ENGINEERING BRIEF

In Support of an Application for a
Power Increase for Private
Commercial Broadcasting Station CFGM

Applicant:	CFGM Broadcasting Limited
Proposed Operation:	1310 kc/s, 50 kw, DA-2, Class III
Engineers and Attorneys:	Hoyles, Niblock and Associates Vancouver, Canada
Project:	6103-3
Date:	February 1967

Revised March 31/'67

WRD

AN ENGINEERING BRIEF
SUPPORTING AN APPLICATION FOR POWER INCREASE FOR PRIVATE COMMERCIAL BROADCASTING STATION CFGM

INTRODUCTION

Hoyles, Niblock and Associates have been commissioned by CFGM Broadcasting Limited to engineer a 50 kw unlimited private commercial broadcasting installation for Radio Station CFGM to provide improved service in the central part of southern Ontario.

DISCUSSION

Radio Station CFGM operates from studios in Richmond Hill with a transmitter site in Vaughan Township a few hundred yards from the northern limit of Metropolitan Toronto.

Due to the great increase in population in this area of southern Ontario and the greatly elevated noise levels, CFGM finds it necessary to apply for permission to increase its power.

In order to be able to meet all the requirements of the Department of Transport it was necessary to relocate the transmitter site south-west from its original location. However, this Brief will demonstrate that all relevant requirements of the Department will be satisfied from this new site.

DAYTIME INTERFERENCE

The protection requirements for CFGM as the result of the operation

AN ENGINEERING BRIEF
SUPPORTING AN APPLICATION FOR POWER INCREASE
FOR PRIVATE COMMERCIAL BROADCASTING STATION CFGM

INTRODUCTION

Hoyles, Niblock and Associates have been commissioned by CFGM Broadcasting Ltd. to engineer a 50 kw unlimited private commercial broadcasting installation for Radio Station CFGM, to serve North York township in southern Ontario.

DISCUSSION

Radio Station CFGM serves North York township and adjacent areas including the City of North York. Due to the great increase in population in this area of southern Ontario, and the every increasing tendency to create large sprawling suburbs around major cities, CFGM finds it necessary to apply for permission to increase their power to serve their listeners who have moved out to these suburbs, and brought with them the greatly elevated electrical noise levels. In order to be able to meet all the requirements of the Department of Transport, it was necessary to relocate the site somewhat distant from the original site. However, it will demonstrate that all relevant requirements of the Department will be satisfied from this site.

DAYTIME INTERFERENCE

The protection requirements for CFGM as the result of the operation

of station CKOY, Ottawa, Ontario, on 1310 kc/s, station CKWW, Kitchener, Ontario, on 1320 kc/s and station WMMJ, Lancaster, New York, on 1300 kc/s are listed in the appendix.

The conductivities used in calculating the limits to CKOY were established by G.W. Lee, P.Eng. A summary of Mr. Lee's work is included as an appendix to this report.

The 50 kw daytime radiation pattern has been designed so as to meet all the protection requirements listed above. The actual radiation at each azimuth plotted on rectangular graph paper in the critical sectors is included in the appendix.

NIGHTTIME INTERFERENCE

The nighttime radiation pattern has been designed to limit the sky-wave radiation towards the following co-channel stations.

CKOY	Ottawa, Ontario
WDOD	Chattanooga, Tennessee
WISE	Asheville, North Carolina
WDXI	Jakson, Tennessee
WGH	Newport News, Virginia
WTIK	Durhan, North Carolina
WRR	Dallas, Texas
WIBA	Madison, Wisconsin
WIFE	Indianapolis, Indiana
WCAM	Camden, New Jersey
WTTL	Madesonville, Kentucky
WKNR	Dearborn, Michigan
WTLB	Utica, New York

WJLK	Asbury Park, New Jersey
WORC	Worchester, Massachusetts
WEEL	Fairfox, Virginia
WICH	Norwich, Connecticut
CHGB	St. Anne-de-la-Pocatiere, Quebec

In each case the protection has been afforded to the nighttime interference limit of the station.

Groundwave protection has also been afforded CKWW, Kitchener, Ontario to its 0.5 mv/m contour.

Included in the appendix is a tabulation of the protection requirements and the proposed radiations.

The nighttime limitation of CFGM has been established by existing co-channel stations at 12.4 mv/m.

ANTENNA SYSTEM RADIATION CHARACTERISTICS

The proposed antenna system will consist of eleven, uniform cross-section, insulated, series fed steel towers. Ten of these towers will be used to achieve the nighttime pattern and nine will be used for daytime operation.

The array design was formulated after the method of Carl E. Smith, whose simplified design procedure was followed. In the procedure:

$$E = \sum_{k=1}^{k=P} E_k \, f_k(\theta) \, B_k$$

Where $f(\theta) = \dfrac{\text{Cos}(G \text{ Sin } \theta) - \text{Cos } G}{(1 - \text{Cos } G) \text{ Cos } \theta}$

and $B_k = S_k \text{ Cos } \theta \text{ Cos } (\phi - \phi) + \mu_k$

p = 9 or 10 as specified above

The symbols used above are defined by Smith in his publication.

While the protection requirement for the nighttime pattern extend over a wide angle the actual value of allowable radiation is reasonably high.

There are several stations, which subtented only a small angle, at which the allowable radiation is a few db greater than -34 db of the maximum. While it is recognized that this degree of supression may normally be difficult to achieve, there are several factors in regards to this installation which lead us to the conclusion that the radiation patterns proposed herein can be initially obtained and subsequently maintained. Our experience has shown that grounded metallic structure such as power lines re-radiate a signal of not

more than -40 db of the illuminating field. Therefore to produce a re-radiated one mile field of 10 mv/m an object would have to be illuminated by at least 1 v/m. In this proposed installation there are only a minimal number of structures within the 1 v/m contour and the client is prepared to take any remedial action necessary to reduce the re-radiation off these or any other offending structures should this course of action prove to be necesssry. It is also relevant to note that during the recently conducted proof of performance for station CHFI-AM, which is located in the same general area as the proposed plant, many potential re-radiating structures were investigated and detuned. Our firm's recent success in adjusting the nine tower array at station CJOE, London, Ontario, further demonstrates that the proposed designs are feasible. It is also our intention that special construction technqiues contemplated at this plant and the equpiment design will ensure that array stability of a very high order will be achieved.

Data has been drawn from the works of Mr. George Mather, P. Eng., in estimating the radiation efficiencies of these antenna system elements. Using tower heights of 120°, 2% transmission line and 3% phasing system losses, the radiation efficiency of the array was calculated as 1317 mv/m per mile unattenuated for 50 kw both night and day.

ANTENNA SYSTEM IMPEDANCE AND POWERS

The array self and mutual impedances are derived from the publications of Carl E. Smith, G.H. Brown, G. Mathers,and Hoyles Niblock and Associates.

Tower Self Impedances was determined to be:

250 + j300 ohms (for all towers)

The Mutual Impedances were determined to be:

$Z_{12} = Z_{13} = Z_{14} = Z_{45} = Z_{67} = Z_{78} = Z_{89} = Z_{9,10} =$ $72/\underline{-210°}$

$Z_{16} = Z_{27} = Z_{38} = Z_{49} = Z_{5,10} = Z_{8,11} =$ $155/\underline{-45°}$

$Z_{13} = Z_{24} = Z_{35} = Z_{68} = Z_{79} = Z_{8,10} =$ $37/\underline{-80°}$

$Z_{14} = Z_{25} = Z_{69} = Z_{7,10} =$ $22/\underline{+40°}$

$Z_{15} = Z_{6,10} =$ $18/\underline{+160°}$

$Z_{17} = Z_{28} = Z_{39} = Z_{4,10} = Z_{26} = Z_{37} = Z_{48} =$

$Z_{59} = Z_{11,9} = Z_{11,7} =$ $69/\underline{-215°}$

$Z_{18} = Z_{29} = Z_{3,10} = Z_{36} = Z_{47} = Z_{58} = Z_{11,6} =$ $36/\underline{-85°}$

$Z_{19} = Z_{2,10} = Z_{57} = Z_{46} =$ $22/\underline{+40°}$

$Z_{1,10} = Z_{56} =$ $18/\underline{+160°}$

$Z_{11,3} =$ $100/\underline{-130°}$

$Z_{11,4} =$ $62/\underline{+100°}$

$Z_{11,1} =$ $34/\underline{-100°}$

TOWER OPERATING IMPEDANCES AND POWERS

From data of Brown and Mathers, base operating impedances have been calculated for each tower of the anntenna system. From these values, tower powers have been calculated.

Base Operating Impedances

Tower	Day Impedance	Night Impedance
1	213.7 + j393.8	210.3 + j339.1
2	232.6 + j356.2	221.0 + j369.7
3	201.3 + j426.6	230.1 + j377.5
4	266.9 + j326.8	221.8 + j360.0
5		223.1 + j320.0
6	98.7 + j330.9	63.0 + j338.5
7	72.5 + j321.9	84.9 + j326.1
8	104.1 + j349.8	89.7 + j317.4
9	42.2 + j306.0	76.8 + j326.9
10		47.7 + j331.5
11	249.6 + j186.0	

Tower Currents and Powers

Tower	Day Current (amps)	Day Power (watts)	Night Current (amps)	Night Power (watts)
1	3.87	3150	2.66	1490
2	7.61	13300	6.75	10060
3	8.54	14400	8.49	16550
4	3.86	3900	5.62	7020
5			1.91	820
6	3.80	1400	2.66	470
7	7.71	4200	6.92	4060
8	9.16	9500	8.70	6790
9	7.61	600	5.77	2560
10			1.97	180
11	1.31	-430		
Total Power		50,020		50,000

SOURCES OF INFORMATION

(a) Pertinent information with respect to broadcasting facilities was obtained from publications of the Department of Transport, Ottawa, and the FCC, Washington. This information was based on data contained in revisions up to and including:

Department of Transport Allocations Maps dated 28/11/66
FCC List of Assignments dated 8/6/66
Canadian Notifications List No. 221
United States Notification List No. 1195

(b) Distances were calculated on a Univac 1107 computer using standard spherical trigonometric procedures or measured on equal area projection maps of the Canadian Department of Mines and Technical Surveys; the National Geographic Society; or the U. S. Coast and Geodetic service. Bearings were calculated on a Univac 1107 computer using standard spherical trigonometric procedures or were measured on Lambert conformal polyconic projection maps.

(c) Ground conductivity data were assembled from field strength measurements made by G. W. Lee and Associates on Station CJBC in Toronto. These data were further

augmented as necessary by reference to FFC map M3 and the Department maps of ground conductivity in Canada.

(d) Calculations relevant to skywave field intensities were predicated on Department of Transport Specification No. 7.

STANDARDS OF PERFORMANCE

Blanketing

There are approximately 75 residences enclosed within the 1 v/m contour of this proposed station. The successful operation of a number of other AM plants in this general area (e.g. CJBC, CBL, CHIN, CHFI, CFRB and CHUM) would indicate that residences within this contour will not be affected by the operation of the proposed plant.

Notwithstanding the above consideration, CFGM Broadcasting Ltd. are prepared to install appropriate devices in radio receivers in those dwellings situated within the 1 v/m contour experiencing blanketing resulting from the operation of this plant.

Using data contained in the 1961 Census, the dwellings enclosed within the daytime and nighttime 250 mv/m contour has been determined to be less than 2500. These figures represent less than

the 10,000 persons allowed under Broadcast Procedure No. 1, Rule 2 for a 50 kw installation.

Intermodulation Interference

The calculated field at the center of the CHFI array is 195 mv/m during the day and 23 mv/m at night. The field intensity established at CHFI by the operationof CHIN is 0.9 v/m. The field established at the CHFI site by CBL and CJBC is 170 mv/m. Since the fields will add in an RMS manner the contribution to the field at CHFI resulting from the proposed CFGM plant will be inconsequental. The generated field at CHIN by the proposed operation of CFGM will be approximately 200 mv/m. This is approximately the field generated at the site by the operation of CBL and CJBC and will not affect the operation of CHIN or cause unacceptable radiation of the CFGM signals since the CHIN towers are electrically short at the CFGM operating frequency.

It is relevant to note that station CFRB in Toronto is within the 1000mv/m contour of station CHUM. In this situation the frequency separation is only 40 kc/s and no objectionable intermodulation has resulted.

It should also be noted that the incident field established by CHFI at the proposed CFGM plant is very low (the theoretical pattern

shows a null) and therefore the re-radiation from the proposed towers will in no way affect the radiation pattern of CHFI.

In the unlikely event that intermodulation results from the operation of the proposed plant CFGM Broadcasting Ltd. is prepared to underwrite the cost of installing filter at the offended plant should this be demonstrated to be necessary.

Harmonic Interference

There is no broadcasting service utilizing the second harmonic of the proposed 1310 kc/s frequency.

Oscillator Radiation Interference

The present operation of CFGM on 1310 kc/s has not resulted in any complaints of oscillator radiation interference and, therefore, the likelyhood of this problem arising from the operation of the proposed plant is minimal. The applicant is prepared to investigate any complaints of oscillator radiation interferences and will assume full financial responsibility for the remedial measures.

EQUIPMENT

The 50 kw transmitter and associated equipment proposed for this installation will meet or exceed the requirements of Broadcast Specification 3 and be of a type technically acceptable to the Department of Transport.

INSTALLATION

The requirements of good engineering practise and provisions of the Department of Transport, Canadian Standards Association, and the Province of Ontario and other relevant regulatory agencies will be observed in the erection of the proposed facilities.

QUALIFICATIONS OF ENGINEERS

The qualifications of the engineers participating in the preparation of this engineering brief are on file with and have been accepted by the Department of Transport, Ottawa, Ontario.

HOYLES, NIBLOCK AND ASSOCIATES

Roy B. Sandberg, P. Eng.

H. Grant McCormick, P. Eng.

Peter A. Niblock, P. Eng.

CORRECTED

DESCRIPTION SHEET
Directional Antenna System

Station: CFGM — Main Studio: Richmond Hill, Ontario

Frequency: 1310 kc/s — Power: 50 kw

Time: Unlimited — Class: III

Notification List No. 224 — Date: April 7, 1967

Geographic Location: 43° 34' 30" N. Latitude
79° 41' 05" W. Longitude

ANTENNA SYSTEM: Mode of Operation DA-2

HEIGHT: The array consist of 11 towers 250' (120° electrical) high with overall height of 255' for each tower.

SPACING: The array consists in part of two rows of 5 towers each. Spacing between towers in each row is 504' (241°) and between rows 167' (80°). The axis of the rows is on a bearing of 110° T and the tower pairs forming the rows lie on a bearing of 20° T. The 11th tower lies 167' (80°) on an azimuth 200° T from Tower No. 9.

TOWER PARAMETERS:

	Day		Night	
Tower	Current Ratio	Current Phase	Current Ratio	Current Phase
1			0.975	-102.726°
2	1.001	-74.323°	2.471	-111.470°
3	1.969	-93.554°	3.106	-114.984°
4	2.204	-93.772°	2.060	-117.239°
5	0.996	-108.555°	0.702	-115.398°
6			1.000	0.000°
7	0.980	33.900°	2.534	-8.744°
8	1.990	12.238°	3.186	-12.258°
9	2.366	19.978°	2.113	-14.513°
10	1.000	-0.194°	0.720	-12.672°
11	0.340	189.000°		

APPROVED

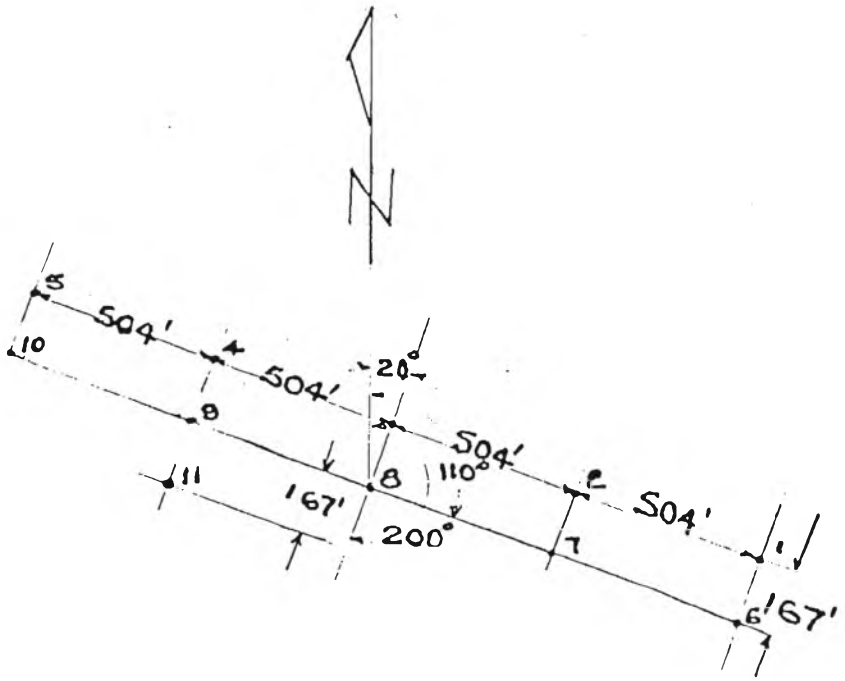
AUG 2 1978

HOYLES, NIBLOCK AND ASSOCIATES | CONSULTING ENGINEERS

GROUND SYSTEM: The ground system will consist of 120, 0.4λ radial No. 10 soft copper about each tower, shortened as required between towers.

PREDICTED FIELD: 1317 mv/m unattenuated at 1 mile for 50 kw

186 mv/m unattenuated at 1 mile for 1 kw



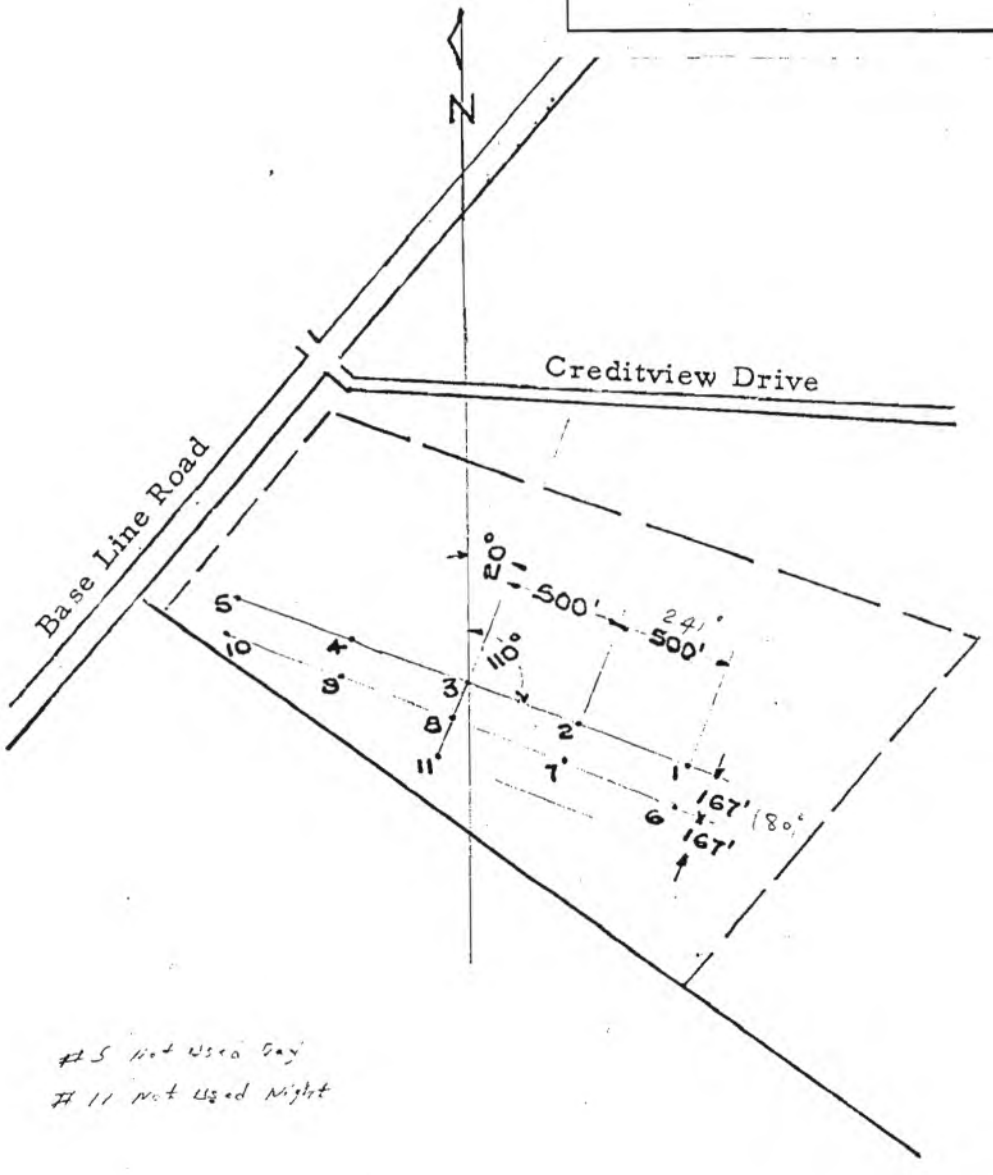
Note: Please retain the radiation patterns previously notified for this station and attach to this corrected description sheet. These revisions concern only a change in the location of one tower. The radiation patterns are not affected

HOYLES, NIBLOCK AND ASSOCIATES
TELECOMMUNICATIONS CONSULTING ENGINEERS AND ATTORNEYS
3110 BOUNDARY ROAD • VANCOUVER 12, B.C., CANADA

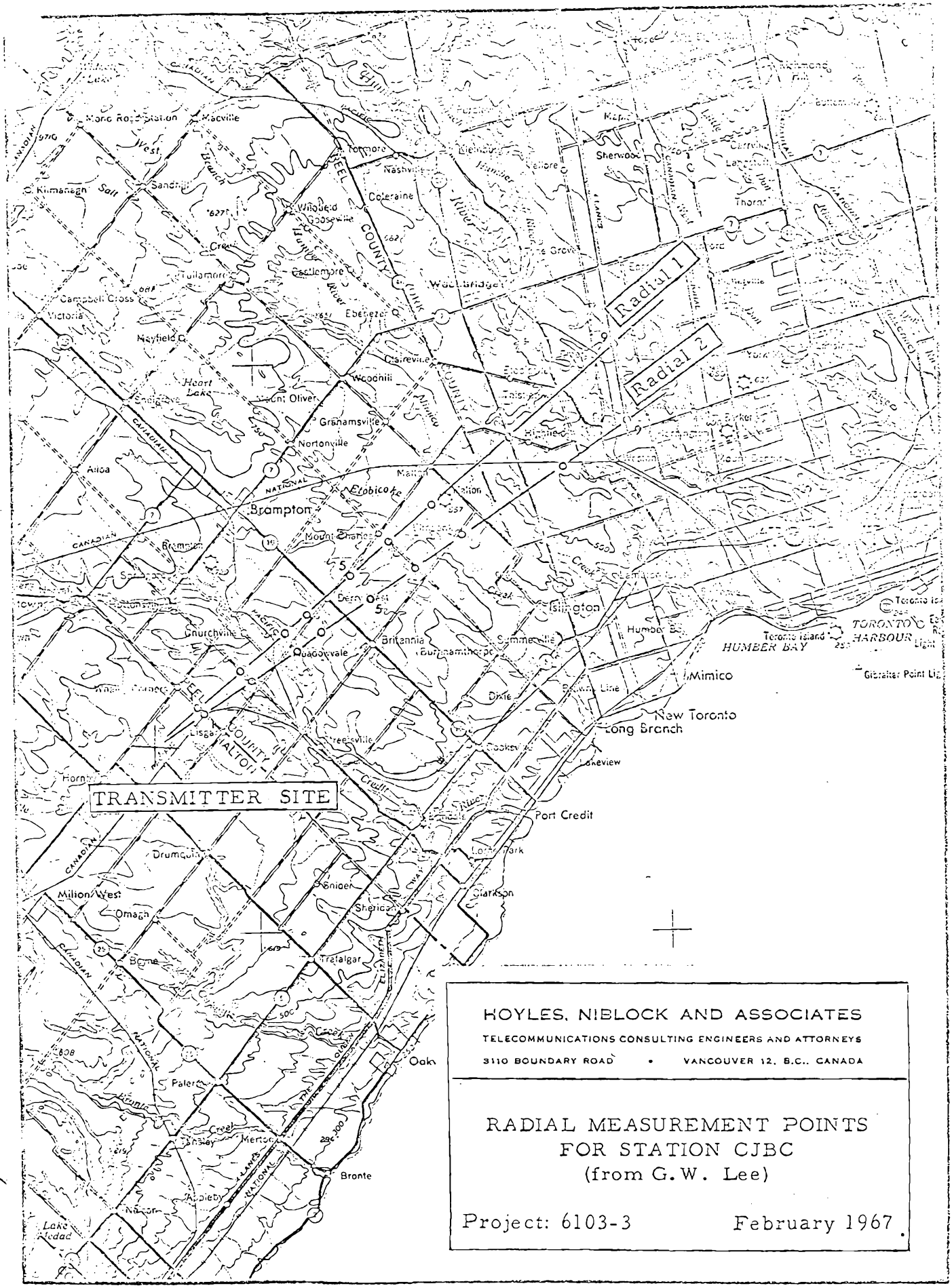
SITE PLAN

Station CFGM
CFGM Broadcasting Limited

1310 kc/s, 50 kw, DA-2, Class III
Project: 6103-3 February 1967



#5 Not Used Day
#11 Not Used Night



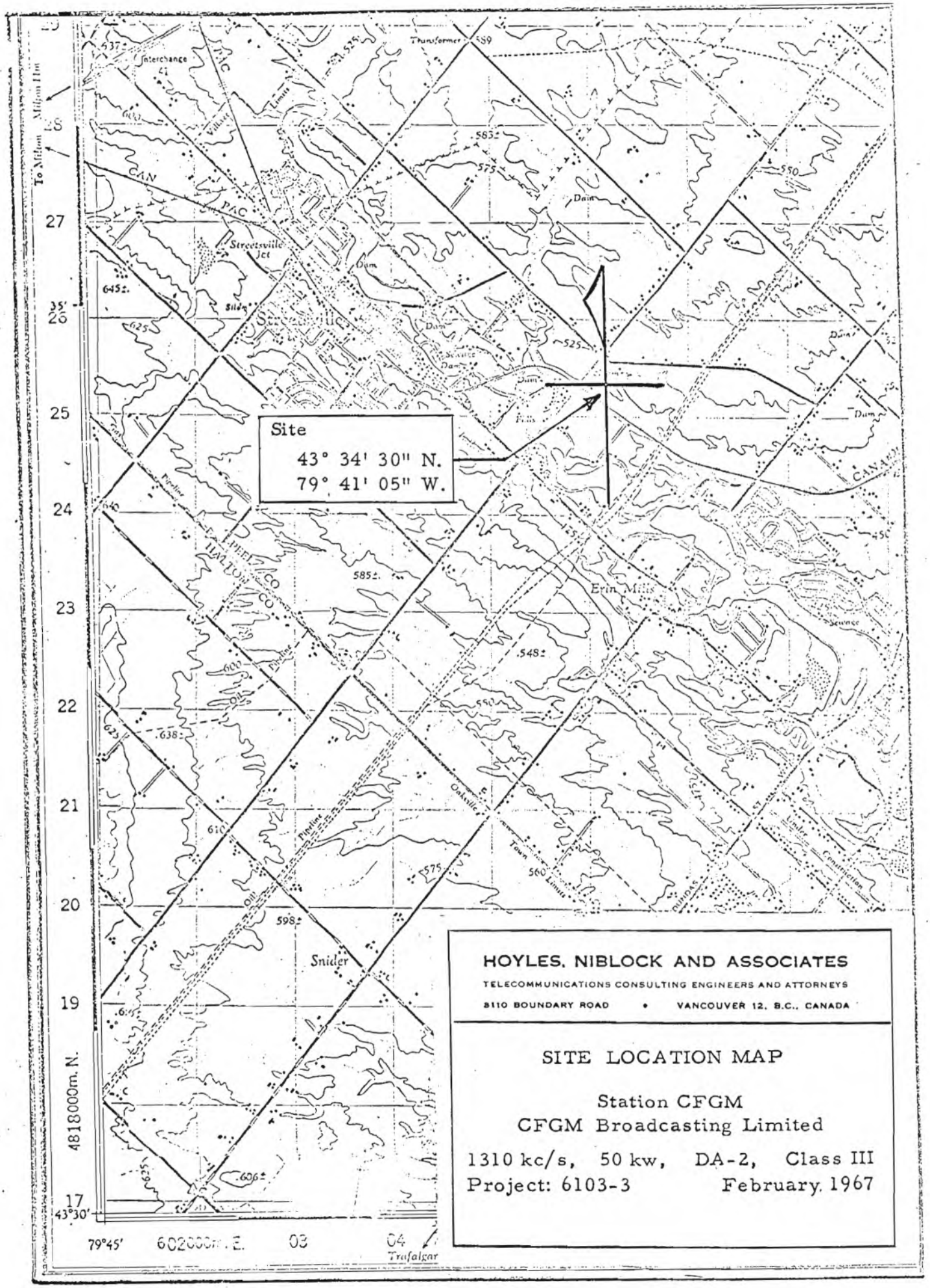
HOYLES, NIBLOCK AND ASSOCIATES

TELECOMMUNICATIONS CONSULTING ENGINEERS AND ATTORNEYS

3110 BOUNDARY ROAD • VANCOUVER 12, B.C., CANADA

RADIAL MEASUREMENT POINTS FOR STATION CJBC (from G.W. Lee)

Project: 6103-3 February 1967



HOYLES, NIBLOCK AND ASSOCIATES

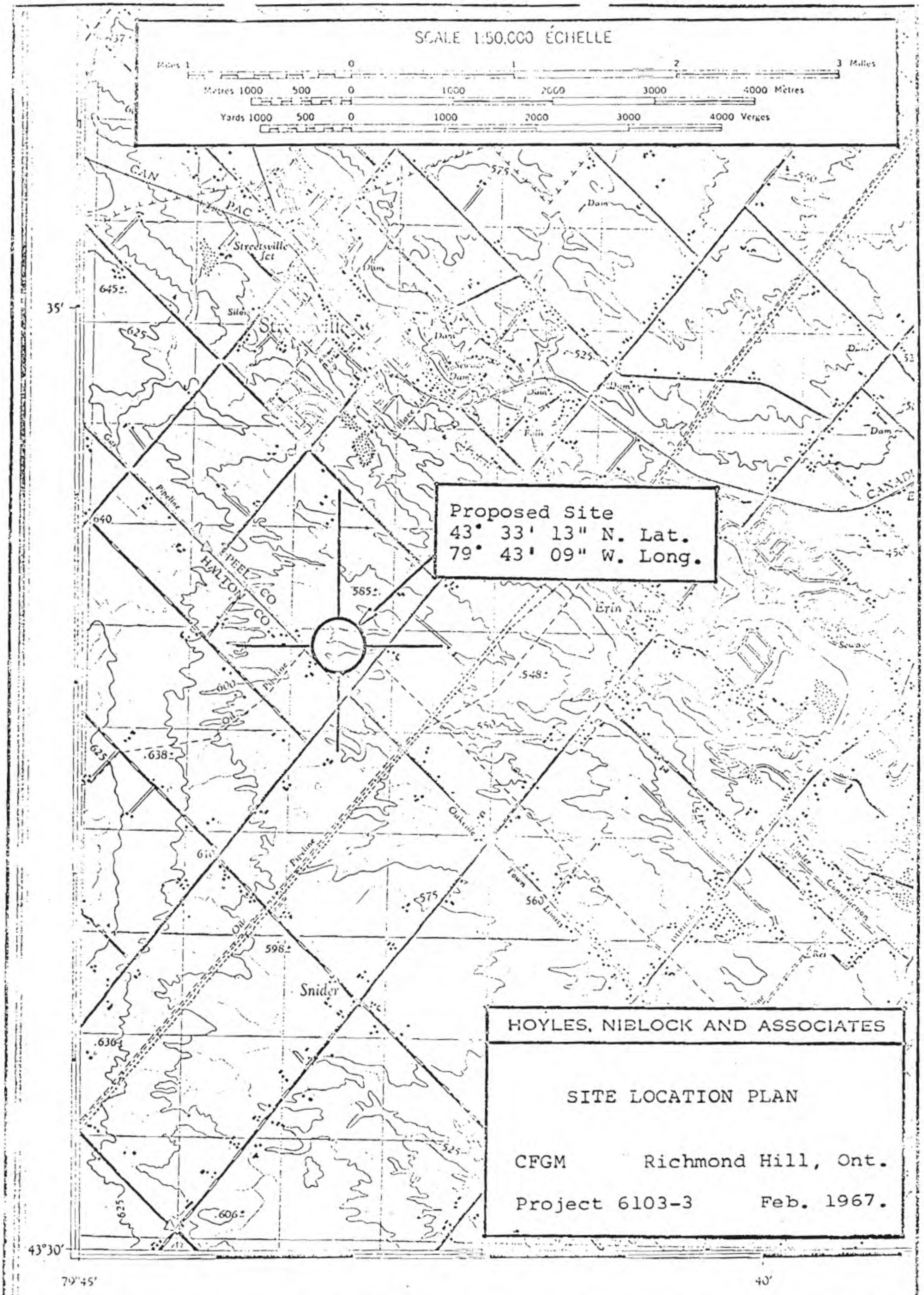
TELECOMMUNICATIONS CONSULTING ENGINEERS AND ATTORNEYS

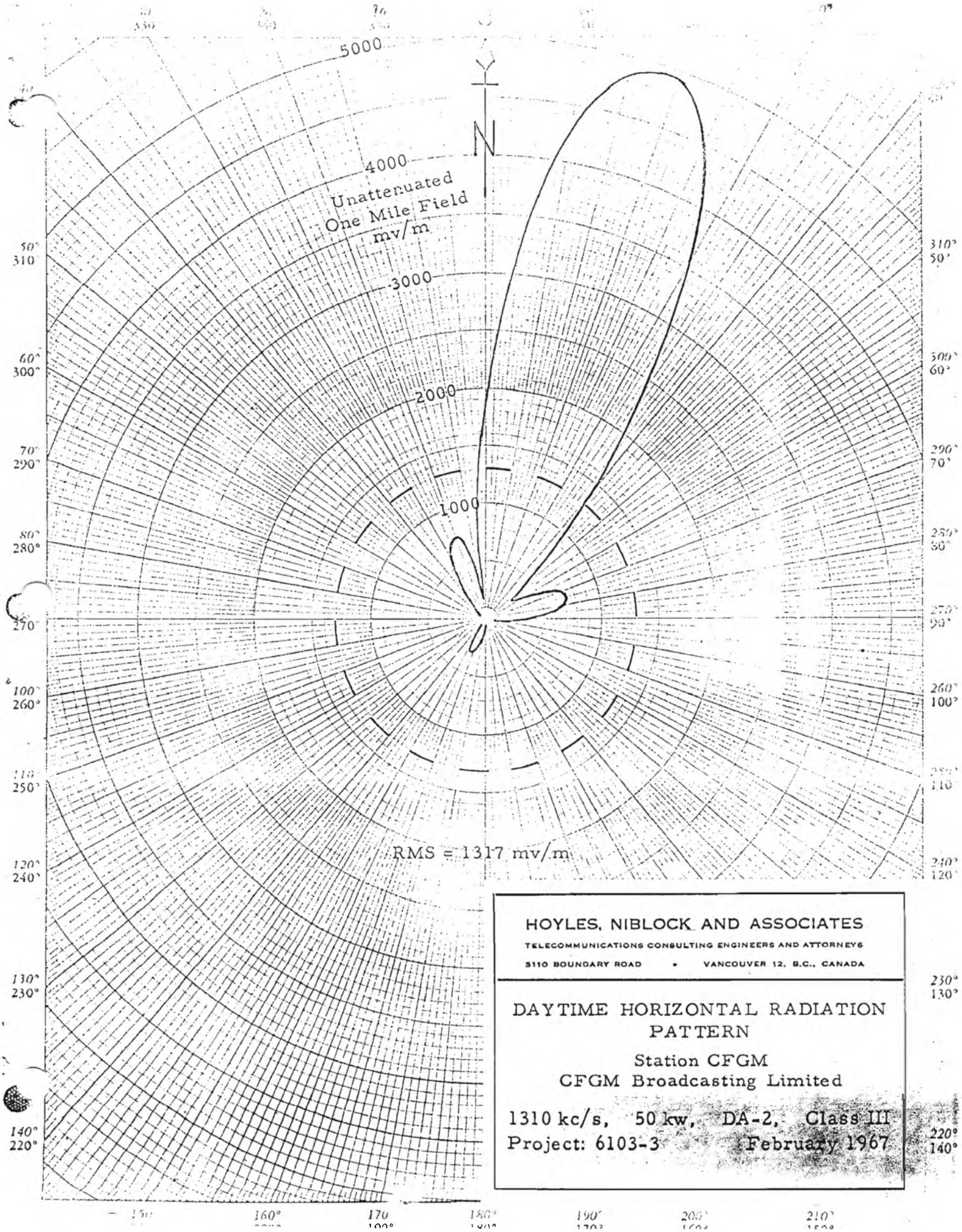
8110 BOUNDARY ROAD • VANCOUVER 12, B.C., CANADA

SITE LOCATION MAP

Station CFGM
CFGM Broadcasting Limited

1310 kc/s, 50 kw, DA-2, Class III
Project: 6103-3 February, 1967


SCALE 1:50,000 ÉCHELLE
Miles 1 0 1 2 3 Milles
Metres 1000 500 0 1000 2000 3000 4000 Mètres
Yards 1000 500 0 1000 2000 3000 4000 Verges
Proposed Site
43° 33' 13" N. Lat.
79° 43' 09" W. Long.
Streetsville
Snider
HOYLES, NIBLOCK AND ASSOCIATES
SITE LOCATION PLAN
CFGM Richmond Hill, Ont.
Project 6103-3 Feb. 1967.
35'
43°30'
79°45'
40'



HOYLES, NIBLOCK AND ASSOCIATES

TELECOMMUNICATIONS CONSULTING ENGINEERS AND ATTORNEYS

3110 BOUNDARY ROAD • VANCOUVER 12, B.C., CANADA

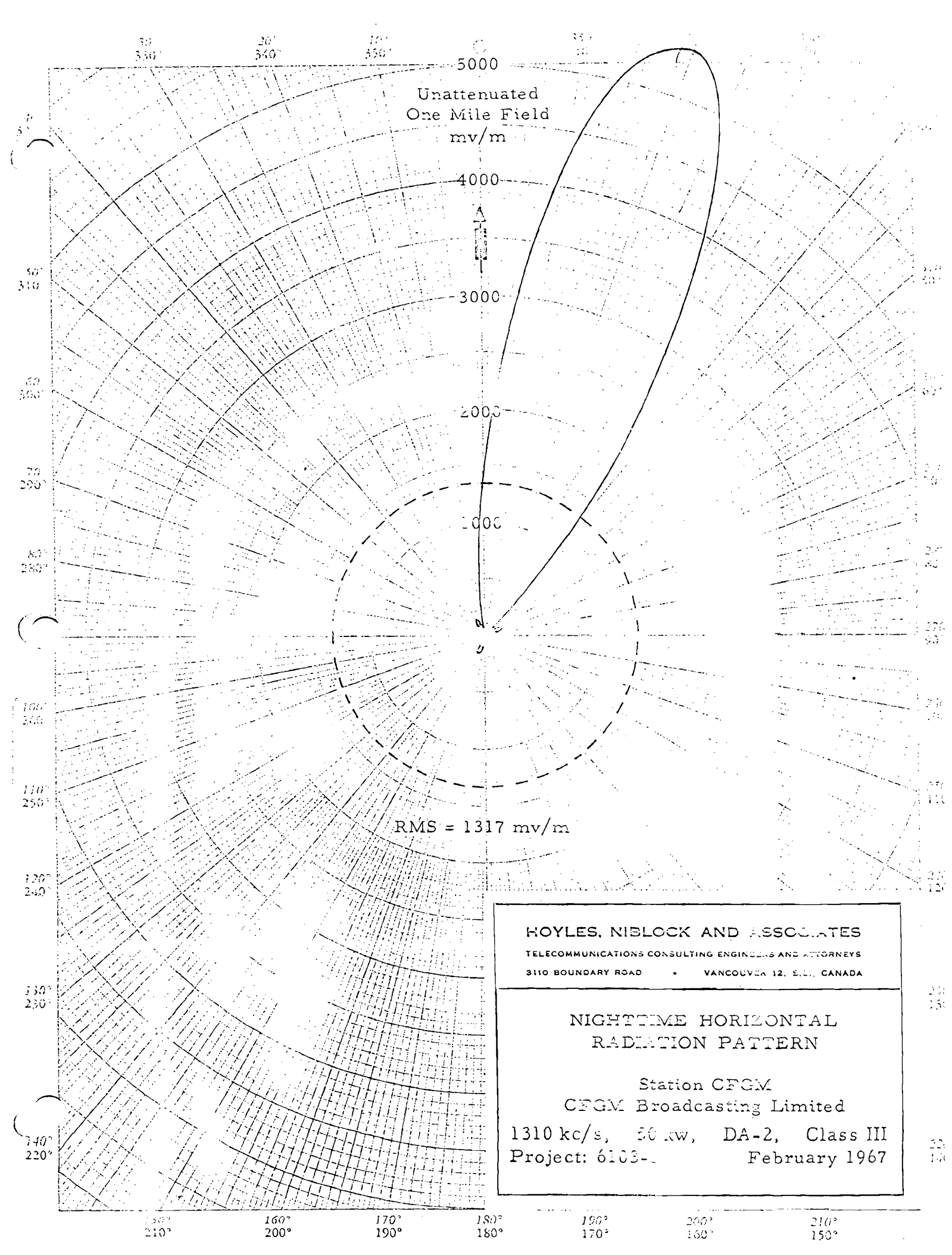
DAYTIME HORIZONTAL RADIATION PATTERN

Station CFGM

CFGM Broadcasting Limited

1310 kc/s, 50 kw, DA-2, Class III

Project: 6103-3 February 1967



HOYLES, NIBLOCK AND ASSOCIATES

TELECOMMUNICATIONS CONSULTING ENGINEERS AND ATTORNEYS

3110 BOUNDARY ROAD • VANCOUVER 12, B.C., CANADA

NIGHTTIME HORIZONTAL RADIATION PATTERN

Station CFGM

CFGM Broadcasting Limited

1310 kc/s, 50 kw, DA-2, Class III

Project: 6103-1 February 1967

...TERS OF THANKS

...NTRAL HOSPITAL

Town of Newmarket

CFGM Radio Station,
50 Yonge St. N.,
Richmond Hill, Ontario

Attention: Public Service Department

Dear Sirs:

It would be most a... to announce occasionally on yo... following public service anno...

"The public of the ... attend the Inaugu... Council to be he... 7:45 P.M. in ... Walford Stre...

. . . Beeton Agriculture

BEETON FAIR . . . Meeting Place of

BEET

KIWANIS CLUB OF MARKHAM, INC.

"We Build"

January 27, 1967

Public Service Department,
Radio Station CFGM,
50 Yonge St. North,
Richmond Hill, Ontario.

Re: Markham District Centennial ...

Dear Sirs:

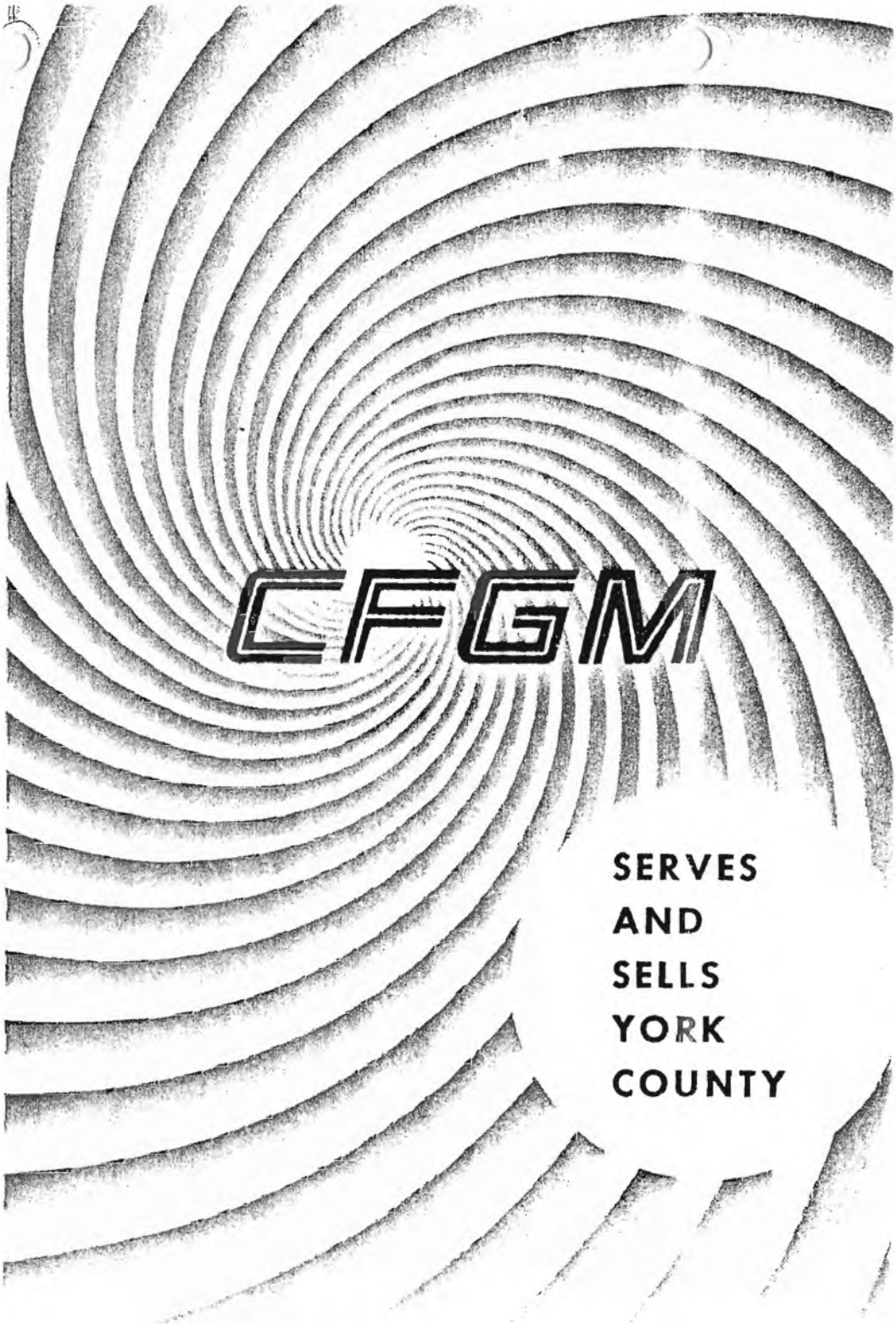
We enclose herewith a copy of our ... Further to our letter to you of January 5th, 1967, which shows ... in receiving from ... our local Markham newspaper ... project is ... that our Centennial ...

Any assistance you can render to publicize the ... function of ... February 23, 1967, at 7 P.M. ... will be much appreciated ... East-West Cabinet Minister ... our guest speaker on that occasion, we might state that ... Tickets sales for this dinner will cease on February 21, 1967, so ... We will be glad to furnish any further information you ...

Yours very truly,

Chairman,
Centennial Committee

Tickets are available from all service ... and from the local banks.


CFGM
SERVES
AND
SELLS
YORK
COUNTY

roadcasts from the Richmond Hill council chambers when York County protest to the Federal Ministry of Forestry about the transfer of laboratories from Maple to Sault Ste. Marie.

CFGM airs the views of both sides when Vaughan Township conducts a liquor plebiscite.

CFGM features local musical talent with Vaughan Township songstress Sandy Selsie.

CFGM reports on an NDP nomination meeting in Newmarket.

CFGM's news editor interviews the Richmond Hill police chief.

