



ENGINEERING BRIEF
ON THE OPERATION OF
TWO STANDARD BAND BROADCAST TRANSMITTERS
INTO A COMMON ANTENNA
AT
TORONTO, ONTARIO.

50 KW	740 KC	CLASS 1-A
50 KW	860 KC	CLASS 1-A

ENGINEERING DIVISION MONTREAL

TITLE OPERATION OF CBL AND CJBC

INTO A COMMON ANTENNA

DWG. NO.

DATE March 27, 1947.

ENG. J. C. APP.

PURPOSE:

This brief presents a design of Antenna Coupling Networks to permit the simultaneous operation of two Northern Electric type 407A-1 50-Kw Broadcast Transmitters operating on 740 Kc and 860 Kc, into a single 645 foot constant cross-section (square cross-section with 10 foot 6 inch sides) guyed vertical radiator located at Hornby, Ontario.

DESIGN REQUIREMENTS:

The basic design requirements are:

- (a) That the total loss at each carrier frequency between the transmitter output and the antenna proper shall be less than 3-Kw.
- (b) That the cross talk introduced on either carrier by a signal modulating either transmitter 100% shall be 70 db down from 100% modulation.
- (c) That both transmitters when operating in accordance with (a) and (b) shall meet the Department of Transport Specification No.3 in so far as fidelity of transmission and modulation capability is concerned.

Plant Department.

DISCUSSION:

Referring to (b) above, the requirement that cross talk shall be 70 db down must be considered arbitrary because only experience will indicate the "frequency-cross talk characteristic" that must be achieved so that cross talk will not be apparent to the listener. It is anticipated that the suppression required for the lower modulating frequencies will be greater than that required for the higher frequencies, on account of the inherent characteristic of speech and music that the fundamental frequencies involved that produce actual 100% modulation are below 500 cycles per second. It will, therefore, not be significant to modulate one transmitter 100% with 10,000 cycles per second and strive to reduce the cross talk on the other carrier to 70 db down from 100% modulation. It is expected that 70 db suppression will be required for modulating frequencies below approximately 500 cycles.

Over and above the suppression provided by the networks (Fig.1), further suppression is inherently obtained by virtue of the inverse feed-back incorporated in both transmitters, (feed-back path being from the R.F. output of the final amplifier to the input of the first audio tube),

Plant Department.

and the actual final amplifier tank and output circuits. Both transmitters will be operated with approximately 25 db of feed-back effective at 500 cycles per second.

The amount of permissible cross talk will be correlated by single frequency and square wave modulation tests and actual listening tests made with a high fidelity radio receiving set.

Due to unknowns such as stray capacities in the feed-back path and the overall effect of several tuned circuits including transmission lines, on side band phase shift and its effect on the amount of usable inverse feed-back at high modulating frequencies, a complete theoretical analysis would not be a practical approach to the design problem involved unless a laboratory set-up using a similar transmitter and antenna system was available. Instead, the design is based on the experience of the Northern Electric Company, Bell Telephone Laboratories and the Canadian Broadcasting Corporation and deductions from the actual performance of one of the transmitters involved.

The networks were designed by the Northern Electric Company in close consultation with the Bell Telephone Laboratories and the Canadian Broadcasting Corporation.

ENGINEERING DIVISION MONTREAL

TITLE OPERATION OF CBL AND CJBC
INTO A COMMON ANTENNA

DWG. NO.

DATE March 27, 1947.

ENG. J. C. APP.

If it is found that the networks introduced are detrimental to the overall transmitter frequency response, the audio input will be equalized to compensate for this condition.

Since the original design of the 407A-1 transmitter in 1936, the Bell Telephone Laboratories have considerably improved the technique of applying inverse feed-back to radio transmitters. The improved technique will be applied to both transmitters which should assure satisfactory operation with the additional networks in the output circuits.

No difficulties are foreseen with the operation of the existing transmitter on 740 Kc for the following reasons. Prior to 1940, CBL transmitter worked into a shunt excited radiator, the "Q" looking into the feed point being approximately 10. The performance under this condition was considerably better than the requirements of the Department of Transport Specification No.3. At that time, measurements listed in Table 1 were made of the transmission line terminating impedance at side band frequencies. It should be noted that the calculated transmission line terminating impedance (see Table 1 and Figs. 4 and 5) at side band frequencies with the additional filter networks incorporated, do not depart from the surge impedance of the transmission line to the same degree as prior to 1940.

Plant Department.

TABLE 1

840 Kc (Prior to 1940) CBL Working Into Shunt Excited Radiator		740 Kc CBL Working Into Network Shown on Fig.1		860 Kc CJBC Working Into Network Shown on Fig.1	
<u>Measured Values</u>		<u>Calculated Values</u>		<u>Calculated Values</u>	
Line		Line		Line	
Terminating Z	830Kc=69-j32	Terminating Z	730Kc=82-j18	Terminating Z	850Kc=115-j5
ditto	Z 840Kc=76+j0	ditto	Z 740Kc=76+j0	ditto	Z 860Kc = 76+j0
"	Z 850Kc=83+j32	"	Z 750Kc=74+j16	"	Z 870Kc = 57+j14

If difficulty is experienced on 860 Kc due to the greater change of line terminating impedances at side band frequencies, it may be necessary to change some of the network and/or transmitter constants or add corrective networks, the design of which will be carried out based on actual measurements made on the transmitter involved.

The proposed solution to the problem of two frequency operation into one antenna is to install a second coaxial transmission line to the antenna tuning house and there to locate the necessary filter and coupling networks. The complete schematic of the networks is shown on Fig.1 where basically $L_3 C_3$ and $L_1 C_1$ are antiresonant and series resonant respectively at 860 Kc; $L_5 C_5$ and $L_2 C_2$ are antiresonant and series resonant respectively at 740 Kc. As the reactance of the antenna is negative at both operating frequencies, L_4 acts to lower the

ENGINEERING DIVISION MONTREAL
TITLE OPERATION OF CBL AND CJBC
INTO A COMMON ANTENNA

DWG. No.
DATE March 27, 1947.
ENG. J. C. APP.

potential across the two antiresonant circuits thereby lowering the circuit losses.

Fig.2 Indicates the reactance of coils and condensers, reactance and resistance of the antenna, and the network input impedance at 740 Kc and 860 Kc.

Fig.3 Indicates the losses in coils at 740 Kc and 860 Kc.

Fig.4 Indicates the network input impedance at 730 Kc.
(lower side band)

Fig.5 Indicates the network input impedance at 750 Kc.
(upper side band).

Fig.6 Indicates the network input impedance at 850 Kc.
(lower side band)

Fig.7 Indicates the network input impedance at 870 Kc.
(upper side band)

Based on actual measurements made by the Northern Electric Company on an experimental coil, it is anticipated that the average "Q" for all coils used in the networks will be approximately 500. Under these conditions, the calculated network losses (see fig.3) are as follows:

740 Kc losses = 1246 watts

860 Kc losses = 1636 watts

Referring to Fig.1 the calculated attenuation of the 740 Kc carrier power across the input of the 860 Kc network, and the attenuation of the 860 Kc carrier power across the input, of

Plant Department.

the 740 Kc network is in both cases approximately 64 db. This together with the inherent suppression in the transmitter output circuits and the amount of inverse feed-back used should suffice to reduce cross talk so that it will not be apparent to the listener.

Plant Department.

CBL - TORONTO



COMMERCIAL DIVISION

C B L - TORONTO - CANADA

COVERAGES AND MARKET DATA

BASED ON ENGINEERING COVERAGES

May 31, 1948
Toronto, Canada

Statistics Department
Commercial Division, CBC

(1)

C B L - TORONTO - CANADA.

Basic Regional Outlet of CBC Trans-Canada Network.

50 Kw. - 740 Kc. Omni-directional Antenna, Class 1-A.

CBL is classified as Class 1-A under the North American Regional Broadcasting Agreement and therefore has a minimum power limitation of 50 Kw. The signal contours of the station are protected from objectionable co-channel interference to the Canadian - U.S.A. Border. The permissible interfering signals are such that CBL service is protected to the 0.1 mv/m groundwave contour daytime and to the 0.5 mv/m groundwave contour night-time at the Canadian - U.S.A. Border. Within Canada, interference limitations are determined only by local noise and also at night by adjacent channel sky-wave interference. The only recognized adjacent channel interference is groundwave interference at or within the 0.5 mv/m groundwave contour.

Therefore, for engineering statistical purposes it is assumed that the day primary service area is the area enclosed by the 0.1 mv/m groundwave contour and the night primary service area is the area enclosed by the 0.5 mv/m groundwave contour, except in South-Western Ontario where WJR Detroit on 760 Kc. limits service to the CBL 0.7 mv/m contour.

(2)

DAY-TIME

COVERAGE SURVEY

Radio StationCBL
Station CityToronto
Frequency740 Kcs.
Power50,000 Watts

Estimated Day-Time Service Area (0.1/0.7 mv/m)

	<u>TOTAL</u>	<u>URBAN</u>	<u>RURAL</u>
Population	2,909,180	1,825,410	1,083,770
Households	805,150	505,250	299,900
Radio Homes	759,030	487,940	271,090

Estimated as of January 1st, 1948.

Counties Within Service Area

Ontario - Brant, Dufferin, Durham, Elgin, Haldimand, Haliburton, Halton, Huron, Lennox & Addington, Lincoln, Middlesex, Muskoka, Norfolk, Northumberland, Ontario, Oxford, Peel, Perth, Peterboro, Prince Edward, Simcoe, Victoria, Waterloo, Welland, Wellington, Wentworth, York.

Counties partially within Service Area

Ontario - Bruce, Frontenac, Grey, Hastings, Kent, Lambton, Lanark, Leeds, Manitoulin, Nipissing, Parry Sound, Renfrew, Sudbury.

Cities and Towns within Service Area

1,000 to 4,999 population -

Ontario - Alliston, Aurora, Aylmer, Bowmanville, Bracebridge, Burlington, Campbellford, Chesley, Clinton, Deseronto, Dunnville, Durham, Elmira, Forest, Hanover, Gananoque, Georgetown, Goderich, Gravenhurst, Grimsby, Harriston, Hespeler, Huntsville, Meaford, Kincardine, Listowel, Merritton, Milton, Mitchell, Mount Forest, Napanee

1,000 to 4,999 population - Cont'd

Ontario - Niagara, Newmarket, Oakville, Orangeville, Palmerston, Paris, Penetanguishene, Petrolia, Picton, Ridgetown, St. Marys, Seaforth, Southhampton, Stayner, Strathroy, Tillsonburg, Uxbridge, Walkerton, Wingham, Acton, Bancroft, Beamsville, Bobcaygeon, Bradford, Brighton, Caledonia, Chippawa, Delhi, Elora, Exeter, Fenelon Falls, Fergus, Fonthill, Frankford, Havelock, Hagersville, Humberstone, Lakefield, Madoc, Markham, Marmora, Milverton, Norwich, New Hamburg, Fort Credit, Port Dalhousie, Port Dover, Port Elgin, Port Perry, Portsmouth, Port Stanley, Richmond Hill, Shelburne, Stoney Creek, Sutton, Stouffville, Tavistock, Tweed, Victoria Harbour, Waterford, Watford, Wellington, Woodbridge, Wiarton

5,000 to 14,999 population

Ontario - Owen Sound, Welland, Woodstock, Barrie, Brampton, Cobourg, Collingwood, Dundas, Fort Erie, Ingersoll, Leaside, Lindsay, Midland, Mimico, New Toronto, Orillia, Parry Sound, Preston, Port Colbourne, Port Hope, Simcoe, Thorold, Waterloo, Weston, Whitby, Forest Hill, Long Branch, Swansea, Trenton

15,000 to 29,999 population

Ontario - Belleville, Galt, Guelph, Niagara Falls, Oshawa, Peterborough, St. Thomas, Stratford

30,000 to 49,999 population -

Ontario - Brantford, Kingston, Kitchener, St. Catharines

50,000 to 99,999 population -

Ontario - London

100,000 & over population -

Ontario - Hamilton, Toronto

Population Ranges based on 1941 Census.

May 14th, 1948
Toronto, Ontario.

(4)

C B L - TORONTO

DAY-TIME MARKET DATA

1948 ESTIMATES

<u>WHERE THEY LIVE</u>	<u>POPULATION</u>	<u>RADIO HOMES</u>	<u>PERCENT</u>
TOTAL	2,909,180	759,030	100.00
<u>URBAN</u>	1,825,410	487,940	64.28
<u>RURAL</u>	1,083,770	271,090	35.72
' UNDER 1000	45,200	11,650	1.54
ON FARMS	507,920	121,760	16.04
NON-FARM	530,650	137,680	18.14

HOW MUCH THEY SPEND

TOTAL RETAIL TRADE - 1946

ALL STORES TOTAL GROUP	\$ 1,512,484,000
GENERAL MERCHANDISE GROUP	244,174,000
COUNTRY GENERAL STORES GROUP	38,585,000
APPAREL GROUP	143,101,000
FURNITURE, HOUSEHOLD AND RADIO GROUP	55,337,000
FOOD GROUP	326,544,000
RESTAURANT GROUP	67,444,000
AUTOMOTIVE GROUP	217,666,000

PROVINCIAL BREAKDOWN OF DAY-TIME MARKET AREAC B L - TORONTO

<u>POPULATION</u>	<u>TOTAL</u>
<u>Total Coverage</u>	2,909,180
<u>Urban - TOTAL</u>	1,825,410
1,000 to 2,499	81,390
2,500 to 4,999	107,390
5,000 and over	1,636,630
<u>Rural - TOTAL</u>	1,083,770
Farm	507,920
Non-Farm	530,650
Villages (under 1000)	45,200
 <u>RADIO HOMES</u>	
<u>Total Coverage</u>	759,030
<u>Urban - TOTAL</u>	487,940
1,000 to 2,499	21,030
2,500 to 4,999	28,810
5,000 and over	438,100
<u>Rural - TOTAL</u>	271,090
Farm	121,760
Non-Farm	137,680
Villages (under 1000)	11,650

NIGHT-TIME
COVERAGE SURVEY

Radio StationCBL
Station CityToronto
Frequency740 Kcs.
Power50,000 Watts

Estimated Night-Time Service Area (0.5/0.7 mv/m)

	<u>TOTAL</u>	<u>URBAN</u>	<u>RURAL</u>
Population	2,751,610	1,773,860	977,750
Households	765,300	492,740	272,560
Radio Homes	723,920	476,050	247,870

Estimated as of January 1st, 1948.

Counties within Service Area

Ontario - Brant, Dufferin, Durham, Elgin, Haldimand, Halton, Huron, Lincoln, Middlesex, Norfolk, Northumberland, Ontario, Oxford, Peel, Perth, Prince Edward, Simcoe, Victoria, Waterloo, Welland, Wellington, Wentworth, York.

Counties partially within Service Area

Ontario - Bruce, Grey, Haliburton, Hastings, Kent, Lambton, Lennox & Addington, Muskoka, Peterboro

Cities and Towns within Service Area

1,000 to 4,999 population

Ontario - Alliston, Aurora, Aylmer, Bowmanville, Bracebridge, Burlington, Campbellford, Dunnville, Chesley, Clinton, Durham, Deseronto, Elmira, Forest, Georgetown, Goderich, Grimsby, Gravenhurst, Hanover, Harriston, Hespeler, Kincardine, Listowel, Meaford, Merritton, Milton, Mitchell, Mount Forest, Napanee, New Market, Niagara, Oakville, Orangeville, Palmerston, Paris, Penetanguishene,

.....

1,000 to 4,999 population - Con'd

Ontario - Petrolia, Picton, Ridgetown, St. Marys, Seaforth, Southampton, Stayner, Strathroy, Tillsonburg, Acton, Uxbridge, Walkerton, Wiarton, Wingham, Beamsville, Bradford, Bobcaygeon, Brighton, Caledonia, Chippawa, Delhi, Elora, Exeter, Fenelon Falls, Fergus, Fonthill, Frankford, Hagersville, Norwich, Havelock, Humberstone, Markham, Lakefield, Milverton, New Hamburg, Port Credit, Port Dalhousie, Port Dover, Port Elgin, Port Perry, Port Stanley, Stoney Creek, Richmond Hill, Shelburne, Stouffville, Sutton, Tavistock, Victoria Harbour, Waterford, Watford, Wellington, Woodbridge

5,000 to 14,999 population -

Ontario - Owen Sound, Welland, Woodstock, Barrie, Brampton, Cobourg, Collingwood, Dundas, Fort Erie, Ingersoll, Leaside, Lindsay, Midland, Mimico, New Toronto, Orillia, Port Colborne, Port Hope, Preston, Simcoe, Thorold, Waterloo, Weston, Whitby, Forest Hill, Long Branch, Swansea, Trenton

15,000 to 29,999 population -

Ontario - Belleville, Galt, Guelph, Niagara Falls, Oshawa, Stratford, Peterborough, St. Thomas

30,000 to 49,999 population -

Ontario - Brantford, Kitchener, St. Catharines

50,000 to 99,999 population -

Ontario - London

100,000 & over population -

Ontario - Hamilton, Toronto

Population Ranges based on 1941 Census

May 14th, 1948.
Toronto, Ontario.

