Cohen, Dippell and Everist, P.C.

Before The
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In The Matter Of	)	
An Inquiry Into The Commission's	***)***	
Policies and Rules Regarding AM	***)***	***MM Docket No. 93-177***
Radio Service Directional Antenna	***)***	***RM 7594***
Performance Verification	***)***	

DISPATCH BROADCASTING GROUP
REPLY COMMENTS
TO THE FURTHER NOTICE

<u>Introduction</u>

These Reply Comments are prepared on behalf of RadiOhio Incorporated, licensee of Radio Station WBNS, assigned to Columbus, Ohio. Radio Station WBNS operates on an assigned frequency of 1460 kHz with licensed facilities of 1/5 kW DA-N. Radio Station WBNS current facilities were authorized in the late 1930's when the Columbus, Ohio urbanized area in the 1940 Census reflected a population of 306,087 persons contained in a land area of 39 square miles and an average population density of 7848 persons per square mile. The 1990 Census Bureau figures find the Columbus urbanized area possesses a total of 632,910 persons in a land area of 190.9 square miles and a population density of 3315 persons per square mile. In the last two years, two AM daytime-only stations have gone silent in the Columbus metropolitan area.

These Reply Comments address the Joint Comments[1] filed by the submission of National Association of Broadcasters and those comments filed by the firm of Glen Clark & Associates[2] and Potomac Instruments.[3]

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[1]Joint Comments of Broadcasters, Broadcast Engineering Consultants, and Equipment Manufacturers

[2]Supplemental Comments of Glen Clark & Associates

[3]Comments of Potomac Instruments, Inc.

Method of Moments

Further examination of the criteria proposed in the Joint Comments filing to evaluate candidate stations reflects a significant effort. This effort's thrust is to provide an assessment tool by stepped criteria which permit the user to determine whether a daytime, critical hours or nighttime directional facility is a potential candidate for the Method of Moments program analysis. The stepped assessment is provided in the eighteen criteria set forth in the Joint Comments. This comprehensive assessment list is to permit an alternative method for the determination of the directional pattern and to ensure that any station that is evaluated using the proposed criteria would not pose an unusual interference risk to other allocationally significant stations. This assessment process in order to be administratively effective must be able to provide assurance to the Federal Communication Commission ("FCC") and to the industry. That assurance must be in the public domain, yield comparable results by the FCC and industry. Further, it will uniquely identify any possible directional facility regardless of the mode of operation in any environmental situation and determine whether that directional array can conform to the requirements sufficient to permit the Method of Moments assessment to the user in lieu of the recently adopted partial and full proof rules as a result of MM Docket No. 93-177. Further, criteria must be developed such that directional arrays that have been found to meet the Method of Moments profile and found compliant and then are later compromised by failure to maintain any one of the eighteen criteria must revert to a predetermined operation that will assure compliance with its instrument of authorization.

In order to assist in the construction of Method of Moments criteria, these Reply Comments will review and identify what it believes to be actual situations in which the proposed criteria may not properly identify the directional station's behavior in response to environmental factors (Criteria 13 through 17) from an electric power line, a communications tower and a building structure. First to be examined is the reaction of a directional antenna system by the introduction of a potential reradiating source. These represent situations involving two, four, and six tower arrays. This effort is to complement the large body of knowledge and effort that are embraced by the proposed eighteen criteria in the Joint Comments. However, it suggests that in order to develop this understanding, further assessment of the criteria and a different philosophical approach based on additional engineering tools need to be examined. These stations were built and in operation prior to the introduction of the power line, communications tower and building. Therefore, based on actual experience, the following information is being furnished. The first station, commissioned in the early 1960s, is licensed to New London, Connecticut. At the time this facility was inaugurated it was a four-tower daytime parallelogram and a six-tower in-line array operated with a

transmitter power of 5 kW[4] on an assigned frequency of 1510 kHz. The second station is licensed to Louisville, Kentucky and operates with a four-tower parallelogram on an assigned frequency of 1080 kHz with a two-tower 5 kW daytime and four-tower 1 kW nighttime facility.

New London, Connecticut

During the operation of this licensed facility, a power line was built by New England Light and Power along the eastern side of the transmitter site. The power line orientation was in a generally north-south direction in the general area of the transmitter site and was in the direction of principal community. The initial construction of the power poles in the area of potential reradiation event were approximately 35 to 40 feet (10.7 to 12.2 meters) or 0.05 to 0.068 in height. The poles were of wooden construction and the elevated static wires were gapped to isolate the static lines and the lightning protection system on the power poles. A copper wire traversed the power pole to a ground rod. Detuning networks were successfully placed at the base of the pole in series with the copper wire. The distance of these power poles to the center of this transmitter site is approximately 0.69 km or within 3.58.

