



Volume 21, Issue 6 The November 14th meeting is at the Philip Miller Library in Castle Rock November/December

Dedicated to the Preservation and Education of Wireless, Radio, Television and Associated Equipment

At the last meeting, Tom Pouliot gave a talk on low frequency communications. During this talk he showed an article that was printed in 1972 in the *Antique Wireless Association* journal, by Carl Lundgren and Robert Morris. The document was scanned and run through an OCR and it is reprinted below.

Many members of AWA are interested in wavelengths of six hundred meters and up. However, many have been disappointed in recent months in listening to the lower frequencies to find few identifiable signals below 200 kHz. Most signals heard now in the LF and VLF ranges are radio teletype transmissions, mainly from famous old Navy radio stations.

There is however, in the range just below 200 kHz, activity which can be monitored with conventional receivers and headphones, and in which interested members of AWA can participate. This is a low power communications service authorized by Part 15 of the FCC Rules and not requiring a license from the Commission.

Subpart E- Low Power Communication Devices states in paragraph 15.201a; "A low power communication device may be operated on

any frequency in the bands 10 - 490 kHz, 510 - 1600 kHz and 26.97 - 27.27 MHz. " A communication device operating in these ranges must not radiate signals exceeding quite small values of field strength, given in a table.

Alternatively, paragraph 15.203 states: "In lieu of meeting the radiation limitation stated in 15.202, a low power communications device operating on a frequency between 160 and 190 kHz need only meet the following requirements:

The power input to the final radio frequency stage (exclusive of filament or heater power) does not exceed 1 watt.

All emissions below 160 kHz or above 190 kHz are suppressed 20 db or more below the unmodulated carrier.

The total length of the transmission line plus the antenna does not exceed 50 feet. "

These rules were probably created to accommodate industrial paging systems, television studio cueing systems, radio controlled garage door openers, etc., all requiring good reliability over short ranges. Interest in the use of the low frequencies for QRP communication over greater distances may have started about ten years ago with the suggestion in CQ Magazine by Dick Hilferty, W2HEY, that experimental communication might be attempted by amateurs in the LF and VLF ranges. By 1967 WA4GHK and K4NTD had set up facilities to conduct tests at 166.25 kHz and were successful in transmitting a signal that could be heard 200 miles away during lulls in the usually high static.

Since 1968, many others, including one group of mostly radio amateur experimenters in New York, New Jersey, Connecticut, Pennsylvania, Massachusetts, and Virginia have become actively interested and have conducted tests resulting in CW and FSK telegraph contacts over distances of 20 to 300 miles. Short range contacts have also been made by AM and SSB telephony, and by teletype. Most of the operation in the New York - New Jersey area has been on, or very near, 189.5 kHz. This is about 4.5 kHz below Nantucket Consolan Station TUK and about 4 kHz above a powerful RTTY station, NSS.

These low frequencies are not assigned to the Amateur Service and some consider it inappropriate, if not contrary to rules, to use their amateur call letters for identification. Accordingly, personal "signs consisting of up to three letters have been used, both with hand-sent and automatic transmission, to identify each experimental station. The latter signals, which sound very much like the aircraft range and beacon station signals above 200 kHz, are usually referred to as "beacons". Because of the wording of the rules, most antennas used for LF transmitting are 50 foot insulated verticals with as many and as long ground radials as possible. ("RM" at Sparta, N. J. uses 30 radials, 60 to 75 ft. long). The transmitter, consisting of small receiving tubes and large coils and capacitors, is usually located at the base of the antenna. It is necessary to be especially careful to eliminate harmonics since these fall into the aircraft and maritime bands.