C B L - TORONTO
NIGHT-TIME MARKET DATA

1948 ESTIMATES

<u>WHERE THEY LIVE</u>	<u>POPULATION</u>	<u>RADIO HOMES</u>	<u>PERCENT</u>
TOTAL	2,751,610	723,920	100.00
<u>URBAN</u>	1,773,860	476,050	65.76
<u>RURAL</u>	977,750	247,870	34.24
UNDER 1000	40,170	10,620	1.47
ON FARMS	451,510	109,820	15.17
NON-FARM	486,070	127,430	17.60

HOW MUCH THEY SPEND

TOTAL RETAIL TRADE - 1946

ALL STORES TOTAL GROUP	\$ 1,452,109,000
GENERAL MERCHANDISE GROUP	237,976,000
COUNTRY GENERAL STORES GROUP	31,904,000
APPAREL GROUP	137,344,000
FURNITURE, HOUSEHOLD AND RADIO GROUP	53,877,000
FOOD GROUP	312,534,000
RESTAURANT GROUP	65,393,000
AUTOMOTIVE GROUP	211,038,000

PROVINCIAL BREAKDOWN OF NIGHT-TIME MARKET AREAC B L - TORONTO

<u>POPULATION</u>	<u>TOTAL</u>
<u>Total Coverage</u>	2,751,610
<u>Urban - TOTAL</u>	1,773,860
1,000 to 2,499	92,880
2,500 to 4,999	97,410
5,000 and over	1,583,570
<u>Rural - TOTAL</u>	977,750
Farm	451,510
Non-Farm	486,070
Villages (under 1000)	40,170
 <u>RADIO HOMES</u>	
<u>Total Coverage</u>	723,920
<u>Urban - TOTAL</u>	476,050
1,000 to 2,499	24,010
2,500 to 4,999	26,400
5,000 and over	425,640
<u>Rural - TOTAL</u>	247,870
Farm	109,820
Non-Farm	127,430
Villages (under 1000)	10,620

SOURCES OF INFORMATION

Population Estimates

January 1st, 1948, estimates of population which are broken down by counties and census divisions have been based on:

- (1) Ration book No. 6, September 15th, 1946.
- (2) Ration Areas for persons in the Armed Services
- (3) Natural Increases
- (4) Armed Force Casualties
- (5) Internal Migration
- (6) 1941 Census Data

The above data for 1946 was projected to 1948. It has been assumed that the ratio of increase or decrease within each unit has continued at the same rate between 1946 and 1948.

It has been assumed for urban centre estimates that the ratio of increase or decrease continued at the same rate as the county or census division in which the urban centre was located.

Household Estimates

1948 estimates of households for each county or census division have been based on the number of persons per household computed for each unit. These indices were computed by taking an average rate of increase or decrease from 1931 to 1941 and projected to 1948. It has been assumed in these index figures that the rate of increase or decrease from 1931 to 1941 continued to 1948.

Radio Homes Estimates

Radio homes estimates have been based on the special report "Heating Facilities, Radios and Telephones in Canadian Homes-August 1947", released by the Dominion Bureau of Statistics and projected to January 1st, 1948.

The 1948 percentages of radio ownership for each county and census division have been computed from 1941 data and projected to 1948 by formula, taking into consideration the August 1947 Dominion Bureau of Statistics Regional totals.

.....

SOURCES OF INFORMATION (Cont'd.)

Coverage and Market Data

These estimates have been based on totals compiled from 1941 Census data to which straight projection of increases computed from latest available reports from the Dominion Bureau of Statistics were made. In other words, they have been based upon current estimates reported by Provinces and apportioned according to the totals compiled from 1941 data.

Households

In the Census a household is defined as "A person or a group of persons living in one housekeeping community. The persons may or may not be related by ties of kinship, but if they live together with common housekeeping arrangements, they constitute a household. It should be noted that two or more households may occupy the same dwelling. If they occupy separate portions of the dwelling and their housekeeping is entirely separate, they shall be treated as separate households."

Persons on Active Service were included as members of their family households whether actually living at home or not, at the date of the Census.

Radio Homes

A radio home is defined as a household having one or more radio receiving sets excluding automobile radios.

F.P.P.



ENGINEERING BRIEF

ON

FINAL PROOF OF PERFORMANCE

OF

STATION CJBC - TORONTO, ONT.

(Transmitter near Hornby, Ont.)

50 kw - 860 kc/s

CLASS I-A

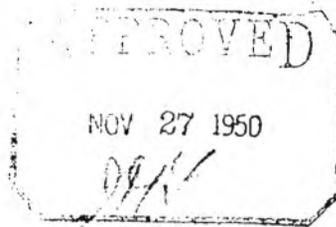
(OMNI-DIRECTIONAL OPERATION)

CJBC

Toronto, Ont.

Montreal, Que.
October 2, 1950.

W.G. Roxburgh
Transmission & Development Department.



ENGINEERING BRIEF

ON

FINAL PROOF OF PERFORMANCE

OF

STATION CJBC - TORONTO, ONT.

(Transmitter near Hornby, Ont.)

50 Kw - 860 kc/s

CLASS I-A

(OMNI-DIRECTIONAL OPERATION)

TITLE Proof of Performance
CBL - CJBC - 50 kw.

DWG. No. _____
DATE Oct. 2/50 ISS. 1
ENG. W.G. ROX. APP. R.E.S.

FOREWARD:

This brief on Final Proof of Performance demonstrates the antenna efficiency and the location of the various field intensity contours specified by Broadcast Specification No. 9.

Station CBL (740 kc/s) and Station CJBC (860 kc/s), operate simultaneously into a common antenna with a power of essentially 50 kw. A schematic diagram of the antenna coupling network required by this method of operation is shown on page 10.

Analysis of the field intensity values obtained, indicate that the soil conductivity in the immediate vicinity of the antenna site is approximately 6×10^{-14} e.m.u. The unattenuated field intensity at one mile is believed to be 1618 mv/m in the case of station CBL and 1826 mv/m in the case of station CJBC.

Field intensity measurements were made with two types of equipment during July and August 1949. Many of the numerous measurements related to the establishment of the antenna radiation efficiency, were made with a portable set type 101-C, manufactured by the Federal Telephone and Radio Corporation. The remainder of the measurements were made with Jansky and Baily equipment, type RR-SG40A, mounted in a passenger type car fitted with a rotatable loop antenna. A complete description of the above measuring equipment is already on file with the Department of Transport. The equipment calibration was checked against Jansky & Bailey equipment at Montreal, by CBC engineers, during May 1949.

TITLE Proof of Performance

DWG. No. _____

DATE Oct. 2/50 ISS. 1ENG. W.G. ROX APP. R.E.S.CBL - CJBC - 50 kw.

The location of the measuring points less than 2000 yards from the antenna was determined by the use of a range finder of a type used by the Canadian Army. The accuracy of the instrument was believed to have been adequate up to the 2000 yard limit. Beyond this distance, location was established by correlation with existing land marks and property lines. The locations were spotted on maps of scale one mile to one inch. Scale measurements on the maps determined the distance of the measuring points from the antenna in cases where the range finder method was impracticable.

The antenna impedance and transmission line impedance was measured with a General Radio bridge type 516-C. The calibration was believed to have been within the measuring tolerance specified by the manufacturer.

Brief Prepared by:

W.G. Roxburgh - Assistant Engineer,
Transmission & Development Department,
Canadian Broadcasting Corporation.

Qualifications:

B. Sc. in R. E. - 1940 - Tri-State College, Angola, Indiana.
Member CBC Engineering Division 1940 - 1950.
Transmission & Development Department 1943 - 1950.

Measurements taken by:

W. G. Roxburgh

W. G. Roxburgh
.....
W. G. Roxburgh

Approved by: *Robt. E. Santo*
.....
R. E. Santo, P. Eng.
Engineer, Transmission & Development
Department.
Canadian Broadcasting Corporation

TITLE Proof of Performance

DWG. No. _____

DATE Oct. 2/50 ISS. 1

CJBC - 50 kw - 860 kc/s.

ENG. W.G. ROX APP. R.E.S.

DESCRIPTION OF ANTENNA

Station: CJBC Main Studio: Toronto, Ont.

Power: 50 kw. Frequency: 860 kc/s Class: I-A

Location: Near Hornby, Ontario

North Latitude: 43° 34' 30"

West Longitude: 79° 49' 03"

ANTENNA:

Mode of Operation: Series fed, Omni-Directional

1 element uniform square cross-section,

insulated, guyed.

Height above insulator: 645' (213.3°)

Overall height: 651'

GROUND SYSTEM:

120 radials 645' long.

No ground screen used.

EFFECTIVE FIELD:

Predicted: 1898 mv/m (268.5 for 1 kw)

Measured: 1826 mv/m (260.5 for 1 kw)

ANTENNA IMPEDANCE DATA

f	R _(ser.)	R _(dec.)	C _(ser.)	C _(dec.)	R _A	X _A	f
kc/s	ω	ω	uuf	uuf	ω	ω	kc/s
700	100 + 94.5	59.4	1000	461.4	253.9	-266	700
710	100 + 94.5	34.6	1000	459.3	229.1	-264	710
720	100	108.2	1000	449	208.2	-271	720
730	100	87.6	1000	451.4	187.6	-266	730
740	100	68.5	1000	459.5	168.5	-253 -258	740
750	100	52.5	1000	460.0	152.5	-250	750
760	100	-	1000	-	-	-	760
770	100	26.4	1000	478.5	126.4	-225.2	770
780	100	14.6	1000	482	114.6	-220	780
820	-	78.7	1000	509.5	78.7	-187	820
830	-	72.4	1000	525.0	72.4	-173	830
840	-	66.5	1000	541.0	66.5	-161	840
850	-	61.8	1000	549.4	61.8	-153	850
860	-	58.5	1000	557.0	58.5	-147	860
870	-	54.8	1000	572.4	54.8	-137	870
880	-	51.4	1000	583.4	51.4	-129	880
890	-	48.9	1000	595	48.9	-121	890
900	-	46.0	1000	610	46.0	-113	900

NOTES

Measurements taken at thermocouple terminal nearest L₄, with L₄ isolated from antenna.

Switch D₁ closed (Ref. Dwg. R-4129-1)

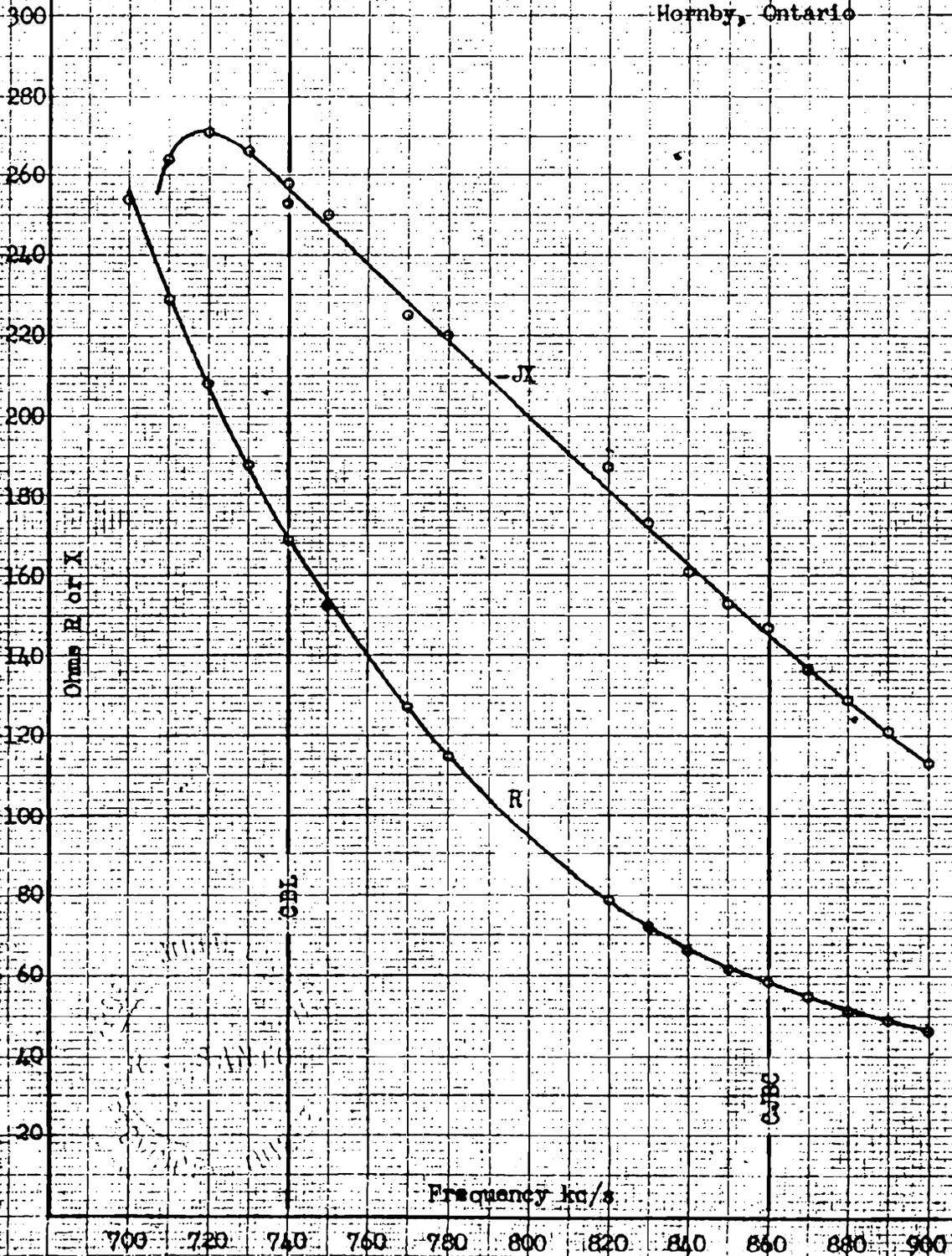
Transmission & Development Department.

Impedance Curves

for
Vertical Radiator
of Stations

CBL - 740 kc/s and CJBC - 860 kc/s

located near
Hornby, Ontario



KEUFFEL & ESSER CO.

NO. 359-11. 10 x 10 to the half inch, 5th lines accented.
Engraving, 7 x 10 in.
MADE IN U.S.A.

