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SCINTDR – A Program for Controlling the Fremouw Scintillation Model

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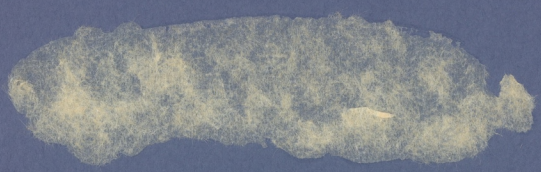

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Space Environment Laboratory
Boulder, Colorado
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SCINTDR -- A PROGRAM FOR CONTROLLING THE FREMOUW SCINTILLATION MODEL

T. A. Burrows
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ABSTRACT

A description of a program that computes the ionospheric scintillation index as a function of a number of input variables, such as transmitter frequency, sunspot number, time, and other parameters relating to transmitter-receiver geometry, is presented. The program, obtained from Stanford Research Institute, has been modified at NOAA for operation with the NOAA computational facility and for ease in inputting various parameters.

I. INTRODUCTION

A new program for controlling the Fremouw scintillation subroutine has been developed (for use on the CDC 3800). The printed output is not as flexible as that obtained from the original driver program, but the new program allows more control over the manner in which the input parameters are incremented and also allows the semiautomatic production of punched output that may be directly submitted to the contour-plotting program.

The only data set that the user must present to the program is a small control program written in the control language described in section III. The control program directs the way in which the input parameters to the scintillation subroutine are set and incremented; it also regulates the printing and punching of output. One may scan a grid by nesting parameter-incrementing loops.

The time required for executing the program is approximately 10+n/40 seconds where n is the number of scintillation computations required.

II. INPUT AND OUTPUT VARIABLES

The 10 input parameters and their units are as follows:

Parameter	Unit
transmitter frequency	megahertz
sunspot number	dimensionless
day	1.0 to 365.0
time of day (at receiver)	0.0 to 24.0
receiver latitude	degrees
receiver longitude	degrees
receiver height	meters (always zero in the current version)
transmitter longitude	degrees
transmitter latitude	degrees
transmitter height	meters

All are in a floating point format. The following output parameters contain the results of a scintillation computation:

S3 (S4) (scintillation index)
PHI (rms phase-shift)
rms delta-N
azimuth
elevation
time at ionospheric penetration point
geomagnetic latitude of penetration point
BIGPHI (S3 is huge and therefore invalid)
BELOW (transmitter is below the horizon; S3 and PHI will be set to zero).

All of the above mentioned input and output variables are automatically printed each time a scintillation computation takes place (all on one line), except that the current

version does not allow the receiver height to be printed because it is not changed during program execution. All of the other nine input variables must be explicitly set in the control program before a scintillation computation is performed. The variable S3 is printed, not S4 (S3 = .73*S4); and BIGPHI and BELOW are logical variables which print as 0 or 1. On the column heading, ↑ means BIGPHI and ↓ means BELOW.

III. THE CONTROL LANGUAGE

The control language has a format resembling that of an assembly language. Each statement (instruction) goes on a separate card and has four fields:

Columns	Designation	Description
1	K	Control field containing an operation code which specifies one of the six instructions: blank, +, D, C, P, S. (See below for definition of these instructions.)
2-6	OP	If K=D, C, or S, OP is blank. If K=blank or +, OP is the three- or four-letter name of one of the input parameters: FREQ, SSN, DAY, TIME, RLAT, RLON, TLAT, TLON, THT. If K=P, then OP = BEGIN or END.
7-10	Unused	The contents of this field must be left justified.
11-20	Z_1	If K= blank or +, Z_1 contains a real number in the Fortran F10.0 format; otherwise, this field is blank.

21-30	Z_2	This field contains a real number K=+.
31-80	Unused	

After the control program has been loaded, instructions are executed sequentially beginning with the first. Column headings are printed before the control program is started. The only branching that takes place is in the D-C (DO-CONTINUE) loops. Normal termination takes place when the interpreter runs off the end of the program (i.e., the end-of-file card acts like a STOP command).

The six instructions are described below:

DO (K=D)

Use this instruction, whose address is recorded on top of a stack, to transfer control to the instruction immediately following this DO statement when the matching CONTINUE statement is encountered.

CONTINUE (K=C)

Continue program execution at the instruction immediately following the DO statement that matches the CONTINUE statement. (The address of the DO is on top of the stack.) The CONTINUE acts like a GO TO statement; incrementing and testing of the indexing variables takes place not in the DO or CONTINUE statements, but in the + instructions.

SET PARAMETER (K=blank)

Set the variable whose name appears in the OP field to the value in the Z_1 field.

INCREMENT PARAMETER (K=+)

Increment the variable whose name appears in the OP field by the value in the Z_1 field ($Z_1>0.0$). If the result is $\leq$ Z_2, continue on to the next instruction; otherwise, exit at the current D-C loop by transferring control to the instruction after the CONTINUE statement.

COMPUTE SCINTILLATION (K=S)

Execute the Fremouw scintillation subroutine by using the current values of the input parameters. Set S3 and PHI to zero if the transmitter is below the horizon; then print the results on a single line. Put 53 into the punch buffer if the punch is on. (Punch the buffer if it is off.)

PUNCH CONTROL (K=P)

Use this instruction for controlling the punched output and for printing markers between different sets of data generated during a single run. The OP field may contain the word BEGIN or END. Details are in the next section.

IV. PUNCHED OUTPUT

All values of S3 (scintillation index) that are computed may be saved on punched cards by turning the punch on before doing the computations. Initially, the punch is off; it may be turned on with a P BEGIN instruction. This statement may be executed more than once, even though the punch cannot be stopped once it is turned on. In addition to turning the punch on (if it is not already on), P BEGIN causes a page ejection, the printing of column heading, and three cards with asterisks in the first five columns to be punched. This instruction is useful for separating different sets of output that are all produced during one run.

Once the punch has been turned on, a value of S3 will be saved in the punch buffer each time the S command is executed. Whenever this buffer becomes full (it holds 16 numbers), the value of S3 that is held by the buffer is punched onto a card in 16F5.3 format; the buffer is thus cleared.

The PEND command will cause anything in the buffer to be sent to the punch. This command is usually given just after an innermost loop is finished; for example:

```
.
.
.
P BEGIN
.
.
.
D
S
+RLON       2.5      95.
C
PEND
.
.
.
C
.
.
.
```

Thus, one Fortran READ may be used to pick up each set of data that was generated by an innermost loop.

In addition to flushing the buffer, the PEND command causes a line of dashes to be printed. This is a lower level of separation than column headings. PEND may be used for this purpose even though the punch is off.

When scanning a grid on the earth's surface, increment the longitude in the innermost loop. This is necessary to make the punched output compatible with the contour-plotting program.

V. ERROR MESSAGES

Several user errors can be detected by this program; one at the time the control program is loaded, and others when their execution is attempted:

CONTROL PROGRAM TOO LONG

The limit is 50 instructions (detected at load time).

UNRECOGNIZABLE COMMAND

Column 1 is not D, C, S, P, blank, or +. User probably meant to use the SET PARAMETER instruction, but has forgotten the blank in the K field, thus putting the first letter of the parameter name in that column (detected at run time).

DO WITHOUT MATCHING CONTINUE

In any program, the number of DO's must equal the number of CONTINUEs. One CONTINUE will not terminate more than one DO loop (detected at run time).

UNRECOGNIZABLE VARIABLE NAME

User probably meant to use the SET PARAMETER instruction, but has forgotten the blank in the K field, so that only the last letters of the parameter name went in the OP field (detected at run time).

VI. EXAMPLE

Suppose the problem is the following:

frequency = 40 MHz
sunspot number = 100
day = 81, and 172
time = midnight at 0° long
receiver longitude = 80°W to 80°E in steps of 5°
receiver latitude = 40°S to 40°N in steps of 5°
transmitter geostationary at 0° lat, 10°E (Height = 35.8 E6 meters).
Two grids are called for, each having a different DAY number.