CFGM's winning hockey team.

CFGM goes to the International Plowing Match in Markham Township

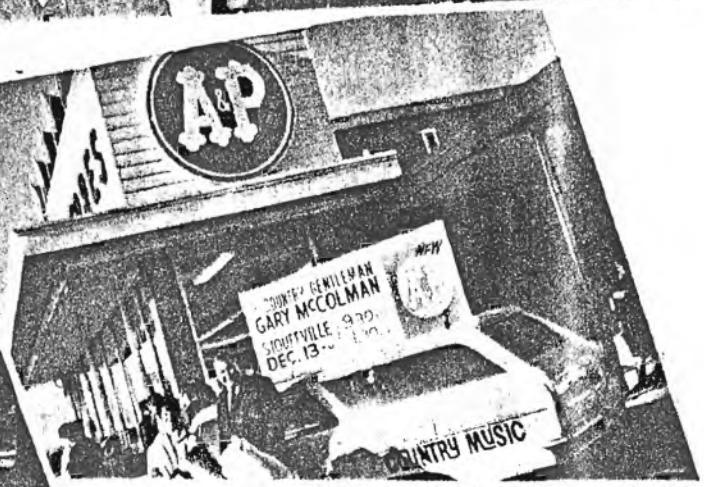
CFGM visits the annual York County Warden's Banquet and records for later broadcast the remarks of Warden Joe Dales.

CFGM helps Y
featuring the

CFGM reports on the hearing held in the Richmond Hill council chambers of the Metropolitan Toronto and Region Tr

CFGM presents an open-line program with Deputy-Reeve candidates of

CFGM representative Bob Aitchison services a client in Altona.



CFGM covers the opening of a new store in Stouffville.

resent at the Liberal nomination
ting in Richmond Hill.

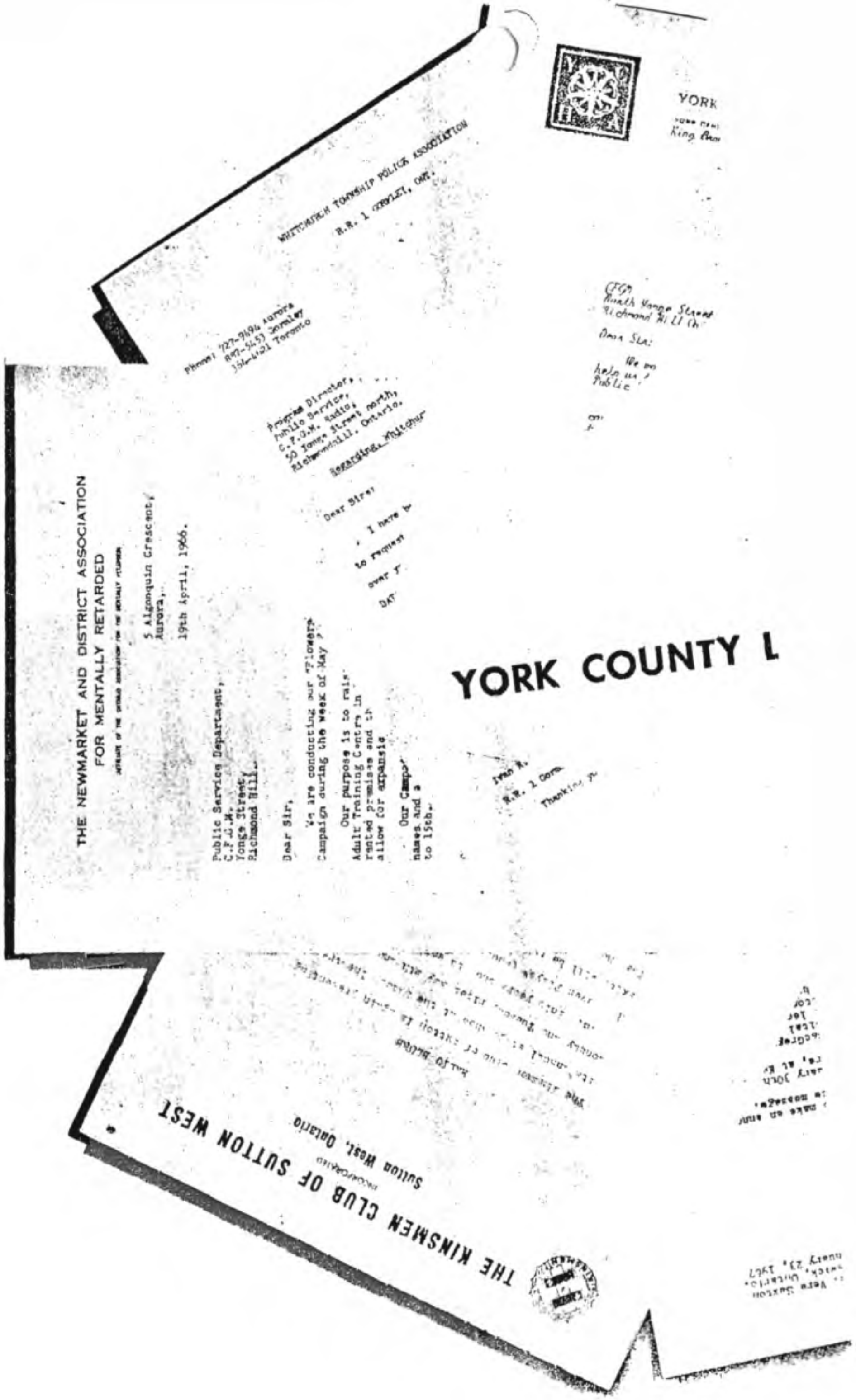
CFGM co-operates with York County Ministerial Association to broadcast a weekly half-hour inspirational program.

CFGM representative George Carey talks to a customer in Keswick.

unty residents make informed political decisions by
candidates on an open-line broadcast.

FOR MORE
INFORMATION ABOUT
HOW CFGM SERVES
AND SELLS
YORK COUNTY,
CONTACT:

Bob Aitcheson
George Carey
Sales Representatives
50 Yonge Street North,
Richmond Hill, Ontario Telephone: 889-4915



THE NEWMARKET AND DISTRICT ASSOCIATION
FOR MENTALLY RETARDED
5 Algonquin Crescent,
Aurora,
19th April, 1966.
Public Service Department,
C.F.G.M.
Yonge Street,
Richmond Hill.
Dear Sir,
We are conducting our "Flowers
Campaign during the week of May 7
WHITCHURCH TOWNSHIP POLICE ASSOCIATION
R.R. 1 GORMLEY, ONT.
Program Director,
Public Service,
C.F.G.M. Radio,
50 Yonge Street north,
Richmondhill. Ontario.
Dear Sirs:
YORK COUNTY L
YORK
THE KINSMEN CLUB OF SUTTON WEST
Sutton West, Ontario


CFGM's
SPOT-
LIGHT on CANADIAN
TALENT

CFGM is proud to present the Canadian Stars of its "Spotlight On Canadian Talent" series.

In its continuing effort to promote Canadian Talent C F G M selected thirteen of the most promising Country Artists and placed them in the public spotlight. Each of the artists you see here was featured in his own half hour show on CFGM backed by a band of professional musicians.

As a listener to CFGM we are pleased to send you this folder containing pictures and the biographies of each of the performers. We hope that you'll be hearing more in the future from these Canadian Artists both on CFGM and other Canadian radio and television stations.

ROLLY CHAMBERS

Rolly Chambers was born 31 years ago in Highland Creek Ontario. He is an excellent singer as well as a bass, rhythm guitarist, drummer, and emcee. Rolly is very well known in Toronto where he has worked all the top night spots. He has also toured recently with Carl Smith and Jimmy Dean and has appeared with such Country Music Creats as George Jones, Johnny Cash, and Faron Young.

LORIE GALE

Born Lorraine Gallant in Moncton, New Brunswick, Miss Lorrie Gale came to Toronto about six years ago and got her start in an all-girl Country group called the Rhythm Sweethearts. Lorrie plays guitar, and sings in both French and English. Her recordings to date include: "I'm in the Middle of a Dream", "You'd Better Go", "Le Voleur de Provencher" . . . all of which are on the Arc label.

BERT CUFF

Newfoundland born Bert Cuff is currently touring across Canada with his own band and recently made a guest appearance on the Carl Smith TV Show. His first record release "Island of Newfoundland" proved to be one of the best selling records on the Canadian east coast in the past fifteen years. Much of his time is spent on return engagements in towns were he has already appeared two or three times.

New Brunswick where he first started
elve. Eight years ago he came to Toronto
and the Bees. He has recorded for
many country music shows both as a
egular entertainer at the Horseshoe, a
. Johnny Burke lives with his wife in
onths old.

ARTIE MacLAREN

Artie MacLaren was born in St. Peter Bay Prince Edward Island in 1940 and later moved with his parents to Moncton New Brunswick. It was in Moncton that he made his first TV and Radio appearances with a Canadian Group the Bunk House Boys. In 1960 he moved west to Toronto to futher his ambitions and shortly after that signed with the Arc Recording company. He has made several records and now appears in clubs in the Toronto area.

GEORGE and JUNE PASHER

George and June Pasher have been singing together for over ten years. Both were born in Nova Scotia and have since come to make their home in Toronto. George plays electric bass and is known for his easy style of singing pop and country ballads. His wife June accompanys him on guitar and sings Kitty Wells, Patsy Cline, and Connie Smith favourites. The Pashers are kept busy with various appearances and recording sessions. Their family consists of two boys, Russell and George.

ROSS ALLEN

Toronto born Ross Allen is typical of many Canadian Country Artists. He began playing guitar at the age of 15, formed his own band to play at dances, and entered into many amateur talent shows. Ross's personal appearances at dances, jamborees, radio, and television have been numerous. He has recorded three albums and one single in his career. He is presently appearing at clubs in Toronto accompanied by bass man Bill Gibbs.

ERRY

singing and entertaining together for a[illegible] in Saskatchewan but moved to [illegible] Yvonne is from New Brunswick [illegible]g in many talent shows. The two vening at a jamboree, when a popular Management asked Chef and Yvonne

CY ANDERS

Cy Anders was raised in Toronto from the age of five but was born in Montreal of parents from Newfoundland. He turned to country music after having worked in radio as an engineer and an anouncer. His professional record includes appearances on the Grand Ole Opry in Nashville, Carl Smith's Country Music Hall on television, and his own show on Radio Station CFGM. He also had three single record releases.

WENDY WEST

Wendy West was born in England in 1943 and came to Canada in 1956. Her first entertaining was done with an Irish Band in Toronto and during the past three years she has been singing in the Country field. Entertaining runs in her family. Her father is in dramatics and her mother in ballet. Wendy has appeared on stage with such Nashville artists as: Don Gibson, Leroy Van Dyke, Ferlin Husky, and Sonny James. A popular artist, she works mainly in nightclubs in Toronto.

DIAL 1310 CFGM

BEN WEATHERBY

Ben Weatherby who hails from Turo Nova Scotia has been in the Country Music business for ten years. He came to Toronto in 1951 and in 1955 under the influence of Chef Adams, started entertaining as a country music artist at clubs and jamborees. At present Ben is producing records for a major Canadian recording company. He is married and has one daughter.

CHEF ADAMS and YVONNE

Chef Adams and Yvonne Terry have bee about three years. Chef was bo nd Toronto to further his career as e and began her career by singing were brought together unexpectedly one man and wife team were unable to appe

LORETTA DREW

Loretta Drew comes from Winnipeg Manitoba where she first began her singing career. Loretta was very successful as an amateur singer. She was the winner for 6 weeks on CKRC Winnipeg's Western Hour which prompted her to try her hand in the professional ranks. Since coming to Toronto she has worked with Mickey McGivern and the Mustangs and also accompanied them on a recent tour of Ontario, Quebec, and Newfoundland.

JOHNNY BURKE

Johnny Burke was born in Regersville
playing guitar for dances at the age of tw
and formed his own group, Johnny
Columbia records, and has worked with
instrumentalist and a singer. He is a r
popular Country music club in Toronto
Toronto and they have a little boy five n

DON WOODS

Country Artist Don Woods came to Toronto from Port Severn when he was 14 years old, and started his career singing in pop music. His first public appearances were made with Joyce Sullivan, Doug Romain, and Jack Duffy. Through the influence of friends who were country music artists Don himself joined the country fold. His country music activities have included appearances with Johnny Cash, Hank Snow, Tex Ritter, and many others. At thirty-two Don Woods is married and has four daughters.

Ken Hodge

Garry McColman

CF

COUNTRY

DIAL
13/10

CI

Al Fisher

Don Daynard

Bob Livingston

EGM'S

R GENTLEMEN

EGM

THE SELLING POWER of COUNTRY MUSIC

LORETTA LYNN

JIMMY NEWMAN

BOBBY LORD

BOB LUMAN

JOHNNY CASH

SKEETER DAVIS

"Country Music is booming in Toronto as never before. In fact, it looks as if the new zipped up Country Music is going to be the next big sound.

The big reason for the current boom . . . is CFGM."

...Toronto Star

"No rage or temporary fad will ever produce in the short span of its success what the country dynamos give the music industry year in and year out. Although Country Music has always been responsible for a great many of each year's biggest sellers, it has never been hotter than it is today."

...Cashbox

YORK COUNTY

is sold on

CFGM

DIAL 1310

CANADA'S TOP

COUNTRY MUSIC

STATION

COUNTY RATE CARD

EFFECTIVE JULY 1, 1965

SALES OFFICE: 50 Yonge St. N.
Richmond Hill
889-4915

February 15th, 1965

SCHEDULE 11
relating to Question 17

to the application of
Radio Richmond Hill Limited
to the Minister of Transport
for authority to establish and operate
a Private Commercial Broadcasting Station (FM)(Sound)
in Toronto, Ontario.

Shareholders of the applicant company, Radio Richmond Hill Limited, holding stock, etc., in any other company operating a broadcasting station, newspaper, publishing business, theatre, advertising agency or station representative agency, are as follows:

John O. Graham - 300 common shares - no par value - Radio House Limited - a station representative agency.
4 common shares - no par value - Suburban York Sales Limited, a station representative agency.

Stewart H. Coxford - 300 common shares - no par value - Radio House Limited - a station representative agency.
4 common shares - no par value - Suburban York Sales Limited, a station representative agency.

Lois M. Graham - 1 common share - no par value - Suburban York Sales Limited, a station representative agency.

Elizabeth R. Coxford - 1 common share - no par value - Suburban York Sales Limited, a station representative agency.

February 15th, 1965

SCHEDULE 16
relating to Question 22

to the application of
Radio Richmond Hill Limited
to the Minister of Transport
for authority to establish and operate
a Private Commercial Broadcasting Station (FM)(Sound)
in Toronto, Ontario.

The applicant, Radio Richmond Hill Limited, was organized in 1957 by Mr. John O. Graham and Mr. Stewart H. Coxford. This company is controlled by Mr. Graham and Mr. Coxford who together have managed it since its inception. A brief biographical sketch of both follows:

John O. Graham -

Mr. Graham is married and has three children, aged 5, 8 and 10. He has lived in Richmond Hill for some eight years, since the organization of Radio Station CFGM. Mr. Graham is a graduate of the University of Toronto and of Osgoode Hall Law School. Prior to the founding of CFGM Mr. Graham was employed as a solicitor by S.W. Caldwell Ltd., during which time he gained experience in all phases of broadcasting, including management, sales, programming and promotion.

Mr. Graham is a member of St. Mary's Anglican Church in Richmond Hill and is a Lay Delegate to Synod for the Diocese of Toronto. For a number of years he has worked actively on behalf of Retarded Children's Associations at both the Provincial and Federal level. He is currently Chairman of the Richmond Hill Retarded Children's Education Authority.

February 15th, 1965

SCHEDULE 16 Continued

Stewart H. Coxford

Mr. Coxford, a resident of Richmond Hill for eight years, is married with three children aged 9, 11 and 13. He is a member of the Richmond Hill United Church. He is Treasurer of that church, as well as being a member of the Board of Stewards and the Official Board. He has been active in Boy Scout work for a number of years and, along with his wife, is in charge of a Cub Pack of some 40 boys.

Mr. Coxford is a Chartered Accountant, and a year after graduation in 1952 joined the staff of S.W. Caldwell Ltd. as Comptroller. During his some 6½ years with this firm, he gained experience in all phases of broadcasting, which subsequently was of great value when organizing Radio Station CFGM with Mr. Graham.

SCHEDULE 17

relating to Question 23(a)

to the application of
Radio Richmond Hill Limited
to the Minister of Transport
for authority to establish and operate
a Private Commercial Broadcasting Station (FM)(Sound)
in Toronto, Ontario.

The applicant company, Radio Richmond Hill Limited has a current staff of approximately 30 people. It is expected that an additional 3 people would be added, who would be related specifically to the FM division of the company. Of the existing staff, many would serve in a dual capacity. We would find this to be the case in areas including Engineering, Accounting, Administration, and, to some degree, in Programming.

The following are the key people presently with the applicant, and their time of service, who would also devote part of their time to the FM division:

John O. Graham - President and General Manager since the company's inception in 1957.

Stewart H. Coxford - Vice President and Station Manager since the company's inception in 1957.

Gordon Symons - Program Director - 4 years

Brian Sawyer - Engineer - 4 years

W. A. Mitchell - General Sales Manager - since the company's inception in 1957

Ken Foss - News Director - 3 years.

Revised 15-11-67

May 30th, 1966

SCHEDULE 6

relating to Question 7

to the application of
CFGM Broadcasting Limited
to the Minister of Transport
for the authority to change the facilities
of a Private Commercial Broadcasting Station (Sound)

Shareholders of the applicant company, CFGM Broadcasting Limited, holding stock, etc. in any other company operating a broadcasting station, newspaper, publishing business, theatre, advertising agency, or station representative agency are as follows:

John O. Graham	-	300 common shares, no par value, Radio House Limited - a station representative agency.
	-	4 common shares, no par value, Suburban York Sales Limited - a station representative agency.
Stewart H. Coxford	-	300 common shares, no par value, Radio House Limited - a station representative agency.
	-	4 common shares, no par value, Suburban York Sales Limited - a station representative agency.
Lois M. Graham	-	1 common share, no par value, Suburban York Sales Limited - a station representative agency.
Elizabeth R. Coxford	-	1 common share, no par value, Suburban York Sales Limited - a station representative agency.

A SUPPLEMENTARY BRIEF

TO THE BRIEF SUBMITTED TO THE BOARD OF

BROADCAST GOVERNORS

, IN OPPOSITION TO THE APPLICATION BY

CFGM BROADCASTING LTD.

FOR AUTHORITY TO INCREASE THE POWER OF

STATION CFGM, RICHMOND HILL,

ONTARIO, AND TO CHANGE THE ANTENNA

SITE.

Submitted by: CHWO Radio Ltd.,

Oakville, Ontario.

8th June, 1967

EXCERPTS FROM STATEMENTS MADE AT PREVIOUS PUBLIC APPEARANCES BY RADIO RICHMOND HILL LIMITED AND CFGM BROADCASTING LIMITED.

Excerpts from Vol.II. Application made in front of the Board of Governors of the Canadian Broadcasting Corporation, Saturday, October 27th 1956 for authority to establish a daytime AM Broadcasting station at Richmond Hill, Ontario.

Page 263 Mr.John O. Graham "I would like to emphasize that the proposed area to be covered extends from the north boundary of Toronto to Lake Simcoe. There is no local radio service available in this area now...."

Page 265-266 Mr. Graham "We feel also that some consideration should be given to locating in the town in that community which will one day be the largest single town in York County."

Page 267 Mr. Graham Our feeling is that our transmitter located north of Richmond Hill and being low-powered we will still be able to put a good signal to the people in the southern part of Markham and Vaughan townships but we will also put an adequate signal right up to Lake Simcoe.

Page 269-270 Mr. Graham I would like to deal for a moment with the possible relationship with Toronto. As I have mentioned, our transmitter is not south, east or west, but it is to be north of Richmond Hill. Now, it may be suggested that because our transmitter is located closer to Toronto

than any of the other proposed transmitters, that there is some sinister and evil motive in locating there. Undoubtedly the suggestion could be carried further that it would be our intention to capitalize on some advertising revenue from the city of Toronto. As I have stated, we have modelled this application along the lines of Wingham's operations, and we generally intend to primarily serve the people of York County. We feel it is physically impossible for us, with 500 watts located north of Richmond Hill, faced with the high noise level in Toronto, to even attempt to build any audience there, and if we cannot build up an audience in the city of Toronto then of course there is no point in soliciting advertising. The main reason, of course, for not attempting to capitalize in any way on the Toronto market is that we would of course alienate all our local merchants in Stouffville, Markham, Woodbridge and so on....they would in a sense feel betrayed if an advertising service which was made available to them was attempting to capitalize on the Toronto market. So we feel that with our power, it will be physically impossible to get into Toronto and that if we did so we would

eliminate our main source of revenue without which such a station would be neither fish nor fowl. It would not please the Toronto advertiser and would alienate all our local advertisers and we think the result would be the station would fail.

Excerpts from the Application to establish a new AM station at Richmond Hill, Ontario before the Canadian Broadcasting Corporation Board of Governors on the 15th March 1967.

Page 178 Mr. Graham — In preparing our application we felt that there was a situation that would make for a community station, in the same sense that there is a successful community station in operation in Wingham, Ontario.

Page 196 Mr. Graham — We feel that Richmond Hill will provide a strong economic base for a community station, and that because of its location it will get recognition of all the residents of York County as a community station.

Page 209 The Chairman — Mr. Graham, it has been suggested that there would not be business out of Richmond Hill to support a station without going a good deal into retail establishments along Yonge Street inside Toronto metropolitan area.

Page 209-210 Mr. Graham — They have put forth the alternative of serving Toronto and Richmond Hill, or nothing at all. It is our intention to serve all the communities of York County. We will have to get income from Aurora, Newmarket, Stouffville, Markham, Woodbridge, Thornhill...all those towns, in

order to survive. And, taking isolated numbers of retail outlets from one community and holding them aloft is not a fair presentation of the available market. We consider Aurora and Newmarket as part of our market.

The Chairman — How definite can you be that you would not, either at this time or later, go into Toronto or metropolitan Toronto for business activity?

Mr. Graham — We feel that if we attempt to sell advertising in Toronto it will be resented by all the merchants of the Richmond Hill area, or the Newmarket area, and so on. If we try to serve Toronto and try to serve York County at the same time we will end up serving neither one, and the station would be recognized by neither group as their station. It would in all probability fail...

Page 210 Mr. Graham — There will still be some Toronto merchants who will be interested in advertising over a Newmarket station or a Richmond Hill station. We have discussed this with the station manager, as to whether it is a problem, and if it is a problem how it can be handled. They say that, so far as accepting advertising from outside your own area is concerned, there are certain responsibilities that go with having the right to operate what would be called a regional advertising monopoly; and that, of course, does carry some responsibilities, as far as accepting

and rejecting advertising from outside the area is concerned.

When a legitimate advertiser from outside the area wants to use your community station...and I am paraphrasing Mr.Cruickshank, who has encountered this problem in the towns of Owen Sound, Stratford and as far as London...they all have their own radio stations...and the way he handles it is to permit legitimate outside advertisers to use station facilities, but he tries to put them on at non-peak listening hours. He also tries to talk them out of using any mention of price, so far as reflecting a better price in the cities than those of the local retailers.

Page 211 The Chairman — I am still wondering, myself, how definite you can be that you will not be...

Mr. Graham — Well, how definite do you want us to be?

The Chairman — That is up to you.

Mr. Graham — Because we do not...

The Chairman — It is a fairly important point that you must meet...that this station will inevitably tend to become part of, and to serve part of the municipality of Toronto.

Mr. Graham — If you accept the allegation that Toronto is going to take over the south part of York County...and we all know Toronto has taken off a bit more than it can chew right now...any

resident of Toronto is familiar with the municipal problems; and it is highly unlikely that Toronto will want to take on any more property, so far as looking after it is concerned. But we feel that so far as Toronto advertising is concerned, our first consideration will have to be for the district merchants. If we let them down we are a financial failure.

Excerpts from the application for an increase in power and change of antenna site of Station CJRH Richmond Hill, Ontario by Radio Richmond Hill Limited - Spring of 1961.

Page 48 Mr. Pearson — Now if this application were granted would this not increase this problem, perhaps, so heavily in favour of the suburban population as to eliminate a great deal of the programming for rural people?

Mr. Graham — Well part of the answer lies in the fact our best advertising response area is amongst the older merchants and in the older towns, and if we neglected our service to the old established residents of these towns, this would be bad for us economically as far as the small town merchants saying " you are not interested in my customers".

Page 52-53 Mr. Graham — You could change it but then you would sacrifice everything you have invested in and built up for four years with the possibility of a very narrow neck of response in the city, which would not compare with what we are doing now. We want to

be able to really do a better job in our own primary service area and we don't blame it all on power...we think part of the solution...we think the main problem is being skipped over, because someone will say "I heard your station yesterday", as though he had brought in Fort Wayne, Indiana...and these people are in our primary service area.

Page 63-64 Mr.Allison I will leave that and come to another aspect...where do you expect to get an increase in revenue to pay for this expensive array you are going to have to put up in order to get better coverage. Is this going to be more in local or more in national because of your greater numbers...are you going to be able to fall back on the large Toronto audience which may not be listening to you but which would give you numbers?

Mr. Graham No.

Page 65 Mr. Allison Finally then Mr. Graham, we have laboured this point because this has been a concern to yourself and to the Board, but you are telling us quite definitely it is not your intention to change the character of the programming by your station through the mere capturing of further potential audience in Toronto?

Mr. Graham That is correct.

Mr. Allison But you would still keep up the service to these towns you now serve and the agricultural reps. and so on?

Mr.Graham Yes. Oh, yes.

Mr.Allison You do not intend to depart from this at all?

Page 66 Mr. Graham No.

Respectfully submitted,

CHWO RADIO LTD.

STATION CALL: CFGM

STUDIO LOCATION: RICHMOND HILL, ONT.

APPLICATION: CHANGE OF FACILITIES

PREPARATION DATE: 30 JULY 1974

APPLICANT: CFGM BROADCASTING LIMITED

CONSULTANT: J. G. ELDER, P. ENG.

	PRESENT	PROPOSED
FREQUENCY	1310 kHz	1320 kHz
POWER	50 kW	same
MODE	DA-2	same
TOWERS	9D/10N	4D/9N
HEIGHT	250'/250'	400'/250'
SITE	Lat.: 43°34'30"N. Long.: 79°41'05"W.	same

TECHNICAL BRIEF

1-INTRODUCTION:

Elder Engineering Limited has been engaged by CFGM Broadcasting Limited to design the facilities that are proposed herein for CFGM. The brief was prepared in accordance with the requirements of Broadcast Procedures One and Two. It complies with all the requirements of the North America Regional Broadcasting Agreement.

2-RELATED ASSIGNMENTS:

The present 50 kW facilities have been in use at CFGM since August 1969.

Groundwave protection requirements impose significant restrictions in the station's potential service area, notably to the east north-east, south and west. In view of the allocation changes that are pending at CKKW Kitchener and CFTJ Galt, careful consideration has been given to the possibility of proposing an additional change at CFTJ that would facilitate a significant improvement in CFGM's westerly service.

As a result, the proposals contained herein are predicted upon (a) the deletion of the CKKW/CFTJ 1320 kHz assignment; (b) the substitution therefor of a 1320 kHz assignment at CFGM: (c) the use of 960 kHz 1 kW full time facilities at CFTJ.

Accordingly, an application for a change of facilities at CFTJ is being filed concurrently and CFGM's proposed changes

are predicated upon approval of this CFTJ application.

3-DAYTIME PRIMARY SERVICE:

There will be an extension of the 25 mV/m and 5 mV/m service contours in most directions, except over the arc 003° to 030°. Richmond Hill and vicinity will receive a somewhat stronger and more uniform signal.

The 5 mV/m contour will extend for up to fifty miles north east, thirty-five miles south west and eighteen miles west. It will generally provide satisfactory service in the communities it encloses.

4-DAYTIME SECONDARY SERVICE:

0.5 mV/m service will be provided from Picton to Woodstock and from Kinmount to Midland in the north. In some areas the service may be impaired by interference from cochannel or adjacent channel assignments, as shown on Figure 5-4 but otherwise, satisfactory service will be rendered to rural areas and smaller communities. The maximum predicted limitation is 1.5 mV/m from WRIE Erie, Pennsylvania.

There will be a substantial increase in CFGM's westerly 0.5 mV/m and interference free intermittent service areas, due to the absence of the CKKW/CFTJ 1320 kHz assignment.

5-NIGHT TIME SERVICE:

The theoretical 10% limitation due to skywave co-channel interference is 26.5 mV/m, which is approximately twice the present value on 1310 kHz. Richmond Hill will continue to receive a satisfactory service. Night pattern improvements will partly compensate for the apparent loss in some areas and the daytime improvements will completely compensate for them.

6-MAXIMUM FIELD INTENSITIES:

In view of the fact that the site and power are unchanged, there will be no significant difference in the populations enclosed within the proposed 1 V/m contours from those enclosed by the present 1 V/m contours.

Similarly, there will be no significant change in the populations enclosed by the proposed 250 mV/m day and night contours as compared with the present 250 mV/m contours. The estimated populations are less than 50,000 and 5,000 respectively, based upon the 1971 Census and also information obtained from Mississagua Planning Board. These figures comply with Broadcast Procedure 1, Rule 2.

Should blanketing or external cross modulation interference result within the proposed 250 mV/m contours, the licencee will remedy all reasonable complaints of such interference at his own expense.

7-ASSUMPTIONS AND SOURCES OF INFORMATION:

All protection requirements were based upon published map values of ground conductivity. All service contour locations were predicted from the foregoing and/or from measurements contained in CFGM's proof of performance.

Assignments were protected in accordance with the 1950 NARBA up to and including: Canadian change list #325 and United States change list #1567. Relevant information was derived from the antenna description sheets distributed by the Department of Communications.

All maps were current editions, obtainable from the Department of Energy, Mines and Resources. The following sheets were used.

Scale	Title	Number
1:50,000	Brampton	30 M/12
1:250,000	Lake Simcoe	31 D
1:250,000	Toronto	30 M
1:250,000	Kitchener	40 P
1:1,000,000	Southern Ontario	

8-LIST OF PROTECTED STATIONS:

CALL	LOCATION	kW	MODE	CLASS	kHz
CKOY	Ottawa, Ontario	50	DA-2	III	1310
WTLB	Utica, New York	.5N/1D	DA-N	III	1310
WNAE	Warren, Pennsylvania	5	ND-D	III	1310
WFAH	Alliance, Ohio	1	DA-D	III	1310
WILS	Lansing, Michigan	1N/5D	DA-2	III	1320
WKTQ	Pittsburgh, Pennsylvania	5	DA-N	III	1320
WHHO	Hornell, New York	5	ND-D	III	1320
CJSO	Sorel, Quebec	10D/5N	DA-2	III	1320
CKEC	New Glasgow, Nova Scotia	5	DA-N	III	1320
WARA	Attleboro, Massachusetts	1	DA-2	III	1320
WSCR	Scranton, Pennsylvania	.5N/1D	DA-N	III	1320
KXYZ	Houston, Texas	5	DA-N	III	1320
KELO	Sioux Falls, South Dakota	5	DA-N	III	1320
WFHR	Wisconsin Rapids, Wis.	.5N/5D	DA-N	III	1320
WDMJ	Marquette, Michigan	1	DA-N	III	1320
WTRX	Flint, Michigan	1N/5D	DA-2	III	1330
WRIE	Erie, Pennsylvania	5	DA-2	III	1330

9-DAYTIME INTERFERENCE ANALYSIS:

The 0.5 mV/m contours of all cochannel and adjacent channel assignments are adequately protected.

10-NIGHT TIME INTERFERENCE ANALYSIS:

The 10% RSS night limitation contours of all cochannel stations are fully protected from skywave interference in accordance with NARBA. The 0.5 mV/m contours of adjacent channel stations are protected from ground wave interference.

11-OSCILLATOR RADIATION INTERFERENCE:

The present 1310 kHz operation of CFGM has not resulted in any complaints of oscillator radiation interference. The proposed 1320 kHz assignment is similarly related to that of CJBC on 860 kHz, therefore there is little likelihood of this problem arising.

The applicant will investigate complaints of oscillator radiation interference and will assume full financial responsibility for the remedial measures as required by the Department.

12-INTERMODULATION WITH OTHER BROADCASTING STATIONS:

Based upon measurements contained in the proof of performance, CFGM's present daytime field intensity at the centre of the CFTR array is approximately 300 mV/m. As proposed, this would be increased to approximately 700 mV/m. The field intensity produced at CHIN's array would be approximately 1000 mV/m. CFGM and CFTR presently produce field intensities of approximately 200 and 500 mV/m there, apparently without any interference problems.

In view of the large differences in frequency that are involved it is unlikely that intermodulation interference will occur in either array. However, if this form of interference does arise from this change of CFGM's daytime facilities, the applicant will bear the cost of remedial measures, including the installation of filters at the other station's plant if necessary.

No other antenna system would be enclosed by the predicted night time 250 mV/m contour.

13-HARMONIC INTERFERENCE:

There are no harmonic relationships between 1320 kHz and any other broadcast assignments in the area.

14-IMAGE INTERFERENCE:

Normal image frequencies are below the standard broadcast band, therefore this form of interference is unlikely to arise.

15-ARRAY DETAILS:

The daytime array will consist of four new 400' towers to be located near the east end of the present array. The night time array will consist of nine towers each 250' high. Towers number 4, 9 and 11 of the present array will be retained in their present locations. They will be renumbered as number 1, 8 and 7 respectively. The night phasor will be located beside tower number 2 and the day phasor beside tower number 10.

Reradiation from metallic structures including power lines will be at approximately the same net level as at present. The daytime towers will be adequately detuned to minimize reradiation from the night time array. The number of towers in each array will be reduced and the daytime protection requirements will be less stringent, so that in practice both arrays will be less "critical" than at present.

Both the day and night arrays are conservatively designed, with low RSS/RMS ratios and satisfactory predicted base operating resistances.

16-ENGINEER'S SEAL AND SIGNATURE:

This brief was prepared by or under the direction of the undersigned, a consultant practicing in the field of broadcast engineering.

J. Gordon Elder

J. Gordon Elder, P. Eng.

30th July 1974

TABLE 1-1

ANTENNA DESCRIPTION SHEET

STATION CALL:	CFGM
MAIN STUDIO:	RICHMOND HILL, ONTARIO
FREQUENCY:	1320 kHz
POWER:	50 kW
CLASS:	III
MODE:	DA-2
TIME:	UNLIMITED
NOTIFICATION LIST NO.:	.351... DATE: Feb. 11/76..
GEOGRAPHICAL LOCATION:	Latitude: 43° 34' 30" North Longitude: 79° 41' 05" West
ARRAY CHARACTERISTICS:	Thirteen guyed steel towers of uniform cross section; base insulated, series fed. Day towers 400'(193°) high; Night towers 250'(120.8°) high; no top loading.
GROUND SYSTEM:	120 equally spaced #10 AWG bare copper radial wires per tower of average length 0.4λ(298') minimum length 0.25λ(186').
PREDICTED EFFICIENCY: (UNATTENUATED HORIZONTAL FIELD INTENSITY AT 1 MILE)	DAY 1600 mV/m or 226 mV/m per kW NIGHT 1317 mV/m or 186 mV/m per kW

RA 11.02.76

APPROVED

AUG AOÛ 3 1978

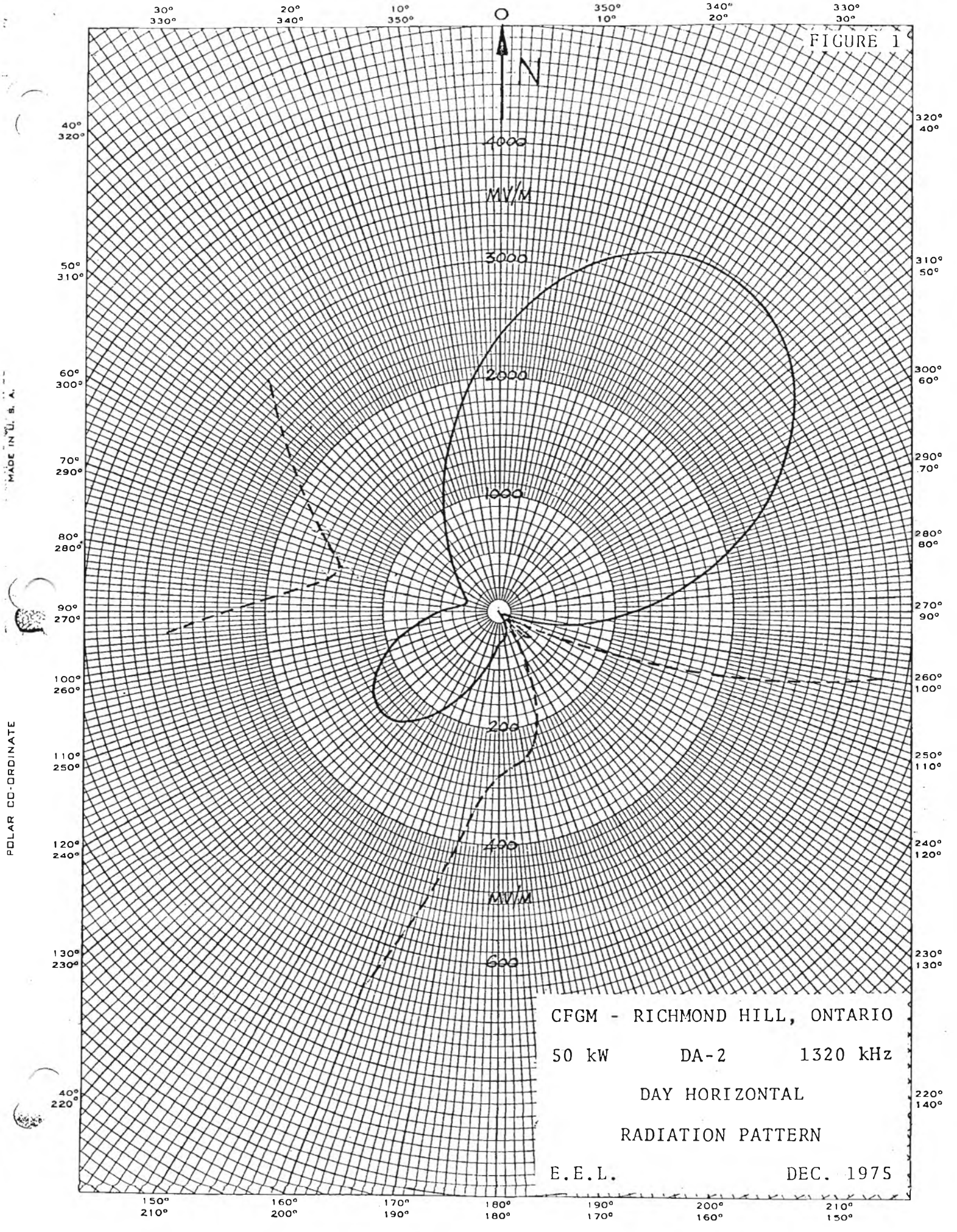
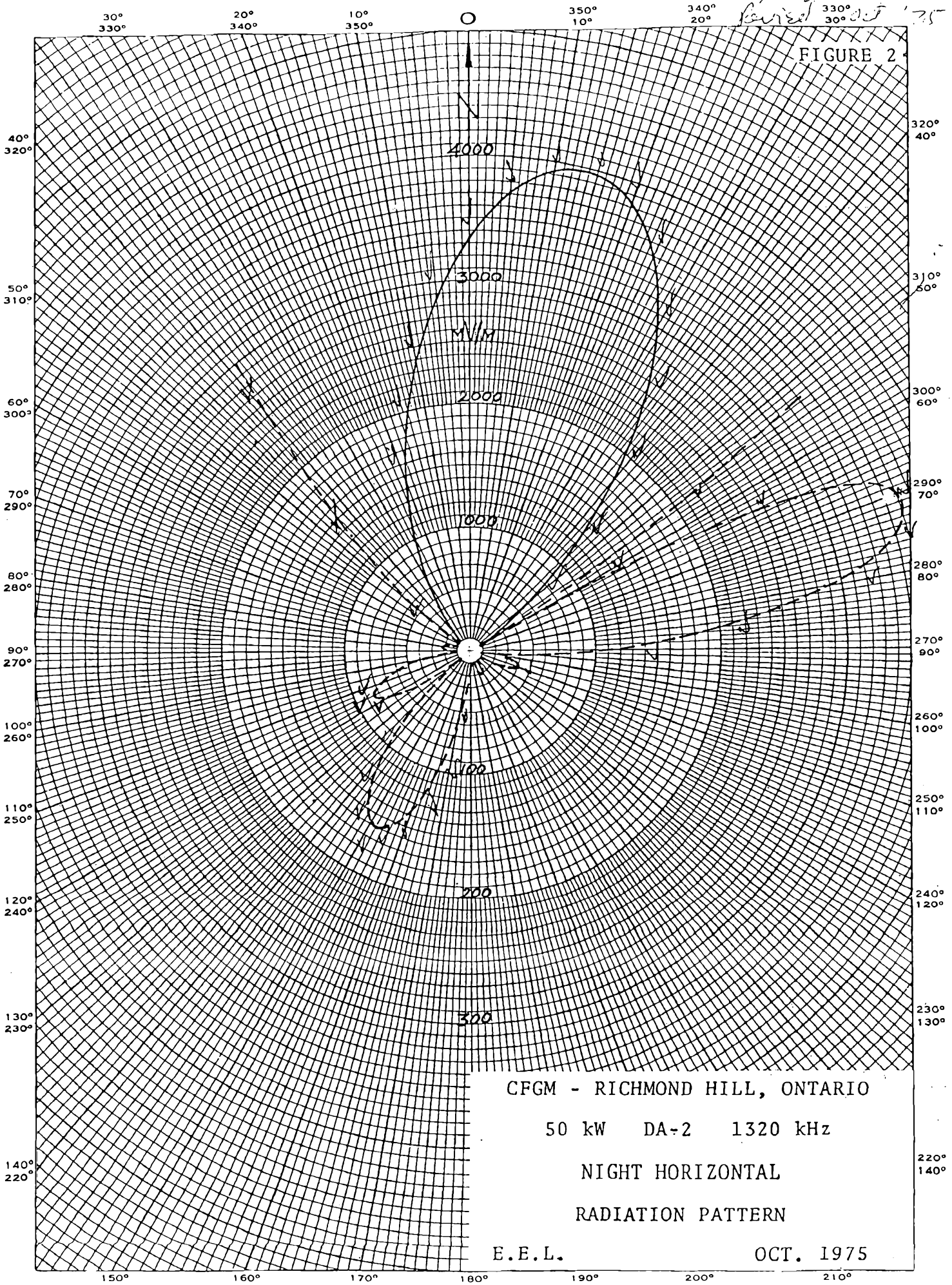


FIGURE 1
N
4000
MV/M
3000
2000
1000
200
400
MV/M
600
30° 330°
20° 340°
10° 350°
0
350° 10°
340° 20°
330° 30°
40° 320°
50° 310°
60° 300°
70° 290°
80° 280°
90° 270°
100° 260°
110° 250°
120° 240°
130° 230°
140° 220°
320° 40°
310° 50°
300° 60°
290° 70°
280° 80°
270° 90°
260° 100°
250° 110°
240° 120°
230° 130°
220° 140°
150° 210°
160° 200°
170° 190°
180° 180°
190° 170°
200° 160°
210° 150°
MADE IN U. S. A.
POLAR CO-ORDINATE
CFGM - RICHMOND HILL, ONTARIO
50 kW DA-2 1320 kHz
DAY HORIZONTAL
RADIATION PATTERN
E.E.L. DEC. 1975

FIGURE 2



CFGM - RICHMOND HILL, ONTARIO

50 kW DA-2 1320 kHz

NIGHT HORIZONTAL

RADIATION PATTERN

E.E.L. OCT. 1975

EUGENE DIETZGEN CO.
MADE IN U. S. A.

NO. 340-P DIETZGEN GRAPH PAPER
POLAR CO-ORDINATE

ANTENNA DESCRIPTION SHEET

STATION CALL: CFGM

DAY	10	11	12	13
TOWER	N	E	S	W
FIELD RATIO	1.00	1.00	1.428	1.428
PHASE ANGLE	342°	000°	100°	082°
SPACING	000°	165°	186.41°	120°
	0'	342'	386'	248.6'
BEARING	000°	132°	171.343°	232°

NIGHT	1	2	3	4	5	6	7	8	9
TOWER	NW	NC	NE	CE	SE	SC	SW	CW	C
FIELD RATIO	1.00	1.52	1.00	1.87	1.00	1.53	1.00	1.88	2.87
PHASE ANGLE	000°	044.6°	089.2°	219.45°	349.7°	305.1°	260.5°	130.25°	174.85°
SPACING	000°	184.5°	369°	387.18°	420.3°	259.39°	161.22°	080.61°	210.15°
	0'	382'	764.1'	801.7'	870.3'	537.1'	333.8'	166.9'	435.2'
BEARING	000°	117°	117°	128.93°	139.38°	155.09°	200°	200°	139.38°

TABLE 1-2

ELDER ENGINEERING LIMITED

ANTENNA DESCRIPTION SHEET

STATION CALL: CFGM

DAY	10	11	12	13
TOWER	N	E	S	W
FIELD RATIO	1.00	1.00	1.428	1.428
PHASE ANGLE	342°	000°	100°	082°
SPACING	000°	165°	186.41°	120°
	0'	342'	386'	248.6'
BEARING	000°	132°	171.343°	232°

NIGHT	1	2	3	4	5	6	7	8	9
TOWER	NW	NC	NE	CE	SE	SC	SW	CW	C
FIELD RATIO	1.00	1.52	1.00	1.87	1.00	1.53	1.00	1.88	2.87
PHASE ANGLE	000°	044.6°	089.2°	219.45°	349.7°	305.1°	260.5°	130.25°	174.85°
SPACING	000°	184.5°	369°	387.18°	420.3°	259.39°	161.22°	080.61°	210.15°
	0'	382'	764.1'	801.7'	870.3'	537.1'	333.8'	166.9'	435.2'
BEARING	000°	117°	117°	128.93°	139.38°	155.09°	200°	200°	139.38°

TABLE 1-2

SCHEDULE B

12

A G R E E M E N T dated the 17th day of March, 1975.

CFGM CFTJ agreement

B E T W E E N:

GALT BROADCASTING LIMITED, a Company incorporated under the laws of the Province of Ontario, having its head office in the City of Cambridge

(hereinafter called "Galt")

OF THE FIRST PART

- and -

CFGM BROADCASTING LIMITED, a Company incorporated under the laws of Ontario, with its head office in the Regional Municipality of York, in the Province of Ontario

(hereinafter called "CFGM")

OF THE SECOND PART.

WHEREAS Galt is presently authorized to operate Radion Station CFTJ on the frequency of 1320 Kilohertz;

WHEREAS CFGM is presently authorized to operate Radio Station CFGM on the frequency of 1310 Kilohertz; and

WHEREAS by Agreement dated the 28 day of May 1974, (the "Option Agreement") made between Mrs. Ada Eleanor St. Clair and CFGM, CFGM was granted an option to purchase certain lands ("The Option") situated in the Regional Municipality of Waterloo, in the Township of North Dumfries and

described as Part Lot 1, Concession 8, comprising approximately 39.69 acres (the"Optioned Lands"); and

WHEREAS CFGM has made application to the Council of the Corporation of the Township of North Dumfries for an amendment to the zoning by-law relating to the Optioned Lands to permit the erection of radio towers (the "Rezoning"); and

WHEREAS CFGM intends to exercise the option and complete the transaction contemplated by the agreement resulting from the exercise of the option (the "Transaction") upon the rezoning becoming law; and

WHEREAS the parties at the present time do not know the exact date upon which the Rezoning will become law or the Transaction will be completed; and

WHEREAS the parties hereto have agreed to do certain actions with a view to improving the facilities under which they carry on their respective businesses.