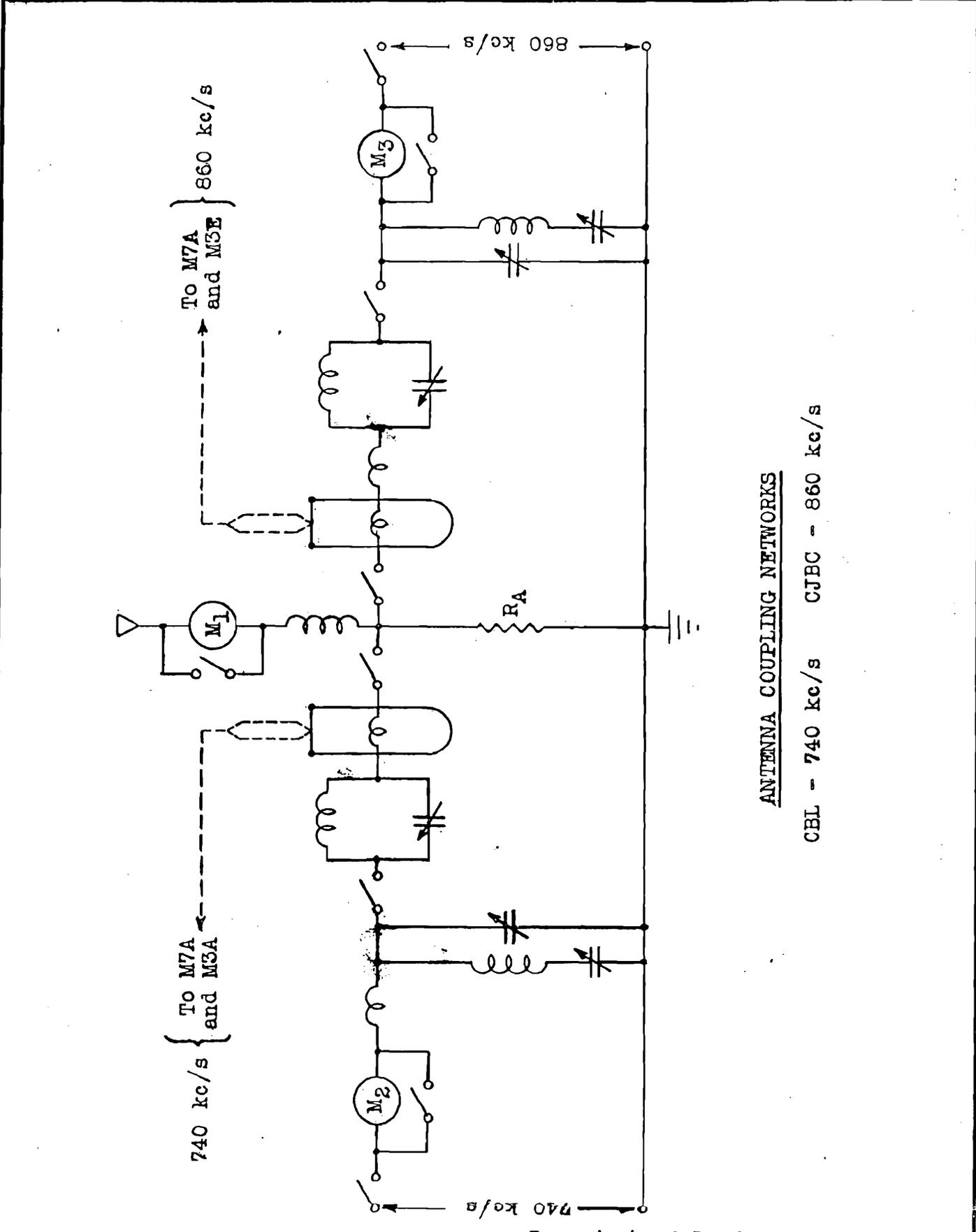
TITLE Proof of Performance

DWG. No. _____

DATE Oct. 2/50 ISS. 1

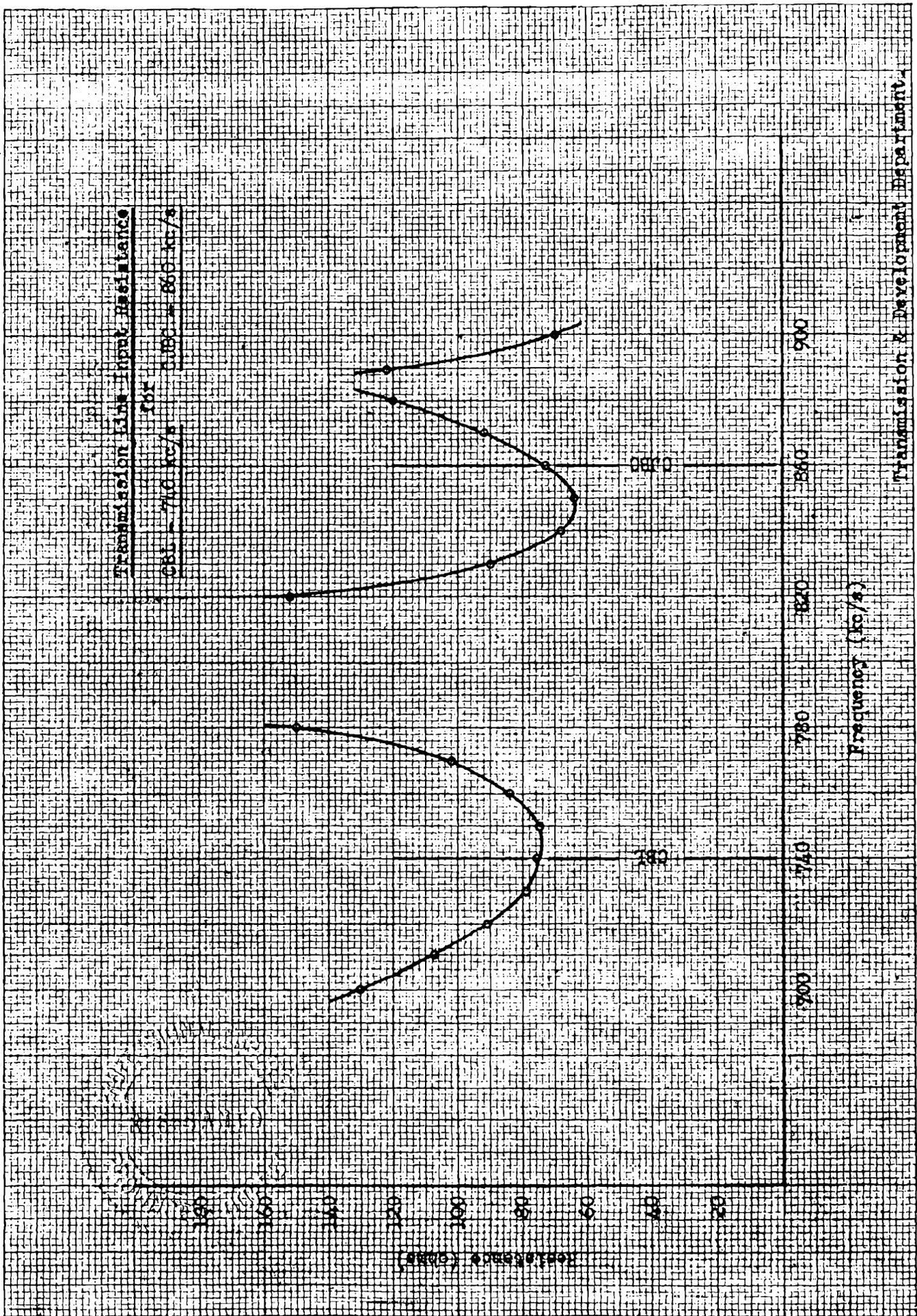
CBL - C.JBC 50 kw.

ENG. W.G. ROX APP. R.E.S.



Transmission Line Input Resistance

281 - 710 kc/s 282 - 860 kc/s



Transmission & Development Paper

CANADIAN BROADCASTING CORPORATION

ENGINEERING DIVISION MONTREAL

TITLE Proof of Performance

CJBC - 50 kw - 860 kc/s.

DWG. No.

DATE Oct. 2/50 ISS. 1

ENG. W. G. ROX. APP. R. E. S.

RADIAL AZIMUTH 0°				RADIAL AZIMUTH 0°			
Point No.	E (mv/m)	D (mi.)	I _A	Point No.	E (mv/m)	D (mi.)	I _A
1	3042	0.58		23	151.4	8.9	
2	2330	0.725		24	110.8	10.7	
3	2100	0.825		25	81.3	12.8	
4	2130	0.865		26	69.2	14.4	
5	1898	0.925		27	59.1	17.0	
6	1716	1.05		28	42.8	19.4	
7	1641	1.135					
8	1398	1.25					
9	1330	1.37	1%				1%
10	1235	1.43	+ 1				+ 1
11	1172	1.50					
12	980	1.63	29 Amperes				29 Amperes
13	964	1.70					
14	850	1.84					
15	729	1.95					
16	737	2.23					
17	527	3.02					
18	452	3.48					
19	387	4.1					
20	301	4.65					
21	270	5.3					
22	231	6.6					

NOTES

CANADIAN BROADCASTING CORPORATION

ENGINEERING DIVISION MONTREAL

TITLE Proof of Performance

CJBC - 50 kw - 860 kc/s.

Page - 13

DWG. No. _____

DATE Oct. 2/50 iss. 1

ENG. W.G. ROX. APP. R.E.S.

RADIAL AZIMUTH 38°				RADIAL AZIMUTH 90°			
Point No.	E (mv/m)	D (mi.)	I _A	Point No.	E (mv/m)	D (mi.)	I _A
1	1846	0.88		1	2075	0.825	
2	1513	1.05		2	1897	0.88	
3	1360	1.14		3	1666	0.955	
4	1270	1.25		4	1537	1.05	
5	1153	1.36		5	1413	1.14	
6	1051	1.42		6	1256	1.32	
7	1026	1.52		7	1102	1.45	
8	898	1.65		8	1076	1.53	
9	892	1.91		9	846	1.61	
10	845	2.03		10	872	1.70	
11	772	2.12		11	691	2.5	
12	459	3.1		12	585	2.8	
13	323	4.0		13	353	4.1	
14	317	4.65		14	297	4.8	
15	253	5.6		15	228	6.2	
16	199	6.6		16	181	7.8	
17	163	8.2		17	163	8.3	
18	113	10.0		18	135	9.5	
19	106	11.6		19	101	11.2	
20	84.6	13.3		20	80.6	12.9	
21	74.3	15.3					

29 Amperes ± 1%

29 Amperes ± 1%

NOTES

RADIAL AZIMUTH 135°				RADIAL AZIMUTH 180°			
Point No.	E (mv/m)	D (mi.)	I _A	Point No.	E (mv/m)	D (mi.)	I _A
1	2388	0.738		1	2100	0.823	
2	2010	0.835		2	1896	0.908	
3	1820	0.910		3	1666	1.02	
4	1588	1.03		4	1537	1.08	
5	1391	1.13		5	1425	1.28	
6	1104	1.45		6	1307	1.36	
7	1074	1.55		7	1204	1.42	
8	861	1.74		8	1106	1.53	
9	690	2.28		9	1052	1.63	
10	664	2.4		10	818	2.17	
11	565	3.05		11	511	3.35	
12	438	4.12		12	327	4.4	
13	332	4.7		13	300	4.9	
14	256	4.92		14	271	5.6	
15	297	5.02		15	202	7.05	
16	127	9.72		16	165	8.4	
17	99.7	11.17		17	141	9.5	
18	74.4	13.4		18	99.1	11.9	
				19	87.8	13.3	
				20	82.6	14.4	
				21	63.6	16.9	
				22	62.4	18.0	

29 Amperes ± 1%

29 Amperes ± 1%

NOTES

CANADIAN BROADCASTING CORPORATION

ENGINEERING DIVISION MONTREAL

TITLE Proof of Performance
CJBC - 50 kw - 860 kc/s.

DWG. No. _____
 DATE Oct. 2/50 ISS. 1
 ENG. W.G.Rox APP. R.E.S.

RADIAL AZIMUTH 218°				RADIAL AZIMUTH 270°			
Point No.	E (mv/m)	D (mi.)	I _A	Point No.	E (mv/m)	D (mi.)	I _A
1	2570	0.725		1	2565	0.67	
2	2102	0.810		2	2460	0.71	
3	1846	0.90		3	2023	0.81	
4	1640	0.97		4	1846	0.91	
5	1576	1.05		5	1590	1.05	
6	1384	1.12		6	1433	1.20	
7	1282	1.24		7	1307	1.28	
8	1179	1.32		8	1179	1.42	
9	1051	1.50		9	1076	1.52	
10	1025	1.56		10	935	1.70	
11	585	2.6		11	618	2.8	
12	538	3.1		12	507	3.2	
13	396	3.6		13	322	4.3	
14	417	4.2		14	252	5.1	
15	353	4.6		15	248	5.7	
16	244	6.1		16	199.6	6.5	
17	203	7.2		17	91.7	8.2	
18	122	9.4		18	66.2	10.6	
19	40.5	11.5		19	29.8	15.4	
20	38.4	13.6		20	15.8	18.2	
21	39.6	15.4					
22	22.3	17.4					

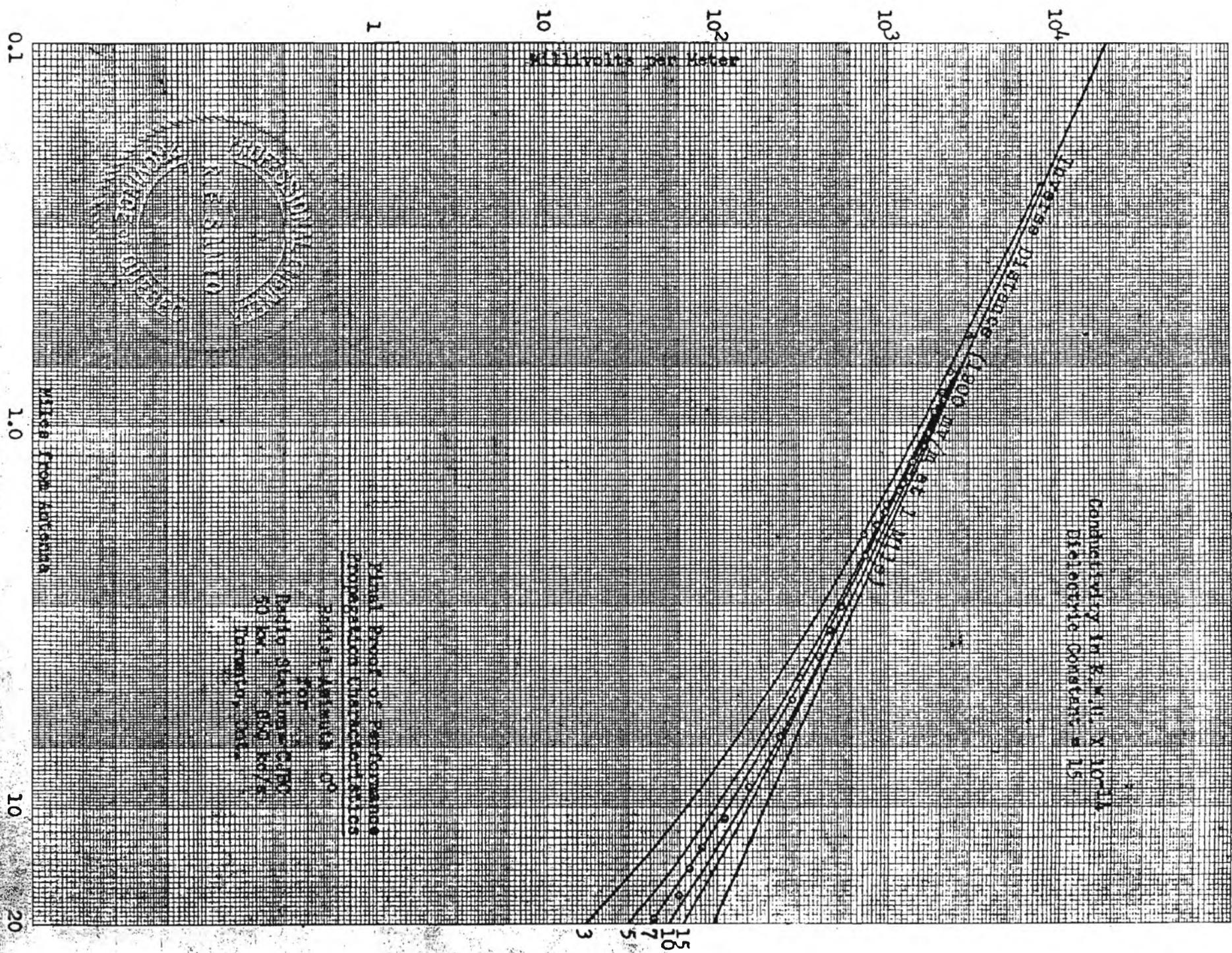
29 Amperes ± 1%

29 Amperes ± 1%

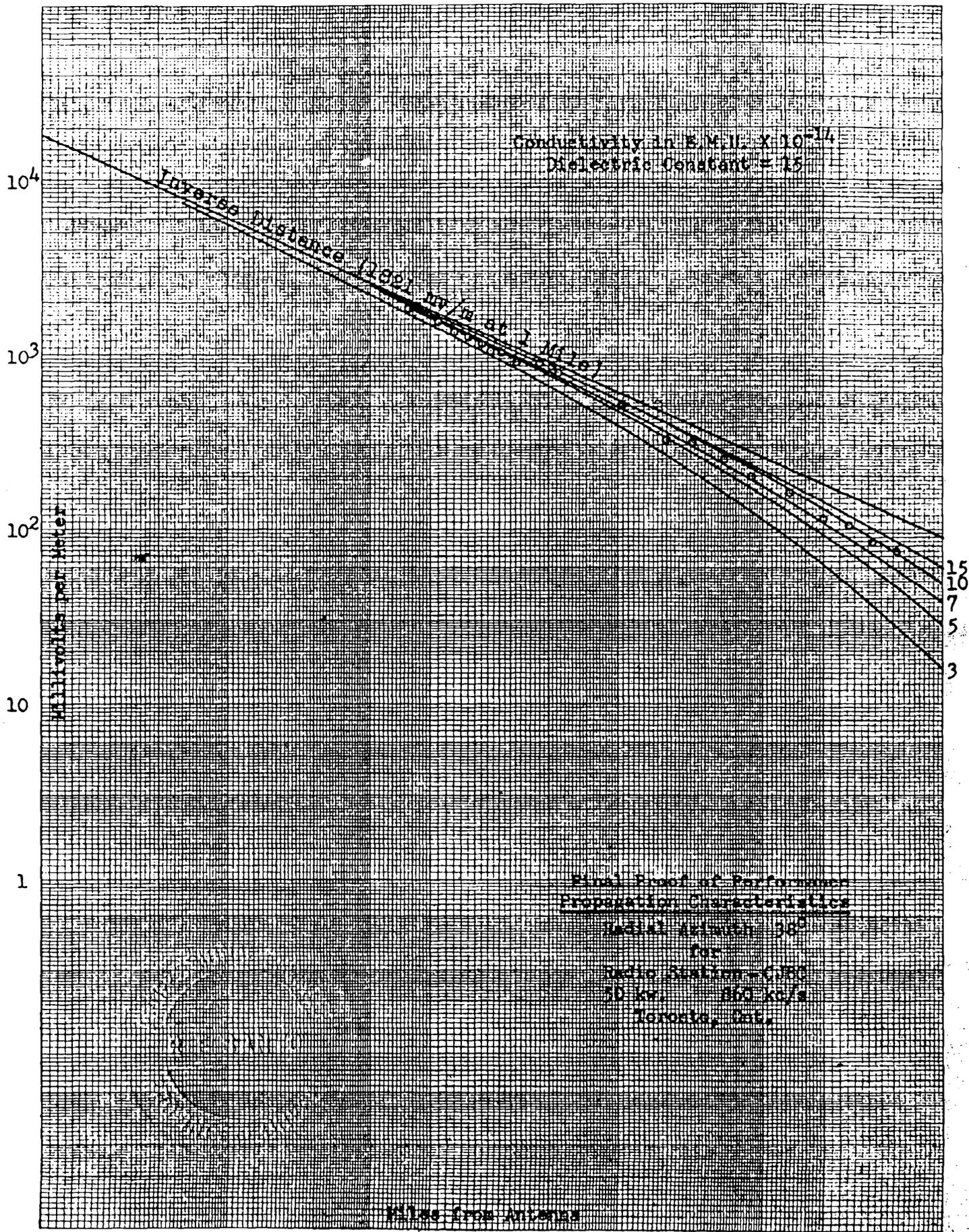
NOTES

RADIAL AZIMUTH 315°				RADIAL AZIMUTH 315°			
Point No.	E (mv/m)	D (mi.)	I _A	Point No.	E (mv/m)	D (mi.)	I _A
1	2238	0.77		23	21.1	17.5	
2	1974	0.88		24	19.3	18.9	
3	1846	0.98		25	16.5	21.6	
4	1563	1.05		26	9.05	26.2	
5	1461	1.19		27	6.65	31	
6	1282	1.34					
7	1037	1.5					
8	923	1.6					
9	872	1.7					
10	770	1.9					
11	664	2.4					
12	377	3.9					
13	319	4.6					
14	283	5.1					
15	236	5.6					
16	199	6.5					
17	119	8.5					
18	108	9.8					
19	74.5	11.2					
20	42.3	13.1					
21	28.3	15.4					
22	25.4	16.8					