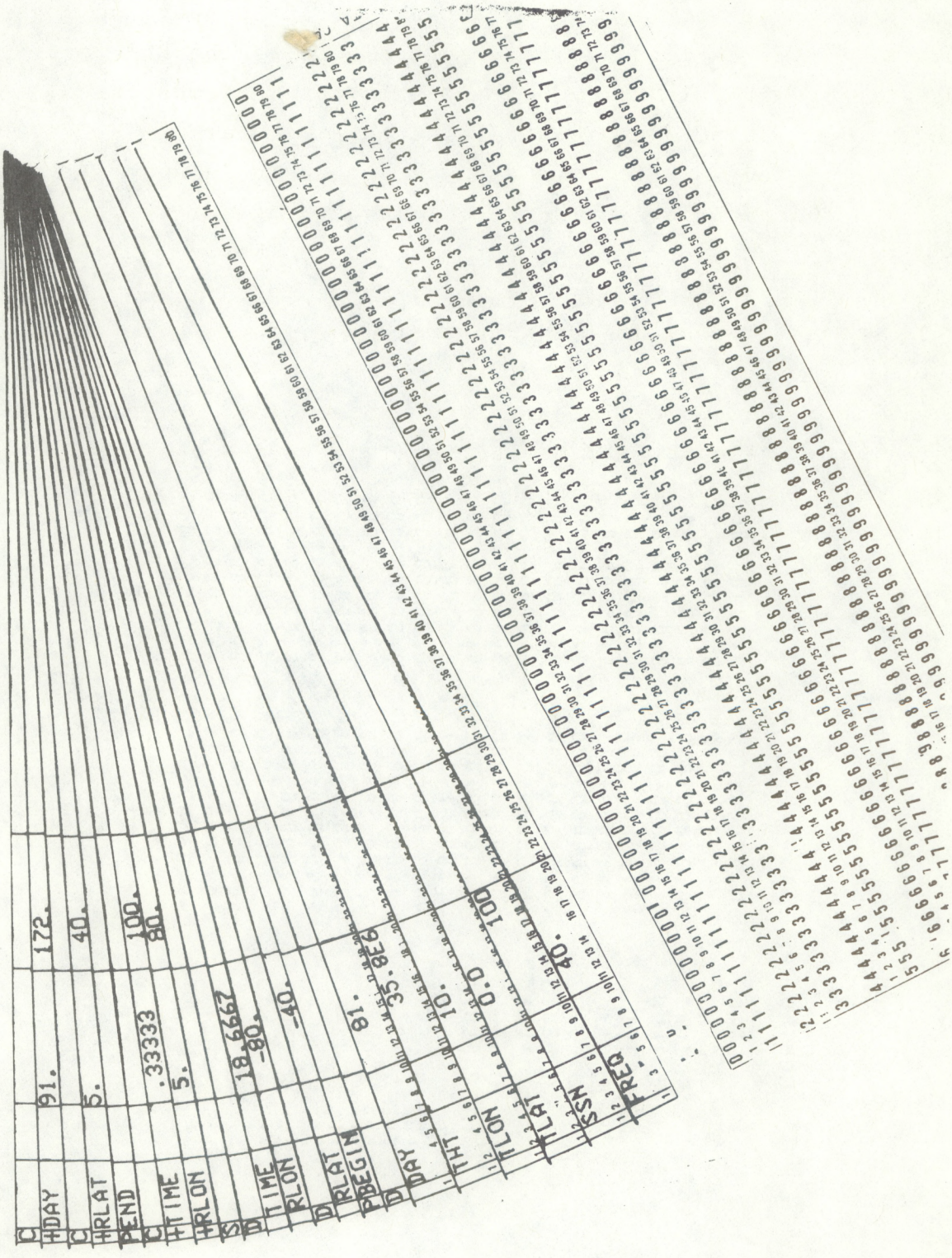
Notice that as the receiver longitude is stepped, the time must also be stepped.

The control program to solve this problem appears on page 9. The deck shown would be inserted between the RUN card and the end-of-file card. Notice that the TIME must be initialized at 80°W to 18.6667 since the time at 0° is 24.00.

The printed output of the example is shown in Appendix A; the control program is listed, column headings are printed, and several pages of the output are shown. Notice that breaks occur when the latitude is incremented and when the DAY changes. Also, in the innermost loop, the +RLON instruction will be the one that determines when the loop is satisfied; therefore, in the +TIME instruction, the Z_2 field is almost irrelevant and may be set to a very large number. This method of termination is easier than computing the final value beforehand.

The flow chart for the SCINTDR program is shown in Appendix B.

CONTROL PROGRAM EXAMPLE



```
CONTROL PROGRAM:
 ↓  ↓
    FREQ        4.00000+001    -0.00000+000
    SSN         1.00000+002    -0.00000+000
    TLAT        0.00000+000    -0.00000+000
    TLON        1.00000+001    -0.00000+000
    THT         3.58000+007    -0.00000+000
    DAY         8.10000+001    -0.00000+000
----D          -0.00000+000    -0.00000+000
    P BEGIN     -0.00000+000    -0.00000+000
    RLAT        -4.00000+001    -0.00000+000
  --D           -0.00000+000    -0.00000+000
    RLON        -8.00000+001    -0.00000+000
    TIME         1.86667+001    -0.00000+000
  --D           -0.00000+000    -0.00000+000
    S           -0.00000+000    -0.00000+000
    + RLON       5.00000+000     8.00000+001
    + TIME       3.33330-001     1.00000+002
  --C           -0.00000+000    -0.00000+000
    P END       -0.00000+000    -0.00000+000
    + RLAT       5.00000+000     4.00000+001
  --C           -0.00000+000    -0.00000+000
    + DAY        9.10000+001     1.72000+002
----C          -0.00000+000    -0.00000+000
 ↑  ↑                ↑               ↑
 k  ØP              z1              z2
```

Blank fields are printed as -0.