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Visit the CRC Website at WWW.RADIOACE.COM

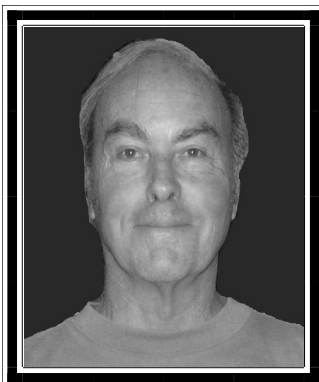
COLORADO RADIO COLLECTORS ANTIQUE RADIO CLUB

Founded October 1988

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Message from the President

Wow !
What an auction! We sold a lot of radios and related items, the same overall as last year with over 200 lots. There were lots of bargains to be had, especially in wood console radios selling for around \$20 - \$30 each. It was definitely the year to buy. With the exception of a few items, prices were very low. Details of the auction and



picnic are in this issue of the Flash. A good time was had by all. Special thanks to **Tectonic Management Group** for the use of their grounds and to Rich Kuberski for his efforts in making the auction go smoothly.

See you all in Castle Rock on Nov. 14th.
Tom

NOTICE

David Boyle will welcome any club members who would like to observe a Tesla coil demonstration to visit his Castle Rock home after the November club meeting.

The Tesla coil stands about 6 feet high and produces streamers around 4 feet in length ...to say nothing about the noise and arc produced by the rotating spark gap!

His shops and collection of over 250 radios and related stuff will also be open for viewing.

David's home is about 12 minutes SW of the Castle Rock library.

Thanks, *David*

CRC CONTACTS

President	Tom Kelly (303)504-0550
Vice President	Marty Phillips 719-495-4229
Treasurer	Mike Cook (303) 471-9596 mldcook@hotmail.com 2383 Indian Paintbrush Circle Highlands Ranch, CO 80129
Archive and Books	Charles Brett (719) 495-8660 brett3729@aol.com
Egroup Manager	Mark Dittmar (303) 403-0669 mbdittmar@comcast.net
Flash! Publisher	Steve Touzalin (303) 988-5394 stevetou@comcast.net
Flash Graphic Editor	Rich Kuberski ROKuberski@msn.com
Flash! Distribution	Richard Beckman (303) 344-8565 rebdalbeck@msn.com
Webmaster	Bill Grimm
Website	www.radioace.com

Upcoming Events

11/14—CRC Meeting
11/25—Thanksgiving
12/2—Hanukkah
12/25—Christmas

Meeting Locations

(Unless noted otherwise)

Littleton	Castle Rock
January	March
May	July
September	November

CRC MEETINGS

Meetings are held on the 2nd Sunday of every other month starting in January (except 3rd Sunday of May) at 1:00 pm. The meetings consist of business, "show & tell", raffles, auctions, swap meets, technical discussions and other subjects of interest

CRC MEMBERSHIP

Annual membership in the CRC runs from July to June. Dues entitle members to attend meetings, "The Flash!" our newsletter, discount book prices, participation in our spring show and Fall auction. Current annual dues are \$12. New memberships will be prorated to the following June.

(Continued from page 1)

The antenna for reception can be either the transmitting antenna, suitably switched to the receiver or a much longer wire if space is available. Surplus low frequency receivers such as the RBL, RDZ, RAK 6 and 7, BC-344 and BC-453 have been used satisfactorily. Special crystal controlled converters together with a high frequency communication receiver have also been designed and used successfully. (See QST, Sept. 1968). The important characteristics of the receiver are the narrow bandwidth necessary to exclude noise, and good amplification linearity to minimize cross modulation products. Filters of less than 100 cycles width are desirable. A broad, yet linear receiver, followed by audio filtering (e.g., cascaded FL-8 range filters) can be very effective. There are potentialities for substantially improved methods of reception which have been only partially explored. Synchronous or coherent detection methods at small information band widths can afford considerable signal advantage over uncorrelated noise. There are other sophisticated methods particularly applicable to the LF ranges which have yet to be tried.

All known low power LF communications have been by vertically polarized surface waves exhibiting

a nominal inverse distance characteristic of signal strength. (One tenth the signal strength for ten times the distance). This is in direct comparison to the much greater reduction in strength at the higher frequencies which approximates inverse distance squared. The latter characteristic also applies for horizontal polarization at the low frequencies.

