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TWO SUNSET / SUNRISE PROGRAMS (WITH SAMPLE OUTPUTS)

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Sunrise and sunset calculations are important aids in the process of determining skip propagation viability on a given DX path. On the frequencies below 5 MHz, minimum skip attenuation generally occurs when the entire signal path is in darkness. Some enhancement may occur if one or both ends of the path is in the "grey zone" (within approximately (plus or minus) 15 minutes of sunrise or sunset). Reports of long-haul signals of incredible strength, especially on the tropical shortwave bands, have been linked to a signal path lying entirely along the "grey line": the day/night boundary.

Two BASIC programs dealing with sunrise/sunset calculations are presented here. Each program's report print-out precedes the actual program listing so that DXers not familiar with programming can immediately see the results which, after all, are the reason for the programs' existence. Both programs use a math. subroutine module derived from an earlier (less-automated) program presented by Ron Schatz in NRC's DX News circa 1982/1983. Both programs are written in DEC (V1.1-00) BASIC-PLUS-2; they run on a PDP-11 under the RSX-11M+ operating system; and they send their outputs to editable / printable disk text files. Modifications must be made to the programs to allow output to be sent directly to a printer and to allow running of the programs on other computers. The necessary modifications, in most cases, should be of a minor nature.

Both programs can link to Geodata disk files which contain up to 120 sets of location names / coordinates each. Refer to the "BEAMTAC" Great-Circle Distance / Bearing article to see how Geodata files are created and modified.

The first program, SUNTABLE.B2S, generates a table of sunrise & sunset times for a user-selected site for 48 dates throughout the year (4 per month). Sites may be selected manually or they may be picked from a Geodata file read by the program. Times are expressed in both GMT and local time (Eastern time was used — the programmer can tweak the program if another local time zone is desired). The following output file, CODDSUN.TXT, was generated by the SUNTABLE program:

This is file: CODDSUN.TXT

Location = USA / MA - W. Yarmouth
Latitude = 41.68 N
Longitude = 70.22 W

Date	TIMES IN GMT		TIMES IN EASTERN LOCAL TIME	
	Sunrise	Sunset	Sunrise	Sunset
7 JAN	12.07	21.14	7:07 AM EST	4:14 PM EST
14 JAN	12.02	21.19	7:02 AM EST	4:19 PM EST
21 JAN	11.56	21.24	6:56 AM EST	4:24 PM EST
28 JAN	11.50	21.31	6:50 AM EST	4:31 PM EST
7 FEB	11.38	21.42	6:38 AM EST	4:42 PM EST
14 FEB	11.30	21.51	6:30 AM EST	4:51 PM EST
21 FEB	11.20	22.00	6:20 AM EST	5:00 PM EST
28 FEB	11.11	22.10	6:11 AM EST	5:10 PM EST
7 MAR	10.59	22.22	5:59 AM EST	5:22 PM EST
14 MAR	10.49	22.32	5:49 AM EST	5:32 PM EST
21 MAR	10.39	22.42	5:39 AM EST	5:42 PM EST

7 MAY	09.37	23.44	5:37 AM EDT	7:44 PM EDT
14 MAY	09.30	23.51	5:30 AM EDT	7:51 PM EDT
21 MAY	09.23	23.57	5:23 AM EDT	7:57 PM EDT
28 MAY	09.18	00.03	5:18 AM EDT	8:03 PM EDT
7 JUN	09.12	00.08	5:12 AM EDT	8:08 PM EDT
14 JUN	09.10	00.11	5:10 AM EDT	8:11 PM EDT
21 JUN	09.10	00.11	5:10 AM EDT	8:11 PM EDT
28 JUN	09.10	00.11	5:10 AM EDT	8:11 PM EDT
7 JUL	09.13	00.07	5:13 AM EDT	8:07 PM EDT
14 JUL	09.17	00.03	5:17 AM EDT	8:03 PM EDT
21 JUL	09.23	23.58	5:23 AM EDT	7:58 PM EDT
28 JUL	09.29	23.52	5:29 AM EDT	7:52 PM EDT
7 AUG	09.39	23.41	5:39 AM EDT	7:41 PM EDT
14 AUG	09.48	23.33	5:48 AM EDT	7:33 PM EDT
21 AUG	09.56	23.24	5:56 AM EDT	7:24 PM EDT
28 AUG	10.06	23.15	6:06 AM EDT	7:15 PM EDT
7 SEP	10.19	23.01	6:19 AM EDT	7:01 PM EDT
14 SEP	10.29	22.52	6:29 AM EDT	6:52 PM EDT
21 SEP	10.39	22.42	6:39 AM EDT	6:42 PM EDT
28 SEP	10.51	22.30	6:51 AM EDT	6:30 PM EDT
7 OCT	11.02	22.19	7:02 AM EDT	6:19 PM EDT
14 OCT	11.12	22.09	7:12 AM EDT	6:09 PM EDT
21 OCT	11.22	21.59	7:22 AM EDT	5:59 PM EDT
28 OCT	11.31	21.50	7:31 AM EDT	5:50 PM EDT
7 NOV	11.43	21.38	6:43 AM EST	4:38 PM EST
14 NOV	11.51	21.30	6:51 AM EST	4:30 PM EST
21 NOV	11.57	21.23	6:57 AM EST	4:23 PM EST
28 NOV	12.03	21.18	7:03 AM EST	4:18 PM EST
7 DEC	12.08	21.13	7:08 AM EST	4:13 PM EST
14 DEC	12.10	21.10	7:10 AM EST	4:10 PM EST
21 DEC	12.11	21.10	7:11 AM EST	4:10 PM EST
28 DEC	12.10	21.10	7:10 AM EST	4:10 PM EST

SUNTABLE.B2S Program Listing:

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3 PRNM$="SUNTABLE.B2S"
5 PRINT\PRINT\PRINT" Program = ";PRNM$
7 PRINT" WALION DX Labs — Software Division — REV = 18 MAR 1985\PRINT
10 PRINT" *****
15 PRINT" * SUNRISE / SUNSET PROGRAM **
20 PRINT" *****
30 PRINT
40 DIM X$(2),M$(12)
50 DATA "JAN","FEB","MAR","APR","MAY","JUN","JUL","AUG","SEP","OCT","NOV","DEC"
60 FOR I=1 TO 12\READ M$(I)\NEXT I
70 FORM1$=" 'LLLLL 'LLLL 'LLLL 'LLLL 'LLLLLLLLLLLL 'LLLLLLLLLLLL'
80 FORM2$=" 'LLLLL 'LLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLL'
90 FORM3$=" 'LLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLL 'L' 'L'
100 K=180/3.1415927\REM DEGREES IN A RADIAN
105 INPUT "Output file name";OUTF$
106 CONT=0
107 OPEN OUTF$ FOR OUTPUT AS FILE #1#
108 INPUT "(0=MANUAL ENTRY/OTHER !=USE GEODATA FILE) LOCATION DATA SOURCE";QL
109 IF QL=0 THEN GOSUB 8000\GO TO 280
110 ON ERROR GO TO 11000
120 GO TO 135
130 PRINT"*** FILE NOT FOUND ***\PRINT
135 GOSUB 7000\REM LIST AVAILABLE DATA FILES
140 INPUT "Geodata input file to read";INF$
150 OPEN INF$ FOR INPUT AS FILE #2#
180 PRINT
210 INPUT #2#,TITL$
220 INPUT #2#,Q$
222 IF Q$="ENDATA" THEN CLOSE #2#\GO TO 720
224 INPUT #2#,T
225 INPUT #2#,A$