Based on the criterion proposed in No. 13, the power lines are not to exceed a height of 0.0758. Therefore, the maximum height predicted to be used and comply with Method of Moments criteria is 49.3 feet (15 meters).

While the daytime 4-tower pattern was somewhat affected based upon five monitor point observations[5], the nighttime array radiated fields adversely reacted at a number of the monitor points.[6] This 1510 kHz nighttime facility was authorized based upon protection to the dominant station located in Nashville, Tennessee.

Therefore, as shown by historical evidence, this is one situation in which if other criteria were met, data find that actual change in radiated field of the nighttime pattern was beyond that authorized in the instrument of authorization and it can be assumed that unacceptable interference would result to the dominant Nashville station.

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[4]Subsequently, the daytime power was later increased to 10 kW using the four tower parallelogram

[5]The 1510 kHz daytime proof radials numbered fourteen

[6]The 1510 kHz nighttime array was monitored along six radials and had a total of sixteen measurement radials.

Attached is an exhibit (Figure 1) which is based on a U.S.G.S. quadrangle map. This exhibit shows the relationship of the 1510 kHz transmitter site and a segment of the power line. A copy of the theoretical pattern (Figure 2) of the nighttime array is provided. As shown, the nighttime major lobe develops a radiated inverse distance field in the major lobe of 1561 mV/m/km. The minimum inverse distance field of the nighttime directional pattern is 15 mV/m/km. This represents a maximum to minimum ratio of 104 i.e., the maximum lobe has a field value that is 104 times the pattern minimum.

If Criterion 16 is assumed, the maximum tower height is 19.5 meters (64 feet). Either of the heights determined by Criterion 13 or Criterion 16 would not have been accurate with reference to potential reradiating structures.

Louisville, Kentucky
Communications Tower

A further historical situation arises where State of Indiana erected a communication tower in the general vicinity of the four-tower parallelogram which produced separate patterns--two-tower daytime and four-tower nighttime directional patterns. This self-supporting communications tower is approximately 200 feet (61 meters) in height and is located 0.67 km at an azimuth angle of N 87ºET from the transmitter site. Using Criterion 16 cited in the proposed rulemaking, the heights permitted for the daytime and nighttime patterns are in the range of approximately 52.4 meters (172 feet) to 58.3 meters (191 feet). In fact, the daytime directional pattern was severely compromised while the nighttime pattern was unaffected.

During the operation of the two-tower daytime facility at 5 kW and the four-tower nighttime facility, the communications tower was constructed. The daytime pattern was distorted beyond its licensed values and readjustment of the two-tower array could not retrieve the authorized pattern. Therefore, permission was obtained from the State of Indiana to place detuning system on the ground base tower. Once the detuning apparatus was installed and was adjusted the restoration of the pattern was achieved with the licensed parameters. Through the course of this effort, the nighttime facility was unaffected..

Therefore, the analysis model only provides a partial assessment of the potential from a reradiating source.

Building

A later time frame to the communication tower, a building was proposed having an approximate dimension of 17.4 meters (57 feet) by 69.5 meters (228 feet) and a height of 25.8 meters (84.5 feet). The location of the building was immediately adjacent to the transmitter site in the direction of each major lobe and approximately 0.23 km from the center of the array at an azimuth angle of N 123ºE. Preliminary field

tests[7] were devised to determine the extent of disruption to each pattern. The tests used a grounded tower having an approximate height of the building height were conducted on the inside of the transmitter property. Using two-way radios, observers were placed at critical monitor points for each pattern. The field test process was continued by raising and lowering the grounded base tower over a number of locations in the main lobe on the transmitter property.

No discernible impact to either the daytime or nighttime pattern was observed.

With the completion of the building, both directional patterns were scrutinized by switching ND/DA at each measurement point along all proof-of-performance radials. Several measurement teams performed measurements along the twelve daytime radials and fifteen nighttime radials. While no observable impact to the daytime directional patterns was observed, the nighttime antenna system range of operating parameters in which the nighttime system could operate was reduced. The building and other possible reradiating sources were investigated to ascertain if there was a reradiating presence from this new construction. None were identified. Therefore, the nighttime array while still able to perform within its instrument of operation was constrained in the flexibility of its operating parameters.