NOW THIS AGREEMENT WITNESSETH that in consideration of the mutual covenants contained herein the parties hereby agree:

1. CFGM hereby agrees to immediately make application

to The Canadian Radio and Television Commission (the "CRTC") to amend its broadcasting transmitting undertaking licence to authorize the operation of Radio Station CFGM on the frequency of 1320 Kilohertz in accordance with the terms of a technical brief prepared by J. Gordon Elder, P. Eng., dated July 30, 1974 (the "1974 Elder Brief").

2. Galt hereby agrees to immediately apply to CRTC to make application to amend its broadcasting transmitting undertaking licence to authorize the operation of Radio Station CFTJ on the frequency of 960 Kilohertz in accordance with the terms of the technical brief prepared by J. Gordon Elder, P. Eng., dated February 14, 1975 (the "1975 Elder Brief").

3. Upon the rezoning becoming law, CFGM agrees to exercise the option or any renewal thereof, and expedite the completion of the transaction as soon thereafter as possible, as set out in the Option Agreement.

4. Upon the completion of the transaction and the granting by CRTC of the amendments applied for in the applications referred to in Paragraphs 1 and 2 (the "Licence Amendments") above:

(a) CFGM will commence construction on the Optioned Lands of the transmitter, towers

and associated equipment comprising the proposed new transmission facility referred to in the 1975 Elder Brief (the "960 Transmission Facility"), all components of which shall be new;

(b) CFGM will commence construction on other lands owned by it of the transmitter, towers and associated equipment comprising the proposed new transmission facility referred to in the 1974 Elder Brief.

5. Upon the issuance by the Department of Communications (Canada) of a "Technical Construction and Operating Certificate" evidencing its acceptance of the "Final Proof of Performance" of the implemented February 14, 1975 Elder Brief:

(a) CFGM will immediately transfer to Galt legal title to the Optioned Lands and to the 960 transmission facility free and clear of any and all liens, charges, or other encumbrances.

(b) Galt will pay to CFGM the sum of Forty Thousand Dollars ($40,000.00) and will deliver a promissory note for the sum of Forty Thousand Dollars ($40,000.00) in the form attached hereto as Schedule "A", the first payment of which shall become payable 30 days after delivery of the legal title to the Optioned Lands and to the 960 transmission facility as hereinbefore prov

(c) Galt will if it has not already done so, immedi ...to the frequency of 1320 Kilohertz.

6. ~~In the event that title to the Optioned Lands is not acquired by CFGM within months of the date hereof, or~~ In the event that CRTC does not grant the licence amendments within 18 months from the date hereof, this agreement may be terminated by either party by giving notice to the other party hereto and this agreement shall be null and void and no longer binding upon either party upon receipt of the said notice.

7. Any notice required or permitted to be given by either party shall be deemed to have been sufficient and effectually given if signed on behalf of the party giving such notice and mailed by registered prepaid post addressed or delivered in the case of notice to Galt Broadcasting Limited, 46 Main Street, Cambridge (G), Ontario; and in the case of CFGM, 10254 Yonge Street, Richmond Hill, Ontario, and/or at such other addresses as shall be designated in writing by the parties from time to time. Any notice so given shall be conclusively deemed to have been given and received if delivered, on the date of delivery, or if so mailed, on the third day following the day on which such notice was mailed.

8. This agreement shall enure to the benefit of and be

binding upon the successors and assigns of the respective parties hereto.

IN WITNESS WHEREOF the parties have executed this Agreement and affixed their corporate seals.

GALT BROADCASTING LIMITED

Per _____

CFGM BROADCASTING LIMITED

Per _____

SCHEDULE "A"

PROMISSORY NOTE

$40,000.00

FOR VALUE RECEIVED the undersigned promises to pay to or to the order of CFGM Broadcasting Limited at its offices at 10254 Yonge Street, Richmond Hill, Ontario, the principal sum of Forty Thousand Dollars ($40,000.00) of lawful money of Canada (without interest) payable on the following days and times:

The sum of $833.34 shall be paid monthly on the day of each and every month from and including the day of 19 , until the said principal sum of $40,000.00 has been fully paid.

GALT BROADCASTING LIMITED

Per _____

_____

STATION CALL: CFGM

STUDIO LOCATION: RICHMOND HILL, ONTARIO

SUBMISSION: TECHNICAL BRIEF

PREPARATION DATE: 4 OCTOBER 1985

LICENCEE: SLAIGHT COMMUNICATIONS INC.

PARAMETER	PRESENT	PROPOSED
FREQUENCY:	1320 kHz	640 kHz
POWER:	50 kW	50 kW
MODE:	DA-2	DA-1
SITE LOCATION:	Mississauga	Beamsville

TECHNICAL BRIEF

1- INTRODUCTION

This brief has been prepared on behalf of Slaight Communications Inc., licencee of CFGM. It was prepared in accordance with Broadcast Procedures 1, 2, Broadcast Specifications 1, 7, 14 and relevant Notices to Broadcast Consultants, including #21, 41, 44, 52, 54.

2- PURPOSE

The main objectives are:

1. to secure a more permanent site and less hostile environment for CFGM's transmitting facilities
2. to obtain a viable alternative to 1320 kHz
3. in general, to improve CFGM's assignment and service.

3- CHOICE OF FREQUENCY AND SITE

CFGM's coverage is being affected to the east and west by high-rise buildings for which detuning treatment is not possible, and well to the north and northeast, by a new 500,000 volt hydro power line which creates significant scattering and shielding. The transmission lines are supported by 180 foot steel towers, which absorb a significant amount of CFGM's present signal.

Mississauga is one of the fastest growing communities in the country. It is anticipated that much of the future construction and development will occur around CFGM's transmitter location. CFTR recently relocated to Grimsby. CKEY is presently doing so and CHIN has moved to Toronto Island. CFRB and CHUM may remain in Mississauga, but their transmitting facilities are located in fully developed areas near Lake Ontario, on lower frequencies, and with considerably smaller arrays, four and six towers compared to CFGM's thirteen.

Efforts have been made over the years to find a satisfactory alternate location for CFGM on 1320 kHz, but all have proved futile.

A site of at least 20 ha would be required. CFGM would require an unobstructed, undeveloped site of at least 20 ha, located south west of York Region, in order to meet protection and service requirements.

It is impossible to find a site suitable for this purpose, near the already built up metropolitan area. CFGM previously considered moving to the Toronto Island or fill parkland along the lakeshore. It even seriously considered a peninsula or island to be constructed by and shared with other broadcasters. None of these alternatives was found to be feasible due to high cost of marine construction, engineering complexity and land use policies.

CFGM's 1320 kHz assignment could not adequately serve York Region from a site on the Niagara Peninsula, because of excessive propagation losses over the relatively long path and high frequency.

However, under the new Canada USA MF Agreement two new lower frequency allotments became available in the area, on 640 and 820 kHz.

820 kHz was studied previously and found to involve fewer protection or siting problems than 640 kHz. It was selected as the basis for an earlier application, which was later denied. Page 6 of CRTC decision 85-13 states in part that "the Commission encourages the unsuccessful licensees to consult with the DOC with a view to finding other viable alternatives to resolve their technical difficulties."

As a result, Mr. Forde and Mr. Elder met in DOC's offices on February 5, 1985. During their initial discussion, it was agreed that 640 kHz is the only alternative frequency that might be viable. It is listed as a Toronto allotment, with transmitting site near Grimsby.

Consideration was given to co-siting with either CKEY on 590 kHz or CFTR on 680 kHz. Additional radiators and extensive filtering would be required. It was concluded that the combined system would be too complex and prone to intermodulation.

A separate transmitting site was obtained near the south shore of Lake Ontario, in the Beamsville area.

The site is far enough from the edge of the escarpment (2½km or 5 wavelengths) and from other sources of reradiation, including high voltage power lines, to avoid significant pattern distortion.

4- DESCRIPTION OF SITE AND SURROUNDING AREA

The transmitting site is presently fruit farmland, over half of which produces grapes. It is located in a rural agricultural area, that is likely to remain undeveloped for many years.

The site has flat, smooth terrain. It is outlined on Figure 2.

A 115 kV hydro tower line runs approximately east and west beside the CNR track, south of the property. It is approximately 1320', 400m or 0.9λ south of the array centre. The array is highly directional, with very low radiation, except from west to north east. Daytime protection of WHLO is critical.

The approximate locations of nearby hydro towers are shown on Figure 2.

The spacing and bearings from the array centre and field intensities at these towers will be approximately as follows:

TOWER #	MILES	BEARING	mV/m
1	1.03	270°	160
2	0.845	268°	180
3	.649	263°	210
4	.458	254°	300
5	.294	234°	410
6	.218	196°	600
7	.327	146°	200
8	.523	127°	50

The hydro towers are self supporting, approximately 87' (20°) high, with a base 24' square and one skywire. The scatter levels have been computed. Even without skywire insulation, they are very low. The hydro tower leg currents are under 10 mA and the total scattered field is 2 - 3 mV/m @ 1 km. However, skywire insulation may prove helpful in reducing local measurement errors and in achieving pattern suppression south westerly. Tower treatment was discussed with Ontario Hydro and letters exchanged with their Western Region. Skywire insulation is feasible. Detuning treatment is unnecessary and not planned.

The escarpment is over $1\frac{1}{2}$ miles or $2\frac{1}{2}$ km south of the site. It is not expected to produce any significant pattern distortion.

5- ARRAY DESIGN

Various configurations were considered. It was concluded that an eight tower parallelogram would provide for the optimum design. The tower height is 350' or 82°. The design complies with the guidelines that are contained in BP1 Rule 16.

The RSS:RMS ratio is 1.11, which is excellent. The Q value is 20 mV/m (0.80% quadrature). The array is therefore "critical". As detailed herein, it will comply fully with Rule 16. The system will be designed and installed for maximum reliability, ease of adjustment and maintenance.

Tower base impedances and currents were calculated by the moment method, allowing current distributions to vary slightly from one tower to the next. This prediction method has been field proven to be accurate. Two towers have a calculated resistance of less than 10Ω. They will have stabilizing resistors added, to provide an effective minimum base operating value of 10Ω.

Elevated counterpoises are planned around the tower bases, to improve stability. Radials will have a minimum effective length of 0.25λ. They will be extended 0.1λ further north under the main lobe, where ground currents are large. Any shortened ones may be insulated for increased efficiency and terminated with driven ground rods, at the property line or beyond.

The westerly ones will be buried across the road allowance. The municipality's public works department has indicated that this will be acceptable.

It should be noted that the radial length exceeds 0.25λ from SSW to SW, towards WHLO.

The antenna tuning units will be mounted in huts beside towers, for security, stability and to facilitate field work in all weather conditions.

An adequate supply of spare tuning components will be stocked, to expedite emergency replacement in case of failure.

The tuning and phasing system will be conservatively rated and designed for ease of adjustment and stability. Vacuum capacitors are considered preferable. Foam filled coaxial cable will be used except where power or voltage requirements dictate the use of larger, air filled coax. Care will be taken to use low Q circuits and to match all transmission lines accurately, in order to provide good overall system bandwidth, efficiency and stability.

6- MONITORING SYSTEM AND ARRAY ADJUSTMENT

The following sampling equipment or its equivalent is proposed:

	MANUFACTURER	MODEL	ACCURACY
antenna monitor	Potomac	AM-19D	1%, 1°
	(long term repeatability 0.4%, 0.3°)		
current sampling transformer	Delta	TCT-1-HV	2%, 2°
	(long term repeatability not specified)		
sampling coaxial cable	Andrew	42394-14	-
	(phase stabilitized, cut to equal electrical length)		

The above equipment has been found to be among the best available. It has been our experience that the sampling transformers offer excellent long term stability. Statistical probability is a realistic method of assessment, which is used extensively in broadcast engineering.

Improbably high values of radiation seldom occur, if an array is well designed, installed and maintained. The monitoring system should have a long term repeatability of 1% and 1°. Although these specifications are not available for the monitoring system as a whole, it is believed that the proposed system will meet this criterion, based upon past experience with other critical arrays and similar equipment.

The radiation pattern will be monitored weekly during the first month of operation and monthly thereafter, until the degree of stability is established. Monitor points will be selected from those used in the final proof of performance. These will probably include three reliable points per radial on each critical bearing.

If the radiation pattern is found to be out of tolerance, then the authorized pattern will be restored by the station's broadcast engineering consultants, as recommended by the Department.

7- DAY PRIMARY SERVICE

The 25 mV/m contour extends north ninety kilometers. It encloses Metropolitan Toronto, together with part of the York Region, Oakville and Mississauga.

The extent of primary service is considered to be 5 mV/m. This contour extends 160 kilometers north and encloses all of York Region. It also encloses part of Hamilton, Shelburne, Collingwood, Halton Hills, Oshawa, Bowmanville and communities between.

8- DAYTIME SECONDARY SERVICE

CFGM's westerly service will be reduced by approximately 100 km. It may reach the Cambridge area, instead of London, as at present. However, this will be offset to some extent by improvements in other directions. It will provide an adequate service in small communities and rural areas, unless limited by interference.

CFCO Chatham and WHLO Akron will impose limitations of up to 1.5 and 2 mV/m, respectively, westerly and south westerly.

9- NIGHTTIME PRIMARY SERVICE

The 10% RSS limitation or Eu is estimated to be 12.8 mV/m at Beamsville. This contour will extend north for approximately one hundred and twenty kilometers. It will enclose most of York Region.

In Richmond Hill and elsewhere in York Region, the calculated useable field strength remains approximately 12.8 mV/m. By definition, the Eu is predicted to exceed the RSS level of skywave interference by 26 db for 90% of night time. A field strength of 5 mV/m is predicted to do so for 67% of the time.

The Regional Municipality of York will obtain a more consistent service, with field intensities in the range of 10 - 50 mV/m. In particular Markham, Stouffville and vicinity will be significantly better served. Listeners in the southeasterly portion of the Region will not be subject to an abrupt loss of signal at pattern change time, or to annoying background interference at night. Listeners throughout the Region will have fewer indoor reception problems due to signal attenuation.

Because 640 kHz is considerably lower than 1320 kHz, it is much less susceptible to diurnal or transitional skywave interference, and to building penetration losses. Therefore reception will be improved inside buildings, especially steel framed structures.

It will also be improved during the two hours before and after sunrise, before and after sunset. Moreover, the night limitation is 50% lower on 640 kHz.

Reliable, though somewhat noisy nighttime reception can be expected most of the time, within the 2.5 mV/m contour.

10- MAXIMUM FIELD INTENSITIES

The 1000 and 250 mV/m contours enclose estimated resident populations of 100 and 250 respectively.

This compares favorably with the requirements of BP1 Rule 2 and with the present situation.

11- ASSUMPTIONS AND SOURCES OF INFORMATION

Values of ground and lake conductivity used in establishing protection requirements were taken from the latest DOC map dated January 1980 and from FCC Figure M3, except northerly towards CFBK-c.f. page 13.

Assignments were protected as required by the new MF Agreements and DOC's domestic rules, up to and including: Canadian change list #428, and United States change list #1817. Relevant information was derived from the antenna description sheets distributed by the Department of Communications.

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

SCALE	TITLE	NUMBER
1:50,000	Niagara	30M/3 & 6
1:500,000	Toronto - Windsor	4ONE & 30 NS
1:1,000,000	Lake Erie	NK-17

12- LIST OF PROTECTED STATIONS

All assignments were protected. The most relevant ones are as follows:

CALL	LOCATION	kHz	kW	MODE
CKTB	St. Catharines, ON	610	5N/10D	DA-2
CFCO	Chatham, ON	630	1N/10D	DA-2
CFBK	Huntsville, ON	630	1	DA-N
CJET	Smith Falls, ON	630	10	DA-2
CBN	St. Johns, NF	640	10	ND-U
KFI	Los Angeles, CA	640	50	ND-U
WHLO	Akron, OH	640	.5N/5D	DA-2
NEW	Cornwall, ON	640	5	DA-N
CFOB	Fort Frances, ON	640	1	DA-N
NEW	Atlanta, GA	640	1N/50D	DA-2
WOI	Ames, IA	640	1N/5D	DA-N
WLDM	Westfield, MA	640	1N/50D	DA-2
NEW	Berrien Springs, MI	640	.25N/.5D	ND-U
NEW	Kingsley, MI	640	1N/10D	DA-2
NEW	Zeeland, MI	640	.25N/1D	ND-U
WFNC	Fayetteville, NC	640	1N/10D	DA-D
NEW	Mount Holly, NJ	640	1N/5D	DA-2
NEW	Cohoes, NY	640	1N/10D	DA-2
NEW	East Greenbush, NY	640	1N/5D	DA-N
USBL-1	Blountville, TN	640	1N/10D	DA-2
WMSO	Collierville, TN	640	.25N/10D	DA-N
WMBG	Williamsburg, VA	640	.5	ND-U
WJJQ	Tomahawk, WI	640	1N/10D	DA-2
CMHQ	Sta Clara, CUBA	640	15	DA-1

13- DAYTIME INTERFERENCE ANALYSIS

All cochannel and adjacent channel assignments are fully protected in accordance with the applicable rules, with three exceptions, discussed below.

14- DAYTIME PROTECTION OF CKTB, CFBK AND CFCO

A small area of overlap would occur between the proposed 25 mV/m contour and the daytime 25 mV/m contour of CKTB, St. Catharines, as shown on figure 5-1. There are very few residents in the affected area and no significant impairment is expected.

A small limitation area would occur to the daytime service of CFBK Huntsville, in the Bracebridge area, as shown on Figure 5-2.

The dotted lines show the estimated limitation contours where the ratio CFBK : CFGM is 1 : 1 and 1 : 2. The normal protection criterion for stations 10 kHz apart is 1 : 1. A 1 : 2 ratio is more realistic on these lower frequencies, based upon DOC's receiver test report CTRB-4, dated April 1973.

Therefore, most of the nominal limitation to CFBK will not occur in practice, on normal receivers. A joint statement was proposed by CFBK's consultants and ourselves, a copy of which is included in the Addendum.

Agreements have been provided by the licencees of both CKTB and CFBK. A copy of CKTB's is included in the Addendum. CFGM's 5 mV/m day contour presently encloses Hamilton and we hope to maintain this level of service on 640 kHz.

This would extend the limitation to CFCO's daytime service slightly west of its former 0.5 mV/m contour, as shown on Figure 5-3. This concept was discussed in a letter dated September 26, 1984 from Mr. Zeitoun of DOC to Mr. Nelson of CRTC, as follows:

> "The basic assumption behind the 640 kHz parameters proposed was that day-time protection requirements to CFCO Chatham on 630 kHz can be somewhat relaxed. There are three arguments (not included in the Moffat submission) which can be used to support this assumption, although comments from Key Radio Limited, licensee of CFCO would have to be invited before this aspect can be decided.
>
> 1. CFCO, in its recently approved pattern change, accepted interference up to its existing 0.5 mV/m contour from a 640 kHz Toronto area station;
>
> 2. Key Radio Limited also operates CHYM Kitchener, which has a much stronger signal than CFCO over the area which would be affected;
>
> 3. Key Radio Limited also operates CKEY Toronto which, after implementing a recently approved power increase, will also provide service over the affected area."

15- NIGHTTIME INTERFERENCE ANALYSIS

The 0.5 mV/m 50% skywave service of the cochannel class A stations and the 10% RSS night limitation contours of cochannel class B stations, are adequately protected. All bearings, distances and radiation values were calculated by computer.

16- INTERMODULATION WITH OTHER BROADCASTING STATIONS

The proposed 250 mV/m contour does not enclose the transmitter site of any other station, therefore this form of interference is most unlikely to arise. The proposed site for CFTR, 50 kW DA-2 on 680 kHz, is approximately 15 km distant on 290° true. CKEY's new site is 9 km away on 250°.

17- HARMONIC INTERFERENCE

The second harmonic is 1280 kHz, which was assigned to CHAM, Hamilton, until its recent move to 820 kHz. However, CHAM's 1280 kHz operation did not serve Beamsville or vicinity, due to protection of and limitation from WPXN Rochester. In addition modern transmitters provide excellent harmonic suppression, therefore this form of interference will not arise.

18- IMAGE INTERFERENCE

The image frequencies are above the broadcast band, therefore this form of interference will not arise.

19- OTHER SIGNIFICANT INFORMATION

An application for remote control authorization will be filed at the appropriate time. Until it is approved the transmitting facilities will be attended.

The installation will be made in accordance with good engineering practice, CSA and other relevant specifications. Equipment will be type approved per RSS 150 where necessary.

20- ENGINEER'S SEAL AND SIGNATURE

This brief was prepared by the undersigned consultant, practicing in the field of broadcast engineering.

J. Gordon Elder, P. Eng.

(00) IFRB Serial No.

FORM FOR THE APPLICATION OF ARTICLE 4 OF THE AGREEMENT
CHARACTERISTICS OF A REGION 2 BROADCASTING STATION IN THE BAND 535 - 1 605 kHz

PART I GENERAL INFORMATION

(01) Administration | FORM No. | Date

Assigned frequency (kHz)		(02)	6 1 4 1 0
TRANSMITTING STATION	Name of the station	(03)	R I C H M O N D H I L L ONT.
	Call sign	(04)	C F G M
	Additional Identification	(05)	
	Station class	(06)	B
	Operational Status	(07)	0
Country		(08)	C A N
Geographical coordinates of the transmitting station		(09)	W 0 7 9 2 6 0 0 N 4 3 1 0 4 5

(11) a) New assignment ☐ b) Modification of characteristic of an assignment recorded in the Plan ☐ c) Cancellation of an assignment ☐

(12) Modification under Article 3.2.4 (Region 2 Agr. Sec. 4.2.14) Yes [X] No ☐

(13) Date of bringing into service or cessation of operation ☐ ☐ ☐ Year Month Day

(14) Extended/Critical hours of operation ☐

STATION PARAMETERS		FULL DAYTIME OPERATION		NIGHT-TIME OPERATION	
Station power (kW)	(21)	5 0 0	(31)		
r.m.s. value of radiation for station power (mV/m at 1 km)	(25)	2 2 4 7 0	(35)		
Antenna type	(26)	B	(36)		
Simple vertical antenna electrical height (degrees)	(27)	8 2 0	(37)		

(44) Remarks

COORDINATION UNDER ARTICLE III:

COUNTRY								
IN PROGRESS								
ACCEPTANCE OBTAINED								

FORM FOR THE APPLICATION OF ARTICLE 4 OF THE AGREEMENT

CHARACTERISTICS OF A REGION 2 BROADCASTING STATION

IN THE BAND 535 - 1605 kHz

(00) IFRB Serial No.

PART II

DESCRIPTION OF A DIRECTIONAL ANTENNA CONSISTING OF VERTICAL CONDUCTORS

Form No. | Date

(01) CFGM RICHMOND HILL — Name of transmitting station

(02) CAN — Country

(03) DN — Hours of operation

(04) 8 — Total number of towers

(05) Tower No.	(06) Tower field ratio	(07) Phase difference of the field (± degrees)	(08) Electrical tower spacing (degrees)	(09) Angular tower orientation (degrees)	(10) Definition point indicator	(11) Electrical height of tower (degrees)	(12) Tower structure
1	3.84	0.	0.	0.		82.	0
2	3.81	355.7	202.	85.		82.	0
3	9.92	117.1	99.	175.		82.	0
4	9.84	113.5	223. 224	110. 187		82.	0
5	10.	237.1	190.	175.		82.	0
6	9.89	234.3	277. 316	128. 246		82.	0
7	3.79	353.6	285.	175.		82.	0
8	3.79	353.6	349. 327	139. 672		82.	0
9	.	.	.	.		.	
10	.	.	.	.		.	

(Use a supplementary sheet in cases where there are more than 10 towers.)

(14) r.m.s. value of theoretical radiation	(15) Type of pattern (T, E or M)	(16) Special quadrature factor
2247. mV/m at 1 km	E	20. mV/m at 1 km

(17) SUPPLEMENTARY INFORMATION

Government of Canada
Department of Communications

Gouvernement du Canada
Ministère des Communications

TABLE 2-1

PARTICULARS OF PROPOSED SITE AND RADIO ANTENNA STRUCTURES

For Broadcasting Applications this form required in Quadruplicate.

For Non-Broadcasting Applications, this form required in Triplicate, and if antenna structures are more than 100 metres apart, a separate application is required for each antenna installation.

Two copies of the sketch and one copy of the map indicated below are required

DÉTAILS SUR L'EMPLACEMENT ET LES BÂTIS D'ANTENNE RADIO

Les demandes en radiodiffusion doivent être présentées en quatre copies.

Les demandes autres que de radiodiffusion doivent être présentées en trois copies, et de plus, si les bâtis d'antenne sont situés à plus de 100 mètres l'un de l'autre, présenter une demande distincte pour chaque bâti.

Fournir deux copies du diagramme et une copie de la carte mentionnés ci-dessous.

GENERAL SECTION - TO BE COMPLETED BY ALL APPLICANTS / RENSEIGNEMENTS GÉNÉRAUX - À REMPLIR PAR TOUS LES REQUÉRANTS

APPLICANT'S NAME AND ADDRESS / NOM ET ADRESSE DU REQUERANT

Slaight Communications Inc.
2 Bloor Street East, Toronto, Ontario M4W 1A8

TELEPHONE NO. / N° DE TÉLÉPHONE

(416) 967-2771

NAME OR LOCATION OF PROPOSED FACILITY / NOM OU EMPLACEMENT DE L'INSTALLATION PROJETÉE

Near Beamsville, Ontario

CALL SIGN (IF ANY)
INDICATIF D'APPEL (S'IL Y A LIEU)

GEOGRAPHIC CO-ORDINATES OF MID-POINT OF SYSTEM / COORDONNÉES GÉOGRAPHIQUES DU POINT MILIEU DU SYSTÈME

43 ° 10 ' 45 " N LAT / LAT N — 79 ° 26 ' 00 " WEST LONG. / LONG OUEST

If applicable, name or address of building or common tower on which antenna is to be located.

Si tel est le cas, nom ou adresse du bâtiment ou du pylône commun sur lequel l'antenne sera installée.

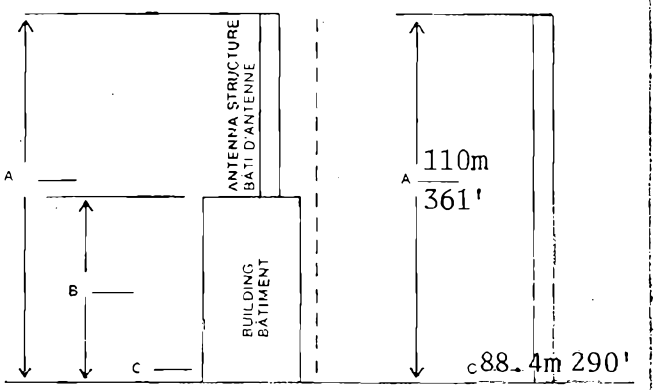
n/a

List any tall adjacent buildings and structures which may overshadow the proposed structure. (Include additional sketch if necessary). Transport Canada requires all vertical dimensions in feet, and for purposes of this sketch all relevant vertical dimensions are required in both feet and metres and all relevant horizontal dimensions required in metres.

Faire une liste indiquant les structures et bâtiments avoisinants plus haut que le bâti projeté. (Inclure un diagramme additionnel si nécessaire). Transports Canada exige que toutes les dimensions verticales pertinentes soient fournies en pieds et que, aux fins de ce diagramme, toutes les dimensions verticales pertinentes soient fournies en pieds et en mètres, alors que les dimensions horizontales pertinentes seront fournies en mètres.

PROPOSED STRUCTURE(S) / BÂTI(S) PROJETÉ(S)

PAINTING / PEINTURE ☐ YES / OUI ☐ NO / NON — LIGHTING / FEU ☐ YES / OUI ☐ NO / NON



A HEIGHT OF STRUCTURE ABOVE GROUND / HAUTEUR DU BÂTI AU-DESSUS DU SOL 110m (361')

B HEIGHT OF BUILDING ABOVE GROUND / HAUTEUR DU BÂTIMENT AU-DESSUS DU SOL

C GROUND ELEVATION ABOVE SEA LEVEL / HAUTEUR DU SOL PAR RAPPORT AU NIVEAU DE LA MER 88.4m (290')

Attach the most recent issue of an Energy, Mines and Resources (EMR) map (scale 1:50 000) on which the mid-point of the antenna system, the latitude and longitude scale, the map scale, and the map name are clearly shown. If this scale of map is not published, use the most detailed EMR map available with the same information.

Joindre l'édition la plus récente d'une carte d'Énergie, Mines et Ressources (EMR) (échelle 1:50 000) sur laquelle sont clairement indiqués le point médian du réseau d'antenne, l'échelle de latitude et longitude, l'échelle et le nom de la carte. S'il n'existe pas de carte à l'échelle pour la région visée, utiliser la carte d'EMR la plus détaillée et y inscrire ces renseignements.

If site is located within 16 kilometres of any land or water aerodrome(s) give name of aerodrome(s), distance(s) in kilometres and true bearing(s) from site.

Si l'emplacement se trouve dans un rayon de 16 kilomètres d'aérodromes terrestres ou d'hydraérodromes, indiquer les noms des aérodromes, les distances en kilomètres jusqu'aux aérodromes et les relèvements vrais de l'emplacement par rapport aux aérodromes.

Grassie Air Park 16 km on 260°

SECTION FOR NON-BROADCASTING APPLICATIONS ONLY / PARTIE RÉSERVÉE AUX DEMANDES AUTRES QUE DE RADIODIFFUSION

If the height of the antenna structure is in excess of 30 metres above ground, list by distance and geographic direction all AM antenna arrays, FM, TV or Cable TV antenna towers or supporting structures within 300 metres.

Si le bâti d'antenne s'élève à plus de 30 mètres au dessus du sol, faire une liste indiquant la distance et l'azimut de tous les réseaux d'antenne de radiodiffusion AM, des pylônes d'antennes ou des bâtis servant de support d'antenne de radiodiffusion FM, de télévision ou de télévision par câble situés à moins de 300 mètres.

DATE OF RADIO STATION LICENCE APPLICATION
DATE DE LA DEMANDE DE LICENCE DE STATION RADIO

SIGNATURE OF APPLICANT
SIGNATURE DU REQUÉRANT ►

DATE ►

SECTION FOR BROADCASTING APPLICATIONS ONLY / PARTIE RÉSERVÉE AUX DEMANDES EN RADIODIFFUSION

(REFER TO BROADCAST PROCEDURE 1, RULE 6) / (CONSULTER LA RÈGLE 6 DE LA PROCÉDURE N° 1, POUR LA RADIODIFFUSION)

CONSULTING ENGINEER / INGÉNIEUR-CONSEIL: J. Gordon Elder, P. Eng.

TELEPHONE NO. / N° DE TÉLÉPHONE: (416) 833-5141

ADDRESS - ADRESSE: P.O. Box 10, King City, Ontario L0G 1K0

TYPE OF UNDERTAKING / TYPE D'ENTREPRISE: [X] AM [ ] FM [ ] TV [ ] CABLE TV / TV PAR CABLE

PRINCIPAL LOCALITY TO BE SERVED / LOCALITÉ PRINCIPALE À DESSERVIR: Richmond Hill & York Region

IS THE SITE CLEAR OF HIGH VOLTAGE POWER LINES (OVER 60 KV) TO A DISTANCE OF 2 000 METRES? L'EMPLACEMENT EST-IL LIBRE DE LIGNES À HAUTE TENSION (AU-DELÀ DE 60 KV) JUSQU'À UNE DISTANCE DE 2 000 MÈTRES? [ ] YES / OUI [X] NO / NON

VOLTAGE / TENSION: 115 kV

DISTANCE FROM SITE (METRES) / DISTANCE DE L'EMPLACEMENT (EN MÈTRES): approx. 400m south

Within 2 000 metres of the location of any element of the proposed antenna system, list and describe (particularly physical dimensions):

a) All antenna structures.

b) All large metallic structures, including high rise buildings.

c) If there are no such structures within 2 000 metres, a statement to this effect shall be inserted.

À moins de 2 000 mètres de l'emplacement de tout élément du réseau d'antenne projeté indiquer et décrire (surtout les dimensions physiques):

a) Tout bâti d'antenne.

b) Toute grande structure métallique y compris les immeubles élevés.

c) S'il n'y a aucun bâti d'antenne ni aucune structure dans un rayon de 2 000 mètres l'indiquer sur la présente formule.

none

SIGNATURE OF APPLICANT OR HIS AUTHORIZED ENGINEERING CONSULTANT / SIGNATURE DU REQUÉRANT OU DE SON INGÉNIEUR-CONSEIL AUTORISÉ: J.G. Elder P. Eng.

DATE: 11 Sept. 1985

TRANSPORT CANADA USE ONLY/À L'USAGE EXCLUSIF DE TRANSPORTS CANADA

AERONAUTICAL HAZARD/DANGER AÉRONAUTIQUE

SITE AND STRUCTURE ACCEPTABLE / EMPLACEMENT ET BÂTI ACCEPTABLES: [ ] YES / OUI [ ] NO / NON

OBSTRUCTION PAINTING REQUIRED / PEINTURE D'OBSTACLE REQUIS: * [ ] YES / OUI [ ] NO / NON

TEMPORARY LIGHTING REQUIRED / FEUX TEMPORAIRES REQUIS: * [ ] YES / OUI [ ] NO / NON

OBSTRUCTION LIGHTING REQUIRED / FEU D'OBSTACLES REQUIS: * [ ] YES / OUI ** [ ] YES / OUI [ ] NO / NON

* per Standards Obstruction Markings TP382, available from Transport Canada, SLPP, Ottawa, K1A 0N8 $5.00 Cheque or money order to Receiver General of Canada.

** Also as per Standards Obstruction Markings TP382, except that for lighting other than steady burning dual red units, Regional Superintendent of Airways (RSAW) is to specifically detail the required type of lighting, number of units and levels on the structure. Details as follows:

* Conformément aux Normes de balisage des obstacles TP382F. On peut se procurer ce document en s'adressant à Transports Canada, Section des publications et de la diffusion, Ottawa K1A 0N8 — faire un chèque ou mandat-poste de $5.00 à l'ordre du Receveur général du Canada.

** Conformément aux Normes de balisage des obstacles TP382F, sauf qu'en ce qui concerne les groupes d'éclairage comprenant deux lampes à éclat continu de couleur rouge, le Surintendant régional - Voies aériennes (RSAW) indiquera de façon précise le genre d'éclairage requis, le nombre de groupes d'éclairage et les niveaux auxquels ils devront être installés sur ce bâti. Ces renseignements sont indiqués en détail ci-dessous.

RSAW to be informed by applicant 90 days prior to construction commencing / Le RSAW doit être informé par le requérant 90 jours avant le début des travaux: [ ] YES / OUI [ ] NO / NON

Approval valid until / Autorisation valable jusqu'au:

If not erected by this date contact RSAW for reassessment / Si le bâti n'est pas encore érigé à la date précisée communiquer avec le RSAW pour une nouvelle évaluation.

REGIONAL CONTROLLER CIVIL AVIATION BRANCH / CONTRÔLEUR RÉGIONAL DIRECTION DE L'AVIATION CIVILE:

DATE:

TELECOMMUNICATIONS AND ELECTRONICS BRANCH COMMENTS / OBSERVATIONS DE LA DIRECTION DES TÉLÉCOMMUNICATIONS ET DE L'ÉLECTRONIQUE

REGIONAL MANAGER TELECOMMUNICATIONS AND ELECTRONICS / GESTIONNAIRE RÉGIONAL TÉLÉCOMMUNICATIONS ET ÉLECTRONIQUE:

DATE:

CFIM 22/MAY/85 07:50:57

FIELD

CFIM 640 DA-1

PROVISIONAL RULE 16 EXPANDED RADIATION

TOWER NUMBER	HEIGHT DEGREES	SPACING DEGREES	BEARING DEGREES	FIELD RATIO	PHASE DEGREES
1	82.0000	0.0000	0.0000	38.4000	0.0000
2	82.0000	202.0000	85.0000	38.1000	355.7000
3	82.0000	95.0000	175.0000	99.2000	117.1000
4	82.0000	223.2240	110.1870	98.4000	113.5000
5	82.0000	190.0000	175.0000	100.0000	237.1000
6	82.0000	277.3160	128.2460	98.9000	234.3000
7	82.0000	285.0000	175.0000	37.9000	353.6000
8	82.0000	349.3270	139.6720	37.9000	353.6000

SCALED TO POWER OF 50KW AND LOSS OF 10HMS
POWER LOSS=2313.39758425WATTS
SCALE FACTOR=11.7995474909
RMS=2247.19207076MV/M
RSS=2505.23610388MV/M
RSS/RMS=1.11514104041

Q = 20

HORIZONTAL PLANE PATTERN

0	6264.94	90	34.77	180	47.79	270	215.58
5	6028.89	95	25.75	185	38.73	275	278.01
10	5634.05	100	34.28	190	29.73	280	308.78
15	5103.34	105	34.04	195	25.49	285	282.37
20	4467.72	110	28.43	200	25.07	290	176.14
25	3764.40	115	26.72	205	23.82	295	83.39
30	3034.29	120	30.69	210	21.48	300	392.49
35	2318.80	125	34.34	215	22.80	305	845.52
40	1656.26	130	35.34	220	28.69	310	1412.63
45	1078.49	135	35.48	225	33.70	315	2071.74
50	608.02	140	36.47	230	34.04	320	2791.89
55	257.77	145	37.48	235	29.97	325	3535.29
60	63.12	150	37.19	240	25.20	330	4260.56
65	137.61	155	36.89	245	22.57	335	4926.31
70	183.57	160	39.74	250	22.59	340	5494.38
75	173.81	165	45.91	255	38.96	345	5932.37
80	131.13	170	51.50	260	81.63	350	6215.64
85	78.08	175	52.59	265	144.31	355	6328.50

TABLE 4

IMPEDANCES CURRENTS AND POWER

Mast height = 82° (350' or 106.7m)
Effective height ≈ 88
Effective radius ≈ 0.5m

BASE OPERATING PARAMETERS

Tower Number	Resistance Ohms	Reactance Ohms	Magnitude Amperes	Ratio %	Phase Degrees	Power Watts
1	62.046	+j132	8.053	41.7	0	4024
2	62.216	+j136	7.998	41.4	-4.3	3979
3	36.789	+j57	19.300	100.0	120.2	13703
4	37.463	+j57	19.146	99.2	116.7	13733
5	18.168	+j38	20.039	103.8	238.7-120	7296
6	17.643	+j38	19.839	102.8	235.9-120	6944
7	3.021	-j26	7.970	41.3	-6.4	192
8	2.027	-j28	7.970	41.3	-6.4	129
						50000

NOTE: Values were computed by moment method and scaled to give estimated actual impedances.

GROUNDWAVE INTERFERENCE TO GROUNDWAVE SERVICE

FROM	TO	PROTECTED CONTOUR FIELD INT. mV/m	PROTECTED CONTOUR BRG. DEGS. TRUE	PROTECTED CONTOUR RAD. mV/m	PROTECTED CONTOUR DIST. KM	BRG. DEGS. TRUE	COND./DIST. mmhos/m	NOISE SIGNAL PER 100 µV/m	PERMISSIBLE NOISE µV/m	PERMISSIBLE RAD. mV/m	PROPOSED NOISE µV/m	PROPOSED RAD. mV/m
CFGM	CFBK	0.5	120		30	11.3	3.5/224	12.2			670	5500
	630	0.5	150		32	9.3	4/210	18.3	as proposed		1043	5700
		0.5	175		33	5.9	4/203	20	per special		1190	5950
		0.5	190		33.5	3.4	4/202.5	20	agreement		1220	6100
		0.5	210		33.5	0.3	4/206	19			1189	6260
		0.5	240		33	357.2	4/219	16.3			1027	6300
		0.5	270			356	3.5/240	10.2			645	6320
CFGM	CJET	0.5	200		50	060.9	15/30,8/74,15/73 5/60,4/58	23.5	500	2120	15.3	65
			225		42	056.8	15/29,8/62,15/78 5/75,4/44	19.0	500	2630	28.5	150
			250		44	053.1	15/31,8/54,15/65 5/112,4/27	17.7	500	2820	62	350
CFGM	WHLO	0.52	300	82.6	63	232	8/65,10/95,8/140	19	25	130	6	33
		.51	020	80	65	225	8/75,10/80,8/72	47	25.5	54	16	34
		.59	030	135	81	223	8/55,10/75,8/80	58	29.5	51	16	32
		.62	040	247	108	218.5	8/50,10/70,8/62	85	31	36.5	19	27
		.5	045	310	126	214	8/47,10/64,8/54	109	25	22.9	24	22
		.5	050	376	134	210	8/42,10/60,8/44 4/14	104	25	23	23	21
		.5	060	510	156	199	8/38,10/40,8/35 4/40	89	25	28.1	22	25
		.5	070	639	173	187	8/38,10/28,8/39 4/65	60	25	41.6	21	35
		.5	080	756	170	192	8/38,10/34,8/32 4/55	75	25	33.3	20	27
	Kingsley	0.5	110	764*	190	290	15/30,5/60,10/64 15/80,8/87	15.5			27.3	176

* to be reduced per note 7 in the Bilateral Agreement.