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300 GOSUB 4000
310 IF QL<>0 THEN 220
720 O=0\INPUT"(1=YES) RUN AGAIN";O
730 IF O=1 THEN 100
900 GO TO 10000
2000 REM ### SUNRISE / SUNSET math SUBROUTINE ###
2004 FOR M=1 TO 12\REM MONTH
2005 FOR D=7 TO 28 STEP 7\REM DAY
2007 DTE$=STR$(D)+" "+M$(M)\REM DATECODE
2008 IF D<10 THEN DTE$=" "+DTE$
2010 GOSUB 3000
2015 A=90-((SIN(Y/K))*23.45)
2020 G=(TAN(T/K))/(TAN(A/K))
2030 IF G>1 THEN PRINT #1 USING FORM2$;DTE$,"Polar Region: no sunrise or sunset"
2035 IF G>1 THEN 2100
2040 G=(ATN(G/((1-(G^2))^0.5)))/(K/15)
2050 H=LO/15\J=6-H\E=10-H
2060 IF E>24 THEN E=E-24
2070 IF J<0 THEN J=J+24
2080 IF Z=1 THEN 2100
2085 R=J+G\S=E-G
2090 GO TO 2110
2100 R=J-G\S=E+G
2110 TIM1=R
2120 GOSUB 3000
2130 SR1$=TIM1$\SR2$=TIM2$
2140 TIM1=S
2150 GOSUB 3000
2160 SS1$=TIM1$\SS2$=TIM2$
2170 PRINT #1 USING FORM1$;DTE$,SR1$,SS1$,SR2$,SS2$
2180 NEXT D
2190 NEXT M
2300 RETURN
3000 REM ### YZ - GET SUBROUTINE ###
3010 Z=(M*100)+D
3020 IF Z>320 AND Z<922 THEN Z=1 ELSE Z=0
3030 IF M=1 THEN Y=100
3040 IF M=2 THEN Y=131
3050 IF M=3 AND D<21 THEN Y=160
3060 IF M=3 AND D>20 THEN Y=-20
3070 IF M=4 THEN Y=11
3080 IF M=5 THEN Y=41
3090 IF M=6 THEN Y=72
3100 IF M=7 THEN Y=102
3110 IF M=8 THEN Y=133
3120 IF M=9 AND D<22 THEN Y=164
3130 IF M=9 AND D>21 THEN Y=-21
3140 IF M=10 THEN Y=0
3150 IF M=11 THEN Y=39
3160 IF M=12 THEN Y=69
3170 Y=Y+D
3180 IF A$="N" AND Z=1 THEN Y=Y*(30/31)\REM spring/summer N hemisphere
3190 IF A$="S" AND Z=0 THEN Y=Y*(30/31)\REM spring/summer S hemisphere
3300 RETURN
3800 REM ### TIME SUBROUTINE 1 ###
3805 IF TIM1>24 THEN TIM1=TIM1-24
3807 IF TIM1<0 THEN TIM1=TIM1+24
3810 TYM=INT(60*(TIM1-INT(TIM1)))
3815 IF TYM=60 THEN TYM=59
3820 TIM1=INT(TIM1)+TYM/100
3830 IF M>4 AND M<11 THEN TYM$="EDT" ELSE TYM$="EST"
3840 IF TYM$="EDT" THEN TIM2=TIM1-4 ELSE TIM2=TIM1-5
3850 IF TIM2<0 THEN TIM2=TIM2+24
3860 GOSUB 3900
3870 RETURN
3900 REM ### TIME SUBROUTINE 2 ###
3905 TIM1$=STR$(INT(TIM1))+". "
3906 IF LEN(TIM1$)<3 THEN TIM1$="0"+TIM1$
3907 TYME=J00*(TIM1-INT(TIM1))
3909 IF TYME-INT(TYME)>=.5 AND TYME<59 THEN TYME=1+INT(TYME)\GO TO 3913

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3935 TYM$=" PM "+TYM$\TIM2=TIM2-12
3940 TIM2$=STR$(INT(TIM2))+": "
3945 IF TIM2<10 THEN TIM2$=" "+TIM2$
3950 TYM=100*(TIM2-INT(TIM2))
3952 IF TYM-INT(TYM)>=.5 AND TYM<59 THEN TYM=1+INT(TYM)\GO TO 3955
3953 TYM=INT(TYM)
3955 IF TYM<10 THEN TIM2$=TIM2$+"0"
3960 TIM2$=TIM2$+STR$(TYM)+TYM$\REM LOCAL TIME
3970 RETURN
4000 REM ### PRINT - OUT SUBROUTINE ###
4003 IF CONT=1 THEN PRINT #1," This is file: "+OUTF$+" (continued)"
4004 IF CONT=1 THEN 4007
4005 CONT=1\PRINT #1," This is file: "+OUTF$
4007 PRINT #1," *****"
4010 PRINT #1," Location = ";O$
4020 PRINT #1," Latitude = ";ABS(T);" ";A$
4030 PRINT #1," Longitude = ";ABS(LO);" ";O$
4032 PRINT #1
4035 PRINT #1," TIMES IN GMT TIMES IN EASTERN LOCAL TIME"
4040 PRINT #1," Date Sunrise Sunset Sunrise Sunset"
4045 PRINT #1," _____"
4050 GOSUB 2000\REM MATH
4060 PRINT #1," *****"
4065 PRINT #1,CHR$(12)\REM FORM-FEED
4070 SR1$=""\SS1$=""\SR2$=""\SS2$=""
4100 RETURN
7000 REM ### DATAFILE LIST SUBROUTINE ###
7010 PRINT
7020 PRINT" AVAILABLE GEODATA FILES:"
7030 PRINT" WORLD.DAT"
7040 PRINT" METROBOS.DAT"
7050 PRINT" NORTHAM.DAT"
7060 PRINT" CARIB.DAT"
7070 PRINT" CENTSTHAM.DAT"
7080 PRINT" EURO.DAT"
7090 PRINT" AFRO.DAT"
7100 PRINT" ASIA.DAT"
7110 PRINT" PACIF.DAT"
7980 PRINT
7990 RETURN
8000 REM ### MANUAL - ENTRY SUBROUTINE ###
8200 PRINT\PRINT
8252 INPUT"NAME OF LOCATION";O$
8255 A$=""\PRINT"INPUT"IS LOCATION LATITUDE NORTH (N) OR SOUTH (S)";A$
8256 IF A$<"N" AND A$<"S" THEN PRINT "ILLEGAL ENTRY"\GO TO 8255
8257 PRINT"PRINT"ENTER LOCATION LATITUDE"\GOSUB 9000
8258 T=DEGREES
8260 O$=""\PRINT"INPUT"IS LOCATION LONGITUDE WEST (W) OR EAST (E)";O$
8261 IF O$<"W" AND O$<"E" THEN PRINT "ILLEGAL ENTRY"\GO TO 8260
8262 PRINT"PRINT"ENTER LOCATION LONGITUDE"\GOSUB 9000
8263 LO=DEGREES
8500 RETURN
9000 REM ### COORDINATE ENTRY SUBROUTINE ###
9010 INPUT"DEGREES";DEGREES
9020 IF DEGREES<INT(DEGREES) THEN 9100
9030 INPUT"MINUTES";MINUTES
9040 INPUT"SECONDS";SECONDS
9050 DEGREES=DEGREES+(MINUTES/60)+(SECONDS/3600)
9100 RETURN
9999 REM ### EXIT ###
10000 CLOSE #1
10500 GO TO 12000
11000 RESUME 130
12000 END

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The second program, DARKFIND.E2S, calculates the sunset & sunrise times

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+ 15 min. to sunrise - 15 min.). The following file, CODDRK.TXT, is a sample output of the DARKFIND program:

This is file: CODDRK.TXT

Program = DARKFIND.B2S * Geodata = WORLD.DAT

Date = 28 OCT * Time = 23.00 GMT

Location	Lat.	Long.	TIMES IN GMT		CX now
			Sunset	Sunrise	
USA / MA - W. Yarmouth	41.68 N	70.22 W	22.00	11.20	NIT
USA / MA - Boston	42.36 N	71.06 W	22.03	11.25	NIT
USA / NY - New York City	40.67 N	73.83 W	22.16	11.33	NIT
USA / LA - New Orleans	30.00 N	90.05 W	23.34	12.25	DAY
USA / IL - Chicago	41.83 N	87.75 W	23.10	12.31	DSK
USA / CA - Los Angeles	34.00 N	118.25 W	01.22	14.23	DAY
USA / WA - Seattle	47.58 N	122.33 W	01.20	14.58	DAY
USA / HI - Honolulu	21.32 N	157.03 W	04.13	16.48	DAY
CANADA / ON - Toronto	43.70 N	79.42 W	22.34	12.00	NIT
CANADA / NF - St. John's	47.57 N	52.68 W	20.41	10.19	NIT
COSTA RICA - San Jose	9.98 N	84.07 W	23.28	11.44	DAY
CUBA - Habana	23.12 N	82.42 W	23.10	11.48	DSK
FUERTO RICO - San Juan	18.48 N	66.13 W	22.09	10.39	NIT
BARBADOS - Bridgetown	13.10 N	59.62 W	21.48	10.08	NIT
VENEZUELA - Caracas	10.58 N	66.93 W	22.19	10.36	NIT
BRAZIL - Natal	5.77 S	35.25 W	20.25	08.16	NIT
BRAZIL - Rio de Janeiro	22.88 S	43.28 W	21.11	08.34	NIT
ECUADOR - Quito	0.23 S	78.50 W	23.14	11.13	DSK
ENGLAND - London	51.50 N	0.17 W	17.04	06.57	NIT
FRANCE - Paris	48.87 N	2.33 E	16.59	06.42	NIT
ITALY - Rome	41.88 N	12.50 E	16.29	05.50	NIT
SPAIN - Madrid	40.42 N	3.72 W	17.36	06.53	NIT
PORTUGAL - Lisboa	38.73 N	9.13 W	18.00	07.12	NIT
AZORES - Flores	39.40 N	31.20 W	19.28	08.41	NIT
GERMANY - Langenberg	51.37 N	7.12 E	16.35	06.27	NIT
SWEDEN - Stockholm	59.33 N	18.05 E	15.31	06.04	NIT
CZECHOSLOVAKIA - Prague	50.00 N	14.42 E	16.08	05.56	NIT
USSR - Moscow	55.75 N	37.70 E	14.22	04.35	NIT
GREECE - Athens	38.00 N	23.73 E	15.50	05.00	NIT
ALGERIA - Algiers	36.83 N	3.00 E	17.14	06.21	NIT
SENEGAL - Dakar	14.63 N	17.45 W	18.58	07.21	NIT
NIGERIA - Lagos	6.45 N	3.47 E	17.41	05.51	NIT
ANGOLA - Luanda	8.83 S	13.25 E	17.13	05.00	NIT
SOUTH AFRICA - Cape Town	33.93 S	18.47 E	17.15	04.16	NIT
KENYA - Nairobi	1.28 S	36.83 E	15.33	03.31	NIT
ISRAEL - Tel Aviv	32.00 N	34.77 E	15.12	04.08	NIT
INDIA - New Delhi	28.62 N	77.22 E	12.26	01.15	NIT
CHINA - Beijing	39.92 N	116.42 E	09.36	22.51	DWN
JAPAN - Tokyo	35.67 N	139.75 E	08.08	21.13	DAY
AUSTRALIA - Melbourne	37.82 S	144.97 E	08.53	19.46	DAY
TAHITI - Papeete	17.53 S	149.57 W	04.11	15.44	DAY

DARKFIND.B2S Program Listing

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3 PRNM$="DARKFIND.B2S"
5 PRINT PRINT PRM$ Program = ";PRNM$
7 PRINT WALION DX Labs — Software Division — REV = 28 MAR 1985\PRINT
10 PRINT *****
15 PRINT * NIGHT / DAY PROGRAM **
20 PRINT *****
30 PRINT
40 DIM X$(2),M$(12)
50 DATA "JAN", "FEB", "MAR", "APR", "MAY", "JUN", "JUL", "AUG", "SEP", "OCT", "NOV", "DEC"
60 FOR I=1 TO 12\READ M$(I)\NEXT I
70 FORM1$=" 'LLLLLLLLLLLLLLLLLLLLL ##.## 'LL ##.## 'L"
75 FORM1$=FORM1$+ 'LLLL 'LLLL 'LLL'
80 FORM2$=FORM1$+ 'LLLLLLLLLLLLLLLLL 'LLL'

```

```

3020 IF Z>320 AND Z<922 THEN Z=1 ELSE Z=0
3030 IF M=1 THEN Y=100
3040 IF M=2 THEN Y=131
3050 IF M=3 AND D<21 THEN Y=160
3060 IF M=3 AND D>20 THEN Y=-20
3070 IF M=4 THEN Y=11
3080 IF M=5 THEN Y=41
3090 IF M=6 THEN Y=72
3100 IF M=7 THEN Y=102
3110 IF M=8 THEN Y=133
3120 IF M=9 AND D<22 THEN Y=164
3130 IF M=9 AND D>21 THEN Y=-21
3140 IF M=10 THEN Y=8
3150 IF M=11 THEN Y=39
3160 IF M=12 THEN Y=69
3170 Y=Y+D
3180 IF AS="N" AND Z=1 THEN Y=Y*(30/31)\REM spring/summer N hemisphere
3190 IF AS="S" AND Z=0 THEN Y=Y*(30/31)\REM spring/summer S hemisphere
3300 RETURN
3800 REM *** TIME SUBROUTINE 1 ***
3805 IF TIM1>24 THEN TIM1=TIM1-24
3807 IF TIM1<0 THEN TIM1=TIM1+24
3810 TYM=INT(60*(TIM1-INT(TIM1)))
3815 IF TYM=60 THEN TYM=59
3820 TIM1=INT(TIM1)+TYM/100
3860 GOSUB 3900
3870 RETURN
3900 REM *** TIME SUBROUTINE 2 ***
3903 UIM=INT(TIM1)
3905 TIM1$=STR$(UIM)+"."
3906 IF LEN(TIM1$)<3 THEN TIM1$="0"+TIM1$
3907 TYME=100*(TIM1-INT(TIM1))
3909 IF TYME=INT(TYME)>=.5 AND TYME<59 THEN TYME=1+INT(TYME)\GO TO 3913
3911 TYME=INT(TYME)
3913 UIM=TYME
3914 IF TYME<10 THEN TIM1$=TIM1$+"0"
3915 TIM1$=TIM1$+STR$(TYME)\REM TIME IN GMT
3970 RETURN
4000 REM *** PRINT - OUT SUBROUTINE ***
4001 IF Q$="ENDDATA" THEN 4063
4002 IF LNE=-1 THEN 4005
4003 IF LNE/42<>INT(LNE/42) THEN 4050
4004 LNE=0
4005 IF CONT=1 THEN PRINT #1," This is file: "+OUTF$+" (continued)"
4006 IF CONT=1 THEN 4008
4007 CONT=1\PRINT #1," This is file: "+OUTF$
4008 PRINT #1,STAR$
4020 PRINT #1," Program = ";PRNM$;" * Geodata = ";INF$
4025 PRINT #1
4030 PRINT #1," Date = ";DTE$;" * Time = ";NTF$
4032 PRINT #1
4035 PRINT #1,HDR1$
4040 PRINT #1,HDR2$
4045 PRINT #1,HDR3$
4050 GOSUB 2000\REM MATH
4060 IF LNE=-1 THEN PRINT #1,DASH$\LNE=0
4062 IF (LNE+1)/42<>INT((LNE+1)/42) THEN 4070
4063 PRINT #1,STAR$
4065 PRINT #1,CHR$(12)\REM FORM-FEED
4070 SRI$=" "SS1$=""
4090 LNE=LNE+1
4100 RETURN
6000 REM *** DARK / LIGHT STATUS SUBROUTINE ***
6050 IF UTSS<UTSR THEN UX=2400 ELSE UX=0
6060 UISS=UTSS+UX
6090 IF NT<=(UISS-UX)+25 THEN NT=NT+UX
6110 IF UTSR-25>NT OR UISS+25<NT THEN CX$="NIT"
6120 IF UTSR-25<=NT AND UTSR+25>=NT THEN CX$="DWN"
6130 IF UISS-25<=NT AND UISS+25>=NT THEN CX$="DSK"
6140 IF UTSR+25<=NT AND UISS-25>=NT THEN CX$="DAY"

