6206-133

TECHNICAL BRIEF

FOR A CHANGE IN DIRECTIONAL ANTENNA SYSTEMS

OF A

PRIVATE COMMERCIAL BROADCASTING STATION

(Sound - Standard Band)

APPLICANT:	CFRB LIMITED
LOCATION:	TORONTO, ONTARIO
STATION:	CFRB
FREQUENCY:	1010 kHz
POWER:	50 kW
MODE OF OPERATION:	DA-2
CLASS:	II

Project #1703

May 15, 1968

CONSULTANT:

D. E. M. ALLEN, P. Eng.,
Broadcast Consulting Engineer,
2631 Portage Avenue,
Winnipeg 12, Manitoba.

TECHNICAL BRIEF

FOR A CHANGE IN DIRECTIONAL ANTENNA SYSTEMS

OF A

PRIVATE COMMERCIAL BROADCASTING STATION

(Sound - Standard Band)

CFRB TORONTO, ONTARIO

I PURPOSE:

It is the purpose of this Technical Brief to support the application of CFRB Limited for permission to change the Directional Antenna Systems of Radio Station CFRB, Toronto, Ontario. This Technical Brief demonstrates that the operation of CFRB with new directional antenna systems would meet the requirements of all applicable Department of Transport procedures and NARBA protection agreements.

II DISCUSSION:

Radio Station CFRB presently operates with a power of 50 kW on 1010 kHz as a Class II Station utilizing a two tower directional antenna system during the day and a four tower directional antenna system at night.

It is proposed to add two tall towers to the antenna systems and utilize the two tall towers plus one existing tower in a new daytime directional antenna system. At night it is proposed to use the two new towers plus two of the existing towers in a new nighttime directional antenna system.

The present daytime antenna system of CFRB which has been utilized for over 19 years results in a number of coverage deficiencies. A complete null at Azimuth 174° results in a signal lack in the Niagara Peninsula, and a minima towards ...

II DISCUSSION: (Cont'd.)

...the northwest results in a signal towards the northwest which is considerably lower than desired.

To overcome these deficiencies and at the same time not decrease the radiation in any other direction, it was necessary to design a daytime antenna system which would have an increased horizontal radiation efficiency. The solution to this problem has been achieved by utilizing two new tall towers (203°) which, with their increased horizontal efficiency, results in a considerable improvement in those coverage areas where daytime deficiencies now exist.

Because of the technical problem involved in making tall towers electrically invisible to the existing nighttime pattern, it was decided to incorporate the two new towers in a new nighttime pattern. This procedure allows the two northerly towers of the existing CFRB system to be disconnected and therefore unused. The revised nighttime pattern utilizing the two tall towers results in some improvement in coverage, primarily in the areas of the nulls, which are complete,in the existing nighttime pattern. In the areas of the lobes of the nighttime pattern, there is very little change in radiation, therefore little change in coverage.

(i) With reference to Broadcast Procedure 1, Rule 2, the population within the proposed 250 mV/m contours is as follows:

Daytime - 176,874 persons

Nighttime - 138,208 persons

Within the proposed 1000 mV/m contours the number of buildings and the population enclosed are as follows:

Daytime	-	Buildings -	5,104
		Population -	19,600
Nighttime	-	Buildings -	3,087
		Population -	11,620

II DISCUSSION: (Cont'd.)

(i) During the 19 years that CFRB has been in operation at 50 kW on 1010 kHz, the incidence of blanketing and external cross-modulation has been very low. This is particularly so during the last 10 years. Consequently it is not anticipated that there will be a problem due to blanketing and external cross-modulation as a result of the proposed new antenna systems. The applicant agrees, however, to take remedial action to correct any legitimate complaint resulting from blanketing or external cross-modulation within the proposed 1000 mV/m contours.

(ii) Daytime rural service will not be limited by other broadcast signals. Calculations indicate that the estimated daytime 0.5 mV/m contour is provided adequate protection by existing co-channel and adjacent channel stations.

(iii) The nighttime interference free contour at Toronto on 1010 kHz has been established by the 50% RSS rule to be 3.04 mV/m.

III ASSUMPTIONS AND SOURCES OF INFORMATION:

Geographical locations and other pertinent data was obtained from Publications of the Department of Transport, Ottawa and the Federal Communications Commission, Washington. This information was based on data contained in correction lists and change lists up to and including the following:

1. Official List of Assignments to Standard Broadcast Stations in Canada, as of December 31, 1967.

2. List of Changes, proposed changes and corrections in Broadcast Station Assignments in Canada, List No. 241, dated March 26, 1968.

III ASSUMPTIONS AND SOURCES OF INFORMATION: (Cont'd.)

3. Official List of Assignments of Standard Broadcast Stations of the United States as of June 7, 1967.

4. List of Changes, proposed changes and corrections in Assignments of the United States Standard Broadcast Stations, U.S. List No. 1252, dated January 24, 1968.

Ground conductivity values for all interference and protection analysis were obtained from D.O.T. Ground Conductivity Map Sheet 2 and F.C.C. Figure M3.

Distances were either calculated using spherical trigonometry or measured on Albers Equal Area Projection maps.

Bearings were either calculated using spherical trigonometry or measured on Lambert Conformal Conic projection maps.

Geographic information has been taken from maps published by the Department of Mines and Technical Surveys of the Government of Canada.

The sheets used in the preparation of this Technical Brief are:

Scale:	1:50,000	Brampton	Sheet 30M/12E
Scale:	1:250,000	Toronto	Sheet 30M
Scale:	1:1,000,000	Southern Ontario	Sheet N.W.42/83 1/2

IV GROUNDWAVE INTERFERENCE ANALYSIS:

The following stations were considered in the groundwave interference analysis calculations which are summarized in Table 1.

Station	Location	Frequency	Operation
WITL	Lansing, Michigan	1010 kHz	.5 kW DA-D
WUNS	Lewisburg, Pa.	1010 kHz	.25 kW ND-D

IV GROUNDWAVE INTERFERENCE ANALYSIS: (Cont'd.)

Station	Location	Frequency	Operation
KDKA	Pittsburgh, Pa.	1020 kHz	50 kW ND
WCFL	Chicago, Ill.	1000 kHz	50 kW DA-2
WIQT	Horseheads, N.Y.	1000 kHz	1 kW ND-D

The proposed Directional Antenna systems result in adequate protection to those co-channel and adjacent channel stations considered in the groundwave interference analysis. Where the existing co-channel and adjacent channel stations are accepting interference from the present CFRB daytime operation, the proposed daytime pattern will reduce that interference. On Figure 4, the existing daytime pattern is shown together with the proposed daytime horizontal pattern and the applicable groundwave limitations. On Figure 4 it is clearly shown that the proposed daytime pattern results in an improvement in co-channel and adjacent channel groundwave protection.

V NIGHTTIME INTERFERENCE ANALYSIS:

The following co-channel stations were considered in the nighttime skywave interference analysis summarized in Table 2.

Station	Location	Operation
CBR	Calgary, Alberta	50 kW DA-2
WINS	New York, N. Y.	50 kW DA-1
KLRA	Little Rock, Ark.	10/5 kW DA-N
KVII	Amarillo, Texas	5/.5 kW DA-1
CMBQ	Havana, Cuba	25 kW DA-1

In all instances adequate co-channel skywave protection is provided by the proposed nighttime Directional Antenna System. In those cases where the existing CFRB nighttime signal is included in the 50% RSS interference calculations to an existing station, the proposed nighttime pattern will reduce the interference contribution from CFRB.

V NIGHTTIME INTERFERENCE ANALYSIS: (Cont'd.)

For the purpose of establishing the allowable radiation towards CBR, Calgary, the following procedure was adopted. Following discussions between the Canadian Broadcasting Corporation and the Applicant it was agreed that the CBC would consider that adequate skywave protection to CBR by CFRB would be met if a signal less than 25 μV/m was calculated to fall on the Manitoba-Saskatchewan border when the Path Mid-Point Latitude 10% Skywave Signal Range Curves (FCC 73.190 Figure 2) were used. Across the arc from 297.8° to 328.4° this limitation has been met.

VI LOCATION OF CONTOURS:

In determining the location of the coverage contours shown in Figures 11, 12, 13 & 14, ground conductivity values obtained in the Proof of Performance of CFRB dated January 25, 1967 were used. It is felt that the ground conductivity as determined in this Complete Proof of Performance provides for a better estimate of the location of the coverage contours, which will result from the proposed directional antenna systems.

VII INTERMODULATION INTERFERENCE: Procedure 1, Rule 3

There are four AM Broadcasting Station transmitting sites within the existing 100 mV/m contours of CFRB. For reference these stations are listed below.

CHFI	680 kHz	1 kW Day,25 kW Night	DA-2
CHIN	1540 kHz	50 kW	DA-D
CHUM	1050 kHz	50 kW	DA-2
CHWO	1250 kHz	1 kW Day,.5 kW Night	DA-1

These four stations will be within the proposed...

VII INTERMODULATION INTERFERENCE: Procedure 1, Rule 3

(Cont'd.)

..100 mV/m contours. Since intermodulation problems have not arisen with these stations in the past, it is not anticipated that problems will arise with the proposed directional antenna systems. CHUM on 1050 kHz is approximately 1 1/2 miles from the CFRB site; however the proposed radiation towards CHUM is not great. In fact, the present daytime radiation from CFRB towards CHUM is approximately equal to the proposed daytime radiation. Since no intermodulation problem has occurred at CHUM due to CFRB, it is not anticipated that any problem will arise as a result of the proposed radiation patterns.

VIII HARMONIC INTERFERENCE: Procedure 1, Rule 4

1010 kHz is not harmonically related to any carrier frequency within the Standard AM Broadcast Band.

IX OSCILLATOR RADIATION INTERFERENCE: Procedure 1, Rule 11

The nearest AM Broadcasting Station on either 550 or 560 kHz (460 and 450 kHz from 1010 kHz) is WGR, Buffalo, New York. An overlap of the WGR 0.5 mV/m contours and the CFRB 0.5 mV/m contours has existed for more than 19 years without causing a serious problem. Therefore it is not anticipated that a problem due to receiver oscillator radiation will occur with the proposed operation.

X IMAGE INTERFERENCE:

Since 1010 kHz does not lie within the frequency ranges of 540 to 690 kHz or 1450 to 1600 kHz, image type interference has not been considered in this proposal.

XI SUMMARY OF TOWER CURRENTS AND IMPEDANCES:

Values of self and mutual impedances used are based on measurements of the existing CFRB towers and curves published by G. H. Brown and Carl E. Smith. The base currents of towers #1 & #2 have been evaluated from curves relating base and loop currents of tall towers published by G. H. Brown. The subscripts 1, 2, 3 & 4 refer to Tower #1 (Southeast), Tower #2 (Southwest), Tower #3 (Centre East and Tower #4 (Centre West). The existing Northeast and Northwest Towers of the present CFRB directional antenna system are not used in the proposed new directional antenna systems.

Self-Impedances

$Z_{11} = Z_{22} = 55-j145$ ohms
$Z_{33} = 69+j97$ ohms
$Z_{44} = 69+j90$ ohms

Mutual Impedances

$Z_{12} = 36/-132°$ ohms
$Z_{13} = Z_{24} = 17/-83°$ ohms
$Z_{14} = 15/-215°$ ohms
$Z_{23} = 16/-152°$ ohms
$Z_{34} = 15/-125°$ ohms

Operating Impedances

Night

$Z_1 = 50-j190$ ohms
$Z_2 = 88-j191$ ohms
$Z_3 = 51+j102$ ohms
$Z_4 = 57+j81$ ohms

Day

$Z_1 = 42-j135$ ohms
$Z_2 = 90-181$ ohms
$Z_3 = 62+j105$ ohms

XI SUMMARY OF TOWER CURRENTS AND IMPEDANCES: (Cont'd.)

Tower Currents

Night

$I_1 = 8.1/-160°$ amperes
$I_2 = 8.2/-165°$ amperes
$I_3 = 20.3/-66°$ amperes
$I_4 = 18.6/-71°$ amperes

Day

$I_1 = 15.5/-160°$ amperes
$I_2 = 14.6/-225°$ amperes
$I_3 = 18.25/-75°$ amperes

Power Analysis

Night

P_1 =	3,280	watts
P_2 =	5,920	watts
P_3 =	21,050	watts
P_4 =	19,750	watts
TOTAL	50,000	watts

Day

P_1 =	10,100	watts
P_2 =	19,200	watts
P_3 =	20,700	watts
TOTAL	50,000	watts

XII EXPIRY DATE:

In the event that this Technical Brief is not submitted to the Department of Transport for approval within two months of the date on the title page, it should be returned to the Consultant for possible revisions before being submitted.

XIII QUALIFICATIONS AND SEAL:

The qualifications of the undersigned who is responsible for the preparation of this Technical Brief, are on file with the Department of Transport, Ottawa.

D. E. M. ALLEN, P. Eng.,
Broadcast Consulting Engineer.

May 15, 1968

PROJECT #1703

DESCRIPTION SHEET - DIRECTIONAL ANTENNA

Station: CFRB Main Studio: Toronto, Ontario

Frequency: 1010 kHz Power: 50 kW Class: II

Notification List No: Date:

GEOGRAPHICAL LOCATION: Latitude: 43° 30' 22" North
Longitude: 79° 37' 50" West

ANTENNA CHARACTERISTICS:

Mode of Operation: DA-2
Number of Elements: Four (4)
Type of Elements: Guyed Steel towers, uniform cross-section, base insulated for series feed

TOWER:	#1(SE)	#2(SW)	#3(NE)	#4(NW)
HEIGHT ABOVE BASE INSULATOR:	550' (203°)	550' (203°)	250' (92.3°)	250' (92.3°)
OVERALL HEIGHT:	555'	555'	255'	255'
FIELD RATIO:				
Nighttime	1.0	1.01	1.0	.92
Daytime	1.0	.94	.47	---
PHASING:				
Nighttime	0°	-5°	-66°	-71°
Daytime	0°	-65°	-75°	---

GROUND SYSTEM: 120 equally spaced radials of No. 10 B & S gauge bare copper wire extend from the base of each tower for a distance of 390' (.4 wavelength) with the exception of those joined along the common chords. Radials are buried approximately eight inches.

PROJECT #1703 CFRB

DESCRIPTION SHEET - DIRECTIONAL ANTENNA
(Continued)

SPACING AND ORIENTATION OF TOWERS: The towers are located at the four corners of a parallelogram whose long sides are 510.7' (188.56°) at azimuth 303° and whose short sides are 365.19' (135°) at azimuth 16°.

PREDICTED EFFECTIVE FIELD:

Nighttime:

1365 mV/m at 1 mile for 50 kW

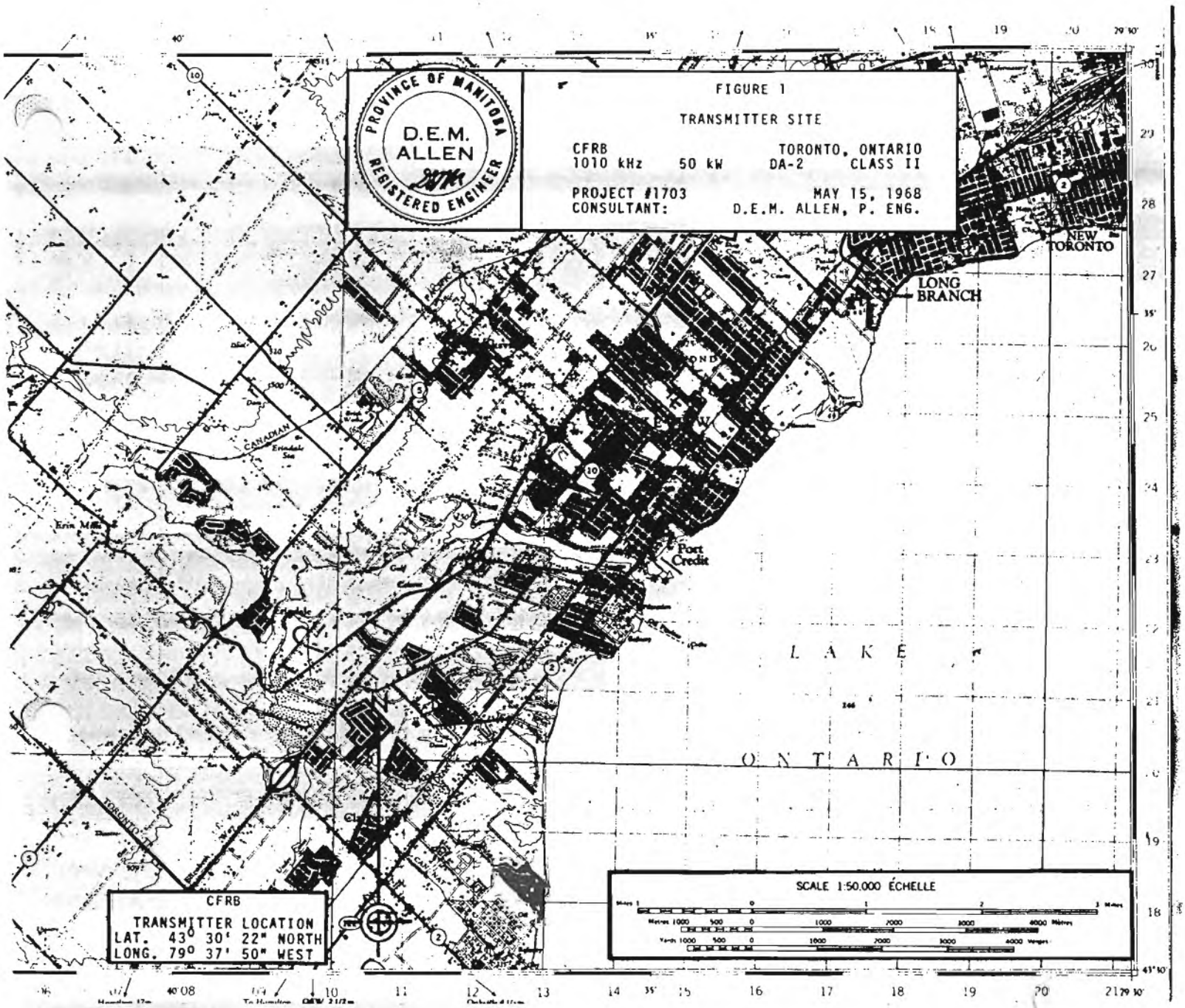
193 mV/m at 1 mile for 1 kW

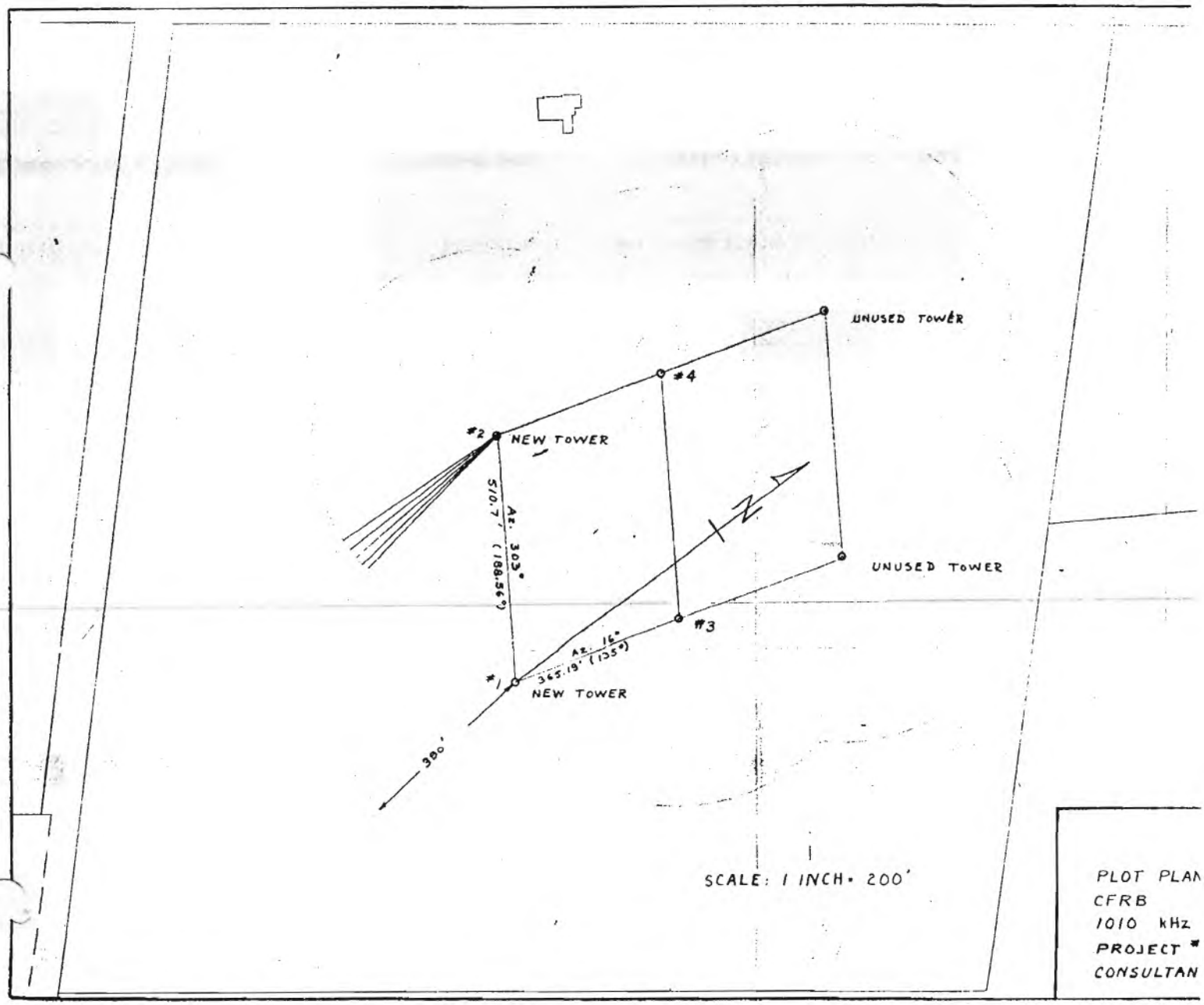
Daytime:

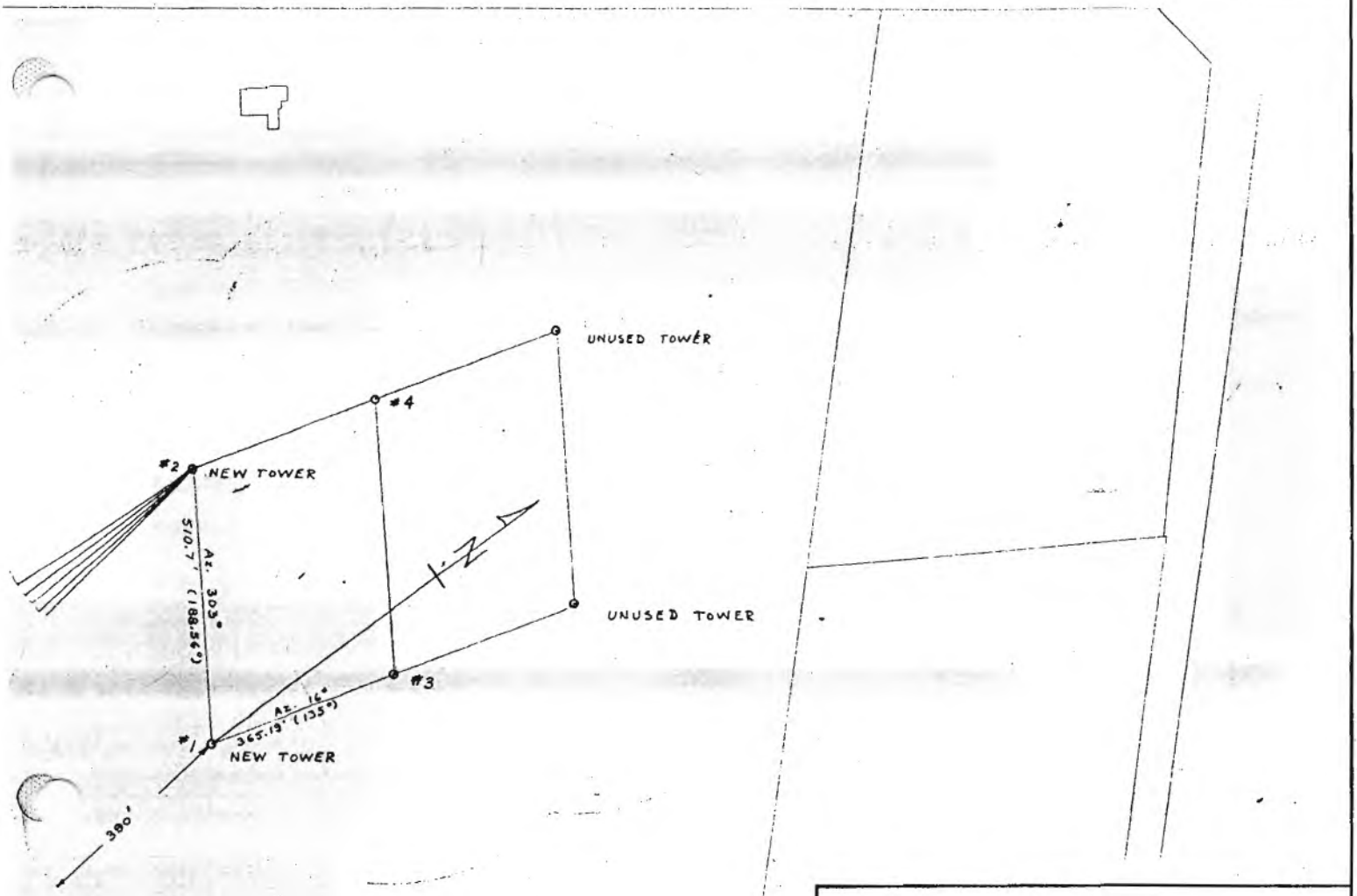
1670 mV/m at 1 mile for 50 kW

237 mV/m at 1 mile for 1 kW

D. E. M. Allen, P. Eng.,
Broadcast Consulting Engineer.


PROVINCE OF MANITOBA
D.E.M. ALLEN
REGISTERED ENGINEER
FIGURE 1
TRANSMITTER SITE
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1703 MAY 15, 1968
CONSULTANT: D.E.M. ALLEN, P. ENG.
CFRB
TRANSMITTER LOCATION
LAT. 43° 30' 22" NORTH
LONG. 79° 37' 50" WEST
SCALE 1:50.000 ÉCHELLE
LAKE ONTARIO
LONG BRANCH
NEW TORONTO
Port Credit
CANADIAN
Erindale Site
Erin Mills
TORONTO INT.

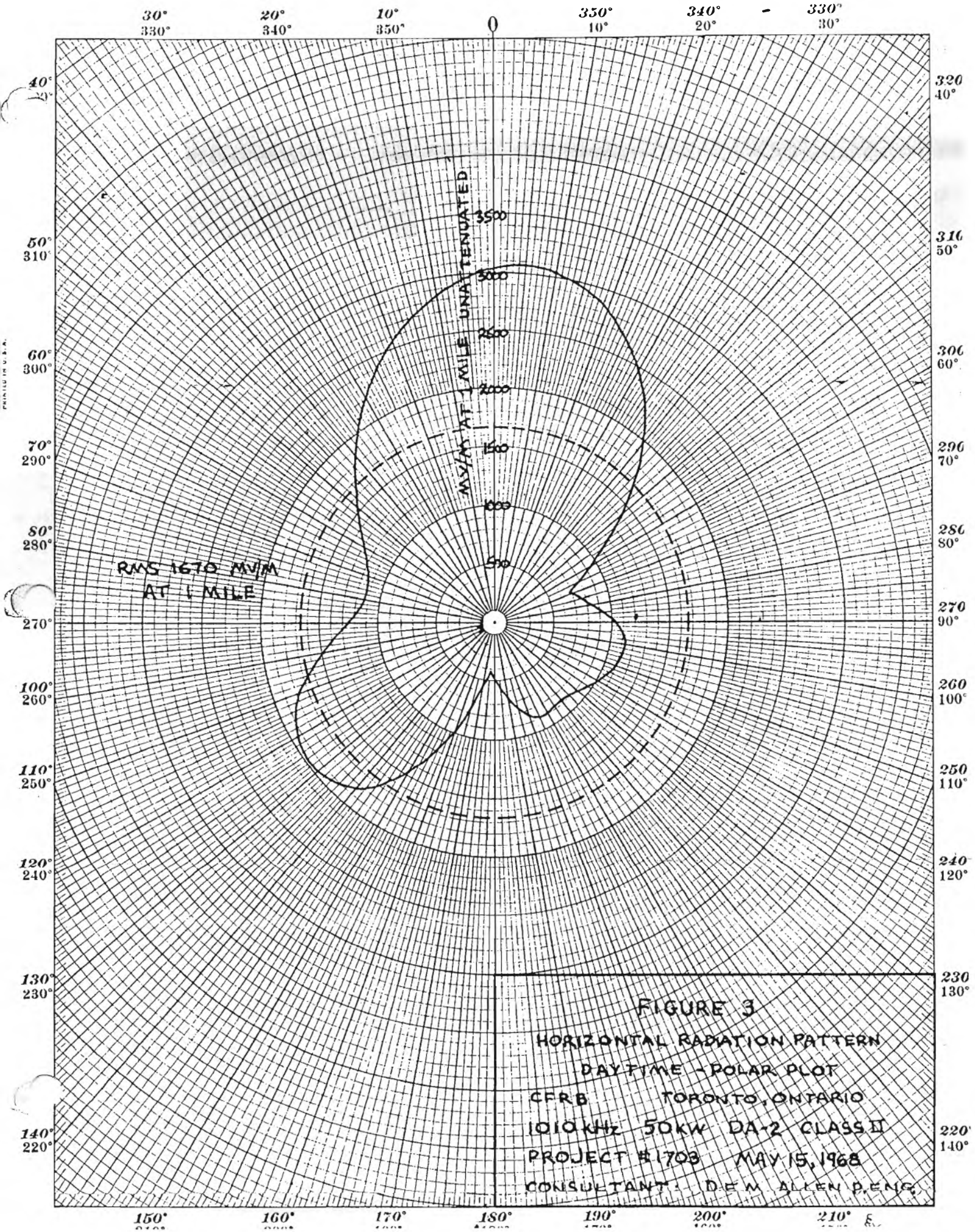

UNUSED TOWER
#4
#2
NEW TOWER
510.7' (188.56°)
Az. 303°
N
UNUSED TOWER
#3
Az. 16°
365.19' (135°)
#1
NEW TOWER
300'
SCALE: 1 INCH = 200'
PLOT PLAN
CFRB
1010 kHz
PROJECT #
CONSULTAN



SCALE: 1 INCH = 200'

FIGURE 2

PLOT PLAN OF STATION PROPERTY
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1703 MAY 15, 1968
CONSULTANT: D.E.M. ALLEN, P.ENG.


