polarized component in any direction. The maximum-to-minimum ratio will be less than 15 dB. The maximum rate of change in gain will be 2 dB or less per 10 degrees in azimuth.

The nominal peak horizontal pattern gain for the antenna is estimated at about 1.8, which gives an overall peak power gain of 1.8 for two bays. With a major lobe gain of 1.8, the nominal transmitter output for 1.504 kW maximum horizontally polarized ERP is 0.913 kW with a transmission line efficiency of 91.5 percent.

The proposed antenna is a Jampro type JSCP-2R(DA) two bay directional circularly polarized FM antenna. The antenna will be equipped with radomes. Directionality will be achieved using parasitic elements.

The maximum azimuth pattern provided by the above limits is shown in Figure 7. A representative vertical pattern plot for a JSCP-2 antenna is given in Figure 8. The horizontally polarized azimuth pattern is given in tabular form in Table 1. The representative vertical pattern plot is given in tabular form in Table 2. Table 1 also gives the free space field strength in mV/m at 1 mile and the effective radiated power in dBk. Additional tabular ERP data at critical bearings is given as part of Table 5. The maximum-to-minimum ratio for the pattern in Figure 7 is 13.32 dB.

V. Terrain Data

The 0 to 16 kilometer ground elevation data for eight equally spaced radials at the proposed Reading site is given in tabular form in Table 3 and is taken from the NGDC 30-second data base in accordance with FCC §73.312(d). The ground elevations used in the calculation of the proposed coverage contours are also taken from the NGDC 30-second data base. The same method is used to calculate the elevations for pertinent co- and adjacent channel stations.

Data taken from the NGDC 30-second data base may differ by a few feet on specific radials when compared with prior

computations of average elevation for specific stations and radials. One purpose in using the same data base for both the proposed Reading and the relevant co- and adjacent channel stations is to reduce the computational variations among the different elevation calculations.

VI. Height Above Average Terrain

The proposed Reading center of radiation above mean sea level (CRAMSL) and center of radiation height above average terrain (HAAT) are computed as follows:

Tower Base	230.1 m	(755')	AMSL
Antenna Mid-Point	57.77	(189.5)	AGL
CRAMSL	287.9	(944.6)	AMSL
Avg. Terrain Elev.	215.9	(708.3)	AMSL
HAAT	72.0	(236.2)	

The height of the proposed Reading antenna radiation center above the average elevation of eight uniform radials is given in Table 4. Also shown in the table are the heights for radials toward the critical co- and adjacent channels. In accordance with FCC Rules and Regulations §73.212(b) the proposed Reading antenna height above average terrain is specified as 72 m.

VII. Proposed Contour

Table 5 shows the 1 mV/m F(50,50) contour in tabular form for the proposed Reading station. This data is plotted in Figure 9. Figure 9 is a composite portion of the St. Louis and Cincinnati Sectional Aeronautical Charts showing the 1 mV/m F(50,50) contour for the proposed Reading station. The cardinal radials along which the profiles are measured are also shown in Figure 9.

VIII. Population and Area Data

The area within the 1 mV/m contour for the proposed Reading station is 453.8 square kilometers (175.2 square miles). The population within the 1 mV/m contour for the proposed Reading station is 518,794 based on the corrected 1980 census.

Population and area calculations were made using the Dataworld POPCOUNT computer code. Past experience with this code has indicated acceptable accuracy when compared with techniques using a calibrated compensating polar planimeter in the method described in FCC §73.525(e)(2). The printout of the population tabulation by minor civil division for the proposed Reading station is given in Table 6.

IX. Blanketing Interference

The 115 dBu blanketing contour for the proposed Reading station is given in Table 7 and is calculated in accordance with FCC §73.318. The blanketing contour is plotted in Figure 1. There are no known government receiving stations within the blanketing contour.

A case-by-case resolution is proposed for any complaints which are received. Station personnel will investigate such complaints and provide assistance in eliminating fundamental frequency overload problems. Traps, down lead replacement, and similar remedies are expected to be sufficient. Difficult cases will be referred to a qualified technical consultant.

The applicant intends for no one to be denied normal reception of broadcast, business, or other communications due to the operation of the proposed facilities. Because of the low power of the proposed station, little, if any, problem with blanketing is anticipated.

X. Potential Interference to Other Stations

Table 8 is a site survey showing the closest AM, FM, TV, and other tower locations with respect to the proposed Reading

facility. No FM or TV broadcast stations are located within 200 feet of the proposed site. The nearest FM is WJVS at a distance of 7.50 km. The nearest TV is WCPO-TV at a distance of 12.29 km. In accordance with FCC §73.316(d) no additional showing as to the possible effect of the proposed Reading station on TV or other FM stations is needed.

The nearest AM Broadcast station is a three tower directional, WSAI, at a distance of 8.94 km. There are no AM Broadcast stations within 3.2 km (2 miles) of the proposed station. Because of the large geographic separations, there should be no significant impact on any AM Broadcast field strength contours because of the proposed antenna.

XI. Allocation Study Including I.F. Interference

Table 9 shows the FM Broadcast co- and adjacent channels which must be investigated for the proposed Reading station. Table 9 is a single channel study for the proposed Reading station based on Class A operation. Table 9 includes the separation requirements for limiting intermediate frequency (I.F.) interference and for TV Channel 6 interference. Stations which do not meet the geographical separation requirements for full Class A operation of the proposed Reading station are marked on the right as "SHORT."

Table 9 shows the proposed Reading station meets the requirements for limiting intermediate frequency (I.F.) interference. TV Channel 6 interference is discussed below in Section XII.

