REPORT
ON
VHF AND UHF PATH LOSS MEASUREMENTS

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REPORT

ON

VHF AND UHF PATH LOSS MEASUREMENTS

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1.0 INTRODUCTION

The following report details the results of a field strength survey conducted during late January/early February, 1994, for the purpose of compiling radio-frequency field values measured along defined radial paths from radio transmitting sources. This data is intended to be compared with the results of the CRC Propagation Prediction Program.

Within the 100-2,000 MHz frequency range of interest, measurements were conducted for four 856 MHz trunking radio sources and five 88-108 MHz FM broadcast radio sources, along 1-3 radial paths from each transmitter location. Criteria for the selection of the radio sources and the specific radial paths are discussed in Section 2.0 and 3.0, respectively.

Measurements were done using roof-mounted, monopole antennas, a precision radio test receiver, and a computer control/data logging system, all mounted in a mini-van. Each measurement was triggered by a bicycle odometer wheel mounted to the back of the van. Measurements were taken every metre over an approximate span of 250 m on either side of each selected radial measurement point. Details of the methodology are provided in Section 4.0.

The test receiving antennas consisted of a roof-mounted, monopole antenna in the case of the FM broadcast signals and a roof-mounted, monopole with inclined ground plane antenna for the 856 MHz trunking radio signals. Reference radio transmitter parameters were obtained from available Industry Canada licensing documentation on each of the sources and, where possible, were verified using a direct reference measurement. This is discussed in Section 5.0.

The data collected at each point were analyzed to determine the median field and standard deviation. Terrain profiles were generated for the cross-section of each radial path. These are discussed in Section 6.0 and are included within this report.

2.0 RADIO SOURCES

The criteria for the selection of the radio sources was as follows:

- Within the range of 100-2,000 MHz, with particular interest on higher frequencies in this range
- Vertically polarized to allow for roof-mounted, monopole antenna use
- Continuously transmitting
- Located in areas where the terrain within 30 - 50 km of the transmitting site was interesting from a propagation perspective, with no local clutter, minimum urban build-up and non-excessive antenna height, such that shadowing effects would be encountered along each radial path
- Sufficiently well-characterized transmit antenna parameters to allow accurate determination of effective radiated power.

These criteria ruled out some originally-contemplated sources: UHF broadcast television (horizontally polarized), 1.7 GHz STL's (combination of incorrect polarization, uninteresting paths, general lack of potential sources), 450 MHz mobile radio (non-continuous transmitting). Two types of sources which met the above criteria were identified and utilized.

At the lower end of the frequency range of interest, five FM radio broadcast facilities, transmitting from four separate sites, were identified. These were deemed suitable due to their circular polarization, i.e., a vertical signal component, well-characterized transmitting parameters, and interesting terrain features in the vicinity. The five sources were as follows:

- CKEY-FM, 101.1 MHz, Fort Erie
- CFMX-FM, 103.1 MHz, Cobourg
- CFMX-FM-1, 96.3 MHz, First Canadian Place (Toronto)
- CKFM-FM, 99.9 MHz, CN Tower (Toronto)
- CHIN-FM, 100.7 MHz, CN Tower (Toronto)

In the mid-range of the frequency band of interest, four 856 MHz trunking radio sites operated by Motorola were selected. Along with meeting criteria such as interesting geographical locations, vertically polarized signals, etc., these sites utilize either omnidirectional or slightly directional transmitting antennas, therefore, allowing for reasonable determination of radiated power. Also of importance, each site utilizes a five frequency block of channels, of which one channel is a control channel, and which is, therefore, continuously transmitting. The four sites were located in King Township north of Toronto, Barrie, Fonthill (mid-Niagara Peninsula), and Kitchener.

Details on the parameters of each source are given in Section 5.0.

3.0 RADIAL MEASUREMENT PATHS

Having selected the transmitting sources, the selections of specific radial measurement paths were based on the following criteria.

- Minimum urban development along the paths in order to minimize urban clutter effects.

- Existence of one or more natural terrain obstructions in order to provide paths where diffraction effects would be in evidence.

- Paths directed within main beams of directional antennas such that ERP was well characterized.

Specific radial directions were selected by plotting a three dimensional terrain plot, (utilizing the CRC Topographic Database) around each site and determining the locations of the natural obstructions and high terrain elevation points. Brief descriptions of the paths chosen for each of the sites are provided below. Plots of the terrain elevation profiles are given in Appendix A2. Locations of the radial paths are shown on 1:250,000 scale topographic maps in Appendix B.

1. CKEY-FM

A single radial from this site was chosen which encompassed two significant terrain features - Fonthill, which is the highest elevation in the Niagara Peninsula area at approximately 35 km from the transmitting site and the Niagara Escarpment at approximately 65 km from the site, which provides a major terrain drop off.

2. CFMX-FM-2

This site, north of Cobourg, is situated in relatively hilly terrain. Two radials with continually undulating terrain were selected.

3. CKFM-FM/CHIN-FM

These stations are located on the CN Tower at an unusually high elevation (456 mAGL). The terrain, northward from Toronto, however, continually rises reaching a peak at approximately 35 km and, thereafter, dropping off. This provided a path with a significant terrain obstruction in the centre.

4. CFMX-FM-1

This site is located on First Canadian Place very near to the CN Tower and, therefore, the radial path northward has the same characteristics. The antenna, however, is mounted some 150 m lower and, therefore, this source would allow for direct comparison between high and low antenna elevations for the same radial path.

5. King City

Three radial paths with various significant terrain obstructions were chosen.

6. Barrie

Two radial paths, northward through fairly mountainous ski country were investigated.

7. Fonthill

Two radial paths, one of which exhibits the Niagara Escarpment as the major terrain feature and one which simply has a continually dropping terrain profile were used.

8. Kitchener

Two radial paths with reasonably undulating terrain and a single major central terrain obstruction were chosen.

4.0 TEST EQUIPMENT AND METHODOLOGY

A list of the test equipment used is provided in Appendix D. Basically, the FM radio broadcast measurements utilized a roof-mounted, adjustable, monopole antenna while the 856 MHz trunking radio measurements utilized a quarter-wave, monopole with 45° inclined ground plane, roof-mounted via a non-conducting extension of approximately 35 cm. These fed a Rohde & Schwarz ESVD precision test receiver via approximately 3 m of RG-58/low-loss flexible coax, respectively. The receiver was triggered via a bicycle wheel odometer arrangement, mounted on the back of the van and calibrated to provide a trigger signal approximately every 1 m. The test receiver was controlled via a PC computer running custom CRC software which also logged the data. A GPS unit was also connected to the PC to provide co-ordinates within the data files, at approximate 3 second intervals.

The selected radial paths were plotted on 1:50,000 scale topographic maps. At every location along the radial where an accessible road crossed the radial, measurements were taken. In general, 100 - 400 measurements points were recorded with the majority of

measurement points numbering in the 250 range. Measurements were conducted at approximately equal distances on either side of the radial/road intersection. Important features such as heavy tree cover, urbanization, building or road embankment shadowing were noted at each measurement point.

A custom program was developed to read the output data files for each measurement point (each consisting of approximately 250 individual measurements around the specific radial point) to determine the median field strength and the standard deviation about the average.

A slight deviation in this procedure was used for the FM broadcast measurements of CKFM-FM, CHIN-FM and CFMX-FM-1. In this case, the radial was run along Highway 11, which is within 2° of a constant azimuth radial line. For this set of measurements, virtually continual measurements were taken along the radial. The CKFM-FM and CHIN-FM measurements were taken simultaneously, with the monopole receive antenna adjusted to be tuned mid-way between the two frequencies and the CFMX-FM-1 measurements were taken on the return path. In the analysis, the data was broken into sections of 250 points and the median field and standard deviation calculations done on each of these sub-sets.

As well, where practical for each source, a reference measurement for the purpose of verifying the assumed ERP, was taken at a location where substantially free space measurements could be obtained. The measurements were taken over a short range (about 100 m) while examining for minimum signal level deviations verifying the free space propagation path.

5.0 REFERENCE DATA

The following sections provide the reference data and calculations for the antenna gains, source ERP's and receiver settings.

5.1 Antenna Calibration

The FM monopole antenna mounted on the van roof was calibrated as follows. Approximately 60 measurements separated by 1-2 m were taken of a mid-band (99.9 MHz) station broadcasting from the CN Tower. Measurements were taken in an open parking lot along the Lake Ontario waterfront, approximately 5 km from the CN Tower. The site was free from foreground obstructions and scattering sources such as buildings, lamp standards, etc. The measurements were then repeated using a vertically oriented, calibrated dipole antenna. The results were as follows:

Monopole: Avg Signal = 85.2 dBuV, Std.Dev. = 1.0 dB
Dipole: Avg Signal = 85.4 dBuV, Std.Dev. = 1.0 dB

It is noted that the measurements show excellent consistency and very small standard deviation, thereby indicating a relatively scattering-free environment. Since the results are within .2 dB of each other, the van/monopole antenna system is considered equivalent to that of the reference dipole. The manufacturer's published gain of the dipole is within .05 dB of an ideal, theoretical dipole.

A similar calibration was not conducted for the 856 MHz monopole due to difficulties in equalizing the line losses between the two antenna systems and the higher variability of UHF signals. Since the monopole was carefully constructed by CRC, was of simple design and since the antenna was well separated (approximately one wavelength) from the van roof, it is anticipated that the gain would be very close to the theoretical. This was calculated using a moment method analysis (CRC Tech. Memo #DRC-93-0) as equal to a factor of 2 (3 dBi).

The antenna factor, which is defined as the conversion in dB between measured signal level in dBuV to ambient field in dBuV/m, is defined by the following formula:

$$E = V \sqrt{\frac{4 \pi \cap}{w^2 g R}}$$

where E = field
V = voltage
$\cap$ = 377 Ω (free-space impedance)
w = wavelength
g = 1.64 (dipole gain)
R = 50 Ω (system impedance)

The antenna conversion factors are thereby, as given below. Line losses were measured by CRC. A nominal .2 dB miscellaneous/connector loss has been included.

Frequency (MHz)	**Theo. Ant.Factor (dB)**	**Gain (dBd)**	**Line Loss (dB)**	**Misc. (dB)**	**Total Ant. Factor (dB)**
96.3	7.75	-	.6	.2	8.6
99.9 100.7 101.1	8.10	-	.6	.2	8.9
103.1	8.34	-	.6	.2	9.1
856	26.73	0.86	.7	.2	26.8

5.2 Transmit Parameters

The transmit parameters assumed for each radio source were those on file with Industry Canada. Antenna horizontal radiation patterns for the directional sources (King Township, Barrie, Fonthill, CKEY-FM and CFMX-FM) are contained in Appendix C.

The parameters used for each source, for each radial direction, are provided at the top of the measurement result Tables 1 through 14, given in Appendix A1. Note that ERP is defined as effective radiated power relative to a dipole.

Direct verification of the FM broadcast ERP's was generally not possible due to difficulty in obtaining a location near to the antenna with sufficient height and foreground clearance to provide free space propagation, i.e., Fresnel zone clearance. The transmission parameters and antenna radiation patterns for these types of facilities, however, are generally very well defined and it is anticipated that the actual versus assumed ERP's are well within overall system tolerances. All of these stations utilize panel antennas which are well-characterized in terms of radiation pattern and are not significantly impacted by supporting tower effects, (as are, for example, side-mounted ring-type antennas). As an example, examining the data for CKFM-FM and CHIN-FM which, theoretically, differ in ERP's by 6.7 dB, it will be noted that the actual difference is very near to this value.

For the 850 MHz trunking radio sources where free space propagation is easier to realize, a reference measurement was made at a convenient, unobstructed nearby location, where possible. The table below details the results.

Site	Azimuth (°)	ERP (W)	Distance (km)	Expected Signal (dBuV)	Measured Signal (dBuV)	Std. Dev. (dB)
King	330	51	4.2	54.8	52.4	1.6
Barrie	26	46	2.0	60.8	61.2	1.5
Kitchener	272	65	8.8	49.4	49.0	1.5
Fonthill	316 5	85 85	0.6 0.5	73.9 75.5	55.3 59.0	0.1 2.5

It is noted that Barrie and Kitchener are within 1 dB of the theoretical values. King City is within 3 dB, while Fonthill differs significantly. In the latter case, this is expected to be due to the fact that the measurement was necessarily taken very close to the antenna and, therefore, the vertical radiation pattern was a factor. Furthermore, the antenna was side-mounted on the tower and, therefore, some distortion of the theoretical horizontal pattern could be anticipated. The Fonthill data should, therefore, be used to determine general trends as opposed to absolute values.

5.3 Receiver Settings

The variable parameters of the ESVD receiver settings were frequency, IF bandwidth, sampling interval and type of detection. Under the computer control the sampling interval was automatically set to 10 ms, and the detection to average (RMS). The frequency was user set to the centre frequency of the channel under study. The IF bandwidths were set to 10 KHz for the 856 MHz radio signals (these have a nominal 16 KHz bandwidth), and 120 KHz for the FM radio signals (nominal bandwidth of 200 KHz).

6.0 DATA AND ANALYSIS

Data for each of the fourteen sources are provided in Tables 1 through 14 of Appendix A1 with accompanying terrain profiles in Figures 1 through 14 of Appendix A3. At the end of each table a graph of the measured median fields versus distance is provided along with a scatter plot of standard deviation of each point.

Appendix A2 provides representative distributions of the measured signal levels at two locations for various radials. For each radial, distributions are provided at locations of relatively low (1-3 dB) and high (6-9 dB) standard deviations, respectively. The sampling interval is 1 dB, i.e., the ordinate indicates the percent of values falling within 1 dB of the values given along the abscissa.

While detailed data analysis and correlation with path terrain characteristics is beyond the scope of this report, the following general observations are made.

The 856 MHz measurements exhibit standard deviations in the range of 2-8 dB, averaging 4-5 dB. No obvious correlations between decreased signal levels, increased standard deviations, and existence of tree cover or urbanization are apparent. The field trends do correlate with the general profile characteristics, showing definite shadow loss in obstructed locations, and increases at elevated, unobstructed locations.

The FM radio signals exhibit slightly lower standard deviations in the 3-4 dB range. The CKFM-FM/CHIN-FM field characteristics track very well with each other, exhibiting a 6-7 dB difference as expected due to the 6.7 dB ERP difference. The CFMX-FM-1 field characteristic also tracks well with the above (noting that the CFMX-FM-1 site is about 0.5 km closer to any given point than is the CN Tower), averaging about 3 dB lower than the CHIN-FM signal.

The field distributions, particularly the examples with low standard deviation, generally indicate symmetrical to slightly skewed behaviours about the medians. This would be expected in a multipath environment with a direct signal and a single dominant multipath signal. For these well-behaved distributions, the maximum fields are generally about 6 dB higher than the median (in-phase addition of direct and reflected signals) while the distribution below the median extends 6-10 dB, typifying anti-phase addition of a direct and reflected signal of slightly differing magnitudes.

APPENDIX A1

FIELD MEASUREMENT DATA

TABLE A1

Site Name :	King City		**Date:**	1-2-94
Co-ordinates :	43 57 58	N. Lat.	**Temp:**	-20C
	79 33 49	W. Long.	**Weather:**	Clear
Azimuth :	299	Deg		
Frequency :	856.2875	MHz		
Antenna Ht:	107	mAGL		
ERP:	51	Watts		

Point #	File #	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
1	22	1.7	50.8	77.6	6.6	Light trees
2	21	2.8	27.6	54.4	4.8	Light trees
3	20	5.5	30.8	57.6	5.8	
4	19	8.2	38.8	65.6	4.6	
5	18	10.1	43.5	70.3	3.0	
6	17	11.5	35.2	62.0	6.5	
7	16	13.9	24.1	50.9	4.9	
8	15	15.5	22.2	49.0	7.4	
9	14	17.7	21.2	48.0	4.5	
10	13	19.5	28.8	55.6	7.7	
11	12	21.5	1.9	28.7	3.3	
12	11	23.6	2.6	29.4	5.7	
13	10	25.4	-9.7	17.1	3.3	Heavy trees
14	9	27.2	14.7	41.5	3.1	
15	8	27.6	-2.1	24.7	4.1	
16	7	29.8	15.5	42.3	4.7	
17	6	30.6	18.3	45.1	3.7	Light trees
18	5	31.4	5.2	32.0	4.4	
19	4	33.2	29.9	56.7	4.7	
20	3	35.0	36.4	63.2	3.8	
21	2	36.6	-2	24.8	4.4	
22	1	38.2	13.2	40.0	5.1	

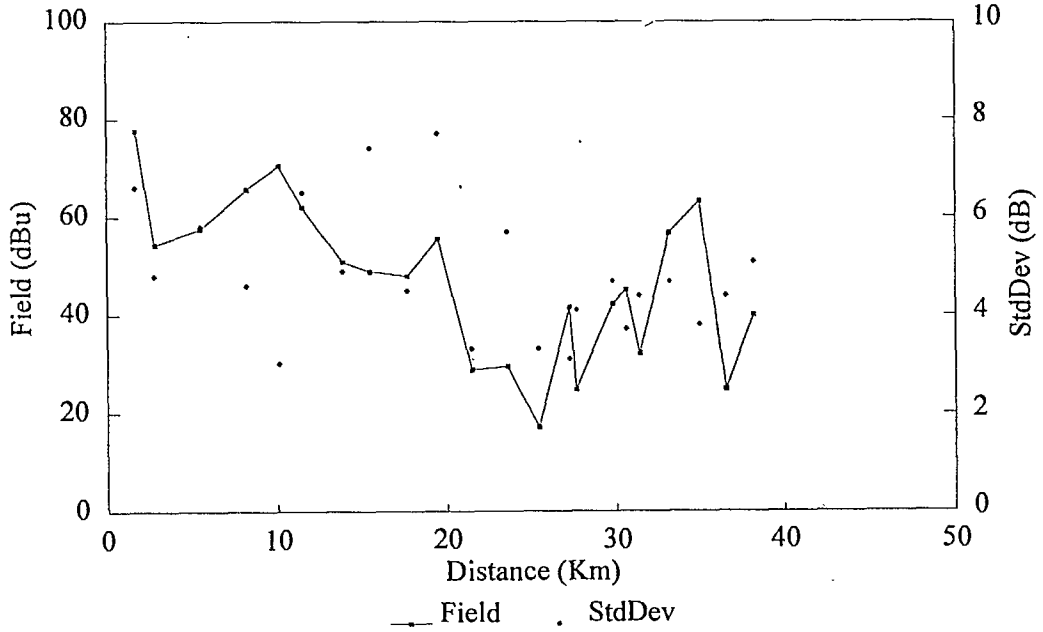


TABLE A2

Site Name :	King City		**Date:**	1-2-94
Co-ordinates :	43 57 58	N. Lat.	**Temp:**	-20C
	79 33 49	W. Long.	**Weather:**	Clear
Azimuth :	328	Deg		
Frequency :	856.2875	MHz		
Antenna Ht:	107	mAGL		
ERP:	51	Watts		

Point #	File #	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
1	1	1.2	51.7	78.5	4.7	
2	2	3.4	55.7	82.5	4.4	
3	3	4.2	51.6	78.4	2.9	
4	4	5.5	35.7	62.5	5.9	
5	5	7.5	29.6	56.4	4.8	
6	6	9.0	44.3	71.1	6.5	
7	7	9.7	40.1	66.9	8.7	Some shadowing by metal bldg
8	8	10.5	27.9	54.7	4.6	
9	9	11.9	40.2	67.0	4.6	
10	10	13.3	17.1	43.9	5.2	
11	11	14.7	39.5	66.3	4.6	Light trees
12	12	16.1	15	41.8	4.8	
13	13	17.6	21.9	48.7	5.2	
14	14	19.0	18.6	45.4	3.8	
15	15	20.4	17.6	44.4	6.5	
16	16	21.8	9.6	36.4	5.3	
17	17	23.2	20.8	47.6	2.2	
18	18	25.0	24.9	51.7	5.0	
19	19	26.0	38.6	65.4	4.1	
20	20	27.7	27.7	54.5	7.5	
21	21	28.2	23.1	49.9	6.1	
22	22	30.9	8	34.8	5.3	
23	23	31.6	7.4	34.2	4.8	
24	24	33.9	11.1	37.9	4.2	
25	25	35.2	-13.1	13.7	3.3	Heavy trees
26	26	37.2	-12.6	14.2	2.7	Heavy trees

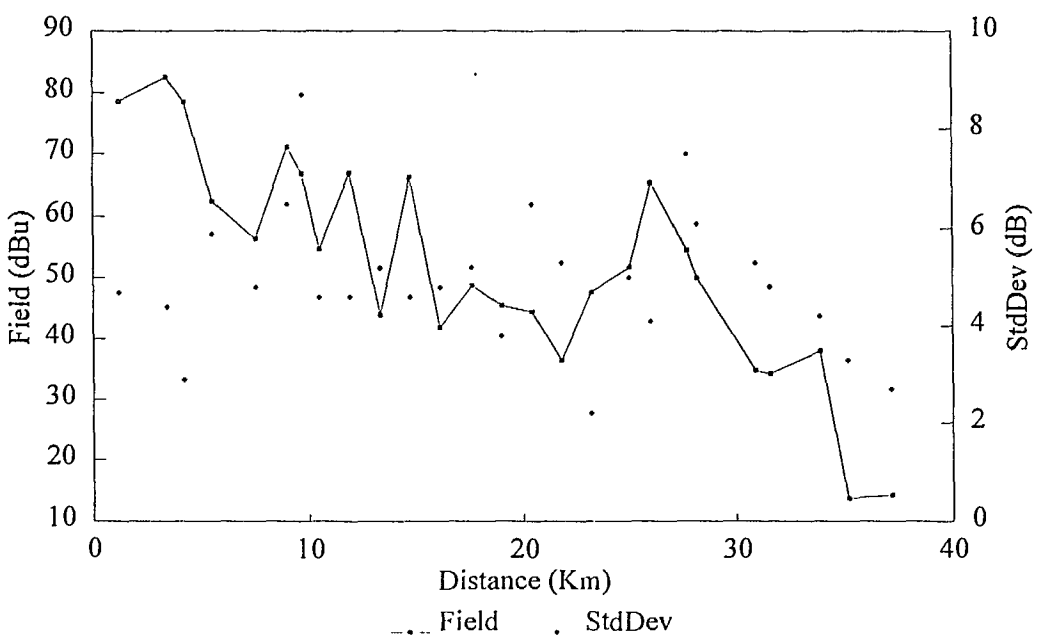


TABLE A3

Site Name :	King City		**Date:**	19-1-94
Co-ordinates :	43 57 58	N. Lat.	**Temp:**	-20C
	79 33 49	W. Long.	**Weather:**	Clear
Azimuth :	345	Deg		
Frequency :	856.2875	MHz		
Antenna Ht:	107	mAGL		
ERP:	51	Watts		

Point #	File #	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
1	1	1.2	48.9	75.7	3.6	Road embankment shadowing
2	2	3.2	54.5	81.3	5.3	
3	3	4.3	47.6	74.4	5.8	
4	4	5.3	53.3	80.1	2.3	Some signal overload
5	5	7.3	22.2	49.0	5.5	
6	6	8.1	19	45.8	4.8	Light trees
7	7	8.8	43.1	69.9	2.9	
8	8	10.5	45.5	72.3	7.5	
9	9	11.5	33.3	60.1	8.6	
10	10	12.9	20.6	47.4	6.3	
11	11	14.3	22.2	49.0	6.2	
12	12	15.6	44.4	71.2	8.9	
13	13	15.6	40.3	67.1	8.4	Redid point 12
14	14	17.0	23.4	50.2	5.1	
15	15	18.4	25.1	51.9	6.0	
16	16	19.7	30.4	57.2	5.6	
17	17	21.1	25.4	52.2	6.7	
18	19	26.9	-6.8	20.0	3.8	
19	20	28.2	16.8	43.6	3.5	
20	21	29.6	15.1	41.9	8.8	
21	22	31.0	19.2	46.0	3.8	
22	23	32.4	26.3	53.1	8.5	

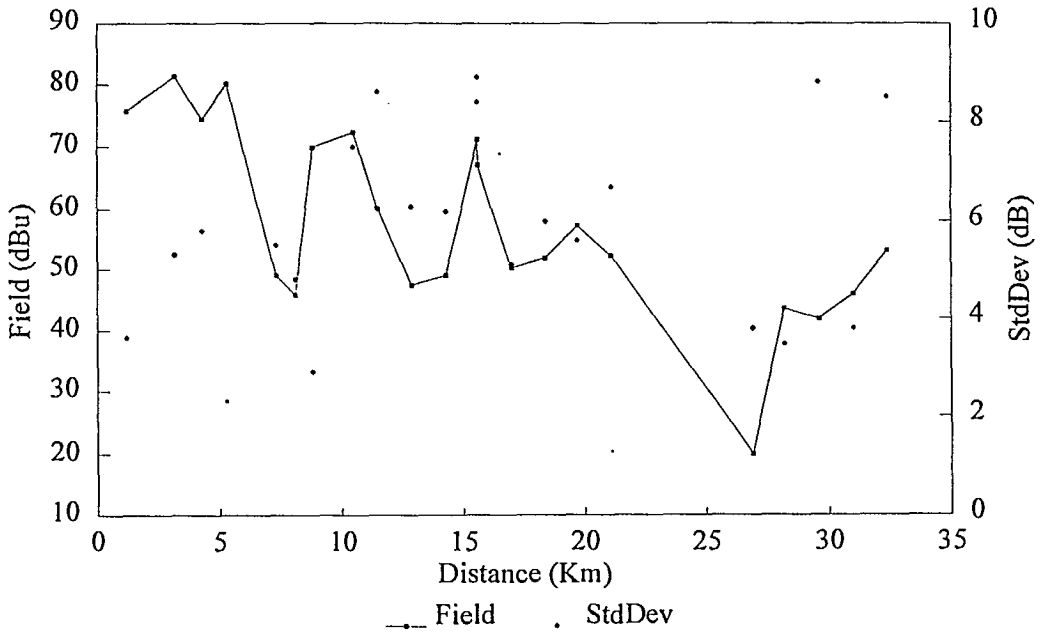


TABLE A4

Site Name :	Barrie		**Date:**	1-2-94
Co-ordinates :	44 24 10	N. Lat.	**Temp:**	-20C
	79 42 38	W. Long.	**Weather:**	Clear
Azimuth :	17	Deg		
Frequency :	859.2125	MHz		
Antenna Ht:	64	mAGL		
ERP:	46	Watts		

Point #	File #	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
1	101	2.2	28.7	55.5	4.1	Trees
2	102	5.1	53.1	79.9	4.7	
3	103	8.0	18.1	44.9	3.6	Overhead Hydro line
4	104	9.8	46.8	73.6	1.0	
5	313	10.8	39	65.8	8.4	
6	312	12.1	30.4	57.2	6.1	
7	311	13.9	13.1	39.9	4.5	Trees
8	310	14.6	20.2	47.0	6.3	Trees
9	309	15.8	16.1	42.9	5.9	
10	308	19.3	-12.4	14.4	3.8	
11	307	23.0	-17.8	9.0	1.1	Trees
12	306	24.9	-7.1	19.7	4.1	
13	305	26.7	-2.5	24.3	6.8	
14	304	28.7	-17.1	9.7	1.4	Trees
15	303	30.2	-17.6	9.2	0.9	Trees
16	301	32.0	-11.2	15.6	5.6	Trees
17	302	33.3	-17.6	9.2	1.8	