FREQ	SSN	DAY	TIME	RLAT	RLON	GMLAT	TLAT	TLON	THT	S3	PHIO	CN	AZ	EL	TIME	**
40	100	81.0	18.67	-40.00	-80.00	-23.48	0.00	10.00	3.58+007	0.000	0.00	1.05+009	90.0	-8.6	21.06	01
40	100	81.0	19.00	-40.00	-75.00	-23.90	0.00	10.00	3.58+007	0.000	0.00	9.64+008	86.8	-4.4	20.97	01
40	100	81.0	19.33	-40.00	-70.00	-24.33	0.00	10.00	3.58+007	0.000	0.00	9.0E+008	83.5	-1.0	20.94	01
40	100	81.0	19.67	-40.00	-65.00	-24.75	0.00	10.00	3.58+007	0.445	0.55	8.76+008	80.2	2.8	20.97	00
40	100	81.0	20.00	-40.00	-60.00	-25.17	0.00	10.00	3.58+007	0.412	1.53	8.51+008	76.6	6.6	21.05	00
40	100	81.0	20.33	-40.00	-55.00	-25.58	0.00	10.00	3.58+007	0.381	0.51	8.43+008	73.3	10.3	21.17	00
40	100	81.0	20.67	-40.00	-50.00	-26.00	0.00	10.00	3.58+007	0.352	0.50	8.40+008	69.8	14.1	21.37	00
40	100	81.0	21.00	-40.00	-45.00	-26.45	0.00	10.00	3.58+007	0.326	0.48	8.39+008	66.3	17.8	21.64	00
40	100	81.0	21.33	-40.00	-40.00	-26.92	0.00	10.00	3.58+007	0.304	0.47	8.39+008	61.7	21.4	21.92	00
40	100	81.0	21.67	-40.00	-35.00	-27.44	0.00	10.00	3.58+007	0.286	0.46	8.3E+008	57.3	24.8	22.07	00
40	100	81.0	22.00	-40.00	-30.00	-28.00	0.00	10.00	3.58+007	0.272	0.46	8.3E+008	52.5	28.3	22.34	00
40	100	81.0	22.33	-40.00	-25.00	-28.60	0.00	10.00	3.58+007	0.263	0.46	8.3E+008	47.4	31.6	22.51	00
40	100	81.0	22.67	-40.00	-20.00	-29.25	0.00	10.00	3.58+007	0.259	0.47	8.3E+008	41.9	34.8	22.59	00
40	100	81.0	23.00	-40.00	-15.00	-29.94	0.00	10.00	3.58+007	0.260	0.48	8.3E+008	36.0	37.8	22.61	00
40	100	81.0	23.33	-40.00	-10.00	-30.67	0.00	10.00	3.58+007	0.267	0.51	8.3E+008	29.5	39.3	23.46	00
40	100	81.0	23.67	-40.00	-5.00	-31.43	0.00	10.00	3.58+007	0.282	0.54	8.42+008	22.6	41.2	23.77	00
40	100	81.0	24.00	-40.00	0.00	-32.23	0.00	10.00	3.58+007	0.307	0.59	8.45+008	15.3	42.8	24.02	00
40	100	81.0	24.33	-40.00	5.00	-33.06	0.00	10.00	3.58+007	0.346	0.66	8.47+008	7.8	43.4	24.37	00
40	100	81.0	24.67	-40.00	10.00	-33.91	0.00	10.00	3.58+007	0.402	0.74	8.4E+008	0.0	43.7	24.62	10
40	100	81.0	25.00	-40.00	15.00	-34.78	0.00	10.00	3.58+007	0.455	0.80	8.41+008	352.2	43.4	24.97	10
40	100	81.0	25.33	-40.00	20.00	-35.66	0.00	10.00	3.58+007	0.441	0.77	8.31+008	344.7	42.8	25.25	10
40	100	81.0	25.67	-40.00	25.00	-36.54	0.00	10.00	3.58+007	0.382	0.69	8.15+008	337.4	41.2	25.56	00
40	100	81.0	26.00	-40.00	30.00	-37.41	0.00	10.00	3.58+007	0.331	0.61	7.93+008	330.5	39.3	25.86	00
40	100	81.0	26.33	-40.00	35.00	-38.28	0.00	10.00	3.58+007	0.295	0.54	7.67+008	324.0	37.0	26.15	00
40	100	81.0	26.67	-40.00	40.00	-39.12	0.00	10.00	3.58+007	0.271	0.48	7.3E+008	317.1	34.4	26.44	00
40	100	81.0	27.00	-40.00	45.00	-39.93	0.00	10.00	3.58+007	0.254	0.44	7.02+008	312.6	31.6	26.72	00
40	100	81.0	27.33	-40.00	50.00	-40.69	0.00	10.00	3.58+007	0.243	0.41	6.67+008	307.5	28.4	26.96	00
40	100	81.0	27.67	-40.00	55.00	-41.40	0.00	10.00	3.58+007	0.236	0.38	6.3E+008	302.7	24.9	27.28	00
40	100	81.0	28.00	-40.00	60.00	-42.03	0.00	10.00	3.58+007	0.234	0.36	5.9E+008	298.3	21.4	27.51	00
40	100	81.0	28.33	-40.00	65.00	-42.57	0.00	10.00	3.58+007	0.235	0.35	5.6E+008	294.2	17.8	27.75	00
40	100	81.0	28.67	-40.00	70.00	-43.00	0.00	10.00	3.58+007	0.239	0.34	5.44+008	290.4	14.1	27.96	00
40	100	81.0	29.00	-40.00	75.00	-43.27	0.00	10.00	3.58+007	0.248	0.33	5.2E+008	286.7	10.3	28.14	00
40	100	81.0	29.33	-40.00	80.00	-43.37	0.00	10.00	3.58+007	0.259	0.33	5.1E+008	283.2	6.6	28.29	00
40	100	81.0	18.67	-35.00	-80.00	-19.26	0.00	10.00	3.58+007	0.000	0.00	2.31+009	90.0	-8.6	20.94	11
40	100	81.0	19.00	-35.00	-75.00	-19.64	0.00	10.00	3.58+007	0.000	0.00	2.0E+009	87.1	-4.6	20.95	11
40	100	81.0	19.33	-35.00	-70.00	-20.03	0.00	10.00	3.58+007	0.000	0.00	1.87+009	84.2	-0.8	20.82	11
40	100	81.0	19.67	-35.00	-65.00	-20.41	0.00	10.00	3.58+007	0.874	1.10	1.74+009	81.3	3.6	20.85	10
40	100	81.0	20.00	-35.00	-60.00	-20.78	0.00	10.00	3.58+007	0.782	1.02	1.67+009	78.2	7.7	20.95	10
40	100	81.0	20.33	-35.00	-55.00	-21.16	0.00	10.00	3.58+007	0.701	0.96	1.62+009	75.0	11.7	21.10	10
40	100	81.0	20.67	-35.00	-50.00	-21.56	0.00	10.00	3.58+007	0.627	0.90	1.56+009	71.7	15.8	21.29	10
40	100	81.0	21.00	-35.00	-45.00	-22.00	0.00	10.00	3.58+007	0.561	0.85	1.54+009	68.1	19.9	21.52	10
40	100	81.0	21.33	-35.00	-40.00	-22.46	0.00	10.00	3.58+007	0.500	0.80	1.48+009	64.3	23.8	21.76	10
40	100	81.0	21.67	-35.00	-35.00	-22.98	0.00	10.00	3.58+007	0.446	0.74	1.41+009	60.2	27.7	22.02	10
40	100	81.0	22.00	-35.00	-30.00	-23.54	0.00	10.00	3.58+007	0.397	0.69	1.33+009	55.9	31.5	22.30	00
40	100	81.0	22.33	-35.00	-25.00	-24.15	0.00	10.00	3.58+007	0.355	0.65	1.24+009	50.7	35.0	22.58	00
40	100	81.0	22.67	-35.00	-20.00	-24.80	0.00	10.00	3.58+007	0.322	0.61	1.15+009	45.2	38.4	22.87	00
40	100	81.0	23.00	-35.00	-15.00	-25.50	0.00	10.00	3.58+007	0.297	0.58	1.06+009	39.1	41.4	23.16	00
40	100	81.0	23.33	-35.00	-10.00	-26.25	0.00	10.00	3.58+007	0.281	0.56	9.82+008	32.4	44.1	23.46	00