TABLE 5-1

GROUNDWAVE INTERFERENCE TO GROUNDWAVE SERVICE

FROM	TO	PROTECTED CONTOUR FIELD INT.** mV/m	PROTECTED CONTOUR BRG. DEGS. TRUE	PROTECTED CONTOUR RAD. @ 1mile mV/m	PROTECTED CONTOUR DIST. * KM	BRG. DEGS. TRUE	COND./DIST. mmhos/m	NOISE SIGNAL PER 100 µV/m	PERMISSIBLE NOISE µV/m	PERMISSIBLE RAD. @ 1 km. mV/m	PROPOSED NOISE µV/m	PROPOSED RAD. @ 1 km. mV/m
				NEW OLD								
CFGM	CFCO	0.5	035	294 302	168	288.4	8/6,15/24,5/110	87	500	575	198	228
		0.5	040	317 324	161	283.5	8/34,5/96	97	500	515	297	306
		0.56	042.5	390 350	167	284	8/33,5/88	117	560	479	351	300
		0.55	045	413 376	174	285.1	8/33,5/77.7	142	550	387	409	288
		0.61	047.5	490 399	181	286	8/33,5/67	185	610	330	462	275
		0.625	050	528 422	186	285.8	8/33,5/58	225	625	278	612	272
		0.68	052.5	590 433	189	284	8/33,5/50	275	680	247	825	300
		0.71	055	632 445	192	281.4	8/34.5/40.5	360	710	197	1130	314
		0.77	057.5	680 442	194	277.4	8.35,5/32.5	450	770	171	1372	305
		0.807	060	710 440	194	271.2	8/37,5/26	530	807	152	1325	250
		.86	062.5	730 425	193.5	263.8	8/40,5/20	610	860	141	866	142
		0.92	065	752 408	191.5	255.5	8/42,5/18	630	920	146	473	75
		1.06	070	755 356	183	241.0	8/42,5/14,8/12.6	520	1060	2040	348	67
				@ 1 km.								
		0.788	52.5	949.5	179	279.3	8/35.4,5/49.15 10/4	255	788		785	308
		0.840	55	1017.1	187	276	8/36,5/44	310	840		840	283
		0.800	57.5	1094.3	190	271	8/38,5/36	360	800		800	215.6
		0.850	60	1150	189	268.5	5/39,8/30	470	850		850	180

* Per 1964 measured 0.5 mV/m contour
** Per CDN Ch. List #419

ELDER ENGINEERING LIMITED

TABLE 5-2

SKYWAVE INTERFERENCE TO SKYWAVE SERVICE

FROM	TO	PROTECTED CONTOUR								PERMISSIBLE		PROPOSED	
		FIELD INT. mV/m	BRG. DEGS. TRUE	RAD. mV/m	DIST. KM	BRG. DEGS. TRUE	DIST. KM	ELEVN. ANGLE DEGS.	10% SIGNAL PER 100 µV/m	NOISE µV/m	RAD. mV/m	NOISE µV/m	RAD. mV/m
CFGM	CBN	0.84	200	418	105	070.4	2085	0.5	9.27	42	453	17.1	184.4
		0.84	220	418	105	069.8	2054	.7	9.68	42	434	17.7	182.7
		0.70	240	466	125	069.3	2014	.9	10.22	35	342	18.5	180.5
		0.55	260	718	255	068.6	1871	1.6	12.9	27.5	213	22.7	175.8
		0.50	272	803	340	066.7	1786	2.1	14.95	25	167	23.6	158
		0.50	280	803	340	065.1	1795	2.0	14.71	25	170	20.1	137
		0.50	300	803	340	061.8	1849	1.7	13.38	25	187	10.3	77
		0.50	320	803	340	059.5	1939	1.3	11.49	25	217	8.0	70
		0.50	333	803	340	058.6	2011	0.9	10.26	25	244	9.4	92
		0.67	340	475	135	064.1	2089	0.5	5.21	33	358	6.6	72
CFGM	KFI	0.5	335	2520	1170	285.9	3574	0	2.40	25	1040	6.4	268
		0.5	000	2520	1170	286	3070	0	3.40	25	735	9.1	268
		0.5	020	2520	1170	283	3696	0	4.67	25	535	14.1	301
		0.5	040	2520	1170	276	2419	0	5.06	25	412	17.4	287
		0.5	060	2520	1170	266.4	2307	0	6.95	25	360	11.4	164
		0.5	080	2520	1170	256.6	2396	0	6.19	25	404	3.1	50
		0.5	100	2520	1170	249.4	2658	0	4.84	25	516	1.06	22

TABLE 6-1

METRIC NIGHTLIMIT

STATION COORDINATES

#	NAME	LAT	LONG
1	CFGM	43 10 45	79 26 0
2	KFI	33 52 48	118 0 48
3	CBN	47 30 10	52 48 7
4	WHL0	41 4 47	81 38 45
5	C0H0	42 48 18	73 43 44
6	WHAZ	42 38 15	73 41 23
7	WLDM	42 10 43	72 45 9
8	WNJX	40 5 28	74 50 30
9	WCI	41 59 34	93 41 27
10	WMBG	37 16 37	76 45 7
11	BLUN	36 30 44	82 22 38
12	WMSC	34 59 20	89 41 10
13	ZEEL	42 47 31	86 1 12
14	KING	44 35 24	85 30 45
15	WFNC	35 4 46	78 55 58
16	CFCB	48 36 10	93 26 52
17	C0RN	45 5 0	74 54 0

FROM STN NAME	TO STN NAME	FWD BRG DEG	DIST KM	--10% SKYWAVE-- THETA DEG	S/100 UV/M	RAD MV/M	Q-FAC MV/M	SL MV/M
WLDM	CFGM	283.8	557.1	17.7	115.57	408.54	8.60	9.44*
WHAZ	CFGM	279.3	471.5	21.0	129.15	336.48	7.06	8.69*
WFNC	CFGM	357.4	901.6	10.0	73.68	309.64	7.95	4.56
WCI	CFGM	78.7	1173.1	6.6	48.15	450.58	10.00	4.34
WMBG	CFGM	341.7	694.5	13.9	99.99	208.02	5.43	4.16
BLUN	CFGM	17.8	782.5	12.0	88.52	227.84	10.00	4.03
C0RN	CFGM	241.3	419.1	23.6	139.34	144.43	22.36	4.03
WHL0	CFGM	37.3	296.2	32.2	174.52	112.00	31.00	3.91
ZEEL	CFGM	83.2	537.3	18.4	119.25	138.66	3.75	3.31
WNJX	CFGM	313.5	513.1	19.3	122.55	127.51	22.10	3.13
C0H0	CFGM	277.1	465.7	21.3	130.14	119.03	10.00	3.10
KING	CFGM	105.7	511.6	19.4	122.75	115.63	14.10	2.84
RSS LIMIT= 12.834174898 4MV/M								
ZEEL	KFI	261.1	2939.7	0.0	3.77	150.00	3.75	0.11*
WMSC	KFI	275.5	2591.8	0.0	5.15	77.12	4.06	0.08*
CFCB	KFI	240.2	2606.1	0.0	5.07	76.45	8.12	0.08*
WCI	KFI	255.0	2305.4	0.0	6.96	41.52	10.00	0.06
RSS LIMIT= 0.158481518483MV/M								

TABLE 6-3

BLUN CBN	53.9	2709.2	0.0	4.61	368.22	10.00	0.34*
JFNC CBN	49.4	2564.1	0.0	5.31	318.00	7.95	0.34*
JMBS CBN	52.2	2258.0	0.0	7.42	217.30	5.43	0.32*
CFSM CBN	67.7	2124.7	0.4	8.80	170.08	20.00	0.30*
CFPB CBN	76.8	2987.3	0.0	3.63	410.96	8.12	0.30
JHLP CBN	62.9	2388.1	0.0	6.25	201.91	31.00	0.25
JHAZ CBN	64.5	1720.8	2.5	16.87	70.81	7.06	0.24
KING CBN	71.0	2525.9	0.0	5.53	200.13	14.10	0.22
JLDM CBN	62.5	1674.7	2.7	18.47	57.22	8.60	0.21
JJJZ CBN	57.6	1942.2	1.3	11.44	79.89	22.10	0.18
CCHP CBN	65.1	1715.7	2.5	17.03	52.70	10.00	0.18
CCRN CBN	78.1	1712.8	2.5	17.12	51.88	22.36	0.18
ZEEL CBN	67.0	2635.7	0.0	4.94	150.00	3.75	0.15
RSS LIMIT= 0.650474533393MV/M							
JLDM JHLP	263.6	748.7	12.7	92.63	449.53	8.60	8.38*
JHAZ JHLP	258.0	680.9	14.2	101.63	307.68	7.06	6.25*
JFNC JHLP	341.2	708.0	13.5	98.22	302.74	7.95	5.95*
JJJZ JHLP	91.8	1006.7	8.5	63.48	447.06	10.00	5.68
BLUN JHLP	6.9	511.7	19.4	122.74	190.05	10.00	4.67
CCHP JHLP	258.3	681.9	14.2	101.51	219.43	10.00	4.45
JMBS JHLP	316.6	597.0	16.4	104.71	204.34	5.43	4.28
ZEEL JHLP	116.3	408.7	24.2	141.53	130.94	3.75	3.71
RSS LIMIT= 11.9933672756MV/M							
JLDM CCHP	311.4	106.1	60.8	430.92	144.76	8.60	12.48*
JHLP CCHP	71.0	681.9	14.2	101.51	217.22	31.00	4.41
JMBS CCHP	21.8	666.2	14.5	103.41	207.10	5.43	4.28
JFNC CCHP	26.0	969.2	9.0	67.39	311.17	7.95	4.19
BLUN CCHP	43.9	1017.5	8.4	62.41	327.39	10.00	4.09
JJJZ CCHP	16.7	315.7	30.5	167.56	99.70	22.10	3.34
CBN CCHP	260.0	1715.7	2.5	17.03	949.82	23.78	3.23
CCRN CCHP	159.3	270.1	34.7	185.97	71.39	22.36	2.66
RSS LIMIT= 12.4757082017MV/M							
JLDM JHAZ	303.9	92.3	64.1	515.87	132.18	8.60	13.64*
JHLP JHAZ	72.6	680.9	14.2	101.63	221.44	31.00	4.50
JMBS JHAZ	22.7	650.5	14.9	105.31	206.55	5.43	4.35
JFNC JHAZ	26.8	954.6	9.2	68.92	310.87	7.95	4.28
BLUN JHAZ	44.8	1008.0	8.5	63.36	330.61	10.00	4.19
JJJZ JHAZ	18.4	299.0	32.0	173.32	97.03	22.10	3.36
CBN JHAZ	259.4	1720.8	2.5	16.87	949.85	23.78	3.20
RSS LIMIT= 13.6371677967MV/M							
CCHP JLDM	130.7	106.1	60.8	430.92	185.27	10.00	15.97*
JHAZ JLDM	123.2	92.3	64.1	515.87	130.63	7.06	13.48*
JHLP JLDM	77.7	748.7	12.7	92.63	236.42	31.00	4.38
JMBS JLDM	30.8	643.2	15.1	105.17	206.27	5.43	4.34
JFNC JLDM	32.3	953.9	9.2	68.99	310.85	7.95	4.29
BLUN JLDM	49.7	1038.9	8.1	60.28	348.42	10.00	4.20
RSS LIMIT= 20.8949348865MV/M							

TABLE 6-4

WLDM WWJZ	217.7	290.6	32.7	176.98	362.30	8.60	12.82*
WHAZ WWJZ	199.1	299.0	32.0	173.32	310.63	7.06	10.77*
CØHC WWJZ	197.5	315.7	30.5	167.56	297.83	10.00	9.98*
BLUN WWJZ	56.5	768.1	12.3	90.27	363.10	10.00	6.56
WENC WWJZ	31.7	663.4	14.6	103.75	300.32	7.95	6.23
WHL0 WWJZ	98.6	584.8	16.8	108.04	271.18	31.00	5.86
WMBS WWJZ	27.3	354.1	27.6	154.87	182.58	5.43	5.66
RSS LIMIT= 19.4939284591MV/M							
KEI WØI	59.8	2305.4	0.0	6.96	2594.00	64.85	3.61*
WMSØ WØI	337.1	852.9	10.7	80.71	221.09	4.06	3.57*
ZEEL WØI	264.6	635.9	15.3	104.95	142.05	3.75	2.98*
KING WØI	249.3	721.7	13.2	96.35	139.43	14.10	2.69
BLUN WØI	305.5	1147.4	6.9	50.26	204.77	10.00	2.06
WØI WØI	91.3	1591.4	3.3	21.95	455.15	10.00	2.00
CFØB WØI	181.6	735.1	12.9	94.50	93.00	8.12	1.76
CFSM WØI	268.4	1173.1	6.6	48.15	182.15	20.00	1.75
WENC WØI	305.4	1492.9	3.9	26.75	316.67	7.95	1.69
WHLØ WØI	279.8	1006.7	8.5	63.48	127.14	31.00	1.61
WLDM WØI	276.4	1723.4	2.5	16.78	451.22	8.60	1.51
WHAZ WØI	274.3	1642.1	3.0	19.73	346.61	7.06	1.37
RSS LIMIT= 5.888973775 31MV/M							
BLUN WMBS	78.7	507.3	19.5	123.35	393.13	10.00	9.70*
WLDM WMBS	213.4	643.2	15.1	105.17	439.76	8.60	9.25*
WENC WMBS	38.1	313.0	30.8	168.45	246.93	7.95	8.32*
WHAZ WMBS	204.6	650.5	14.9	105.31	343.69	7.06	7.24
WHLØ WMBS	133.5	597.0	16.4	104.71	299.75	31.00	6.28
CØHC WMBS	203.7	666.2	14.5	103.41	301.04	10.00	6.23
RSS LIMIT= 15.774119492 8MV/M							
WENC BLUN	298.2	349.0	28.0	156.21	257.97	7.95	8.06*
WHLØ BLUN	187.3	511.7	19.4	122.74	292.05	31.00	7.17*
WLDM BLUN	235.9	1038.9	8.1	60.28	468.70	8.60	5.65*
WMBS BLUN	262.0	507.3	19.5	123.35	199.21	5.43	4.91
WØI BLUN	118.3	1147.4	6.9	50.26	444.19	10.00	4.45
WHAZ BLUN	230.4	1008.0	8.5	63.36	303.31	7.06	3.84
CØHC BLUN	229.5	1017.5	8.4	62.41	258.10	10.00	3.22
ZEEL BLUN	154.8	764.4	12.3	90.71	144.80	3.75	2.63
RSS LIMIT= 12.17715275 28MV/M							
WØI WMSØ	154.6	852.9	10.7	80.71	381.80	10.00	6.16*
WENC WMSØ	272.5	978.5	8.9	66.41	311.36	7.95	4.14*
WHLØ WMSØ	228.7	976.1	8.9	66.66	267.54	31.00	3.57
BLUN WMSØ	257.8	680.7	14.2	101.66	173.20	10.00	3.52
KEI WMSØ	79.2	2591.8	0.0	5.15	2594.00	64.85	2.67
ZEEL WMSØ	201.3	923.5	9.6	71.74	146.81	3.75	2.11
WMBS WMSØ	261.5	1187.9	6.5	46.95	215.24	5.43	2.02
WLDM WMSØ	247.0	1670.4	2.8	18.63	474.42	8.60	1.77
RSS LIMIT= 7.42202354535MV/M							

TABLE 6-5

JØI	ZEEL	79.4	635.9	15.3	104.95	426.20	10.00	8.95*
JLDM	ZEEL	278.1	1088.8	7.5	55.83	443.47	8.60	4.95*
JHAZ	ZEEL	275.2	1006.5	8.5	63.50	345.84	7.06	4.39
JFNC	ZEEL	326.6	1053.1	7.9	58.91	312.67	7.95	3.68
BLIN	ZEEL	337.1	764.4	12.3	90.71	177.55	10.00	3.22
JMBJ	ZEEL	310.8	998.2	8.6	64.34	213.67	5.43	2.75
CFJM	ZEEL	267.7	537.3	18.4	119.25	109.47	20.00	2.61
JMSØ	ZEEL	19.0	923.5	9.6	71.74	177.46	4.06	2.55
JHLØ	ZEEL	299.2	408.7	24.2	141.53	86.82	31.00	2.46
KINJ	ZEEL	191.7	204.0	42.7	228.30	50.96	14.10	2.33
CFØB	ZEEL	135.5	865.2	10.5	78.90	143.58	8.12	2.27
RSS LIMIT= 10.2250663273MV/M								
JØI	KING	63.7	721.7	13.2	96.35	430.92	10.00	8.30*
JHAZ	KING	286.9	975.2	8.9	66.76	373.82	7.06	4.99*
JLDM	KING	288.9	1064.1	7.8	57.96	423.27	8.60	4.91*
ZEEL	KING	11.4	204.0	42.7	228.30	97.52	3.75	4.45
CFØB	KING	123.4	752.0	12.6	92.21	201.91	8.12	3.72
JFNC	KING	334.1	1196.3	6.4	46.27	314.52	7.95	2.91
BLIN	KING	344.6	936.1	9.5	70.63	176.96	10.00	2.50
CFJM	KING	289.9	511.6	19.4	122.75	97.84	20.00	2.40
JMBJ	KING	320.7	1095.3	7.4	55.27	214.58	5.43	2.37
CØRN	KING	270.0	837.9	11.0	82.41	137.51	22.36	2.27
RSS LIMIT= 10.8600343218MV/M								
BLIN	JFNC	116.1	349.0	28.0	156.21	384.09	10.00	12.00*
JLDM	JFNC	216.2	953.9	9.2	68.99	457.28	8.60	6.31*
JHLØ	JFNC	159.6	708.0	13.5	98.22	308.20	31.00	6.05
JMBJ	JFNC	219.3	313.0	30.8	168.45	175.02	5.43	5.90
JHAZ	JFNC	210.1	954.6	9.2	68.92	337.77	7.06	4.66
CØHØ	JFNC	209.3	969.2	9.0	67.39	287.72	10.00	3.88
RSS LIMIT= 13.5577806469MV/M								
KINJ	CFØB	309.2	752.0	12.6	92.21	461.50	14.10	8.51*
CFJM	CFØB	304.0	1238.2	6.0	43.05	766.10	20.00	6.60*
JØI	CFØB	1.4	735.1	12.9	94.50	318.42	10.00	6.02*
CØRN	CFØB	292.2	1459.7	4.2	28.50	516.17	22.36	2.94
KFI	CFØB	43.7	2606.1	0.0	5.07	2594.00	64.85	2.63
RSS LIMIT= 12.3359881233MV/M								
CFJM	CØRN	58.1	419.1	23.6	139.34	406.31	20.00	11.32*
JHAZ	CØRN	340.8	288.7	32.9	177.82	293.57	7.06	10.44*
JLDM	CØRN	332.6	366.2	26.8	151.83	244.15	8.60	7.41
CØHØ	CØRN	340.1	270.1	34.7	185.97	179.07	10.00	6.66
CRN	CØRN	269.1	1712.8	2.5	17.12	949.80	23.78	3.25
JMBJ	CØRN	9.5	881.6	10.3	76.51	212.15	5.43	3.25
RSS LIMIT= 15.4017029891MV/M								

*- CØNTRIBUTE TØ THE CALCULATED RSS VALUE.

ELDER ENGINEERING LIMITED

SKYWAVE INTERFERENCE TO GROUNDWAVE SERVICE

FROM	TO	PATH DATA				PRESENT per DOC-FCC Plan			OPTIONAL CLIP STUDY		PROPOSED		
		BRG. DEGS. TRUE	DIST. KM	ELEVN. ANGLE DEGS.	10% SIGNAL PER 100 µV/m	RAD. mV/m	SINGLE LIMIT mV/m	RSS LIMIT mV/m	BRG. DEGS. TRUE	DIST. KM	RAD. mV/m	SINGLE LIMIT mV/m	RSS LIMIT mV/m
CFGM	Corn-wall	053.2	419.8	23.6	139.2				330	36	661.7	18.4	21.1
		055.3	407	24.3	141.8				300	23.5	556	15.77	18.9
		058.1	419	23.6	139.3		10.7	15.2	0	0	406	11.31	15.4
		058.6	413	24.0	140.7				210	7.3	392	11.03	15.1
CFGM	WHLO	215.0	254	32.4	175.3			12.8	120	19.5	42.7	1.50	11.99
		216.0	286	33.2	179				090	17.5	45.8	1.64	11.99
		217.7	284	33.3	180				060	13	48.7	1.75	11.99
		218.9	288.8	32.9	177.8				030	7.5	49.7	1.77	11.99
		219.5	291.4	32.7	176.6				000	6	50.1	1.77	11.99
		219.9	296.0	32.2	174.6				310	6	49.8	1.74	11.99
		220.3	300.4	31.8	172.7				280	9	49.7	1.71	11.99
CFGM	CFOB	303.9	1234.8	6.0	43.3			13.2	150	4	757	6.55	12.31
		304.0	1231	6.1	43.60				120	7	767.4	6.69	12.39
		304.2	1229.5	6.1	43.72				090	9.3	787	6.87	12.48
		304.4	1232.0	6.1	43.52				060	10.2	806.5	7.02	12.57
		304.5	1236.9	6.0	43.15				030	10.5	815.7	7.04	12.58
		304.0	1238	6.0	43.05				000	0	766	6.60	12.33

Table 6-6

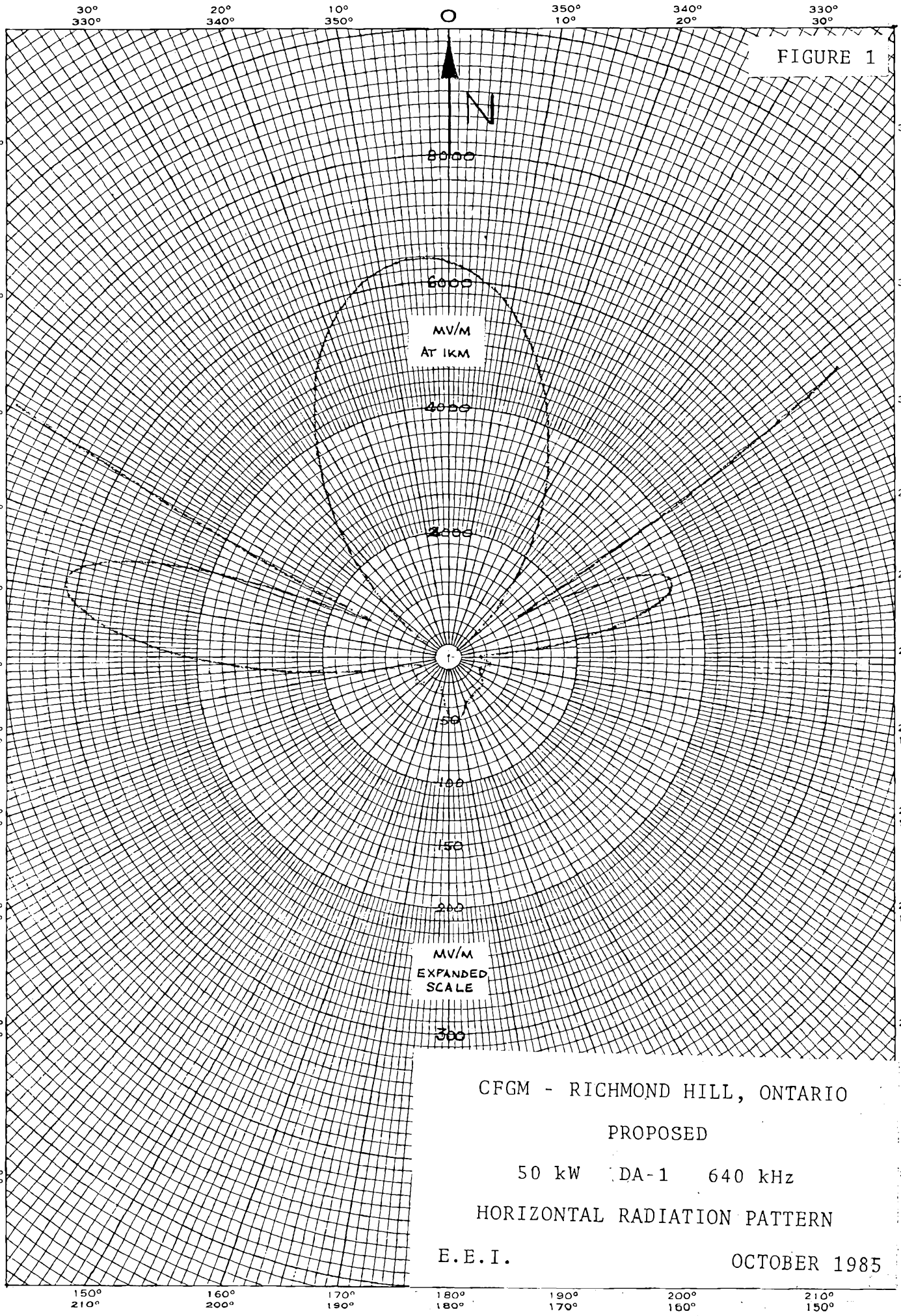
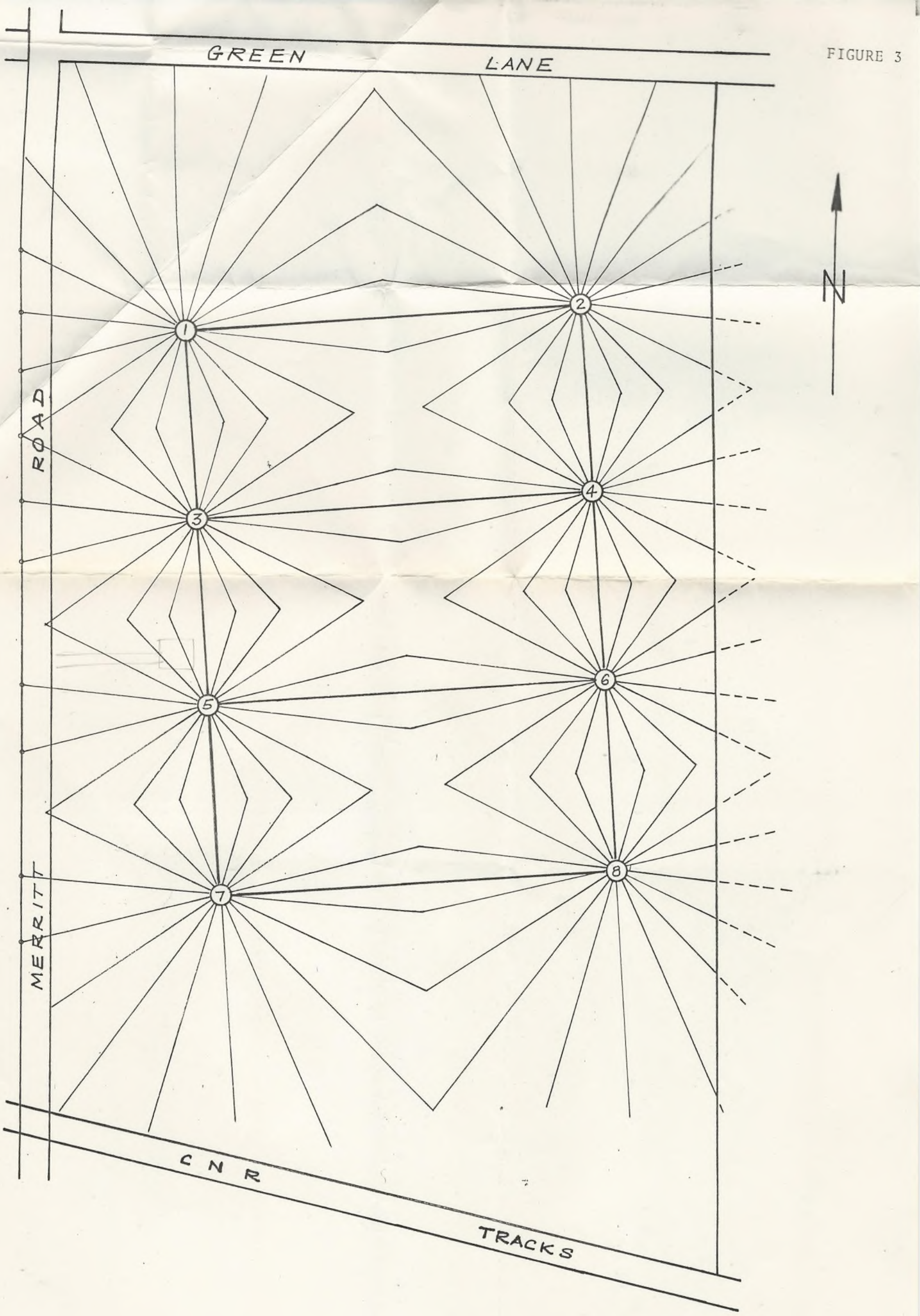


FIGURE 1
O
N
8000
6000
MV/M
AT 1KM
4000
2000
50
100
150
200
MV/M
EXPANDED
SCALE
300
30° 330°
20° 340°
10° 350°
350° 10°
340° 20°
330° 30°
40° 320°
50° 310°
60° 300°
70° 290°
80° 280°
90° 270°
100° 260°
110° 250°
120° 240°
130° 230°
140° 220°
320° 40°
310° 50°
300° 60°
290° 70°
280° 80°
270° 90°
260° 100°
250° 110°
240° 120°
230° 130°
220° 140°
150° 210°
160° 200°
170° 190°
180° 180°
190° 170°
200° 160°
210° 150°
CFGM - RICHMOND HILL, ONTARIO
PROPOSED
50 kW DA-1 640 kHz
HORIZONTAL RADIATION PATTERN
E.E.I.
OCTOBER 1985

FIGURE 3



DRIVEN GROUND RODS

OPTIONAL RADIAL EXTENSIONS – – – –
TO 0.25λ (117m)

SCALE: 1:2,500
1 cm ≅ 25 m

CFGM -- RICHMOND HILL, ONTARIO

PROPOSED

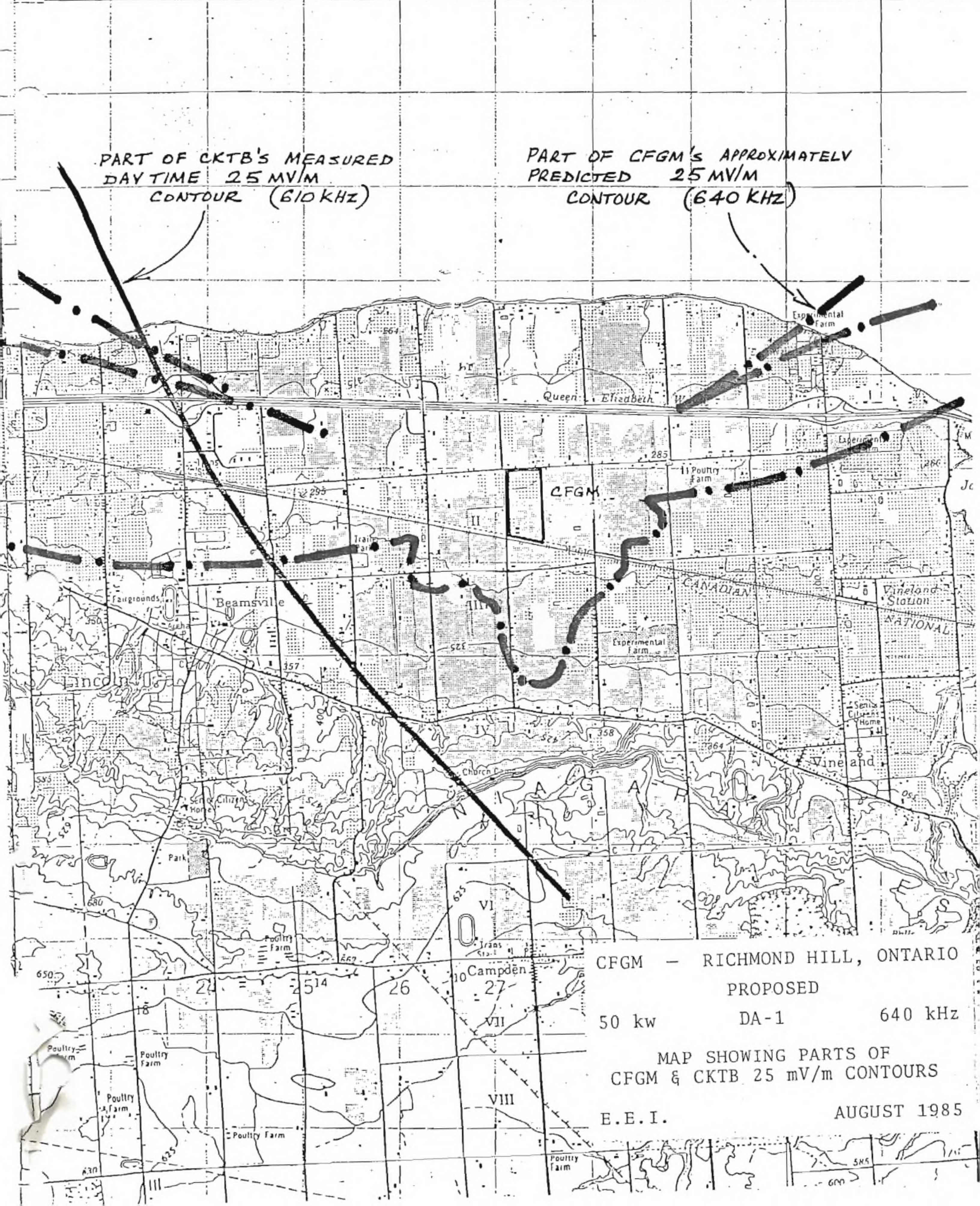
50 KW DA-1 640 kHz

SKETCH OF SITE SHOWING TOWER LAYOUT

AND TYPICAL RADIALS OF THE
GROUND SYSTEM

E.E.I. OCTOBER 1985

FIGURE 5-1



CFGM – RICHMOND HILL, ONTARIO
PROPOSED
50 kw DA-1 640 kHz

MAP SHOWING PARTS OF
CFGM & CKTB 25 mV/m CONTOURS

E.E.I. AUGUST 1985

STANDARD BROADCASTING CORPORATION LIMITED
2 St. Clair Avenue West, Toronto, Ontario, Canada M4V 1L6

H. T. McCURDY
Deputy Chairman

12 September 1985

Mr. Allan Slaight
Slaight Communications Inc.
2 Bloor St. E., Ste. 3034
Toronto ON
M4W 1A8

Dear Allan:

This letter is in regard to the proposed 640 kHz 50 kW facilities for CFGM, Richmond Hill, and the resulting overlap between the daytime 25 mV/m contours of CFGM and CKTB, St. Catharines on 610 kHz.

While it is recognized that, in the public interest, the DOC may permit an overlap situation to occur, the impact of your 640 kHz proposal could be significant to CKTB particularly because of the presence of the CKEY and CFTR 50 kW transmitter sites in the same area. We are concerned that there may be intermodulation interference in some areas along the Q.E.W. that may be difficult to resolve.

Notwithstanding the above and because of the relationship between Slaight Communications and Standard Broadcasting, we are prepared to accept the overlap as shown on the map prepared by your consultant and will not oppose the CFGM application for 50 kW on 640 kHz provided that CFGM never opposes any frequency, site, power or pattern change that will augment the coverage and quality of the CKTB signal.

Furthermore, we understand and expect that CFGM will take adequate remedial measures to correct any interference problems that may arise to CKTB as a result of the implementation of the CFGM 640 kHz proposal.

Finally, we require that CFGM will not change its programming in any significant manner without our prior approval, which will not be unduly withheld.

Yours truly,

/sh

JOINT ENGINEERING STATEMENT TO MUSKOKA PARRY SOUND BROADCASTING LTD. AND SLAIGHT COMMUNICATIONS INC.

SUBJECT:

Adjacent channel daytime limitation to CFBK Huntsville (1 kW DA-N on 630 kHz), resulting from proposed 50 kW DA-1 640 kHz operation at CFGM Richmond Hill.

REFERENCE:

Contour map dated May 1985, copy attached
DOC receiver test report BTRB-4 dated April 1973
AM Technical Improvement - NAB report October 1984

GENERAL:

Dotted lines are included on the contour map to show the estimated limitation contours where the ratio CFBK : CFGM is 1 : 1 and 1 : 2. The normal protection criterion for stations 10 kHz apart is 1 : 1. A 1 : 2 ratio is more realistic on these lower frequencies, based upon DOC's receiver test report BTRB-4.

Therefore, most of the nominal limitation to CFBK will not occur in practice, on normal receivers.

Over 90% of AM broadcast receivers have no audio response above 4 kHz. Therefore, on receivers in Bracebridge area that are tuned to CFBK, the interference from CFGM would consist of sideband splatter, on frequencies above 634 kHz.

CFGM's audio response is down 3 db at ±6.5 kHz, -6.5 db at ±10 kHz and this roll off would be maintained on 640 kHz, according to Mr. Heffler.

The resulting interference level will vary depending upon several factors including:

JOINT ENGINEERING STATEMENT
TO MUSKOKA PARRY SOUND BROADCASTING LTD.
AND SLAIGHT COMMUNICATIONS INC.

GENERAL Cont'd.:

CFGM's peak modulation levels, programming content, CFBK : CFGM relative signal levels at the receiving location, loopstick antenna orientation, accuracy of tuning and design characteristics of the receiver.

For these reasons, DOC's receiver test results were based upon appropriate statistical sampling techniques. They indicate that CFBK may lose up to 12% of their potential listeners between the 1:1 and 1:2 ratio contours.

Almost all receivers use envelope detectors. Future models could employ other detectors to reduce adjacent channel interference, as noted in the NAB report.

ENGINEERS SIGNATURES:

To the best our knowledge, the foregoing information and assessment is accurate.

David F. Wood, P. Eng.
for CFBK

J. Gordon Elder, P. Eng.
for CFGM

13 September 1985
Dated

STATION CALL: CFGM

STUDIO LOCATION: RICHMOND HILL, ONTARIO

FINAL PROOF OF PERFORMANCE

SUBMISSION DATE: 25 OCTOBER 1988

FINAL PROOF OF PERFORMANCE - STATION CFGM

1-INTRODUCTION

The work described herein was carried out between August and October 1988, on behalf of Westcom Radio Group Limited. It included extensive tests, measurements and adjustments that were performed on CFGM's array.

Severe time constraints precluded compilation and submission of a preliminary proof of performance. However, preliminary performance data was filed with the Department on September 15, 1988 and temporary authority to broadcast on 640 kHz was granted the next day.

This report constitutes a final or complete proof of performance, as required by Broadcast Procedure II-B, Subsection 3.

We submit that the results demonstrate good agreement with the authorized notified facilities.

2-INSTALLATION

The design, materials and workmanship employed in this system fully conform with recognized standards of good engineering practice and with commitments contained in Section 19 of the technical brief.

The eight vertical mast radiators are painted and lighted in accordance with Department of Communications and Transport Canada specifications.

Two 10' diameter 960 MHz grid parabolic antennas are mounted on Tower #5 and were in place before work commenced on this proof. Two VHF communications antennas are mounted on Towers #7 and #8.

All eight towers are equipped with LEA lightning dissipation arrays, which add about three degrees of top-loading.

3-TREATMENT OF RERADIATORS

The only potential source of reradiation is a 115 kV power line. It runs south of the array along a bearing of 101°. It was treated by insulating the skywire on ten towers closest to the array. Initially two towers immediately south of the array also had detuning stubs on each leg. However, after the pattern had been established, ratio measurements were made with and without the stubs and showed them to be unnecessary (as predicted on Page 5 of the technical brief).

In our opinion, based on extensive ratio and radial measurements, the pattern's far field is not significantly affected by reradiation.

4-MEASUREMENT METHODS

Tower self impedances were measured by the bridge method, with other towers floated, lighting transformers and isocoupler connected. The self impedances were measured initially in August 1988. The results recorded herein were obtained in October 1988.

The sampling lines were measured and trimmed so that their electrical lengths were equal within ±0.2°.

The electrical lengths of the RF transmission lines were also measured.

The phasor components were pre-set to their design values.

A 20 kW omni pattern was established using Tower #3. Field measurements were then made on the ratio circuit. In addition, a radial was run on a bearing of 130°, to determine a multiplying factor for the ratio measurements.

The initial adjustment of the array was made using a transmitter power of 5 kW. Adjustments were made to flatten the lines and to achieve the target parameters on the phase monitor. Ratio measurements were then made at 50 kW and showed excessive radiation to the south. Two more sets of array parameters were tried and yielded similarly unsatisfactory results. At this point pairing measurements were made in an attempt to determine if there were any errors in the monitoring system.

During the pairing measurements it was discovered that the lighting circuits were affecting the tower self impedances. Eventually it was determined that this was due to the AC lines and conduit creating a path between the ATU panel and the metal roof deck. This path, and consequently the tower self impedance, varied when the tower lights, building lights or heater were switched on or off and also when the solid state flasher for the tower beacon switched on and off. This problem was remedied by bonding the roof deck directly to the ATU panel.

Additional problems were encountered when it was found that some of the insulated counterpoise wires were shorting to the flashing around the roof. This was found to affect the phase monitor parameters and was corrected by insulating the counterpoise wires from the roof flashing using 2" diameter PVC pipe.

After a fourth set of phase monitor parameters based on the pairing measurements failed to yield satisfactory results, a talk down was tried. This consisted of placing observers at the ratio points on bearings of 62°, 159°, 199.5° and 220° and adjusting the phasor to achieve the required field intensities. When these were achieved a complete set of ratio measurements were made and showed all protections to be met.

At this point the two communications antennas were installed on Towers #7 and #8 and were found to have no effect on the pattern.

Radial measurements were then made on seventeen bearings. The operating and self impedances were measured. As well, the common point impedance bandwidth and the transmission line input impedances were measured and found to require no further adjustment.

5-RESULTS

After careful refinement using the talk down method, already described, a pattern was obtained that meets all protection requirements with minor lobe detail closer to the notified one.

The phasor and power distribution system operate efficiently. VSWR's are less than 1.18:1 on the four highest power transmission lines.

The radial measurements show the shape and size of the measured horizontal radiation pattern to generally be in good agreement with those notified. The ratio measurements generally conform, but differ on some bearings. We attribute this mainly to local scatter, minor distortion in the omni pattern and aperture affects due to proximity to the array. The calculated near field is shown on the radial plots as a broken line.

As stated previously the measured pattern meets all protection requirements. However, it exceeds the notified pattern on some southerly bearings. We propose that the notified pattern be augmented on these bearings. The appropriate sector augmentation is shown on Table 9 and Figure 3-2. We believe that sector augmentation is justified in this case because the bearings in question are not towards critical protections

and the magnitude of the radiation on these bearings is comparable to what would be allowed if the pattern was not critical.

The measured ground conductivity was generally in the range 8 - 15 mS/m on the Niagara Peninsula, which is slightly higher than the map value for that area. Further west, the conductivity ranged from 8 - 10 mS/m which is typical for that area. In the region immediately to the north of Lake Ontario the conductivity ranged from 8 - 15 mS/m which is slightly higher than the map values for the area. Further to the north the measured conductivity generally agrees with map values except in two areas. These are just north of Barrie and north of Port Severn where the conductivity is very low. These areas appear on the 352.5° radial plot as sudden drops in field intensity at 140 kilometres and 180 kilometres, respectively. The conductivity of 0.5-1.5 mS/m on the Bruce Peninsula northwest of Owen Sound is also much lower than the map value.

The main lobe portions of the contours are generally in good agreement with the predictions contained in the technical brief.

Spot measurements made along the north shore of Lake Ontario from Crysler Point to Trenton verified the locations of the 5, 2.5 and 0.5 mV/m contours in that area.

The contours differ in the minor lobe and null areas because aperture effects and, of course, the sector augmentation were not taken into account in calculating the predicted contours.

The 5 and 0.5 mV/m contours do not extend as far north and northwest as predicted due to the differences in conductivity discussed above.

Spot measurements made along Highway 11 near Orillia, Gravenhurst, Bracebridge and Huntsville indicate that the 5, 2.5 and 0.5 mV/m contours extend slightly farther due north of the array then they do along the 352.5° radial. This is probably due to the longer overwater path across Lake Simcoe on the 000° bearing.

6-INSTRUMENTS USED

CLASS	MANUFACTURER	TYPE	ACCURACY
Field Intensity Meters	Potomac	FIM-21,41	±5%
Antenna Monitor	Potomac	AM-19D(210)	1%, 1°
Toroidal Current Transfor.	Delta	TCT-1	
R. F. Bridge	Delta	OIB-2	±1Ω, ±5%
Synthesizer	Potomac	SD-31	
R. F. Filter	Potomac	FL-31	
Ammeters	Delta	TCA20/40-EXR TCA10/20-EXR	

7-ENGINEER'S SEAL AND SIGNATURE

The work documented in this report was carried out by the undersigned and William Marchand, assisted by R. Heffler, CFGM's engineering manager.

K. Stuart Hahn

K. Stuart Hahn, P. Eng.

J. Gordon Elder

J. Gordon Elder, P. Eng.

25 October 1988

41 5932
88 01 26
4 2845 G = 194°

PROGRAM SEARCH - REVISION 5.0 APRIL 1988
CFGM 10-11-1988 10:20:12

TABLE 1

640 B CFGM 1 Richmond Hill ON CA 43 10 45N 79 26 00W D-AU N-AU

DATE 10/08/87 BORDER 27.8 CANADA 2.6 US 29.3 FRANCE 1860.0
DOC# 399 CRTC# 0 TCOC CL1 443 CL2 0 CL3 0 IFRB 0 0

ARRAY PARAMETERS 8 TOWERS 50000 W RMS= 2247.00 REDUCED TOL.= 20.00 EU= .0

TWR NO.	HT. (DEG)	SPACING (DEG)	BEARING (DEG)	FIELD RATIO	PHASE (DEG)	ANT TYP	TOWER FLD A	TOWER FLD B	TOWER FLD C	TOWER FLD D
1	82.0	.0000	.0000	3.8400	.0000	0	.00	.00	.00	.00
2	82.0	202.0000	85.0000	3.8100	355.7000	0	.00	.00	.00	.00
3	82.0	95.0000	175.0000	9.9200	117.1000	0	.00	.00	.00	.00
4	82.0	223.2240	110.1870	9.8400	113.5000	0	.00	.00	.00	.00
5	82.0	190.0000	175.0000	10.0000	237.1000	0	.00	.00	.00	.00
6	82.0	277.3160	128.2460	9.8900	234.3000	0	.00	.00	.00	.00
7	82.0	285.0000	175.0000	3.7900	353.6000	0	.00	.00	.00	.00
8	82.0	349.3270	139.6720	3.7900	353.6000	0	.00	.00	.00	.00

MODE: UNATTENDED OP CODE: N AUTO PROG CODE: N NETWORK: INDE

LICENSEE: Slaight Communications Inc.

640 B CFGM 1 Richmond Hill ON CA 43 10 45N 79 26 00W D-AU N-AU

DATE 08/02/88 BORDER 27.8 CANADA 2.6 US 29.3 FRANCE 1860.0
DOC# 399 CRTC# 0 TCOC CL1 443 CL2 0 CL3 0 IFRB 12477 12477

ARRAY PARAMETERS 8 TOWERS 50000 W RMS= 2247.00 REDUCED TOL.= 20.00 EU= .0

TWR NO.	HT. (DEG)	SPACING (DEG)	BEARING (DEG)	FIELD RATIO	PHASE (DEG)	ANT TYP	TOWER FLD A	TOWER FLD B	TOWER FLD C	TOWER FLD D
1	82.0	.0000	.0000	3.8400	.0000	0	.00	.00	.00	.00
2	82.0	202.0000	85.0000	3.8100	355.7000	0	.00	.00	.00	.00
3	82.0	95.0000	175.0000	9.9200	117.1000	0	.00	.00	.00	.00
4	82.0	223.2240	110.1870	9.8400	113.5000	0	.00	.00	.00	.00
5	82.0	190.0000	175.0000	10.0000	237.1000	0	.00	.00	.00	.00
6	82.0	277.3160	128.2460	9.8900	234.3000	0	.00	.00	.00	.00
7	82.0	285.0000	175.0000	3.7900	353.6000	0	.00	.00	.00	.00
8	82.0	349.3270	139.6720	3.7900	353.6000	0	.00	.00	.00	.00

MODE: UNATTENDED OP CODE: N AUTO PROG CODE: N NETWORK: INDE

LICENSEE: Slaight Communications Inc.

TABLE 2-1

IMPEDANCE DATA

TOWER BASE SELF (OCTOBER 10, 1988)

FREQUENCY kHz	#1	#2	#3	#4
605	40.5+j23.9	40 +j20.9	39.8+j22.4	39.5+j22.4
615	43.9+j32.6	43 +j28.9	42 +j30.8	42 +j30.8
625	47 +j41.3	46 +j36.9	45.5+j38.8	44.5+j38.4
635	51 +j48.9	49 +j44.8	48.3+j46.4	45.5+j46.4
640	53.5+j52.8	51.5+j48.6	50.5+j50.6	49 +j50.6
645	55.5+j56.8	53.8+j53.2	52.5+j54.8	50.5+j54.8
655	60.5+j65.5	58.5+j61.9	56 +j62.2	54 +j64.2
665	65 +j73.2	65 +j70.8	59.7+j71.5	58.5+j74
675	71 +j83.7	70 +j81	65 +j82.4	65 +j84.4
Average	54.2+j53.2	53 +j49.7	51 +j51.1	49.8+j51.8

FREQUENCY kHz	#5	#6	#7	#8
605	42.1+j25.4	42 +j20.6	39.8+j21.2	43 +j22.7
615	45.8+j33.8	45 +j28	42.3+j29.2	45 +j30.8
625	49 +j42.2	48.2+j35.6	46 +j37.5	49.1+j39.4
635	53.2+j49.5	52.5+j43.2	50.1+j45.4	54 +j47
640	56 +j53.8	55.5+j46.4	53.5+j49.3	56.2+j50.6
645	59 +j58.1	58 +j49	56 +j52.6	60 +j54.5
655	65 +j65.8	61.5+j53.1	63 +j59	66.5+j60.6
665	69.5+j74.1	61.5+j59.9	66 +j65.2	70 +j67.2
675	75 +j85.4	64 +j72.2	70 +j76.6	74 +j78.3
Average	57.2+j54.2	54.2+j45.3	54.1+j48.4	57.5+j50.1

Average self impedance is 53.9+j50.5 ohms which indicates an effective height of 95.5°.

TABLE 2-2

COMMON POINT IMPEDANCE MEASUREMENTS

OCTOBER 10, 1988

FREQUENCY kHz	IMPEDANCE AT INPUT TO PHASOR OHMS	VSWR
620	29.5+j 9	1.777
625	41 +j 9.4	1.332
630	47 +j 4.4	1.116
635	49 +j 1.1	1.03
640	50 -j 2.2	1.045
645	51.8-j 5.2	1.114
650	52 -j 8.5	1.187
655	51.5-j10.6	1.234
660	48.7-j11.9	1.274

TABLE 3-1

IMPEDANCE, CURRENT AND POWER DIVISION

TRANSMITTERS:

MAIN: NAUTEL NAR 1 AMPFET 50

ALTERNATE: CONTINENTAL 317C-2

MAIN TRANSMITTER

D.C. SUPPLY	POTENTIAL		71	VOLTS
	CURRENT -	BLOCK A	228	AMPS
		BLOCK B	229	AMPS
		BLOCK C	229	AMPS
		BLOCK D	230	AMPS
		TOTAL	916	AMPS
	POWER		65036	WATTS
	EFFICIENCY		78.2	PERCENT
COMMON POINT	IMPEDANCE *		50 - j 1.9	OHMS
	CURRENT		31.9	AMPS
	POWER		50881	WATTS

* Common Point adjusted for minimum reflected power as read on Nautel reflectometer.

TABLE 3-2

IMPEDANCE, CURRENT AND POWER DIVISION

TOWER NUMBER	LINE INPUT AT PHASOR IMPEDANCE OHMS	VSWR	TOWER BASE PARAMETERS IMPEDANCE OHMS	CURRENT AMPS	POWER WATTS
1	48 +j25	1.657	133.9+j181	5.25	3,691
2	49 +j11.8	1.270	132.2+j196	5.25	3,644
3	52.5-j 0.77	1.052	52 +j 72.3	16.2	13,647
4	48.5-j 4.5	1.101	49.8+j 70.2	17.0	14,392
5	44.3-j 5.1	1.176	27.1+j 53.8	16.4	7,289
6	56 ±j 0	1.120	21.2+j 46.1	16.8	5,983
7	33 -j 6.3	1.557	4.3+j 33.3	5.95	152
8	59 -j 4.6	1.204	7.2+j 39.7	5.75	238
					49,036

TOWER # 3 OMNI

IMPEDANCE	50.5+j50.6	OHMS
CURRENT	20	AMPS
POWER	20,200	WATTS

TABLE 4

ANTENNA MONITOR DATA

TOWER NUMBER	MONITOR AT PHASOR		MONITOR AT TRANSMITTER*	
	RATIO PERCENT	PHASE DEGREES	RATIO PERCENT	PHASE DEGREES
1	32.5	-114.8	32.7	-115.3
2	32.4	-121.1	32.2	-120.8
3	100.0	0.0	100.0	0.0
4	105.6	-3.4	105.6	-3.7
5	101.9	118.7	101.3	118.4
6	105	115.9	105.5	115.7
7	36	-129.7	36.4	-129.5
8	34.5	-127.5	34.4	-127.6

* The sampling lines from the towers are terminated in the phasor building. Approximately 190m of Andrew $\frac{3}{8}$" phase-stabilized cable is used to extend these lines to the transmitter building where the phase monitor is normally located.