As can be seen from Table 9, additional analysis is needed on twelve co- and adjacent channel stations to verify the proposed Reading station meets the noncommercial educational FM requirements for protection from interference. These twelve stations are listed below:

Station	Location	Channel
WCNE	Batavia, OH	204
WOBO	Batavia, OH	204
WLMH	Morrow, OH	206
WVXR*	Richmond, IN	207
WFPL	Louisville, KY	207
WHSS	Hamilton, OH	208
WDPS	Dayton, OH	208
WDPR	Dayton, OH	208
WDPR/CP	Dayton, OH	208
WVXM/CP*	West Union, OH	208
WNKU	Highland Heights, KY	209
WLHS	West Chester, OH	210

* Call recently assigned.

Stations WCNE and WOBO share channel 204 with separate facilities. Stations WDPS and WDPR share channel 208 with common facilities, although station WDPR has a construction permit granted in March of 1988 to establish separate facilities with increased power and height. Stations WOBO, WNKU, and the WDPR construction permit employ directional antennas.

As it turns out, if the WOBO 1 mV/m, WFPL 0.1 mV/m, WNKU 10 mV/m, and WLHS 1 mV/m contours are protected by the proposed Reading station, the remaining contours and stations are also protected. The critical contours for stations WOBO, WFPL, WNKU, and WLHS are considered first, and then a showing is made that the other contours and stations are protected by the resulting proposed Reading contours.

For each station, the terrain elevation is calculated using the NGDC 30-second data base. The effective antenna height in the direction of the radial being considered is calculated by taking the effective average height (HAAT) from Table 9, adding the average terrain elevation for eight uniform radials, and

subtracting the average terrain elevation for the radial being considered.

For WOBO, radials on either side of the direct bearing toward the proposed Reading station are investigated in detail in order to include the effect of the WOBO directional antenna. The ERP for WOBO is taken from the WOBO azimuth pattern plot in the Jampro report dated September 28, 1987 and submitted to the FCC as an attachment to WOBO's Application for License BLED-880202KB. A copy of the plot is included herein as Figure 10 for reference.

The effective antenna heights for WOBO are given in Table 10. The effective antenna heights for the proposed Reading station are given in Table 11. The 1 mV/m contours are calculated using the F(50,50) curves, while the 100 mV/m undesired contours are calculated using the F(50,10) curves. For distances below those given in the F(50,10) curves, the F(50,50) curves are used. For distances below 1.61 km, the FCC's TVFMFS code uses the free space formula.

The results are given in Table 12. As can be seen in Table 12, the proposed Reading station limits vary as a function of bearing to WOBO. Table 12A shows the limits on the proposed station's 100 mV/m contour because of the WOBO 1 mV/m contour. Table 12B shows the limits on the proposed station's 1 mV/m contour because of the WOBO 100 mV/m contour. The 1 mV/m WOBO contour imposes the more severe limit (Table 12A).

The ERP data in Table 12A is plotted in Figure 4 as a function of bearing from the proposed Reading station using a cubic spline interpolation for the eleven radials between 85.5 and 125.3 degrees that are given in the table. Figure 4 shows the maximum proposed station ERP in kilowatts allowed by the WOBO 1 mV/m contour. The lowest limit occurs at 103.9° and is 0.437 kW.

The rate of change for the curve in Figure 4 is less than 0.2 dB per degree when the proposed Reading station's allowed 100 mV/m contour is less than 1.61 km. Because of the shift in code TVFMFS from free space to tabular interpolation at 1.61 km,

the rate of change for the data with asterisks in Table 12A is much more than 0.2 dB per degree. A transition point of 85.0° is arrived at by linear interpolation for 1.60 km between 84.5° (1.61 km) and 85.5° (1.59 km). A transition point of 126.7 degrees is arrived at by linear interpolation for 1.60 km between 125.3° (1.55 km) and 127.5° (1.63 km).

At 85.0 degrees, the ERP limit for the proposed Reading station from Figure 4 is 0.519 kW, and at 126.7 degrees, the ERP limit is 0.492 kW. For the angles immediately outside these critical angles, the 0.2 dB per degree rate of change limits the ERP for the proposed station. (The rate of change limit is not considered in Figure 4.)

For WFPL, the same basic process is used. Radials on either side of the direct bearing toward the proposed Reading station are investigated in detail. While WFPL does not use a directional antenna, terrain variations produce some minor variations in contour distance versus bearing. Only the WFPL F(50,10) 0.1 mV/m contour is critical, as will be shown later.

The effective antenna heights for WFPL are given in Table 13. The effective antenna heights for the proposed Reading station are given in Table 14. The 1 mV/m contour is calculated using the F(50,50) curves, while the 0.1 mV/m undesired contour is calculated using the F(50,10) curves.

The results are given in Table 15. As can be seen in Table 15, the proposed Reading station limits vary as a function of bearing to WFPL. The table shows the limits on the proposed station's 1 mV/m contour because of the WFPL 0.1 mV/m contour.

The ERP data in Table 15 is plotted in Figure 6 as a function of bearing from the proposed Reading station using a cubic spline interpolation for the twenty-three radials between 197.1 and 242.1 degrees that are given in Table 15. Figure 6 shows the maximum proposed Reading station ERP in kilowatts allowed by the WFPL 0.1 mV/m contour. The lowest limit occurs at 227.4° and is 0.176 kW.

The rate of change for the curve in Figure 6 is less than 0.2 dB per degree from 200.3 to 238.2 degrees. At 200.3 degrees, the ERP limit is 0.448 kW, and at 238.2 degrees, the ERP limit is 0.292 kW. For the angles immediately outside these critical angles, the 0.2 dB per degree rate of change limits the ERP for the proposed Reading station. (The rate of change limit is not considered in Figure 6.)

For WNKU, radials on either side of the direct bearing toward the proposed Reading station are investigated in detail in order to include the effect of the WNKU directional antenna. The ERP for WNKU is taken from the WNKU azimuth pattern plot in the Electronics Research, Inc. report dated October 30, 1984 and is believed to be the latest WKNU license data. A copy of the plot is included herein as Figure 11 for reference.

