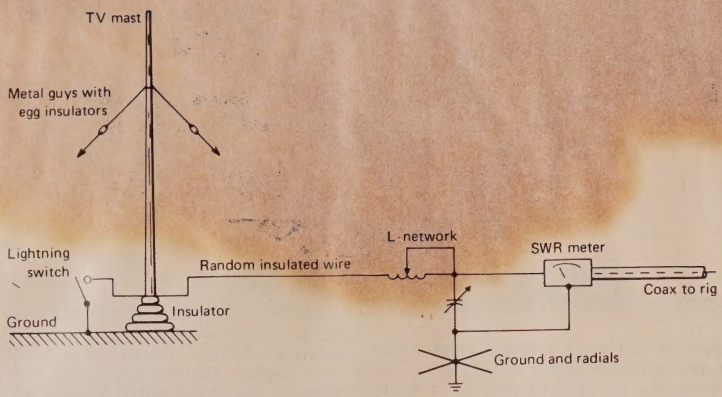


Fig. 7—The super-simple end-fed antenna of K0ILS. Chuck uses a 40 foot TV mast insulated from ground and attached to the side of his house. An insulated wire runs to an adjustable L-network at the station. Antenna, plus lead-in wire forms random length antenna which works well on all high frequency bands. A lightning switch shorts the antenna to ground for protection during heavy lightning storms. A second set of guy wires may be necessary in windy areas.

10 meter resonance of the antenna shifted about 100 kHz. The tower is used with several random 125 foot radials, plus a ground rod, for good DX on 160 meters".

"Man, his Karma is *really* heavy!!", said my friend.

"Glad you like it", I responded. "As long as we are discussing "Hi-Tower" antennas, here's another 160 meter modification worked out by Al, W5UTV. He modified the 75 meter portion to work on 160 meters by placing a loading coil at the top of the tower section, connecting it between the upper pipe and the vertical wire running down to the feed point, as shown in fig. 5.

"The coil is a surplus one, about 3½ inches in diameter and 16 turns per inch. A *Millen* grid-dip meter was used at the base of the tower to resonate it to 1805 kHz. The vertical wire is tapped on the coil with an alligator clip — a copper plated one! The tower can be resonated to any point in the 160 meter band and to any point in the 80 meter band, phone or c.w., by merely moving the clip about.

"Al also experimented with the coil at the bottom of the vertical wire

Band	Radial ground wire length (ft)
169	136.0
80	68.0
40	34.0
20	17.0
15	11.5
10	8.5

Fig. 8—Radial ground wire lengths for high frequency bands. Make radial of insulated wire and tape free end to prevent contact with wire.

at ground level. The alligator clip is merely attached to the center conductor of the coaxial line, which is tapped along the coil for lowest s.w.r. reading on the line.

"For a ground return, W5UTV uses eight ground rods around the tower, plus eight 130 foot radials made of copper wire scrounged from an old, burned-out pole transformer (free). Al's running 160 watts and has worked 4 continents and 47 states with this antenna. Not bad at all, I say".

"That's right", agreed Pendergast." It sounds as if a modified "Hi-Tower" is a pretty good antenna for 160 meters.

"Let's go to the other end of the h.f. spectrum", I suggested.

"I received a note from Bob, K4-HTU, telling me about the four element Quad beam he built for 10 meters. It cost him about twelve dollars for everything. He made the elements of surplus #12 enameled wire. The boom is fourteen feet long and was made of 2-inch diameter irrigation tubing. Since Bob had this at hand, he didn't include it in his cost, so another amateur duplicating the antenna would have to spend money for the boom. In any event, the spreaders are made of ½-inch PVC (Polyvinyl Chloride) 315 psi water pipe. It makes a snug fit over ½-inch electrical steel wall conduit.

"Each Quad assembly is made up of two arms, each composed of two 6-foot sections of PVC plastic pipe pressed onto a three foot length of metal conduit. This makes an arm about 13'6" long. The two arms are cross-mounted on a 9" square aluminum plate (fig. 6) by means of U-bolts. The aluminum plate has a right-angle surface on one side that supports a second U-bolt which acts as a boom clamp.

"Spacing between elements is about 4'6". The PVC pipes are easily drilled to pass the wire loops and the pipes can be pressed outwards from the center plate to place tension on the wires."

"How does Bob feed the Quad?", asked Pendergast, as he started to sketch the antenna in his notebook.

"He uses a simple Gamma match", I replied. "The driven loop is off-center fed by a gamma wire, spaced about 2 inches below it. The wire is about 20" long. A series-connected 100 pF capacitor resonates the match, and an adjustable shorting bar drops it into resonance at the chosen center frequency.

"Bob is very pleased with the beam's performance, even though 10 meters isn't exactly hot these days. I'll bet he can't wait until the sunspot cycle starts to go up".

"Really great", said my friend. "It's just about the simplest beam I've ever seen".

"Well, the prize for the simplest antenna goes to Charles, K0ILS, I think. Look at this drawing he sent me (fig. 7). This is a simple, end-fed vertical antenna that takes up a minimum of room and works on all bands from 160 to 6 meters.

"All it is is a 40 foot TV mast insulated from ground and affixed to the side of the house. It is base-fed, with a single wire that runs to a simple L-network located at the transmitter. Charles uses a length of insulated wire as it is "hot" with r.f. He brings it in through a window to the matching network.

"The antenna is mounted on a surplus porcelain insulator found in the junk yard. The guy wires are insulated from the vertical with egg insulators and are broken up every 10 feet. Finally, a heavy duty knife switch — also a surplus item — is mounted at the base of the vertical to short it to ground when the antenna is not in use. This, of course, is for lightning protection. The antenna is made up of low cost TV mast sections *(Radio Shack 15-5067)*.

"This antennas works as a random length single wire, if you want to call it that. It requires a good ground at the L-network. The ground can be a combination of ground rods and radial wires."

I turned to Pendergast. "Are you sure what a radial ground wire is?"

My friend gulped and said, "I guess so. I've used one".

"A radial ground wire is an extremely handy thing, regardless of what type of antenna you are using. At the very least, it will get the r.f.



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off the equipment and reduce audio feedback. This is very important if you are using speech processing. Many fellows look askance at speech processing because they haven't been able to get it to work. Too much r.f. in the shack causes feedback and upsets the operation of the speech processor.

"A radial ground wire establishes an r.f. ground point at the transmitter. All that is required is a quarter-wavelength wire attached to the ground point of the equipment. The chart of fig. 8 gives representative lengths. Simply cut a ground wire for the band you operate on. Use insulated wire, as the ground wire can be somewhat "hot". Tape the far end of the wire so it can't be touched. Then lay out the wire away from the equipment. You can run it around the baseboard of the room, out the window and along the ground, or wherever it is out of the way. Try and keep it at least a foot above ground, since it is a tuned wire and can be detuned by touching ground.

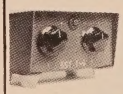
"Since the wire establishes a quarterwave resonance, the end of the wire is at high potential and the end attached to the equipment is at ground potential. The amount of r.f. at the end of the radial wire is a function of the amount of r.f. floating around the equipment. The wire, in effect, transfers the r.f. from the shack out to the end of the wire, leaving the equipment "cold".

"How about when you operate on more than one band?", asked Pendergast.

"Add a ground wire to the transmitter for each band", I replied. "I had a terrible time getting rid of r.f. in the shack on 20 meters until I hung a 16 foot ground radial on the transmitter. I ran it back of the bookcase and around the room. That cooled everything off".

"That's great", laughed my friend. "I can't think of a better cure for less money than that!" ■

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JOHN A. ATTAWAY, K4IIF, ON

DX

OCTOBER is the month of *THE* CONTEST if you're a phone man. THE weekend is Oct. 30 and 31. If c.w.'s your bag wait until next month, the Nov. 27-28 weekend.

Last year's *CQ* Worldwide DX Contests produced a deluge of 1858 phone logs and 1944 c.w. logs for our hard working contest committee. Many additional stations were active for part of the contest but didn't file logs. THE CONTEST is now by far the largest and most popular DX contest in the world. As a result, the *CQ* Worldwide DX Contest weekends present the best opportunities of the year for a DXer to add to his zone, country and prefix totals. Many rare stations will normally work only a handful of U.S. stations in a given weekend or month, but during THE CONTEST they will work literally thousands of W, K, WA and WB DXers. During the 1975 CONTEST, WB4ZHN reported working 20 new countries. This was a typical performance, not an exception.

If those antennas and feedlines aren't in first class shape, get a move on, and don't forget that spare set of finals. If Murphy strikes it will be 2 a.m., not when your friendly electronic supplier is open. GOOD LUCK and work all the new ones.

*P.O. Box 205, Winter Haven, FL 33880



Dr. Sanford Hutson, K5QHS, of the Arkansas DX Association. San recently completed a sensational DXpedition thru the trouble spots of Africa where he activated FH8, D6A and FL8. See details under Here and There.



Single Band WAZ winner Paul Furman, WB4ECE, of Dunwoody, Georgia. Paul made Single Band #23 on 20 meter phone using a 5-element homebrew beam and a station to make anyone drool.

The WPX Program

Mixed

533...W6YMH 535...UW9SG
534...I3ANE 536...HA7PQ

CW

1487...W4NM 1496...UW3PW
1488...OZ7BW 1497...UA6NX
1489...JA3WBK 1498...UB5MAR
1490...G3JXE 1499...UQ2MU
1491...UA6CP 1500...UY5DJ
1492...UA4OP 1501...UKØLAK
1493...UK9OAD 1502...SP6FER
1494...UA9OBJ 1503...SP1ADM
1495...UA1PU 1504...W8ZPX
1505...WA8FIO

SSB

919...LX1RR 921...I6FLD
920...UA6BV 922...ISØMVE
923...W5DMM

VPX

105...UQ2-037-6 109...UC2-009-223
106...UQ2-037-43 110...UB5-065-177
107...UA9-161-59 111...UD6-001-135
108...UA1-120-136 112...UA3-123-174
113...UA3-122-385

Endorsements

Mixed: 1319 ON4QX, 1156 W9FD, 989 K2AAC, 650 UY5OQ, 650 WA3GNW, 558 JH1VRQ.
CW: 1400 W4LRN, 1149 ON4QX, 850 K2AAC, 800 WA5VDH, 700 UK4WAB, 700 WA9UES, 675 UD6BW, 600 WA1JMP, 555 UA6BV, 504 UY5OQ, 379 UA9MP.
SSB: 1029 I4ZSQ, 850 WB4KZG, 616 K2JFE, 300 WA3GNW.
20 Meters: UA9OBJ
80 Meters: UB5VK ,
Asia: UA9MP
Europe: UK9OAD, UA6CP, UY5OQ, UW9SG, UK5MAG.

Complete rules for the WPX Program are found in the May, 1976 issue of *CQ*. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to the WPX Awards Manager, Mr. Bob Huntington, W6TCQ, 5014 Mindora Drive, Torrance, CA 90505.

De Extra

Over the years many interested DXers, including this column, have spoken in favor of an outgoing QSL Bureau for U.S. amateurs. In recent months this has become more and more desirable as a result of soaring postage costs. Consequently, we are pleased to learn that at its Denver meeting in July the A.R.R.L. board voted 10-6 in favor of establishing an outgoing bureau. We understand that it will be in service by Jan. 1, 1977.

Named to head the outgoing bureau was the very capable Bob White, W1CW, who has done an outstanding job with DXCC for many, many years. We congratulate Bob for his past services to the world's DXers and wish him the very best in his new endeavor.

In another matter not related to DX, the board voted 12-4 against a motion by directors from the western states to move A.R.R.L. headquarters from Connecticut to a more centrally-located state. They voted instead to spend $800,000 on enlarging the present building in Newington.

Single Band WAZ— No. One on 40 Meter C.W.

The big news in WAZ this month is the first single band award on 40



Palle Olsen, OZ9VO, long an active participant in the CQ DX Awards Program, has been QRV from Greenland as OX3VO since August. Palle's new QTH is Danmarkshavn on the northeast coast.

meter c.w. The deserving winner of this #1 plaque is Stig Roskvist, SM5AYY of Ljungsbro, Sweden.

Stig overcame a DXing time problem which few DXers will ever face. In fact, in my 18 years of DXing this is the first time I have heard of a DXer put off the air by *triplets*. Stig had only two zones to go, Zone 2 and Zone 6, when the XYL delivered *three* boys and he went QRT to spend as much time as possible helping with the new arrivals.

A few weeks ago Stig was able to start listening again and snared XE1AO for his last zone, only to find that neither of his Zone 2 contacts had replied to his requests for a QSL, meaning he had to get this tough zone all over again.

Stig's rig is a homebrew transmitter running 500 watts to a 2-element, 40 meter yagi. He worked 182 countries on 40 meter c.w. in his quest for the 40 zones.



Pete Hansen, W8TWA, is a regular participant in the CQ Worldwide and CQ WPX contests and a WAZ certificate winner. He is a senior engineer for Bendix Aerospace and an active member of the South Lyon (Michigan) Amateur Radio Club.

Single Band WAZ plaques now outstanding are 80 meter c.w. and both phone and c.w. on 10 meters.

A Personal Note

De Extra is pleased to report a new DXer in the family. Joe Attaway, age 16, received his license as WN4-RVC this summer. K4IIF/Mobile was promptly equipped with a key for quick QSO between the car and home on 40 and 15 meter c.w. Give Joe a call when you hear his CQ.

CQ DX Committee Comes Up With A New One, —

An award that is, not a new country.

Acting on the recommendation of Bill DeWitt, W2DD, *CQ* Slow Scan TV Editor, the Committee has approved the addition of a Slow Scan TV (SSTV) DX Award as a companion to the *CQ* C.W. DX Award and the *CQ* S.S.B. DX Award. The new award will require 100 countries confirmed on SSTV, with the cards and applications to be handled by Assistant DX Editor, Rod Linkous, W7YBX. Applications will be accepted by W7YBX starting Jan. 1, 1977, but contacts may have been logged at any time after Nov. 15, 1945.

There was some discussion of an initial award at the 50 country level, starting point for the *CQ* S.S.B. DX Award when it was initiated back in the1950's. However, W2DD indicates that 3, SSTV DXers are already over the 100 country mark and another 12-15 are closing in on that magic number, so the Committee decided to include the full 100 for the initial basic certificate.

If there is a question regarding the award of certificate #1, that number will go to the applicant with the earliest postmark *on or after* Jan. 1, 1977. If you want #1, don't mail your cards in December, 1976. If there is a tie for #1, it will be resolved by the DX Department in an equitable manner.

Applications should be made on the regular CQ DX Award form which may be obtained by sending an s.a.s.e. to W7YBX at 5632 47th Ave. S.W., Seattle, WA 98116, or to the DX Editor at P.O. Box 205, Winter Haven, FL 33880.

Complete rules will be published in the December issue.

Here and There

K5QHS DXpedition — Thanks to a long letter from Dr. Hutson, details of his spectacular trip to 3 rare countries in troubled east Africa are now available. San writes as follows:

"I tried to correlate my operation with the simultaneous independence



Ed, W3JZJ, operating from I3MMM using Mino's 40 meter Yagi and triband quad. Ed was QST editor in 1963 and 1964.



Rare Spanish Sahara was activated in 1976 by Fernando, EA8CR/9, who made 2000 contacts with 106 countries, mostly on 80 and 40 meters, but 23 of which were on 160. Fernando is now working toward single band WAZ on 80 and 40 meter c.w. and would like skeds with Zones 29 and 30. Interested VK's may contact him at La Rosa 33, Santa Cruz de Tenerife, Canary Islands.