30° 330°
20° 340°
10° 350°
0
350° 10°
340° 20°
330° 30°
40° 320° 40°
50° 310° 50°
60° 300° 60°
70° 290° 70°
80° 280° 80°
90° 270°
100° 260° 100°
110° 250° 110°
120° 240° 120°
130° 230° 130°
140° 220° 140°
150° 160° 170° 180° 190° 200° 210°
MV/M AT 1 MILE UNATTENUATED
3500
3000
2500
2000
1500
1000
500
RMS 1670 MV/M
AT 1 MILE
FIGURE 3
HORIZONTAL RADIATION PATTERN
DAYTIME - POLAR PLOT
CFRB TORONTO, ONTARIO
1010 KHz 50KW DA-2 CLASS II
PROJECT # 1703 MAY 15, 1968
CONSULTANT: D.E.W. ALLEN P.ENG.

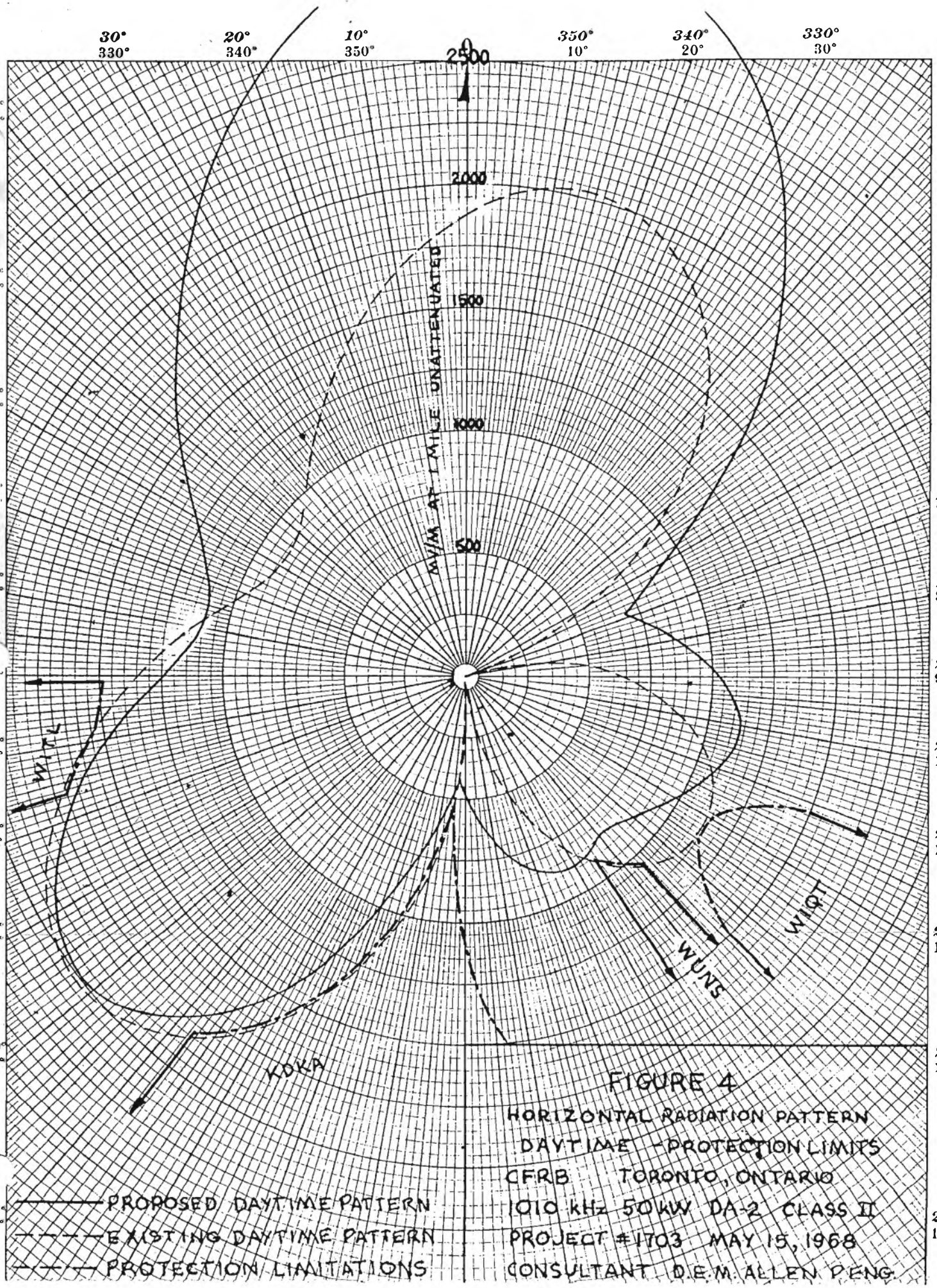
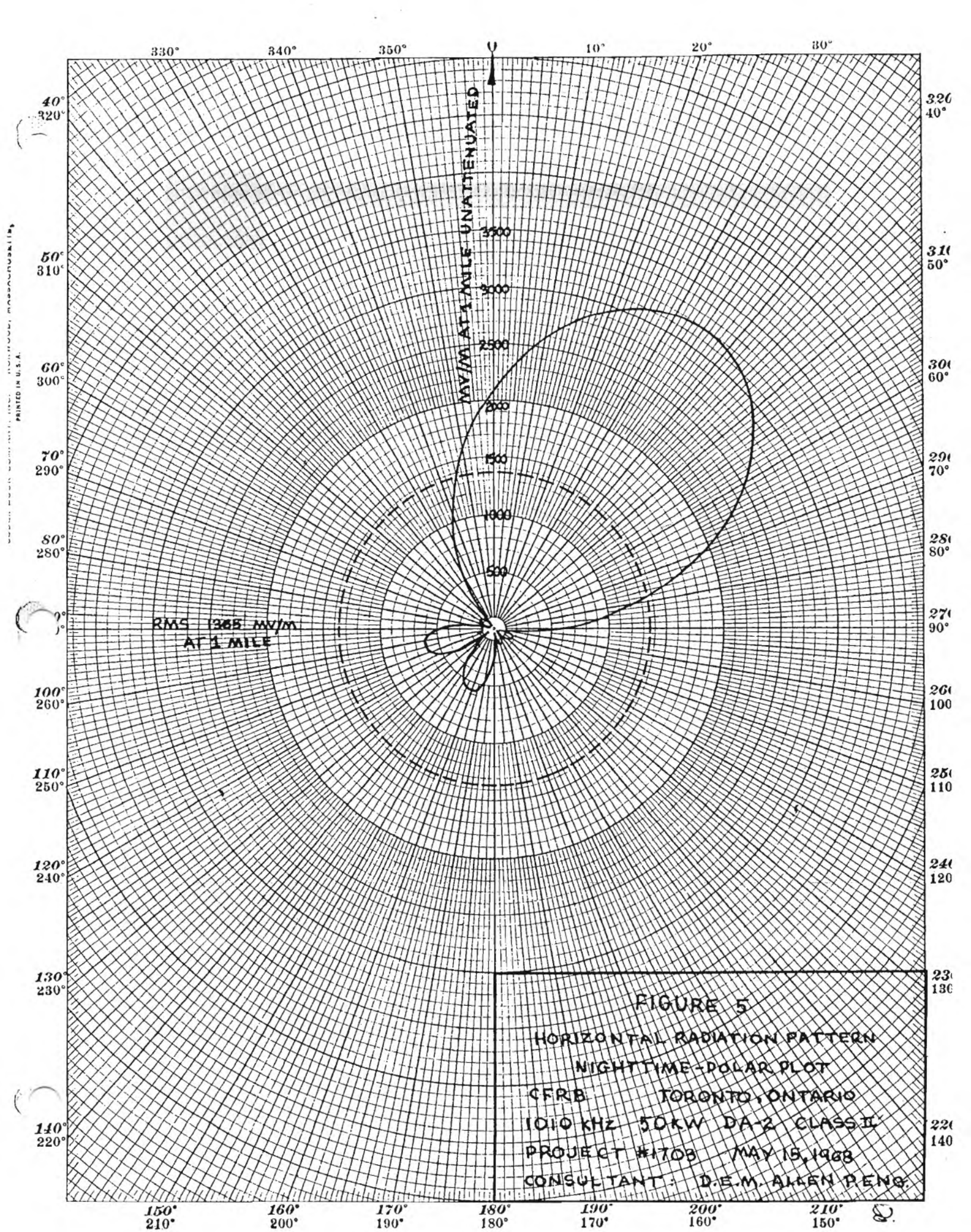


FIGURE 4

HORIZONTAL RADIATION PATTERN
DAYTIME - PROTECTION LIMITS
CFRB TORONTO, ONTARIO
1010 kHz 50kW DA-2 CLASS II
PROJECT #1703 MAY 15, 1968
CONSULTANT D.E.M. ALLEN P.ENG.


330° 340° 350° 0° 10° 20° 30°
40° 320°
50° 310°
60° 300°
70° 290°
80° 280°
90° 270°
100° 260°
110° 250°
120° 240°
130° 230°
140° 220°
150° 210°
160° 200°
170° 190°
180°
190° 170°
200° 160°
210° 150°
MV/M AT A MILE UNATTENUATED
3500
3000
2500
2000
1500
1000
500
RMS 1365 MV/M
AT 1 MILE
FIGURE 5
HORIZONTAL RADIATION PATTERN
NIGHTTIME - POLAR PLOT
CFRB TORONTO, ONTARIO
1010 KHZ 50KW DA-2 CLASS II
PROJECT #1703 MAY 15, 1968
CONSULTANT: D.E.M. ALLEN P.ENG.

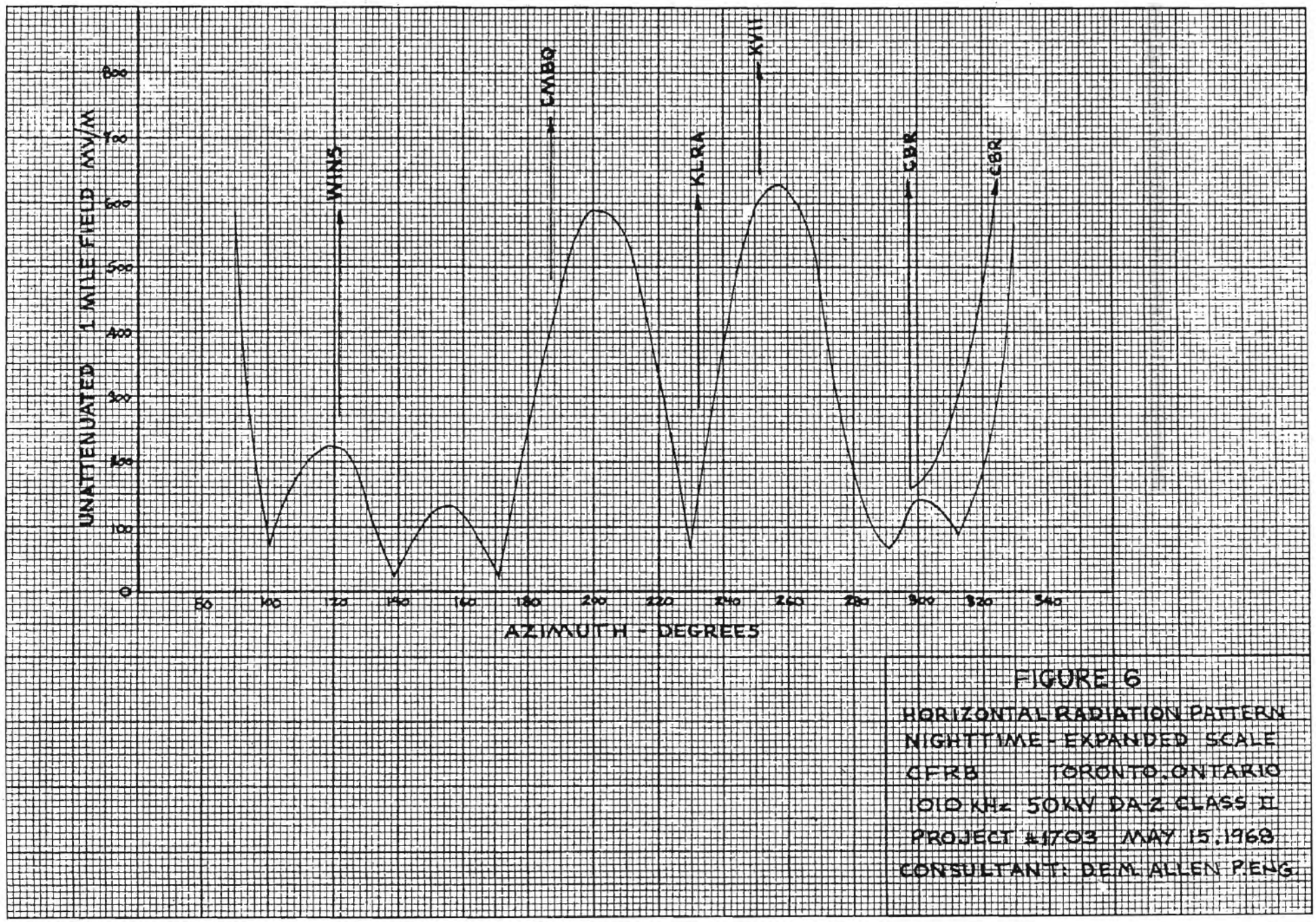


FIGURE 6
HORIZONTAL RADIATION PATTERN
NIGHTTIME - EXPANDED SCALE
CFRB TORONTO, ONTARIO
1010 KHz 50KW DA-2 CLASS II
PROJECT #1703 MAY 15, 1968
CONSULTANT: D.E.M. ALLEN P.ENG.

ADDENDUM

TO

TECHNICAL BRIEF

(Project #1703 - May 15, 1968)

APPLICANT:	CFRB LIMITED
LOCATION:	TORONTO, ONTARIO
STATION:	CFRB
FREQUENCY:	1010 kHz
POWER:	50 kW
MODE OF OPERATION:	DA-2
CLASS:	II

Project #1703

Revision Date March 15, 1972

PROJECT #1703

ADDENDUM

This addendum contains a revised nighttime radiation pattern for CFRB, Toronto. CFRB has been authorized to operate with the Nighttime Radiation Pattern shown in an approved Technical Brief dated May 15,1968, (Project #1703). This addendum has been prepared to show a proposed change in the field phase of Tower #3, (Northeast) from -66° to -64.2°. The purpose of this small change is to increase the radiation towards WINS, New York to a value close to that which has been authorized for CFRB for some twenty-three years. The allowable radiation towards WINS is 138.9 mV/m and it is proposed, with this revised pattern, to radiate 133 mV/m rather than 107 mV/m as shown in the Technical Brief dated May 15, 1968. This increase in proposed radiation will result in more latitude in the adjustment of the Nighttime Array of CFRB.

This addendum contains the following:

- Description Sheet - Directional Antenna
- Table 2 Nighttime Interference Analysis
- Figure 5 Horizontal Radiation Pattern - Nighttime - Polar Plot
- Figure 6 Horizontal Radiation Pattern - Nighttime - Expanded Plot
- Figure 7 Vertical Radiation Patterns - Nighttime - Azimuths 40° & 108.5°
- Figure 8 Vertical Radiation Patterns - Nighttime - Azimuths 121.5° & 124°
- Figure 9 Vertical Radiation Patterns - Nighttime - Azimuths 187.1° & 232.2°
- Figure 10 Vertical Radiation Patterns - Nighttime - Azimuths 297.8° & 300°

PROVINCE OF MANITOBA
D.E.M. ALLEN
REGISTERED ENGINEER

D. E. M. ALLEN, P. ENG.
BROADCAST CONSULTING ENGINEER

March 15, 1972

PROJECT #1703

DESCRIPTION SHEET - DIRECTIONAL ANTENNA

STATION: CFRB — MAIN STUDIO: Toronto, Ontario

FREQUENCY: 1010 kHz — POWER: 50 kW — CLASS: II

NOTIFICATION LIST NO: — DATE:

GEOGRAPHICAL LOCATION: Latitude 43° 30' 22" North
Longitude 79° 37' 50" West

ANTENNA CHARACTERISTICS:

Mode of Operation: DA-2
Number of Elements: 4 (four)
Type of Elements: Guyed steel towers, uniform cross-section, base insulated for series feed

TOWER:	#1(SE)	#2(SW)	#3(NE)	#4(NW)
HEIGHT ABOVE BASE INSULATOR:	550' (203°)	550' (203°)	250' (92.3°)	250' (92.3°)
OVERALL HEIGHT:	555'	555'	255'	255'
FIELD RATIO:				
Nighttime	1.0	1.01	1.0	.92
Daytime	1.0	.94	.47	--
PHASING:				
Nighttime	0°	-5°	-64.2°	-71°
Daytime	0°	-65°	-75°	--

GROUND SYSTEM: 120 equally spaced radials of No. 10 B & S gauge bare copper wire extend from the base of each tower for a distance of 390' (.4 wavelength) with the exception of those joined along the common chords. Radials are buried approximately eight inches.

SPACING AND ORIENTATION OF TOWERS: The towers are located at the four corners of a parallelogram whose long sides are 510.7' (188.56°) at azimuth 303° and whose short sides are 365.19' (135°) at azimuth 16°.

PREDICTED EFFECTIVE FIELD:

Nighttime: 1363 mV/m at 1 mile for 50 kW
193 mV/m at 1 mile for 1 kW

Daytime: 1670 mV/m at 1 mile for 50 kW
237 mV/m at 1 mile for 1 kW

March 15, 1972

FIGURE 5
HORIZONTAL RADIATION PATTERN
NIGHTTIME - POLAR PLOT
CFRB TORONTO, ONTARIO
1010 KHz 50KW DA-2 CLASS II
PROJECT #1703 REV. MARCH 15, 1972
D.E.M. ALLEN & ASSOCIATES LTD.
CONSULTING ENGINEERS

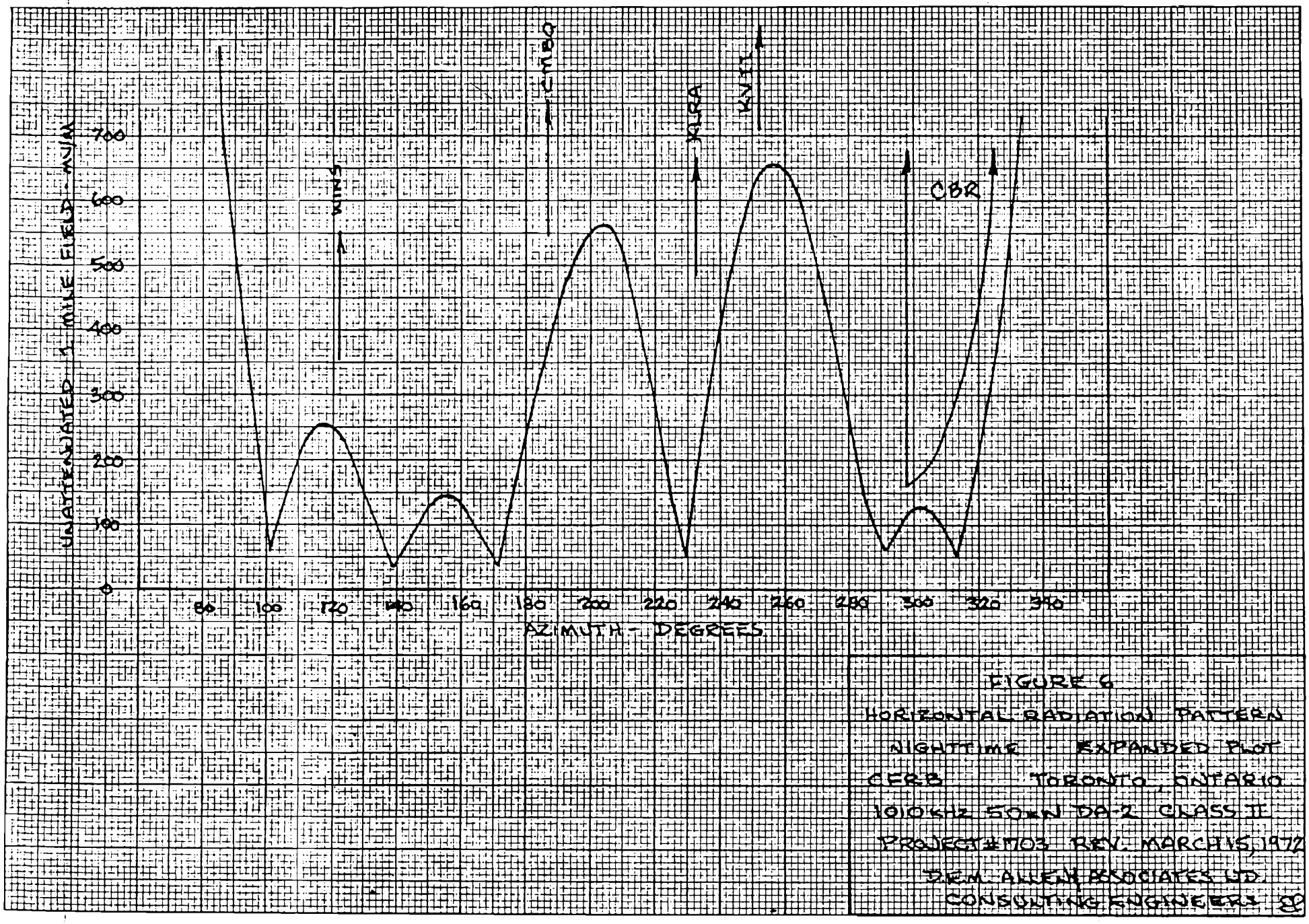


FIGURE 6
HORIZONTAL RADIATION PATTERN
NIGHTTIME - EXPANDED PLOT
CERB TORONTO, ONTARIO
1010 KHz 50kW DA-2 CLASS II
PROJECT #703 REV. MARCH 15, 1977
R.E.M. ALLEN ASSOCIATES LTD.
CONSULTING ENGINEERS

PROJECT #1703

DESCRIPTION SHEET - DIRECTIONAL ANTENNA

STATION: CFRB MAIN STUDIO: Toronto, Ontario

FREQUENCY: 1010 kHz POWER: 50 kW CLASS: II

NOTIFICATION LIST NO: 290 DATE: May 3, 1972

GEOGRAPHICAL LOCATION: Latitude 43° 30' 22" North
Longitude 79° 37' 50" West

ANTENNA CHARACTERISTICS:

Mode of Operation: DA-2
Number of Elements: 4 (four)
Type of Elements: Guyed steel towers, uniform cross-section, base insulated for series feed

TOWER:	#1(SE)	#2(SW)	#3(NE)	#4(NW)
HEIGHT ABOVE BASE INSULATOR:	550' (203°)	550' (203°)	250' (92.3°)	250' (92.3°)
OVERALL HEIGHT:	555'	555'	255'	255'
FIELD RATIO:				
Nighttime	1.0	1.01	1.0	.92
Daytime	1.0	.94	.47	--
PHASING:				
Nighttime	0°	-5°	-64.2°	-71°
Daytime	0°	-65°	-75°	--

GROUND SYSTEM: 120 equally spaced radials of No. 10 B & S gauge bare copper wire extend from the base of each tower for a distance of 390' (.4 wavelength) with the exception of those joined along the common chords. Radials are buried approximately eight inches.

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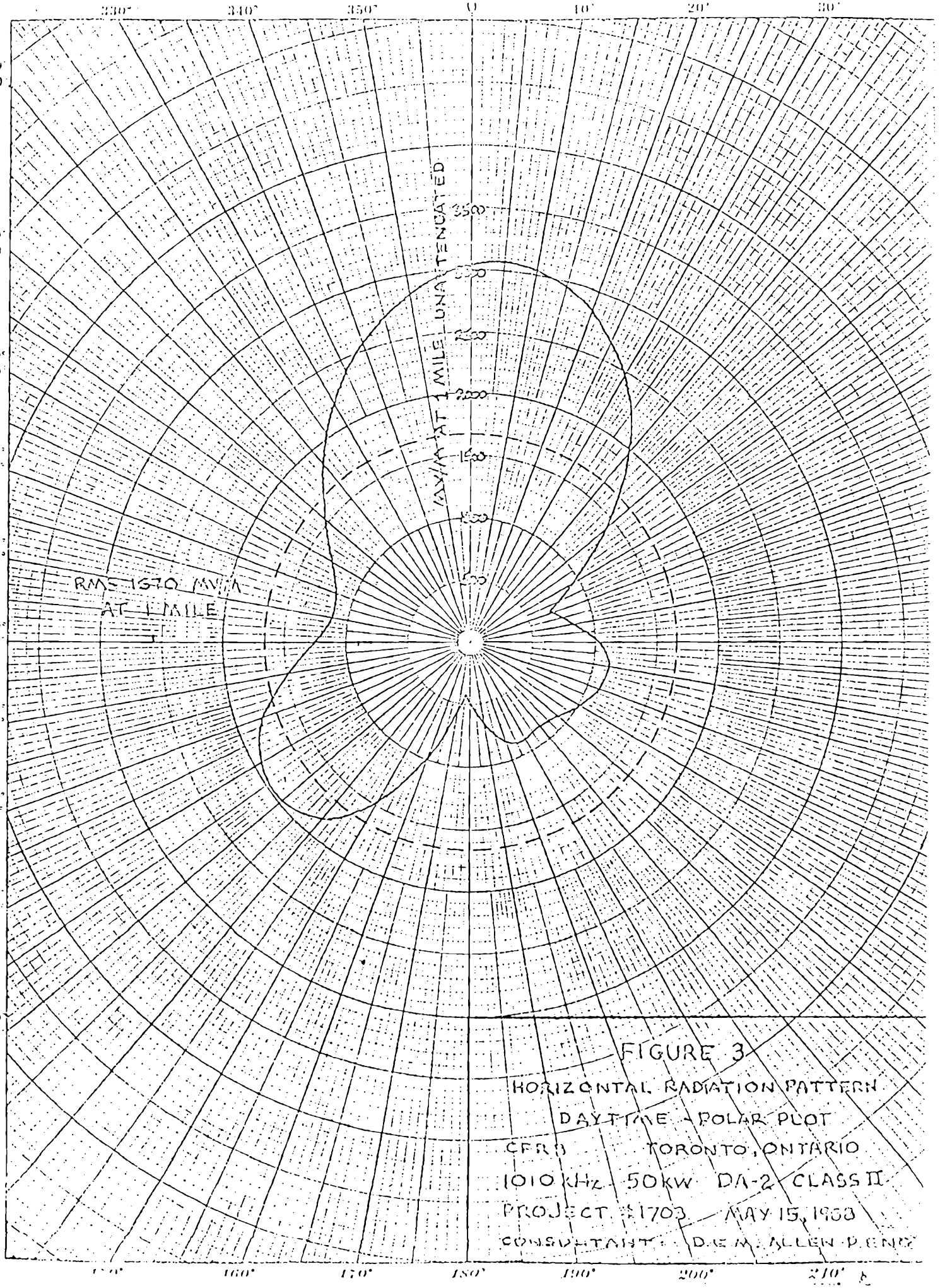
PREDICTED EFFECTIVE FIELD:

Nighttime 1363 mV/m at 1 mile for 50 kW
193 mV/m at 1 mile for 1 kW

Daytime 1670 mV/m at 1 mile for 50 kW
237 mV/m at 1 mile for 1 kW

March 15, 1972


330°
340°
350°
0
10°
20°
30°
40°
320
50°
310
60°
300
70°
290°
80°
280°
90°
270°
100°
260°
110°
250°
120°
240
130°
230°
170°
220
160°
170°
180°
190°
200°
210°
MV/M AT 1 MILE UNATTENUATED
350
300
250
200
150
100
50
RMS 1570 MV/M
AT 1 MILE
FIGURE 3
HORIZONTAL RADIATION PATTERN
DAYTIME - POLAR PLOT
CFRB TORONTO, ONTARIO
1010 KHz 50KW DA-2 CLASS II
PROJECT #1703 MAY 15, 1958
CONSULTANT - D.E.M. ALLEN P.ENG.

