



DX NEWS

*the magazine of the
National Radio Club*

— SINCE 1933 —

VOLUME 44; NO. 20

21 MARCH 1977

This being our next-to last issue, we'll mention now the new club address in Louisville. It will be NRC, Box 32125, Louisville, KY 40232. Items of club business, clippings, varies for publication, columns, requests for back issues or replacements and changes of address will go there. Requests for publications/prices will still go to the NRC Publications Center, Box 401, Gales Ferry, CT 06335; while renewals, drops, or requests for samples to be sent out (except to CPC testers) go to the NRC Membership Center, P.O. Box 118, Poquonock, CT. CPC TEST notices also go to Louisville.

Once again, the sked for the next few issues: Masthead dates will be 3/28 here in NJ, and 4/11 and 4/25 in Louisville. Deadlines for these two should be assumed to be the same as if they were being published in NJ, namely copy to editors by 4/1 and 4/15, respectively. Further info on subsequent bulletins, etc. will appear shortly.

Effective along with the change of publishers, DXND will also have a new editor, beginning with issue # 22 (4/11). He is Chuck Hutton, 2114 Myrtle Ln., #1; Decatur, GA 30033. Chuck has been in the international DX scene for several years, and is well qualified for the post. He has most recently been handling distribution of Reprints. Taking over that task will be Karl Jeter, who, luckily, lives close by and can pick up things in person, as well as consult w/Chuck on problems.

NEW MEMBERS

Gregory Reams, Rural Rt. 5, Box 103, Melbourne, FL 32935 (re-joins)

RENEWALS

J. Bruner, J. Cieslewicz, A. Meizels, P. Kemp, Y. Mattson, J. Cesana, H. Fein, R. Hymes, K. Onyschuk, D. Barber, J. Cohen, J. Shiels, A. Holt, R. Northup,

ON THE INSIDE.....

**** SPECIAL PROPAGATION ISSUE ****

- Propagation at Medium Wave Frequencies - Phil Sullivan
- Factors of Medium Wave Propagation - Fred Dinning, Medium Wave Circle
(These two articles cover much of the same ground, and we believe that each has merits which is why both appear here)
- Answers to Frequently-Asked Questions About Domestic Propagation - RJE

OTHER FEATURES.....

- Receiver/Accessory Interfacing Made Cheap & Simple - RJE
- DXChange - RJE

THE WORLD'S OLDEST AND LARGEST ALL MEDIUM-WAVE DX CLUB

C. P. C. TEST SCHEDULE

MONDAY MAR. 21	- 0100-0230	* WAKE-1500	* Valparaiso, IN	1000 D	NRC
	- 0200-0300	* WIGM-1490	* Medford, WI	1000/250 U	NNRC
SUNDAY 27	- 0330-0400	* KTFI-1270	* Twin Falls, ID	5000/1000 U	IRCA
MONDAY 28	- 0200-0300	* WCMY-1430	* Ottawa, IL	500 D	GWDXA
	- 0200-0230	* KTXJ-1350	* Jasper, TX	1000 D	NRC
MONDAY APR. 04	- 0300-0400	* WCPK-1600	* Chesapeake, VA	1000 D	NRC

(Please note that the NNRC TEST above may not appear. Most NNRC TESTS over the past few seasons have not.)

DETAILS:

WAKE - EZL mx, TT, frequent IDs. "Mystery" code word which must appear in ppts. V/s will be Randy Woolbright, CE, but send reports to John Bowker, 304 Brandt Hall, 46383. Prepaid calls at (219) 462-6111. Full power non-DA. Arr: Bowker.

WIGM - No pgs. details. V/s: Ray Schmitt, CE, Box 59, 54451. Arr: Gen. Davis III.

WCMY - TT & IDs. Prepaid calls at (815)-434-6050. V/s: Del Dayton, CE, Box 430, 61360. Arr: Geoff Parrish. Make-up for 3/7 sked.

KTFI - Will use day facilities of 5 kw NDA. No calls. Return postage required. No program details. V/s: W. Snow, CE, Box 65, 83301. Arr: Nick Hall-Patch.

KTXJ - Music, IDs, 1 kHz. TT; No v/s; Addr: Box 6090, 75951. Arr: Neil Zank.

WCPK - Big band mx, 1 kHz. TT, IDs. Prepaid calls at (804) 543-3535. V/s: Mr. Paine, 500 E. Liberty St., 23324. Arr: Mike O'Shea.

FLASH TIPS & SUCHLIKE

3/7 ; KYME-740 hrd by Hansch, Sundstrom; WCWA-1230, tentative by Hansch; WCMY-1430 not on. 3/13: CJGX-940 not hrd by Dalley, RJE, FT, due to aurora. 3/14: WOI-640 not hrd by RJE due to a largely daylight path.

NOTES &c FROM N3PC

Al Merriman noted that a binder of the looseleaf variety is available which fits the NRC Log, no re-punching necessary. This allows for easy updating without struggling to replace pages into the spiral binder, which is the price we pay for having a log which can lay flat on the desk. It is made by National, and the Stock # is 64-051. It's a high-quality binder, and costs around \$5.00. We guess this would be available through most stationers.

Chuck Hutton noted that Autek Research is offering a 10% discount on orders of 5 or more of their QF-1 or QF-2 filters. QF-1 list is now \$52.95 (w/disc't, \$47.66) and the list for the QF-2 is \$32.95 (\$29.66). If there's enough interest, Chuck will put through an order, so contact him if interested. Several members are using them, and find them to be worthwhile. Chuck's review of the QF-1 appeared a few issues back. His address is as above.

LATE FLASH TIP.....

WDJZ-1530, Bridgeport CT, a new station will TEST for the NRC on MM 3/28/77 from 0000-0130 EST. No program details are available, but the CE is very interested in reports. TEST was arranged by Konstantine Rychalsky, per call from Frank Dalley. V/s is Mike Fest, 39 Salt St., 06605.

international dx digest

editor: Alan Merriman
P.O. Box 8
Fairfax, VA. 22030

Phone 703-354-2135 Before 2200 EDT *All Times Are GMT *Deadlines Are Friday*

With the publishing change coming in a few weeks, this column will also get a new editor. Chuck Hutton is going to take over IDXD at that time. My last deadline will be March 18. After that, all material for publication will go to Chuck. His address is 2114 Myrtle Lane, Apt. #1, Decatur, Georgia 30033.

Cx have picked up considerably - some good stuff this time. Will start is out with a report from Jim Young in California, who noted another good TA opening on the West Coast on March 6.

"Another TA opening from WCNA on March 6, 1977. This time using the Hammarlund HA-180A and 235' Vee at home QTH. The December TA batch heard mostly from Table Mountain 3/2 miles west, up additional 1500 feet with SPR-4 and 200 foot long wire, if you recall. This time I was able to make some recordings of a few.

- 647 -ENGLAND Daventry, accented EE by 2 m voices at 0536.
- 665 -PORTUGAL Lisbon I here at 0558 w/mx in PP.
- 701 -ANDORRA R. Andorra w/FF sounding mx and anmts at 0605.
- 746 -HOLLAND Lopik (?), carrier here at 0606.
- 764 -SENEGAL Dakar, vy strong w/f voice in FF at 0704.
- 782 -PORTUGAL Miramar assumed here at 0645 w/carrier.
- 818 -ANDORRA Sud Radio w/mx and talking in/out between 0623 and 0647. Strong, but WBAF-820 killed them!
- 827 -LIBYA/MOROCCO ? AA mx and singing at 0608.
- 836 -CANARY ISLANDS Las Palmas here at 0631 w/SS talking, pop mx, but hrd often when Africans in WCNA. Seems to be another carrier w/w SAH.
- 845 -ITALY Rome w/pop mx at 0527.
- 854 -SPAIN RNE, o/Feru w/SAH at 0616.
- 926 -UNID Carrier here at 0625, no audio.
- 935 -MOROCCO Agadir, AA mx in/out, distorted somewhat.
- 1034 -PORTUGAL Porto Alto here at 0559 w/s/on anmts, anthen, into PP talking and mx at 0611, 3/6; also hrd 0727 w/PP pop mx and talking from 0729 to 0734. Ad, anmts, then back to PP pop mx pgs, 3/7.
- 1205 -FRANCE Bordeaux, carrier here at 0620.
- 1214 -GREAT BRITAIN assumed w/carrier at 0643.
- 1349 -FRANCE Nice (and it was!) w/FF mx at 0603 after FF a voice at 0600. Carrier still noted at 0646.
- 1376 -FRANCE Lille, strong w/FF pop mx and anmts from 0601-0637 in/out.
- 1385 -UNID Carrier at 0629. Spain?
- 1394 -ALBANIA ? Seems too late, mx of some sort at 0627.
- 1403 -GUINEA R. Conakry carrier from 0354 to as late as 0713, almost daily, but strong this date, and little audio. FF pop mx, and f voice.

From my SWBC observations on 3/4 and 3/5, TA's were probably to the WCNA, but I was too busy to think straight, and stayed on SW. Didn't even try BCB. On 3/6, I once again heard Andorra on 6.230 for only a few moments around 0745. My December 26 logging of them there yielded me a prompt and proper QSL and personal letter!! Now for a MW QSL! 73's till more TA's or unusual LA or TP's."

Now, what else has been heard. If no credit, item is from Mark Connelly

- 529 -ALGERIA Ain Belda loud w/AA mx, 2332, 3/4.
- 545 -DOMINICA Roseau, R. Jumbo hrd w/"Jumbo" IDs between tunes, 0955, 2/28. (Renfrew)
- 548 -ALGERIA Oran finally hrd w/potent sig w/AA chants 2242 3/4. Local WFIL-560 splash not as bad at my new location. (Eckman) * Noted well w/AA talk, heavy fast SAH present when loop moved to favor more northerly TA paths, 2315, 3/1.
- WEST GERMANY Konigsutter, on top at 0300, 3/7, w/someone just behind, perhaps Kichinov, maybe Ocan - if on then. (Dangerfield)
- 550 -YUKONIA TWK is quite strong at site, NEP w/many IDs as YVKE around 0500. I guess this one will be a post. 2/22. (Clark) (Dangerfield)
- 557 -UNID at 0404, 3/7, but too much WFIL splatter for a reading. My guess is the E. German, for many Germans were being hrd at the time. Seldome hrd freq here.
- 566 -WEST BERLIN Fair sig 0402 on 3/7 w/mx. First sign of this stn since about 1945. (Dangerfield)

04

- 575 -WEST GERMANY Stuttgart stop w/good sig on 3/7 just after 0400. At least two stns in the background. On 3/8 at 0150, the Algerian was practically all alone. (Dangerfield)
- 584 -SPAIN Madrid strong w/lite mx, SAH also 2241 3/4. (Eckman) //(Dangerfield)
- 587 -SAUDI ARABIA This one tentative. Vy strong carrier has been coming thru between 0300 and about 0430 (when fadeout) since first noted on 3/5. So far, only bits of audio logged so can't be sure. Halfway between 584 and 590.
- 593 -WEST GERMANY Frankfurt, strong and clear at 0358 w/EE vocal, (Dream a Little Dream of Me), then the nx. (Dangerfield)
- 638 -CZECHOSLOVAKIA The Prague super power is putting in vy good signals here. The best so far was at 0335 on 3/7. (Dangerfield) //(Eckman)
- SPAIN La Coruna strong w/a in SS 2255 3/4. Not hrd often in last few months.
- SPAIN/UNID SS talk noted w/2nd audio and SAH, 2312, 3/1. (Connolly)
- UNID 0530 6 pipe in the midst of bells and chimes, 3/8. (Renfrew)
- 647 -ENGLAND Daventry. BBC nx in EE hrd 0505 3/7 and 0605 3/8. At times louder than WGN. Country #21. (Renfrew) * Local w/end of nx, into lite mx 2309 2/26. Kint 0409 3/5 w/World Service nx. (Eckman) * Fair o/sains QSN w/cl mx, 2311 3/1. (Connolly)
- 650 -COLOMBIA Bogotá. En. Monserrate ID hrd at 0730, 2/28. WSM off. (Renfrew)
- 655 -EL SALVADOR San Salvador. R. Nacional ID at 0400 in the midst of nx about that days crushed coup. Hrd names that appeared in next days paper. Martial mx in spots. Country #19. (Renfrew)
- 656 -UNID at 0345 on 3/7, but again my guess is the West German. (Dangerfield)
- 665 -PORTUGAL Lisbon vy strong w/"Imagine" by John Lennon 2256 3/4. The FF stns often play good rock mx, hi. (Eckman) * Good w/group vocal //719, WRKO just nulled, 2310, 3/1. (Connolly)
- 674 -HOLLAND Lopik III, would almost have to be the one pla soft, pop orch, mx on the 0345-0400 segment of its 24 hour sked.
- UNID Strong sig w/rock mx 2333 3/4. No annts noted. FF culture was off at 2300 so not them. Is there something new here as Lopik not too possible w/ this type pgm. (Eckman) Lopik is most likely. They have to compete w/Caroline somehow, hi. (ED)
- 699 -DOMINICAN REPUBLIC HICN in Mao is off freq w/their LA mx. Many IDs as R. Mao w/s/off at 2 AM. 2/20. (Clark) They've been here for years - haven't answered a couple of reports of mine. (ED)
- 701 -VENEZUELA YMH R. Popular is on the other side of 700 w/a vy weak WLM trying to make it in. Mx is rock in SS at 0235 2/20. (Clark)
- 719 -PORTUGAL Norte potent w/m in PP 2245 3/4. Virtually no trace of WGN. (Eckman) *Vy good (killing 720) w/FF m voice and soft jazz-style background, then PP talk and a group vocal, 2309, 3/1. (Connolly)
- 728 -EAST GERMANY Berlin to good peaks w/GG verison of Glen Campbell song, 2333, 3/4. (Connolly)
- 737 -SPAIN Barcelona strong and alone on freq 2300 3/4 w/nx by man. (Eckman) * Good w/m in SS, 2308, 3/1. Good w/jazz influenced rock guitar mx, 0019, 3/2.
- 740 -MONTERRAT R. Antilles "rubber bandish" IS hrd at 0926 u/CBNM s/on. Has been louder in the past. 2/28. (Renfrew)
- 746 -UPPER VOLTA Ouagadougou. Another good short log on this one from 2345-2400 on 3/7 (then s/off). Features a lot of soft ballads w/string accompaniment, not the drums and shouting one might be looking for. (Dangerfield) * Fair on w/man in AA, 2245, 3/3. (Connolly)
- 755 -PORTUGAL Lisboa potent w/cl mx 2316 2/26. Also strong 2245 3/4. (Eckman) * Kint (no QRM) w/f in PP, then opera mx, 2307, 3/1. (Connolly)
- 764 -SERBIA Bakar lead w/AA dialogue (religious?) between 2 men, one w/echoey large room acoustic effect on voice, 2306, 3/1. AA talk, like a local on TRV, 2230, 1/3. Good w/a-capella chant, 0040, 3/5.
- 770 -COLOMBIA Bogotá. R. Tequendama IDs hrd between mx selections w/WABC off, 0725, 2/28. (Renfrew)
- 773 -SPAIN Caceres et al strong w/old British rock mx 0205 3/5 holding its own against WABC. (Eckman) Must have been special pgm of some type - normal s/off is 0100. (ED) * Good w/m/f in SS, heave 2.4 hz SAH but too much WABC to extract 2nd audio, 2305, 3/1. (Connolly)
- 780 -COLOMBIA Cali HJZG noted w/WBEM w/frequent mentions of Cali, the usual Cuban had drifted well off to the high side, 0345, 3/4. (Connolly)
- 782 -PORTUGAL Miramar w/local-like sig 0200 3/5 alone on the freq w/time pips and IS. No problems fm the Cuban at approx 784. Nx at 0200 was //665. (Eckman)