The effective antenna heights for WNKU are given in Table 16. The effective antenna heights for the proposed Reading station are given in Table 17. The 1 mV/m contours are calculated using the F(50,50) curves, while the 10 mV/m undesired contours are calculated using the F(50,10) curves. For distances below those given in the F(50,10) curves, the F(50,50) curves are used.

The results are given in Table 18. As can be seen in Table 18, the proposed limits for the Reading station vary as a function of bearing to WNKU. The upper half of the table shows the limits on the proposed Reading station's 10 mV/m contour because of the WNKU 1 mV/m contour. The lower half of the table shows the limits on the proposed station's 1 mV/m contour because of the WNKU 10 mV/m contour. The 10 mV/m WNKU contour imposes the more severe limit (the lower half of Table 18).

The ERP data in the lower half of Table 18 is plotted in Figure 5 as a function of bearing from the proposed Reading station using a cubic spline interpolation for the nine radials between 171.5 and 184.6 degrees that are given in the Table 18. Figure 5 shows the maximum proposed station ERP in kilowatts

allowed by the WNKU 10 mV/m contour. The lowest limit occurs at 179.9° and is 0.490 kW.

The rate of change for the curve in Figure 5 is less than 0.2 dB per degree from 173.2 to 180.3 degrees. At 173.2 degrees, the ERP limit is 0.540 kW, and at 180.3 degrees, the ERP limit is 0.494 kW. For the angles immediately outside these critical angles, the 0.2 dB per degree rate of change limits the ERP for the proposed Reading station. (The rate of change limit is not considered in Figure 5.)

For WLHS, the same basic process is used, but the terrain effects are more pronounced. Radials on either side of the direct bearing toward the proposed Reading station are investigated in detail. Like WFPL, WLHS does not use a directional antenna. Only the WLHS F(50,50) 1 mV/m contour is critical, as will be shown later.

The effective antenna heights for WLHS are given in Table 19. The effective antenna heights for the proposed Reading station are given in Table 20. The 1 mV/m contour is calculated using the F(50,50) curves, while the 100 mV/m undesired contour is calculated using the F(50,10) curves. For distances below those given in the F(50,10) curves, the F(50,50) curves are used. For distances below 1.61 km, the TVFMFS code uses the free space formula.

The results are given in Table 21. As can be seen in Table 21, the proposed Reading limits vary as a function of bearing to WLHS. The table shows the limits on the proposed station's 100 mV/m contour because of the WLHS 1 mV/m contour.

The ERP data in Table 21 is plotted in Figure 3 as a function of bearing from the proposed Reading station using a cubic spline interpolation for the twenty-three radials between 301.4 and 68.5 degrees that are given in Table 21. Figure 3 shows the maximum proposed station ERP in kilowatts allowed by the WLHS 1 mV/m contour. The lowest limit occurs at 358.6° and is

0.070 kW. This is also the absolute minimum ERP for the proposed station.

The rate of change for the curve in Figure 3 is less than 0.2 dB per degree from 308.3 to 65.0 degrees. At 308.3 degrees, the ERP limit is 0.143 kW, and at 65.0 degrees, the ERP limit is 0.320 kW. For the angles immediately outside these critical angles, the 0.2 dB per degree rate of change limits the ERP for the proposed station. (The rate of change limit is not considered in Figure 3.)

The other significant contours are analyzed in detail in Tables 22 through 33. Table 22 gives the direct bearing and height parameters used in the analysis. For each station, the terrain in the direction of the proposed Reading station is calculated using the NGDC 30-second database. The terrain values and resulting effective height values are shown in Tables 23 through 31.

The last two columns in Table 22 give the direct bearing from the proposed Reading station and the proposed Reading station effective height along that bearing. The bearing from the proposed Reading station is taken from Table 9. The proposed Reading station effective height along each bearing is taken from Table 4.

Table 32 shows that the previously established ERP limits for the proposed Reading station will not cause harmful interference to any listed station's F(50,50) 1 mV/m contour. Table 33 shows the previously established limits for the proposed Reading station F(50,50) 1 mV/m contour will not receive harmful interference from any of the stations shown. The undesired dBu values in Tables 32 and 33 are taken from FCC §73.509(a). The contours are based on the F(50,50) and F(50,10) curves in FCC §73.333.

A summary of the interference study results is given in Table 5. This table gives the critical angles for all

transitions in the allowed limits, along with the cardinal radials and the bearings to all stations considered above.

The pertinent contours for the critical co- and adjacent channel stations WLHS, WOBO, WNKU, and WFPL are plotted in Figure 9 using the tabular results developed above. Inspection of the data in Tables 32 and 33 suggests the possibility that the WHSS contours could also be critical since they have the smallest margin of any of the other stations. These contours are also plotted in Figure 9. In no case will the proposed station cause or receive harmful interference.

XII. TV Channel 6 Predicted Interference

This section shows that there is no predicted TV Channel 6 interference area due to the proposed Reading station. In accordance with FCC §73.525(a)(1) the radius of TV Channel 6 protection for NCE-FM Channel 207 is a distance of 196 km (121.2 miles). A list of the Channel 6 TV licenses within 196 km is given in Table 9. The three stations to be considered are WSYX in Columbus, Ohio, a WSYX application, and WRTV in Indianapolis, Indiana. The three Low Power Television Stations, W06BC, W06AY, and W06BK, are considered to be secondary service and do not receive protection from NCE FM Broadcast Stations.

The WSYX application is for an increase in HAAT at a location slightly closer to the proposed Reading station, so protection to the WSYX application also provides protection to the current WSYX license.