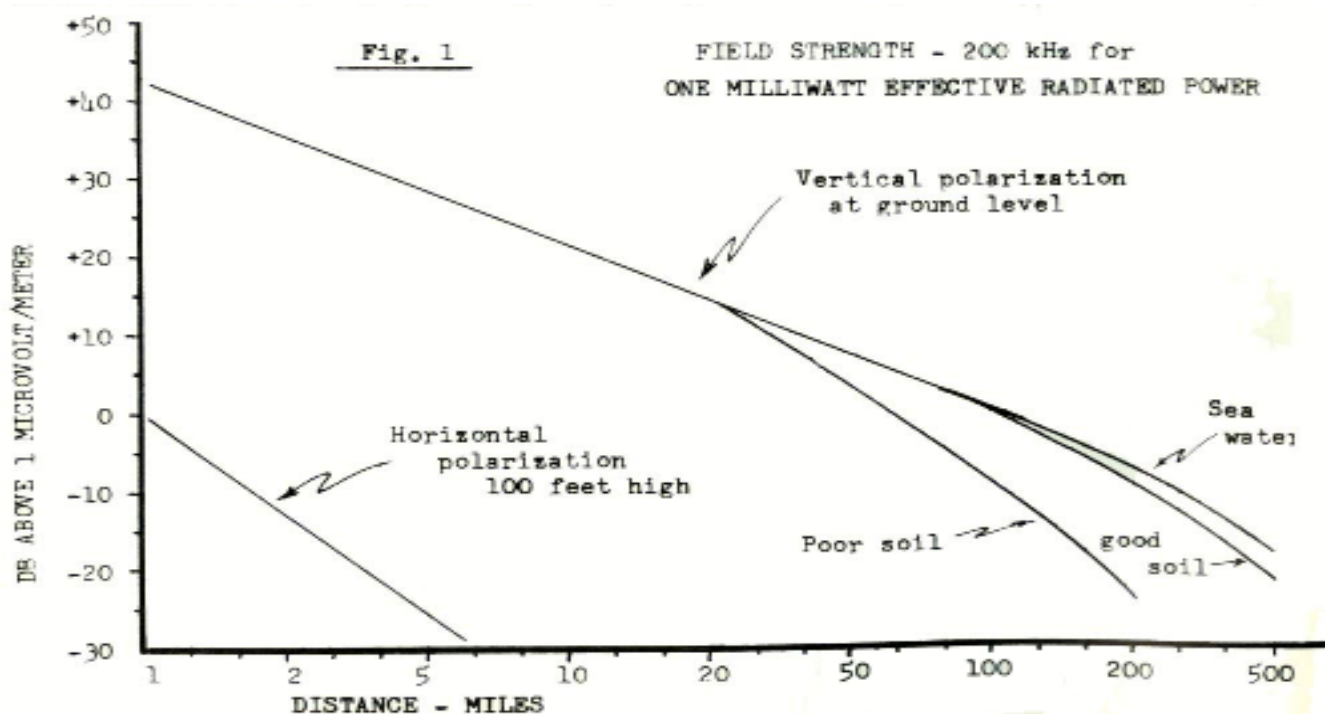
Figure 1 shows the average field strength of 200 kHz for one milliwatt of effective radiated power with both horizontal and vertical polarizations. It should be pointed out that power level in a practical system will be somewhat less than shown in Figure 1 due to extremely low antenna efficiency. The radiation resistance of a 50 foot vertical is approximately forty milliohms (0.040 ohms), which, with a ground resistance (and loading coil loss) of 25 to 100 ohms, means that radiation is measured in microwatts.

In spite of these handicaps, the writers and other experimenters interested in investigating LF propagation have been successful in communicating during the winter months with signal readability of 4 to 5. "FL" (W2HEY) near Port Jefferson, Long Island, puts 20 word/minute signals into New Jersey at distances of 70 to 90 miles, in spite of very poor soil

conductivity. W2RRA near Syracuse, N. Y. has received LF signals from "J" (K2ANR) in Riverhead, L.I. and "TH" (W2AZQ) in Colts Neck, N. J., distances of over 200 miles. Most activity in the NYC area is on weekends at mid-day when static is low. At such times "beacons" signing "Q", "TH", "K", "RM", "AL", "QW", "J", "JK", and "FL" can be heard. Two way contacts are frequently made after the automatic "beacon" is shut off. There are at present four members of AWA actively interested in experimental LF operation.