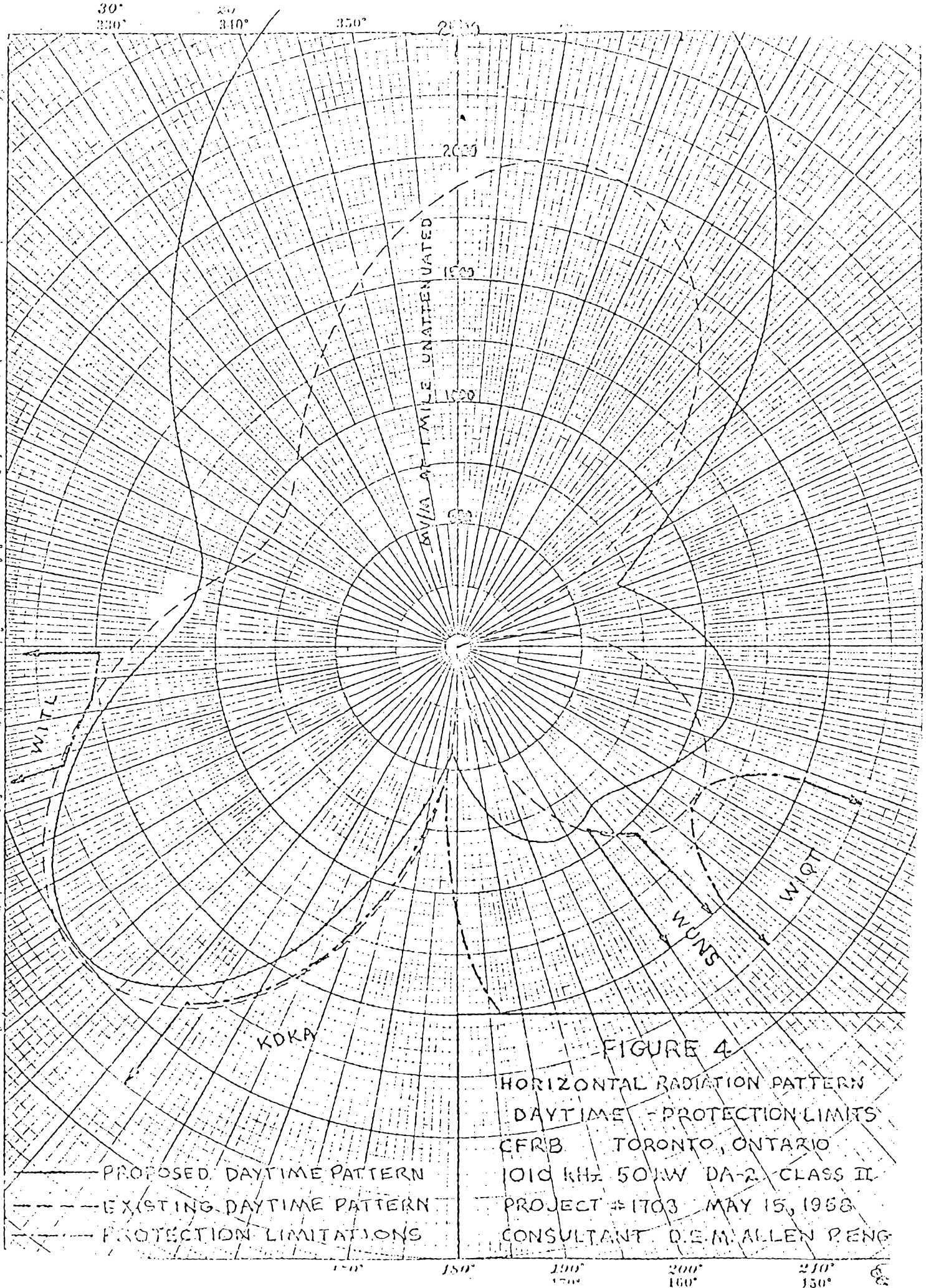


FIGURE 4

HORIZONTAL RADIATION PATTERN

DAYTIME - PROTECTION LIMITS

CFRB TORONTO, ONTARIO

1010 KHz 50 kW DA-2 CLASS II

PROJECT #1703 MAY 15, 1958

CONSULTANT D.E.M. ALLEN P.ENG

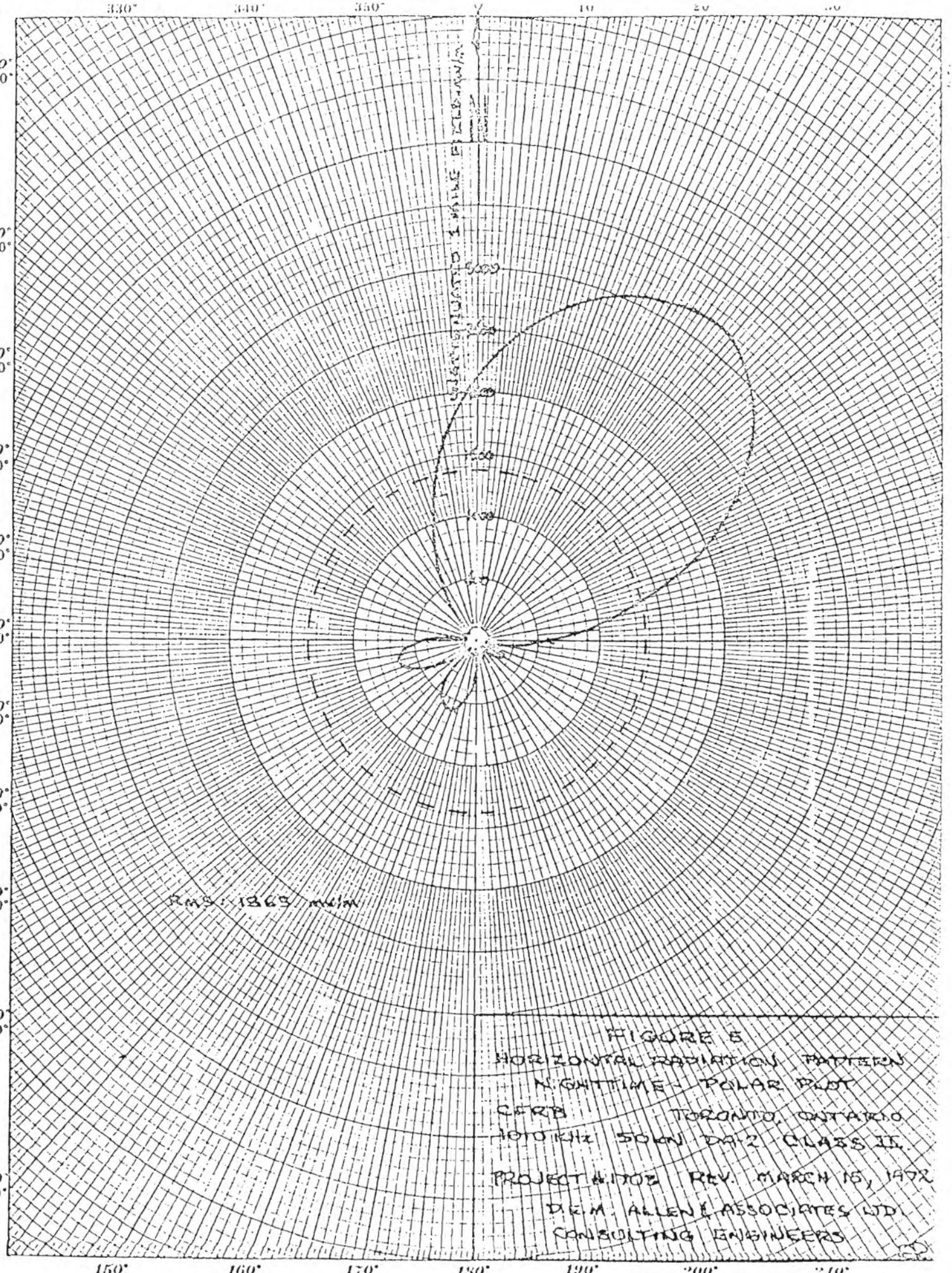


FIGURE 5
HORIZONTAL RADIATION PATTERN
NIGHTTIME - POLAR PLOT
CERB TORONTO, ONTARIO
1010 KHz 50kW DA-2 CLASS II.
PROJECT #1702 REV. MARCH 15, 1972
D.E.M. ALLEN & ASSOCIATES LTD.
CONSULTING ENGINEERS

APPROVED
SEP 12 1973

FINAL

PROOF OF PERFORMANCE

DIRECTIONAL ANTENNA SYSTEMS

STATION:	CFRB
LOCATION:	TORONTO, ONTARIO
FREQUENCY:	1010 kHz
POWER:	50 kW
MODE OF OPERATION:	DA-2
CLASS:	II

PROJECT #1707

OCTOBER 20, 1972
REVISED MAY 31, 1973

FINAL PROOF OF PERFORMANCE

DIRECTIONAL ANTENNA SYSTEMS

BROADCASTING STATION CFRB TORONTO, ONTARIO

1.0 PURPOSE:

The purpose of this Final Proof of Performance is to demonstrate that the antenna systems of Broadcasting Station CFRB, Toronto, Ontario, are in proper adjustment within practical limits. This submission substantiates the information filed in the Preliminary Proof of Performance for CFRB dated October 26, 1970 (Project #1705).

2.0 GENERAL COMMENTS:

Broadcasting Station CFRB is a Class II Station authorized for operation with a power of 50 kW on a frequency of 1010 kHz. The directional patterns authorized are those shown in the approved Technical Brief dated May 15, 1968 (Project #1703) daytime, and the addendum dated March 15, 1972 for the night-time pattern.

There are some numerical differences between the currents and impedances listed in this submission and those shown in the Preliminary Proof of Performance dated October 26, 1970 (Project #1705). These small numerical differences are due to a rearrangement of some components and leads on the antenna coupling and phasing equipment panels, which was necessitated by certain mechanical difficulties encountered with the antenna changeover relays.

2.0 GENERAL COMMENTS: (Cont'd.)

As noted in previous Proofs of Performance filed for CFRB, certain anomalies in Field Strength Measurements do occur, and this is so even along radials. However, as the distance from the station increases, the anomalies seem to diminish. This is quite evident on Radial #7 at Azimuth 303° in the Nighttime Pattern as shown in Figure 19. No doubt due to the low value of the direct radiation compared with the reradiated fields from nearby power lines and other structures, the actual fields measured are somewhat suspect, however at the greater distances along the radial in question, it becomes obvious that the actual radiated 1 mile field is shown.

The directional patterns shown in Figures 1, 2 and 3 indicate that the protection requirements of the station are met.

3.0 DESCRIPTION OF ANTENNA SYSTEM:

3.1 Number of Radiators: 4 (Four)

3.2 Type of Radiators: Guyed steel towers, uniform cross-section, base insulated for series feed

3.3 Height of Towers above base insulators:

Tower #2 Centre-East & Tower #3 Centre-West: 250' (92.3°)

Tower #5 Southwest & Tower #6 Southeast: 550' (203°)

3.4 Overall Height above ground:

Tower #2 Centre-East & Tower #3 Centre-West: 255'

Tower #5 Southwest & Tower #6 Southeast: 555'

3.0 DESCRIPTION OF ANTENNA SYSTEM: (Cont'd.)

3.5 Orientation and Spacing: The towers are located at the four corners of a parallelogram whose long sides are 510.7' (188.56°) at Azimuth 303° and whose short sides are 365.19' (135°) at Azimuth 16°.

3.6 Details of Ground System: 120 equally spaced radials of No.10 B & S gauge bare copper wire extend from the base of each tower for a distance of 390' (0.4 wavelength) with the exception of those joined along the common chords. Radials are buried approximately eight inches. In addition to the normal radials, 120 radials 100' long extend from the base of each tall tower.

3.7 Location: Latitude 43° 30' 22" North
Longitude 79° 37' 50" West

3.8 Painting & Lighting: The towers are painted and lighted in accordance with Department of Communications Broadcast Procedure No. 16.

3.9 Measured Efficiency:

Daytime

1680 mV/m at 1 mile for 50 kW
237 mV/m at 1 mile for 1 kW

Nighttime

1345 mV/m at 1 mile for 50 kW
191 mV/m at 1 mile for 1 kW

4.0 IMPEDANCE MEASUREMENTS, OPERATING DATA AND CALCULATIONS:

4.1 Impedance Measurements

4.1.1 General

The method of measuring self-impedances at this installation is generally known as the radio frequency bridge method. Self-Impedance Measurements were made directly using a General Radio 1606-A RF Bridge and associated equipment. To measure the operating impedances of the towers, an operating impedance bridge was used directly with the station transmitter as the RF source.

4.2 Test Equipment and its Accuracy

4.2.1 General Radio Type 1606-A Radio Frequency Bridge, Serial No. 496, Accuracy ±1%

4.2.2 RF Signal Generator, Delta Electronics Model D15-1, Serial #055 Receiver Generator calibrated at the time of use against existing stations in the broadcast band

4.2.3 Null Detector, Superheterodyne Receiver, CBY 46145, Serial #3638

4.2.4 Operating Impedance Bridge - Delta Electronics Type OIB-1, Serial #398, Accuracy 5% ±1 ohm, checked against Type 1606-A Bridge

4.3 Measured Impedances

The following values of self and operating impedances were used in all relevant calculations. The subscripts 2, 3, 5 and 6 refer to the Centre-East, Centre-West, Southwest and Southeast towers respectively. This tower numbering system has been used to correspond with the designation system utilized by the staff of CFRB in relating to the original 4 tower antenna system.

4.0 IMPEDANCE MEASUREMENTS, OPERATING DATA AND CALCULATIONS:

4.3 Measured Impedances (Cont'd.)

To provide a correlation between the numbering system utilized in the approved Technical Brief and the system utilized in this submission, the following Table has been prepared.

Tower Number and Description	
This Submission	Approved Technical Brief
#2 Centre-East	#3 Northeast
#3 Centre-West	#4 Northwest
#5 Southwest	#2 Southwest
#6 Southeast	#1 Southeast

4.3.1 Self-Impedances

Using RF Bridge

Z_{22} = 74 +j81 ohms

Z_{33} = 81 +j94.5 ohms

Z_{55} = 52 -j177 ohms

Z_{66} = 53 -j178 ohms

4.3.2 Operating Impedances

Using Operating Impedance Bridge

Daytime	Nighttime
Z_2 = 90 +j63 ohms	Z_2 = 61.5 +j52 ohms
Z_5 = 80 -j189 ohms	Z_3 = 56 +j63 ohms
Z_6 = 26.5 -j189 ohms	Z_5 = -13 -j235 ohms
	Z_6 = 15 -j201 ohms

4.0 IMPEDANCE MEASUREMENTS, OPERATING DATA AND CALCULATIONS:

4.4 Antenna Currents

Tower	Current	Tower Meter Reads (amperes)	Theoretical Field Ratios
Daytime			
#2 - Centre-East	14.0	14.0	.47
#5 - Southwest	16.1	16.1	.94
#6 - Southeast	22.2	22.2	1.00
Nighttime			
#2 - Centre-East	21.4	21.4	1.00
#3 - Centre-West	19.5	19.5	.92
#5 - Southwest	10.3	10.3	1.01
#6 - Southeast	13.7	13.7	1.00

4.5 Phase Monitor Readings

Phase Monitor is a Potomac Instrument Inc. Type AM19, Serial #182 with a Weston Digital Voltmeter Type 1240, Serial #2295 for digital readout.

Tower	Phase Reading	Theoretical Field Phase	Remote Current Magnitude
Daytime			
#2 - Centre-East Base Loop	0°	0°	50.0
#5M - Southwest Middle Loop	-148.8°	+10°	47.1
#6M - Southeast Middle Loop	-80.1°	+75°	53.2
Nighttime			
#2 - Centre-East Base Loop	0°	0°	100.0
#3 - Centre-West Base Loop	- -1.3°	-6.8°	94.6
#5M - Southwest Middle Loop	-103.1°	+59.2°	52.5
#6M - Southeast Middle Loop	-95.7°	+64.2°	53.2

It should be noted that the middle loop sampling loops on towers #5 and #6 are used for monitoring, since the tower current towards the centre of these towers is more indicative of the radiated field phase and magnitude.

4.0 IMPEDANCE MEASUREMENTS, OPERATING DATA AND CALCULATIONS:

4.6 Power Analysis

4.6.1 Daytime

Antenna

$P_2 = 14.0^2 \times 90 = 17,650$ watts
$P_5 = 16.1^2 \times 80 = 20,700$ watts
$P_6 = 22.2^2 \times 26.5 = 13,050$ watts
TOTAL 51,400 watts

Common Point Input

$Z_{cp} = 51 + j3$ ohms

$I_{cp} = 31.9$ (meter reads 31.0) amperes

$P_{cp} = 31.9^2 \times 51 = 51,900$ watts

Transmitter Readings

PA Plate Voltage: 10.8 kV
PA Plate Current: 6.0 amperes
PA Plate Input: $6.0 \times 10.8 = 64.8$ kW

Efficiency = $\frac{51,900}{64,800} \times 100 = 80.2\%$

4.6.2 Nighttime

Antenna

$P_2 = 21.4^2 \times 61.5 = 28,200$ watts
$P_3 = 19.5^2 \times 56 = 21,300$ watts
$P_5 = 10.3^2 \times -13 = 1,380$ watts
$P_6 = 13.7^2 \times 15 = 2,820$ watts
TOTAL 50,940 watts

4.0 IMPEDANCE MEASUREMENTS, OPERATING DATA AND CALCULATIONS:

4.6.2 Nighttime (Cont'd.)

Common Point Input

Z_{cp} = 48 -j1 ohms

I_{cp} = 33.4 (meter reads 32.5) amperes

P_{cp} = 33.4^2 x 48 = 53,500 watts

Transmitter Readings

PA Plate Voltage: 10.8
PA Plate Current: 6.2 amperes
PA Plate Input: 6.2 x 10.8 = 67 kW

Efficiency = $\frac{53,500}{67,000}$ x 100 = 79.8%

The transmitter is an RCA BTA-50F 50 kW transmitter.

5.0 ANTENNA EFFICIENCY AND HORIZONTAL PATTERNS:

5.1 Antenna Efficiency

The scale of the horizontal patterns was determined by two methods as follows:

5.1.1 Measurements were taken along a number of radials, eight for the daytime pattern and seven for the nighttime pattern. The results of these measurements were plotted (Figures 6 to 20 inclusive), and the resulting one mile unattenuated fields were then plotted (Figures 1, 2 and 3).

5.1.2 The unattenuated one mile field at Azimuth 358° was determined by running a radial while operating with the daytime pattern and an antenna power of 50 kW.

5.0 ANTENNA EFFICIENCY AND HORIZONTAL PATTERNS:

5.1.2 (Cont'd.)

This unattenuated field was found to be 3200 mV/m at one mile. It was found upon examination of the directional/non-directional ratio in the main lobe, together with the one mile field at 358° as determined above, that a size factor K of 1500 mV/m would result in a best fit in plotting the daytime horizontal pattern for the arc from 295° to 359.5°.

It was found upon examination of the shape of the non-directional radiation pattern, that there was some distortion present. To evaluate this distortion, a number of short radials were run on both day and night patterns, and it was found that three values of K were acquired. These values are as follows:

K = 1200 mV/m between azimuths 77° and 282°

K = 1500 mV/m between azimuths 295° and 359.5° and for azimuth 64.5°

K = 1700 mV/m between azimuths 7° and 54°

5.2 Derivation of the Directional Horizontal Patterns

The shape of the patterns shown in Figures 1, 2, and 3 were determined as follows:

Field Intensity Measurements were taken at various points for both directional and non-directional operation. These points were on radials at approximately 15 degree intervals, the distance from the array in all instances being at least ten times the spacing between the #3 and #6 towers. For each point the measured field intensities were expressed as a ratio and multiplied by the size factor K.

The resulting 50 kW directional unattenuated 1 mile field intensity was plotted (See Figures 1, 2 & 3), and the areas within the horizontal patterns were equated to equivalent circles, the radii of which are shown in Figures 1 and 2. The equivalent non-

5.0 ANTENNA EFFICIENCY AND HORIZONTAL PATTERNS:

5.2 Derivation of the Directional Horizontal Patterns (Cont'd.)

directional one mile field for 50 kW was found to be 1680 mV/m for the daytime pattern and 1345 mV/m for the nighttime pattern. On Figures 1, 2 and 3 the measured patterns are shown dashed, the solid lines are the theoretical patterns.

5.3 Sample Calculation

Point #1 - Azimuth 07°

Field Intensity - Daytime Directional = 460 mV/m
Field Intensity - Non-Directional = 250 mV/m
Directional/Non-Directional ratio = $\frac{460}{250}$ = 1.84

The 50 kW 1 mile field (unattenuated) at Point #1 = 1.84 x 1700 = 3128 mV/m.

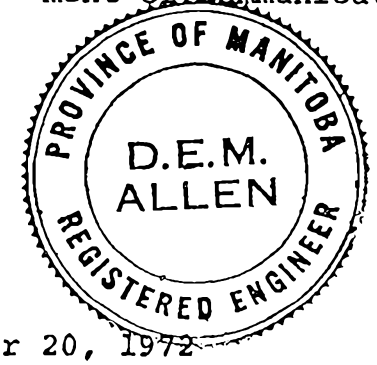
All measured values at each point for both patterns have been analyzed in the above manner.

6.0 FIELD INTENSITY MEASUREMENTS:

Field Intensity Measurements were taken with an RCA Type WX-2D Field Intensity Meter, Serial #1266, and a Nems Clarke Type 120E Field Intensity Meter, Serial #1309. All normal precautions were taken in regard to power lines, wire fences, etc.

7.0 QUALIFICATIONS AND SEAL:

The qualifications of the undersigned, who is responsible for the preparation of this Final Proof of Performance, are on file with the Department of Communications, Ottawa.



D. E. M. Allen, P. Eng.
Broadcast Consulting Engineer

October 20, 1972
Revised May 31, 1973

TABLE 1

ANTENNA SELF-IMPEDANCE DATA

Frequency (kHz)	Resistance (ohms)	Reactance (ohms)
	Tower #2 - Centre-East	
960	55	+j54
970	58	+j60
980	61	+j65
990	65	+j71
1000	69	+j76
1010	74	+j81
1020	79	+j87
1030	83	+j93

At 1010 kHz from Curves Z_{22} = 74 +j81 ohms

	Tower #3 - Centre-West	
960	58	+j67
970	62	+j72
980	67	+j78
990	71	+j82
1000	76	+j87
1010	80	+j93
1020	86	+j100
1030	92	+j107

At 1010 kHz from Curves Z_{33} = 81 +j94.5 ohms

(Continued on Page 12)

TABLE 1
(Continued)

ANTENNA SELF-IMPEDANCE DATA

Frequency (kHz)	Resistance (ohms)	Reactance (ohms)
	Tower #5 - Southwest	
960	83	-j240
970	75	-j226
980	68	-j211
990	62	-j200
1000	57	-j189
1010	52	-j177
1020	48	-j166
1030	44	-j154

At 1010 kHz from Curves Z_{55} = 52 -j177 ohms

	Tower #6 - Southeast	
960	85	-j242
970	77	-j227
980	70	-j214
990	63	-j202
1000	58	-j190
1010	53	-j178
1020	48.5	-j166
1030	44	-j154

At 1010 kHz from Curves Z_{66} = 53 -j178 ohms

TABLE 2

DIRECTIONAL/NON-DIRECTIONAL RATIO MEASUREMENTS

(Daytime)

Point No.	Azimuth (degrees)	Non-Directional Field Intensity (mV/m)	Directional Field Intensity (mV/m)	Directional Unattenuated 1 mile field (D/ND x K) (mV/m)
1	07	250	460	3128
2	16	320	580	3081
3	25.5	330	520	2678
4	33	240	365	2585
5	42.5	305	315	1755
6	54	560	380	1153
7	64.5	740	420	851
8	77	410	310	907
9	87	420	340	971
10	100	980	860	1053
11	108	890	710	957
12	122	420	315	900
13	137	420	260	743
14	147.5	320	225	844
15	161	290	180	745
16	170.5	290	190	786
17	178	305	130	511
18	186	290	120	496
19	193	160	92	690
20	199	130	115	1062
21	214	160	200	1500
22	226.5	120	190	1900
23	240	82	130	1902
24	254	165	210	1527
25	273	185	155	1005
26	282	180	155	1033
27	295	150	120	1200
28	305	200	200	1500
29	313.5	175	190	1629
30	321	300	380	1900
31	329	480	700	2187
32	343	360	670	2792
33	359.5	280	580	3107

NOTE: Because of the distorted shape of the non-directional reference, three different K factors were used:

K = 1200 between Azimuths 77° and 282°
K = 1500 between Azimuths 295° and 359.5° and for Azimuth 64.5°
K = 1700 between Azimuths 07° and 54°

TABLE 2 (Cont'd.)

DIRECTIONAL/NON-DIRECTIONAL RATIO MEASUREMENTS

(Nighttime)

Point No.	Azimuth (degrees)	Non-Directional Field Intensity (mV/m)	Directional Field Intensity (mV/m)	Directional Unattenuated 1 mile field (D/ND x K) (mV/m)
1	07	280	390	2370
2	16	360	580	2740
3	25.5	330	590	3040
4	33	300	540	3060
5	42.5	340	620	3100
6	54	630	1000	2700
7	64.5	540	760	2110
8	77	410	420	1230
9	87	420	210	600
10	100	980	170	209
11	108	890	185	249
12	122	460	90	235
13	137	460	44	115
14	147.5	500	80	192
15	161	360	64	214
16	170.5	190	30	189
17	178	305	49	193
18	186	230	62	324
19	193	160	72	540
20	199	140	72	618
21	214	130	54	500
22	226.5	120	27	270
23	240	105	45	514
24	254	160	85	637
25	273	190	67	423
26	282	225	45	240
27	295	150	10	100
28	305	200	12	90
29	313.5	175	7	60
30	321	300	33	165
31	329	480	150	468
32	343	360	270	1125
33	359.5	280	380	2030

NOTE: Because of the distorted shape of the non-directional reference, three different K factors were used:

K = 1200 between Azimuths 77° and 282°
K = 1500 between Azimuths 295° and 359.5° and for Azimuth 64.5°
K = 1700 between Azimuths 07° and 54°

TABLE 3

FIELD INTENSITY MEASUREMENTS

50 kW Directional

RADIAL #1 AZIMUTH 38°

Point No.	Distance (miles)	Field Intensity (mV/m) Day	Night
101	1.0	2200	3300
102	1.1	1980	3000
103	1.2	1650	2550
104	1.3	1600	2470
105	1.4	1500	2400
106	1.5	1400	2240
107	1.6	1600	2490
108	1.7	1300	1950
109	1.8	900	1390
110	1.9	930	1620
111	2.0	910	1490
112	2.55	740	1100
113	3.1	660	1030
114	3.6	540	843
115	3.85	395	605
116	4.5	320	493
117	5.0	370	570
118	5.5	275	430
119	6.0	290	445
120	7.15	225	360
121	8.2	200	308
122	9.15	150	238
123	10.0	155	245
124	12.2	130	205
125	14.7	69	107
126	17.4	63	98
127	20.2	20	33
128	23.2	21	27.2
129	26.8	8.1	12.7
130	30.6	6.9	9.7
131	34.4	6.5	10.2
132	38.0	5.3	8.6
133	41.0	4.2	6.4
134	45.3	2.0	3.1
135	49.2	1.75	2.8
136	54.7	1.75	2.7
137	65.0	1.50	2.3
138	72.0	1.2	1.9
139	84.5	.49	.76
140	95.7	.41	.65
141	126.0	.090	.141

TABLE 4

FIELD INTENSITY MEASUREMENTS

Daytime Pattern

50 kW Directional

RADIAL #2 AZIMUTH 121.5°

Point No.	Distance (miles)	Field Intensity (mV/m)
201	1.0	1000
202	1.1	892
203	1.2	782
204	1.3	664
205	1.55	755
206	1.63	746
207	1.65	728
208	1.77	700
209	1.9	683
210	1.96	655
211	2.03	618
212	2.11	582
213	2.16	551
214	2.25	528
215	2.4	446
216	2.65	387
217	3.14	273
218	3.76	223

TABLE 5

FIELD INTENSITY MEASUREMENTS

50 kW Directional

RADIAL #3 AZIMUTH 145°

Point No.	Distance (miles)	Field Intensity (mV/m) Day	Night
301	1.0	600	105
302	1.1	790	130
303	1.2	575	95
304	1.3	585	100
305	1.4	425	72
306	1.5	425	70
307	1.72	495	86
308	1.76	475	80
309	1.79	515	84
310	1.85	495	83
311	1.9	470	79
312	1.96	445	76
313	2.04	415	69
314	2.13	375	64
315	2.27	335	55
316	2.4	305	50
317	2.56	255	44
318	2.84	200	34
319	3.08	180	30
320	3.42	160	27
321	3.75	135	22
322	4.25	140	23
323	4.6	120	20
324	27.5	12	2.2
325	30.6	8.0	1.7
326	34.0	8.4	1.6
327	37.7	6.9	1.5
328	42.3	5.2	.64
329	47.0	4.2	.96
330	53.0	3.7	.4

TABLE 6

FIELD INTENSITY MEASUREMENTS

50 kW Directional

RADIAL #4 AZIMUTH 190°

Point No.	Distance (miles)	Field Intensity (mV/m) Day	Night
401	1.0	645	415
402	1.1	520	325
403	1.2	415	280
404	1.3	430	265
405	1.4	385	255
406	1.5	375	250
407	1.6	350	235
408	1.7	340	220
409	1.8	330	210
410	1.9	320	205
411	2.0	295	190
412	2.1	290	185
413	2.4	220	140
414	2.45	185	150
415	3.0	120	92
416	3.11	115	88
417	3.3	110	85
418	3.48	115	88
419	3.7	105	78
420	3.92	85	63
421	4.18	70	48
422	4.36	85	57
423	4.95	80	55
424	19.2	16.5	9.1
425	21.1	10	9.4
426	25.0	12	8.2
427	27.5	11	5.7
428	30.3	9.8	6.8
429	34.2	6.6	4.5
430	37.2	5.3	4.5
431	40.8	3.9	3.0
432	45.5	2.9	2.3

TABLE 7

FIELD INTENSITY MEASUREMENTS

50 kW Directional

RADIAL #5 AZIMUTH 220°

Point No.	Distance (miles)	Field Intensity (mV/m) Day	Night
501	1.0	1900	240
502	1.1	1900	317
503	1.2	1620	225
504	1.3	1480	260
505	1.4	1420	258
506	1.5	1230	204
507	1.6	1180	210
508	1.7	1100	193
509	1.8	1080	196
510	1.9	1030	184
511	2.0	890	170
512	3.0	530	85
513	3.5	455	79
514	4.0	400	73
515	4.5	342	72
516	5.0	335	56
517	5.5	240	45
518	6.0	258	46
519	7.0	180	33
520	8.0	125	22
521	9.0	138	32
522	10.0	115	25
523	12.3	105	18
524	15.7	52	9
525	19.3	38	6
526	23.0	28.5	4.9
527	26.9	21.5	3.9
528	32.0	13.5	2.3
529	38.1	7.8	1.3
530	45.4	6.4	1.15
531	55	3.4	.59
532	64.8	1.25	.22
533	77.5	.78	.13
534	81.4	.63	.11

TABLE 8

FIELD INTENSITY MEASUREMENTS

50 kW Directional

RADIAL #6 AZIMUTH 260°

Point No.	Distance (miles)	Field Intensity (mV/m) Day	Night
601	1.0	1450	880
602	1.1	1450	760
603	1.2	1280	660
604	1.3	1100	610
605	1.4	1025	600
606	1.5	960	520
607	1.6	880	490
608	1.7	810	445
609	1.8	790	450
610	1.9	750	390
611	2.0	700	380
612	2.25	570	340
613	2.7	430	250
614	4.2	285	170
615	4.88	235	120
616	5.8	205	110
617	7.5	165	76
618	8.3	105	55
619	10.0	100	53
620	13.0	64	36
621	16.3	40	21
622	18.6	13	7.5
623	22.2	12.5	6.8
624	26.9	5.8	3.0
625	33.4	4.8	2.7
626	38.3	3.2	1.9
627	45.7	2.2	1.15
628	54.2	1.7	.95
629	63.7	1.5	.84
630	73.8	1.25	.73
631	83.3	.85	.45
632	101.5	.55	.30
633	120.8	.42	.23

TABLE 9

FIELD INTENSITY MEASUREMENTS

50 kW Directional

RADIAL #7 AZIMUTH 303°

Point No.	Distance (miles)	Field Intensity (mV/m) Day	Night
701	1.0	2400	340
702	1.1	1100	235
703	1.18	1030	145
704	1.3	795	185
705	1.4	710	150
706	1.49	680	98
707	1.6	670	115
708	1.7	620	89
709	1.8	600	105
710	1.9	655	94
711	2.0	500	72
712	2.7	415	56
713	3.55	322	46
714	4.05	260	37
715	4.5	252	19
716	5.3	220	31
717	6.2	160	15.5
718	7.4	120	17
719	9.3	105	14.5
720	10.0	77	11
721	12.3	56	8.5
722	15.2	44	5.6
723	17.7	24	3.5
724	21.5	16	2.3
725	28.3	9.3	1.3
726	35.6	4.4	.63
727	43.4	3.9	.56
728	50.2	2.8	.4
729	57.0	1.7	.24
730	68.6	.87	.11
731	77.3	.61	.085
732	89.1	.43	.06
733	93.3	.32	.045
734	94.4	.35	.05
735	108.0	.37	.054

TABLE 10

FIELD INTENSITY MEASUREMENTS

50 kW Directional

RADIAL #8 AZIMUTH 358°

Point No.	Distance (miles)	Field Intensity (mV/m) Day	Night
801	1.0	2710	1750
802	1.1	2280	1560
803	1.2	2350	1520
804	1.3	1940	1300
805	1.4	2230	1550
806	1.5	2180	1410
807	1.6	1840	1220
808	1.7	1890	1200
809	1.79	1300	850
810	1.9	1570	980
811	2.0	1550	920
812	2.5	1110	740
813	3.2	795	560
814	3.65	740	470
815	4.15	710	440
816	5.0	530	340
817	5.5	500	320
818	6.0	445	260
819	7.8	260	170
820	8.8	250	165
821	10.0	190	120
822	11.1	165	105
823	13.8	135	87
824	15.0	115	75
825	16.8	100	58
826	18.3	100	56
827	20.8	73	43
828	23.2	65	41
829	26.2	42.5	27
830	28.8	37.5	24
831	32.7	24	15.5
832	35.5	22	13.5
833	39.7	18	11.5

(Continued on Page 24)

TABLE 10
(Continued)

Point No.	Distance (miles)	Field Intensity (mV/m) Day	Night
834	44	14.5	9.3
835	49.5	7.4	4.7
836	54.0	6.5	4.0
837	58.4	3.9	2.5
838	59.8	3.1	1.9
839	62.6	3.2	2.1
840	67.8	3.0	1.95
841	74.7	.92	.59
842,	82.3	.79	.5
843	88.7	.48	.32
844	102.2	.32	.2
845	111.9	.26	.16
846	123.0	.20	.13
847	132.3	.24	.15

ADDENDUM

TO THE FINAL PROOF OF PERFORMANCE

CFRB TORONTO ONTARIO

In reviewing certain sections of the Final Proof of Performance dated October 20, 1972, the need for more detailed explanations has been considered in relation to two points.