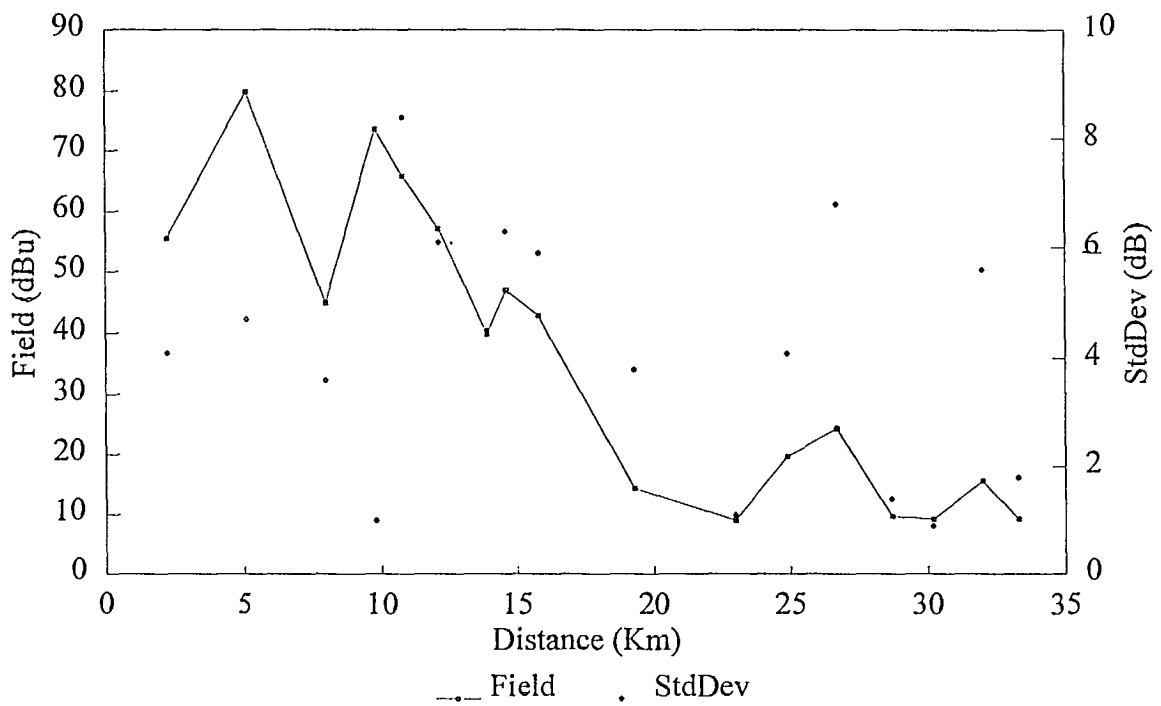


TABLE A5

Site Name :	Barrie		**Date:**	2-2-94
Co-ordinates :	44 24 10	N. Lat.	**Temp:**	-20C
	79 42 38	W. Long.	**Weather:**	Clear
Azimuth :	35	Deg		
Frequency :	859.2125	MHz		
Antenna Ht:	64	mAGL		
ERP:	46	Watts		

Point #	File #	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
1	1	1.8	52.4	79.2	6.8	
2	2	5.5	37.4	64.2	3.2	On bridge
3	3	6.6	34.6	61.4	5.1	
4	4	9.9	29.6	56.4	5.4	Trees
5	5	11.4	34.9	61.7	4.4	
6	6	12.9	28.8	55.6	5.6	
7	7	14.5	15.6	42.4	5.0	Trees
8	8	15.3	34.6	61.4	6.9	
9	9	16.0	14	40.8	6.3	Trees
10	10	17.5	-5.1	21.7	4.4	Trees
11	11	19.0	-0.4	26.4	5.2	Trees
12	12	22.0	-15.9	10.9	2.0	Trees
13	13	23.5	-15.4	11.4	1.9	Trees
15	15	28.6	-10.5	16.3	4.2	
16	16	29.5	-17.2	9.6	1.1	Trees
17	17	31.0	-15.1	11.7	3.0	

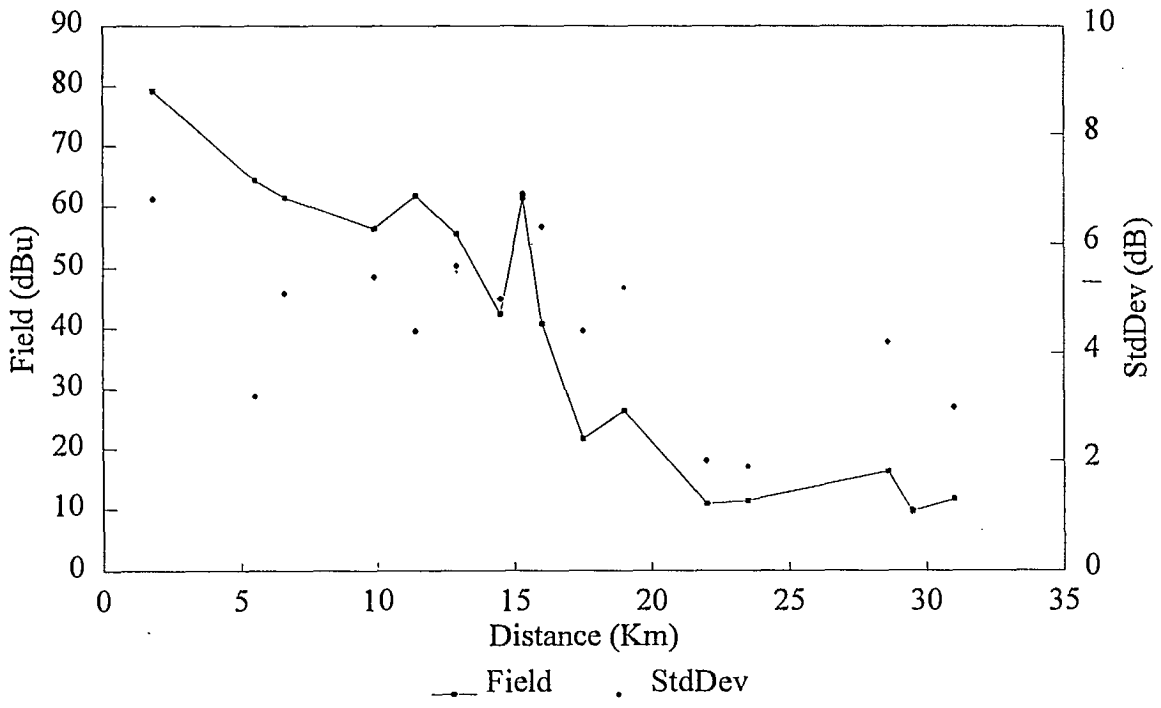


TABLE A6

Site Name :	Font Hill		**Date:**	4-2-94
Co-ordinates :	43 02 53	N. Lat.	**Temp:**	-15
	79 18 09	W. Long.	**Weather:**	Clear
Azimuth :	5	Deg		
Frequency :	856.2875	MHz		
Antenna Ht:	46	mAGL		
ERP:	85	Watts		

Point #	File #	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
1	201	0.5	57.6	84.4	4.1	
2	202	1.5	29.7	56.5	5.5	Heavy trees
3	203	3.0	19.1	45.9	5.0	Heavy trees
4	204	4.4	27.5	54.3	5.5	Overhead Hydro lines
5	205	6.5	20.5	47.3	5.5	Trees
6	206	7.7	29	55.8	7.4	
7	207	10.0	36.9	63.7	1.9	Overhead Hydro lines
8	208	10.7	29.8	56.6	4.1	
9	209	11.8	29	55.8	5.5	
10	210	12.8	27.3	54.1	5.5	
11	211	15.8	17.4	44.2	4.1	

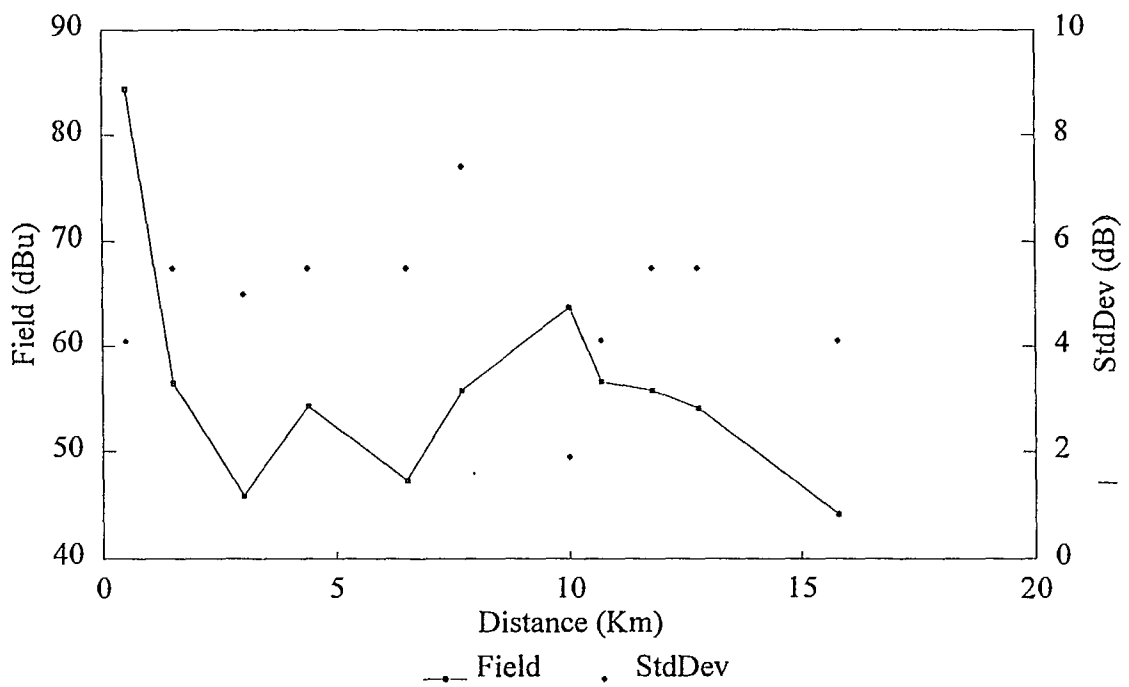


TABLE A7

Site Name :	Font Hill		**Date:**	3/4-2-94
Co-ordinates :	43 02 53	N. Lat.	**Temp:**	-15C
	79 18 09	W. Long.	**Weather:**	Snowing
Azimuth :	315	Deg		
Frequency :	856.2875	MHz		
Antenna Ht:	46	mAGL		
ERP:	85	Watts		

Point #	File #	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
1	24	0.6	55.3	82.1	2.7	
2	23	1.1	26.4	53.2	5.9	Heavy trees
3	22	2.0	19	45.8	6.2	Light trees
4	21	3.4	32.8	59.6	5.1	Heavy trees
5	20	4.6	38.3	65.1	3.4	
6	19	4.8	37.2	64.0	5.4	
7	18	5.8	26.7	53.5	5.8	
8	17	6.3	29.5	56.3	6.8	Trees
9	16	7.1	22.5	49.3	5.6	
10	15	7.7	28.9	55.7	4.9	
11	14	10.2	20.6	47.4	4.5	
12	13	12.1	22.6	49.4	6.1	
13	12	12.7	21.4	48.2	4.9	
14	11	13.5	24	50.8	4.5	
15	10	14.9	23.4	50.2	3.7	
16	9	15.2	25.4	52.2	3.9	
17	6	17.1	-1.6	25.2	5.3	Road embankment shadowing
18	5	18.8	7.6	34.4	3.3	
19	4	19.1	-3.1	23.7	6.4	
20	3	20.0	-9.4	17.4	2.8	Residential
21	2	20.5	-8	18.8	3.6	Light residential
22	1	21.3	-1.9	24.9	4.2	

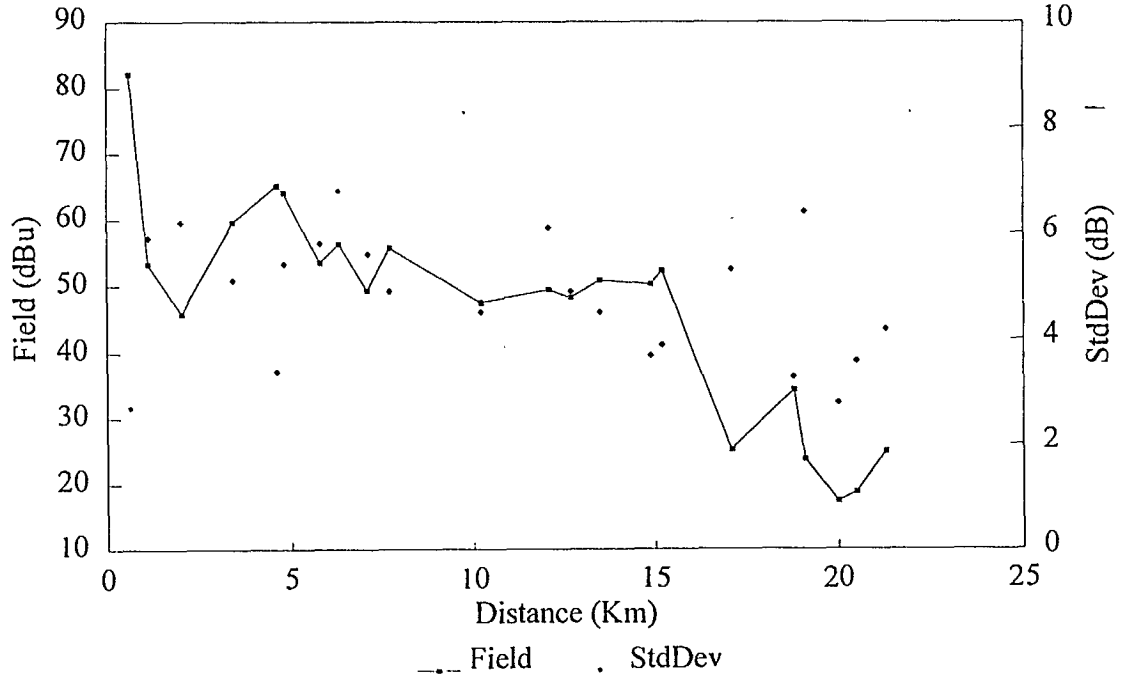


TABLE A8

Site Name :	Kitchener		**Date:**	9-2-94
Co-ordinates :	43 27 14	N. Lat.	**Temp:**	-15C
	80 29 09	W. Long.	**Weather:**	Clear
Azimuth :	245	Deg		
Frequency :	856.7875	MHz		
Antenna Ht:	69	mAGL		
ERP:	65	Watts		

Point #	File #	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
1	212	3.1	45.4	72.2	7.2	
2	211	10.5	12	38.8	5.1	
3	210	14.0	-0.9	25.9	5.8	Trees
4	209	15.4	-1.5	25.3	4.3	
5	208	17.5	2.1	28.9	4.7	
6	207	19.0	9.1	35.9	6.6	Residential
7	206	20.2	20.4	47.2	4.4	
8	205	24.4	9.2	36.0	4.7	
9	204	26.6	2.1	28.9	4.1	
10	203	27.5	4	30.8	5.3	
11	202	28.8	7.3	34.1	3.7	
12	201	31.0	1.7	28.5	5.7	

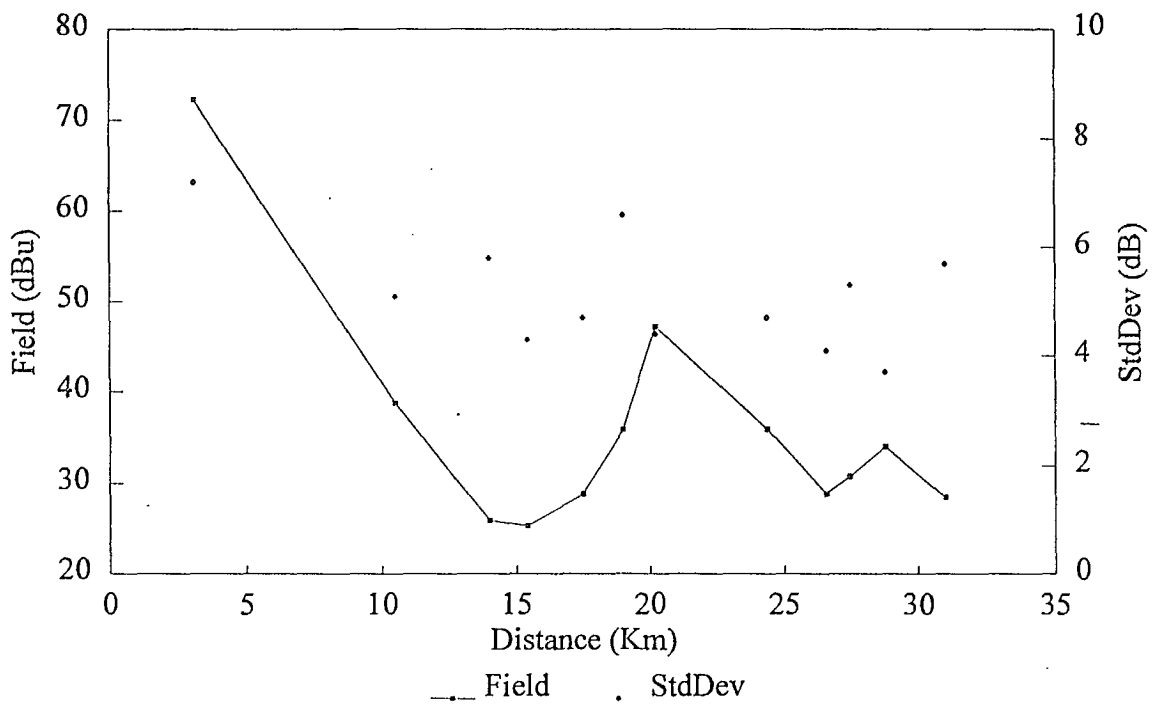


TABLE A9

Site Name :	Kitchener		**Date:**	9-2-94
Co-ordinates :	43 27 14	N. Lat.	**Temp:**	-15C
	80 29 09	W. Long.	**Weather:**	Clear
Azimuth :	271	Deg		
Frequency :	856.7875	MHz		
Antenna Ht:	69	mAGL		
ERP:	65	Watts		

Point #	File #	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
1	1	0.5	47.7	74.5	5.3	Urban
2	2	0.8	47.7	74.5	6.0	Urban
3	3	1.2	47.1	73.9	4.7	Urban
4	4	3.3	36.4	63.2	4.7	
5	5	4.7	32.3	59.1	4.5	Residential
6	6	5.5	38.4	65.2	5.4	
7	7	7.0	28.2	55.0	4.9	
8	8	9.1	27.5	54.3	6.2	
9	9	12.5	27.3	54.1	3.5	Trees
10	10	13.5	9.8	36.6	0.6	
11	11	18.5	18.9	45.7	2.2	
12	12	22.2	6.9	33.7	6.2	
13	13	24.3	-2.1	24.7	6.1	
14	14	28.4	-8.2	18.6	4.7	

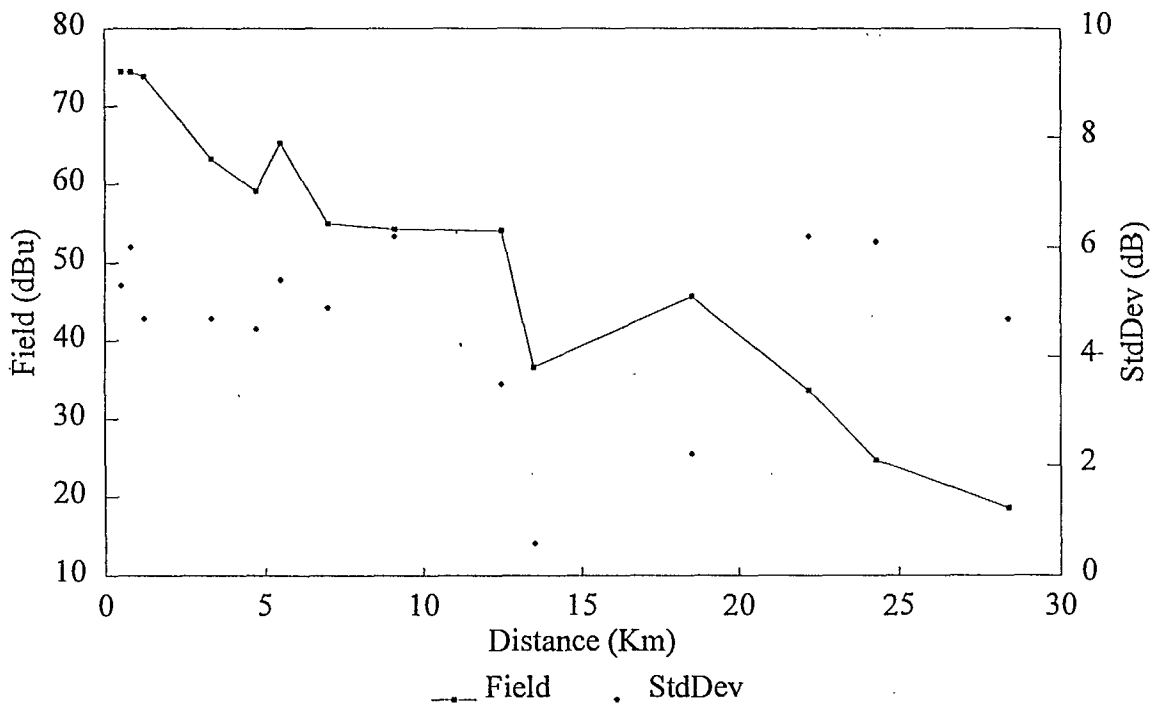


TABLE A10

Site Name :	Fort Erie (CKEY-FM)		**Date:**	3-2-94
Co-ordinates :	42 53 52	N. Lat.	**Temp:**	-15C
	78 57 27	W. Long.	**Weather:**	Snowing
Azimuth :	300	Deg		
Frequency :	101.1	MHz		
Antenna Ht:	73.5	mAGL		
ERP:	16.4	KiloWatts		

Point #	File #	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
1	1	1.2	96.2	105.1	3.4	
2	2	2.9	80.2	89.1	4.2	
3	3	4.8	79.3	88.2	2.1	
4	4	5.3	66.2	75.1	3.7	
5	5	6.0	64.1	73.0	5.6	Light trees
6	6	7.0	63.4	72.3	4.8	
7	7	8.4	67.6	76.5	3.5	Trees
8	8	9.5	56.9	65.8	5.4	Light residential
9	9	12.1	47.4	56.3	5.5	
10	10	13.1	53.5	62.4	4.0	
11	11	14.3	56	64.9	5.7	
12	12	16.2	52	60.9	4.2	
13	13	18.0	52.6	61.5	5.6	
14	14	20.0	49.1	58.0	6.4	
15	15	21.0	51.7	60.6	6.3	Light residential
16	16	22.3	46.9	55.8	5.3	Overhead Hydro lines
17	17	22.7	46.7	55.6	3.2	
18	18	27.0	35.7	44.6	4.6	Light trees
19	19	27.9	43.4	52.3	2.9	
20	20	28.9	46.5	55.4	4.8	Light trees
21	21	29.8	46	54.9	3.0	
22	22	30.7	46	54.9	5.4	
23	23	31.5	48.3	57.2	5.5	Urban
24	24	32.1	48.7	57.6	5.6	Urban
25	25	32.7	56.4	65.3	3.2	
26	26	33.3	46.1	55.0	5.6	
27	27	35.3	31.5	40.4	5.3	Road embankment shadowing
28	28	36.5	39.1	48.0	2.4	
29	29	37.4	32.3	41.2	3.0	
30	30	38.4	29.5	38.4	2.9	
31	31	39.4	30.5	39.4	5.3	Heavy trees
32	32	40.9	34.8	43.7	3.7	
33	33	42.8	26.6	35.5	4.4	
34	34	43.8	26.6	35.5	3.5	
35	35	45.3	29.4	38.3	4.5	
36	36	45.7	32.6	41.5	2.1	
37	37	48.7	30.8	39.7	2.3	
38	38	49.7	33.8	42.7	3.2	
39	39	51.5	28.6	37.5	4.9	
40	40	53.5	26.1	35.0	2.6	
41	41	55.5	20.9	29.8	6.2	
42	42	57.6	27.1	36.0	2.2	
43	43	60.9	21.8	30.7	2.6	
44	44	62.6	20.2	29.1	2.6	
45	45	65.0	24.4	33.3	3.2	
46	46	67.3	25.1	34.0	8.0	Starting down escarpment
47	47	69.6	6	14.9	2.3	
48	48	70.7	8.5	17.4	2.7	Urban
49	49	71.1	5.3	14.2	2.8	Urban
50	50	73.4	8	16.9	2.1	Urban
51	51	75.2	10.6	19.5	1.9	Urban
52	52	76.8	9.6	18.5	2.5	Urban

TABLE A10 [continued]

Site Name :	Fort Erie (CKEY-FM)		**Date:**	3-2-94	[continued]
Co-ordinates :	42 53 52	N. Lat.	**Temp:**	-15C	
	78 57 27	W. Long.	**Weather:**	Snowing	
Azimuth :	300	Deg			
Frequency :	101.1	MHz			
Antenna Ht:	73.5	mAGL			
ERP:	16.4	KiloWatts			

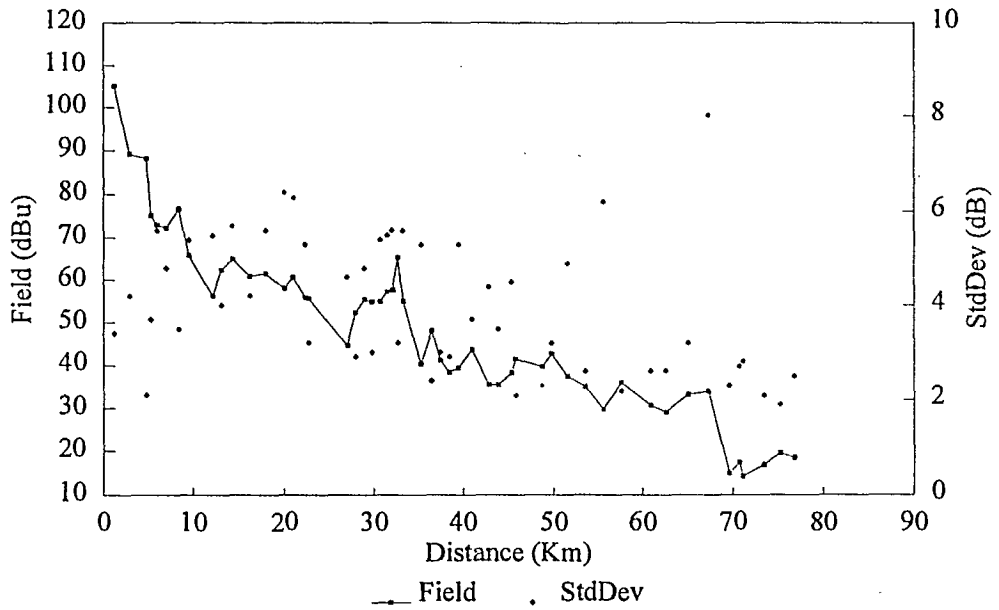


TABLE A11

Site Name :	Cobourg (CFMX-FM)		**Date:**	10-2-94
Co-ordinates :	44 04 14	N. Lat.	**Temp:**	-15C
	78 08 36	W. Long.	**Weather:**	Clear
Azimuth :	80	Deg		
Frequency :	103.1	MHz		
Antenna Ht:	116.8	mAGL		
ERP	82.8	KiloWatts		

Point #	File #	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
1	26	3.5	85.6	94.7	4.5	Trees
2	25	6.5	87.4	96.5	5.4	Trees
3	23	8.5	82.3	91.4	3.2	
4	22	9.8	76.8	85.9	1.5	
5	21	10.7	78.1	87.2	4.2	
6	20	11.9	79.4	88.5	3.8	Trees
7	19	14.0	79.7	88.8	7.5	Trees
8	18	16.0	66.4	75.5	4.6	
9	17	17.5	61.3	70.4	5.5	
10	16	22.6	59.1	68.2	6.6	
11	15	27.4	61.6	70.7	9.7	
12	14	29.4	65.4	74.5	4.4	
13	13	31.7	69.5	78.6	6.2	
14	12	32.4	53.5	62.6	5.7	
15	11	36.6	56.5	65.6	3.9	Trees
16	10	38.0	52.1	61.2	6.5	Heavy trees
17	9	38.8	63.2	72.3	2.7	
18	8	39.4	49.6	58.7	8.5	Trees
19	7	40.7	50.8	59.9	6.5	Trees
20	6	42.1	51.6	60.7	19.1	
21	5	43.3	48.8	57.9	10.2	
22	4	45.0	38	47.1	7.4	
23	3	48.0	50.1	59.2	2.6	
24	2	49.8	45.6	54.7	3.4	
25	1	50.4	47.5	56.6	1.5	

