

# DX NEWS



the magazine of the National Radio Club

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NUMBER 7

"I've very much enjoyed my first year in NRC and hope the coming issues of DX NEWS will be just as interesting." (Charles S. Wackerman, Md.)



## IN THIS ISSUE...



- The Limits of Midday MW DX Reception- (conclusion) - Gordon Nelson
- The Super Signal Snatcher - Dave Fischer
- Latest Construction Permit List - Steve Bohac
- DXtras West - Blake Lawrence



## NEW MEMBERS THIS WEEK...

- \* Weldon T. Childers, Box 188, Carbon Hill, Ala. 35549
- \* Wm. Phillipson, 1045 W. Washington, #11, Sunnysvale, Ca. 94086
- \* Wladyslaw J. Grzybe, 66 Pine St., Holyoke, Ma. 01040
- \* Ed. C. Tafel, 413 Seymour St., Syracuse, N.Y., 13204
- \* Conrad "Chick" Borland, 147 Pasco Rd., Indian Orchard, Ma. 01051

Welcome to the NRC, gentlemen, please send a Musing to Ernie and introduce yourselves to the other club members, and Good DX.

## PAGE TAYLOR TAKES OVER IDXD...

As we announced last week, Foxy's backup editor will take over the IDXD section until further notice... **Page Taylor certainly doesn't need anything** in the way of introduction since he's one of the very top DX'ers in the international field as well as one of the most active... It's longtime NRC policy to select editors from the ranks of the most active and knowledgeable members in the particular area concerned and Page follows in this tradition. Until further notice address all IDXD material directly to Page Taylor, Box 282, Butler, N.J. 87405. His phone for DX-related calls is 201-838-5721 and this number may be called at any hour. Thanks again to Foxy for a great job; his final section for an as yet undefined period appears herein - an 8 page giant! And good luck to Page (from one who's been through it, let's see how much time you have for DX'ing now, hi! GPN)...

Sincerest condolences are extended to Russ Edmunds whose father died suddenly two weeks ago... RJE's absent section that week, combined with the lack of an IDXD forced us to reschedule the regular Thanksgiving skipped issue; as a result the HQ crew was unable to make it to the NJ gettogether due to the rescheduled issue and ERC's skip is out of phase - thus no Musings this week. **Ernie will** be back next week with a double section of Musings; meanwhile we'll follow last week's largest-ever Musings section with the largest technical issue in history...

\*GPN & BGK



(P. Taylor takes over next week; see front page)

Receptions:

- 535 Grenada. "Radio Grenada". Note name. Perhaps the other W.I.B.S. stations are "doing their own thing" also. (Schatz, Fla.)
- 540 Colombia. HJKA believed to be the poor/fair Spanish with YL ancr, vocal mx by man and woman. Think I heard a Radio Horizonte ID 0746 10/23. Hvy QRN. (Pejza)
- 552 Costa Rica. TISBJ, Radio Libertad, San Jose was logged for the first time on 11/1 from 0517 to 0545 with tropical mx; fair signal. (Krejny, Ohio) (Welcome..)
- 555 St. Kitts. ZIZ, Basseterre was logged from 2336 on 10/20 to 0015 on 10/21. Broadcasts of speeches with shallow modulation did not help any, only a fair signal. (Krejny, Ohio) (Still noted often with very poor modulation; het -ed.)
- 555 Nicaragua. YNS, Radio Tic-Tac, Chinandega on 11/4 at 0300 and on with talk and mx; weak in WFIL-560 null. (Sundstrom, NJ)
- 560 Guyana. G.B.S. noted 11/7 0002-0025 very strong with usual dedication format; some India-style mx, and some Western; spot noted mentioning Georgetown, New Amsterdam and a third town; ID at 0010 ran, "You're tuned in to the Guyana Broadcasting Service"; no appreciable QRM. (Feidt, Md.)
- GBS very strong at 0830 11/6 with their guitar tuning signal. Actual signon was at 0843; into religious pgm after signon. (Merriman, Va.)
- 580 Mexico. unID XE-- on top of the freq MM 11/6 1229-1242; several IDs as Radio Mexicana, but no local ID as far as I could tell. One mention of San Francisco and not known if this is a town or street. Was still bombing in 0834-0905 MM 11/13; TCs CST, still only ID as Radio Mexicana. (Pejza, Calif.)
- 580 El Salvador. YSDR, Santa Ana was noted on 11/5 from 0554-0604 s/off. IDed as YSKT Radiocadena Central; a fair signal on an auroral night. Another new one for me. (Krejny, Ohio)
- 590 Nicaragua. YNRD, Managua, Radio 590 was noted on 11/3 from 0521-0525. Signal was too poor to even get a report, but a definite ID. (Krejny, Ohio)
- 640 unID SS hrd 1007-1013½ on 10/23 with KFI off the air. Man in Spanish says one sentence between music. (Karchevski, Calif.)
- 645 China PRC. Radio Peking hrd 1425-1430 10/23 (GOAT seg. XII). Strength 1 of 10 and readability 1 of 10 with bad KNBR slop. 1425 mx: trumpet (with orch?) cl mx; 1425½ woman talks in Chinese. Faded out 1426-29 then f/in at 1429 with orch mx; 1430 woman in Chinese, very faint. 1430½ orch mx starts again.
- 645 Paraguay. It's still here. Noted with poor (Karchevski, Calif.) to fair signals on 11/6, was already on at 0752. Much splash from 640-650 making decent copy impossible; sounds just like it did last year. Surely someone is going to come up with a definite ID on it this year. (Merriman, Va)
- 650 Hawaii. KORL Honolulu the only thing noted during GOAT segments. Telephone talk show, records played occasionally. Promo at 0825 10/23 for "Talkback Radio, KORL", also in 2nd segment with news 1000-1005. (Pejza, Calif.)
- KORL hrd 0809-0815 10/23 (GOAT seg. X) at strength 2 to 4 of 5 and readability 3-5 of 5 with bad KNBR slop. 0809 a mention of Howard Hansen show tomorrow. 0812 a talk show, call 923-2055, a recorded Chrysler spot; mx while waiting for phone call. At 0830 hrd "KORL Talkback". (Karchevski, Calif.)
- 650 Alaska. KYAK Anchorage hrd 0850-0859 s/off 10/23 (GOAT seg. X) at strength 0 to 3 of 5; readability 0 to 1 of 5 with bad KNBR slop and static. Hrd mx to 0857 ID, begins s/off statement and SSB by large choir 0858-59. (Karchevski)
- 650 Mexico. XETNT, Los Mochis, Sin. hrd 1126-1203 10/23, strength 3-4/5 and readability 2-4/5 with bad KNBR slop. Only IDs hrd were "Radio 65" and La Hora Popular. Also one recorded spot played almost once evry 5 minutes, "..dos por cinco pesos..". Show is rancho mx with deejay doing dedications. (Karchevski)
- 655 North Korea. Pyongyang hrd 0925-0930 10/23 (Seg. X) with strength 0-3/5 and read. 0-2/5 with bad static. Talk at 0925 f/in, lecture? 0930 still talking, then a time ~~break~~ folo by a 3 hz SAH as another carrier comes on (Russia?) Hrd also 1029-1036 (Seg. XI) and 1300-1306 (Seg. XII) strength 3 and read, 4 with 1300 pips L&C, man and woman alternate talking. Stn behind w/mx 1300 (Karc.

- 655 Asiatic RSFSR. Verkhoyansk hrd 1300 10/23 with Kremlin Bells faint behind pips from Pyongyang hrd L&C. (Karchevski, Calif.) (Evidently this stn, once reported nearer 656 is now only a few hz away from Pyongyang, per above rpt from RAK, and per Manning, IRCA -ed.) (Karchevski, Calif.)
- 660 unID tester doing freq response runs, various tones hrd 1058-1119 10/23.
- 674 France. Marseilles hrd with good signal, amnt by male ancr, no ID, natch, 0433 10/16 folo by light vocals. (Edmunds, NJ)
- 683 Spain. Sevilla hrd 10/30 with a very nice s-7 signal and excellent audio w/ man and woman talking in Spanish, also had a clear "Radio Nacional de Espana" ID for tape at 2330. (Feidt, Md.)
- 690 Mexico. XETRA Tijuana with OC and TT 0540 10/23, testing with MoR at 0615. On regular sked later in the morning. (Pejza, Cal.)
- 725 North Korea. Kim-chaek or, Songjin with what sounded almost like Western MoR mx, 0912-0920 10/23; male ancr in Korean between songs. Even one with an electric organ. (Pejza, Calif.)
- 734 Cuba. CMAQ, Pinar del Rio, Radio Liberacion was the CM here. Back on 740 as of 11/2. (Schatz, Fla.) (A signal, weak audio here evening 11/21 here -ed.)
- 730 (out of seq. -ed.) Colombia. HJCU, Radio Melodia hrd 11/12 at 0755 with IDs bet between typical Colombian mx. (Breger, Texas) (Welcome Back, Michel -ed)
- 730 Trinidad. Radio Trinidad, weak but atop a weak jumble here evenings of 11/6 and 7 in auroral cx, as is usually the case in such cx. India-style mx at times and soft spoken ancrs. No sign of CKAC/CHIR these nights. (Foxworth, NY)
- 750 Nicaragua. YNX hrd apparently just after s/on 1105 MM 11/6, still giving details on frequency, power etc. JOIB under. (Pejza, Calif.)
- 760 Guyana. BRG hrd 11/8 0105-0115 with talk in English by man and woman, many ads and mentions of Radio Demara (Radio Demerara -ed.) slogan, ID by gal at 0110: "This is Radio (Demerara), the voice of Guyana; a good signal but bothered by SAH flutter. (Feidt, Md.)
- 760 Mexico. XEABC is the one with Radio Moderna ID and Spanish rock, hrd 11/12 at 0500 with "XEABC, Radio Moderna... Mexico" over/under CMCD/WJR. (Breger, Tex)
- 780 Brit. Virgin Is. Rare midevening reception of this one noted on 11/6 at 2359 tunein way atop the channel and almost alone except for het from the Cuban (the same het that bothers WBEM), Carib-accented "that's all for today folks ...from the Mighty Zed", spoken call ID as Zed-B-V-I, a few seconds of heavy rock mx then into newscast 0000 11/7. This was heard on HQ-129X bought from Rick Heald, in basement, with only a 25 foot LW, indoors. Checked again at 2355 2355 on 11/7 with main rx, ZBVI still atop channel, but weaker; format was similar to above except had an a capella sung call letter ID just before news on the hour this date. Normally have Cuban u/WBEM here this time. (Foxworth, NY)
- 790 Cuba. CMCH Havana atop this usually jammed midevening channel 11/7, this one hrd giving clear slow call letter ID. (Foxworth, N.Y.)
- 806.5a unID CA stn 11/4 0320-0500 with soft MoR instrumentals, some with a slight Latin flavor, but mostly NA pop tunes and show mx; many organ renditions; had low key male and female ancrs between cuts in Spanish; ID at 0356 was, "estan escuchando Radio Cero Hombre"; this slogan makes little sense to me, but it was phonetically very similar anyway; TC at 0357 was for 10:00 PM and apparently s/off at 0500 without any anthem. Bearing seemed to be between 205° & 215° indicating Central America and I strongly suspect Guatemala, Honduras or El Salvador. Signal was a very good s-8 at times, but more normally s-5 or 6 which made for difficult copy with PJB splash. Would appreciate some help on this one. (Feidt, Md.)
- 810 Mexico. XEFW, Tampico with call letter ID 1212 MM 11/6; later a mention of Tampico; even with KNDR s/on 1220 and on top afterwards. (Pejza, Calif.)
- 824 Guatemala. TGTO, Radio Internacional 11/7 at 0259 in midst of a series of amnts. Weaker than TIOS but still a good signal once rx's Q-null null function took out het. (Sundstrom, NJ) (This is a good place to mention: Those of you who use HQ-150's will find that, in order to use the Null function effectively, the "null gain" pot setting is quite critical, as well as the "freq" adjust; in my set the "null" pot must be set at about 2 o'clock, that is, at about 2/3 open (NOT full open) to get a sharp, deep null - AND, the "freq" setting will be extremely critical. Rotating through an angle the width of

(cont'd) the width of the pointerline on the knob face is enough to pass the null across the carrier, from one side to the other. When nulling hets with the HQ-150's Q-mult, rock both the "null" and "freq" pots back and forth while looking for deepest null, and tune slowly. On the other hand, when in "peak" mode, the higher up the "peak gain" pot is turned, the sharper the peak (until the Q-mult breaks into oscillation). When adjusted carefully the HQ-150 null function can take out either carrier causing the loud het on 780, as an example, to the point of inaudibility of the het, leaving clear audio. (ed.)

Costa Rica. Radio Titania, TIOS, San Jose 11/7 at 0300 and on with alogan ID after each record, a good signal and stronger than TGTO. (Sundstrom, NJ)

Cuba. CMCA, Havana 11/4 0218-0230 just above WCCO, perhaps 400 to 600 hz up. Spanish pop mx with woman deejay. Gave ID with call letters. Music had a higher modulation percentage than voice. Very good level. (Tull, K.C. Mo.)

CORRECTION: to my unID of 10/2 - NOT Radio Peking; possibly Radio Malaysia. (Karchevski, Calif.) (My fault for delay in getting into print, sorry -ed.)

St. Lucia. Radio Caraibes very strong and mostly alone on channel 11/8 and 11/9 around 2230 - 2300 and later, at times a 3 hz SAH with very weak WHAS. Lots of rock, soul mx, always in French whenever hrd, often a girl ancr. This one occasionally hrd in WHAS loop null in normal ex, but with hets from IAs. There was no trace of IA activity here either the 8th or 9th. (Foxworth, NY)

Panama. Radio Libertad, HOL80 was in with an excellent signal on 10/30 from 0730-0800. All music. New for me. (Krejny, Ohio)

This stn hrd very well 10/30 at 0330 ID, for very nice tape, a pretty complete ID mentioned Radio Libertad 3 or 4 times. Signal just about alone. (Foxworth) unID. 11/4 0245-0304. Very weak signal. Classical piano mx; long deep fades. Lots of dead air time. One anmt in Spanish at 0250. This may have been a test. At 0302 music like a national anthem, at 0304 lost carrier. (Tull, Mo.)

Guatemala. TGX, Radio Ciro's, was logged on 11/6 from 0655 to 0701 s/off. Had romantic music before that. IDed as "Ciro's Musical, la emisora del carismo (sp.?-ek)". Was dominant although YNAV and HJKC also noted. HJKC was dominant later on. (Ed Krejny, Ohio) (WJW no problem there? -ed.)

Curacao. PJC-2, Willemsstad 11/7 at 0310 with cl mx concert, apparently supplie by Radio Nederland, as per anmt 0322. Good, steady, clear signal. This evening apparently auroral, as many of the domestic clears to the W and N barely audib now, and didn't even show at local sunset. (Sundstrom, NJ) (Krejny, next)

Dom. Rep. HILR, Radio Clarin, Santo Domingo was logged for the first time here on 10/30 from 0932 s/on to 0945. I hate time zones that are a 1/2-hour off, as it sure makes conversion difficult. Very good at times but widely variable.

Morocco. A newie here is almost surely Morocco, and appears // 818 and 935. Hrd 10/16 0420+ with Quoranic chantings. Cannot be totally sure on any of these Moroccan parallels inasmuch as chantings sound pretty much alike. We should maybe watch this. (Edmunds, NJ) (Or get a 2nd rx, hi -ed.)

Japan. JOGB, Fukuoka hrd 1320-1330 10/30 (GOAT seg. XV). 1320 woman with "Nippon Hoso Kyokai", fades out. 1323: signal in with man talking in Japanese, 1325 man speaks slowly and distinctly. Strength 0-4/5 and readability 0-4/5 with fading and some WWL QRM. (Karchevski, Calif.)

North Korea. Wonsan. Hrd 1023-1028 10/30 (GOAT. seg. XIV). 1023 woman sings, in Oriental style, sounded Chinese? Korean?. 1025 woman talking as signal fade then chorus, woman speaks; 1028 a girl or child shouting. Freq msd by msng the 2600hz het and assuming was against 880 khz. At 1101 hrd unusual IS: 4 chords ascending on a (celeste?). (Karchevski, Calif.) Hrd again 1302-1309 10/30 for GOAT seg. XV, woman and man talking, fade in and out. Strength 0-4/5 and readability 0-3/5. QRM from KRVN slop; 2600 hz het. (Karchevski, Ca.)

unID SS on with cl mx, 0836 10/30. Another unID with YL making short anmts between dance mx, all instr's, 0845-0935 10/30. (Karchevski)

Cuba. Radio Progreso, CMAF, Pinar del Rio, is the one here from 670, not Matanzas. (Schatz, Fla.)