TABLE 5-1

RATIO FIELD STRENGTH MEASUREMENTS

POINT NUMBER	DESCRIPTION	BEARING DEGREES	DISTANCE km	FIELD STRENGTH mV/m DA	FIELD STRENGTH mV/m OMNI	DA / OMNI	× 1400 = FIELD AT 1 km(mV/m)
1	South side of Lakeshore, 100m east of Maplegrove near pole NTD3252m 50 paces into field.	016.5	2.17	1890	635	2.9764	4167
2	North side of Lakeshore, west of Cherry, near large and small willow trees north of Hydro pole	030.5	2.55	1060	542	1.9557	2738
3	North side of Lakeshore, west of Martin, north of intersection of power lines and small pipes near south side of road.	045	2.97	348	445	0.782	1095
4	North side of Lakeshore, 300m west of Victoria, near large willow tree, north of larger building	056.5	3.38	94	452	0.208	291
4A	North side of Lakeshore, on jut of land just west of end of guard rail.	058.5	3.47	44.2	330	0.1339	188
5	East side Victoria, 100m south of bend in road, in parking lot near outhouses	062	3.43	27.5	352	0.07813	109
6	North side North Service Road, just west of QEW Toronto ramp east of Stop Ahead sign.	071	3.37	44.8	352	0.1273	178
7	West side 21st Street, 100m south of South Service Road, in orchard across from 2nd hydro pole south of corner.	080	4.34	24.6	263	0.09354	131
8	West side 21st, 120m south of 1st Avenue, 40 paces west of pole 81.	090	4.22	6.3	270	0.02333	32.7
9	East side 21st, 30m north of intersection, half way between hydro poles, 50 paces into orchard.	100	4.45	9.7	282	0.0344	48.2
10	West side 21st, 380m south of railroad crossing, 50 paces down lane into orchard	111	4.65	15.8	273	0.05788	81
11	East side 21st, at bend across from 3rd arrow sign	120	5.14	6.2	217	0.02857	40
12	East side 19th, 300m south of 21st, 50 paces down land through vineyard.	129.5	6.78	7.4	168	0.04405	61.7
13	West side of Road 675, 250m south of Road 575 between Rubel and Roepke mail boxes, near log.	140	6.81	10.3	190	0.05421	75.9
14	South side of Fly, near A. Dyck mail box, 50 paces southeast into field.	149	5.52	10.3	217	0.04747	66.5
15	North side Fly, 200m east of intersection, 40 paces north of fence.	159	4.99	10.5	290	0.03621	50.7
16	South side Fly, east of grain elevator, near pole 65, 50 paces onto lawn.	169.5	4.87	4.4	248	0.01774	24.8

TABLE 5-2

RATIO FIELD STRENGTH MEASUREMENTS

POINT NUMBER	DESCRIPTION	BEARING DEGREES	DISTANCE km	FIELD STRENGTH mV/m DA	FIELD STRENGTH mV/m OMNI	DA / OMNI	× 1400 = FIELD AT 1 km (mV/m)
17	South side Linden Ave., in school yard, south of portable	178.5	4.89	7.9	285	0.02772	38.8
18	North side Fly, east of creek, over fence, 50 paces northeast along creek	189	4.8	8.2	273	0.03004	42.1
19	On Dutch Lane 50m south of Fly	199.5	5.25	1.75	262	0.006679	9.35
20	North side Fly, near J. Patsiazis mail box 50 paces into field	210	5.57	2.9	248	0.01169	16.4
21	On Philp at end of wooded area	220	5.95	3.5	227	0.01542	21.6
22	West side Zimmerman, 200m north of Philp near end of vineyard, 50 paces into field	230	6.27	4.3	185	0.02324	32.5
23	West side Konkle, 600m north of Philp, 50 paces down wide lane into vineyard	239.5	6.68	12.1	181	0.06685	93.6
24	On Lincoln, 150m east of Mountain View just east of entrance to Evergreen Tree Farm	249.5	5.45	20.2	242	0.08347	117
25	East side Mountain View, 900m north of Lincoln, 40 paces down lane	260	5.32	23.8	218	0.1092	153
26	East side Mountain View, 600m north intersection, near Stop Ahead sign, 50 paces into field	270	5.25	35.7	240	0.1488	208
27	On road, 50 paces east of Mountain View	280	5.3	49.5	230	0.2152	301
28	West side Lincoln, 350m north of North Service Road, south of pole #78, 50 paces into orchard	290	4.81	54.5	253	0.2154	302
29	East side Ontario St., across from Ontario St. pumping station, 50 paces into orchard	295	4	63	321	0.1963	275
30	East side Bartlet, 150m north of Lister, near Von Bredow mail box, 50 paces down lane	300	3.23	126	440	0.2864	401
31	East side Sann, 800m north of North Service Rd., across from pink and green house, 50 paces into orch.	314.5	2.79	622	518	1.2008	1681
32	East side Tufford, 650m north of North Service Rd., south of Don Klasson mail box and transformer, north of 60 km/hr sign, 50 paces into field	330	2.3	1620	610	2.6557	3718
33	North side Lakeshore, 600m east of Tufford, at break in northern tree line	344	2.25	2190	600	3.65	5110
34	North side Lakeshore, 0.5 km west of Maplegrove, across from Bell pole B823	000	2.19	2260	615	3.6748	5145

TABLE 6

OMNI RADIAL MEASUREMENT DATA

RADIAL BEARING: 130° TRUE

POWER: 20 kW

MEASURED RADIATION: 1400 mV/m at 1 km

DATE: AUGUST 26, 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	0.8	1030
2	0.8	920
3	1.9	660
4	3	430
5	4.4	291
6	5.8	208
7	6.9	178
8	8	160
9	11.8	102
10	13.4	91
11	17.6	70

TABLE 7-1

RADIAL MEASUREMENT DATA

RADIAL BEARING: 020° TRUE
POWER: 50 kW
MEASURED RADIATION: 4400 mV/m at 1 km
DATE: OCTOBER 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	0.45	8400
2	1.05	3220
3	1.44	2280
4	2.35	1390
5	71.2	24.5
6	77.1	31.2
7	82.1	21.2
8	87.4	19.3
9	92.6	17
10	97.4	14.1
11	102.6	14.9
12	108.9	1.1
13	114.4	11.2
14	124.2	10.8
15	131.2	8.3
16	136.4	7.4
17	143.4	6.65
18	153.2	4.72
19	163.4	4.45
20	173.4	2.78
21	185.3	1.48
22	194.2	1.1
23	201.5	0.585
24	214.2	0.44
25	221.6	0.49
26	227.8	0.38

TABLE 7-2

RADIAL MEASUREMENT DATA

RADIAL BEARING: 041° TRUE
POWER: 50 kW
MEASURED RADIATION: 1480 mV/m at 1 km
DATE: OCTOBER 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	0.8	1410
2	1.28	970
3	2.0	730
4	2.9	435
5	106.4	9.1
6	111.6	5.6
7	116.6	5.05
8	122.8	4
9	127.2	3.1
10	132.1	2.52
11	135.1	2
12	141.7	2.3
13	149.7	1.92
14	154.3	1.78
15	160.6	1.38
16	165.3	1.23
17	170.5	1.16
18	177.8	0.98
19	187.5	0.83
20	194.7	0.43
21	204.8	0.48
22	211.1	0.3

TABLE 7-3

RADIAL MEASUREMENT DATA

RADIAL BEARING: 075° TRUE
POWER: 50 kW
MEASURED RADIATION: 170 mV/m at 1 km
DATE: SEPTEMBER 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	0.58	640
2	1.38	148
3	2.28	66
4	3.83	35.8
5	14.15	8.8
6	16.5	7.7
7	18.18	6.3
8	21.5	6.75
9	23.3	5.5
10	25.5	5
11	28.17	4.45
12	30.22	3.9
13	31.35	2.7

TABLE 7-4

RADIAL MEASUREMENT DATA

RADIAL BEARING: 090° TRUE
POWER: 50 kW
MEASURED RADIATION: 30.5 mV/m at 1 km
DATE: SEPTEMBER 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	0.58	400
2	1.35	56
3	2.2	16
4	3.05	10.1
5	4.25	5.6
6	5.72	3.5
7	6.55	2.1
8	7.44	1.4
9	8.05	1.2
10	9.45	0.67
11	10.7	0.85
12	11.7	0.65
13	12.6	0.45
14	14.85	0.9
15	15.65	0.55
16	17.8	0.8
17	19.65	0.35
18	23.23	0.19
19	25.1	0.55
20	30.33	0.42

TABLE 7-5

RADIAL MEASUREMENT DATA

RADIAL BEARING: 105° TRUE
POWER: 50 kW
MEASURED RADIATION: 83 mV/m at 1 km
DATE: SEPTEMBER 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	0.6	170
2	1.4	44.5
3	2.3	28.2
4	3.64	24.3
5	4.5	18.7
6	6.05	12.6
7	7.8	9.9
8	9.1	7.3
9	12.35	5.6
10	14.35	4.62
11	16.6	4.6
12	21.5	2.45
13	22.55	1.85
14	25.8	1.83
15	28.95	1.88
16	31.15	0.8

TABLE 7-6

RADIAL MEASUREMENT DATA

RADIAL BEARING: 140° TRUE
POWER: 50 kW
MEASURED RADIATION: 65 mV/m at 1 km
DATE: SEPTEMBER 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	0.95	74
2	2.12	23
3	3.2	15.2
4	4.7	11.2
5	6.85	10.3
6	7.78	8.2
7	9.43	6.7
8	10.55	5
9	12.6	5.1
10	14.18	4.3
11	16.8	2.02
12	19.9	1.72
13	21.82	1.69
14	24.2	2
15	30.3	0.6
16	33.85	1
17	35.7	0.62
18	38.9	0.94
19	43.5	0.7
20	46.35	0.82
21	47.9	0.42

TABLE 7-7

RADIAL MEASUREMENT DATA

RADIAL BEARING: 160° TRUE
POWER: 50 kW
MEASURED RADIATION: 51 mV/m at 1 km
DATE: SEPTEMBER 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	0.7	65
2	2	12.5
3	3.9	8.4
4	5.0	10.2
5	6.1	7.5
6	7.55	6.6
7	8.65	4.9
8	10.35	3.4
9	11.85	3.2
10	13.85	2.65
11	16	1.8
12	19.35	1.87
13	24.15	2.02
14	28.05	1.32
15	32.6	1.4
16	33.85	1.38
17	35.95	0.97

TABLE 7-8

RADIAL MEASUREMENT DATA

RADIAL BEARING: 190° TRUE
POWER: 50 kW
MEASURED RADIATION: 35 mV/m at 1 km
DATE: SEPTEMBER 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	0.75	49.5
2	1.55	22.1
3	2.2	15.2
4	3.85	8.4
5	5.4	5
6	7	3.8
7	8.45	2.7
8	10.15	2.5
9	11.6	2.7
10	16.8	1.82
11	24.5	1.45
12	27.48	1.0
13	29.54	0.62
14	32.7	0.45
15	34.3	0.5

TABLE 7-9

RADIAL MEASUREMENT DATA

RADIAL BEARING: 205° TRUE
POWER: 50 kW
MEASURED RADIATION: 20 mV/m at 1 km
DATE: SEPTEMBER 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	0.7	40
2	2.45	3.9
3	5.1	1.38
4	7.92	1.88
5	9.75	1.11
6	11.38	0.6
7	12.75	1.08
8	15.28	1.01
9	16.87	0.22
10	18.44	0.7
11	20	0.85
12	20.65	0.35
13	21.6	0.26
14	23.15	0.37
15	28.3	0.37
16	31.15	0.45
17	32.43	0.17

TABLE 7-10

RADIAL MEASUREMENT DATA

RADIAL BEARING: 225° TRUE
POWER: 50 kW
MEASURED RADIATION: 40 mV/m at 1 km
DATE: SEPTEMBER 27, 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	1.1	20
2	1.45	15.8
3	2.6	7.7
4	3.95	7.1
5	5.53	8.5
6	6.2	7.9
7	9.15	3.9
8	15	1.9
9	17.85	1.8
10	21.15	1.25
11	25.6	1.38
12	29.2	1.3
13	33.2	0.82
14	37.5	0.84
15	48.6	0.47
16	52.8	0.4
17	55.6	0.27

TABLE 7-11

RADIAL MEASUREMENT DATA

RADIAL BEARING: 240° TRUE
POWER: 50 kW
MEASURED RADIATION: 90 mV/m at 1 km
DATE: SEPTEMBER 27, 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	1.23	59
2	2.3	30.5
3	2.95	23.8
4	4.5	17.3
5	5.63	16.2
6	6.85	13.5
7	7.8	10.8
8	9.25	9
9	11.7	6.7
10	14.5	5.3
11	15.85	5.9
12	17.7	3.75
13	19.3	4.85
14	22.1	2.8
15	23.8	2.6
16	25.6	3.75
17	27.3	3.6
18	29	2.25
19	31.5	2.4
20	36	2.1
21	41.1	1.85
22	42.3	1.4
23	46.5	1.65
24	51.6	1.1
25	54	1.45
26	63.3	0.4
27	70.6	0.95
28	80	0.59
29	83.5	0.68
30	91	0.28
31	94.6	0.2
32	98.3	0.32
33	101.8	0.15

TABLE 7-12

RADIAL MEASUREMENT DATA

RADIAL BEARING: 250° TRUE
POWER: 50 kW
MEASURED RADIATION: 105 mV/m at 1 km
DATE: SEPTEMBER 23 and 27, 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	1.2	138
2	1.98	60
3	2.8	41.5
4	3.3	44
5	4.13	30.5
6	4.75	26
7	5.42	22.1
8	6.7	17.4
9	7.73	15.3
10	11.15	6.7
11	12.9	6.2
12	14.7	4.95
13	17.45	5.6
14	19.4	3.2
15	23.6	2.92
16	27.8	2.08
17	31.9	2.4
18	36.5	1.85
19	41.4	1.45
20	44.4	1.25
21	48.9	0.88
22	54.6	0.98
23	60.1	1.4
24	67.6	0.98
25	75	0.36
26	79.1	0.8
27	88	0.47
28	97.5	0.17
29	105.5	0.3

TABLE 7-13

RADIAL MEASUREMENT DATA

RADIAL BEARING: 280° TRUE
POWER: 50 kW
MEASURED RADIATION: 305 mV/m at 1 km
DATE: SEPTEMBER 26, 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	1.17	347
2	2.06	168
3	2.76	114
4	3.77	79
5	4.58	60
6	5.3	50
7	6.14	48
8	6.57	39.5
9	9.55	29.5
10	10.4	26.8
11	12.45	21.5
12	14.68	17.5
13	17.18	14.3
14	20.5	11.5
15	23.1	8.1
16	25.5	7.2
17	29.6	7
18	35.4	5
19	38.3	4.85
20	39.8	4
21	43.7	3.95
22	47.3	3.45
23	54.6	2.26
24	61.8	1.8
25	67.5	1.88
26	73.5	1.4
27	81.8	0.8
28	90.8	0.67
29	100	0.59
30	111.1	0.43

TABLE 7-14

RADIAL MEASUREMENT DATA

RADIAL BEARING: 295° TRUE
POWER: 50 kW
MEASURED RADIATION: 105 mV/m at 1 km
DATE: SEPTEMBER 23, 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	0.37	4400
2	1	740
3	1.28	480
4	2.2	182
5	2.86	115
6	3.55	75
7	3.97	64
8	4.6	48
9	31.8	2.95
10	35.1	2.7
11	39.9	2.53
12	42	1.75
13	43.8	2.4
14	47.4	1.55
15	50.8	1.15
16	56.5	1.03
17	61.7	0.71
18	63.8	0.56
19	64.6	0.52
20	68.6	0.6
21	72	0.345
22	75.1	0.37
23	76.1	0.34

TABLE 7-15

RADIAL MEASUREMENT DATA

RADIAL BEARING: 305° TRUE
POWER: 50 kW
MEASURED RADIATION: 840 mV/m at 1 km
DATE: OCTOBER 4, 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	0.65	2950
2	1.68	680
3	2.55	320
4	3.07	262
5	32.3	17.5
6	33.6	18.2
7	36.4	16.3
8	39.8	15.7
9	44.3	12.8
10	46.6	9.2
11	52	7.4
12	63.4	3.95
13	68.3	3.5
14	74	2.5
15	84	2.25
16	90	2.5
17	97.2	1.27
18	103.6	1.43
19	113.3	1.29
20	121	1.45
21	131.5	0.9
22	139.5	1.05
23	149.5	0.65
24	157.9	0.5
25	164.9	0.46
26	175	0.465
27	184.8	0.42
28	203.8	0.31

TABLE 7-16

RADIAL MEASUREMENT DATA

RADIAL BEARING: 324° TRUE
POWER: 50 kW
MEASURED RADIATION: 3400 mV/m at 1 km
DATE: OCTOBER 5, 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	0.65	6300
2	1.39	2480
3	2.1	1500
4	2.7	1100
5	34	78
6	36.6	70
7	38.4	65
8	41.2	58
9	43.5	54
10	45.5	49
11	48.8	44
12	51.5	40
13	55.2	37
14	58.2	34
15	61	32.8
16	65.2	28.5
17	67.4	24.5
18	71.1	25
19	74.8	19
20	78.1	13.5
21	84.2	11.5
22	91.9	9.4
23	98.6	8
24	103.6	6.3
25	110.2	7
26	116.8	5.7
27	122.5	4.9
28	129	4.2
29	137.3	3.8
30	143.6	3.45
31	149.5	3.2
32	153.6	2.5
33	159.1	2.2
34	173.4	1.42
35	182.4	1.26
36	192.4	0.77
37	202.7	0.9
38	212.3	0.52
39	223.4	0.42
40	232	0.37

TABLE 7-17

RADIAL MEASUREMENT DATA

RADIAL BEARING: 352.5° TRUE
POWER: 50 kW
MEASURED RADIATION: 6300 mV/m at 1 km
DATE: OCTOBER 9 and 10, 1988

POINT NUMBER	DISTANCE (km)	FIELD STRENGTH (mV/m)
1	0.4	10,000+
2	1.12	4,850
3	2.17	2,440
4	45.7	105
5	48.9	95
6	51.7	80
7	54.6	78
8	57.7	72
9	61.3	65
10	66.6	58
11	68.7	53
12	71.2	45.5
13	76.7	40
14	81	39
15	87.6	34
16	92.8	25
17	96.8	22.2
18	100	24.5
19	104.9	19.8
20	110.6	17
21	114.8	13.2
22	120.5	12.9
23	126	10.5
24	131.7	10.2
25	133.4	8.2
26	138.4	8.9
27	141.4	6.8
28	148.2	5.35
29	157.2	3.2
30	163.1	2.51
31	170.3	2.48
32	174.6	2.05
33	181.6	1.85
34	191.4	1.2
35	205.9	0.66
36	218.2	0.63
37	226.4	0.61
38	235.7	0.45
39	244.8	0.41
40	253	0.32
41	270.5	0.3
42	281.8	0.24

MEASURED DISTANCE (KILOMETRES) TO 50 kW CONTOUR

CFGM 50 kW

BEARING DEGREES	RADIATION mV/m AT 1 km	mV/m 1000	250	100	25	15	12.5	5	2.5	0.5
020	4400	(4)	(16)	(34)	78	99	110	150	175	220
041	1480	1.3	(5.5)	(13.5)	(42.5)	(63)	(70)	116	145	203
075	170		1.35	1.75	(5.3)	(8.6)	(10)	25.5	(38)	(98)
090	30.5		0.8	1.05	1.8	2.3	2.65	4.5	6.2	19
105	83			0.82	3.3	5.2	6	13	21	(68)
140	65				1.9	3.2	4.2	12.5	20	(58)
160	51				1.5	1.8	2	8.6	14.5	(56)
190	35				1.4	2.2	2.6	5.4	12.5	34
205	20				0.86	1.1	1.25	2.1	3.9	24
225	40				0.98	1.45	1.65	7.2	13	47
240	90			0.76	2.8	6	7.4	16	28	84
250	105			1.45	5	7.6	8.8	16	28.5	88
280	305	0.6	1.5	3	11	17	19.5	36	57	105
295	105	0.89	1.85	3	(6.9)	(9.6)	(10.9)	(20.5)	40	70
305	840	1.2	3.2	(7.8)	(27)	41	45	58	80	160
324	3400	3.1	(12)	(27.5)	68	77	84	120	153	215
352.5	6300	(5.8)	(20.9)	44	95	113	121	155	171	235

NOTE: Figures in brackets are interpolated or extrapolated over-water distances

TABLE 8

PROGRAM FIELD - REVISION 1.1 DECEMBER 1987
CFGM 10-21-1988 12:16:08

TABLE 9

PROPOSED CFGM SECTOR AUGMENTATION

MODIFIED RADIATION

AUG NO.	RAD @ 1km mV/m	BRG (DEG)	SPAN (DEG)	AUG NO.	RAD @ 1km mV/m	BRG (DEG)	SPAN (DEG)	AUG NO.	RAD @ 1km mV/m	BRG (DEG)	SPAN (DEG)
1	90.00	107.5	18.0	2	70.00	140.0	60.0	3	105.00	249.0	55.0

TOWER NUMBER	HEIGHT DEGREES	SPACING DEGREES	BEARING DEGREES	FIELD RATIO	PHASE DEGREES
1	82.000	0.000	0.000	3.840	0.000
2	82.000	202.000	85.000	3.810	355.700
3	82.000	95.000	175.000	9.920	117.100
4	82.000	223.224	110.187	9.840	113.500
5	82.000	190.000	175.000	10.000	237.100
6	82.000	277.316	128.246	9.890	234.300
7	82.000	285.000	175.000	3.790	353.600
8	82.000	349.327	139.672	3.790	353.600

Q FACTOR = .8 %

SCALED TO RMS OF 2247 MV/M AT 1 KM
SCALE FACTOR = 117.9852
RSS = 2505.719 MV/M
RSS/RMS = 1.115139

HORIZONTAL PLANE PATTERN

BEARING DEGREES	FIELD MV/M @1KM	BEARING DEGREES	FIELD MV/M @1KM	BEARING DEGREES	FIELD MV/M @1KM	BEARING DEGREES	FIELD MV/M @1KM
0.00	6264.40	90.00	34.77	180.00	47.79	270.00	218.76
5.00	6028.37	95.00	25.75	185.00	38.72	275.00	278.13
10.00	5633.56	100.00	40.64	190.00	29.73	280.00	308.76
15.00	5102.89	105.00	83.70	195.00	25.49	285.00	282.34
20.00	4467.33	110.00	81.58	200.00	25.07	290.00	176.12
25.00	3764.07	115.00	34.50	205.00	23.82	295.00	83.38
30.00	3034.03	120.00	42.83	210.00	21.47	300.00	392.46
35.00	2318.60	125.00	54.44	215.00	22.80	305.00	845.46
40.00	1656.12	130.00	62.66	220.00	28.69	310.00	1412.52
45.00	1078.39	135.00	67.75	225.00	39.39	315.00	2071.57
50.00	607.97	140.00	70.00	230.00	58.77	320.00	2791.67
55.00	257.75	145.00	68.81	235.00	77.58	325.00	3535.00
60.00	63.11	150.00	63.72	240.00	92.89	330.00	4260.21
65.00	137.60	155.00	56.09	245.00	102.52	335.00	4925.90
70.00	183.56	160.00	49.71	250.00	104.96	340.00	5493.91
75.00	173.80	165.00	48.45	255.00	104.25	345.00	5931.87
80.00	131.12	170.00	51.50	260.00	116.46	350.00	6215.11
85.00	78.07	175.00	52.59	265.00	157.33	355.00	6327.95

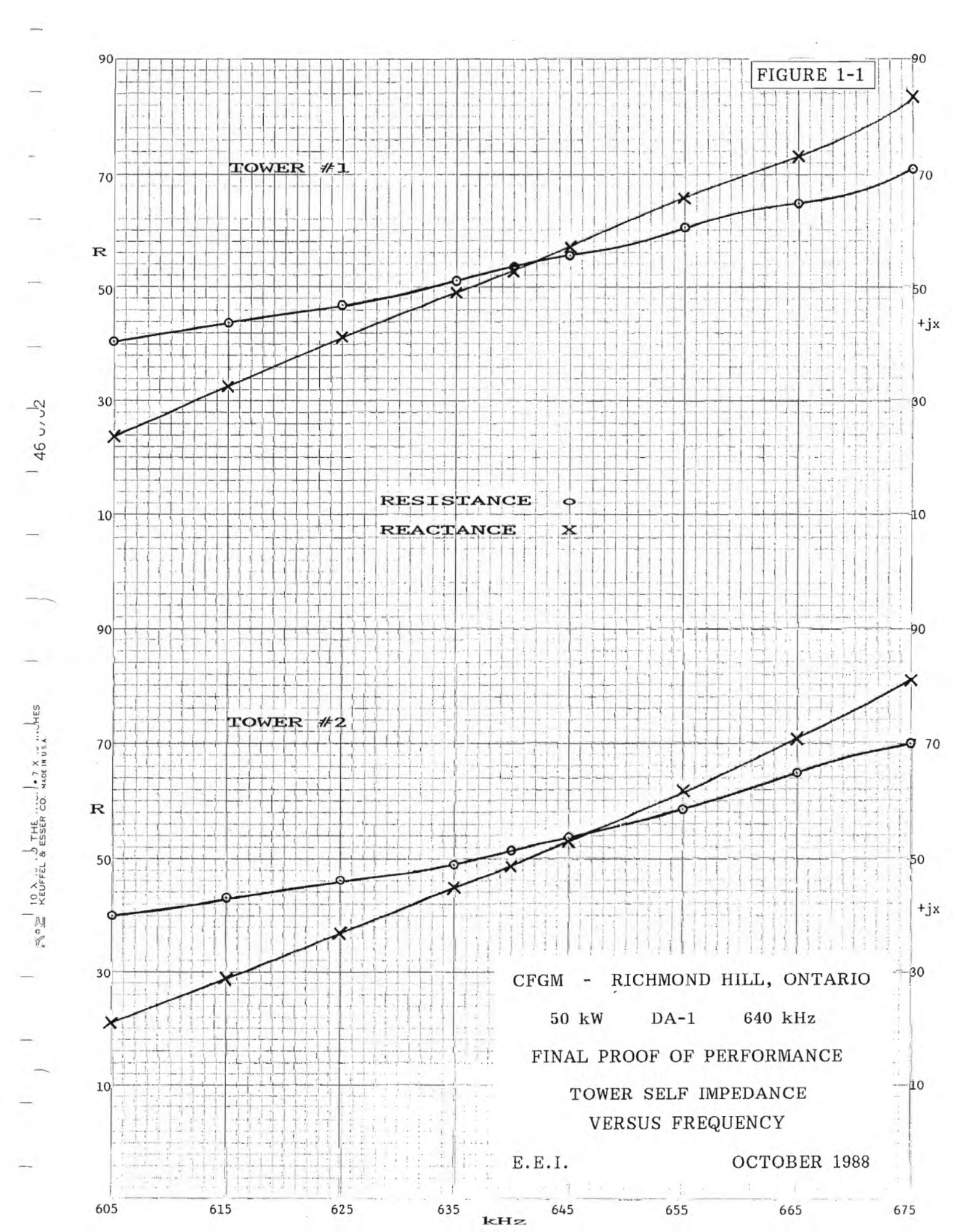
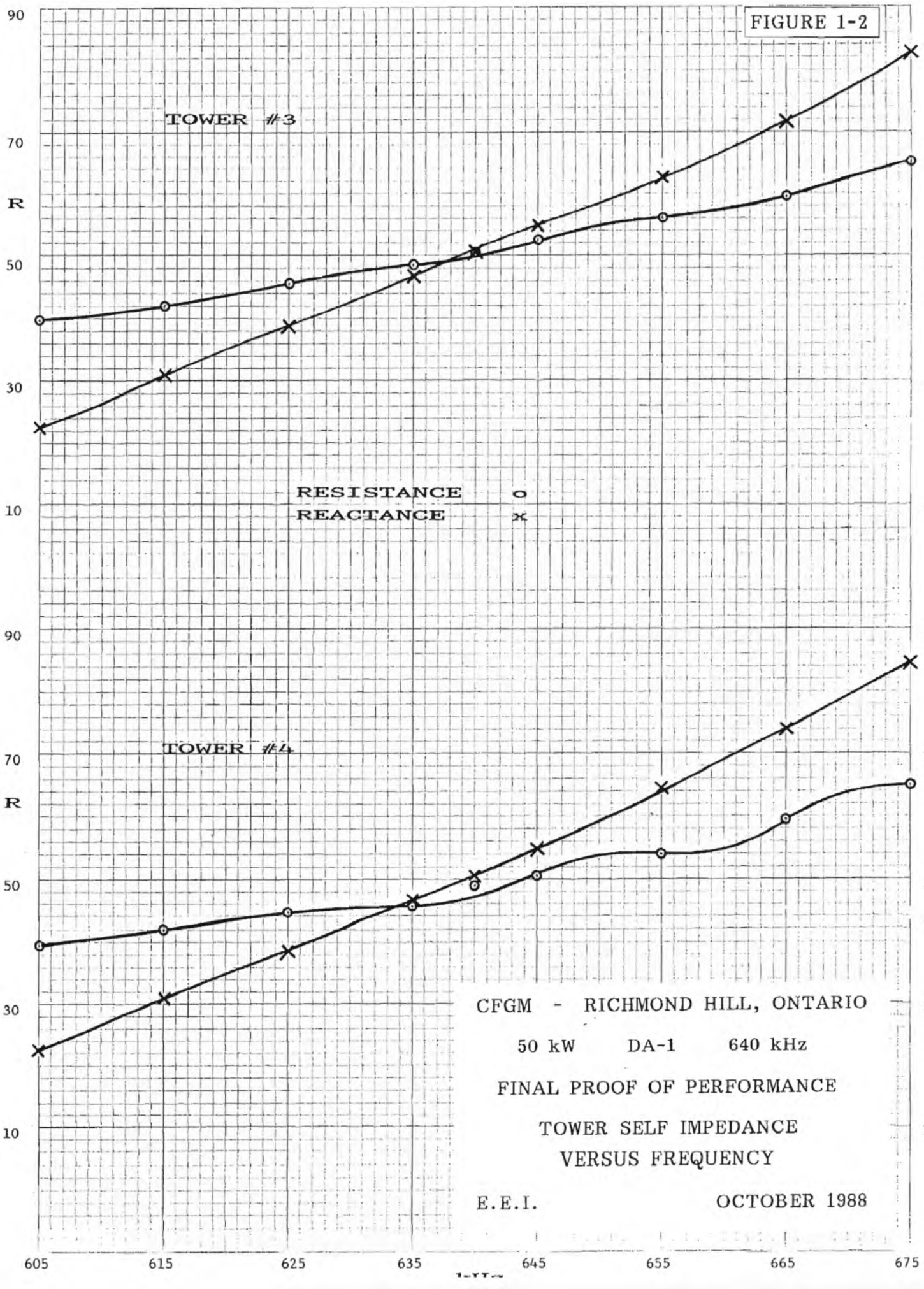


FIGURE 1-1
TOWER #1
R
+jx
RESISTANCE o
REACTANCE X
TOWER #2
R
+jx
CFGM - RICHMOND HILL, ONTARIO
50 kW DA-1 640 kHz
FINAL PROOF OF PERFORMANCE
TOWER SELF IMPEDANCE
VERSUS FREQUENCY
E.E.I. OCTOBER 1988
90
70
50
30
10
605
615
625
635
645
655
665
675
kHz

FIGURE 1-2



CFGM - RICHMOND HILL, ONTARIO

50 kW DA-1 640 kHz

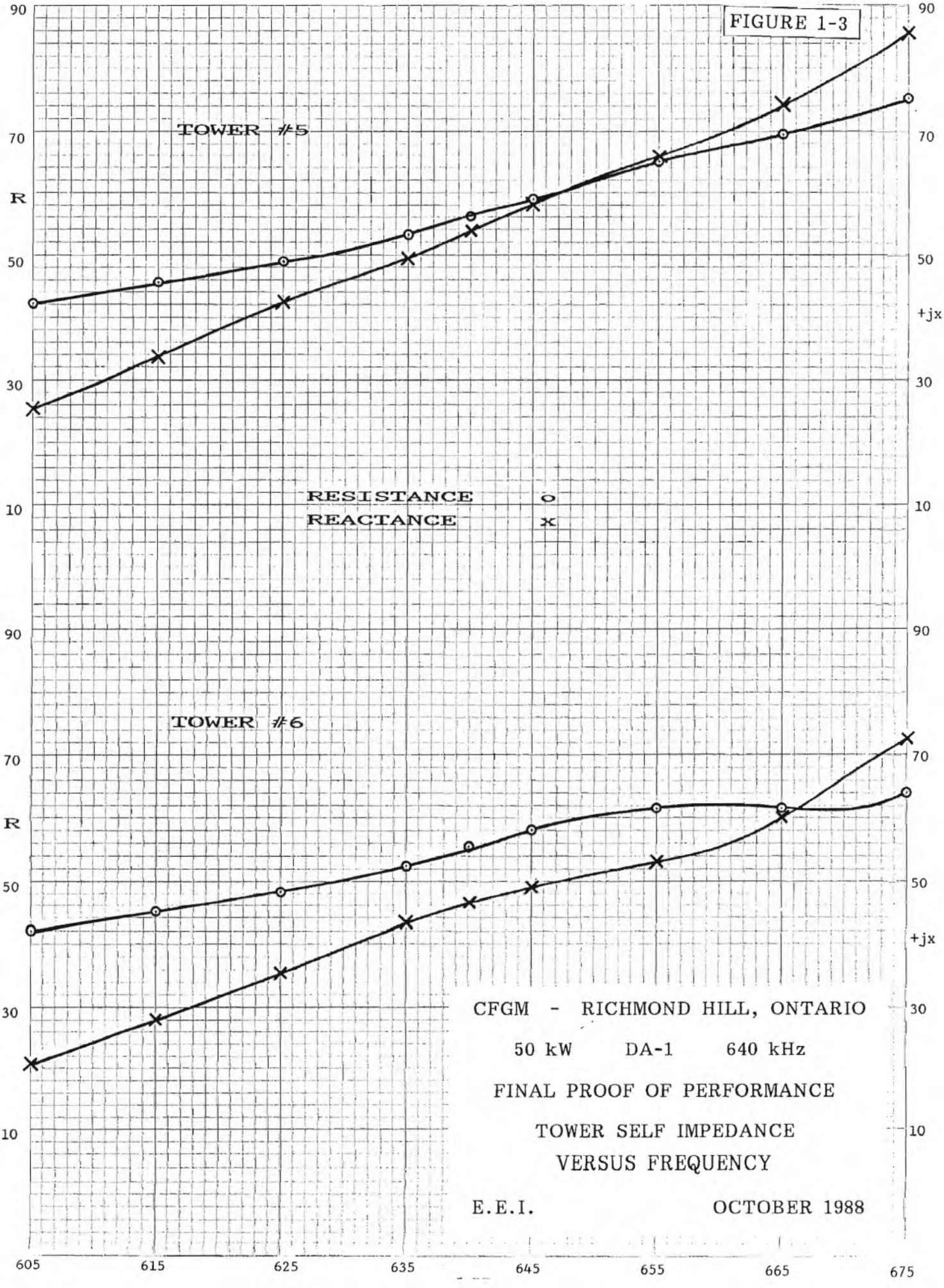
FINAL PROOF OF PERFORMANCE

TOWER SELF IMPEDANCE
VERSUS FREQUENCY

E.E.I. OCTOBER 1988

46 0/02

KE 10 X 10 TO THE INCH • 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.



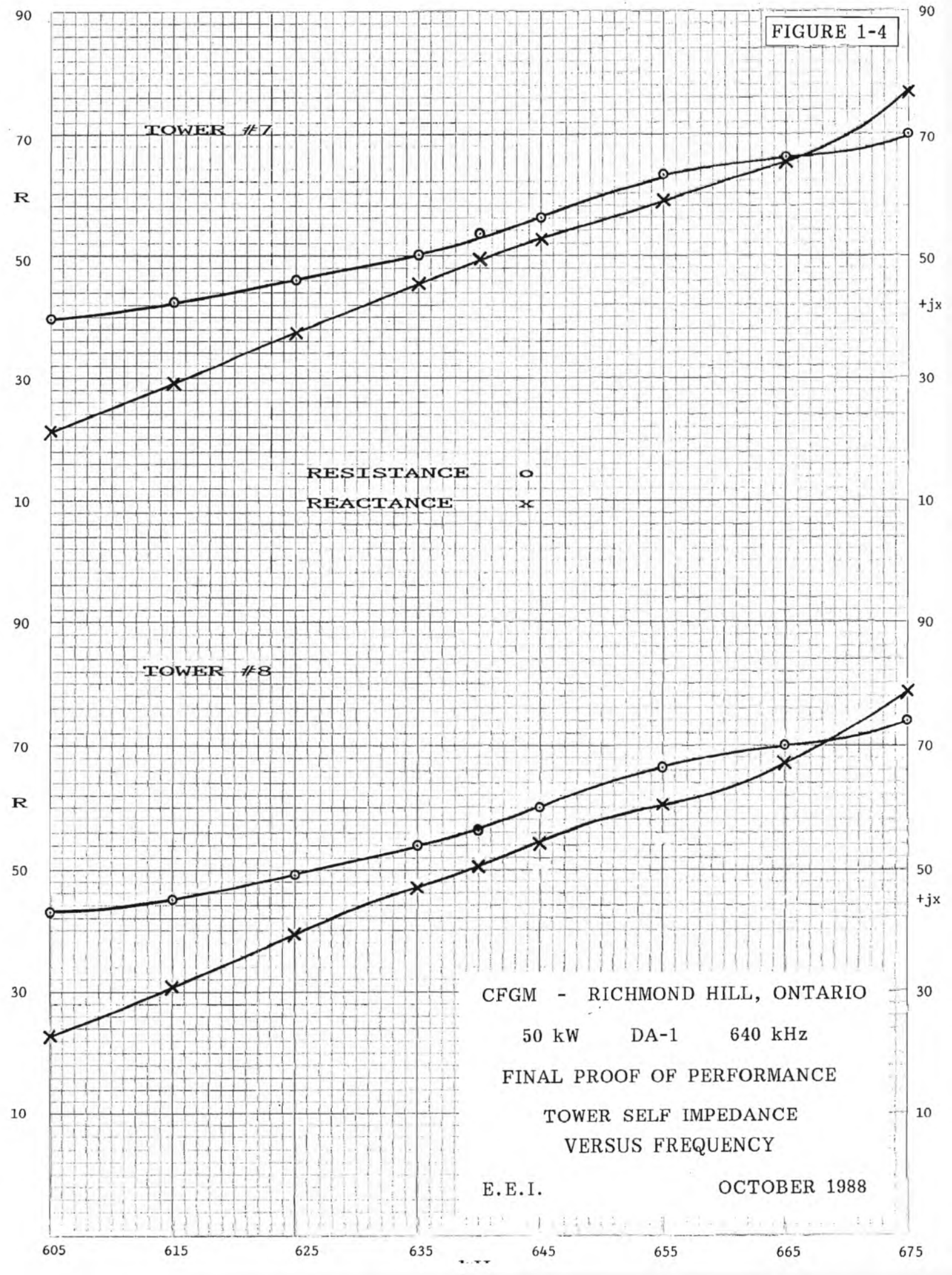


FIGURE 1-4
TOWER #7
TOWER #8
RESISTANCE o
REACTANCE x
R
+jx
90
70
50
30
10
605
615
625
635
645
655
665
675
CFGM - RICHMOND HILL, ONTARIO
50 kW DA-1 640 kHz
FINAL PROOF OF PERFORMANCE
TOWER SELF IMPEDANCE
VERSUS FREQUENCY
E.E.I. OCTOBER 1988

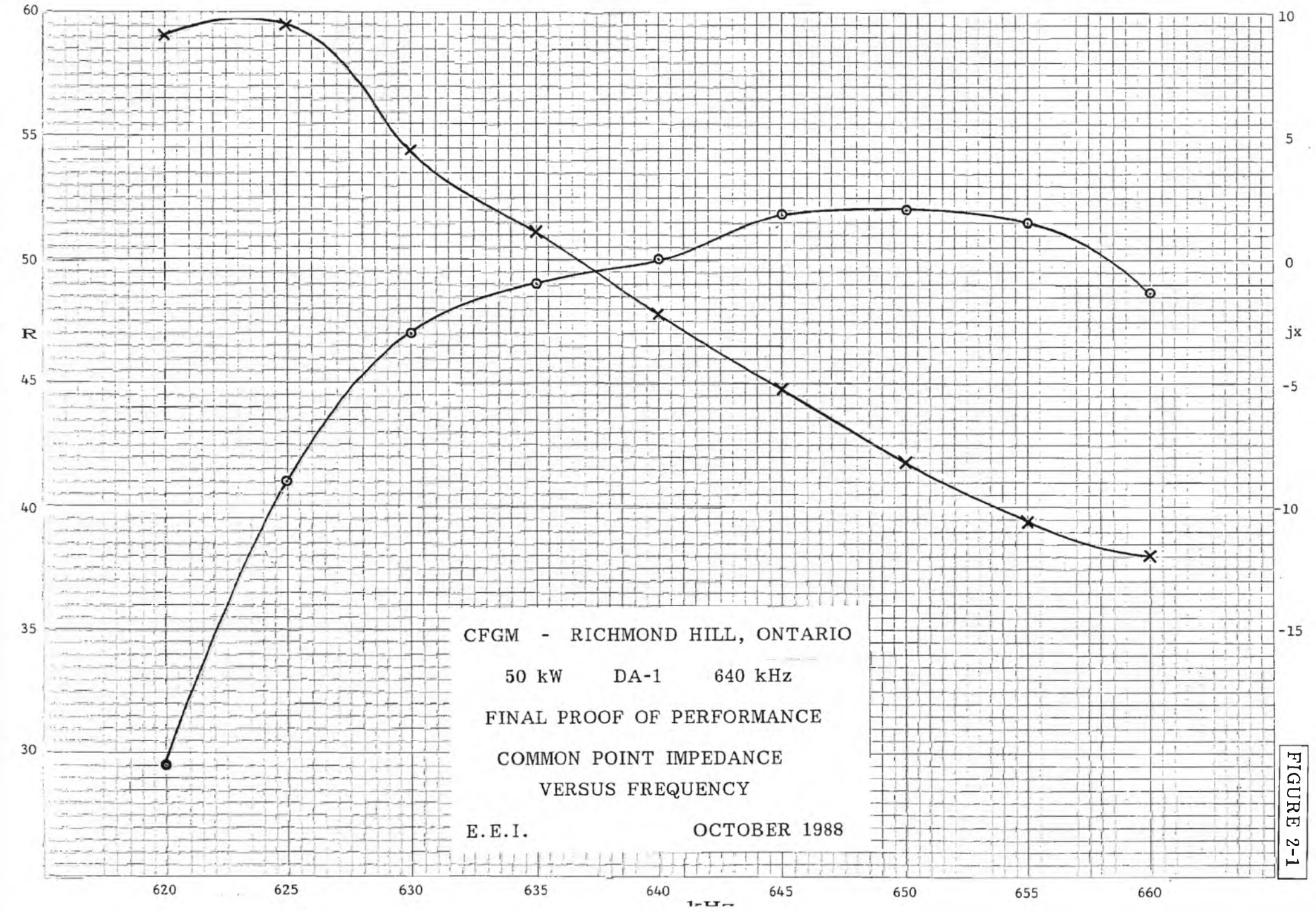


FIGURE 2-1

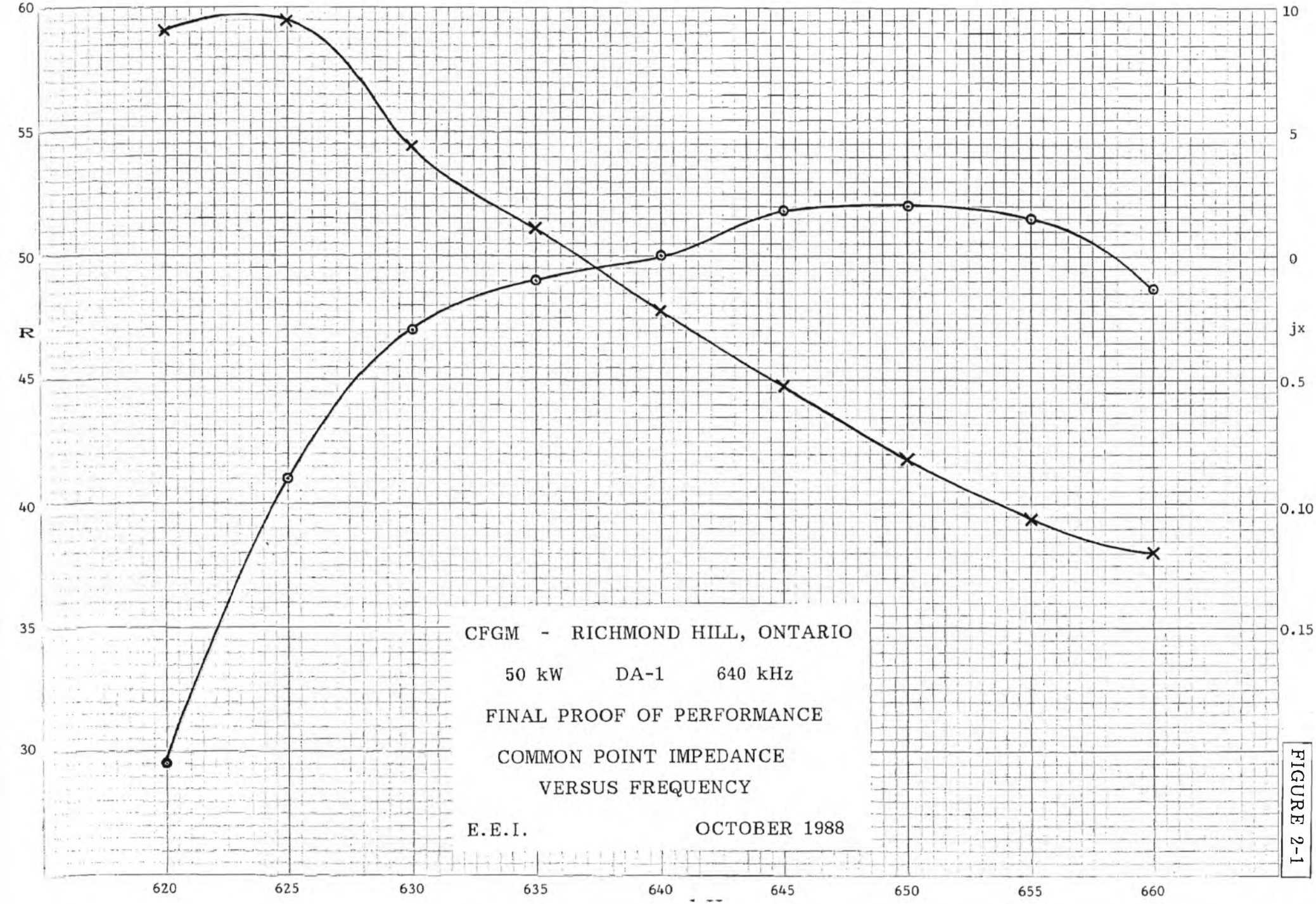
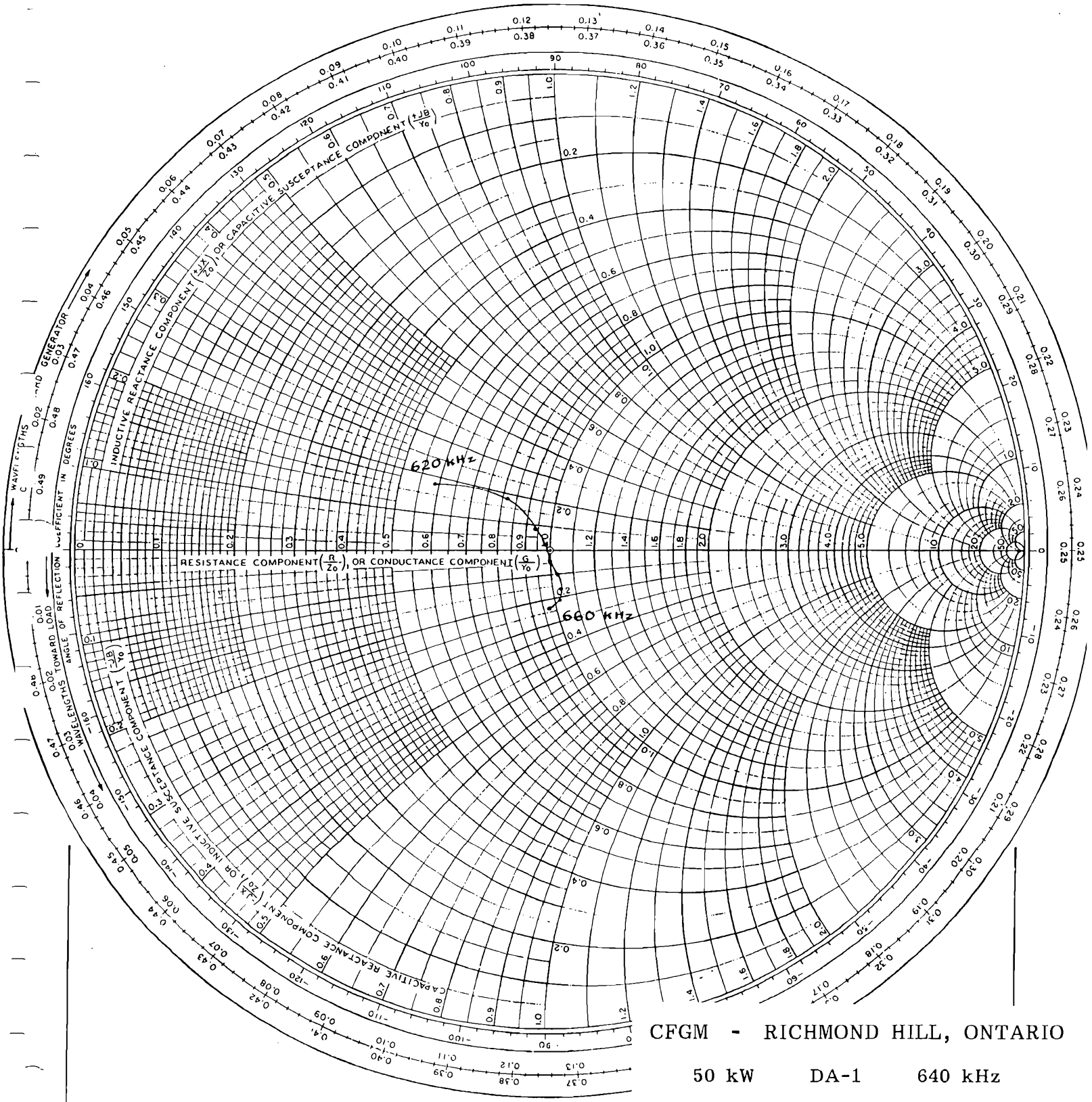