Attached is an exhibit (Figure 3) which is based on a U.S.G.S. quadrangle map. Figure 3A provides a photograph of the site with the building. This exhibit shows the relationship of the communications tower and building in relation to the four-tower directional array. A copy of the daytime theoretical (Figure 4) and the nighttime theoretical patterns (Figure 5) are provided.

The daytime pattern for 10 kW develops a radiated inverse distance field in the major lobe of 1705 mV/m/km. The daytime minimum inverse distance field of the daytime directional pattern is 140 mV/m/km. This represents a maximum to minimum ratio of **12.2**.

The use of Criterion 17 finds the building height could not exceed 19.9 meters (65 feet).

For the nighttime pattern, it develops an inverse distance radiated field in the major lobe towards the building of 595 mV/m/km. The nighttime minimum inverse distance field of the nighttime pattern is 9.7 mV/m/km. This represents a maximum to minimum ratio of 61.3. The use of Criterion 17 finds the building height could not exceed 1 meter. Either of the heights determined by Criterion 16 would not have been accurate with reference to a potential reradiating source.

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[7]It was believed that using a slender tower having the same approximate height would reradiate a greater signal level thereby representing the worst case.

Directional Patterns

It is common knowledge that there is a preponderance of highly suppressed directional patterns in use in the United States. The majority of the nighttime facilities will possess even more restrictive directional patterns. The FCC has stated a desire to lessen the administrative burden imposed by directional antenna systems. Directional antenna systems with less stringent protection constraints will be less subject to deviations due to environmental influences from power lines, bridges, buildings, towers, etc. This will help to foster even a larger pool of directional antenna systems which can potentially use the Method of Moments program.[8] Realtime transmitter and parameters and field values could be placed on a web page.[9] This would augment the current monitoring requirements imposed by the FCC Rules.[10]

As Class B (formerly regional status) WBNS is a classic example of a station which started as a 15 watt part-time station in 1922. According to station personnel, by the late 1930s, it was authorized to operate with its current licensed facilities. During that time, based upon data supplied by the U.S. Bureau of the Census, the following population and area data is supplied for the Columbus urbanized area.

Year	Population	Land Area (sq.mi.)	Average Density Persons Per Sq. Mi.
1940	306,087	39	7848
1950	375,901	39.4	9541
1960	471,316	89	5296
1970	539,677	134.6	4009
1980	564,871	180.9	3123
1990	632,910	190.9	3315
2000	711,470	**	**

**Unavailable

[8]It is noted that Potomac Instruments has indicated the prospect of independent realtime monitoring of the radiated field is possible. This could be valuable.

[9]Other parameters could be also displayed

[10]The conventional method of monitoring the array would take precedence in case of dispute or uncertainty over those parameters displayed on a web site.

As can be seen over the past 50 years, communities such as Columbus has experienced dramatic growth and the WBNS antenna system was designed for service in a different era.

A significant benefit in terms of service would accrue if during nighttime hours a methodology which approaches the intent of the FCC Rules was considered and adopted. Stations such as WBNS could increase their nighttime power and groundwave coverage while permitting a relaxation of the present null constraints. Further such an approach while making available a larger pool of Method of Moments candidates and thereby offering the prospect of increased FCC administrative efficiency and would allow some daytime-only stations to operate during nighttime hours.

Summary

Constructive efforts have been achieved in MM Docket No. 93-177 with the adoption of the new partial and full proof requirements. The Further Notice offers a forum whereby additional improvements can result which affords the FCC administrative efficiency while achieving important service gains.