- 782 -PORTUGAL/EAST GERMANY Miramar/Burg here w/hig carrier and 3 hz SAH, weak audio, 0001, 3/2. (Connolly) * Burg potent w/f in GG on top of Portugal w/re-sultant SAH, 2321 2/26. Also strong 2300 2/27 w/NA taped - still well atop Miramar's time pipe. However, Burg did not s/off at the time so wonder why the NA was played at this time? (Eckman) 2300 would be midnite in Germany, that's probably why NA played. I've even hrd US stns play SSB at midnite when they weren't signing off. Burg listed as a megawatt here now. (ED)
- 785A -CUBA Camaguey CMJN has been lately noted drifting all over the place w/a rough wobbly carrier; its frequency control has gone berserk, drifting as high as 790, annihilating semi-local WEAN, as hrd 0343, 3/4. This should easily make it across the Atlantic. (Connolly) * Have been hearing a vy distorted R. Bebalde on or about this freq for several nights, sounds almost like side band. IDed at 0500 3/3. (Renfrew)
- 818 -ANDORRA Sud Radio strong as well atop Rabat w/FF pop tune, 2253 2/26. (Eckman)
- MOHOCOD Rabat good o/TV QSN w/a-capella male vocal, 0005, 3/2. (Connolly)
- MOHOCOD/UNID Rabat strong w/AA mx 2304 3/4 w/2nd stn w/also in AA, w/resultant SAH. Egypt supposedly well off freq (measured as 817.5 in Oct. 75) so would assume it's not them unless they've drifted back up to 818. (Eckman)
- 827 -UNID Possibly Spain although not // to 737, 773, 872; cut from Pinkfloyd's "Animals" LP played at 0010 and long live version of "Ridgetop" by Jessi Colin Young, at 0050, 3/2. (Connolly) This stn shouldn't be //737, 773, 872 even if it is Spain. A privately owned stn w/separate pgm. (ED)
- 836 -FRANCE Nancy strong w/f in FF //863 2254 2/26. S/off at 2300. (Eckman)
- 845 -ITALY Roma ridiculously strong 2302 3/4 and various times between 0000-0300 3/5 w/usual nite pgm of lite mx; nx in FF/CG on half hour noted several times as well. (Eckman) * Most probably the one w/multilingual nx (including KE) at 0205 3/3. Still looking for a possible ID. (Renfrew)
- 854 -SPAIN Murcia. Several R. Nacional IDs hrd between 0530 and 0600 3/7. Annts in SS and tune "Cabaret" were hrd. The 6 pipe at 0600 indicated Spain rather than Pers. Country #22. (Renfrew) * Strong w/nx by man 2303 3/4. Mixing w/ 2nd stn all evening (3/5 morning UTC), maybe the V. German? (Eckman) Maybe Bucarest w/extended sked due to earthquakes, if they're on the air. (ED)
- 863 -FRANCE Paris strong w/Pr. Culture pgm 0430 3/5 //1554/1376. (Eckman)
- 872 -SPAIN Zaragoza powerful, o/SAH, w/Moorish SS mx (SS male chanting and steel guitar) //737 and 773, 0023, 3/2. (Connolly) Like 827 this is a privately owned stn and should not be // the RNE outlets. (ED) //(Eckman)
- SPAIN/UNID Zaragoza assumed w/lite mx w/prominent SAH as well 2255 2/26.
- 880 -COLOMBIA R. Bucaramanga hrd at 0735 2/28 during WGN SP. (Renfrew)
- 908 -ENGLAND One of the BBC stns noted here w/strong sig w/a in EE 2327 2/26. No positive ID noted. (Eckman)
- 909 -SPAIN Madrid fair w/cl mx, 0029, 3/2. (Connolly)
- 1043 -EAST GERMANY Dresden, on 3/7, had the nx up to 0310, then a rendition of "Volga Boatmen", w/sig clearer than WHO. (Dangerfield) //(Dangerfield)
- 1088 -UNID BBC or Albania, which one? Had oriental or AA type pgm before and after 0500 on 3/6. Can't find a listing for any such pgm at that hour in WRTVH.
- 1106 -UNID non-stop cl mx, strong, 2318, 3/4. (Connolly) //(Clark)
- 1125 -DOMINICAN REPUBLIC HICN R. Antillas has moved off freq on 2/10 and has not returned to their non 1120 spot. They are vy close to HIRL-1130 in Santiago.
- 1165 -ANTIGUA Haven't ever hrd a peep out of ZDK, but the Caribbean Radio Light-house ID came thru WHAM slop at 0100 3/6 after some gospel mx. (Renfrew)
- 1214 -GREAT BRITAIN BBC fair w/violin mc, 2315, 3/4. (Connolly)
- 1265 -ST KITTS Didn't hear an ID thru adjacent channel noise, but freq and 50 kw power were mentioned quite clearly in EE at 0000 3/6. (Renfrew)
- 1268 -WEST GERMANY DLF Neumunster fair/good w/lite mx 0435 3/5. (Eckman) * Fair, m in GG, 2314, 3/4. (Connolly)
- 1277 -FRANCE (?) Strasbourg perhaps the one occasionally peaking to fair level 0440-0450 3/5 w/what seemed to be FF culture pgm //1376 though not absolutely positive. (Eckman)
- 1320 -DOMINICAN REPUBLIC A new stn on the air not in WRTH-76 in Sabana Grande de Boya, call not known however it is a strong daytimer in Puerto Plata. (Clark)
- 1330 -AUSTRALIA 4BU Bundaberg, Qld., 1035. (Maguire)
- 1358 -JAPAN JOSF good at 1033 2/23. (Maguire)
- EAST GERMANY Berlin fair thru WDRG splatter; talk by man, then jazz, 0347, 3/7. (Connolly)
- 1394 -ALBANIA Lushnje strong w/f in SS 2320 3/4 and again at 2303 3/5. (Eckman) * Strong w/m/f in SS, 2301, 3/3. Loud w/SS talk, 2312, 3/4. (Connolly)

- 1400 -DOMINICAN REPUBLIC HISD is Federnales not on 1310 has in WRTH-76. When RTVD gives out all their freq at s/off. 2/24. (Clark)
- 1403 -GUINEA Conakry fair thru splash w/FF talk, 0037, 3/2; little else in the way of TA's on the high end of the band at this time. (Connelly)
- 1415 -DOMINICAN REPUBLIC Radio Marien in Dajabon is another new stn on the air. Quite good in the daytime w/pop SS mx, also many IDs as Marien thru their mx. Complete ID on the hour. 2/24. (Clark)
- 1439 -LUXEMBOURG Marnach fair/good at times 0238 3/5 w/rock mx, EE DJ, easily split-table fm 1440 domestics. (Eckman)
- 1460 -PUERTO RICO AFON is still the only unlisted stn I get in the daytime w/rock mx at 1600. (Clark)
- 1466 -MONACO Monte Carlo booming in w/vocal mx on car radio 2355, 2/27. Good w/"Trans World Radio, 205 meters" EE ID, 2300, 3/3. (Connelly) * Local-like w/rel pgn in AA 2355 3/4 w/m giving stn address. IS 2359 repeated several times and carrier off. (Eckman)
- 1475 -AUSTRIA Vienna strong w/SS pop mx 2339 3/4 w/deep fades at times. (Eckman)
- 1490 -DOMINICAN REPUBLIC HISD Puerto Plata is a vy strong super pest for me. ID as 1500 khs!! (Clark) / (Clark)
- 1500 -DOMINICAN REPUBLIC HIAF R. Generacion on new freq 2/26 in Moca, ex-1495.
- 1550 -TURKS & CAICOS ISLANDS VSI is a vy strong daytimer o/HIJC in Santiago. I don't see why they wanted this freq w/HIJC quite strong too. They s/on at 1 PM dally and have no spots. Sound like a bootleg radio stn to me. (Clark)
- 1554 -FRANCE Nice poor to fair w/f in FF, 0614, 3/5. (Connelly)
- 1562 -INTERNATIONAL WATERS Caroline or Mi Amigo whichever, had a good sig on 3/6 at 0606, and unless my ears were playing tricks, were announcing in both EE and DD. (Dangerfield) * R. Mi Amigo to good peaks atop low growl; rock mx, 0613, 3/5. (Connelly)
- 1586 -WEST GERMANY Langenberg vy good w/GG mx about Eastern European countries; then uptempo muzak, 0610, 3/5. Good w/rock influenced insts, 0345, 3/7. (Con) * W/local like sig 0612 2/27 w/GG type mx. Also potent at 0445 3/5 w/lite mx.
- 1596 -DOMINICAN REPUBLIC Radio Femina is still off freq after 2 years. / (Eckman) I still think they bought HIPA crystal when they went on the air. Mx is EL, a weak daytimer here. (Clark)
- 1602 -WEST GERMANY BR Munich strong w/m in GG 0408 2/26. WDR-1586 only poor/fair at this time. (Eckman)

One lone verie

- 1330 -AUSTRALIA 4BU Bundaberg, Qald. 2 kw, QSL and letter. G. L. McKennarley, Mgr. Said stn will be using new RCA xmtr w/5 kw in about 2 weeks. (Maguire)
- Almost for gotten department - some longwave loggings from Steve Bohac
- 164 -FRANCE Allouis on 3/4 at 0505 w/fair audio level til 0520 fade, back up to earlier level 0526. Featured FF mx fare w/a sonic m ancr.
- 180 -WEST GERMANY Europa #1, Saarlouis on 3/4 between 0505 and 0520 w/m/f FF vocals. Sig level a bit better than Allouis-164. M whistling at 0517 as part of what appeared to be a commercial of some sort. Sig level nose-dived approx 0520; although much weaker, was still detectable past 0600.
- 251 -ALGERIA Tebessa, 3/4 hrd well w/AA fare and wailing 0506, tho mixed w/beacon "ZV". Sig and audio at ear splitting level for a period of 10 minutes from 0525-0535 completely obliterating the beacon. Checked for Azilal-209; however, nothing noted.

The reporters for this issue

Steve BOHAC - Fairview, New Jersey LW portable w/built in loopstick
 Richard CLARK - Puerto Plata, Dominican Republic SPR-4, HA600A, 4" and 8" loops
 Mark CONNELLY - Arlington, Mass. R390A, TRF, SM-2
 Ben DANGERFIELD - Wallingford, Pa. HQ-180, SM-2
 Richard ECKMAN - Philadelphia, Pa. Modified HQ-180A, Sanserino loop
 Norm MAGUIRE - Honolulu, Hawaii SPR-4, Sanserino loop
 Jim RENFREW - Rochester, New York DX150A, 40' longwire
 Jim YOUNG - Wrightwood, California HQ-180A, 235' Vee

That is all for another week. There is still some good DX to be had - give it a try and let us know what you are hearing. Remember, my final deadline will be 3/18 - after that all material will go to Chuck Hutton. 73 - DX - See you in 7

**DOMESTIC
 DOES NOT EXIST!**

Editor: Eric Rittenhouse
 2315 Dwight Way #101
 Berkeley, CA 94704

Good Evening!

(Never mind that it's really afternoon...). Not your basic biggie column this week; seems that maybe the ionosphere has finally decomposed on us, hi. I've even had to (dare I utter the words?) DX myself, in order to beef this one up a bit. Anyway, on to it, such as it is...

Changes:

600 WICC CT BRIDGEPORT, now on til 0300 wkends only per phone call w/secretary. (KR-CT)
 1340 WRIT WI MILWAUKEE, SP is MM 0100-0600, s/off w/ISSB. (W'ski-WI)
 1530 WJDZ CT BRIDGEPORT, will be on mid-March, probably as you read this; info from phone call w/CE. (KR-CT)

RCs:

Oh come on! I want to see 50 next week, hi.

Tests:

740 KYME ID BOISE, hrd by Starr, Hansch, not hrd by Arruda.
 780 WBBO NC FOREST CITY, hrd by Rychalsky.
 1080 KYMN MN NORTFIELD, hrd by Wessolowski.
 1230 WCWA OH TOLEDO, tent by Hansch, not hrd by Arruda.
 1430 WCMY IL OTTAWA, not hrd by Starr, Arruda, Hansch.

Sunset to Midnight:

730 KWRE MO WARRENTON, 3/2 C&W 1910, then s/off data, ISSB 1912. Distinctive version, last portion is much slower than first part. (W'ski-WI)
 1340 WOYL PA OIL CITY, 3/6 ex WKRZ hrd using new call, also ments of WRJS (their new FM call). Seems now to be mostly T-40, s/off still 0000. (*-Visiting in PA)
 1380 CKPC ON BRANTFORD, 2/23 call letters clear 2300, 2310 but no other audible copy u/WMEE. (W'ski-WI) (W'ski-WI)
 1470 CHOW ON WELAND, 2/28 ID by female 2328 in WMBD null, no sign of usual WCHO. New here--are they now on 2.5kw nite?
 1550 WEVR WI RIVER FALLS, 3/2 ID out of sx 1856, then spot for Northland Ford Dealers. (W'ski-WI)

Midnight to Sunrise:

710 WGBS FL MIAMI, 2/28 tuned in to hear "...ami, Florida" 0117 followed by tone (lower than TT). Direction SE/NW per loop. (W'ski-WI)
 740 KCBS CA SAN FRANCISCO, 3/7 0307 s/off heard. (Ross-WI)
 KBRT CA AVALON, 3/7 0307 "This is KBRT Avalon on the air with a test broadcast". (Ross-WI) How come I never get this one, hi, ECR.