FIGURE 2-1

NAME	TITLE	DWG. NO.
SMITH CHART Form 756-N	GENERAL RADIO COMPANY, WEST CONCORD, MASSACHUSETTS	DATE

IMPEDANCE OR ADMITTANCE COORDINATES

FIGURE 2-2



CFGM - RICHMOND HILL, ONTARIO

50 kW DA-1 640 kHz

FINAL PROOF OF PERFORMANCE

COMMON POINT IMPEDANCE

VERSUS FREQUENCY

E.E.I. OCTOBER 1988

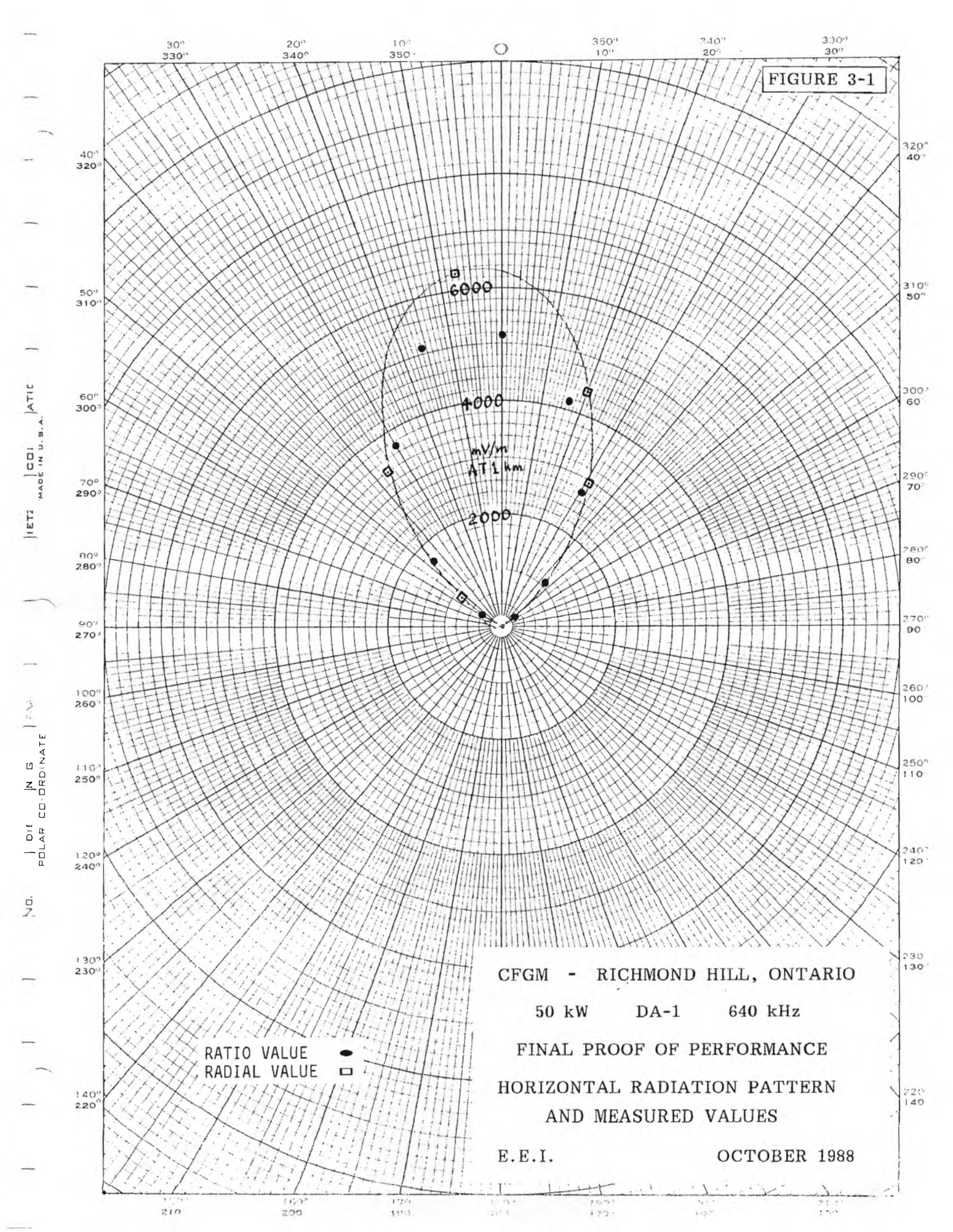


FIGURE 3-1
6000
4000
2000
mV/m
AT 1 km
RATIO VALUE
RADIAL VALUE
CFGM - RICHMOND HILL, ONTARIO
50 kW DA-1 640 kHz
FINAL PROOF OF PERFORMANCE
HORIZONTAL RADIATION PATTERN
AND MEASURED VALUES
E.E.I. OCTOBER 1988
POLAR CO-ORDINATE

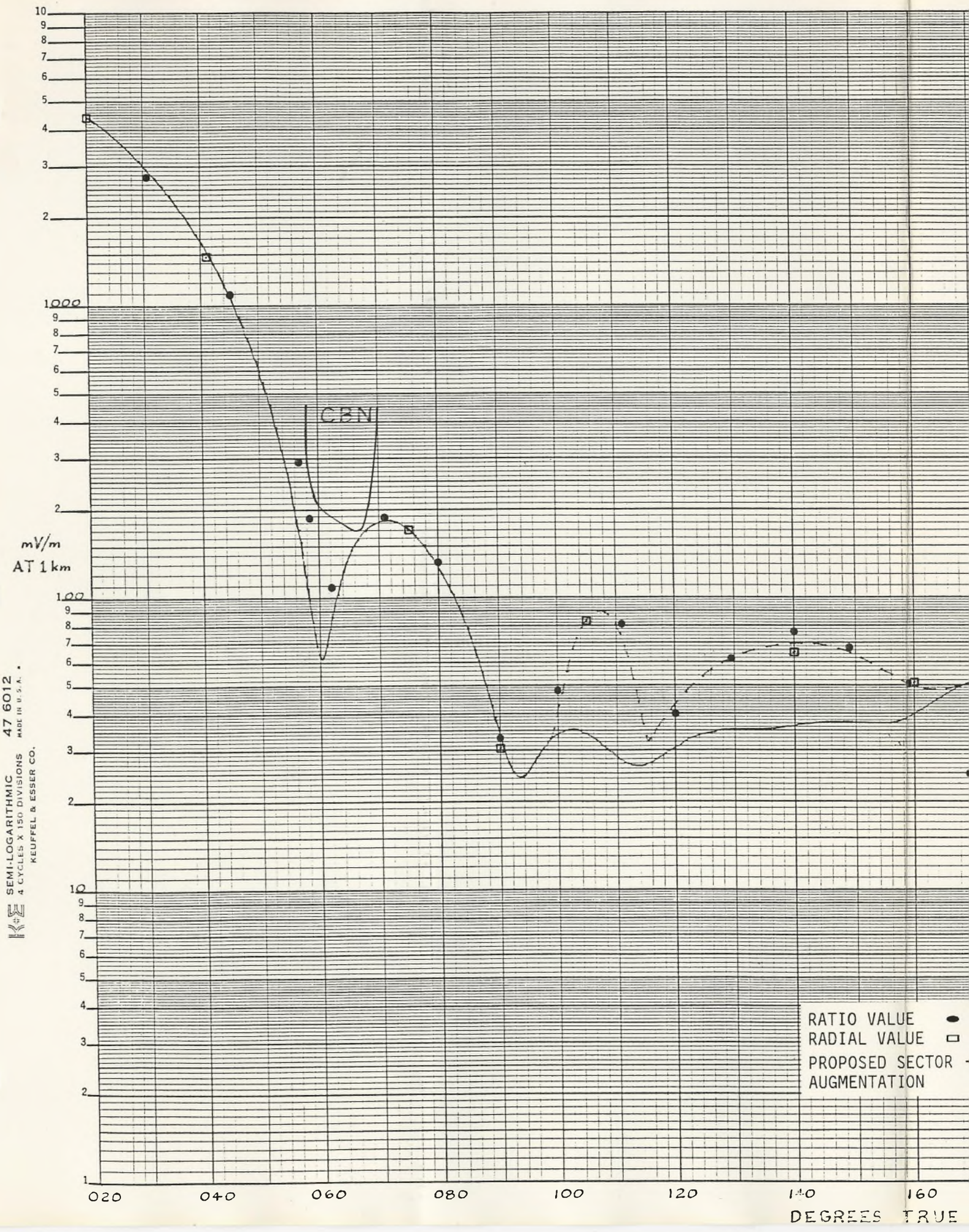
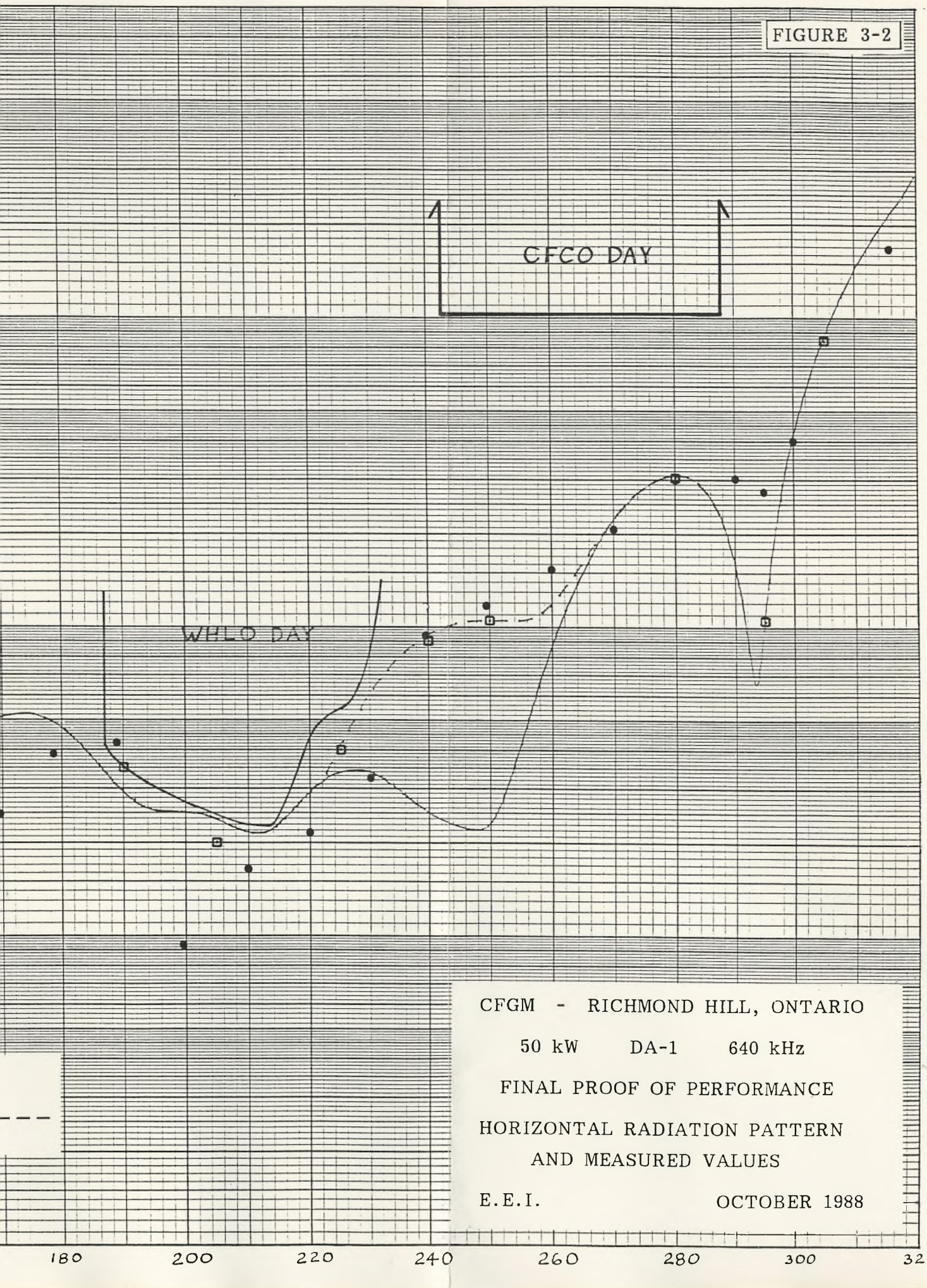

10
9
8
7
6
5
4
3
2
1000
9
8
7
6
5
4
3
2
100
9
8
7
6
5
4
3
2
10
9
8
7
6
5
4
3
2
1
mV/m
AT 1 km
CBN
020
040
060
080
100
120
140
160
DEGREES TRUE
RATIO VALUE
RADIAL VALUE
PROPOSED SECTOR
AUGMENTATION
SEMI-LOGARITHMIC
4 CYCLES X 150 DIVISIONS
KEUFFEL & ESSER CO.
MADE IN U.S.A.
47 6012

FIGURE 3-2



CFGM - RICHMOND HILL, ONTARIO

50 kW DA-1 640 kHz

FINAL PROOF OF PERFORMANCE

HORIZONTAL RADIATION PATTERN
AND MEASURED VALUES

E.E.I. OCTOBER 1988

FIGURE 4

CFGM - RICHMOND HILL, ONTARIO

50 kW DA-1 640 kHz

FINAL PROOF OF PERFORMANCE

RATIO POINT LOCATIONS

E.E.I. OCTOBER 1988

CFGM - RICHMOND HILL, ONTARIO

50 kW DA-1 640 kHz

FINAL PROOF OF PERFORMANCE

RADIAL POINT LOCATIONS

E.E.I. OCTOBER 1988

Scale 1:50 000 Échelle

Miles 1 0 1 2 3 Milles

Metres 1000 0 1000 2000 3000 4000 Mètres

FIGURE 5-1

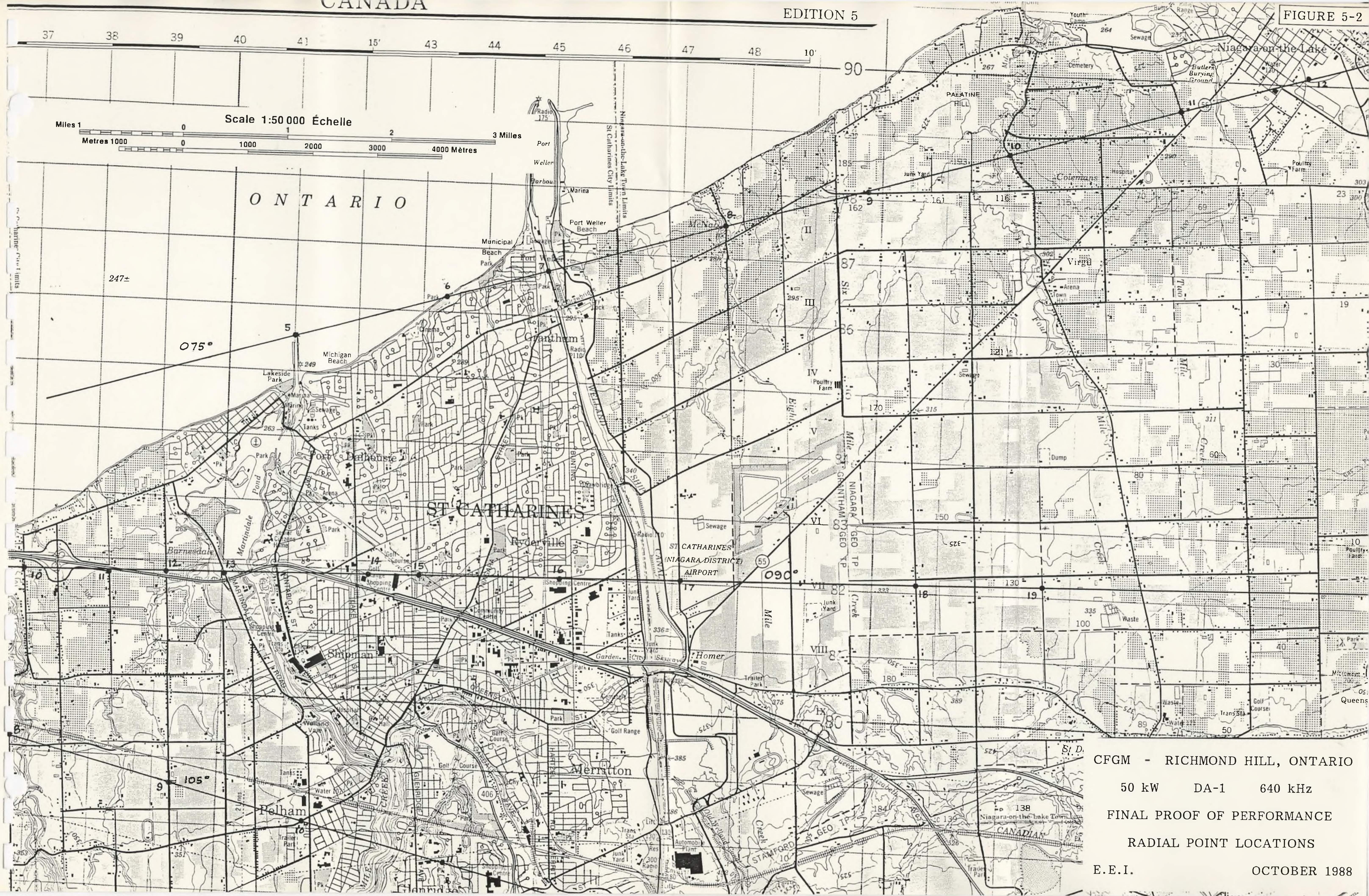


FIGURE 5-2

CFGM - RICHMOND HILL, ONTARIO

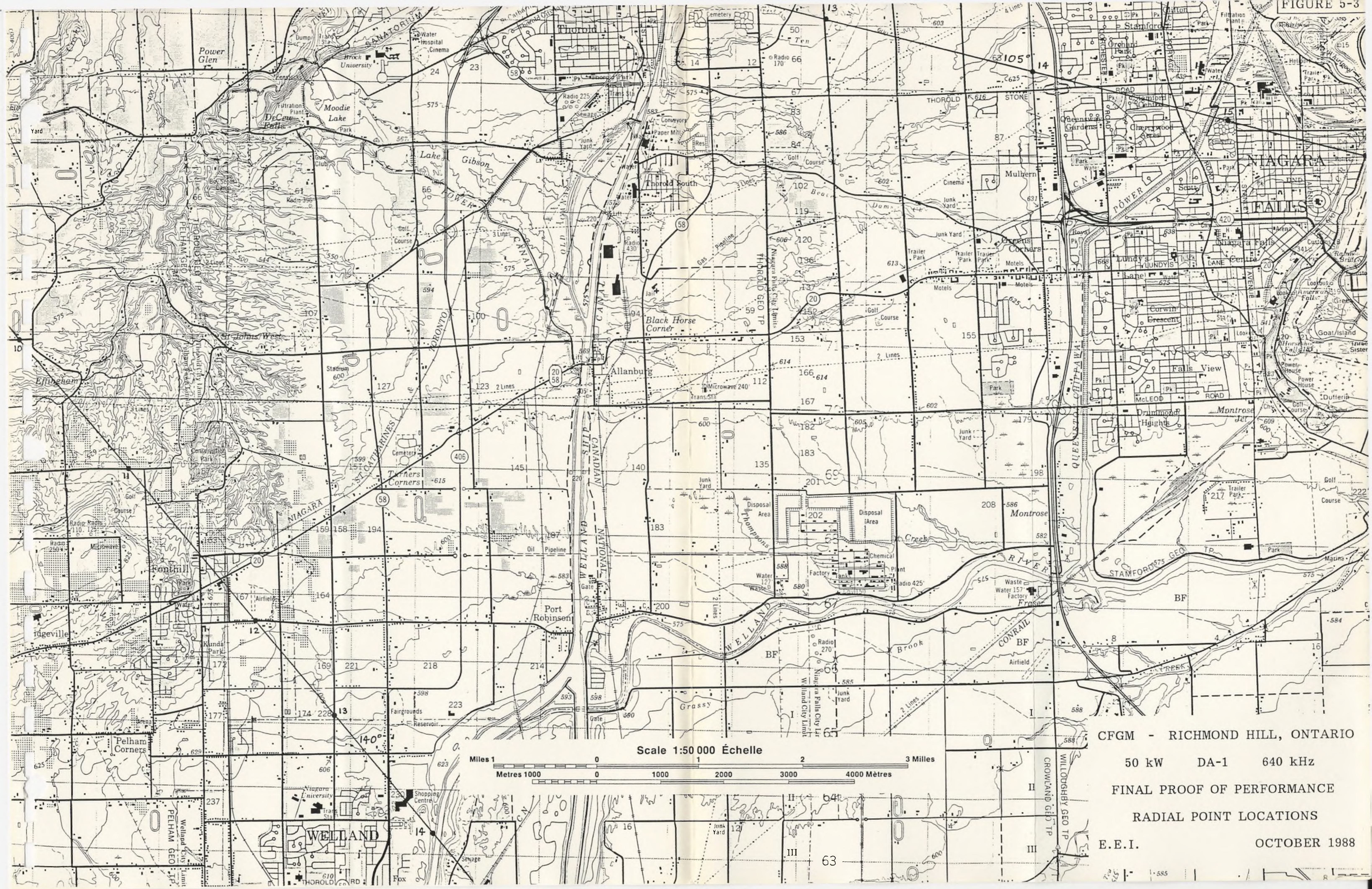
50 kW DA-1 640 kHz

FINAL PROOF OF PERFORMANCE

RADIAL POINT LOCATIONS

E.E.I. OCTOBER 1988

FIGURE 5-3



CFGM - RICHMOND HILL, ONTARIO

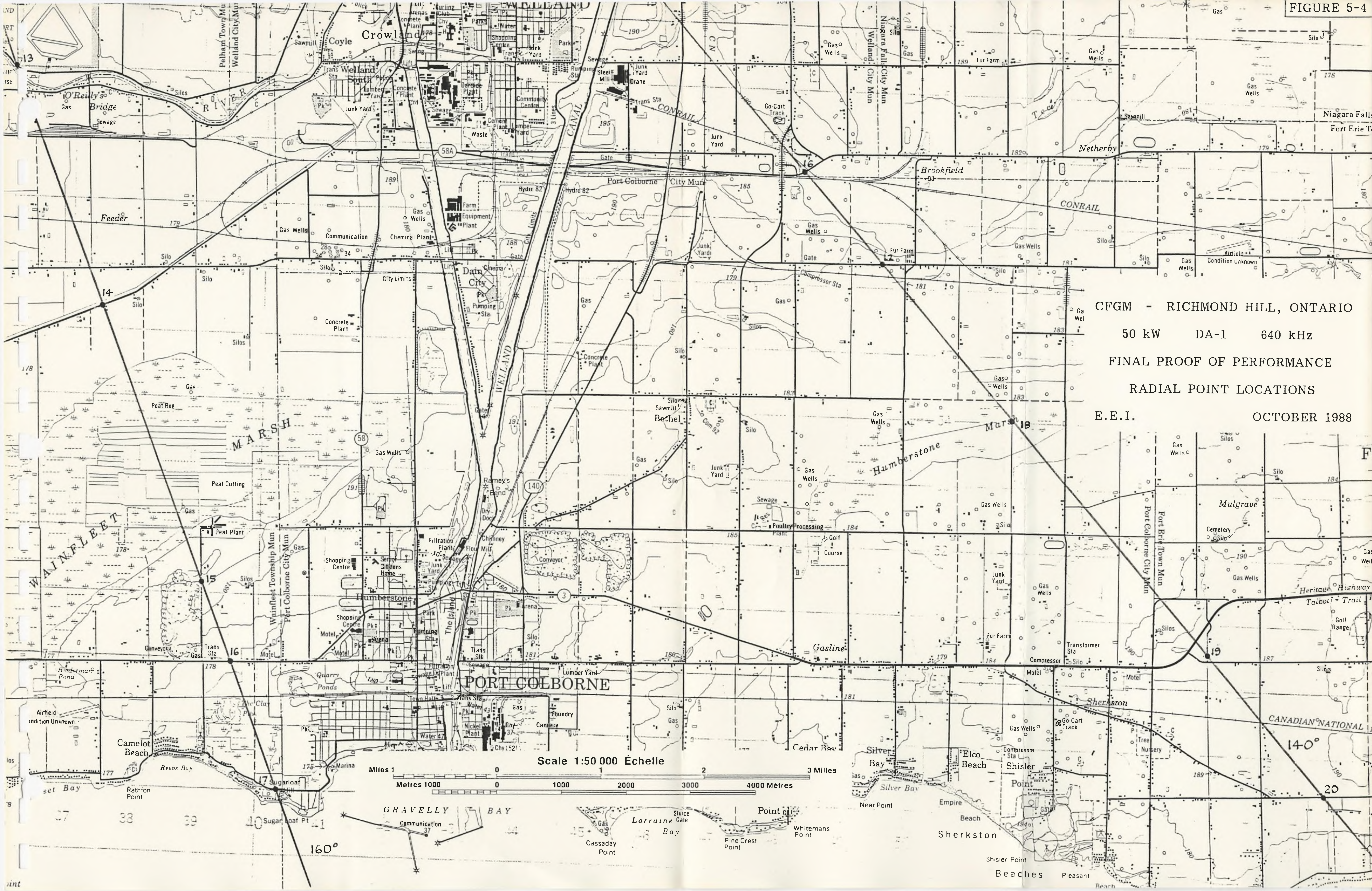
50 kW DA-1 640 kHz

FINAL PROOF OF PERFORMANCE

RADIAL POINT LOCATIONS

E.E.I. OCTOBER 1988

FIGURE 5-4



CFGM - RICHMOND HILL, ONTARIO

50 kW DA-1 640 kHz

FINAL PROOF OF PERFORMANCE

RADIAL POINT LOCATIONS

E.E.I. OCTOBER 1988

EDITION 6

35'

79°30'

Scale 1:50 000 Échelle

Miles 1 0 1 2 3 Milles

Metres 1000 0 1000 2000 3000 4000 Mètres

CFGM - RICHMOND HILL, ONTARIO

50 kW DA-1 640 kHz

FINAL PROOF OF PERFORMANCE

RADIAL POINT LOCATIONS

E.E.I. OCTOBER 1988

FIGURE 5-5

FIGURE 5-6

CFGM - RICHMOND HILL, ONTARIO

50 kW DA-1 640 kHz

FINAL PROOF OF PERFORMANCE

RADIAL POINT LOCATIONS

E.E.I. OCTOBER 1988

Scale 1:50 000 Échelle

Miles 1 0 1 2 3 Milles

Metres 1000 0 1000 2000 3000 4000 Mètres

FIGURE 5-7

CFGM - RICHMOND HILL, ONTARIO

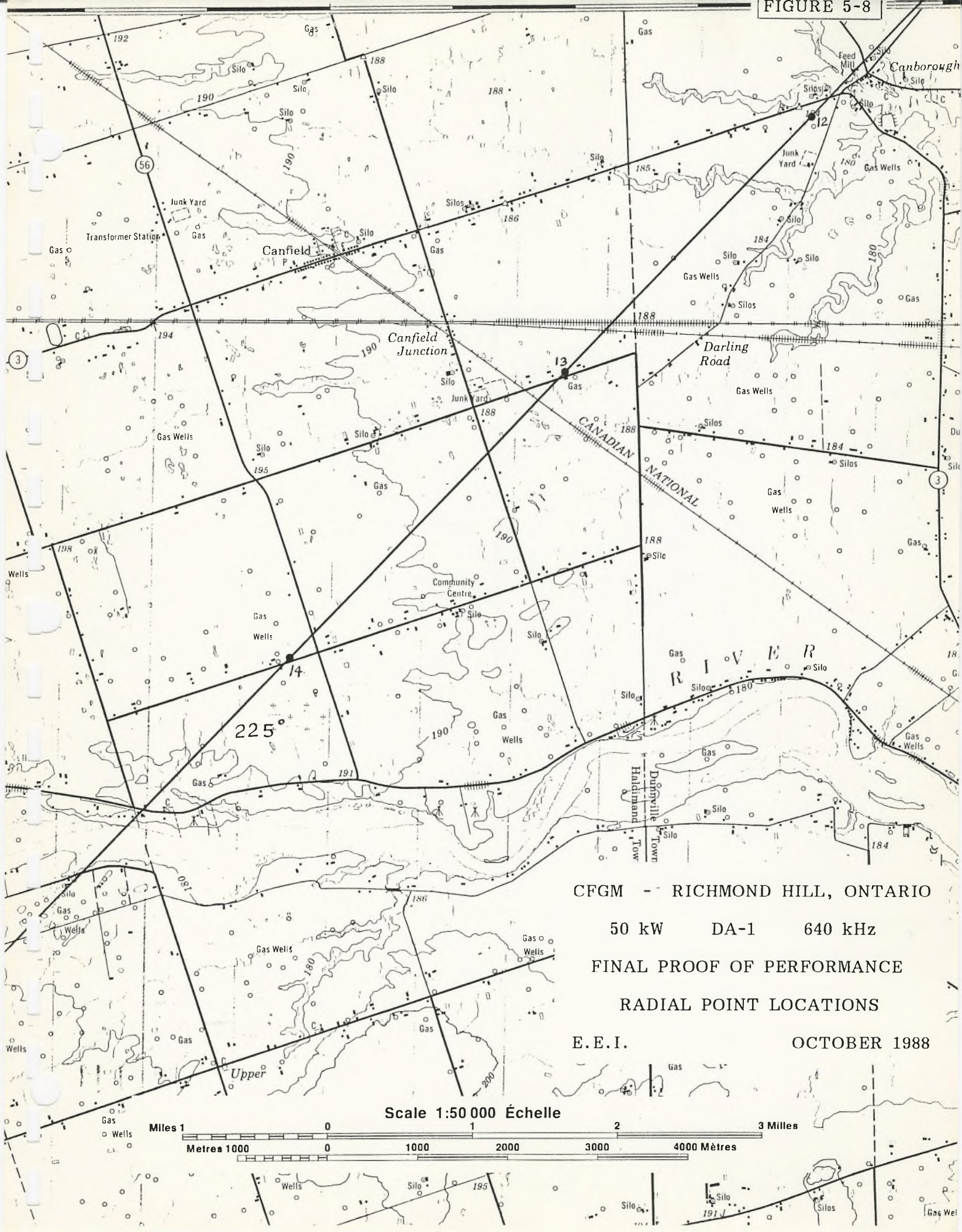
50 kW DA-1 640 kHz

FINAL PROOF OF PERFORMANCE

RADIAL POINT LOCATIONS

E.E.I. OCTOBER 1988

FIGURE 5-8


Canborough
Feed Mill
Silos
Junk Yard
Gas Wells
Transformer Station
Canfield
Canfield Junction
Darling Road
CANADIAN NATIONAL
RIVER
Community Centre
Haldimand Tow
Dunnville Town
Upper
225
CFGM - RICHMOND HILL, ONTARIO
50 kW DA-1 640 kHz
FINAL PROOF OF PERFORMANCE
RADIAL POINT LOCATIONS
E.E.I. OCTOBER 1988
Scale 1:50 000 Échelle
Miles 1 0 1 2 3 Miles
Metres 1000 0 1000 2000 3000 4000 Mètres

Scale 1:50 000 Échelle

Miles 1 0 1 2 3 Miles

Metres 1000 0 1000 2000 3000 4000 Mètres

CFGM - RICHMOND HILL, ONTARIO

50 kW DA-1 640 kHz

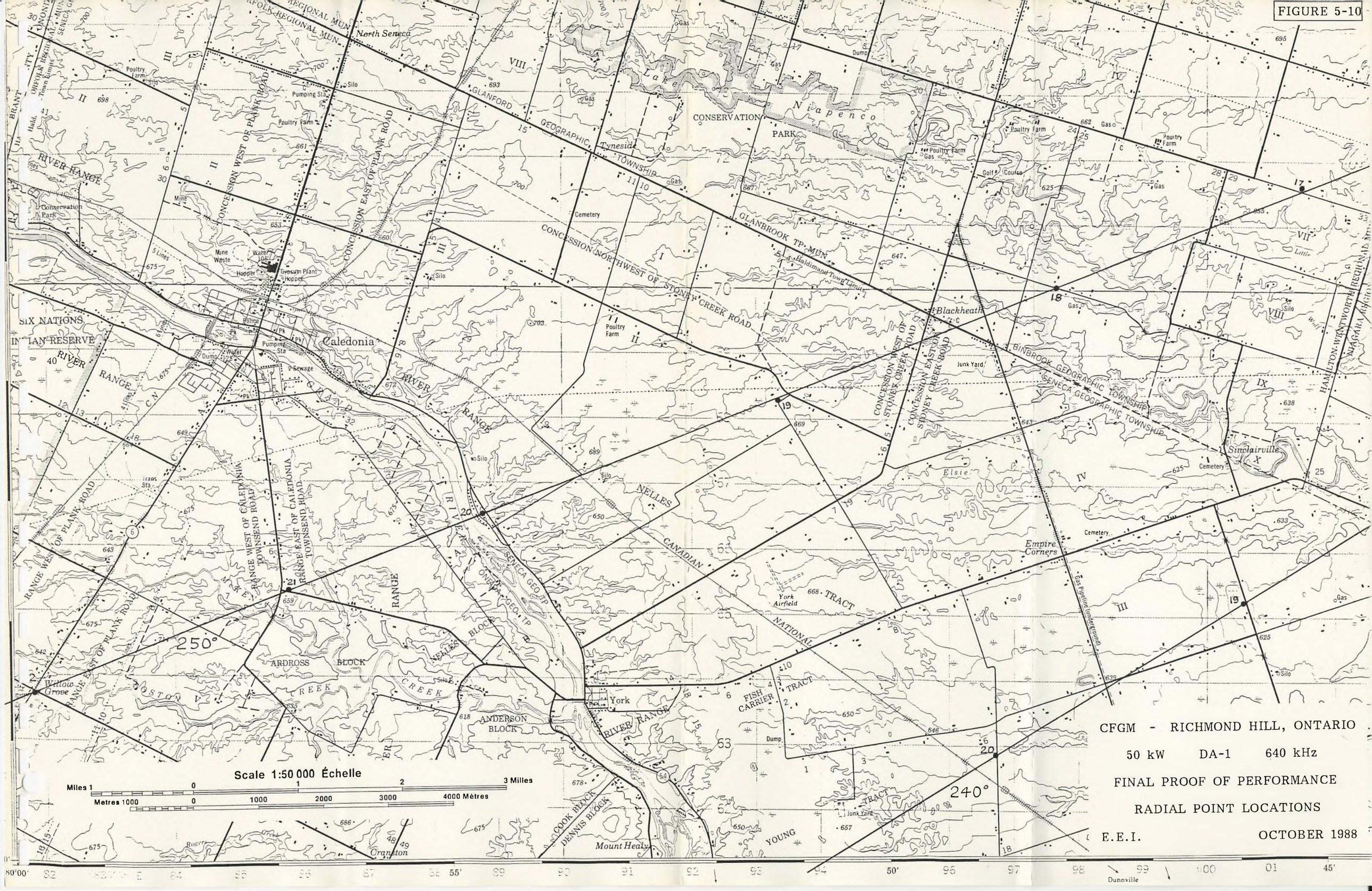
FINAL PROOF OF PERFORMANCE

RADIAL POINT LOCATIONS

E.E.I. OCTOBER 1988

FIGURE 5-9

FIGURE 5-10



Scale 1:50 000 Échelle

Miles 1 — 0 — 1 — 2 — 3 Miles

Metres 1000 — 0 — 1000 — 2000 — 3000 — 4000 Mètres

CFGM - RICHMOND HILL, ONTARIO

50 kW DA-1 640 kHz

FINAL PROOF OF PERFORMANCE

RADIAL POINT LOCATIONS

E.E.I. OCTOBER 1988

FIGURE 5-11

CFGM - RICHMOND HILL, ONTARIO

50 kW DA-1 640 kHz

FINAL PROOF OF PERFORMANCE

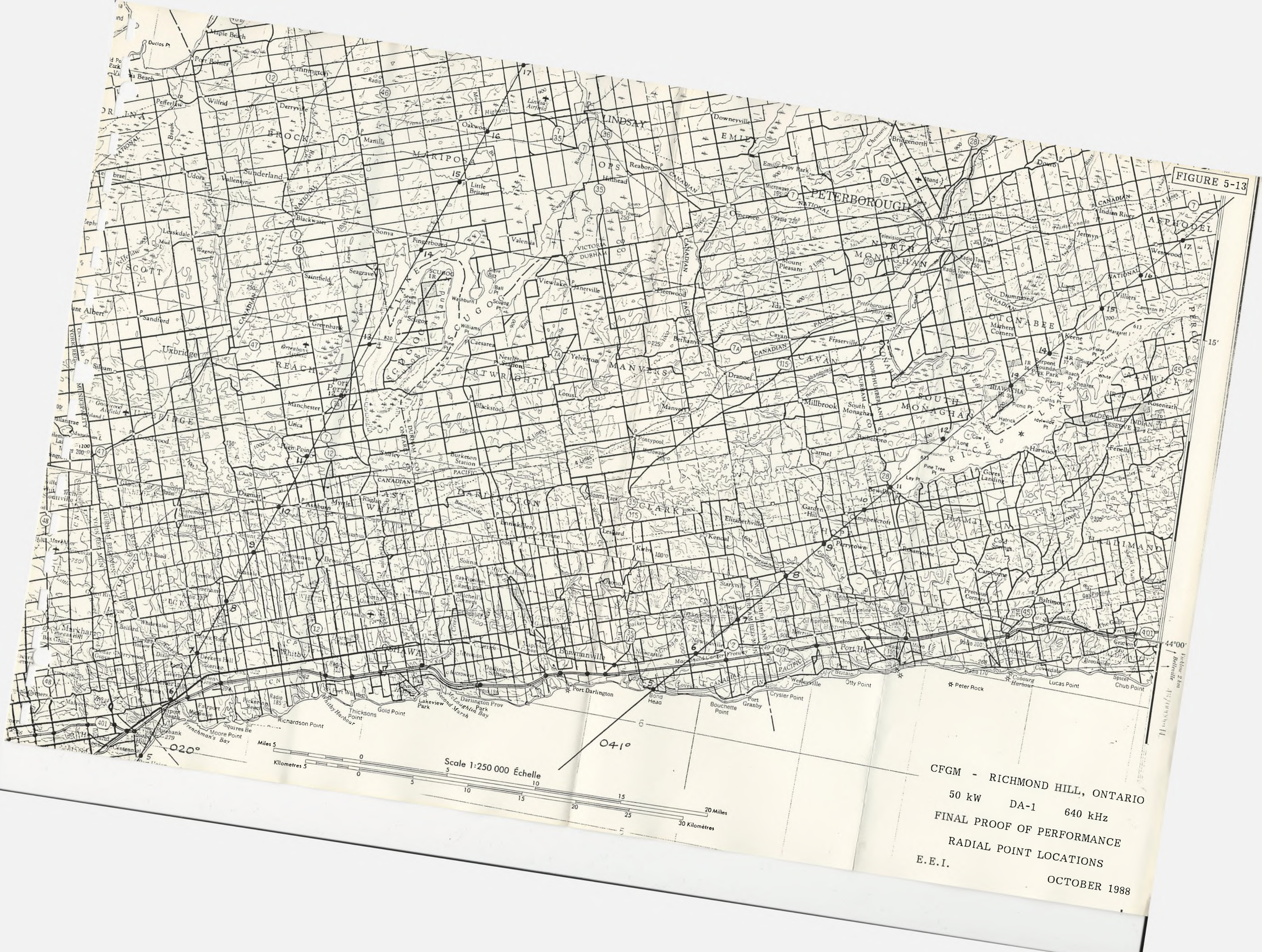
RADIAL POINT LOCATIONS

E.E.I. OCTOBER 1988

FIGURE 5-12


BRANTFORD
Gobles
Muir
Cathcart
Burford
Bishopgate
Mount Vernon
Harley
New Durham
Fairfield Plain
Mount Pleasant
Hatchley
Oakland
Scotland
Kilvyn
Vanessa
Otterville
Teeterville
Windham Centre
La Salette
Waterford
Villa Nova
Townsend Centre
Rockford
Hagersville
Newport
Onondaga
Middleport
Burtch
Abandoned
Ohsweken
Six Nations Indian Reserve 40
Six Nations Corner
Smith Corner
Victoria Mills
Wilsonville
Harford
Bostwick
East Oakland
New Credit Indian Reserve 40A
New Credit Indian Reserve 40
Courtland
Delhi
Nixon
Lynedoch
Simcoe
Jarvis
Marburg
Nanticoke
Langton
Silver Hill
Walsingham
Walsh
Vittoria
Port Ryerse
Port Dover
Normandale
Turkey Point Provincial Park Campsite
Turkey Point
TURKEY POINT
Deep Hole Point
Port Rowan
Inner Bay
Clear Creek
Hyersons Island
250°
240°
BRANT CO
HALDIMAND-NORFOLK REGIONAL MUNICIPALITY
OXFORD CO
NORFOLK CO
TORONTO, HAMILTON AND BUFFALO
CANADIAN NATIONAL
CFGM - RICHMOND HILL, ONTARIO
50 kW DA-1 640 kHz
FINAL PROOF OF PERFORMANCE
RADIAL POINT LOCATIONS
OCTOBER 1988
E.E.I.
Scale 1:250 000 Échelle
Miles 5 0 5 10 15 20 Milles
Kilometres 5 0 5 10 15 20 25 30 Kilomètres

FIGURE 5-13


Scale 1:250 000 Échelle
Miles 5
Kilometres 5
20 Miles
30 Kilometres
020°
041°
44°00'
CFGM - RICHMOND HILL, ONTARIO
50 kW DA-1 640 kHz
FINAL PROOF OF PERFORMANCE
RADIAL POINT LOCATIONS
E.E.I.
OCTOBER 1988