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96 HDR4$="no s'set/s'rise"
97 STAR$=" "DASH$=STAR$
98 FOR I=1 TO 72\STAR$=STAR$+**\DASH$=DASH$+--\NEXT I
100 K=180/3.1415927\REM DEGREES IN A RADIAN
105 INPUT " Output file name";OUTF$
106 CONT=0
107 OPEN OUTF$ FOR OUTPUT AS FILE #1%
108 PRINT\INPUT " Month #";M\M=INT(M)
109 IF M<1 OR M>12 THEN PRINT " ILLEGAL ENTRY"\GO TO 108
110 PRINT\INPUT " Day #";D\D=INT(D)
111 IF D<1 OR D>31 THEN PRINT " ILLEGAL ENTRY"\GO TO 110
112 IF M=1 OR M=3 OR M=5 OR M=7 OR M=8 OR M=10 OR M=12 THEN 115
113 IF D>30 THEN D=30
114 IF D>28 AND M=2 THEN D=28
115 DTE$=STR$(D)+" "+M$(M)\REM DATECODE
116 IF D<10 THEN DTE$=" "+DTE$
117 PRINT\INPUT " (use 4-digit, GMT, 24-hr. format) Time";NT
118 IF NT<0 OR NT>2359 OR (NT/100)-INT(NT/100)>=60 THEN 120 ELSE 121
120 PRINT " ILLEGAL ENTRY"\GO TO 117
121 QOSUB 6500
122 NT=(100*INT(NT/100))+((NT-(100*INT(NT/100)))/.6)
125 ON ERROR GO TO 11000
127 GO TO 135
130 PRINT " *** FILE NOT FOUND ***"\PRINT
135 GOSUB 7000\REM LIST AVAILABLE DATA FILES
140 INPUT " Geodata input file to read";INF$
150 OPEN INF$ FOR INPUT AS FILE #2%\LINE=-1
160 GOSUB 8000\GOSUB 4000\REM OPERATOR QTH
180 PRINT
210 INPUT #2%,TITL$
220 INPUT #2%,Q$
222 IF Q$="ENDDATA" THEN CLOSE #2%\GO TO 300
224 INPUT #2%,T
225 INPUT #2%,A$
226 INPUT #2%,LO
227 INPUT #2%,O$
300 GOSUB 4000
305 IF Q$="ENDDATA" THEN 720
310 GO TO 220
720 O=0\INPUT " (1=YES) RUN AGAIN";O
730 IF O=1 THEN 108
900 GO TO 10000
2000 REM ### SUNRISE / SUNSET math SUBROUTINE ###
2003 IF A$="S" THEN T=-T
2005 IF O$="W" THEN LO=-LO
2010 GOSUB 3000
2015 A=90-((SIN(Y/K))*23.45)
2020 G=(TAN(T/K))/(TAN(A/K))
2025 IF G<1 THEN 2040
2028 IF G=1 THEN CX$="GRY"\GO TO 2038
2030 IF A$="N" AND Z=1 THEN CX$="DAY"
2032 IF A$="N" AND Z=0 THEN CX$="NIT"
2034 IF A$="S" AND Z=1 THEN CX$="NIT"
2036 IF A$="S" AND Z=0 THEN CX$="DAY"
2038 PRINT #1 USING FORM2$;Q$,ABS(T),A$,ABS(LO),O$,HDR4$,CX$
2039 GO TO 2300
2040 G=(ATN(G/((1-(G^2))^.5)))*(K/15)
2050 H=LO/15\J=6-H\E=10-H
2060 IF E>24 THEN E=E-24
2070 IF J<0 THEN J=J+24
2080 IF Z=1 THEN 2100
2085 R=J+G\S=E-G
2090 GO TO 2110
2100 R=J-G\S=E+G
2110 TIM1=R
2120 GOSUB 3800
2125 UTSR=(UTM*100)+(UTM/.6)
2130 SRI$=TIM1$
2140 TIM1=S