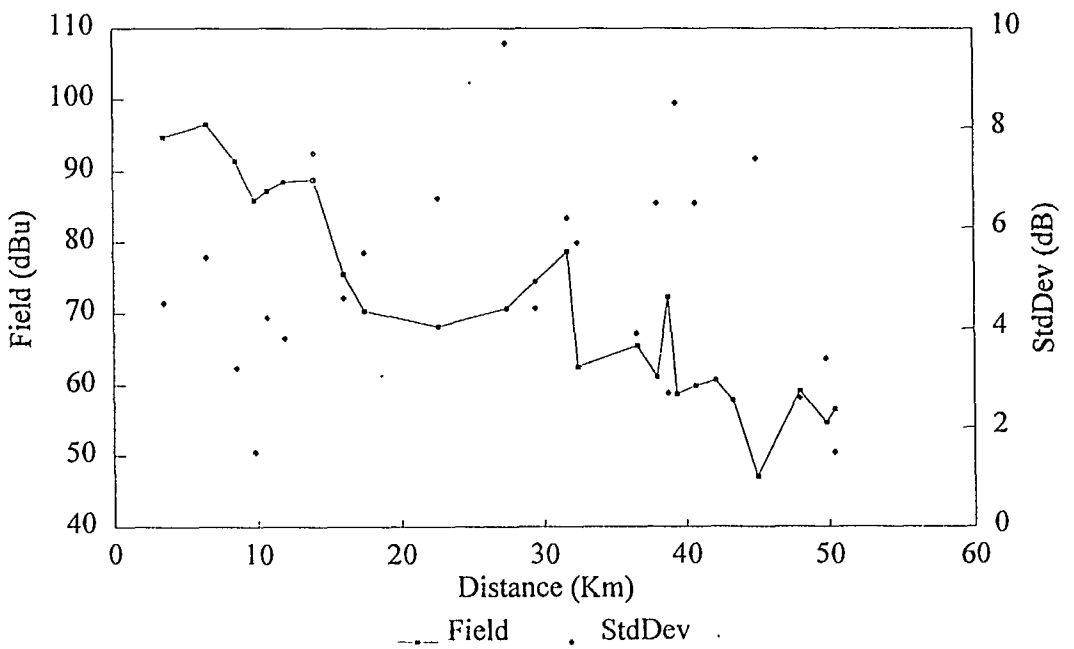


TABLE A12

Site Name :	Cobourg (CFMX-FM)		**Date:**	10-2-94
Co-ordinates :	44 04 14	N. Lat.	**Temp:**	-15C
	78 08 36	W. Long.	**Weather:**	Clear
Azimuth :	269	Deg		
Frequency :	103.1	MHz		
Antenna Ht:	116.8	mAGL		
ERP	82.8	KiloWatts		

Point #	File #	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
1	301	2.5	73.9	83.0	7.6	Trees
2	302	3.7	101.5	110.6	5.4	
3	303	5.2	90.2	99.3	3.0	
4	304	7.7	82.1	91.2	6.8	
5	305	9.7	72.2	81.3	4.2	
6	306	11.2	65.4	74.5	12.5	
7	307	13.9	63.7	72.8	3.1	
8	308	17.3	68.5	77.6	2.9	
9	309	18.6	68.4	77.5	4.3	Trees
10	310	23.0	68	77.1	4.4	Trees
11	311	24.5	67.9	77.0	5.4	Trees
12	312	28.6	53.5	62.6	4.4	Trees
13	313	38.6	57.1	66.2	5.1	
14	314	43.5	55.4	64.5	1.4	Trees
15	315	51.0	50.4	59.5	4.5	
16	316	58.7	36.9	46.0	3.0	
17	317	61.5	37	46.1	2.0	
18	318	66.0	42.8	51.9	2.6	

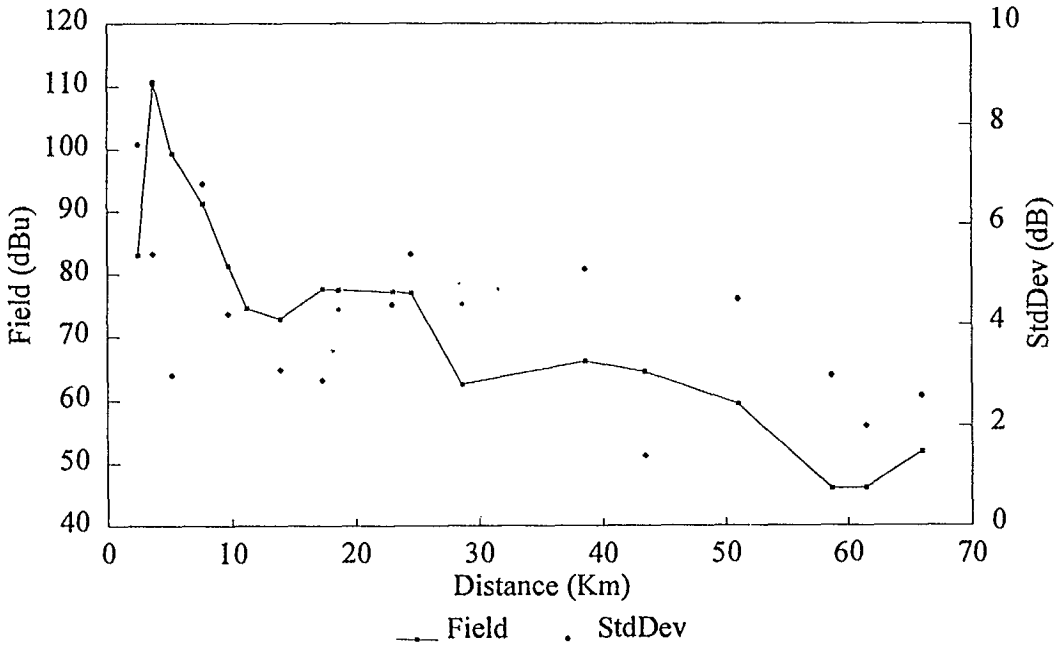


TABLE A13a

Site Name :	CN Twr (CKFM-FM)		**Date:**	7-2-94
Co-ordinates :	43 38 33	N. Lat.	**Temp:**	-10C
	79 23 15	W. Long.	**Weather:**	Hazy
Azimuth :	351	Deg		
Frequency :	99.9	MHz		
Antenna Ht:	456	mAGL		
ERP:	40	KiloWatts		

Point #	F#	Entry	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
1	1	125	7.63	82.8	91.7	5.3	Urban
2	1	375	7.88	72.4	81.3	4.2	Urban
3	1	625	8.13	74.1	83.0	5.1	Urban
4	1	875	8.38	76.2	85.1	4.3	Urban
5	1	1125	8.63	75.5	84.4	5.8	Urban
6	1	1375	8.88	67.9	76.8	4.7	Urban
7	1	1625	9.13	71	79.9	4.5	Urban
8	1	1875	9.38	74.2	83.1	4.5	Urban
9	1	2125	9.63	74.4	83.3	2.6	Urban
10	1	2375	9.88	76	84.9	2.7	Urban
11	1	2625	10.13	75.9	84.8	2.4	Urban
12	2	125	11.13	67.8	76.7	3.7	Urban
13	2	375	11.38	67	75.9	4.7	Urban
14	2	625	11.63	70.5	79.4	4.3	Urban
15	2	875	11.88	75.9	84.8	5.3	Urban
16	2	1125	12.13	81.1	90.0	2.6	Urban
17	2	1375	12.38	84	92.9	2.0	Urban
18	2	1625	12.63	84.2	93.1	3.4	Urban
19	3	125	13.03	75.4	84.3	5.1	Urban
20	3	375	13.28	73.1	82.0	4.4	Urban
21	3	625	13.53	76.2	85.1	4.2	Urban
22	3	875	13.78	78	86.9	2.3	Urban
23	3	1125	14.03	77.7	86.6	2.1	Urban
24	3	1375	14.28	75.3	84.2	2.9	Urban
25	3	1625	14.53	76.6	85.5	2.8	Urban
26	3	1875	14.78	78.1	87.0	2.4	Urban
27	3	2125	15.03	73.5	82.4	4.2	Urban
28	3	2375	15.28	70	78.9	3.6	Urban
29	3	2625	15.53	69.3	78.2	3.8	Urban
30	3	2875	15.78	68.4	77.3	3.6	Urban
31	3	3125	16.03	68	76.9	5.1	Urban
32	3	3375	16.28	68.7	77.6	3.2	Urban
33	3	3625	16.53	69.6	78.5	2.5	Urban
34	3	3875	16.78	64.2	73.1	4.5	Urban
35	4	125	17.53	68.3	77.2	2.6	Urban
36	4	375	17.78	68.2	77.1	2.3	Urban
37	4	625	18.03	67.1	76.0	4.0	Urban
38	4	875	18.28	59	67.9	4.0	Suburban
39	4	1125	18.53	58.2	67.1	4.2	Suburban
40	4	1375	18.78	61.1	70.0	4.9	Suburban
41	4	1625	19.03	66.2	75.1	4.0	Suburban
42	4	1875	19.28	65.7	74.6	2.9	Suburban
43	4	2125	19.53	64.6	73.5	4.4	Suburban
44	4	2375	19.78	59.7	68.6	4.7	Suburban
45	4	2625	20.03	71	79.9	2.3	Suburban
46	4	2875	20.28	66.3	75.2	3.0	Suburban
47	4	3125	20.53	67	75.9	3.5	Suburban
48	4	3375	20.78	71.6	80.5	2.8	Suburban
49	5	125	21.63	70.4	79.3	5.1	Suburban
50	5	375	21.88	69.7	78.6	4.9	Suburban
51	5	625	22.13	67.9	76.8	4.2	Suburban
52	5	875	22.38	71.2	80.1	1.7	Suburban

TABLE A13a [continued]

Site Name :	CN Twr (CKFM-FM)	**Date:**	7-2-94	
Co-ordinates :	43 38 33	N. Lat.	**Temp:**	-10C
	79 23 15	W. Long.	**Weather:**	Hazy
Azimuth :	351	Deg		
Frequency :	99.9	MHz		
Antenna Ht:	456	mAGL		
ERP:	40	KiloWatts		

Point #	F#	Entry	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
53	5	1125	22.63	67.9	76.8	3.6	Suburban
54	5	1375	22.88	69.7	78.6	2.5	Suburban
55	5	1625	23.13	68.9	77.8	2.9	Suburban
56	5	1875	23.38	66.7	75.6	3.9	Suburban
57	5	2125	23.63	64.2	73.1	3.8	Suburban
58	5	2375	23.88	66.3	75.2	4.0	Suburban
59	5	2625	24.13	66.5	75.4	4.0	Suburban
60	5	2875	24.38	65.4	74.3	4.1	Suburban
61	5	3125	24.63	65.2	74.1	3.4	Suburban
62	5	3375	24.88	66.8	75.7	3.3	Suburban
63	5	3625	25.13	69.2	78.1	2.9	Suburban
64	5	3875	25.38	72.8	81.7	3.1	Suburban
65	5	4125	25.63	72.1	81.0	3.7	Suburban
66	5	4375	25.88	65.6	74.5	4.8	Suburban
67	6	125	27.73	64.9	73.8	3.6	Suburban
68	6	375	27.98	65.1	74.0	2.4	Suburban
69	6	625	28.23	65.7	74.6	3.3	
70	6	875	28.48	66.1	75.0	2.8	
71	6	1125	28.73	68.4	77.3	2.2	
72	6	1375	28.98	68.7	77.6	2.7	
73	6	1625	29.23	66.6	75.5	3.9	
74	6	1875	29.48	69.3	78.2	3.5	
75	6	2125	29.73	71.2	80.1	2.7	
76	6	2375	29.98	70.7	79.6	3.5	
77	6	2625	30.23	68	76.9	3.8	
78	6	2875	30.48	70.8	79.7	4.1	
79	6	3125	30.73	71.7	80.6	3.0	
80	6	3375	30.98	65.4	74.3	3.8	
81	6	3625	31.23	70.2	79.1	3.4	
82	6	3875	31.48	69.6	78.5	2.6	
83	6	4125	31.73	65.8	74.7	2.0	
84	6	4375	31.98	62.1	71.0	3.6	
85	6	4625	32.23	58.2	67.1	4.4	
86	6	4875	32.48	56.7	65.6	3.7	
87	6	5125	32.73	58.2	67.1	3.9	
88	7	125	33.93	58	66.9	3.3	Suburban
89	7	375	34.18	59.3	68.2	2.5	Suburban
90	7	625	34.43	59.1	68.0	2.2	Suburban
91	7	875	34.68	58.4	67.3	2.9	Suburban
92	7	1125	34.93	56.3	65.2	2.7	Suburban
93	7	1375	35.18	58.5	67.4	3.5	Suburban
94	7	1625	35.43	61.5	70.4	2.4	
95	7	1875	35.68	58.8	67.7	2.6	
96	7	2125	35.93	63	71.9	2.8	
97	7	2375	36.18	59.7	68.6	3.7	
98	7	2625	36.43	52.6	61.5	3.6	
99	7	2875	36.68	49.8	58.7	2.1	
100	7	3125	36.93	51.6	60.5	2.2	
101	7	3375	37.18	49.8	58.7	1.9	
102	7	3625	37.43	49.3	58.2	1.7	
103	7	3875	37.68	49.4	58.3	1.3	
104	7	4125	37.93	49.3	58.2	1.6	

TABLE A13a [continued]

Site Name : CN Twr (CKFM-FM) **Date:** 7-2-94
Co-ordinates : 43 38 33 N. Lat. **Temp:** -10C
79 23 15 W. Long. **Weather:** Hazy
Azimuth : 351 Deg
Frequency : 99.9 MHz
Antenna Ht: 456 mAGL
ERP: 40 KiloWatts

			Distance	Med Sig	Med Fld	StdDev	
Point #	F#	Entry	(km)	(dBuV)	(dBu)	(dB)	Notes
105	8	125	40.13	40.8	49.7	5.5	Suburban
106	8	375	40.38	43.1	52.0	4.5	Suburban
107	8	625	40.63	42.4	51.3	3.5	Suburban
108	8	875	40.88	42.6	51.5	3.6	Suburban
109	8	1125	41.13	43.6	52.5	3.4	Suburban
110	8	1375	41.38	44.3	53.2	2.9	
111	8	1625	41.63	45.5	54.4	4.3	
112	8	1875	41.88	46.9	55.8	3.2	
113	8	2125	42.13	45.8	54.7	2.4	
114	8	2375	42.38	45.4	54.3	3.0	
115	8	2625	42.63	52.3	61.2	2.5	
116	8	2875	42.88	54.4	63.3	2.8	
117	9	125	44.23	47.9	56.8	4.6	
118	9	375	44.48	51.9	60.8	3.1	Suburban
119	9	625	44.73	51.2	60.1	3.2	Suburban
120	9	875	44.98	48.6	57.5	4.9	Suburban
121	9	1125	45.23	43.2	52.1	5.1	Suburban
122	9	1375	45.48	48.9	57.8	3.0	Suburban
123	9	1625	45.73	50	58.9	4.2	Suburban
124	9	1875	45.98	46.1	55.0	5.9	Suburban
125	9	2125	46.23	43	51.9	3.6	Suburban
126	9	2375	46.48	43.8	52.7	4.7	Suburban
127	9	2625	46.73	50.3	59.2	2.9	Suburban
128	9	2875	46.98	51	59.9	3.3	Suburban
129	9	3125	47.23	47.1	56.0	4.0	
130	9	3375	47.48	48.9	57.8	3.8	
131	10	125	48.33	52.5	61.4	2.0	
132	10	375	48.58	53.2	62.1	1.7	
133	10	625	48.83	53.2	62.1	2.5	
134	10	875	49.08	50.2	59.1	4.1	
135	10	1125	49.33	39.8	48.7	4.9	
136	10	1375	49.58	30.3	39.2	3.8	Trees
137	10	1625	49.83	34	42.9	6.0	Trees
138	10	1875	50.08	35.4	44.3	2.9	Trees
139	10	2125	50.33	33.8	42.7	3.1	Trees
140	10	2375	50.58	37.5	46.4	2.2	Trees
141	10	2625	50.83	39.7	48.6	3.2	Suburban
142	10	2875	51.08	40.1	49.0	4.4	Suburban
143	10	3125	51.33	34.6	43.5	3.9	Suburban
144	10	3375	51.58	34.2	43.1	4.6	Suburban
145	10	3625	51.83	39.3	48.2	3.8	Suburban
146	10	3875	52.08	38.6	47.5	4.6	Suburban
147	10	4125	52.33	39.2	48.1	4.2	Suburban
148	10	4375	52.58	41	49.9	4.0	Suburban
149	10	4625	52.83	36.2	45.1	5.3	Suburban
150	10	4875	53.08	37.4	46.3	3.0	Suburban
151	10	5125	53.33	38.5	47.4	4.2	Suburban
152	10	5375	53.58	38.8	47.7	4.1	Suburban
153	10	5625	53.83	40	48.9	3.3	Suburban
154	10	5875	54.08	38.9	47.8	3.5	Suburban
155	10	6125	54.33	40	48.9	4.1	Suburban
156	11	1	60.8	40.9	49.8	1.3	

TABLE A13a [continued]

Site Name :	CN Twr (CKFM-FM)		**Date:**	7-2-94
Co-ordinates :	43 38 33	N. Lat.	**Temp:**	-10C
	79 23 15	W. Long.	**Weather:**	Hazy
Azimuth :	351	Deg		
Frequency :	99.9	MHz		
Antenna Ht:	456	mAGL		
ERP:	40	KiloWatts		

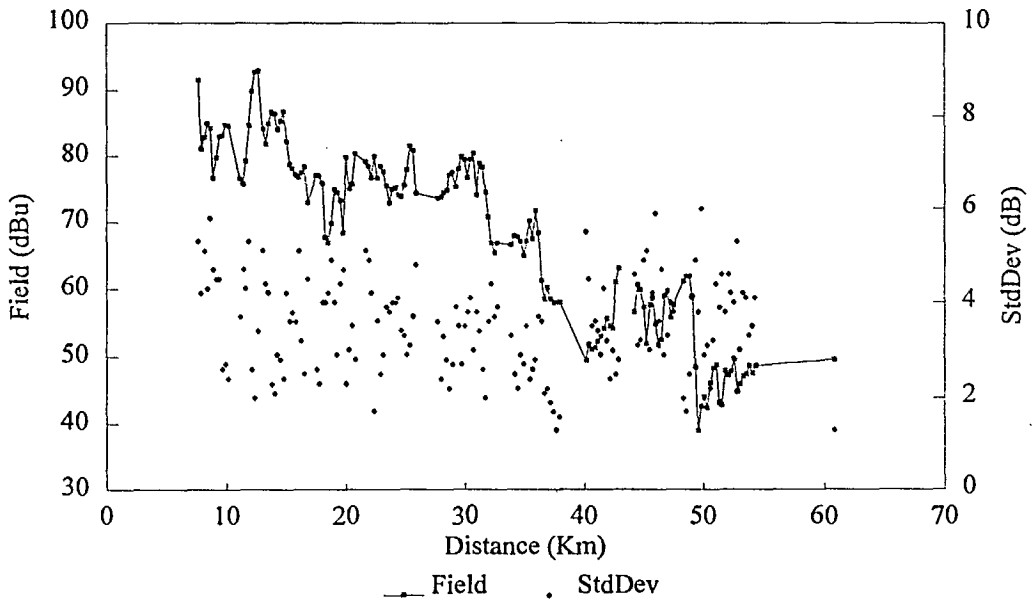


TABLE A13b

Site Name :	CN Twr (CHIN-FM)		**Date:**	7-2-94
Co-ordinates :	43 38 33	N. Lat.	**Temp:**	-10C
	79 23 15	W. Long.	**Weather:**	Hazy
Azimuth :	351	Deg		
Frequency :	100.7	MHz		
Antenna Ht:	456	mAGL		
ERP:	8.5	KiloWatts		

Point #	F#	Entry	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
1	1	125	7.63	77	85.9	4.8	Urban
2	1	375	7.88	65.6	74.5	4.5	Urban
3	1	625	8.13	66.9	75.8	4.3	Urban
4	1	875	8.38	70	78.9	4.9	Urban
5	1	1125	8.63	69.7	78.6	5.8	Urban
6	1	1375	8.88	61.3	70.2	4.3	Urban
7	1	1625	9.13	64.6	73.5	4.2	Urban
8	1	1875	9.38	67.9	76.8	4.0	Urban
9	1	2125	9.63	68.4	77.3	3.4	Urban
10	1	2375	9.88	70.1	79.0	2.6	Urban
11	1	2625	10.13	69.7	78.6	2.6	Urban
12	2	125	11.13	60.6	69.5	4.1	Urban
13	2	375	11.38	60.4	69.3	4.2	Urban
14	2	625	11.63	63.3	72.2	3.8	Urban
15	2	875	11.88	69.5	78.4	5.3	Urban
16	2	1125	12.13	73.9	82.8	2.7	Urban
17	2	1375	12.38	77	85.9	2.2	Urban
18	2	1625	12.63	77.6	86.5	3.3	Urban
19	3	125	13.03	68.8	77.7	5.0	Urban
20	3	375	13.28	66.5	75.4	4.1	Urban
21	3	625	13.53	69.6	78.5	4.4	Urban
22	3	875	13.78	72	80.9	2.5	Urban
23	3	1125	14.03	72.7	81.6	2.2	Urban
24	3	1375	14.28	69.2	78.1	3.5	Urban
25	3	1625	14.53	71.4	80.3	3.4	Urban
26	3	1875	14.78	71	79.9	2.3	Urban
27	3	2125	15.03	66.4	75.3	4.8	Urban
28	3	2375	15.28	63.5	72.4	3.7	Urban
29	3	2625	15.53	63.2	72.1	3.3	Urban
30	3	2875	15.78	61.8	70.7	3.3	Urban
31	3	3125	16.03	61.7	70.6	5.1	Urban
32	3	3375	16.28	62.2	71.1	2.7	Urban
33	3	3625	16.53	63	71.9	2.2	Urban
34	3	3875	16.78	58.3	67.2	3.8	Urban
35	4	125	17.53	62.4	71.3	2.6	Urban
36	4	375	17.78	62.5	71.4	2.2	Urban
37	4	625	18.03	61.1	70.0	4.0	Urban
38	4	875	18.28	52.4	61.3	3.3	Suburban
39	4	1125	18.53	52.4	61.3	3.1	Suburban
40	4	1375	18.78	55.4	64.3	3.9	Suburban
41	4	1625	19.03	60.5	69.4	3.9	Suburban
42	4	1875	19.28	59.7	68.6	2.6	Suburban
43	4	2125	19.53	58.6	67.5	4.1	Suburban
44	4	2375	19.78	54.1	63.0	4.0	Suburban
45	4	2625	20.03	64.8	73.7	2.4	Suburban
46	4	2875	20.28	60.5	69.4	3.2	Suburban
47	4	3125	20.53	61	69.9	3.3	Suburban
48	4	3375	20.78	65.1	74.0	2.9	Suburban
49	5	125	21.63	64.2	73.1	5.6	Suburban
50	5	375	21.88	63.7	72.6	4.3	Suburban
51	5	625	22.13	61.7	70.6	3.9	Suburban
52	5	875	22.38	64.5	73.4	1.9	Suburban

TABLE A13b [continued]

Site Name :	CN Twr (CHIN-FM)		**Date:**	7-2-94
Co-ordinates :	43 38 33	N. Lat.	**Temp:**	-10C
	79 23 15	W. Long.	**Weather:**	Hazy
Azimuth :	351	Deg		
Frequency :	100.7	MHz		
Antenna Ht:	456	mAGL		
ERP:	8.5	KiloWatts		

Point #	F#	Entry	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
53	5	1125	22.63	61.5	70.4	3.5	Suburban
54	5	1375	22.88	64.1	73.0	2.3	Suburban
55	5	1625	23.13	62.1	71.0	2.7	Suburban
56	5	1875	23.38	60.6	69.5	3.8	Suburban
57	5	2125	23.63	58	66.9	3.1	Suburban
58	5	2375	23.88	60.1	69.0	3.8	Suburban
59	5	2625	24.13	60.5	69.4	4.2	Suburban
60	5	2875	24.38	59.5	68.4	3.7	Suburban
61	5	3125	24.63	58.7	67.6	3.1	Suburban
62	5	3375	24.88	60.6	69.5	3.1	Suburban
63	5	3625	25.13	63.2	72.1	3.0	Suburban
64	5	3875	25.38	66.6	75.5	3.3	Suburban
65	5	4125	25.63	66	74.9	3.7	Suburban
66	5	4375	25.88	58.9	67.8	4.2	Suburban
67	6	125	27.73	58.6	67.5	3.2	Suburban
68	6	375	27.98	58.5	67.4	2.1	Suburban
69	6	625	28.23	59.3	68.2	3.2	
70	6	875	28.48	59.3	68.2	2.8	
71	6	1125	28.73	61.8	70.7	2.3	
72	6	1375	28.98	61.6	70.5	2.5	
73	6	1625	29.23	59.6	68.5	3.5	
74	6	1875	29.48	62.7	71.6	3.5	
75	6	2125	29.73	64.6	73.5	2.6	
76	6	2375	29.98	64.3	73.2	3.4	
77	6	2625	30.23	61.8	70.7	3.3	
78	6	2875	30.48	64.5	73.4	4.1	
79	6	3125	30.73	65.1	74.0	3.3	
80	6	3375	30.98	58.7	67.6	3.7	
81	6	3625	31.23	63.3	72.2	3.7	
82	6	3875	31.48	63.5	72.4	2.4	
83	6	4125	31.73	59.6	68.5	2.1	
84	6	4375	31.98	56.4	65.3	2.8	
85	6	4625	32.23	52.9	61.8	3.5	
86	6	4875	32.48	51.7	60.6	2.7	
87	6	5125	32.73	52.9	61.8	2.8	
88	7	125	33.93	52.5	61.4	2.6	Suburban
89	7	375	34.18	54	62.9	2.1	Suburban
90	7	625	34.43	53.7	62.6	1.8	Suburban
91	7	875	34.68	52.9	61.8	2.1	Suburban
92	7	1125	34.93	51.1	60.0	1.8	Suburban
93	7	1375	35.18	53.2	62.1	3.0	Suburban
94	7	1625	35.43	55.6	64.5	2.0	
95	7	1875	35.68	53.5	62.4	2.2	
96	7	2125	35.93	57.5	66.4	2.5	
97	7	2375	36.18	54.6	63.5	3.4	
98	7	2625	36.43	49.2	58.1	2.0	
99	7	2875	36.68	47.9	56.8	0.9	
100	7	3125	36.93	48.5	57.4	1.1	
101	7	3375	37.18	47.8	56.7	0.7	
102	7	3625	37.43	47.8	56.7	0.8	
103	7	3875	37.68	47.7	56.6	0.6	
104	7	4125	37.93	47.8	56.7	0.7	

TABLE A13b [continued]

Site Name :	CN Twr (CHIN-FM)		**Date:**	7-2-94
Co-ordinates :	43 38 33	N. Lat.	**Temp:**	-10C
	79 23 15	W. Long.	**Weather:**	Hazy
Azimuth :	351	Deg		
Frequency :	100.7	MHz		
Antenna Ht:	456	mAGL		
ERP:	8.5	KiloWatts		

Point #	F#	Entry	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
105	8	125	40.13	34.4	43.3	5.6	Suburban
106	8	375	40.38	36.7	45.6	4.5	Suburban
107	8	625	40.63	35.8	44.7	3.3	Suburban
108	8	875	40.88	36.4	45.3	3.8	Suburban
109	8	1125	41.13	37	45.9	3.1	Suburban
110	8	1375	41.38	37.7	46.6	2.5	
111	8	1625	41.63	39.2	48.1	4.3	
112	8	1875	41.88	40.9	49.8	3.1	
113	8	2125	42.13	39.9	48.8	2.6	
114	8	2375	42.38	40.1	49.0	3.4	
115	8	2625	42.63	46.3	55.2	2.6	
116	8	2875	42.88	48.1	57.0	3.1	
117	9	125	44.23	42	50.9	5.0	
118	9	375	44.48	44.9	53.8	3.3	Suburban
119	9	625	44.73	44.9	53.8	3.5	Suburban
120	9	875	44.98	42.2	51.1	5.0	Suburban
121	9	1125	45.23	37.1	46.0	4.8	Suburban
122	9	1375	45.48	43.2	52.1	2.7	Suburban
123	9	1625	45.73	43.5	52.4	4.3	Suburban
124	9	1875	45.98	39.8	48.7	5.7	Suburban
125	9	2125	46.23	36.9	45.8	3.3	Suburban
126	9	2375	46.48	36.8	45.7	4.3	Suburban
127	9	2625	46.73	43.4	52.3	3.2	Suburban
128	9	2875	46.98	45.2	54.1	3.8	Suburban
129	9	3125	47.23	40.8	49.7	4.5	
130	9	3375	47.48	42.6	51.5	3.7	
131	10	125	48.33	46.2	55.1	1.7	
132	10	375	48.58	46.4	55.3	1.7	
133	10	625	48.83	46.6	55.5	2.7	
134	10	875	49.08	44.2	53.1	3.9	
135	10	1125	49.33	34	42.9	4.9	
136	10	1375	49.58	24.6	33.5	2.9	Trees
137	10	1625	49.83	27.9	36.8	4.9	Trees
138	10	1875	50.08	29.1	38.0	2.9	Trees
139	10	2125	50.33	28.1	37.0	2.6	Trees
140	10	2375	50.58	31.6	40.5	2.1	Trees
141	10	2625	50.83	33.9	42.8	3.5	Suburban
142	10	2875	51.08	33.6	42.5	4.6	Suburban
143	10	3125	51.33	28.6	37.5	3.6	Suburban
144	10	3375	51.58	28.1	37.0	3.9	Suburban
145	10	3625	51.83	32.8	41.7	3.7	Suburban
146	10	3875	52.08	32	40.9	4.0	Suburban
147	10	4125	52.33	32.1	41.0	4.3	Suburban
148	10	4375	52.58	34.2	43.1	3.5	Suburban
149	10	4625	52.83	29.7	38.6	4.7	Suburban
150	10	4875	53.08	30.5	39.4	2.8	Suburban
151	10	5125	53.33	31.2	40.1	3.6	Suburban
152	10	5375	53.58	32.2	41.1	4.0	Suburban
153	10	5625	53.83	33.1	42.0	3.3	Suburban
154	10	5875	54.08	31.7	40.6	3.9	Suburban
155	10	6125	54.33	32.6	41.5	3.9	Suburban
156	11	1	60.8	34.4	43.3	1.3	