CFGM - RICHMOND HILL, ONTARIO

50 kW DA-1 640 kHz

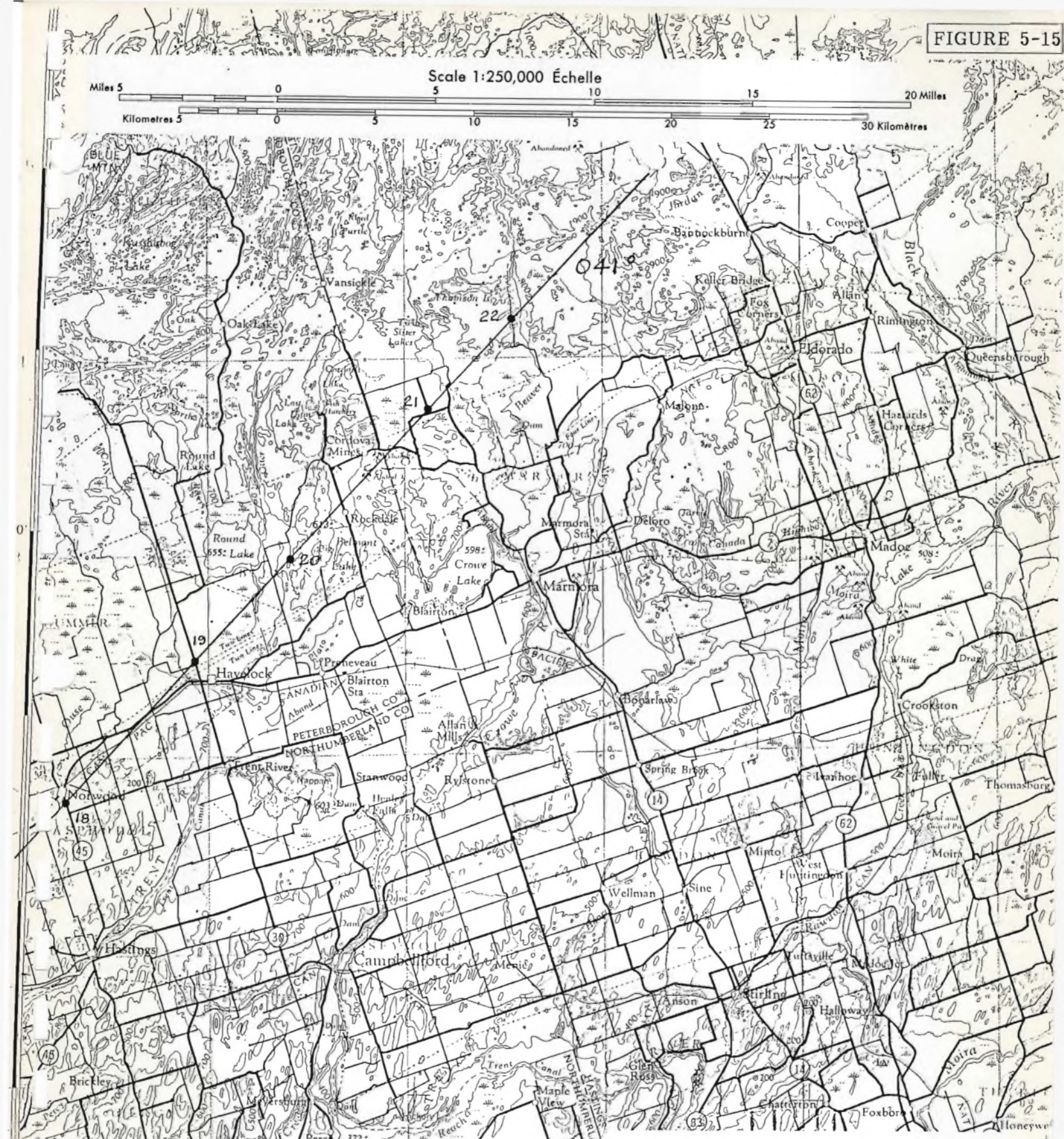
FINAL PROOF OF PERFORMANCE

RADIAL POINT LOCATIONS

E.E.I. OCTOBER 1988

FIGURE 5-14

FIGURE 5-15



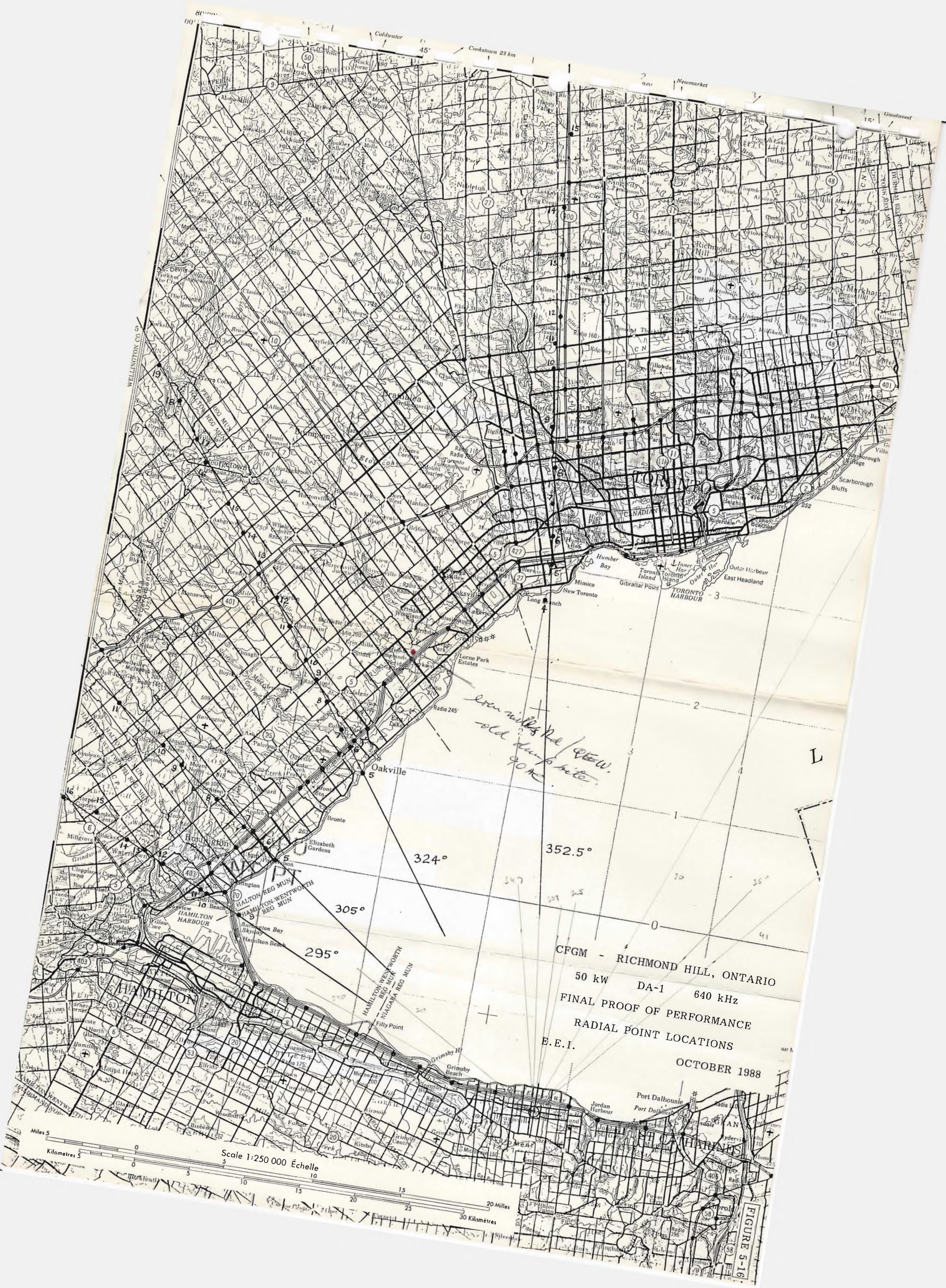
CFGM - RICHMOND HILL, ONTARIO

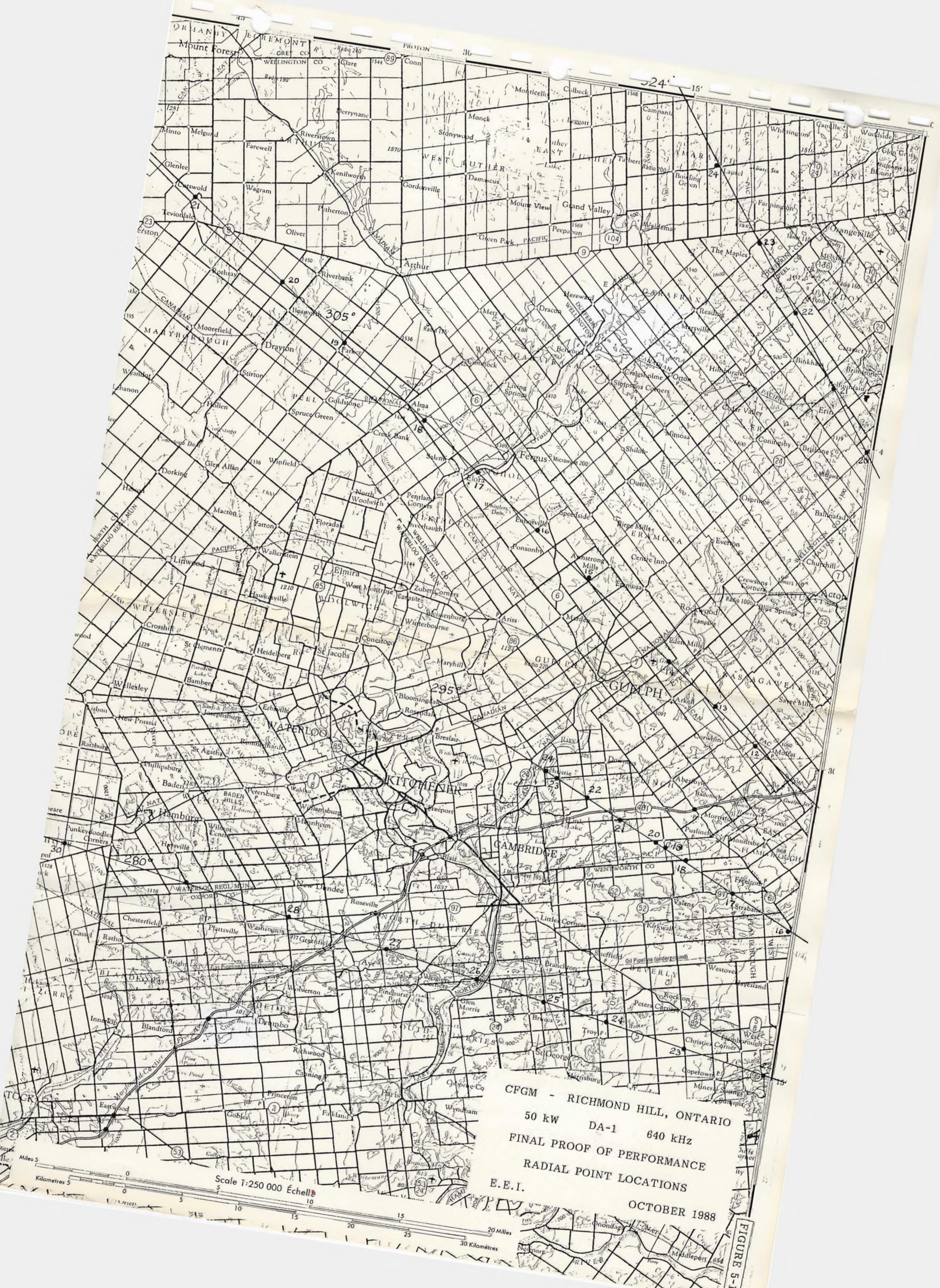
50 kW DA-1 640 kHz

FINAL PROOF OF PERFORMANCE

RADIAL POINT LOCATIONS

E.E.I. OCTOBER 1988


Coldwater
Cookstown 23 km
Newmarket
Goodwood
WELLINGTON CO
DUFFERIN COUNTY
PEEL REG MUN
CANADIAN
NORTHERN RAILWAYS
Orangeville
Alton
Caledon Village
Speersville
Mono Mills
Palgrave
Albion
Bolton
Nobleton
Kleinburg
Vaughan
King City
Richmond Hill
Maple
Thornhill
Markham
Unionville
Woodbridge
Kettleby
Sharon
Queensville
Holland Landing
Schomberg
Aurora
Newmarket
Sutton
Georgina
Keswick
Jackson's Point
Sibbald Point
Pefferlaw
Brampton
Bramalea
Streetsville
Meadowvale
Malton
Mississauga
Port Credit
Lorne Park Estates
Oakville
Bronte
Burlington
Hamilton
Dundas
Waterdown
Millgrove
Milton
Georgetown
Acton
Guelph
Rockwood
Fergus
Elora
Arthur
Orangeville
Shelburne
Creemore
Stayner
Collingwood
Wasaga Beach
Barrie
Orillia
Midland
Penetanguishene
Port McNicoll
Victoria Harbour
Waubaushene
Honey Harbour
Muskoka Lakes
Gravenhurst
Bracebridge
Huntsville
Parry Sound
Port Carling
Port Sydney
Rosseau
Port Cunnington
Lake Joseph
Lake Rosseau
Lake Muskoka
Lake of Bays
Dwight
Baysville
Dorset
Minden
Haliburton
Kinmount
Bancroft
Gooderham
Tamworth
Sharbot Lake
Kaladar
Actinolite
Madoc
Marmora
Stirling
Campbellford
Hastings
Norwood
Peterborough
Lakefield
Bridgenorth
Buckhorn
Omemee
Bobcaygeon
Fenelon Falls
Lindsay
Kirkfield
Uxbridge
Stouffville
Whitchurch-Stouffville
Pickering
Ajax
Whitby
Oshawa
Bowmanville
Newcastle
Port Hope
Cobourg
Colborne
Brighton
Trenton
Belleville
Picton
Wellington
Consecon
Napanee
Deseronto
Tyendinaga
Shannonville
Bloomfield
Carrying Place
Glenora
Adolphustown
Milford
Cherry Valley
Roblin
Prince Edward
Point Petre
Hillier
Ameliasburgh
Rednersville
Black River
Sandbanks Provincial Park
Presqu'ile Provincial Park
Presqu'ile Point
Brighton Beach
Gosport
Salem
Ballantrae
Stouffville
Claremont
Greenwood
Whitevale
Ashburn
Myrtle
Port Perry
Scugog Island
Lake Scugog
Lake Simcoe
Cook's Bay
Big Bay Point
Georgina Island
Fox Islands
Snake Island
Thorah Island
Beaverton
Sunderland
Cannington
Manilla
Woodville
Kirkfield
Fenelon Falls
Bobcaygeon
Pigeon Lake
Buckhorn Lake
Chemong Lake
Stony Lake
Rice Lake
Gore Bay
Manitoulin Island
Little Current
Espanola
Sudbury
Lake Nipissing
North Bay
Mattawa
Deep River
Chalk River
Petawawa
Pembroke
Renfrew
Arnprior
Carleton Place
Almonte
Perth
Smiths Falls
Merrickville
Kemptville
Prescott
Brockville
Gananoque
Lansdowne
Rockport
Thousand Islands
Wolfe Island
Kingston
Amherstview
Odessa
Napanee
Deseronto
Tyendinaga
Shannonville
Bloomfield
Carrying Place
Glenora
Adolphustown
Milford
Cherry Valley
Roblin
Prince Edward
Point Petre
Hillier
Ameliasburgh
Rednersville
Black River
Sandbanks Provincial Park
Presqu'ile Provincial Park
Presqu'ile Point
Brighton Beach
Gosport
Salem
Ballantrae
Stouffville
Claremont
Greenwood
Whitevale
Ashburn
Myrtle
Port Perry
Scugog Island
Lake Scugog
Lake Simcoe
Cook's Bay
Big Bay Point
Georgina Island
Fox Islands
Snake Island
Thorah Island
Beaverton
Sunderland
Cannington
Manilla
Woodville
Kirkfield
Fenelon Falls
Bobcaygeon
Pigeon Lake
Buckhorn Lake
Chemong Lake
Stony Lake
Rice Lake
Gore Bay
Manitoulin Island
Little Current
Espanola
Sudbury
Lake Nipissing
North Bay
Mattawa
Deep River
Chalk River
Petawawa
Pembroke
Renfrew
Arnprior
Carleton Place
Almonte
Perth
Smiths Falls
Merrickville
Kemptville
Prescott
Brockville
Gananoque
Lansdowne
Rockport
Thousand Islands
Wolfe Island
Kingston
Amherstview
Odessa
Toronto
Toronto Island
Inner Harbour
Outer Harbour
East Headland
TORONTO HARBOUR
Humber Bay
Mimico
New Toronto
Long Branch
Gibraltar Point
Scarborough Bluffs
Riverdale
Leaside
Thorncliffe
Flemingdon Park
Don Valley
Don Mills
Willowdale
Newtonbrook
Downsview
Weston
York
East York
Scarborough
North York
Etobicoke
York Mills
Lawrence
Eglinton
Bloor
Dundas
Queen
King
Wellington
Front
Gerrard
Danforth
Kingston Rd
Lake Ontario
Lorne Park Estates
Oakville
Bronte
Burlington Bay
Skyway
Hamilton Beach
Fifty Point
Grimsby Hr
Grimsby Beach
Jordan Harbour
Port Dalhousie
Elizabeth Gardens
HAMILTON HARBOUR
HALTON REG MUN
HAMILTON-WENTWORTH REG MUN
NIAGARA REG MUN
324°
352.5°
305°
295°
CFGM - RICHMOND HILL, ONTARIO
50 kW DA-1 640 kHz
FINAL PROOF OF PERFORMANCE
RADIAL POINT LOCATIONS
E.E.I.
OCTOBER 1988
Scale 1:250 000 Échelle
Miles 5 0 5 10 15 20 Miles
Kilometres 5 0 5 10 15 20 25 30 Kilomètres
FIGURE 5-16



CFGM - RICHMOND HILL, ONTARIO
50 kW DA-1 640 kHz
FINAL PROOF OF PERFORMANCE
RADIAL POINT LOCATIONS
E.E.I. OCTOBER 1988

FIGURE 5-17

GEORGIAN BAY

NOTTAWASAGA BAY

Scale 1:250 000 Échelle

Miles 5 0 5 10 15 20 Miles

Kilometres 5 0 5 10 15 20 25 30 Kilometres

CFGM - RICHMOND HILL, ONTARIO

50 kW DA-1 640 kHz

FINAL PROOF OF PERFORMANCE

RADIAL POINT LOCATIONS

E.E.I.

OCTOBER 1988

FIGURE 5-18

OWEN SOUND
324°
Griffith Island
Cape Commodore
Pyette Point
North Keppel
Kemble
Big Bay
Deepwater Point
White Cloud
Cameron Point
North Pt
Cornet Pt
Kidd Pt
Gravelly Pt
Gravelly Bay
Presqu'ile Point
Sutton Pt
Johnson
Hogg
37
Lindenwood
Wolseley
Lake Charles
ESTHER CLIFF
SKINNER BLUFF
MALCOLM BLUFF
BRUCE CO
GREY CO
Colpoys Bay
Colpoys Bay
Oxenden
38
39
Purple Valley
Adamsville
ALBEMARLE
Mar
Berford Lake
Wiarton
Radio 125
Clavering
KEPPEL
Shouldice
Shallow Lake
Hepworth
Cruickshank
Balmy Beach
Benallen
Springmount
Jackson
Derby
Kilsyth
Inglis Falls
Squire
Rockford
Hoath Head
35
36
Leith
Annan
Brooke
SYDENHAM
CANADIAN
Gas Pipeline
Chatsworth
Sullivan Mills
Arnott
Keady
Keward
Grierston
Alvanley
Tara
Dobbinton
River
Park Head
Tolmie
AMABEL
Sauble Beach
Sauble Beach North
Sauble Beach South
Sauble Falls
Skipness
Allenford
Scotch Settlement
Elsinore
Oliphant
Red Bay
Howdenvale
Pike Bay
Stony Pt
Chiefs Point
CHIEFS POINT I.R. 28
Main Station I
Burke Is
Evelyn I
Beament I
Cavalier I
Ghegheto I
St Jean Pt
Pike Pt
Kolfage I
Smokehouse I
Whitefish I
Rutherford Pt
FISHING ISLANDS
Frenchman Point
SAUGEEN I.R. 29
Chippawa Hill
Southampton
Chantry I
McNab Pt
Port Elgin
Burgoyne
Arkwright
Mount Hope
Dumblane
Turners
Queen Hill
North Bruce
MacGregor Pt
Scott Pt
Baie du Doré
Macpherson Pt
Nuclear Power Station
Douglas Pt


CFGM - RICHMOND HILL, ONTARIO
50 kW DA-1 640 kHz
FINAL PROOF OF PERFORMANCE
RADIAL POINT LOCATIONS
E.E.I.
OCTOBER 1988
Scale 1:250 000 Échelle
Miles 5
Kilometres 5
20 Milles
30 Kilometres
FIGURE 5-19

Scale 1:250,000 Échelle

Miles 5 0 5 10 15 20 25 30 Miles

Kilometres 5 0 5 10 15 20 30 Kilometres

CFGM - RICHMOND HILL, ONTARIO

50 kW DA-1 640 kHz

FINAL PROOF OF PERFORMANCE

RADIAL POINT LOCATIONS

E.E.I.

OCTOBER 1988

Scale 1:250,000 Échelle

Miles 5 0 5 10 15 20 Miles

Kilometres 5 0 5 10 15 20 25 30 Kilomètres

CFGM - RICHMOND HILL, ONTARIO

50 kW DA-1 640 kHz

FINAL PROOF OF PERFORMANCE

RADIAL POINT LOCATIONS

E.E.I. OCTOBER 1988

FIGURE 5-21

FIGURE 6-1

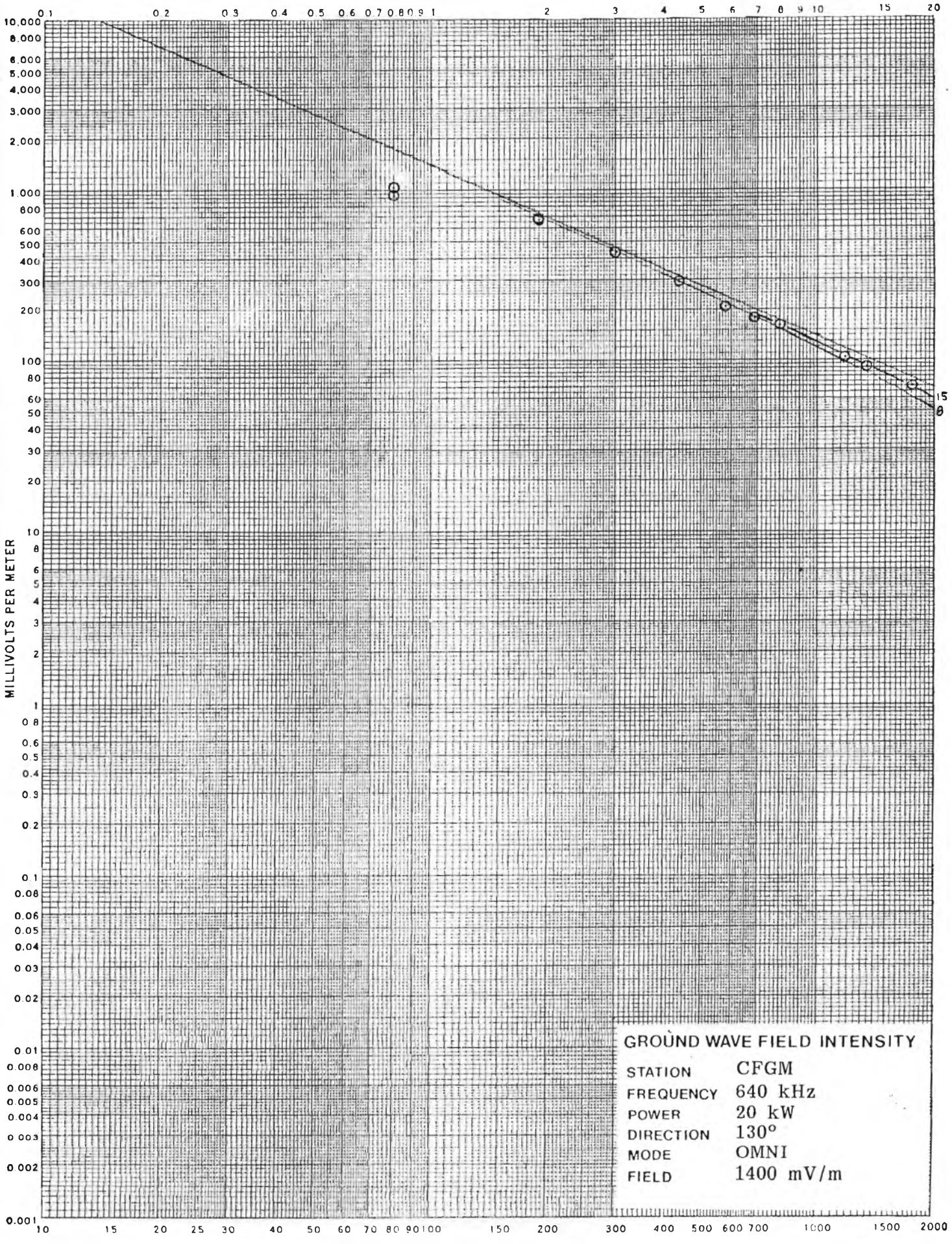

KILOMETRES FROM ANTENNA
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7 8 9 10 15 20
10,000 8,000 6,000 5,000 4,000 3,000 2,000 1,000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0.8 0.6 0.5 0.4 0.3 0.2 0.1 0.08 0.06 0.05 0.04 0.03 0.02 0.01 0.008 0.006 0.005 0.004 0.003 0.002 0.001
MILLIVOLTS PER METER
10 15 20 25 30 40 50 60 70 80 90 100 150 200 300 400 500 600 700 1000 1500 2000
KILOMETRES FROM ANTENNA
15
0
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 20 kW
DIRECTION 130°
MODE OMNI
FIELD 1400 mV/m

FIGURE 6-2

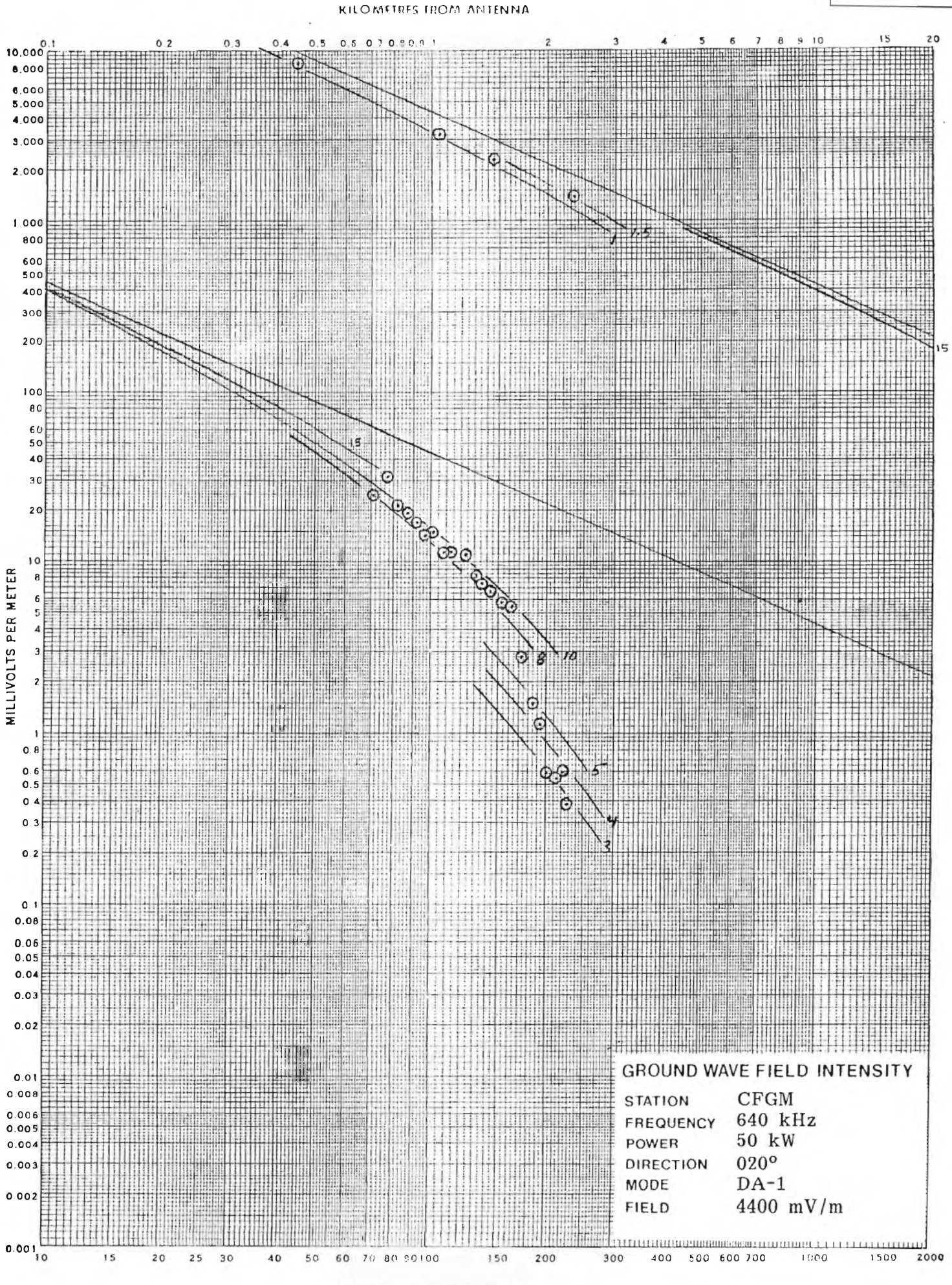

KILOMETRES FROM ANTENNA
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
2
3
4
5
6
7
8
9
10
15
20
10,000
8,000
6,000
5,000
4,000
3,000
2,000
1,000
800
600
500
400
300
200
100
80
60
50
40
30
20
10
8
6
5
4
3
2
1
0.8
0.6
0.5
0.4
0.3
0.2
0.1
0.08
0.06
0.05
0.04
0.03
0.02
0.01
0.008
0.006
0.005
0.004
0.003
0.002
0.001
MILLIVOLTS PER METER
1
1.5
15
5
10
8
7
6
5
4
3
10
15
20
25
30
40
50
60
70
80
90
100
150
200
300
400
500
600
700
1000
1500
2000
KILOMETRES FROM ANTENNA
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 020°
MODE DA-1
FIELD 4400 mV/m

FIGURE 6-3

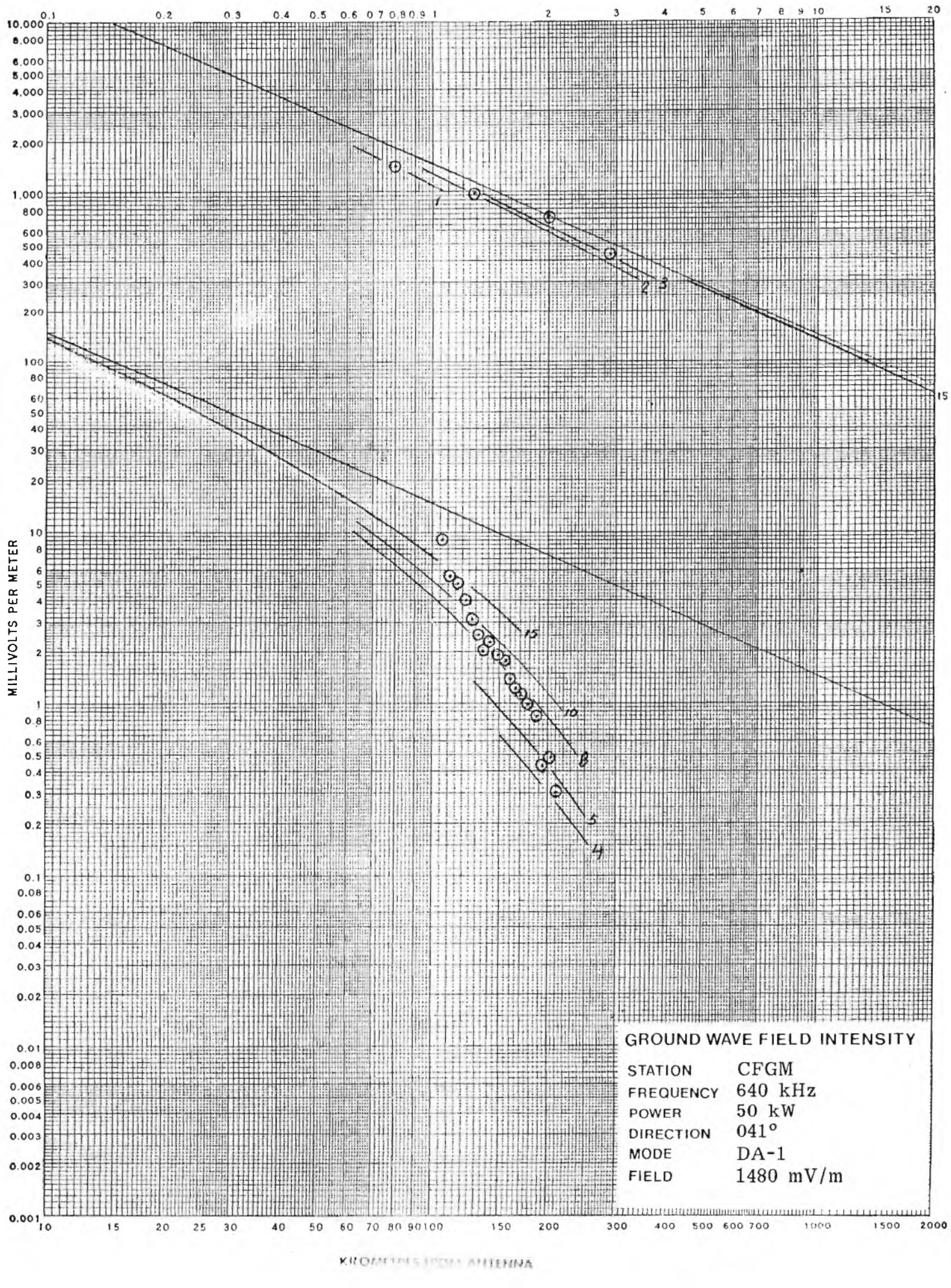

KILOMETRES FROM ANTENNA
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7 8 9 10 15 20
10,000 8,000 6,000 5,000 4,000 3,000 2,000 1,000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0.8 0.6 0.5 0.4 0.3 0.2 0.1 0.08 0.06 0.05 0.04 0.03 0.02 0.01 0.008 0.006 0.005 0.004 0.003 0.002 0.001
MILLIVOLTS PER METER
1
2
3
15
15
10
8
5
4
10 15 20 25 30 40 50 60 70 80 90 100 150 200 300 400 500 600 700 1000 1500 2000
KILOMETRES FROM ANTENNA
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 041°
MODE DA-1
FIELD 1480 mV/m

FIGURE 6-4

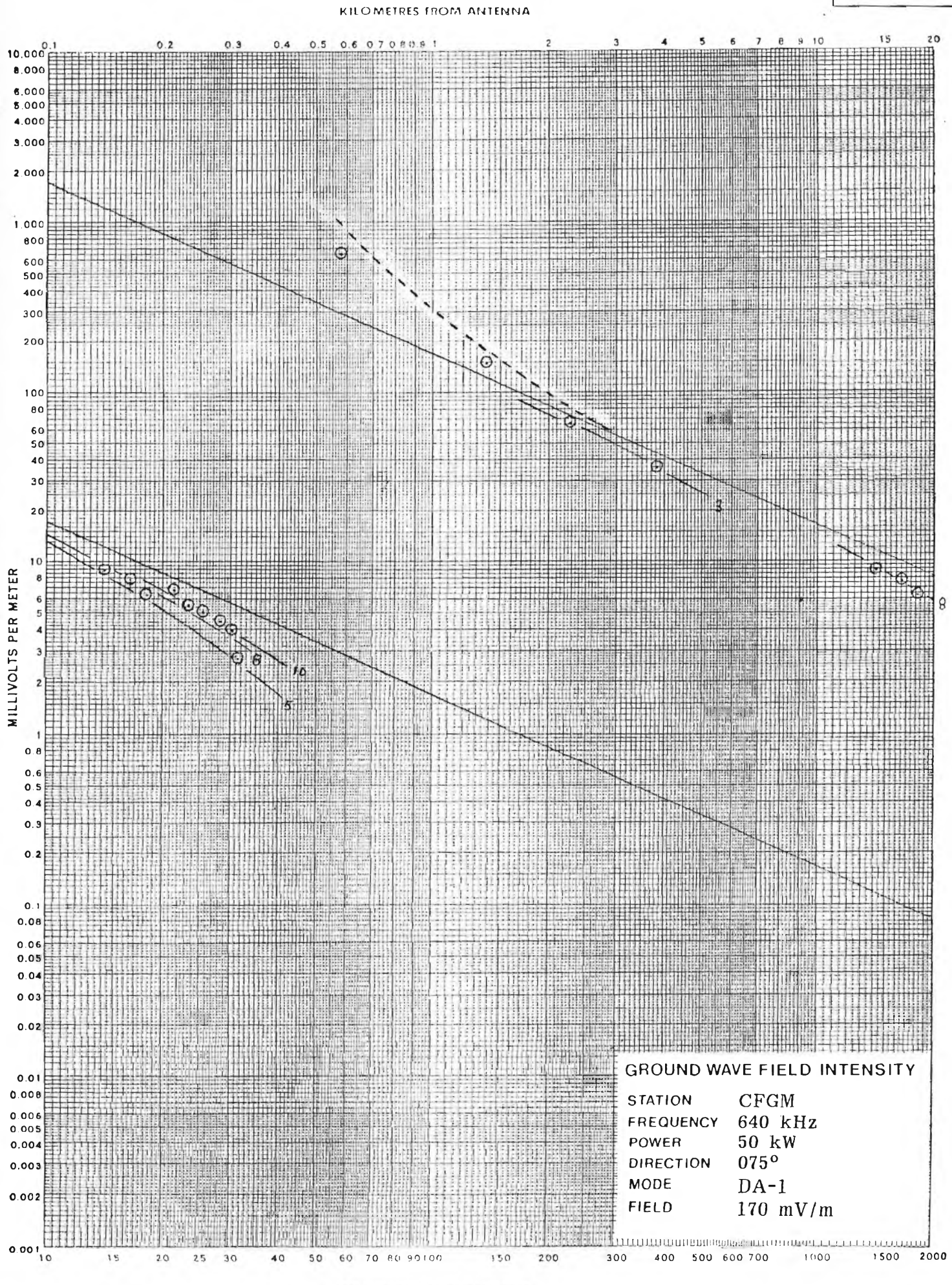

KILOMETRES FROM ANTENNA
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7 8 9 10 15 20
10,000 8,000 6,000 5,000 4,000 3,000 2,000 1,000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0.8 0.6 0.5 0.4 0.3 0.2 0.1 0.08 0.06 0.05 0.04 0.03 0.02 0.01 0.008 0.006 0.005 0.004 0.003 0.002 0.001
MILLIVOLTS PER METER
10 15 20 25 30 40 50 60 70 80 90 100 150 200 300 400 500 600 700 1000 1500 2000
KILOMETRES FROM ANTENNA
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 075°
MODE DA-1
FIELD 170 mV/m

FIGURE 6-5

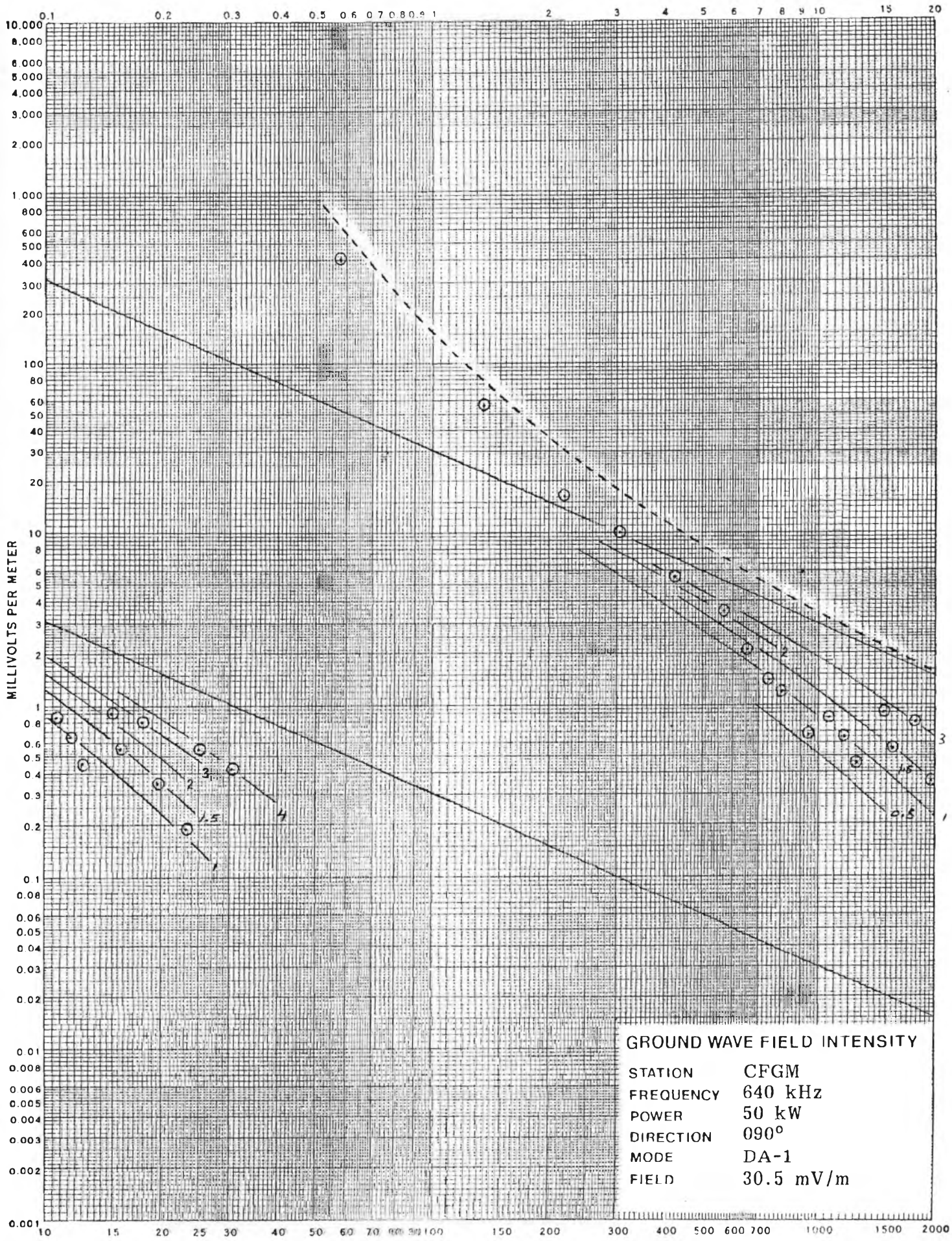

KILOMETRES FROM ANTENNA
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7 8 9 10 15 20
MILLIVOLTS PER METER
10,000 8,000 6,000 5,000 4,000 3,000 2,000 1,000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0.8 0.6 0.5 0.4 0.3 0.2 0.1 0.08 0.06 0.05 0.04 0.03 0.02 0.01 0.008 0.006 0.005 0.004 0.003 0.002 0.001
10 15 20 25 30 40 50 60 70 80 90 100 150 200 300 400 500 600 700 1000 1500 2000
0.5
1
1.5
2
3
4
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 090°
MODE DA-1
FIELD 30.5 mV/m

FIGURE 6-6

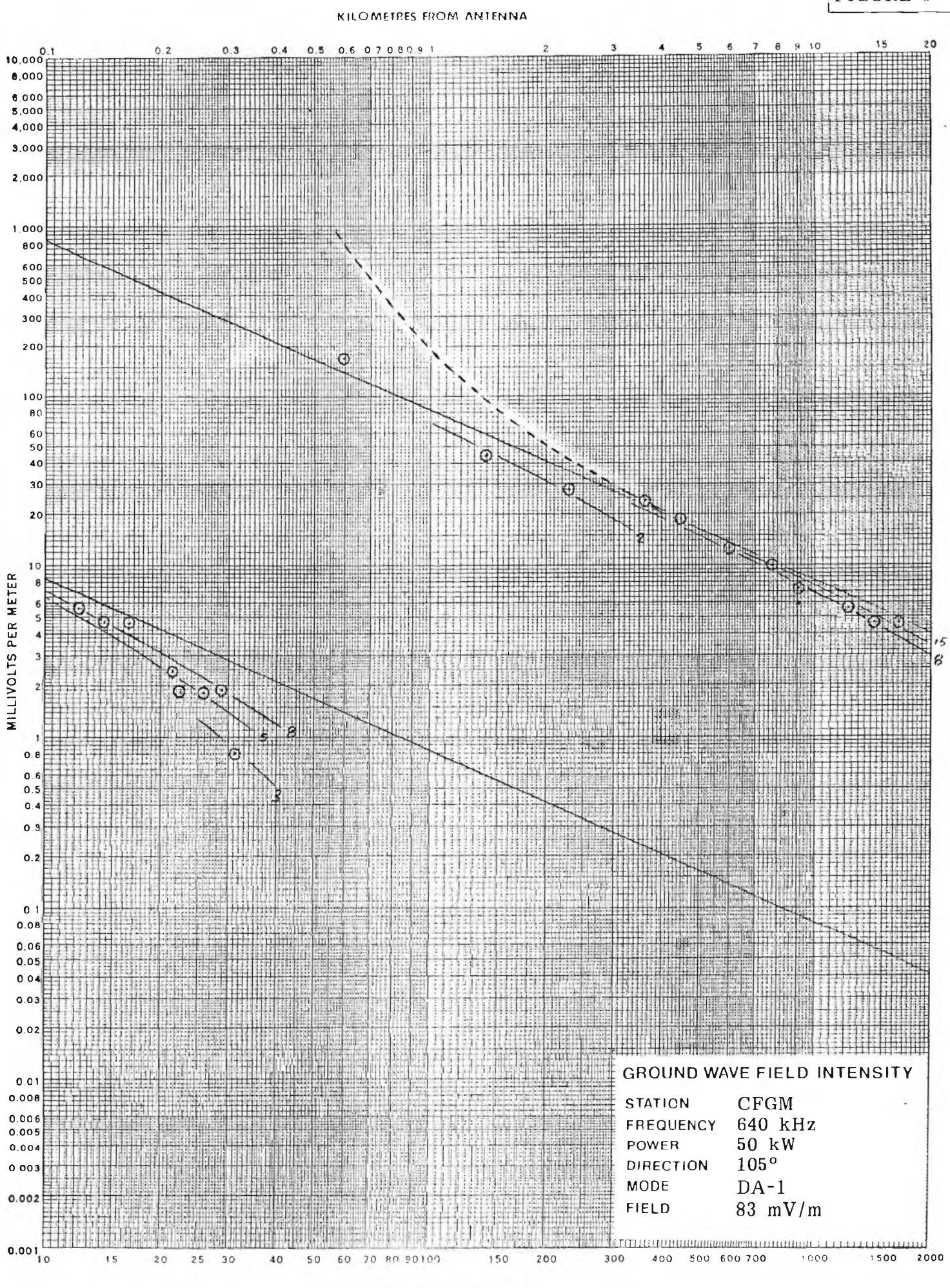

KILOMETRES FROM ANTENNA
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7 8 9 10 15 20
10,000 8,000 6,000 5,000 4,000 3,000 2,000 1,000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0.8 0.6 0.5 0.4 0.3 0.2 0.1 0.08 0.06 0.05 0.04 0.03 0.02 0.01 0.008 0.006 0.005 0.004 0.003 0.002 0.001
MILLIVOLTS PER METER
10 15 20 25 30 40 50 60 70 80 90 100 150 200 300 400 500 600 700 1000 1500 2000
KILOMETRES FROM ANTENNA
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 105°
MODE DA-1
FIELD 83 mV/m

FIGURE 6-7

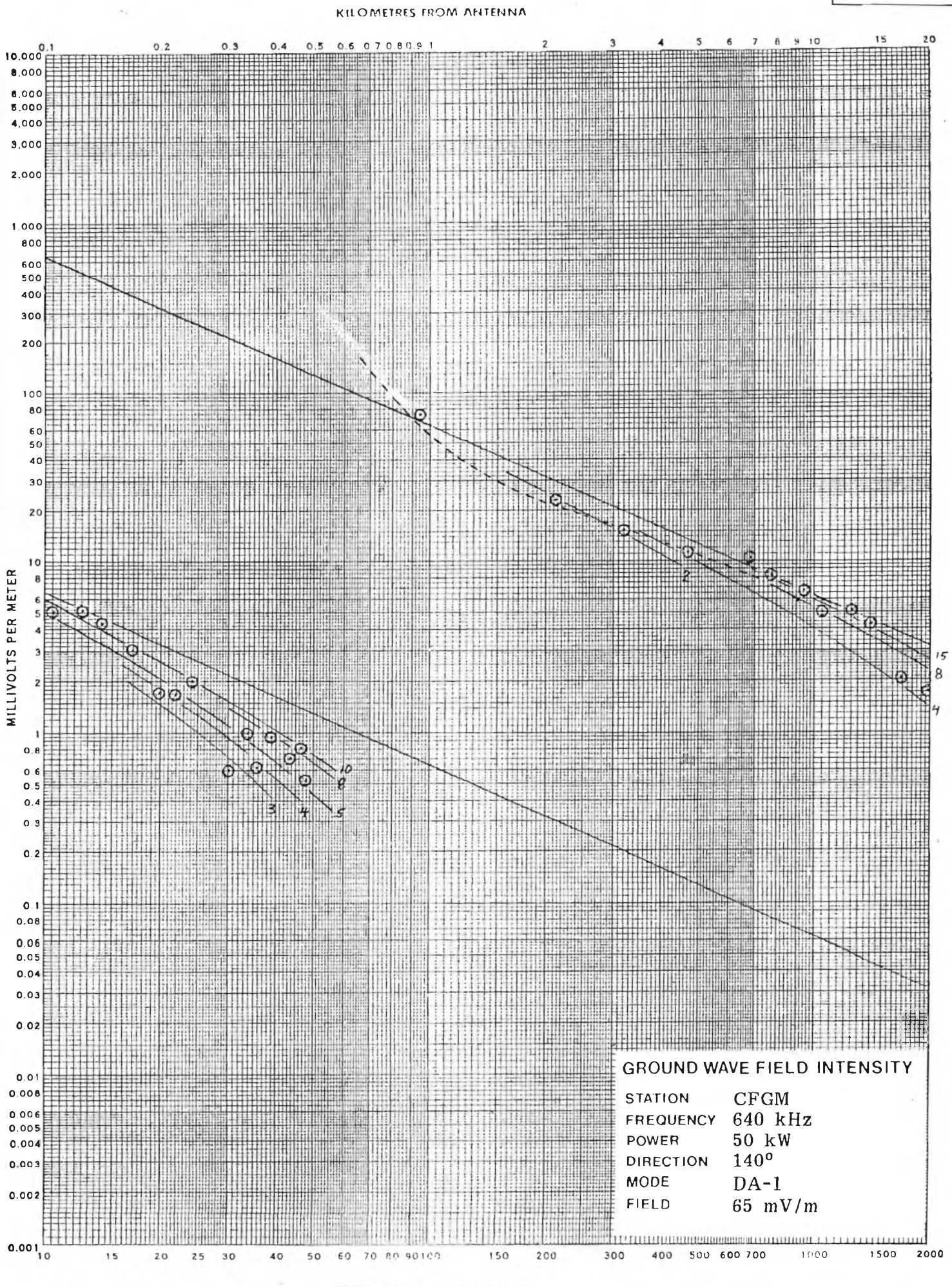

KILOMETRES FROM ANTENNA
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7 8 9 10 15 20
10,000 8,000 6,000 5,000 4,000 3,000 2,000 1,000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0.8 0.6 0.5 0.4 0.3 0.2 0.1 0.08 0.06 0.05 0.04 0.03 0.02 0.01 0.008 0.006 0.005 0.004 0.003 0.002 0.001
MILLIVOLTS PER METER
10 15 20 25 30 40 50 60 70 80 90 100 150 200 300 400 500 600 700 1000 1500 2000
KILOMETRES FROM ANTENNA
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 140°
MODE DA-1
FIELD 65 mV/m