NOTES



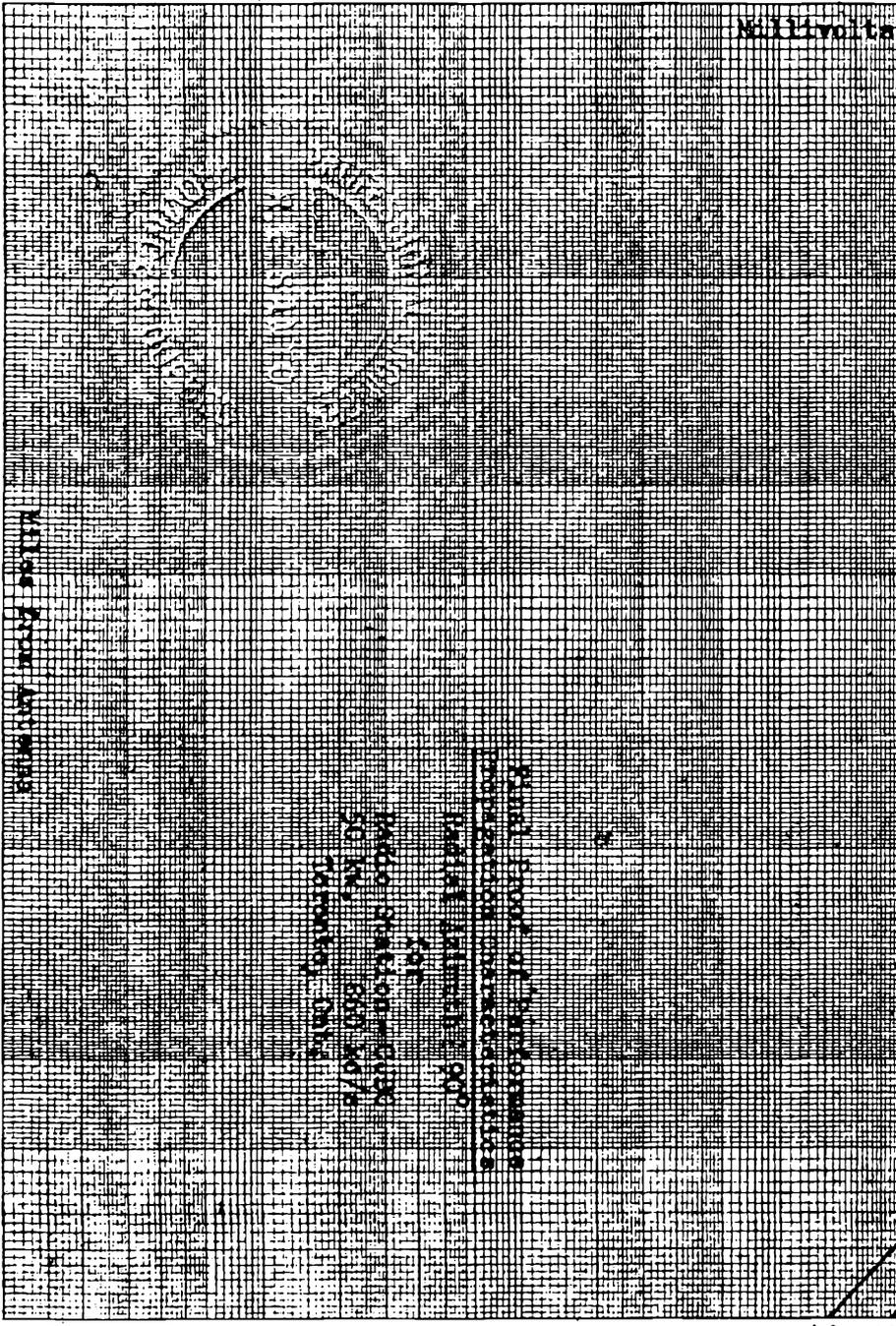
Final Proof of Performance
 Propagation Characteristics
 Bureau of Aeronautics
 For
 Radio Stationing Office
 50 Feet 1000 Feet
 Frequency 3000



10

1

Millivolts



0.1

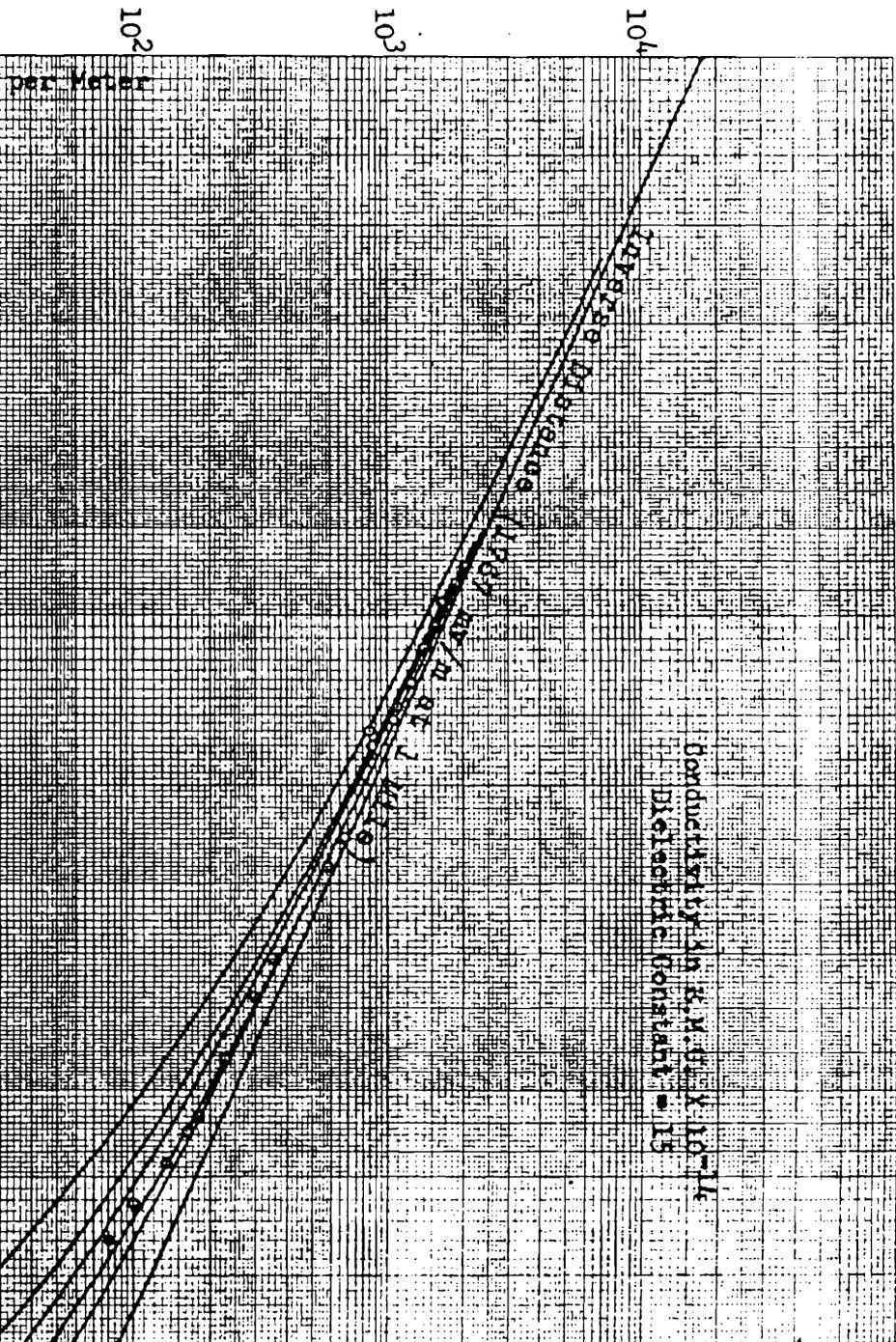
1.0

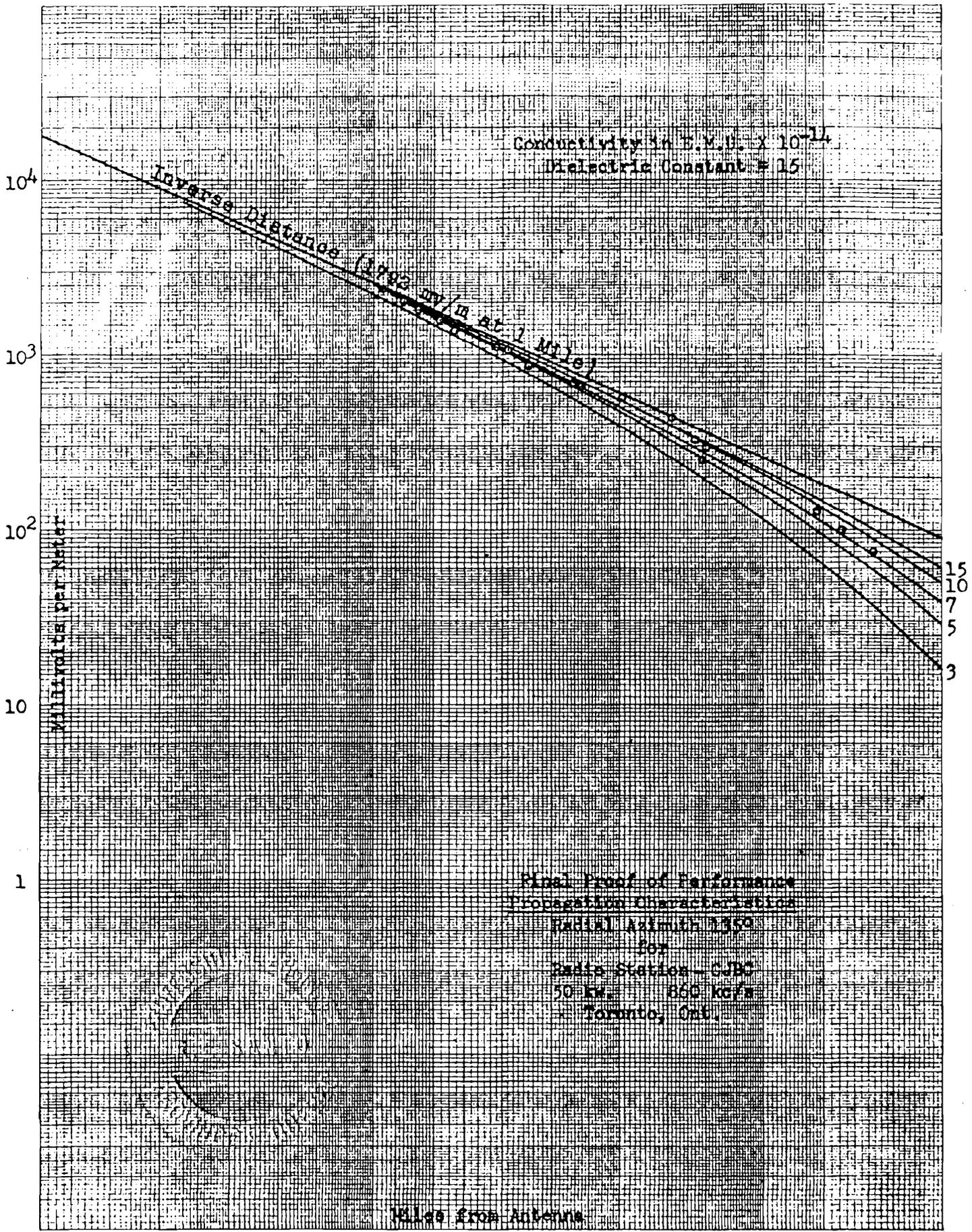
10

20

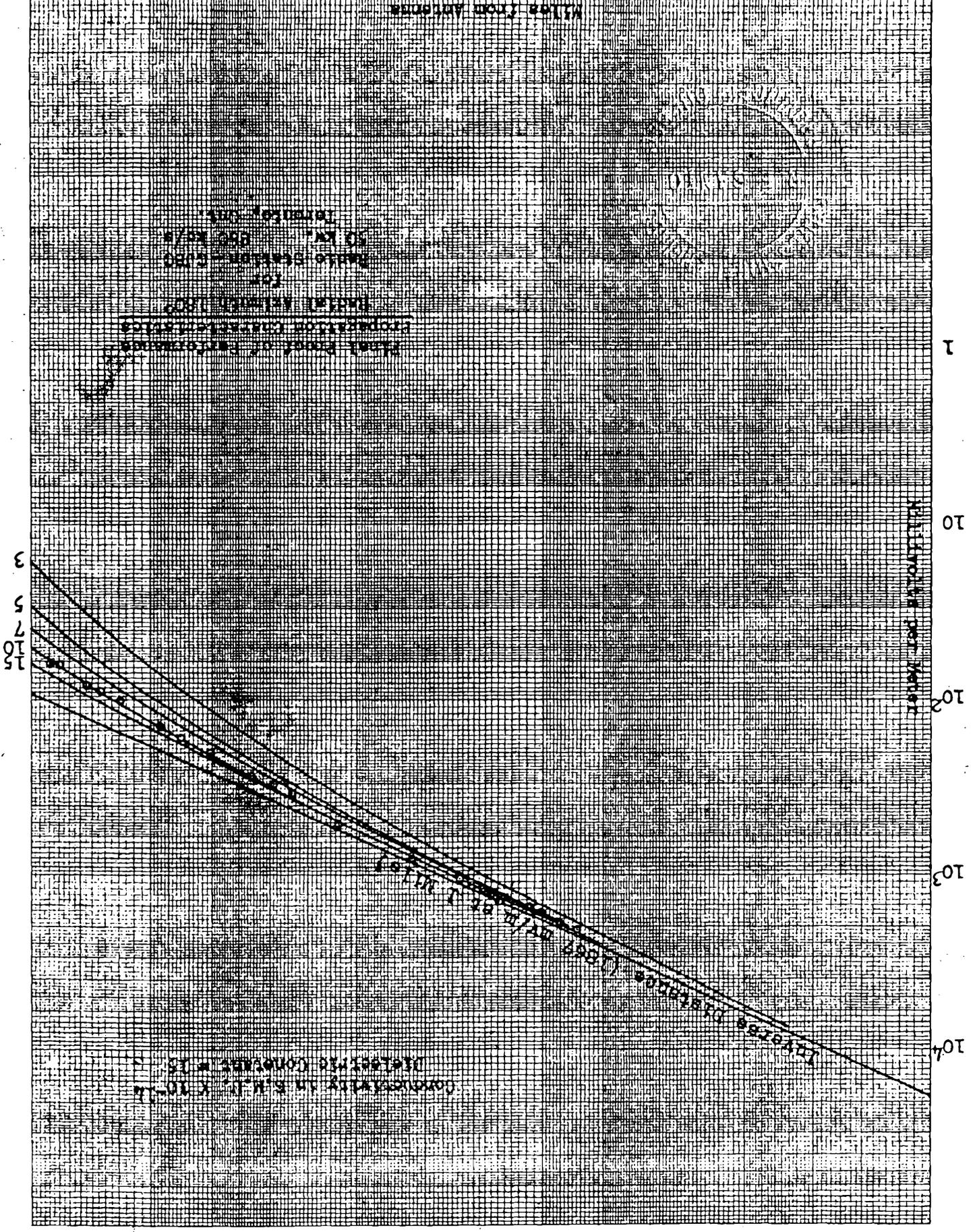
Measured on a 7.5 MHz standard generator