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```

6600 NT2=INT(NT-(100*NT1)+.1)
6620 IF NT2<10 THEN NT$=NT$+"0"
6640 NT$=NT$+STR$(NT2)+" GMT"
6660 RETURN
7000 REM ### DATAFILE LIST SUBROUTINE ###
7010 PRINT
7020 PRINT " AVAILABLE GEODATA FILES:"
7030 PRINT "
7040 PRINT " WORLD.DAT"
7050 PRINT " METROBOS.DAT"
7060 PRINT " NORTHAM.DAT"
7070 PRINT " CARIB.DAT"
7080 PRINT " CENMSTHAM.DAT"
7090 PRINT " EURO.DAT"
7100 PRINT " AFRO.DAT"
7110 PRINT " ASIA.DAT"
7120 PRINT " PACIF.DAT"
7980 PRINT
7990 RETURN
8000 REM ### OP. QTH SUBROUTINE ###
8200 PRINT\PRINT
8090 QD=0
8100 INPUT " (1=YES / ANY OTHER #=NO) USE DEFAULT OPERATOR LOCATION";QD
8110 IF QD<1 THEN 8252
8120 Q$="USA / MA - W. Yarmouth"\A$="N"\T=41.68
8130 O$="W"\LO=78.22\GO TO 8500
8252 PRINT\INPUT " NAME OF OPERATOR LOCATION";Q$
8255 A$=""\PRINT\INPUT " IS OP.LOCATION LATITUDE NORTH (N) OR SOUTH (S)";A$
8256 IF A$<"N" AND A$<"S" THEN PRINT " ILLEGAL ENTRY"\GO TO 8255
8257 PRINT\PRINT " ENIER OP.LOCATION LATITUDE"\GOSUB 9000
8258 T=DEGREES
8260 O$=""\PRINT\INPUT " IS OP.LOCATION LONGITUDE WEST (W) OR EAST (E)";O$
8261 IF O$<"W" AND O$<"E" THEN PRINT " ILLEGAL ENTRY"\GO TO 8260
8262 PRINT\PRINT " ENIER OP.LOCATION LONGITUDE"\GOSUB 9000
8263 LO=DEGREES
8500 RETURN
9000 REM ### COORDINATE ENTRY SUBROUTINE ###
9010 INPUT " DEGREES";DEGREES
9020 IF DEGREES<INT(DEGREES) THEN 9100
9030 INPUT " MINUTES";MINUTES
9040 INPUT " SECONDS";SECONDS
9050 DEGREES=DEGREES+(MINUTES/60)+(SECONDS/3600)
9100 RETURN
9999 REM ### EXIT ###
10000 CLOSE #1%
10500 GO TO 12000
11000 RESUME 130
12000 END

```

(end of article)

G44-9-5

BEAMAC - A "Deluxe" Great Circle Bearing / Distance Program

Mark Connelly — WALION DX Labs — 15 MAR 1985

DXers using directive antennae (such as loops and Beverages on low and medium frequencies or Yagi beams, quads, & rhombics on the higher freq's) need to know the direction and the distance to target DX-station areas in order to optimise antennae. Furthermore, bearings to known target areas aid in the use of direction-finding techniques on unidentified signals.

A world globe and a string can be used to determine approximate direction bearings (horizontal angles) to DX stations; however, use of computer programs allows the rapid determination of many bearings and distances. Several programs have been published in the DX press at various times.

BEAMAC - a versatile great-circle bearing & distance program

This article presents a program with several enhancements over previously-published programs. In short, these are:

1. Data is not stored within the main program. This cuts down on computer-memory usage and reduces the main program's length. Small "satellite" BASIC programs generate disk datafiles. These satellite files give greater versatility: they can be edited, deleted, augmented, etc. (& then re-run to generate fresh datafiles) without effecting the main BEAMAC program. The WORLD.B2S program shown after the main program is one of several satellite datafile-generators. The datafiles (e. g. WORLD.DAT) created by the satellite files are called Geodata files: they contain location data which are not only usable by BEAMAC but by several other programs including the SRSS series sunrise/sunset programs.
2. Sorting Capability. The output can list target sites:
 - (1) by the order in which they are listed in the Geodata file;
 - (2) by order of bearing in degrees east (clockwise) of true north
 - (3) by order of distance from the operator's location
 - (4) by order of targetsite latitude (most northerly to most southerly)
 - (5) by order of targetsite longitude (most westerly to most easterly)
 Geodata files of up to 120 entries may be used.
3. Distance may be specified in statute miles, kilometres, or nautical miles.
4. Operator location can be a programmer-chosen default (see Line 1060) (thus eliminating the need to enter home-site data each time) or any other location (with appropriate coordinate info. entry).
5. Output is in a write-to-disk-textfile format for the benefit of those who want to do word-processing on the output before printing; the PRINT #1 lines can be changed to the appropriate direct-print-to-paper commands if so desired. A single output file may be comprised of several different runs (e.g. same operator site, different sort methods - or same sort method, different operator sites - or same operator site, different Geodata files - etc.) if so desired.
6. Numerous error-handling utilities have been put into the BEAMAC program to keep faulty entries from "hanging up" program execution.

A sample Output File:

This is file: WORLDLIST.TXT

Geodata input file: WORLD.DAT
 Great Circle Bearing & Distance Program: BEAMAC.B2S
 >> ANGLE-SORTED <<

Operator Location: USA / MA - W. Yarmouth
 Lat. = 41.680 N / Long. = 70.220 W

<u>Location</u>	<u>Lat.</u>	<u>Long.</u>	<u>GCB(deg)</u>	<u>GCD(MI)</u>
INDIA - New Delhi	28.62 N	77.22 E	29.1	7148.8
USSR - Moscow	55.75 N	37.70 E	36.2	4498.1
SWEDEN - Stockholm	59.33 N	18.05 E	38.9	3749.6
CZECHOSLOVAKIA - Prague	50.00 N	14.42 E	50.2	3887.7
GERMANY - Langenberg	51.37 N	7.12 E	51.0	3560.2
ENGLAND - London	51.50 N	0.17 W	52.9	3261.1
FRANCE - Paris	48.87 N	2.33 E	55.5	3424.4
ISRAEL - Tel Aviv	32.00 N	34.77 E	56.5	5460.0
GREECE - Athens	38.00 N	23.73 E	57.8	4719.7
CANADA / NF-St. John's	47.57 N	52.68 W	58.7	950.2
ITALY - Rome	41.88 N	12.50 E	59.5	4076.8
SPAIN - Madrid	40.42 N	3.72 W	68.0	3373.7
ALGERIA - Algiers	36.83 N	3.00 E	69.0	3809.1
PORTUGAL - Lisboa	38.73 N	9.13 W	72.4	3159.4
KENYA - Nairobi	1.20 S	36.83 E	79.4	7147.7
AZORES - Flores	39.40 N	31.20 W	81.3	2036.0
NIGERIA - Lagos	6.45 N	3.47 E	96.1	5078.6
ANGOLA - Luanda	8.83 S	13.25 E	100.9	6286.0
SENEGAL - Dakar	14.63 N	17.45 W	104.6	3642.8
SOUTH AFRICA - Cape Town	33.93 S	18.47 E	117.4	7658.4
BRAZIL - Natal	5.77 S	35.25 W	137.3	3947.8
BRAZIL - Rio de Janeiro	22.88 S	43.28 W	153.5	4778.9
BARBADOS - Bridgetown	13.10 N	59.62 W	159.0	2073.7
PUEERTO RICO - San Juan	18.48 N	66.13 W	170.2	1619.9
VENEZUELA - Caracas	10.58 N	66.93 W	173.8	2156.6
EQUADOR - Quito	0.23 S	78.50 W	192.3	2939.6
COSTA RICA - San Jose	9.98 N	84.07 W	205.0	2344.8
CUBA - Habana	23.12 N	82.42 W	212.5	1462.1
USA / LA - New Orleans	30.00 N	90.05 W	240.2	1366.4
TAHITI - Papeete	17.53 S	149.57 W	249.9	6486.1
USA / NY-New York City	40.67 N	73.83 W	250.8	200.1
AUSTRALIA - Melbourne	37.82 S	144.97 E	266.4	10554.7
USA / CA - Los Angeles	34.00 N	118.25 W	274.5	2637.2
USA / IL - Chicago	41.83 N	87.75 W	276.5	901.4
USA / HI - Honolulu	21.32 N	157.83 W	284.8	5129.4
CANADA / ON - Toronto	43.70 N	79.42 W	289.7	487.0
USA / WA - Seattle	47.58 N	122.33 W	297.4	2543.7
USA / MA - Boston	42.36 N	71.06 W	317.6	63.8
JAPAN - Tokyo	35.67 N	139.75 E	335.8	6761.4
CHINA - Beijing	39.92 N	116.42 E	354.9	6778.8

G 44-9-6

"BEAMAC" program listing

{PPP-11 BASIC-PLUS-2 V2.2-00}