Cuban noted here with semi-cl mx, some Broadway showtunes; about 20 hz higher than WCBS. Frequent mention of Cuba. Woman on the hour and halfhour with R. Revolutionary ID (Are you sure of that spelling, John? Not Revolutionario?-ed) 11/9 0525-0605. Too good a signal for 250w. (Tull, Mo) (LA log obsolete here-ed)

unID here, with nothing noted on 880, weak carrier and audio, man in lang. 5 at 0720 and on, 11/13. (Edwards, NJ)

Colombia. HJCE, Bogota hrd 0829-0834 10/30 with ID, ".Radio Cinc..en Bogota" with poor signal, unreadable under KNEW slop. (Karchevski)

unID. May have been AFRS Adak Is., 1335-1340 10/30 with mx from West Side Story. Very poor signal behind another unID, Fiji? (Karchevski)

unID. Maybe Fiji, except Fiji not supposed to be on at this time. Hrd 1332-1349 10/30. 1332 woman stops talking, oriental mx, flutes and chorus (procession?). 1344 signal fades in rapidly with a loud wailing flute-like instrument. At 1345 flute stops, then cl mx with Renaissance flavor, like the theme of the BBC's "Elizabeth R". Man over with "Kay-ton-dong" and renais. mx continues. Man over with 2 sentences. At 1345 1/2 man says (sounds like) "KRA en-nay CA-NA (pause) FEE-JEE" and more talk. At 1347 2 men in conversation, adlib style and lang sounds: frequent "some-dung-gum" sounds; also many words starting with "gah". Sample sentence: "yong don ga-done" ga-dum'." Ideas?(Karchevski)

unID. Sendai? Hrd 1349-1359 10/30 with man and woman singing opera. 1351 a woman talking in Japanese? Then mx "Jesus Christ Superstar", faded. (Karchevski)

unID. Who with first two bars of "Eye Bye Blackbird" on chimes or glockenspiel at 1428 10/30, used as IS? (Karchevski)

unID. Who with four minutes of pips (?-ed.) 1429-1433 10/30? Each pip plus reverb takes one second with 7 seconds between each. In noise. (Karchevski)

Barbados. Black Rock. Radio Barbados was noted on this frequency for the first time here (have had them on 795,785 and 780) on 11/4 from 0341-0353. Almost non-stop mx and only one promo noted the whole time. Auroral ex meant a variable signal, but practically no CHML/XEW QRM. (Krejny, Ohio)

Radio Barbados was fair strength but practically alone here 0030 11/10 with local government news, still in at 0105 but with XEW in by then, quite strong but easily loopable, with letters from children in St. Michael parish, asking for penpals in Caribbean or Guyana; ancr had a "veddy British" accent. This stn hrd mentioning Barbados often but reluctant to actually ID. (Foxworth, NY)

Romania. Cluj hrd here 10/16 0450 with talk in Slavic lang but very weak. PT was able to pull ID: best I could do was presume that there was one, hi. // 1151, though, so should count for some degree of certainty, though dunno how much. No other obvious choices, anyway, hi. (Edmunds, NJ)

Tentative Surinam. Radio Nickerie 11/7 2320-2359 had quite strong carrier peaking up to s-6 1/2, looping about 145° (the same as 725khz stn-wbf), audio was vly weak, but think I hrd India-type mx at times on peaks, also talk by man but not strong enough to determine lang; BGK said he had bearing of 190° but suspect this was pulled off by his semilocal, this bears watching anyway. (Feidt, Md.) (There has been a stn rptd here like this off and on for yrs-ed.)

unID. Something here for several nights up to 10/16 with apparent Spanish & guitar mx. Loops about right for Madrid (60°) but that one not supposed to be on. A sked change or what? Not good enough audio on voice parts to ID, if one was given. 0440 10/16. (Edmunds, NJ)

unID. Weak IA noted here at 0700 11/3. Not YVNN or XEQ. Sounded like a Colombian and possibly Radio Eco in Cali, although they are not sked to be on all night. Thought I heard one ID as Radio Tiempo, but signal poor and QRM heavy. (Merriman, Va.) (The way Colombians are going AN, wouldn't surprise me-ed)

Venezuela. Radio Punto, Caracas 11/7 2242-46 briefly atop here with talk in Spanish, ID 2245 by gal was, "Radio Punto, noveciento cincuenta, la nueva emisora de Caracas.." so perhaps this is new and not a slogan change for YVKG. If so, what happened to Ondas Populares? (Feidt, Md.) (SEE: Stns hrd in Caracas 8/12 thru 8/16/72, by Objio, in DX News; he rptd this stn here as "R. Punto Novecientos Cincuenta". -ed.)

Mexico. XEFA, Chihuahua bombing in during XEGM's SP. "Crackling Rose" in Sp., ID as "La nueva F - A" after every record, also "Radorama". Listed in RFS list and FBIS as 500 w-day; VJ has 500/250. Gradually faded. (Pejza, Cal.)

unID SS noted here with tropical mx on 11/6 from 0314-0332. As usual it peaked for the mx but went into the mud during (presumed) anmts. Occasionally was very good but WFIR QRM did not help. (Krejny, Ohio)

Mexico. XEO, Matamoros showed up on 11/4 between 0425-0446 for a real surprise. Frequent IDs as "X-E-O" (with reverb). Occasionally

(cont'd)

Occasionally a very good signal, but again, variable with auroral ex. I like this freq; 1963 aurora brought in XEVT, but not noticed this time. (Krejny)  
1000 Mexico. XEFV, Cd. Juarez has ID as Radio Rancherita (not Bonita), as well as XEFV. S/on hrd at 1215 10/9. (Breger, Texas)  
1000 Colombia. HJAJQ, Radio Miramar, Cartagena hrd with several RCN IDs 0405-0415 with no XBOY; excellent signals. (Sundstrom, NJ)  
Radio Miramar noted with good signals on 11/6 at 0815. This stn is IDing as Radio Miramar, La Voz de Barranquilla y La Voz de Cartagena. (Merriman, Va)  
1007 North Korea. Apparently // 725 but much weaker 0922 10/23. (Pejza, Cal.)  
1020 Colombia. Radio Colosal, HJJR Neiva very strong at 0655 on 11/6. At 0658 they had an anmt mentioning Nebraska and Missouri and I think they were sending greetings to DXers who had sent them a report. (Merriman, Va.)  
\*\* 1020 Venezuela. Radio Calendario, YVMX, Maracaibo is apparently now AN as noted on 11/4, 5 and 6 with mx, ID every 2 or 3 records. (Merriman, Va.)  
Radio Calendario noted 0545 11/6, slugging it out with HJDP (Radio Colosal? and neither very good. AN now? (Krejny, Ohio) (Use care to distinguish from Radio Margarita, YVRS here who also sometimes run very late - ed.)  
Radio Calendario on top of channel with LA mx and a "Radio Titania type slog between discs. (Edwards, NJ)  
1034 Portugal. Porto on 10/30 0440-0448 at a s-9+ level with light pop vocals and talk in Portuguese, may have had an SAH also but much WBZ slop moved the S-meter too much to be sure. 10/30 was not too good a TA morning here. (Feidt)  
1035 Panama. HOS21 11/8 0220-0230 fair after 4VEF s/off with "Radio Union, mil treinta cinco kclos." ID, then into a fairly extensive coverage of the U.S. cuba returns; some WBZ slop problem. (Feidt) (Krejny /  
059 Cuba. CMKG, Baracoa in on 11/4 between 0312-0330 with an excellent signal.  
061 Denmark. Referring to your IDXD #2 of 10/20, 1061 is Kalundborg, Denmark. I called Copenhagen Hq and asked them. The program control said OK. They were on the air until all votes were clear. Even the Faeroe Islands station on 581 were on the air late that night. (Ericson, Sweden) (I'm sure rje and PT say thanks, Bengt -ed.)  
1070 France. Hrd finally with s/on 0430, then faded for 20 minutes, then soft instr mx, 6 or 7 pips, the last one a bit longer than the others, but very poor under the others on the channel, then folo by news, // others at 0500 10/16. Also same as PT's 1070 but not as good. (Edmunds, NJ)  
1000 Antigua. ZDK noted with quite strong signal, entirely alone on channel 2225 to past 2250 11/9, calypso show, several spots, local news at :45 with electronic news sounder between news items. Still atop 0100 with weak WKYC behind and still strong. Hrd also at 0213 s/off 11/20 under "normal" cx, weak behind WKYC basketball. Had been in and out all that evening. (Foxworth, NY)  
\*\* 1100 Nicaragua. YNQ, Emisora Lider, is a new slogan (per 2200 khz harmonic reception.) (Schatz, Fla.)  
1110 Puerto Rico. WVJP, Caguas surprised me by showing up MM 11/6 between 0732 and 0742. HNL hurt but signal was occasionally quite good. Believe the pgm was called "Los exitos del Mundo .. los Exitos del Hit Parade". New here. This was Puerto Rico #23. (Krejny, Ohio) (This apparently AN MMs, it seems? -ed.)  
1110 Colombia. Radio Reloj, Cali fair to poor 11/6 at 0630. Had QRM from another LA, probably YVXR. Pgm was like Reloj's on 1100. They had one recorded promt that mentioned La Voz del Rio Cauca, the other Caracol station in Cali. Not bad for a listed 1 kw. Call is HJEW. (Merriman, Va.)  
1115 Nicaragua. YNP 11/8 0330-0346 in nicely with Latin vocals and ID at 0331 as "desde Leon, Radio Circuito...musica favorita"; some slop from WBT. (Feidt)  
1115 Morocco. Tangier II must be the one here with chanting for Ramadan // 818 and 935. 0510 10/16. I suspect a power increase here, too, although not of the magnitude of 818. (Edmunds, NJ)  
1140 Philippines. VoA, Poro, poor Yankee Doodle IS repeated at s/on several times 1059-1100 10/23. Any anmt after that was not readable. (Pejza)  
1140 Puerto Rico. WITA 11/7 o/u WRVA with ID at 0230 as "desde San Juan, Puerto Rico, transmite..." and gave WRVA a real run for its money. (Feidt, Md.)  
1160 Colombia. HJBL, Ondas de Cienaga Grande was alone on the channel on 11/3 from 0126 to 0135. Fairly good signal. Another try for a verie. (Krejny, Ohio)  
1160 Dominican Rep. HIEG, Radiolandia, Stgo. was logged on their new freq. on 7 11/6 between 0442 and 0512. Very good signal. AN now. (Krejny)  
Radiolandia noted IDs 11/5 at 0630 and 0649 in the midst of all music. In again 11/7 at 2245; excellent later that evening 0300-0400. Normally covers KSL here. (Sundstrom, NJ) (Here since last summer, rptd 5 kw -ed.)  
1180 Venezuela. YVMB s/on hrd 10/17 at 1000 with anthem and many IDs as Radio Petrolera. Jingle ID also used. No mention of the calls listed in the NRC LA Log. (Breger, Texas)  
1187 Int. Waters(?) Radio Caroline-73 has been testing during week #46. (early Nov.-ed) Tremendous signal. Hungary pressed totally. Starting around 0530 Z playing nonstop several nights until after 2300. No special IDs hrd but RNI jingle "man of action" hrd at one time. Station quiet Sat 11/11, perhaps by tough weather in the Channel. (Ericson, Sweden)  
1190 Mexico. XEPZ, Ci. Juarez with further ID as Radio Mexicana hrd 10/14 at 1100 and suspect the station is a daytimer. (Breger, TX) (also next item /  
1190 Mexico. XEWK, Guadalaajara s/on 10/14 at 1200 with marching mx and XEW ID.  
1196 Morocco. Agadir 10/30 2231-2250 at a surprising s-7 level with native mx with flutelike and string instruments and some chanting, WOWO splash made copy rough, looped about 70° and was actually better than 935 at this time, later had talk in Arabic-sounding lang, by a man. (Feidt, Md.)  
1180 (out of seq.-ed) Brazil. ZYD65, Rio believed the one with mx SM 11/12 at 0742-0815. Alerted to this one by Gene Martin, but unfortunately too much slop from local KCEQ-1170 to get much on this one. Another station in there and seemingly in English. One to try for again. (Pejza, Cal.)  
1205 France. Bordeaux 10/30 0425-0431 with TT to 0429, then La Marseillaise, s/on and into talk in French; s-7 at times. (Feidt, Md.)  
\*\* 1210 China PRC. Radio Peking operating new powerful outlet since late September. Carries Foreign Svce, hrd in Korean until 1200, then time pips and a short version of "The East is Red". Then into Chinese. This is the strongest mainland China signal now; must be using highpowered xmtr and/or directional antenna. Tx causes strong hum (het?-ed) on the freq, and most of the time is killing JOOR, Osaka. Should make it to WCNA. (Ryden, Tokyo, Japan)  
1210 China CPR. (Evidently the above-ed.) China strong in Korean 1338-1400 10/12 with JOOR overriding them at times. Home Service pips at 1400, then an ID which sounded like "Kwan-(?)- Jenmin Kwangpo Tientai" and seemed to be in Chinese under JOOR at 1406 tuneout. Must double as a Foreign Svce outlet.  
1210 China. A second station, much weaker than the above, with bits of Chinese by a YL, Home Svce pips at 1400 10/12. I guess China doesn't time their pips very accurately. The first pip of the weaker station was one second ahead of the first pip from the stronger station; they gradually drew closer together until the sixth pip from both stations occurred simultaneously. unID. At 1400 10/12. Halfway through China's pips (see above) someone else with six short, low pips occurring at one second intervals. Strength was about the same as the weaker Chinese. JOOR was also in there, with their single pip. 4 TPs at once-what a mess!(All 3 1210's from Al Lehr, CA viaFJP)  
1225 Costa Rica. TIGM is a regular here. Hrd IDing as "Radio D-B between records 11/04 around 0440. (Breger, Texas)  
1232 Morocco. Also this one on for Ramadan, stronger than last year though general cx are worse, hi. Hrd 0515 10/16. (Edmunds, NJ)  
1260 Mexico. XEL in D.F. hrd often with American top 40 mx, in both EE and SS. They "voice-over" the mx with "Radio Capital" slogan. On 10/11 changed pgmg from Eng to Spanish at 0700. (Breger, TX)  
1286 Senegal. Kaolack had a fair signal 0645 11/2 with chanting. Was // 764 and just as strong. (Schatz, Fla.)  
\*\* 1310 Venezuela. Radio Andina, eastern part of ctry, is new and AN. Frequent TCs, bo both YV and HJ music. (Schatz, Fla.)  
1325 Costa Rica. TIRG, Liberia, Radio Columbia was logged for my annual report on 11/3 from 0104-0115. Good signal on an auroral evening. (Krejny, Ohio)  
TIRG 10/31 0035-0116 with continuous rapidfire Spanish by a man till shortly past 0100, then brief mention of "Radio Columbia" slogan; better ID at 0110 was "...Liberia, Costa Rica, Columbia..." and then into a radio drama. Had a bad het from a weaker stn abt 600 hz lower, likely Colombian. (Feidt, Md.)

8  
 1325 Neth. Antilles. PJA10, La Voz di Aruba, strong evenings in Spanish and Papiamentu (which sounds like Portuguese). (Schatz, Fla.)  
 1329v Brazil. Belem, "Radio Difusora Liberal" first noted 10/30 before 0830 with guitar sambas and messages to listeners in Maranhão state. Still drifting around the evening of 11/2. (Schatz, Fla.) (Schatz, next)  
 \*\* 1330 Haiti. "Radio Haiti", 4VW is here from 1325. They are audible days in Miami.  
 1368.7a Domestic, but thought I would mention it in case someone noted a het here. WCOA was noted on this freq on 11/4 at 0530. Apparently signed off, or back on the freq, 10 minutes later. (Merriman, Va.)  
 1370 Mexico. XEPEJ IDs as Radio Capital, Guadalajara, and not it's actual location near Guadalajara. (Breger) (Note Hauser-ed)  
 1375 Costa Rica. TIMAR, Radio Monumental, Limon was also logged for an annual report on 11/3 between 0051 and 0500. Very good signal also. Mentioned stns affiliated with Monumental in a news network as: TGRF, YSKL, HRN (?) and @ YNX. (Krejny, Ohio) TIMAR noted 10/31 0005-0025 with talk in Spanish mentioning C.R. provinces including Puntarenas and Limon; then upbeat Latin mx with many ads interspersed; slogan is "Monumental" and "Radio Monumental" and satellite slogan mentioned in the NRC Log was not noted. (Feidt, Md.)  
 1400a unID. BBC Eastern Relay stn hrd here some nights by several. Tests? Or, 2x 700 or 701? This noted at 2300 when station is usually off the air. (Ericson)  
 1414 Mali. Bamako most assuredly the station noted with French; chanting around 0700 11/2; as strong as 1268 above. (Schatz, Fla.)  
 1457 unID. Further on this mystery station. On 10/11 I logged this station at 0430 with IS, ID and anthem which I feel certain are Peking's. This would strongly suggest the Tirana xmtr sometimes listed for this channel, although no Tirana ID was noted. (Krejny, Ohio)  
 1466 Monaco. Monte Carlo 10 over s-9 10/27, noted giving sked in English 2330. A it hard to read as audio not filling carrier. (Sundstrom, NJ)  
 1475 Costa Rica. Radio Monumental, Ciudad Quesada, listed. TTGHP. Enthusiastic sports coverage 0128 11/13. (Hauser, Texas)  
 1480 China CPR. With reference to Bundy's search for the English lessons from Shanghai-795, I recently noted such lessons at 0845Z on 1480, under NHK-2. I did not identify, but there is a Peking (Educational) outlet listed on this channel, so that's my wild guess. (Ryden, Japan)  
 1502 unID. Strong TA noted on 1502 11/3 at 0510, no audio. Due to auroral cx, must be an African south of 30° N. (Schatz, Fla.)  
 1510 Mexico. XEOF. Celaya, Gto., with ID "La Rancherita" under WLAC on long antenr only, at 0018 11/13. (Hauser)  
 1520 Mexico. XEYP was SS dominating KOMA et. al. at times on the long antenna; ad for bus to (Ciudad) Victoria, leading me to believe this is XEYP, El Limon, Tamps. once again, 0010 11/13. (Hauser, TX)  
 1525 Costa Rica. TIEEAW with enthusiastic sports coverage almost seemed to be // 1475, at 0129 11/13, but this is listed as a Radio Columbia outlet in Turrialba. (Hauser, Texas)  
 1525 China CPR. 11/2 at 2300 hrd with usual format at fair level. Cx at the time were very auroral. A<sub>90</sub> on 11/1 was 76, per WWV. Signal suffered from rapid fading, not flutter, as did 1546 USSR and 1586 Germany. (Grant, Mass)  
 1525 unID. A definite signal here, only fair, 0010 11/8 with badly auroral cx. At times enough to determine a man and woman speaking alternately, not in well enough to determine the lang. I tend to lean toward China here, but am not discounting possibility of the TI. Didn't stay with it very long. Loop not a great deal of help as Sinkiang and the TI just about colinear from here. I have about 5 minutes of tape. Interesting in that receptions of the China stn on 10/12 and 11/2 and tentatively here on 11/7 all made during noticeably auroral cx. This reception exhibited very little of the rapid jumpy fading noted 10/13; rather, sort of "rolled" in and out. (Foxworth, NY)  
 1529 Asiatic RSFSR. OC at tunein 0859, Foreign Service IS at 0900; at 0901 march cut in on several times by man or woman with anmts in Chinese, probably an ID, etc. Even had one segment of marimba mx. 10/23. (Pejza, Cal.)  
 1540 Bahamas. ZNS1, Nassau, has been running 20 kw on a 2-tower array since late September, should be weaker in NA. AN, still, and // ZNS2-1240. (Schatz, Fla.)