TABLE A13b [continued]

Site Name :	CN Twr (CHIN-FM)		**Date:**	7-2-94
Co-ordinates :	43 38 33	N. Lat.	**Temp:**	-10C
	79 23 15	W. Long.	**Weather:**	Hazy
Azimuth :	351	Deg		
Frequency :	100.7	MHz		
Antenna Ht:	456	mAGL		
ERP:	8.5	KiloWatts		

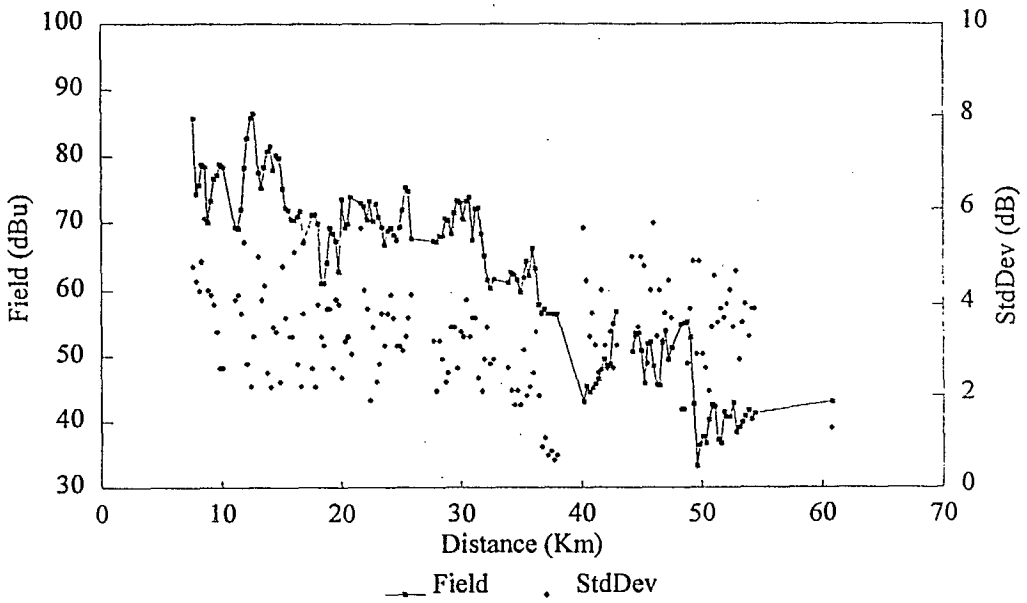


TABLE A14

Site Name :	First Can Place (CFMX-FM-1)		**Date:**	7-2-94
Co-ordinates :	43 38 56	N. Lat.	**Temp:**	-10C
	79 22 55	W. Long.	**Weather:**	Hazy
Azimuth :	350	Deg		
Frequency :	96.3	MHz		
Antenna Ht:	306.5	mAGL		
ERP:	10.4	KiloWatts		

Point #	F#	Entry	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
1	11	3875	6.43	73.7	82.3	4.6	Urban
2	11	3625	6.68	72.3	80.9	4.8	Urban
3	11	3375	6.93	67.6	76.2	4.8	Urban
4	11	3125	7.18	70.4	79.0	4.7	Urban
5	11	2875	7.43	69.9	78.5	4.9	Urban
6	11	2625	7.68	69.9	78.5	4.8	Urban
7	11	2375	7.93	66	74.6	5.1	Urban
8	11	2125	8.18	68.1	76.7	4	Urban
9	11	1875	8.43	72	80.6	4.1	Urban
10	11	1625	8.68	64.5	73.1	4.6	Urban
11	11	1375	8.93	64.7	73.3	4.4	Urban
12	11	1125	9.18	66.4	75.0	3.9	Urban
13	11	875	9.43	69.4	78.0	2.5	Urban
14	11	625	9.68	68	76.6	3.7	Urban
15	11	375	9.93	60.8	69.4	4.2	Urban
16	11	125	10.18	62.7	71.3	4.8	Urban
17	10	1375	11.33	74.7	83.3	2.4	Urban
18	10	1125	11.58	74	82.6	4.3	Urban
19	10	875	11.83	66.8	75.4	6.2	Urban
20	10	625	12.08	73.4	82.0	3.9	Urban
21	10	375	12.33	72.1	80.7	4.6	Urban
22	10	125	12.58	67.5	76.1	5	Urban
23	9	2375	14.43	64.4	73.0	4.4	Urban
24	9	2125	14.68	67.3	75.9	3.1	Urban
25	9	1875	14.93	62	70.6	5.2	Urban
26	9	1625	15.18	56.5	65.1	5	Urban
27	9	1375	15.43	58.6	67.2	5.3	Urban
28	9	1125	15.68	53.4	62.0	4.6	Urban
29	9	875	15.93	57.1	65.7	4.7	Urban
30	9	625	16.18	57.1	65.7	4	Urban
31	9	375	16.43	53.5	62.1	4.7	Urban
32	9	125	16.68	56.7	65.3	3.5	Urban
33	8	3375	17.53	50.7	59.3	4	Urban
34	8	3125	17.78	46.7	55.3	4.3	Suburban
35	8	2875	18.03	47.8	56.4	4.5	Suburban
36	8	2625	18.28	46.7	55.3	4.7	Suburban
37	8	2375	18.53	46.7	55.3	4.8	Suburban
38	8	2125	18.78	49.1	57.7	5.6	Suburban
39	8	1875	19.03	50.2	58.8	4.6	Suburban
40	8	1625	19.28	52.5	61.1	5.6	Suburban
41	8	1375	19.53	55.7	64.3	5.1	Suburban
42	8	1125	19.78	50.6	59.2	4.4	Suburban
43	8	875	20.03	54	62.6	4.8	Suburban
44	8	625	20.28	53.9	62.5	4.2	Suburban
45	8	375	20.53	52.2	60.8	5.2	Suburban
46	8	125	20.78	58.8	67.4	5.1	Suburban
47	7	5125	22.18	58.1	66.7	4	Suburban
48	7	4875	22.43	54.2	62.8	5	Suburban
49	7	4625	22.68	56.6	65.2	3.8	Suburban
50	7	4375	22.93	54	62.6	5.6	Suburban
51	7	4125	23.18	54.2	62.8	5	Suburban
52	7	3875	23.43	54.7	63.3	5.1	Suburban

TABLE A14 [continued]

Site Name : First Can Place (CFMX-FM-1) **Date:** 7-2-94
Co-ordinates : 43 38 56 N. Lat. **Temp:** -10C
79 22 55 W. Long. **Weather:** Hazy
Azimuth : 350 Deg
Frequency : 96.3 MHz
Antenna Ht: 306.5 mAGL
ERP: 10.4 KiloWatts

Point #	F#	Entry	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
53	7	3625	23.68	55.1	63.7	4.7	Suburban
54	7	3375	23.93	55.5	64.1	4.8	Suburban
55	7	3125	24.18	54.1	62.7	5.1	Suburban
56	7	2875	24.43	53.7	62.3	5.2	Suburban
57	7	2625	24.68	55.4	64.0	4.6	Suburban
58	7	2375	24.93	58	66.6	4.3	Suburban
59	7	2125	25.18	62.5	71.1	2.9	Suburban
60	7	1875	25.43	63.1	71.7	4.2	Suburban
61	7	1625	25.68	56	64.6	4.6	Suburban
62	7	1375	25.93	51.7	60.3	4.8	Suburban
63	7	1125	26.18	51.9	60.5	5	Suburban
64	7	875	26.43	52	60.6	5.8	Suburban
65	7	625	26.68	51.2	59.8	4.9	Suburban
66	7	375	26.93	51.9	60.5	4.8	Suburban
67	7	125	27.18	52.9	61.5	4.6	Suburban
68	6	3875	29.43	61.1	69.7	3.6	
69	6	3625	29.68	60.5	69.1	4.8	
70	6	3375	29.93	57.6	66.2	4.7	
71	6	3125	30.18	60.4	69.0	4.7	
72	6	2875	30.43	62	70.6	4.5	
73	6	2625	30.68	57.1	65.7	5.6	
74	6	2375	30.93	59.5	68.1	5.1	
75	6	2125	31.18	60.7	69.3	3.1	
76	6	1875	31.43	58.3	66.9	3.1	
77	6	1625	31.68	56	64.6	2.3	
78	6	1375	31.93	54.3	62.9	4.8	
79	6	1125	32.18	48	56.6	5.5	
80	6	875	32.43	49.5	58.1	5.8	
81	6	625	32.68	48.7	57.3	4.3	
82	6	375	32.93	49.5	58.1	3.7	
83	6	125	33.18	46.9	55.5	4.9	
84	5	4875	34.43	47.3	55.9	3.9	Suburban
85	5	4625	34.68	47.3	55.9	4	Suburban
86	5	4375	34.93	52.8	61.4	3.9	
87	5	4125	35.18	50.2	58.8	3.1	
88	5	3875	35.43	52.1	60.7	4.2	
89	5	3625	35.68	53.5	62.1	5.2	
90	5	3375	35.93	47	55.6	5	
91	5	3125	36.18	40.3	48.9	5	
92	5	2875	36.43	42.6	51.2	5.5	
93	5	2625	36.68	39.8	48.4	5.6	
94	5	2375	36.93	40.1	48.7	5.2	
95	5	2125	37.18	39.7	48.3	4.3	
96	5	1875	37.43	36.8	45.4	5.5	
97	5	1625	37.68	40.2	48.8	4.4	
98	5	1375	37.93	34.9	43.5	4.5	
99	5	1125	38.18	35.2	43.8	5	
100	5	875	38.43	38.5	47.1	5.6	
101	5	625	38.68	36	44.6	4.3	
102	5	375	38.93	35.2	43.8	4.7	
103	5	125	39.18	35.6	44.2	4.2	
104	4	3875	39.73	30.7	39.3	4.5	Suburban

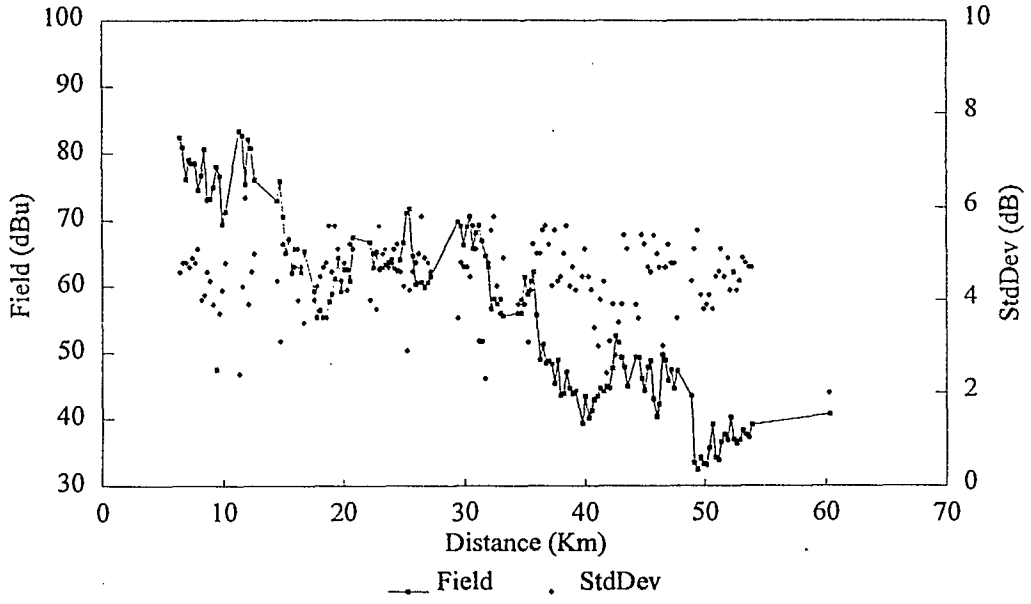
TABLE A14 [continued]

Site Name : First Can Place (CFMX-FM-1) **Date:** 7-2-94
Co-ordinates : 43 38 56 N. Lat. **Temp:** -10C
79 22 55 W. Long. **Weather:** Hazy
Azimuth : 350 Deg
Frequency : 96.3 MHz
Antenna Ht: 306.5 mAGL
ERP: 10.4 KiloWatts

Point #	F#	Entry	Distance (km)	Med Sig (dBuV)	Med Fld (dBu)	StdDev (dB)	Notes
105	4	3625	39.98	34.8	43.4	5.1	Suburban
106	4	3375	40.23	31.5	40.1	4.5	Suburban
107	4	3125	40.48	32.6	41.2	4.2	Suburban
108	4	2875	40.73	34.3	42.9	3.4	Suburban
109	4	2625	40.98	34.8	43.4	3	
110	4	2375	41.23	36	44.6	4	
111	4	2125	41.48	35.5	44.1	4.4	
112	4	1875	41.73	36.3	44.9	2.4	
113	4	1625	41.98	36	44.6	3.1	
114	4	1375	42.23	39	47.6	3.9	
115	4	1125	42.48	43.9	52.5	2.8	
116	4	875	42.73	42.9	51.5	3.5	
117	4	625	42.98	40.7	49.3	3.9	
118	4	375	43.23	39.2	47.8	5.4	
119	4	125	43.48	36.3	44.9	5.1	
120	3	3625	44.18	40.7	49.3	3.9	Suburban
121	3	3375	44.43	40.7	49.3	3.6	Suburban
122	3	3125	44.68	37.5	46.1	5.4	Suburban
123	3	2875	44.93	35.7	44.3	5.2	Suburban
124	3	2625	45.18	39.2	47.8	4.7	Suburban
125	3	2375	45.43	40.1	48.7	4.6	Suburban
126	3	2125	45.68	34.4	43.0	5.4	Suburban
127	3	1875	45.93	31.7	40.3	5	Suburban
128	3	1625	46.18	33.6	42.2	4.7	Suburban
129	3	1375	46.43	41.1	49.7	3	Suburban
130	3	1125	46.68	40.3	48.9	4.7	
131	3	875	46.93	37.2	45.8	5.2	
132	3	625	47.18	38.8	47.4	4.8	
133	3	375	47.43	36	44.6	4.8	
134	3	125	47.68	38.7	47.3	3.6	
135	2	5125	48.88	34.9	43.5	4.4	
136	2	4875	49.13	24.8	33.4	5.1	Trees
137	2	4625	49.38	23.8	32.4	5.5	Trees
138	2	4375	49.63	25.6	34.2	4.1	Trees
139	2	4125	49.88	24.7	33.3	3.8	Trees
140	2	3875	50.13	24.5	33.1	3.9	Trees
141	2	3625	50.38	27	35.6	4.1	Suburban
142	2	3375	50.63	30.6	39.2	3.8	Suburban
143	2	3125	50.88	25.6	34.2	4.5	Suburban
144	2	2875	51.13	25.2	33.8	4.6	Suburban
145	2	2625	51.38	27.9	36.5	5.1	Suburban
146	2	2375	51.63	29	37.6	4.5	Suburban
147	2	2125	51.88	28.2	36.8	4.9	Suburban
148	2	1875	52.13	31.6	40.2	4.2	Suburban
149	2	1625	52.38	28.3	36.9	4.6	Suburban
150	2	1375	52.63	27.7	36.3	4.2	Suburban
151	2	1125	52.88	28.2	36.8	4.4	Suburban
152	2	875	53.13	29.6	38.2	4.9	Suburban
153	2	625	53.38	29	37.6	4.8	Suburban
154	2	375	53.63	28.6	37.2	4.7	Suburban
155	2	125	53.88	30.5	39.1	4.7	Suburban
156	1	1	60.30	32.1	40.7	2	

TABLE A14 [continued]

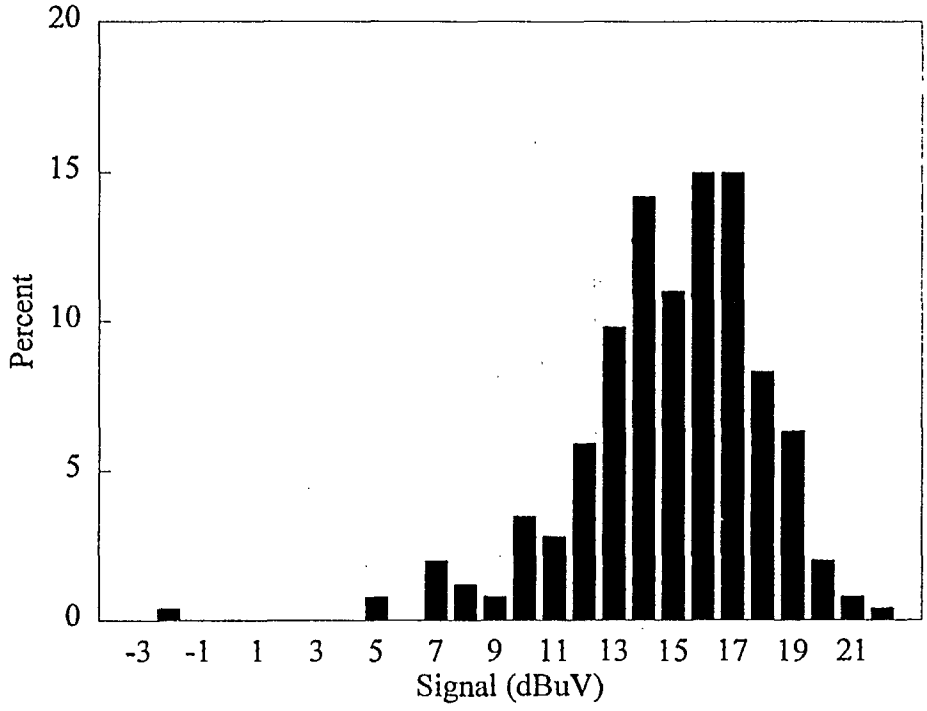
Site Name :	First Can Place (CFMX-FM-1)		**Date:**	7-2-94
Co-ordinates :	43 38 56	N. Lat.	**Temp:**	-10C
	79 22 55	W. Long.	**Weather:**	Hazy
Azimuth :	350	Deg		
Frequency :	96.3	MHz		
Antenna Ht:	306.5	mAGL		
ERP:	10.4	KiloWatts		



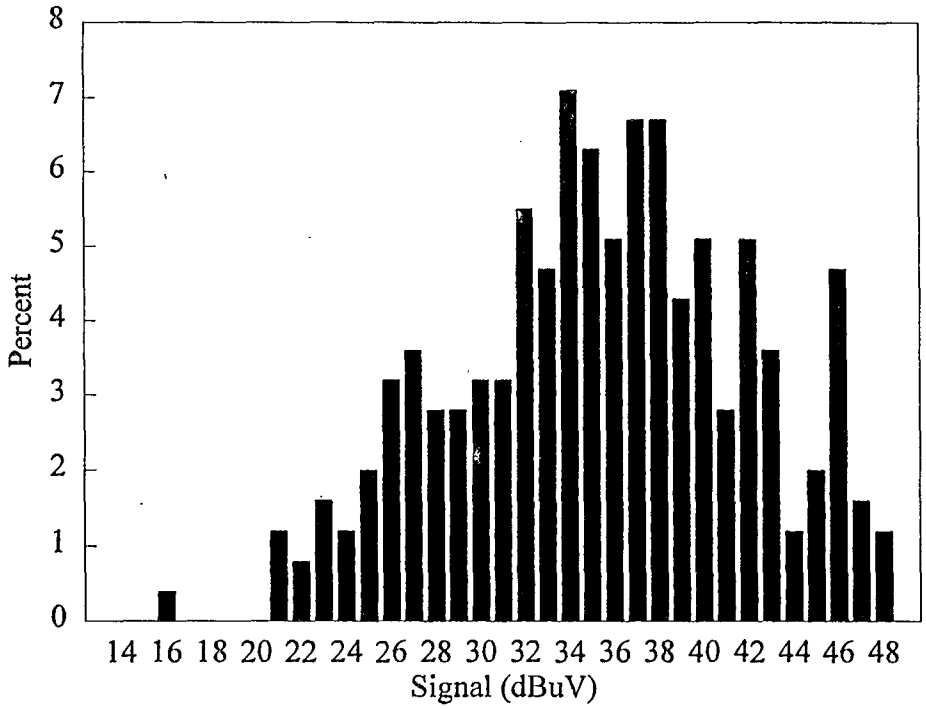
APPENDIX A2

SAMPLE DISTRIBUTIONS

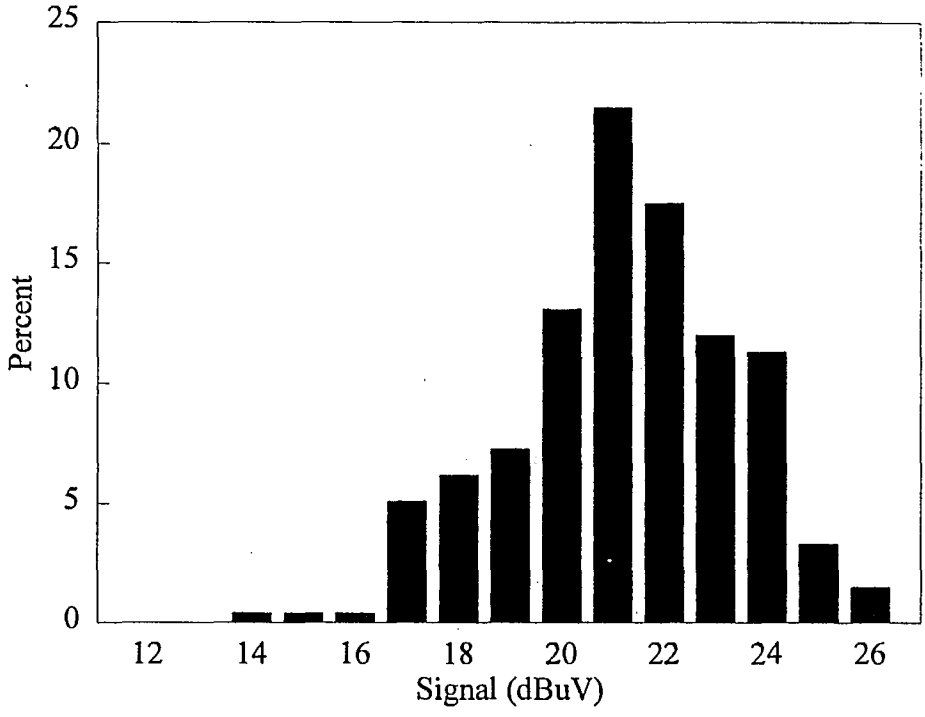
Site:	King City
Azimuth:	299
Point #:	14
# Points:	254
Avg Signal:	14.4
Med Signal:	14.7
StdDev:	3.1



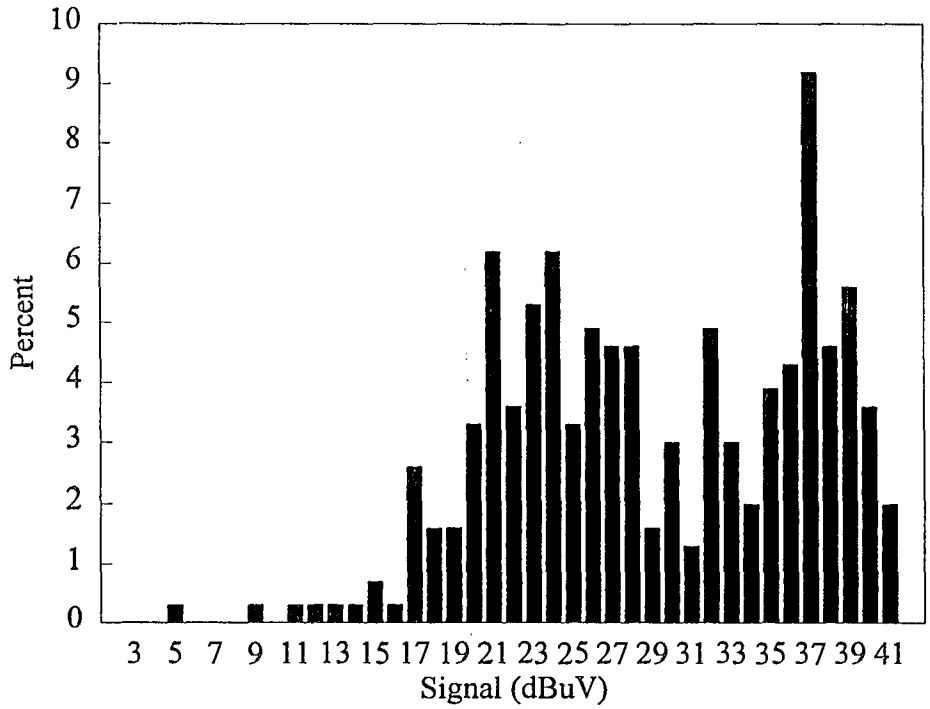
Site:	King City
Azimuth:	299
Point #:	6
# Points:	253
Avg Signal:	35
Med Signal:	35.2
StdDev:	6.5



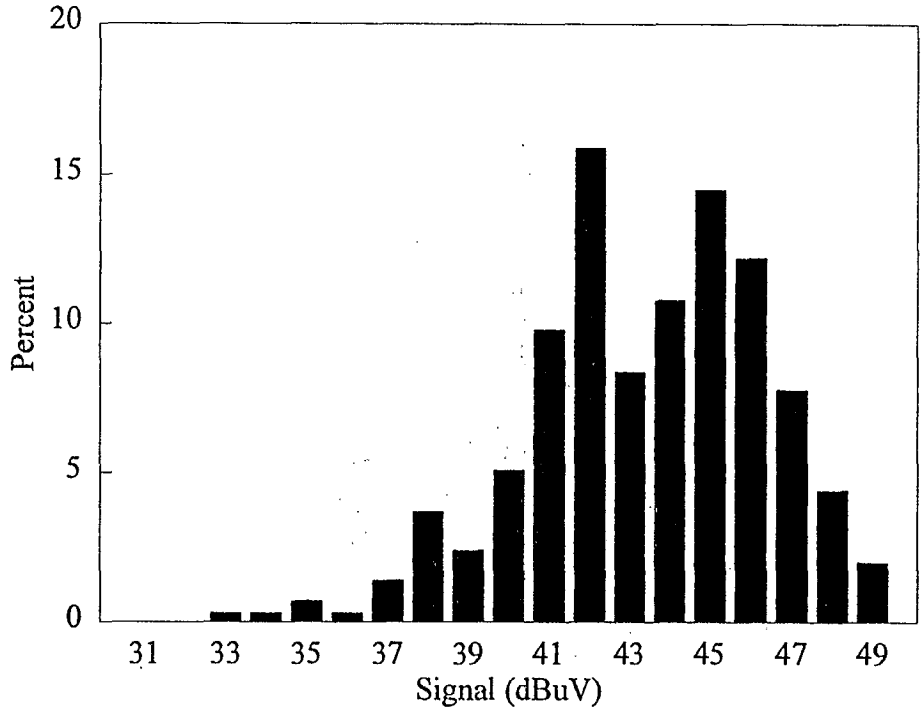
Site:	King City
Azimuth:	328
Point #:	17
# Points:	274
Avg Signal:	20.7
Med Signal:	20.8
StdDev:	2.2



