QKAREA, a Sample Run

Input Deck:

```
. 1
.TEST PROBLEM 1, QKAREA
. 2         0.          100.        10.         400.        25.
. 32        70.
. 4         10.         50.         90.         95.
.870110     400.        10.         1.          200.
. 1
.TEST PROBLEM 2, QKAREA
.861        25.
.99
. 1
.TEST PROBLEM 4, QKAREA
. 31        10.
. 57        30.         350.        300.        25.         0.02
. 60000     1200.       5.          1000.
.88
.
```

This deck gives rise to four pages of output which are reproduced in the following.

TEST PROBLEM 1, QKAREA

FREQUENCY	400. MHZ		
ANTENNA HEIGHTS	10.0	1.0 M	
EFFECTIVE HEIGHTS	14.5	1.0 M	(SITING=1,0)
TERRAIN, DELTA H	200. M		

POL=1, EPS=15., SGM= .005 S/M
CLIM=5, N0=301., NS=301., K= 1.333

MOBILE SERVICE
REQUIRED RELIABILITY- 70.0 PER CENT

ESTIMATED QUANTILES OF BASIC TRANSMISSION LOSS(DB)

DIST KM	FREE SPACE	WITH CONFIDENCE 10.0	50.0	90.0	95.0
10.0	104.5	136.1	145.7	155.3	158.1
20.0	110.5	149.3	158.4	167.4	169.9
30.0	114.0	156.5	165.1	173.7	176.1
40.0	116.5	162.6	170.8	179.0	181.3
50.0	118.5	168.0	175.9	183.8	186.1
60.0	120.1	172.8	180.6	188.3	190.5
70.0	121.4	177.4	185.0	192.7	194.8
80.0	122.6	181.7	189.3	196.9	199.0
90.0	123.6	185.9	193.4	201.0	203.1
100.0	124.5	190.0	197.4	204.9	207.0
125.0	126.4	197.4	204.8	212.1	214.2
150.0	128.0	200.0	207.2	214.5	216.5
175.0	129.4	202.5	209.6	216.8	218.8
200.0	130.5	205.0	212.1	219.1	221.1
225.0	131.5	207.6	214.6	221.5	223.4
250.0	132.5	210.2	217.1	223.9	225.9
275.0	133.3	212.8	219.6	226.4	228.3
300.0	134.0	215.2	222.0	228.7	230.6
325.0	134.7	217.6	224.3	231.1	232.9
350.0	135.4	219.9	226.6	233.3	235.2
375.0	136.0	222.1	228.8	235.5	237.3
400.0	136.5	224.3	230.9	237.6	239.5

TEST PROBLEM 2, QKAREA

```
        FREQUENCY          25. MHZ
   ANTENNA HEIGHTS    10.0      1.0 M
 EFFECTIVE HEIGHTS    14.5      1.0 M  (SITING=1,0)
  TERRAIN, DELTA H        200. M

POL=1, EPS=15., SGM=  .005 S/M
CLIM=5, N0=301., NS=301., K= 1.333

MOBILE SERVICE
     REQUIRED RELIABILITY- 70.0 PER CENT
```

ESTIMATED QUANTILES OF BASIC TRANSMISSION LOSS(DB)

DIST KM	FREE SPACE	WITH CONFIDENCE 10.0	50.0	90.0	95.0
10.0	80.4	110.2	120.1	130.1	132.9
20.0	86.4	125.3	134.9	144.5	147.2
30.0	90.0	131.3	140.6	149.8	152.5
40.0	92.5	136.1	145.1	154.1	156.7
50.0	94.4	140.4	149.1	157.9	160.4
60.0	96.0	144.2	152.7	161.2	163.7
70.0	97.3	147.7	156.0	164.4	166.7
80.0	98.5	151.0	159.2	167.3	169.6
90.0	99.5	154.1	162.1	170.2	172.4
100.0	100.4	157.1	165.0	172.9	175.1
125.0	102.3	164.0	171.6	179.2	181.4
150.0	103.9	170.3	177.8	185.2	187.3
175.0	105.3	176.3	183.6	190.9	193.0
200.0	106.4	182.1	189.3	196.4	198.4
225.0	107.5	187.8	194.9	202.0	204.0
250.0	108.4	193.7	200.7	207.7	209.6
275.0	109.2	199.7	206.6	213.5	215.4
300.0	110.0	205.8	212.6	219.4	221.4
325.0	110.6	211.9	218.7	225.4	227.3
350.0	111.3	218.0	224.7	231.4	233.3
375.0	111.9	220.3	227.0	233.7	235.5
400.0	112.5	222.5	229.1	235.7	237.6