9  
 1546 USSR? Noted 11/13 0000-0030 with what sounded like chanting with YL anc. in lang, then deep Russian bass (Ivan Rebrotff?) (Edwards, NJ)  
 \*\* 1548 Costa Rica. TIASF, nominally 1550, in the clear here, 11/13 at 0130, Spanish sermon about sex, marriage, European customs; 0209 ending "hasta el proximo domingo", 0210 an 8:11 TC and ID as Radio Cima de Costa Rica (listed 2 kw in Ciudad Quesada), 0214 Radio Cima ID again over vocal mx; pgm name was Domingo Supermusical". (Hauser, Texas)  
 The het against 1546 is from LA anncg what seemed to be Radio Caramba or Malamba or whatever. Hrd best 0020 11/13. (Same date as above-ed.) Had no trouble splitting off from either 1546 or 1550 with the R-390. (Edwards, NJ)  
 \*\* 1550 Japan. FEN Itazuke xmtr closed down last Summer since the USAF base there closed. That is why AFNT in Taiwan took over the freq. All according to NRC member Bruce Reynolds, who by the way is now the evening newsmen on FEN in Japan. (Ryden, Japan)  
 1550 Colombia. HJZI, Radio Fantasia, Bogota was good on 11/6 at 0720. Easy listening instrumental mx; infrequent anmts. Only QRM was from KGMO ET. (Merriman)  
 1550+ unID SS noted here 11/5 0715-0749 under auroral cx. Occasionally dominant and very good, but not often. The het was excruciating, but I'm fairly certain the ID was "Radio Puma" and I realize this is close to Radio Cima but I don't think it was them. Any ideas? Believed to have been CA or Colombia; my loop is no good for DFing. (Krejny, Ohio) (Note too, yours on the high side; Hauser rpts Cima on low side of 1550 - unless drifting across. -ed.)  
 1554 France. RTF Nice 10/27 peaking at a level over that on 1550 with French talk at 2320 and on. (Sundstrom, NJ)  
 1560 Mexico. XEJPV, Cd. Juarez with call letters and ID as Radio Chamizal MM 10/30 at 1326. (Pejza, Cal.)  
 1565 Colombia. HJZT, Manizales, "Radio Sensacion" finally IDed at s/off 0500 11/2 Nominally 1570. (Schatz, Fla.) (Why do you use c/d instead of s/off? -ed.)  
 1570 Guatemala. La Voz Evangelica, TGVE, 11/11 0435 ID, inviting phone calls, dominating a rumble of other stations here, as XERF was off until its carrier returned at 0546. (Hauser, Texas)  
 \*\* 1574 Sharjah. A very interesting logging here is Sharjah Broadcasting Svce, hrd around 1600 Z with a good signal, then DDR-1570 takes over. Incidentally DDR itself now rptd at least 100 kw, ex-20 kw. (Ericson, Sweden)  
 1578 Portugal. CSB5, Porto booming in 10/27 2315+ with pop mx. (Sundstrom, NJ)  
 1588+ Mexico. XEPT. Stn hrd all evening 11/14 Z 0100, till 0307 s/off giving 9:04 and said would return at 6 AM, off at 0310. Likely this the Misantla, Ver. stn last noted here a year and a half ago. (Hauser, Texas)  
 ++++++  
 FCC News  
 ●KGMB, Honolulu - Broadcast bureau granted CP modifications for main and aux, and alternate main, to change xmtr site to 111 Ahui Street; share existing facilities with KGU, KKUA and KHAI; conditions. Action 10/18.  
 ●New AM Stations, application - Kotzebue, Alaska. Kotzebue Broadcasting, Inc. seeks 720 khz, 5 kw. PO Address: Kotzebue 99752. Est. constr. cost \$103,333; first year operating cost \$64,500; revenue none. Principals June Nelson et. al. Annc. 9/12.  
 ●New AM stations: FCC granted request by Magof, Inc. for waiver of AM Freeze rules and accepted for filing application for new AM in Agana, Guam, on 570 khz with 5 kw-U, in Agana. Magof, Inc. will provide a second service to a population of 85,000. Action 10/12. Further, chief, Broadcast Bureau gave notice (annc. 10/26) that (the above) AM application will be considered ready and available for processing, on 12/7/72. (de Broadcasting 10/23 and 11/6)  
 ●Mod. of CP: Broadcast Bureau granted mod. of CP to KVOK, Kodiak, AK to extend completion date to 5/10/73; granted same to KIPA, Hilo, Hawaii, to 1/20/73, resp.  
 ●Existing AM stations, final action: Broadcast Bureau granted CP to WJIT, San Juan, P.R. to install new auxiliary xmtr. Action 11/3.  
 ●Ownership changes: KUAI (AM), Eleele, Hawaii seeks transfer of control of American Islands Broadcasting Corp (details p. 49 Broadcasting 10/23/72).

Info on new CPs, extensions thereof, may help in logging ETs from stations such as those listed above, when they hit the air. Although the Guam one is a far out hope.



EDITOR:

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Greetings, folk. Cx continue to be poor in general, but while the auroral cx have pretty well messed up the TAs and not quite enhanced the LAs sufficiently to be interesting, it would seem that domestic DX is positively affected....

**changes**

- + 730 CP -BC (Rutland) - delete
- x + 970 KIAK-AK CP is on.
- + 850 KLEU-IA (Waterloo) CP is on. MoR & EL mx = WWJC here at same dist, despite less power, so gets out well. (Geo. B. Sherman, Rosemoun ex-WPBC. Hrd w/ new call. Has new owner and format is now/Mn) rr "oldees" (stn's spelling). SCH is 24 hrs. SP MM 0300-??.
- + 980 WYOO-MN This makes all Twin Cities fulltimers at least AN-5-ugh.(GBS).
- + 1060 WGTR-MA Natick, CP is on. Hrd 11/11 1125 w/continuous promo tape saying they would be on 1200 11/12. (Phil Sullivan, Leominster, M)
- + 1310 WPRJ-NJ (Parsippany). Is now testing days. Currently w/ NDA only, whi they de-tune the nearby watertower (shades of WTCL, hi). Will probably be testing DA by 12/15, hoping for RS by 12/25. Will run one f/c b4 air-date at nite. Am trying to set it up as a TEST. (RjE)
- + 1450 KFLS-OR ex-KPLW.

**call applications**

1360 WINT-FL req. WZNG

**r/c's**

SEPT.: (new time, date) : KROX-1260 is 4th WM 0100-0115 w/TT  
 " " : WHMT-1190 is 4th WM 0130-0140 w/TT (500 cycle)  
 4th MM: KOZA-1230, KPDN-1340.  
 3rd MM: WXCL-1350

NOV. : 1st FM: WGOK-900

**midnight to sunrise**

- 730 WPIK-VA Vy gd w/ nx 0630 10/31 way o/WLIL (GBS)
- 790 CKSB-ON 11/13 w/rr to0200 ID into nx,wx. Some CKLW splash. WAEB off. (Tom Sundstrom, Willingboro, N.J.)
- 850 WYDE-AL Pinning meter w/ c&w & "WIDE" (sic.) slogan o/nullted KOA 10/31 0649. (GBS)
- 940 WGRP-PA S/on 0615 10/31 tbs' PSA allows 0600 s/on & LSR time would've been 0630. Fair w/ QRM. (GBS)
- 950 WERL-WI Hrd s/an 0700 11/15. (Frank Wheeler, Erie, Pa.) \*\* Welcome back - RjE
- KXJK-AR S/on 11/15 0705 (FW)
- WANT-VA Fair w/ QRM 0625 10/31. I've WANTED them a long time,hi (GBS)
- 1010 WCSI-IN Vy gd w/local spots u/OC & o/KXEN s/an 0715 10/31 (GBS)
- 1080 KYMN-MN Mostly mx 0230-0320 s/off on TEST. TT b4 that. Good o/WTIC, WKLO on 4.2 watt PSA 0302-15 at 12 miles. Back to 1kw 0315-20 so could've made it to WC after KWJJ s/off. (GBS)
- Weak on TEST 0123-30 and later 10/16, TT cut thru QRM, but anncts difficult to copy. (Morris Sorensen, God's Narrows, MB)

- 1130 WDGY-MN Hrd w/ 400 Hz TT 11/6 0540-55. Good ID 0550. (John Tull, Kansas City, Mo.)
- 1260 WALM-MI S/on 0536 w/SSB, then pwr, freq statement. Ment. FM. Then c&w stacked comm'ls, mx,wx,sx. (Tull) (GBS)
- 1320 KWSH-OK S/on amt, then SSB good o/QRM 0700 11/4, was a most-wanted
- KNIA-IA Another most-wanted, good o/QRM 0702 11/4. (GBS)
- KELO-SD Hrd 11/6 0610-30 w/ farm mx, wx, election spots, SIDs. Much QRM on a wk signal. (Tull)
- 1340 WOKE-SC Alone, dominating freq., w/ election spot 0100 11/6 then S.C. Hiway Dept. rpt. (Page Taylor, Butler, N.J.)
- \* 1470 WMRD-IL 11/13 0010 ID into mx. Another ID 0019 w/WSAN off to return 0600 (off 0007) (TRS)
- CHOW-ON Noted 0015-50 11/13 w/distorted audio. RR, then finally a readable ID & TC 0050 (TRS) (next item TRS also)
- 1480 WSAR-MA 11/13 0240 "conducting engineering tests". 0245 ID, TT, OC, good signal. Probably the one noted earlier 0030-0105 w/tt,OC
- 1530 WRPM-MS 11/13 0240 t/in w/ET of TT, quiet mx, OC. Very slurred ID 0247 and s/off. Called stn to be sure, and CE Ben Griffin said was on 10 kw. (TRS)
- KPCR-MO 11/13 s/on 0315 w/OC, ID 0320 for ET w/TT, "Dixie" another ID 0330. Good sig. (TRS) (next item also TRS)
- 1550 WTHB-GA W/ET 11/13 t/in 0300 w/OC,TT,mx. Only ID 0338 prior to 0340 s/off. Strong sig. Had presumed was CBE, but glad I went back.

**sunset & evening**

- 730 WLOR-GA "The Georgia Giant" alone w/ c&w, s/off 1745 11/1 (Carl "Flash" Junker, Kettering, Ohio)
- WARB-LA Extremely good reception w/rr, s/off 1830 11/1 (CJ)
- 750 WHEB-NH 11/14 1750 ID, TC, bank ad, Budweiser ad, into rr, another ID & TC 1725, no WSB. (TRS)
- 780 WCKB-NC 11/12 1715 s/off, no SSB w/ WBBM looped. Had FM promo for WOTI - 103.1. (TRS)
- 810 WSJC-MS Lively MoR 1750, polit. spot, local ads w/ WAIT splash, no sign of KCMO or WGY. Good sig. to 1802 patt. chg. (Ken Onyschuk, Blue Island, Ill.) 11/6. (KO)
- x 740 WBAM-AL Hrd 1st time w/polit. spot, clothing ad, then s/off 1745 11/6
- 810 KAFE-NM 10/29 o/WJCY w/"Power for Today" relig. pmg, s/off w/promo for more c&w on 97.3 @ 1930 10/31. Usually KCMO/WGY here (GBS)
- 860 KOSE-AR S/off 1800 11/1 (CJ)
- WAMI-AL Fair sig. w/nx 1740 11/2 (CJ)
- 900 KALT-TX A real surprise w/nx to 1815 s/off 11/2, #28 on fqy. (CJ)
- WGOK-AL 1750-1800 s/off w/NN pmg 11/6 (PT)
- WAYN-NC Alone at 1715 s/off 11/5 (PT)
- 930 WKCT-KY Good w/ABC n: 1900 (EDT) 10/24 (CJ)
- 940 WCPC-MS Alone w/ coll. FB scores 1753, contest, then 1800 s/off 11/3 (KO) \*\*\* Which proves their CP for N ops not yet on -RjE
- + 980 WYOO-MN ex-WPBC (\*\* see prev. listing-RjE) noted 11/7 2230-42 good to exc. w/ oldies & many IDs w/ slogans - "WYOO, the new station that plays the oldies" (MS) \*\*\* "Oldees", hi -RjE
- 1000 KSTA-TX S/off SSB fair o/SS 1900 11/4, WCFL/KTOK normal (GBS)
- 1030 KVPI-LA S7 o/unID QRM 1813 11/4 usually KUPK & Canadians here (GBS)
- KLEN-TX 1829 s/off s8 barely o/QRM 11/4 (GBS)
- WSMT-TN Good @ s/off 1915 EDT 10/24 (CJ)
- WMOS-KY S/off 1745 11/3 (CJ)
- KLPL-LA Very strong @ s/off 1800 11/4 (CJ)
- KVPI-LA Good @ s/off 1813 11/4, noted several eves. later in FF.(CJ)
- WAUG-GA Good @ s/off 1727 11/8 (CJ)
- KMYC-AR Heard w/nx 1755 to 1800s/off 11/8 (CJ)

1060 WMCL-IL Fair @ s/off 1915 EDT 10/24 (CJ)  
 WJKY-KY In well @ s/off 1730 11/9 (CJ)  
 1080 KRLD-TX Polit. spot & wx 1811, then ~~mx~~ 1815 11/6, fair sig. (KO)  
 1110 WFCG-LA S/off 1800 11/4 (CJ)  
 KCIA-NM 10/s9 w/ c&w o/KFAB 1905 10/31, KFAB normally a "local" (GBS)  
 1130 KWKH-LA MoR w/ads,wx,etc. 1732-1800, reg. nx 1800, patt cgh. 1815 11/14  
 then lost to wk WISN (KO)  
 WNGA-GA Hrd 10/26 1835 EDT w/ nx, c&w (CJ)  
 1140 ELPS-OE Fair sig w/ nx 1805 11/9, almost no WRVA which usually is dominant here (CJ)  
 1220 WLPO-IL Pleasant MoR 1650-1700 reg nx, sx 1700-30 then s/off (KO) 11/10  
 1270 Hrd brief ID, wx 2250 while trying for HS FB on WHBF in WVCA null, wk WXYZ rr beh. (KO) \*\*\* Oops, is KFJZ-TX, hi -RJE ( was 11/10  
 1310 WDOE-TN Brief ID, wx, then fade 1956 11/3 (KO)  
 1350 WSMB-LA Fem. vocal group 1958, ID 2000, then reg nx. 11/3 (KO)  
 1360 KRRR-NM Fair mostly u/mess w/wx, cold temp. ~~ade me think I had a loca.~~  
 , hithen "K-Triple R ID, s/off 1900 11/4 (GBS)  
 1370 WGOH-KY S/off 1730, 11/20 (PT)  
 1410 WGMT-TN 1731 s/off 11/6 (PT)  
 1490 WMRC-MA Bank ad 1630 10/31 strong, alone (PT)  
 1500 WGUL-FL S/off following easy-listening (henceforth EL mx, -RJE) stuff  
 1730 11/6, alone. (PT)  
 1520 WQMA-MS Alone @ 1755 w/nx 11/7 (CJ)  
 KMPL-MO Hrd in WKBW null w/ movie ad then MoR loud & clr 1851 11/12 (KO)  
 1530 WENG-FL S/off 1730 11/6 (PT)  
 WAAO-AL S/off simul w/ above 1730 11/6 (PT)  
 WTHO-GA Wk w/ WCKY @ s/off 1700 EDT 10/24 (CJ)  
 WQVA-VA 11/11 1700 s/off SSB mixed w/WCKY but good at times (TRS)  
 1540 WPME-PA Fair @ s/off 1830 EDT 10/26 (CJ)  
 KGBC-TX Alone 11/4, no KXEL, WPYR, ZNS. Taped w/nx 1855, MoR @ 1900,  
 faded 1930 leaving KBUY (CJ)  
 1550 WXVA-WV 11/12 1700 s/off SSB atop w/ good sig. (TRS)  
 KCAN-TX 1833 11/2 ending TSN nx into c&w 15/s9 w/no QRM readable. Usually, just KKJO/CBE here (GBS)  
 1560 WNGN-TN Record offer, manv mtns of Nashville, gospel format fair mostly o/mess at times bad WDXR QRM. (GBS) 1723 11/1  
 KGUL-TX S/off fair o/mess 1828 11/2 usually WDXR dominant (GBS)  
 KCAD-TX Strong sig @ 1843 s/off 11/4 (CJ)  
 WBOL-TN Fair @ s/off 1745 11/9 (CJ)  
 KEGG-TX S/off 1815 by fem. w/ strong drawl, hard to understand 11/9 (CJ)  
 1570 CFOR-ON Variety of lt mx in clr 1830-43 11/12 (KO)  
 1580 KPFD-AR S/off 1843 w/ heavy accent 10/30 (PT)  
 WCCF-FL On 1/2 hr late to 1830 entire 1st wk of Nov. (PT) \*\* Rptd. such last issue also -RJE  
 WBBA-IL S/off 1930 EDT 10/27 (CJ)  
 WCCF-FL Much wanted finally hrd @ s/off 1800 11/2 (CJ) \*\* AHA! Musta bean OK this date -RJE  
 1590 WMSO-TN S/off 1800 11/2 (CJ)  
 WDBL-TN S/off 1745 11/4 (CJ)  
 1600 KOGT-TX Incredibly topping semi-local KCRG at times w/ a 20/s9 sig  
 2022 11/2, PB shows deep null this way. (GBS)

AND TWO MORE MDT-SR ITEMS, SRI -RJE

1500 WKIZ-FL A real surprise amid the jumble, rose to surface 0000 11/6 w/ s/off (CJ)  
 1540 KPOL-CA C1 mx & ID 0230 11/6 w/ KXEL off. Only QRM an unID TT. (CJ)

THASSIT 'TIL NEXT TIME. 73, RJE

## The Limits of Midday MW-DX

(Conclusion)

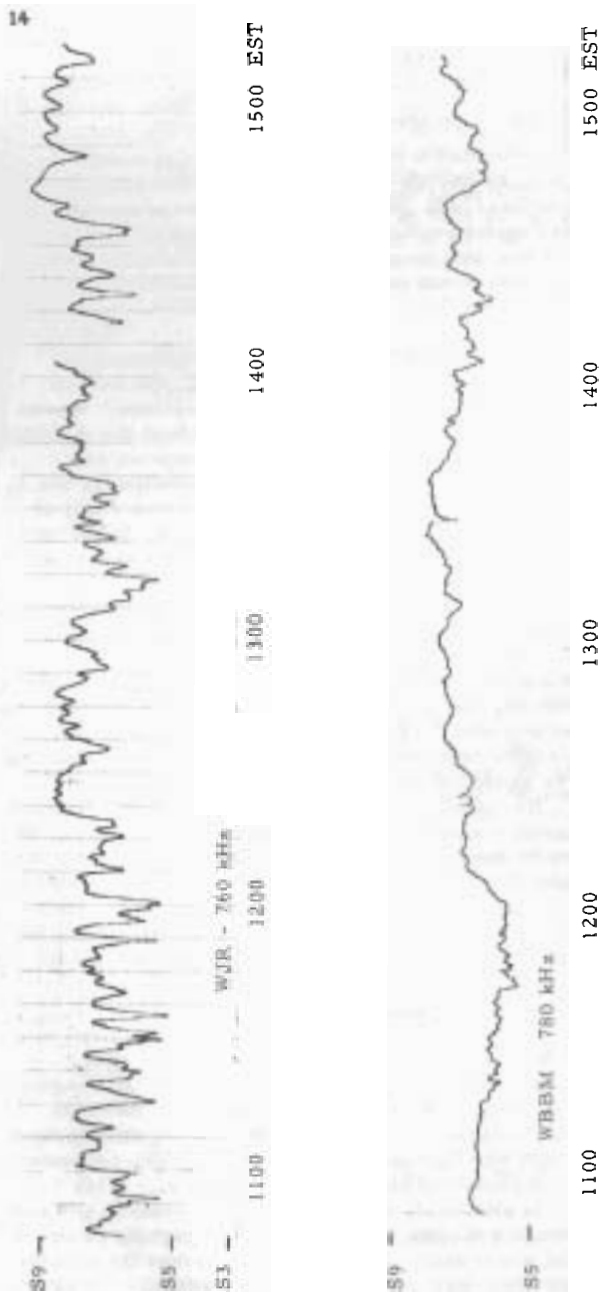
\*G.P. Nelson

That's the most favorable circumstance possible, of course; in actual practice you'll probably never be lucky enough to have all the breaks going for you to that extent. Most NRC members will probably have "average rural" noise levels at best, will be listening for midband nondirectionals like WJR and WBBM due to QRM, and will have average ground conductivities along the path. In which case an effective ground wave range of perhaps 385 miles should be expected.