The WAZ Program
Single Band WAZ

40 Meter C.W.

1...SM5AYY

20 Meter C.W.

13...UK3AAC

20 Meter Phone

28...UK3AAC

S.S.B. WAZ

1331...UV3DN
1332...I6FLQ
1333...OE3EVA
1334...DJ9RB
1335...K4GRD
1336...EA3SA
1337...WA4HSE

C.W.—Phone WAZ

3985...UW3RX
3986...UA6APP
3987...UA3RH
3988...UF6FN
3989...WA3SWI
3990...WA3LJP
3991...W3UHV
3992...PT2JB
3993...G3JXE
3994...DL8BL
3995...DJ2GW
3996...DK8GT
3997...OK3QQ
3998...VE1AIH
3999...WØBKS

Phone WAZ

520...CX2CN

The complete rules for all WAZ awards are found in the May, 1976 issue of *CQ*. Applications and reprints of the rules may be obtained by sending a business-size, self-addressed, stamped envelope to the DX Editor, P.O. Box 205, Winter Haven, FL 33880.

The CQ DX Award Program

S.S.B. DX

441...I4ZSQ
442...UA9VE
443...UI8OM
444...UA1LL
445...UK4WAC
446...UQ2IL
447...UA3ERD
448...DA2HD
449...WB6OMF

C.W. DX

210...OK1BF
211...UA9JH
212...UL7HD
213...UA4SM
214...UD6CN
215...UA3GO
216...UV3WT
217...UC2AF
218...UA3RH
219...UV3QQ
220...UA1PU
221...UY5OQ
222...UK4WAC
223...UD6BW
224...UW3PW

Endorsements

C.W.

150...UA3GO, UA3RH and UA9JH

Complete rules for the CQ C.W. and CQ S.S.B. DX Awards are found in the May, 1976 issue of *CQ*. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to the Assistant DX Editor Mr. Rod Linkous, W7YBX, 5632 47th Ave. S.W., Seattle, WA 98136.

Everybody wants the ultimate ham station, but the only way most of us are going to get it is to start now and grow into it.

And the best way to start is with our 700CX.

Then you'll have an excellent transceiver with 700 solid watts P.E.P. input of SSB power at the lowest cost per watt—about a buck—of any comparable equipment.

And when you're ready to add capability and features, plug in or hook up Swan accessory equipment for easy expandability.

For instance, just plug in our 510-X crystal oscillator when you want extra frequency coverage. Want VOX? Plug in the Swan VX-2 and start talking. Or hook up our FP-1 telephone patch in minutes.

And when you're ready for that big jump to all-the-law-allows, our 2000 watt P.E.P. input Mark II linear amp is waiting in the wings.

Add our complete selection of power supplies, microphones and other options and you've got everything you need for a full-house rig in matching specs and matching decor.

So your ham station will look and perform like it belongs together.

The 700CX is designed to handle problems like cross-modulation and front end overload. And you get all bands from 10 to 80 meters with selectable upper or lower sideband, or CW with sidetone.

Get started on your dream rig today. See the 700CX at your nearest Swan dealer or order direct from our factory. Use your Swan credit card. Applications at your dealer or write to us.

700CX Champion Transceiver	$649.95
117-XC 110V AC Power Supply *(includes Speaker and Cabinet)*	$159.95
117-X 110V AC Power Supply *(less Speaker and Cabinet)*	$114.95
510-X Crystal Oscillator	$ 67.95
VX-2 Plug-In VOX	$ 44.95
FP-1 Telephone Patch	$ 64.95
Mark II Linear Amplifier *(complete with 110/220 VAC power supply and tubes)*	$849.95

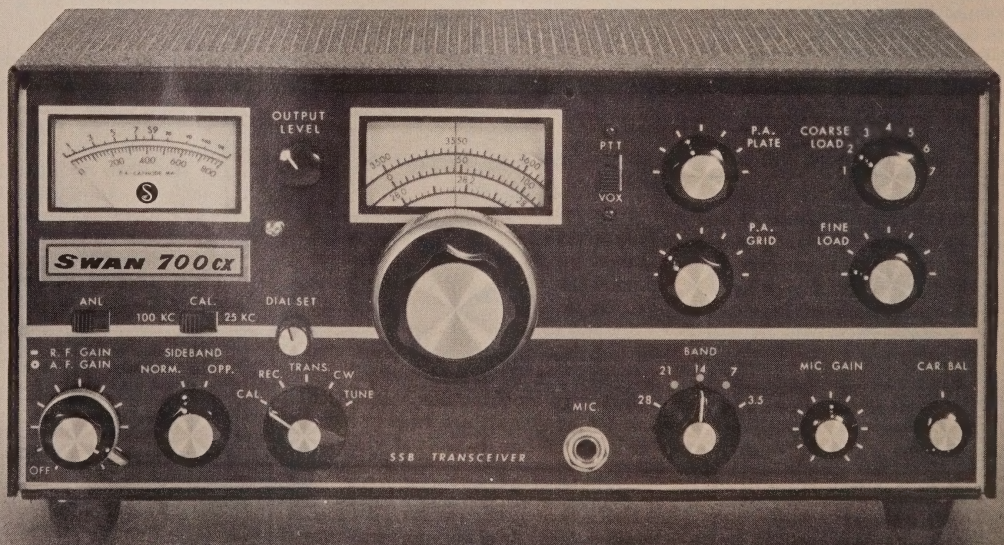
(prices FOB Oceanside, CA)

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ARKANSAS
Moory's Electronics, DeWitt

ARIZONA
The Radio Shop, Kingman

CALIFORNIA
Antenna King, Torrance
Fontana Electronics, Fontana
Gary Radio, Inc., San Diego*
Ham Radio Outlet, Burlingame
Henry Radio, Inc., Los Angeles*
Henry Radio, Inc., Anaheim*
Quement Electronics, San Jose
Western Radio, San Diego

COLORADO
CW Electronics Sales, Denver*

FLORIDA
Amateur Radio Center, Inc., Miami*
Amateur Electronics Supply, Orlando*

ILLINOIS
Erickson Communications, Inc., Chicago

INDIANA
Hoosier Electronics, Terre Haute

IOWA
Bob Smith Electronics, Ft. Dodge

KANSAS
Associated Radio Communications, Overland Park
Electronics Inc., Salina*

LOUISIANA
ALS Electronics, Alexandria

MARYLAND
Amateur Radio, Limited, Silver Spring
Professional Electronics, Baltimore

MASSACHUSETTS
Tufts Radio Electronics, Medford

MICHIGAN
Electronics Distributors, Inc., Muskegon*
Radio Supply & Engineering Co., Clawson

MINNESOTA
Electronics Center, Inc. Minneapolis*

MISSISSIPPI
Electronics World Inc., Pascagoula

MISSOURI
Esco Amateur Sales, St. Joseph
Ham Radio Center, St. Louis
Henry Radio, Inc., Butler*

MONTANA
Conley Radio Supply, Billings

NEW HAMPSHIRE
Evans Radio, Concord*

NEW JERSEY
Atkinson & Smith, Inc., Eatontown
George Marko, Little Falls**

NEW MEXICO
Electronics Module, Hobbs
Gene Hansen Company, Corrales*

NEW YORK
Harrison Radio, Farmingdale
Westchester Communications Specialists, Yonkers**

NORTH CAROLINA
Freck Radio & Supply Company, Asheville
Slep Electronics Company, Otto

OHIO
Amateur Electronics Supply, Cleveland*
Coston Electronics, Cincinnati

OKLAHOMA
Radio Store Inc., Oklahoma City

OREGON
Portland Radio, Portland*

PENNSYLVANIA
Hamtronics, Trevose
Whiteside Electronics, Pittsburg

SOUTH CAROLINA
Amateur Radio Electronics, Inc., Cayce

SOUTH DAKOTA
Burghardt Amateur Center, Watertown

TENNESSEE
Freck Radio & Supply Co., Johnson City

TEXAS
Appliance and Equipment Co., San Antonio
Electronic Module, Odessa
Electronics Center Inc., Dallas*
Madison Electronics Supply, Inc., Houston
Waco Communications, Waco

WASHINGTON
ABC Communications, Seattle
Amateur Radio Supply Co., Seattle*
HCJ Electronics, Spokane

WISCONSIN
Amateur Electronic Supply, Milwaukee*

*Sales and warranty repair station.
**Warranty repair only.

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The WPX HONOR ROLL

The WPX Honor Roll is based on confirmed *current* prefixes, which are submitted by separate application in strict conformance with the CQ Master Prefix List. Scores are basd on the current prefix total, regardless of an operators all-time prefix count.

Mixed

W4LRN	1625	YU1BCD	1182	K4KQB	960	WA1JMP	857
WA6MWG	1453	W8ROC	1181	K6ZDL	957	G3DO	849
F9RM	1363	WB4KZG	1170	K2AAC	952	WAØCPX	844
VE3GCO	1300	PAØSNG	1146	W4IC	950	WAØKDI	824
ON4QX	1268	WA6GLD	1100	I6SF	946	W6NJU	811
W3PVZ	1263	WA2EAH	1100	DL1MD	940	W9WHM	811
W2NUT	1258	WA5VDH	1074	WØAUB	929	W9ZTD	807
W9DWQ	1253	W3GJY	1052	WB4ISJ	910	IØJX	803
W4CRW	1251	K6SDR	1037	SM7TV	905	SM6DHU	803
WB2FMK	1240	W9FD	1035	WA6TAX	899	IT9AGA	791
DJ7CX	1202	W6ISQ	1028	W3YHR	882	K2ZRO	782
W4BQY	1188	YU1AG	1002	YU2OB	882	YU4EBL	782
W4WSF	1185	YU2DX	995	WA6JVD	875	JA1AG	765

K8UDJ	750						
WØSFU	750						
CT1LN	749						
WA5LOB	749						
PY4AP	735						
KØBIT	733						
K7NHG	719						
WA6EPQ	713						
PA0VB	706						

CW

W8LY	1256	W9FD	962	IT9AGA	825	W4BYU	768
W8KPL	1256	G2GM	911	W6ISQ	824	W4IC	754
WA6MWG	1109	W3ARK	910	K2AAC	816	W4WSF	754
WB2FMK	1085	DJ7CX	887	K7ABV	812	I6SF	726
ON4QX	1081	W2HO	885	VK3AHQ	809	SM5BNX	706
DL1QT	1030	VO1AW	873	WA5VDH	807	WA2EAH	700
W2AIW	972	WA2HZR	853	YU1AG	804	VO1KE	700
YU1BCD	962	K6ZDL	833	WA6JVD	803	OK2DB	693

K2ZRO	649		
K2LWI	629		
VE4QX	600		
OK2QX	600		
WB4KZG	600		

SSB

W4NJF	1381	18YRK	1008	ZL3NS	874	PY3BXW	808
F9RM	1299	DK2BI	1003	DL1MD	858	WB4SIJ	803
IØAMU	1257	DL9OH	954	W3YHR	857	DJ7CX	800
WA6MWG	1164	HP1JC	954	WA6TAX	855	W4IC	800
I8KDB	1106	WB2NYM	941	WA2EAH	850	OE2EGL	780
W9DWQ	1083	YU1BCD	940	WB4KZG	850	G3DO	765
IØZV	1067	CT1PK	923	IT9JT	833	OK1MP	763
W4WSF	1048	F2MO	904	WA5VDH	823	YU1AG	758
PAØSNG	1034	WØYDB	884	W6RKP	822	W2EHB	750
I4ZSQ	1021	K2POA	883	W3DJZ	818	WA5LOB	747

W6YMV	720		
WB6DXU	708		
CX2CN	702		
WB2FMK	700		
CR7IK	613		
I4LCK	608		

celebrations in D6 and the U.S.A., but my permission only came on the night of July 5. I was the only American in the entire area during the time of my visit. The people I met were very skeptical of U.S.A. types, but I spread the good one U.S.A. spirit and changed that image.

"Unfortunately, all 6 criteria, sunspot cycle, time of year, general weekly 'N', local power, antenna and local conditions were at the worst possible level, but 1500+ contacts from D6A with 74 different countries shows that someone heard us.

"The illness I contracted was like the 'Legion Sickness,' high temperature, headaches and sore throat. After I was given permission to operate as D6A I stayed up for 38 of the next 48 hours. Fatigue was greater than on any other DXpedition of mine. Food was at a premium, for example beer was $1.80 a can.

"I *never* ask for contributions either before or after a DXpedition, but naturally they would be appreciated. So far, contributions have paid for about 10% of the cost of the trip.

"Next year its back to D6 and I also hope to operate from Abu Ail as well. YI would be great! This year's trip was a ground breaker and I had to get on the air the best way I could. Next year I will be a known quantity in the area.

(continued on page 90)



1976 Board of Directors of the Northern Illinois DX Association. Left to right are WA9IVL, WA9JCO Secretary, K9WEH, W9JUV President, WA9LZA, WA9FWY Treasurer and W9-NB Vice President. The NIDXA has 35 members in the greater Chicago area, 11 of whom are on the DXCC Honor Roll. (Thanks K9WEH)



A. EDWARD HOPPER, W2GT, ON

Awards

The "Story of The Month" for October/November, as told by Garry is:

Garry V. Hammond, VE3GCO

"Kindly permit me the use of Ed's column as a way of giving you some additional information about that big husky fellow behind the voice or c.w. at VE3GCO.

"The age here is 35. I've been on the ham bands as a s.w.l. since 1957. After confirming 325 DXCC as VE3-7554 and receiving USA-CA-500-#384 May 23, 1964, I obtained my ham license in 1965 and have been quite active since. To date my ham DXCC stands at 312 worked and confirmed. I am keenly interested in WPX 1200+ confirmed; IOTA, awards chasing, and contests. Perhaps we'll meet in the REF, ARRL, WPX, WAE, W/VE, CW/PH CQWW, VK/ZL, etc.

"VE3GCO has held a number of calls. We may have worked from VP2DAE, VP2MAA, VP2SM, VP2LC/P, 9Y4VE, 9Y4VE/Tobago, VE3GCO/VP9, /XE, ZB2CX, VA3HAM and 3C3GCO. In 1975 I used the special centennial call CG3GCO to commemorate the 100th birthday of the founding of Listowel, Ontario. In addition to the aforementioned calls, I have been an operator at GB2SM, 3A2MJC, HV3SJ, 4U1ITU, VE3LSS, VE3FHO, and VE3OSC.

"At present I am QSL manager to my own calls and also those of VP2-DAJ, VP2MAC, VP2DAL, VP2MF, and VA4RRC. May I help you with these stations?

"Needless to say I do like traveling, DX'peditioning, etc. but photography, philately, and my special Wife occupy much of my attention, but not necessarily in that order. Yes, we were married July 5, 1975 and so from being my special YL, she is now my special Wife!

"GCO is a geography high school teacher. L.D.S.S. is a modern secondary school offering academic, commercial and vocational courses to some 1,150 students in grades 9-13. Our town of Listowel has about 5,000 people. We are in an excellent agricultural area of the province, about 100 miles due west of Toronto.

"Our country is noted for excellent beef, butter, bacon, and cheese! We also have the Stratford Shakespearean Festival take place a mere 30 miles south of us. It is well worth a visit.

"Your QSL would be greatly appreciated! It will be used for working towards awards and possibly as a part of a bulletin board display for geography in room 126, L.D.S.S.".

Garry is also custodian for the *Maple Leaf Award* and *Two Olympic Awards,* data and photos *CQ* November 1975, page 73.

Garry is one of the very few who obtained USA-CA-500 as an s.w.l. and then added to it as an amateur. In November 1969 he got up to USA-CA-2000.

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

Awards Issued

Three more BIG ones in the Special Honor Roll:

Special Honor Roll
All Counties

#151—Clint Aberly, K5JBC 6-19-76
#152—Robert S. Serles, W6QPF 7-1-76
#153—Albert E. Johnson, K1IIK 7-8-76

USA-CA Honor Roll

3000	2000	1000
K5JBC ..170	K5JBC ..256	K5JBC ..400
W6QPF ..171	W6QPF ..257	WB4RUA 401
K1IIK ...172	K1IIK ...258	W6QPF ..402
	W1UYL ..259	K1IIK ...403
2500	**1500**	W1UYL ..404
K5JBC ..217	K5JBC ..301	**500**
W6QPF ..218	W6QPF ..302	YU2QZ .1112
K1IIK ...219	K1IIK ...303	W4MNZ 1113
W3ARK ..220	W1UYL ..304	K5JBC .1114
		DJ9ON .1115
		W6QPF .1116
		WA4UAZ 1117

Clint Aberly, K5JBC won them *ALL,* having waited until completion, he was issued USA-CA-500 through 3000 endorsed All S.S.B., All 14, All Mobiles; and All Counties endorsed All S.S.B.