For the WSYX application, the effective antenna heights are given in Table 34. The effective antenna heights for the proposed Reading station are given in Table 35. The predicted interference area includes only the area within the TV Channel 6 Grade B (47 dBu) contour. Table 36 shows the distance and bearing to the WSYX application's 47 dBu contour both from WSYX and from the proposed Reading station.

The 47 dBu contour is calculated using the F(50,50) curves given in Figure 9 of FCC §73.699 as calculated using the FCC code TVFMFS. The maximum allowed field strength from the proposed Reading station that can intersect the WSYX application's 47 dBu contour without causing harmful interference is found by adding the TV Channel 6 field strength (47dBu) to the undesired-to-desired (U/D) signal ratio for Channel 207 from Figure 1 of FCC §73.599. The resulting value is 67.4 dBu. The 67.4 dBu undesired contour is calculated using the F(50,10) curves given in Figure 1a of FCC §73.333 as calculated using the FCC code TVFMFS. For distances below those given in the F(50,10) curves, the F(50,50) curves in Figure 1 are used.

The results are given in Table 36. As can be seen from Table 36, the 67.4 dBu contour from the proposed Reading station does not intersect the 47 dBu contour from the WSYX application, so there is no TV Channel 6 predicted interference area from the proposed Reading station to either the WSYX application or to WSYX.

A similar result is obtained for WRTV. For WRTV, the effective antenna heights are given in Table 37. The effective antenna heights for the proposed Reading station are given in Table 35. Table 38 shows the distance and bearing to the WRTV 47 dBu contour both from WRTV and from the proposed station. Table 38 also shows the distance to the proposed Reading station's 67.4 dBu contour. As can be seen from Table 38, the 67.4 dBu contour from the proposed Reading station does not intersect the 47 dBu contour from WRTV, so there is no TV Channel 6 predicted interference area from the proposed Reading station to WRTV.

The 47 dBu contours for WSYX/APP and WRTV, together with the 67.4 dBu contours for the proposed Reading station, are plotted in Figure 9.

XIII. Environmental Impact

The environmental impact of the proposed Reading station has been evaluated under FCC Rules and Regulations §1.1307. The location of the proposed facility is not in an officially designated wilderness area or wildlife preserve. The proposed facility will have no known impact on districts, sites, buildings, structures or objects significant in American history, architecture, archeology or culture, that are listed in or eligible for listing in the National Register of Historic Places.

The impact of the proposed Reading station on the exposure of humans to radiofrequency radiation is considered in the following subsection. Based on these results the proposed station is excluded from environmental processing.

A. RFR Compliance

This section evaluates the proposed Reading station for compliance with FCC-specified guidelines for human exposure to radiofrequency radiation. The evaluation is in accordance with FCC §1.1307(b) and OST Bulletin No. 65 (October 1985).

The proposed tower base is at or above the level of the surrounding terrain. The current ANSI radiofrequency protection guide (RFPG) for FM Broadcast is 1.0 mW/cm². For the proposed station, the center of radiation is at 57.77 m (189.5') AGL. Using circular polarization and assuming the maximum radiation of 1.50 kW in both the horizontal and vertical, equation (4) on page 8 of OST No. 65 gives a worst case upper limit of

$$S = \frac{(2.56)(1.64)(3000)(1000\ \text{mW/W})}{4\pi\ (5{,}777\ \text{cm})^2}$$

$$S = 0.03\ \text{mW/cm}^2$$

or 3 percent of the RFPG. The proposed Reading station is therefore in compliance with ANSI recommendations.

Occupational exposure will be controlled by scheduling work in close proximity to radiating elements when the transmitter is operating at reduced power or is shut down.

XIV. Certification

Louis A. Williams, Jr. certifies that he is a consulting engineer doing business since 1970 as Louis A. Williams, Jr. and Associates with offices at 2092 Arrowood Place, Cincinnati, Ohio 45231. He holds a degree of Bachelor of Science in Humanities and Engineering from the Massachusetts Institute of Technology. He is a licensed Professional Engineer in Ohio (#33727) and Kentucky (#7374) and holds a General Radiotelephone license (PG-19-19343).

The foregoing report entitled "Engineering Exhibit Supporting the Application of the President and Board of Trustees of The Miami University, Oxford, Ohio for a New Noncommercial FM Broadcast Station in Reading, Ohio" was prepared by him personally or under his supervision and is true and accurate to the best of his belief and knowledge.

Louis A. Williams Jr.

Louis A. Williams, Jr., P.E.

Date: April 6, 1989

STATE OF OHIO
LOUIS
A.
WILLIAMS, JR.
33727
REGISTERED
PROFESSIONAL ENGINEER

Original stamped in purple.