Now that we hopefully have some feel for the factors which influence and contribute to distant ground wave reception on the broadcast band, can we say anything else a priori about these "deep fringe" ground wave receptions? Based on the physics involved, at least we can make some predictions about the stability of such receptions. Since the factors involved in ground wave reception are relatively constant and fixed (i.e., frequency, power, ground conductivity, etc.), we should not expect distant ground wave propagation to show the same sorts of rapid fading which we routinely experience with nighttime sky waves. In marked contrast to sky wave reception, we should expect ground wave propagation to be highly stable and free from fading and day-to-day variation.

The constancy of ground wave reception is taken for granted by the broadcasting industry and the FCC to a rather remarkable degree... Yet there is good evidence that even close into a MW transmitter the daytime signal strength will fluctuate slightly from day-to-day and season-to-season. In a rather amusing article in Broadcast Management and Engineering, one professional broadcast engineering consultant rather recently reported that he had found that MW daytime signals, presumably propagated by ground wave only, varied by as much as 10 db from midsummer to midwinter.<sup>12</sup> He found after a three year study that "summer signal levels are low but stable, while winter levels are strong but variable". He initially assumed the variation to be due to local changes in effective ground conductivity due to rainfall but eventually discovered that weather effects contributed 0.2 db of variation at very most. For want of anything else to account for these close-in signal strength variations they concluded that temperature seemed to be the only factor which could possibly else be involved. The amusing part of this study is that at no time was the possibility of midday sky wave propagation considered...

Consider now the following strip-chart record of WJR's carrier level recently made here at NRC HQ near Boston. The black line shows WJR's carrier strength during the midday period from 10:45 AM until 3:15 PM that afternoon (EST). The vertical axis is signal strength (in db) and the horizontal axis is time. This chart recording was made with our Rustrak strip chart recorder, connected to an HQ-180A via appropriate compensation and filtering circuitry. This particular type of chart recorder is absolutely ideal for MW DX research and has been long in use here for systematic studies of MW DX effects such as dawn-induced fade out ("E20"), auroral absorption, etc. The paper moves through the recorder at a rate of 2 inches per hour; every one and one half seconds the carrier strength is recorded on the paper as an almost microscopic black dot. Slowly fading carriers register as continuous black lines; sideband splash and other types of transient noise bursts are effectively suppressed by the sampling action of the recorder and by the associated filtering circuitry.<sup>13</sup> An article describing the use of this device for MW DX research with circuit diagrams will appear soon in DXN.



Examples of daytime sky wave reception. The top records shows the carrier strength of WJR-760 on 11/3/72 from 10:45 AM EST to 3:15 PM. Notice the rapid fading from a high of over S9 to a low of about S5; this is a variation in signal strength of about 15 to 1. The noise level here would show a bit above S3; the expected ground wave signal strength is about S3. This is a typical midday sky wave fade record. \*The second record shows WBBM-780 recorded during the same time period but 4 days later; the signal was remarkably stable that day; in fact this is one of the most stable sky wave records we have made. **Expected ground wave signal strength at this distance from WBBM is less than 0.1  $\mu\text{v}/\text{m}$  - about S0 on this system.** Gap in top record is for calibration.

Based on WJR's antenna pattern and the FCC ground wave curves, we would expect to receive about 0.6  $\mu\text{v}/\text{m}$  of WJR ground wave during the day here. In our location, this is somewhat below the local external noise level, which would show at about S3 on the chart. On the particular mid-November day when this recording was made, WJR's carrier slowly faded back and forth from a minimum of about S5 (3  $\mu\text{v}/\text{m}$ ) to a peak value of more than S9 (more than 50  $\mu\text{v}/\text{m}$ ); at no time did the carrier drop even as low as the local noise level. Programming from WJR was audible most of the time and an oscillographic SAH monitoring device confirmed that WJR was alone on the channel; this is a necessary precaution to guarantee that the chart recording shows only carrier power from WJR uncontaminated by other weak carriers.<sup>14</sup> A similar recording made earlier in the month under essentially identical conditions showed only the local noise level around S3 - and no WJR. Since no reports of local active volcanos or other major geological upheavals have reached us recently, we can safely assume that the ground conductivity certainly can't have changed...

Figure 4 shows the classical situation in day/night MW propagation. During the daylight hours - especially the midday period - a sky wave signal must make a double traverse of the highly absorbent D region before reaching the receiver site. During the daylight hours the normal E layer at a height of about 105 kilometers is an excellent reflector of MW signals; the absence of strong daytime MW sky waves is due to the D absorption and not any absence of an effective reflecting layer; the daytime E layer will behave like an almost perfect mirror for MW signals - if the signal can somehow make it through the D region on the way up and back.<sup>15</sup>

How then can midday sky wave propagation take place? Two possibilities are open to us: (1) The D region absorption may decrease very much on some days, thus somehow permitting significant reflection from the daytime E layer at 105 km. (2) Reflection may possibly take place from within the D region itself, effectively circumventing much of the D region absorption.

There is substantial and convincing evidence that both effects contribute to MW midday sky wave reception. A variety of techniques are available for measurement of sky wave absorption and researchers in a variety of installations - particularly at Slough in England - have made systematic measurements of the overhead noontime absorption for many years.<sup>16</sup> They have found that the total D region absorption varies markedly from day-to-day, especially during midwinter. Days of abnormally high absorption occur unpredictably in runs of several days duration during the winter months; this is the mysterious Midwinter Anomaly in ionospheric absorption.<sup>17</sup> The fluctuation in D region absorption goes both ways; there are days of abnormally low absorption as well. How much variation can occur from day-to-day?

Recent data from the White Sands Missile Range<sup>18</sup> taken in conjunction with ionospheric-sampling rockets designed to investigate the Midwinter Anomaly have shown that variations of 25 to 35 db occur typically in noontime absorption at 5 MHz; scaled down to the broadcast band by means of the Appleton magnetoionic equations<sup>19</sup> it works out to a minimum variation of 50 to 70 db from a high day to a low one. Figure 5 shows typical 5 MHz absorption values from W.S.M.R.; double the values on the vertical axis to get the minimum values of the effect on the broadcast band.

The causes of these daily fluctuations in midwinter D absorption are still imperfectly understood and the object of intensive research and debate.<sup>19</sup>



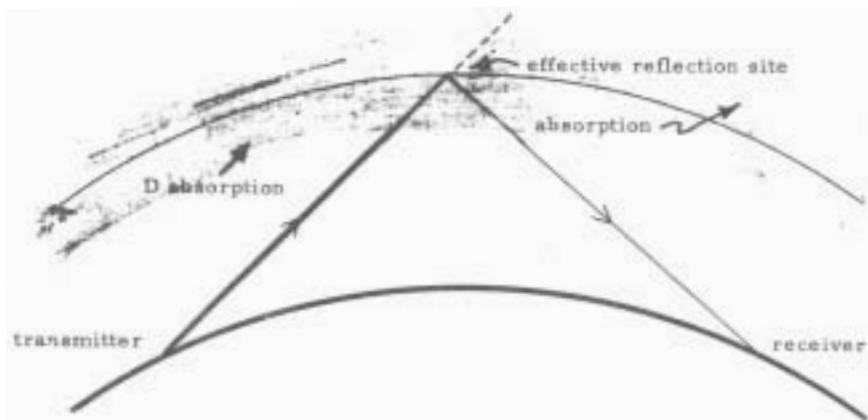


Figure 3. During the midday period a MW signal must pass through the D region absorption both on the way up to the reflection site and on the way back down. The higher the reflection region the weaker the signal will be since it must traverse more of the D region absorption. Thus the higher the site of a midday D region partial reflection the more distant the reception - but the weaker the signal. With the aid of Figure 6 the MW DX'er can determine the height of the partial reflection site for his midday sky wave receptions. **Noontime reception of** daytimers out to 1,000 miles and beyond can occur; reception of this sort peaks during the longest days of winter (around the solstice on December 21) and is enhanced by auroral disturbances and by planet-wide weather disturbances. This type of ionospheric "reflection" results from sharp vertical electron density gradients and very little is really known about the patterns in this type of MW reception. **This is probably the most virgin and fertile area for MW DX exploration at this time.** How many daytimers within a thousand mile radius do you need?

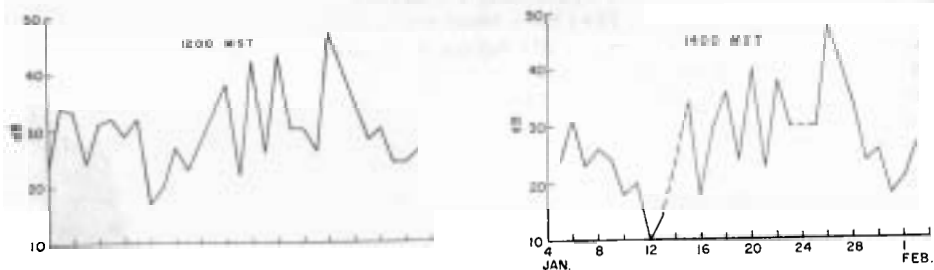


Figure 4. Daily fluctuations in D region absorption during the midday period are quite large during winter and essentially unpredictable from day to day. These values are from the White Sands Missile Range for 5 MHz; MW absorption values are at least double.

On one of these days of particularly low absorption where in the ionosphere does the reflection occur - all the way up at the daytime E layer or lower? Curiously enough, some of the best data for daytime MW propagation comes from - of all places - Tsumeb, in Southwest Africa. **The Max Planck Institute in Germany** has mounted several expeditions to this extremely remote area to study MW propagation effects; not only is the natural background noise level at Tsumeb extremely low, man-made interference is almost nonexistent. **And there are no local stations...** Just the place we've all been looking for in a MW DX location! In this ideal MW DX location they observed weak but stable reflections from within the D region itself during midday. **By employing an exceptionally sensitive vertical sounding technique** - essentially an ionospheric radar working at MW frequencies - they were able to **measure the height at which these daytime reflections took place.** They found that these daytime partial reflections took place at a height which varied from 75 to 90 kilometers - well below the normal day E region.<sup>20,21</sup>

While these D region reflections have been observed by researchers for a number of years, the cause and origin are still incompletely understood. Several observations of concern to MW DX'ers were made at Tsumeb. **The midday reflections from the D** occurred mostly on those days when the over-all Midwinter Anomaly absorption was most intense. If this seems like a contradiction it really isn't: the MWA absorption refers to the entire D region as would be experienced by a signal in full traverse; partial reflection from an area part way through the D could easily produce enough return signal to more than compensate for the increased total D region absorption.

Their second important finding was that the height of midday reflection was lowest at noon local time.

The combination of conditions necessary for effective midday MW skywave propagation, that is, reduced D absorption and/or the presence of effective reflecting structure within the D region, appears to be primarily a midwinter phenomenon; like the probably related Midwinter Anomaly, there is great variation from day-to-day with little if any relationship between effects on one day and the next.

Thus midday sky wave MW propagation via D region partial reflections may well provide unexpected DX opportunities for the domestic DX'er as well as providing us international DX types with some early warning of the ravages of the Midwinter Anomaly later in the local day...

What is the expected range for midday MW DX via the D region? Alas, far short of **Chad and Indonesia...** But still far enough to be interesting. Figure 6 is a plot of the maximum skip distance for a midday MW signal as a function of the height of the D region reflection layer. **We've included potential reflection heights as high as** the normal daytime E layer although there is no evidence that the D absorption ever falls so low as to permit propagation from such a great height.<sup>22</sup>

The BCB DX'er can conduct some simple but scientifically important experiments in this regard by simply making note the maximum range of midday MW signals out beyond the expected ground wave coverage area. **The idea is to determine the effective** D region reflection height during the midday period. Figure 7 shows the effective single skip distances from NRC HQ here in Boston for various assumed D region reflection heights. **Based upon our limited remaining data (earlier recordings were unfortunately destroyed in the HQ fire) plus that gathered this year, it would appear**

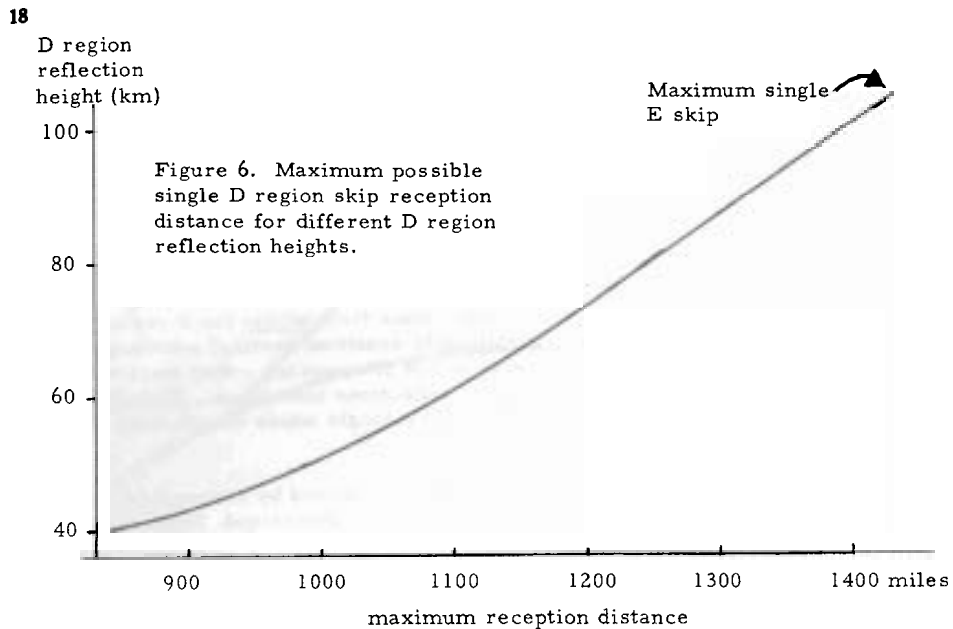


Figure 7. Maximum midday single D skip distances for different reflection heights. Chicago, Detroit, Cincinnati, and closer locations are audible; St. Paul, Memphis, and beyond are not. (From Greater Boston)

that the greatest effective height doesn't exceed about 60 kilometers; as shown on Fig. 7 we get substantial sky wave some days from stations such as WBBM, WJR, and WLW; even on days good enough to provide nice signals from 5 kw WAIT on 820 in Chicago we don't get a trace of say WCCO on 830 kHz. While WCCO doesn't seem that much farther away, if the highest effective reflection height isn't above about 60 kilometers a single D region skip just can't make it. Higher reflecting structures certainly must exist but signal access apparently means so much D absorption traverse that we don't hear them with our noise level and antenna. With, for example, a Beverage antenna<sup>26</sup> it should be possible to receive these weak reflections from higher levels with no difficulty - perhaps all the way up to the E? It's important to remember that the higher the reflection height the greater the skip distance - but the weaker the signal since the traverse through the D absorption is longer.

What should midday D skip reception be correlated with? Don't expect to find any correlation with local weather conditions such as temperature or barometric pressure - us mere mortals on the surface of the Earth are separated from the site of action by about 50 kilometers of air... There is good evidence however that these D region disturbances such as daytime partial reflections, and fluctuations in MW absorption like the Midwinter Anomaly, are connected with very large scale weather patterns.<sup>24</sup> Large scale in this case means entire frontal systems which may be thousands of miles long and which only show up clearly when displayed on world-wide weather maps. Not surprisingly there is also an auroral effect - highly energetic precipitating charged particles can penetrate as deeply as the D region; if a goodly number of the falling particles have close to the same initial energy they'll tend to stop at the same height in the D thus producing the sorts of electron density gradients required for midday partial reflections.<sup>25</sup>

Rather odd reception conditions occur when when both auroral absorption (produced by precipitating charged particles and located throughout the D region) and midday D region partial reflections (either from the precipitation or from the underside) are present on the same day. We recently recorded WBBM with 50  $\mu\text{v}/\text{m}$  and more of noontime and afternoon daytime signal from D skip; as dusk came on they actually weakened and were replaced by ZBVI in the British Virgin Islands. This was a highly auroral time and it seems likely that once the low-level D reflecting structure vanished with the onset of dusk the next highest reflection site would have been the E or even the F; this meant a full traverse of the (higher) D region absorption and therefore a weakening of the signal. ZBVI was of course favored because of the auroral screening effect.

If you're interested in combining your daytime DX'ing with a bit of researching, we suggest that the following topics would make ideal research areas for the MW DX'er. A season of intelligent and careful observations of midday skywave DX reception could easily result in anything from an interesting article in DX NEWS to a prize-winning Science Fair project to a formal research paper in a technical journal. Some things to look for: (1) Correlation between midday D skip and large-scale weather patterns, auroral activity, solar flux, cosmic ray activity, high and low latitude MW receptions. (2) Differences between N-S and E-W reception on a particular day. (3) Correlation between midday skip and nighttime reception. (4) Seasonal patterns. (5) Evidence that the D skip region drifts around during the day like a sporadic E cloud on FM.

Good luck and be sure to report your results here in DX NEWS!