**WARNING- SOME PARAMETERS ARE NEARLY OUT OF RANGE.
RESULTS SHOULD BE USED WITH CAUTION.

AREA PREDICTIONS FROM THE LONGLEY-RICE MODEL, VERSION 1.2.1

FREQUENCY	100. MHZ		
ANTENNA HEIGHTS	3.0	3.0 M	
EFFECTIVE HEIGHTS	3.0	3.0 M	(SITING=0,0)
TERRAIN, DELTA H	90. M		

POL=1, EPS=15., SGM= .005 S/M
CLIM=5, N0=301., NS=301., K= 1.333

BROADCAST SERVICE
REQUIRED RELIABILITY- 50.0 PER CENT TIME
50.0 PER CENT LOCATIONS

ESTIMATED QUANTILES OF BASIC TRANSMISSION LOSS(DB)

DIST KM	FREE SPACE	WITH CONFIDENCE 50.0	90.0	10.0
10.0	92.5	132.8	142.5	123.2
20.0	98.5	143.8	153.0	134.6
30.0	102.0	150.0	158.8	141.2
40.0	104.5	155.1	163.5	146.7
50.0	106.4	159.6	167.7	151.4
60.0	108.0	163.6	171.4	155.7
70.0	109.4	167.3	174.9	159.7
80.0	110.5	170.8	178.2	163.3
90.0	111.5	174.2	181.6	166.9
100.0	112.5	177.6	184.9	170.3
110.0	113.3	180.8	188.0	173.7
120.0	114.0	184.0	191.1	176.9
130.0	114.7	187.2	194.2	180.1
140.0	115.4	190.3	197.2	183.3
150.0	116.0	193.4	200.3	186.4
200.0	118.5	198.9	205.6	192.1
250.0	120.4	204.2	210.8	197.6
300.0	122.0	209.4	215.9	202.9
350.0	123.3	214.3	220.8	207.8
400.0	124.5	218.9	225.3	212.4
450.0	125.5	223.1	229.5	216.7
500.0	126.4	227.1	233.5	220.7

TEST PROBLEM 4, QKAREA

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          FREQUENCY        1200. MHZ
    ANTENNA HEIGHTS      5.0  1000.0 M
  EFFECTIVE HEIGHTS      5.0  1000.0 M  (SITING=0,0)
   TERRAIN, DELTA H          30. M

POL=0, EPS=25., SGM=  .020 S/M
CLIM=7, N0=350., NS=339., K= 1.447

ACCIDENTAL SERVICE
      10.0 PER CENT TIME AVAILABILITY
```

ESTIMATED QUANTILES OF BASIC TRANSMISSION LOSS(DB)

DIST KM	FREE SPACE	WITH CONFIDENCE 50.0	90.0	10.0
10.0	114.0	114.0	130.0	110.2
20.0	120.1	119.9	135.9	116.2
30.0	123.6	123.2	139.1	119.7
40.0	126.1	125.5	141.2	122.2
50.0	128.0	127.1	142.6	124.1
60.0	129.6	128.5	143.6	125.6
70.0	130.9	129.6	144.2	126.9
80.0	132.1	130.5	144.7	128.0
90.0	133.1	131.3	144.9	128.9
100.0	134.0	132.3	146.2	129.9
110.0	134.9	136.9	152.3	131.4
120.0	135.6	142.9	158.3	132.9
130.0	136.3	148.8	164.2	134.7
140.0	137.0	154.6	170.0	139.2
150.0	137.6	160.2	175.6	144.8
200.0	140.1	175.1	190.8	159.5
250.0	142.0	175.3	191.2	159.3
300.0	143.6	179.8	195.6	164.0
350.0	144.9	186.1	201.7	170.5
400.0	146.1	192.2	207.6	176.7
450.0	147.1	197.7	213.0	182.3
500.0	148.0	202.7	218.0	187.4

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15. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)*

The ITS model of radio propagation for frequencies between 20 MHz and 20 GHz (the Longley-Rice model) is a general purpose model that can be applied to a large variety of engineering problems. The model, which is based on electromagnetic theory and on statistical analyses of both terrain features and radio measurements, predicts the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space.

The model is described in the form used to make "area predictions" for such applications as preliminary estimates for system design, military tactical situations and surveillance, and land-mobile systems. This guide describes the basis of the model, its implementation, and some advantages and limitations of its use. Sample problems are included to demonstrate applications of the model.

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