40	100	81.0	23.67	-35.00	-5.00	-27.03	0.00	10.00	3.58+007	0.277	0.56	9.21+008	25.0	46.3	23.76	00
40	100	81.0	24.00	-35.00	0.00	-27.84	0.00	10.00	3.58+007	0.288	0.58	8.7E+008	17.1	48.0	24.06	00
40	100	81.0	24.33	-35.00	5.00	-28.69	0.00	10.00	3.58+007	0.321	0.64	8.46+008	8.7	49.0	24.36	00
40	100	81.0	24.67	-35.00	10.00	-29.56	0.00	10.00	3.58+007	0.402	0.75	8.29+008	0.0	49.4	24.67	10
40	100	81.0	25.00	-35.00	15.00	-30.44	0.00	10.00	3.58+007	0.600	0.92	8.21+008	351.3	49.0	24.97	10
40	100	81.0	25.33	-35.00	20.00	-31.34	0.00	10.00	3.58+007	0.694	0.99	8.18+008	342.9	48.0	25.27	10
40	100	81.0	25.67	-35.00	25.00	-32.24	0.00	10.00	3.58+007	0.475	0.81	8.1E+008	335.0	46.3	25.57	10
40	100	81.0	26.00	-35.00	30.00	-33.13	0.00	10.00	3.58+007	0.360	0.67	8.14+008	327.6	44.1	25.87	00
40	100	81.0	26.33	-35.00	35.00	-34.02	0.00	10.00	3.58+007	0.310	0.59	8.07+008	320.9	41.4	26.17	00
40	100	81.0	26.67	-35.00	40.00	-34.88	0.00	10.00	3.58+007	0.284	0.53	7.97+008	314.8	38.4	26.46	00
40	100	81.0	27.00	-35.00	45.00	-35.71	0.00	10.00	3.58+007	0.271	0.49	7.81+008	309.3	35.0	26.75	00
40	100	81.0	27.33	-35.00	50.00	-36.50	0.00	10.00	3.58+007	0.264	0.46	7.62+008	304.4	31.5	27.03	00
40	100	81.0	27.67	-35.00	55.00	-37.23	0.00	10.00	3.58+007	0.263	0.44	7.40+008	299.8	27.7	27.31	00
40	100	81.0	28.00	-35.00	60.00	-37.90	0.00	10.00	3.58+007	0.266	0.42	7.1E+008	295.7	23.8	27.57	00
40	100	81.0	28.33	-35.00	65.00	-38.47	0.00	10.00	3.58+007	0.272	0.41	6.92+008	291.9	19.9	27.82	00
40	100	81.0	28.67	-35.00	70.00	-38.94	0.00	10.00	3.58+007	0.283	0.41	6.70+008	288.3	15.8	28.04	00
40	100	81.0	29.00	-35.00	75.00	-39.26	0.00	10.00	3.58+007	0.297	0.41	6.52+008	285.0	11.7	28.23	00
40	100	81.0	29.33	-35.00	80.00	-39.42	0.00	10.00	3.58+007	0.314	0.41	6.41+008	281.8	7.7	28.36	00
40	100	81.0	18.67	-30.00	-80.00	-14.99	0.00	10.00	3.58+007	0.000	0.00	5.57+009	90.0	-8.6	20.84	11
40	100	81.0	19.00	-30.00	-75.00	-15.32	0.00	10.00	3.58+007	0.000	0.00	5.02+009	87.5	-4.3	20.75	11
40	100	81.0	19.33	-30.00	-70.00	-15.66	0.00	10.00	3.58+007	0.000	0.00	4.63+009	85.0	-0.0	20.72	11
40	100	81.0	19.67	-30.00	-65.00	-15.99	0.00	10.00	3.58+007	2.151	2.69	4.40+009	82.4	4.3	20.76	10
40	100	81.0	20.00	-30.00	-60.00	-16.33	0.00	10.00	3.58+007	1.948	2.56	4.28+009	79.7	8.6	20.87	10
40	100	81.0	20.33	-30.00	-55.00	-16.69	0.00	10.00	3.58+007	1.760	2.44	4.24+009	76.9	13.0	21.03	10
40	100	81.0	20.67	-30.00	-50.00	-17.06	0.00	10.00	3.58+007	1.586	2.32	4.21+009	73.9	17.4	21.23	10
40	100	81.0	21.00	-30.00	-45.00	-17.48	0.00	10.00	3.58+007	1.421	2.20	4.15+009	70.7	21.7	21.47	10
40	100	81.0	21.33	-30.00	-40.00	-17.94	0.00	10.00	3.58+007	1.264	2.07	4.03+009	67.2	26.0	21.72	10
40	100	81.0	21.67	-30.00	-35.00	-18.45	0.00	10.00	3.58+007	1.113	1.92	3.84+009	63.4	30.3	21.99	10
40	100	81.0	22.00	-30.00	-30.00	-19.02	0.00	10.00	3.58+007	0.971	1.76	3.57+009	59.2	34.4	22.27	10
40	100	81.0	22.33	-30.00	-25.00	-19.63	0.00	10.00	3.58+007	0.838	1.59	3.24+009	54.5	38.4	22.58	10
40	100	81.0	22.67	-30.00	-20.00	-20.30	0.00	10.00	3.58+007	0.718	1.41	2.87+009	49.1	42.2	22.85	10
40	100	81.0	23.00	-30.00	-15.00	-21.01	0.00	10.00	3.58+007	0.612	1.24	2.46+009	43.0	45.8	23.15	10
40	100	81.0	23.33	-30.00	-10.00	-21.76	0.00	10.00	3.58+007	0.522	1.09	2.11+009	36.1	49.1	23.45	10
40	100	81.0	23.67	-30.00	-5.00	-22.56	0.00	10.00	3.58+007	0.450	0.95	1.7E+009	28.2	51.4	23.79	10
40	100	81.0	24.00	-30.00	0.00	-23.39	0.00	10.00	3.58+007	0.396	0.85	1.47+009	19.4	53.4	24.09	10
40	100	81.0	24.33	-30.00	5.00	-24.24	0.00	10.00	3.58+007	0.361	0.78	1.24+009	9.9	54.6	24.38	10
40	100	81.0	24.67	-30.00	10.00	-25.13	0.00	10.00	3.58+007	0.347	0.73	1.0E+009	0.0	55.0	24.67	10
40	100	81.0	25.00	-30.00	15.00	-26.03	0.00	10.00	3.58+007	0.351	0.72	9.33+008	350.1	54.6	24.97	10
40	100	81.0	25.33	-30.00	20.00	-26.94	0.00	10.00	3.58+007	0.354	0.70	8.51+008	340.6	53.4	25.28	10
40	100	81.0	25.67	-30.00	25.00	-27.85	0.00	10.00	3.58+007	0.329	0.65	8.02+008	331.4	51.4	25.59	00
40	100	81.0	26.00	-30.00	30.00	-28.76	0.00	10.00	3.58+007	0.292	0.56	7.75+008	323.9	48.4	25.89	00
40	100	81.0	26.33	-30.00	35.00	-29.66	0.00	10.00	3.58+007	0.265	0.52	7.63+008	317.0	45.0	26.19	00
40	100	81.0	26.67	-30.00	40.00	-30.54	0.00	10.00	3.58+007	0.250	0.48	7.5E+008	310.9	42.2	26.48	00
40	100	81.0	27.00	-30.00	45.00	-31.38	0.00	10.00	3.58+007	0.244	0.46	7.5E+008	305.5	38.4	26.76	00
40	100	81.0	27.33	-30.00	50.00	-32.19	0.00	10.00	3.58+007	0.244	0.44	7.53+008	300.8	34.4	27.07	00
40	100	81.0	27.67	-30.00	55.00	-32.94	0.00	10.00	3.58+007	0.250	0.43	7.4?+008	296.6	30.3	27.34	00
40	100	81.0	28.00	-30.00	60.00	-33.63	0.00	10.00	3.58+007	0.259	0.42	7.3E+008	292.8	26.0	27.61	00
40	100	81.0	28.33	-30.00	65.00	-34.23	0.00	10.00	3.58+007	0.273	0.42	7.2E+008	289.3	21.7	27.87	00
40	100	81.0	28.67	-30.00	70.00	-34.73	0.00	10.00	3.58+007	0.290	0.43	7.1E+008	286.1	17.4	28.10	00