Bob Serles, W6QPF also waited until he completed them *All* and obtained USA-CA-500 through 2500 endorsed All S.S.B., All 14, All Mobiles; and USA-CA-3000 and All Counties endorsed Mixed.

Al Johnson, K1IIK who had USA-CA-500 in January 1964, added to his collection USA-CA-100, 1500 and 2000 endorsed All S.S.B., All 14, All Mobiles; and USA-CA-2500 and 3000 endorsed All S.S.B.; and All Counties Mixed.

Jack Kupp, W3ARK acquired USA-CA-2000 endorsed All A-1.

Jim Carroll, W1UYL qualified for USA-CA-1000, 1500 and 2000.

John Boston, WB4RUA claimed USA-CA-1000.

Rudi Tomse, YU2QZ gained USA-CA-500 endorsed All A-1 (#3 award to YU).

Ron Toller, W4MNZ was issued USA-CA-500 endorsed All 2 × S.S.B.

Dr. Dieter Messer, DJ9ON applied for USA-CA-500 endorsed All A-1.

Steve Hawley, WA4UAZ collected USA-CA-500.

Awards

WR1ACT Worked All Mass. Counties Award: Submissions must include a log listing dates, stations worked, mode and frequency, you must work all 14 Counties. No QSL cards required. All QSOs valid including contacts thru repeater stations. Stations worked must be operating from County claimed. Log must be signed by another amateur certifying that applicant has made the contacts claimed. Awards will be issued for a single band or mode if requested. A self addressed stamped envelope must be enclosed for mailing the award. Submit logs to WR1ACT, South Shore Repeater Association,



DARC—EU-DX-D

Box 284, East Milton, Mass. 02186.

Bicentennial Worked All S.V.A.R.A. Award: Issued by the Saginaw Valley Amateur Radio Association (Burt, Michigan), for contacts with 5 SVARA members during the year 1976. Send 5 QSL cards from SVARA members with one dollar. The QSLs will be returned with the certificate. Any band, any mode are ok. Send the 5 QSLs and dollar to: Secretary of SVARA, WB8KFU, 2115 West Sloan, Burt, Michigan 48417.

DARC DX-Awards: Last month all informations regarding their WAE award was listed and I promised to give data on their Europe Diplom and *EU-DX-D*, so here is that data:

Europa Diplom: First the general rules for ALL DARC's official DX-Awards.

1. DARC's official DX-awards Europa Diplom, WAE and EU-DX-D can be obtained by licensed radio amateurs and s.w.ls all over the world. The specific rules of these awards will follow.

2. All contacts must be made from the same country. Awards for club stations will be issued to the club, not to an individual operator.

3. The DARC-DX-awards are based on the "European Countries List"—listed last month, in my column.

4. All amateur bands for which the applicant holds a valid license may be used.

5. A set of application forms for DARC-DX-awards is available for a large size SAE plus 3 IRCs at the address listed later. The use of these official forms is obligatory.

6. QSL-cards for all contacts claimed must be submitted with the application. All cards must be presented in their original form. Any altering or forging will result in disqualification.

7. The service charge is 2 US-dollars per award, 1 US-Dollar per endorsement or equivalent. The extra charge for the return of cards by registered mail is 1 US-Dollar. All applications go to: DARC-DX-AWARDS, P.O.B. 262, D 895 Kaufbeuren, Germany (FRG).

7-A. North American residents may send their applications, logs to: Hartwin E. Weiss, WA3KWD, 323 North St., Millersburg, PA. 17061. Service charge: 3 Dollars for awards, 2 Dollars for endorsements. Applications for the Europa Diplom Honor Roll should arrive before May/November.

8. New certificate holders will be published in *'cq-DL'*, the club magazine of DARC.

9 The decisions of the DARC-DX-Committee are final.

Europa Diplom:

1. The ED is awarded for working (hearing) amateurs in European countries.

2. Applicants must prove a total of at least 100 points by submitting QSL-cards. The score is computed as follows:

2.1. Contacts:
The basic idea of the award is to work as many European countries as possible on different bands in different calendar years. There are no restrictions as to modes of operation or specific amateur bands.

2.2. Multiplier:
Confirmed contacts of the current and the two preceeding years count 1 point (multiplier 1.0). Older confirmations are devalued by a quarter point per year (multiplier 0.75, 0.5, 0.25). QSL cards dating back more than five calendar years have lost their value for the certificate.

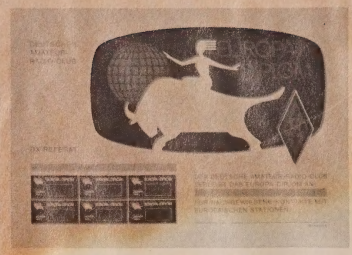
2.3. Annual score:
The sum of all confirmed European countries on different bands in a calendar year multiplied by the respective multiplier produces the annual score.

2.4. Total score:
The total score is the rounded sum of all annual scores.

2.5. Example:
Date of application December 31, 1977.



Bicentennial Worked All S.V.A.R.A. Award.



DARC—Europa Diplom

	1977	1976	1975	1974	1973	1972	1971
confirmed QSOs	32	48	52	44	38	36	17
multiplier	1.0	1.0	1.0	0.75	0.5	0.25	0.0
annual score	32	48	52	33	19	9	0
total score	32	48	52	33	19	9	
							= 193

3. **Europa Diplom Honor Roll**

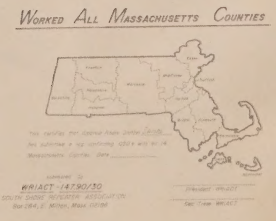
3.1. Each certificate holder with an actual score of at least 100 points will be listed in the ED Honor Roll. The ED-HR arranged according to the scores will be published in DARC's "cq-DL" twice a year. Members on the Honor Roll are awarded an additional sticker.

3.2. To improve the score suitable QSL-cards may be submitted twice a year. make sure that the award-manager receives them before the end of June or December to be considered in the subsequent publication.

EU-DX-D:

1. The EU-DX-D is an award that may be claimed annually. First year of issue is 1964.
2. The EU-DX-D is issued in the following classes: Telegraphy, Telephony (a. m./f. m./s. s. b.), Mixed modes. For the mixed class, at least 30% of the contacts must be made in a different mode.
3. The basic idea of the award is a proportional combination of European and non-European contacts worked in the course on *ONE* calendar year.

(Continued on page 91)



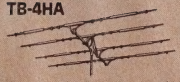
WR1ACT Worked All Massachusetts Counties.

Everything you put into ham radio comes together at your antenna. That's why we put everything we've got into making Swan antennas the best you can buy.

Swan beam antennas are precision engineered to give you a full 2000-watt P.E.P. rating. They're designed for a VSWR of 1.5:1 or better at resonance. They'll give you optimum gain and they're built tough and rugged to stand up to some of the meanest environments.

Don't lose it right where it all comes together. Get one of these Swan beam antennas and top off your rig with a winner. Use your Swan credit card. Applications at your dealer or write to us.

TB-4HA



Heavy-duty, four-working-element antenna for 10, 15 and 20 meters. **$249.95**

TB-3HA



Heavy-duty, three-working-element antenna for 10, 15 and 20 meters. **$189.95**

TB-2A



Light-weight, two-working-element antenna for 10, 15 and 20 meters. **$129.95**

MB-40H



Heavy-duty, two-working-element antenna for 40 meters. **$199.95**

Ask about our 1040V trap vertical for 10 thru 40 meters with optional 75-meter add-on kit.

SWAN BEAM ANTENNA SPECIFICATIONS. For 52-ohm coaxial feedlines.

ANTENNA MODEL NUMBER	BOOM LENGTH & DIAMETER	LONGEST ELEMENT	TURNING RADIUS	MAXIMUM WIND SURVIVAL	WIND LOAD @ 80 MPH	WIND SURFACE AREA	NET WEIGHT
TB-4HA	24' x 1.5"	28'-10"	18'-6"	100 mph	148 lbs.	6 sq.ft.	54 lbs.
TB-3HA	16' x 1.5"	28'-2"	16'	100 mph	110 lbs.	4 sq.ft.	44 lbs.
TB-2A	6.5' x 1.5"	27'-8"	14'-3"	80 mph	60 lbs.	1.8 sq.ft.	18 lbs.
MB-40H	15.75'x1.5"	30'-4"	17'-6"	100 mph	80 lbs.	2.5 sq.ft.	40 lbs.

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GEORGE JACOBS, W3ASK, ON

Propagation



DX CONTEST SPECIAL

The 1976 *CQ* World Wide DX Contest will be held on the following dates:

Phone Section: 0000 GMT Saturday, October 30-
2400 GMT Sunday, October 31

C.w. Section: 0000 GMT Saturday, November 27-
2400 GMT Sunday, November 28

See page 47, *CQ*, August, 1976 for complete details concerning the Contest.

For the 26th successive year, this month's *Propagation* column contains a special forecast for use during the Contest sections, both Phone and C.w.

Sunspot Activity

The Swiss Federal Observatory at Zurich reports a mean monthly sunspot number of 2.1 for July, 1976. The sun's face was completely clear of spots for the entire period between July 8 and 31. The *highest* daily level was reported on July 3rd, when the count hit 14!

This is the lowest level of mean solar activity reported since Sept. 1954, more than twenty years ago. It indicates that the end of the present cycle may be near at hand.

Based on July's level of mean solar activity, the latest *smoothed sunspot number* is 16, centered on January, 1976. A smoothed sunspot number of 8 is forecast for this October. The sunspot cycle is based upon smoothed sunspot numbers, and this is the lowest one expected for any *CQ* DX Contest period since the Contest of October, 1964. A smoothed sunspot number of 16 was recorded during last year's Contest period.

This means that propagation conditions on the *10* and *15* meter bands, and to a lesser extent on the *20* and *40* meter bands, should not be as good during this year's Contest when compared to last year's results. Conditions should be somewhat better, however, on the *80* and *160* meter bands, since DX propagation on these bands usually *improves* during periods of very low solar activity.

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

LAST MINUTE FORECAST OCT./NOV.

Day-to-Day Conditions Expected for Oct. & Nov. 1976

	Expected Signal Quality			
Propagation Index	(4)	(3)	(2)	(1)
Date				
Above Normal: 8, Nov. 4	A-B	A	B	C
High Normal: 1, 7, 10, 24, 28. Nov. 1, 3, 20, 28, 30	B	B	C	D
Low Normal: 2, 5-6, 9, 11, 13, 20-23, 25-27, 29, 31. Nov. 2, 5-6, 9-10, 16-19, 21, 23-25, 27, 29	B	C	D	E
Below Normal: 3-4, 12, 14-16, 19, 26, 30. Nov. 7-8, 11-12, 15, 22, 26	C	C-D	D-E	E
Disturbed: 17-18. Nov. 13-14	D	D-E	E	E

Where *expected signal quality is:*

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

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

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

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

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, a path shown in the Charts with propagation index of (3) will be fair (C) at the beginning of the CQ World-Wide DX Contest on Oct. 29; Fair to poor (C-D) on the 30th and fair (C) on the 31st., etc. For the C.W. section, Nov. 26 should be fair to poor (C-D); fair (C) on the 27th and good (B) on the 28.

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

Band-By-Band Conditions

The following is a band-by-band summary of DX propagation conditions normally expected from mid-October through mid-December, and centered on the Contest periods.

10 Meters—With the bottom of the present sunspot cycle rapidly approaching, very few DX openings are expected on this band. During HIGH or ABOVE NORMAL conditions look for some openings towards Central and South America from a few hours before until a few hours after noon, and perhaps towards the South Pacific during the afternoon.

15 Meters — Although DX conditions are not expected to be as good as last year, *15* meters could be a fair DX band during many of the daylight hours, especially towards Central and South America. When conditions are HIGH or ABOVE NORMAL, signals from Europe and Africa should peak an hour or two before noon, while signals from Central and South America, the Far East and the South Pacific should peak during the late afternoon. During BELOW of DISTURBED conditions, *15* meter openings will be spotty and of short duration, if possible at all.

20 Meters—This is again expected to be the "mainstay" band during the Contest. During NORMAL conditions good DX openings are expected to almost every corner of the world sometime between sunrise and the early evening hours. Conditions should peak for a few hours after sunrise and again during the late afternoon. When conditions are HIGH and ABOVE NORMAL, the band should remain open for DX well into the evening hours. During peak periods, openings will usually be characterized by strong, steady signals. When conditions are BELOW NORMAL, *20* meter openings will be considerably fewer in number, of shorter duration, and with weaker signal levels. In general, however, the band should hold up for some DX openings during all but DISTURBED conditions.

40 Meters—The band is expected to open towards Europe and the east during the late afternoon hours, and remain open for DX to one area of the world or another until shortly after sunrise. Look for openings to

Europe and Africa to about Midnight in the MST and PST time zones, and to about 2 a.m. in the CST and EST zones. Good openings towards Central and South America should be possible throughout most of the hours of darkness. Openings towards the South Pacific and the Far East are expected to peak during a two hour period before sunrise. When conditions are at least LOW NORMAL, *40* meters should share honors with *80* meters as the best DX band during the hours of darkness. When conditions are BELOW NORMAL or DISTURBED, openings will be spotty and considerably fewer in number.

80 Meters—DX propagation conditions are generally at their best on this band during periods of very low solar activity. Some good *80* meter DX openings are expected to several areas of the world during the hours of darkness and the sunrise period. When propagation conditions are at least LOW NORMAL, signals should be strong during many openings. Even during BELOW NORMAL and DISTURBED periods, there is a fairly good chance that some DX openings may be possible during the hours of darkness. Expect conditions to normally peak around Midnight for openings towards Europe, Africa and the east, after Midnight and before sunrise for openings towards Central and South America, and just before sunrise for openings towards the South Pacific and the Far East.

160 Meters — DX possibilities are also improving on this band as the solar cycle nears its absolute minimum. While not as good as *40* and *80* meter openings, some DX should be possible to many areas of the world on *160* meters during the hours of darkness and the sunrise period. Because of power limitations imposed in this band in many areas of the world, signals at best are likely to be weak, especially on phone. The best time to look for *160* meter DX is when a path is in complete darkness, or when the sun is just beginning to rise at the *easterly* terminal. The best do-it-yourself forecaster for *160* meter DX is a set of sunset and sunrise tables. For example, if the sun is expected to rise at 0600 GMT in western Europe, then this would be the best time to check *160* meters for openings between the USA and western Europe, plus or minus a half hour. Conditions on *80* meters can often serve as an indicator for *160* meter openings. When conditions seem to be peaking on a particular path on *80* meters, check for the same path to open on *160*. With these tips and some patience, it should be possible to work several DX areas of the world on *160* meters during the Contest.

Contest Work Plan

The *DX Propagation Charts* on the following page show the times when each amateur band from *10* through *160* meters is expected to open for DX from the United States to the major areas of the world. Instructions for the proper use of these *Charts* are given elsewhere in this column.

The information contained in the *Charts* can easily be reorganized into more convenient types of operational work plans, or schedules, which can serve as valuable propagation guides during the Contest. Experience gained through previous years has shown that such plans can be extremely useful in piling up points with a minimum of wasted time.

HOW TO USE THE DX PROPAGATION CHARTS

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

2. The predicted times of openings are found under the appropriate meter band column (15 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. A ** indicates the best time to listen for 10 meter openings; * best times for 160 meter openings.