Point #1

Shape of the daytime directional radiation pattern:

The original polar plot, Figure 1, dated October 20, 1972, exhibited a distortion of the minima centred on Azimuth 70°.

Steps were taken to readjust the daytime array, and the resulting daytime horizontal radiation pattern is shown in Figure 1, Revised May 31, 1973.

Point #2

Explanation of the Phase Monitor Readings shown on Page 6 of the Final Proof of Performance of CFRB dated October 20, 1972 (Project #1707), Revised May 31, 1973:

There is a wide discrepancy between the theoretical phases and the measured phases of 5M and 6M.

Using Tower #2 as the reference tower, the sampling lines to 5M and 6M are 164° longer at 1010 kHz. This additional length is due to the fact that the loops at 5M and 6M are mounted at the current loops on these tall towers, and there is an additional length of line used to form an isolation coil at the base of these two tall towers. The length difference was measured electrically to be 164°.

(Cont'd.) on page 25

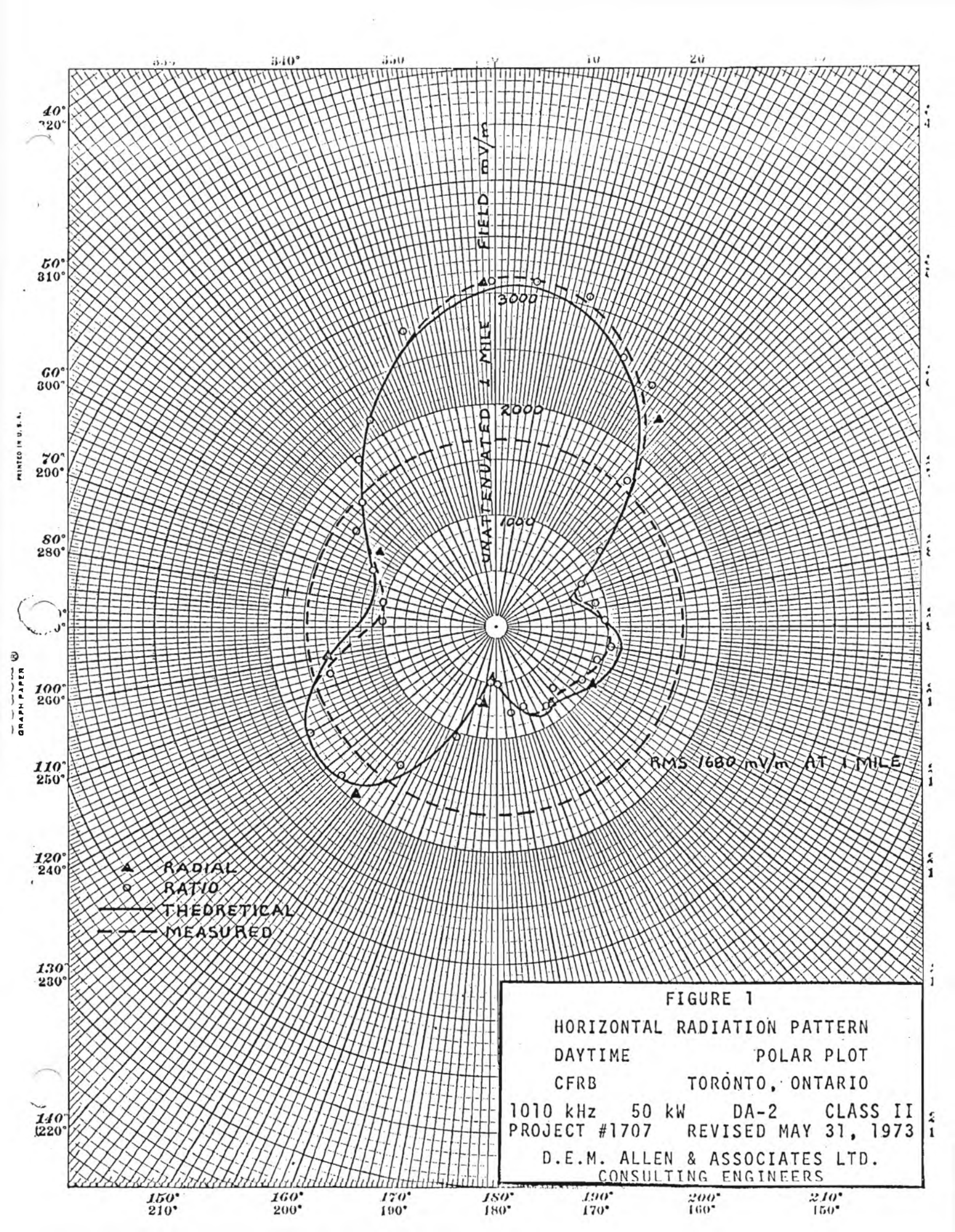
ADDENDUM

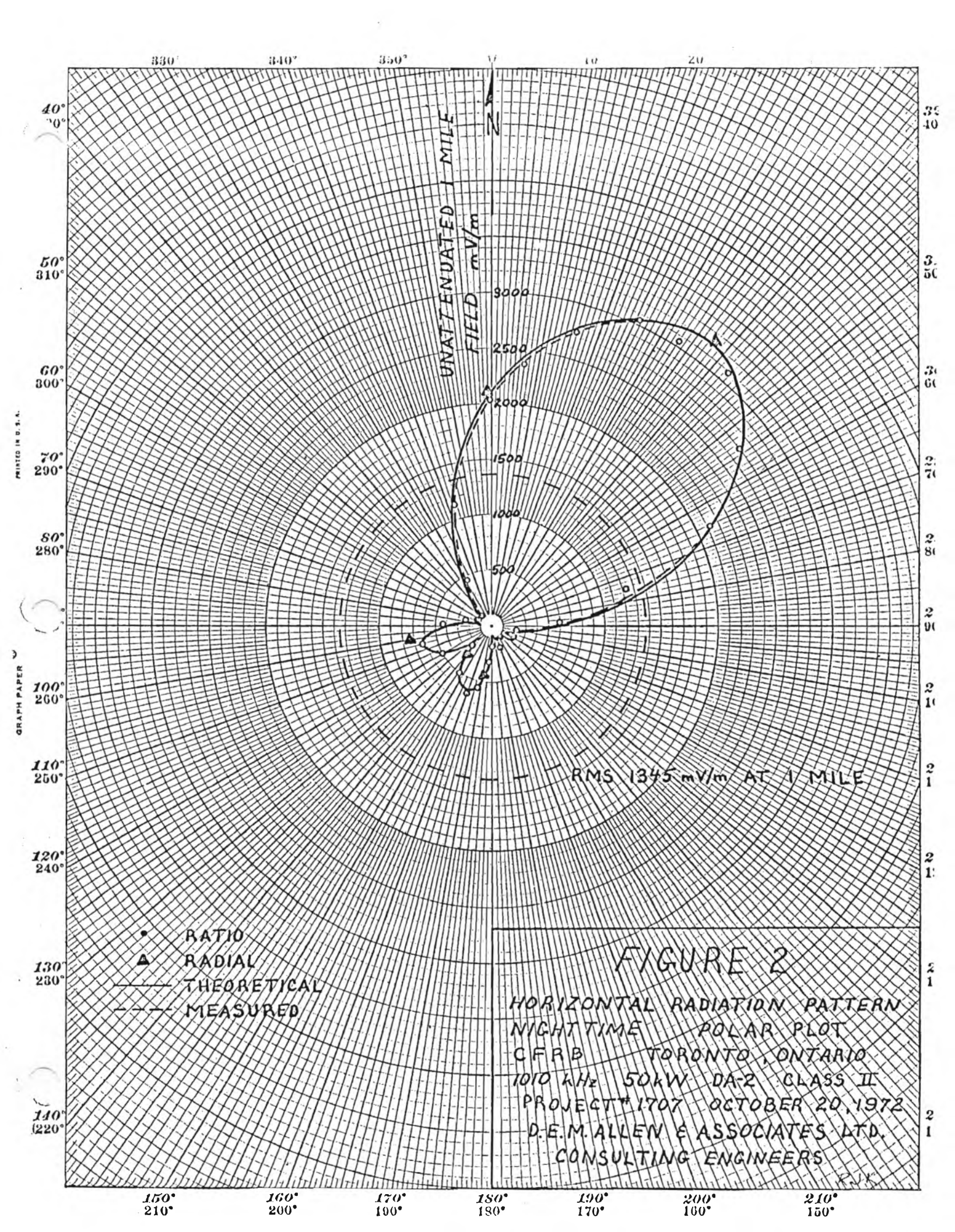
Point #2 (Cont'd.)

Therefore, if we want to determine the actual current phase at the current loops on Towers #5 and #6, we should add +164° to the 5M and 6M readings tabulated on Page 6, and compare this value with the Theoretical Phase.

The table on the next page provides this information.

Tower	Phase Monitor Reading	Correction due to Sampling Line Length	Current Phase At Loop	Theoretical Field Phase
Daytime				
#2 Centre East Base Loop	0°	0°	0°	0°
#5M Southwest Middle Loop	-148.8°	+164°	+15.2°	+10°
#6M Southeast Middle Loop	-80.1°	+164°	+83.9°	+75°
Nighttime				
#2 Centre East Base Loop	0°	0°	0°	0°
#3 Centre West Base Loop	-1.3°	0°	-1.3°	-6.8°
#5M Southwest Middle Loop	-103.1°	+164°	+60.9°	+59.2°
#6M Southeast Middle Loop	-95.7°	+164°	+68.3°	+64.2°


FIELD mV/m
UNATTENUATED 1 MILE
3000
2000
1000
RMS 1680 mV/m AT 1 MILE
RADIAL
RATIO
THEORETICAL
MEASURED
FIGURE 1
HORIZONTAL RADIATION PATTERN
DAYTIME POLAR PLOT
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1707 REVISED MAY 31, 1973
D.E.M. ALLEN & ASSOCIATES LTD.
CONSULTING ENGINEERS


330°
340°
350°
N
10
20
40°
50°
310°
60°
300°
70°
290°
80°
280°
100°
260°
110°
250°
120°
240°
130°
230°
140°
220°
150°
210°
160°
200°
170°
190°
180°
UNATTENUATED 1 MILE FIELD mV/m
9000
2500
2000
1500
1000
500
RMS 1345 mV/m AT 1 MILE
RATIO
RADIAL
THEORETICAL
MEASURED
FIGURE 2
HORIZONTAL RADIATION PATTERN
NIGHTTIME POLAR PLOT
CFRB TORONTO, ONTARIO
1010 kHz 50kW DA-2 CLASS II
PROJECT# 1707 OCTOBER 20, 1972
D.E.M. ALLEN & ASSOCIATES LTD.
CONSULTING ENGINEERS
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GRAPH PAPER

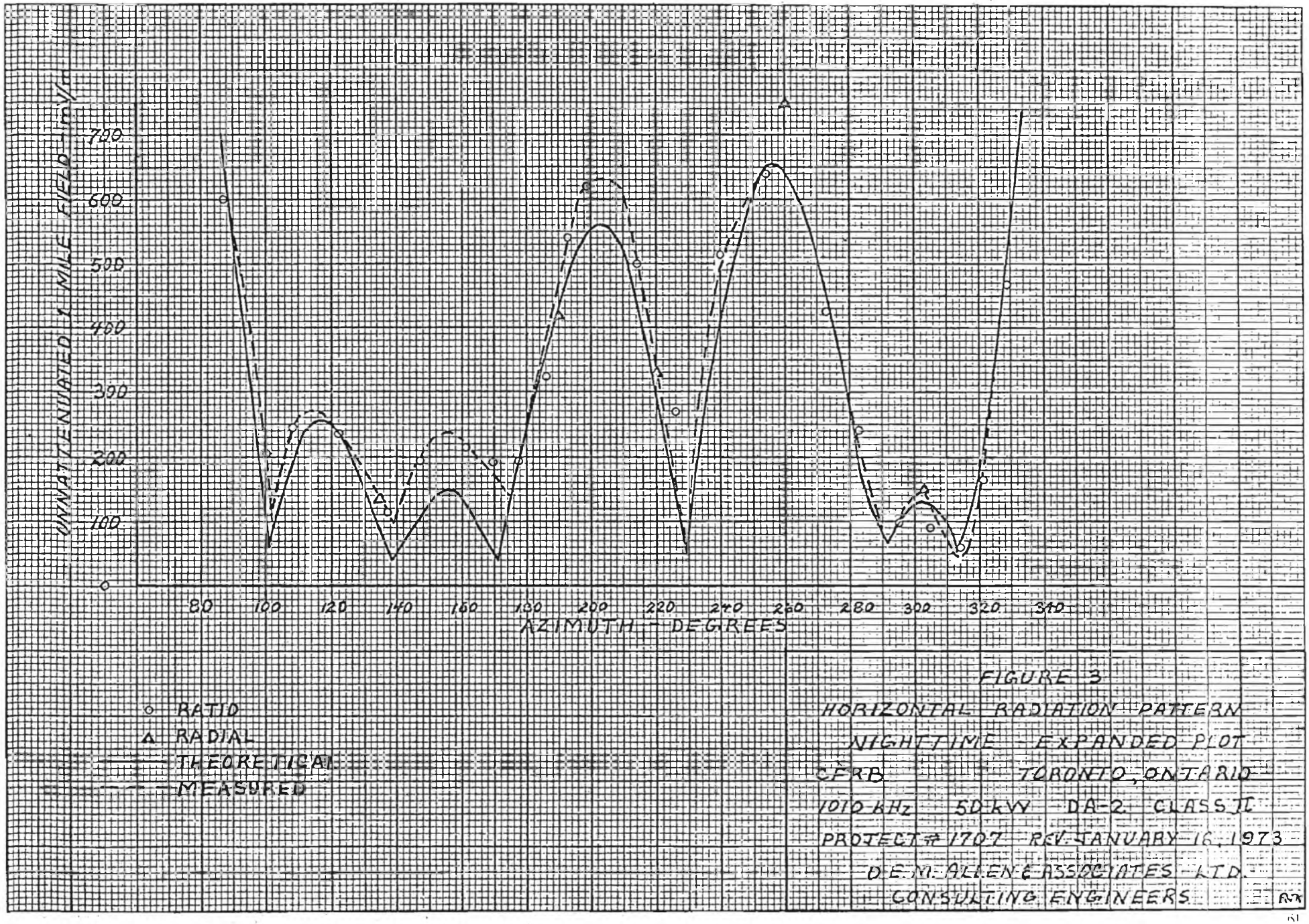

FIGURE 3
HORIZONTAL RADIATION PATTERN
NIGHTTIME EXPANDED PLOT
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT # 1707 REV. JANUARY 16, 1973
D. E. M. ALLEN & ASSOCIATES LTD.
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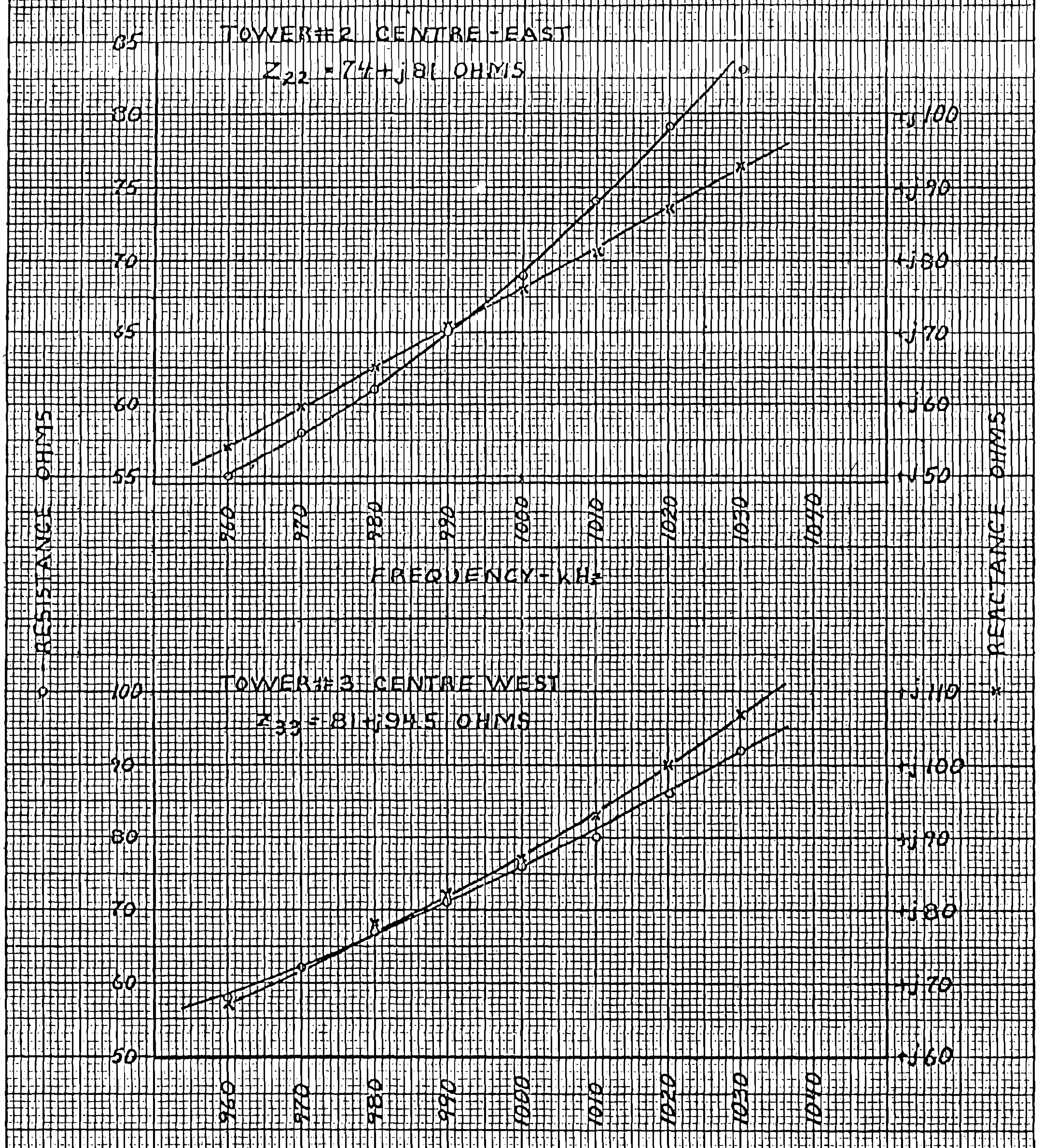

FIGURE 4

SELF-IMPEDANCE CHARACTERISTICS

CFRB TORONTO ONTARIO

1010 kHz 50 kW DA-2 CLASS II

PROJECT # 1707 OCTOBER 20, 1972

D.E.M. ALLEN & ASSOCIATES LTD.
CONSULTING ENGINEERS

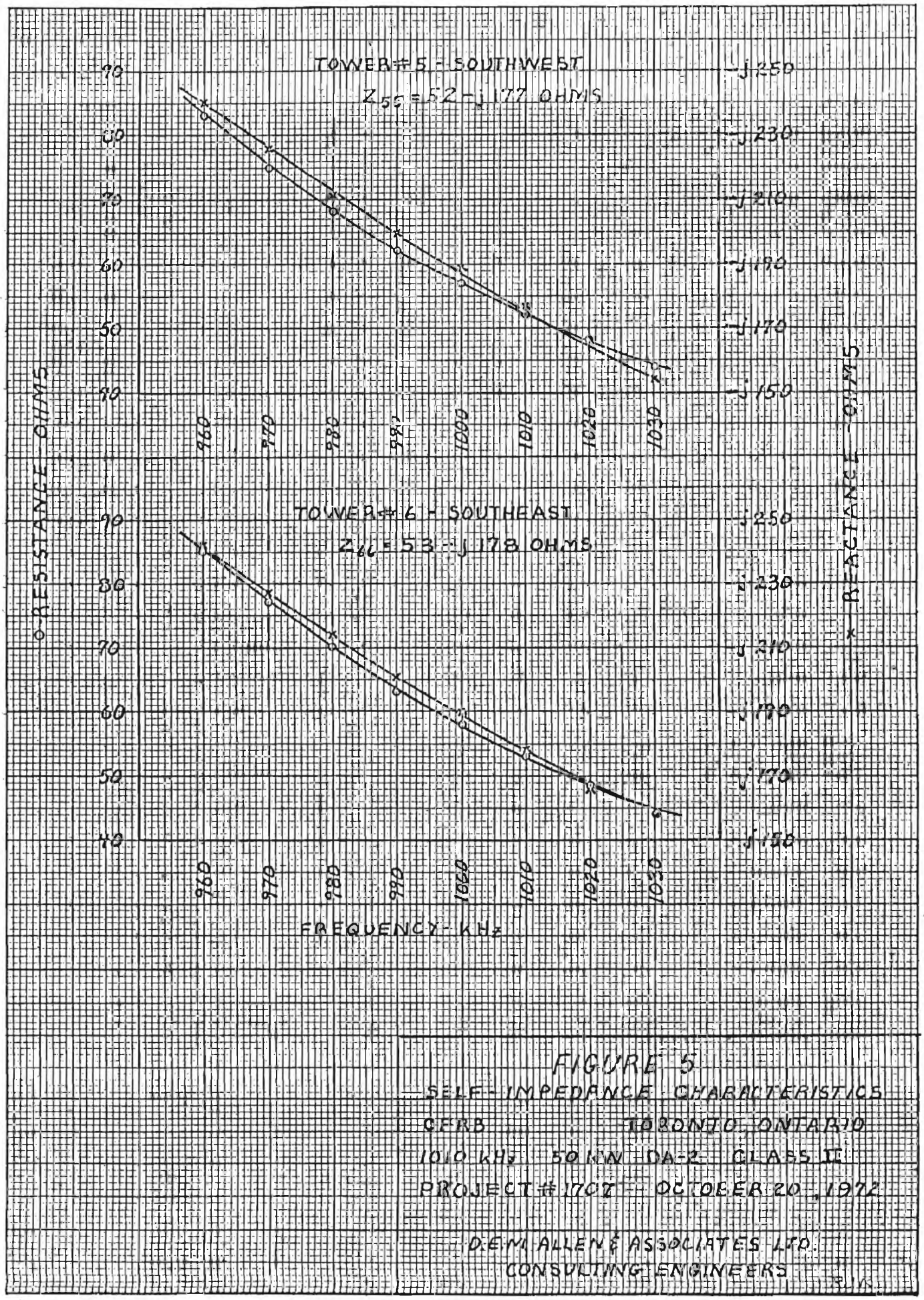

FIGURE 5

SELF - IMPEDANCE CHARACTERISTICS

CFRB TORONTO, ONTARIO

1010 kHz 50 kW DA-2 CLASS II

PROJECT #1707 - OCTOBER 20, 1972

D.E.M. ALLEN & ASSOCIATES LTD.