1. For a good sequence of low frequency ionograms showing just how complex the transition from day to night conditions is on the MW band see "Some results of sweep frequency investigations in the low-frequency band" by Watts and Brown, Journal of Geophysical Research, Vol. 59, p. 71, 1954.
2. See "Polar and magnetospheric substorms" by Syun-ichi Akasofu, Reidel Publishing Company, Dordrecht, Holland.
3. The best treatment of ground wave propagation is probably Section 10 of Terman's Radio Engineer's Handbook, McGraw-Hill, 1943. See also "Groundwave propagation in a normal and an ionized atmosphere" by J.R. Johler, ESSA Technical Report ERL 121-ITS 85, 1969.
4. See URSI Special Report No. 7, "The measurement of characteristics of terrestrial radio noise", Elsevier Pub. Co., New York, 1962.
5. "Amplitude and time statistics of atmospheric and man-made radio noise", by Disney and Spaulding, ESSA Tech Report ERL 150-ITS 98, 1970. **By far the most comprehensive world-wide noise data for natural (i. e, non man-made) noise levels, broken down by geographical location, season, and time of day, is CCIR Report 322, "World distribution and characteristics of atmospheric radio noise", published by the ITU in 1964. This vital reference is unfortunately now out of print; HQ will supply a copy to interested members for the price of Xeroxing, write HQ for more info. See also "Radio frequency interference handbook", NASA SP-3067, 1971 and "The radio noise spectrum", edited by D. Menzel, Harvard U. Press, 1960.**
6. For example see "Man-made noise measurements: an unsolved problem?", given at the 1972 Fall USNC/URSI meeting by G. Hubbard of the NSA.
7. The standard quantity given for noise measurements is  $F_a$ , the noise power which would be received by a short vertical antenna over an ideal ground with a 1 kHz receiver passband. The loops, verticals, and short longwire antennas used by DX'ers are close enough to the reference type for our purposes; only a Beverage will be able to substantially improve on these figures at our frequencies. The conversion from  $F_a$  which is expressed in db above kTB to field strength in microvolts per meter is via the relationship
 
$$\text{Field strength (db above } 1 \mu\text{v/m)} = F_a - 65.5 + 20\log_{10} f$$
 where  $f$  is the frequency in mHz. This is the relation we have used in preparing Table 1 and elsewhere in this article. We have assumed a 1 kHz passband - about the narrowest selectivity the DX'er can use and expect to recover enough audio for an ID. Corrections for different bandwidths exist; see CCIR Report 322 for a full treatment. The S meter readings assume 6 db per S unit which is a typical value.
8. In most references the tables also show the level of the galactic or cosmic noise due to extraterrestrial natural sources; typical 1000 kHz cosmic values are about the same as deep rural man-made noise and it's easy to assume that you'd be hearing the galactic noise level instead of the weaker atmospheric noise level if you carried portable equipment into a very remote area. This is misleading because the indicated noise levels do not take into account the screening effect of

- the ionosphere. Just as signals from ground-based MW stations are reflected back down to Earth by the ionospheric layers, cosmic noise at MW frequencies will be reflected away by the topside of the ionosphere; at broadcast frequencies the Earth would then look like a perfect mirror - from both sides of the ionosphere. Thus MW signals will not be heard in an orbiting spacecraft and cosmic noise will not be heard on the surface. The Alouette research satellite carried a very sensitive MW receiver and monitored the galactic noise level above the ionosphere. (They also noted a small amount of "breakthrough" from ground MW stations on very rare circumstances; this is apparently caused by an explicable but very complex magnetoionic coupling effect; while the orbiting DX'er might then be able to hear bits and snatches of ground stations on rare occasions, not enough of the galactic noise level will be able to leak through from the outside to be detectable here on the surface. See page 958, Figure 18, in the special IEEE issue on Topside Sounding and the Ionosphere, June, 1969 for a lovely picture of BCB signals breaking through the ionosphere to reach the satellite.)
9. See URSI Special Report No. 7, op. cit.
  10. Refer to Terman, op. cit., p. 697 for a discussion of the ground depths which influence the effective conductivity.
  11. We have taken into account the frequency dependence of the noise level values for these calculations. Distances in the tables are from the ground attenuation curves in Part III of the FCC Rules and Regulations; where necessary we have extrapolated for very low values.
  12. "Summer to winter changes in AM coverage", P. Godley, Jr., BME, July, 1970.
  13. These recordings have been lowpass filtered at 0.18 Hz with a specially designed IC gyrator filter.
  14. "Subaudible heterodynes on the MW BCB", G. Nelson, DX NEWS, 3/14/65.
  15. See the URSI Handbook of Ionogram Interpretation by Piggott and Rawer, Elsevier, 1961 for a clear discussion of the E region.
  16. See "Ionospheric absorption measurements during a sunspot cycle", Appleton and Piggott, Journal of Atmospheric and Terrestrial Physics, V. 5, 141, 1954.
  17. See "Medium wave signal paths, Parts I - IV" by G. Nelson, DX NEWS, 2/28/70
  18. See "Positive ions and the winter anomaly", J. Mitchell, et al., Radio Science Special issue: D and E region chemistry, V. 7, p. 175, January, 1972.
  19. The entire special issue of Radio Science in (18) above is essentially devoted to this and related problems.
  20. See "Medium wave reflection properties of the ionosphere above Tsumeb", W. Elling, Proc. DRTE/AFCL Conference on Ground Based Radio Wave Propagation Studies of the Lower Ionosphere, Ottawa, 19 67, Vol. 2.
  21. "On the causes of excessive absorption in the ionosphere on winter days", W.

22. The maximum single skip distance for reflection at some particular height  $h$  is simply:

$$\text{Distance} = 2R \cos^{-1} (R/(R + h))$$

where  $R$  is the radius of the Earth.

Midday D region reflections are called partial reflections because they have a somewhat different origin than the reflections from normal layers such as the E and F. **Partial reflections result from sharp changes** in the electron density; the sharper the gradient the more complete the reflection. The best discussion of these partial reflections in the D is probably in "An introduction to the ionosphere and magnetosphere" by J. Ratcliffe, Cambridge U. Press, 1972, section 9.3.

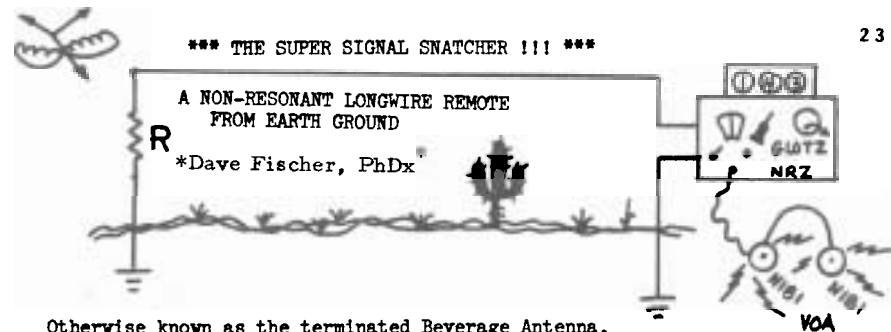
Data from rocket sounding showing the existence of the necessary sharp electron density gradients in the midday D region will be found in "Information on the D and E region electron density profiles" by E. Thrane, Radio Science Special issue, op.cit.

23. See DX NEWS, Vol. 40, No. 6, p. 35 for an example of frequency scaling.

24. "Statospheric-ionospheric interaction during the movement of a planetary wave in January 1967", B. Williams, et al., Radio Science special issue, op. cit., p. 193.

25. "Some characteristics of the D region ionosphere during auroral activity", A. Ohmholt, et al., Jour. Geophysical Res., V45, No. 6, June 1960.

26. A really large Beverage antenna is so incredible on the BCB that many of the values given in this article will have to be substantially modified if this sort of antenna is used. **All published noise figures including those given here assume an essentially nondirectional receiving antenna** so that the external noise contributions from both man-made and atmospheric sources come in from a full  $360^\circ$ . Because of the exceptional directivity of the Beverage antenna, noise coming from outside the main lobe(s) will be quite suppressed; the net effect is a very real and significant reduction in the external noise level. This ability to reject noise from directions in not those of interest is one of the factors which makes the Beverage such a remarkable MW antenna. **We haven't been able to find any relevant published data on the limits of Beverage antenna noise rejection ability and have just begun to gather our own data.** We do have a rough idea of how much improvement can be expected, based on antenna theory. Suppose you are listening for a very weak signal in our Class IV remote rural location where the weak man-made noise level at  $0.32 \mu\text{v}/\text{m}$  is the limiting factor. With the 2 wavelength Beverage antenna whose pattern is given in Figure 38 of the original Beverage article, the signal-to-noise ratio improvement is about 18 db - an effective reduction in the external noise level of about 8. **At  $0.04 \mu\text{v}/\text{m}$  of external noise there's a lot of DX lurking around out there!** This is a 2 wavelength Beverage; at greater lengths the signal-to-external noise situation just keeps getting better and better... See "The super signal snatcher" by Dave Fischer, DX NEWS, Vol. 40, No. 7 for more information and additional references.



Otherwise known as the terminated Beverage Antenna, this super signal snatcher can be erected with very little difficulty provided sufficient land is available. In recent years BCB DXers have used this type of antenna and their very out-of-the-ordinary receptions have been listed in both DXN and DXM.

The purpose of this article is to present a bit of the theory of operation (simplistic), to present some "paperwork" evaluations that can be made for performance estimation prior to construction and to describe one manner of construction which has proven quite practical.

The configuration for this antenna is very simple: a long long wire is erected as close as possible to a given fixed height above the ground and run as straight as possible in a given direction. Two views are shown in Figures A and B with length of wire  $L$  (feet), height above ground  $H$  (inches), wire diameter  $D$  (inches) and orientation for reception of signals from the general direction of  $A^\circ$  azimuth.

Bidirectional operation can be had by removing the resistor  $R$  at the expense of directivity and hence gain. However, unidirectional operation is assumed here as it is most likely the desirable mode of operation.

Almost all antennas require a ground plane of high conductivity for greatest performance and belong to the huge general classification of E-field antennas--i.e., the most important component of the electromagnetic (radio) wave is the electric component. The loop antenna, on the other hand, is about the only H-field (magnetic) antenna in that, in theory, it derives its performance from the magnetic component.

Consider Figure C. A wavefront  $W$  travels in the forward direction of  $W$  (the Poynting Vector) where  $W = E \times H$ ,  $W$  is normal to the plane formed by  $E$  and  $H$  which are themselves normal to each other. As this wavefront passes along and above the ground (earth) plane  $G$ ,  $E$  can be broken into horizontal (EH) and vertical (EV) components. The vertical component induces no currents in the antenna but EH does so that as the wavefront travels along the path of the antenna and the finite ground constants cause  $W$  to tilt more and more towards the vertical and thus  $E$  toward the horizontal (hence decreasing EV and increasing EH--desirable!), the greater the "signal" induced in the antenna. Ground with poorer electrical properties tilts the wavefront more than earth with good electrical parameters. Hence, the Beverage is expected to perform better over poorer ground--exactly the opposite of what one would naively expect!

The directional properties of the antenna can be explained in the following simple manner: In Figure C, as depicted,  $W$  is progressing from end A to end B, so if a RX is connected between B and ground (earth), the "signal" FH would appear at its antenna terminals. If the RX were replaced by a resistor  $R$  of a certain value, the "signal" energy would be almost entirely dissipated in the form of heat. Suppose now end B was not connected to either  $R$  or a RX and was left "floating"--not connected to anything--and a RX was connected at end A to earth ground. The "signal" travelling from A to B would "run out of wire"

(see an impedance discontinuity) and it would be in large part reflected back along the wire to arrive eventually at A as input to the RX. Thus, with B "floating", wavefronts travelling from A to B and from B to A arrive at the RX --bidirectional operation. To restore unidirectional operation then, RX at A, a resistor is placed at end B to ground thus suppressing the wavefronts passing from A to B but allowing those from B to A to arrive at the RX. That is, in the unidirectional mode, the antenna receives best from the general direction the antenna is "pointing"--the direction of the large arrow in Figure B.

As a point in terminology, this type of antenna is often referred to as a travelling wave (longitudinal with the wire) antenna as opposed to the much larger classification of standing-wave mode antennas.

To be correct, the termination required at the remote or far end of the antenna is not purely resistive so perfectly a network is required. However, it is not practically possible to totally terminate the wave progressing along the antenna to its remote end because the components of this termination network depend upon the distributed parameters (constants per unit length) of capacitance inductance, resistance and conductance several of which vary with frequency so that the characteristic impedance (termination required) varies somewhat with frequency. Nevertheless, for almost all BCB applications of the Beverage a simple fixed value carbon resistor will suffice quite well. (Note: there is no great practical reason why RXs--possibly in conjunction with a modified value of R--couldn't be operated on both ends of the antenna thus DXing both directions simultaneously and each in the unidirectional mode.)

The value of the terminating (carbon) resistor can be well approximated from the following simple equation (for an infinite highly conducting wire above an infinite infinitely conducting ground plane), viz:

$$R = 138 \log_{10} (4H/D) \dots \text{ohms}$$

where H is average height above ground and D is wire diameter. Units for D and H are unimportant as long as the same measure is used for both. Several DXers have proposed the use of a carbon base potentiometer (variable resistor) at the termination to be used to "tune" the system--it is thought that this will not likely produce noticeable improvement in performance. Table I lists values for R at most BCB applications of the Beverage--standard resistors within 20-40 ohms or so of the table value should work as well.

Most likely the greatest factor of importance in the performance and construction of this antenna is that of the earth ground at each end. Here lies the dilemma: the poorer (electrically) the soil the better the expected performance of this antenna, but the more difficult it is to obtain a good, highly conductive, earth ground. However, in any case, the larger the metallic surface area in contact with the earth, the better the system ground. Multiple ground rods as well as ground screens (e.g., 1/2" wire mesh) buried under the earth are not to be overlooked!

The theoretical patterns of a terminated Beverage are of interest in approximating its performance in the field. Although the discussion here is restricted to the antenna in free space (i.e., infinitely remote from a ground plane) when computing patterns, the patterns so obtained can be used with the ground plane present by accounting for certain "most likely" pattern perturbations such as elevated vertical directivity. The equation for such a terminated Beverage is given below under the assumption of a simple current distribution along the wire when the antenna is in the active (transmitting) mode and then appealing to the Reciprocity Theorem for the passive (receiving) case. It is of some musing interest to note that almost all antenna work by electromagnetic mathematicians resort to this type of analysis. (GPN on loops

has done the more difficult problem of passive analysis and his work is quite exceptional in the field of electromagnetics!)

$$E = K \frac{\sin(\varphi)}{1 - \cos(\varphi)} \sqrt{1 - \cos[L^\circ(1 - \cos(\varphi))]} \text{ mv/m} \\ \text{ @ M miles}$$

where K is a constant depending on parameters of little interest here,  $\varphi$  is the angle measured from the wire as in Figure B and  $L^\circ$  is the length of the wire in wavelengths at the frequency of operation, viz:

$$L^\circ = 360 f L / 984 = 0.366 f L$$

where f is the frequency in MHz and L is the antenna length in feet. Since the interest here is in the relative performance of these antennas for different lengths L at various BCB frequencies f, the only factor of interest in the above equation is:

$$A = \frac{1}{C} \left( \frac{\sin(\varphi)}{1 - \cos(\varphi)} \right) \sqrt{1 - \cos[L^\circ(1 - \cos(\varphi))]}$$

where the factor (1/C) has been added to normalize the patterns with respect to a specific chosen pattern for the purpose of comparative analysis. It is suggested that for the shortest length L and the lowest frequency f, that C=1 for the calculation of this "initial" pattern. Then in this "initial" pattern find the maximum value of A, say AM, and set C equal to this value. Then divide all values of this "initial" pattern by C so that its maximum value is now 1.0. For all subsequent patterns, C=AM. Calculations need only be made for the range  $0^\circ \leq \varphi \leq 180^\circ$  since the patterns are symmetrical about the axis of the antenna wire.

An antenna pattern is inherently three-dimensional! In almost all pattern plots (save for the stereographic projections, for example) a plane is passed through the pattern and contours (pattern projections) are then plotted in that plane. The usual planes are the "horizontal" and "vertical" planes sometimes measured with respect to the earth, sometimes the antenna or whatever else is handy. Figures D and E show this procedure for a loop antenna. The three dimensional pattern of an electrically small perfect loop is a "donut" with a pinhole center. Figure D is that pattern traced on the plane passing through the plane of the loop and Figure E is that traced on the plane normal or perpendicular to the loop--the apex pattern BCB DXers strive for! The terminated Beverage has a pattern symmetrical about the antenna wire as shown in Figure F. The three dimensional pattern is that envisioned by rotating or revolving the plotted pattern about the wire axis to form "cones" of radiation/reception about the antenna.

Beverage antennas in practice actually do not assume their characteristics until the length of the wire becomes significant with respect to wavelength--even tho patterns can be calculated for any length. For this discussion we shall restrict our attention to  $L^\circ = 0.5$  to  $L^\circ = 4.0$  wavelengths. The wavelength W in feet for any frequency given in MHz is computed from  $W = 984/f$ . Thus, one wavelength at 540 kHz is 1822 feet while one wavelength at 1600 kHz equals 615 feet. Table II gives W in feet as a function of f and  $L^\circ$ . A few comments can be made about Beverage patterns in general. There is a lobe (peak) for every half-wave length in the wire and if the number of half-wavelength is odd, then there will be a lobe at  $\varphi = 90^\circ$ , i.e., at right angles to the antenna. There is only one major lobe (shown as two such lobes in a planar projection) and this lobe tends to "fold" toward the wire axis as the length of the antenna is increased. The length of the wire for the lobe to fall within 10-15° of the wire axis is much too long for any practical consideration here. When  $L^\circ = 7.0$ , the major lobe has its maximum at 19°. Also it is clear when observing the patterns that as the wire length increases with respect to wavelength, the number of lobes increase and their corresponding widths decrease.

Reviewing Patterns I-VIII, hand drawn from computer evaluation of the above equation for A with  $\phi$  ranging 0-180° in 1° increments, which show estimated practical performance in the horizontal plane with ground, one must remember that the pattern of the antenna changes with frequency so that as one tunes across the BCB the "big eye" keeps changing its view. For example, a 1800' Beverage assumes the basic pattern of Pattern II at 540 kHz and as one tunes to ward 1600kHz, the pattern continuously varies from Pattern II to Pattern VI. Note that the patterns plotted are taken in half-wave increments (solely for convenience here) and only 0-180° of each pattern is drawn. Also note that Mother Nature's Fundament: "Ya Can't Have Your Cake and Eat it Too" holds: viz., as the major lobe becomes more directive, so the number of side and back lobes increase! Thus, although the Beverage has tremendous "forward" gain compared to the side and back lobes (even more so when compared with a loop!!!) these minor lobes are significant when compared with, say a loop, so that one should not expect "super" suppression thereabouts. The usual BCB pests and dominants still show but stations coming in off the main lobes may well override them--they therefore do not retain their status as dominants and pests in many cases! Also note that a pattern such as Pattern II may, in practice, perform better than one such as Pattern VIII because the sidelobes are not as numerous thus allowing suppression over wider areas or arcs of azimuth although the major lobes differ significantly.