3. The *propagation Index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:
(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days
Refer to the "Last Minute Forecast" at the beginning of this Propagation column for the actual *dates* on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 p.m., etc. Appropriate *daylight* time is used, *not GMT*. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

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

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

The following is an example of one of the several type plans than can be devised. It shows, for each three hour period throughout the day, the areas of the world to which the *20* meter band is expected to be optimum for DX propagation. Optimum conditions are considered to exist when an opening is rated in the *Charts* with a propagation index of (3) or (4). If optimum conditions do not exist during a specific time period, openings with an index of (2) or (1) are shown, with appropriate remarks.

A western USA QTH has been chosen for this example, but similar plans can be devised from the *Charts* for other locations, for other bands, or for multi-band operation and for other time spans.

Sample 20 Meter Operating Schedule for Western USA QTH Areas to which openings should be optimum

Time PST	
00-03	Nothing optimum. At best, an occasional opening to South America, South Pacific, New Zealand and Australasia. A good time to catch up on some sleep.
03-06	No optimum openings, and band should be pretty dull. If you didn't get some sleep before, get some now!
06-09	Should open in several directions. Not all optimum, but among the best should be most of Asia and the Far East, Pacific Islands, New Zealand, Australasia, and most of South America. Also to Europe, some areas of Africa, Eastern Mediterranean and the Middle East.
09-12	Openings in much the same direction as during previous time period, but not as good. Signals should be weaker, especially towards Europe, Africa and South America.
12-15	Most of the Caribbean, Central America and the northern countries of South America. Also Western and Southern Europe and most of Africa.
15-18	All of South America, West and Central Africa, Pacific Islands and New Zealand, Far East.
18-21	A good time period to increase scores. Most of Asia along with the Far East, Pacific Islands, New Zealand and Australasia. Good openings to South America, but falling off. Antarctica should open.
21-00	Not an optimum period, but look for openings to South Pacific, New Zealand and Australasia. Some openings should be possible towards South America and Antarctica, and to Europe and Africa, but not optimum.

Up-Dated Contest Info

If the Dept. of Commerce carries out its announced plans to discontinue the 14 minute after hourly propagation forecasts on WWV, this will be the first *CQ* DX Contest during

which these forecasts will not be available. At the time of writing there seems to be no real-time substitute for the WWV forecasts.

In order to meet printing and publication deadlines, the "Last Minute Forecast" appearing in this column was made six weeks before the beginning of the Contest, and is subject to change. For more updated data, specially tailored for the radio amateur and available just before the Contest begins, check MAIL-A-PROP and DIAL-A-PROP.

A special MAIL-A-PROP forecast will be issued for both the Phone and C.w. sections of the Contest. MAIL-A-PROP forecasts, issued bi-weekly in newsletter format, contain day-to-day descriptions of expected conditions and openings on each h.f. band, and from three main geographical areas of North America to all the main DX areas of the world. Regular subscribers will automatically receive the Contest forecasts. The annual subscription rate is $25 postpaid (FIRST CLASS), for 26 issues. A special two-month trial subscription, including the Contest periods, is available for $5 postpaid. Checks should be sent to MAIL-A-PROP, 11307 Clara Street, Silver Spring, Md. 20902. Checks must be received before October 10 for the issues that will cover both the Phone and C.w. sections of the Contest; and before November 10 for the issues that will cover the C.w. Section.

A three minute summary of the special MAIL-A-PROP Contest forecasts will be carried on *CQ*'s DIAL-A-PROP service beginning October 26 for the Phone section and November 23 for the C.w. section. DIAL-A-PROP forecasts are available around-the-clock by dialing Area Code 516-883-6223. The forecasts are issued every Tuesday, and are made for a week in advance. The DIAL-A-PROP number *is not* toll-free, and you must pay for the call.

Radio Storm

One of the greatest fears of DX'ers is the possibility that a major radio storm may occur during a DX Contest. At the time of writing there is a one out of three chance that one will occur during the Phone section of the 1976 Contest.

The propagation data appearing in the *Charts* in this column are based on NORMAL conditions for a smoothed sunspot level of approximately 8. If a radio storm should develop during the Contest, conditions will likely drop to BELOW NORMAL or DISTURBED, depending upon its severity. Under such conditions, expect considerably fewer openings on *10*, *15* and *20* meters. During periods of radio storminess propagation conditions on *40*, *80* and *160* meters also become very erratic, with poorer conditions during certain phases, but with improved conditions at other times.

If a storm should develop, circuits passing through or near polar regions will become weak, fade considerably, or may even black-out completely. Concentrate on working the higher frequency bands, and paths to the northeast, north and northwest during the daylight hours, and the lower bands, and the paths to the east, south and west during the evening and early morning hours. A "Last Minute Forecast" for the Phone section of the Contest, made at press time, appears at the beginning of this column. A similar forecast for the C.W. section will appear in next month's column.

HOW TO USE THE SHORT-SKIP CHARTS

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

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

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

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

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. On the Short-Skip Chart appropriate *daylight* time is used at the *path midpoint*. For example, on a circuit between Maine and Florida, the time shown would be EDT; on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to daylight time in other USA time zones, *add* 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in CDT zone, and 6 hours in the EDT zone. *Add* 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA, *subtract* 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

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

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

For a more complete discussion of radio storms, and what can and cannot be done about them on the amateur bands, see *Don't Be Afraid Of The Big Bad Blackout*, by John J. Schultz, in the November, 1969 issue of *CQ* (page 31).

V.H.F. Ionospheric Openings

While the v.h.f. bands are not part of the *CQ* DX Contest, some interesting ionospheric activity may be possible on these bands during October.

Auroral activity is expected to increase during the month, and some auroral-scatter type v.h.f. openings should be possible during periods when h.f. propagation is either BELOW NORMAL or DISTURBED. Check the "Last Minute Forecast" appearing at the beginning of this column for the days that are expected to be in these categories during October.

ORIONIDS, a major meteor shower is expected to last for about two days, peaking during the early morning hours of October 21, with an hourly count of about 25 meteors. This should make possible some fairly good meteor-type scatter openings on the v.h.f. bands.

C.W. Contest Forecast

This month's *Charts* are valid for *both* the Phone and C.W. sections of the 1976 Contest. *Be sure to keep them handy for use during next month's C.W. section as well.*

CQ DX Contests generate a very large amount of radio amateur operating activity throughout the world. For this reason, these Contests offer an excellent opportunity to check the accuracy, or inaccuracy of the *CQ* forecasts. Reports received during the Contest periods for the past 25 years have contributed considerably in improving these forecasts. Any comments or observations concerning this year's Contest forecast would be appreciated, and can be sent directly to W3ASK, the Editor of this column.

Good luck in the 1976 Contest!

73, George, W3ASK

October 15-December 15, 1976
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Central Europe & North Africa	08-09 (1) 09-11 (2) 11-12 (1)	06-07 (1) 07-08 (2) 08-09 (4) 09-11 (3) 11-13 (4) 13-14 (2) 14-15 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-01 (2) 01-02 (3) 02-03 (2) 03-04 (1)	19-21 (1) 21-23 (2) 23-01 (3) 01-02 (2) 02-03 (1) 20-23 (1)* 23-01 (2)* 01-02 (1)*

*Indicates best time for 160 Meter opening.
**Indicates best time for 10 Meter opening.

Northern Europe & European USSR	08-10 (1)	06-07 (1) 07-11 (2) 11-13 (1)	17-19 (1) 19-22 (2) 22-00 (1) 00-01 (2) 01-02 (1)	19-22 (1) 22-01 (2) 01-02 (1) 22-01 (1)*
Eastern Mediterranean & Middle East	08-09 (1) 09-10 (2) 10-11 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-17 (1)	17-19 (1) 19-23 (2) 23-02 (1)	20-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Western Africa	10-14 (1)** 08-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-17 (4) 17-18 (2) 18-19 (1)	18-20 (1) 20-02 (2) 02-03 (1)	20-22 (1) 22-01 (2) 01-02 (1) 22-01 (1)*
Eastern & Central Africa	10-13 (1)** 09-11 (1) 11-13 (2) 13-15 (1)	07-15 (1) 15-17 (2) 17-18 (1)	20-01 (1)	21-00 (1)
Southern Africa	09-12 (1)** 08-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-15 (1) 15-17 (2) 17-18 (1)	18-19 (1) 19-22 (2) 22-00 (1)	20-23 (1) 20-22 (1)*
Central & South Asia	17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-21 (1)	18-21 (1) 05-08 (1)	18-20 (1) 05-07 (1)
South-east Asia	17-19 (1)	07-08 (1) 08-10 (2) 10-13 (1) 18-21 (1)	17-20 (1) 05-08 (1)	05-07 (1)
Far East	17-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 16-19 (1) 19-21 (2) 21-22 (1)	17-20 (1) 04-08 (1)	05-07 (1)
South Pacific & New Zealand	13-16 (1)** 12-15 (1) 15-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (2) 11-17 (1) 17-18 (2) 18-20 (3) 20-22 (2) 22-00 (1)	00-03 (1) 03-05 (3) 05-08 (2) 08-09 (1)	02-04 (1) 04-07 (2) 07-08 (1) 05-07 (1)*
Australasia	14-16 (1)** 14-16 (1) 16-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-20 (1) 20-22 (2) 22-00 (1)	02-04 (1) 04-08 (2) 08-09 (1)	04-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	08-09 (1)** 09-14 (2)** 14-15 (1)** 07-08 (1) 08-10 (2) 10-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	00-03 (2) 03-06 (1) 06-07 (2) 09-11 (3) 11-15 (2) 15-16 (3) 16-18 (4) 18-19 (2) 19-00 (1)	18-19 (1) 19-21 (3) 21-03 (4) 03-05 (3) 05-06 (2) 06-07 (1)	19-21 (1) 21-01 (2) 01-03 (3) 03-05 (2) 05-06 (1) 22-02 (1)* 02-04 (2)* 04-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina and Uruguay	10-15 (1)** 07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-16 (3) 16-17 (2) 17-18 (1)	02-06 (1) 06-08 (2) 08-11 (2) 14-16 (1) 16-17 (2) 17-18 (3) 18-20 (2) 20-23 (1) 23-02 (2)	20-22 (1) 22-04 (2) 04-05 (1)	21-23 (1) 23-03 (2) 03-04 (1) 02-04 (1)*
McMurdo	15-17 (1)	20-22 (1) 22-00 (2) 00-07 (1)	00-03 (1) 03-05 (2) 05-07 (1)	03-05 (1)

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

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

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

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

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

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

CQ Short-Skip Propagation Chart November & December, 1976

Local Standard Time At Path Mid-Point (24-Hour Time)

Band (Meters)	*Distance Between Stations (Miles)*			
	50-250	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	*Nil*	11-16 (0-1)	11-16 (1-0)
15	*Nil*	10-16 (0-1)	09-10 (0-1) 10-12 (1) 12-16 (1-2) 16-17 (0-1)	09-10 (1) 10-12 (1-2) 12-14 (2-3) 14-16 (2) 16-17 (1) 17-18 (0-1)
20	*Nil*	09-11 (0-1) 11-16 (0-2) 16-19 (0-1)	08-09 (0-1) 09-11 (1-4) 11-16 (2-4) 16-17 (1-3) 17-18 (1-2) 18-19 (1) 19-21 (0-1)	07-08 (0-1) 08-09 (1-3) 09-11 (4) 11-15 (4-3) 15-16 (4) 16-17 (3) 17-18 (2-3) 18-19 (1-2) 19-20 (1)
40	07-09 (0-1) 09-10 (1-3) 10-15 (3-4) 15-16 (2-3) 16-18 (1-2) 18-20 (0-1)	07-09 (1-3) 09-10 (3) 10-15 (4-3) 15-16 (3-4) 16-18 (2-4) 18-20 (1-2) 20-00 (0-2) 00-07 (0-1)	07-09 (3) 09-14 (3-1) 14-15 (3-2) 15-16 (3) 16-18 (4) 18-20 (2-4) 20-22 (2-3) 22-00 (2) 00-06 (1-2) 06-07 (1-3)	07-08 (3-2) 08-09 (3-1) 09-14 (1-0) 14-15 (2-0) 15-16 (3-1) 16-17 (4-2) 17-18 (4-3) 18-20 (4) 20-22 (3-4) 22-04 (2) 04-06 (2-3) 06-07 (3)

(Continued on page 91)

Ham it up for $4.50.



Amateur crystals 143.99 - 148.01 only for this trim price (and it's postpaid). Florida residents add 4% sales tax. Send frequencies, make and model when ordering. Our price includes most gear on our free Parts List. For equipment not listed, we'll provide prices on request and slice up something special. Master Charge & Bankamericard telephone orders accepted. No C.O.D.'s.

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Antenna functions as follows:

75/80 meters — half-wave antenna (bidirectional)
40 meters — two-half-waves-in-phase (2dB gain, bidirectional)
20 meters — four-half-waves (maximum radiation in "X" pattern)
15 meters — four-half-waves-in-phase (4dB gain, bidirectional)

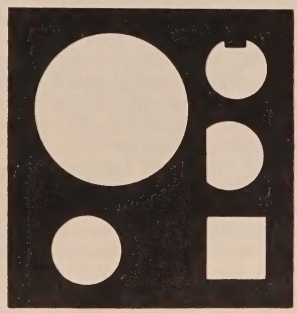
Kit includes:

100 ft —450 ohm open wire ladder line
100 ft — solid copper antenna wire
5 — antenna insulators
1 — 4:1 ferrite balun
1 — reprint of CQ article

Complete kit, postage paid: $38.00
PLEASE send check or money order only.

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GLEN COVE, NEW YORK 11542

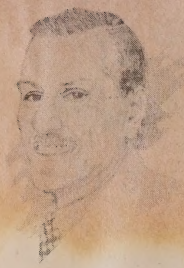




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Ex-Cell-O Corporation



Contest Calendar

BY FRANK ANZALONE, W1WY

There have been many thrilling moments in my long and exciting career in amateur radio. To name a few, starting with my first QSO using a "Ford" spark coil over 50 years ago. Being one of the first stations to contact the first Byrd Antarctic Expedition and relaying their traffic back home. Seeing my name and call in print at the head of my first Column. And receiving my 50 year QCWA certificate from Senator Barry Goldwater.

But none can compare with the thrill I experienced when I opened up the August issue of CQ and saw "W1WY elected to DX Hall of Fame." Haven't quite got over the shocking surprise yet but it goes without saying that this honor is the crowning even in my amateur radio career. I feel proud and with a sense of humility to be associated with the ten illustrious colleagues that have received this honor before me.

Now to get off "Cloud Nine" and back to reality.

Add the following two Trophies to the award list of 30 that appeared in the Rules of the CQ WW Contest on page 47 of the August issue.

Oceania—Phone—Single Operator, 14 MHz. The John Martin, VK3JW Memorial. (International Pacific DX Net donors.)

Canada—C.W.—Single Operator, All Band. (Canadian DX Association donors.)

I had the pleasure of meeting VK3JW when he was on a state-side visit a few years ago. It saddens me to see the name of this fine gentleman and DXer joining the list of "silent keys."

If you find it difficult identifying the many new prefixes that keep showing up on the air, and don't we all, I highly recommend Geoff Watts' (publisher of *DX News Sheet)* new prefix /country/zone list. Its the most informative and complete list of this type that I have seen. Goeff can be reached at 62 Belmore Road, Norwich NR7 OPU, England. (A buck will get you a copy Air Mail.)

73 for now, Frank, W1WY

*14 Sherwood Rd., Stamford, Conn. 06905

Calendar of Events

*Oct.	2-3	California QSO Party
*Oct.	2-3	VK/ZL/Oceania Phone
*Oct.	9-10	VK/ZL/Oceania C.W.
*Oct.	9-10	RSGB 21/28 MHz Phone
*Oct.	15-17	Boy Scouts Jamboree
*Oct.	16-17	RSGB 7 MHz C.W. Contest
*Oct.	16-17	WADM C.W. Contest
*Oct.	17-18	Manitoba QSO Party
*Oct.	19-20	YLRL Anniv. C.W.
**Oct.	30-31	**CQ WW DX Phone**
Nov.	5-8	CHC/FHC/HTH Party
*Nov.	6-7	RSGB 7 MHz Phone
Nov.	6-8	ARRL C.W. Sweepstakes
*Nov.	9-10	YLRL Anniv. Phone
Nov.	13-14	Delaware QSO Party
Nov.	13-14	Missouri QSO Party
Nov.	13-14	European RTTY Contest
Nov.	14	Czechoslovakian Contest
Nov.	20-22	ARRL Phone Sweepstakes
Nov.	20-21	Austrian 160 Contest
Nov.	**27-28**	**CQ WW DX C.W. Contest**
Dec.	4-5	TAC "TOPS" 1976
Dec.	11-12	Hungarian DX Contest

*Covered last month.
**Rules in August issue.