Respectfully Submitted By,

Donald G. Everist

Date: September 7, 2001

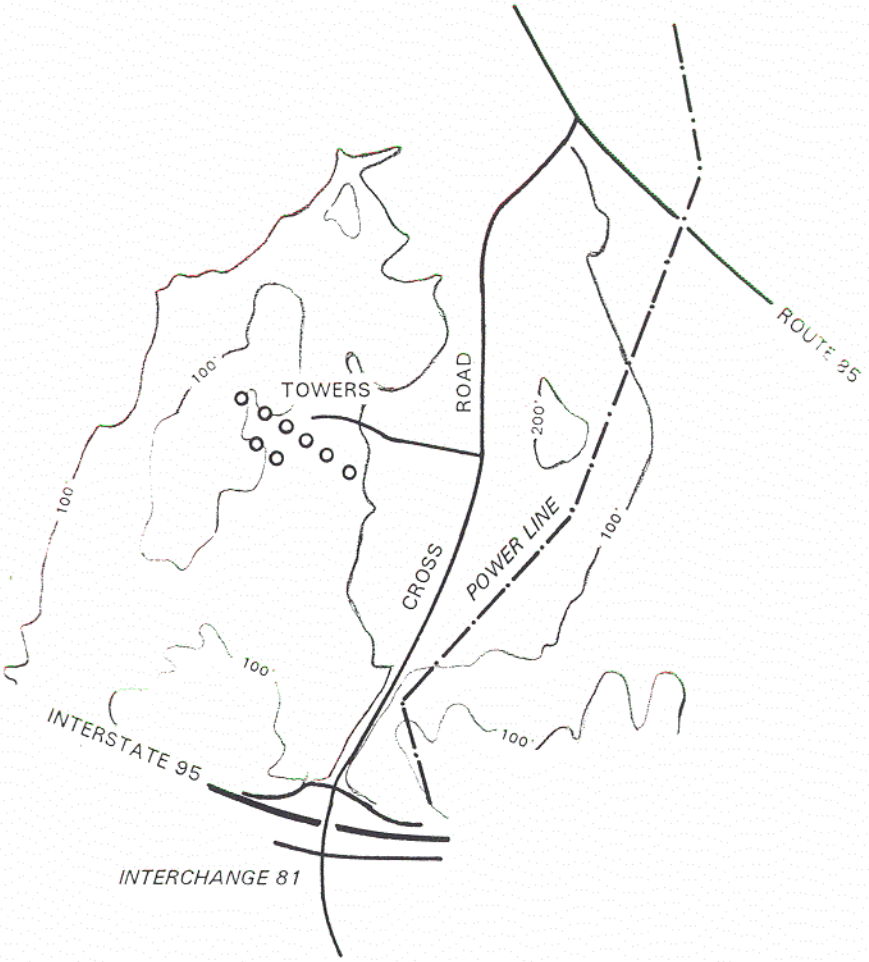
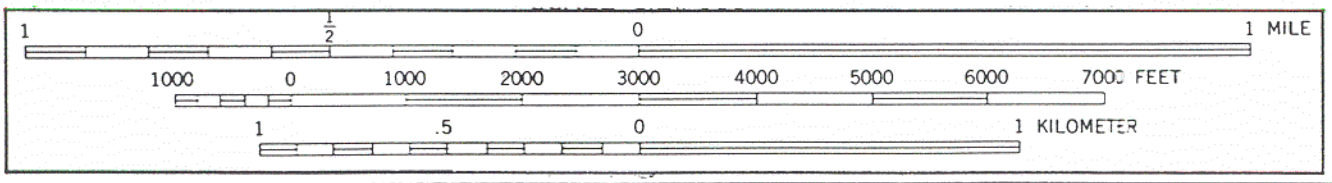


FIGURE 1
FOUR DAYTIME AND SIX TOWER NIGHTTIME
DIRECTIONAL ANTENNA AND TRANSMITTER SITE
IN RELATION TO
NEW ENGLAND LIGHT AND POWER TRANSMISSION LINE
1510 kHz 5/10 kW DA-2