```
20 DIM NBR(120),QTH$(120),LATD(120),LAT$(120),LONGD(120)
30 DIM LONG$(120),ANG(120),DIST(120),XSORT(120)
40 PRINT\PRINT
60 PRNAME$="BEAMAC.B2S"
80 PRINT " "+PRNAME$
90 BL$="Great Circle Bearing and Distance"
100 PRINT " "+BL$+" Program with Sorting Capability"
110 PRINT " WALLON DX Labs -- Software Division"
120 PRINT " REV = 15 MAR 1985"
160 PRINT " When entering data, don't use comma , "
170 PRINT
200 DIM Y$(40)
220 RQ=0
240 INPUT " OUTPUT FILE NAME";OUTF$
250 OPEN OUTF$ FOR OUTPUT AS FILE #1
340 FOR I=1 TO 25\PRINT\NEXT I
350 PRINT " Select units of distance:"
360 PRINT " 1 = statute miles"
380 PRINT " 2 = kilometres"
400 PRINT " 3 = nautical miles"
420 INPUT " Distance unit from menu";D
440 IF D<>1 AND D<>2 AND D<>3 THEN PRINT " ILLEGAL ENTRY"\PRINT\GO TO 350
460 IF D=1 THEN D=69.0468\DS="(MI)"\GO TO 600
480 IF D=2 THEN D=111.12\DS="(KM)"\GO TO 600
500 D=60\DS="(NMI)"
600 F$=" Location Lat. Long. GCB(deg) GCD"+DS
610 UL$=" "+UL$
620 F1$=" 'LLLLLLLLLLLLLLLLLLLLLLLLL ###.## 'L ###.## 'L ###.## #####.##"
630 F2$=" 'LLLLLL ##.### 'L 'L 'LLLLLLL ###.### 'L"
635 STAR$=" "\FOR I=1 TO 67\STAR$=STAR$+"*\NEXT I
640 IF D$="(NMI)" THEN UL$=UL$+"*\STAR$=STAR$+"*"
680 P=3.1415927
700 RAD=180/P
720 REM
1000 PRINT\PRINT " *** OPERATOR LOCATION ***"
1020 DOQ=0\INPUT " (1=YES) USE DEFAULT OPERATOR LOCATION";DOQ
1040 IF DOQ<>1 THEN 1080
1060 CQ$="USA / MA - W. Yarmouth"\LA=41.68\UA$="N"\LO=70.22\UO$="W"\GO TO 1290
1080 PRINT\INPUT " NAME OF OPERATOR LOCATION";CQ$
1100 UA$=""\PRINT\INPUT " IS OP QTH LATITUDE NORTH (N) OR SOUTH (S)";UA$
1120 IF UA$<>"N" AND UA$<>"S" THEN PRINT " ILLEGAL ENTRY"\GO TO 1100
1140 PRINT\PRINT " ENTER OP QTH LATITUDE"\GOSUB 6000
1160 LA=DEGREES
1170 IF LA=90 THEN LA=89.99
1180 IF LA>90 OR LA<0 THEN PRINT " ILLEGAL ENTRY"\GO TO 1140
1200 UO$=""\PRINT\INPUT " IS OP QTH LONGITUDE WEST (W) OR EAST (E)";UO$
1220 IF UO$<>"W" AND UO$<>"E" THEN PRINT " ILLEGAL ENTRY"\GO TO 1200
1240 PRINT\PRINT " ENTER OP QTH LONGITUDE"\GOSUB 6000
1260 LO=DEGREES
1270 IF LO=180 THEN LO=179.99
1280 IF LO<0 OR LO>180 THEN PRINT " ILLEGAL ENTRY"\GO TO 1240
1290 IF UA$="S" THEN LA=-LA
1300 IF UO$="E" THEN LO=-LO
1310 LT=LA/RAD\LG=LO/RAD
2400 REM " *** O U T P U T ***"
2460 MM=0
2465 ON ERROR GO TO 11000
2466 GO TO 2468
2467 PRINT " *** FILE NOT FOUND ***"\PRINT
2468 GOSUB 7000\INPUT " Geodata input file to read";INF$
2469 OPEN INF$ FOR INPUT AS FILE #2
2470 PRINT\PRINT
2478 PRINT\INPUT " Output sorting method (from menu)";YSORT
2480 YSORT=INT(ABS(YSORT))
2485 IF YSORT<1 OR YSORT>5 THEN YSORT=1\REM DATA-FILE ORDER IS DEFAULT
2486 IF YSORT=1 THEN YSORT$="DATAFILE-ORDER-SORT"
2487 IF YSORT=2 THEN YSORT$="ANGLE-SORTED"
2488 IF YSORT=3 THEN YSORT$="DISTANCE-SORTED"
2489 IF YSORT=4 THEN YSORT$="LATITUDE-SORTED"
2490 IF YSORT=5 THEN YSORT$="LONGITUDE-SORTED"
2495 PRINT\PRINT\PRINT
2500 INPUT #2,B2$\REM DATA FILE TITLE
2550 GOSUB 4400
2560 FOR MN=1 TO MM
2565 IF MN>40 THEN CONT$=" (continued)" ELSE CONT$=""
2570 IF (MN-1)/40<>INT((MN-1)/40) THEN 2710
2600 PRINT #1
2605 IF RQ=0 THEN RQ$="" ELSE RQ$=" (continued)"
2610 PRINT #1," This is file: "+OUTF$+RQ$
2620 PRINT #1,STAR$
2630 PRINT #1
2640 PRINT #1," Geodata input file: "+B2$
2650 PRINT #1," Great Circle Bearing & Distance Program: "+PRNAME$
2655 PRINT #1," >> "+YSORT$+" << "+CONT$
2660 PRINT #1
2670 PRINT #1," Operator Location: ";CQ$
2680 PRINT #1 USING F2$;Lat. =" ,ABS(LA),UA$,"/", "Long. =" ,ABS(LO),UO$
2690 PRINT #1
2700 PRINT #1,F$\PRINT #1,UL$\PRINT #1
2710 KK=NBR(MN)
2720 PRINT #1 USING F1$;QTH$(KK),LATD(KK),LAT$(KK),
LONGD(KK),LONG$(KK),ANG(KK),DIST(KK)
2850 IF MN=MM THEN 2870
2860 IF MN/40<>INT(MN/40) THEN 2900
2870 PRINT #1\PRINT #1,STAR$
2880 PRINT #1,CHR$(12)\REM FORM-FEED
2900 NEXT MN
3030 RQ=0
3040 INPUT " (append to existing output file) (1=YES) Run pgm. again";RQ
3060 IF RQ<>1 THEN 10000
3070 SQ=0
3075 INPUT " (1=YES, ANY OTHER NUMBER=NO) SAME OPERATOR LOCATION";SQ
3080 IF SQ = 1 THEN 2400 ELSE 1000
3500 REM ### M A T H S U B R O U T I N E ###
3520 A2=A1\O2=O1
3540 IF A2$="S" THEN A1=-A1
3560 IF O2$="E" THEN O1=-O1
3620 A1=A1/RAD
3640 O1=O1/RAD
3660 L=LG-O1\IF L=0 THEN 4020
3680 IF L>P THEN L=L-(2*P)
3700 IF L<-P THEN L=L+(2*P)
3720 AA=COS(L)*(COS(A1)/SIN(A1))
3730 AA=ATN(AA)
3740 AZ=((COS(L)/SIN(L))*COS(LT+AA))/SIN(AA)
3750 AZ=ATN(1/AZ)
3760 AZ=AZ*RAD\I=L*RAD
3780 IF L>0 AND AZ<0 THEN AZ=AZ+180
3800 IF L<0 AND AZ>0 THEN AZ=AZ-180
3820 IF L<0 AND AZ<0 THEN AZ=AZ+360
3840 AZ=(INT((10*AZ)+.5))/10
3860 DX=(SIN(LT)*SIN(A1))+COS(LT)*COS(A1)*COS(L/RAD)
3880 DX=((1-(DX*2)).5)/DX
3900 IF LG=O1 THEN 4060
3920 DX=ATN(DX)
3940 DX=DX*RAD
3950 IF DX<0 AND AZ<0 THEN DX=DX+180
```

G44-9-87