The size of wire used is important in the sense that the larger the wire diameter, the smaller the RF resistance per unit length. RF resistance represents energy loss in the system and destroys the patterns by reducing the null depths significantly between lobes as well as distorting lobes, especially the major one--Figure H. The longer the wire the greater the RF resistance so once again Mother Nature strikes: you obtain significant increase in forward or main lobe gain/directivity at the expense of getting more side and back lobes and increased RF resistance tending to "smear" the entire "tailend" together thus allowing much BCB to leak in on the sides and back. Too, the larger the wire diameter, the more resistant the antenna is to wire breakage. For those interested in approximating the RF loss resistance, the following formula is applicable to copper wire:  $RL = 1.02 (L/D) \sqrt{f} / 1000$  ... ohms, where as before, L is antenna length in feet, D is wire diameter in inches and f is frequency in MHz. For example, a 3200' Beverage made of 24GA copper has an RF resistance, RL, equal to 162 ohms at 1000 kHz while the same antenna made of 18GA copper has RL = 81 ohms at 1000 kHz. A measure of the RF efficiency of this antenna can be made from the following formula:  $Eff = (100R)/(R + RL)$  ...% With R = 560 ohms, for example, and the 3200' Beverage above using 24GA, we have  $Eff = 76\%$  while the same antenna using 18GA renders  $Eff = 87\%$ . Power loss is directly proportional to the RF resistance.

Table III lists some useful statistics.  $L^\circ$  denotes the length of the antenna in wavelengths,  $\phi^*$  denotes the azimuth angle at which a lobe maximum occurs,  $E^*$  is the magnitude of such a lobe referenced to the maximum lobe for  $L^\circ = 1.0$  thus giving a comparison of these antennas as their length is increased,  $dB^*$  is the corresponding power gain of such a lobe, again referenced to the maximum lobe of  $L^\circ = 1.0$  and  $dBL$  is the amount of "suppression" the sidelobes (for fixed  $L^\circ$ ) have with respect to the major lobe for that specific pattern. Table III lists these parameters for  $L^\circ = 0.5$  to  $L^\circ = 7.0$  in increments of 0.5 wavelengths. More comments can now be made. Note, too, that if L is a multiple of an even number of half-wavelengths, then there is a null at  $\phi = 90^\circ$ . The angular compression of the lobes is clearly shown. The separations between lobes at  $L^\circ = 2.0$  are 39°, 29° and 32° while for  $L^\circ = 7.0$ , they are 19°, 12°, 10°, 9°, 8°, 8°, 8°, 9°, 9°, 10°, 11°, and 15°, thus showing the "clutter"

of lobes for large  $L^\circ$ . The size of these sidelobes for large  $L^\circ$  is also significant, e.g., for  $L^\circ = 7.0$  @  $\phi^* = 86^\circ$ ,  $E^* = 0.55343$  or more than one-half the major lobe of  $L^\circ = 1.0$ . Thus, "bigger" is not necessarily "better"!

Finally, an essential point in presenting this writing is to give the BCB DXer knowledge of the general behavior of a terminated Beverage so that he can erect such an antenna attempting to orient it in such a way as to optimize its use for his purposes--e.g., aligning the "pests" and "dominants" as close as possible to the computed null areas with the understanding however that the "powerhouses" aren't likely to be "wiped out" but they can be "knocked down" considerably. The essential point to remember is that the arguments given here are an approximation to actual field performance and that Figure H should always be kept in mind! Figure G is also important to remember because the pattern of the Beverage is three-dimensional and a "cone" about the wire axis so that reception directly "off the end" of the Beverage is to be expected tho the horizontal pattern plots show no response there! --de Fish, Ph. Dx

Project NEBE (NEbraska BEverage) was started in October 1972 here in Nebraska with the blessing of the University of Nebraska and is carried on solely for the analysis of the Beverage on the BCB! It will eventually involve analysis of TA/TP paths through the polar cap/ring. Onesquare mile of land is dedicated for this single project for an indefinite period of time. Numerous Beverage antennas will be constructed and evaluated under my direction and the results will be given to the BCB fraternity with the hope that it be of pragmatic value for other "in-the-field" BCB DXpeditions. The initial phase of Project NEBE has been completed and results will be given to DX News in the very near future as a sequel to this writing. Good DXing!!!!

TABLE I --- Terminating Resistance, R

| Wire Size | D (inches) | H(feet) ----- R ohms ----- |     |     |     |     |     |
|-----------|------------|----------------------------|-----|-----|-----|-----|-----|
|           |            | 5                          | 8   | 10  | 15  | 20  | 25  |
| 24        | 0.02010    | 562                        | 591 | 604 | 628 | 645 | 659 |
| 22        | 0.02535    | 548                        | 576 | 590 | 614 | 631 | 645 |
| 20        | 0.03196    | 534                        | 563 | 576 | 600 | 617 | 631 |
| 18        | 0.04030    | 520                        | 549 | 562 | 586 | 604 | 617 |
| 16        | 0.05082    | 507                        | 535 | 548 | 572 | 590 | 603 |
| 14        | 0.06408    | 493                        | 521 | 534 | 558 | 576 | 589 |
| 12        | 0.08081    | 479                        | 507 | 520 | 545 | 562 | 575 |
| 10        | 0.10190    | 465                        | 493 | 506 | 531 | 548 | 561 |

TABLE II --- Wavelength vs. Frequency (table values in feet)

| f / $L^\circ$ | 0.5 | 1.0  | 1.5  | 2.0  | 2.5  | 3.0  | 3.5  | 4.0  | 4.5  | 5.0  | 5.5   |
|---------------|-----|------|------|------|------|------|------|------|------|------|-------|
| 540kHz        | 911 | 1822 | 2733 | 3644 | 4555 | 5467 | 6378 | 7289 | 8200 | 9111 | 10022 |
| 1600kHz       | 308 | 615  | 923  | 1230 | 1538 | 1845 | 2153 | 2460 | 2768 | 3075 | 3383  |

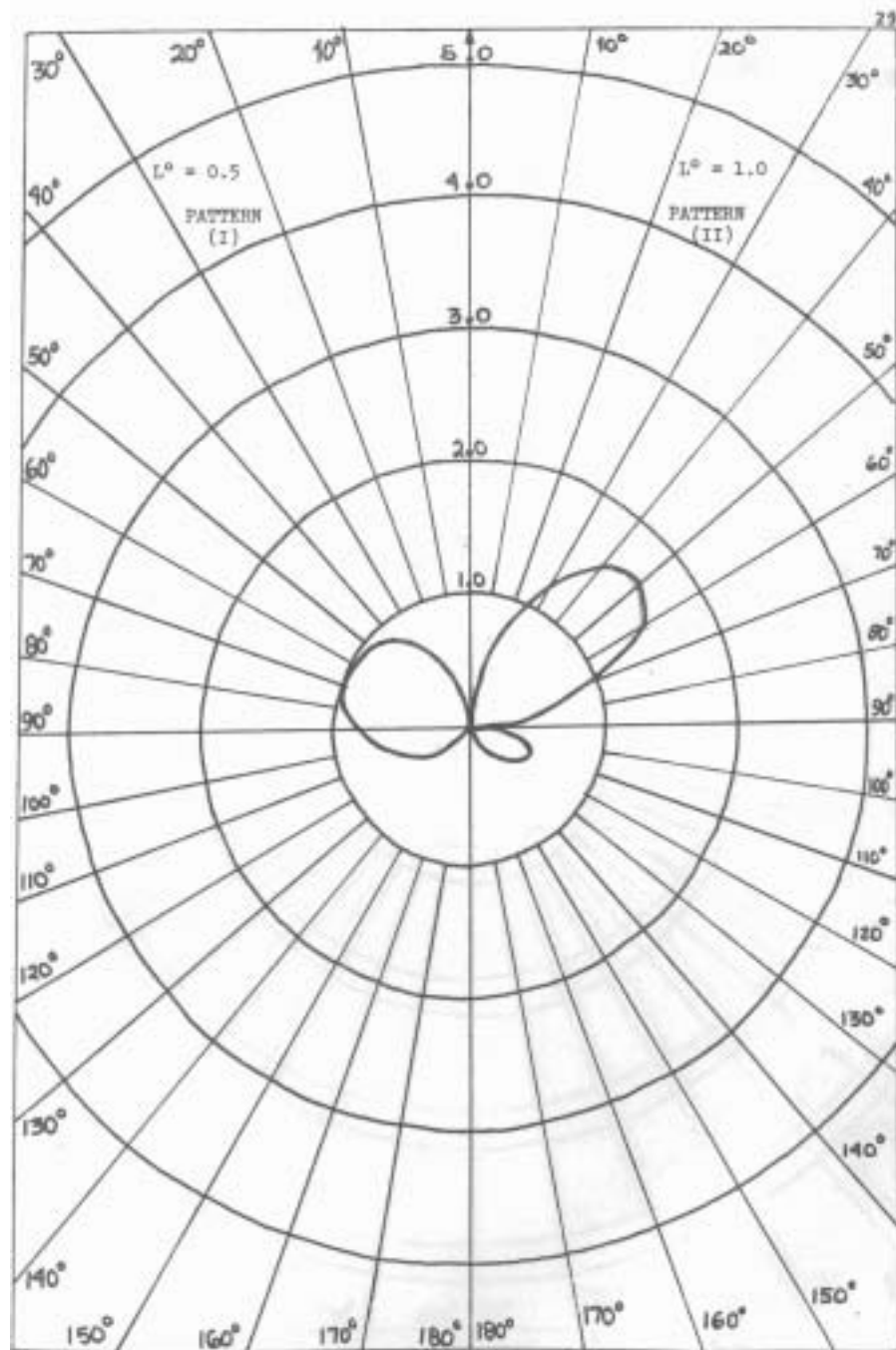
  

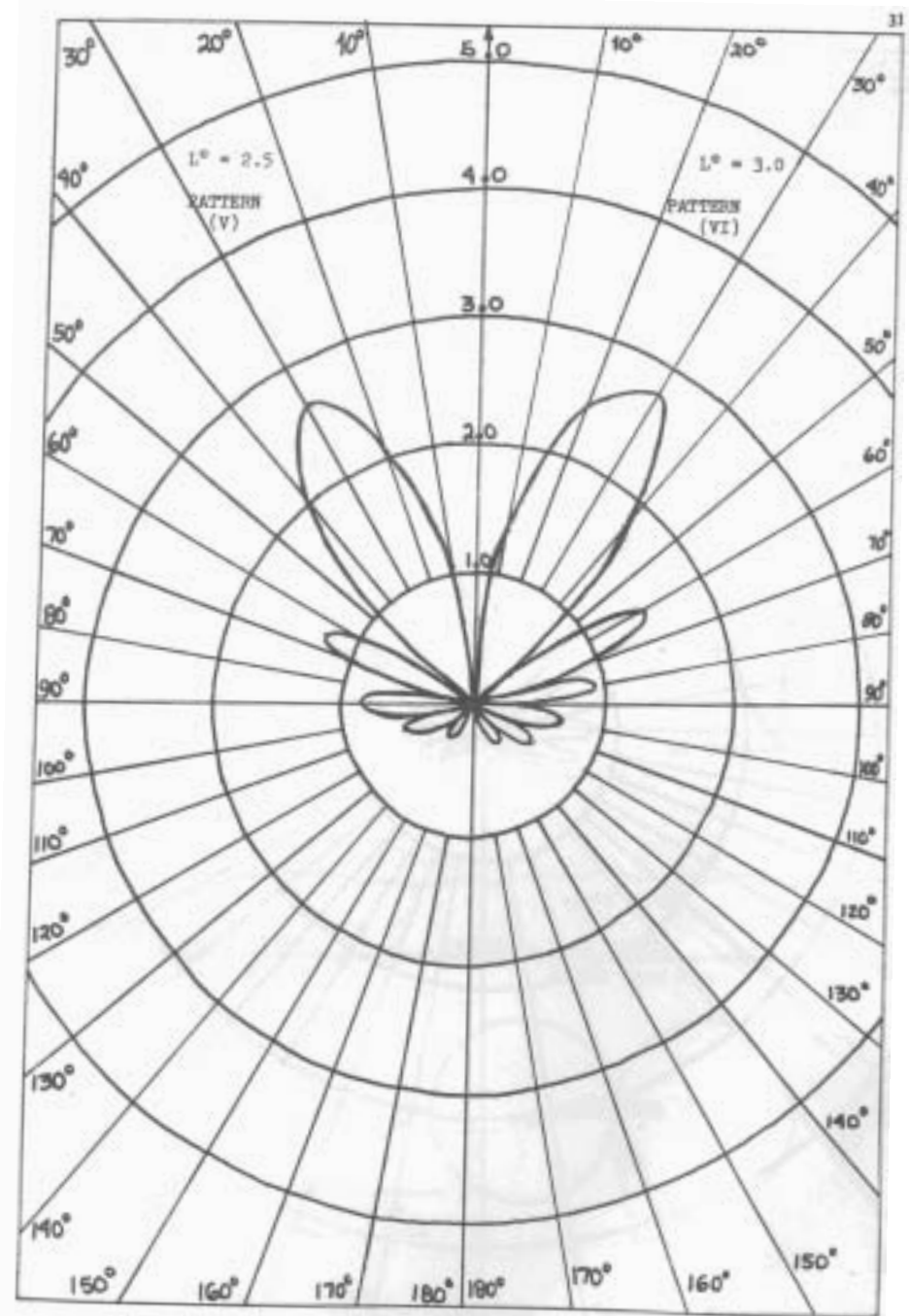
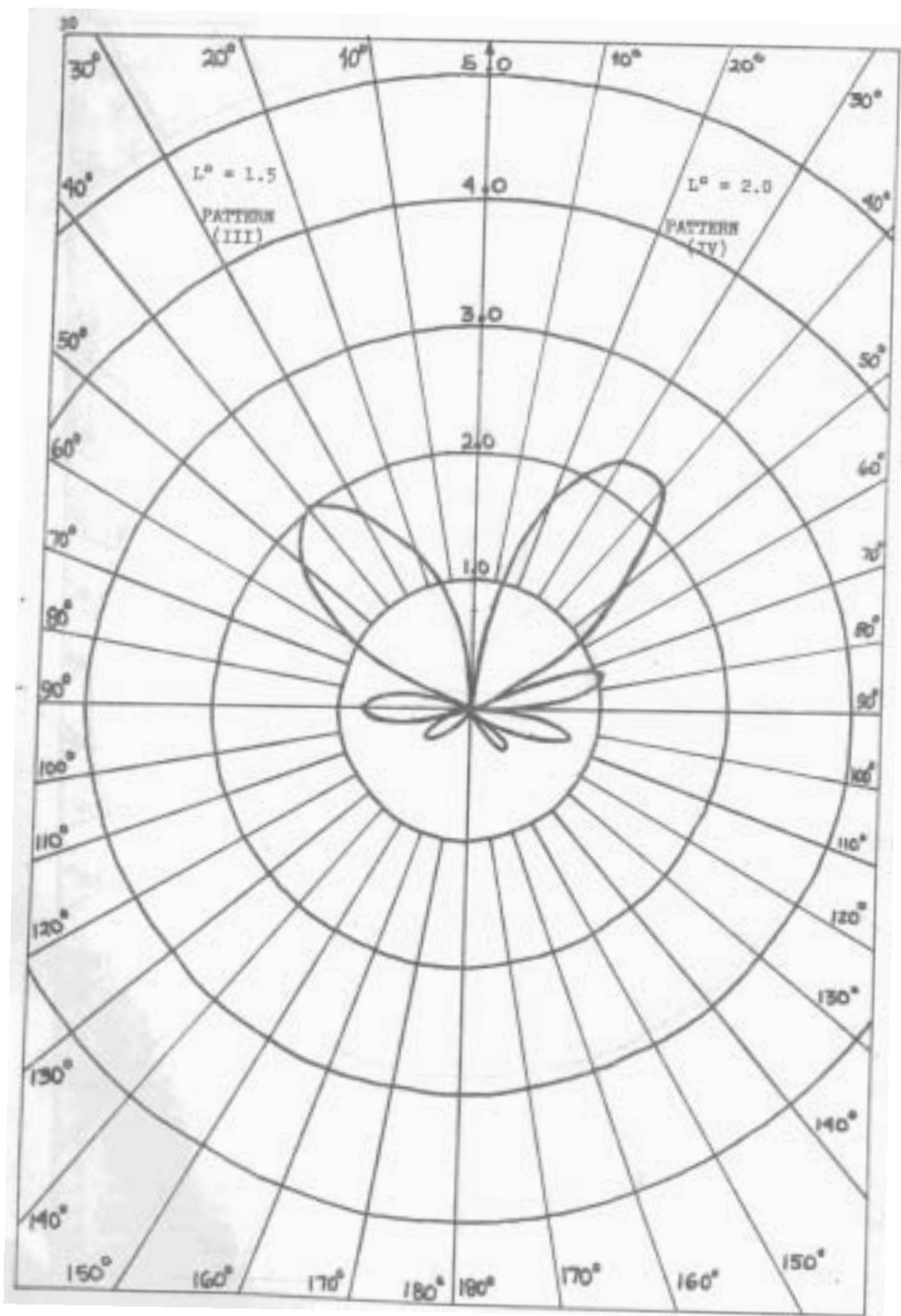
| $L^\circ$    | 6.0   | 6.5   | 7.0   |
|--------------|-------|-------|-------|
| f = 540kHz   | 10933 | 11844 | 12755 |
| f = 1600 kHz | 3690  | 3998  | 4305  |