NEW LONDON, CONNECTICUT

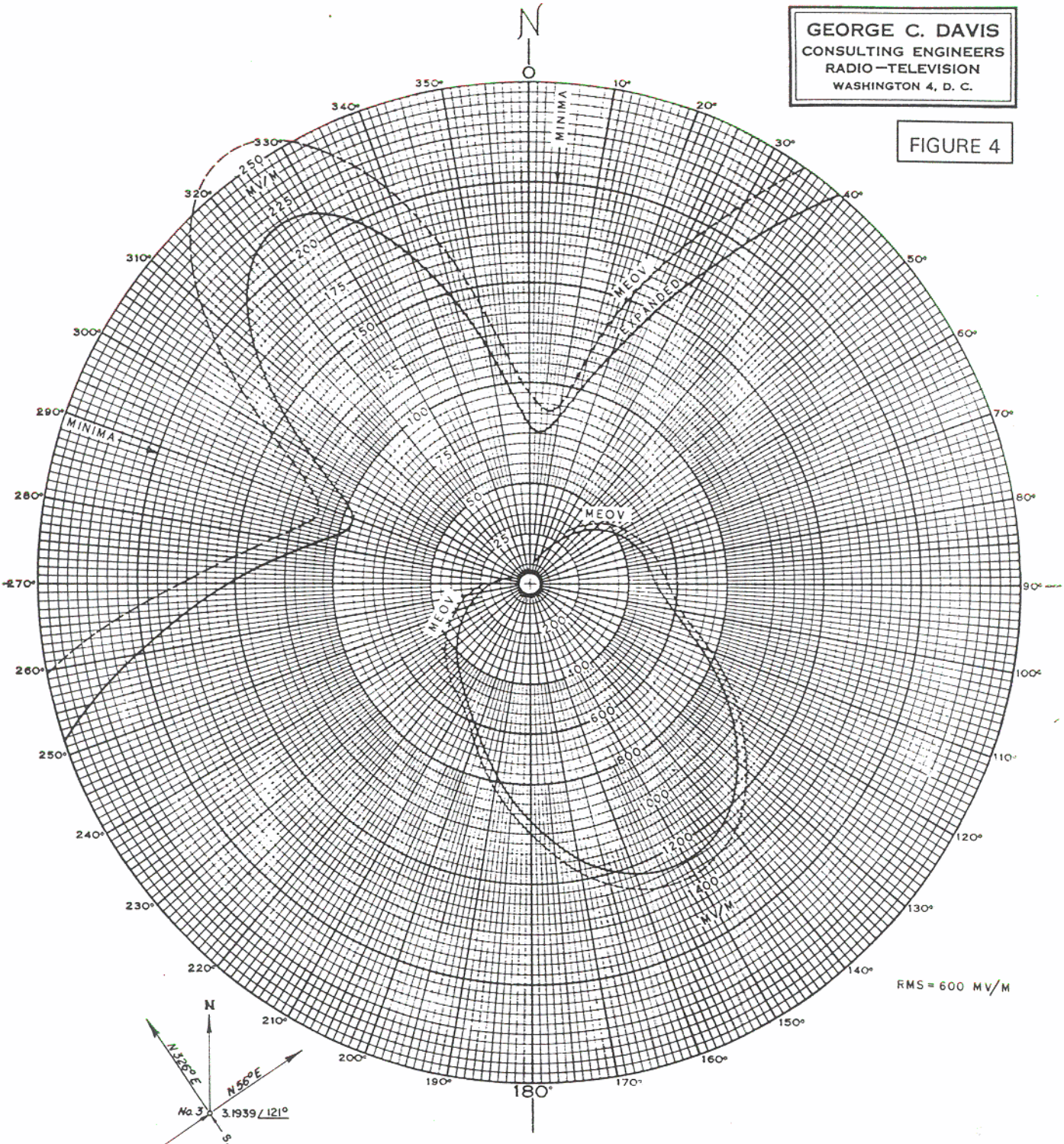
SEPTEMBER 2001

COHEN, DIPPELL AND EVERIST, P.C. Consulting Engineers Washington, D.C.

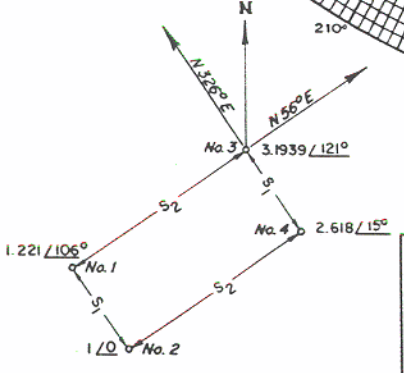


GEORGE C. DAVIS
CONSULTING ENGINEERS
RADIO—TELEVISION
WASHINGTON 4, D. C.

FIGURE 4



RMS = 600 MV/M



S_1 = 90° = 227.7'
S_2 = 191° = 484.9'
H = 90.5°: 230'

COMPUTED
HORIZONTAL PLANE RADIATION PATTERN
FOR PROPOSED DAYTIME OPERATION OF
WKLO, LOUISVILLE, KENTUCKY
1080 KC - 1/10 KW - DA-2
APRIL 1968

NORTH LATITUDE 38° 18' 28.9"
WEST LONGITUDE 85° 49' 45.3"