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40	100	81.0	22.00	35.00	-30.00	40.39	0.00	10.00	3.58+007	0.240	0.42	7.18+008	124.4	31.5	22.30	00
40	100	81.0	22.33	35.00	-25.00	39.76	0.00	10.00	3.58+007	0.248	0.45	7.45+008	129.3	35.0	22.58	00
40	100	81.0	22.67	35.00	-20.00	39.06	0.00	10.00	3.58+007	0.262	0.49	7.72+008	134.8	36.4	22.87	00
40	100	81.0	23.00	35.00	-15.00	38.30	0.00	10.00	3.58+007	0.287	0.55	7.97+008	140.9	41.4	23.1E	00
40	100	81.0	23.33	35.00	-10.00	37.49	0.00	10.00	3.58+007	0.329	0.63	8.17+008	147.6	44.1	23.4E	00
40	100	81.0	23.67	35.00	-5.00	36.65	0.00	10.00	3.58+007	0.409	0.75	8.34+008	155.0	46.3	23.76	10
40	100	81.0	24.00	35.00	0.00	35.77	0.00	10.00	3.58+007	0.566	0.91	8.44+008	162.9	48.0	24.0E	10
40	100	81.0	24.33	35.00	5.00	34.87	0.00	10.00	3.58+007	0.595	0.94	8.48+008	171.3	49.0	24.3E	10
40	100	81.0	24.67	35.00	10.00	33.96	0.00	10.00	3.58+007	0.424	0.78	8.46+008	180.0	49.4	24.67	10
40	100	81.0	25.00	35.00	15.00	33.03	0.00	10.00	3.58+007	0.325	0.64	8.38+008	188.7	49.0	24.97	00
40	100	81.0	25.33	35.00	20.00	32.11	0.00	10.00	3.58+007	0.274	0.55	8.24+008	197.1	48.0	25.27	00
40	100	81.0	25.67	35.00	25.00	31.19	0.00	10.00	3.58+007	0.244	0.49	8.07+008	205.0	46.3	25.57	00
40	100	81.0	26.00	35.00	30.00	30.29	0.00	10.00	3.58+007	0.225	0.45	7.85+008	212.4	44.1	25.87	00
40	100	81.0	26.33	35.00	35.00	29.40	0.00	10.00	3.58+007	0.213	0.41	7.62+008	219.1	41.4	26.17	00
40	100	81.0	26.67	35.00	40.00	28.54	0.00	10.00	3.58+007	0.205	0.39	7.37+008	225.2	38.4	26.46	00
40	100	81.0	27.00	35.00	45.00	27.71	0.00	10.00	3.58+007	0.202	0.37	7.10+008	230.7	35.0	26.75	00
40	100	81.0	27.33	35.00	50.00	26.91	0.00	10.00	3.58+007	0.202	0.35	6.83+008	235.6	31.5	27.03	00
40	100	81.0	27.67	35.00	55.00	26.15	0.00	10.00	3.58+007	0.205	0.34	6.56+008	240.2	27.7	27.31	00
40	100	81.0	28.00	35.00	60.00	25.44	0.00	10.00	3.58+007	0.210	0.33	6.28+008	244.3	23.8	27.57	00
40	100	81.0	28.33	35.00	65.00	24.77	0.00	10.00	3.58+007	0.217	0.33	6.01+008	248.1	19.9	27.82	00
40	100	81.0	28.67	35.00	70.00	24.16	0.00	10.00	3.58+007	0.226	0.33	5.75+008	251.7	15.8	28.04	00
40	100	81.0	29.00	35.00	75.00	23.59	0.00	10.00	3.58+007	0.237	0.32	5.52+008	255.0	11.7	28.23	00
40	100	81.0	29.33	35.00	80.00	23.07	0.00	10.00	3.58+007	0.249	0.33	5.35+008	258.2	7.7	28.38	00
40	100	81.0	18.67	40.00	-80.00	44.64	0.00	10.00	3.58+007	0.000	0.00	5.11+008	90.0	-8.6	21.06	01
40	100	81.0	19.00	40.00	-75.00	45.28	0.00	10.00	3.58+007	0.000	0.00	4.82+008	93.2	-4.8	20.97	01
40	100	81.0	19.33	40.00	-70.00	45.79	0.00	10.00	3.58+007	0.000	0.00	4.63+008	96.5	-1.0	20.94	01
40	100	81.0	19.67	40.00	-65.00	46.14	0.00	10.00	3.58+007	0.237	0.29	4.54+008	99.8	2.8	20.97	00
40	100	81.0	20.00	40.00	-60.00	46.34	0.00	10.00	3.58+007	0.224	0.29	4.53+008	103.2	6.6	21.05	00
40	100	81.0	20.33	40.00	-55.00	46.37	0.00	10.00	3.58+007	0.211	0.28	4.56+008	106.7	10.3	21.19	00
40	100	81.0	20.67	40.00	-50.00	46.26	0.00	10.00	3.58+007	0.199	0.28	4.61+008	110.4	14.1	21.37	00
40	100	81.0	21.00	40.00	-45.00	46.02	0.00	10.00	3.58+007	0.190	0.28	4.71+008	114.2	17.8	21.58	00
40	100	81.0	21.33	40.00	-40.00	45.66	0.00	10.00	3.58+007	0.186	0.29	4.88+008	118.3	21.4	21.82	00
40	100	81.0	21.67	40.00	-35.00	45.20	0.00	10.00	3.58+007	0.186	0.30	5.11+008	122.7	24.9	22.07	00
40	100	81.0	22.00	40.00	-30.00	44.66	0.00	10.00	3.58+007	0.190	0.32	5.41+008	127.5	28.3	22.34	00
40	100	81.0	22.33	40.00	-25.00	44.03	0.00	10.00	3.58+007	0.199	0.35	5.74+008	132.6	31.5	22.61	00
40	100	81.0	22.67	40.00	-20.00	43.34	0.00	10.00	3.58+007	0.212	0.38	6.09+008	138.1	34.4	22.88	00
40	100	81.0	23.00	40.00	-15.00	42.59	0.00	10.00	3.58+007	0.232	0.42	6.46+008	144.0	37.0	23.19	00
40	100	81.0	23.33	40.00	-10.00	41.79	0.00	10.00	3.58+007	0.258	0.48	6.83+008	150.5	39.3	23.48	00
40	100	81.0	23.67	40.00	-5.00	40.96	0.00	10.00	3.58+007	0.291	0.54	7.17+008	157.4	41.2	23.77	00
40	100	81.0	24.00	40.00	0.00	40.09	0.00	10.00	3.58+007	0.325	0.61	7.43+008	164.7	42.6	24.07	00
40	100	81.0	24.33	40.00	5.00	39.20	0.00	10.00	3.58+007	0.344	0.64	7.77+008	172.2	43.4	24.37	00
40	100	81.0	24.67	40.00	10.00	38.30	0.00	10.00	3.58+007	0.333	0.63	7.9E+008	180.0	43.7	24.67	00
40	100	81.0	25.00	40.00	15.00	37.39	0.00	10.00	3.58+007	0.309	0.59	8.14+008	187.8	43.4	24.97	00
40	100	81.0	25.33	40.00	20.00	36.47	0.00	10.00	3.58+007	0.285	0.55	8.23+008	195.3	42.6	25.26	00
40	100	81.0	25.67	40.00	25.00	35.57	0.00	10.00	3.58+007	0.267	0.51	8.24+008	202.6	41.2	25.54	00
40	100	81.0	26.00	40.00	30.00	34.68	0.00	10.00	3.58+007	0.255	0.48	8.19+008	209.5	39.3	25.80	00
40	100	81.0	26.33	40.00	35.00	33.81	0.00	10.00	3.58+007	0.246	0.46	8.07+008	215.9	37.0	26.05	00
40	100	81.0	26.67	40.00	40.00	32.96	0.00	10.00	3.58+007	0.241	0.43	7.90+008	221.9	34.4	26.44	00
40	100	81.0	27.00	40.00	45.00	32.14	0.00	10.00	3.58+007	0.238	0.42	7.69+008	227.4	31.5	26.72	00
40	100	81.0	27.33	40.00	50.00	31.35	0.00	10.00	3.58+007	0.239	0.40	7.44+008	232.5	28.3	26.99	00
40	100	81.0	27.67	40.00	55.00	30.60	0.00	10.00	3.58+007	0.241	0.39	7.17+008	237.3	24.9	27.26	00
40	100	81.0	28.00	40.00	60.00	29.90	0.00	10.00	3.58+007	0.246	0.38	6.89+008	241.7	21.4	27.51	00
40	100	81.0	28.33	40.00	65.00	29.23	0.00	10.00	3.58+007	0.253	0.37	6.61+008	245.8	17.8	27.75	00
40	100	81.0	28.67	40.00	70.00	28.61	0.00	10.00	3.58+007	0.262	0.37	6.33+008	249.6	14.1	27.98	00
40	100	81.0	29.00	40.00	75.00	28.04	0.00	10.00	3.58+007	0.272	0.37	6.08+008	253.3	10.3	28.14	00
40	100	81.0	29.33	40.00	80.00	27.51	0.00	10.00	3.58+007	0.281	0.36	5.86+008	256.8	6.6	28.28	00