If one has an interest in pitting his knowledge and skill against difficult odds to achieve communication reminiscent of early wireless with others of similar interest;--if he is blessed with a "quiet" rural location suitable for a vertical antenna with an ample radial ground system;--if he has a collection of old mica and large variable capacitors, large Litz-basket-weave coils, variometers, etc., which he would like to put back into actual use; then, such a person could very well enjoy putting together and operating an experimental LF station.

Tom Pouliot is experimenting now and will have more information in the near future.



2010 CRC Auction Results

Total Sales \$7,136.00 CRC Commision \$729.50

Aetna 252P	40.00
Airline 62-177 1936	25.00
Altec 605/604 Speaker 1945	50.00
Arvin 444A 1946	45.00
Arvin Heater	5.00
Atwater Kent 20 1924	45.00
Atwater Kent 40 w/ stand, E3 Speaker 1928	200.00
Atwater Kent 52 15 Speaker 1928	15.00
Atwater Kent 55C Kiel 1929	25.00
Atwater Kent 70-L 1930	20.00
Atwater Kent 72 1929	50.00
Atwater Kent Cabinet 1928	2.00
Atwater Kent E3 Speaker	60.00
Atwater Kent TRF, Early Superhet	110.00
Aviloa 601-612	20.00
Battery Charger 1920s	15.00
Belmont 650 1934	80.00
Bendix 526A 1946	35.00
Box - 1920 QST Books	30.00
Box - 20 Transistor Radios	35.00
Box - 3 Cathode Ray Tubes	5.00
Box - 3 Radios	7.50
Box - 5 01A Tubes - All Good	45.00
Box - Audio Transformers	25.00
Box - GE 202 1947, Philco 48-461	20.00
Box - Meters	20.00
Box - Misc Radio Books	70.00
Box - Misc Radios, Power Supply, Parts	40.00
Box - Misc Test Equip.	20.00
Box - Philco 37-33 1937, Philco Cathedral	25.00
Box - Radio Collector Books	75.00
Box - Radio Magazines, Books 1940s	20.00
Box - Radio Parts	15.00
Box - Senora RBU-176, Zenith 7F02	15.00
Box - Sony Watchman TV, Zenith Royal 20	25.00
Box - Transformers, Crystals	2.00
Box - Transistor Radios, Misc Parts	25.00
Box - Tubes	40.00
Box - Zenith 3000, Zenith 7000	35.00
Box - Zenith 650, Zenith 1000 parts radio	5.00
Box - Zenith 6G001, Zenith 6G004	10.00
Box Misc Parts	50.00
Box of Bezels	15.00
Box of Knobs	40.00
Cobra 23 Plus CB Radio	2.00
Code Practice Osc. w/ Tapes	30.00
Conair 280 Sig. Gen.	10.00
Coors Can Transistor Radio	10.00
Coronado 1152 1948	2.00
Crosley 51 Portable 1924	135.00