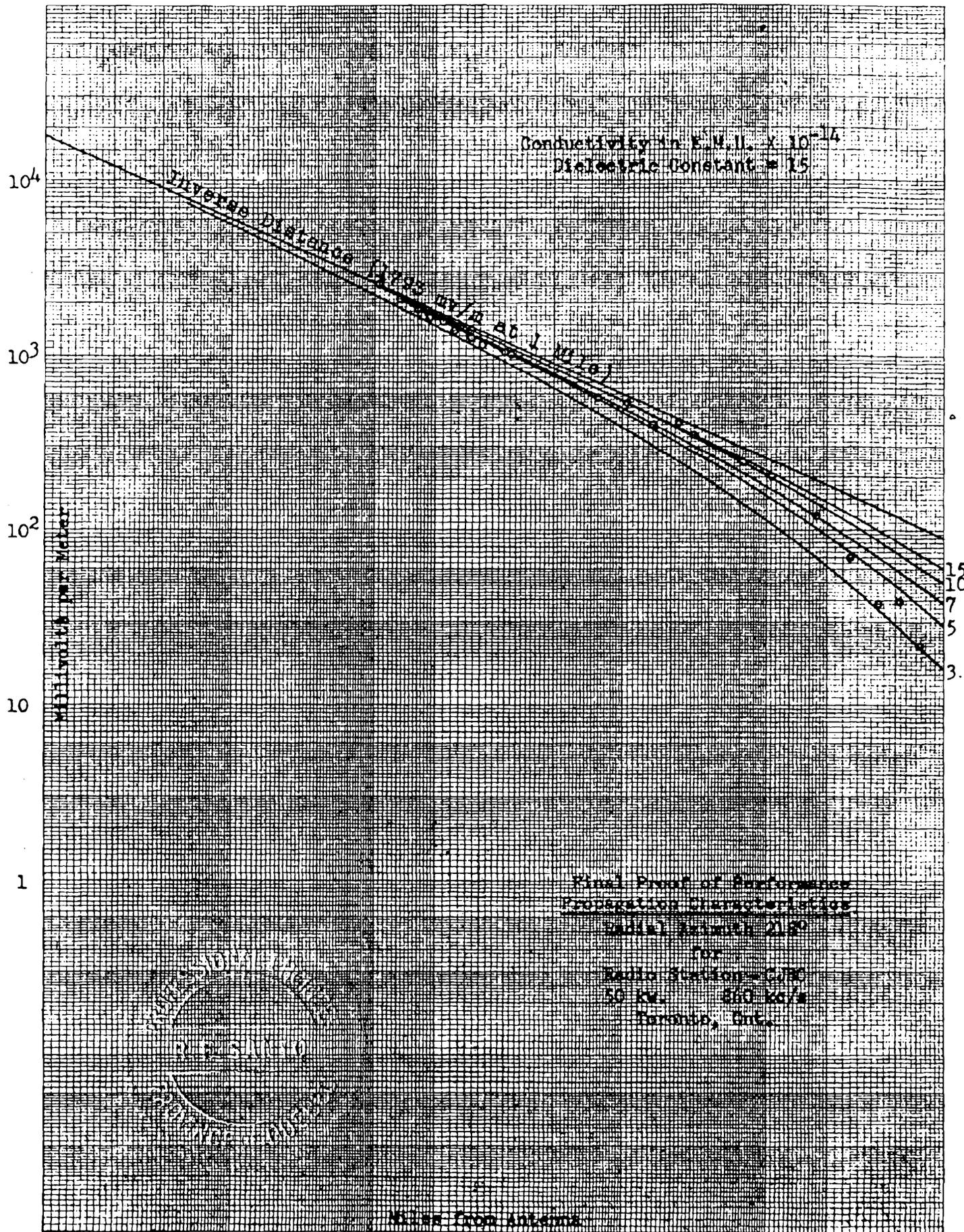
3 5





F. C. C. Sheet
MADE IN U.S.A.





15
10
7
5
3

Millivolts per Meter

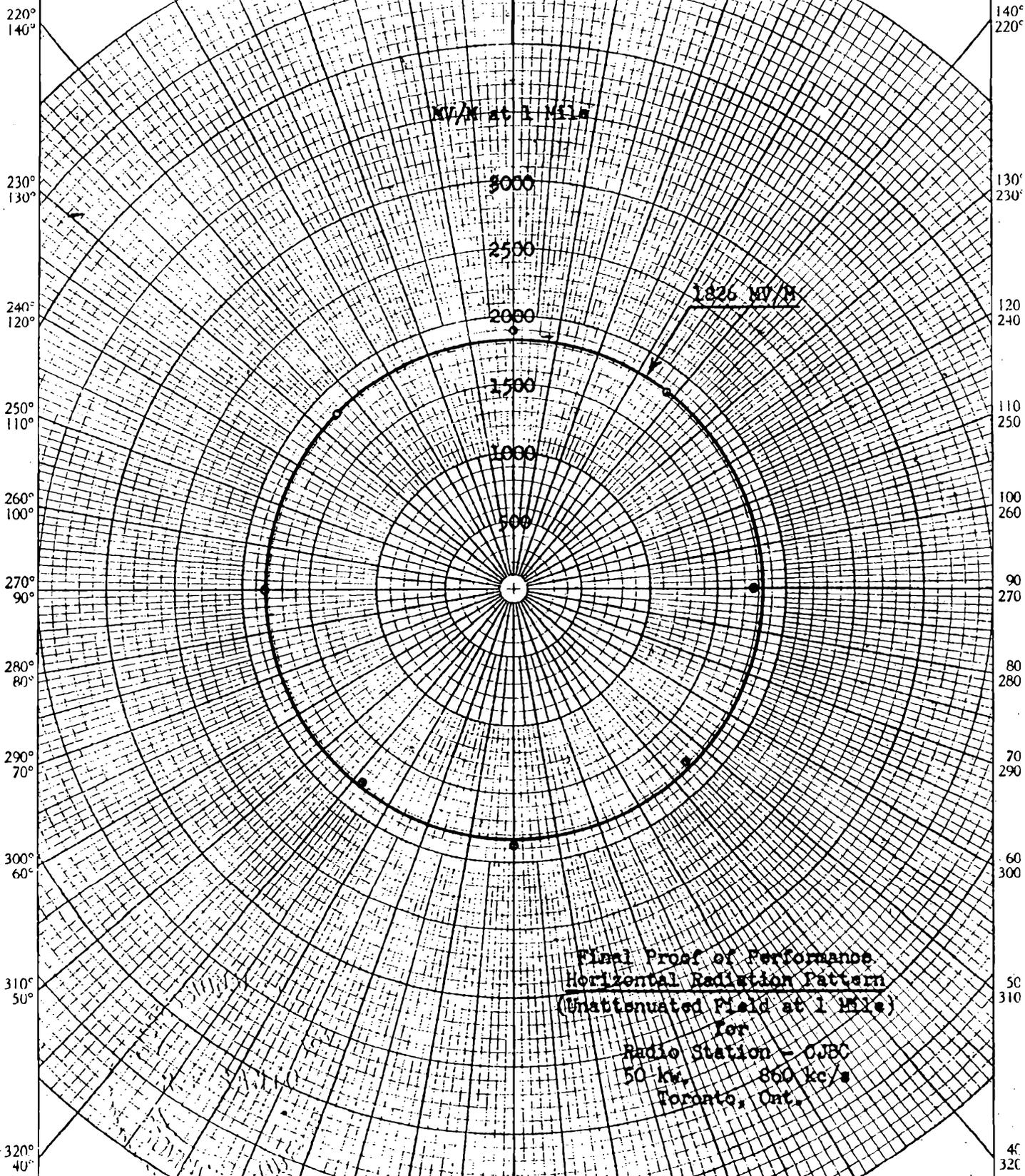
10⁴
10³
10²
10
1

0.1

1.0

20

210° 150° 200° 160° 190° 170° 180° 170° 160° 150° 210°



Final Proof of Performance
 Horizontal Radiation Pattern
 (Unattenuated Field at 1 Mile)
 for
 Radio Station - CJBC
 50 kw., 860 kc/s
 Toronto, Ont.

Transmission & Development Department.

KEUFFEL & ESSER CO. N. Y. NO. 359-31
 Polar Coordinates
 MADE IN U. S. A.



Supplementary Proof of Performance

CJBC Toronto, Ont.

860 kc/s, 50 kw OD, Class I-A

Montreal, Que.
November 6, 1959

Transmission & Development Department

TITLE CJBC Toronto, Ont.
860 kc/s, 50 kw OD, Class I-A

DWG. No.
DATE NOV. 6/59 ISS.
ENG. J.L. APP. R.E.S.

APPROVED
JAN. 15 1960
Y.R.H.

*Refer to CBC letter
Jan 12/60
6296-60*

Supplementary Proof of Performance

CJBC Toronto, Ont.

860 kc/s, 50 kw OD, Class I-A

ENGINEERING DIVISION MONTREAL

TITLE.....CJBC Toronto, Ont.
.....360 kc/s, 50 kw OD, Class I-ADWG. No.....
DATE Nov 6/59 ISS.....
ENG. J.L. APP. R.E.S.

3. Introduction

This brief presents the supplementary proof of performance of CJBC Toronto, Ont., 360 kc/s, 50 kw OD, Class I-A. It demonstrates that the station continues to function substantially as authorized, according to measurements made in September and October, 1959.

4. Discussion

Measurements of current and impedance were made at the input to the antenna. All field intensity measurements have been corrected for an antenna current of 29.1 amps, i.e. 50.0 kw. No adjustments or changes were made.

Field intensity measurements were made along two radials to determine the size of the radiation pattern. Its shape had been determined in 1955 from measurements made along six radials. The minor distortion of the pattern shape is caused by an emergency "T" antenna located near the tower.

One radial was extended to beyond the 0.1 mv/m contour and another was extended to the U.S. border. Measurements were made along seven radials across Metropolitan Toronto to establish field intensities in the city. The results are shown in Appendix A.

CJBC suffers groundwave interference on the east and west sides of its coverage area. In the east there is interference between the 0.3 and 0.1 mv/m contours due to adjacent - channel station CKVL Verdun, Que., 350 kc/s, 50 kw day/10 kw night DA-2, Class II.

In south - western Ontario there is interference at and beyond the 1.5mv/m contour due to adjacent - channel station WJW Cleveland, Ohio, 850 kc/s, 5 kw DA-1, Class II. Field intensity measurements were made to establish the extent of interference from CKVL and WJW. The results of this survey are shown in Appendix B.

The 0.25 mv/m contour of CKVL does not penetrate inside CJBC's 0.5 mv/m contour. Therefore, the protection requirements of the Department of Transport standards are fulfilled. The present assignment of WJW was notified three years before CJBC so we must accept the interference.

TITLE CJBC Toronto, Ont.
860 kc/s, 50 kw OD, Class I-A

DWG. NO.
DATE Nov. 6/59 ISS.
ENG. J.L. APP. R.E.S.

5. Qualifications

Measurements and brief by:

Jack Litchfield
.....
Jack Litchfield, P. Eng.

Transmission & Development Department

B.A. Sc. University of Toronto, 1953
CBC 1953 to date.

Brief checked by:

W.G. Roxburgh
.....
W.G. Roxburgh

Transmission & Development Department

Brief approved by:

Robt. E. Santo
.....
R.E. Santo, P. Eng.

Transmission & Development Engineer

6. Equipment

Impedance measurements were made using a General Radio RF bridge, type 916-AL, serial No. 2673; a General Radio oscillator, type 684-A, serial No. 177; and an RCA receiver, type AVR-11. The accuracy of the bridge was checked by the writer during the survey and was found to be within 1%. ✓

An RCA field intensity meter, type WX-2D, was used to make the field intensity measurements. Its accuracy was checked by the writer just prior to the survey, and was found to be within 3%. ✓

A military - type range finder having a base 80 cm. in length was used to measure distances for the close-in points. It was calibrated by the writer just prior to the survey. Distances for the other points were determined using maps of appropriate scales.

The true value of the antenna current was determined using a Weston 0-50 amp ammeter, model 640, serial No. 4780. It was calibrated by the writer just prior to the survey and was found to be accurate to 1% at the part of the scale involved. ✓

ENGINEERING DIVISION MONTREAL

TITLE CJBC Toronto, Ont.
860 kc/s, 50 kw OD, Class I-A

DWG. No.
DATE Nov. 6/59 ISS.
ENG. J.L. APP. R.E.S.

7. Antenna Impedance

At input to antenna:

Impedance	59 - j 114 ohms ± 1%	✓
Current	29.1 amps ± 1%	✓
Power	50.0 kw ± 3%	✓

3rd of value on curve

Transmitter meter readings:

Input to antenna	28.0 amps on Weston 0-60 amp, Type 743, No. 5800
Input to A.T.U.	27.3 amps on Weston 0-35 amp, Type 743, No. 3993
Input to transmission line	26.7 amps on Weston 0-40 amp, Type 743, No. K878

52 kw

Z?

ENGINEERING DIVISION MONTREAL

TITLE CJBC Toronto, Ont.860 kc/s., 50 kw OD, Class I-A

DWG. No.

DATE NOV. 6/59 ISS.ENG. J.L. APP. R.E.S.8. Field Intensity Measurements

All measurements have been corrected for an antenna current of 29.1 amps.

Tabulation of Points by Radials

Radial Pt. No.	Survey Pt. No.	Dis. Miles	Field Int. mv/m	Radial Pt. No.	Survey Pt. No.	Dis. Miles	Field Int. mv/m
Radial No. 1 Azimuth 58.3°							
1	102	0.86	1680.	19	122	24.3	37.
2	101	1.16	1300.	20	123	25.4	30.
3	103	1.75	860.	21	124	28.1	25.5
4	104	2.05	720.	22	125	30.5	20.
5	105	2.25	640.	23	126	32.8	16.5
6	167	5.9	230.	24	127	34.5	12.8
7	166	9.4	122.	25	325	50.	5.0
8	165	10.9	100.	26	326	61.	2.95
9	112	13.3	82.	27	327	69.	1.38
10	113	15.3	66.	28	328	84.	1.36
11	114	16.8	55.	29	329	106.	0.80
12	115	17.1	53.	30	330	114.	0.44 ✓
13	116	17.9	57.	31	331	123.	0.255
14	117	19.1	54.	32	92	152.	0.088
15	118	20.1	47.	33	93	160.	0.070
16	119	21.0	42.	34	94	173.	0.056
17	120	22.2	40.	35	95	182.	0.037
18	121	23.4	35.				

ENGINEERING DIVISION MONTREAL

TITLE CIBC Toronto, Ont.

860 kc/s., 50 kw OD, Class I-A

DWG. No.

DATE Nov. 6/59 ISS.

ENG. J.L. APP. R.E.S.