FREQ	SSN	DAY	TIME	RLAT	RLON	GMLAT	TLAT	TLON	THT	S3	PHID	DN	AZ	EL	TIONO	++
40	100	172.0	18.67	-40.00	-80.00	-23.48	0.00	10.00	3.58+007	0.000	0.00	6.93+008	90.0	-8.6	21.06	01
40	100	172.0	19.00	-40.00	-75.00	-23.90	0.00	10.00	3.58+007	0.000	0.00	6.67+008	86.8	-4.8	20.97	01
40	100	172.0	19.33	-40.00	-70.00	-24.33	0.00	10.00	3.58+007	0.000	0.00	6.53+008	83.5	-1.0	20.94	01
40	100	172.0	19.67	-40.00	-65.00	-24.75	0.00	10.00	3.58+007	0.332	0.41	6.48+008	80.2	2.8	20.97	00
40	100	172.0	20.00	-40.00	-60.00	-25.17	0.00	10.00	3.58+007	0.316	0.41	6.52+008	76.8	6.6	21.05	00
40	100	172.0	20.33	-40.00	-55.00	-25.58	0.00	10.00	3.58+007	0.299	0.40	6.61+008	73.3	10.5	21.19	00
40	100	172.0	20.67	-40.00	-50.00	-26.00	0.00	10.00	3.58+007	0.282	0.40	6.73+008	69.6	14.1	21.37	00
40	100	172.0	21.00	-40.00	-45.00	-26.45	0.00	10.00	3.58+007	0.267	0.39	6.87+008	65.6	17.8	21.58	00
40	100	172.0	21.33	-40.00	-40.00	-26.92	0.00	10.00	3.58+007	0.255	0.39	7.03+008	61.7	21.4	21.82	00
40	100	172.0	21.67	-40.00	-35.00	-27.44	0.00	10.00	3.58+007	0.245	0.40	7.18+008	57.3	24.9	22.07	00
40	100	172.0	22.00	-40.00	-30.00	-28.00	0.00	10.00	3.58+007	0.239	0.40	7.34+008	52.5	28.3	22.34	00
40	100	172.0	22.33	-40.00	-25.00	-28.60	0.00	10.00	3.58+007	0.237	0.41	7.51+008	47.4	31.5	22.61	00
40	100	172.0	22.67	-40.00	-20.00	-29.25	0.00	10.00	3.58+007	0.238	0.43	7.67+008	41.9	34.4	22.90	00
40	100	172.0	23.00	-40.00	-15.00	-29.94	0.00	10.00	3.58+007	0.244	0.45	7.84+008	36.0	37.0	23.19	00
40	100	172.0	23.33	-40.00	-10.00	-30.67	0.00	10.00	3.58+007	0.255	0.48	8.00+008	29.5	39.3	23.48	00
40	100	172.0	23.67	-40.00	-5.00	-31.43	0.00	10.00	3.58+007	0.273	0.52	8.14+008	22.6	41.2	23.77	00
40	100	172.0	24.00	-40.00	0.00	-32.23	0.00	10.00	3.58+007	0.300	0.58	8.26+008	15.3	42.6	24.07	00
40	100	172.0	24.33	-40.00	5.00	-33.06	0.00	10.00	3.58+007	0.341	0.65	8.34+008	7.8	43.4	24.37	00
40	100	172.0	24.67	-40.00	10.00	-33.91	0.00	10.00	3.58+007	0.399	0.73	8.38+008	0.0	43.7	24.67	10
40	100	172.0	25.00	-40.00	15.00	-34.78	0.00	10.00	3.58+007	0.452	0.79	8.36+008	352.2	43.4	24.97	10
40	100	172.0	25.33	-40.00	20.00	-35.66	0.00	10.00	3.58+007	0.440	0.77	8.26+008	344.7	42.6	25.26	10
40	100	172.0	25.67	-40.00	25.00	-36.54	0.00	10.00	3.58+007	0.381	0.69	8.13+008	337.4	41.2	25.56	00
40	100	172.0	26.00	-40.00	30.00	-37.41	0.00	10.00	3.58+007	0.330	0.61	7.92+008	330.5	39.3	25.86	00
40	100	172.0	26.33	-40.00	35.00	-38.28	0.00	10.00	3.58+007	0.295	0.54	7.66+008	324.0	37.0	26.15	00
40	100	172.0	26.67	-40.00	40.00	-39.12	0.00	10.00	3.58+007	0.270	0.48	7.35+008	318.1	34.4	26.44	00
40	100	172.0	27.00	-40.00	45.00	-39.93	0.00	10.00	3.58+007	0.254	0.44	7.02+008	312.6	31.5	26.72	00
40	100	172.0	27.33	-40.00	50.00	-40.69	0.00	10.00	3.58+007	0.243	0.41	6.67+008	307.5	28.3	26.99	00
40	100	172.0	27.67	-40.00	55.00	-41.40	0.00	10.00	3.58+007	0.236	0.38	6.32+008	302.7	24.9	27.26	00
40	100	172.0	28.00	-40.00	60.00	-42.03	0.00	10.00	3.58+007	0.234	0.36	5.96+008	298.3	21.4	27.51	00
40	100	172.0	28.33	-40.00	65.00	-42.57	0.00	10.00	3.58+007	0.235	0.35	5.68+008	294.2	17.8	27.75	00
40	100	172.0	28.67	-40.00	70.00	-43.00	0.00	10.00	3.58+007	0.239	0.34	5.44+008	290.4	14.1	27.98	00
40	100	172.0	29.00	-40.00	75.00	-43.27	0.00	10.00	3.58+007	0.248	0.33	5.26+008	286.7	10.3	28.14	00
40	100	172.0	29.33	-40.00	80.00	-43.37	0.00	10.00	3.58+007	0.259	0.33	5.16+008	283.2	6.6	28.24	00
40	100	172.0	18.67	-35.00	-80.00	-19.26	0.00	10.00	3.58+007	0.000	0.00	1.14+009	90.0	-8.6	20.04	01
40	100	172.0	19.00	-35.00	-75.00	-19.64	0.00	10.00	3.58+007	0.000	0.00	1.03+009	87.1	-4.6	20.85	01
40	100	172.0	19.33	-35.00	-70.00	-20.03	0.00	10.00	3.58+007	0.000	0.00	9.61+008	84.2	-0.5	20.80	01
40	100	172.0	19.67	-35.00	-65.00	-20.41	0.00	10.00	3.58+007	0.459	0.58	9.17+008	81.3	3.6	20.85	00
40	100	172.0	20.00	-35.00	-60.00	-20.78	0.00	10.00	3.58+007	0.419	0.55	8.93+008	78.2	7.7	20.98	00
40	100	172.0	20.33	-35.00	-55.00	-21.16	0.00	10.00	3.58+007	0.382	0.52	8.82+008	75.0	11.7	21.19	00
40	100	172.0	20.67	-35.00	-50.00	-21.56	0.00	10.00	3.58+007	0.348	0.50	8.77+008	71.7	15.8	21.49	00
40	100	172.0	21.00	-35.00	-45.00	-22.00	0.00	10.00	3.58+007	0.318	0.48	8.72+008	68.1	19.9	21.82	00
40	100	172.0	21.33	-35.00	-40.00	-22.46	0.00	10.00	3.58+007	0.291	0.46	8.63+008	64.3	23.6	21.76	00
40	100	172.0	21.67	-35.00	-35.00	-22.98	0.00	10.00	3.58+007	0.268	0.45	8.49+008	60.2	27.7	22.02	00
40	100	172.0	22.00	-35.00	-30.00	-23.54	0.00	10.00	3.58+007	0.248	0.43	8.31+008	55.6	31.5	22.30	00
40	100	172.0	22.33	-35.00	-25.00	-24.15	0.00	10.00	3.58+007	0.232	0.42	8.10+008	50.7	35.0	22.58	00
40	100	172.0	22.67	-35.00	-20.00	-24.80	0.00	10.00	3.58+007	0.222	0.42	7.90+008	45.2	38.4	22.87	00
40	100	172.0	23.00	-35.00	-15.00	-25.50	0.00	10.00	3.58+007	0.217	0.42	7.73+008	39.1	41.4	23.16	00
40	100	172.0	23.33	-35.00	-10.00	-26.25	0.00	10.00	3.58+007	0.218	0.43	7.61+008	32.4	44.1	23.46	00