IARS CHC/FHC/HTH QSO Party

Starts: 2300 GMT Friday, Nov. 5
Ends: 0600 GMT Monday, Nov. 8

It is suggested that you send a s.a.s.e. to K6BX for detailed information. Here are the rules in brief.

Exchange: QSO no., RS(T), name, CHC/FHC no., state, county or similar division. Non-members send HTH and omit member number.

Scoring: For CHC — 1 point per QSO with other CHCers, 2 points if its a HTHer, 1 additional point if its a YL, B/P, FHC, Novice, CHC 200, Merit or Club station, or if its on vhf/uhf. Double above points if QSO is out of own country. *For HTH*—Contacts with other HTHers 1 point, with CHCers 3 points, rest same as above. S.w.l. use same scoring as for HTHers.

Multiplier: Each continent, country, ITU zone and U.S. state. (counted only once)

Final Score: Total QSO points from all bands times the sum of the multiplier. Multi-op stations divide score by number of operators. (The same station may be worked on each band and mode for QSO points but not a multiplier.)

Frequencies: C.W. — 3575, 3710, 7070, 7160, 14075, 21075, 21090, 21140, 28090. Phone — 3770, 3790, 3943, 3960, 7090, 7210, 7275, 14330, 14340, 21360, 21440, 28620, 28690. (For US and as allowed for DX stations) Also 50.1-50.5 and145-147.

Awards: The party supports hundreds of certicates and trophies in all categories and divisions. A s.a.s.e. to K6BX will get you a list. Include extra postage for ITU, IARU, IARC, IARS country, prefix and zone lists.

Send all requests and your log to: International Amateur Radio Society, K6BX, P.O. Box 385, Bonita, Calif. 92002.

ARRL Sweepstakes

C.W.—Nov. 6 to 8 Phone—Nov. 20-22
Starts: 2100 GMT Saturday
Ends: 0300 GMT Monday

The fellows really tear up the "pea patch" in this one. Activity is confined to ARRL sections as listed in QST each month.

In order to minimize QRM to non-contest stations it is recommended that operation be confined to certain portions of the respective bands. It is suggested that you check *QST* for this and other information.

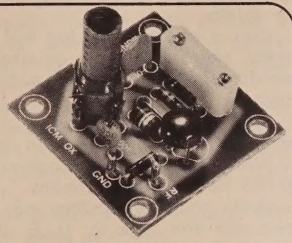
The "SS package" which includes log and summary sheets, and Operating Aid No. 6 will make your contest operating that much easier. A large s.a.s.e. will get you enough forms for 300 contacts. (13¢ stamp, make it 24¢ if you expect to make more.)

The address, as if you didn't know, ARRL Communications Dept., 225 Main Street, Newington, CT 06111.

for the experimenter!

INTERNATIONAL CRYSTALS & KITS

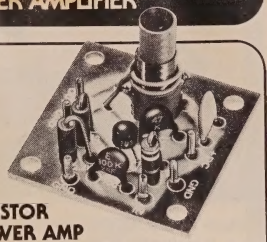
OSCILLATORS • RF MIXER • RF AMPLIFIER • POWER AMPLIFIER



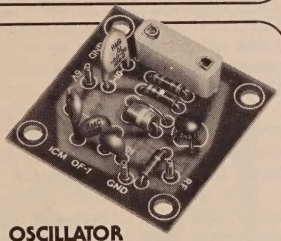
OX OSCILLATOR
Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101
Specify when ordering.
$3.95 ea.



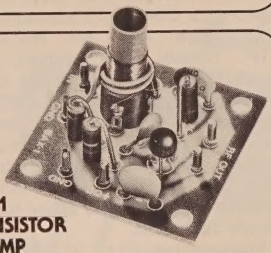
MXX-1
TRANSISTOR
RF MIXER
A single tuned circuit intended for signal conversion in the 30 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106
Specify when ordering.
$4.50 ea.



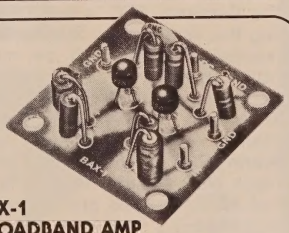
PAX-1
TRANSISTOR
RF POWER AMP
A single tuned output amplifier designed to follow the OX or OF-1 oscillator. Outputs up to 200 mw, depending on frequency and voltage. Amplifier can be amplitude modulated. 3 to 30 MHz, Cat. No. 035104
Specify when ordering.
$4.75 ea.



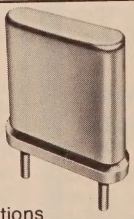
OF-1 OSCILLATOR
Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO, Cat. No. 035108. 18 to 60 MHz, OF-1 HI, Cat. No. 035109
Specify when ordering.
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TRANSISTOR
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A small signal amplifier to drive the MXX-1 Mixer. Single tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 035102. 20 to 170 MHz, Hi Kit, Cat. No. 035103.
Specify when ordering.
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BAX-1
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General purpose amplifier which may be used as a tuned or untuned unit in RF and audio applications. 20 Hz to 150 MHz with 6 to 30 db gain. Cat No. 035107
Specify when ordering
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031081	20 to 60 MHz — For use in OX OSC Hi *Specify when ordering*	$4.95 ea.
031300	3 to 20 MHz — For use in OF-1L OSC *Specify when ordering*	$4.25 ea.
031310	20 to 60 MHz — For use in OF-1H OSC *Specify when ordering.*	$4.25 ea.

Shipping and postage (inside U.S., Canada and Mexico only) will be prepaid by International. Prices quoted for U.S., Canada and Mexico orders only. Orders for shipment to other countries will be quoted on request. Address orders to:
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ICM

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Oklahoma City, Oklahoma 73102



Fr. Dave Reddy, CEØAE was the guest of honor at the August meeting of the Stamford A.R.A. It took a bit of doing but we were able to get a 1975 WW Contest certificate issued in time for the August meeting and present it to Fr. Dave for his c.w. operation in our last contest. That's Al Goldberg, K1JWX President of the Club giving me moral support.

Delaware QSO Party

(4 periods—GMT)
0001-0600 & 1600-2200 Sat. Nov. 13
0001-0600 & 1600-2200 Sun. Nov. 14

The Delaware ARC is again sponsoring this year's party. Stations may be worked once per band, per mode for QSO points.

Exchange: QSO no., RS(T) and QTH. County for Delaware, ARRL section or country for others.

Scoring: Del. stations score 1 point for each QSO. Multiply total by number of ARRL sections and DX countries worked.

Others get 5 points for each Del. contact. Multiply total by 1 if one Del. county is worked, by 3 if two counties, and 5 if all three counties are worked (New Castle, Kent and Sussex).

Frequencies: C.W. — 3560, 7060, 14060, 21060, 28160. Phone: 3975, 7275, 14325, 21425, 28650. Novice: 3710, 7120, 21120, 28160.

Appropriate awards will be given to top scorers and in addition a certificate to all stations working all three Delaware counties.

Mailing deadline is December 31st to John R. Low, K3YHR, 11 Scottfield Drive, Newark, Del. 19713. Include a s.a.s.e. for results or the W-DEL certificate.

Missouri QSO Party

Starts: 1800 GMT Saturday, Nov. 13
Ends: 2300 GMT Sunday, Nov. 14

This is the 13th annual party sponsored by the St. Louis ARC. Special effort will be made to activate rare Missouri counties.

The same station may be worked on each band and mode and Missouri mobiles from each county change. Mo. stations may also work in-state stations for QSO and state multipliers.

Exchange: QSO no., RS(T) and QTH. County for Missouri, state, province or country for all others.

Scoring: One point per QSO. Mo. stations multiply total by sum of states, provinces and DX countries worked. Others use Mo. counties for their multiplier. (max. of 115) Mo. mobiles total separate score for each county activated.

Frequencies: 60 to 70 kHz up from low end of each band, phone and c.w.

Awards: Certificates to top scorers in each state, province and DX country, the top 10 Missouri entries, and the top 3 Mo. mobiles.

Mailing deadline is December 15th to: St. Louis A.R.C., K0LIR, 842 Tuxedo Blvd., Webster Grove, Missouri 63119. Include a large s.a.s.e. for copy of results.

European RTTY Contest

Starts: 0000 GMT Saturday, Nov. 13
Ends: 2400 GMT Sunday, Nov. 14

The DARC has streamlined its contest program to three basic contests each year. The dates are established as the second full week-ends of the month as follows. C.W. in August, Phone in September, and RTTY in November.

Rules are the same for all three contests with the following exceptions.

In the RTTY contest contacts are also permitted between all continents as well as one's own continent, and count 1 point per QSO. However they have no multiplier value other than the countries as listed in the rules. ARRL and European country lists) QTC traffic is also allowed between all stations, but not between stations in the same country. Everything else remains the same.

Since the rules are quite lengthy, explaining the QTC feature, WAE country list and etc., they will not be repeated here but refer you to the June Calendar where they were given in details.

Copies of the rules, log and summary sheets can be obtained by sending a s.a.s.e. to the addresses below.

Mailing deadline for your contest entry is December 1st and go to: WAEDC Committee, Postbox 262, D-895 Kaufbeuren, Germany.

North American stations may send requests and logs to: H. E. Weiss, WA3KWD, 323 North Street, Millersburg, PA 17061.

Czechoslovakian Contest

Starts: 0000 GMT Sunday, Nov. 14
Ends: 2400 GMT Sunday, Nov. 14

We have not heard from the Czech Central Radio Club but assume the rules will be the same as in previous years. If there are any modifications they will be covered next. month.

Contacts may be made both on phone and c.w. but the same station may be contacted only once on each band for QSO and multiplier credit.

This is a world-wide type contest but QSOs with Czech stations have additional value. The Czech stations are looking for more stateside and Canadian participation. Many awards go begging for lack of entries.

Categories: Single operator, both single and all band. Multi-operator all band only.

Exchange: RS(T) plus two figures indicating your ITU zone. (List and map available from C.R.C., s.a.e. and 2 IRCs.)

Scoring: One point per QSO, 3 points if its with a Czech station. Multiply total QSO points by sum of ITU zones worked on each band for final score. Own country may be worked for multiplier credit but no QSO points.

Awards: Certificates to the top scoring station in each category in each country.

The "100 OK" and "S6S" awards are available for contest contacts upon written application with your contest entry.

Mailing deadline for your entry is December 31st to: The Central Radio

Club, P.O. Box 69, 113 27 Praha 1, Czechoslovakia.

Austrian 160 C.W. Contest

Starts: 1900 GMT Saturday, Nov. 20
Ends: 0600 GMT Sunday, Nov. 21

The Landesverband Salzburg of the Oe. V. S. V. has been sponsoring this contest for the past few years but with little publicity.

Exchange: RST plus a QSO number starting with 001.

Scoring: Each completed QSO counts 1 point. Score a multiplier of 1 for each country prefix worked, 2 multiplier points if its an OE prefix. (OE1-9) Final score, total QSOs times the sum of multiplier points.

Frequencies: Australian stations are authorized to use, 1823-38, 1854-73, 1879-1900 MHz. Others according to frequencies authorized in their country.

There is also a s.w.l. division with scoring same as above.

Awards: Certificates to top scorers in each country, special awards to over-all winners.

Mailing deadline December 15th to: Landesverband Salzburg des Oe.V.S.V., c/o Wolfgang Latzenhofer, OE2LOL, Pfeifferhofstrabe 7, A-5020 Salzburg, Austria.



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Surplus Sidelights

BY GORDON ELIOT WHITE*

A few years back the Technical Material Corporation, of Mamaroneck, N.Y., built an accessory sideband converter, the MSR, which was subsequently sold to the military as the CV-591A/URR. These units, particularly the Navy version, have been sold in surplus in recent months. They are an excellent solution to the problem of receiving sideband signals on older but excellent equipment such as the R-390 receivers which do not have internal product detectors.

Of course, much has been written about adding product detectors to the 390 series, and the 51J4 (R-388) Collins' receivers. Generally, however, getting into the guts of the Collins units has not been entirely satisfactory. Unless a very careful job is done, home-brew editions tend to decrease the value of a receiver that even today is not cheap. Problems with automatic gain control circuits and with stability, can make add-on sideband detectors less than optimally useful. I do not want to denigrate the design work of those authors who have come up with product detectors, but in many cases some of us have not been able to duplicate their results.

A good accessory detector saves a great deal of work, and avoids getting into the innards of your receiver.

Leo P. Biese, a New Hampshire pathologist, has written me offering a suggested modification of the CV-591A which makes it compatible with receivers having a 500 kHz intermediate frequency output (51J4 for example). For other units, the R-390A being one, the 591A requires no changes, since its 455 kHz input frequency matches the receiver.

This converter offers reception possibilities in upper and lower sideband, c.w., a.m. selectable sideband, exalted carrier a.m., and simultaneous a.m. and frequency shift signals. It is a 12-tube unit, and mounts in a standard 19 inch rack. Dimensions are 5¼ inches high and 13¼ inches deep. Weight is 24 pounds, power is 110/220 volts, 60 Hz a.c.

Input impedance is 240 K ohms, with a voltage range of 0.1-10 volts RMS. Audio output is available at 8 and 600 ohms.

Fig. 1 is a block diagram of the unit.

The CV-591A combines a highly efficient filter with a bandspread oscillator, allowing tuning over a plus or minus 3 kHz range, for manual sideband selection, or by using the Crystal switch position for more stable sideband control.

Remote sideband selection is available in most MSR-4 and CV-591 units, but under field change orders 4 and 5, the Navy eliminated the remote feature in shipboard installations.

Upper or lower sideband selection is made through a front panel push button which operates a relay. Indicators light to show which sideband has been chosen.

Carrier for s.s.b., exalted a.m., or c.w. reception is inserted at the second mixer by a fixed b.f.o. A following low pass filter shapes the resulting audio signal, which is then amplified to a higher level for the output circuit.

The design of the receiver used with the CV-591A affects the upper and lower sideband selection; with a double conversion receiver that has a first oscillator above the r.f. signal frequency, the sidebands are reversed from the situation found when the local oscillator is lower than the r.f. frequency. As originally supplied, the left light has an "L" for lower, the right one a "U" indicator. If a second or third conversion oscillator in the receiver is above the i.f. frequency, the situation is reversed and the indicator must be switched.

The original design of the CV-591A allows use of the variable oscillator only with receivers having 455 kHz i.f. outputs, but by using appropriate crystals, any receiver i.f. between 225 kHz and 1.5 MHz can be accommodated in the crystal position. Since variable operation is most flexible, and crystals are expensive, here is Dr. Biese's modification to allow use of the unit with a 500 KHz output:

Change C-32 (inside T2) from 430 uuf to 347 uuf by adding 1800 uuf in series. Realign bandspread to hit the 500 kHz point desired. Crystals for 500 kHz would include 517 kHz (upper) and 483 kHz (lower).

The Navy's modifications to disable the remote feature included removing relay driver (12AU7) and reactance tube (6J6) and clipping of the wiring to K3-SW6. Internal wires in Z-5 were also cut. An added plus was the replacement of the rectifier power tube (5Y3) by a diode rectifier, 1N 2389.

The filters in the CV-591 are pretty good, and will improve on most receiver bandpass characteristics. The internal filters in the unit give a width of 3.2 kHz at the—3 db point. For most efficient signal to noise ratio, it is useful to tune the receiver so that the desired sideband falls in the center of the receiver i.f.