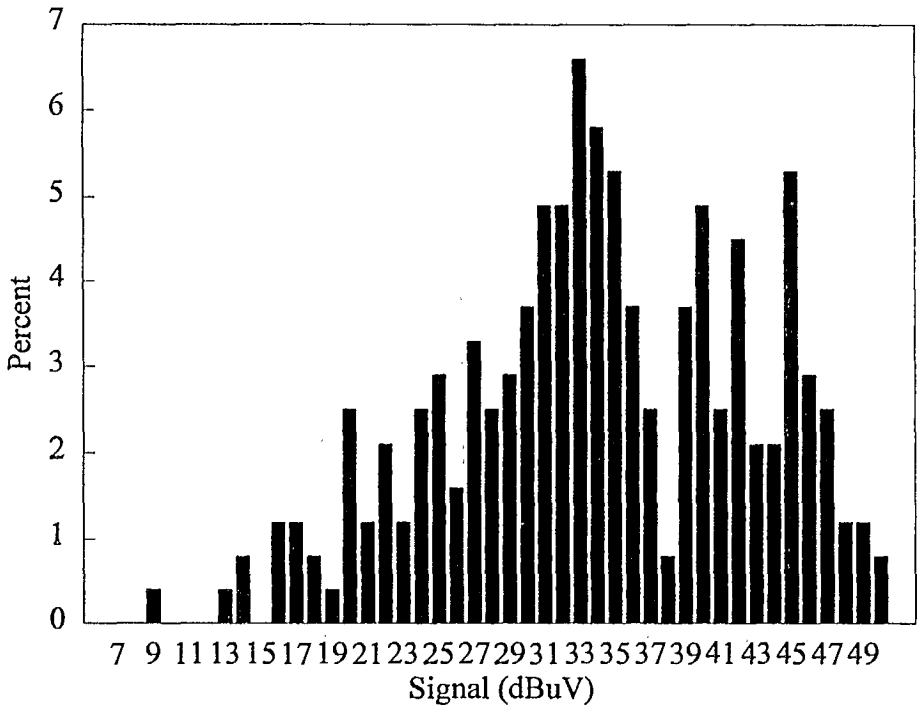
Site:	King City
Azimuth:	328
Point #:	20
# Points:	304
Avg Signal:	28.6
Med Signal:	27.7
StdDev:	7.5



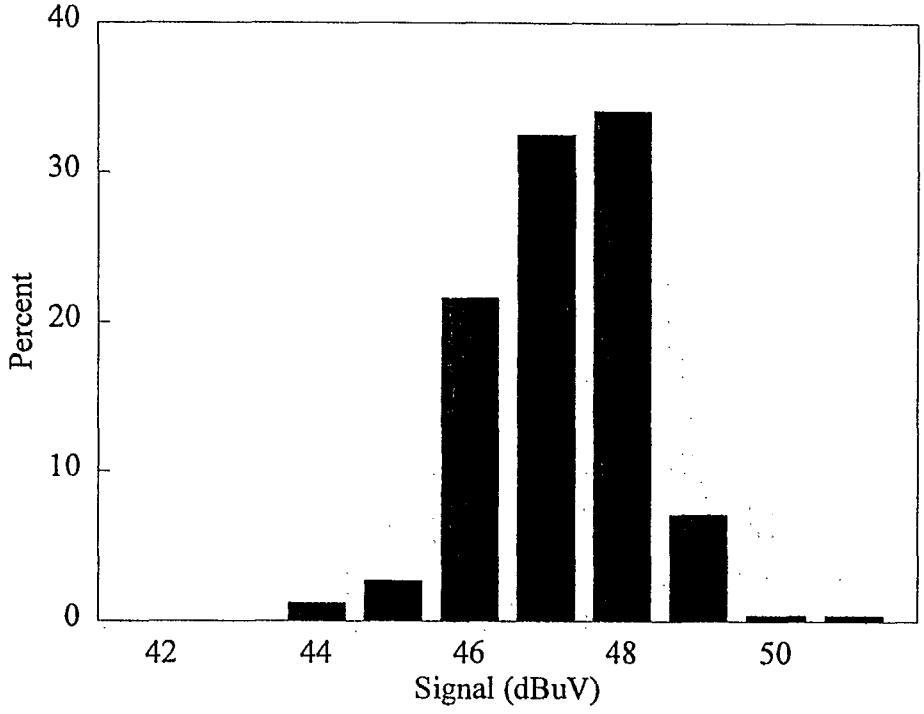
Site:	King City
Azimuth:	345
Point #:	7
# Points:	296
Avg Signal:	42.9
Med Signal:	43.1
StdDev:	2.9



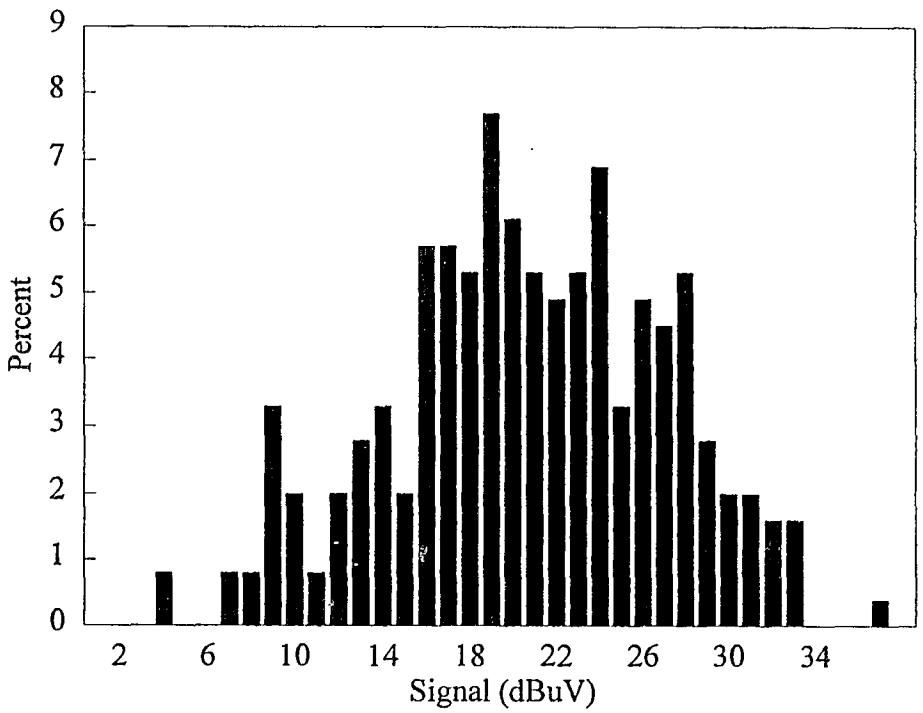
Site:	King City
Azimuth:	345
Point #:	9
# Points:	243
Avg Signal:	33.4
Med Signal:	33.3
StdDev:	8.6



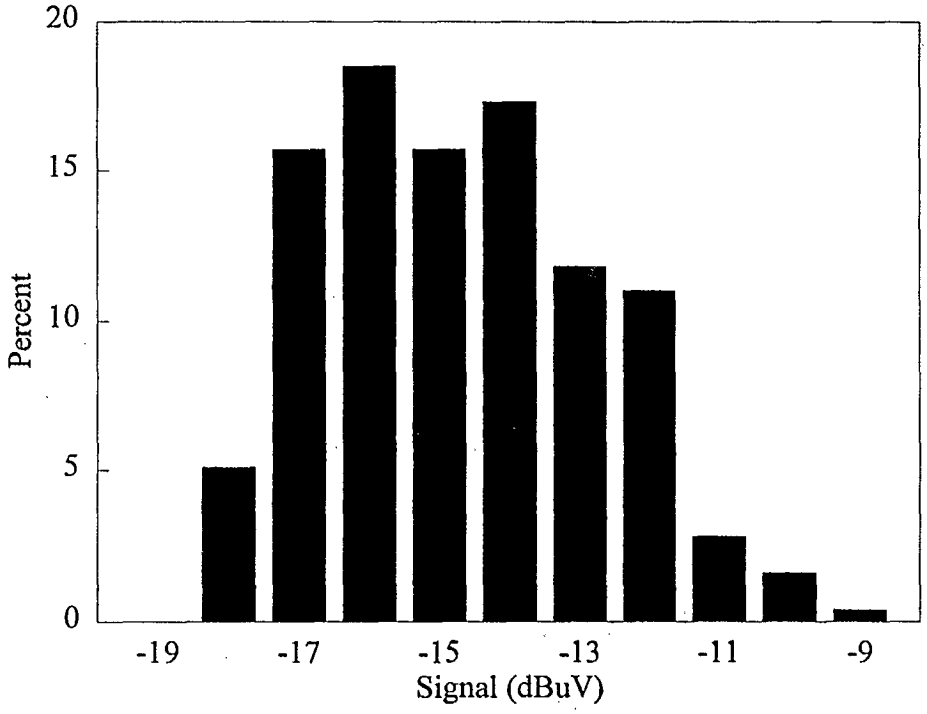
Site:	Barrie
Azimuth:	17
Point #:	4
# Points:	255
Avg Signal:	46.7
Med Signal:	46.8
StdDev:	1



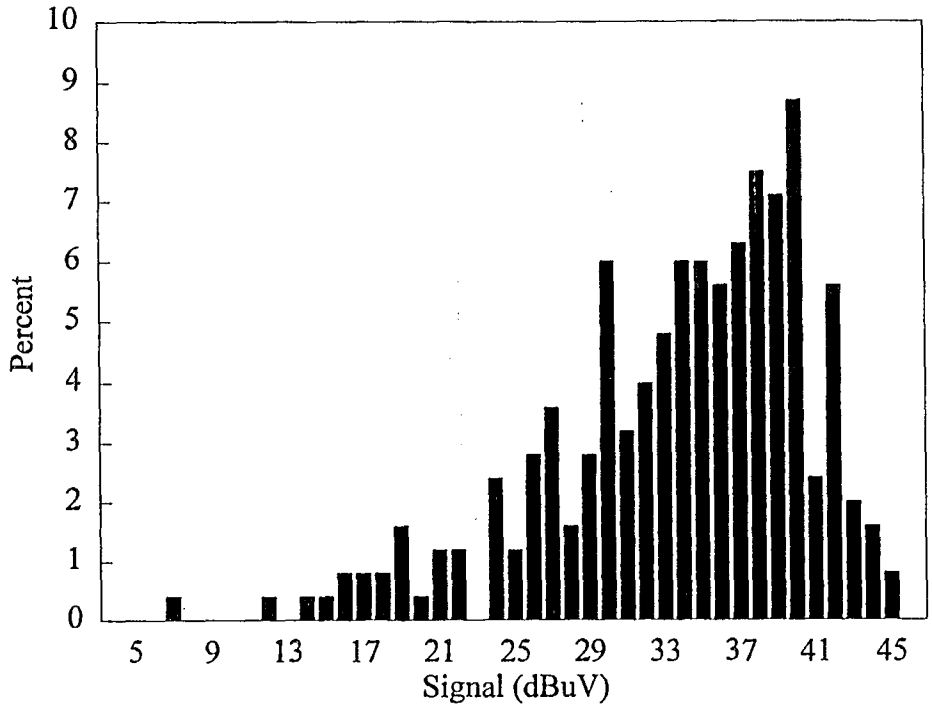
Site:	Barrie
Azimuth:	17
Point #:	8
# Points:	246
Avg Signal:	20.2
Med Signal:	20.2
StdDev:	6.3



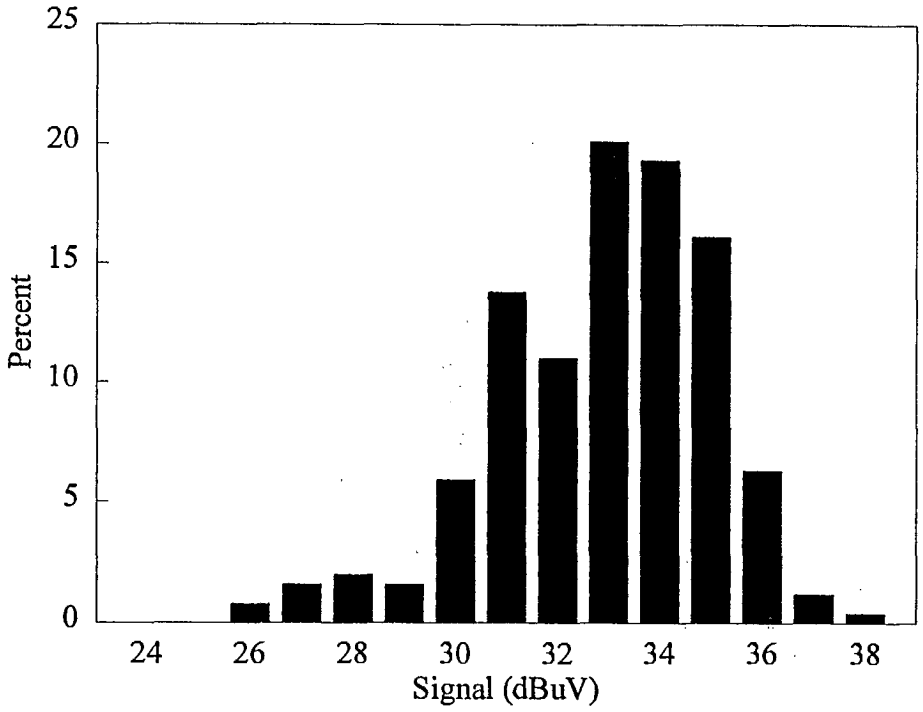
Site:	Barrie
Azimuth:	35
Point #:	13
# Points:	254
Avg Signal:	-15.2
Med Signal:	-15.4
StdDev:	1.9



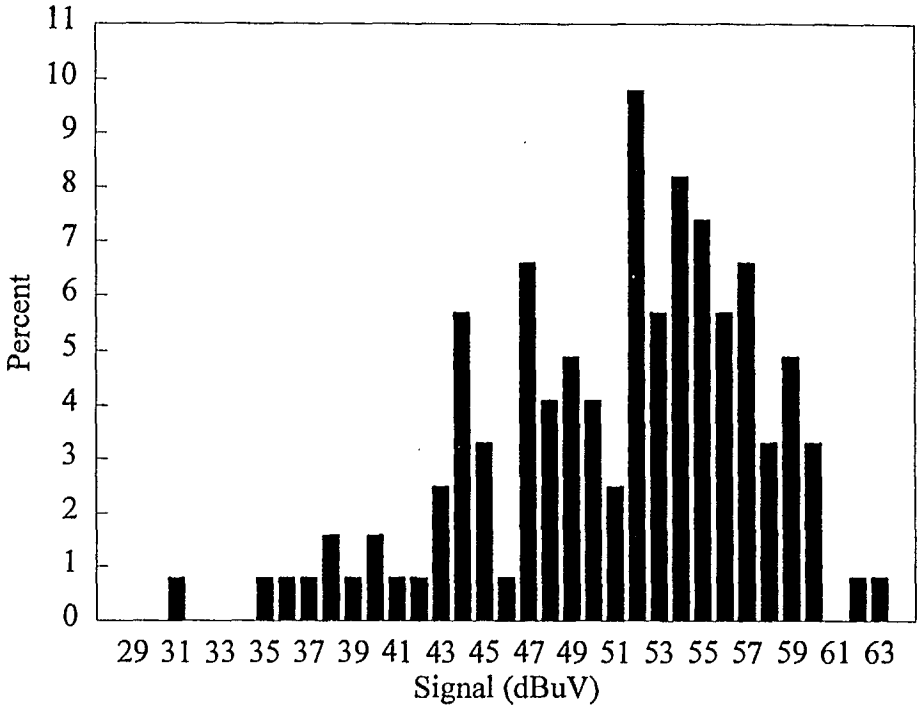
Site:	Barrie
Azimuth:	35
Point #:	8
# Points:	252
Avg Signal:	33.2
Med Signal:	34.6
StdDev:	6.9



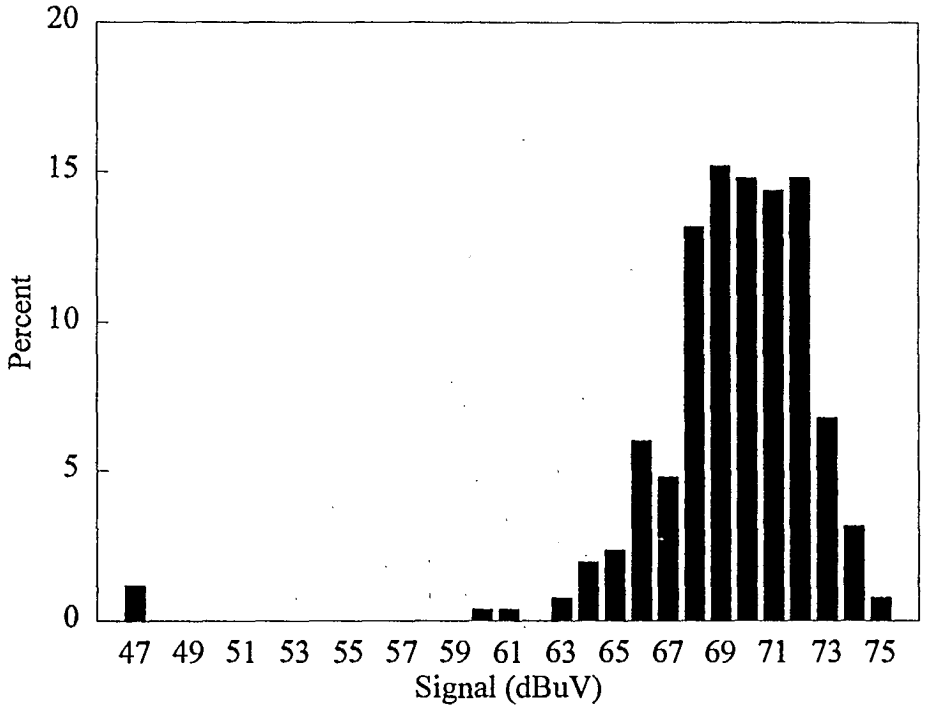
Site:	CKEY-FM
Azimuth:	300
Point #:	36
# Points:	254
Avg Signal:	32.4
Med Signal:	32.6
StdDev:	2.1



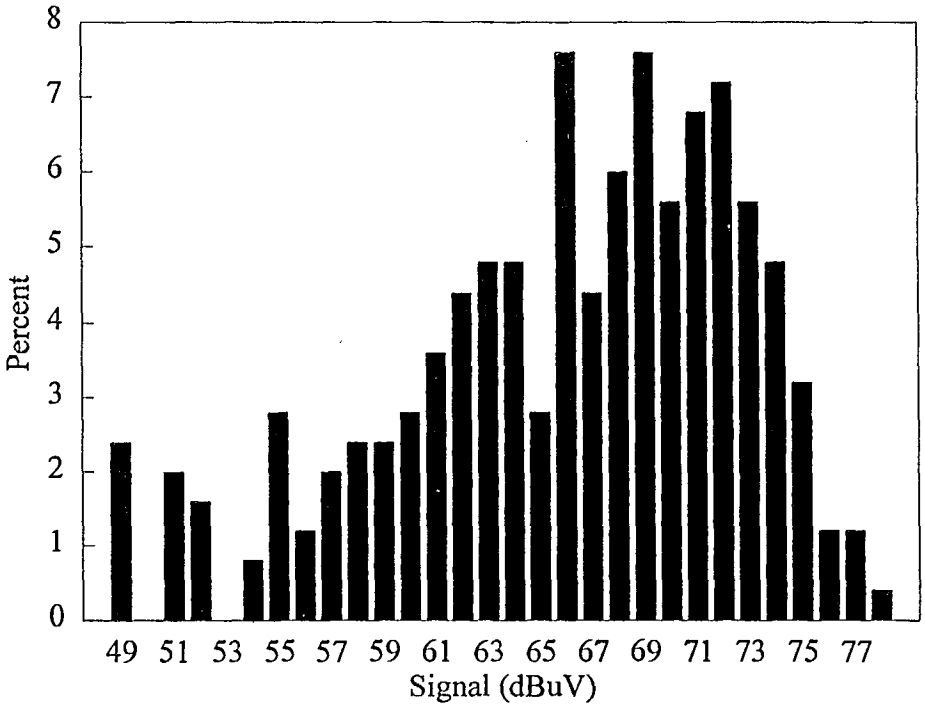
Site:	CKEY-FM
Azimuth:	300
Point #:	15
# Points:	122
Avg Signal:	50.5
Med Signal:	51.7
StdDev:	6.3



Site:	Fst Can Place (CFMX-FM-1)
Azimuth:	350
Point #:	13
# Points:	250
Avg Signal:	69.1
Med Signal:	69.4
StdDev:	2.5



Site:	Fst Can Place (CFMX-FM-1)
Azimuth:	350
Point #:	19
# Points:	250
Avg Signal:	65.9
Med Signal:	66.8
StdDev:	6.2



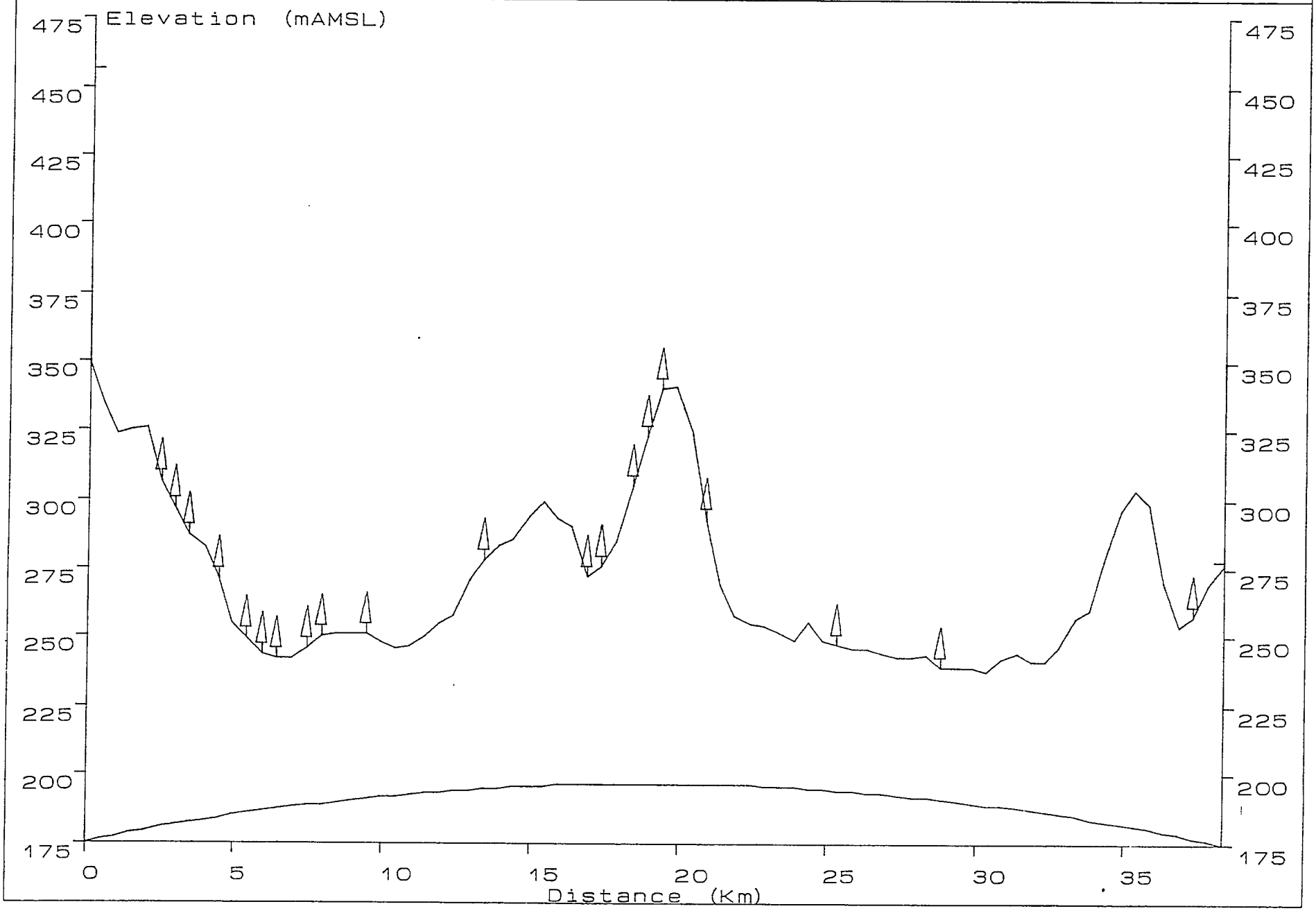
APPENDIX A3

TERRAIN PROFILES

Path :KING-299
Freq (MHz):856
Dist (Km) :38.3

FIGURE-1

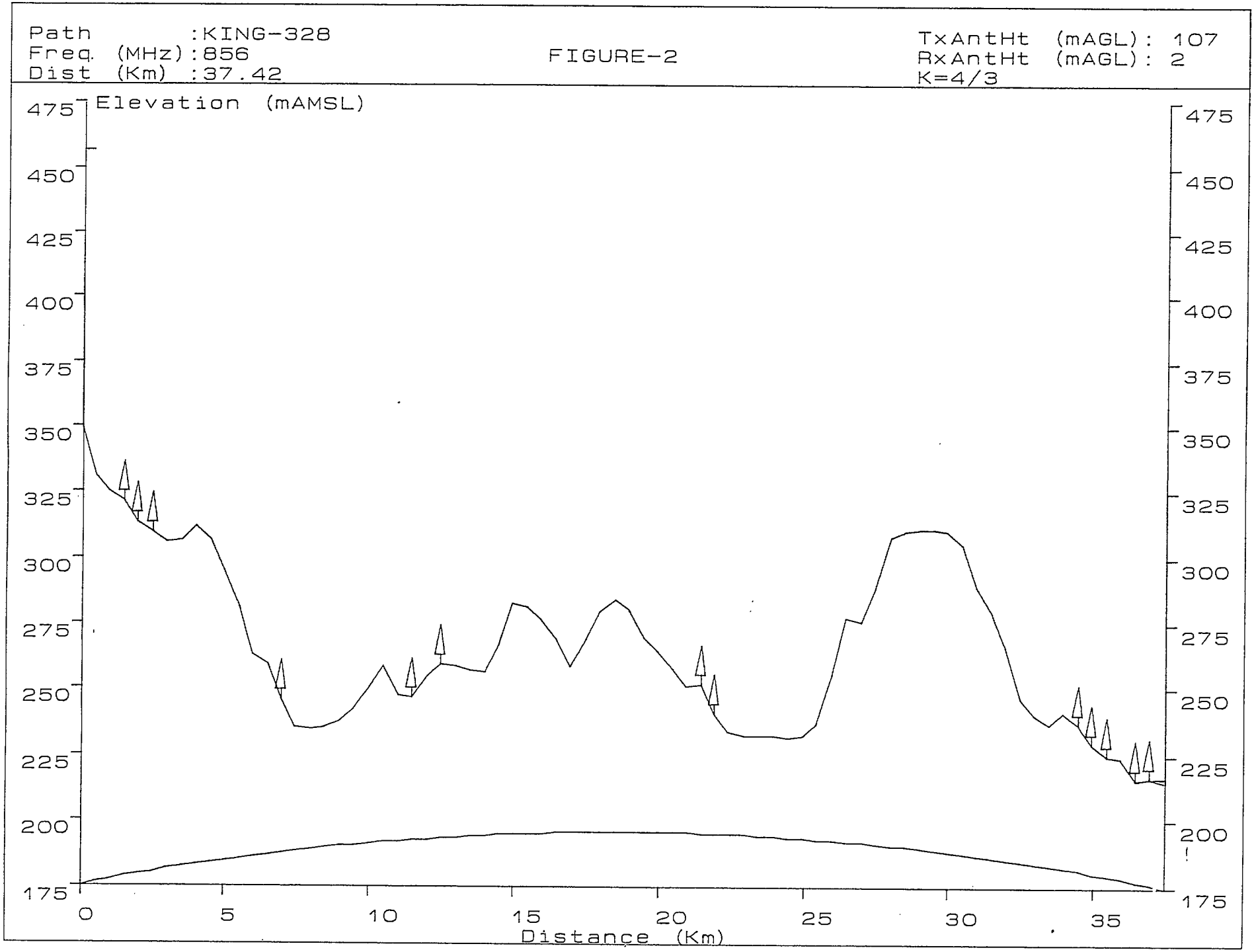
TxAntHt (mAGL): 107
RxAntHt (mAGL): 2
K=4/3