40	100	172.0	23.67	-35.00	-5.00	-27.03	0.00	10.00	3.58+007	0.228	0.46	7.56+008	25.0	46.3	23.76	00
40	100	172.0	24.00	-35.00	0.00	-27.84	0.00	10.00	3.58+007	0.249	0.50	7.58+008	17.1	48.0	24.06	00
40	100	172.0	24.33	-35.00	5.00	-28.69	0.00	10.00	3.58+007	0.290	0.58	7.64+008	8.7	49.0	24.36	00
40	100	172.0	24.67	-35.00	10.00	-29.56	0.00	10.00	3.58+007	0.375	0.70	7.74+008	0.0	49.4	24.67	00
40	100	172.0	25.00	-35.00	15.00	-30.44	0.00	10.00	3.58+007	0.574	0.88	7.86+008	351.3	49.0	24.97	10
40	100	172.0	25.33	-35.00	20.00	-31.34	0.00	10.00	3.58+007	0.675	0.96	7.96+008	342.9	48.0	25.27	10
40	100	172.0	25.67	-35.00	25.00	-32.24	0.00	10.00	3.58+007	0.467	0.80	8.03+008	335.0	46.3	25.57	10
40	100	172.0	26.00	-35.00	30.00	-33.13	0.00	10.00	3.58+007	0.357	0.67	8.05+008	327.6	44.1	25.87	00
40	100	172.0	26.33	-35.00	35.00	-34.02	0.00	10.00	3.58+007	0.308	0.58	8.02+008	320.9	41.4	26.17	00
40	100	172.0	26.67	-35.00	40.00	-34.88	0.00	10.00	3.58+007	0.283	0.53	7.94+008	314.8	38.4	26.46	00
40	100	172.0	27.00	-35.00	45.00	-35.71	0.00	10.00	3.58+007	0.270	0.49	7.80+008	309.3	35.0	26.75	00
40	100	172.0	27.33	-35.00	50.00	-36.50	0.00	10.00	3.58+007	0.264	0.46	7.61+008	304.4	31.5	27.03	00
40	100	172.0	27.67	-35.00	55.00	-37.23	0.00	10.00	3.58+007	0.262	0.44	7.39+008	299.8	27.7	27.31	00
40	100	172.0	28.00	-35.00	60.00	-37.90	0.00	10.00	3.58+007	0.265	0.42	7.16+008	295.7	23.8	27.57	00
40	100	172.0	28.33	-35.00	65.00	-38.47	0.00	10.00	3.58+007	0.272	0.41	6.92+008	291.9	19.9	27.82	00
40	100	172.0	28.67	-35.00	70.00	-38.94	0.00	10.00	3.58+007	0.283	0.41	6.70+008	288.3	15.8	28.04	00
40	100	172.0	29.00	-35.00	75.00	-39.26	0.00	10.00	3.58+007	0.297	0.41	6.52+008	285.0	11.7	28.23	00
40	100	172.0	29.33	-35.00	80.00	-39.42	0.00	10.00	3.58+007	0.314	0.41	6.41+008	281.8	7.7	28.38	00
40	100	172.0	18.67	-30.00	-80.00	-14.99	0.00	10.00	3.58+007	0.000	0.00	2.46+009	90.0	-8.6	20.84	11
40	100	172.0	19.00	-30.00	-75.00	-15.32	0.00	10.00	3.58+007	0.000	0.00	2.23+009	87.5	-4.3	20.75	11
40	100	172.0	19.33	-30.00	-70.00	-15.66	0.00	10.00	3.58+007	0.000	0.00	2.07+009	85.0	-0.0	20.72	11
40	100	172.0	19.67	-30.00	-65.00	-15.99	0.00	10.00	3.58+007	0.965	1.21	1.97+009	82.4	4.3	20.76	10
40	100	172.0	20.00	-30.00	-60.00	-16.33	0.00	10.00	3.58+007	0.877	1.15	1.93+009	79.7	8.6	20.87	10
40	100	172.0	20.33	-30.00	-55.00	-16.69	0.00	10.00	3.58+007	0.796	1.10	1.92+009	76.9	13.0	21.03	10
40	100	172.0	20.67	-30.00	-50.00	-17.06	0.00	10.00	3.58+007	0.720	1.05	1.91+009	73.9	17.4	21.23	10
40	100	172.0	21.00	-30.00	-45.00	-17.48	0.00	10.00	3.58+007	0.649	1.00	1.89+009	70.7	21.7	21.47	10
40	100	172.0	21.33	-30.00	-40.00	-17.94	0.00	10.00	3.58+007	0.581	0.95	1.85+009	67.2	26.0	21.72	10
40	100	172.0	21.67	-30.00	-35.00	-18.45	0.00	10.00	3.58+007	0.517	0.89	1.78+009	63.4	30.3	21.99	10
40	100	172.0	22.00	-30.00	-30.00	-19.02	0.00	10.00	3.58+007	0.457	0.83	1.68+009	59.2	34.4	22.27	10
40	100	172.0	22.33	-30.00	-25.00	-19.63	0.00	10.00	3.58+007	0.402	0.76	1.56+009	54.5	38.4	22.56	10
40	100	172.0	22.67	-30.00	-20.00	-20.30	0.00	10.00	3.58+007	0.353	0.69	1.41+009	49.1	42.2	22.85	00
40	100	172.0	23.00	-30.00	-15.00	-21.01	0.00	10.00	3.58+007	0.311	0.63	1.26+009	43.0	45.6	23.15	00
40	100	172.0	23.33	-30.00	-10.00	-21.76	0.00	10.00	3.58+007	0.278	0.58	1.12+009	36.1	48.8	23.45	00
40	100	172.0	23.67	-30.00	-5.00	-22.56	0.00	10.00	3.58+007	0.254	0.54	9.97+008	28.2	51.4	23.75	00
40	100	172.0	24.00	-30.00	0.00	-23.39	0.00	10.00	3.58+007	0.241	0.52	8.94+008	19.4	53.4	24.05	00
40	100	172.0	24.33	-30.00	5.00	-24.24	0.00	10.00	3.58+007	0.239	0.51	8.16+008	9.9	54.6	24.36	00
40	100	172.0	24.67	-30.00	10.00	-25.13	0.00	10.00	3.58+007	0.251	0.53	7.63+008	0.0	55.0	24.67	00
40	100	172.0	25.00	-30.00	15.00	-26.03	0.00	10.00	3.58+007	0.276	0.57	7.32+008	350.1	54.6	24.97	00
40	100	172.0	25.33	-30.00	20.00	-26.94	0.00	10.00	3.58+007	0.299	0.59	7.18+008	340.6	53.4	25.28	00
40	100	172.0	25.67	-30.00	25.00	-27.85	0.00	10.00	3.58+007	0.294	0.58	7.17+008	331.8	51.4	25.58	00
40	100	172.0	26.00	-30.00	30.00	-28.76	0.00	10.00	3.58+007	0.272	0.54	7.22+008	323.9	48.8	25.89	00
40	100	172.0	26.33	-30.00	35.00	-29.66	0.00	10.00	3.58+007	0.253	0.50	7.31+008	317.0	45.6	26.19	00
40	100	172.0	26.67	-30.00	40.00	-30.54	0.00	10.00	3.58+007	0.243	0.47	7.39+008	310.9	42.2	26.49	00
40	100	172.0	27.00	-30.00	45.00	-31.38	0.00	10.00	3.58+007	0.240	0.45	7.44+008	305.5	38.4	26.79	00
40	100	172.0	27.33	-30.00	50.00	-32.19	0.00	10.00	3.58+007	0.242	0.44	7.46+008	300.8	34.4	27.07	00
40	100	172.0	27.67	-30.00	55.00	-32.94	0.00	10.00	3.58+007	0.248	0.43	7.43+008	296.6	30.3	27.34	00
40	100	172.0	28.00	-30.00	60.00	-33.63	0.00	10.00	3.58+007	0.259	0.42	7.36+008	292.8	26.0	27.61	00
40	100	172.0	28.33	-30.00	65.00	-34.23	0.00	10.00	3.58+007	0.272	0.42	7.26+008	289.3	21.7	27.87	00
40	100	172.0	28.67	-30.00	70.00	-34.73	0.00	10.00	3.58+007	0.290	0.43	7.15+008	286.1	17.4	28.10	00