Crosley 125 1930s	75.00
Crosley Dashboard Green 1951	70.00
Crosley Dashboard White 1951	45.00
Crosley Super Tridyn 1925	70.00
Day-Fan OEM-12 1925	50.00
Day-Fan OEM-7 1925	40.00
Echophone 3C1A	30.00
Eico 425 'Scope w/ Probes	2.00
EICO 625 Tube Tester	40.00
EICO 625 Tube Tester	40.00
Emerson 425 1942	25.00
Emerson 528 1947	10.00
Fairbanks Morse 6AT4	45.00
Firestone Airchief 4-A-17 AM/Phono 1947	7.50
Four Tube 1920s Kit	40.00
Garrard Zero-One, 2 Turn Tables	7.50
GE 2-63 1930s	40.00
GE 409 1952	25.00
GE 510-F Clock Radio 1951	25.00
GE A63 1935	85.00
GE Portable 1948	15.00
GE RC-4572 1965	5.00
Gloritone 26P 1929	60.00
Graybar R8 1931	115.00
Grundig Elite Boy 1000	10.00
Grundig Satellite 2100	40.00
Grunow 1183 1937	5.00
Grunow Teledial 1291 Console 1936,	50.00
Guild 484 1956	40.00
Hallicrafters 8R-40 1952	45.00
Hallicrafters Continental 1950s	60.00
Hallicrafters S-120	35.00
Hallicrafters S-120 1956	40.00
Hallicrafters S-38E 1950s	25.00
Hallicrafters S-72 1950	20.00
Hallicrafters S-72R Portable/AC 1951	50.00
Hallicrafters Sky Buddy S19R 1940s	60.00
Hallicrafters SX130 1965	35.00
Hammerlund HX-50 Transmitter w/ manual	85.00
Hammerlund SP-600 1950s	225.00
Heathkit HW202 Transceiver	5.00
Heathkit IG-102 Signal Generator	15.00
Heathkit IM-17 VTVM	2.00
Heathkit IO-104 'Scope	15.00
Heathkit IT-21 Tube Tester	40.00
Heathkit IT-28 Capacitor Checker	40.00
Heathkit TC-2 Tube Tester	25.00
HH "After Dinner" Horn Speaker	40.00
Hickok OS-7 RF Generator	20.00
Homebrew Radio w/ 199s	45.00
HP 120B 'Scope	25.00
HP 200CD Audio Gen	30.00

2010 CRC Auction Results

HP E2373A Digital VTVM	40.00
IBM Flat Screen Monitor	20.00
Juliette AM/FM 8 Track w tapes	5.00
Knight 83YX142 Tube Tester	40.00
Knight RF Gen	15.00
Macom PS-1517 Power Supply	15.00
Majestic 6C35 Radio/Phono	15.00
Majestic 7YR752 Record Plyr/Rec 1947	10.00
Majestic 83452 Radio-Phono	15.00
Monarch Wood Radio	20.00
Motorola Pee-Wee Radio	15.00
National SW-54	35.00
NEC Transistor Radio	10.00
Old Parr Whiskey Bottle Radio	25.00
Packard Bell 5R1 1956	2.00
Panasonic TR55 Port. TV	5.00
Phiclo 46-1201 (AM-RP) 1946	20.00
Phiclo 81 1930s	50.00
Philco 16B	75.00
Philco 29X 1934	10.00
Philco 37-116 1937	30.00
Philco 38-10T 1938	40.00
Philco 38-2 1938	5.00
Philco 38-3 1938	5.00
Philco 39-7 1939	25.00
Philco 40 155 1940	15.00
Philco 40-150 1940	10.00
Philco 42-122 1942	5.00
Philco 44 1933	20.00
Philco 49-904	5.00
Philco 51-1731 1951	2.00
Philco 570 1932	75.00
Philco 60 1930s	65.00
Philco 71 w/ Spare Chassis	80.00
Phillips B3X95U	10.00
Precision E-200-C Sig Gen 1940s	20.00
Radio Books Box 1	60.00
Radio Books Box 2	80.00
Radiola 66 1935	10.00
RCA 103 Speaker, 2 Speakers	110.00
RCA 125 1934	45.00
RCA 262 1934	10.00
RCA 54B1 1946 (1)	30.00