FIGURE 6- 8

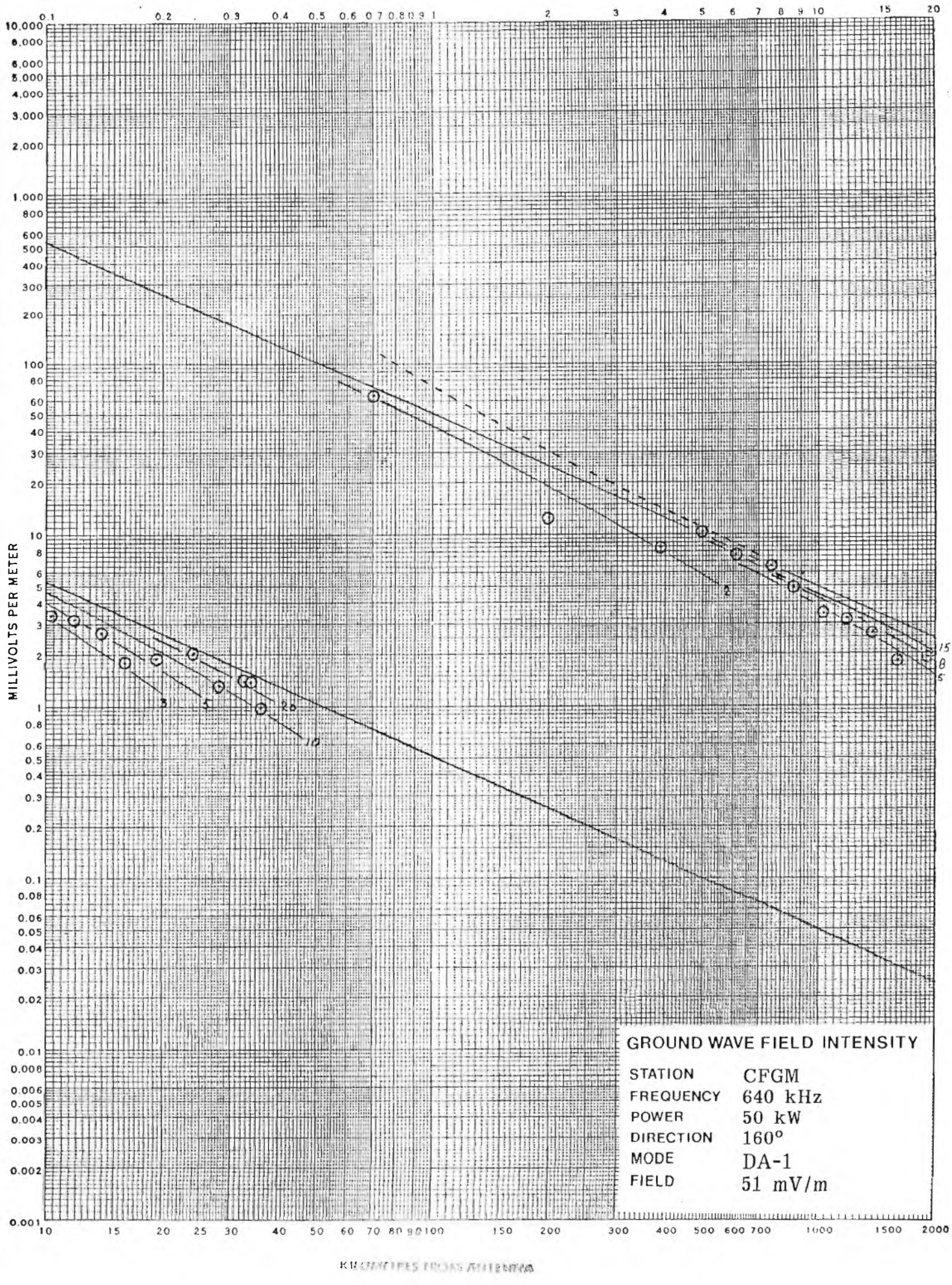

KILOMETRES FROM ANTENNA
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7 8 9 10 15 20
10,000 8,000 6,000 5,000 4,000 3,000 2,000 1,000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0.8 0.6 0.5 0.4 0.3 0.2 0.1 0.08 0.06 0.05 0.04 0.03 0.02 0.01 0.008 0.006 0.005 0.004 0.003 0.002 0.001
MILLIVOLTS PER METER
10 15 20 25 30 40 50 60 70 80 90 100 150 200 300 400 500 600 700 1000 1500 2000
KILOMETRES FROM ANTENNA
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 160°
MODE DA-1
FIELD 51 mV/m

FIGURE 6- 9

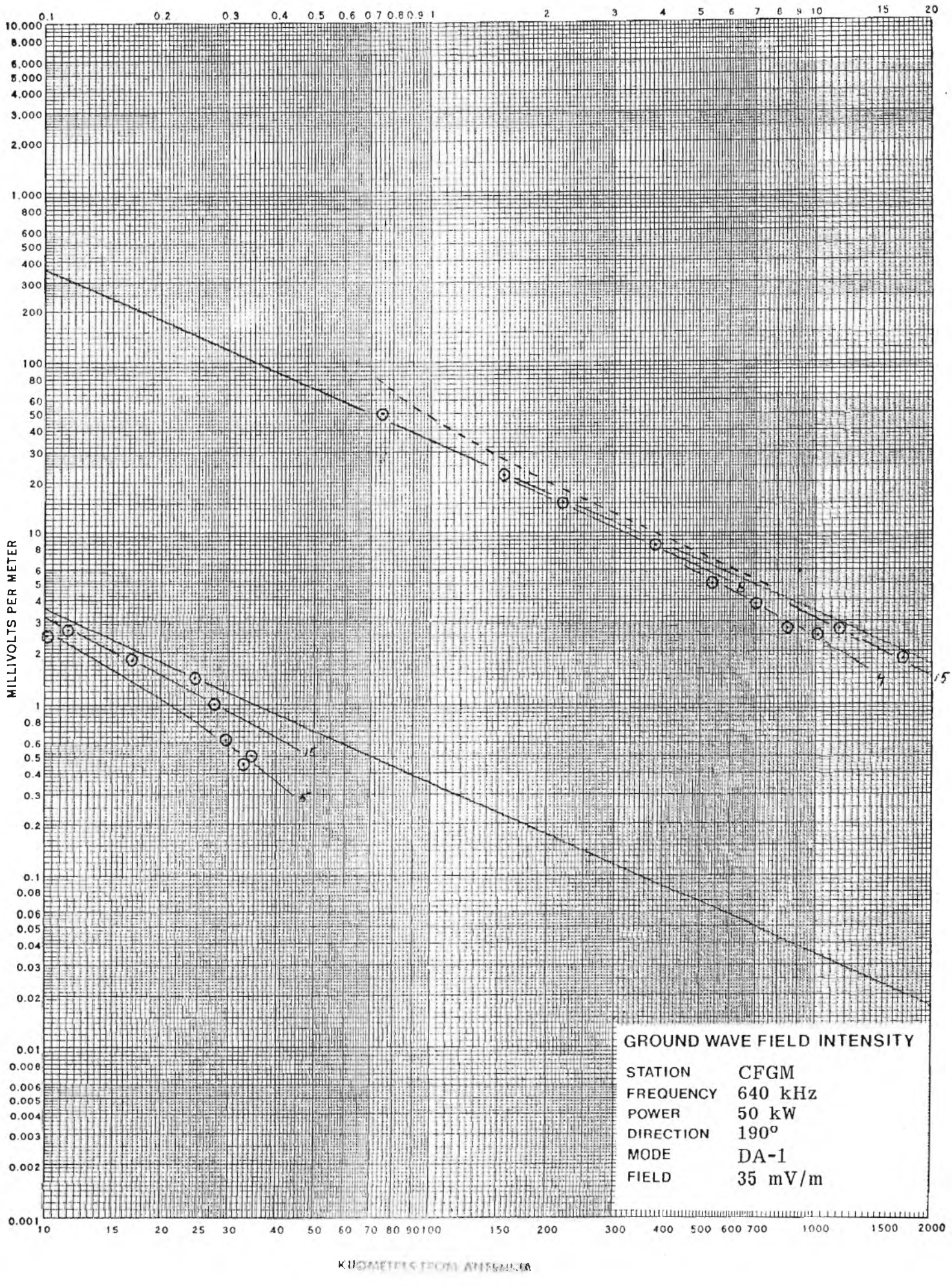

KILOMETRES FROM ANTENNA
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7 8 9 10 15 20
10,000 8,000 6,000 5,000 4,000 3,000 2,000 1,000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0.8 0.6 0.5 0.4 0.3 0.2 0.1 0.08 0.06 0.05 0.04 0.03 0.02 0.01 0.008 0.006 0.005 0.004 0.003 0.002 0.001
MILLIVOLTS PER METER
10 15 20 25 30 40 50 60 70 80 90 100 150 200 300 400 500 600 700 1000 1500 2000
KILOMETERS FROM ANTENNA
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 190°
MODE DA-1
FIELD 35 mV/m

FIGURE 6-10

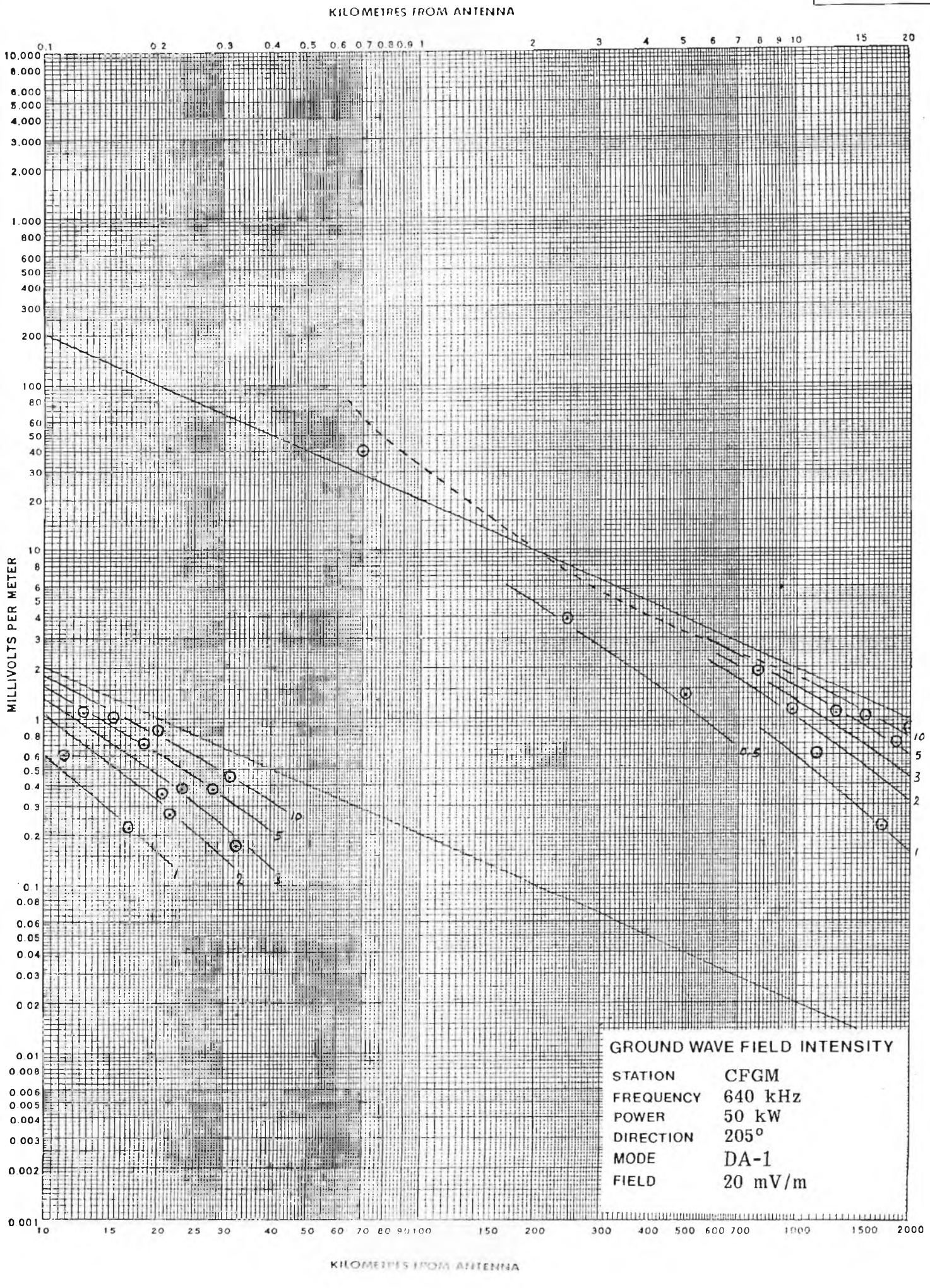

KILOMETRES FROM ANTENNA
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7 8 9 10 15 20
10,000 8,000 6,000 5,000 4,000 3,000 2,000 1,000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0.8 0.6 0.5 0.4 0.3 0.2 0.1 0.08 0.06 0.05 0.04 0.03 0.02 0.01 0.008 0.006 0.005 0.004 0.003 0.002 0.001
MILLIVOLTS PER METER
0.5
1
2
3
5
10
10 15 20 25 30 40 50 60 70 80 90 100 150 200 300 400 500 600 700 1000 1500 2000
KILOMETRES FROM ANTENNA
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 205°
MODE DA-1
FIELD 20 mV/m

FIGURE 6-11

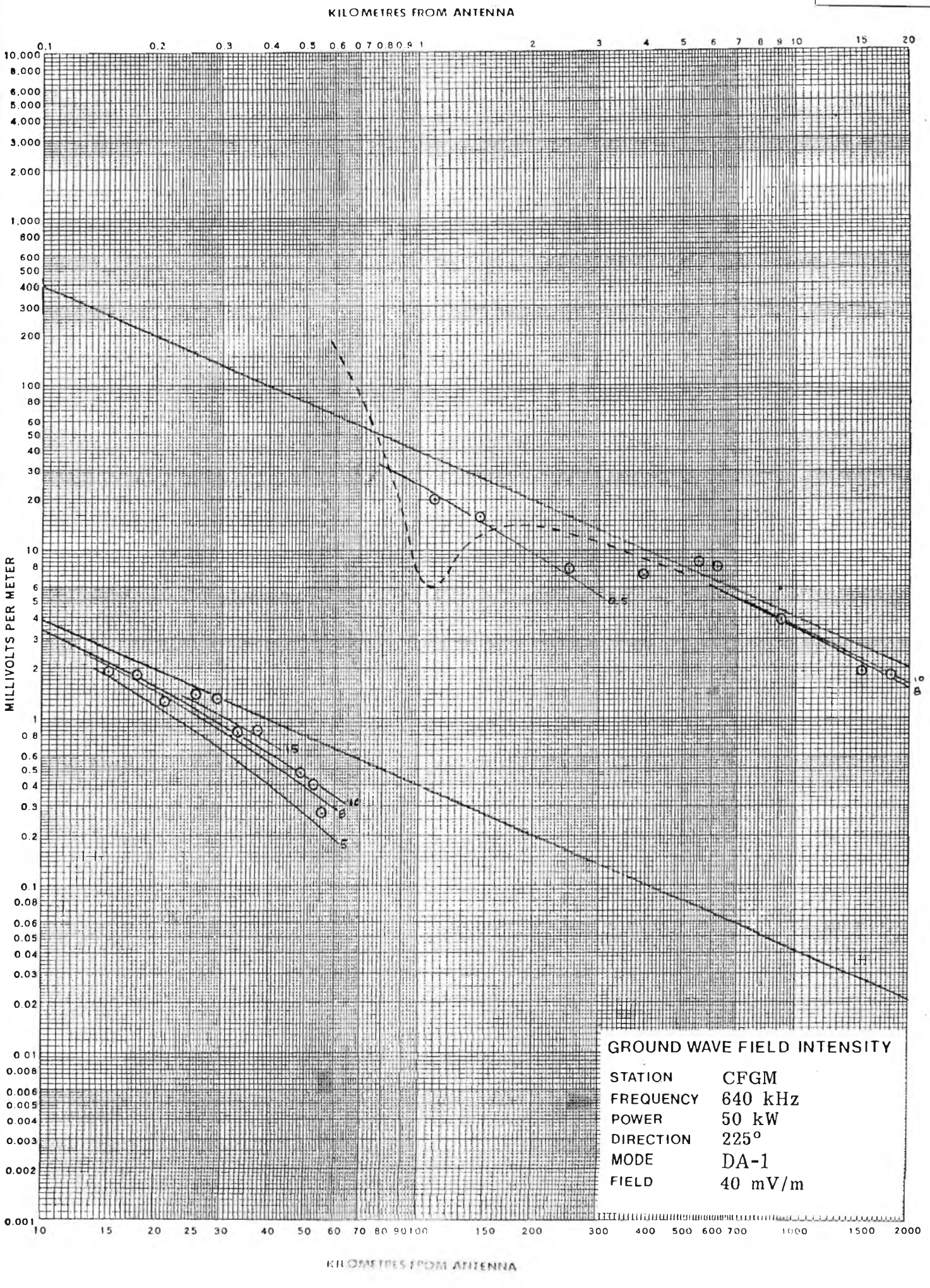

KILOMETRES FROM ANTENNA
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7 8 9 10 15 20
10,000 8,000 6,000 5,000 4,000 3,000 2,000 1,000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0.8 0.6 0.5 0.4 0.3 0.2 0.1 0.08 0.06 0.05 0.04 0.03 0.02 0.01 0.008 0.006 0.005 0.004 0.003 0.002 0.001
MILLIVOLTS PER METER
0.5
10
8
15
10
5
10 15 20 25 30 40 50 60 70 80 90 100 150 200 300 400 500 600 700 1000 1500 2000
KILOMETRES FROM ANTENNA
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 225°
MODE DA-1
FIELD 40 mV/m

FIGURE 6-12

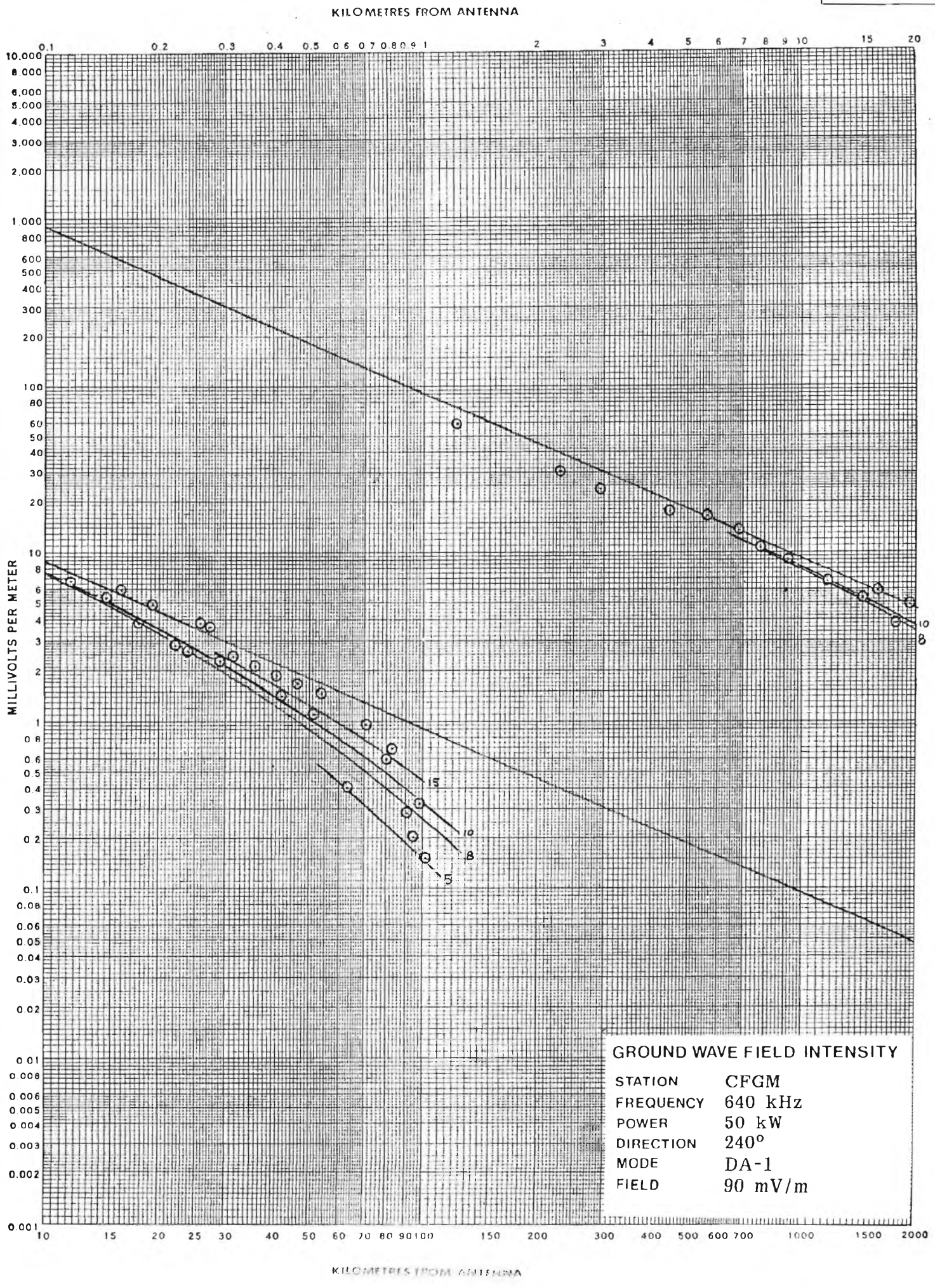

KILOMETRES FROM ANTENNA
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7 8 9 10 15 20
10,000 8,000 6,000 5,000 4,000 3,000 2,000 1,000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0.8 0.6 0.5 0.4 0.3 0.2 0.1 0.08 0.06 0.05 0.04 0.03 0.02 0.01 0.008 0.006 0.005 0.004 0.003 0.002 0.001
MILLIVOLTS PER METER
10 15 20 25 30 40 50 60 70 80 90 100 150 200 300 400 500 600 700 1000 1500 2000
KILOMETRES FROM ANTENNA
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 240°
MODE DA-1
FIELD 90 mV/m

FIGURE 6- 13

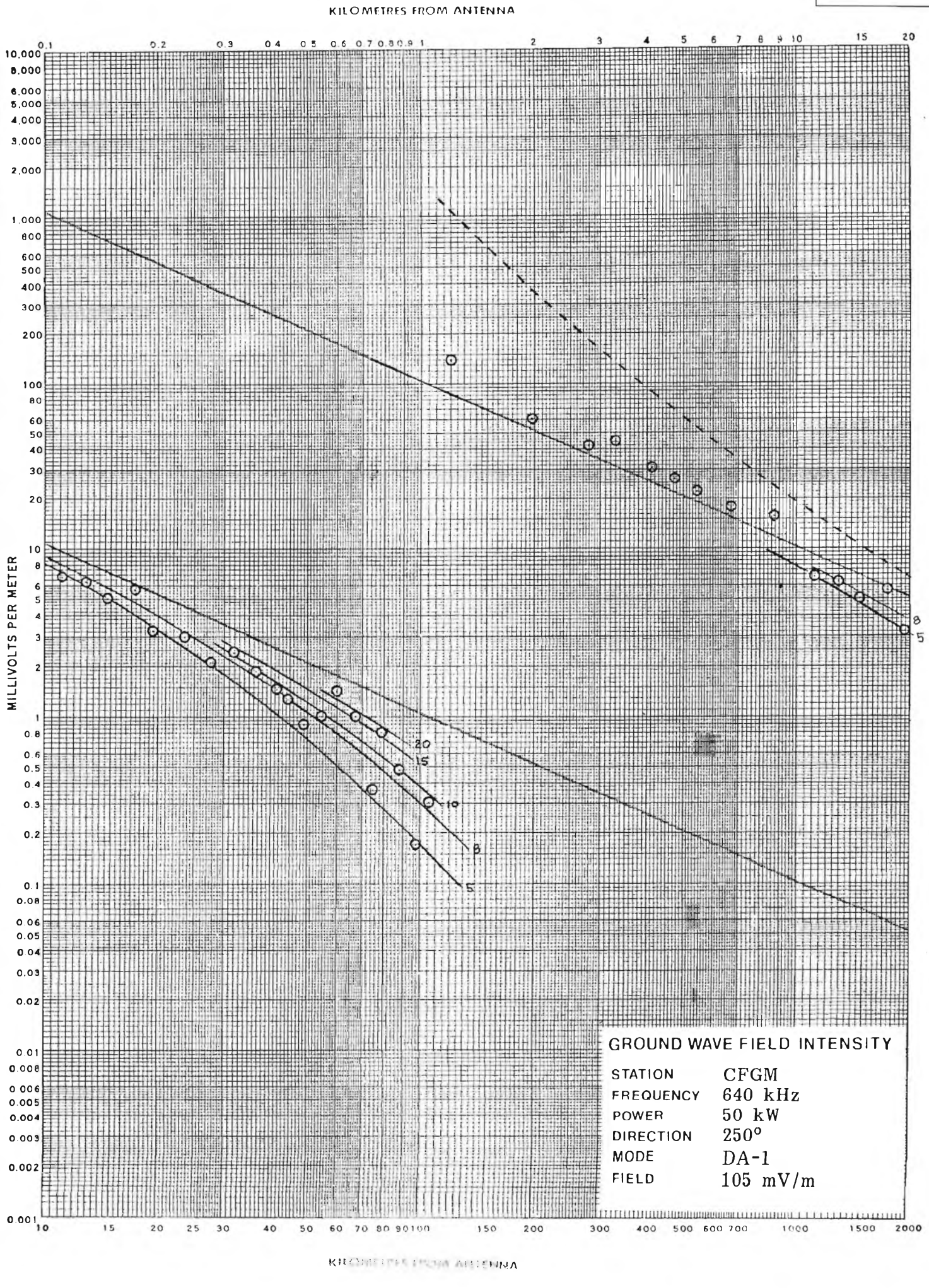

KILOMETRES FROM ANTENNA
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7 8 9 10 15 20
10,000 8,000 6,000 5,000 4,000 3,000 2,000 1,000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0.8 0.6 0.5 0.4 0.3 0.2 0.1 0.08 0.06 0.05 0.04 0.03 0.02 0.01 0.008 0.006 0.005 0.004 0.003 0.002 0.001
MILLIVOLTS PER METER
10 15 20 25 30 40 50 60 70 80 90 100 150 200 300 400 500 600 700 1000 1500 2000
KILOMETRES FROM ANTENNA
20
15
10
8
5
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 250°
MODE DA-1
FIELD 105 mV/m

FIGURE 6- 14

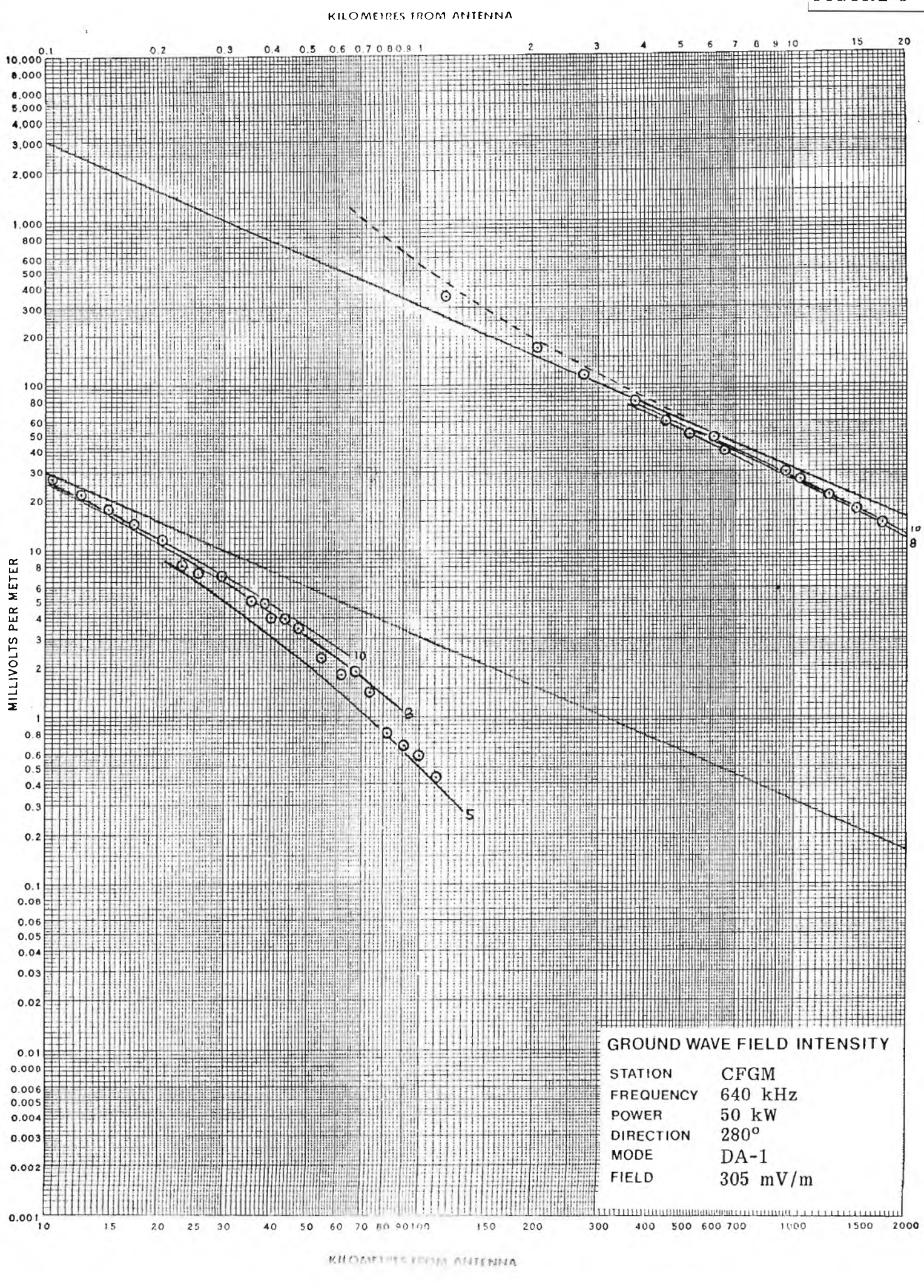

KILOMETRES FROM ANTENNA
MILLIVOLTS PER METER
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7 8 9 10 15 20
10,000 8,000 6,000 5,000 4,000 3,000 2,000 1,000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0.8 0.6 0.5 0.4 0.3 0.2 0.1 0.08 0.06 0.05 0.04 0.03 0.02 0.01 0.008 0.006 0.005 0.004 0.003 0.002 0.001
10 15 20 25 30 40 50 60 70 80 90 100 150 200 300 400 500 600 700 1000 1500 2000
10
8
10
8
5
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 280°
MODE DA-1
FIELD 305 mV/m

FIGURE 6- 15

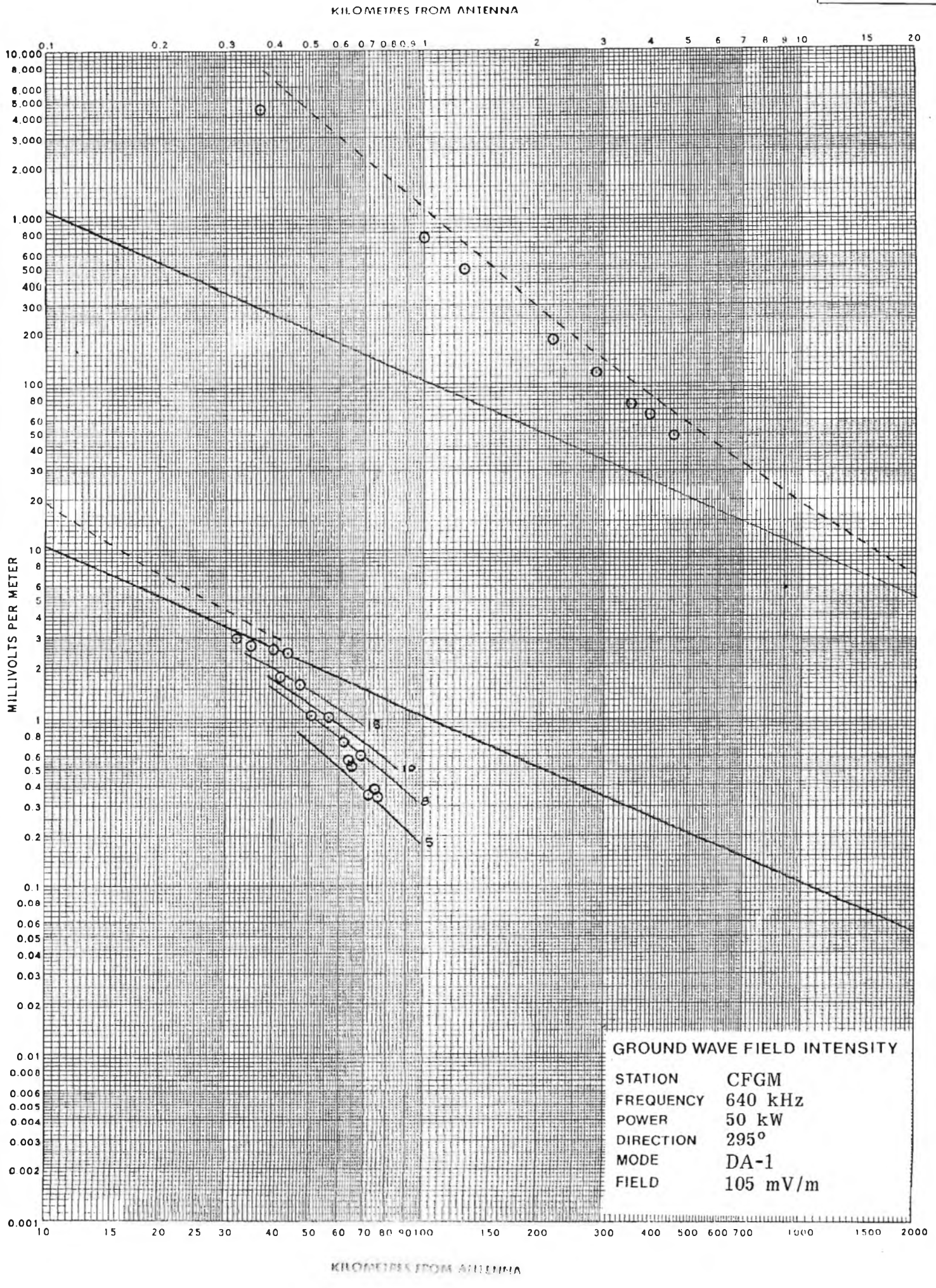

KILOMETRES FROM ANTENNA
MILLIVOLTS PER METER
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7 8 9 10 15 20
10.000 8.000 6.000 5.000 4.000 3.000 2.000 1.000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0.8 0.6 0.5 0.4 0.3 0.2 0.1 0.08 0.06 0.05 0.04 0.03 0.02 0.01 0.008 0.006 0.005 0.004 0.003 0.002 0.001
10 15 20 25 30 40 50 60 70 80 90 100 150 200 300 400 500 600 700 1000 1500 2000
KILOMETRES FROM ANTENNA
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 295°
MODE DA-1
FIELD 105 mV/m

FIGURE 6- 16

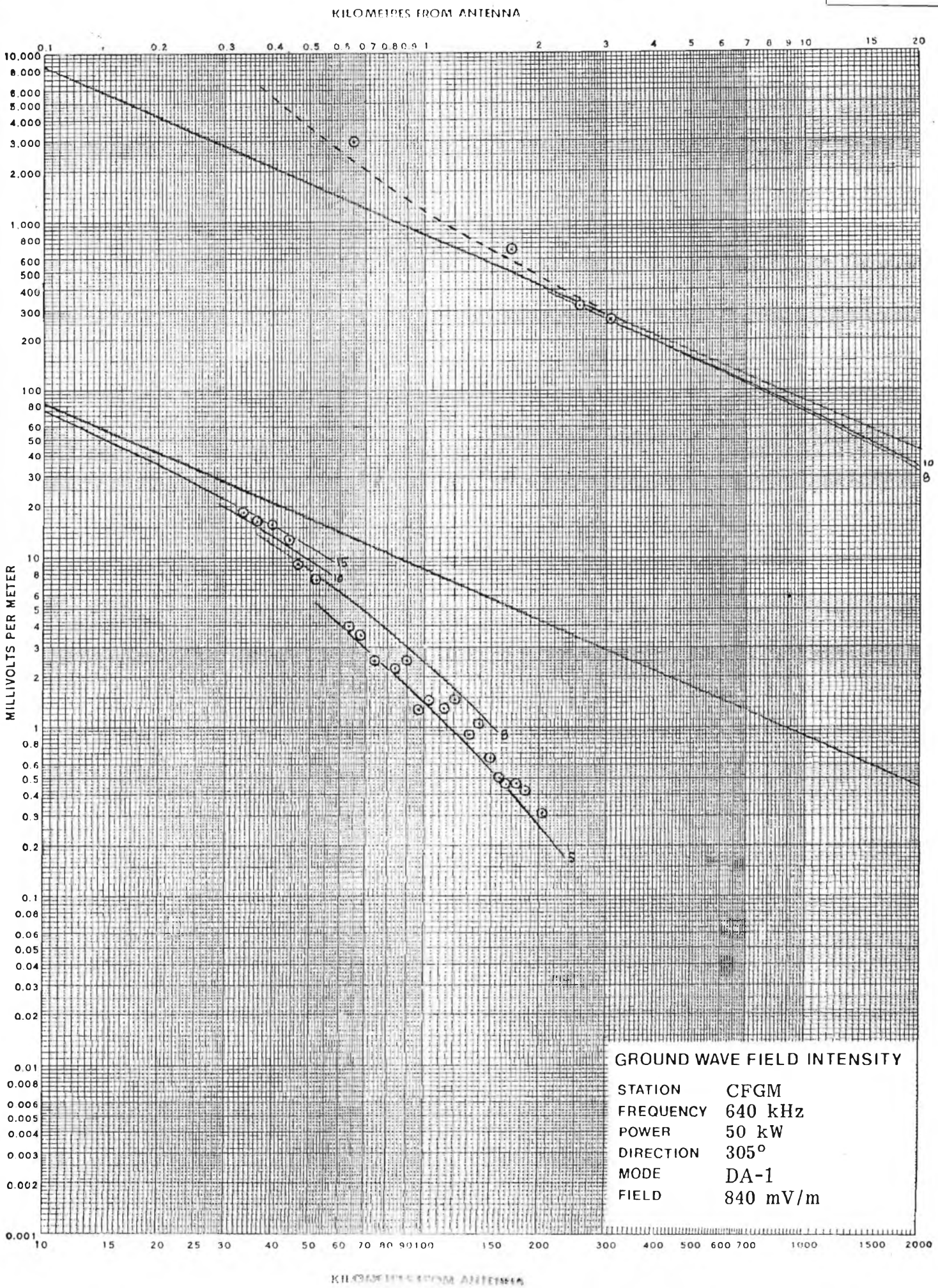

KILOMETRES FROM ANTENNA
MILLIVOLTS PER METER
10
8
5
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 305°
MODE DA-1
FIELD 840 mV/m

FIGURE 6- 17

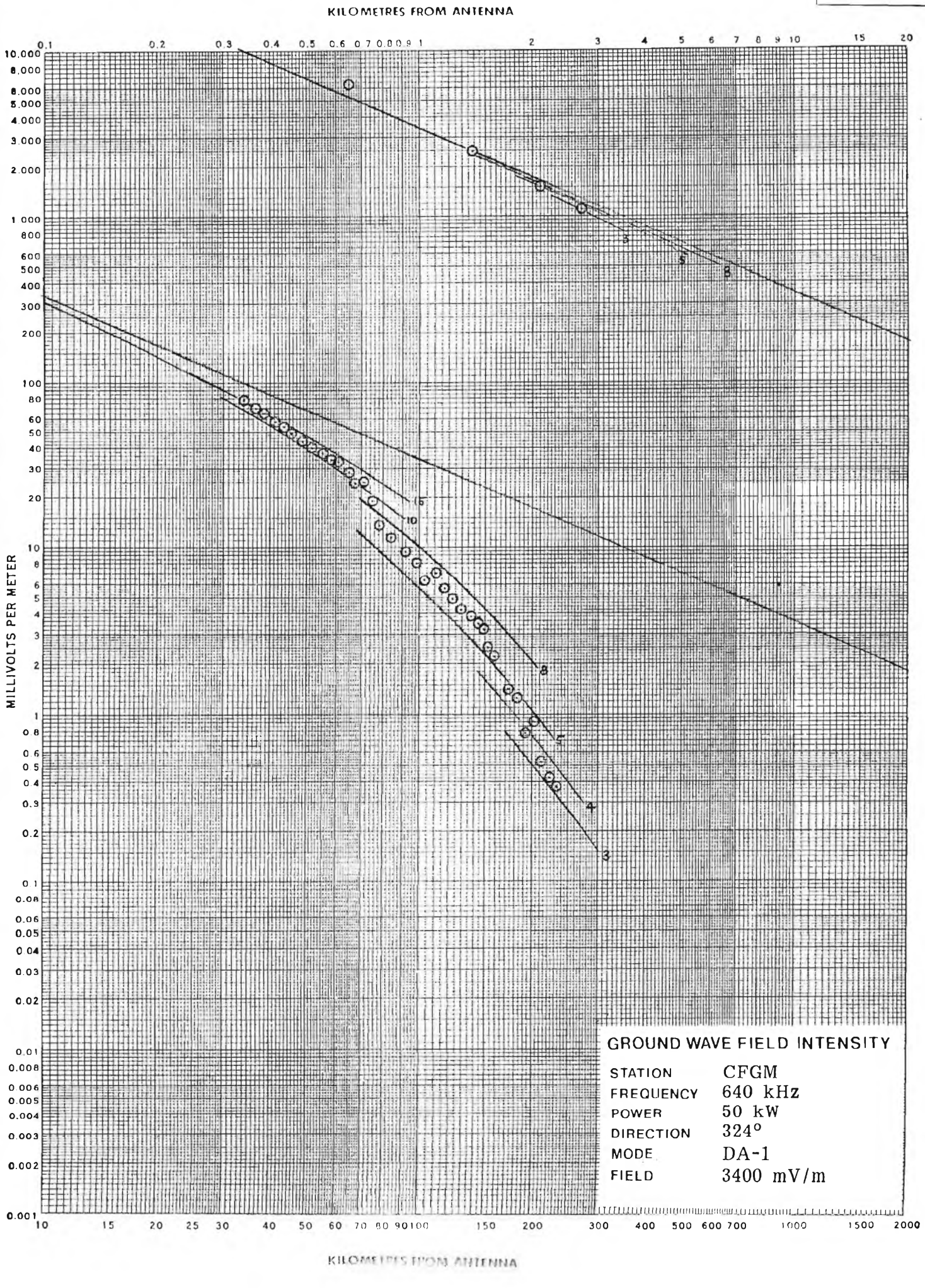
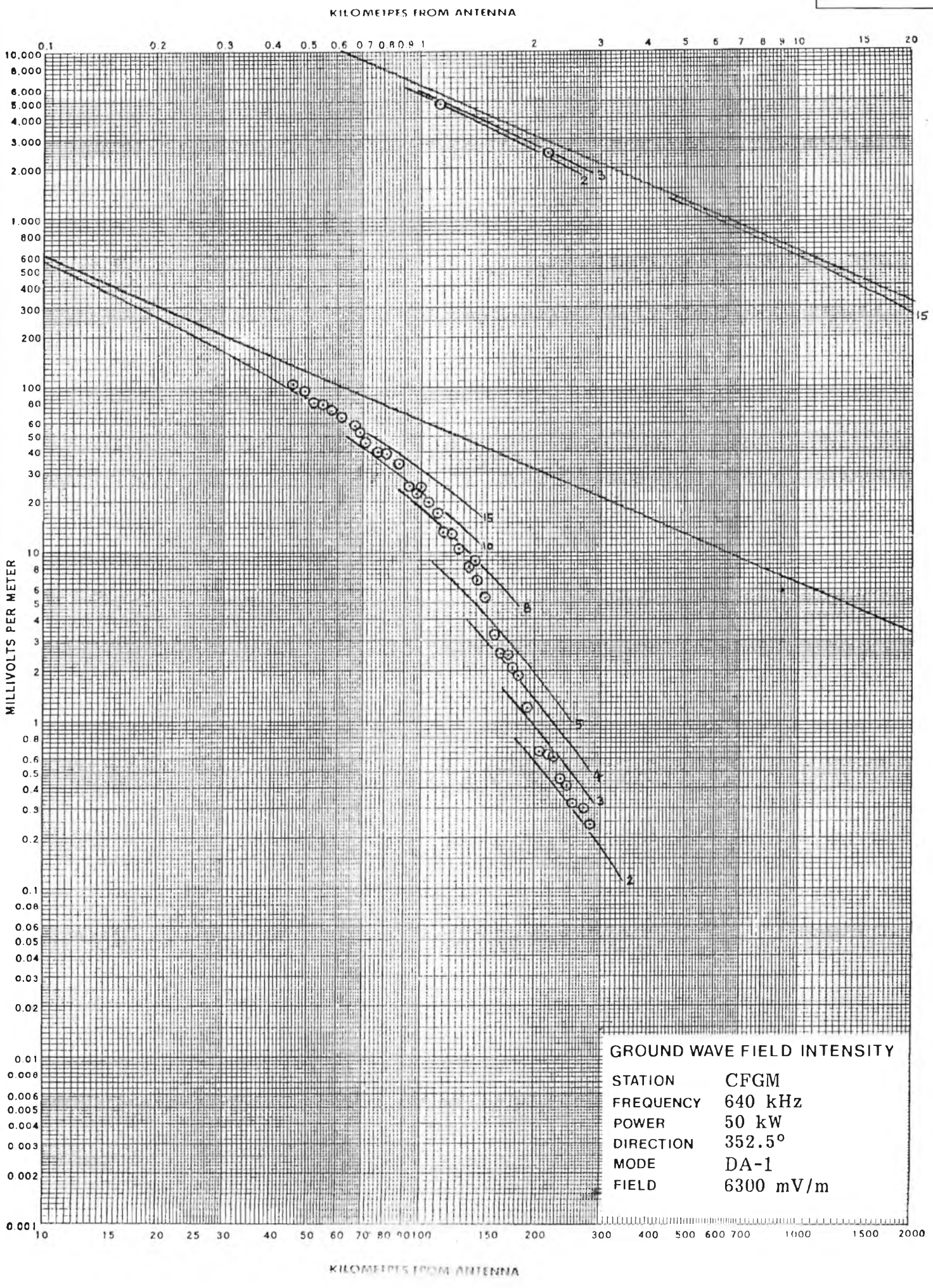

KILOMETRES FROM ANTENNA
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7 8 9 10 15 20
10,000 8,000 6,000 5,000 4,000 3,000 2,000 1,000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0.8 0.6 0.5 0.4 0.3 0.2 0.1 0.08 0.06 0.05 0.04 0.03 0.02 0.01 0.008 0.006 0.005 0.004 0.003 0.002 0.001
MILLIVOLTS PER METER
10 15 20 25 30 40 50 60 70 80 90 100 150 200 300 400 500 600 700 1000 1500 2000
KILOMETRES FROM ANTENNA
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 324°
MODE DA-1
FIELD 3400 mV/m

FIGURE 6- 18


KILOMETRES FROM ANTENNA
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7 8 9 10 15 20
10,000 8,000 6,000 5,000 4,000 3,000 2,000 1,000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0.8 0.6 0.5 0.4 0.3 0.2 0.1 0.08 0.06 0.05 0.04 0.03 0.02 0.01 0.008 0.006 0.005 0.004 0.003 0.002 0.001
MILLIVOLTS PER METER
10 15 20 25 30 40 50 60 70 80 90 100 150 200 300 400 500 600 700 1000 1500 2000
KILOMETRES FROM ANTENNA
GROUND WAVE FIELD INTENSITY
STATION CFGM
FREQUENCY 640 kHz
POWER 50 kW
DIRECTION 352.5°
MODE DA-1
FIELD 6300 mV/m