Path :KING-328
Freq. (MHz):856
Dist (Km) :37.42

FIGURE-2

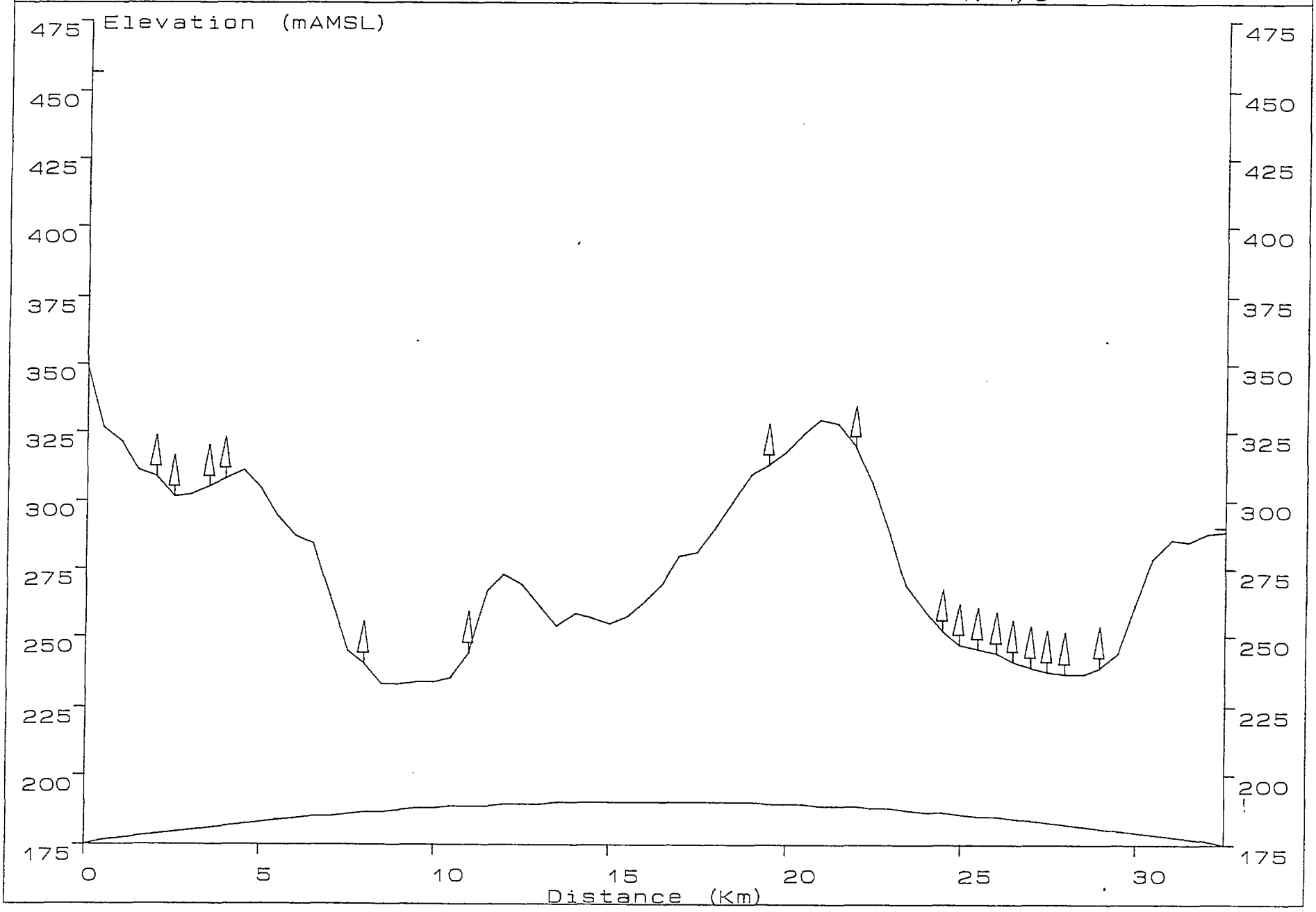
TxAntHt (mAGL): 107
RxAntHt (mAGL): 2
K=4/3

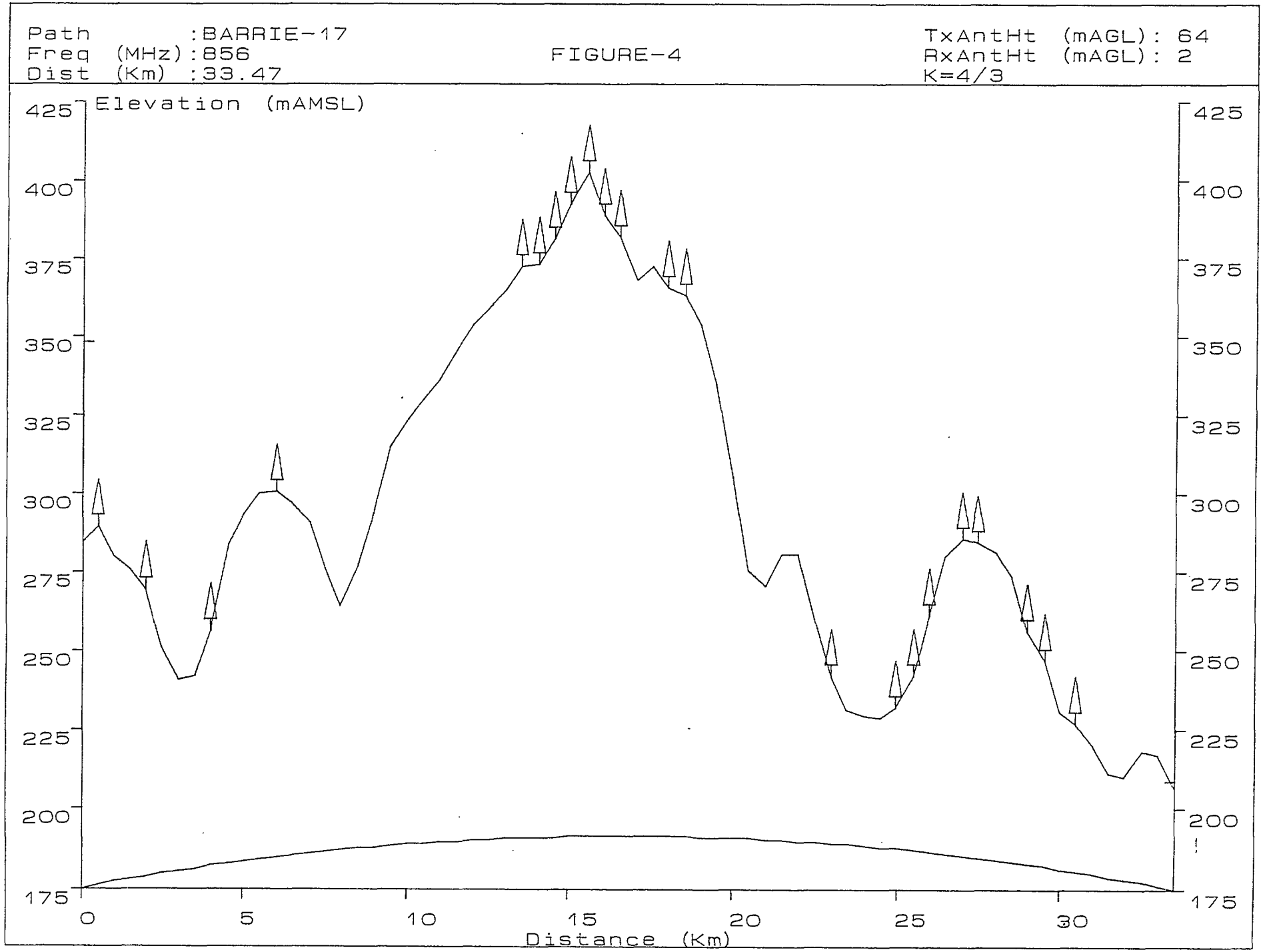


Path :KING-345
Freq (MHz):856
Dist (Km) :32.44

FIGURE-3

TxAntHt (mAGL): 107
RxAntHt (mAGL): 2
K=4/3

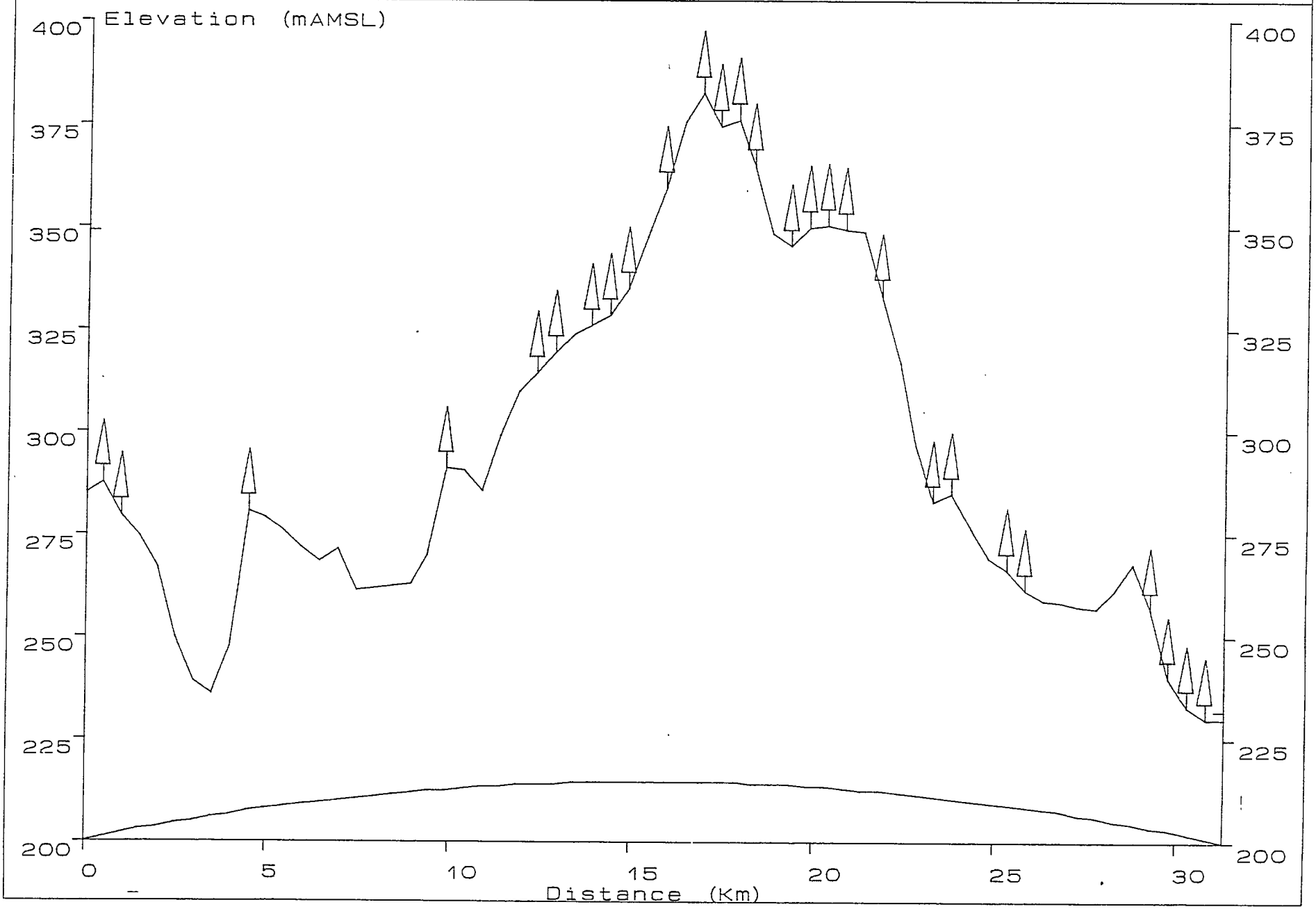


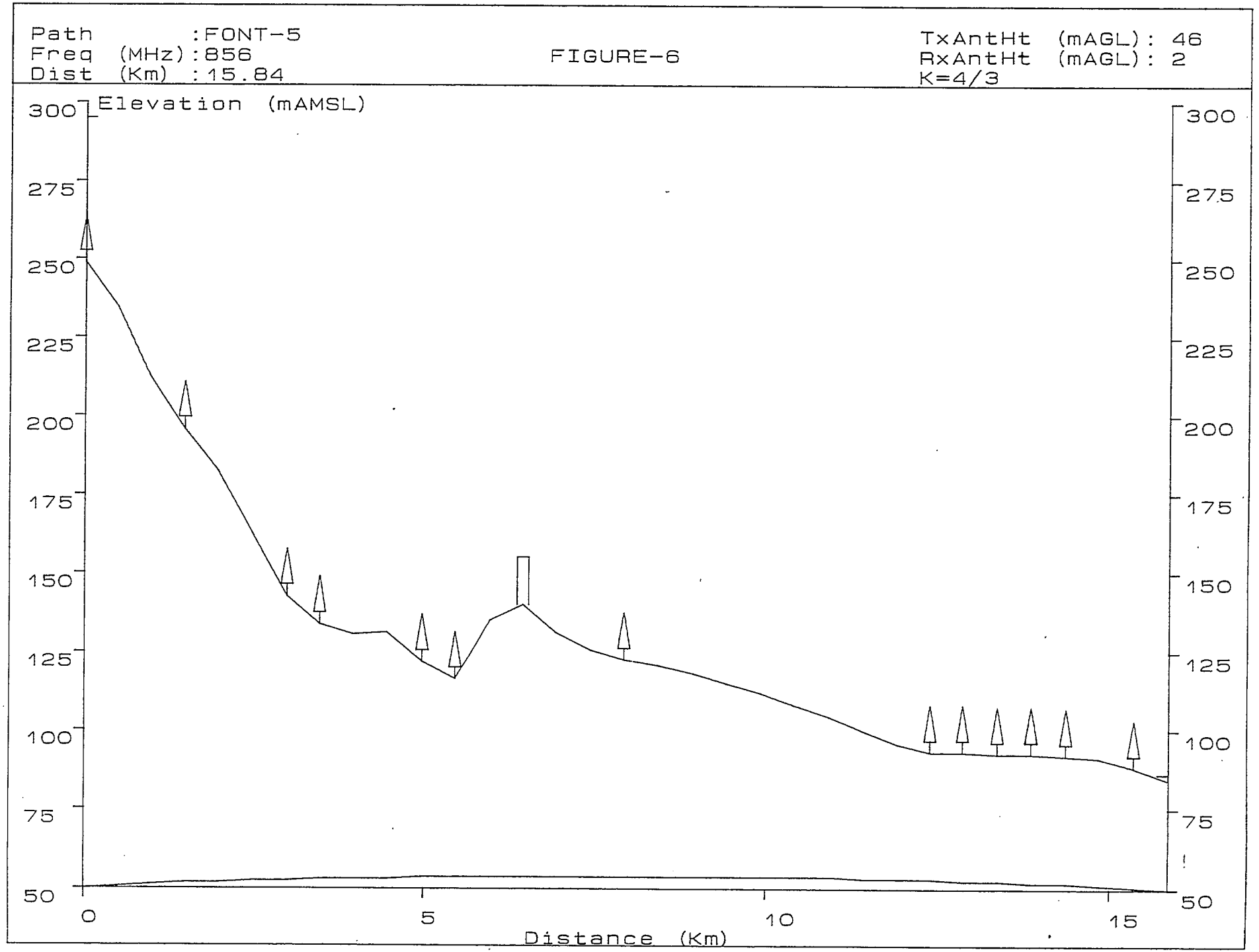

Path :BARRIE-17
Freq (MHz):856
Dist (Km) :33.47
FIGURE-4
TxAntHt (mAGL): 64
RxAntHt (mAGL): 2
K=4/3
Elevation (mAMSL)
425
400
375
350
325
300
275
250
225
200
175
0
5
10
15
20
25
30
Distance (Km)

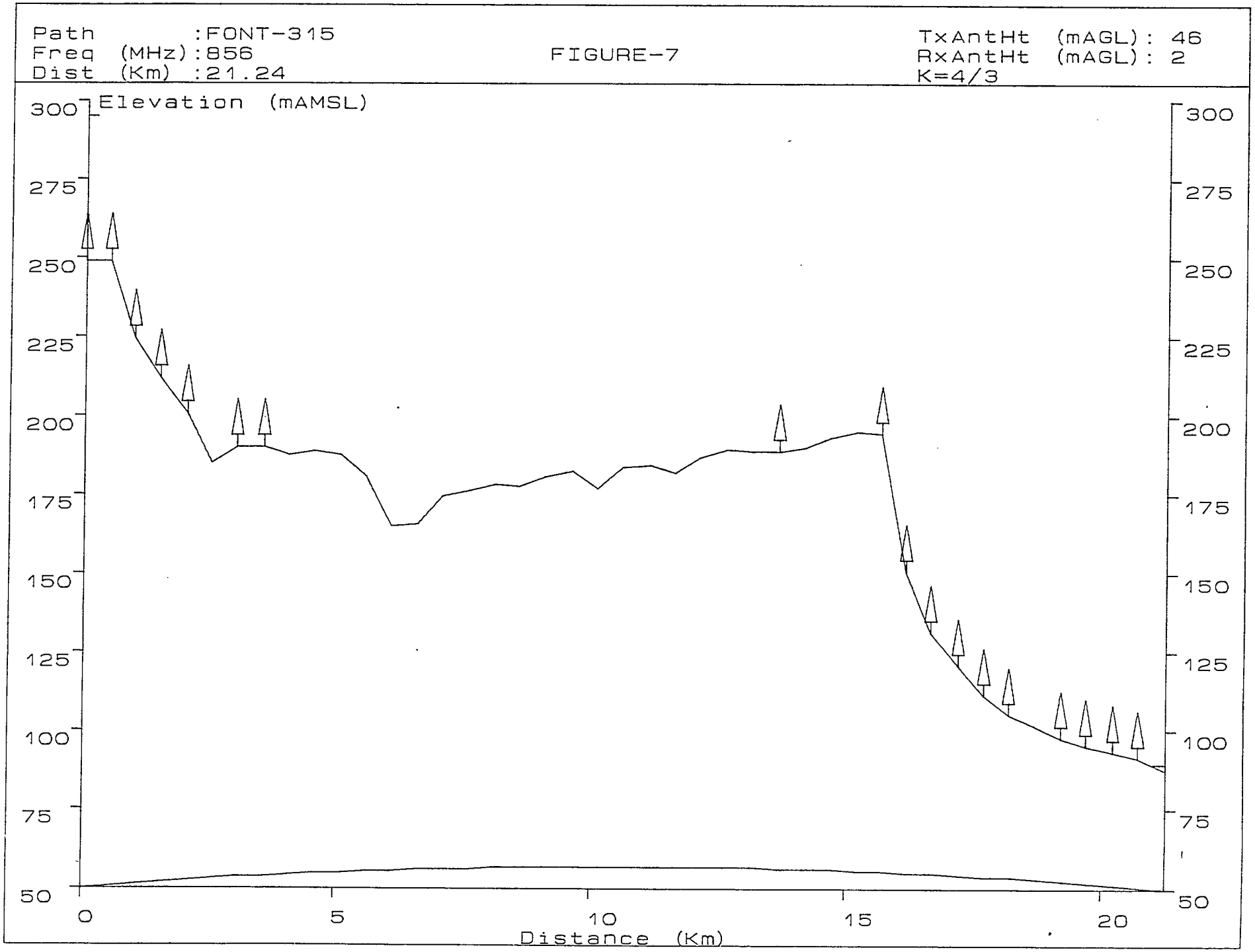
Path :BARRIE-35
Freq (MHz):856
Dist (Km) :31.27

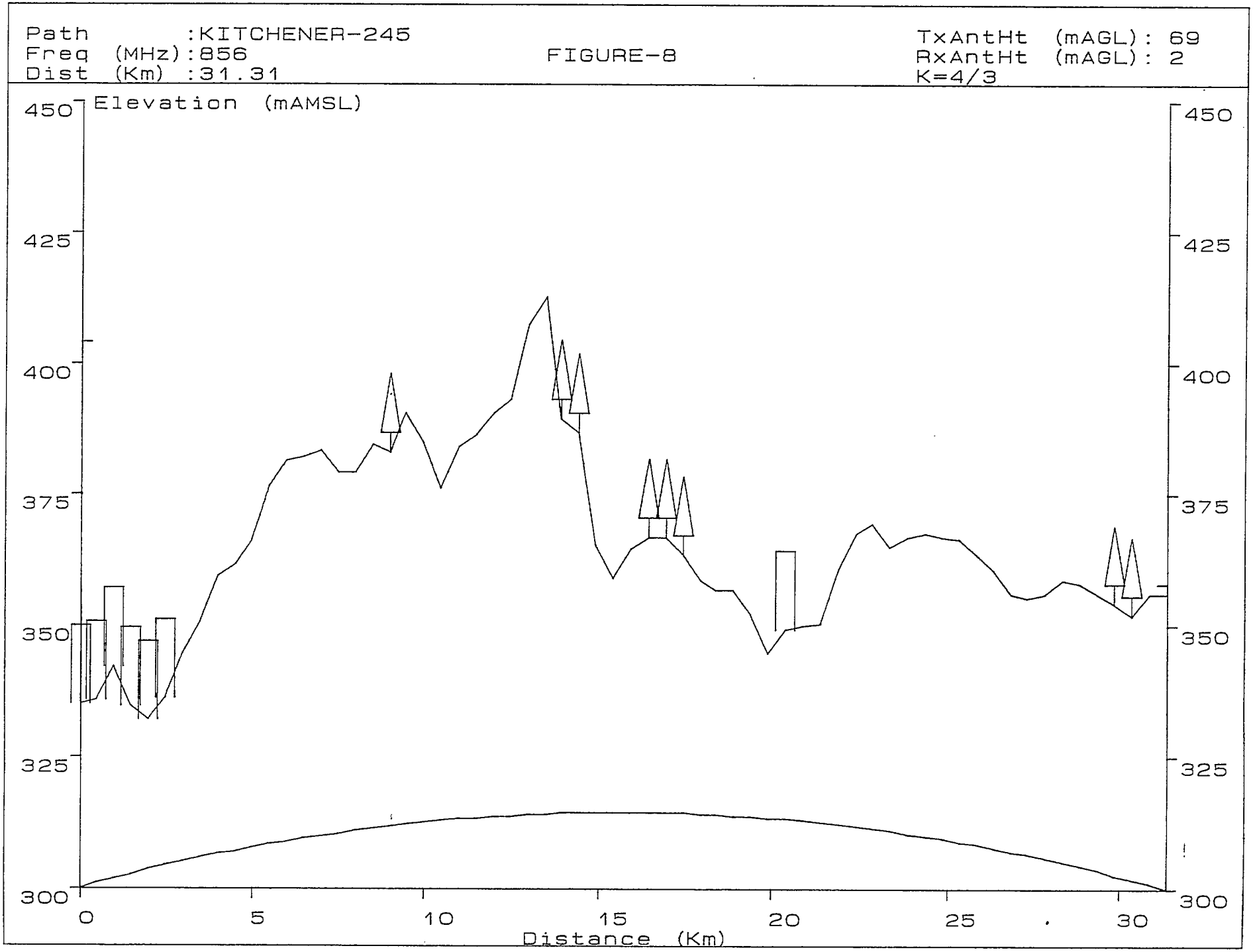
FIGURE-5

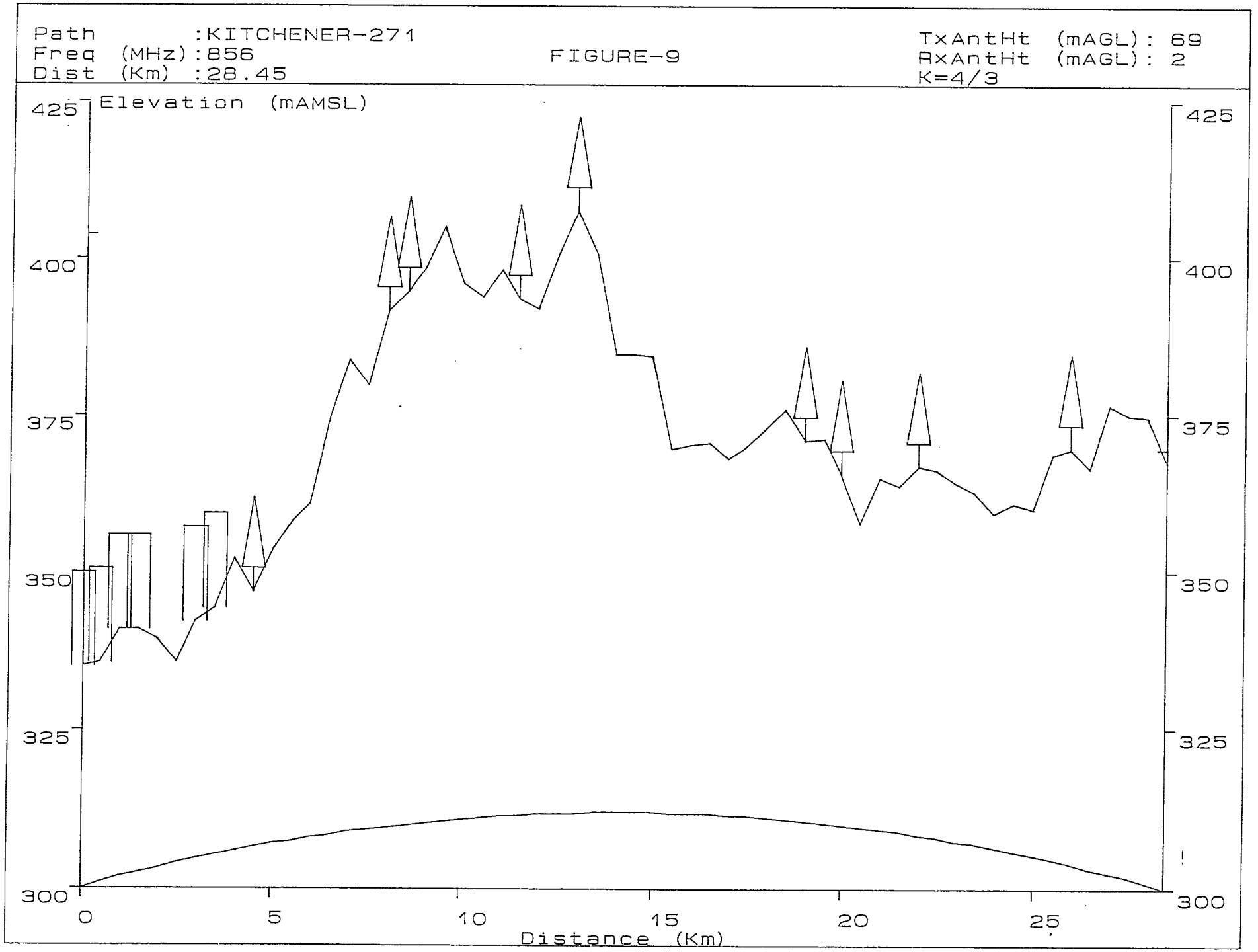
TxAntHt (mAGL): 64
RxAntHt (mAGL): 2
K=4/3

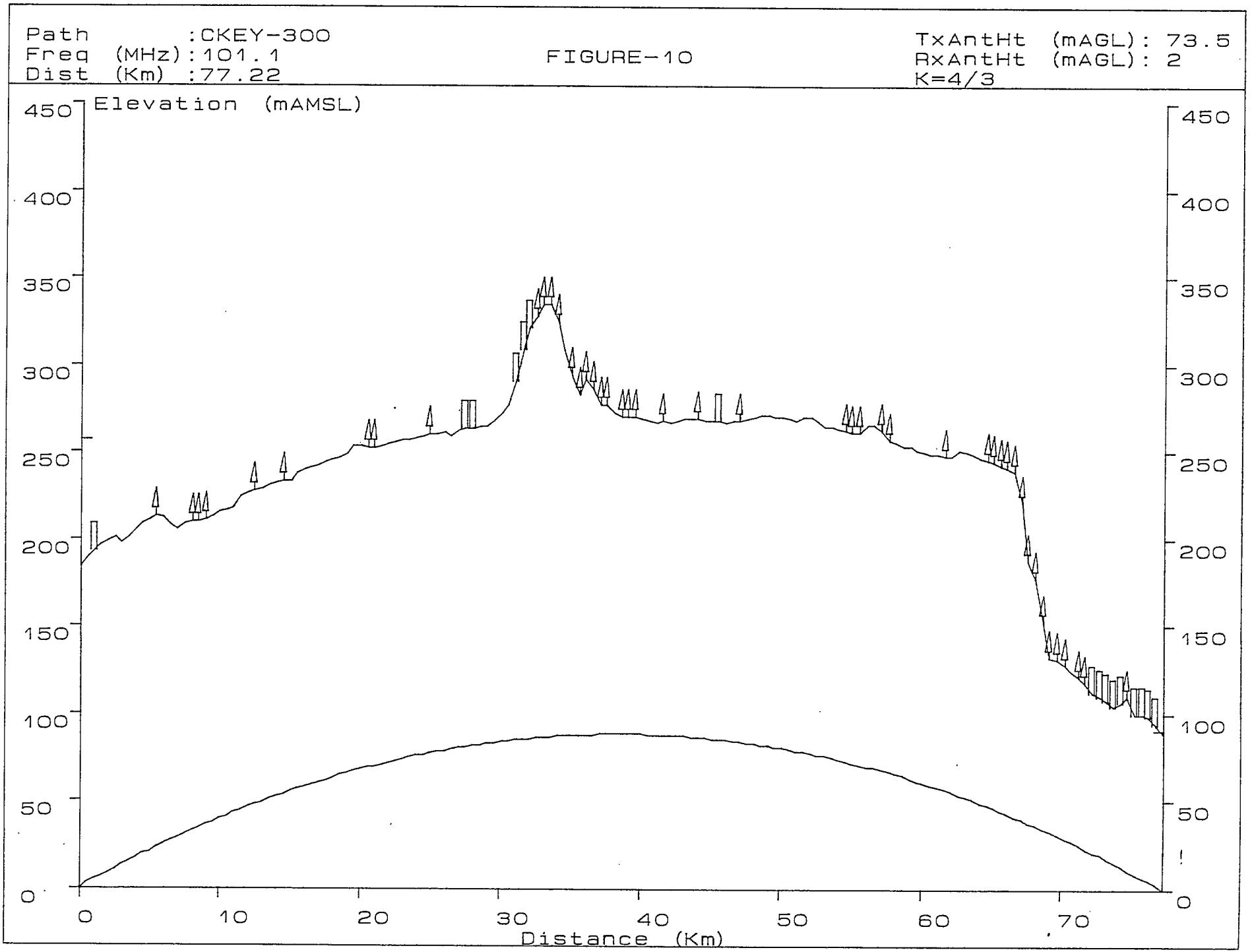



Path :FONT-5
Freq (MHz):856
Dist (Km) :15.84
FIGURE-6
TxAntHt (mAGL): 46
RxAntHt (mAGL): 2
K=4/3
Elevation (mAMSL)
300
275
250
225
200
175
150
125
100
75
50
0
5
10
15
Distance (Km)