TABLE III --- Pattern Comparisons

| L <sup>λ</sup> | θ*  | E*    | dθ*   | EL*   | dBL   | L <sup>λ</sup> | θ*  | E*    | dθ*   | EL*   | dBL   |
|----------------|-----|-------|-------|-------|-------|----------------|-----|-------|-------|-------|-------|
| 0.5            | 65  | 0.638 | -3.9  | 1.0   | 0.0   | 5.5            | 21  | 2.541 | 8.1   | 1.0   | 0.0   |
| 1.0            | 48  | 1.000 | 0.0   | 1.0   | 0.0   | 5.5            | 43  | 1.307 | 2.3   | 0.515 | -5.8  |
| 1.0            | 113 | 0.322 | -9.8  | 0.322 | -9.8  | 5.5            | 57  | 0.951 | -0.4  | 0.374 | -8.5  |
| 1.5            | 40  | 1.266 | 2.1   | 1.0   | 0.0   | 5.5            | 68  | 0.752 | -2.5  | 0.296 | -10.6 |
| 1.5            | 87  | 0.528 | -5.6  | 0.417 | -7.6  | 5.5            | 79  | 0.619 | -4.2  | 0.244 | -12.3 |
| 1.5            | 127 | 0.246 | -12.2 | 0.194 | -14.3 | 5.5            | 90  | 0.516 | -5.7  | 0.203 | -13.8 |
| 2.0            | 35  | 1.486 | 3.4   | 1.0   | 0.0   | 5.5            | 100 | 0.429 | -7.4  | 0.169 | -15.4 |
| 2.0            | 74  | 0.676 | -3.4  | 0.455 | -6.8  | 5.5            | 111 | 0.353 | -9.0  | 0.139 | -17.1 |
| 2.0            | 103 | 0.406 | -7.8  | 0.273 | -11.3 | 5.5            | 123 | 0.280 | -11.0 | 0.110 | -19.1 |
| 2.0            | 135 | 0.206 | -13.7 | 0.139 | -17.1 | 5.5            | 136 | 0.207 | -13.7 | 0.081 | -21.8 |
| 2.5            | 31  | 1.678 | 4.5   | 1.0   | 0.0   | 5.5            | 153 | 0.118 | -18.6 | 0.046 | -26.7 |
| 2.5            | 65  | 0.798 | -1.9  | 0.476 | -6.5  | 6.0            | 20  | 2.660 | 8.5   | 0.0   | 0.0   |
| 2.5            | 89  | 0.521 | -5.7  | 0.310 | -10.1 | 6.0            | 41  | 1.376 | 2.8   | 0.517 | -5.7  |
| 2.5            | 113 | 0.341 | -9.3  | 0.203 | -13.8 | 6.0            | 54  | 1.009 | 0.18  | 0.380 | -8.4  |
| 2.5            | 140 | 0.181 | -14.8 | 0.108 | -19.3 | 6.0            | 66  | 0.781 | -2.1  | 0.294 | -10.6 |
| 3.0            | 28  | 1.849 | 5.3   | 1.0   | 0.0   | 6.0            | 75  | 0.664 | -3.6  | 0.250 | -12.0 |
| 3.0            | 56  | 0.824 | -1.7  | 0.446 | -7.0  | 6.0            | 85  | 0.562 | -5.0  | 0.211 | -13.5 |
| 3.0            | 80  | 0.614 | -4.2  | 0.332 | -9.6  | 6.0            | 95  | 0.472 | -6.5  | 0.178 | -15.0 |
| 3.0            | 99  | 0.439 | -7.1  | 0.237 | -12.5 | 6.0            | 104 | 0.399 | -7.9  | 0.150 | -16.5 |
| 3.0            | 119 | 0.301 | -10.4 | 0.163 | -15.7 | 6.0            | 114 | 0.330 | -9.6  | 0.124 | -18.1 |
| 3.0            | 143 | 0.163 | -15.7 | 0.088 | -21.1 | 6.0            | 125 | 0.264 | -11.6 | 0.099 | -20.0 |
| 3.5            | 26  | 2.006 | 6.0   | 1.0   | 0.0   | 6.0            | 138 | 0.196 | -14.1 | 0.074 | -22.6 |
| 3.5            | 54  | 0.997 | -0.1  | 0.497 | -6.1  | 6.0            | 154 | 0.113 | -18.9 | 0.042 | -27.5 |
| 3.5            | 73  | 0.696 | -3.1  | 0.347 | -9.2  | 6.5            | 19  | 2.770 | 8.8   | 0.0   | 0.0   |
| 3.5            | 90  | 0.516 | -5.7  | 0.257 | -11.8 | 6.5            | 39  | 1.439 | 3.2   | 0.520 | -5.7  |
| 3.5            | 106 | 0.387 | -8.3  | 0.193 | -14.3 | 6.5            | 52  | 1.059 | 0.5   | 0.383 | -8.3  |
| 3.5            | 124 | 0.272 | -11.3 | 0.136 | -17.4 | 6.5            | 62  | 0.848 | -1.4  | 0.306 | -10.3 |
| 3.5            | 146 | 0.150 | -16.5 | 0.075 | -22.5 | 6.5            | 72  | 0.710 | -3.0  | 0.257 | -11.8 |
| 4.0            | 25  | 2.151 | 6.6   | 1.0   | 0.0   | 6.5            | 81  | 0.604 | -4.4  | 0.218 | -13.2 |
| 4.0            | 51  | 1.081 | 0.7   | 0.502 | -6.0  | 6.5            | 90  | 0.516 | -5.7  | 0.186 | -14.6 |
| 4.0            | 68  | 2.096 | -2.3  | 0.356 | -9.0  | 6.5            | 99  | 0.440 | -7.1  | 0.159 | -15.9 |
| 4.0            | 82  | 0.985 | -4.7  | 0.272 | -11.3 | 6.5            | 108 | 0.375 | -8.5  | 0.136 | -17.4 |
| 4.0            | 97  | 0.456 | -6.8  | 0.212 | -13.5 | 6.5            | 117 | 0.312 | -10.1 | 0.113 | -18.9 |
| 4.0            | 112 | 0.348 | -9.2  | 0.162 | -15.8 | 6.5            | 128 | 0.252 | -12.0 | 0.091 | -20.8 |
| 4.0            | 128 | 0.250 | -12.0 | 0.116 | -18.7 | 6.5            | 140 | 0.188 | -14.5 | 0.068 | -23.4 |
| 4.0            | 148 | 0.140 | -17.1 | 0.065 | -23.7 | 6.5            | 155 | 0.108 | -19.3 | 0.039 | -28.2 |
| 4.5            | 23  | 2.289 | 7.2   | 1.0   | 0.0   | 7.0            | 19  | 2.874 | 9.2   | 1.0   | 0.0   |
| 4.5            | 47  | 1.160 | 1.3   | 0.507 | -5.9  | 7.0            | 38  | 1.498 | 3.5   | 0.521 | -5.7  |
| 4.5            | 63  | 0.835 | -1.6  | 0.365 | -8.8  | 7.0            | 50  | 1.107 | 0.9   | 0.385 | -8.2  |
| 4.5            | 77  | 0.649 | -3.8  | 0.283 | -10.9 | 7.0            | 60  | 0.895 | -0.9  | 0.311 | -10.1 |
| 4.5            | 90  | 0.516 | -5.7  | 0.226 | -12.9 | 7.0            | 69  | 0.751 | -2.5  | 0.261 | -11.7 |
| 4.5            | 103 | 0.410 | -7.7  | 0.179 | -14.9 | 7.0            | 78  | 0.631 | -4.0  | 0.220 | -13.2 |
| 4.5            | 116 | 0.322 | -9.8  | 0.140 | -17.0 | 7.0            | 86  | 0.553 | -5.1  | 0.192 | -14.3 |
| 4.5            | 131 | 0.233 | -12.7 | 0.102 | -19.8 | 7.0            | 94  | 0.481 | -6.3  | 0.167 | -15.3 |
| 4.5            | 150 | 0.131 | -17.6 | 0.057 | -24.8 | 7.0            | 102 | 0.414 | -7.6  | 0.144 | -16.8 |
| 5.0            | 22  | 2.418 | 7.7   | 1.0   | 0.0   | 7.0            | 111 | 0.354 | -9.0  | 0.123 | -18.1 |
| 5.0            | 45  | 1.239 | 1.9   | 0.512 | -5.8  | 7.0            | 120 | 0.298 | -10.0 | 0.104 | -19.7 |
| 5.0            | 60  | 0.894 | -1.0  | 0.370 | -8.6  | 7.0            | 130 | 0.241 | -12.4 | 0.084 | -21.5 |
| 5.0            | 72  | 0.704 | -3.1  | 0.291 | -10.7 | 7.0            | 141 | 0.179 | -14.9 | 0.062 | -24.0 |
| 5.0            | 84  | 0.572 | -4.8  | 0.237 | -12.5 | 7.0            | 156 | 0.164 | -19.7 | 0.036 | -28.8 |
| 5.0            | 96  | 0.464 | -6.7  | 0.192 | -14.3 |                |     |       |       |       |       |
| 5.0            | 107 | 0.379 | -8.4  | 0.157 | -16.1 |                |     |       |       |       |       |
| 5.0            | 120 | 0.298 | -10.5 | 0.123 | -18.2 |                |     |       |       |       |       |
| 5.0            | 134 | 0.218 | -13.2 | 0.090 | -20.9 |                |     |       |       |       |       |
| 5.0            | 152 | 0.124 | -18.1 | 0.051 | -25.8 |                |     |       |       |       |       |

Beverage Antenna Patterns for

L<sup>λ</sup> from 0.5 to 7.0 wavelengths





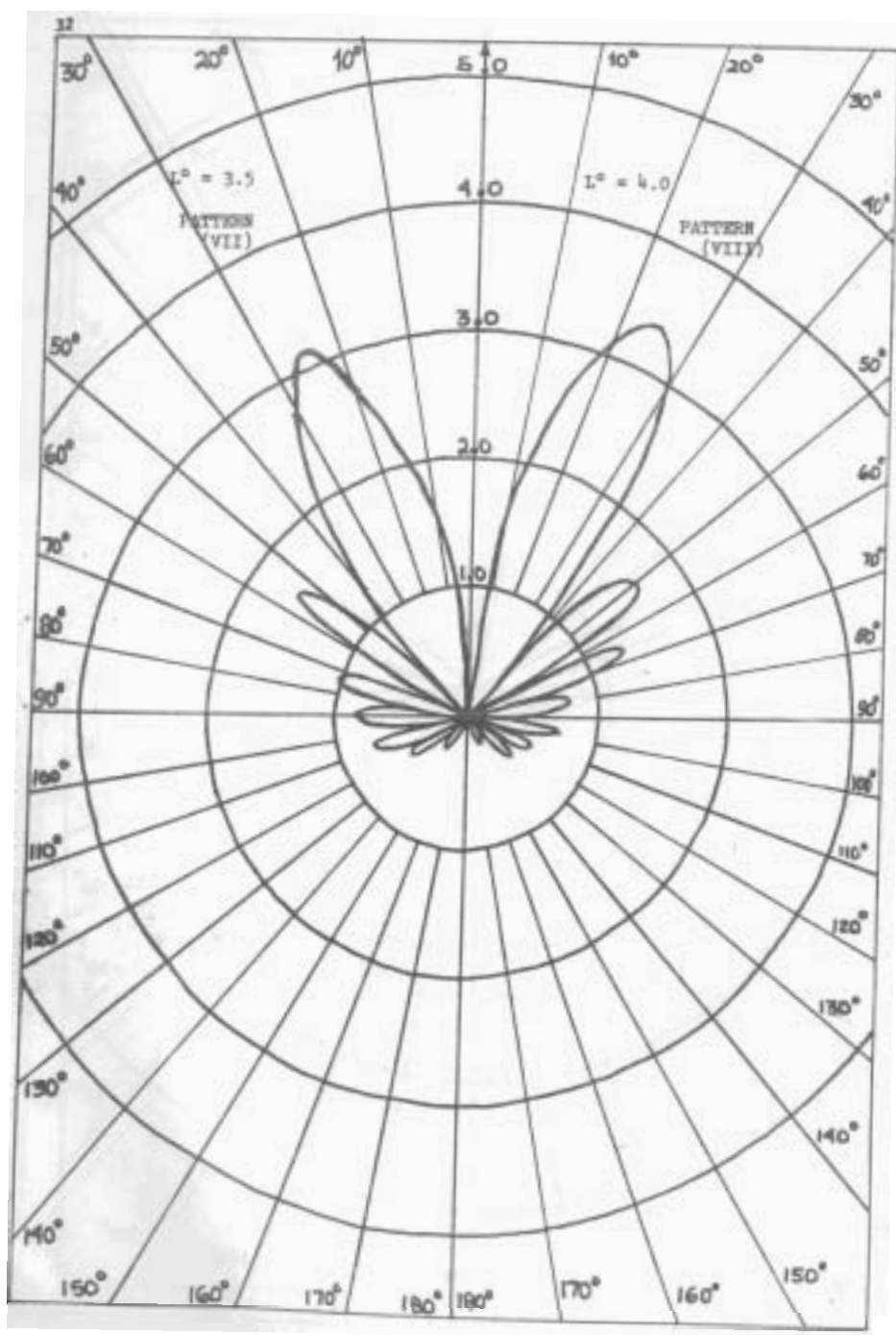


FIGURE A: Side View of Antenna

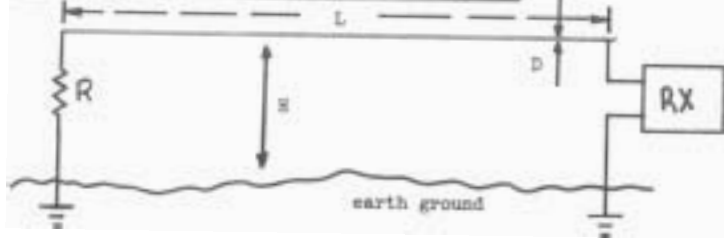


FIGURE B: Top View of Antenna

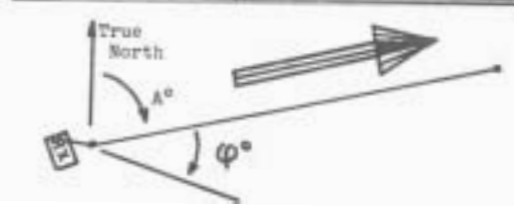


FIGURE C: Electrical Operation of Antenna

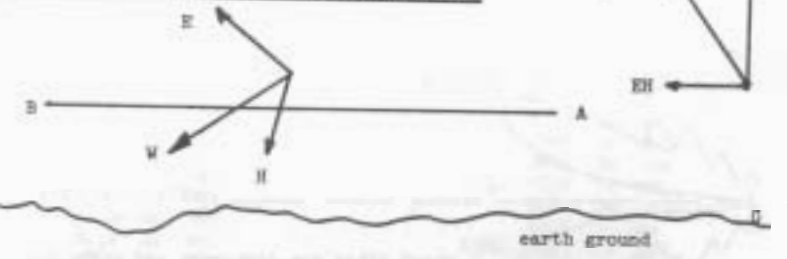


FIGURE D: Loop Pattern

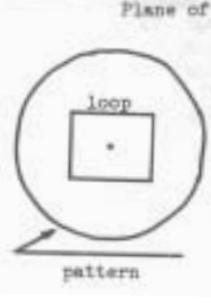


FIGURE E: Loop Pattern

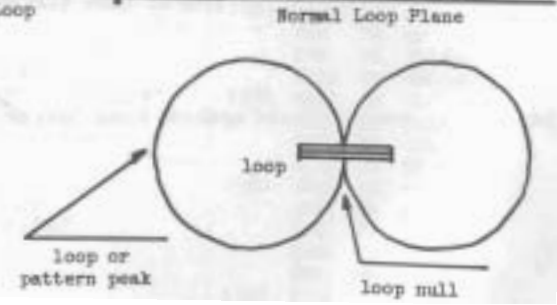


FIGURE F: Typical Terminated Beverage Pattern



FIGURE G: Effects of Ground Plane on Vertical Pattern

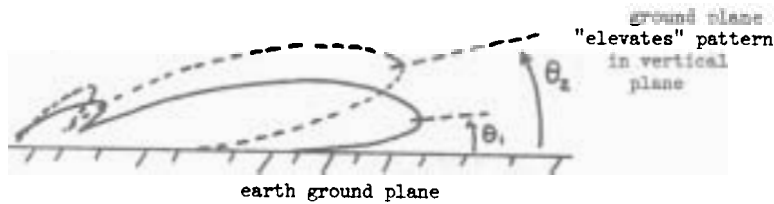
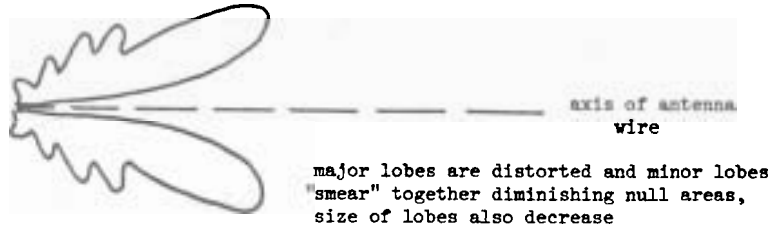


FIGURE H: Pattern Distortion due to RF Resistance



(See page comments and addenda from GPN at HQ)



It's been a good while since this column appeared, but my time is at a minimum lately, so something has to wait...luckily, DXtras isn't a time-dated feature, hi. Next deadline will be at the end of December, as this is being typed near Thanksgiving. Well, on with biz:

FORMATS & STUFF

|      |      |    |                                |      |      |    |                                       |
|------|------|----|--------------------------------|------|------|----|---------------------------------------|
| 550  | KBOW | MT | MoR/c&w                        | 1260 | CKOO | BC | MoR/rr                                |
| 560  | KPQ  | WA | MoR                            | 1250 | WHEN | KS | Uptempo MoR                           |
| 580  | KANA | MT | c&w                            |      | KMSU | WA | Educ                                  |
| 590  | KHAR | AK | MoR                            |      | KTW  | WA | "The Pioneer of Seattle Broadcasters" |
| 650  | KORL | HI | Soft rr                        | 1260 | CFRN | AB | MoR                                   |
|      | KIKK | TX | c&w                            | 1270 | KTFI | ID | MoR                                   |
| 660  | KOWH | NE | R&B                            |      | CHKK | BC | MoR/rr                                |
| 710  | KIRO | WA | Uptempo MoR, "Radio Northwest" | 1280 | KVOV | NV | R&B                                   |
|      |      |    |                                |      | KERB | OR | MoR                                   |
| 770  | KXA  | WA | Cl, semi-cl                    |      | KNAK | UT | rr (soon to progressive MoR -ed)      |
| 780  | KORL | NV | Cl, semi-cl, MoR               |      | KIT  | WA | MoR 0900-0300, rr other               |
| 790  | KWIL | OR | Rel                            |      | KTLK | CO | rr, "The Double K" (BL)               |
|      | KGMI | WA | MoR                            | 1290 | KMEN | CA | rr                                    |
|      | KJRJ | WA | rr                             |      | KOIL | NB | rr                                    |
| 810  | KGO  | CA | "People-to-people R."          |      | KUMA | OR | MoR                                   |
| 850  | KTAC | WA | rr, "The Big 85"               |      | KLIQ | OR | Talk                                  |
| 860  | WAMO | PA | R&B                            | 1300 | KOL  | WA | "The Rock of Seattle"                 |
| 870  | KAIM | HI | Rel                            |      | KONW | CA | CA                                    |
| 900  | KUEN | WA | C&W                            | 1310 | KNPT | OR | MoR/rr                                |
| 910  | KOYN | MT | C&W                            |      | CPGM | ON | C&W                                   |
| 920  | KWYS | MT | C&W                            | 1340 | KIST | CA | rr                                    |
|      | KQEO | SN | rr                             |      | KIHR | OR | MoR/rr                                |
|      | KELP | TX | rr                             |      | KAGT | WA | rr                                    |
| 930  | KYSS | MT | C&W                            | 1350 | KCKC | CA | C&W                                   |
|      | KJCA | AB | MoR                            |      | KIVN | HI | rr                                    |
| 960  | KALE | WA | rr                             |      | KRLC | ID | MoR/rr                                |
| 1000 | KOMO | WA | Soft MoR                       | 1360 | KRUX | AZ | rr                                    |
| 1010 | KSAY | CA | C&W                            |      | KGB  | CA | rr                                    |
| 1010 | KHCS | AZ | MoR/Rel                        |      | KMO  | WA | C&W/rel                               |
|      | KDJW | TX | C&W                            |      | KVRS | WY | MoR/cw/rr                             |
|      | CFRB | ON | MoR                            | 1370 | KEEN | CA | C&W                                   |
| 1080 | KSFO | CA | Soft MoR                       |      | KXLF | MT | MoR/rr                                |
| 1090 | KING | WA | "The Music Machine"            |      | KSOP | UT | C&W                                   |
| 1120 | KPNW | OR | Uptempo MoR                    |      | CFLV | PQ | FF                                    |
| 1130 | CKWX | BT | MoR                            | 1380 | WAMS | DE | rr                                    |
| 1140 | KGEM | ID | C&W                            |      | WSIZ | GA | rr                                    |
|      | KLUC | NV | rr                             |      | KPOI | HI | rr                                    |
|      | CKXL | AB | Drake rr                       |      | KUDL | KS | rr                                    |
| 1170 | KJNP | AK | Rel/ C&W/MoR                   |      | KRKO | WA | rr                                    |
| 1190 | KEX  | OR | MoR                            | 1390 | KGER | CA | Rel                                   |
| 1230 | KRIZ | AZ | rr                             |      | KQMS | CA | MoR                                   |
|      | KYJC | OR | rr                             |      | WWIN | MD | R&B                                   |
|      | KJNL | BC | MoR/rr                         | 1400 | KLIN | NE | MoR                                   |
| 1240 | KTTI | LE | MoR                            |      | KUNO | TX | SS                                    |
|      | KBOY | CA | rr                             |      | KIXX | UT | MoR                                   |
|      | KSON | CA | C&W                            |      |      |    |                                       |
|      | KPR3 | OR | C&W                            |      |      |    |                                       |

1410n KESN CA Drake rr  
 1430 KEGE CA Q&W  
 1430 KARM CA Soft MoR  
 KYM HI Q&W  
 1440 WCHB ND R&B  
 EGRE MN Progressive rr  
 KODL OR rr  
 KPMR TX rr  
 1450 KDNW CA rr  
 KORO CA rr  
 WLYV IN rr  
 1460 KYAC WA "The Soul of the  
 Northwest"  
 KENO NV rr  
 KDON CA rr  
 WAXC NY rr  
 WACO TX rr  
 KMWX WA Uptempo MoR/rr  
 WPNX AL Q&W  
 WXOK LA R&B  
 WOKO NY Q&W  
 1480 WLEE VA rr  
 1490 KOWL CA MoR  
 KDID ID MoR  
 KAIR AZ Soft MoR  
 KENE WA rr

1490 CFWB BC MoR  
 1500 KXRX CA Soft MoR  
 KUMU HI MoR  
 KROQ CA rr  
 1520 KYXI OR Soft MoR  
 1530 KECK NE Q&W  
 1540 WPTR NY rr  
 KBUY TX Q&W  
 KBES WA Uptempo MoR  
 1550 KKHI CA OL  
 KOKA LA R&B  
 WOKJ ME R&B  
 1560 KDFL WA Soft MoR  
 1570 CHUB BC MoR/rr/comedy  
 CHLO ON rr  
 1580 KWIP CA Q&W  
 KDAY CA RR  
 KEGO TX rr  
 1590 KLIV CA rr  
 KUDU CA Q&W  
 1600 KASH OR rr  
 KOHI OR MOR

(All Formats, slogans, etc. from  
 Bruce Portzer, unless otherwise noted)

#### DOMINANTS: 690 MHz

-Day: WKUR-Pa. and WADS-Conn. Night: CBF Montreal (Leo Alster, N.J.)  
 -Day: CBF, weak. Night: CBF o/Radio Progreso. AN: Radio Progreso. SSS: WAPE,  
 WVOK during winter o/u CBF. (Bill Caldwell, Mass.)  
 -Day: Local KSTL. (Rich Eddie, St. Louis)  
 -Day: WNTT. SSS& SRS: WAPE o/CBF. Night: CBF o/CMB. (Richard Frcho, D.C.)  
 -Day: CBU. Evening: XETRA/CBU. AN: XETRA. During rare XETRA MM SP\*8, it's  
 KKUA, CMB, and sometimes JOAB (Bruce Portzer, Seattle)  
 -Day: Nothing. Nights: CBF. After CBF signs off CMB comes in if southern  
 skip is good. (Morris Sorensen, God's Narrows, Man.)  
 -Day: CBF and CPTK splatter. Night: CBF and CMB. (Dave Whatmough, Ontario)  
 -XETRA through KKUA, CBU weaker. (Richard Wood, Hawaii)  
 -Day: KAPT. SSS: KAPT, KGGF, KHEY. Night: KGGF w/KEOS under. AN: XETRA.  
 MM: XETRA, sometimes CMB. (Ed)

#### DOMINANTS: 920 MHz

-Day: Local WTTM-N.J. Night: WJAR-R.I. (Alster)  
 -Day: WJAR (tho QRMed by local on 930) Night: WJAR o/WKY (Caldwell)  
 -Day: Local WGNU-Ill. (Eddie)  
 -Day: WPTX. Night: WPTX/WMMN/WGST/KARK/WREL. (Frcho)  
 -Day: KITN. Eves: KGAL/KXLY. AN: KOLO/KGAL. MM: KERP (Portzer)  
 -Nothing days. SSS: CTRY. Nights KDHL used to dominate last year but CTRY seems  
 to have taken over since power increase. (Sorensen)  
 -Day: KXKX o/WNI. Night: WMMN, WMMI/WOKY irreg. AN: WKTY (Whatmough)  
 -Night: KGAL, KOLO close second; KXLY common (Wood)  
 -Day: KLTR. Night: KPTB, KERP, sometimes KARN or KORK. AN: KERP, KARN. MM:  
 KERP. (Ed.)

STAY TUNED TO EXTRAS WEST FOR MORE DOMINANTS COMING UP ON THE NEXT PAGE OF DX NEWS

#### MORE DOMINANTS: 1270 MHz

-Day: WLER Pa. Night: WXYZ-Mich. and WSPR-Mass. (Alster)  
 -Day & Night: Local WSPR. AN: WXYZ. MM: CJOB. (Caldwell)  
 -Day: WELC Charleston, Ill. or WHBF-Ill. (Eddie)  
 -Day: WTTD. SSS: WMPM Night: WXYZ/WOOK (Frcho)  
 -CHWK/KBAM days, KBAM/KAJO/KOOK/KTFI/CHWK/CHAT SSS, usually CHWK Eves w/CHAT,  
 KTFI/KOOK under. On strong auroral nights CHWK is gone, KOOK dominates. CHWK  
 dominates AN. MM's: KFJZ u/CHWK's OC. (Portzer)  
 -Nothing days, CHAT usually very strong at night. (Sorensen)  
 -WHLD days, WXYZ nights, KFJZ AN if WXYZ off (Whatmough)  
 -Clear days, KSOB/WHBF/KIML/KFJZ SSS, WHBF/KIML/KFJZ eves, KFJZ AN and MM. (Ed.)

So, that does it for this time. Thanks to all reporters. Next dominants will  
 be 560, 1430, and 1590. Send dem reports on in by the end of December, and Happy  
 Holidays! 73 de BNL.

#### ADDENDA TO FISCHER'S BEVERAGE ARTICLE

\* Gordon P. Nelson

The mind does boggle... Ghoti's great article arrived this morning  
 while yours truly was busily slaving over a hot slide rule on the kitchen table  
 busily solving the Beverage antenna equations - presto, he's done it for us.<sup>1,2</sup>

I think the only important point to be added is to reemphasize an important  
 point that Dave has already stressed: that his curves are based on the assumption  
 that the antenna is so far above real ground that earth effects can be neglected.  
 Real world ground is not only covered with Kleenex and beer cans, it's also  
 nonuniform and has both a finite conductivity and dielectric constant. The  
 effects of nonideal ground conductivity and dielectric properties are twofold:  
 (1) The equations get mucked up almost as badly as the loop equations do when  
 you include real ground,<sup>3</sup> and (2) The split in the center of the main pattern  
 lobe(s) tends to vanish. Otherwise the front-to-back and side-lobe properties  
 remain essentially unchanged. But the front-lobe-splitting is definitely an  
 artifact due to the ground assumptions.

In actual practice the value of that terminating impedance out there at the  
 far end tends to vary somewhat with time due to a variety of ground effects  
 ordinarily neglected in the theoretical treatments: in particular the action of  
 temperature and moisture on the connection between the earth and the termi-  
 nation ground connection. Ground-rods, radial wires buried in the ground,  
 old radiators thrown in the frog pond - all of these are metallic electrodes  
 in contact with the chemically complex and variable trash pile known as the  
 surface of the Earth.<sup>4</sup> Changes in the temperature, chemical composition, and  
 moisture content of the contact area between the termination electrodes and the  
 soil there will change the effective termination from hour-to-hour and day-to-  
 day. In practice this means that no matter how carefully you have set the  
 termination resistor to null out the back lobe, within a few hours or a few days

(continued page 39)

## C P LIST

9/15/72

560 \*KVOK Kodiak, Ak (5/10)  
 580 \* Blowing Rock, NC (9/8)  
 590 \*CKRS Jonquiere, Que (4/1/1)  
 620 #KQW Portland, Ore 8/7  
 630 \* Lachute, Que 5/12  
 710 \* Eupora, Ms 11/  
 \* Blacksburg, Va (2/3)  
 \*WEGG Rose Hill, NC 3/9  
 720 \*KIQX Las Vegas, Nv (7/3/9)  
 730 \* Rutland, BC 9/1  
 790 +EKON Kaleakakua, Ha 12/22  
 \*CFWN Port aux Choix, MF (7/30)  
 800 #CJJC Langley, BC 9/1  
 810 +WVYN San Juan, PR 6/19  
 850 \*KLSU Waterloo, Ia 2/23  
 \*WMAQ Forest, Ms 3/15  
 \* Houston, Tx 2/19  
 900 \* Pontiac, BC (6/23)  
 910 +CKLY Lindsay, Ont 6/30  
 940 +WOPC Eouaton, Ms unk  
 \* Smithfield, Va 4/12  
 +WFOC Fayetteville, NC 4/12  
 +CJIB Fernan, BC 11/22/72  
 950 \* Steubenville, Oh 8/29  
 970 #WQZB Jacksonville, Fla 12/10  
 \*KIAK Fairbanks, Ak 1/13  
 1010 +KODA Houston, Tx 4/5  
 1060 \* Nebane, NC 11/3  
 \* Ozark, Tn (8/5)  
 \*EHYN Gilmer, Tx 4/19  
 1080 \*KJEL Lebanon, Mo 11/17  
 #WBCF Carthage, Ms 11/4  
 1090 \* Jacksonville, Al 2/9  
 1100 +KFAI San Francisco, Ca unk  
 1110 #WUAT Pikeville, Tn 9/1/72  
 \* Norfolk, Va 5/24  
 1120 +KPHW Eugene, Ore 1/6/73  
 1130 +ESDO San Diego, Ca 1/1  
 \* Mt. Pleasant, Ia 2/23  
 \*Faton, Oh 2/1  
 +WDTY Minneapolis, Mn 12/1  
 +WISN Milwaukee, WI 1/11  
 1140 #WECB Hainesville, Ky 6/19  
 \* Lexington, NC (1/8)  
 \* Yakima, Wa 9/26  
 1150 +CKK Brandon, Wb (1/15)  
 \*KBAI Morro Bay, Ca 11/22  
 1170 +KPOB Bellingham, Wa 8/29  
 +WLEH Mattoon, Ill 8/4  
 1190 \* Chattanooga, Tn 11/10  
 1220 \* Midwest City, Ok 1/26  
 1230 #WHOD Jackson, Al unk  
 +ESUN Bisbee, Az 2/12  
 +KRDG Redding, Ca 1/17  
 +KTHC Falls City, Wb 6/1  
 1240 +KLOA Ridgcrest, Ca 1/17

\*EMJB Globe, As 7/18  
 +CJAP Cabano, Que 6/14  
 1270 +WEIC Charleston, Ill (6/3)  
 +WGNR Elkhart, Ind 4/5  
 1290 +KQVO Missoula, Wt 6/7  
 1310 #WPHJ Parsippany, NJ 12/30  
 1320 +KXIM Clayton, Mo 11/1  
 1340 \*KFOR Pago, Az unk  
 +KSPR Needles, Ca (7/23)  
 +KMYJ Cathedral City, Ca 1/13  
 +WUSJ Lockport, NY (3/31)  
 +KOLE Port Arthur, Tx 3/1  
 +KVIC Victoria, BC (6/9)  
 \* Sussex, NB 7/21  
 \* Asbestos, Que 6/14  
 1350 \* St.-Pamphile, Que 6/14  
 +CJEM Moncton, NB 5/25  
 1380 \* Gulfport, Ms 9/1  
 1390 +WROA Fairfield, Al (permit gone)  
 1400 +WJLD Tuscon, Az (4/21)  
 +KTOC Santa Paula, Ca unk  
 +KQIQ Henderson, Wv (7/15)  
 +KMBI , As 8/2  
 1410 +KVOY Ft. Myers, Fla unk  
 #WPKK Charlottesville, Va 3/22  
 1420 \* Plessisville, Que 12/21  
 1430 +KLO Ogden, Ut 10/21  
 1440 +KEYS Corpus Christi, Tx (11/6)  
 +CFGO Ottawa, Ont 9/1  
 1450 +KOWH Escondido, Ca (6/2)  
 1470 +CPOX Pointe Claire, Que (9/1)  
 1480 +KANT Douglas, As unk  
 +WBSW Warsaw, Ind 6/1  
 +KADR Tuscon, Az (8/4)  
 +KCUZ Clifton, Az (4/29)  
 +KWWC Del Rio, Tx (12/16)  
 +KVCZ Laredo, Tx 10/21  
 +KIBL Beeville, Tx 4/5  
 \* Hartsville, SC 11/17  
 \* WZBS Ponce, PR 12/7  
 +CJOC-1 Caleman, Alb 1/4  
 1500 \* Clarksville, Ga 6/2  
 \* Ellwood City, Pa 2/2  
 \* Great Slave Lake, Wt unk  
 1510 \*KPIA Ironton, Mo 12/4  
 #WBLB Pulaski, Va 6/1  
 1530 #WDJZ Bridgeport, Ct (6/24/9)  
 \* Flora, Ill 8/24  
 \* Wheaton, Ill 9/24  
 \* WYAZ Yazoo City, Ms 1/25  
 \* McCombsburg, Pa 3/10  
 \* Jeannette, Pa 11/24  
 1540 \*KISA Honolulu, Ha 9/9  
 \* Circleville, Oh 6/1  
 1550 #WOKI Oak Ridge, Tn 9/1



1580 #WYYZ Jasper, Ga 1/1/73  
 1590 \* Clayton, NC 8/9  
 \* Alexander City, Al 9/1  
 1600 +WREN Warner Robins, Ga 5/3  
 +WAAM Ann Arbor, MI (4/5)  
 #WNST Milton, WVa 8/25

(cont. from p.37)

the electrode chemistry in the ground will have altered the value enough to require a significant change. Thus in actual practice it's necessary to be able to control the value of the termination resistor if you're going to maintain the advantage of the back-lobe terminator. The people who deal with these effects on a daily basis have developed elaborate techniques for "tweaking" the value of the termination remotely to compensate for these secular changes; unfortunately these techniques are not available to the amateur. Either one of us will come up with a simple remote technique to modify the value of the terminator or some poor soul will have to spend a long cold night out there in the swamp at the far end riding the terminator potentiometer on request from the receiver site people via CB...

The noise-cancelling properties of the Beverage have been mentioned in passing elsewhere this issue. In conjunction with Dave's NEBE project, a related effort is underway at HQ. Within a few days we hope to activate our 11 wavelength Beverage (6600 ft.) in N.H. Beamed on Central Asia and the Far East, it's erected over solid Conway Granite and terminated in swamps... Pattern center is due North and hopefully we'll be able to get through on some of the midwinter Far East Asian paths discussed at the NRC Miami Convention.

Since we're heavy on footnote/reference numbers this week, we'll append (with apologies) to Ghoti:

(1) "The wave antenna - a new type of highly directive antenna", H.H. Beverage, et al., Transactions of the AIEE, Vol. 42, p. 215, 1923. Available as an NRC reprint from HQ; most definitely both the first and (almost) the last word on this ultimate MW antenna!

(2) "The BCB DX'ERS BEVERAGE", G. Nelson, DX NEWS, 2/28/71.

(3) "Analysis of the electrostatically perturbed loop antenna over real lossy ground", G. Nelson, available as an NRC Monograph from HQ, 45 pages of solid equations, not for the faint of heart.

(4) "Reference electrodes - theory and practice", D. Ives & G. Janz, Academic Press, N.Y., 1961. Interesting and relevant work on this subject was done as early as WWII; unfortunately all of the relevant files were yanked from the FCC/FBIS public archives when they were transferred to the National Intelligence Authority in August of 1946. See "Preliminary inventories of the national archives No. 93, records of the federal communications commission", Washington, 1956, for the shadows of the missing research bodies...

\* GPN