770 KOB NM ALBUQUERQUE, 2/28 during OC on WABC XR tests. Jingle ID "77 K-O-B" 0130 followed by fanfare, then TT from WABC that almost blew my ears off. (W'ski-WI) wanna trade me WABC for KOB? Hi--ECR.

790 CHIC ON BRAMPION, 2/21 now every night, foreign language til 12 midnight. (KR-CT)

WPIC PA SHARON, 3/7 ET/TT 0110+. (*-OH)

860 KONO TX SAN ANTONIO, 3/7 ET/TT/OC 0340-0435 ID+. (*-OH)

900 CHML ON HAMILTON, 3/6 0522 w/CHML-CKDS (Their FM) ID thru partially looped CJVI/KNEW slop. (ECR-CA)

910 CKLY ON LINDSAY, 3/2 s/off 0111 followed by fight between WGBI/WSBA. (KR-CT)

940 WFNC NC FAYETTEVILLE, 3/1 ID out of local nx 0631 followed by spot for Fayetteville Used Auto Parts Assn. (W'ski-WI)

WMIX IL MT VERNON, 3/7 FINALLY w/nx 0401-0403, then mx w/ female announcer. (*-OH)

990 KTKT AZ PUCSON, 3/6 0541-0605, 3 stations mixing it here; one had rr, another seemed to have down MoR, the only IDs I could pull were for KTKT. Assume the rr to be KTKT, any ideas for the other two? Too early for CBW. (ECR)

1050 CFGP AB GRANDE PRAIRIE, 3/5 in all AM w/good sigs o/mess. (ECR)

1080 WKLO KY LOUISVILLE, 3/5 ID 0105 u/WTIC; rr. (KR-CT)

1440 WHIS WV BLUEFIELD, 3/7 ET/TT/MX 0130-0210+. (*-OH)

1450 WNBY MI NEWBERRY, 3/7 unlisted PC/TT 0100-0115. (*-OH)

1460 WAXC NY ROCHESTER, 3/4 fair 0030-0050 w/rr, contest. (KR-CT)

1530 WTHO GA THOMPSON, 3/4 testing to 0005, TT/announcement. (KR)

1590 KVGB KS GREAT BEND, 2/28 s/off data 0012 u/CBS Mystery Theater on WAKR & UnID TTer. (W'ski-WI)

Finis. 24 tips this week; hard to believe I had 150 just a couple of issues ago! Maybe it's bad breath... But I use a leading mouthwash... Regardless, I want to see 150 for next week, or else, hi. Guess everyone's got an early case of Spring Fever, or something... Later...
.....ECR.....

Almost forgot!

RA	RAY ARRUDA	New Bedford, MA	SX122, SM-1
AB	ALPHONSO BEDOYA	Bum Junction, NM	Wired
UF	UNGER FLEEN	Mamaroneck Home for the Puce	
Ross	ROSS HANSCH	Madison, WI	HQ-180, 4' lp
KR	KONSTANTINE RYCHALSKY	Bridgeport, CT	"hi"
*	ASTERISK FUST	Hubbard, OH	RACAL, etc
W'ski	BOB WESSOLOWSKI	Milwaukee, WI	Philco, 4' lp
ECR	Grand Poohba, Kentucky	Derby Ecumenical Society....	

Eric

musings of the members

editor: Ernest R. Cooper

5 Anthony St.

Provincetown, MA. 02857

The opinions expressed in this column are those of the individual members, and do not necessarily reflect those of the editors, the publishers, or the National Radio Club.

SKIP LABELSTEIN - 8209 West 78th Street - Overland Park, KS - 66204

The month of February ended pretty well for this DXer as I received a v/1 from fellow NRCer Chris Bobbitt of WKXO for mh #1,900. Other veries since last Muse have been v/ls from KSYM-1370, WVOV-1000, KALT-900, KHIL-1250, KNED-1150, WDUZ-1400. v/f from WDOC-1310 & v/r from KGIA-1110, WBLO-1470 & WSFC-1240. DX since last Muse has been the following: 1/31- WTMA-1250 Charleston SC IDing for ET @ 2 just prior to the very good KHIL TEST. Later on, KGFF Shawnee, OK s/off @ 11:59pm. 2/5 brought r/c-TT from WDOC-1310 Prestonburg, KY. On 2/11 I finally got enough on WBLO-1470 Evergreen, AL during their r/c-DT for a report. Unlisted f/c-TT from KGRN-1410 Grinnell, IA on 2/12 @ 6:35 (thanks, Neil). 2/14- WKXO-1500 o/u KSTP on TEST. 2/18 brought my kind of f/c from WYHI-1570 Fernandina Beach FL during their r/c w/IDS EVERY MINUTE! Finally, the WDUZ-1400 TEST was heard here fair on 2/21. Totals now at 2,036 logged and 1,902 verified. A belated welcome to Murray Mann back into NRC. It was he who got me interested in ECB DXing back in 1959 when my family moved across the street from his. As for the Convention, we are trying to line up as a speaker, the attorney representing the Superpower Broadcasters, Rufus Dazmone, from the firm of Dewey, Cheetum and Howe. 73s till next time and good DX.

CONRAD R. DUROCHER - 437 Essex Street - Saugus, MA - 01906

Happy St. Pat's everyone! Well, the knocked-down LW is still embedded in ice & I may have come up with a new design as the DX keeps coming in. How about a short beverage on the rocks? Anyway, on 2/10 R. Tiempo-1200 was blasting in @ S-9 around 6:30pm. Sounds like SS T-40, screaming DJ's and all. At 7, Antigua-1165 was S-9 plus 10 and I almost mistook it for WWVA. 2/16- On 1000, still looking for WRNJ's s/off u/local WLMS, I did catch WHWB VT w/NX till 5:30pm. At 6 on 1466, Monaco changed from FF to EE "This is Monte Carlo", folo by announcer of TWR. Does Manaco relay Nederland? Same ID @ 6:30, and to SS. Heavy flutter signals on 2/28 & 3/1. But would AU bring in CFCY-PEI on 630 wiping out usually strong WPRO @ 1:40am? See y'all next trip.

TEX STOUT - 9720 Thor Avenue - Louisville, KY - 40229

I have just joined the NRC & this is my first Muse. I am 19 years old & have been DXing for about five years. I started keeping a log of my AM DX in 1974 along with my SW loggings. I enjoy AM DXing the most but also DX SW & TV. I have logged 380 stations from 33 states, four provinces, & 14 countries including one TA; Algeria-529 which just really IDed here yesterday, although I have heard what I thought was this station before. I use a DX-150B w/a 120' LW stretching in the E/W direction, & a 65' LW stretching from NW to SE. The latter is a new antenna which has really been bringing in results. New loggings from here include: 2/24- WOOF-560 6:30pm w/s/off; WGOK-900 6:42 s/off 6:45; WWUN-1590 6:55pm, WDOC-1300 10:39pm w/rr, on 2/26. WNLA-1380 7am; WJRL-1530 7:07 w/c/w. 2/28- TILX-725 "R. Columbia" @ midnight s/off. WONE-980 3:46pm w/QRM from WAVE; WJKY-1060 3:56pm; WCBR-1110 4:08; Algeria-529 7:49pm w/AA mx. I've really had a lot of time to DX lately & have been at the controls almost 24 hours a day on some days. I have logged 23 new ones since 2/13. F/c list has helped in logging WCAZ, WANY, WOIC, WGOE, WLSM, KLTII. 73s. (Welcome to the NRC, Tex! We hope you will Muse often! Where were you when we had our 1976 Convention in your city? -ERC)

RANDY TOMER - Route 2 - Box 177 - Sonora, CA - 95370

The Yaesu FRG-7 issue is starting to get pretty interesting. As an owner of both the Yaesu and an HQ-180 to compare it with, I'll throw in my 2¢ worth. I could either totally praise my FRG-7 or verbally tear it to pieces, depending on what factors I felt were most important. If I was feeling ornery enough, I could even criticize my HQ-180. One thing is for certain, if you're a serious DXer & are planning to buy the FRG-7, you should definitely also plan on making a selectivity modification to it. Also, its pre-selector control must be tuned carefully to avoid spurs. Other than that it seems to be a good RX, and it definitely has the necessary sensitivity. 300 bucks is a lot of dough. If you are making the move from a simple RX to a fancy one and portability is not necessary, my opinion is that the HQ-180 is the only way to go, & you can get one for the same price as the "frog"; it just takes a little time & patience to locate one. The main reason I got the FRG-7 was to use as a traveling RX & with its built-in speaker & D-cell operation it works out great. Because of its battery operation, the FRG-7 saved an MM DX session for me when a storm knocked the power out, right when CX were getting good. One criticism I have is the Yaesu's black main dial w/close-together white markings. If you are losing your eyesight, this dial won't do you any good at all. At BCB frequencies the HQ-180 dial readout is totally superior. I am happy with my FRG-7, but I also think the "old-fashioned" tube RXs have an awful lot to say for themselves, and can be had for the same price or even less. 73s from Sonora.

JAMES E. CRITCHETT - 1635 Walbridge Street - Red Bluff, GA - 96080

From 2/24-28 the following items of possible interest to the other DXers were noted. Thurs. 2/24 @ 10am EST on 910, KURY, Curry County, OR, Brookings, was heard, finally. (Not a pleasure enduring KNEW from 9:32). Same morning @ 10:32 on 970, KREM IDed u/KOIN/KBEE. KCHV mentioned Idaho, but not IDed yet. Fri. 2/25 @ 8:15pm on 1310, KNPT, Newport, OR IDed at the end of their NX. (KLIX, Twin Falls, ID there @ 7:45). Sat. 2/26 @ 4:37 on 1440, CFCP, Courtenay, BC said "Mx all weekend long", also @ 4:53, so not off @ 3 & 4 weekends. (Same morning @ 10:11am on 1430, KALI IDed as the SS, no KNTA yet. At 8:18pm, KCHJ -1010, Delano IDed. SM 2/27, while trying for KMWX-1460 u/KDON, I heard instead KYSN, Colorado Springs @ 6:07am. At 6:10 it was KENO; no KMWX yet. MM 2/28 was a 1230k morning. At 2:55 KGEE, Bakersfield, IDed; KRDG, Redding went off @ 3, folo @ 3:02 by KNG, Stockton. KYJO, Medford OR gave the TX & IDed @ 3:25; not off yet. At 3:30 the TEST from KAAA-1230 was IDed by code & voice, coordinated with the NRC, on top of KGEE until 4:01 s/off w/code. At 4:07 KLAV, Las Vegas, IDed at the end of the NX. At 4:16 KRDR-1230, Gresham, OR IDed at end of USAF recruiting program. At 4:39 on 1520, KYXI IDed, o/a music station, unID. Too much HJAQ & KOMO for 1ZD @ 5. XEHL-1010 ID @ 5:30, & w/CFRB, no KLRA was heard, if on then. There was an SSB on 1530 @ 6, but faded u/WCKY CBS NX. Six new stations in one night. At 11:08 on 1430, KGAY, Salem, OR, IDed u/KARM/KJAY religion. KGAY was #456. Keep trying, they are there - and report to MUSINGS! 73s.

BOB WESSOLOWSKI - 1933 South 33 Street - Milwaukee, WI - 53215

(The Polack with the Pabst & Philco). Back in one of my first Muses, I asked what a PoP was. Well, I found out Sat. 2/5 - it's boring! Sure was nice logging newie WEYY-1580, but I wish I could have done it without listening to two hours (2:05-4:05) of assorted TTs OCs & unIDs from WCLS & KLOU. Could someone please tell me what a PoP is needed for? Also, at the end they played two c/w songs. I thought daytimers couldn't do that on checks & TESTs & such. Sure were a lot of checks of one sort or another going on that night (2/5). Between 3 & 3:30, I heard TTs on 1440, 1460, 1480, 1570, 1590 & 1600. I didn't hang around any of 'em long enough to get an ID 'cause I wanted to be sure I bagged my 1580. Other recent stuff: Tentative KVGB-1590 s/off 12:14am

(Wessolowski) 1/24, but too weak to be sure. WAKR's a pest here, & my loop doesn't null well on the upper end. WXIT-1490 (WV) in for a quick location ID 3:30 1/29, a nice surprise. WLTD-1590 (LTD for Limited range, no doubt, h1) s/off 5:46pm 1/29, mentions "The Sound of the Shore". 1/31 brought in WRBJ's TEST; report sent 2/1 & verie received today, 2/7. That must be record time! I still haven't received a verie from WIQT-TEST; has anyone? UnID TTer w/possible CW IDs on 1400 2/5 1:21-1:31 (first Sat.) Maybe a f/c, not in the list. Antenna direction, E/W. 'Tis time to depart again with my same question "WWWR?" "Why Won't Wisconsinites Rite?" (Again, your editor must apologize for a missed report - this should have been two issues ago - it got put aside apparently because it contained a tip I needed myself -ERC). Now, for Bob's current Muse:

BOB WESSOLOWSKI - 1933 South 33rd Street - Milwaukee, WI - 53215

I got the KYMN TEST 2/21 rather clearly, about even w/WTIC. Makes me wonder how come I never pulled it in at SSS. I have been trying to snag WWQM-1550 from Madison (about 80 miles) for a couple of weeks, and can't do it. I'm pretty sure I got them 2/19 late morning, 'cause I heard several Oldies rock, but couldn't make out any IDs. It's aggravating not to be able to pull a 5kw-er within a hundred miles, especially since I got WEVR-1550 from River Falls, this afternoon @ 6:56 & they're only 1kw. Other new stuff includes KCBS-740 @ 2:06am 2/20 w/ID by woman out of NX. I had unID TTer on 1590 from 12:06-12:18 AM ON 2/28, antenna E/W, no IDs heard. I think I may have snagged WKIS-740 2/28 @ 1:36am w/WX mentioning the temperature at Daytona Beach. I thought I finally had the WLDY-1340 r/c @ 1:52am 2/28. I heard TT then, but the direction was WW/NE and Ladysmith is NW of here. Does anyone know if WIXZ has NBC NX @ midnight? I heard the NBC tones E/W on 1360 @ 12 2/23-24 & the only 1360 NBCer is WIXZ per our Log. I got up early Tues. 3/1 & added WFNC-940, WTHM-1530 & WSAU-550 to my log. I had to null the slop from WIND-560 Chicago to get WSAU. Also a tentative on WCGO-1600. Listening @ SSS 3/2 got me WEVR-1550 & KWRE-730 around 7. At 7:27 I got some foreign (SS I think) yak on 790 with the antenna E/W, but too weak @ 7:30 to make out ID. Who is this? Question: Could someone give me the call of one or two of the strong Canadians who s/off w/O Canada? I've heard this anthem mentioned many times, & I don't know if I've heard it or not. I've got to say it again - there are 15 other Wisconsin NRCers. There are NO other Wisconsin Musers. Someone else from Wisconsin please write!