FIGURE 1

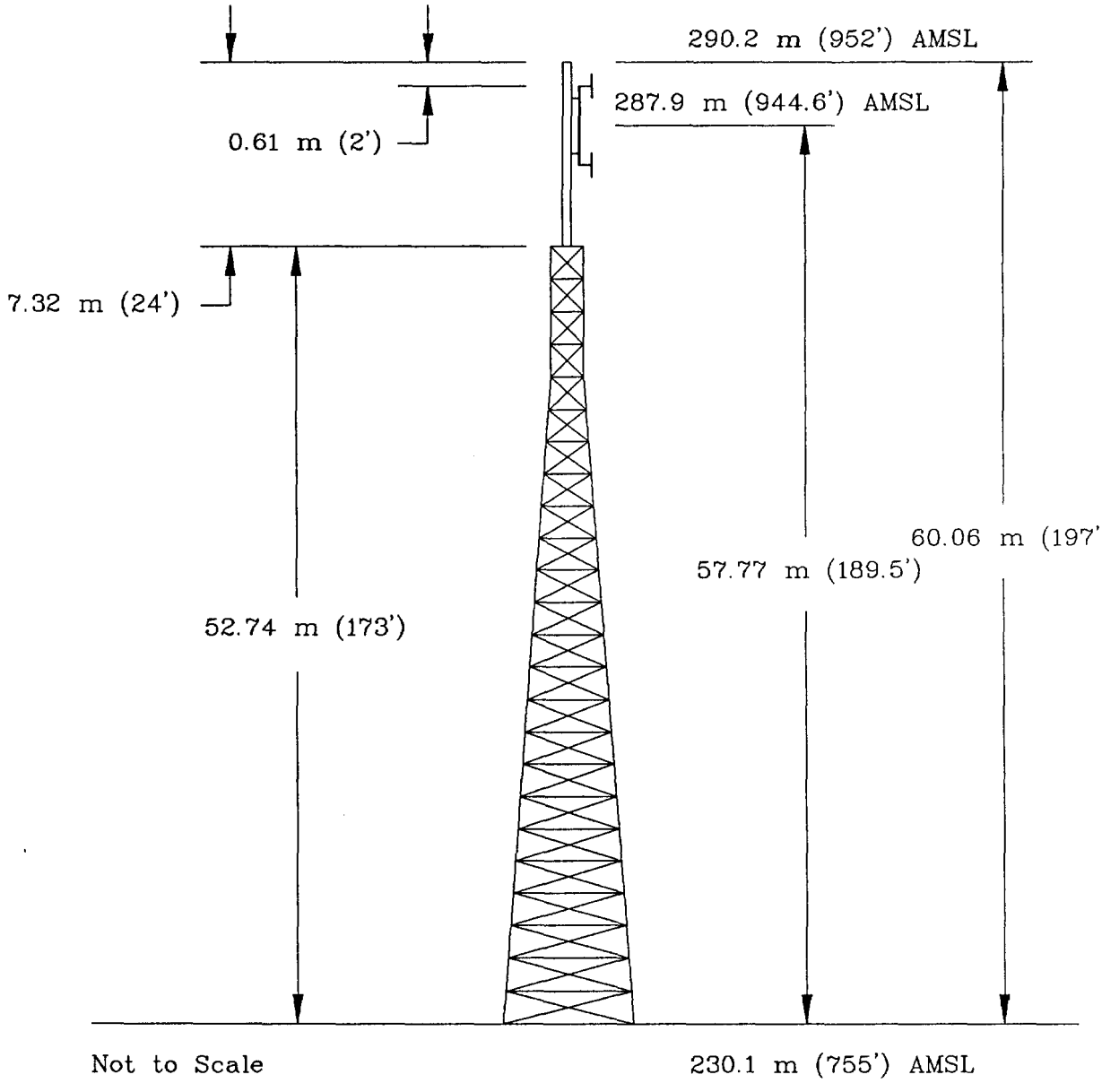
AT

END OF EXHIBIT

FIGURE 2

VERTICAL PLAN SKETCH OF ANTENNA
Proposed Reading, Ohio

Channel 207 1.50 kW ERP 72 m AAT



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March 1989

FIGURE 3

Maximum Allowed ERP toward WLHS
(excluding the 2 dB per 10 degree rate of change limit)