Path :FONT-315
Freq (MHz):856
Dist (Km) :21.24
FIGURE-7
TxAntHt (mAGL): 46
RxAntHt (mAGL): 2
K=4/3
Elevation (mAMSL)
300
275
250
225
200
175
150
125
100
75
50
0
5
10
15
20
Distance (Km)


Path :KITCHENER-245
Freq (MHz):856
Dist (Km) :31.31
FIGURE-8
TxAntHt (mAGL): 69
RxAntHt (mAGL): 2
K=4/3
Elevation (mAMSL)
450
425
400
375
350
325
300
0
5
10
15
20
25
30
Distance (Km)

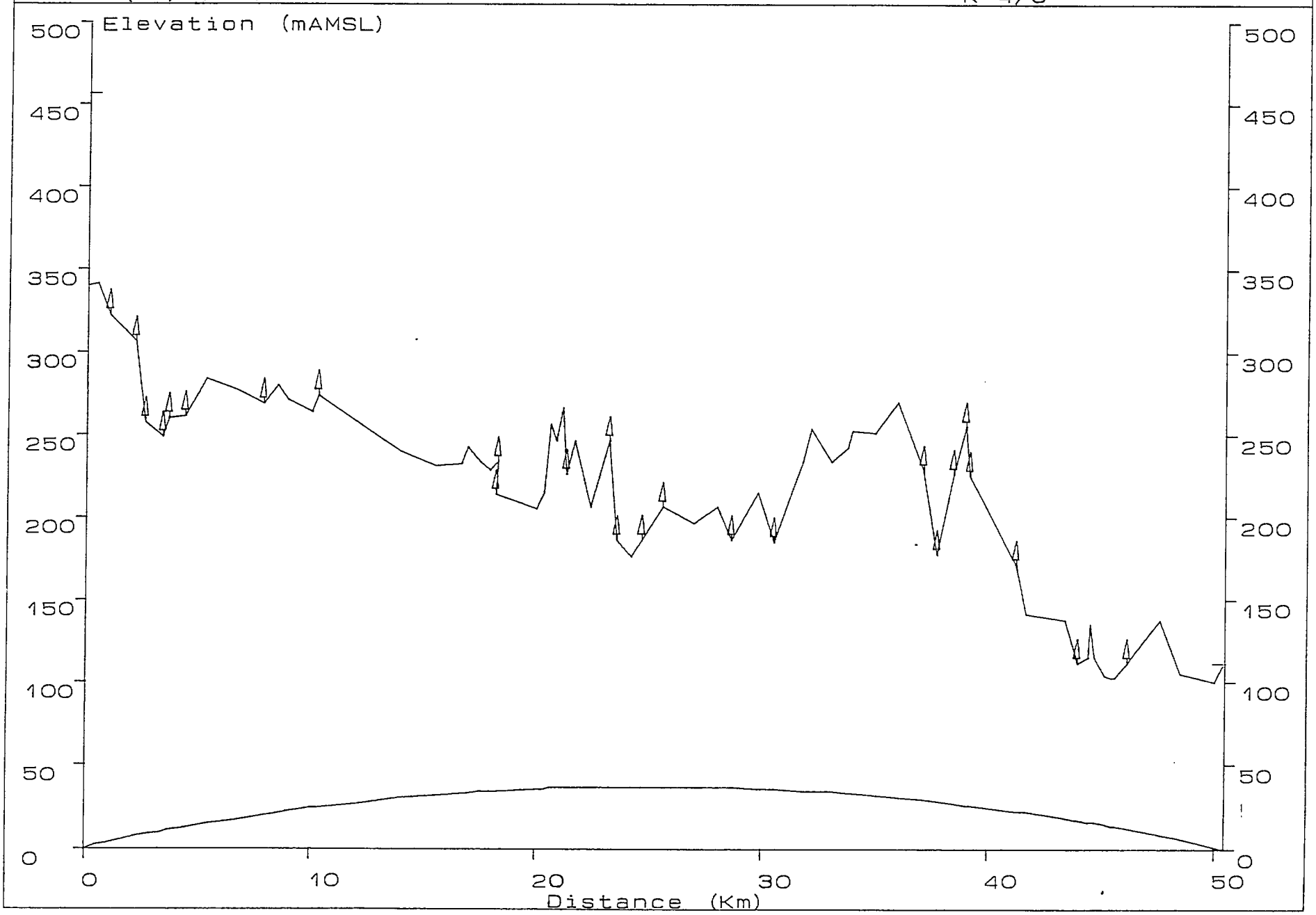

Path :KITCHENER-271
Freq (MHz):856
Dist (Km) :28.45
FIGURE-9
TxAntHt (mAGL): 69
RxAntHt (mAGL): 2
K=4/3
Elevation (mAMSL)
425
400
375
350
325
300
0
5
10
15
20
25
Distance (Km)


Path :CKEY-300
Freq (MHz):101.1
Dist (Km) :77.22
FIGURE-10
TxAntHt (mAGL): 73.5
RxAntHt (mAGL): 2
K=4/3
Elevation (mAMSL)
450
400
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
Distance (Km)

Path :CFMX-80
Freq (MHz):103.1
Dist (Km) :50.4

FIGURE-11

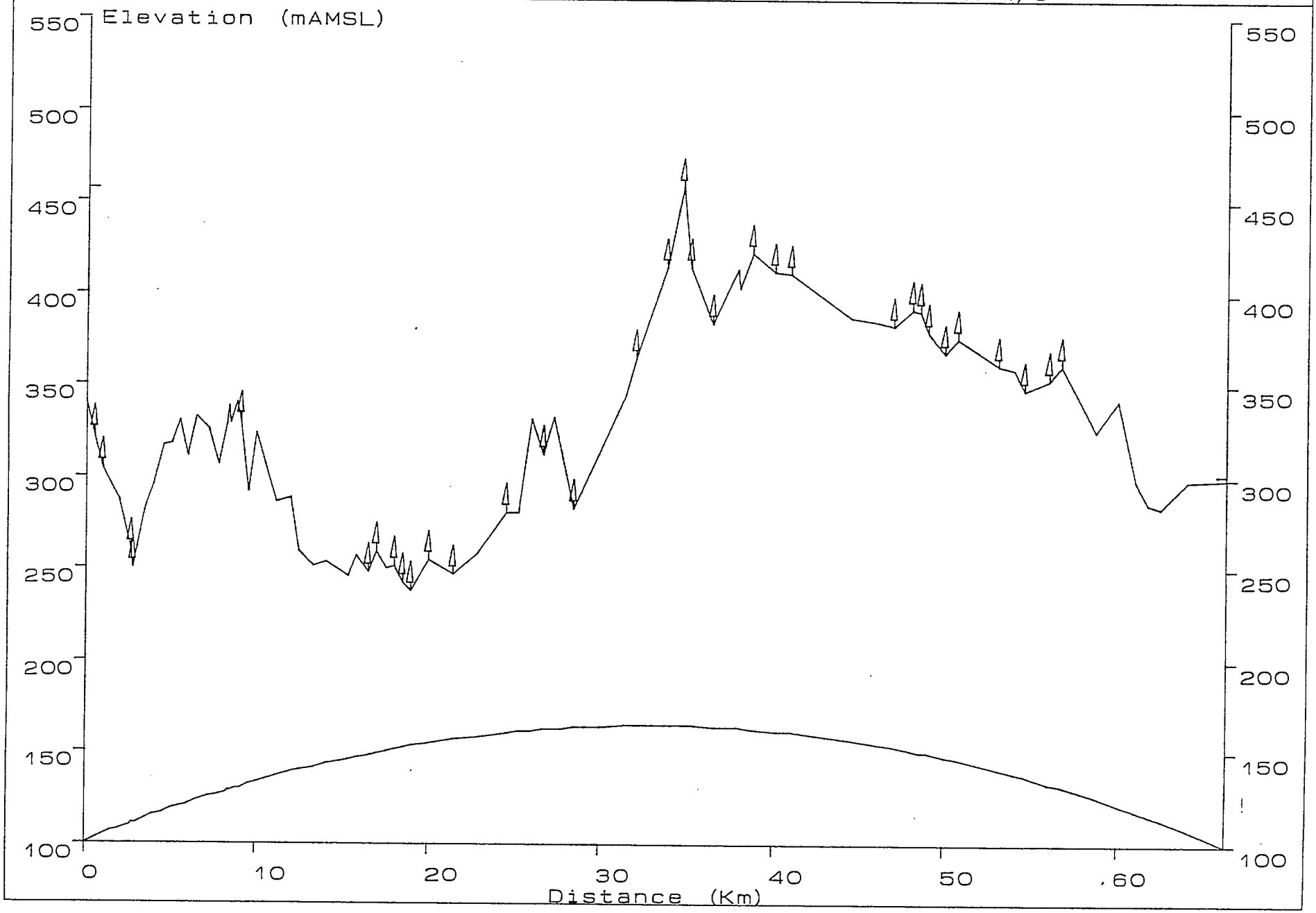
TxAntHt (mAGL): 116.8
RxAntHt (mAGL): 2
K=4/3



Path :CFMX-269
Freq (MHz):103.1
Dist (Km) :66.2

FIGURE-12

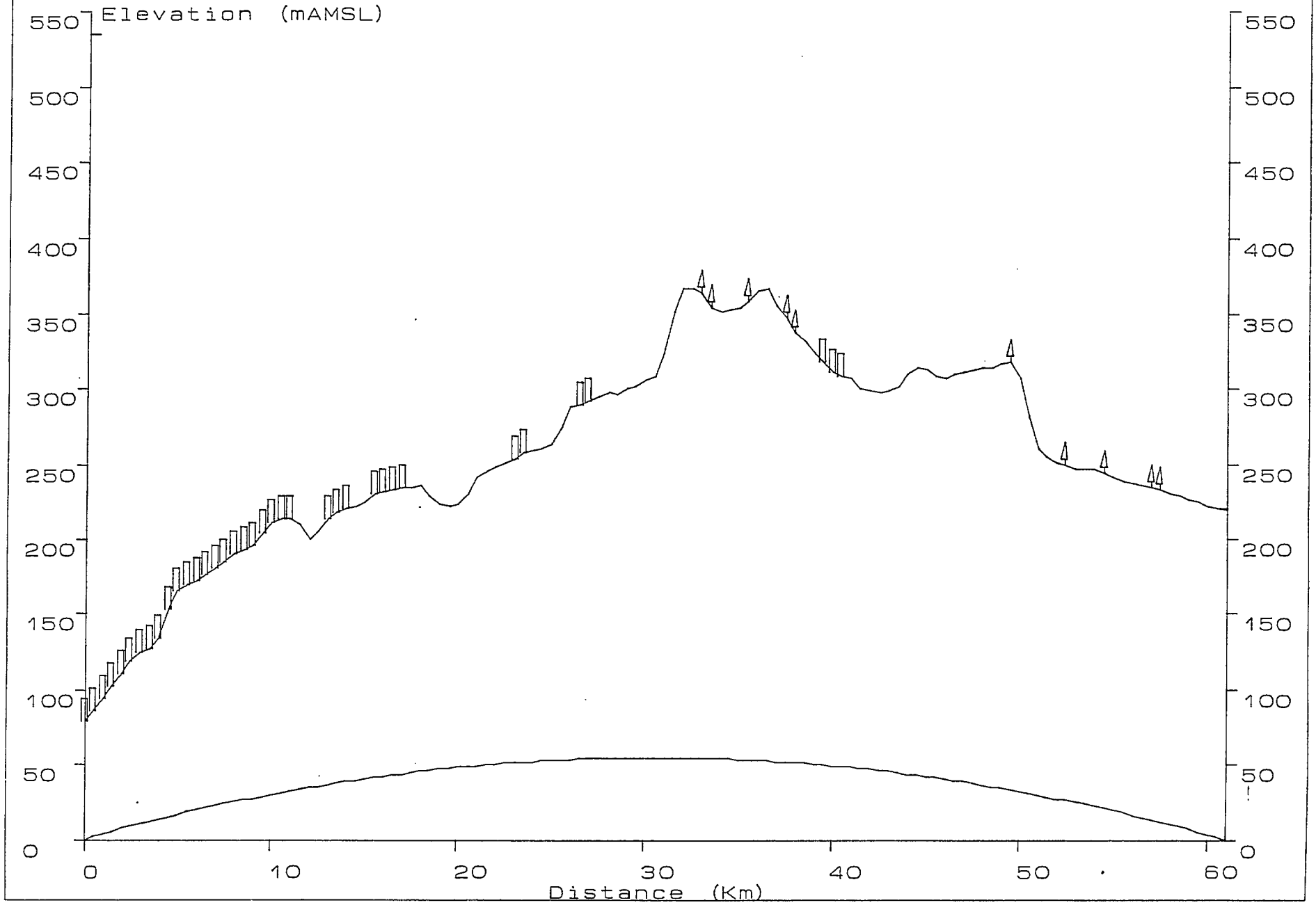
TxAntHt (mAGL): 116.8
RxAntHt (mAGL): 2
K=4/3



Path :CNTOWER-351
Freq (MHz):99.9
Dist (Km) :60.88

FIGURE-13

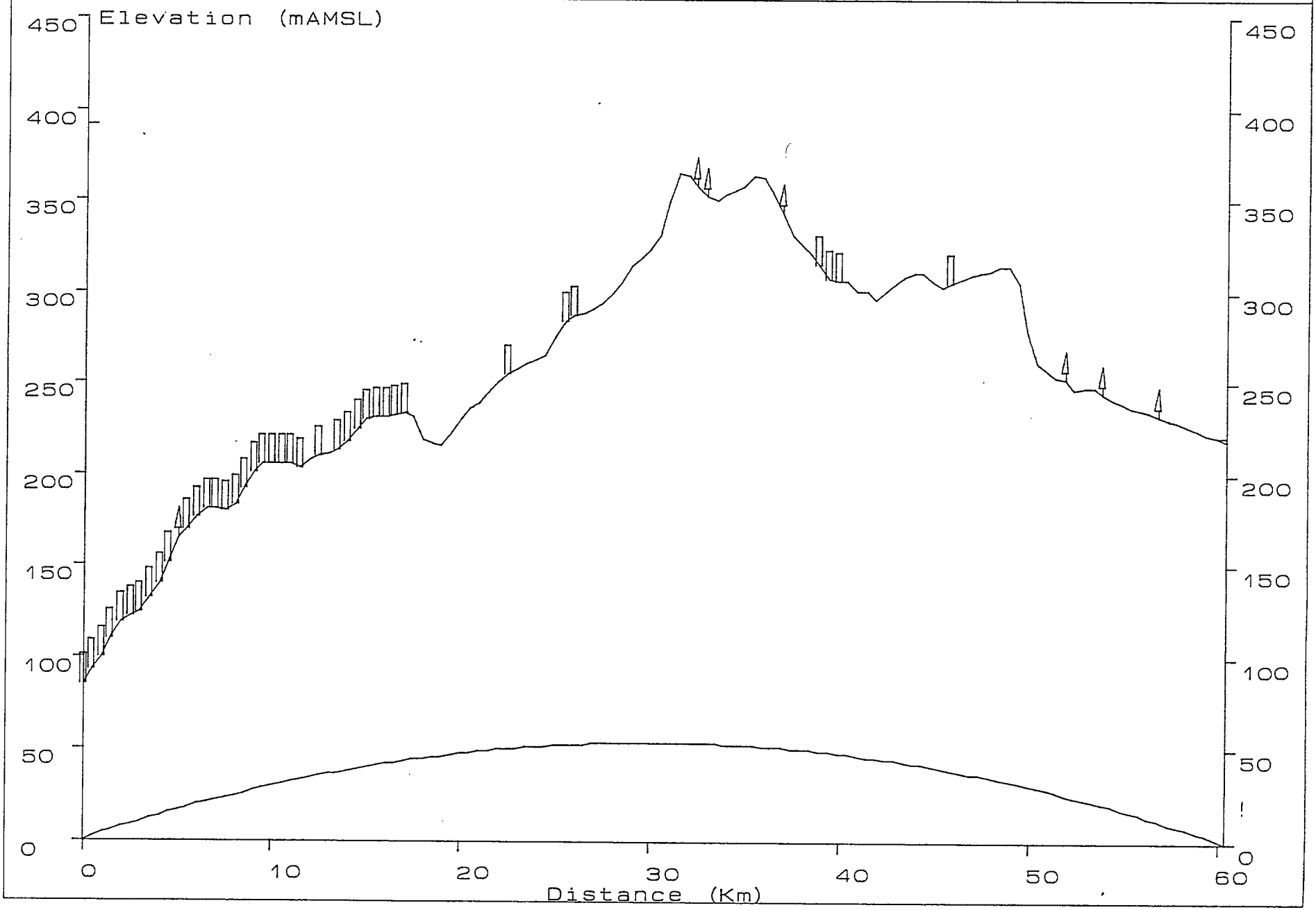
TxAntHt (mAGL): 456
RxAntHt (mAGL): 2
K=4/3



Path :FSTCANPLC-350
Freq (MHz):96.3
Dist (Km) :60.25

FIGURE-14

TxAntHt (mAGL): 306.5
RxAntHt (mAGL): 2
K=4/3



APPENDIX B

RADIAL MAPS

FIGURE B1

KING CITY RADIALS

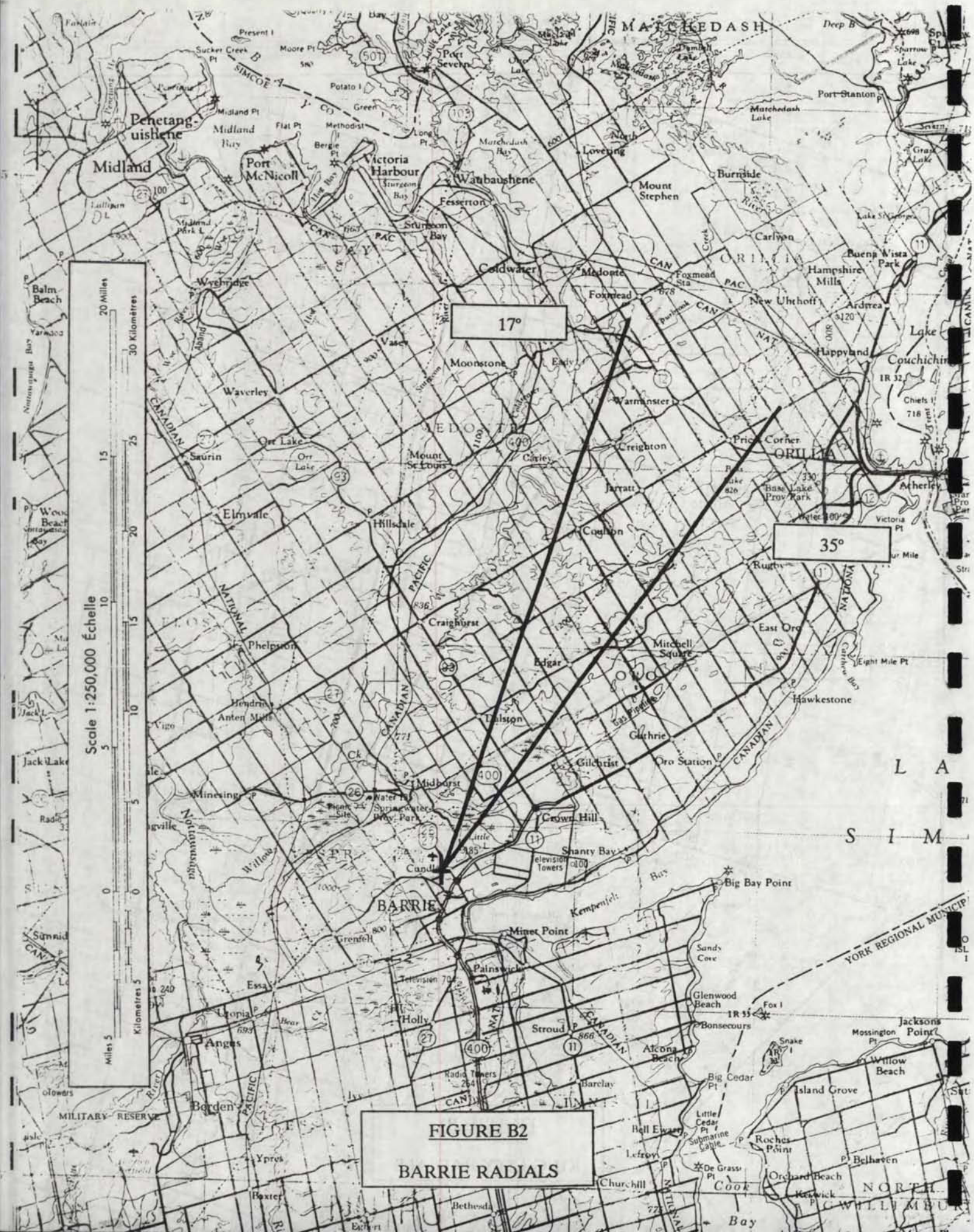


FIGURE B2

BARRIE RADIALS

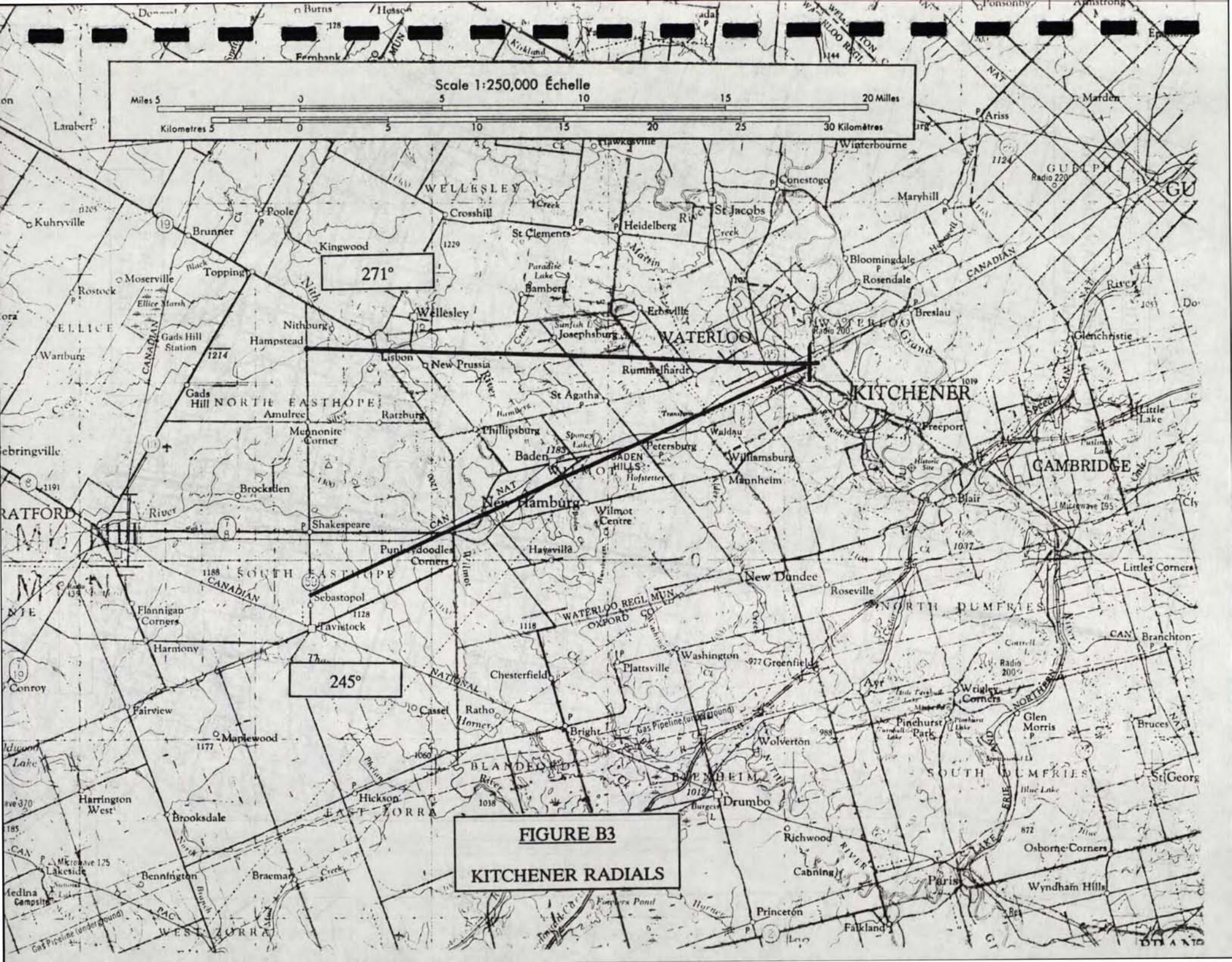
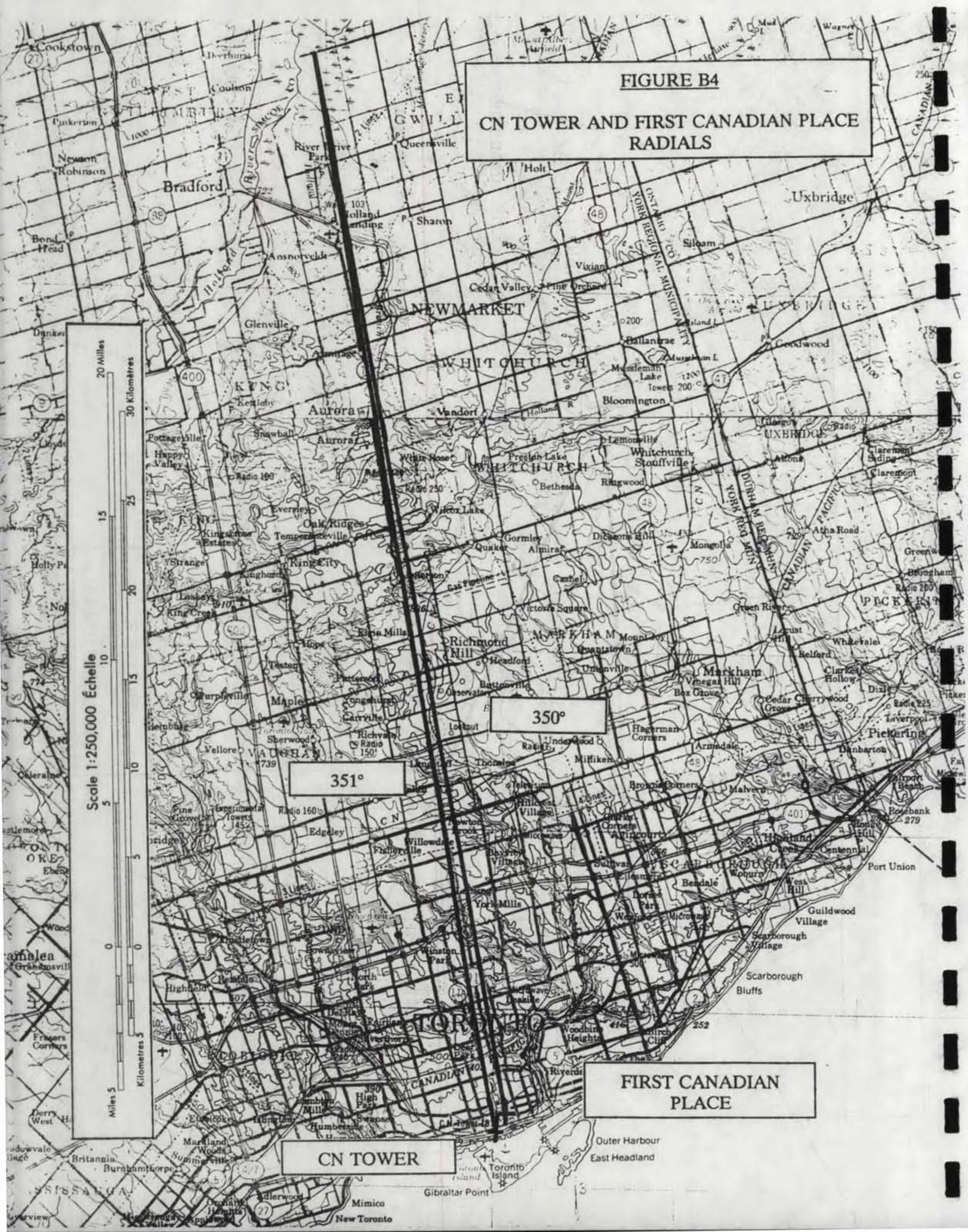