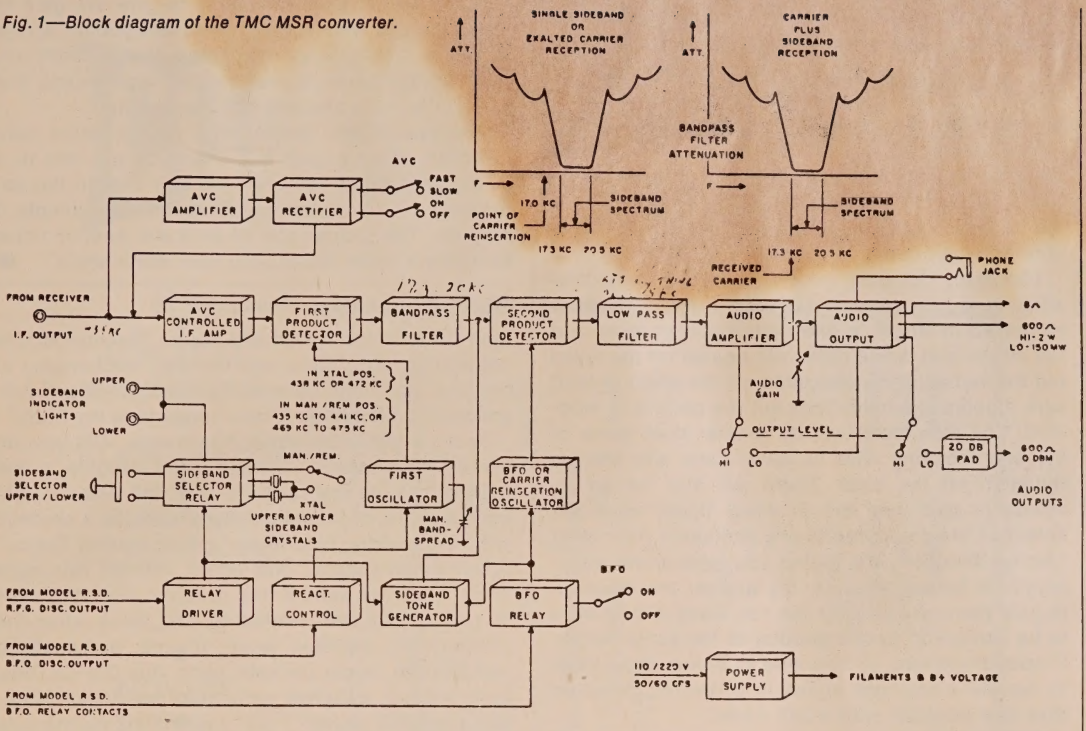
For reception of a.m. signals, where carrier is used, the filtering is too narrow to pass enough carrier, normally. Adjust for carrier by offsetting via the variable oscillator in the converter, or the receiver, about 400 Hz. Obviously, for c.w. reception, the variable oscillator also must be offset enough (about 1 kHz.) to produce an audible signal.

For frequency Shift Keying reception (teletype) offset the variable oscillator so as to give the standard (or whatever desired) mark and space tones.

The Automatic Volume Control circuitry provides slow a.v.c. in c.w. and s.s.b. positions, with fast a.v.c. in a.m. and FSK positions. ■

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Fig. 1—Block diagram of the TMC MSR converter.



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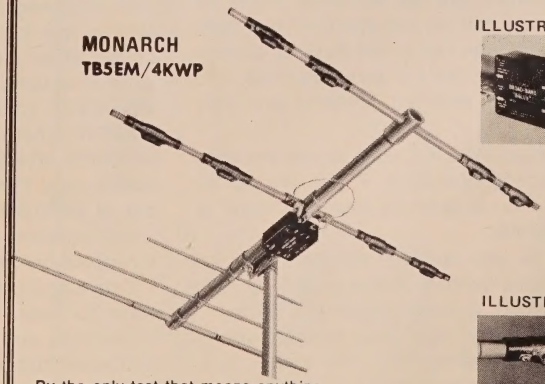


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Long Long Dipoles *(from page 37)*

for the long dipoles differ from the formula for the end fed long wire antenna which is:

$$\text{Length in Feet} = \frac{492\ (N\text{-}0\ .05)}{\text{Freq. (MHz.)}}$$

N = Number of ½ waves in the long wire antenna.

The reason for the difference is due to the end affect in the dipoles. The long wire dipoles in free space being fed at the 70 ohm point are similar to the ½ wave dipole in free space and so are made shorter by approximately 5%.

Maximum radiation from a half wave horizontal antenna is broadside to the wire. If the antenna is increased in length to one wavelength or more and fed off the end, some lobes will appear off the sides but the radiation concentrates off the ends. In long wire dipoles this holds true but the pattern is modified. The side lobes will be greater than those of the end fed long wire however there will still be radiation off the ends. There will also be an increase in gain over the ½ wave dipole when the antennas are compared to one another in their most favored direction. The higher you raise a one wavelength or longer antenna, the greater the increase in gain there will be over the half wave if they were to be compared to one another at the same height. Proper orientation of long wire antennas allow them to radiate a stronger signal in a desired direction than that possible with a half wave.

Patterns for ½, 1 and 1½ wavelength antennas may be found in most of the antenna and radio handbooks. The patterns shown in these books for one wavelength and over are more likely obtained patterns for the end fed long wires, but are reasonably applicable to the long wire dipoles. There will be some modification and for example the one wave dipole will have lobes at right angles to the wire whereas the one wave end fed will show lobes off the ends. There will still be radiation off the ends of the one wave dipole but it will have a pattern more closely related to the 1½ wave end fed. The 1½ wave dipole and end fed patterns are very similar.

There will be those who will wish to use the long dipoles for multiband operation. If you are so inclined this can best be done by inserting traps at the appropriate points.

It is possible to use multiple radiators but the author is against this method as it is extremely high in harmonic radiation. A tuner is almost a must.

The 160 and 80 Meter long, long dipoles will be easier to install as inverted V's. The author has, however, worked quite a number of stations on both of these bands with long wires on "the back 50."

Some amateurs on the high bands, have to be content with dipoles for one reason or another. They can improve their signals with the long dipoles and if they wish a degree of directivity they can erect them as slopers.

Don't expect these antennas to give the gain of Yagis, Quads and sophisticated directional arrays or you will be disappointed. You can certainly expect an improvement over the half wave dipole and you will be very pleased with the results.

The results you obtain from your antenna construction depend upon the effort you put into it. It is suggested that you use time and care in the adjustment of any antenna, no matter how simple it may be. The proper use of an s.w.r. and/or noise bridge will make the project well worth while. ■

YLRL Convention *(from page 35)*

next door to the hospitality room. Throughout the convention also, there was constant exchanging of the blue and silver covered "girl-on-the-globe" programs and the query, "Have you signed my book?"

Another query frequently heard was, "Did you get one of my swaps?" "Swaps" have become a real tradition of the conventions and this one brought forth all sorts of ingenious ones, such as a ceramic and yarn poodle, crocheted "yellow rose of Texas," Bicentennial coaster, pincushion, billfold, rain caps (fortunately the storms that brought over 13 inches of rain to Houston waited till the week after the convention!), petrified wood, photos, personalized matchbooks, sugar packets, pens, tiny Ojo de Dios, book marker, polished rock from the Rocky Mtns., and a ceramic round "TUIT" (ask K5MIZ for the cute explanation on this one). All could be carried around in our tote bags made by GAYLARKs — blue cotton with blue and white applique depicting the State of Texas.

Assisting chairman Annie, K5JKV, was WA5MPM, Frances, who acted as co-chairman and prize chairman and who also is president of GAYLARK. Secy-treas. of the club is K5MXO, Margaret, and treasurer for the convention was WA5VGJ, Jeanette. WA5WKE, Martha was tour chairman. Much credit goes to all of the other club members as well for their hard work in making the convention the success it was: WB5AQB, K5BJU, K5DJS, WA5DYC, W5ERH, WA5FVH, K5JGC, WA5KRI, K5MIZ, WN5NLM, K5PFF, WN5RFS, WN5SHS, WA5WZF, K5VZB, WA5ZDI. To assist guest YLs in spotting hostess YLs, each member of GAYLARK wore a white vest with the GAYLARK emblem and individual call embroidered in turquoise on the back.

Our sincere thanks to GAYLARKs from all who were fortunate enough to attend for a very fine convention and for the years of planning and work that went into making it a memorable occasion!

Of special interest was one GAYLARK family group: K5JKV, Annie (mother); WA5WKE, Martha, and WA5FVH, Sue (daughters), and WN5RFS, Lisa (granddaughter).

Of all the YLRL conventions that have been held, there are now only two YLs who have attended all

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seven — W6QGX and W5RZJ. (W6CEE and W3PVH had made them all through the 6th.) And can you imagine, for all times for it to happen, your reporter was suffering from a severe case of laryngitis!

At Saturday's business meeting the matter was brought up of the site for the next YLRL convention. No invitations had been received, but WB2YBA, Chris, thought there might be a possibility of the N.Y.-N.J. area. Your reporter would like to suggest that the eighth YLRL convention be held in 3 years, in 1979, rather than in 4 years, so that it would coincide with YLRL's 40th anniversary! The only areas in which we have not met are the southwest and the northwest. How about it, gals? ■

CQ Reviews: HR-1680 *(from page 44)*

prior to the r.f. amplifier attenuates signals above 30 MHz.

A two section ganged variable capacitor is used as the preselector tuning. One section is connected across Gate 1 of the r.f. amplifier transistor and the other section is across the drain. Lead placement from the variable to the circuit board is critical in order to achieve proper tracking between the two sections of the capacitor. If you follow the assembly instructions carefully there should be no problem.

The stability of the HR-1680 is outstanding. Heathkit claims that drift will be less than 100 Hz per hour after 30 minutes warmup. I found that drift was less than 60 Hz. You can bang on the receiver, pick it up and turn it over, even raise it three inches off the desk and drop it, but the frequency will not shift. Absolutely great in this respect.

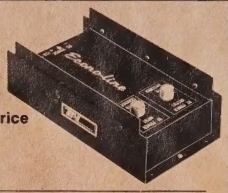
The dial drive mechanism must be given credit for its contribution to the stability of the receiver while subject to mechanical stress. It is simple and yet unique in its design. Two Jackson Brothers verniers are connected in tandem. The first one is mounted on the front panel and the second one on the v.f.o. tuning capacitor sub-assembly. The result is the most rigid dial tuning mechanism to be found on any of the current crop of receivers or transceivers on the amateur market.

The large spinner type tuning knob provides easy, fatigue-free tuning over extended periods of time. One revolution tunes approximately 15 kHz. Heathkit claims less than 50 Hertz of backlash in the dial drive mechanism. If you are careful about alignment during assembly, you won't detect any backlash.

Assembly of the HR-1680 is simple enough for a beginner to put together and be sure of achieving good results. When the receiver was first turned on, I heard signals. Alignment is easy without any test gear because of careful kit design and the use of many fixed tuned circuits employing toroid coils. Rough alignment of coils requiring tuning has obviously been done at the factory, thus minimizing such problems as getting oscillators to oscillate, etc. About five evenings should be allowed for construction of the kit.

While the experienced operator can think of additional features that are desirable, don't think for a minute that the HR-1680 is a "beginner's" receiver. It is capable of really good c.w. and s.s.b. performance on today's crowded bands. In my opinion it is the "best buy" that Heathkit has ever offered in a receiver, giving consideration to performance versus cost. ■

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Modular Amplifier *(from page 29)*

shorted out on L1, which had 22 turns. The amplifier current increased to 400 ma at resonance. The three shorted turns were removed from L1, however, the photo in fig. 5 shows the coil before modification. The bias was set to −10 v.d.c. which results in an idling current of 25 ma. This is done by pressing the mike switch, which applies the high voltage with no excitation applied to the amplifier input (assuming it is quiet and the carrier balance is nulled). The output was then coupled to an oscilloscope and the normal s.s.b. waveform was displayed. No flattopping could be observed.

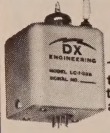
I am satisfied with the performance of the two small units as well as their appearance. Peak currents are slightly over 400 ma. for a power input of 500 watts. If more power is desired, a voltage tripler could be tried. ■

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QRP *(from page 60)*

and humiliate them in front of the world by simply sending: "W6BBX LID GET LOST SK". So much for general rules. We will continue with this discussion of DX contesting techniques for the QRPp'r in a later column. In the meantime, have fun in the upcoming CQ WW DX Contest. It is usually better than the ARRL bash and, to my mind, is the real test.

73, Ade, K8EEG

In Focus *(from page 63)*

WB6TOC, surprised some of his friends (including yours truly!) with Hawaiian Coconut QSLs during his recent stay on the Islands where he visited Don Muth, KH6HJF. Peter's unusual "QSL" has become the number one conversation piece for visitors to my shack. All those gray boxes and flashing lights are ignored until I answer a round of questions about that coconut.

Thanks very much Peter! On your next trip how about sending back a well-filled grass skirt?

Rule Britannia, News From The UK

Looking for a GM contact? Keep an eye out for GM3PIB, of Forres, Morayshire, Scotland. GM stations are hard to find, but this one is active and about to build a keyboard. (per G3WW.)

Richard Thurlow, G3WW, single-handedly arranged a "junior hamfest" on the occasion of a recent visit to G-land by Clarence Munsey, K6IV. The get-together included Howard Waton, G3GGJ, Ron Johnson, G3GRJ, Alan Mitchell, G3YJZ, and Dave Standley, G3XSA. All four of the last named amateurs have built WB9LVI scan converters. Wish I'd been there with a portable tape recorder!

The accompanying photograph of K6IV with G3GGJ and G3GRJ was taken by G3WW. The "QTH CROMER" photograph also sent in by G3WW represents an interesting sequence of events as described in its caption.

I hope that "In Focus" readers will thank G3WW as I do for his frequent contributions to this column.

Here And There Around The USA

Paul Capetz, W6PLI, of Glendora, CA. keeps the West Coast on the SSTV map with the neat-but-extensive equipment line-up shown in an accompanying photo. Paul built his own keyboard, a beautifully packaged job. I hope that you can see it well enough to appreciate it in the somewhat out of focus picture! I have a sneaking suspicion that by the time this issue hits your desk Paul will have acquired a Robot 400 (as hinted in a recent letter).

Warren Weldon, W5DFU, down in Tulsa has been written up in two American Airlines publications recently because of his outstanding work in both slow and fast scan TV. Warren you remember, is the chappie who has a weather-watch TV camera mounted on his tower and transmits 430 MHz fast scan pix to the local US Weather Service Office.

Gene Kundert, W8YEK, was firstest with the mostest in submitting his claim for the new *CQ* Award for 100 Countries Worked On SSTV. We'll have a picture of Gene with the coveted diploma in the very near future!

Final-Final

Please keep those letters and pictures coming. What YOU are doing IS of interest to your fellow slow scanners. Same old address here on the farm, 2112 Turk Hill Rd., Fairport, N.Y. 14450. 73, Bill, W2DD

DX *(from page 71)*

"There have been a minimum of 5 pirates reported using my calls, and many top DXers thought they had a D6 contact, but didn't. I really hate to say not in the log, but that's DX."

The breakdown on Dr. Hutson's contacts were 306 from FL8, including 202 to the U.S.; 1,676 from FH8 including 627 to the U.S. and 1,526 from D6A with 685 to the U.S. If you are one of the lucky ones, the QSL route is Box 2588, Hot Springs, Arkansas 71901.

WB7ABK DXpedition — Bill Rindone, WB7ABK, was caught in Khartoum, ST2-land, in the middle of the attempted coup last July. Fighting was heavy up to within 100 yards of his location. The perils of DXpedition forays increases year by year.