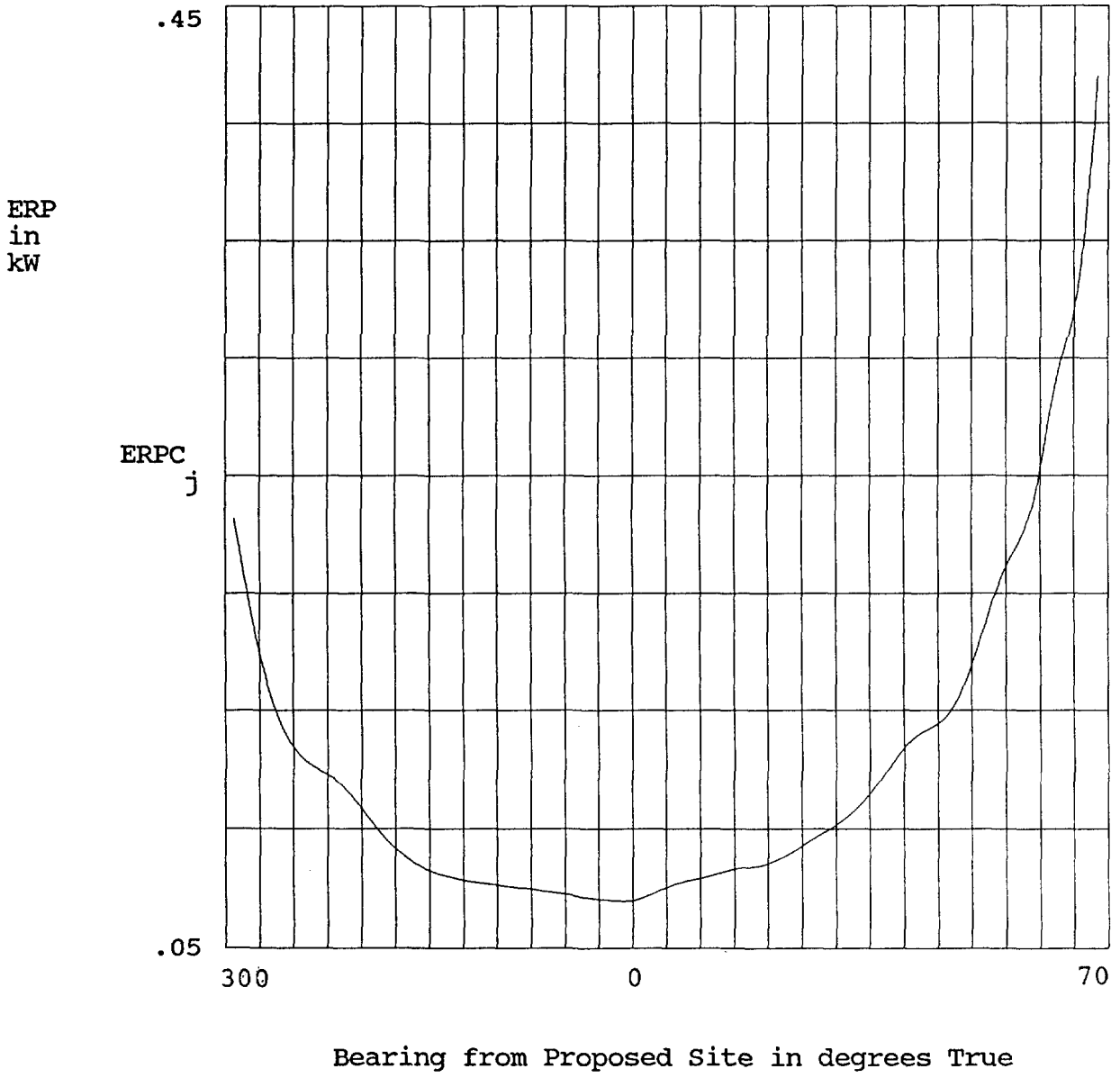

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FIGURE 4

Maximum Allowed ERP toward WOBO
(excluding the 2 dB per 10 degree rate of change limit)

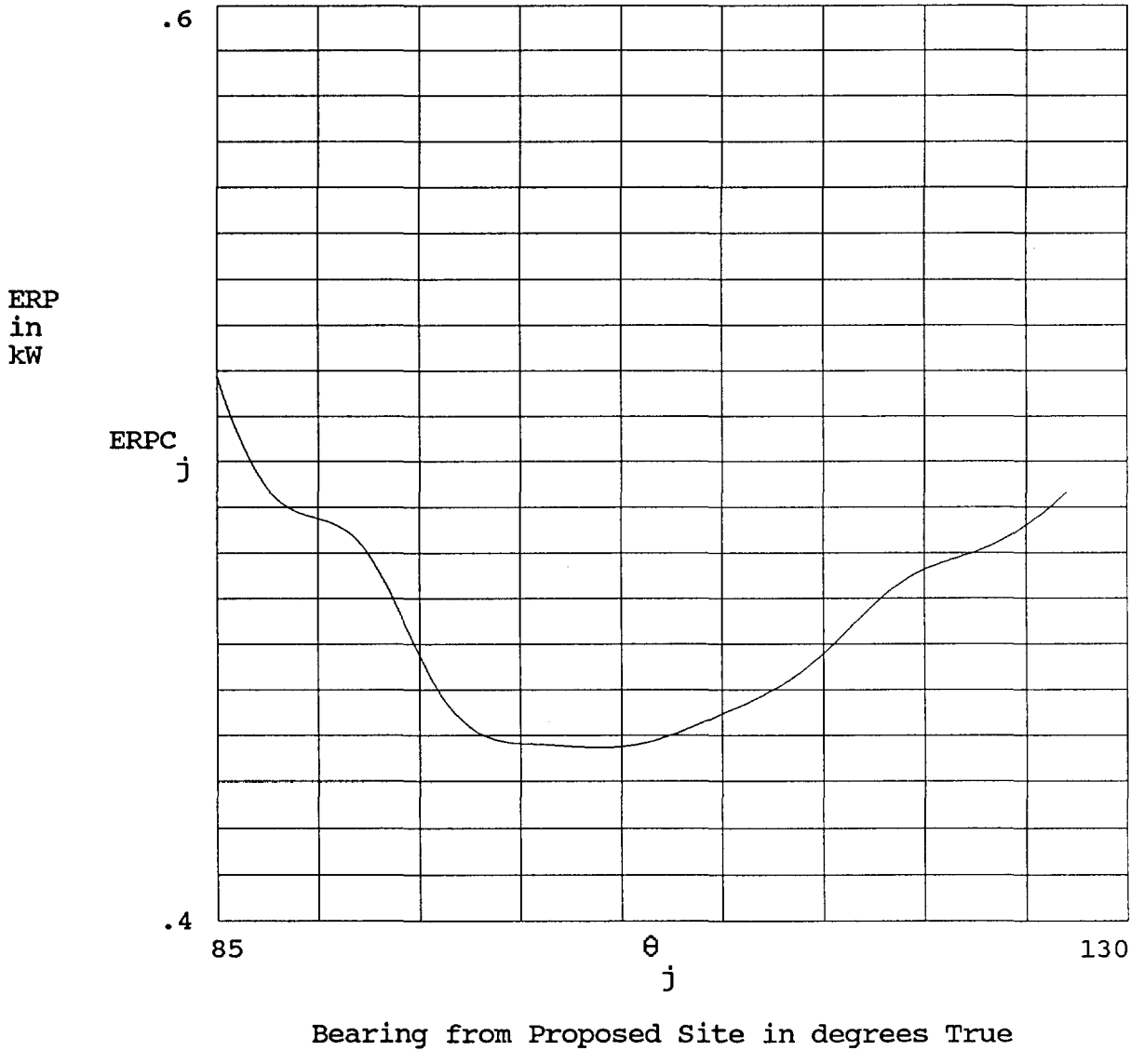

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FIGURE 5

Maximum Allowed ERP toward WNKU
(excluding the 2 dB per 10 degree rate of change limit)