CONSULTING ENGINEERS

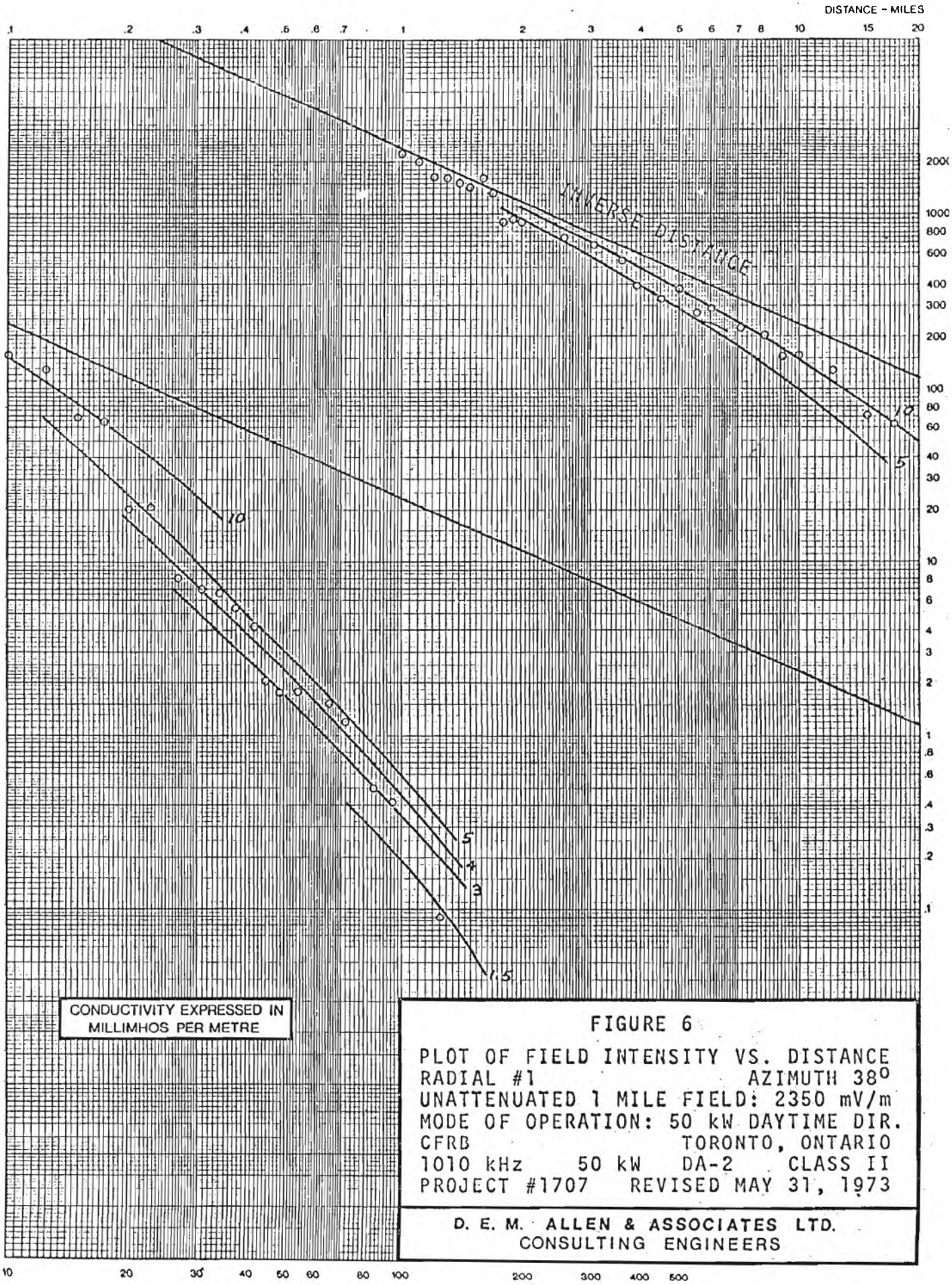

FIGURE 6

PLOT OF FIELD INTENSITY VS. DISTANCE
RADIAL #1 AZIMUTH 38°
UNATTENUATED 1 MILE FIELD: 2350 mV/m
MODE OF OPERATION: 50 kW DAYTIME DIR.
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1707 REVISED MAY 31, 1973

D. E. M. ALLEN & ASSOCIATES LTD.
CONSULTING ENGINEERS

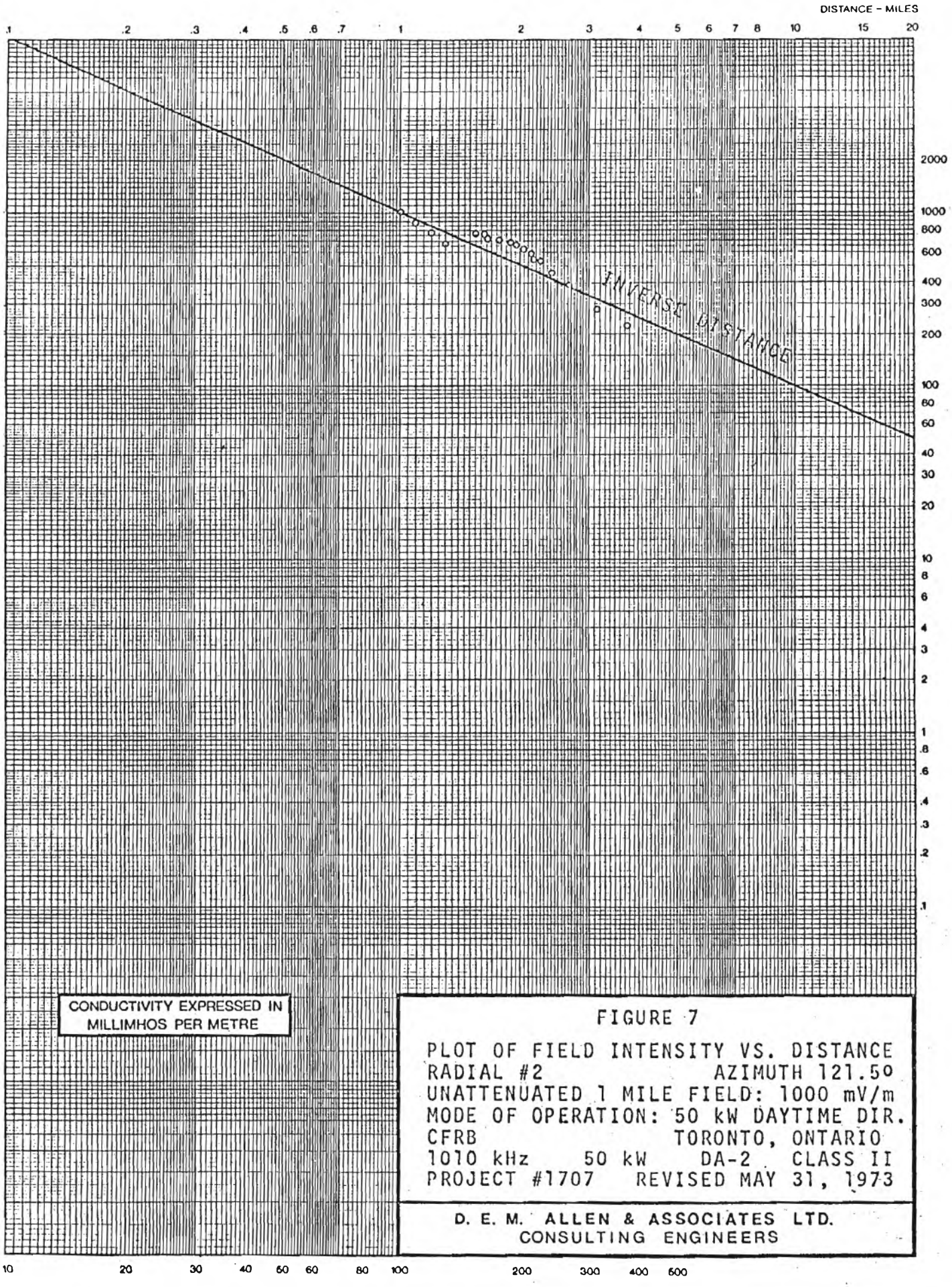

FIGURE 7

PLOT OF FIELD INTENSITY VS. DISTANCE
RADIAL #2 AZIMUTH 121.5°
UNATTENUATED 1 MILE FIELD: 1000 mV/m
MODE OF OPERATION: 50 kW DAYTIME DIR.
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1707 REVISED MAY 31, 1973

D. E. M. ALLEN & ASSOCIATES LTD.
CONSULTING ENGINEERS

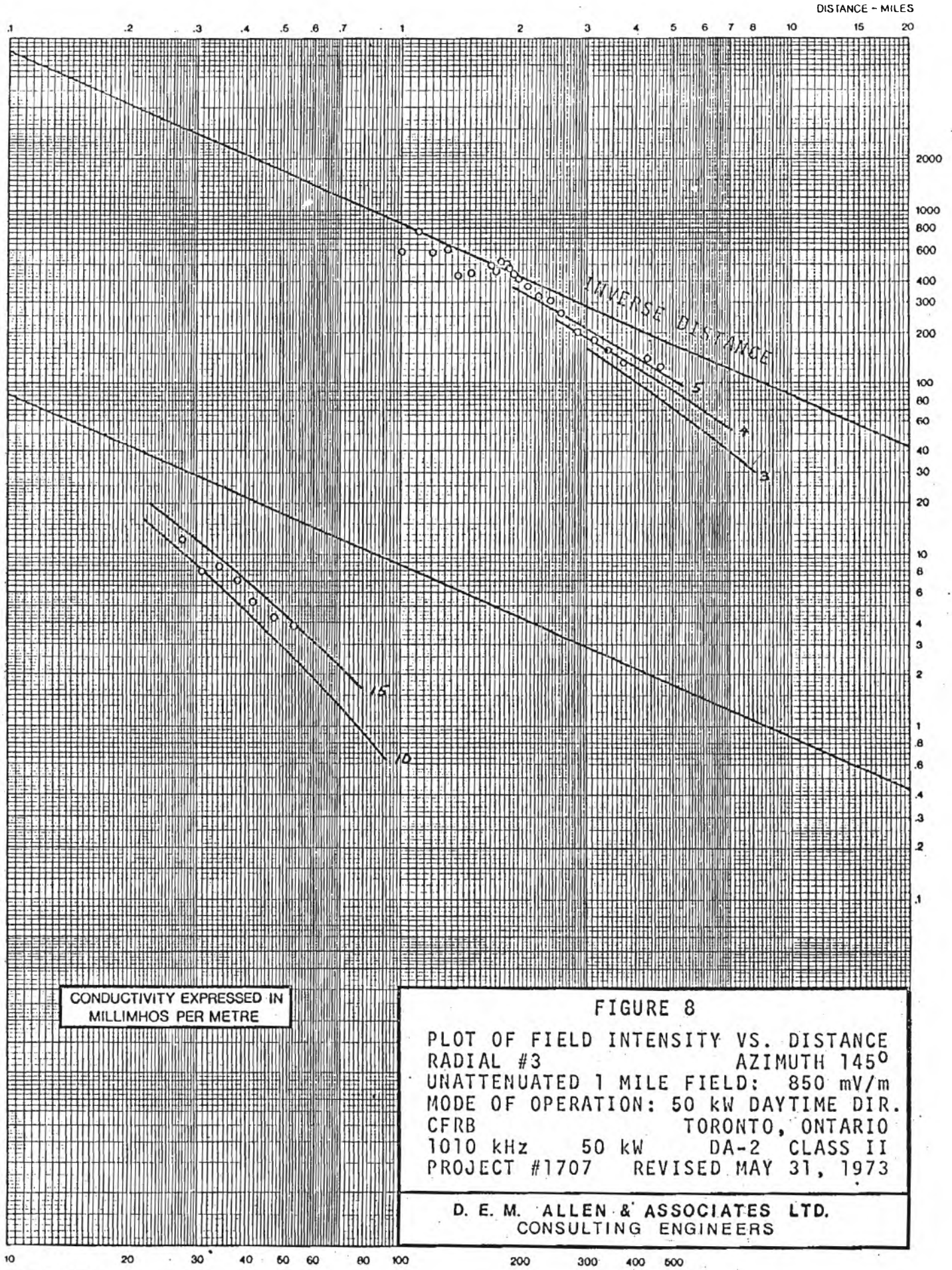

FIGURE 8

PLOT OF FIELD INTENSITY VS. DISTANCE
RADIAL #3 AZIMUTH 145°
UNATTENUATED 1 MILE FIELD: 850 mV/m
MODE OF OPERATION: 50 kW DAYTIME DIR.
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1707 REVISED MAY 31, 1973

D. E. M. ALLEN & ASSOCIATES LTD.
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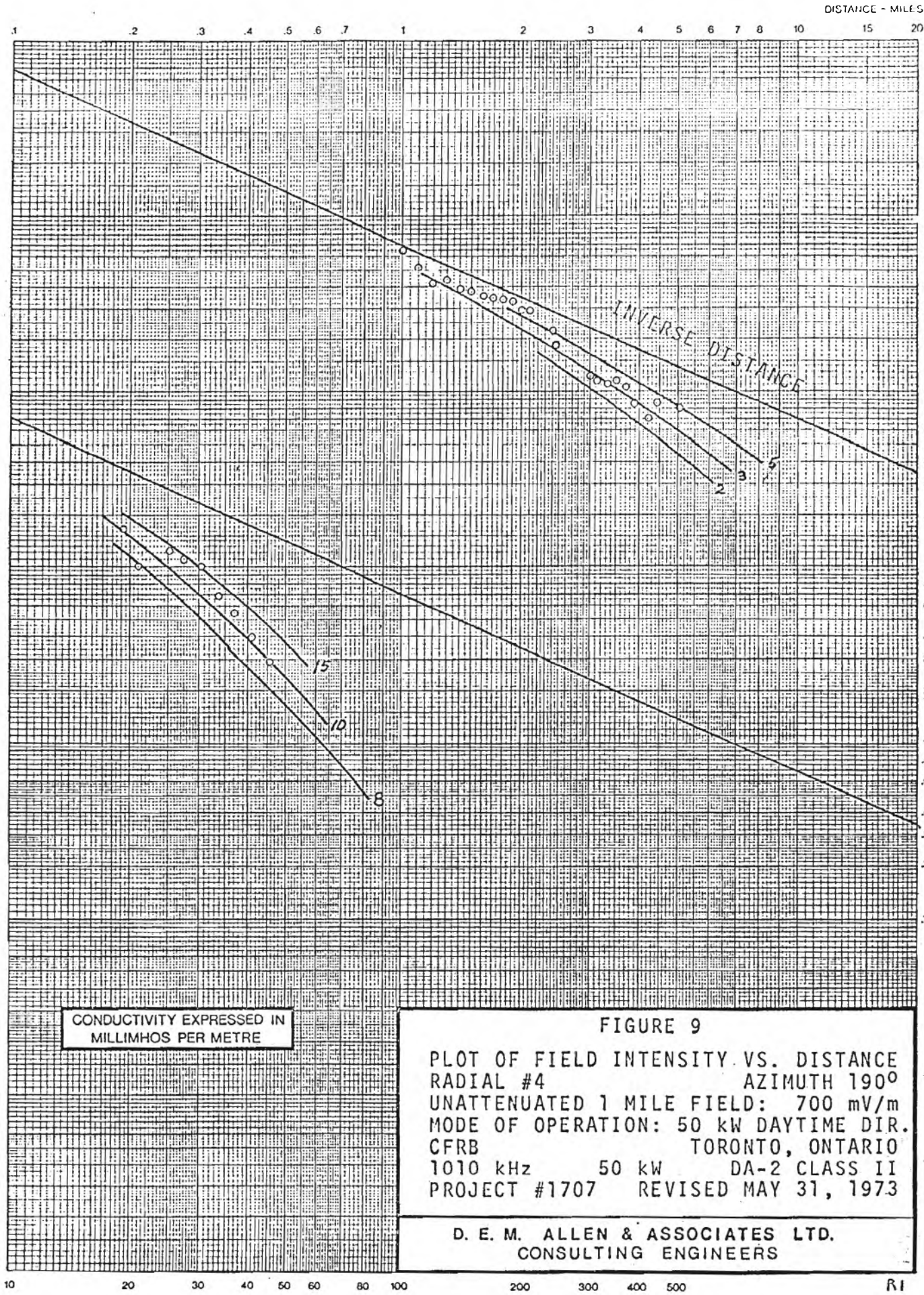

FIGURE 9

PLOT OF FIELD INTENSITY VS. DISTANCE
RADIAL #4 AZIMUTH 190°
UNATTENUATED 1 MILE FIELD: 700 mV/m
MODE OF OPERATION: 50 kW DAYTIME DIR.
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1707 REVISED MAY 31, 1973

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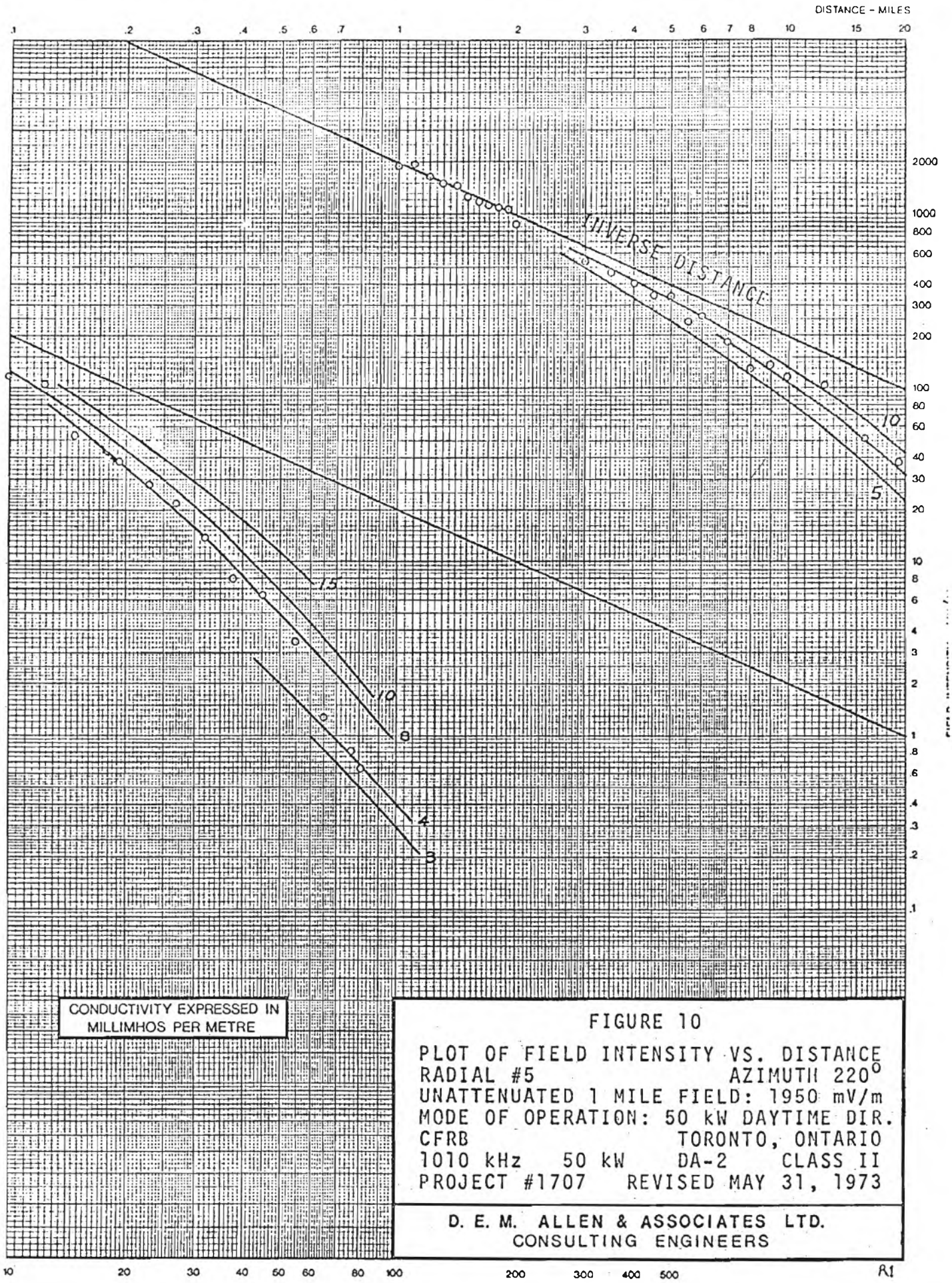

FIGURE 10

PLOT OF FIELD INTENSITY VS. DISTANCE
RADIAL #5 AZIMUTH 220°
UNATTENUATED 1 MILE FIELD: 1950 mV/m
MODE OF OPERATION: 50 kW DAYTIME DIR.
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1707 REVISED MAY 31, 1973

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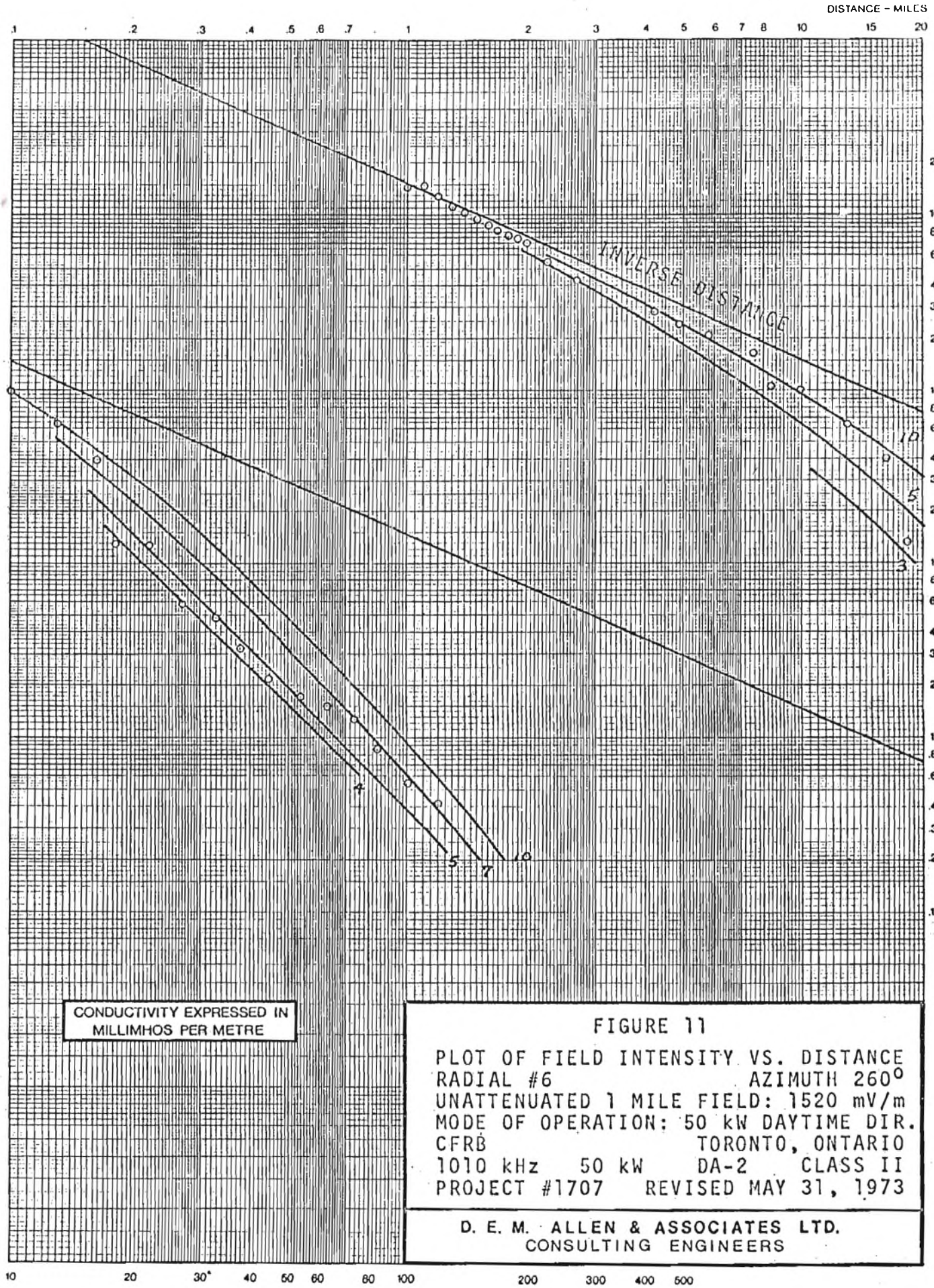

FIGURE 11

PLOT OF FIELD INTENSITY VS. DISTANCE
RADIAL #6 AZIMUTH 260°
UNATTENUATED 1 MILE FIELD: 1520 mV/m
MODE OF OPERATION: 50 kW DAYTIME DIR.
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1707 REVISED MAY 31, 1973

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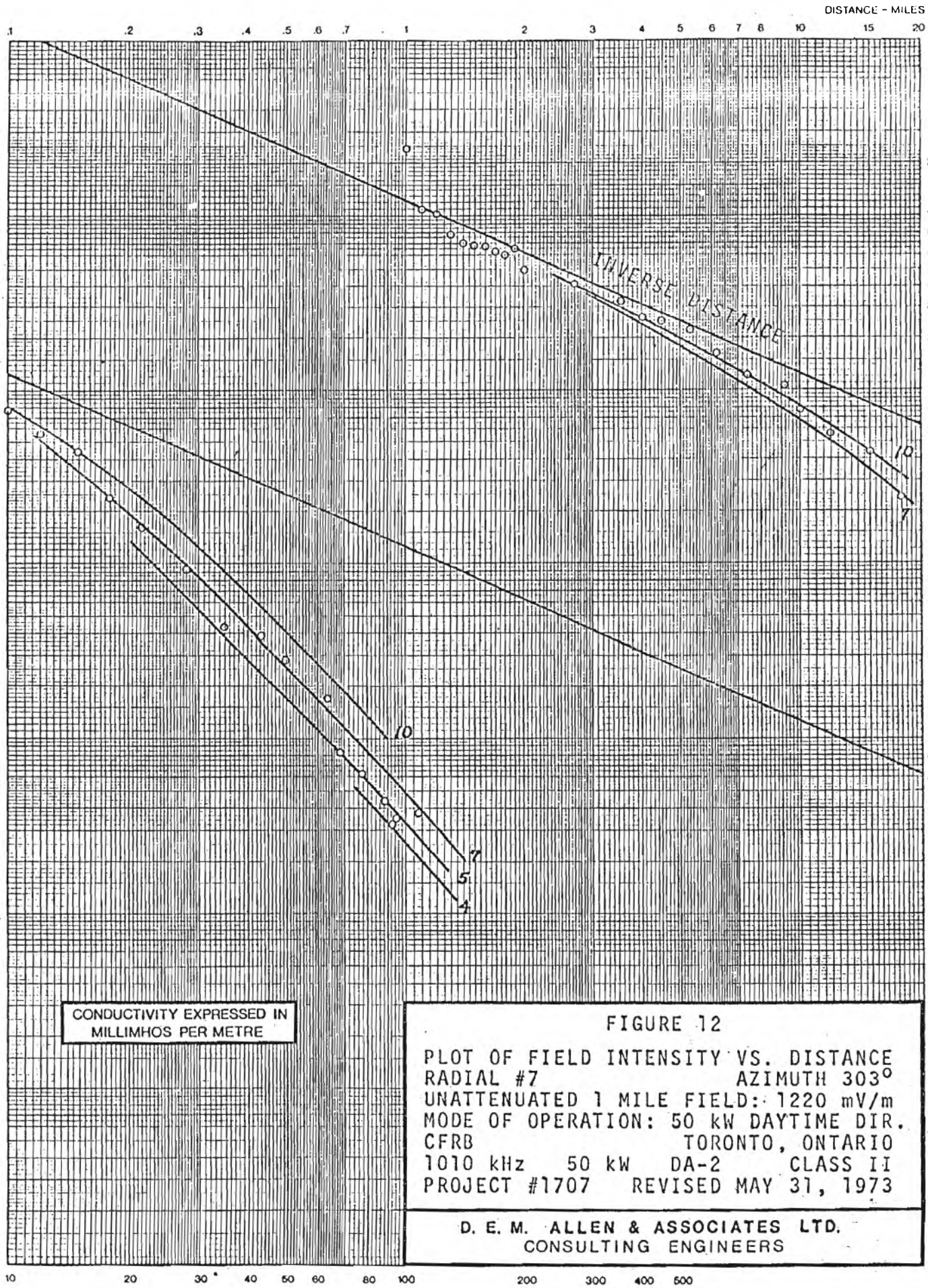

FIGURE 12

PLOT OF FIELD INTENSITY VS. DISTANCE
RADIAL #7 AZIMUTH 303°
UNATTENUATED 1 MILE FIELD: 1220 mV/m
MODE OF OPERATION: 50 kW DAYTIME DIR.
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1707 REVISED MAY 31, 1973

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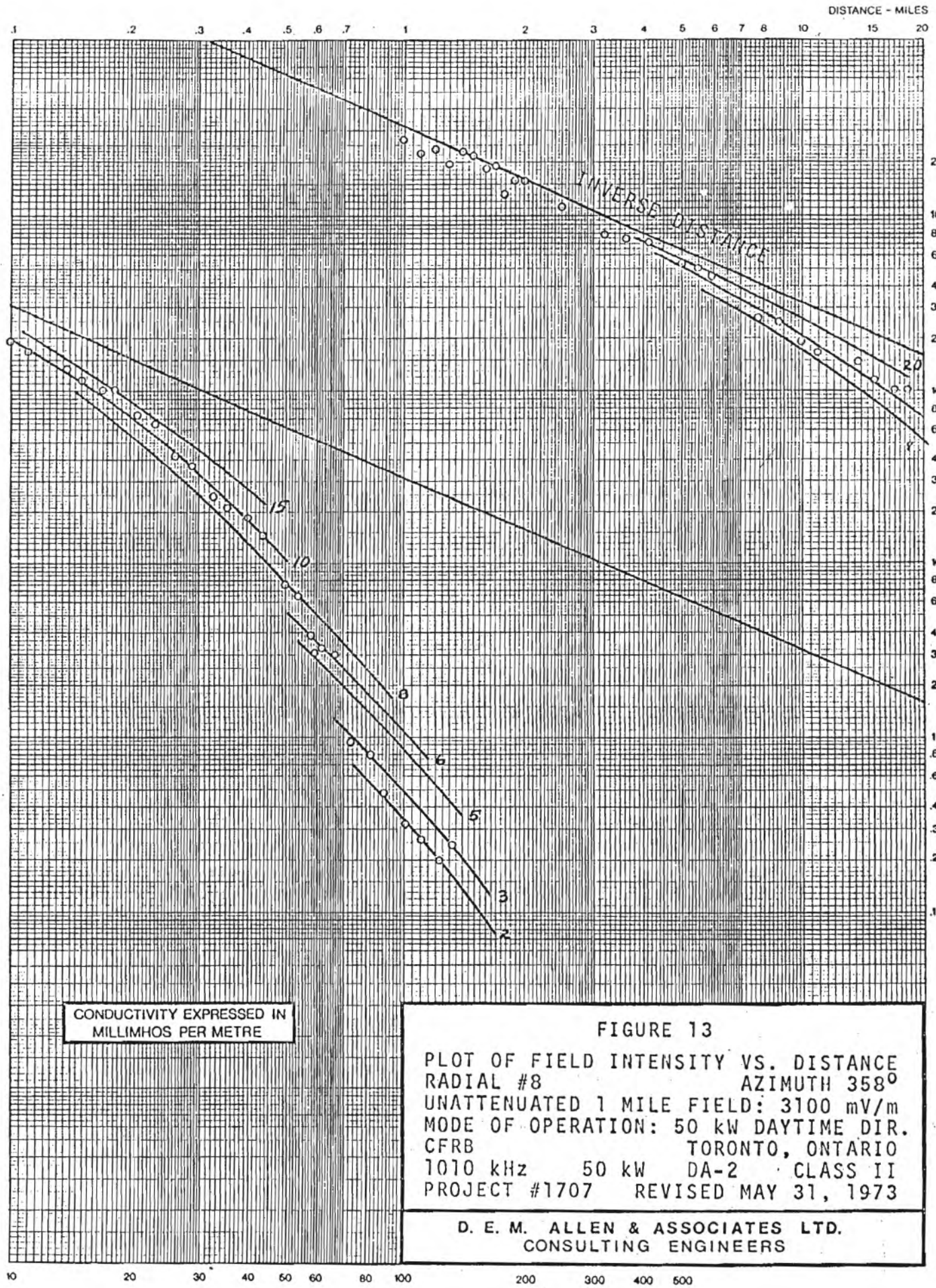

FIGURE 13

PLOT OF FIELD INTENSITY VS. DISTANCE
RADIAL #8 AZIMUTH 358°
UNATTENUATED 1 MILE FIELD: 3100 mV/m
MODE OF OPERATION: 50 kW DAYTIME DIR.
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1707 REVISED MAY 31, 1973