Bill hopes that his ST2SA/Ø operation from an autonomous province in the southern Sudan will be granted new country status. So do those DXers, including 1600 from the U.S., who were among his 3200 contacts. The Long Island DX Association, P.O. Box 173, Huntington, N.Y. 11743 is accepting contributions to assist Bill in continuing his trip. His favorite DXpedition frequencies are 14025 c.w. and 14195 s.s.b. QSLs go to his home at 3049 Doris Court, Lake Oswego, Oregon 97034.

The World Wide DX Association has announced a new DX award based on total accumulative country count during a DXers lifetime of operating. This award will help those who move around as someone with 200 coun-

tries as a W6, 250 as a W8 and 250 as a W4 would have a total accumulative count of 700 countries. If interested contact Frank Jerome, K5CM, 908 Holoway, Midwest City, Oklahoma 73110.

EA8CR was in Argentina on vacation using the call LU8CCR prior to joining forces with PY7YS for a venture from St. Peter and Paul Rocks.

Pacific—It's possible to knock off 2 rare Pacific countries, East and West Carolines, at one crack if you can catch KC6CG (West) and KC6DX (East) mornings after 1100 GMT on 14215 and 14220 respectively.

QSL Information

A2CCY—Via K4CDZ
AH3FF—To W6KLI
BV2B—P.O. Box 101, Taipei, Taiwan, Republic of China
C21KM—c/o WA6AHF
C31KF—Via F2NY
C31KO/p—To ON4ER
D6A—c/o K5QHS
FK8CO—P.O. Box 3956, Noumea, New Caledonia
FW8CO—Via Hihifo Airport, Wallis and Futuna Islands, Pacific
HC5EE/HC6—To WA8TDY
HC6TA—Tarquino Altamirano, Box 239, Ambato, Equador
HI8LC—c/o W4KF
IF9HLO—Via IT9KZW
JW1SO—To LA1SO
JW7FD—c/o LA5MN
KG6SW—Via W7YBX
KJ6BZ—Ron Miles, Box 209, APO San Francisco, CA 96305
KJ6CF—To Box 014, APO San Francisco, CA 96305
KJ6DL—c/o WB5HVY
KX6BU—Via Box 444, APO San Francisco, CA 96555
N4V—To W4PRO
N9TRF—c/o W9LT
ND9EAA—Via WA9GJU
OX3CM—To OZ6HS
OX4KP—c/o W1TW
OX3YY—Via OZ7YY
P29JS—Box 2053, Konedobu, New Guinea
PJ9CDC—To W1CDC
SM4ATE/4U—c/o QSL Bureau, S.S.A., Ostmarksg 43, S-12342 Farsta, Sweden
TA1MB—Via WA1EVO, RFD 1, Box 183C, Hampden Highlands, Maine 04445
VP1MPN—To W5QPX
VP2SV—c/o W3GYD
VR3AH—Via K2BT
VR3AN—To K6VIB
VR4BT—c/o G4CRY, 99 Ings Road, Redcar-Cleveland, TS-102-DE, England
W4EGL/VQ9(Chagos)—Via W4FLA, 2011 N.W. 86th Terrace, Pembroke Pines, FL 33024
WW9WWW—To WA9UEK
YJ8AN—c/o P.O. Box 219, Vila, New Hebrides
YM0AA—Via WB7ABK
YN8KMA—To WA5WCT
YU0OM—c/o YU2AAU
ZK1BA—P.O. Box 268, Rarotonga, Cook Islands
ZK2AR—Kazuhiko Inoue, JR1ATU, 2-chome, 1-14 Tamagawa Denenchofu, Setagaya-Ku, Tokyo 158, Japan
3D8DA—To 39 Brown Sequard Ave., Vacoas, Mauritius
4J0IAP—c/o UW0IX, P.O. Box 88, Moscow, U.S.S.R.
7J1RL—Via Japan Amateur Radio League, P.O. Box 377, Tokyo Central, Tokyo, Japan
7SL7DM—To SL7DM
9M0EXP—c/o 9M2 Bureau
9V1SQ—Via VE3FFA

73, John, K4IIF

Awards *(from page 73)*

3.1. A minimum of 50 points is required for the EU-DX-D. 20 points must be obtained by contacts with European countries and 30 points by contacts with countries outside Europe. All these contacts have to be made within *ONE* calendar year.

3.2. All amateur bands (h.f. and v.h.f. /u.h.f.) may be used Each different country counts one point (on 1.8 MHz and 3.5 MHz two points). A country can only be counted once regardless of the band(s) used. The countries are determined by the "European Countries List" and ARRL's "DXCC Countries List".

3.3. Stickers are available for each additional block of four European plus six non-European countries within the same calendar year.

4. The EU-DX-D may be claimed every year anew. Each year's score may be added to obtain the EU-DX-D 500 and EU-DX-D 1000. The DARC issues a seal of merit for 500 points and a trophy for 1000 points. There is no limit as to the number of years.

Notes

Hope you all had a wonderful summer, (or winter if you had that), and don't forget to write and tell me, How was your month? 73, Ed., W2GT.

Propagation *(from page 78)*

80	09-16 (4) 16-17 (2-4) 17-18 (1-3) 18-19 (0-3) 19-21 (0-2) 21-06 (0-1) 06-07 (0-2) 07-08 (1-3) 08-09 (2-3)	08-09 (3-2) 09-16 (4-1) 16-18 (3-2) 18-19 (3-4) 19-21 (2-4) 21-22 (1-4) 22-05 (1-3) 05-06 (1-4) 06-07 (2-4) 07-08 (3)	08-09 (2-1) 09-16 (1-0) 16-18 (2-1) 18-20 (4-3) 20-22 (4) 22-05 (4-3) 05-06 (4) 06-07 (4-2) 07-08 (3-1)	08-09 (1-0) 09-16 (0) 16-18 (1-0) 18-20 (3-2) 20-04 (4-3) 04-06 (4-2) 06-07 (2-1) 07-08 (1)
160	07-09 (3-2) 09-11 (2-0) 11-17 (1-0) 17-19 (3-2) 19-07 (4)	07-09 (2-1) 09-17 (0) 17-19 (2-1) 19-04 (4) 04-06 (4-3) 06-07 (4-2)	06-07 (2-1) 07-09 (1-0) 09-17 (0) 17-19 (1-0) 19-20 (4-2) 20-21 (4-3) 21-04 (4) 04-06 (3-2)	06-07 (1-0) 07-19 (0) 19-20 (2-1) 20-21 (3-2) 21-04 (4-2) 04-06 (2-1)

HAWAII

November & December, 1976
Openings Given in Hawaiian Standard Time #

To:	15 Meters	20 Meters	40 Meters	80 Meters
Eastern USA	07-09 (1) 09-12 (2) 12-13 (1)	06-07 (1) 07-09 (2) 12-13 (2) 13-14 (3) 14-15 (2) 15-16 (1)	16-18 (1) 18-20 (2) 20-03 (3) 03-04 (2) 04-05 (1)	18-20 (1) 20-01 (2) 01-03 (1) 20-22 (1)* 02-03 (1)*
Central USA	09-11 (1)** 07-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-15 (1)	06-07 (1) 07-08 (3) 08-12 (2) 12-15 (4) 15-16 (2) 16-17 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 14-16 (1)	17-20 (1) 20-02 (3) 02-04 (1) 20-22 (1)* 02-03 (1)*
Western USA	11-14 (1)** 07-09 (1) 09-10 (2) 10-13 (4) 13-14 (2) 14-15 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	15-17 (1) 17-18 (2) 18-20 (3) 20-02 (4) 02-05 (3) 05-07 (2) 07-08 (1)	17-18 (1) 18-20 (2) 20-04 (4) 04-06 (2) 06-07 (1) 19-02 (1)* 02-04 (2)* 04-06 (1)*

ALASKA

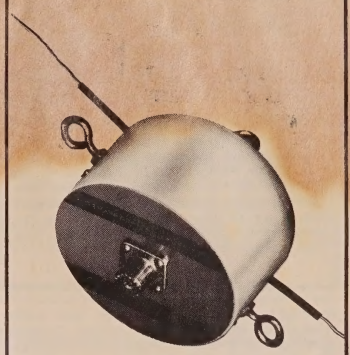
November & December, 1976
Openings Given in GMT #

To:	15 Meters	20 Meters	40 Meters	80 Meters
Eastern USA	20-22 (1)	19-21 (1) 21-23 (2) 23-00 (1)	00-11 (1) 11-13 (2) 13-14 (1)	07-11 (1)
Central USA	20-22 (1)	17-21 (1) 21-00 (2) 00-01 (1)	01-12 (1) 12-14 (2) 14-15 (1)	07-13 (1)
Western USA	19-21 (1) 21-23 (2) 23-00 (1)	17-19 (1) 19-20 (1) 20-23 (3) 23-01 (2) 01-02 (1)	00-01 (1) 01-02 (2) 02-03 (3) 03-14 (2) 14-16 (3) 16-17 (1)	04-09 (1)* 09-12 (2)* 12-14 (1)*

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

5 KW PEP INPUT

WITH THIS NEW BALUN



On all bands 160 to 10 meters.

Runs cool as a cucumber at its CCS rating of 2 KW (Continuous output power through the balun at matched load).
4" dia. Wt. 24 oz. $32.50 PPD.

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- Toroidal core for highest efficiency.
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- Wideband 1.7 to 30 MHz.
- Hang-up hook provided.
- Now available in either 1:1 or 4:1 ratio. 1:1 ratio matches 50 or 75 ohm coax to 50 or 75 ohm balanced load (dipoles and inverted Vees). 4:1 ratio matches 50 or 75 ohm coax to 200 to 300 ohm balanced load.

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California residents add 6% tax.
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BOX 455, ESCONDIDO, CA 92025
Phone: (714) 747-3343

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NATIONAL 190 RECEIVER $120. Utica 650 six meter transceiver, vfo and mike $100. 301-997-0995.

"BUILD THIS COLOR TV CAMERA for about $400." plus list of Deflection Yokes, Focus Coils and Ampex spare Boards - all in Flyer 976A4. Copy free on request. Denson Electronic Corp. P.O. Box 85, Rockville, CT 06066.

SALE: Atlas 210B complete with 110/220 V AC Console. Excellent condition. $550 PP. With mods (R.I.T., etc.) as per my Feb. CQ article and latest factory updates. Great rig. Only reason for sale is that am now in CN8 and CN8 will not issue license. Schultz, K3EZ Box "L", FPO New York 09544.

LOOKING FOR old Lionel trains. Interested only in "0" gauge, excellent to like-new condition. Primary interest is locomotives prior to 1952, but will consider complete sets or more recent models. Am willing to buy outright for cash or swap radio gear to meet your needs. Write Dick Cowan, WA2LRO, c/o CQ Magazine, or call 516/883-6200.

FOR SALE: Raytrack 30 amp. filament choke $4.00, Bud type H-9116 chrome handles $3.50, Raytrack 6 meter plate choke on 3/4" steatite form $2.50, 3 pairs Raytheon circuit board mounting brackets, 1 1/2", 2", 2 1/2", $2.00, 3 Raytheon knobs (2-MS91-22-8-3F 2B, 1- MS91528-1F2B) $1.75. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, N.Y. 11050.

FOR SALE: Vol I, No. I Jan. 1945 CQ Magazine $15.00. Simpson model 29 4" O-500 v.d.c. meter, $6.00, 4" National Steatite pillar (X 3/4") screw top, mtg. base, $2.00. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, N.Y. 11050.

WANTED: Coaxial Connectors type LC and HN. SELL: HW-32A transceiver $80. A. Emerald, 8956 Swallow Ave., Fountain Valley, CA 92708.

WANTED: Drake Remote VFO RV-3 Mint Condx - A Sturko Box 72, QSL Bureau, Ft. Smith NWT Canada.

MEDICAL: Any licensed amateur radio operator in the medical or paramedical field should join MARCO (Medical Radio Council). Contact: Stan Carp, M.D., K1EEG, 44 Main St., Saugus, MA 01906. (617)233-1234.

MAGAZINES FOR SALE: CQ/73/QST/HAM RADIO, issues at 20 cents each (including USA shipping) from Lockheed Ham Club, 2814 Empire, Burbank, CA 91504. Send list and check. Available issues and any refund due will be sent promptly.

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DID YOU KNOW that supplements to the book "CQ YL" are available? They bring the book up to date with YLRL Officers through 1973 and the 6th YLRL Convention, held at Long Beach in May '72. If you have a copy of "CQ YL" and would like to add the new supplements (the pages are "slotted" so they fit directly into the "CQ YL" spiral backbone), drop a note with your request to author/publisher W5RZJ, Louisa Sando, 9412 Rio Grande Blvd., N.W. Albuquerque, N.M. 87114 Please enclose two thirteen cent stamps to cover cost of mailing. The one and only book about YLs in ham radio, "CQ YL" contains 21 chapters, over 600 photographs. Order your autographed copy or a gift copy from W5RZJ, $3.00 postpaid.

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FOR SALE: SBE SB-34 very good condx. Manual. Latest modifications $250. SB-200 Linear very good condx w/new 572A's Manual. $230. M. Arehart, KL7AVT, P.O. Box 1000, Auke Bay, AK 99821.

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COLLECTORS ITEMS - QST 1923 thru 1962 some 1917, 1920, 1921, 1922, 1963; Popular Radio and Television Magazine Dec. 1924 thru May 1928; Nat'l Radio Inst. Home Study Booklets - 7 different booklets c 1926-27. Accepting best offers. Charles Hardiman, Box 2526, Delray Beach, FL 33444.

WANTED C.B. - S.S.B. HyGain Mobile Models 674 A or 674 - Should have input for HyGain V.F.O. Contact A. Morelli, 4439 S. McIntosh Rd., Sarasota, FL 33581. (813) 924-8513.

WANTED: HARVEY-WELLS Bandmaster Deluxe with VFO un modified State condition and lowest acceptable price. Rittman, P.O. Box 7461, Las Vegas, NE 89101.

NOVICES, OTHERS: Get unused 5 cent Radio Amateur Stamp - Into free - SASE please Postals ignored W6LM Box 308, Wrightwood, Calif. 92397.

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SELL: Mint Palomar 3 kw - PEP Balun 1:1 - $10.00 plus shipping. David Schwartz, 1183 Southeast St., Amherst, MA 01002.

SELL: Hallicrafter Rec. SX28 Super Sky Rider and Spk. 6 band 42-55 mc. Colec. item Clean $125. Pick up only. Sorry. 212-FA4-2569.

SELL Drake like new AC 4 MS-4 Power Supply for $100.00. Paul Skidmore, 1612 Stone Ave. Crossville, TN 38555.

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SELL: SBE-34 w/pwr mike $225.00; T-150 $65. W. B. Adams, P.O. Box 324, Fishkill, N.Y. 12524.

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WANTED: Drake, RV-3 VFO. Must be in good condx. Larry, WB9AZQ, Box 144, Robinson, IL 62454.

FOR MONEY OR WHAT-HAVE-YOU: Trade CQ Mag. 3/71 - 12/75, QST 10/71-12/75, Handbook, 4/31, 8th edition. William R. Smith, Brown Terrace, Uxbridge, MA 01569.

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ARRL Handbooks; 1966-68-67-47 Very Good. 1950-51 Covers worn 1956 Mint. 1943 cover bad, ads have been wet. Editors & Engineers 1941 hard cover very good. M. J. Douglas, 2254 Pepper Drive, Concord CA, 94520. Please make offer plus postage.

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SB-33 Transceiver with spare finals, mobile mount, instructions $159.00 plus shipping. Recent factory overhaul, alignment. Used as base station. Heinlein, W7BIF, 107 Wyoming, Boulder City, NV 89005.

HAM SENTENCES in 54 languages on your card get DX QSLs! K3CHP's DX QSL Guide, still $3.95. Joe Mikuckis, 6913 Furman Pkwy. Riverdale, MD 20840.

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SELL: Magnum six R.F. speech processor for Yaesu 400/401/560/570, $70.00. J.A. Frisch, 1 Channel Rd. Toms River, N.J. 08753.