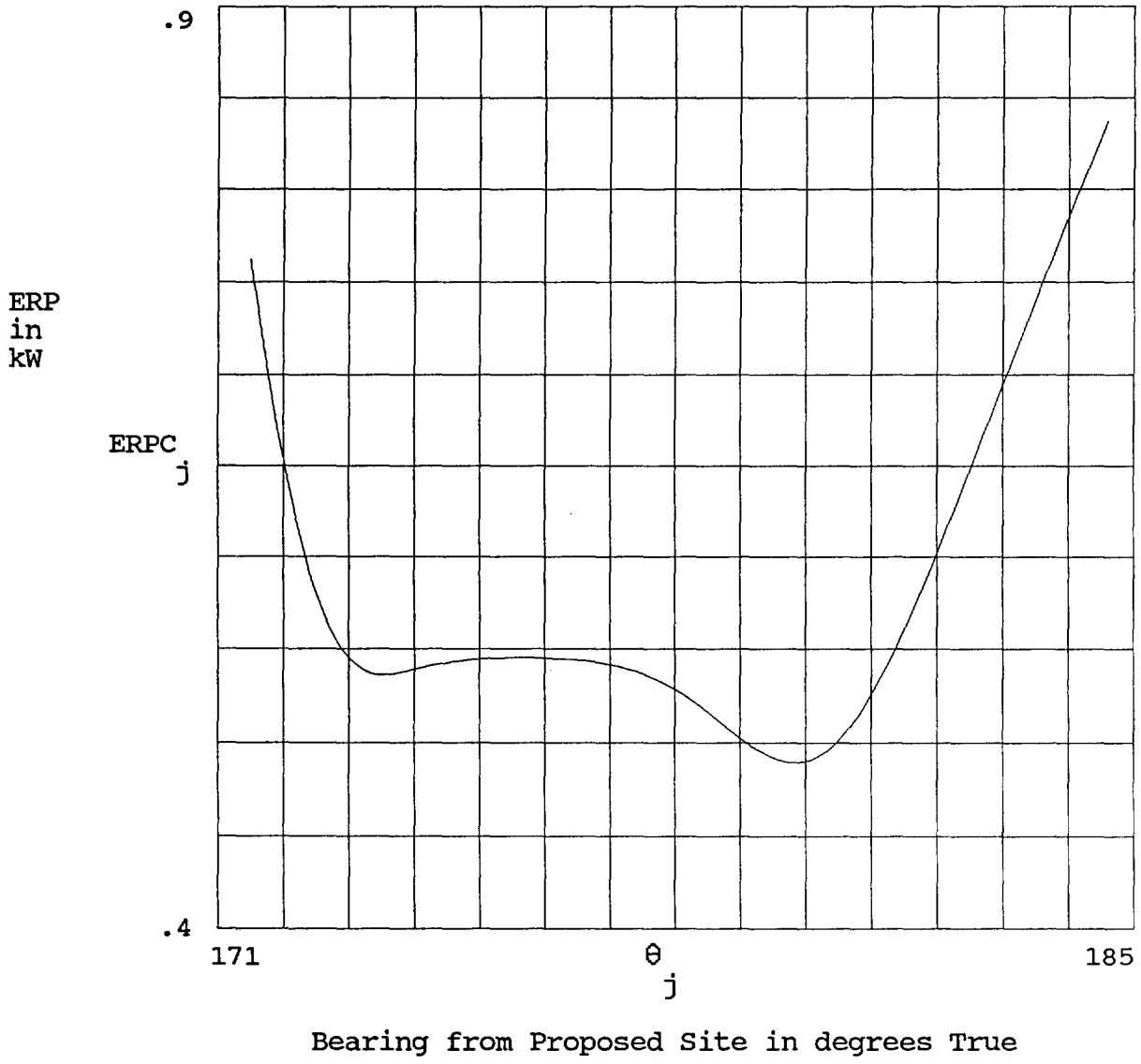

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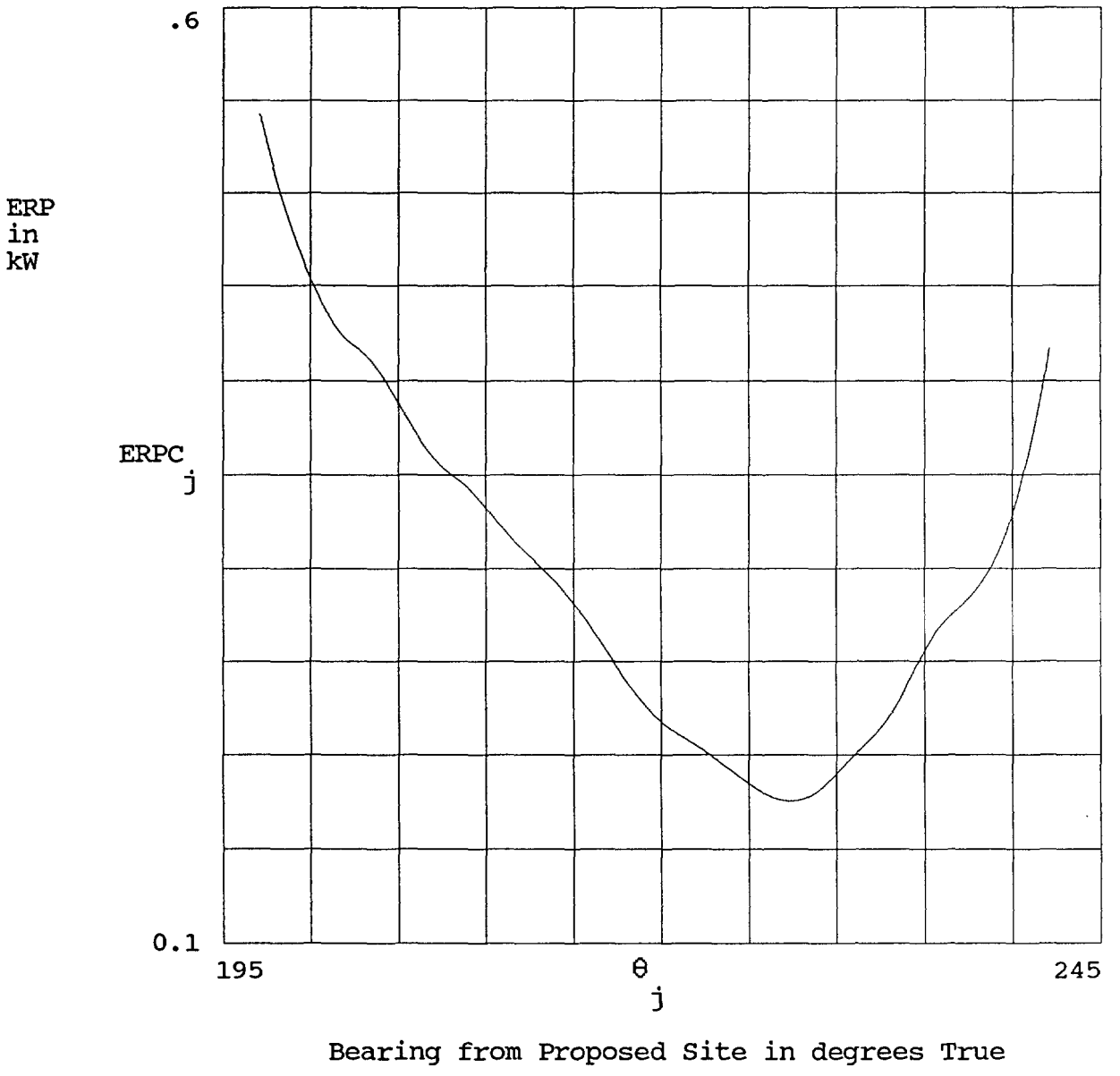
FIGURE 6