Radial Pt. No.	Survey Pt. No.	Dis. Miles	Field Int. mv/m
-------------------	-------------------	---------------	-----------------------

Survey Pt. No.	Dis. Miles	Field Intensity mv/m
-------------------	---------------	----------------------------

Radial No. 8
Azimuth 240°

0.5 mv/m contour
Azimuth 242.5°

1	106	0.94	1800.
2	111	1.13	1460.
3	107	1.5	1180.
4	109	2.0	820.
5	110	2.2	780. ¹
6	210	47.	2.5 ⁴
7	211	52.	2.3
8	212	56.	2.4
9	213	63.	1.95
10	222	69.	1.65
11	214	76.	1.10
12	223	81.	1.34
13	224	91.	1.0
14	225	101.	0.82
15	226	109.	0.72
16	227	119.	0.60
17	228	129.	0.46
18	229	136.	0.42
19	230	141.	0.39
20	288	175.	0.255
21	243	182.	0.21

292	132	0.52
291	135	0.49
290	142	0.46
289	147	0.44

Azimuth 245°

293	129	0.59
298	142	0.51
299	148	0.42

Azimuth 248°

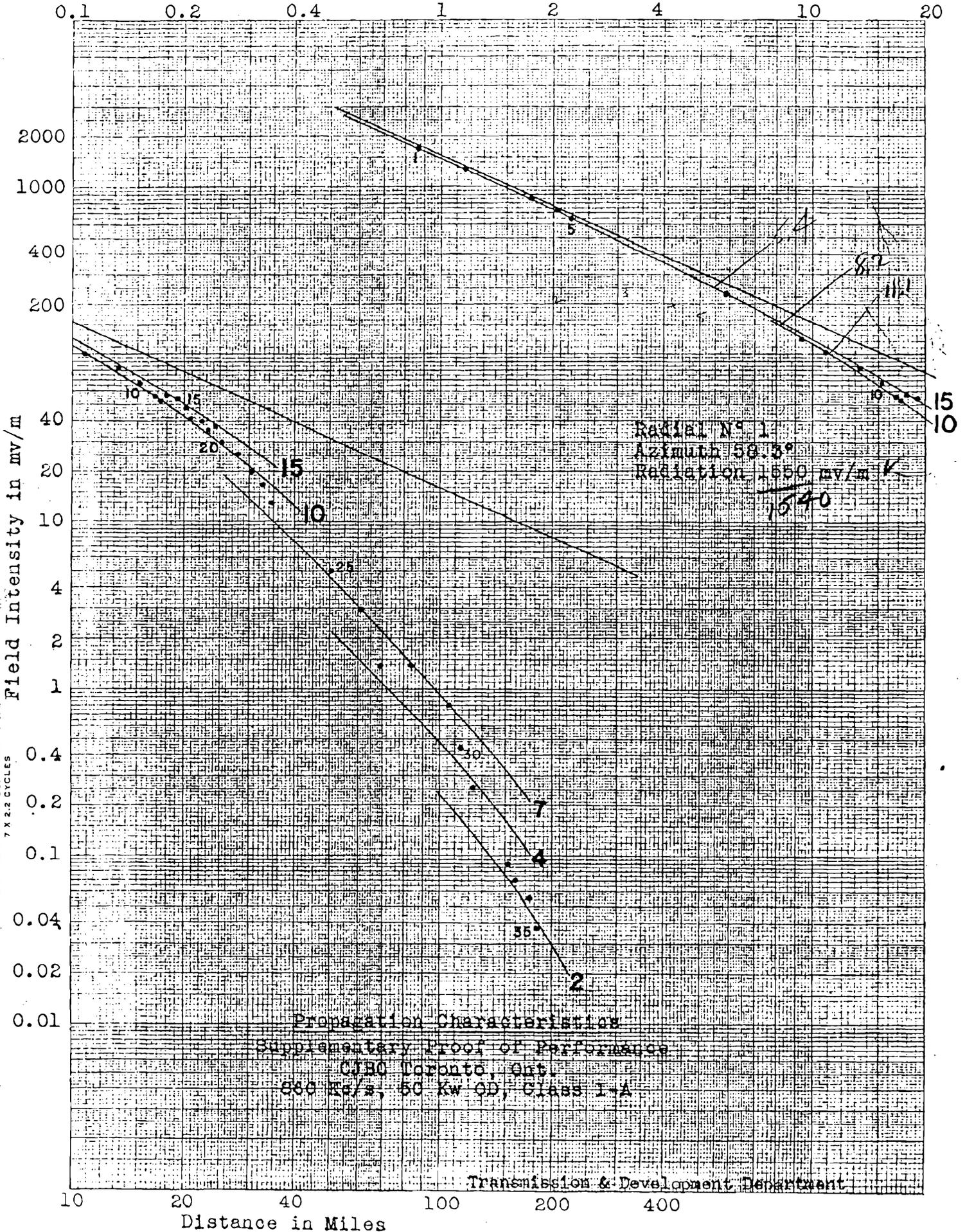
294	126	0.70
297	139	0.59
300	145	0.43

Azimuth 251°

295	133	0.54
296	136	0.53
301	142	0.42

Azimuth 263°

304	124	0.67
303	132	0.58
302	137	0.51



LOGARITHMIC 359-127G
KEUFFEL & ESSER CO. MADE IN U.S.A.
7 X 2.2 CYCLES

0.1 0.2 0.4 1 2 4 10 20

2000

1000

400

200

100

40

20

10

4

2

1

0.4

0.2

0.1

0.04

0.02

0.01

Field Intensity in mv/m

15

X

Radial N° 6
Azimuth 240°
Radiation 1750 mv/m

1810

Propagation Characteristics

Supplementary Proof of Performance

CJBC Toronto, Ont.

850 Kc/s, 50 Kw CD, Class 1-A

Transmission & Development Department

10

20

40

100

200

400

Distance in Miles

LOGARITHMIC 359-127G
KEUFFEL & ESSER CO. MADE IN U.S.A.
7 X 2.2 CYCLES

CANADIAN BROADCASTING CORPORATION
ENGINEERING DIVISION MONTREAL

TITLE CJBC Toronto, Ont.
860 kc/s, 50 kw OD, Class I-A

DWG. No.
DATE NOV. 6/59 ISS.
ENG. J.L. APP. R.E.S.

9. Description of Antenna

Station: CJBC ✓ Main Studio: Toronto, Ont.
Power: 50 kw ✓ Frequency: 860 kc/s ✓ Class: I - A ✓
Location: Near Hornby, Ontario ✓

Latitude 43° 34' 30" north ✓
Longitude 79° 49' 03" west ✓

Antenna: One tower, series fed, uniform, square cross-section,
base insulated, guyed.

Height above insulator 645' (213.3°) ✓
Overall height 651'

Ground System: 120 radials 645' long ✓

Effective Field:

low (RMS 1680 mv/m for 50 kw
238 mv/m for 1 kw)

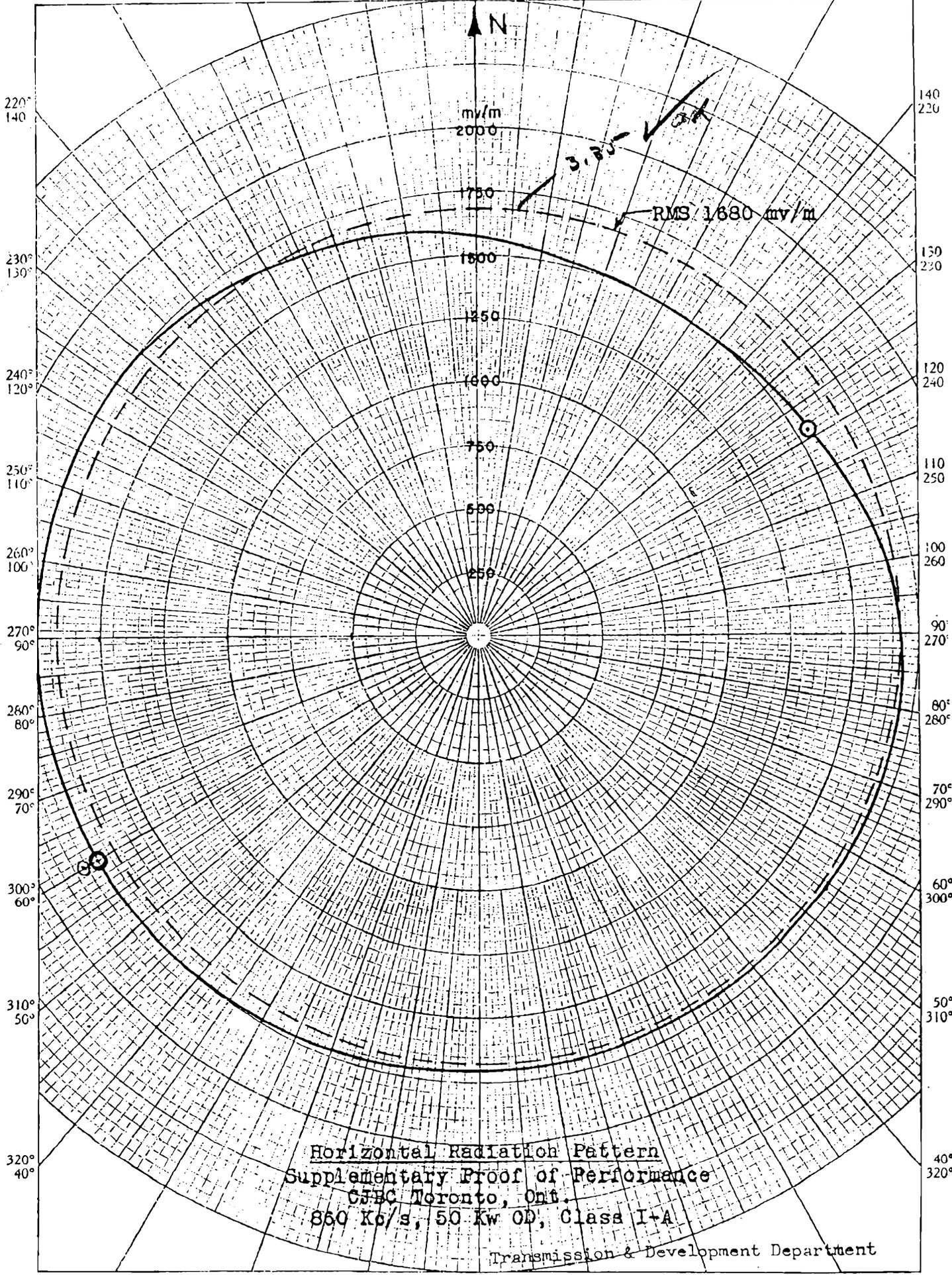
*182° f. F.F.P. X
Oct. 2/50
260.5/kw.
Variation 9.6%*

The antenna is painted and lighted in accordance with Broadcast Specification No. 16.

*Indicated (Brief) 1898 - X
268.5/kw
Variation 11.2%*

GM A 275

210° 150° 200° 160° 190° 170° 180° 170° 190° 160° 200° 150° 210°



POLAR CO-ORDINATE 359-31
NEUFFEL & ESSER CO. MADE IN U.S.A.

ENGINEERING DIVISION MONTREAL

TITLE CJBC Toronto, Ont.
860 kc/s, 50 kw OD, Class I-A

DWG. No.
 DATE Nov. 6/58 ISS.
 ENG. J.L. APP. R.E.S.

11. Appendix A - Field Intensities in Metropolitan Toronto

Tabulations of Points by Radials

Radial Pt. No.	Survey Pt. No.	Dis. Miles	Field Int. mv/m	Radial Pt. No.	Survey Pt. No.	Dis. Miles	Field Int. mv/m
Radial No. 1 Azimuth 58.3°				Radial No. 2 Azimuth 62.4°			
9	112	13.3	82.	1	128	13.8	88.
10	113	15.3	66.	2	129	15.1	70.
11	114	16.8	55.	3	130	15.9	60.
12	115	17.1	53.	4	131	16.8	59.
13	116	17.9	57.	5	132	18.4	50.
14	117	19.1	54.	6	133	19.3	56.
15	118	20.1	47.	7	134	20.4	46.
16	119	21.0	42.	8	135	21.8	46.
17	120	22.2	40.	9	136	22.9	42.
18	121	23.4	35.	10	137	24.7	40.
19	122	24.3	37.	11	138	26.0	24.5
20	123	25.4	30.	12	139	27.8	20.
21	124	28.1	25.5	13	140	30.1	17.5
22	125	30.5	20.	14	141	32.3	15.5
23	126	32.8	16.5	15	142	34.3	12.2
24	127	34.5	12.8				

ENGINEERING DIVISION MONTREAL

TITLE CJBC Toronto, Ontario
 860 kc/s, 50 kw OD, Class I-A

DWG. No.
 DATE Nov. 6/59 ISS.
 ENG. J.L. APP. R.E.S.

Radial Pt. No.	Survey Pt. No.	Dis. Miles	Field Int. mv/m
----------------	----------------	------------	-----------------

Radial Pt. No.	Survey Pt. No.	Dis. Miles	Field Int. mv/m
----------------	----------------	------------	-----------------

Radial No. 3
 Azimuth 66.5°

Radial No. 4
 Azimuth 71.3°

1	148	13.6	82.
2	149	14.8	64.
3	150	15.8	56.
4	151	17.0	58.
5	152	17.8	52.
6	153	17.9	53.
7	154	18.7	46.
8	155	19.6	47.
9	156	20.8	47.
10	159	23.4	37.
11	160	24.7	41.
12	147	26.1	23.
13	146	28.2	21.5
14	145	29.7	21.
15	144	31.8	16.5
16	143	33.4	14.4

1	168	13.5	72.
2	169	14.8	62.
3	170	15.3	64.
4	171	16.4	64.
5	172	17.7	46.
6	173	18.7	44.
7	175	20.8	35.
8	177	22.3	22.5
9	178	23.4	19.5
10	179	25.1	22.
11	180	26.5	11.5
12	161	27.7	12.6
13	162	29.0	9.6
14	163	30.0	11.0
15	164	30.9	19.

CANADIAN BROADCASTING CORPORATION

ENGINEERING DIVISION MONTREAL

TITLE... CJBC Toronto, Ont.
860 kc/s, 50 kw OD, Class I-A

DWG. No.

DATE Nov. 6/59 ISS.

ENG. J.L. APP. R.E.S.

Radial Pt. No.	Survey Pt. No.	Dis. Miles	Field Int. mv/m
----------------	----------------	------------	-----------------

Radial Pt. No.	Survey Pt. No.	Dis. Miles	Field Int. mv/m
----------------	----------------	------------	-----------------

Radial No. 5
Azimuth 76.4°

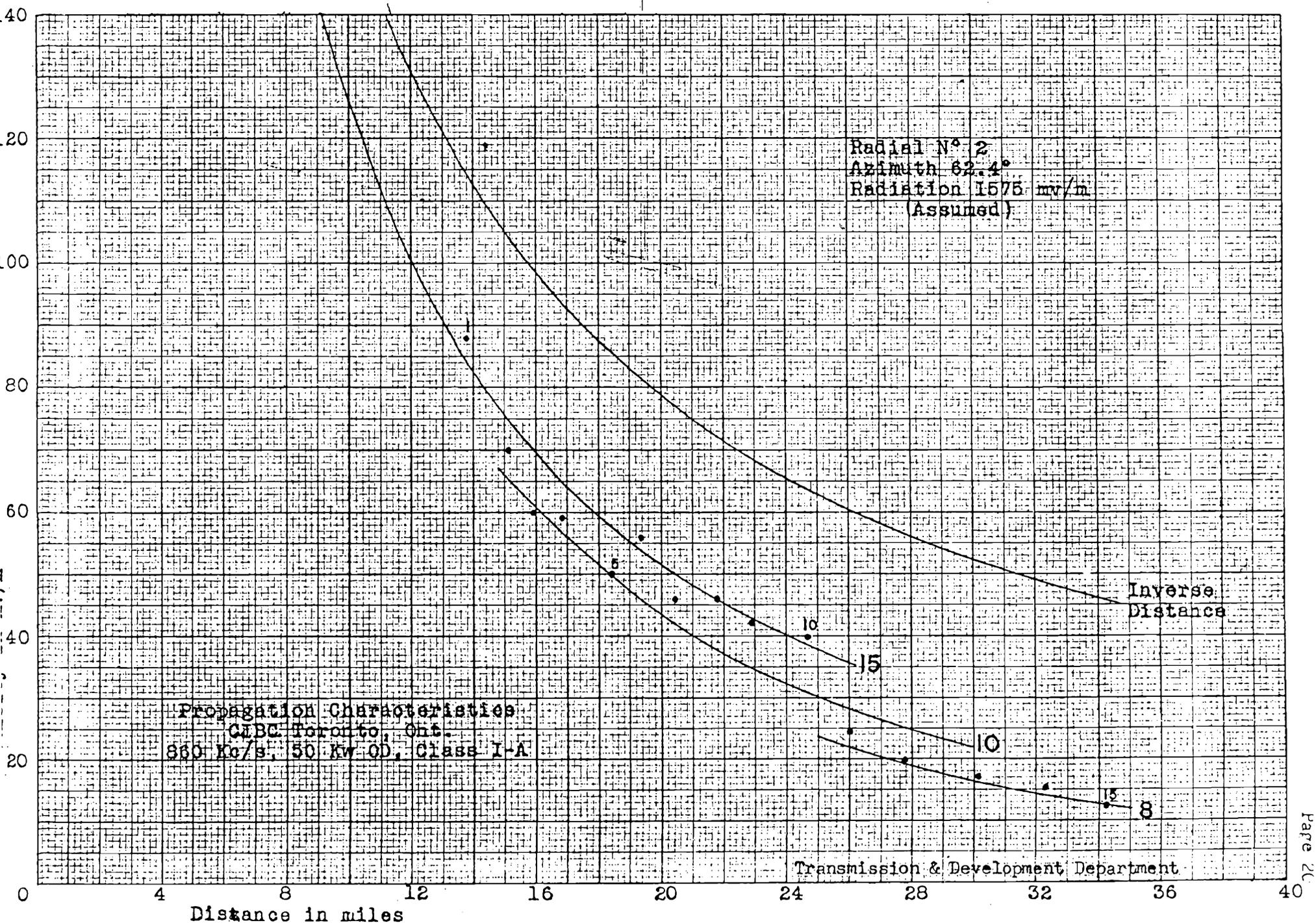
1	196	13.6	76.
2	195	15.3	68.
3	194	16.2	68.
4	193	17.0	66.
5	192	18.3	54.
6	191	19.7	54.
7	190	20.9	48.
8	189	21.5	46.
9	188	22.4	42.
10	187	23.5	25.
11	185	23.6	16.
12	186	23.9	16.
13	184	24.6	25.
14	183	25.6	21.
15	182	26.5	19.5
16	181	27.2	15.5