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40	100	172.0	22.00	35.00	-30.00	40.39	0.00	10.00	3.58+007	0.240	0.42	7.18+008	124.4	31.5	22.30	00
40	100	172.0	22.33	35.00	-25.00	39.76	0.00	10.00	3.58+007	0.248	0.45	7.45+008	129.3	35.0	22.58	00
40	100	172.0	22.67	35.00	-20.00	39.06	0.00	10.00	3.58+007	0.262	0.49	7.72+008	134.8	38.4	22.87	00
40	100	172.0	23.00	35.00	-15.00	38.30	0.00	10.00	3.58+007	0.266	0.55	7.9E+008	140.9	41.4	23.1E	00
40	100	172.0	23.33	35.00	-10.00	37.49	0.00	10.00	3.58+007	0.328	0.63	8.1E+008	147.6	44.1	23.4E	00
40	100	172.0	23.67	35.00	-5.00	36.65	0.00	10.00	3.58+007	0.408	0.75	8.31+008	155.0	46.3	23.7E	10
40	100	172.0	24.00	35.00	0.00	35.77	0.00	10.00	3.58+007	0.564	0.91	8.40+008	162.9	48.0	24.0E	10
40	100	172.0	24.33	35.00	5.00	34.87	0.00	10.00	3.58+007	0.591	0.93	8.43+008	171.3	49.0	24.3E	10
40	100	172.0	24.67	35.00	10.00	33.96	0.00	10.00	3.58+007	0.420	0.77	8.3E+008	180.0	49.4	24.67	10
40	100	172.0	25.00	35.00	15.00	33.03	0.00	10.00	3.58+007	0.321	0.64	8.27+008	188.7	49.0	24.97	00
40	100	172.0	25.33	35.00	20.00	32.11	0.00	10.00	3.58+007	0.269	0.54	8.09+008	197.1	48.0	25.27	00
40	100	172.0	25.67	35.00	25.00	31.19	0.00	10.00	3.58+007	0.238	0.48	7.85+008	205.0	46.3	25.57	00
40	100	172.0	26.00	35.00	30.00	30.29	0.00	10.00	3.58+007	0.217	0.43	7.57+008	212.4	44.1	25.87	00
40	100	172.0	26.33	35.00	35.00	29.40	0.00	10.00	3.58+007	0.202	0.39	7.25+008	219.1	41.4	26.17	00
40	100	172.0	26.67	35.00	40.00	28.54	0.00	10.00	3.58+007	0.193	0.36	6.91+008	225.2	38.4	26.4E	00
40	100	172.0	27.00	35.00	45.00	27.71	0.00	10.00	3.58+007	0.187	0.34	6.56+008	230.7	35.0	26.7E	00
40	100	172.0	27.33	35.00	50.00	26.91	0.00	10.00	3.58+007	0.183	0.32	6.21+008	235.6	31.5	27.03	00
40	100	172.0	27.67	35.00	55.00	26.15	0.00	10.00	3.58+007	0.183	0.31	5.8E+008	240.2	27.7	27.31	00
40	100	172.0	28.00	35.00	60.00	25.44	0.00	10.00	3.58+007	0.184	0.29	5.52+008	244.3	23.8	27.57	00
40	100	172.0	28.33	35.00	65.00	24.77	0.00	10.00	3.58+007	0.187	0.28	5.20+008	248.1	19.9	27.8E	00
40	100	172.0	28.67	35.00	70.00	24.16	0.00	10.00	3.58+007	0.192	0.28	4.90+008	251.7	15.8	28.04	00
40	100	172.0	29.00	35.00	75.00	23.59	0.00	10.00	3.58+007	0.199	0.27	4.63+008	255.0	11.7	28.23	00
40	100	172.0	29.33	35.00	80.00	23.07	0.00	10.00	3.58+007	0.205	0.27	4.41+008	258.2	7.7	28.3E	00
40	100	172.0	18.67	40.00	-80.00	44.64	0.00	10.00	3.58+007	0.000	0.00	5.11+008	90.0	-8.5	21.0E	01
40	100	172.0	19.00	40.00	-75.00	45.28	0.00	10.00	3.58+007	0.000	0.00	4.82+008	93.2	-4.5	20.97	01
40	100	172.0	19.33	40.00	-70.00	45.79	0.00	10.00	3.58+007	0.000	0.00	4.63+008	96.5	-1.0	20.94	01
40	100	172.0	19.67	40.00	-65.00	46.14	0.00	10.00	3.58+007	0.237	0.29	4.54+008	99.8	2.6	20.97	00
40	100	172.0	20.00	40.00	-60.00	46.34	0.00	10.00	3.58+007	0.224	0.29	4.53+008	103.2	6.6	21.05	00
40	100	172.0	20.33	40.00	-55.00	46.37	0.00	10.00	3.58+007	0.211	0.28	4.56+008	106.7	10.5	21.19	00
40	100	172.0	20.67	40.00	-50.00	46.26	0.00	10.00	3.58+007	0.199	0.28	4.61+008	110.4	14.1	21.37	00
40	100	172.0	21.00	40.00	-45.00	46.02	0.00	10.00	3.58+007	0.190	0.28	4.71+008	114.2	17.6	21.58	00
40	100	172.0	21.33	40.00	-40.00	45.66	0.00	10.00	3.58+007	0.186	0.29	4.8E+008	118.3	21.4	21.82	00
40	100	172.0	21.67	40.00	-35.00	45.20	0.00	10.00	3.58+007	0.186	0.30	5.11+008	122.7	24.9	22.07	00
40	100	172.0	22.00	40.00	-30.00	44.66	0.00	10.00	3.58+007	0.190	0.32	5.41+008	127.5	28.3	22.34	00
40	100	172.0	22.33	40.00	-25.00	44.03	0.00	10.00	3.58+007	0.199	0.35	5.74+008	132.6	31.5	22.61	00
40	100	172.0	22.67	40.00	-20.00	43.34	0.00	10.00	3.58+007	0.212	0.38	6.0E+008	138.1	34.4	22.90	00
40	100	172.0	23.00	40.00	-15.00	42.59	0.00	10.00	3.58+007	0.232	0.42	6.4E+008	144.0	37.0	23.19	00
40	100	172.0	23.33	40.00	-10.00	41.79	0.00	10.00	3.58+007	0.258	0.48	6.8E+008	150.5	39.3	23.48	00
40	100	172.0	23.67	40.00	-5.00	40.96	0.00	10.00	3.58+007	0.291	0.54	7.17+008	157.4	41.2	23.77	00
40	100	172.0	24.00	40.00	0.00	40.09	0.00	10.00	3.58+007	0.325	0.61	7.49+008	164.7	42.6	24.07	00
40	100	172.0	24.33	40.00	5.00	39.20	0.00	10.00	3.58+007	0.343	0.64	7.7E+008	172.2	43.4	24.37	00
40	100	172.0	24.67	40.00	10.00	38.30	0.00	10.00	3.58+007	0.333	0.63	7.98+008	180.0	43.7	24.67	00
40	100	172.0	25.00	40.00	15.00	37.39	0.00	10.00	3.58+007	0.304	0.59	8.13+008	187.8	43.4	24.97	00
40	100	172.0	25.33	40.00	20.00	36.47	0.00	10.00	3.58+007	0.285	0.55	8.21+008	195.3	42.6	25.26	00
40	100	172.0	25.67	40.00	25.00	35.57	0.00	10.00	3.58+007	0.267	0.51	8.21+008	202.5	41.2	25.54	00
40	100	172.0	26.00	40.00	30.00	34.68	0.00	10.00	3.58+007	0.253	0.48	8.15+008	209.5	39.3	25.8E	00
40	100	172.0	26.33	40.00	35.00	33.81	0.00	10.00	3.58+007	0.244	0.45	8.02+008	216.0	37.0	26.1E	00
40	100	172.0	26.67	40.00	40.00	32.96	0.00	10.00	3.58+007	0.238	0.43	7.83+008	221.9	34.4	26.44	00
40	100	172.0	27.00	40.00	45.00	32.14	0.00	10.00	3.58+007	0.236	0.41	7.60+008	227.4	31.5	26.7E	00
40	100	172.0	27.33	40.00	50.00	31.35	0.00	10.00	3.58+007	0.235	0.40	7.34+008	232.5	28.3	27.0E	00
40	100	172.0	27.67	40.00	55.00	30.60	0.00	10.00	3.58+007	0.237	0.38	7.05+008	237.3	24.9	27.26	00
40	100	172.0	28.00	40.00	60.00	29.90	0.00	10.00	3.58+007	0.241	0.37	6.75+008	241.7	21.4	27.51	00
40	100	172.0	28.33	40.00	65.00	29.23	0.00	10.00	3.58+007	0.247	0.37	6.45+008	245.9	17.8	27.75	00
40	100	172.0	28.67	40.00	70.00	28.61	0.00	10.00	3.58+007	0.255	0.36	6.1E+008	249.6	14.1	27.96	00
40	100	172.0	29.00	40.00	75.00	28.04	0.00	10.00	3.58+007	0.263	0.35	5.8E+008	253.3	10.3	28.14	00
40	100	172.0	29.33	40.00	80.00	27.51	0.00	10.00	3.58+007	0.271	0.35	5.65+008	256.8	6.6	28.28	00

APPENDIX B. FLOW CHART OF SCINTDR