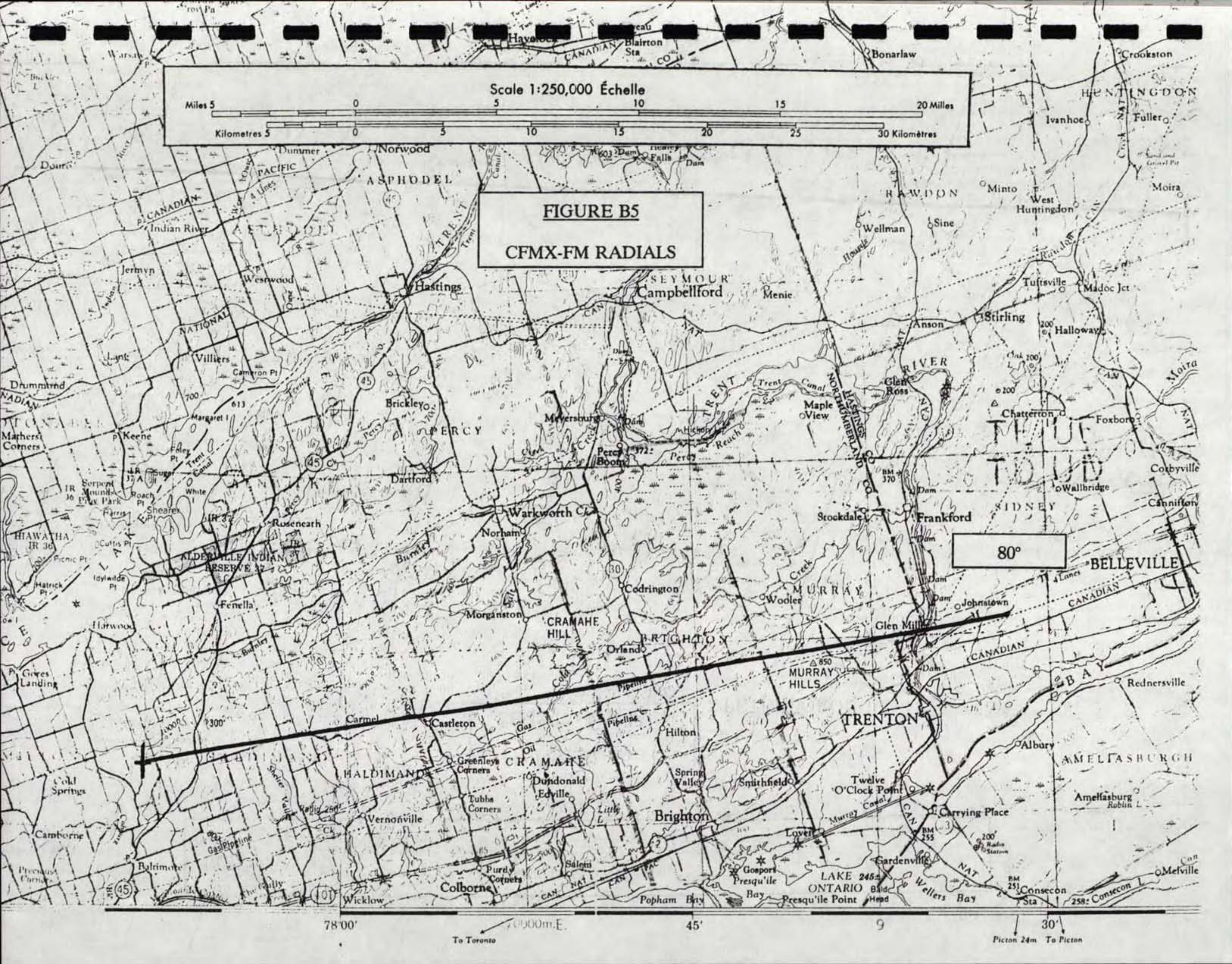
FIGURE B3

KITCHENER RADIALS

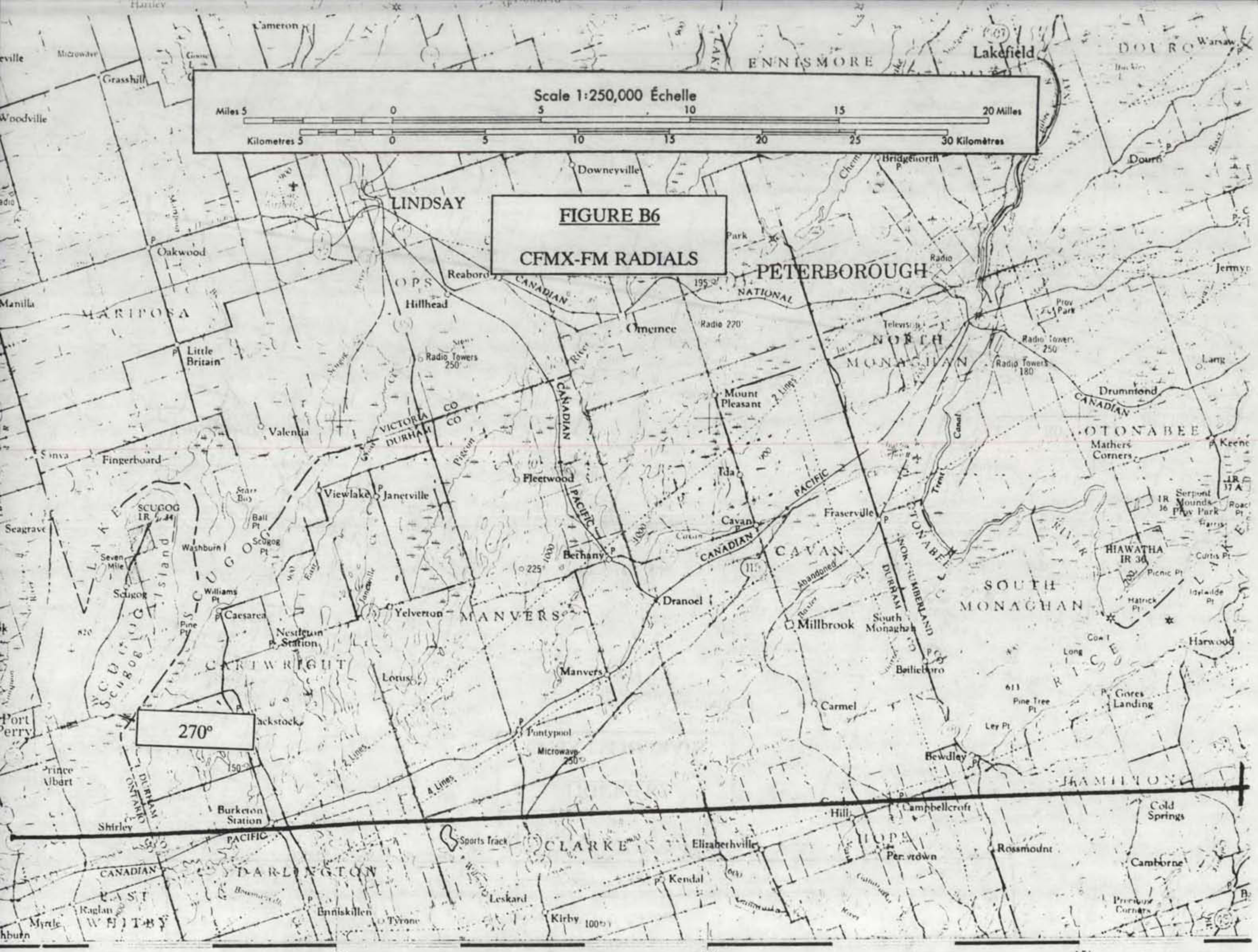
FIGURE B4

CN TOWER AND FIRST CANADIAN PLACE RADIALS





Scale 1:250,000 Échelle
Miles 5 0 5 10 15 20 Milles
Kilometres 5 0 5 10 15 20 25 30 Kilomètres
FIGURE B5
CFMX-FM RADIALS
80°
Havelock
Blairton Sta
Bonarlaw
Crookston
HUNTINGDON
Ivanhoe
Fuller
Norwood
Dummer
ASPHODEL
RAWDON
Minto
West Huntingdon
Moira
Indian River
Wellman
Sine
Jermyn
Westwood
Hastings
SEYMOUR
Campbellford
Menie
Tuftsville
Madoc Jct
Stirling
Halloway
Anson
Villiers
Cameron Pt
Drummond
Brickley
Glen Ross
Maple View
Chatterton
Foxboro
Keene
PERCY
Meyersburg
Percy Boom
Dartford
Corbyville
Wallbridge
Serpent Mounds Park
Roseneath
Warkworth
Norham
Stockdale
Frankford
SIDNEY
Cannifton
HIAWATHA IR 36
ALDERVILLE INDIAN RESERVE 37
BELLEVILLE
Codrington
MURRAY
Wooler
Johnstown
Fenella
Morganston
CRAMAHE HILL
BRIGHTON
Orland
Glen Miller
Harwood
Gores Landing
MURRAY HILLS
Rednersville
Carmel
Castleton
Hilton
TRENTON
Albury
Greenleys Corners
CRAMAHE
HALDIMAND
AMELIASBURGH
Cold Springs
Dundonald
Edville
Spring Valley
Smithfield
Twelve O'Clock Point
Tubbs Corners
Vernonville
Brighton
Carrying Place
Ameliasburg
Camborne
Lovett
Baltimore
Salem
Gosport
Presqu'ile
Gardenville
Purdy Corners
Colborne
LAKE ONTARIO
Presqu'ile Point
Consecon Sta
Melville
Wicklow
Popham Bay
Wellers Bay
78°00'
45'
30'
To Toronto
Picton 24m
To Picton


Scale 1:250,000 Échelle
Miles 5 0 5 10 15 20 Milles
Kilometres 5 0 5 10 15 20 25 30 Kilomètres
FIGURE B6
CFMX-FM RADIALS
270°
LINDSAY
PETERBOROUGH
Lakefield
ENNISMORE
DOURO
MARIPOSA
NORTH MONAGHAN
SOUTH MONAGHAN
OTONABEE
MANVERS
CAVAN
CARTWRIGHT
CLARKE
DARLINGTON
HOPE
HAMILTON
Oakwood
Little Britain
Valentia
Fingerboard
Cameron
Grasshill
Woodville
Downeyville
Reaboro
Hillhead
Omemee
Mount Pleasant
Fleetwood
Ida
Viewlake
Janetville
Bethany
Cavan
Fraserville
Dranoel
Millbrook
South Monaghan
Baillieboro
Yelverton
Nestleton Station
Caesarea
Lotus
Manvers
Carmel
Pontypool
Bewdley
Gores Landing
Burketon Station
Shirley
Port Perry
Prince Albert
Seagrave
Campbellcroft
Elizabethville
Perrytown
Rossmount
Cold Springs
Camborne
Kendal
Leskard
Kirby
Enniskillen
Tyrone
Raglan
Myrtle
Bridgenorth
Drummond
Mathers Corners
Keene
Harwood
Jermyn
Warsaw
HIAWATHA IR 36
SCUGOG IR 34
Sports Track
45′
30′
15′

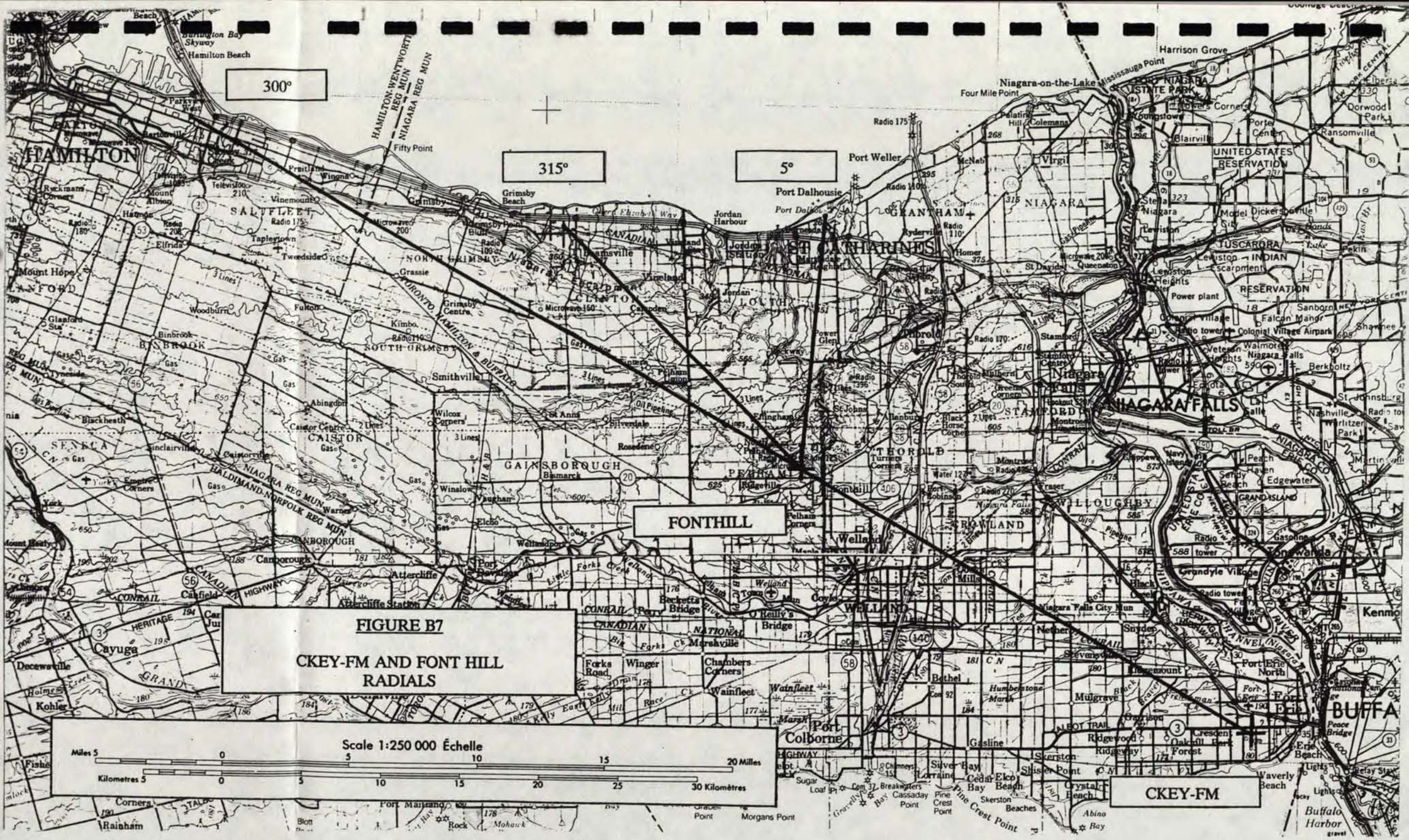


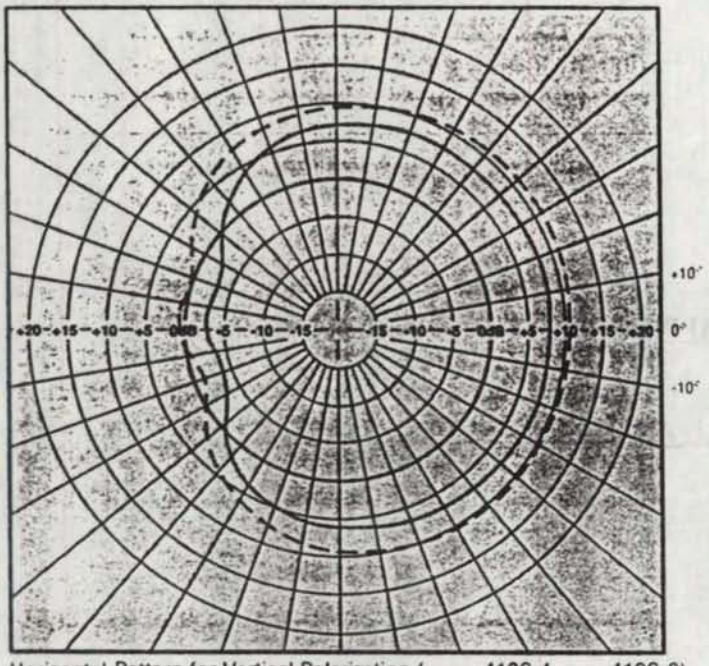
FIGURE B7

CKEY-FM AND FONT HILL RADIALS

APPENDIX C

DIRECTIONAL ANTENNA PATTERNS

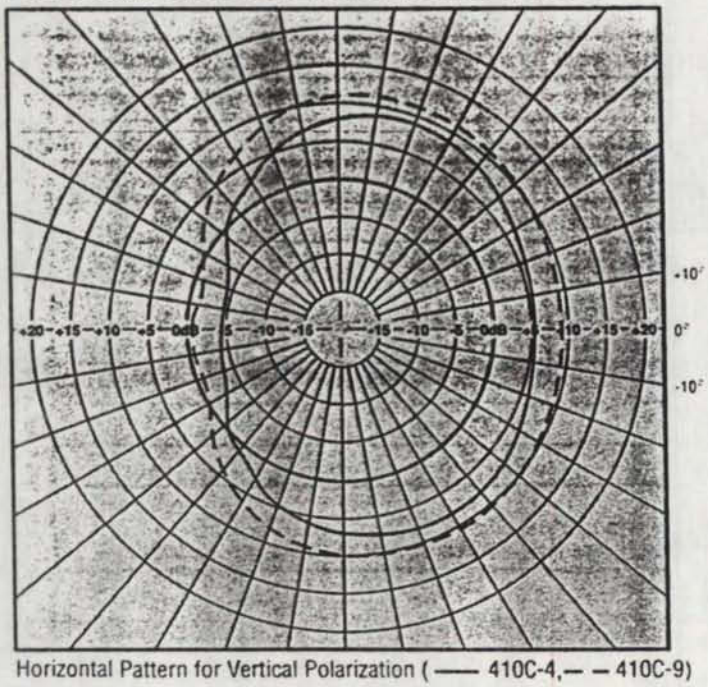
Offset SRL-410C-4/SRL-410C-9



Horizontal Pattern for Vertical Polarization (—— 410C-4,— — 410C-9)

King City: SRL-410C-9 Offset
Antenna Azimuth = 20 Deg TN

Bidirectional SRL-410C-4/SRL-410C-9



Horizontal Pattern for Vertical Polarization (—— 410C-4,— — 410C-9)

Barrie: SRL-410C-9 Bidirectional
Antenna Azimuth = 315 Deg TN

Fonthill: SRL-410C-9 Bidirectional
Antenna Azimuth = 270 Deg TN

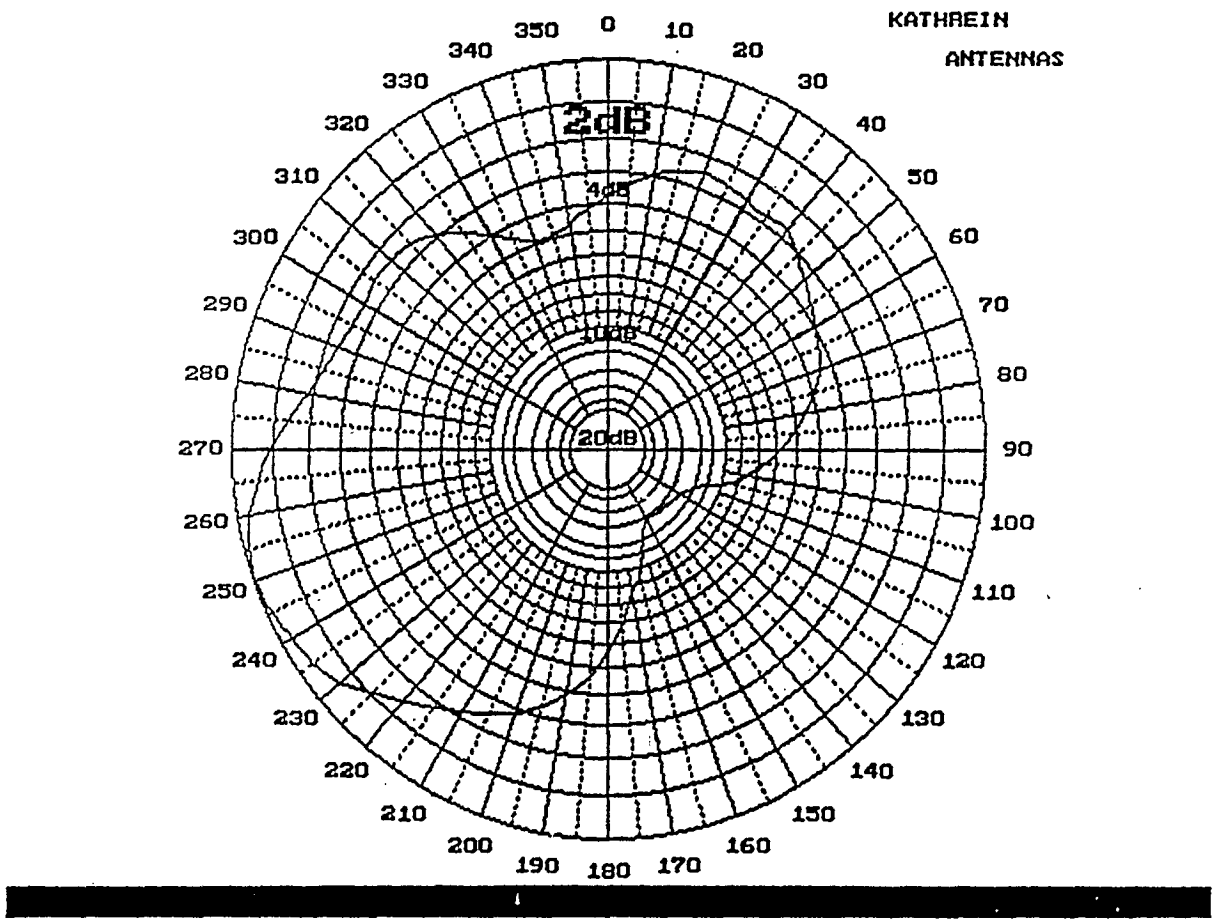
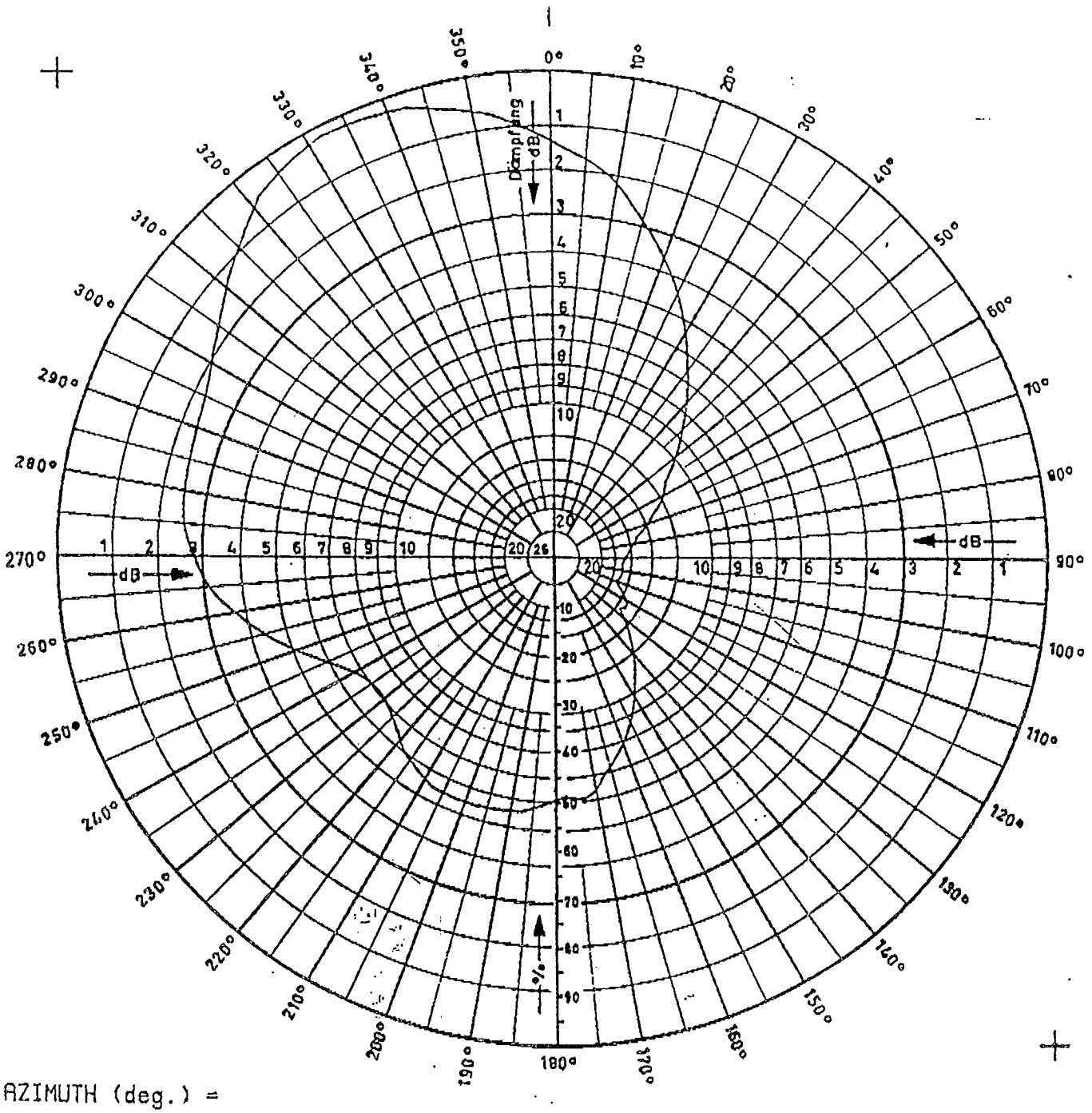


FIGURE 3

ANTENNA HORIZONTAL RADIATION PATTERN

CFMX-FM-1		TORONTO, ONTARIO
CH. 242C$_1$	30 kW MAX ERP	283.6 M EHAAT
	13.3 kW AVG ERP	
PROJECT: MR-TOR		JANUARY 1993
IMAGINEERING LIMITED		TORONTO, ONTARIO



AZIMUTH (deg.) =
210 330
DISTANCE (mm) =
800
OFFSET (left=+)=
0
PHASE (deg) =
0
POWER (ratio) =
1 3

FIGURE 3

RELATIVE HORIZONTAL FIELD STRENGTH PATTERN

NEW		FORT ERIE, ONTARIO
CH. 266B	26.0 kW ERP	79.5 m EHAAT
	DIRECTIONAL	
PROJECT: DBR-FM		FEBRUARY, 1990
IMAGINEERING LIMITED		TORONTO, ONTARIO

KATHREIN TENNAPLEX 10:41:15	Day 14 Feb 1990	HORIZONTAL DIAGRAM FM CP Transmit Antenna Imagineering	Type No. 754 154
	Name R.JOE	Directivity(dB)= 4.66 101.1 MHz	Sheet: 10:

APPENDIX D

EQUIPMENT LIST

EQUIPMENT LIST

Test Receiver:	Rohde and Schwarz ESVD
GPS Receiver:	Magellan NAV5000 PRO
Pre-Amplifier:	Magellan
GPS Antenna:	Magellan
Computer:	Bull PM-80-100X
Computer Monitor:	NEC JB-1408HMA
Computer Keyboard:	NEC APC-H412
DC Inverter:	Wilmore 1403-12
Odometer Wheel:	CRC Custom
Control Box:	CRC Custom
Antenna, UHF:	856 MHz monopole with inclined ground plane
Antenna, VHF:	85-115 MHz adjustable monopole, magnetic root mount
Battery, 12V:	Canadian Tire Rv/Marine
Reference Dipole:	EMCO DB-2