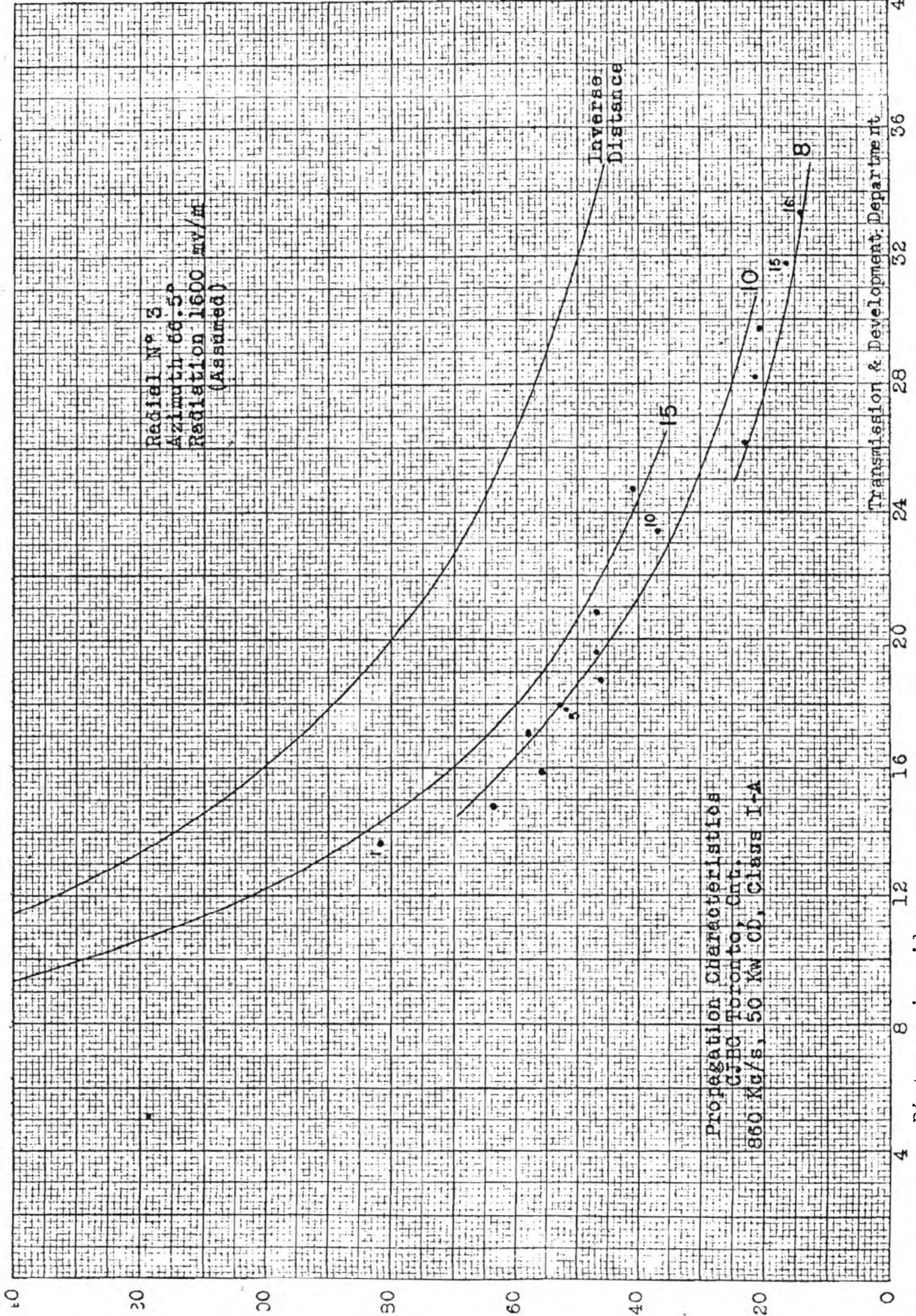
Radial No. 6
Azimuth 86°

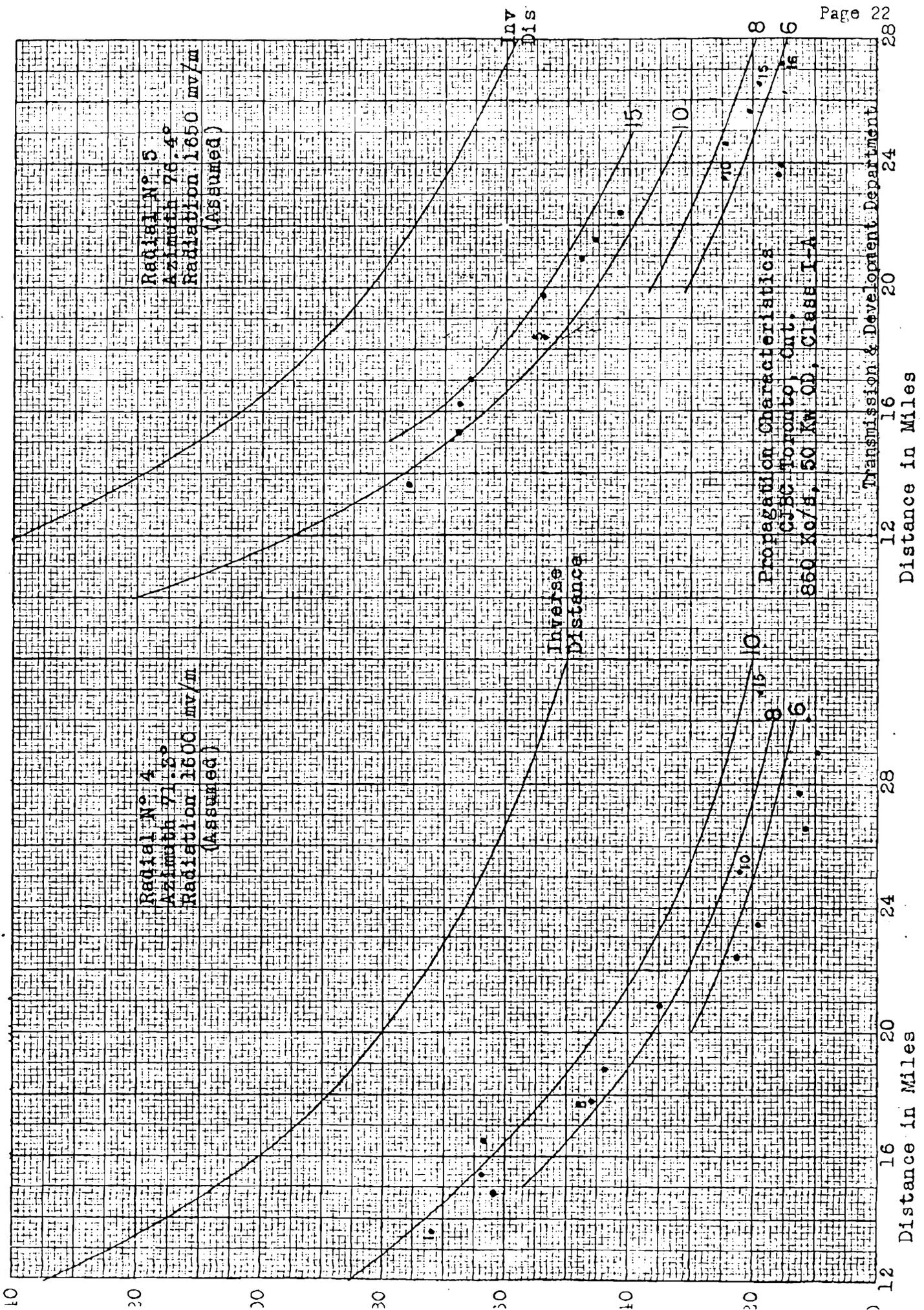
1	204	9.5	136.
2	203	10.4	116.
3	202	11.2	96.
4	200	12.9	82.
5	199	13.8	80.
6	198	14.9	78.
7	197	15.7	78.

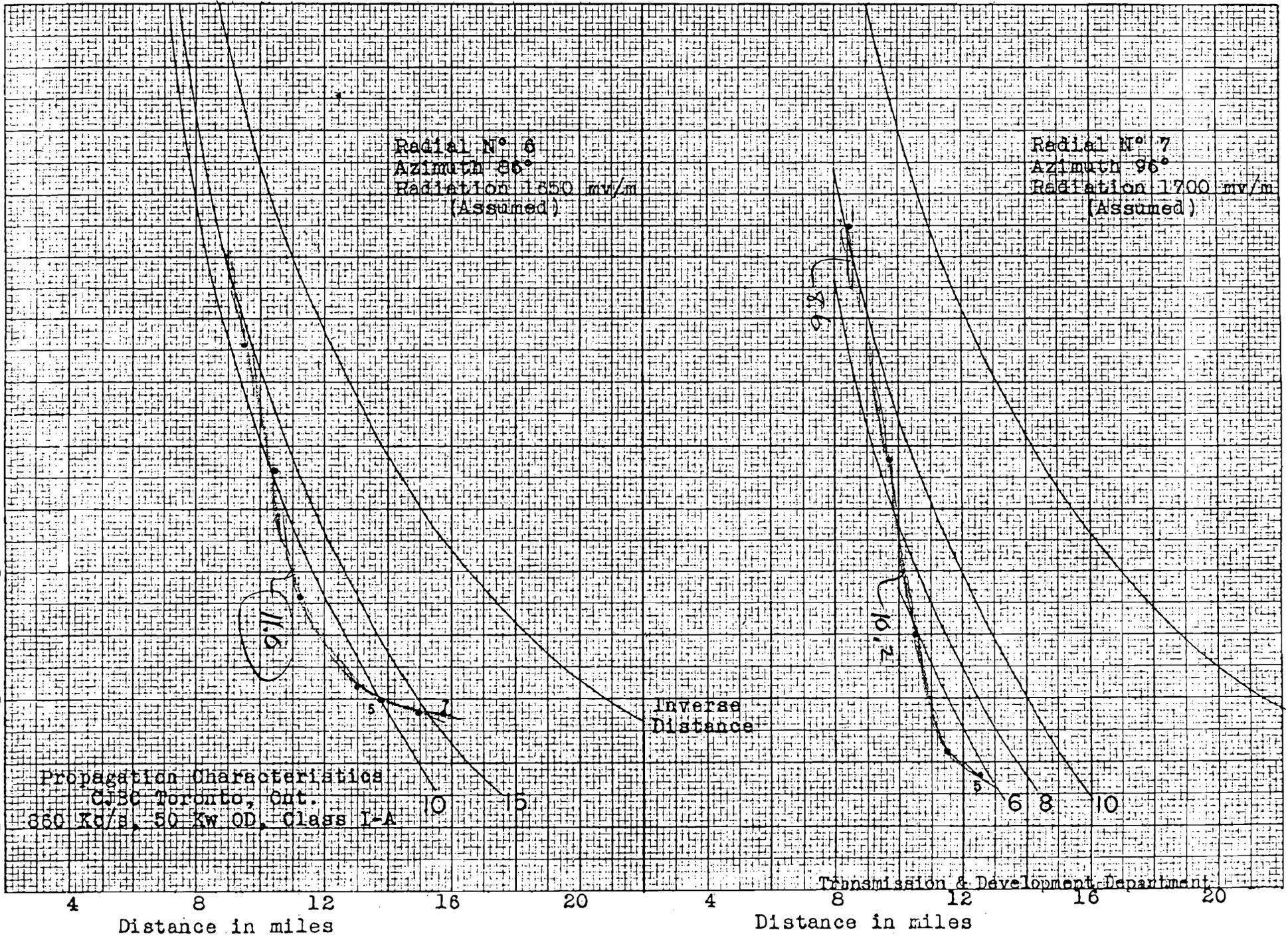
Radial No. 7
Azimuth 96°

1	205	8.5	155.
2	206	9.7	118.
3	207	10.6	90.
4	208	11.5	72.
5	209	12.5	68.









ENGINEERING DIVISION MONTREAL

TITLE CJBC Toronto, Ont.
860 kc/s, 50 kw OD, Class I-A

DWG. No. _____
DATE Nov. 6/59 ISS _____
ENG. J.L. APP. RES

12.. Appendix B - Extent of Groundwave Interference to CJBC.

Interference to CJBC from adjacent - channel station CKVL

Verdun, Que., 850 kc/s, 50 kw day/10 kw night DA-2, Class II

Tabulation of Points by Radials

Radial Pt. No.	Survey Pt. No.	CJBC Dist. Miles	CJBC Field Int. mv/m	CKVL Field Int. mv/m	Radial Pt. No.	Survey Pt. No.	CJBC Dist. Miles	CJBC Field Int. mv/m	CKVL Field Int. mv/m
----------------	----------------	------------------	----------------------	----------------------	----------------	----------------	------------------	----------------------	----------------------

Radial No. 1
Azimuth 58.3°

29	329	106	.80	--
30	330	114	.44	--
31	331	123	.255	.049
32	92	152	.088	.042
33	93	160	.070	.064
34	94	173	.056	.060
35	95	182	.037	.112

Radial No. 2
Azimuth 62.4°

16	100	159	.084	.062
17	99	168	.062	.064
18	98	172	.070	.090
19	97	176	.078	.090
20	96	180	.072	.106

Radial No. 3
Azimuth 66.5°

17	91	138	.19	.066
18	90	145	.144	.076
19	89	152	.124	.078
20	88	157	.098	.106
21	87	165	.098	.092
22	86	169	.098	.104
23	85	178	.066	.118
24	84	185	.078	.134
25	83	194	.057	.28
26	82	201	.043	.24

Radial No. 4
Azimuth 71.3°

16	332	117	.56	.12
17	333	128	.48	.112
18	334	142	.35	.142
19	335	149	.295	.15
20	336	153	.24	.142
21	337	159	.22	.19
22	338	164	.18	.18
23	341	182	.148	.35
24	342	188	.134	.275
25	343	198	.100	.30
26	344	203	.074	.37
27	345	207	.066	.58

CANADIAN BROADCASTING CORPORATION

ENGINEERING DIVISION MONTREAL

TITLE CJBC Toronto, Ont.

860 kc/s, 50 kw OD, Class I-A

 DWG. No.
 DATE Nov. 6/59 ISS.
 ENG. J.L. APP. R.E.S.

Interference to CJBC from adjacent - channel station WJW Cleveland, Ohio,
 5 kw DA-1, Class I-A.

Tabulation of Points by Radial

Survey Pt. No.	CJBC Dist. Miles	CJBC Field Int. mv/m	WJW Field Int. mv/m	Survey Pt. No.	CJBC Dist. Miles	CJBC Field Int. mv/m	WJW Field Int. mv/m
Azimuth 223°				Azimuth 245°			
221	70	1.8	0.45	307	75	1.85	0.50
220	71	1.20	0.57	308	80	1.6	0.59
219	76	1.28	0.64	309	86	1.35	0.68
218	80	1.24	0.70				
217	83	1.18	0.86				
Azimuth 233°				Azimuth 251°			
216	76	1.9	0.88	311	84	1.55	0.70
215	80	1.44	0.90	310	89	1.4	0.80
Azimuth 240°				Azimuth 257°			
222	69	1.65	0.47	313	83	1.45	0.64
214	76	1.10	0.59	312	86	1.45	0.76
223	81	1.34	0.73				
Azimuth 264°				Azimuth 264°			
				314	85	1.45	0.58
				315	95	1.2	0.62

Transmission & Development Department

Objections

V. Attamel

CVBC Supplementary Proof. 860KC

1- Efficiency:

Briet (predicted)	=	1898 mV/m.	(268.5)	11.2%
F.P.P. (oct 2/50)	=	1826 mV/m.	(260.5)	8.6%
low. * S.P.P.	=	1680 mV/m.	(238)	—
GM. curve H: 213.3°	=		~ (275)	

2- Page. 13.

Inverse field curve indicates.

~~1750~~ mV/m instead of 1810 mV/m.

3- Map # 1 Page 26.

Contours shown indicate a coverage reduction.

Points obtained from the Field strength vs. distance curves ~~seems~~ seem to fall closer to the F.P.P. contours

4- Map # 3 Page 28

Contours shown are the same as the final Proof except for small areas where the major radials are passing through.

5- Conductivity.

local conductivity found is $\sim \sigma = 15$
From F.P.P. local cond. used was $\sim \sigma = 6$

APPLICATION FOR AUTHORITY
TO BROADCAST PROGRAMS IN THE FRENCH LANGUAGE,
ON CJBC, TORONTO

A Submission to the Board of Broadcast Governors

CANADIAN BROADCASTING CORPORATION

AUGUST 1962

TABLE OF CONTENTS

Presentation

Schedules

- I Average Audience for Toronto Radio Stations
9 p.m. to 11 p.m., Fall, 1961

- II Average Audience for Toronto Radio Stations
9 p.m. to 11 p.m., Spring, 1962

- III Support

Foreword

This application is for authority to broadcast programs in the French language on CBC-owned English-language AM Radio Station CJBC in Toronto on a permanent basis.

The Corporation proposes to broadcast two hours of French Radio Network programming each week night on CJBC effective October 1, 1962.

Thereafter, the service in the French language will be developed, altered and extended where indicated.

CJBC has been for 18 years the key station in the Dominion Network. A submission now before this Board proposes that this function will cease on October 1st, 1962, with the consolidation of the Dominion and Trans-Canada Radio Networks. In its new role, CJBC will serve as an extension of the French Radio Network.

Summary of the Corporation's Position

(General)

The Corporation is licensed to operate CJBC until March 31, 1965. As the Board is aware, CJBC has been the key station of the CBC's Dominion Radio network since January, 1944. Another submission before this Board proposes that this function will cease on October 1st, 1962, with the consolidation of the Trans-Canada and Dominion networks.