```
4060 IF LT>A1 THEN DX=LT-A1\GO TO 3940
4080 IF LT<A1 THEN DX=A1-LT\GO TO 3940
4100 RETURN
4400 REM ### DATA SUBROUTINE ###
4410 MM=MM+1
4420 INPUT #2%,Q5\REM LOCATION NAME
4422 IF Q5="ENDDATA" OR MM>120 THEN CLOSE #2%\MM=MM-1\GO TO 4439
4424 INPUT #2%,A1\REM LATITUDE IN DEGREES
4425 INPUT #2%,A2S\REM LATITUDE N/S
4426 INPUT #2%,O1\REM LONGITUDE IN DEGREES
4427 INPUT #2%,O2S\REM LONGITUDE E/W
4430 GOSUB 5000\REM MATH
4431 NBR(MM)=MM
4432 Q1H$(MM)=Q5
4433 LATD(MM)=A2\LATS(MM)=A2S
4434 LONGD(MM)=O2\LONGS(MM)=O2S
4435 ANG(MM)=AZ
4436 DIST(MM)=DX
4438 GO TO 4410
4439 IF YSORT=1 THEN 4450
4440 GOSUB 5000\REM SORT
4450 RETURN
5000 REM ### SORT SUBROUTINE ###
5013 FOR I=1 TO MM
5014 IF YSORT=2 THEN XSORT(I)=ANG(I)
5015 IF YSORT=3 THEN XSORT(I)=DIST(I)
5016 IF YSORT=4 AND LATS(I)="N" THEN XSORT(I)=90-LATD(I)
5017 IF YSORT=4 AND LATS(I)="S" THEN XSORT(I)=90+LATD(I)
5018 IF YSORT=5 AND LONGS(I)="W" THEN XSORT(I)=180-LONGD(I)
5019 IF YSORT=5 AND LONGS(I)="E" THEN XSORT(I)=180+LONGD(I)
5020 NEXT I
5025 FOR I=1 TO MM
5030 FOR J=1 TO MM-I
5040 IF XSORT(J)<XSORT(J+1) THEN 5200
5100 TEMP1=XSORT(J)\TEMP2=NBR(J)
5105 XSORT(J)=XSORT(J+1)\NBR(J)=NBR(J+1)
5190 XSORT(J+1)=TEMP1\NBR(J+1)=TEMP2
5200 NEXT J
5210 NEXT I
5240 RETURN
6000 REM ### COORDINATE ENTRY SUBROUTINE ###
6010 INPUT" DEGREES";DEGREES
6020 IF DEGREES<>INT(DEGREES) THEN 6100
6030 INPUT" MINUTES";MINUTES
6040 INPUT" SECONDS";SECONDS
6050 DEGREES=DEGREES+(MINUTES/60)+(SECONDS/3600)
6100 RETURN
7000 REM ### DATAFILE LIST SUBROUTINE ###
7010 PRINT
7020 PRINT" AVAILABLE GEODATA FILES:"
7030 PRINT" WORLD.DAT"
7040 PRINT" METROBOS.DAT"
7050 PRINT" NORTHAM.DAT"
7060 PRINT" CARIB.DAT"
7070 PRINT" CENTSTHAM.DAT"
7080 PRINT" EURO.DAT"
7090 PRINT" AFRO.DAT"
7100 PRINT" ASIA.DAT"
7110 PRINT" PACIF.DAT"
7980 PRINT
7990 RETURN
9999 REM *** EXIT ***
10000 CLOSE #1%
10500 GO TO 12000
```

Sample Geodata File Generator (one needed for each data file;
lines 105-108, 1005-2000 are common
to all data file generator pgms.)

```
5 REM >>> WORLD.DAT DATA FILE GENERATOR <<<
10 PRINT"PRINT"WORLD.B25"PRINT
105 REM Data is in the form of Location name, Latitude(deg.),
106 REM Latitude designator (N or S), Longitude (deg.),
107 REM Longitude designator (E or W)
108 REM 40 data lines per file is 'normal' configuration
110 DATA "USA / MA - Boston",42.36,"N",71.063,"W"
120 DATA "USA / NY-New York City",40.67,"N",73.83,"W"
130 DATA "USA / LA - New Orleans",30,"N",90.05,"W"
140 DATA "USA / IL - Chicago",41.83,"N",87.75,"W"
150 DATA "USA / CA - Los Angeles",34,"N",118.25,"W"
160 DATA "USA / WA - Seattle",47.58,"N",122.33,"W"
165 DATA "USA / HI - Honolulu",21.32,"N",157.83,"W"
170 DATA "CANADA / ON - Toronto",43.7,"N",79.42,"W"
180 DATA "CANADA / NF-St. John's",47.57,"N",52.68,"W"
190 DATA "COSTA RICA - San Jose",9.98,"N",84.07,"W"
200 DATA "CUBA - Habana",23.12,"N",82.42,"W"
210 DATA "PUERTO RICO - San Juan",18.48,"N",66.13,"W"
220 DATA "BARBADOS - Bridgetown",13.1,"N",59.62,"W"
230 DATA "VENEZUELA - Caracas",10.58,"N",66.93,"W"
240 DATA "BRAZIL - Natal",5.77,"S",35.25,"W"
250 DATA "BRAZIL - Rio de Janeiro",22.88,"S",43.28,"W"
260 DATA "ECUADOR - Quito",0.23,"S",78.5,"W"
270 DATA "ENGLAND - London",51.5,"N",0.17,"W"
280 DATA "FRANCE - Paris",48.87,"N",2.33,"E"
290 DATA "ITALY - Rome",41.88,"N",12.5,"E"
300 DATA "SPAIN - Madrid",40.42,"N",3.72,"W"
310 DATA "PORTUGAL - Lisboa",38.73,"N",9.13,"W"
320 DATA "AZORES - Flores",39.4,"N",31.2,"W"
330 DATA "GERMANY - Langenberg",51.37,"N",7.12,"E"
335 DATA "SWEDEN - Stockholm",59.333,"N",18.05,"E"
340 DATA "CZECHOSLOVAKIA - Prague",50.08,"N",14.42,"E"
350 DATA "USSR - Moscow",55.75,"N",37.7,"E"
360 DATA "GREECE - Athens",38,"N",23.73,"E"
370 DATA "ALGERIA - Algiers",36.83,"N",3,"E"
380 DATA "SENEGAL - Dakar",14.63,"N",17.45,"W"
390 DATA "NIGERIA - Lagos",6.45,"N",3.47,"E"
400 DATA "ANGOLA - Luanda",8.83,"S",13.25,"E"
410 DATA "SOUTH AFRICA - Cape Town",33.93,"S",18.47,"E"
420 DATA "KENYA - Nairobi",1.28,"S",36.83,"E"
430 DATA "ISRAEL - Tel Aviv",32.08,"N",34.77,"E"
440 DATA "INDIA - New Delhi",28.62,"N",77.22,"E"
450 DATA "CHINA - Beijing",39.92,"N",116.42,"E"
460 DATA "JAPAN - Tokyo",35.67,"N",139.75,"E"
470 DATA "AUSTRALIA - Melbourne",37.817,"S",144.967,"E"
480 DATA "TAHITI - Papeete",17.53,"S",149.57,"W"
500 DATA "ENDDATA"
1000 OUTP$="WORLD.DAT"
1005 OPEN OUTP$ FOR OUTPUT AS FILE #1%
1010 PRINT "OUTPUT FILE = ";OUTP$
1020 PRINT #1%,OUTP$\REM TITLE
1500 READ Q5
1510 PRINT #1%,Q5
1520 IF Q5="ENDDATA" THEN 1600
1530 READ T,A,S,LO,Q5
1540 PRINT #1%,T
1545 PRINT #1%,A$
1550 PRINT #1%,LO
1560 PRINT #1%,Q5
1570 GOTO 1500
```

644-9-8

Automatic Sort-by-Frequency Program for DX Loggings

Mark Connelly — WALION DX Labs — 24 JAN 1985

Often the DXer has a need to put his or her loggings into order by frequency. This article presents a BASIC program which allows frequencies (and up to five lines of accompanying text data per frequency) entered in random frequency order to produce an output of logged stations in correct frequency order. This is of considerable benefit to editors of columns of loggings of DX by different club members. This version of the program provides both screen display and output to a disk file whose name is selected by the user. The disk text file may be edited further through word-processing software or it may be sent, as is or modified, to a line printer or other peripheral device. Those using computers not having disk text file output capability can modify the output statements to provide direct printing to paper.

The program can be configured to give an interim screen display of all frequencies entered so far during the run, in order, prior to final print-to-disk (or print-to-paper). This is handy during DXpeditions to give an idea of what's been heard so far, in a form which can help multiple-operator teams reduce inefficiency and duplication of effort.

A blow-by-blow / play-by-play description of the program should not be totally necessary, because the program is somewhat self-documenting and because a sample output file has been included at the end. Aside from frequency/loggings sortings, the program is readily adaptable to sortings of other kinds of data tying a number and descriptive text. Examples include part numbers/part descriptions, prices/items, times/events.

(Program Listing) (DEC PDP-11 BASIC-PLUS-2 v2.2-000)