RCA 5T 1936	85.00
RCA 88K 1937, Zenith 7G01	10.00
RCA AP-937 Duo-Rectron	45.00
RCA Companion Record Player 1940s	10.00
RCA R-94B RP, V-M 8810 Amp, Records	15.00
RCA RP70 Radio/Phono 1946	5.00
RCA Tombstone 1920s	35.00
RCA TV 1956	10.00
RCA-Cunningham UX201/301 Duds 1929	12.50
Sansui 4 Chann. Tape Deck	10.00
Schaub-Lorenz Tivoli 59 1958	25.00
Sentinal 267-T (Catlin Knobs) 1939	20.00
Silvertone 8680A Wire Recorder	5.00
Silvertone Neutrodyne 1924	15.00
Simplex 5C	45.00
Sonochorde Reproducer 1925	30.00
Sony AN1 Wide Range Antenna	20.00
Sparton 80 1935	90.00
Speakers Qty 26 - 3 Boxes	40.00
Stewart Warner 9003B 1945	20.00
Stromberg Carlson 410-H 1938	40.00
Stromberg Carlson Console	10.00
Supreme Tube Tester	50.00
Teac 40005 4-Trk Tape	10.00
Telechron 8H67 Musalarm 1948	20.00
Telefunken ADAG1053	7.50
Truetone D2269 1937	5.00
Two Boxes - Tubes	80.00
Variac & Isolation Transformer	70.00
Wilcox Gay Recordio 1946	30.00
Wireless Improve. CO - Wave Meter 1918	265.00
Zenith 5R216 1937	90.00
Zenith 6D030E	30.00
Zenith 6D614 1942	25.00
Zenith 6-S-52 1935	65.00
Zenith 6V27 1935	200.00
Zenith 775 1933	25.00
Zenith A-600 T.O. 1952	110.00
Zenith G730 AM-FM 1950	17.50
Zenith Royal 97	35.00
Zenith Sherman Tank Radio 1944	225.00
Zenith T600 Transoceanic 1955	120.00
Zenith T825 1955	10.00