FIGURE 3A
PHOTOGRAPH SHOWING BUILDING AT
LOUISVILLE TOWER SITE
SEPTEMBER 2001

COHEN, DIPPELL AND EVERIST, P.C. **Consulting Engineers** **Washington, D.C.**

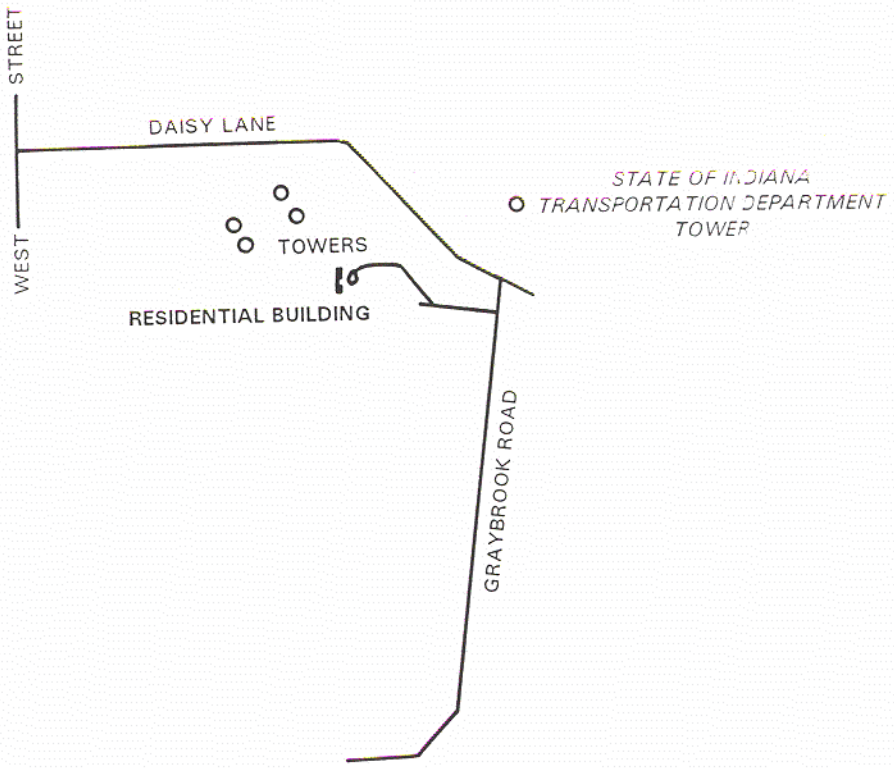
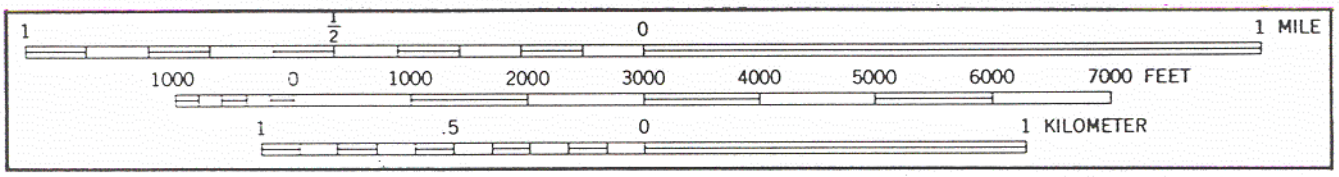


FIGURE 3
FOUR TOWER
DA-2 DIRECTIONAL ANTENNA AND TRANSMITTER SITE
IN RELATION TO
COMMUNICATIONS TOWER AND RESIDENTIAL BUILDING
1080 kHz 1/10 kW DA-2

LOUISVILLE, KENTUCKY

SEPTEMBER 2001

COHEN, DIPPELL AND EVERIST, P.C. Consulting Engineers Washington, D.C.