HAM-M beam rotator degree bearing indicator for sale. Also Potter & Brumfield DPST 25 A. 120 VAC relay never used. Make offer. O'Brien, 56085 Harman Dr., Mishawaka, IN 46544. Phone (219) 259-7733.

WANTED: Heath HR-10B or other good Ham Receiver in good condition. Mickey Henniger, Bend Route, Lometa, TX 76853.

SELL: Touch Tone Pad, sized for HT, $33 Shipped. WA9WDB/P5 John Teles, 10511 Tenneco Dr., Houston, TX 77099.

FOR SALE Zenith Super Trans-Oceanic Portable rcvr. 7 bands good cond. I have operating guide $60. Kevin Abel, R3-52 Talbot St. Kew Gardens, N.Y. 11415.

WORLD RECORD HOLDER - British made Joystick Antenna - 160-10 M. inc. Tuner, Feeder, Instructions. Indoor/Outdoor use. Brand new, Shipped prepaid $75.00. R. L. Winslow, W2DAP, 4 Brookfield Lane, Centereach N.Y. 11720.

WANTED: Heath HG10B in good condition. E. Stacy, 103 E. Bartlett Ave., Selah, WA 98942.

WOULD ANY U.S. YL HAM like to write to 31 year old U.K. penfriend. Very few YL Hams in U.K. I.G. Mant, G8AVJ, 28 Welbourne Rd. Liverpool, L166AJ Great Britain

LAFAYETTE BUG $10. Lafayette 6 meter converter $10. WANTED: 1967 ARRL handbook. R. Voelker, WA2PCL, 101-23 Lefferts Blvd., Richmond Hill, N.Y. 11419.

FERRITE BEADS: Lowest price in the country. 15 for $1.00 with spec. sheets. On orders under please enclose .25 for handeling. T. Gorlin, 4829 Buchanan St., Hollywood, FL 33021.

NEED INFO on how to convert Prop pitch motor into rotator for heaby beam. J.L. Davis 802 Chain St., Norristown, Pa. 19401.

WANTED CHEAP VEHICLE SURPLUS receiver - type AN/GRR-5 R-174/URR + PP308/URR Complete Unit for mobile use. Write G.V. Haylock, G2DHV, 28 Longlands Rd., Sidcut Kent England.

SWAP - BYTE no. 1-8 for CQ no. 2-5. Don Erickson, 6059 Essex St., Riverside CA 92504

FOR SALE OR TRADE: Riders Radio - Volumes 1 thru 22; $250 or swap for Riders TV, or Sams Photofacts. Donald Erickson, 6059 Essex, Riverside, CA 92504.

COMPLETE SET OF CQ MAGAZINES available, also all QST, 1922 to date. K5UJI, 342 Blaze, San Antonio, TX 78218.

WANTED: MInt Collins KWM2, 399C1, 516F2. S Mtr. for S37 S36 S27. Sell mint Swan 350 w/acc. W7KSG, 1876 E. 2990 So. Salt Lake City, UT 84106.

WANTED: Old Radio Equipment, receivers, parts, Transmitters, Broadcast and Communication receivers such as SW3, SW5, FB7's Etc. Will trade or pay cash. Have many QST's Radio, Radio News, CQ's, call books etc. Erv Rasmussen W6YPM, 164 Lowell St., Redwppd City, CA 94062.

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SELL: Gotham All-Band Vertical and 60' Coax $25.00. Wanted: Tempo DC Supply and Mobile ant. System will trade Gretsch Guitar or sell outright $85.00. Will Roberts Box 907, Roseboro, N.C. 28382.

CLEANING HOUSE: Tubes, meters, xfrs, relays, pots, crystals, resistors, condensers, switches, etc. Send Stamp for list. W9FOC, 1616 Campbell St., Joliet, IL 60435.

SELL: 100 CQ magazines 1967 thru 1975. $20 M. A. George, 35 Ridgeway Ave., Pittsfield MA 01201.

WANT: ARRL mobile manual. State price and condition. Glenn McMichael Box 231, Goderich, Ont. N7A 3Z2 Canada.

SELL: Cush-Craft Ringo Ranger 2 M. Ant., ARX-2, Brand New, $19.00. Wanted: HM-102 HM-2102. B. Nastoff, 320 W. 56th Place, Merrillville, IN 46410.

SWAP: 2 mtr Standard 826M w/base sup, excl cond. for Argonaut. Must be Al cond. WA2IFE, 92-60 224 St., Queens N.Y. 212/464-2505.

BANDSCANNER $55.00 ppd. Nvr usd in orig bx. variable panadaptor & RF & AF on xmt & rcv. 455KC IF. J. Davis, 802 Chain, Norristown, Pa. 19401.

WANTED: Heath Ignition Analyzer Scope, Weather Station. K6KZT 2255 Alexander Ave. Los Osos, Ca. 93402.

WANTED: All Coils for HRO-60 except A,B, C, & D. Howard S. Long, 4000 Kendall St., Wheat Ridge, CO 80033.

SWAP: a 16/mm, 3/turret lens, Bolex camera for a Side Band Engineers SB2LA Linear Amplifier. The Bolex moving picture camera is a very good one, but has no sound attachment, and is about 25 yrs old. I paid $450. wholesale for it in Switzerland I haven't taken moving pictures for years so have no use for it Russell A. Garlin, 11533 Key West Drive, N.E., Albuquerque, N.M. 87111.

WANTED: Used Autek QF-1 audio filter. Don Erickson, 6059 Essex St., Riverside, Ca., 92504. (714) 687-5910.

NEED MANUAL & Circuit Diagram for Hallicrafters S-38D Receiver. R.D. Sever, K8RXD, 147 S. Wise, N. Canton, OH 44720.

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WANTED FPM 300 and SBE 33 Any Condition Bill Burkett, WB4JGQ, 1714 Clinton Ave S.E., Roanoke Va. 24013.

HEATHKIT SB-301 Rcvr, SB-401 Xmtr, SP-500 Speaker, interconnecting cables, SSB & CW filters, crystals for use transceive or separate. $395.00 complete. WA2PAT, 14 Wickford Ave. Trenton, N.J. 08618.

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INTERNATIONAL VIDEO CORP. Model 850-ASMC Full Color 1" Video tape recorder with slow motion, new Demo for Rack Mounting. $1,500. G. Alfred Dodds, P.O. Box 25, Brunswick, OH 44212.

TR-3 $300 NC300 with 6M conv. $110. George Zurbuchen, W9UDK, 13631 S. Elm St. Orland Park, IL 60462.

SELL: Heath Hw 16 W1 VFO, Good, $100. Collins AR 388, Good, $250, SB100 Mint $300. Need TR4B. John Culleton, 2401 Haight, Sykesville, MD 21784. (301)795-1159

FOR SALE: Drake SPR-4 $375. SB-650 Frequency display $125. G.V. Nordstrom, 1708 Marian Dr., Bismarck, N.D. 58501. (701)223-7132.

SWAN 700CX DCLX P.S. Mike, SS16 Filter three months old. $650.00. J.P. Johnson, WB4BYO 135 W. 9th St., Jacksonville, FL 32206.

SELL: Swan 14-117 P.S. Mint $80. 117 AC and 12 V.DC for mobile. N4MGL, 7010 S.W. 16 St. Plantation, FL 33317.

HRO-500 with LF-10 Tuner $900. 28/22 OMHZ 30 wt. transverter $95. K8HWW, 33727 Brownlea, Sterling Hgts, MI 48077.

FOR SALE: for parts or possible repair National HRO60 with 4 coils $75., WN8TEB, H.R. Allshouse, 2619 Highland Circle, Fishtabula, OH 44004.

FOR SALE: QST/73/CQ. SASE for list. Guimares, RFD 2, Box 480, Middleboro, MA 02346.

SALE: HQ 170 C $150. Knight T-60 $35. 18 Foot Vertical $50. W2JBI, 69 Judith Rd., Little Silver, N.J. 07739, (201) 741-4918.

WANTED: Power Transformer for mod. 6000 Hickok tube tester. J. Boles, W4SBM, Box 458, Jamestown, TN 38556.

SELL: GT550, 25kc cal., A.C. PS, Spkr, $295 4-1000A, used $25.50MF oil filled cap. at 10 KV $40. Galaxy Phone patch, New, $25. WA2FKF, Box 236 Waldwick, N.J. 07463.

COLLINS KWM-2 Round emblem, mint, $900., R. Shideler, 3731 Evergreen, Visalia, CA 93277.

SELL: Mint HA-10 LF/MF tuner for SX117 $20 PPD. Sever, 147 S. Wise, North Canton, OH 44720.

SELL: Heath SB-650 freq. display. Manual. mint Cond. $130. Bob Levasseur, WN4PTL, 4101 S.W. 108Ct. Miami, FL 33165 (305) 221-4118.

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SELL: Hammarlund SP600 tunes 540 Kc. to 54 Mhz. Want Defense Electronics Receiver tunes 30 Mhz to 260 Mhz. Model G-175H. Alan Mark, P.O. Box 372, Pembroke, MA 02359.

HEATH HG10B, New $40.00. Cushcraft A 147-4 2 M Beam, never used $10.00. WB9SSP 6426 Blackhawk Trail, LaGrange, IL 60525.

SWAP: Heath HW-32 SSB xcvr w/HP-23 Pwr Sup. for 2M fm rig. W9AMM, 5973 Sugarbush Ln., Greendale, WI 53129.

SALE: Receiver Model RBC-2 Type CRV - 46148 W/PS. $100.00. Will Deliver up to 200 mile radius. Local only: E.M. McFadden, P.O. Box 248, Glenns Ferry, ID 83623.

FOR SALE: ROBOT SSTV: 70B monitor, 80A camera with macro lens, cables, books . . $525. Mike Ludkiewicz, 143 Richmond Rd., Ludlow, MA 01056.

TUBES: Many oldies. Stamped envelope for list. Also, Antique Solar Cap. Analyzer and Resist. Bridge., John Hamilton, 6050 North Oakley, Chicago, IL 60659.

WANTED: Model PS-5 (High Voltage Power Supply) for TMC PAL-1K Linear Power Amplifier. JA1BM1/W2, 450 Mountain Ave., Westwood P.O., New Jersey 07675.

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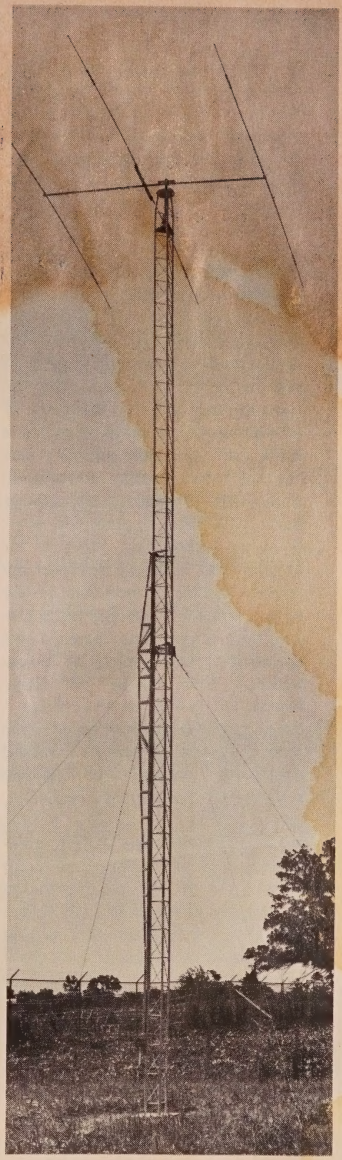
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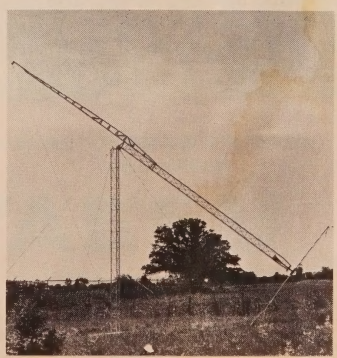
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Zero Bias (from page 5)

do not relinquish that authority or abrogate that responsibility to "civilians". The Commission has the right and is charged with the duty to prescribe the qualification for station operators but I still fail to see where they have the right to pass their authority on to another private organization (ARRL) which in turn will confer this power however selectively onto someone else.

5. On page 7 the ARRL puts forth the argument that government agencies whether state or federal have the right to pass on the adequacy of schools and/or training programs is quite valid and these agencies have the right to prescribe educational minimums. **However**, these agencies have steadfastly maintained their licensing jurisdiction. Were I, for example, to graduate from an approved school of medicine or law with a straight A average and therefore have a right to a degree, I still could not practice medicine or law without first taking the **State Boards** where I chose to practice. I could not get license to practice from the institution where I studied no matter how well I did and how well the school rated scholastically.

The remainder of the ARRL comments seem to be in the nature of "what wonderful folks we are" and that the interests and objectives of the ARRL are identical with the FCC. Frankly, gentlemen this is what worries me.

It is not my intention to put stumbling blocks or any form of impediment in the way of amateur radio. What I am asking is for a clarification on the price to be paid for this growth, for certainly it appears to be growth at any price.

The ARRL has provided many services and laudable contributions to amateur radio over their very long history. But this in no way entitles them to have or adopt the attitude of the General Bullmoose character from the Little Abner comic strip when he says "What's good for Gen. Bullmoose is good for the country".

I am concerned not only over this document but the entire method in which this program was launched, reported, and the capitalization both present and foreseeable that the ARRL has received already concerning this matter.

The language, logic and rationality of this document is worthy of a Perry Mason. One positive thing I glean from it, and I'm glad, is that the **Radio Amateur's Handbook** helped us win WWII. Another feeling I come away with is that some League officials deserve Ph.d's in obfuscation. We are mixing objectives, for while we energetically wave the flag over an apple pie and an 8 X 10 glossy of mom we tend to forget that the ARRL's "advice and assistance" objectives are a conflict, both financial and moral, to a federally regulated pursuit.

What is subtly being asked of all amateurs, prospective amateurs and just us ordinary taxpayers in general is to further compensate and reward a system racked with bureaucratic bungling. We are now being asked to increase this bureaucracy through political collusion or necessity . . . call it what you will.

We all plunk down our $4 for our license, the CBers and commercial people put theirs in too. Everyone who wants a license or service puts up their few bucks. Now one may stop and reason that this money goes to pay for the very thing we are asking or applying for . . . wrong. The money goes into a general fund out of which the FCC gets their appropriation. This figure generally works out to be a lot less than what comes in. Where does the rest of it go? Who knows, but it's not going for what you'd expect. When the Communications Act of 1934 (which everyone is happy to quote) stated the aims and purposes of the FCC in regard to amateur radio, it was implied that the FCC itself would take care of this as part of their job. In fact one of the lofty aims and objectives is concerned with training programs and the greater more efficient and effective use of radio in the public interest. This is (or should be) generated by qualified people within the FCC, that's what they're paid to do. Well, maybe they can't. Maybe they're understaffed or overworked. We've all seen the confusion on TV newscasts during the big push for CB licenses. All these people spent their money in good faith that the government wasn't ripping them off when they expected something in return. Well we're all being ripped off by this process. The money is there, duly collected and put away . . . somewhere.

So this boils down to all of us paying a fee that doesn't go where it's supposed to go (so why pay it?) and none of us knowing what it does actually pay for. What is now being proposed is a solution that will further increase more of the same. We now add on a publishing house (ARRL), ostensibly a non-profit, public interest group, which in turn is subsidized by the rest of us who are taxpayers - to the tune of enlarging their business (which is competing with tax paying publishers) and we come up with a very large group of people supported by all of us doing what the basic group (FCC) should have been doing all along. The money was spent, is there and was there all of the time.

Think about the possibility of adding one million new amateur licensees. The general fund would be happy, they could collect one million fees. The ARRL would be happy, they could sell one million tax free publications. The rest of us would pick up the tab and the FCC would go bannanas trying to issue and administer these licenses . . . not bad.

73,

Alan M. Dorhoffer, K2EEK
Editor, CQ

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