Stay tuned for Part II of

A History of the Transistor and the First Transistor Radios

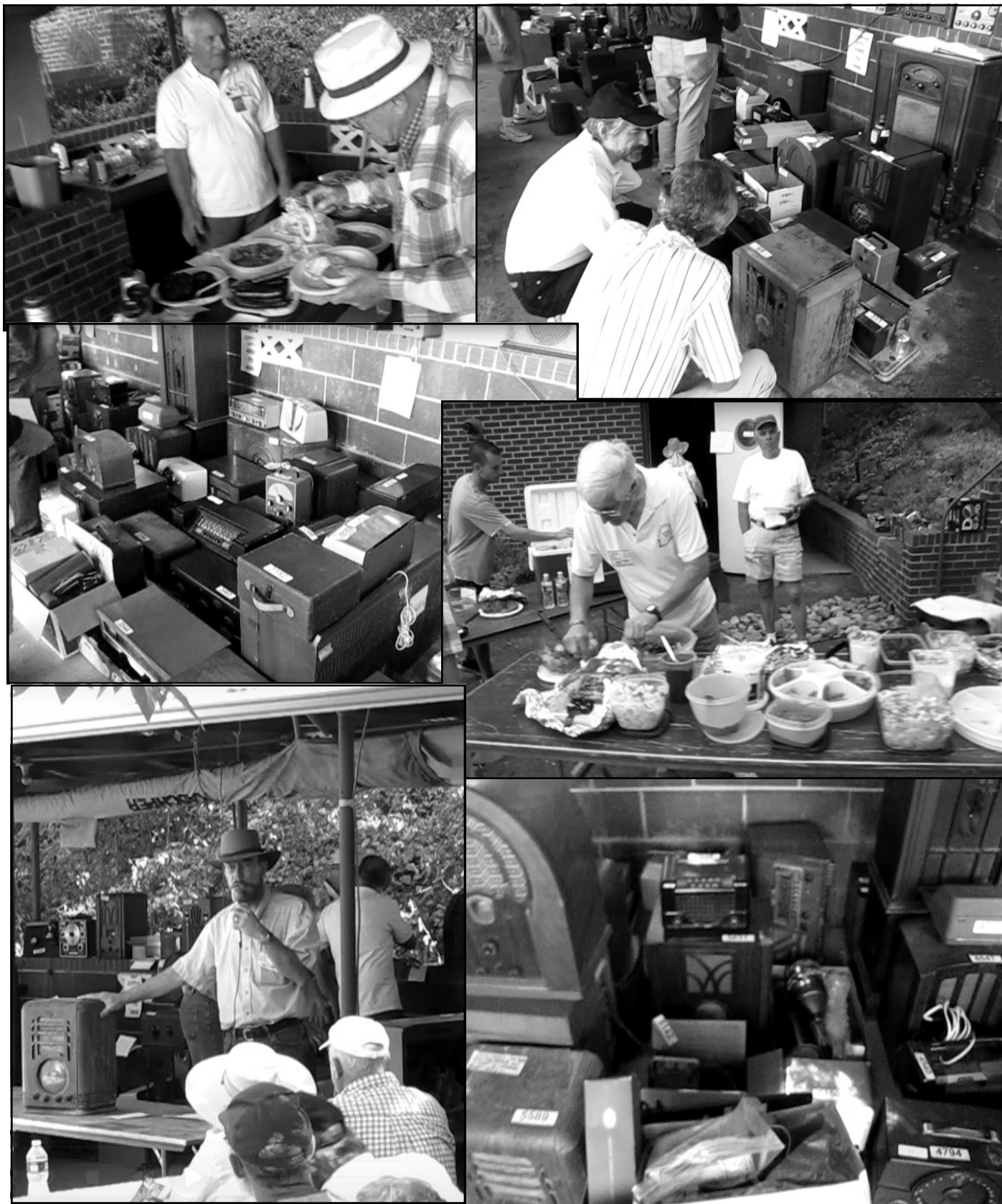
By Dave Laude

In the next issue of *THE FLASH*

2010 CRC Auction Photos



2010 CRC Auction Photos



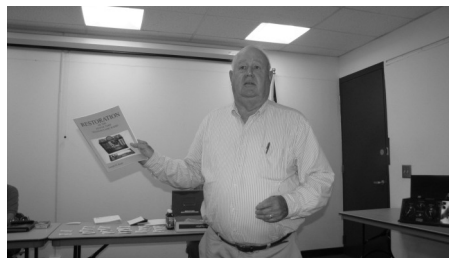
Photos from September 12th Meeting at the Bemis Library in Littleton



New Member
Bob Wilfley



Tom Pouliot discusses 1500 meter
(160-190khz) 1 watt communications



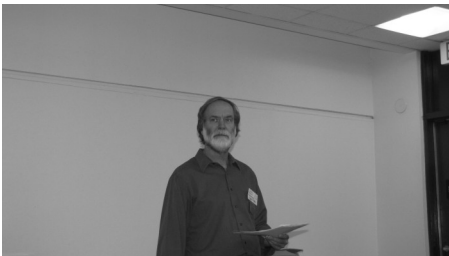
Joe Kaiser's new book on the
Original T-O restoration



Robert Baumann discusses E-Group
benefits to users



Dave Boyle gives information
on CRC Annual Picnic



Robert Baumann shows pictures from
Illinois Ham Fest



Tom Pouliot shows MRC-12



Bill Harris with his restored wire
recorder



Tom Kelley—I forgot what he was
doing but I needed 1 more picture

- - - - - Just Published - - - - -

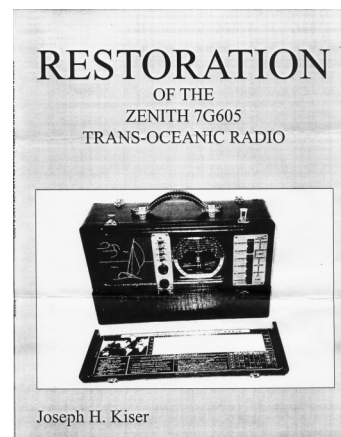
Restoration of the Zenith 7G605 Trans-Oceanic Radio by Joseph Kiser

48 pages including a complete pictorial guide for step by step restoration of this famous receiver, the first of the Trans-Oceanic series of radios. Complete materials and parts sources along with current prices are included.