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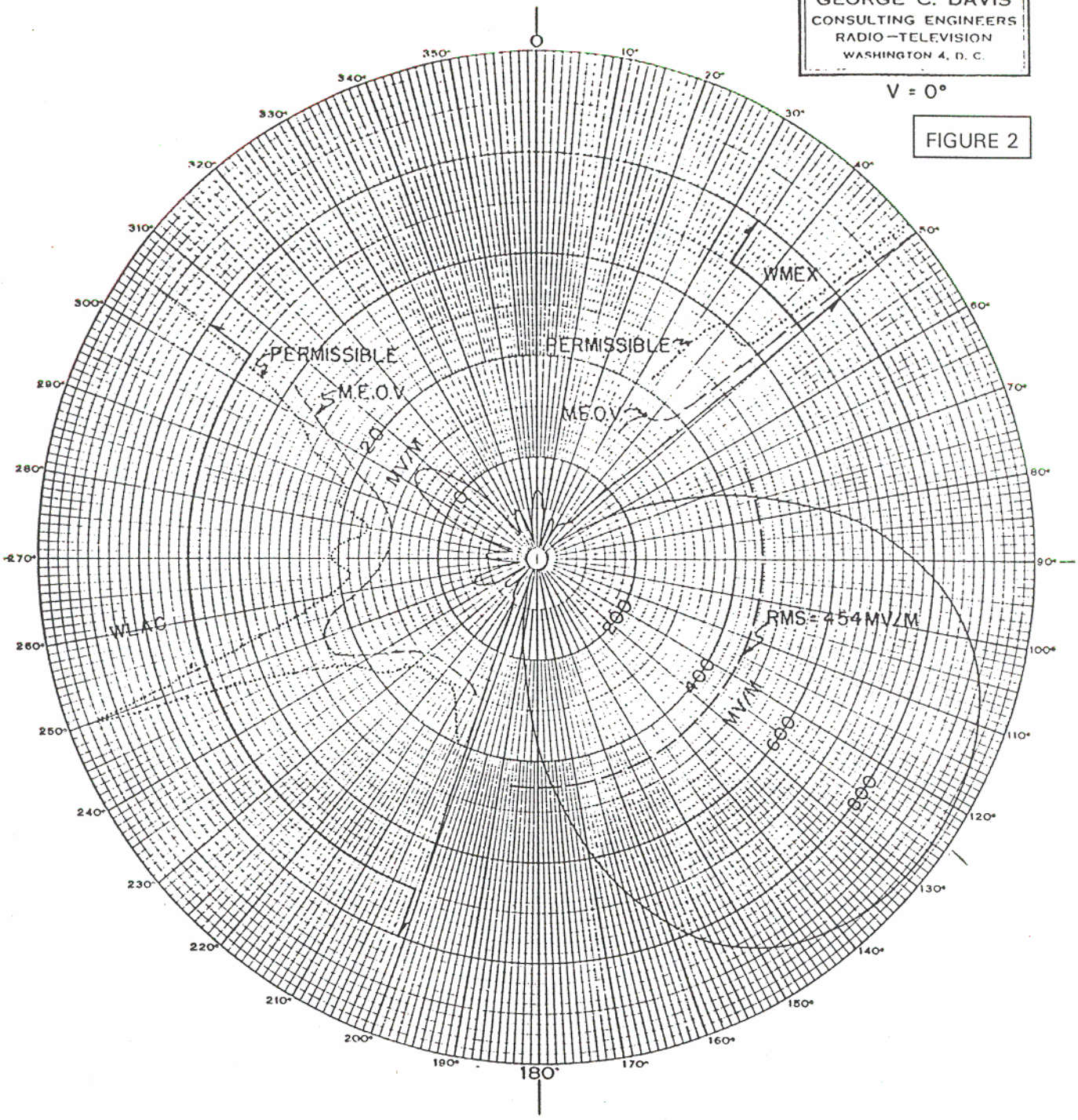
V = 0°

FIGURE 2



H = 220' = 121.8°

NIGHTTIME PATTERN

1/+151°	3.279/+18.29°	5.294/-113.83°	5.062/+113.83°	2.867/-18.29°	0.7996/-151°
N305°E ←●1	●2	●3	●4	●5	●6

S = 217' = 120°

COMPUTED
HORIZONTAL PLANE RADIATION PATTERN
FOR PROPOSED OPERATION OF
WNLC, NEW LONDON, CONN.
1510 KC, 5 KW, DA-2
JUNE 1960

NORTH LAT. 41° 22' 38"
WEST LONG. 72° 10' 02"