STEPHEN FRANCIS - 1629 Lodge Street - Alcoa, TN - 37701

If tennis pro Dr. Renee Richards was a DXer, would she have to start verifying everything all over again? MM 2/14- CKAP-580 Ont. finally IDed as the one w/non-stop EZL instrumentals; they're in most MMs nearly alone on channel. A taped "CKAP, 580" about every 20 minutes is apparently their only ED AN. 2/17- Montserrat-930 fair/good u/WGNT w/ that same IS 740 uses to s/on by carib-accented male @ 4:25. MM 2/21- KXEO-1340 MO w/ID on r/c 1:20am u/local WKGN. WFSO-570 strong w/ID 3:34 on ET/TT/OC for long-awaited FL #100 - they'd been in the 90's here since 6/75! WMRN-1490 OH good w/detailed ET ID 4:01 during what I thought was a rare SP of local WKVQ. Turns out it was actually the first night of their new 5:00 to 12:06 sked, after being NSP for as long as I can remember. I thought these things only happened in other markets, hi. 2/26- WYTL-1490 WI fair w/c/w & female DJ 3:41. MM 2/28- WBCB-1490 PA weak @ 1:50 w/ID on r/c. 3/2- WARK-1490 MD fair w/ID & OBS NX @ 2. 3/4- WSIB-1490 SC strong 1:28 w/rr. With April almost here, it's a good time to remind SRS fans that many daytimers in the East will be signing on w/full power as early as 5:15, 5:30 or 5:45, depending on which time their LSR is. Noted here in the past have been WPGC/WHEX/WZKY-1580, WTRQ-1560, WRCP/WARD-1540, WADR-1480, WKMG-1370, WHLW-1170 (first SM during WWVA's 4-6am SP), WWOL-1120, WCMS-1050, WLIB-1190, WSVS-800 & WPIT-730. There's bound to be some in New England too, but I've never heard any or noticed one reported in recent years. WJBQ-1440, WEXT-1550 & WILD-1090 were reported in the early 70's, though. Give it a try again in June since DST s/on times will be roughly the same as Aprk1's. 73.

MICHAEL COUGHLIN - 17 Bellis Circle - Cambridge, MA - 02140

This weekend I bought a Realistic Long Range AM radio (with TRF) & heard Ain-Beida-529, Algeria the first night. Everything else was anti-climatic. Algeria comes in right after SSS & can still be heard @ 10-11pm although beacon QRM gets worse as time gets later. I have heard it three nights in a row so far, March 5, 6, & 7. Programming is in Arabic with very pleasant musical selections; of course, Arabic singing does take a bit of getting used to. As for the RX, it performs very well for a broadcast radio. Tuning is smooth with no backlash, & the high end of the band is spread out with a straight line frequency characteristic. The bottom of the band has a straight line wavelength characteristic. As for a DX RX, it has the disadvantage of poor skirt selectivity and shallow nulls in the loop pattern. Everybody complains about the lack of selectivity in their less than \$500 receivers; however, there is little said about the fact that for AM reception we need good selectivity at 60 DB down which we get by having lots of tuned circuits in the IF. These can either be the 6 to 10 or so elements in a mechanical filter (or in a ceramic ladder filter) or even lots of 455 kHz IF transformers. So when the manufacturer says his RX has a 6 or 4k selectivity, we are not getting the whole scoop. Don't be impressed with a receiver unless it has selectivity of 8 to 12k at 60 DB down with 5k at 6DB down. The Realistic Long Range AM radio has one IF transformer & one ceramic filter, so it's no surprise that selectivity is not enough for split channels. What would it do if it had three ceramic IF filters? An interesting experiment is to hook up this RX to your hi-fi. Sub-audible heterodynes become audible in the deep bass and you can hear all sorts of fantastic hets and thumps on weak stations. You get good audio on strong stations, little or no distortion, and hi fidelity except for the missing high audio frequencies.

DAVE SCHMIDT - 42 Chelwynne Road - Castle Hills - New Castle, DE - 19720

Here's a few lines for the Captain of the Keys! First, the following veries were added: WJZZ-1260, WKDE-1000, WKXO-1500-TEST (thanks, Chris!) all v/1. V/f's from WGSB-740, WHPA-1340, WIVS-850-TEST & WWWD-1240. Total: 865. Heard and reported: 2/23- CHIC-790 1:12-1:25am w/AN show, first time using the recorder/RX on the timer. 2/24- WBLT-1350 5:55-5:59pm s/off. 2/27- WWSBA/WRNL both off, WGAF on top w/NEC NX and Drake automated rr, 3:59-4:15am. With my fingers crossed, a f/up went to WCBG-1590. To help keep your log updated a bit, WGAL-1490 is now using the calls of WDDL, still MoR. WFEC-1400 is now running a modern c/w format, with signs all over Harrisburg for "WFEC Country." I understand they're supposed to change calls also. I, also, miss the "Changes" section that Wes ran in DXDD; any of our radio station employee members who may be able to get that stuff from Broadcasting! Welcome to new member Allen Luckey, turns out he lives about three blocks away! First person to hear WWWD in Bradford, MA wins a case of Dr. Pepper! Til next time, 73s

RICHARD CLARK - Avenida 27 de Febrero #23 - Puerto Plata, Dominican Rep.

Well, after quite a while I better dosome Musing to let everybody know I am still around. First of all we moved from El Paso, TX to Dominican Republic in November, but however the moving company took about three months just to get here. We now have a place in Puerto Plata & all my antennas are up to do DXing again. My wife Esperanza (also a DX'er too) has been trying to find the ideal DX area in this country & we have found it in La Vega as being ideal, only to have 10kw HLDV-590 only less than 1/2 mile from me. Anyway you look at it, it still is the ideal area for DX. I hope to buy land there so I could build a house in this place. So for now I am living in Puerto Plata, in which is really nice & HOT!! Cesar Objio from Sto Domingo is coming up for a big DX weekend of 4/3 at my house. We get VSI very strong w/s/on @ 1pm daily. Their power is 1kw. (Frequency?? -ERC) Also a very strong AFCC-1460 from Puerto Rico (not listed in WRTH) -WIOD-610 & WGRS-710 are datimers here. Local HISD stations on the air. One is R. Boya-1320 in Sabana Grande de Boya, and R.

(Clark) Marien-1415 in Dajabon. Also HISD in Pedernales is 1400, not 1310 in WRTH. Also I must say that R. St. Vincent is not a new station! It has been on for a few years and very strong here. I have a very strong FF on 1403 that I haven't IDed yet. I guess it is Africa from its mx format. TAs are very strong so I have quite a bit of DXing until I know what stations are what. I must say I sure missed my Mexican stations! I had! How about XEJ-970 here we need it. Great station! I love ranchera mx! For now, 73s. (Good luck in your new country, Richard, but please Double-Space us more!-ERC)

JEFFREY KAY - 12 Peveril Hill South - Toronto, Ontario - M6C 3A8

The DX bug has bitten again. The TRF is pulling in many stations that I had never been able to hear on my other RXes. Many distant clear channel stations can be listened to almost static-free. To DX: 2/7- WQXI-790 in very faint w/local CHIC off. 2/13- TEST of WNRI-1380- heard, this TEST points out the great advantage of IDs in Morse Code. The code IDs were clear and easily copied, the VIDS were almost unreadable. Let's have more TESTs with CIDs! 2/14- WIVS-850-TEST only CIDs heard from this station. The night of 2/19-20 was the best Canadian night in a long time. At 10pm CBF-690 finally was pulled out from u/GFTR-680 slop. At 1:49am "Winnipeg's Friendly Giant" CKY-580 heard. At 2, CBK-540 w/CBC NX, moving further West, CFAC-960 w/c/w "Music City CFAC". I tried for several stations in BC this night with success. CFAC & CBK represent two new provinces heard. 2/21, another successful night: KNX-1070 & WMBD-1470 heard briefly, WBBO-780-TEST w/march mx heard well w/WBEM & unID SS. Veries have been arriving in bunches here. Within 1 1/2 weeks ten veries arrived, among them my first two V/PP/c's from WDXR-1560 & KFVS-960. KFVS also sent a very large CM. V/1 from CKEY-590 after a wait of 11 months. All verie info will appear in v/s column. Contrary to pupular belief, DXing does NOT give you warts, hi! 73s.

ERIC FADER - 23-35 Bell Boulevard - Bayside, NY - 11360

Hi all. Another March Musing from the Duke of Drivel. SM 2/6- WGSB-970 duly noted on top in NNIS RS, 2:35. I tried for the Cuban 1180 ticker, but only local spurs and esad air were in evidence. I tried again for a positive ID on the 860 Brazilian creature, but they were extremely weak w/EZ & vocals. The only newie of the morning was long-tried, never-before-heard CHIC-790, topping the channel w/AM-FM IDs. The FM sounded like CFMY-FM?? They were running MoR & oldies, very low-key like an FM progressive DJ. Excellent signal, into ad @ 2:48am. Only one AT-40 add-on: KODY-1240 NE. Thatzall. 73s.

MICHAEL L. HOGAN - 9224 Cottage Grove Avenue - Highland, IN - 46322

My fellow DXers, the night of 3/6 & the early AM of 3/7 turned out to be very exciting, because I think I have now set a World DX Record in the number of TTs I have not IDed on consecutive MMs: 3 1/2 hours, yes, count 'em, 3 1/2 of listening to those musical devils that we call TT & not one ID from any of those! A musical symphony, for a DXer's sympathy, hi! Also it looks like another nighttime DX frequency is shot for me as it appears CEO-920 is now w/50kw, for a while I only had to contend w/CKCY, but now both these stations are burning up the wavelengths.73

GEOFFREY L. PARRISH says:

We are sorry to inform you that the sked TEST from WCMY-1430, Ottawa, IL was not aired as sked on Mon. 3/7/77. Mr. Delner J. Dayton, CE, was unable to perform the TEST at that time due to illness. However, WCMY has re-sked the TEST for MM 3/28, again from 2-3am EST. All programming details & info remain the same. WCMY operates on 1430k w/a power of 500w non-directional. This TEST will be simulcast on WRKX-FM-95.3m, which operates w/a power of 3,000w. We regret any inconvenience this may have caused you and we hope that you and your Club members will again listen for WCMY on the new TEST date.

WE'RE NOT SURE OF OUR NEXT DEADLINE DATE, SO GET THOSE MUSINGS IN NOW!

"CONCERNING CONVENTIONS OF CERTAIN DIMENSIONS"
(from the 10/22/60 DX NEWS, written shortly after the WHITE PLAINS Convention)

The citizens were quite confused - And then the winds began to blow -
We didn't hold a parade The quietude had ceased!
Conventioners were never boozed
Nor jailed in any raid. 4
Twenty-five men in a bedroom
Are too many by a far
We gained the name around the town There was simply never the headroom
Of being quiet folks For the corwed who'd made it a bar
In public spots we didn't clown
Nor make with noisy jokes. 5
White Plains today is unlitteed
We left it in usable shape
The Roger Smith was quiet If anyone there is embittered
So the staff was really pleased
Complaints are submitted on tape.
next week - ????

TO REMIND YOU OF THE GET-TOGETHER IN PROVINCETOWN ON SATURDAY, APRIL 2, from 11 a.m. to 6 p.m. We're hoping for a large turnout of DXers from the area. Everyone is invited. We're asking a \$2 donation towards the refreshments, please. Let ERC know if you're coming, either by mail, or by calling 617-487-9337. Talk DX, have some fun, and have a scenic drive through Cape Cod in the early days of Spring!

ERNIE COOPER - The Cape Tip DXer - 5 Anthony Street - Provincetown 02657
We've had recent enjoyable phone calls from Paul Mount and Stan Moss - and one v/l-GM from WBBO-TEST who received 29 reports on the TEST. I've seen several members mention hearing WBBO's TEST and whose names are NOT on the list of reporters - please, members, let the TESTING station know you heard them or tuned for them - they think that only 29 listened! Even if you don't collect veries, at least send the station a note you heard them and thank them for their courtesy to us DXers - that's not much to ask now, is it? Verie count: 4,031. The Bohac-NRC 4' aktaz loop is now A-OK in 100% working order and pulling 'em in, to wit: 3/3-WKBW, WCKY off again! UNID TT-1360 @ 12:56 & one on 1500 same time, but let's till at least 2:17 bedtime. The Cuban who battled WBBO's test is off 780 now, about 785 today - too bad he didn't drift earlier. Unn WFBC topping 1330 today, 2:10. Oops- another fine phone-in, from Frank Dailey. Sat 3/5- ET/rr on 1550 @ 1:15, ID sounded like WILU??? TT-1500 again, N/S, 1:32-2:17 & on. SM 3/6- WKBW maintaining silence again. FFG-1290 on top briefly @ 4:38, then quickly died, no report. No sign of WYWY-950 r/c. MM 3/7- Tentative on WCWA-1230-TEST, many TTs but no IDs noted here, 1:11-1:51. Needed WNDE-1260 in/out u/WEZE all AM till surprise (to me) s/off @ 4, to return at 5! No sign of WCMY-1430-TEST here. Preaching on 1520 landed me my second Toledo catch of the day & completes that city for me; So, three new ones for reports today, WCWA-1230 WGOR-1520 & WNDE-1260. UNID SS-1560 which seems to s/on @ 4 noted @ 4:03 with sermonette to 4:15 then talk - we'll try again next week, & be there at "the grand opening". 3/8- Unn WVAM-1430 on r/c-TT 1-1:08. UNID TT-1490 1:07-1:17. KAAA-1560 noted again, & surprise again, they s/off @ 1:59am w/f announcer. Newie WGEE-1360 pushing through WDRG-rr 2:02-3:06am for a report. 3/9- Tester w/rr, OC & TT on 1580 1:03-2:35 & on with no announcer. Unn but rare KPMC -1560 topping KAAA/Cuba today @ 1:55! UNID TT-1320 2:05-2:10, one u/KYW-1060 w/no sign of the Frenchie @ 2:10, and still another on 1470 2:39-3 & on, none IDed, of course. 3/11- TT-1600 while looking for WQCK 1:30-1:45 f/c @ 1:31, but only on 30 seconds & too loud for them. TT also on 1590 1:34-1:44, and one on 1330 2:34-2:47. I can't tune the NRC HAM NET for 1 sleep 8pm-lam Sundays prior to my MM DX session. Others do, too! CUN7.

dxchange



R. J. Edmunds
P.O. Box 127
Boonton, N.J. 07005

Welcome to still another edition of DXChange. Again, we suggest you note the comments about other publications featuring this type of material if you don't find it here. See issue # 19 for this info.