A list of all tools needed and associated suppliers is also detailed. This new book is available from Charles Brett, book seller of the Colorado Radio Club.

Retail price \$13.95

Club Member price \$11.50





The Open Trunk

Member submitted advertisements



WANTED: Buy/Sell/Trade: "Heavy Metal" communications gear, telegraph related items, vintage calculators & microphones.

Robert Baumann, 303-988-2089
HQ180A@aol.com. (07/09)

REPAIR SERVICE:

Radio repairs for club members. Reasonable rates. Good references.

Call David Boyle
303-681-3258 11/09

For Sale: by Dave Boyle

All of the following older but "classic" radio and TV repair instruments have been expertly refurbished, repaired, and calibrated as appropriate.

All Instruments come with test leads, as required and most have manuals. Prices might be negotiable.

- 1) Heathkit TV Alignment Generator; IG-52. \$65.00
- 2) Heathkit's best "Laboratory" Signal Generator, IG-42 (I use one myself). \$105.00
- 3) Heathkit Capacitor Tester, C-3. Also checks leakage, power factor, and resistance. \$65.00
- 4) Heathkit Tube Tester, IT-21. Tests older types too! \$50.00
- 5) Eico Model 324 Signal Generator. \$60.00
- 6) Precision Apparatus Company (PACO) Model E-400 Sweep Signal Generator. \$55.00

Call
David Boyle, 303-681-3258 3/10

WANTED: Shirt pocket transistor radios, working or not.

Tom Keeton 303-797-8073
9/10

FOR SALE: Tube tester, Hickok model 533A w/supplements for European types

Electrical condition - very good, the unit is fully functional
Cosmetic condition - fair, some of the fabric covering is torn
I'll deliver the unit to Castle Rock.

Price is \$125. Pete Rawson
719-687-7144 5/10

FOR SALE: New construction—120 volt power supply with variac. Includes volt meter, amp meter and integral fuse to protect the connected load.

Give me a call and I will bring it to the next club meeting.

Price is \$75. Rich Kuberski
303-422-9510 11/14

THANKSGIVING RADIO SHOW

This year the *St. Luke's Radio Players* are recreating a composite of many Jack Benny Thanksgiving shows and a Father Knows Best Thanksgiving Show. As usual it's done one a stage with microphones, sound effects and actors performing from scripts.

Performances are at St. Luke's Episcopal Church, 13th and Quebec St. in Denver. There are two dates; Saturday, November 20th and Sunday, November 21st both at 2:00 PM. Both performance are the same and contain both shows. Reservations are not required. The cost is \$5.00 which includes light refreshment so the audience can meet the actors. This is the 12th year that we have performed with this group so they are all still hams.

Any questions contact JoAnn or Fred Bantin 303-427-5431

SUBMISSION OF ARTICLES AND ADVERTISEMENTS

Classified Ads for The Open Trunk and articles of any radio/electronic or historical related subject to be published in the Flash are encouraged and welcomed. The article(s) should be submitted in Microsoft Word, RTF, or as text cut/paste into your email to Steve Touzalin, either by email at stevetou@comcast.net , or by postal mail to 417 So. Queen Circle, Lakewood CO 80226 .

Formatting is not necessary, but if you do, set the font to Times New Roman, size 10, left justified. If you have graphics (.jpg files) to be inserted, please name them and be specific about how you would like them placed. We will do our best based on space limitations.

The November 14th, 1:00 pm meeting will be at the Philip Miller Library in Castle Rock

Directions

From I-25: Take the Plum Creek Parkway, exit #181
Turn East onto Plum Creek Parkway.
Turn Left (North) onto S. Wilcox Street and continue north 2 tenths of a mile.
The Philip S. Miller Library is on the east side of the street at 100 S. Wilcox St.
The building is towards the back of the parking lot, past the Dairy Queen.



**Colorado Radio Collectors
Antique Radio Club
417 S. Queen Cir.
Lakewood CO 80226**

FIRST CLASS MAIL