SEE DETAIL HORIZONTAL PLANE RADIATION PATTERN FOR MEOV FROM N 300° E TO N 355° E

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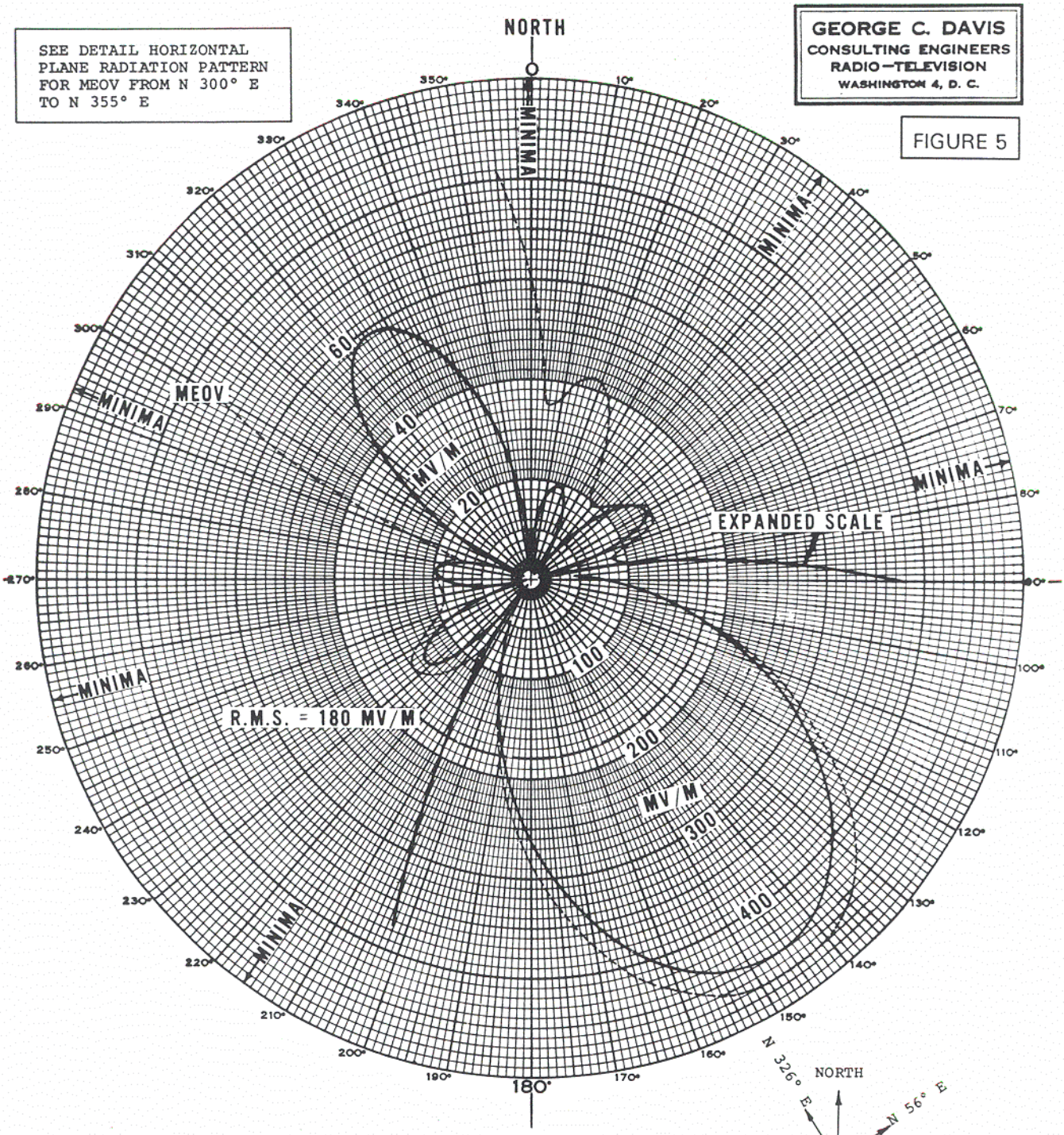
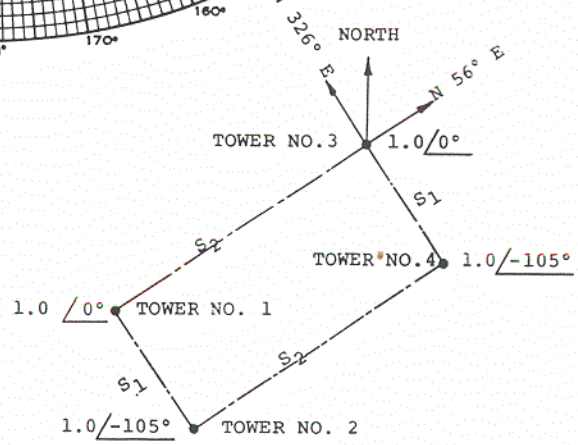
FIGURE 5



COMPUTED HORIZONTAL
PLANE RADIATION PATTERN
FOR PRESENT NIGHTTIME OPERATION OF
WKLO, LOUISVILLE, KENTUCKY
1080 KHz - 1/5 KW - DA-2
APRIL 1968



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