WANTED

Reel-to-reel tape recorder - mono only - for DX monitoring use. Good working condition, please. (Bob Hoffman, 507 Woods Edge, Weikel Rd., Lansdale, PA 19446; (215) 855-6501)

Airchecks (no DX airchecks, please!) of major and secondary market stations (top 40, contemp., MoR & AOR only) in the US and Canada. Cassette or reel-to-reel, full-length (no telescoped airchecks). Will exchange for airchecks of Chicago area stations. If you can run them, but wish reimbursement for tape, I'll send tape. FM airchecks also appreciated, same formats, as above. (Tim Benko, 2748 179th St., Lansing, IL 60438)

Old radio programs for sale or trade. (Yours for mine.) Send list of programs available. (Donald E. Birch, 4420 N. Newland Blvd., Tucson, AZ 85705)

Any 1930's radios by E. H. Scott, preferably Philharmonic models. (30 tubes, 2 chassis, chrome plated.) Will buy, or trade for communications receiver. (Dick Nelson, 3470 Travis Ave., Simi Valley, CA 93063)

Hellierafters SK-42, SK-62, or SK-62A in good working condition. (RJE % Box 127, Boonton, NJ 07005)

NRC HAM OPS. INFO: For NRC Ham List. If you haven't sent yours, send it now. Copies of the list available for \$ASE (RJE)

IS THERE A LIBRARIAN IN THE HOUSE ??? If we have a librarian somewhere within the NRC, would you please contact me a.s.s.p. !! (RJE)

FOR SALE

(receivers)

Drake SPR-4, mint condition, 1 1/2 yrs. old, w/ xtals for amateur bands & SCC-4 calibrator, with SM-1 antenna. Best offer. (J.M. Ross, O. D., Hunter Hills, Apt. F9, Flemington, NJ 08822 (201)-782-0316).

Hammerlund HQ-180, exc. cond., plastic clock cover missing. \$285 firm. (Charles Zipser, % Courtney Look & Hardware Co., 2242 Jerome Ave., Bronx, NY 10453 - ph. weekdays: (212)-733-1262 or 1263. Nights and weekends: (914)-636-8123.)

Wards Airline AM-FM, vintage 1955-60, Modl 35WG-1570B; Good on both AM & FM for DX. Needs minor work on FM, \$20 + shipping or best offer (RJE)

(antennas)

NRC 4' FET alt. simuth loop. Wound w/ #12 wire, w/ brass, threaded base. Perfect ex - is too big for the shack. \$55. (Zipser)

SM-2. 2 months old. \$45. (Zipser)

(ham gear)

National NGI-500; 80-10 meter transceiver. PEP- 500w., SSB, CW. W/homebrew PS. \$200. (Page Taylor, Box 282, Butler, NJ 07405)

(accessories)

Amper Micro 88 cassette recorder. 8 watts per channel, self-contained. \$100 (Taylor)

(miscellaneous)

Radio Shack Mod. 15-1699 FM antenna. Exc. cx. \$5.75 post. incl. in US. Add 50¢ to Canada. Prefer postal Money Order in US funds. (Albert Lobel, 10514 Caminito Baywood, San Diego, CA 92126)

METERS: USAF Autopilot A5 Panel Mount DC Voltmeter, 0-130v, \$4; Westinghouse #516583 portable 2-scale voltmeter, 0-50 and 0-250 VDC - \$5; Micronta 0-15 VDC panel-mount never used \$3. (RJE)

Transformers: 2) 8, 16 ohm to 25, 70 v. line transformers for PA, multi-speaker use. New. List \$6 ea., yours for \$2 ea. ; 115vac to 7.4, 5.3 and 750 CT \$3. (RJE)

FET LOOP Q-gain pot: Mallory Midgetrol #U-55; \$3. (RJE)

Sprague "Filterol" Line Filter. \$3 (RJE)

CAPACITORS, RESISTORS: Many values, most new or slightly used. Medium quantities of common values, fewer of others. Resistors 5¢ ea., 25¢/1; Capacitors: Disc - 10¢ ea., tubular - 15¢ ea., electrolytic (single-section only) - 25¢ ea. Send list of needs and SASE. (RJE)

NEW 1977 WRTH's . \$8 postpaid book rate. extra copies at same address, \$7. Delivery will vary w/ availability. Send SASE for confirmation w/ check or money order. (Donald Erickson, 6059 Essex St., Riverside, CA 92504)

OLD RUBBER STAMPS. Does anybody out there have the facilities to use old rubber stamp blocks and handles to make new ones ?? If so, make offer. Various sizes. Several available. (RJE)

FOR TRADE OR SALE:

Atwater Kent Model 35, ser. 982881, good cx; Atwater Kent Model 41, ser. 1564784, v. good cx; Atwater Kent Model 42, ser. unr., poor cx; Unknown make and model 4-tube battery-operated radio w/ spkr, about 1925 vintage, good cx.; Temple dynamic speaker, Model 14, fair condition; Operadio 6 tube battery-operated radio w/ built-in spkr., good cx, sht. 1925 vint.; batch of tubes for the above; All but Operadio had tubes pulled, don't know what went where. Depending on value will trade all or part for HQ-180A or better. Prepaid calls or letters welcome. (Len Gaska, 1723 W. 9th St., Pomona, CA 91766. 714-622-1473 evenings or 714-629-5111 ext. 4838 days.)

SERVICES:

Receiver alignments/repairs on Hammarlund equipment. Also repairs and alignment of FET Loop amplifiers. (Steve Bohac, 97 Shaler Ave., Fairview, NJ 07022)

Well, that wraps up another one. Next issue in 3-4 issues. We will run new items, and only those previously-run items for which we receive notification to re-run. We had hoped to run all ads 2-3x, but volume at present prohibits it unless we are sure the offers still stand. -

73's RJE

R. J. Edmunds

If you're the type of DX'er who never expects to go beyond his current receiver, and has no accessories aside from headphones and maybe a tape recorder, then this article isn't for you. If, on the other hand, you're the proud possessor of two receivers, or perhaps an audio filter or two, and perhaps two tape recorders; or even if those accessories in multitude are still in the planning stages, then pay attention.

Many DX'ers who have equipment which dictates that certain segments of the receiving system be interchanged with others, or who have one piece of equipment of one type, but it must be used with two of everything else, will appreciate the need for an effective means of interfacing their equipment in such a manner that quick changes can be achieved while still affording maximum versatility. Many years ago, I developed such a system out of necessity, and never thought another thing of it until I began to realize that many DX'ers hadn't done the same thing, and that some of them were interested in the idea.

My first such device was a combination antenna tuner and switcher, first built back in 1963. The basic tuner circuitry is contained in a prior article entitled "Antenna Tuning Devices for Longwires on the MW ECB" contained in the NRC Receiver Reference Manual. At the time, I had three longwires strung, each favoring a different direction. The initial attempt proved quite unsatisfactory, inasmuch as I simply employed a switch for this purpose. I soon discovered what many DX'ers already know: that antennae will radiate the received signals, which can be picked up by nearby antennae or their lead-ins. This was ultimately solved with a minibox with three plugs for the three lines available to be plugged into any of three jacks. This allowed for selection of any one, two or all three antennae at a given time. The inputs of the three antennae were not phased one to another in any way, as I might be inclined to do now, but rather directly connected to the same tuning circuit. The unused lead-in (s) would be kept as far away as possible from the connexions in use.

This setup endured for the entire time I lived in that location with no modification whatever. Many DX'ers who have both longwire and loop antennae use a similar arrangement to switch between the two. Generally, loop circuitry being as sensitive as it is, great care must be exercised to keep the loop shielded from the lead-in from the longwire, and this is best done through the use of jacks and plugs instead of, or in addition to, switches.

Another interface device which I put into use fairly early on was patterned after commercial units designed for home workshop use. This was a switchable power console. Since a DX'er never has enough electrical outlets to suit his needs unless he installs them especially for that purpose, I decided to do it once, and never have to worry about it again no matter how many times I'd move, by making it portable. While I could have bought one of the commercial units (even though the cost would have been somewhat more than the cost of my console), the main reason I didn't was a feature which I wanted which couldn't be bought, namely, the incorporation of a clock-timer device for remote warm-up of equipment, or for remote taping of DX TESTS when not at home, or when asleep. Thus, I procured a minibox large enough to accommodate six console-mount AC receptacles on one side, and six toggle switches on the other, then procured those parts, and set to work. By using the DPDT toggles, one side of each switch may be wired to a line going to the power from the source, while the other side of the switch could be wired to the timed source. The center poles of the switches were tied to the receptacles at the rear of the box.

Six outlets seemed to be sufficient for anything I could conceive of wanting to run through the timer, and has proved to be adequate. Currently, I run the receivers (2), a tape recorder (stereo, serving the two receivers), the audio filter, shack lamp, and spectrum analyser through it. The latter three are really never put on the timer, and so are run there simply for the convenience of having all the wires in one place. When the toggles are up, the plugs are directly powered, and when down, they are powered through the timer. A second timer can be employed with the taper switch in the "direct" position to warm up the rig (and, if necessary, both rigs) at one time, and the taper at another. With either a solid state rig, or with one with a predictable amount of drift in frequency over a given period of time, this will present no problems. If your receiver is prone to drift for hours, then you'll have to let it run on "direct" all night to insure that it stays where you want it. My HQ-150 needs at least six hours of warmup time before it can be set on a frequency and be expected to stay there for another six. This, by the way, is an unusual case, and indicates that the receiver needs to be serviced. I just don't care to take the rig out of the line during the DX season for the time it takes to fix it

In a similar manner, two tape recorders may be used with as many receivers, and set for different times. The second taper should be powered on "direct", and a second timer device used between the console and the taper. Further still, the DX'er may want to really get tricky, and install two timers in series, one set to turn on the equipment as desired, and the other to turn it off again at some time later. Some timers incorporate the capacity to do both in one unit, while others will do either-or, and still others will do only one or the other. Generally, household timers will allow you to turn things on at one time, and off at another, but the interval between the two is inevitably at least 90 minutes on the less expensive models. Still other types, such as used in clock radios allow turn-on at a set time, or an up to 60-minute leave-on feature. You may mix these units to suit your needs.

The interface device which is perhaps the most versatile is the one for audio interface. This allows audio coupling of multiple receivers, tapers, filters, headphones, and speakers, and can be as simple or as complex as your needs dictate. Such other accessories as operate on RF or IF, such as scopes, spectrum analysers, and the like, should be directly coupled with quick-disconnects, as the fewer connections in those lines, the better to eliminate stray pickup. In my particular device, the audio line from the receiver (s) is taken from the speaker terminals, simply because it gets the wiring behind the rig and out of the way. This in turn goes to a plug into the back of the console, as do any other receiver inputs. The audio filter (s) may be connected in the same fashion, both input and output. Likewise speaker attachments may be made in this way also. Headphone jacks, due to the nature of the beast, should be mounted on the front. Due to the frequent interchange of tape machines in my shack, my tape input and output are also located on the front panel. It should go without saying that the switches should all be located there also.

There are as many ways to go with this unit as there are DX'ers, but I have included three circuits with this article. Figure 1 is a very basic interfacier, with one input, into one channel, into two outputs - tape and speaker or phones. There is no input switching, you jack in either taper or receiver, although you could put two inputs on it, and switch them into the single channel with a little extra construction. The audio filter is jacked and switched, and the speaker and headphones are wired in the same way. S3 is a record switch, which may seem at first glance to be unnecessary. I have discovered, however, that it is not advisable to play a taper into the interfacier while the taper input is connected. This switch eliminates the necessity for removing the plug. If you're using a switchable input on the interfacier, you could mount these two switches close beside each other, and tie a bar across the toggles so that they throw together, or, you might want to substitute a largerswitch to automatically disconnect the recorder input when tape is played.