The Corporation plans now, in the light of CJBC's changing circumstances, to introduce some changes in the station's programming. At the present time there are six English-language AM radio stations - - including CJBC and CBL - - competing for nighttime radio listeners in an area where television has captured the bulk of the available audience. English-language radio saturates the Toronto area. In addition to the program fare of CBL, CJBC, CKFH, CHUM, CKEY and CFRB, listeners can tune to several United States' stations. Then, too, there is FM for those equipped to receive it.

French-language broadcasts, on the other hand, are virtually non-existent in an area housing some 155,000 persons who understand the language and of whom 65,000 count French as their mother tongue. They are able to hear little or no broadcasting in the French language with the exception of a few programs provided by the CBC; The Trans-Canada radio network and the English TV network have made popular in the area the programs Chansonnettes, Time for French, Chez Helene and Speaking French.

Summary of the Corporation's Position

(Specific)

The Corporation is required to provide broadcast service to the largest possible number of Canadians in both French and English; to underline the bicultural character of the nation. This it does, as witness the French and English networks in television and radio.

In this regard, it is significant that French-speaking residents of Montreal and Quebec have at their disposal the programs of the English networks in addition to the French network service. This provides them with the opportunity to broaden their understanding of the English language and of their English-speaking compatriots. No such benefit accrues to the English-speaking population of the Canada's major English-language city. The Corporation feels that the institution of French programming on CJBC will contribute to developing national unity by promoting better understanding of French-speaking Canada and Canadians among the citizens of Toronto.

Since April 23rd, CJBC has been providing, on an experimental basis, a half-hour of news and commentary in French from Montreal, each week night starting at ten p.m. On Saturdays and Sundays a ten-minute newscast in French has been provided at ten p.m. On July 16 the half-hour week night service was increased to one hour with the addition of a nightly half-hour of a variety of programs from the French radio network, including light music, recitals by Canadian artists and other proven network programs.

Public reaction has been favorable and the Corporation has received a number of letters of encouragement from persons in various walks of life.

Our experience with this French programming on CJBC has provided information that will be useful in the future, not only in the Toronto area but for our entire French program service. It will be most helpful, for instance, in evaluating the merit of possible requests for extension of the French service to other English-speaking communities.

The Corporation wishes to emphasize its intention to introduce French programming in the Toronto area a step at a time. The first step was taken on April 23rd, the second on July 16th and it is now proposed that a third step be taken on October 1st of this year, increasing the budget of French programming to two hours each week night, starting at 9 p.m.

A complete program schedule has not yet been worked out for October 1st, but the listings will embrace a balance of news, information, public affairs, drama, music, sports and children's programming.

AUDIENCE SIZE

As all broadcasters are aware, television has taken and held a great proportion of the overall night-time audience. In the Toronto metropolitan area less than five percent of radio sets are in use between 9 and 11 p.m. and this small audience is shared at the moment by six Canadian AM radio stations, three Canadian FM stations and a number of American stations. As a result, audience sizes between 9 and 11 p.m. for radio stations are small, very small. Schedule 1 attached indicates that in the Spring of 1962 the Monday to Friday 9 - 11 p.m. average homes listening to radio stations in the Toronto area stood at:

CBL, 7,800; CFRB, 22,500; CFRB-FM, 5,000;
CHFI-FM, 4,000; CJBC, 2,600; CKEY, 4,600. These figures are derived from a BBM survey which did not show figures for non-member stations.

The Corporation cannot yet estimate or indicate the size of the audience it will eventually obtain for CJBC's changing night time schedule. But an interesting speculation is that CJBC's nightly French-language programming might attract as large and more loyal audience, because of its exclusive nature, than is obtained presently at night by most of the existing English-language radio stations in the Toronto area.

The Future

We believe we can most successfully introduce French programming in the Toronto area by doing so gradually.

The Corporation plans a developing service in the light of public acceptance and needs; sound growth towards a really worthwhile service in the French language for the residents of Toronto and environs. The CJBC licence expires on March 31, 1965; in the normal course of events it will come up for renewal about two and one-half years from now. At that time the Corporation will be prepared to place before the Board CJBC's record of performance and the experience gained during two and one-half years of developing a broadcast service in French in a city populated primarily by English-speaking persons but containing a significant French-speaking population.

This is a natural outgrowth of the CBC's responsibility to provide the fullest possible broadcasting service in both English and French to as great a number of Canadians as possible. This has been for more than twenty-five years the chief aim and object of the publicly-owned broadcasting service.

This Board knows as a result of nearly four year's experience with the Corporation's methods and performance that the service provided on CJBC will be nothing less than the best possible service that can be provided; the quality will be high, the performance will be sound and responsible.

The service proposed by the CBC is a growing, developing one, enriching the life and language of the French-speaking community in the Toronto area and adding a new dimension to the broadcasting service available to the English-speaking community.

An important aspect of the Corporation's proposal is that the life and thought of Canada's second largest city could be reflected on the French network eventually as it is today on the English networks. It is part of the Corporation's proposal for CJBC that it will participate in network programs as well as receiving and broadcasting network fare in the Toronto area.

The Corporation feels its proposal for the broadcasting of programs in the French language in Toronto is sound and good and requests permission to proceed on a permanent basis with the project already initiated with the Board's approval on an experimental basis.

Average Audience
for Toronto Radio Stations
9:00 p.m. - 11:00 p.m.

<u>Stations</u>	<u>Homes Listening</u>		
	<u>Monday to Friday Average</u>	<u>Saturday</u>	<u>Sunday</u>
CBL	8,000	8,400	5,000
CFRB	20,300	11,500	13,600
CHFI-FM	3,100	2,200	800
CHUM	(1)	(1)	(1)
CJBC	2,100	2,700	3,800
CKEY	2,300	1,500	1,600
CKFH	1,000	4,300	8,000

Source: Compiled from the BBM Radio Station Report, Fall 1961 Survey

(1) No figures are published for CHUM because it was established by BBM that the station conducted an unusual appeal to its listeners which may have distorted the results of the survey.

Statistics Department,
Ottawa,
July 23, 1962.

Average Audience
for Toronto Radio Stations
9:00 p.m. - 11:00 p.m.

<u>Stations</u>	<u>Homes Listening</u>		
	<u>Monday to Friday Average</u>	<u>Saturday</u>	<u>Sunday</u>
CBL	7,800	12,300	8,400
CFRB	22,500	10,900	12,800
CFRB-FM	5,000	3,100	2,500
CHFI-FM	4,000	2,200	4,200
CHUM	(1)	(1)	(1)
CJBC	2,600	1,700	3,900
CKEY	4,600	3,000	1,700
CKFH	(1)	(1)	(1)

Source: Compiled from the BBM Radio Station Report, Spring 1962 Survey

(1) Non-member stations are not shown in this Spring Survey.

Statistics Department,
Ottawa,
July 23, 1962.

CBC Information Services,
140 Wellington Street, Ottawa, Ontario.
Contact: John H. Smith 236-0311 Ext. 227
Date: December 3, 1963.

63-HO-32

FOR IMMEDIATE RELEASE:

OTTAWA — Radio station CJBC in Toronto will increase its CBC French Radio Network service effective Jan. 1, 1964.

CBC President Alphonse Ouimet made the announcement Tuesday following meetings of CBC directors in Toronto.

"The Corporation believes that French programming on CJBC will contribute to the development of national unity by promoting a better understanding of French-speaking Canada and Canadians among the listeners in the station's coverage area," said Mr. Ouimet.

Starting Jan. 1, CJBC will broadcast programs from the French Network from 7:00 to 10:30 p.m. EST, Monday to Friday, followed by The Learning Stage until sign off. On Saturdays and Sundays CJBC will carry French Network programming starting at 7 p.m. to closing at 1 a.m.

The changeover to complete daytime French programming will not take place until Oct. 1, 1964, when CJBC will become fully French, with the exception of The Learning Stage, in English, which will continue Monday to Friday.

Effective Oct. 1, French programming will consist of service from the CBC French Network except for 5½ hours a week which will originate with CJBC.

The CBC statistics department estimates that there are about 163,000 people who can speak French in the daytime coverage area of CJBC, of which 67,000 give French as their mother tongue. These figures are based on a projection of the last federal census, and show that it is the greatest minority of the country, French or English, not yet able to enjoy CBC service in their mother tongue.

Changeover to French network service on CJBC will not involve any increase in staff. English-speaking employees at CJBC will be absorbed in other departments of the CBC and no new positions will be created.

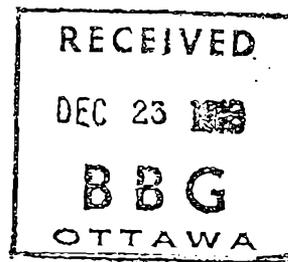
With consolidation of the CBC Dominion and Trans-Canada Radio Networks in October, 1962, CJBC, which had been the key station of the Dominion network, became a Toronto regional operation. Since April 23, 1962, some French programs have been carried on CJBC. At present CJBC broadcasts two hours of French programs from 9 to 11 p.m. Monday to Friday, plus a half hour on Saturdays and Sundays.

Canadian Broadcasting Corporation,
140 Wellington Street, Ottawa, Ontario.
Contact: J.D. Lusher 236-0311 Ext. 204
Date: December 20, 1963.

~~SECRET~~
400 CS Be-9.
63-HO-34

FOR IMMEDIATE RELEASE:

OTTAWA -- The following statement was issued today by R.C. Fraser,
Vice-President, Corporate Affairs of the Canadian Broadcasting
Corporation.



CJBC Fact Sheet

1. CBC required to provide national service in radio and television, in French and in English, to as many Canadians as possible in their mother tongue.
2. It is CBC responsibility to provide national service to minorities as well as majorities.
3. The 67,000 people in Toronto-Hamilton and surrounding areas who claim French as their mother tongue constitute the largest group of Canadians, French or English, not now receiving national service in their mother tongue.
4. Toronto is the only place in Canada with two CBC AM radio stations, CJBC and CBL.
5. CBL is the key station of CBC English-language national radio network. CJBC was established to be the key station of CBC Dominion network. This role ceased October, 1962, with consolidation of the two English-language national radio networks of the CBC.
6. Provision of French-language radio network service through CJBC least expensive and only technically possible means of reaching widely-scattered French-speaking population of Ontario.
7. CBC English-language radio network service will continue to be provided by CBL.
8. Provision of French network programming on CJBC requires no additional operating or capital expenditure.
9. No loss of jobs for CJBC employees.
10. Provision of French service in CJBC coverage area in the national interest and consistent with CBC's mandate from Parliament.
11. Provision of the service under consideration by CBC for several years. Mentioned by Fowler Commission in 1957, as well.

STATEMENT RE CJBC

Ways and means of providing French-language radio service for listeners in the Toronto area have been under study by the CBC for several years.

The Corporation is required to provide broadcast service to the largest possible number of Canadians. And it has been part of the CBC's mandate for the more than 25 years of its existence that this distinctive, Canadian service be provided in French and in English.

The CBC has, therefore, decided that it is in the national interest to move now towards extension of the full service of the French radio network into the Western and Southern Ontario area.

There is one way to do it and there is no other way. The Corporation is convinced that the only workable technical arrangement within reasonable financial limits is to use the CJBC transmitter. The French-speaking population for whom service must be provided is scattered all the way from the rim of Georgian Bay to Oshawa in the East and across to the Niagara Peninsula and the shores of Lake Erie. CJBC occupies the only available frequency, with the required power, capable of reaching these people.

The French-speaking population within the CJBC coverage area constitutes the largest group of Canadians--either English or French--still without national radio service in its mother tongue. This group includes 163,000 persons who understand French, of whom 67,000 count French as their mother tongue.

CJBC was established in 1944 as the key station of the CBC's Dominion network. This function ceased in October of last year with the consolidation of the two English language national radio networks of the CBC.

Since then, CJBC has operated in the daytime as a local station. During the evening hours it has been carrying some French programming and has been broadcasting some adult education programming on an experimental basis.

At the present time there are seven Canadian, English-language AM radio stations (CBL, CJBC, CHUM, CFRB, CKEY, CKFH and CHFI) serving Toronto, as well as a number of American and FM stations. English-language radio saturates the Toronto area. And CJBC has the smallest audience of the Canadian stations in the coverage area.

Toronto is the only city in Canada with two CBC AM stations broadcasting in the same language. This double English service is not justified in the light of the unfilled need for national broadcasting service in the French language. When CJBC becomes a French network station next October, the national service in English will still be available to listeners in the area on CBL.

Many people have expressed concern about the future of certain on-air personalities whose programs on CJBC have attracted a loyal following. This situation has been under study by management for several months and this study will be a continuing process. Everything possible will be done, bearing in mind CBL's network role, to ensure that these highly-qualified people will still be heard on CBC radio after October 1st, 1964.

The shift of the popular Don Simms program from CJBC to CBL has already been announced. Wherever possible, similar changes will be made. These will be announced in the months ahead.

No member of the CBC staff will be out of a job as a result of the switch-over. Normal staff turnover in other sections of Toronto's CBC operation will absorb those few members of CBC staff whose positions will be eliminated when CJBC moves to its new role.

The conversion of CJBC to a French-language operation was first seen as a definite possibility more than two years ago when plans were under consideration for consolidation of the radio networks. It became obvious then that when the networks were fused, the role of CJBC would be changed; it would no longer have a national English network purpose. On the positive side, however, it was seen that the long-sought solution to the problem of providing French radio service in the Toronto area was at hand. Surveys were conducted and a series of meetings held. It was decided to move gradually into a French-language operation. In April, 1962, a half-hour of French programming was introduced on CJBC. The widest publicity was given to this move and it was fully reported in the press. In July, 1962, the half-hour was increased to an hour.

In August, 1962, the CBC applied to the Board of Broadcast Governors at a public hearing,

"for authority to broadcast programs in the French language on CBC-owned English-language AM Radio Station CJBC in Toronto on a permanent basis."

The Corporation's brief to the BBG said:

"The Corporation proposes to broadcast two hours of French Radio Network programming each week night on CJBC effective October 1, 1962.

"Thereafter, the service in the French language will be developed, altered and extended where indicated."

This submission which was presented at a public hearing, covered by the press, said "The Corporation plans a developing service in the light of public acceptance and needs; sound growth towards a really worthwhile service in the French language for the residents of Toronto and environs."

The Corporation's decision to develop French programming on CJBC is no sudden development, no secret. Its intention to do so was expressed at the public hearing in August, 1962.

"This is a natural outgrowth of the CBC's responsibility," the brief to the SBC said, "to provide the fullest possible broadcasting service in both English and French to as great a number of Canadians as possible.

"The service proposed by the CBC is a growing, developing one, enriching the life and language of the French-speaking community in the Toronto area and adding a new dimension to the broadcasting service available to the English-speaking community."

The Board of Broadcast Governors approved this application in a public announcement. Again, this was more than a year ago.

Early this month, the Corporation announced a further increase in French programming on CJBC starting January 1st. French is to be broadcast on CJBC from 7 p.m. to 10.30 p.m. on weekdays and from 7 p.m. to sign-off on Saturday and Sunday. At the same time, the Corporation announced its intention to shift CJBC into a fully French network operation on October 1st, 1964. This followed a decision of the Corporation after careful consideration of all the many factors involved in such a move.

The change-over to French on CJBC is the least expensive and only technically possible means of bringing French service to the widely-scattered French-language population of the area. The move will not deprive anyone of the national radio service in English; this will continue to be provided by CBL. The coverage area of CBL includes 4,700,000 people. CJBC's signal is available to 4,200,000 people. The end result of the move will be that the full service of CBC's French and English radio networks will be made available to the people of Toronto and surrounding areas.

The conversion of CJBC to French will require no additional operating or capital funds.

A great deal of the programming to be provided on CJBC in its role as a French network station will be of interest to the English-speaking audience as well as those who speak French. Music, for instance, knows no language barrier. The French radio network at present broadcasts 57 hours a week of music; 31 hours of "light" and 26 hours of "serious" music. Forty-seven percent of the weekly schedule of the French network consists of musical programs that can be enjoyed by listeners of every language group. The remainder of the varied and comprehensive network's schedule can be enjoyed by French-speaking listeners and students of the language as well.

It is interesting to note that back in 1957 the Royal Commission on Broadcasting (Fowler Report) commented on possibility of providing French-language radio in the Toronto area.

"Unhappily," the Commissioners said, "many obstacles, financial and technical--mostly the former--thwart the extension of French-language radio service to the Toronto-Hamilton area and south-westward to Windsor. The obstacles are not insuperable, yet they are of such a magnitude as to cause one to halt for serious reflection. Desirable frequencies are all occupied and suitable ones could be secured only with difficulty unless, as for instance in Toronto, the CBC should turn to wider use the frequency occupied by its basic Dominion network station (CJBC). Cheap low-power and short radius relay transmitters, which render such acceptable service in small communities, are of limited efficacy in large urban centres because of the magnitude of local electrical interference."

The Commissioners said further that extension of CBC's French radio network to southern and western Ontario "is a project worthy of serious study and no effort of ingenuity should be spared to find, within reasonable financial limits, a workable technical arrangement."