```
5 PRINT\PRINT"AUTOSORT2.E2S"
7 PRINT"Automatic Sorting Program, with Text-File & CRT outputs"
10 PRINT"WALION DX Labs / Software Division: REV. = 24 JAN 1985"\PRINT
11 DIM T1$(200),T2$(200),T3$(200),T4$(200),T5$(200)
12 DIM E(200),F(200),FA(200),HA(200),HB(200)
13 STARS$="*****"
14 W=1E30\ME=0
15 PRINT\INPUT "DATA OUTPUT FILE TITLE";S$
20 OPEN S$ FOR OUTPUT AS FILE #1#
21 PRINT #1,STARS\PRINT #1\PRINT #1," This is file: ";S$\PRINT #1
22 IF ME=1 THEN 50
25 Q1=0\PRINT\INPUT "(1=YES) ARE INTERIM LISTS WANTED";Q1
30 D=0\PRINT\INPUT "(1=YES) INCLUDE DUPLICATE ENTRIES";D
35 T=0\PRINT\INPUT "(1=YES) INFO. TEXT ENTRY OPTION";T
46 X=0
50 FOR N=X+1 TO 200 \ REM UP TO 200 ENTRIES
60 PRINT\INPUT "ENTER A NUMBER, OR 0 TO STOP";F(N)
61 E(N)=F(N)\Q2=F(N)
62 IF F(N)=0 THEN M=N-1\GO TO 500
63 IF T<>1 THEN T1$(N)="*NO"\GO TO 79
64 PRINT\PRINT"*** Maximum of 5 lines of text per number entered ***"
65 GOSUB 5000
67 INPUT "TEXT LINE 1";T1$(N)\IF T1$(N)="*NO" THEN 79 ELSE GOSUB 5000
68 INPUT "TEXT LINE 2";T2$(N)\IF T2$(N)="*NO" THEN 79 ELSE GOSUB 5000
```

```
69 INPUT "TEXT LINE 3";T3$(N)\IF T3$(N)="*NO" THEN 79 ELSE GOSUB 5000
70 INPUT "TEXT LINE 4";T4$(N)\IF T4$(N)="*NO" THEN 79 ELSE GOSUB 5000
71 INPUT "TEXT LINE 5 (FINAL LINE 1)";T5$(N)
79 IF Q1=1 THEN M=N\GOSUB 1000 \ REM SORTER
80 NEXT N
500 GOSUB 1000
510 C=0\PRINT\INPUT "(1=YES) ANOTHER COPY";C
520 IF C=1 THEN 500
530 PRINT\INPUT "(1=YES) MORE ENTRIES";ME
540 IF ME=1 AND C<>1 THEN PRINT #1\PRINT #1,STARS\CLOSE #1\X=M\GO TO 20
550 GO TO 10000
1000 REM SUB SORTER
1003 IF Q1=1 OR Q2=0 THEN PRINT
1005 IF C=1 THEN 1000
1010 FOR K=1 TO M
1020 FA(K)=W
1030 FOR J=1 TO M
1040 IF E(J)<FA(K) THEN FA(K)=E(J)\HA(K)=J
1050 NEXT J
1055 G=HA(K)
1060 E(G)=W
1070 NEXT K
1080 IF D=1 THEN 1200
1085 IF C=1 THEN 1172
1090 L=0
1100 FOR J=1 TO M
1105 IF M=1 THEN L=1\HB(L)=HA(J)\GO TO 1172
1110 IF J=M THEN 1170
1120 IF FA(J)<FA(J+1) THEN L=L+1\HB(L)=HA(J)
1130 NEXT J
1170 IF FA(J)>FA(J-1) THEN L=L+1\HB(L)=HA(J)
1172 PRINT
1175 FOR J= 1 TO L
1176 H=HB(J)
1177 E$=STR$(F(H))
1180 GOSUB 2000
1182 GOSUB 3000
1185 NEXT J
1190 GO TO 1300
1200 FOR J=1 TO M
1201 H=HA(J)
1202 E$=STR$(F(H))
1203 GOSUB 2000
1210 GOSUB 3000
1220 NEXT J
1230 IF C=1 THEN 1350
1300 FOR J=1 TO M
1310 E(J)=F(J)
1320 NEXT J
1350 RETURN
2000 REM SUB LENGTH NORMALISE
2010 R=LEN(E$)
2020 IF R>10 THEN 2200
2030 FOR FX=R TO 10
2040 E$=" "+E$
2050 NEXT FX
2200 R=LEN(E$)+2
2210 EES$=""FOR FX=1 TO R\EES=EES+" "\NEXT FX
2250 RETURN
3000 REM ** TEXTPRINT SUBROUTINE MODULE A **
3010 IF T1$(H)<>"*NO" THEN F$=E$+" "+T1$(H)\ELSE F$=E$
3014 PRINT
3016 IF Q2=0 AND C<>1 THEN PRINT #1
```


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```
3500 REM ** TEXTPRINT SUBROUTINE MODULE B **
3520 PRINT F$
3540 IF Q2=0 AND C<>1 THEN PRINT #1,F$
3600 RETURN
5000 REM ** TEXT ENTRY PROMPT SUBROUTINE **
5020 PRINT
5040 PRINT"  ENTER INFORMATIONAL TEXT IF DESIRED"
5060 PRINT"  HIT RETURN FOR BLANK LINE TO BE FOLLOWED BY TEXT LINES"
5080 PRINT"  ENTER *NO IF NO FURTHER TEXT LINES"
5090 PRINT"DON'T USE , DURING TEXT ENTRY (choose alternate symbol such as""
5095 PRINT" ; then change to , with SEARCH/REPLACE in word processor pgm.)"
5100 PRINT
5200 RETURN
10000 PRINT #1\PRINT #1,STARS\CLOSE #1%
10020 PRINT"QQ=0\INPUT"(1=YES) ,GENERATE ANOTHER FILE";QQ
10040 IF QQ=1 THEN ME=0\GO TO 15
10100 END
```

(Sample printout of a text file created by AUTOSORT2 program)
(Items were entered in random frequency order: 1510, 566, 1010,
890, 1165, 1214)

This is file: AUG63DX.LOG

- 566 Ireland - Athlone - AUG 03 @ 0500 Z
Reels; jigs; other folk music REALLY GREAT SIGNAL on
car radio in my '57 Chevy convertible -- heard while
girl-watching at beach in Hyannis. (DeLorenzo - Mass.)
- 890 WLS - Chicago Ill. - AUG 28 @ 0900 Z
Surfin' music including "Surf City" by Jan & Dean.
Good level. Frequency measured at 890.000012 kc using
\$4000 General Radio freq. counter with Nixie readout.
Covered by TA's before 0500 Z. (GPN - Mass.)
- 1010 WINS - New York N. Y. - AUG 20 @ 0245 Z
Good w/"Murray the K's Swingin' Soiree" - many soul hits
were played; signal peaked up well (despite Holland - 1007
splatter) during Fingertips Part II by Stevie Wonder.
Newfangled Loop Antenna helped. (Monferini-ITALY)
- 1165 Swan Island (or is this a flying transmitter ?) R.Americas
- AUG 15 @ 0330 Z - SS translation of a recent JFK speech
about Fidel's mother's army boots. Annihilating adjacent
WVA/KSL. (CMS-Ont.) + Ditto (Kneitel-N.Y.)
+ Likewise (RFS-Fla.)
- 1214 England - BBC Light Service - AUG 25 @ 0145 Z
Music by a British rock 'n' roll group - Name given
by DJ sounded like Beagles or Beetles. Often heard
at sunset on 8 transistor Realistic portable here at
beach cottage in West Dennis. (MC-Mass.)
- 1510 WMEX - Boston Mass. - AUG 22 @ 0100 Z
Arnie "Woo Woo" Ginsberg show featuring ads for 25 cent
cheeseburgers & \$1 clam boxes at Adventure Car Hop
in Saugus. An ad for a Esso service station in
Medford mentioned 29 cent/gallon gas. (Slater-UK)