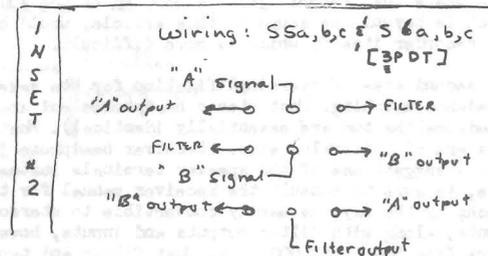
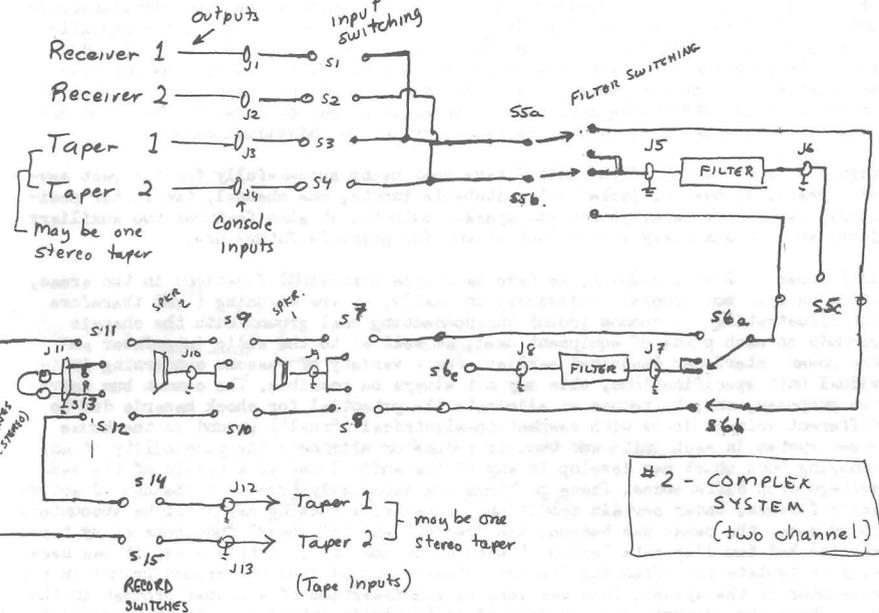
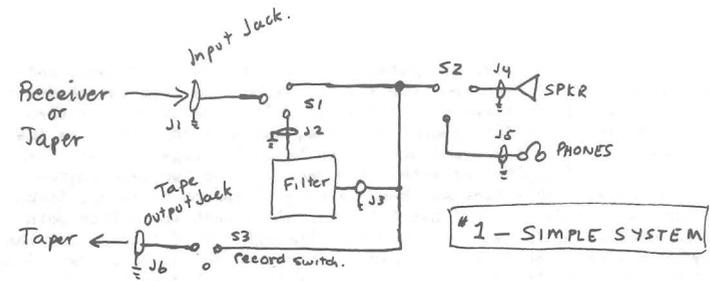


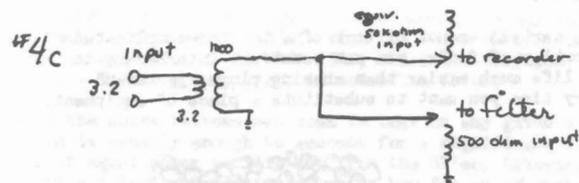
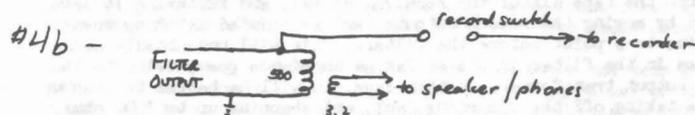
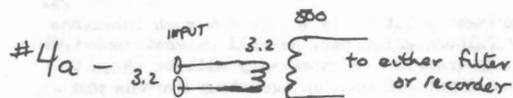
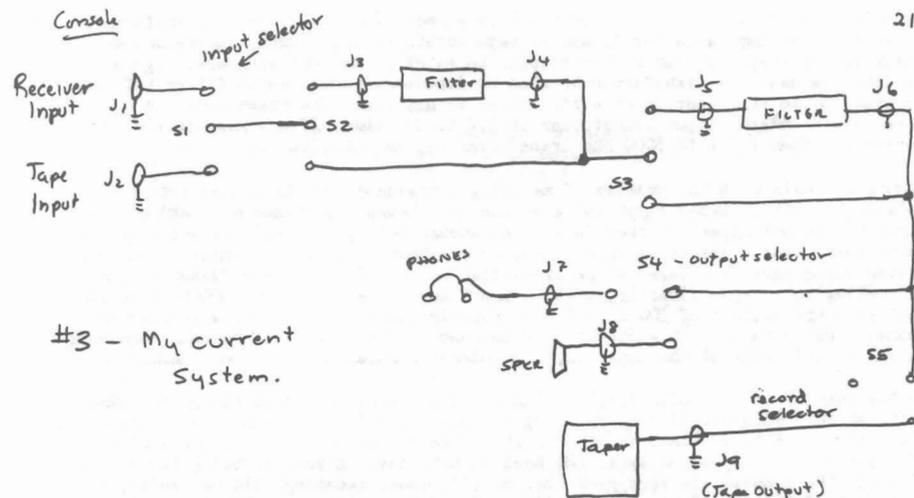
Figure 2 depicts about the most complex system most DX'ers could ever need, and probably it is too complex. It features four inputs, switchable into two channels, with two filters, two accessory speakers, headphones with either mono or stereo (one channel in each ear) operation, record switches, and back into two tape inputs. It requires 13 jacks and 15 switches and would thus be quite large in size. The circuit allows selection of inputs for either two receivers or two tape channels, but they are not mixable, mostly because there is no good reason to do so. Either channel may go into either filter (neither filter should accept audio from both channels, but one channel is fed so that it may go through both filters), and the circuit is carefully wired (see inset) to prevent cross-switching, which may result in filter input damage. The wiring must automatically divert through the switch and on into the line when the other channel is switched into the filter input.

It also features multiple speakers, either so that both may be used simultaneously, with two different channels of audio, or so that they may be used interchangeably. This latter aspect is especially useful if you happen to have speakers with different tonal characteristics to supplement the audio filters with somewhat less attenuation, in extreme cases. I have included as much in this circuit as possible in order to illustrate the many possibilities which may be covered. The DX'er may use whatever parts of it as will be necessary in the individual case.

Figure 3 is a diagram of the unit I have been using successfully for the past several years. It has two jacked and switchable inputs, one channel, two filter positions, as well as tape, phones and speaker outputs. It also features two auxiliary jacks and one auxiliary switch (not shown) for possible future use.

In Figures 1, 2 & 3, however, we have made some over-simplifications in two areas, which we will now proceed to discuss. Initially, we are assuming (and therefore not illustrating) a common ground bus connecting real ground with the chassis grounds on each piece of equipment used, as well as to the audio interfacer and the power interfacer described earlier. For a variety of reasons concerning individual unit specifications, this may not always be possible. The common bus serves two purposes, one, to reduce or eliminate the potential for shock hazards due to different voltage drops with respect to electrical ("real") ground in the house power system in each unit; and two, to reduce or eliminate the possibility of an annoying buzz which may develop in any of the audio lines as a result of the same voltage drop differences. These problems are especially true with the use of active audio filters. Under certain conditions, however, a buzzing may still be encountered. In my case, the cause was because the "record" and "playback" functions of my tape machine had two disparate "grounds" within the one unit. In this case, it was necessary to isolate the offending "record" chassis ground from the common ground in the remainder of the system. This was done by the insertion of a rubber grommet in the hole where the "record" jack is mounted on the audio interfacer. Another solution, which is beyond the scope of this article, would be to rectify the matter within the recorder itself, which is more difficult.

The second area of oversimplification for the sake of clarity lies in the area of impedance matching. Most stereo headphones and speakers operate on 3.2 or 4 ohms impedance (the two are essentially identical). Most receiver and tape recorder outputs are of this value also. (Receiver headphone jacks are sometimes another matter. I suggest use of the speaker terminals instead, but if you wish to do otherwise, be sure to consult the receiver manual for the impedance of the phone jack, which, by the way, is easily convertible to stereo phones in the mono mode.) Tape inputs, along with filter outputs and inputs, however, are not. These may run anywhere from 500 to 50,000 ohms. Most filter and taper inputs are of the higher figures, and will accommodate a number of lower values with minimal losses of gain. It is advisable, however, to increase the impedance of the audio entering these inputs to at least 500 ohms, as the 3.2 or 4 ohm impedances will result in low audio gain



as well as probable distortions or tonal imbalance. The insertion of transformers to step up the impedance for filter or tape inputs becomes highly desirable, as does their use in stepping down filter outputs to match phones and speakers. Figure 4a depicts the use of a transformer to step up impedance to the audio filter (if one is used) or to the taper if an audio filter is not used. The transformer in this case is a standard output transformer of 3.2 to 500 ohms. If a higher impedance is necessary, then a 3.2 to 5000 ohm transformer may be substituted.

Figure 4b deals with the problem of matching a presumed 500 ohm filter output impedance to both a taper input and a speaker simultaneously. While this circuit does not appear to provide a close enough match, it should be a far greater improvement over a system using no transformers than it is a compromise to an ideal system using more, and less-generally-available, transformers. The filter output is feeding to a taper directly, with an input impedance of 5000 to 50000 ohms, as well as a transformer of 500 ohms (when properly loaded with either a speaker or phones), which results in a mismatch of between 1.1 and 1.01 to one, depending on the actual value of the taper input impedance figure.

In the case of the use of multiple audio filters, inter-filter matching must also be taken into account. If you are using two passive filters of the same manufacture, there should be no problem, as it is highly likely that input and output impedances of these units will be the same, and need no matching. If you are using two active filters, the chances are very good that no additional matching will be needed, as an output of 500 ohms from one should be sufficient to drive a 5000 ohm input on the other. If this should prove to be a problem, you will need to insert a 500 to 5000 ohm transformer between the filters (assuming these values). Such a transformer is far less common than the others already described.

In any case, it is often best to experiment a bit to determine how much imbalance of impedance can be tolerated by your filters and taper, as well as most importantly, by your ears. You may find that the only transformers necessary will be those to bring up the 3.2 ohm line for the taper input and to step back down for the phones.

Many DX'ers do not wish to introduce filtering into the line before the recorder, thereby recording onto the tape all of the received signal, and filtering it later. This is accomplished by moving the record outputs (and associated matching transformers) back in the line to a point before the filters. This will undoubtedly cause additional imbalances in the filter inputs as far as impedance goes, owing to the 3.2 ohm side of the output transformer. In this case, it will be better to step up the impedance before taking off the recording jack, and stepping up to 1000 ohms, so that there will be a sufficient amount of impedance to satisfy both the recorder and filter inputs, as in Figure 4c.

Thus it can be seen that with a certain amount of work of a not-too-complicated nature and a relatively small outlay of funds, you can construct interfacers to suit your own needs. They make life much easier than chasing plugs, jacks and cords all over your shack every time you want to substitute a piece of equipment.



SOME ANSWERS TO FREQUENTLY-ASKED QUESTIONS ABOUT DOMESTIC PROPAGATION

R. J. Edmunds

Perhaps the most frequently-asked question about propagation of domestic stations is some form of 'why does W— get out so much better than W— when they have the same (or less) power and a similar location?'

There are actually several answers to this question, and some of the more common ones are answered below:

GROUND CONDUCTIVITY. This is the factor which most frequently effects propagation. A station located on marshy land, or other wet areas, such as seacoasts has the best location for "getting out". The station located on dry desert land, or rocky terrain is at a decided disadvantage. Wet ground conducts signals much better, and often provides a more suitable base for skywave signals. Heavy mineral deposits may actually absorb signals which would otherwise be radiated. Also a factor is the efficiency of the station's ground system. Generally, the more radials a station employs to ground its antenna, the better groundwave signal it will have.

HORIZON BLOCKAGE. After ground conductivity, horizon blockage is the major factor effecting propagation. Whether or not the blockage is man-made is of little consequence, as the signal will still be blocked. Most man-made structures are composed of metallic materials which will also absorb signals to some degree, and mountains frequently do the same thing. Natural "ducts" such as canyons, river beds, etc. will usually "carry" signals along them much farther than they would normally go over average terrain.

WEATHER. Old-timers will recognize the importance of weather patterns to the DX'er. In addition to the commonly-known fact that cold weather, plus the shorter days in winter cause lesser amounts of ionospheric absorption and make ground conductivity slightly better. Likewise, a cover of snow, or extremely wet ground due to heavy rains will also cause greater signal coverage. Occasionally, heavy frontal systems will enhance reception slightly within its area (both transmitter and receiver are under the same front). This is especially prevalent with snowstorms.

ANTENNA. The efficiency of the antenna system as a whole can make a signal get out much better. A poor system will radiate less power (regardless of the power put into the system) than a good one will. Likewise, some stations employ antennas which are especially designed to limit skywave components. WPAT-930 is one of these.

MODULATION. A station with good, clean modulation may well be heard better (and, as a result, more easily ID'ed) than one which is undermodulated or has muddy audio. A good example of this is WGSX-1310, which has very poor quality modulation and, despite a fairly good signal, is not often ID'ed.

All of the above reasons can come to bear in any given comparison of stations. One of them is usually enough to account for a significant difference between two stations of equal power equidistant from the DX'er. Likewise, these factors serve to prevent any hard and fast rules as to how far an AM station's coverage can be predicted to extend. As you can easily see, many of these factors are easily variable, either with time or personnel changes at the same station. Thus, it becomes virtually impossible to generalize about this area of propagation.

By Philip L. Sullivan

There are four basic ways by which a radio wave can propagate, or travel, from transmitter to receiver. These are illustrated in Figure 1.

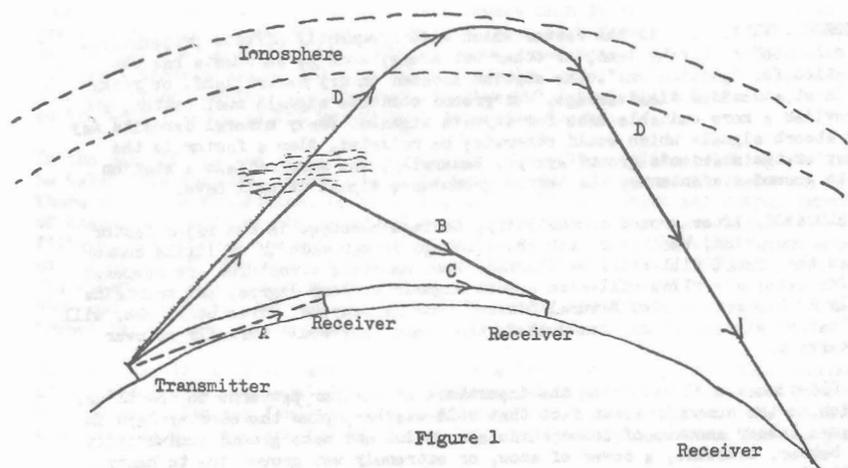


Figure 1

Path A is a direct, line-of-sight, propagation called "space wave." Path B involves reflection of the signal from an irregularity in the troposphere; this is called "tropo-scatter." Path C, known as "ground wave" propagation, is a wave guided along and by the earth's surface. Path D involves a signal travelling to and then returning from the ionosphere; this is referred to as "sky wave" propagation. The first two paths are not important in the reception of distant broadcast band stations (the space wave is useless beyond the horizon, and tropo-scatter is important only at high frequencies). Therefore, we will only consider the characteristics of the last two propagation modes.

Ground Wave Propagation

The wave that propagates along the surface of the earth does so as a guided wave, guided in a way analogous to a wave guided through a waveguide or along a transmission line. The waveguide encloses the wave on all sides by good, metallic conductors, whereas in the case under consideration there is a conductor (the earth) only on one side. The earth has a much lower conductivity; nevertheless, many of the same ideas apply.

Two factors contribute to the loss in signal strength during ground wave propagation. The first is the distance factor due to dispersion of the signal as it radiates out from the antenna.