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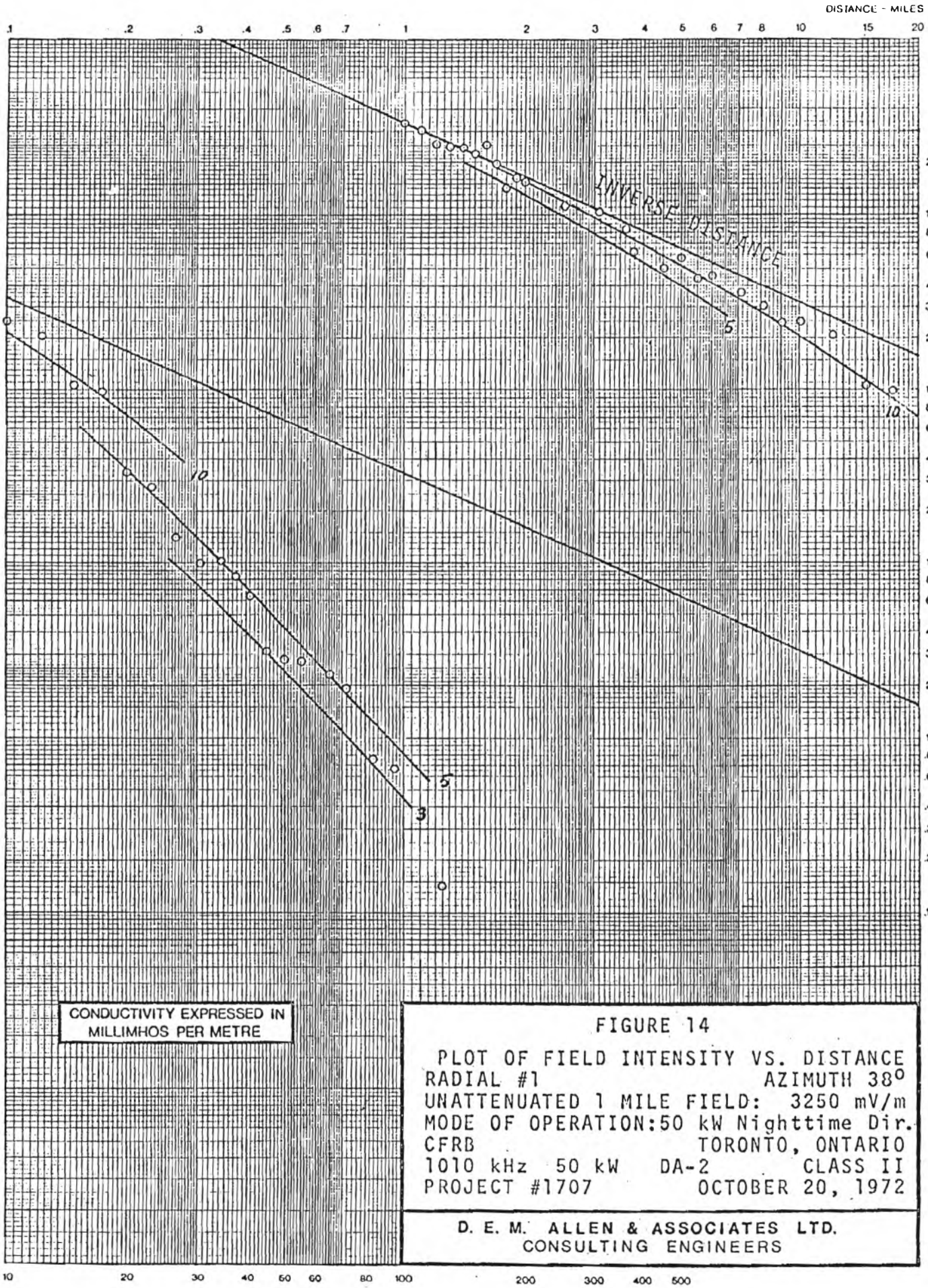

CONDUCTIVITY EXPRESSED IN MILLIMHOS PER METRE

FIGURE 14

PLOT OF FIELD INTENSITY VS. DISTANCE
RADIAL #1 AZIMUTH 38°
UNATTENUATED 1 MILE FIELD: 3250 mV/m
MODE OF OPERATION: 50 kW Nighttime Dir.
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1707 OCTOBER 20, 1972

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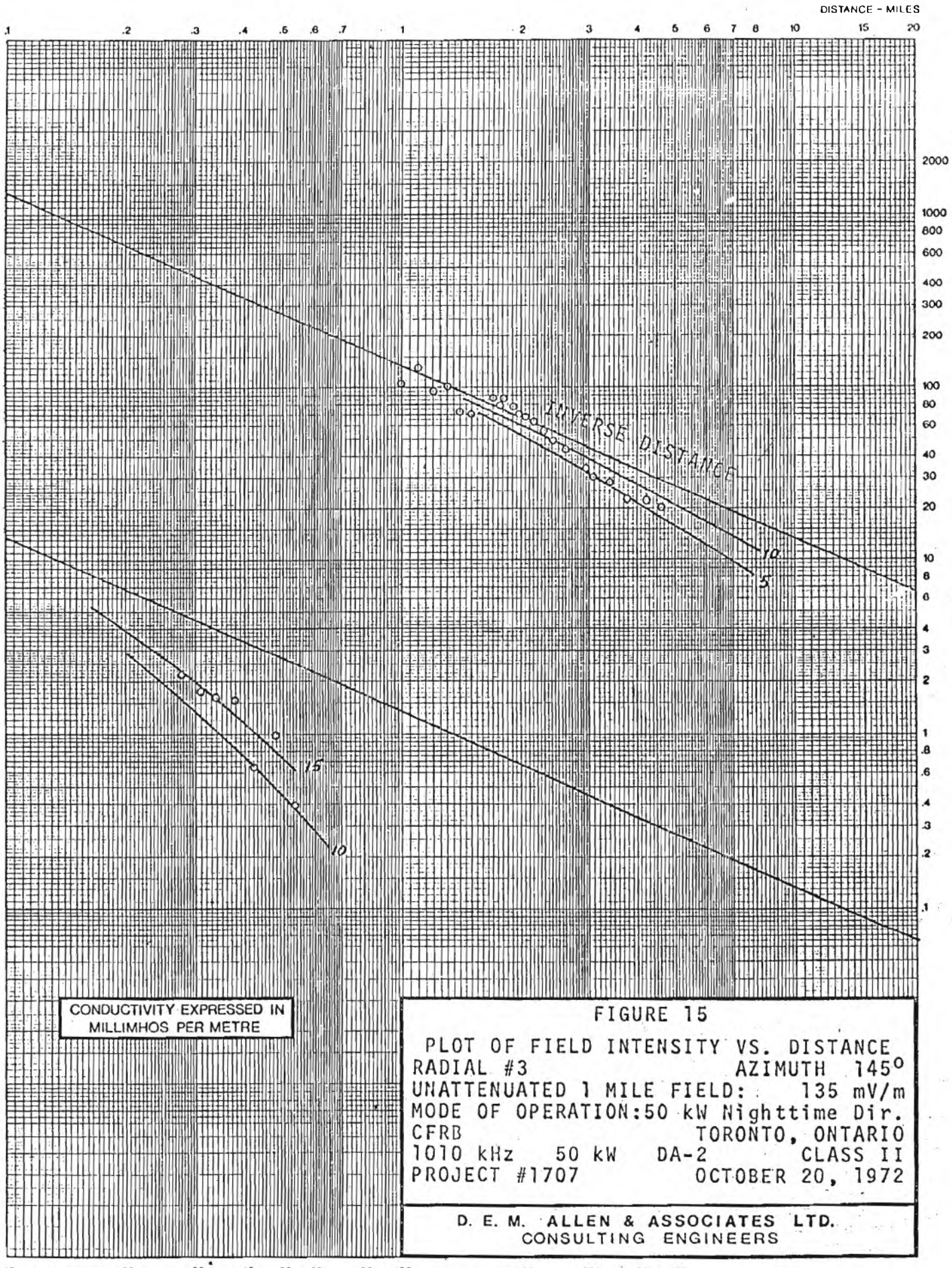

FIGURE 15

PLOT OF FIELD INTENSITY VS. DISTANCE
RADIAL #3 AZIMUTH 145°
UNATTENUATED 1 MILE FIELD: 135 mV/m
MODE OF OPERATION: 50 kW Nighttime Dir.
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1707 OCTOBER 20, 1972

D. E. M. ALLEN & ASSOCIATES LTD.
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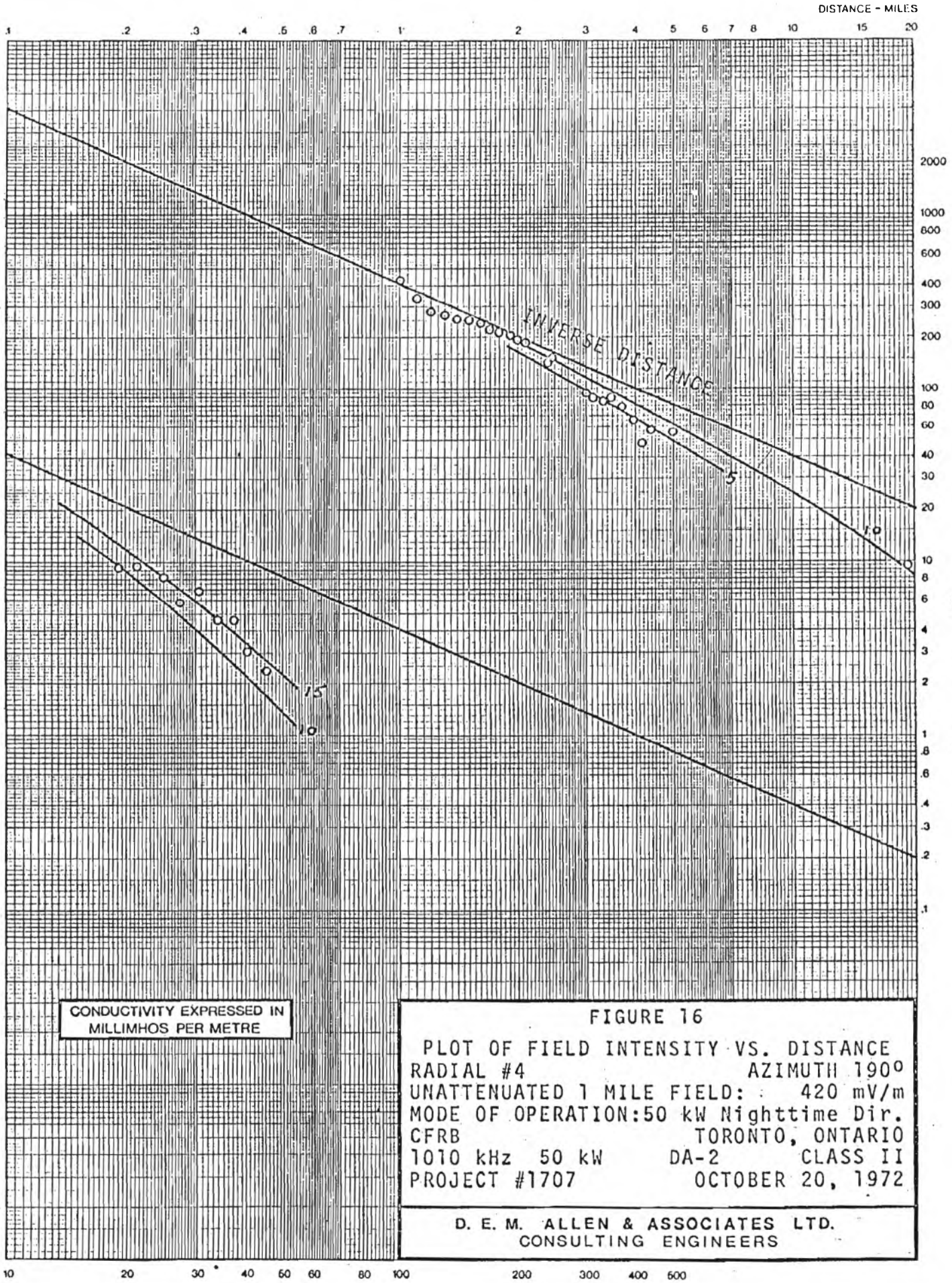

FIGURE 16

PLOT OF FIELD INTENSITY VS. DISTANCE
RADIAL #4 AZIMUTH 190°
UNATTENUATED 1 MILE FIELD: 420 mV/m
MODE OF OPERATION: 50 kW Nighttime Dir.
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1707 OCTOBER 20, 1972

D. E. M. ALLEN & ASSOCIATES LTD.
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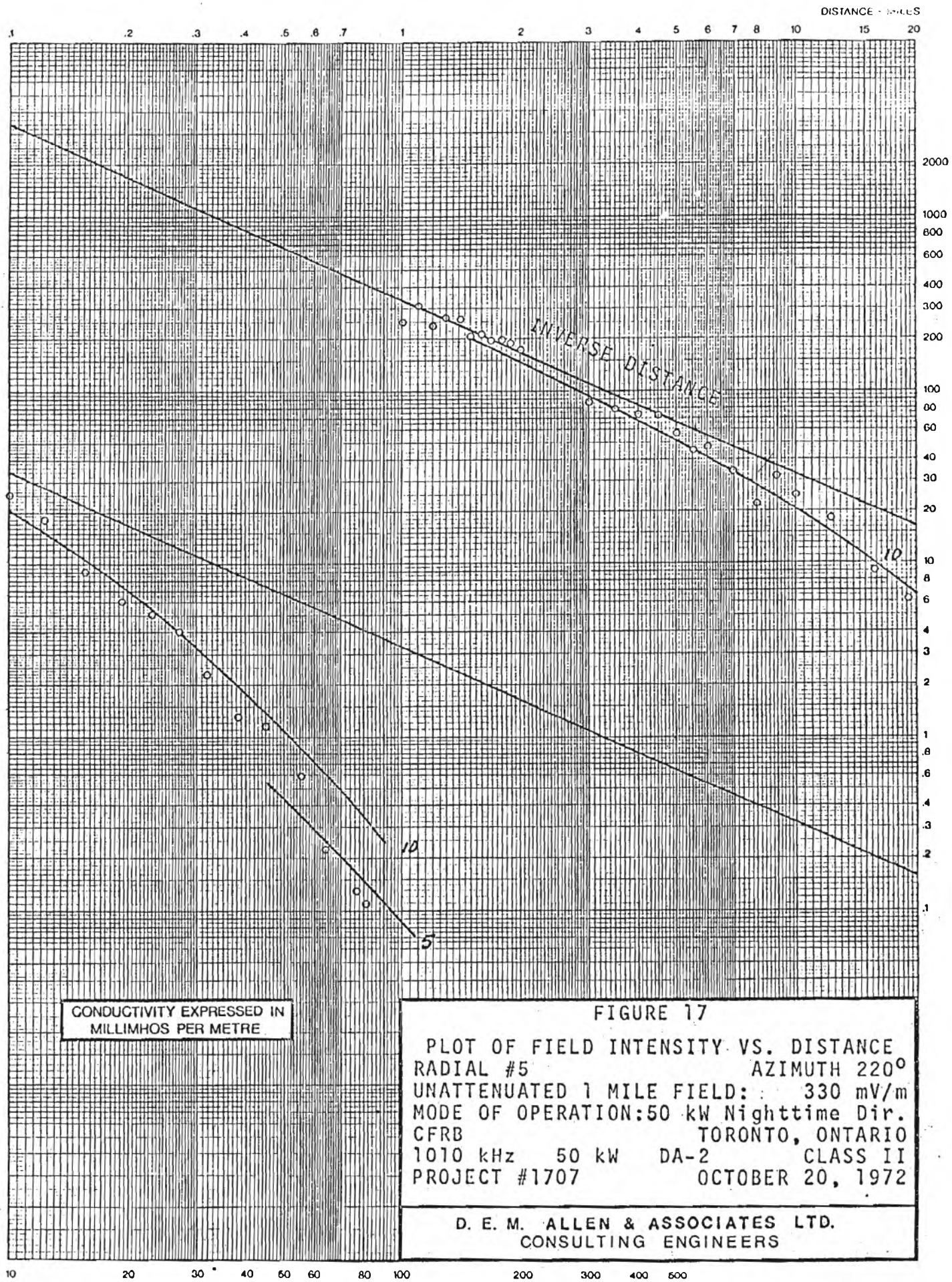


FIGURE 17

PLOT OF FIELD INTENSITY VS. DISTANCE
RADIAL #5 AZIMUTH 220°
UNATTENUATED 1 MILE FIELD: 330 mV/m
MODE OF OPERATION: 50 kW Nighttime Dir.
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1707 OCTOBER 20, 1972

D. E. M. ALLEN & ASSOCIATES LTD.
CONSULTING ENGINEERS

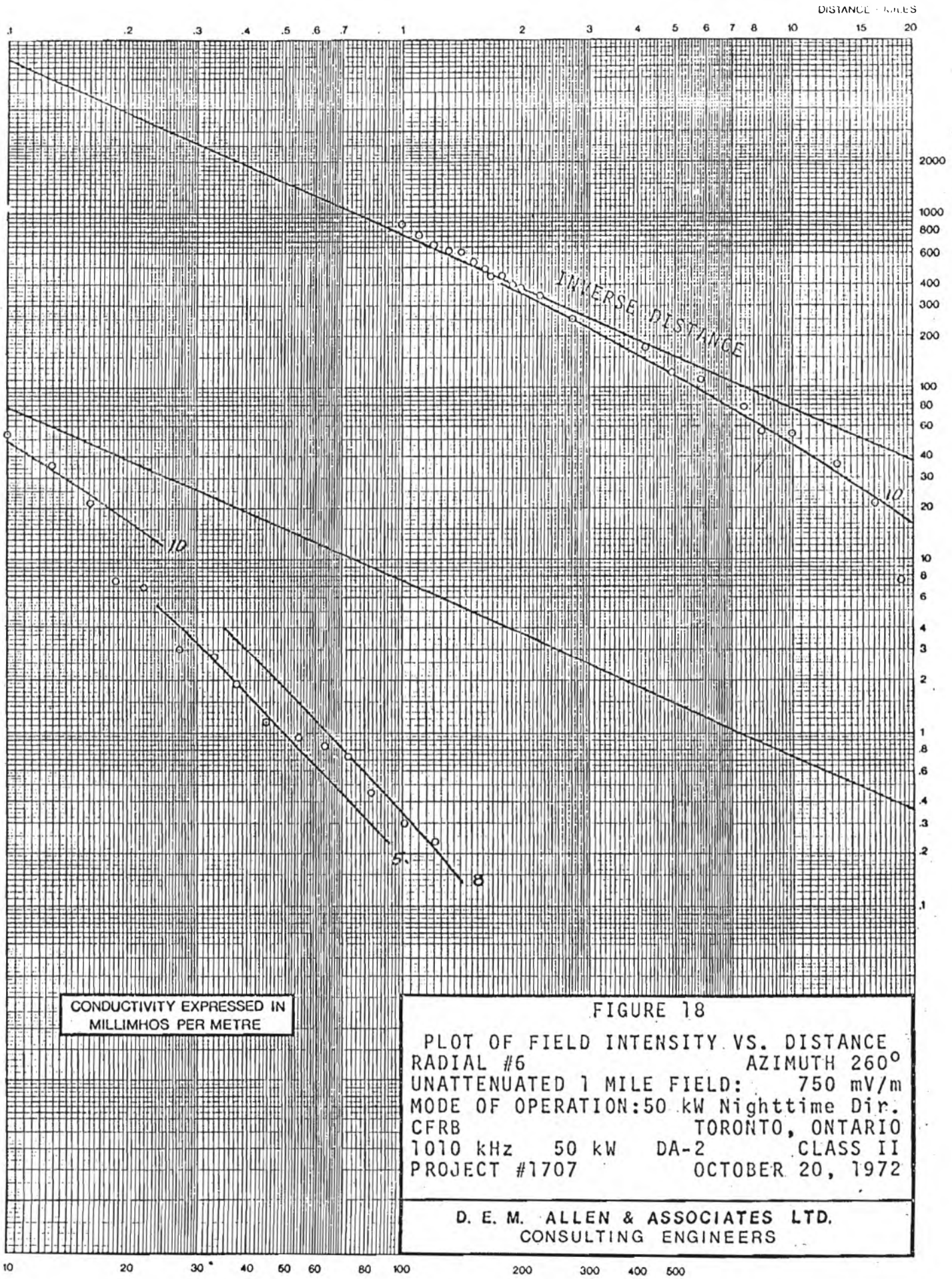


FIGURE 18

PLOT OF FIELD INTENSITY VS. DISTANCE
RADIAL #6 AZIMUTH 260°
UNATTENUATED 1 MILE FIELD: 750 mV/m
MODE OF OPERATION: 50 kW Nighttime Dir.
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1707 OCTOBER 20, 1972

D. E. M. ALLEN & ASSOCIATES LTD.
CONSULTING ENGINEERS

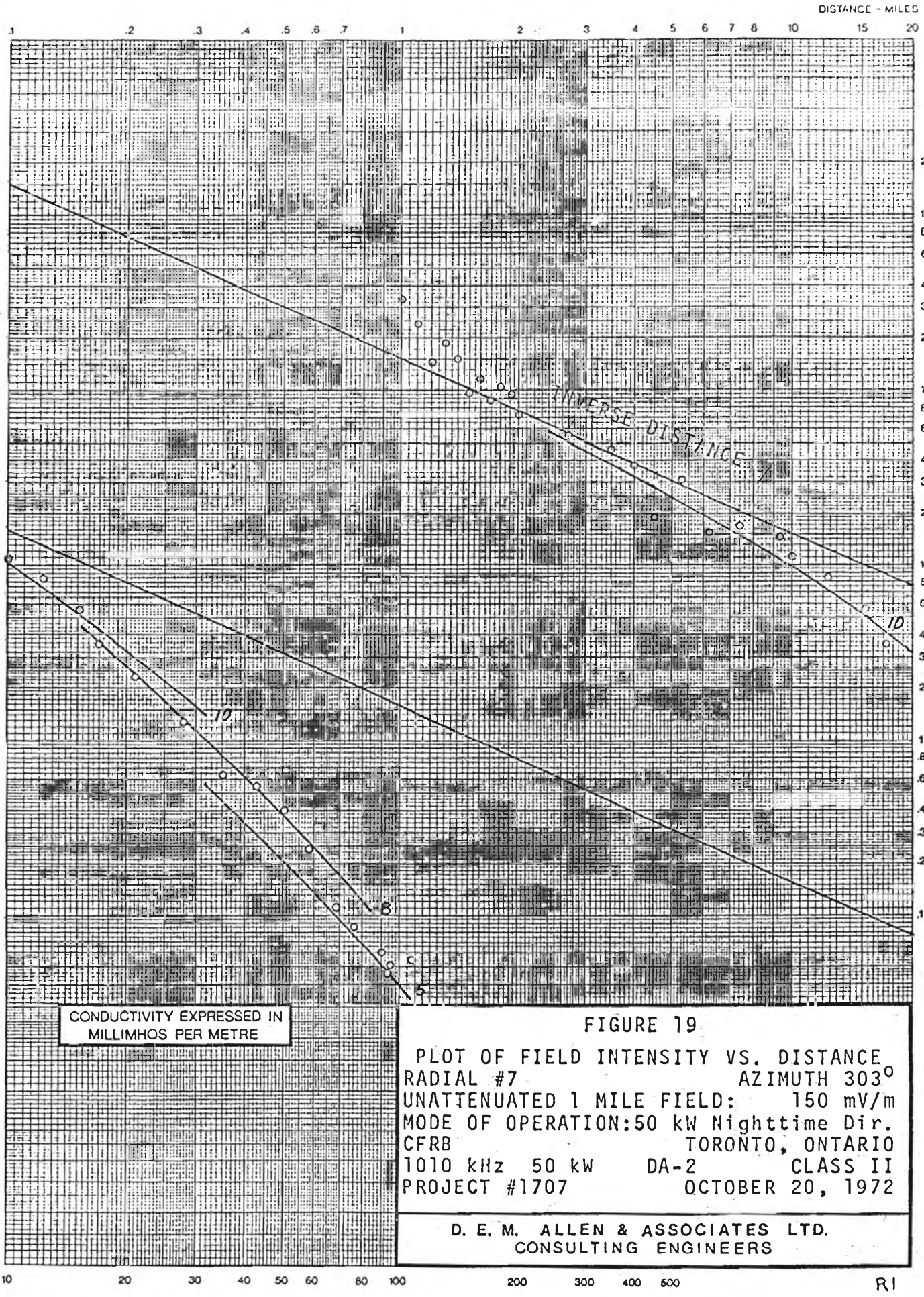


FIGURE 19

PLOT OF FIELD INTENSITY VS. DISTANCE
RADIAL #7 AZIMUTH 303°
UNATTENUATED 1 MILE FIELD: 150 mV/m
MODE OF OPERATION: 50 kW Nighttime Dir.
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1707 OCTOBER 20, 1972

D. E. M. ALLEN & ASSOCIATES LTD.
CONSULTING ENGINEERS

R1

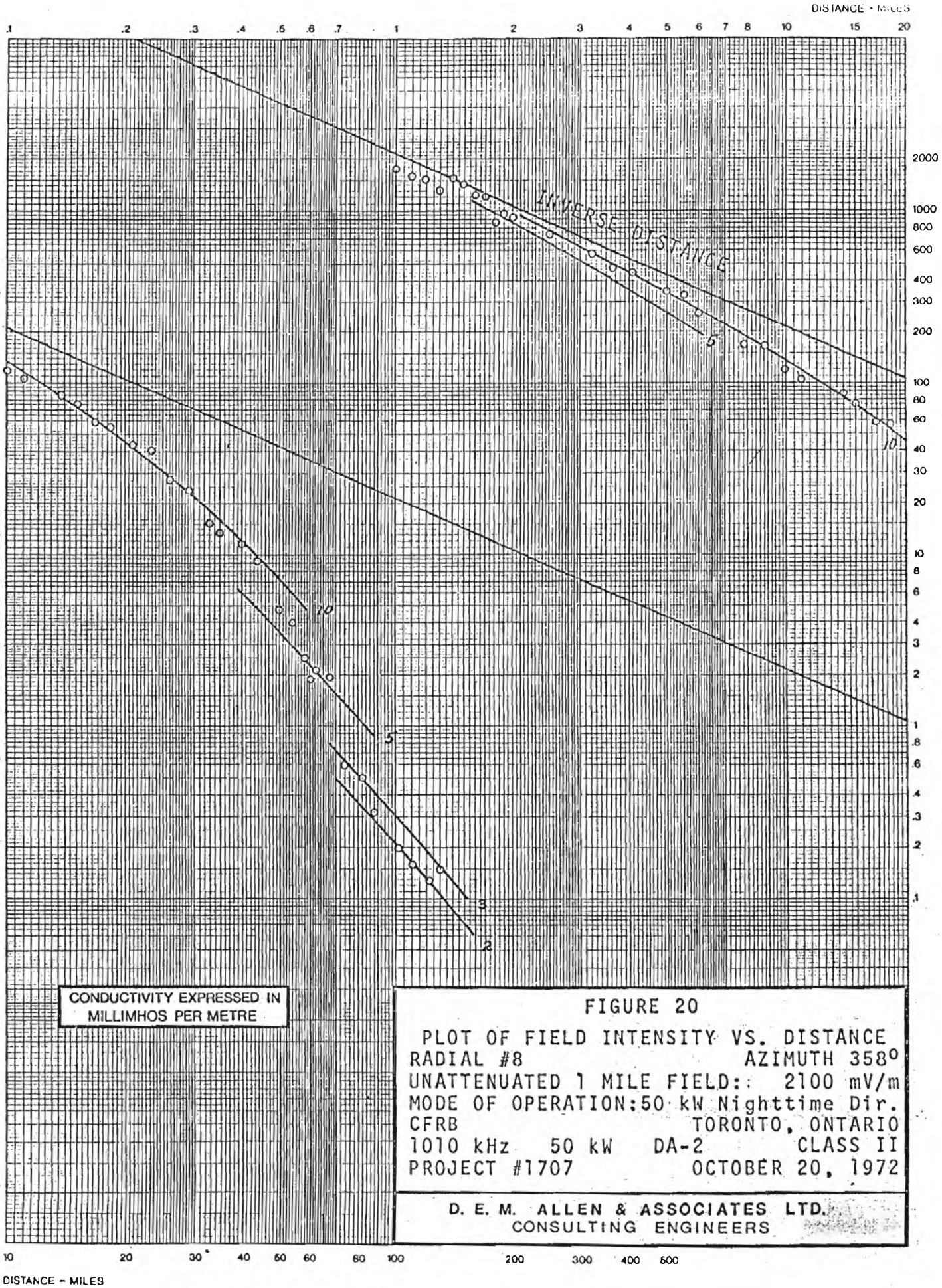
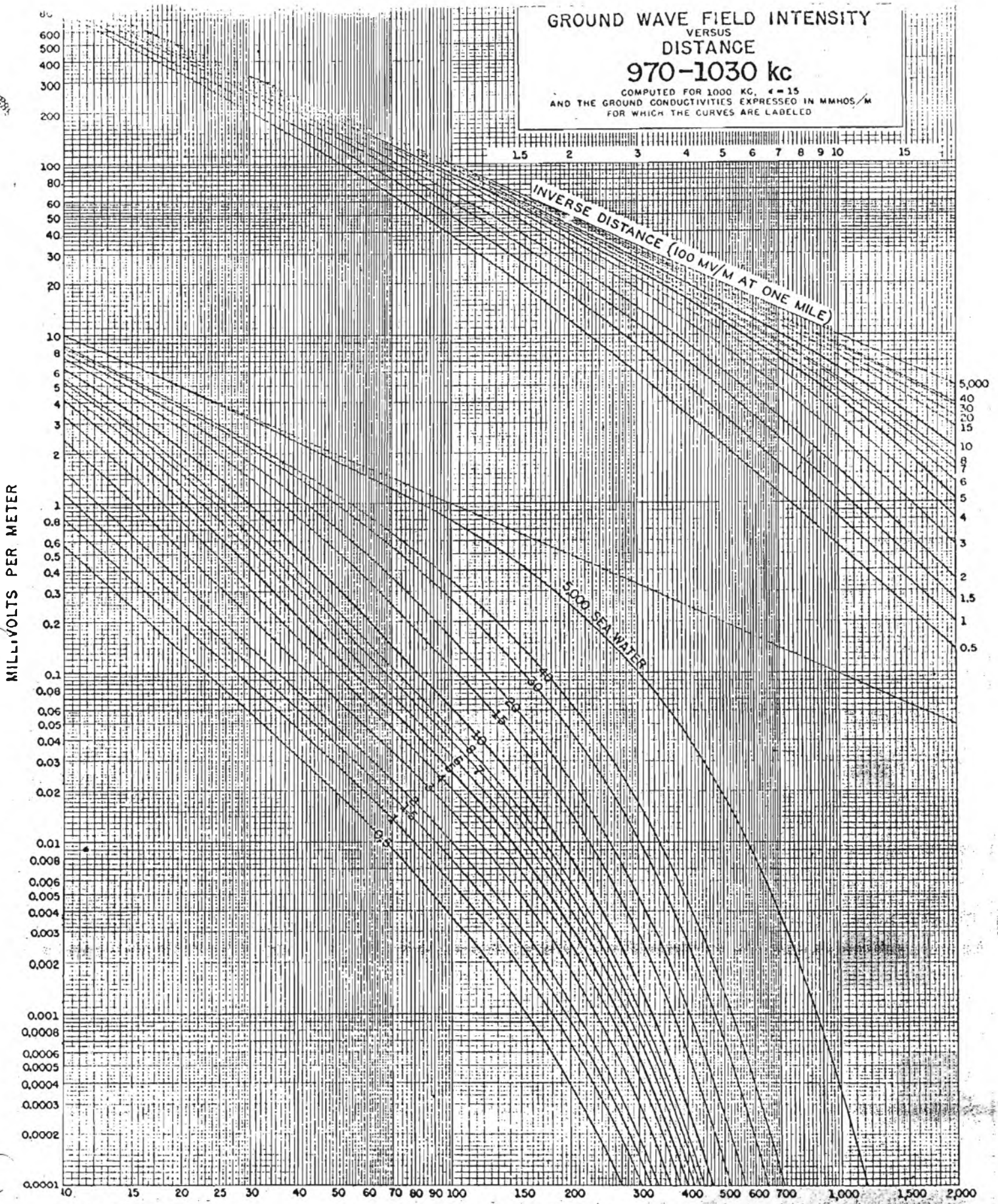


FIGURE 20

PLOT OF FIELD INTENSITY VS. DISTANCE
RADIAL #8 AZIMUTH 358°
UNATTENUATED 1 MILE FIELD: 2100 mV/m
MODE OF OPERATION: 50 kW Nighttime Dir.
CFRB TORONTO, ONTARIO
1010 kHz 50 kW DA-2 CLASS II
PROJECT #1707 OCTOBER 20, 1972

D. E. M. ALLEN & ASSOCIATES LTD.
CONSULTING ENGINEERS



FCC § 73.184, GRAPH 12

FIGURE 21

06-133

STATION CALL: **CFRB**

District

STUDIO LOCATION: **TORONTO, ONTARIO**

06-133

TECHNICAL BRIEF

PREPARATION DATE: 19 MAY 1993
REVISED DATE: 21 APRIL 1997

LICENSEE: STANDARD RADIO INC.