This $1/d^2$ factor enters into the signal strength formulas no matter what the means of propagation. The second factor accounts for the amount of signal power lost by absorption by the earth because of the finite and variable conductivity of the earth. At large enough distances, combining both factors, we get the following expression for the received energy of the ground wave:

$$E_{\text{ground wave}} = \frac{K\sigma}{f^2 d^2}$$

where K is a constant of proportionality involving transmitter power, antenna gain, etc., f is the frequency in mhz, σ is the ground conductivity in mv/m units, and d is the distance in miles. This formula is an approximation of more general (and more complicated) formulas, but it is adequate for the values of σ , f and d that normally occur in the study of broadcast band propagation.

From the above equation for received signal strength, it is apparent that better ground wave reception will be achieved over ground with a higher conductivity, or looking at it the other way round, greatest weakening of the ground wave is over terrain having lowest conductivity. Typical values of the ground conductivity in North America range from 1 to 5 mv/m in dry, desert regions and mountainous areas; from 5 to 10 in the Great Lakes region; and from 10 or 20 in the Great Plains and Prairies, with some areas in the Dakotas and just north having values up to 30. For seawater, the ground conductivity is about 5000 mv/m , meaning that ground wave reception over seawater is much better than for a corresponding distance over land. Over fresh water, σ is not as high but is still considered above that of average soil and results in very good daytime reception over the Great Lakes.

In summary, ground wave propagation is the primary means by which we receive broadcast band stations at distances of up to a few hundred (and occasionally 1000 miles) in the daytime.

Sky Wave Propagation

The important mode of propagation known as "sky wave" is due to the existence of a region in the upper atmosphere called the ionosphere. Although sky wave is the principal (and often only) means of propagation from a distant transmitter, it suffers from many variations and irregularities. To understand the mechanism of sky wave propagation and of the disturbances that affect it, we must first examine the ionosphere.

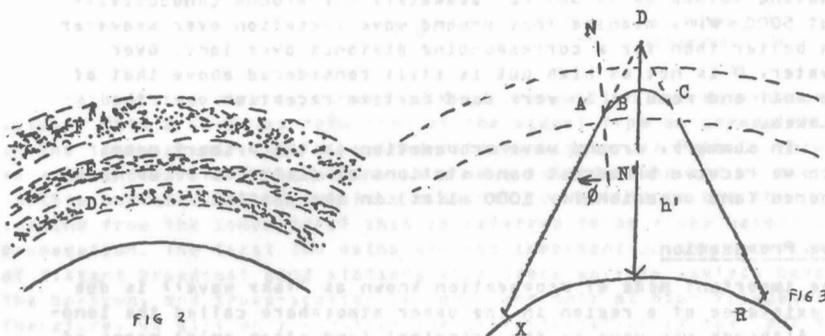
The ionosphere consists of several layers of ionized gases (fig. 2), the ionization being mainly produced by ultraviolet radiation from the sun. The lowest layer, at a height of 30 to 50 miles, is the D layer. Above this is the E layer from 60 to 80 miles. The D layer exists only in the daytime; the E layer exists both day and night, being much weaker at night. Above the E layer is a region known as the F layer. At night, this consists of a single layer between 150 and 200 miles up. At broadcast band frequencies, the principal effect of the D and daytime E layers is absorption of the

signal. Since these are the lowest layers, they prevent the signal from reaching the higher layers where refraction would otherwise take place. This is why sky wave propagation of broadcast band signals is virtually non-existent in the daytime. The layers that are most important for our consideration are the nighttime E and F layers.

Many discussions of sky wave propagation consider the ionosphere to reflect the radio waves. Strictly speaking, the signals are refracted, not reflected, as shown in figure 3. A signal from the transmitter (X) enters the ionosphere at a point A at an angle θ from the normal (N-N'). The effect of the ionization is to reduce the index of refraction (n) within the ionized layer to a value less than that of the atmosphere below it:

$(n = \sqrt{1 - 81N/f^2})$, where N is the number of electrons per cm.² and f is the frequency in kHz; $n_{\text{air}} = 1.$

Using Snell's law from optics, we find that when a wave enters a region with a lower n it is bent away from the normal. Since n continues to decrease with increasing height the actual path of the signal is the curve XABCR in figure 3. For most purposes, though, the problem can be treated by pretending the signal is sharply reflected from point D. The height, h' , of D is called the "virtual



height" of the ionosphere. For the nighttime E layer h' is about 65 miles, for F it is about 190 miles.

Besides refraction, the other way in which the ionized gases of the ionosphere affect a radio signal is by absorption. As previously mentioned, this is the principal effect of the D layer and daytime E layer, but does occur to some extent in the F layer. Using a simplified model we find that the attenuation per unit is proportional to $N\nu/(\nu^2 + 4f^2)$ where N is again the electron density and ν is the collision frequency of the ions. Thus a higher frequency will have a lower attenuation. Unfortunately for the broadcast band however, the earth has a magnetic field. Solving the equations of motion

of an electron in a magnetic field we find that this motion has a resonant frequency f_0 given by $f_0 = B_0 e / 2\pi m$, where B_0 is the earth's magnetic field and e and m are the charge and mass of the electron. Evaluating this expression gives f_0 , often called the "gyrofrequency," a value between 1100 and 1500 kHz, right in the top of the broadcast band. (This holds over most of the world, however over parts of SA the gyrofrequency is as low as 680 kHz.) A signal at or near f_0 will have a larger portion of its energy absorbed by this resonant system and thus an attenuation higher than would otherwise result occurs in the higher part of the broadcast band. This attenuation is in addition to that normally expected when the magnetic field is not considered.

Variations and irregularities in sky wave propagation are linked to changes in the ionosphere. These can be grouped into four classes: (1) daily, (2) seasonal, (3) those following the sunspot cycle and (4) irregular.

The daily changes have already been discussed as the appearance of the D and E layers during the daytime. During the course of a year there are two major seasonal effects on broadcast band sky wave propagation. First there is the change in the electron density (N) in the F layer -- in the summer it is higher than in the winter and this results in higher attenuation (attenuation is proportional to N) and thus poorer propagation in the summer. Secondly the longer days and shorter nights in the summer result in more ionization of the D and E layers and it takes longer after sunset for this ionization to disappear. With an earlier sunrise this means there is much less time during the night when the D and E absorption is low enough for good propagation. Both of these effects, in short, make sky wave propagation of broadcast band signals much better in winter than summer.

Years of sunspot maxima also result in higher N and hence sky wave propagation is worse in such years than in years of minima. Sunspots come in 11-year cycles, the last maximum being 1968 and the last minimum 1963-64. We are now (in early 1977) at or near a minimum. In addition to deterioration of propagation conditions during the summer and in years of sunspot maxima, the level of the atmospheric noise is generally higher at these times too and this further degrades reception. Sunspot maxima also increase the occurrence of ionospheric storms as discussed below.

Irregular changes in the ionosphere are by their very nature unpredictable. They do, however, have considerable effect on sky wave propagation. At broadcast band frequencies, the most important of these disturbances are the ionospheric storms. These ionospheric storms result in charged particles precipitating into the lower layers (as low as 35 miles -- the D layer). The effect is the same as that produced by the normal daytime ionization of these layers -- increased absorption. In areas experiencing an ionospheric storm the effect is much as if the D layer and daytime E layers lasted through the night. Propagation along any path passing through a region of ionospheric storm activity will be virtually eliminated.

While the time at which an ionospheric storm will occur is random, some idea can be obtained as to the times most likely. The cause of the ionospheric storm is the arrival in the ionosphere of highly energized particles emitted by the sun. The emission of these particles is associated with solar flares - large clouds of hot glowing gas, often millions of miles long - that erupt from the surface of the sun. These flares are the result of increased solar activity and are most prevalent near and slightly after the time of the sunspot maxima. Since the light from the flare reaches the earth some time before the particles do, sighting of a flare by an observatory is an indication of probable ionospheric storm activity in the immediate future. These particles enter the ionosphere mainly in the region above the magnetic poles, so the magnetic polar areas are the regions in which ionospheric storms are centered. For DXers in North America, an ionospheric disturbance will black out signals from the north, including those from central Asia which must come over the pole (when they do come). This clears many frequencies for reception from Central and South America. The corresponding effect in the southern hemisphere makes it almost impossible to hear South African stations from New Zealand. Besides disrupting normal propagation, these storms also cause the gas in the upper atmosphere to glow; this glow is the "Aurora Borealis" (or australis) and for this reason propagation conditions resulting from ionospheric storms are often called "auroral conditions." Once started, such a condition may last 2 or 3 days.

In summary: sky wave propagation involves the return of a signal to the earth from the ionosphere. It is the method by which broadcast band signals travel over long distances (from a few hundred to several thousand miles), but, because of many changes in the ionosphere, the characteristics of this means of propagation are constantly changing. Of great importance is the existence in the daytime of the absorbing D and E layers, allowing sky wave propagation only when the path from transmitter to receiver is mostly or entirely dark. Summers and years of sunspot maxima are the worst times for this type of propagation, whereas winters and sunspot minima are best.

Propagation by Several Modes

So far, we have discussed ground wave and sky wave propagation as if only one of these modes was present at a given time. For daytime reception this is true: ground wave alone is present. At night, just because the sky wave becomes possible and greatly dominates over the ground wave, this does not mean that the ground wave disappears or is weaker - it is essentially constant throughout the day and night.

The presence of two possible paths for a signal to travel to a given receiver location might merely result in a greater signal strength received, but this isn't always true. The difference in the lengths of these paths results in a difference in phase between two arriving signals. The phase of the ground wave is essentially con-

stant so any change in the path differences will come from sky wave variations. A phase shift of 0° , 360° , 720° , etc. (corresponding to a path length difference of 0, 1 wavelength (λ), 2λ , etc.) results in the addition of the two signals; while a phase shift of 180° , 540° , 900° , etc. (a path length difference of $1/2\lambda$, $1\ 1/2\lambda$, $2\ 1/2\lambda$, etc.) results in the subtraction of the two signals. Thus, a change of $1/2\lambda$ (from 300 to 900 feet for the BCB) in the path length difference can result in signal strength variations equal to twice the strength of the weaker of the two components. This variation in path length is so small that it occurs very readily due to normal fluctuations in the ionosphere, resulting in "flutterings" in the signal from many semi-local stations (out to perhaps 200 miles) at night, since for these stations the sky and ground waves are of comparable strength.

Similar effects can occur at greater distances due to the presence of "multi-hop" sky wave propagation (fig. 4). Path 1 is

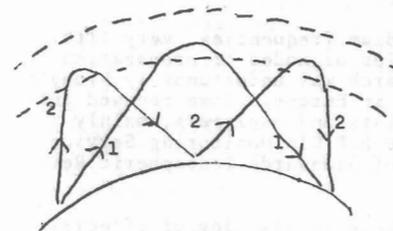


Figure 4

the normal one-hop sky wave that has already been discussed. Path 2 is an example of two-hop propagation: refraction from the ionosphere, reflection from the ground at point A, and another trip to the ionosphere and back, finally arriving at the receiver. Again the same signal arrives by two different paths, possibly resulting in some cancellation of the signal. While not shown, other possible paths of three or more hops exist, and scattering of

waves as they pass through lower ionospheric layers causes spreading of the idealized paths, further complicating the problem. In general, the signal arriving by the fewest number of hops will be strongest. The largest distance that can be covered by a single hop is about 2000 miles. Beyond this distance, the two-hop signal predominates with the three-hop being the chief component of interference. Beyond 4000 miles the two-hop disappears and the three-hop is dominant, and so on. For multi-hop propagation, the ground conductivity at a point of reflection is important in much the same way that it is for ground wave propagation. For example, TA and TP paths are often good for receptions over long distances, but cross-country reception is more difficult. The presence of several simultaneous modes of propagation and the deviation from ideality of the received signals makes day to day reception on the BCB quite variable and difficult to predict accurately, but hopefully the above discussion will have given you an idea of the general physical phenomena that controls BCB propagation.

--This article was originally written in 1967 for the IRCA.

Article retyped by Lynn Burke

Fred Dinning, Medium Wave Circle, reprinted by permission

Introduction Although at first the subject of Medium Frequency radio waves may seem somewhat outdated with the advent of Very High Frequency usage for high fidelity stereophonic broadcasts for both local and national networks, the Medium Frequency broadcast band still plays an important role in entertainment. For various reasons to be discussed below, the Medium Frequency band is more suitable for certain applications, e.g. reception in moving vehicles when phase distortion and multipath reception would cause distortion, in hilly zones, and for rural areas. Medium frequencies are also of great use because of the higher usable range during night hours when they are widely used for regular international broadcast. For these reasons every country which at present uses medium frequencies is tending to continue their use, at least for the foreseeable future.

In spite of this continual usage of medium frequencies, very little research has been done into the varieties of modes of propagation encountered since the 1930's. This research was unfortunately brought to an untimely end by the state of war in Europe. Some renewed interest has been shown by groups of scientists and engineers, mainly in long distance reception, notably at the B.B.C's Monitoring Service and the United States National Bureau of Standards Ionospheric Records Division.

The subject however is of great importance in planning of effective coverage areas by day and night for new transmitter installations and in agreements on channel spacing and shared frequencies. Hence a full knowledge of Medium Frequency propagation phenomena would be very advisable in order to be best able to plan for maximal channel usage and effective coverage with minimum interference problems. This applies to local stations serving a small town as well as international services.

The subject is of considerable value in helping to coordinate knowledge of solar effects on the earth, the atmosphere, and magnetic nature of the earth. Much information about solar radiation can be derived from radio observations of M.F. propagation.

Physical phenomena governing propagation of M.F. radio waves. Ground wave. Firstly consider the propagation of waves travelling along the surface of the earth. Field strengths at various distances away from the transmitter are obviously governed by the effective height of transmission antennae above ground - the higher the antennae the more likely that the wave will be able to follow a straight line path to the receiver. In practise, however, it has been found that waves propagate beyond the horizon. At M.F. this can be described in terms of diffraction of the signal round the spherical earth. This corresponds with the laws of diffraction as derived from the boundary conditions of Maxwell's equations. As also expected from these solutions, the signal strengths depend on the conductivity of the ground over which the signal has passed. It should be noted that ground conductivity affects the penetration of the wave into the ground and hence the relevant conductivity may be that of the ground up to several hundred meters below the surface where the earth currents are set up. The angle of inclination of electric and magnetic components of the wave to the ground is thus affected by ground conductivity as reflected by the phenomena of diffraction.