TABLE OF CONTENTS

TABLE OF CONTNENTS

TECHNICAL BRIEF

1 - INTRODUCTION

This brief was prepared on behalf of Standard Radio Inc., licensee of CFRB, Toronto, Ontario. It was prepared in accordance with Broadcast Procedures and Rules, Parts I, II and the Interim MF Working Arrangement between FCC and DOC of February 1991, together with the Memorandum of Understanding in Exhibit 1.

2 - OBJECTIVES

The principal objective is to improve CFRB's day and night transmitting facilities, service and site utilization, partly as a result of recent developments on 1010 kHz in the United States of America.

3 - SITE DISCUSSION

In 1988, the Separate School Board demanded part of CFRB's antenna site, for Lakeshore Secondary school. Two years later, several adjacent industrial land users objected to the rezoning application. Also in 1988, several adjacent high rise developments were proposed, which would have had a significant impact on CFRB's transmissions. The proposed building heights were reduced, to help satisfy our concerns.

These activities were the result of the rapid growth, construction boom and scarcity of vacant land in this part of Mississauga. They forced Standard Radio to re-examine the possibility of relocating CFRB's transmitting facilities. They are located in an area that was rural

in 1948 and is now urban and surrounded by industrial-commercial operations, with residential beyond. Due to the hostile environment, pattern distortion became excessive and it has been impossible to conduct a satisfactory supplementary proof of performance for many years. For all of these reasons, a thorough search was conducted. Many open areas were considered and detailed plans were developed in 1990-91, for relocating to Lakeside Park.

However, for economic and other reasons, it became clear that the most feasible alternative is for Standard Radio Inc. to retain CFRB's present site.

4 - FREQUENCY ASSIGNMENT

We understand that CBY (later CJBC) Toronto, commenced operating with 1 kW ND-U on 1010 kHz, in 1942. It moved to 860 kHz in 1948, when CFRB commenced operating on 1010 kHz, at 50 kW, DA-2. Under the Rio Agreement, its assignment became class A. Sector augmentations have been notified, but are not yet implemented.

In 1990, Standard Radio Inc. was approached by Westinghouse Broadcasting Inc., licensee of WINS, New York City (50 kW, DA-1, class B, 1010 kHz). WINS transmitting facilities are located in a hostile environment and its array is old. It operated on special temporary authority from the FCC. Westinghouse proposed a new, improved array for WINS to help solve the problems.

Because CFRB has a class A assignment, the Canada USA Bilateral MF Agreement requires no additional impairment of its nighttime skywave service. WINS proposed antenna could not meet this requirement. Accordingly, a special agreement was required between licensees, that was also acceptable to both administrations.

A Memorandum of Understanding has been negotiated between licensees, a copy of which is included herein as Exhibit 1.

The allocation engineering benefits to CFRB may be summarized as follows: - the nighttime assignment of KSYG, Little Rock will be deleted - CFRB will partially substitute its contributions to other cochannel stations.

The target skywave radiation from WINS new night pattern to CFRB's Eu contour will be obtained or confirmed by means of helicopter "talk-downs" - that is, fine tuning of the array in conjunction with airborne field intensity measurements.

CFRB's minor lobe and null detail will be augmented significantly, in order to compensate for scatter from neighbouring buildings, towers, etc., which cause considerable pattern distortion.

The other improvements to CFRB's array and service coverage are discussed in Section 6.

5 - ARRAY LOCATION

The new array will be in almost the same location as the present one.

6 - ARRAY DESIGN (Reference - Tables 1 to 4 and Figure 1)

CFRB's present array is a parallelogram with two guyed radiators of height 76m (92.3°) and two of 167.6m (203°). There is also an emergency non-directional radiator.

The proposed array is a parallelogram consisting of the two existing 167.6m (203°) tall, series fed, guyed masts and two new ones. The design improvements include increased radiation efficiencies, lower RSS/RMS ratios for better stability and higher Q' or safety factors, as follows:

	DAY		NIGHT	
	PRESENT	PROPOSED	PRESENT	PROPOSED
RMS(mV/m at 1 km)	2687.6	2935	2193.5	2800
RSS/RMS	1.178	1.087	1.381	1.244
Q %	2.5	5.35	2.5	5.35
Q mV/m	79.2	170.6	75.7	186.3

The horizontal RMS radiation values were calculated assuming 50 kW and a loss of 1 ohm per radiator.

The night pattern includes eight sector augmentations as a precaution, because of the large number of potential reradiators in the area.

7 - GROUND SYSTEM Reference: Figure 2(1-2)

Counterpoises of 6m radius will be used, to reduce the RF losses and to improve array stability. Each counterpoise will include at least forty galvanized pipes 3cm-4cm diameter, secured 3m above ground. A chain link fence will surround each counterpoise, partly to protect against public access and vandalism. Beyond the counterpoises, the ground system will consist of 120 equally spaced radials per tower, of #10 AWG bare copper wire. They will be buried 25cm-50cm below grade and have typical lengths of 168m or 0.57 wavelength. Some of the south westerly radials will be shorter than average with a minimum length of 145m (0.49 wavelength), these will be terminated with ground rods. Where feasible, the new radials will be bonded to the

existing ones, to improve and/or extend the ground system. As a result, the effective lengths of those under the main lobe will be at least 223m, or 0.75 wavelength

8 - PHASOR

The phasing, tuning, power dividing and filtering system will be conservatively designed and rated. The main phasor will probably remain at the existing building near the present Tower 3.

9 PATTERN DISTORTION

Reference: BPR-II-B-2.8

The minimum radiation from the proposed day pattern is 1200 mV/m at 1 km, except from the incidental null on about 077°. The minimum augmented night horizontal radiation values are approximately 400 mV/m.

As a result, only a night pattern scatter comparison has been made, because it is more susceptible to excessive distortion.

Five significant reradiators are considered in the following table:

	APPROXIMATE Height m	Height °	Dis km	Brg. True	THEORETICAL RADIATION FROM CFRB (V/m @ 1 kw) Present	Proposed	% Change
1 St. Lawrence Cement Co. Chimney	167	203	1.5	164°	0.163	0.407	+150
2 Petro Canada Oil Refinery Chimney	72	87	1.7	109°	0.315	0.196	-38
3 CHUM's six towers	72	87	2.1	159°	0.221	0.354	+60
4 Ontario Hydro MW Tower	70	85	2.3	178°	0.290	0.372	+28
5 High rise apartment building	70	85	0.8	020°	4.746	6.218	+31

We expect that CFRB's higher Q and sector augmentations will provide sufficient head room to include the increased scatter from these and other obstructions.

However, if necessary, as a last resort, we shall seek permission on behalf of CFRB, to treat some of them, such as item 1, 3 or 4. Item 4 has already been treated by CHUM, so would require additional or modified stubs. Suitable filters would then be designed, installed and adjusted, to reduce the scatter to an acceptable level.

Standard Radio Inc. will normally bear all related expenses, including those due to a loss of revenue resulting from CHUM having to suspend operation if 1010 kHz ATU filters are required in their system for the first time. However, if detailed measurements prove that such filters would have been necessary to reduce scatter to an acceptable level, based upon CHUM's present facilities and CFRB's incident field intensities in 1965, Standard Radio Inc. reserves the right to negotiate equitable cost sharing with CHUM Ltd. Other issues are referred to in Section 20 and in the present agreements between licensees, dated 10 July 1964 and 16 May 1969.

10 - ASSUMPTIONS AND SOURCES OF INFORMATION

Values of ground and lake conductivity used to establish protection requirements, were based upon the official DOC map dated January 1980 and FCC Figure M3.

Conductivity values used to predict service contour locations were based upon 1987 - 1991 measurements, made on 880, 1010 and 1050 kHz, in order to obtain realistic conservative estimates. The conductivities assumed and distances to contours are shown in Table 5.

Typical conductivity values are as follows:

	CONDUCTIVITY (mS/m)		
	DOC MAP	CFRB 1972 PROOF	1993/97 BRIEF
Metropolitan Toronto			
East	8	5	3.5
North and Central	8	10	4-6
West	5	10	6
North of Metropolitan Toronto (5 mV/m)	8 & 10	10	3-5
Lake Ontario	15	15	15

The proof of performance for CFRB's present facilities was conducted in 1972. The measured contours are included on comparative contour maps, as required in BPR-I-3.3.2. However, subsequent construction and expansion of the Metropolitan area has greatly increased signal absorption. It is evident that CFRB's service contours north of Toronto have shrunk considerably, as a result. Also, CFRB's coverage along the north shore of Lake Ontario was not measured during the 1972 proof. Recent measurements made in the southeast part of Toronto indicate that coverage to this area benefits greatly from the over-water path and extends much further than shown in the proof.

Because of these two factors, the contours in the 1972 proof do not accurately represent CFRB's present coverage. For this reason they have been revised, using the measurements made since 1987 to locate the primary service contours and to estimate the location of the secondary service contours. The revised contours are also shown on the comparative contour maps. Information on related assignments was obtained from the Department's Broadcast Database, downloaded on January 14, 1997. Stations were protected as required by the current MF agreements and Industry Canada's domestic rules except where

special agreements apply.

All maps were current editions obtainable from Energy, Mines and Resources Canada. The following sheets were used:

Scale	Title	Number
1:50,000	Hamilton	30M/5
1:50,000	Toronto	30M/11
1:50,000	Brampton	30M/12
1:500,000	Toronto-Ottawa	31SW
1:500,000	Windsor-Toronto	40NE and 30NW
1:500,000	Manitoulin-Owen Sound	41SE
1:1.000,000	Lake Erie	NK-17
1:1,000,000	Hudson River	NK-18
1:1,000,000	Georgian Bay	NL-17
1:1,000,000	Ottawa	NL-18
1:2,000,000	Ontario	MCR 39

11 - DAY PRIMARY SERVICE (Reference: Figures 3-1, 3-2, 4-5 and 4-6)

The 25 mV/m contour extends up to 43 km north, beyond Kleinburg and Maple, 37 km northeast to western Scarborough, 43 km southwest to enclose Hamilton and 22 km west to Milton. Major towns and cities enclosed include most of Metropolitan Toronto, all of Woodbridge, Mississauga, Oakville, Burlington, Stoney Creek, Hamilton, Brampton and Vaughan. Compared to the revised present contour, there will be a reduction in service to

Georgetown, an increase in coverage to the densely populated easterly portions of Toronto and Hamilton.

The extent of primary service is considered to be 5 mV/m. This contour extends: 82 km north enclosing Alliston, Cookstown, Bradford, Newmarket, Aurora and Richmond Hill; 65 to 90 km northeast enclosing Stouffville, Markham and the southerly parts of Pickering, Ajax, Whitby and Oshawa; 67 km southeast enclosing St. Catharines and Niagara Falls; 75 km south and southwest enclosing Cayuga and Brantford; and 47 to 65 km west and northwest enclosing parts of Cambridge and Orangeville.

Service north easterly and southerly will be improved. There will be some reduction in coverage westerly.

12 - DAYTIME SECONDARY SERVICE (Reference: Figures 3-3 and 4-7)

The 0.5 mV/m contour will extend 120 to 210 km. It will enclose an area bounded by Brighton and Peterborough in the northeast, Midland and Thornbury to the north, Listowel to the west, Strathroy and West Lorne to the southwest. To the southeast and south it will extend beyond the Niagara Escarpment and Lake Erie. Major centres enclosed include Orillia, Barrie, Kitchener, Waterloo, Stratford, Simcoe, Woodstock, London and St. Thomas. It will provide satisfactory service in rural areas and small communities.

CFRB's nominal daytime Eu is 0.1 mV/m. As proposed, this contour will extend from approximately Windsor to Kingston, as well as north to Parry Sound and the Bruce Peninsula. It is free from groundwave cochannel and adjacent channel interference in Ontario and will continue to provide satisfactory fringe service in favorable locations.

13 - NIGHTTIME PRIMARY SERVICE (Reference: Figures 3-1 and 4-8)

The 25 mV/m contour will extend 40 to 50 km north and northeast enclosing Mississauga, most of Metropolitan Toronto, also parts of Markham, Richmond Hill and Vaughan. To the southwest it will extend 28 km enclosing most of Burlington. To the northwest it will extend at least 10 km and enclose most of Brampton.

Coverage will be increased significantly to the northeast and southwest.

14 - NIGHT SECONDARY SERVICE (Reference: Figures 3-2, 3-3 and 4-9)

The calculated groundwave Eu of 2.0 mV/m will extend 95 to 170 km north and northeast enclosing communities along Lake Ontario from Toronto to Brighton, Port Perry, Uxbridge and Barrie. Southerly and south easterly it will extend 50 to 80 km, enclosing Burlington, Hamilton and Grimsby, and most of St. Catharines. Westerly it will extend 40 to 50 km enclosing Brantford.

The 3.2 and 2.0 mV/m contours are compared on Figure 4-8, because CFRB's Eu as a former class II or B station would be approximately 3.2 mV/m. However, as a class A assignment, its proposed Eu is 2.0 mV/m per Figure 4-A, Annex 2 of the Bilateral Agreement. Further details are provided in Table 6.

As for the primary contours, there will be significant coverage gains in most directions, but losses to the west.

The 0.5 mV/m or 25% Eu contours will provide useful intermittent service. The 0.5 mV/m groundwave contour will extend 70 to 240 km.

All the objectives of BPRII-C-3 will be met, of course.

recommended or implemented by CFRB's engineering staff. Bell Canada or DOC's District Office staff are not normally involved.

An important reason for the small number of interference problems is that the area has been blanketed by CFRB for many years. As a result, residents and business staff know how to avoid, minimize or tolerate potential interference.

In most areas, CFRB's field intensities will increase by approximately 25% or 2 dB. The Department's past experience indicates that simple remedial measures are normally successful, if the field intensity is under 3 V/m. We estimate that these contours will extend an additional 300 metres maximum.

If receivers are overloaded and/or external cross-modulation interference is caused, to other users of the radio spectrum within the 0.25 V/m contour, as at present, CFRB is prepared to accept financial and technical responsibility to remedy all valid complaints, as required in section C-10.3.2, defined in C-10.4 and restated in the Appendix to the application.

In the unlikely event that there is a substantial number of complaints which cannot be resolved satisfactorily, as a last resort, Standard Radio Inc. undertakes to reduce CFRB's power to a DOC stipulated level, as required.

After CFRB's new facilities are fully installed and in temporary use for scheduled broadcasting, it will not be feasible to revert to the present ones. This normal commitment is impractical because parts of the old array will be modified and used in the new one, the terms of the CFRB-WINS Agreement and other factors.

16 - RADIATION EXPOSURE

Health and Welfare Canada's Radiation Protection Bureau's Safety Code 6 of May 1991, contains recommendations for protecting RF workers and the general public from non-ionizing radiation at frequencies above 10 kHz. At 1010 kHz, the time (6 minutes) and spatially averaged limits are:

	E FIELD	H FIELD	CONTACT CURRENT
WORKERS	594 V/m	4.85 A/m	40 mA
PUBLIC	277 V/m	2.17 A/m	15 mA

Safety Code 6 states that the immediate vicinity of unmanned high power sources of RF radiation must be fenced off, to prevent unauthorized access to places where overexposure could occur.

CFRB's site will be posted with appropriate warning and danger signs on fences surrounding the property and the counterpoises to discourage public access. There will also be motion detectors or other security devices.

Incidentally, the above Safety Code 6 limits are lower than those in ANSI/IEEE C95.1-1992, which is presently under consideration by FCC.

Another relevant document is the FCC's Office of Science and Technology Bulletin #65, dated October 1985. If 50 kW were radiated from one tower of height 180°, its E and H field strengths at a radius of 6m - i.e. the counterpoise fence, would not exceed 265 V/m and 1.4 A/m per OST65's Figure 3; (OTS65 Table 1 indicates that the minimum or worst case distance to ensure that the public E and H field limits are not exceeded is 22m, regardless of tower height.)

As previously noted, the counterpoises will be enclosed within chain link fences and locked gates, to prevent unauthorized access. These will be 2.4m high, vinyl clad and bonded to the support posts, which will be spaced 3m-3.5m apart and grounded. As a result, there is no risk whatsoever of contact currents exceeding 15 mA, between these fences and persons who touch them.

To provide background information, finger contact currents were measured on accessible metal on April 15, 1993. Those on the emergency tower's lower guy wires were 33, 43 and 70 mA, respectively. The hydro pole guy near CFRX produced 14 mA. The main towers' bottom guy insulators are at least 3m agl, so that the guys above are inaccessible from ground level. The security fences are wooden. No other currents could be measured on site. Other tests were made under the main lobe immediately north northeast of the site on various metal objects including fences, hydro poles, a fire department communications tower and playground swings. No currents were measurable, even on the 2-20 mA scale.

Contact currents will also be measured during CFRB's proof of performance to verify compliance with the Safety Code 6 criteria.

17 - LIST OF PROTECTED STATIONS

The most relevant ones are as follows:

CALL	LOCATION	kHz	kW	MODE
WCMF	Rochester, NY	990	2.5N/5D	DA-2
WCCD	Parma, OH	1000	0.5	DA-D
WLNL	Horseheads, NY	1000	5	ND-D
CBR	Calgary, AB	1010	50	DA-2
CKXD	Gander, NF	1010	1 *	ND-U
-	Thunder Bay, ON	1010	5N/10D	DA-N
KTNZ	Amarillo, TX	1010	.5N	DA-2
KXEN	Festus-St. Louis, MO	1010	.5N/50D	DA-2
WCST	Berkley Springs, WV	1010	.016N/.25D	ND-U
WINS	New York, NY	1010	50	DA-1
WIOI	New Boston, OH	1010	.021N/1D	ND-U
WITL	Lansing, MI	1010	.013N/.5D	DA-2
WMOX	Meridian, MS	1010	1N/10D	DA-2
WPMH	Portsmouth, VA	1010	.45N/5D	DA-2
WQYK	Tampa, FL	1010	5N	DA-2
WTGC	Lewisburg, PA	1010	.01N/.76D	ND-U
WIOJ	Jacksonville, FL	1010	4.3N	DA-2
WOLB	Baltimore, MD	1010	.026N/1D	ND-U
KDKA	Pittsburgh, PA	1020	50	ND-U
WYSL	Avon, NY	1030	1	ND-D

* Presently 1 kW; 5 kW authorized

18 - DAY INTERFERENCE ANALYSIS

All related cochannel and adjacent channel assignments are adequately protected. The protected contours are shown on Figure 5. The analysis is contained in Table 8. Some stations presently accept interference from CFRB and none of these limitations will be increased.

19 - NIGHT INTERFERENCE ANALYSIS

All related cochannel and adjacent channel assignments are adequately protected. The analysis is contained in Table 9.

CBR's skywave and groundwave protection requirements have been carefully considered. The proposed interference from CFRB to CBR's night 0.5 mV/m groundwave contour will not exceed the presently notified levels, including sector augmentation. (As a result CBR's skywave service will be protected along the Alberta-Saskatchewan border. The CBC does not require protection north or east of this because those regions are served by their stations in Edmonton and Watrous.)

As a result of the special agreement, referred to in Section 4, KSYG has been omitted from the protection analysis. CFRB and WINS will partially substitute for KSYG contributions, as summarized on Table 10.

Notifications with less than 250 watts are not specifically protected, in accordance with DOC-FCC's understanding or agreement.

Cuban stations have been excluded from the interference analysis, because Cuba was not a signatory to RAMFBC-R2 and their assignments are not recognized by FCC.

The vacant allotment at Thunder Bay, Ontario has an Eu of 9.0 mV/m, which will decrease to 8.39 mV/m.

The Eu of CKXD, Gander, Newfoundland will increase from 13.8 mV/m to 15.0 mV/m. In October 1980, CHUM Ltd. was authorized to change CFYQ's, now CKKD's frequency to 1010 kHz and to increase its power to 5 kW. The frequency change was implemented but not the power increase. CKXD remains at 1 kW ND-U.

CKXD's 1 kW Eu contours at present and as proposed, are compared on Figure 6-1. CFRB's proposals would reduce the radius from approximately 5.2 to 4.9 km. The affected area is a ring 350 metres wide with no resident population. As shown, it covers uninhabited land, swamp, lake, short sections of highways and runways. A similar situation would apply, if CKXD's power had been increased to 5 kW, as shown on Figure 6-2.

Accordingly, the CFRB proposals would not cause objectionable interference, or be detrimental to CKXD's service.

Moreover, since CFRB was granted class A status in 1984, CKXD's power increase would create objectionable skywave interference to CFRB's skywave service. This would not comply with the protection requirements of BPR-II. Accordingly, we have requested that authority for the power increase not be renewed.

The present CFRB proposals fully comply with all the requirements of BPR-II-C-12, with one exception. Based on preliminary negotiations with NewCap Broadcasting in 1993, an agreement between licensees would have required significant financial compensation. In this case, in accordance with spectrum management policies and precedents, no compensation is justified, therefore an administrative decision is required.

20 - INTERMODULATION AND CROSS MODULATION

As at present, CFRB's proposed 250 mV/m day contour will enclose CHUM's site and its 250 mV/m night contour will not. Interaction between the arrays is higher than normal because their carrier frequency separation is only 40 kHz or 4%. Filters may be desirable, to avoid third order products on 970 kHz and/or 1090 kHz.

As required in BPR-II-C-8, we hereby undertake to study the potential interference situation. Suitable filters will be designed and installed at CFRB as at present, to reduce the interference to non-objectionable levels. Standard Radio Inc. will bear all reasonable expenses, including those due to a loss of revenue resulting from CHUM having to suspend operation, if an isolation filter is required at CHUM's common point, for example.

CFRB and CHUM have been located inside each others 250 mV/m day contours, since CHUM moved site in the early 1960's. A similar commitment was made for CHUM then and for CFRB's change of facilities in the early 1970's.

Reradiation is an important and closely related factor, which will be controlled by the ATU filters in CFRB's array.

21 - IMAGE INTERFERENCE (Reference: BPR-II-C-7)

The intermediate frequency on normal broadcast receivers is approximately 455 kHz, so they are not susceptible to image interference from stations operating on frequencies above 700 kHz. Therefore, CFRB's 1010 kHz transmissions cannot generate this type of interference.

22 - OTHER SIGNIFICANT INFORMATION

The transmitting facilities will be unattended and remotely controlled as at present. AM stereo will continue to be used.

The installation will be made in accordance with DOC, NHW and CSA requirements, standards of good engineering practice and local hydro codes.

Standard Radio's shortwave station CFRX shares CFRB's site. Its transmitting facilities with 1 kW on 6070 kHz, may be relocated slightly. Further details will be provided later.

23 - ENGINEER'S SEAL AND SIGNATURE

This brief was prepared by the undersigned consultants, who practice in the field of broadcast engineering.

K. Stuart Hahn

K. Stuart Hahn, P. Eng.

J. Gordon Elder

J. Gordon Elder, P. Eng.

21 April 1997

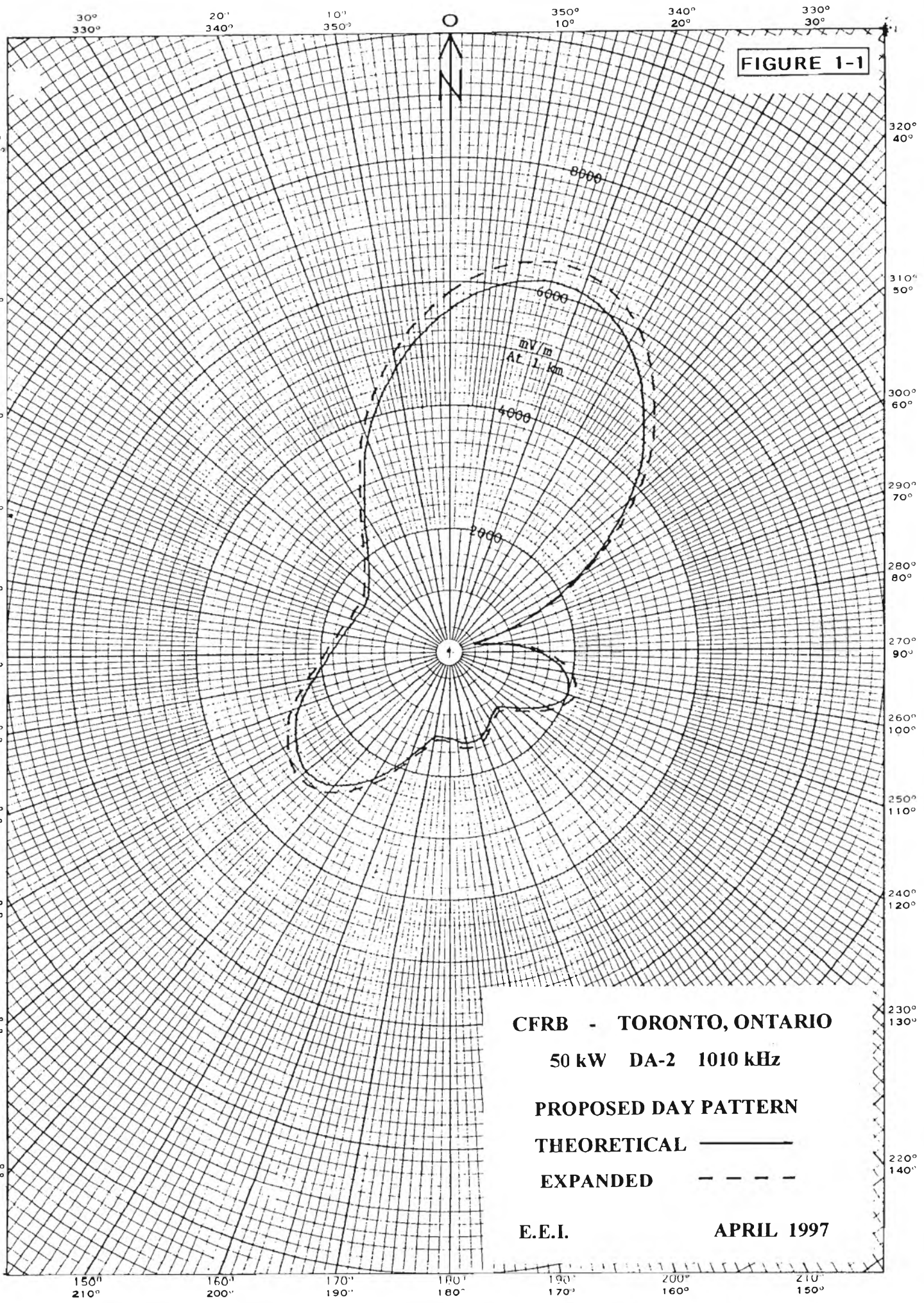


FIGURE 1-1
O
N
8000
6000
4000
2000
mV/m
At 1 km
CFRB - TORONTO, ONTARIO
50 kW DA-2 1010 kHz
PROPOSED DAY PATTERN
THEORETICAL
EXPANDED
E.E.I.
APRIL 1997

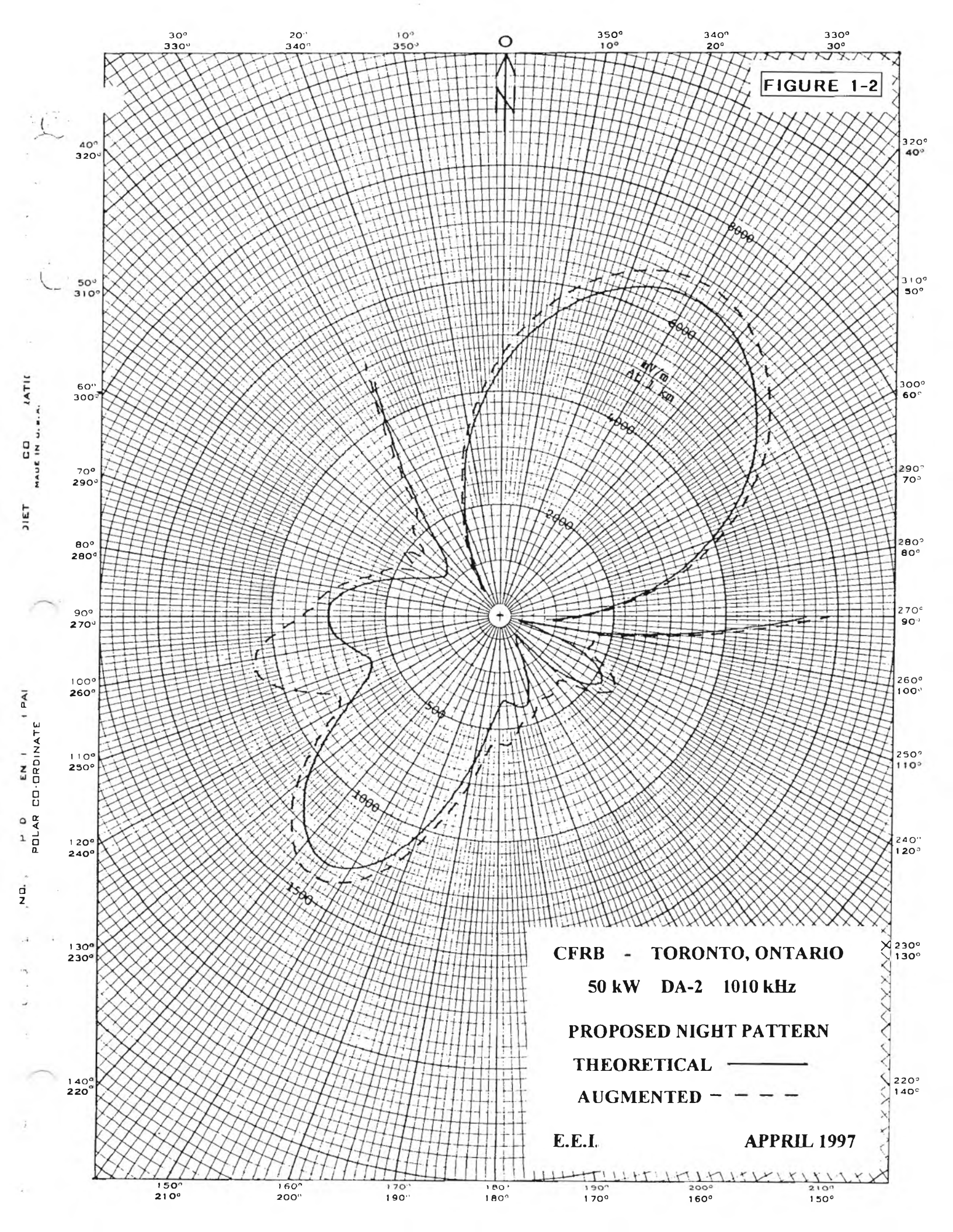
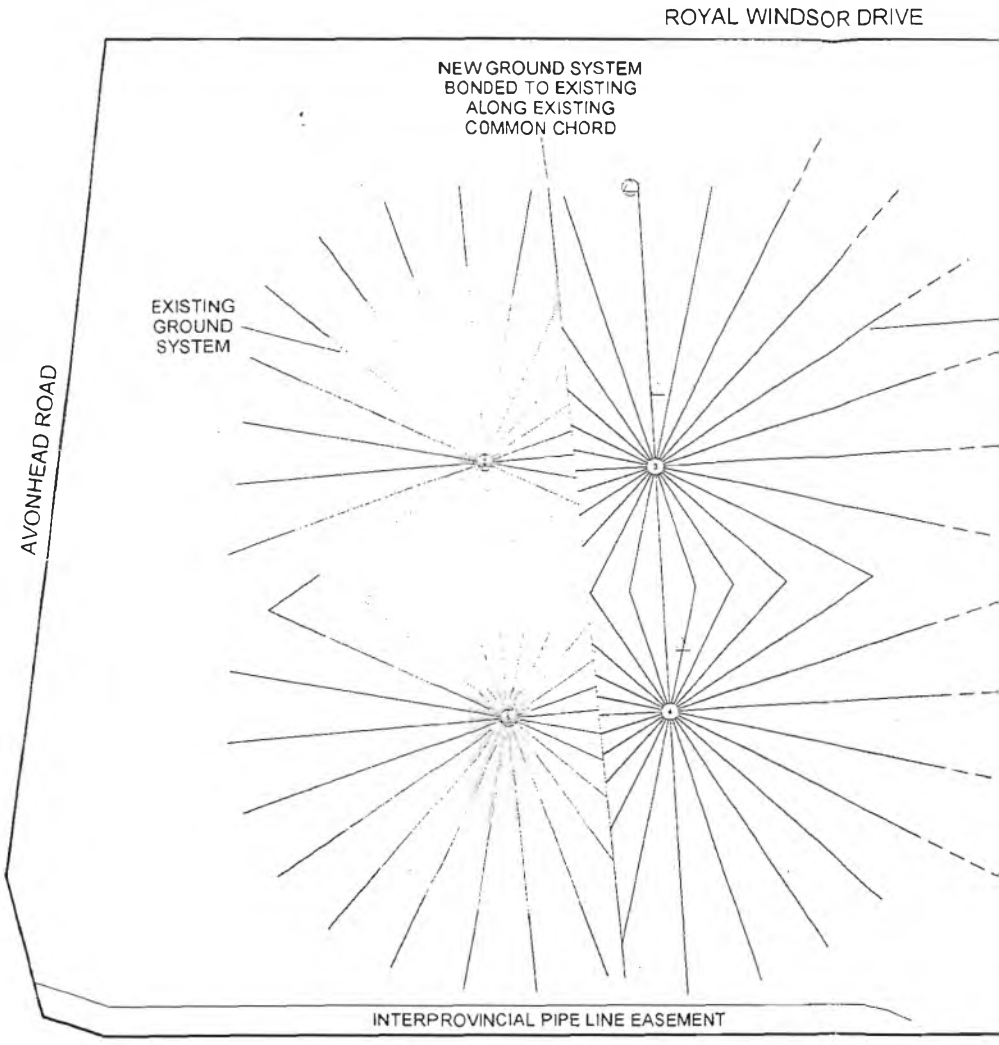
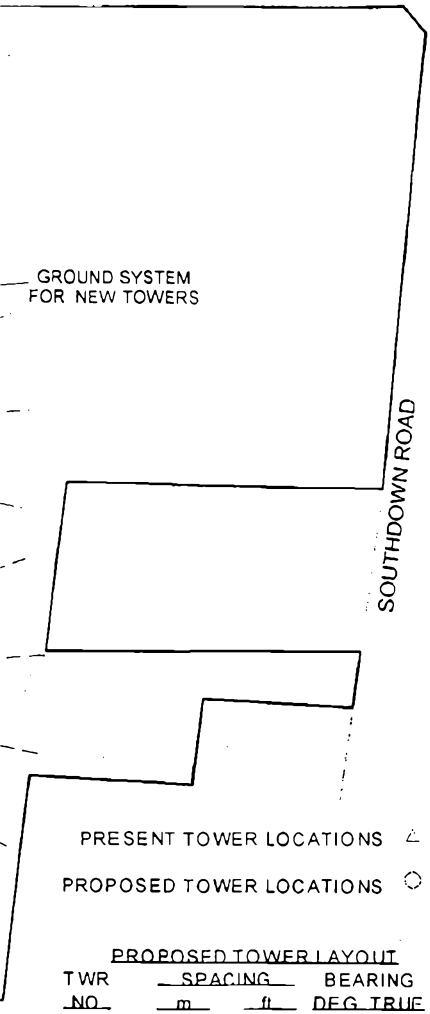
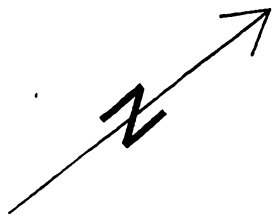


FIGURE 1-2
O
N
8000
6000
4000
2000
1000
500
1500
mV/m
At 1 km
CFRB - TORONTO, ONTARIO
50 kW DA-2 1010 kHz
PROPOSED NIGHT PATTERN
THEORETICAL
AUGMENTED
E.E.I.
APPRIL 1997


ROYAL WINDSOR DRIVE
NEW GROUND SYSTEM
BONDED TO EXISTING
ALONG EXISTING
COMMON CHORD
EXISTING
GROUND
SYSTEM
AVONHEAD ROAD
INTERPROVINCIAL PIPE LINE EASEMENT





FOUR ARRAY TOWERS TO BE
167.6 m (550') TALL GUYED MASTS

GROUND SYSTEM

- EXPANDED COPPER MAT OR WIRE MESH AROUND TOWERS EXTENDING 10' FROM BASE PIER
- #10 AWG COPPER WIRES SILVER SOLDERED AND MECHANICALLY BONDED TO MATS
- 120 PER TOWER EXTENDING 167 m (0.56λ) AND BURIED 15-30 cm
- EXISTING GROUND SYSTEM TO BE EXTENDED TO 167 m (0.56λ) OR TERMINATED AT PPG'S WALL
- EXTREMITIES OF TOWERS 3 & 4 TO BE BONDED TO PRESENT SYSTEM WHERE FEASIBLE

PRESENT TOWER LOCATIONS △

PROPOSED TOWER LOCATIONS ○

PROPOSED TOWER LAYOUT

TWR NO	SPACING m	SPACING ft	BEARING DEG TRUE
1		Ref.	
2	155.47	510.1	303.0
3	175.54	575.9	338.0
4	95.73	314.1	035.9

FIGURE 2-2

CFRB - TORONTO, ONTARIO

50 kW DA-2 1010 kHz

SKETCH SHOWING TOWER LOCATIONS AND PROPOSED GROUND SYSTEM

Approximate Scale: 1 cm = 30 m

0 50 100 150 m

Elder Engineering Inc. February 1997

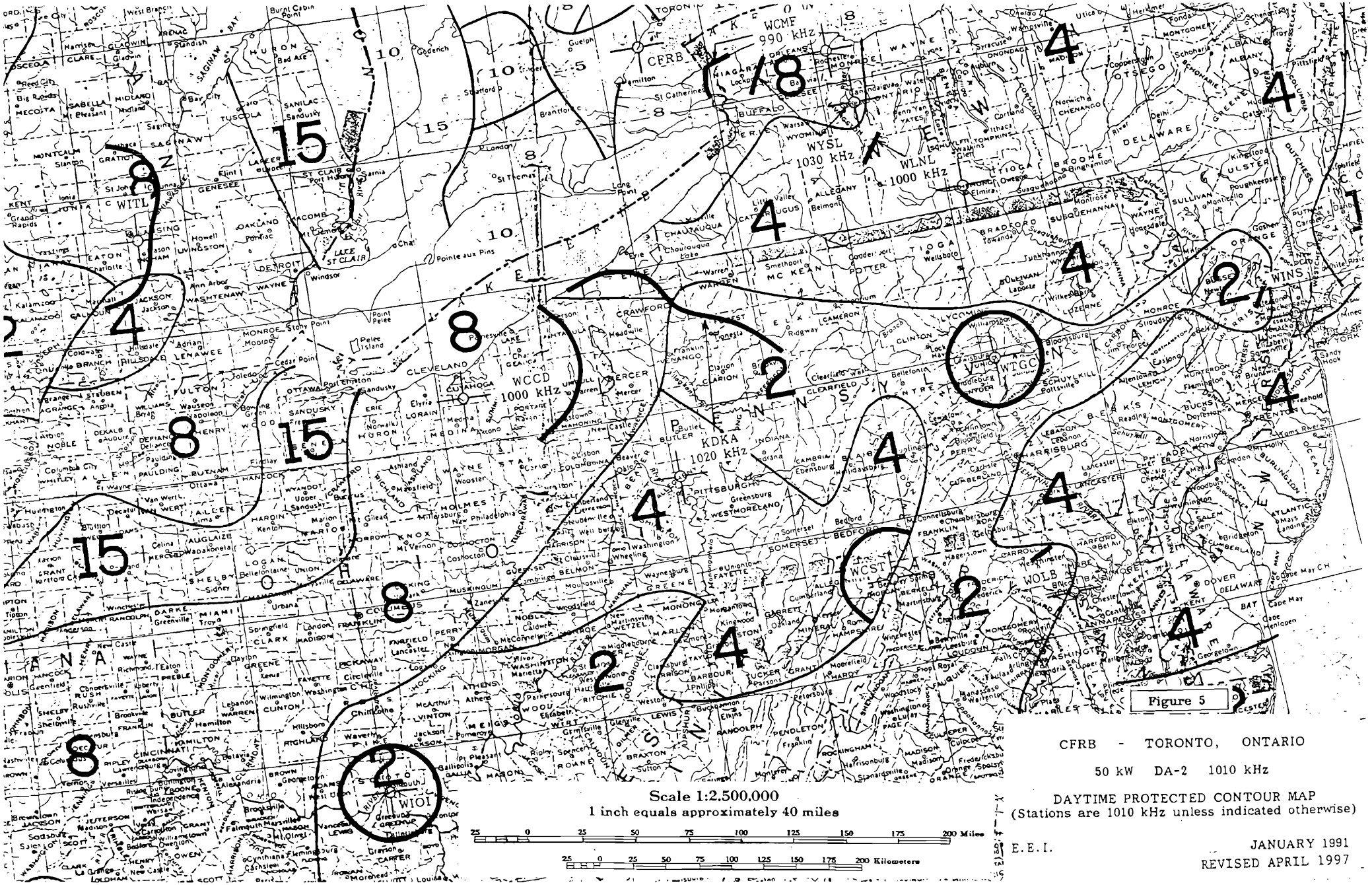


Figure 5

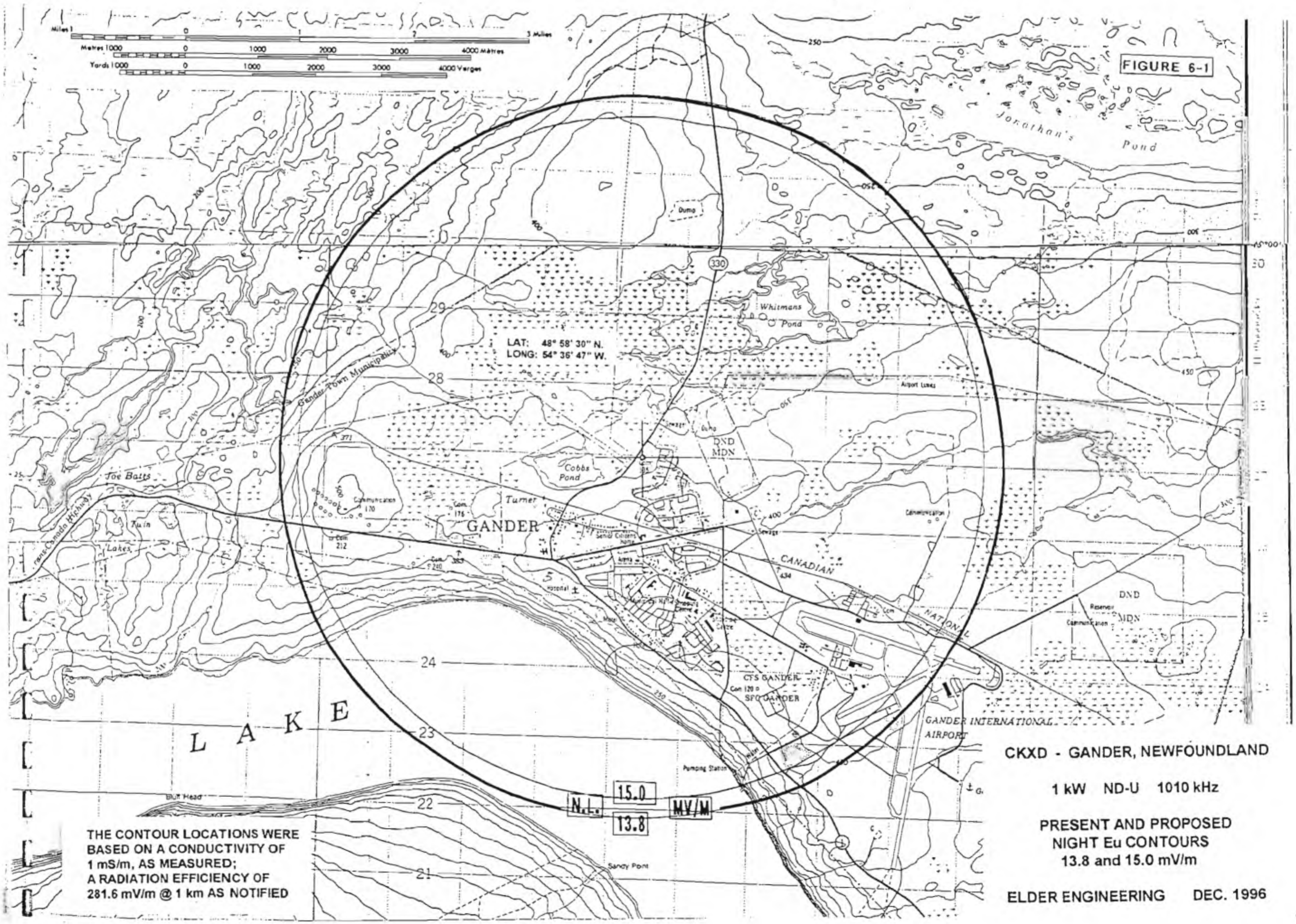
CFRB - TORONTO, ONTARIO

50 kW DA-2 1010 kHz

DAYTIME PROTECTED CONTOUR MAP
(Stations are 1010 kHz unless indicated otherwise)

E.E.I.

JANUARY 1991
REVISED APRIL 1997



CKXD - GANDER, NEWFOUNDLAND

1 kW ND-U 1010 kHz

PRESENT AND PROPOSED NIGHT Eu CONTOURS 13.8 and 15.0 mV/m

ELDER ENGINEERING DEC. 1996

THE CONTOUR LOCATIONS WERE BASED ON A CONDUCTIVITY OF 1 mS/m, AS MEASURED; A RADIATION EFFICIENCY OF 281.6 mV/m @ 1 km AS NOTIFIED

ATTACHMENT A

MEMORANDUM OF UNDERSTANDING

Exhibit 1-1

This MEMORANDUM OF UNDERSTANDING ("Memorandum") is made and entered into this 29th day of May, 1992, between GROUP W RADIO, INC., owner, operator and licensee of AM Station WINS, New York, New York ("Group W") and STANDARD RADIO INC., owner, operator and licensee of AM Station CFRB, Toronto, Canada ("Standard").

WHEREAS, Stations WINS and CFRB are co-channel stations operating on the same frequency of 1010 kHz, the use of which is governed by the provisions of the AGREEMENT BETWEEN THE GOVERNMENT OF THE UNITED STATES OF AMERICA AND THE GOVERNMENT OF CANADA RELATING TO THE AM BROADCASTING SERVICE IN THE MEDIUM FREQUENCY BAND ("Treaty"), entered into between the Governments of the United States and Canada on January 17, 1984; and

WHEREAS, Group W and Standard each desire to make changes in operation of their respective stations which require modifications to the operating parameters of each station as presently specified in the Treaty; and

WHEREAS, Group W and Standard each believe that these changes in the operating parameters are in the best interest of their listening audiences and will promote the more efficient utilization of the frequency by both the United States and Canada under the Treaty; and

WHEREAS, Group W is willing to undertake certain arrangements with another United States station operating on the frequency in order to reduce interference to other stations and further Station CFRB's use of the frequency.

NOW, THEREFORE, in exchange for the mutual commitments contained herein and other good and valuable consideration, receipt of which is hereby acknowledged by Group W and Standard, Group W and Standard hereby agree as follows:

Article I

Notification of Revised Operating Parameters

1.1. Group W and Standard agree to seek the concurrence and approval of their respective Governments to the modification of the Treaty to incorporate the revised operating parameters for Station WINS and Station CFRB set forth in Schedule 1 and Schedule 2 attached hereto. To this end, each Party shall use reasonable efforts to induce its respective Government to give appropriate notification under the Treaty to the other Government specifying the revised operating parameters governing the Party's station and to signify Governmental agreement to the revised operating parameters similarly notified by the other Government for the other Party's station. Each Party shall also use reasonable efforts to induce its Government to give appropriate notification of the station's revised operating parameters, to the extent required, to the International Frequency Registration Board.

1.2. During the term of this Memorandum, neither Group W nor Standard shall take any action with respect to the respective operation of Station WINS or Station CFRB which would prevent or impede the performance of their obligations under this Memorandum.

1.3. Group W and Standard agree to mutually cooperate with each other in fulfilling the terms of this Memorandum. Each Party shall be solely responsible for dealing with the agencies and instrumentalities of its Government and shall, when requested, cooperate with the other Party in securing the necessary consents and approvals of the other Party's Government.

Article II

Associated United States Frequency Changes

2.1. As a prerequisite to and in order to permit the modification in operating parameters of Station CFRB specified in Schedule 2, Group W agrees to endeavor to induce AM Station KBIS, Little Rock, Arkansas, which also operates on the frequency of 1010 kHz, to discontinue operation and relinquish its license to use the frequency pursuant to procedures recently adopted by the United States Federal Communications Commission ("FCC") in MM Docket No. 89-46. Group W will use reasonable efforts to negotiate an acceptable arrangement with Station KBIS providing for the relinquishment of the KBIS license in return for the payment of compensation by Group W, provided that Group W shall not be obligated to compensate Station KBIS in an amount deemed unreasonable in the sole judgment of Group W for the relinquishment of its license. Group W shall have no obligation under this Memorandum to make such payment until such time as it has received from the FCC a construction permit through a Final Order no longer subject to review, reconsideration or appeal by the FCC or any court with jurisdiction to review said Order, fully

effectuating the modified operating parameters for Station WINS set forth in Schedule 1.

2.2. It is expressly understood that the negotiation of an acceptable arrangement with Station KBIS is a prerequisite to the seeking of revised operating parameters for Station WINS and Station CFRB as provided in Article I. Except as to applications already on file with an agency or instrumentality of the Party's Government or other notifications or actions that are expressly required by law, Group W or Standard shall not disclose the terms of this Memorandum or the intended changes to be sought in the Treaty (except to Station KBIS as may be required in the sole judgment of Group W in the furtherance of the negotiation of an acceptable arrangement) to any other person or entity until such time as Group W has entered into a definitive arrangement with Station KBIS, subject only to FCC and other necessary Government approvals, as contemplated in paragraph 2.1. It is the intent of the Parties that the consummation of all actions and transactions contemplated hereunder will be mutually contingent upon each other.

2.3. Should Group W after undertaking due efforts be unable to negotiate an acceptable arrangement for the relinquishment of license of Station KBIS in a reasonable period following execution of this Memorandum, Group W may at its option cancel this Memorandum with no liability or obligation to Standard under Article IV of this Memorandum.

Article III

Cost of Modification of Facilities

3.1. All costs and expenses associated with the planning, construction and implementation of each station's modified facilities in furtherance of the operating parameters set forth in Schedules 1 and 2 shall be borne exclusively by the respective licensee of each station. No obligation is imposed by this Agreement on either Group W or Standard to pay for the cost of modification of facilities of the other Party's station, including all associated legal, engineering and other consulting costs, or to compensate the other Party for such costs. Except as expressly set forth in Article II and IV of this Memorandum, each Party shall also bear all of its costs associated with the effectuation of this Memorandum and the acquiescence of its Government to the modified operating parameters for Station WINS and Station CFRB set forth in Schedule 1 and 2.

Article IV

Cancellation of Memorandum

4.1. If the modifications to the Treaty contemplated by this Memorandum are not obtained within three years from the date of this Memorandum, this Memorandum may be cancelled by either Party on thirty days written notice to the other Party with no liability or obligation to the other Party. Furthermore, this Memorandum may be cancelled at any time during the first three years on thirty days written notice to the other Party, provided that the Party so canceling the Memorandum reimburses the other

Party for its reasonable legal, engineering and other expenses, including without limitation, any payments or expenses relating to the relinquishment of the KBIS license, incurred to date of cancellation in seeking to implement the terms of this Memorandum.

Article V

Regulatory Approvals and other Terms

5.1. Each Party's obligation to implement the terms of this Memorandum shall be subject to whatever regulatory or Governmental approval may be required from the agencies or instrumentalities of the Party's respective Government, specifically including as to Group W, the FCC and the Department of State of the United States and, as to Standard, the Canadian Radio-Television and Telecommunications Commission, and the Department of Communications of the Government of Canada.

5.2. The construction and performance of all obligations imposed by this Memorandum shall be governed by the laws of the State of New York, without giving effect to the choice of law provisions thereof, except as to any question involving the rights, obligations or limitations of the Party's ability to deal with the agencies and instrumentalities of its respective Government, in which case the laws of that Governmental entity shall apply.

5.3. This Memorandum may be executed in one or more counterparts, each of which shall be deemed an original and all

of which, when taken together, shall constitute one in the same instrument.

5.4. This Memorandum embodies the sole understandings between Group W and Standard and is expressly intended to supersede any prior understanding, agreement, exchanges of correspondence, written or oral, between the Parties. This Memorandum may be modified only upon the written agreement of both parties, duly executed by both parties.

IN WITNESS HEREOF, the Parties have executed this Memorandum of Understanding on the day and year written above.

GROUP W RADIO, INC.

WITNESS

By: _____

VICE PRESIDENT
Title

WITNESS

STANDARD RADIO INC.

By: _____

VICE PRESIDENT AND GENERAL MANAGER
Title

FREQ KHZ	INDICATIF D'APPEL	PY	LATITUDE	LONGITUDE	PUIS (KW)	HRES	DIR	CL	S	HAUTEUR ELECT (DEG)	RMS (MV/M)	ET PR	VILLE	FACTEUR Q (MV/M)	NOT
FREQ KHZ	CALL SIGN	CT	LATITUDE	LONGITUDE	POWER (KW)	HRS	DIR	CL	S	ELECT HT (DEG)	RMS (MV/M)	ST PR	CITY	Q-FACTOR (MV/M)	NOT

NO. DE TOUR	RAPPORT CHAMPS	PHASE (DEGREES)	ESPACEMENT (DEGREES)	ORIENTATION (DEGREES)	HAUT. ELECT (DEGREES)	DONNEES POUR ANTENNES A CHARGE TERMINATE (T) OU SECTIONALISEES(S)
TOWER NUMBER	FIELD RATIO	PHASING (DEGREES)	SPACING (DEGREES)	ORIENTATION (DEGREES)	ELECT. HT (DEGREES)	TOP-LOADED(T) OR SECTIONALIZED(S) ANTENNA DATA
1010	CFRB	CA	43-30-15 N	79-37-52 W	50.0 N	D A P	2800.00 ON TORONTO 186.35
1	1.120	4.9	0.0	0.0	203.0	
2	1.000	0.0	188.56	303.0	203.0	
3	1.280	280.0	212.9	338.0	203.0	
4	1.270	284.0	116.1	35.9	202.0	

AUG # / AUG #	AZIMUTH AZIMUTH (DEG)	ARC SPAN (DEG)	RAYONNEMENT RADIATION (MV/M)	AUG # / AUG #	AZIMUT AZIMUTH (DEG)	ARC SPAN (DEG)	RAYONNEMENT RADATION (MV/M)
1	106.0	15.0	405.0	5	256.0	34.0	1100.0
2	147.0	26.0	405.0	6	293.0	10.0	547.0
3	178.0	20.0	570.0	7	303.0	12.0	520.0
4	190.0	20.0	729.0	8	313.0	14.0	553.0

1010 CFRB

AUG # / AUG #	AZIMUT AZIMUTH (DEG)	ARC SPAN (DEG)	RAYONNEMENT RADIATION (MV/M)	AUG # / AUG #	AZIMUT AZIMUTH (DEG)	ARC SPAN (DEG)	RAYONNEMENT RADATION (MV/M)

FREQ KHZ	INDICATIF D'APPEL	PY	LATITUDE	LONGITUDE	PUIS (KW)	HRES	DIR	CL	S	HAUTEUR ELECT (DEG)	RMS (MV/M)	ET PR	VILLE	FACTE .. Q (MV/M)	NOT
FREQ KHZ	CALL SIGN	CT	LATITUDE	LONGITUDE	POWER (KW)	HRS	DIR	CL	S	ELECT HT(DEG)	RMS (MV/M)	ST PR	CITY	Q-FACTOR (MV/M)	NOT

NO. DE TOUR	RAPPORT CHAMPS	PHASE (DEGREES)	ESPACEMENT (DEGREES)	ORIENTATION (DEGREES)	HAUT. ELECT (DEGREES)	DONNEES POUR ANTENNES A CHARGE TERMINATE (T) OU SECTIONALISEES(S)
TOWER NUMBER	FIELD RATIO	PHASING (DEGREES)	SPACING (DEGREES)	ORIENTATION (DEGREES)	ELECT. HT (DEGREES)	TOP-LOADED(T) OR SECTIONALIZED(S) ANTENNA DATA

1010	WINS	US	40-48-14N	74-06-24W	50.00	D	D	B	P	2496.96	NY NEW YORK 70.71
1.	1.0000		0.0000	0.0000	0.0000	147.9					
2.	0.8400		115.7000	90.0000	317.0000	147.9					
3.	0.9300		104.1000	100.0000	234.0000	147.9					
4.	0.7000		-142.6000	142.5000	272.8000	147.9					
5.	0.1000		-111.5000	100.3000	104.5000	90.0					

AUG # AUG #	AZIMUT AZIMUTH (DEG)	ARC SPAN (DEG)	RAYONNEMENT RADIATION (MV/M)	AUG # AUG #	AZIMUT AZIMUTH (DEG)	ARC SPAN (DEG)	RAYONNEMENT RADATION (MV/M)
1.	194.5	20.0	320.0	4.	294.0	30.0	260.0
2.	249.0	40.0	220.0	5.	357.0	30.0	600.0
3.	274.0	24.0	300.0				

1010	WINS	US	40-48-14N	74-06-24W	50.00	N	D	B	P	2439.47	NY NEW YORK 70.71
1.	1.0000		0.0000	0.0000	0.0000	147.9					
2.	1.0700		95.4000	90.0000	317.0000	147.9					
3.	1.2000		86.6000	100.0000	234.0000	147.9					
4.	1.2800		182.0000	142.5000	272.8000	147.9					

AUG # AUG #	AZIMUT AZIMUTH (DEG)	ARC SPAN (DEG)	RAYONNEMENT RADIATION (MV/M)	AUG # AUG #	AZIMUT AZIMUTH (DEG)	ARC SPAN (DEG)	RAYONNEMENT RADATION (MV/M)
1.	265.0	40.0	225.0	3.	296.0	30.0	150.0
2.	280.0	32.0	210.0	4.	336.0	28.0	200.0