The diffraction effect is enhanced by decrease in frequency used and an increase in ground conductivity. These effects are displayed in greater range of lower M.F. signals (around 500 kHz) over sea paths,

e.g. Radio Veronica when on 557 kHz, on a ship anchored in the North Sea. A full solution of signal strengths for a variety of ground paths allowing for variations in topography and soil conductivity is mathematically possible using the boundary conditions of Maxwell's equations. Other factors can also be considered, e.g. Soviet scientists have discovered that signals are enhanced over tree covered paths when the leaves are green and moist resulting in higher conductivity. In hilly regions areas of shielding and areas of enhanced reception due to reflections from surrounding objects, diffractions at sharp boundaries, and so forth. It is also found that at the edge of high cliffs overlooking the sea high field strengths can be obtained at a distance. This is due to the effect of the apex of a rectangular wedge illuminated in a constant field solution of Maxwell's equations. There is no real advantage in having the transmitter over the sea so long as there is a sea path in the direction of the propagation.

It is now necessary to consider that part of the signal leaving the transmitter which travels upwards at an angle toward the sky instead of at a grazing incidence to the ground. Appropriately these are called sky waves. At this point it becomes necessary to examine the nature of the upper layers of the atmosphere. These layers are under constant bombardment by solar radiation - X-rays, ultraviolet rays, and on occasion by solar corpuscles. This bombardment results in ionisation of the molecules in the atmosphere, and the ionisation density can be approximated to a parabola.

Solutions to this parabolic ion distribution can be approximated for a wide range of parameters by the Appleton-Benyon transmission equation. This equation holds true for thick ionisation layers. Using Maxwell's equations and the Appleton-Benyon equation it can be shown that certain frequencies can be reflected back from this layer.

Since the ionisation zone is uniform, it can be shown that the angle of elevation of the sky wave at transmission is equal to the angle at reception, and it can be seen that there is a zone where no signal is heard - the skip distance. Note also the possibility of 'multi-hop' propagation due to reflection at earth's surface. The 'hop' depends on the transmission angle, the vertical height of the ionosphere, i.e. the point from where the wave seems to be reflected as though the ionosphere were a discrete dielectric boundary rather than a parabolic distribution of ion density.

It should be noted that from the solution of Maxwell's equations, for low frequencies the degree of absorption of signals is greater (due to conductivity associated with a plasma.) The mechanism of this absorption associated with a passage through an ionised layer has been described by the Appleton-Hartree magnetoionic theory in terms of the ions oscillating at the frequency of the wave. If ionic recombination occurs, part of the energy of the wave is lost. It should also be noted that the degree of bending is inversely proportional to the frequency.

If one now considers the actual structure of the ionosphere, one finds a series of ionisation levels depending on the time of day, year, etc (see later). The main zones of interest are D, E, F1 and F2 in ascending order of elevation. C, E5 and G layers have been observed under unusual conditions but are of little interest to this discussion.

It is useful to define the following terms: The Lowest Usable Frequency (L.U.F.) At a certain level of ionospheric activity the degree of attenuation of the sky wave is too great to allow good communication. This is usually due to D layer ionisation. The D layer when ionised by direct sunlight (mainly ultraviolet radiation) has the effect of absorbing all but high frequencies making signals below 5MHz unusable. Above 5 MHz the attenuation effect is decreased. The Maximum Usable Frequency (M.U.F.) The highest frequency for which this

wave is reflected back to the earth from any path. Normally this will be from the F2 layer but also could be from the F1 or E layer. The Critical Frequency is that frequency from which some signal is still scattered back for vertically incident waves.

Brief descriptions of layers of the ionosphere and their dependence on solar radiation level

D Layer (30 - 55 miles) At this level the atmosphere is still quite dense and is directly ionised by the incident ultraviolet and X-ray radiation in sunlight. Thus the level of ionisation appears at ionospheric sunrise, i.e. the time at which the sun's rays strike the layer, and disappears at ionospheric sunset. Due to the density of the layer, recombination of electrons and ions occurs very quickly at ionospheric sunset. Thus the layer is absent during darkness. The level of ionisation depends directly on solar radiation and hence is higher when the sun is at its zenith on midsummers day in the northern hemisphere. The level of attenuation due to this layer is great enough to absorb all M.F. signals during daylight hours. Daytime M.F. propagation is therefor solely due to groundwave. It should be noted also that Appleton and Ratcliffe have postulated the possibility of D layer reflection below 2 MHz. This however in practise would seem to be unimportant compared to the groundwave. It should be noted that H.F. waves of above 5 MHz can pass through this layer.

E Layer (50 - 90 miles) This layer like the D layer rises in electron density to a maximum value during daylight hours. The atmosphere is thinner so attenuation is much lower so that mid-high frequency (7MHz) can be reflected during the day. Waves of a higher frequency can pass through (see E critical frequency above). The E layer combines less quickly at night and hence is present to some extent after dark when it contributes to M.F. attenuation.

F Layer (200 - 300 miles) This layer varies considerably in height and density dependent on the degree of solar activity. The layer is responsible for H.F. propagation by day and night and M.F. propagation by night. Recombination is slow due to the rarified nature of the atmosphere. The F2 rises to a much higher level separating from the F1 layer in daylight. Ionisation levels are high and so are M.U.F. and Critical Frequencies. Very high levels of F2 are associated with a thermal expansion effect in summer.

Solar Activity Many variations in day to day and month to month and year to year results exist over given signal paths. These effects were studied in detail in the 1930's by J.H. Dellinger, J.A. Pierce and others commissioned by the Institute of Radio Engineers. It was noted on certain days signals on a trans-Atlantic path were not heard whereas signals from South America were noted regularly. Attempts to coordinate these occurrences with solar activity were made. The results obtained then modified by more recent findings are detailed below.

Long term cycles on M.F. signal paths

22 year cycle Optimal M.F. conditions at every other minimum when ionisation falls to all time low levels.

11 year cycle This cycle corresponds to the well known cycle of sunspots - dark patches appearing on the disc of the sun. This is one half of the cycle above. The underlying causes of these two cycles are unknown. These sunspots are associated with high levels of ultraviolet and X-radiation. There would appear to be a high correlation of this radiation with sunspot cycles. Plots of critical frequencies against sunspot numbers indicate highest F2 ionisation at the maximum of the sunspot cycle. Optimum M.F. conditions hence occur at low points of the cycle when L.U.F.'s are low. Methods of numbering sunspots have been derived counting numbers and areas and converting them to a standard scale - the Wolf number (R).

$$R = k(10g + f)$$

k = correction factor particular telescope

f = number of individual sunspots

g = number of observed sunspot groups

Typically R = 0 to 150

1 year cycle This cycle is due to 23½ degree tilt of the earth on its axis resulting in the variation of the amount of sunlight on the ionosphere. The residual daytime absorption levels are higher in summer than in winter. This also affects the parts of the signal path in light or in darkness.

Short term cycle (25 - 27 days) This cycle results directly from the location of the sun on its own axis. Hence groups of sunspots or individual sunspots take 25 to 27 days to orbit the sun. The exact mechanism of this cycle involves a study of the nature of the effect that the sun has on the earth's magnetic field. Associated with most sunspots there is a 'throwing off' into space of streams of solar corpuscles. So far as researchers can tell these consist of protons, electrons and various other sub-atomic particles, e.g. neutrinos in various concentrations. Much research work into the nature and composition of this solar wind as it is called is still going on. Much of the work done by the U.S. Sky-lab project was of this nature. Associated with the earth is a magnetic field, the exact distribution of whose lines of force is shown on isogonic maps. In space a magnetosphere and a magnetopause result from the modification of the earth's magnetic field due to the solar wind.

It is now necessary to examine the nature of a 'gust' of this solar wind. The term 'gust' is appropriate as there is an overall level associated with the average sunspot level, i.e. it displays 11 and 22 year cycles as above. Associated with most sunspots at particular times and positions on their transits across the disc of the sun, streams of particles are thrown out across space some of which encounter the magnetic field of the earth. This encounter occurs around 20 hours after the radiation effect of the sunspot on the ionosphere, due to the transit time of the particles across space. Only a few of these high energy particles actually reach the earth, and by far the bulk of those that do are deflected aside by the earth's magnetic field due to the shock front of the solar gust. It is known that there are several regions within this protected area where very high energy particles which have got through over time have been trapped. These areas are called the Van Allen radiation belts.

These areas are kept charged even during periods of low solar corpuscular activity by replenishment by the solar wind. The high energy shock front of the 'solar gust', however, has the effect of the whole magnetic field forcing it inwards toward the surface of the earth. This results in the particles in the Van Allen radiation belts being forced downwards along the lines of magnetic field. This process is described as a solar precipitation or dumping effect. Associated with this effect are disruptions in H.F. and certain M.F. signals known as magnetic storm disturbances, auroral effects, etc.

Basically the above can be regarded as resulting from a transfer of energy from the solar corpuscles to the earth's magnetic field - a magnetohydrodynamical effect. The consequences of this precipitation effect result in a channelling of particles towards the magnetic polar zones and into the atmosphere. These particles set up oval belts of ionisation as they cut the D layer of the earth at points where the relevant magnetic field lines cut this layer. These are called auroral zones because of the phenomena of Aurora Borealis and Aurora Polaris resulting when abnormally high degrees of ionisation in the D layer produce a fluorescent effect as quanta of light emanate from the ionisation process. It should also be noted that changes in the earth's magnetic field of this type result in earth currents being set up causing disruption of wire communications. It is obvious

that the above will also have a dramatic effect on radio propagation at M.F. With D layer ionisation levels abnormally high even at night due to considerable time required for recombination after extreme ionisation, signals passing through this zone will be highly attenuated. Thus signal paths through the auroral belt are subject to disruption. The exact position of the auroral belt obviously depends on the severity of the 'solar gust' and can vary as far south as Florida in a very magnetic storm. Under undisturbed conditions the auroral zone will be virtually absent. Detailed studies over many years by the I.R.E. on path performances in the 1930's showed a correlation between the earth's magnetic field index, the recent (approximately 20 hours before) observation of sunspot groups and the sun's activity over the last few weeks - the last observation due to the fact that since extreme degrees of ionisation are involved, several days or even weeks are required for recovery in all layers. During a storm the F layer will be lowered considerably due to the compression of the magnetic field. Attenuation in lower layers will increase, i.e. L.U.F.'s and M.U.F.'s decrease. As a result in the British Isles signals from the south will predominate and signals from North America will be absent.

For study purposes the main bodies involved in the study of radio propagation gauge ionospheric and magnetic activity and present results in number form. The K index is obtained every three hours by measuring the rate at which particles are being induced to precipitate from the Van Allen radiation belts at a particular locality. Measurement is usually by balloons or satellites. These K indices are then averaged over 24 hours to give A indices. Experiments over many years have confirmed the validity of the above model over a great variety of signal paths.

Miscellaneous other effects As well as the previously mentioned cycles, there are also other factors governing day to day possibilities. Sudden ionospheric disturbances resulting in very high D layer ionisation during daylight hours and resultant residual ionisation at night. This effect - the Dellinger Effect - is caused by solar eruptions with which high levels of ultraviolet radiation are associated - solar flares. These effects have short duration and have greatest effect at the Equator.

A phenomenon called the Mid-Winter Anomaly and of unknown origin results in higher auroral absorption zone effects during mid-winter sunspot minimum years.

A variety of weather associated effects can result in reflection of ground waves and low angle sky waves - tropospheric effects (boundary solutions of Maxwell's equations between air masses).

In practise it would appear that the layers of the ionosphere are not at all even or uniformly ionised. This results in diffuse reflection. Partial reflection would also appear to be common. Sharp patches of ionisation result in ionospheric electron gradients. As a result of these factors great circles would be found less often in practise than one would expect for the solution of a perfect ionosphere over a perfectly conducting earth. The discontinuous nature of the ionosphere results in signal fading due to reception from several paths simultaneously but which are changing with time. Ionospheric slopes are most commonly observed at dusk.

From the above notes on various common and less common modes of M.F. propagation, it can be clearly seen that no hard and fast conclusions can be drawn for methods of mathematical modelling of the sky wave because of discontinuous nature of the ionosphere, the earth's magnetic field, etc. - although reasonable results have been obtained

for the ground wave. It is however important to note the basic qualitative trends, e.g. an M.F. station in Europe is less likely to suffer co-channel interference from a U.S.A. station than a South American one due to auroral absorption; two stations separated by sea are more likely to cause each other interference than two separated by land. With a knowledge of these general trends, the designer of M.F. transmitter and antenna installations can glean much information on angle of radiation required for area coverage, night/day power ratios, choice of site, frequency, etc.

In the wider field much information has been added to our knowledge of the sun, earth and atmosphere and their relation to radio communications and geophysics.

Fred Dinning is a member of Britain's Medium Wave Circle, holds a degree in Electronics, and prepared this thesis in connection with studies on his Masters. He has a 6600 foot beverage, and lives on a farm Southwest of Glasgow. He is employed with Ferranti, a large British electronics firm, and has studied European propagation extensively, with writings on that subject due to appear in Medium Wave News shortly. This work is reprinted by permission of the author and MWC. We feel that it is a good pertinent discussion of propagation on the medium waves in straight language. Thanks to Glenn Cooper for retyping the article from MWN - RJE



WNDE
RADIO

WNDE RADIO 1260
P.O. BOX 20167
6161 FALL CREEK BLVD
INDIANAPOLIS, INDIANA 46220
(317) 257-7565

11 April 1974
Brian Vernon
c/o
Sherritt Gordon Mine
Leaf Rapids, Manitoba

This confirms your reception of WNDE - 1260 KHZ between 5:27-5:38am CDT 1027-1038 GMT on 18 March 1974

WNDE operates with a power of 5000 watts. Our daytime antenna is non-directional. Our nighttime antenna is directional with two main lobes at 171 and 351 degrees, we also have two smaller lobes at 61 and 261 degrees. When you received us we were operating on the Directional antenna.

Our main transmitter is a RCA BTA-5H and our alternate main transmitter is a RCA BTA-5U2. Both transmitters operate with an output power of 5000 watts. We were operating on the BTA-5H transmitter when you received us.

We changed our call letters to WNDE in August of 1973. Our former call letters were WFBM. WFBM was the first commercial radio station in the state of INDIANA.

We also operate FM station WFBQ on 94.7 MHz with an effective radiated power of 52,000 watts.

Thank you very much for your report.

Charles J. Collingwood

Engineering Department WNDE/WFBQ

Many Thanks Brian for an excellent report. You now hold the distinction of being the second furthest report this station has received. The furthest being one from New Zealand. Your log was 100% correct which is rare coming from BC listeners. The reports from NRC club members are usually pretty good.