Maximum Allowed ERP toward WFPL
(excluding the 2 dB per 10 degree rate of change limit)



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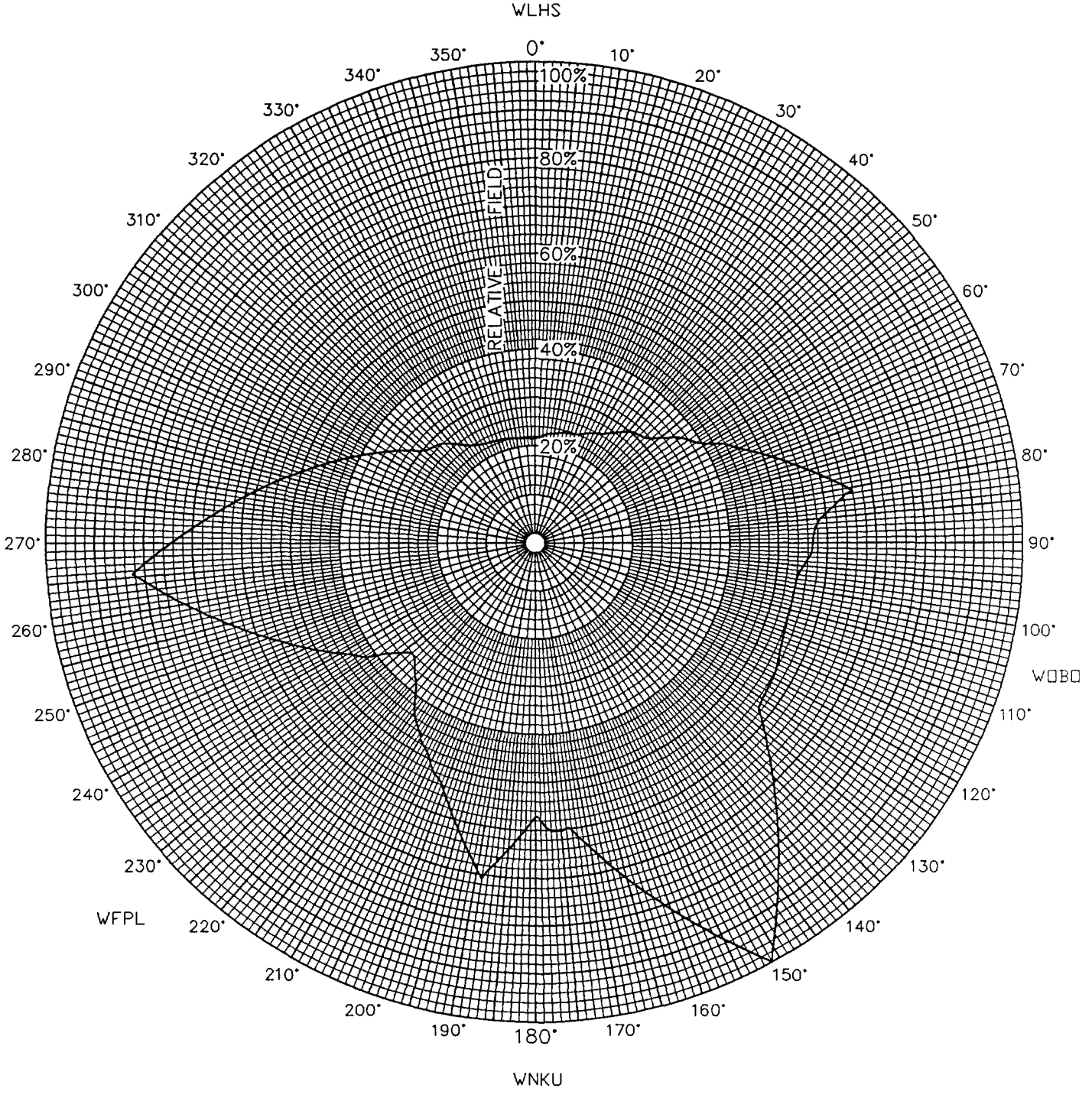

FIGURE 7
PROPOSED READING AZIMUTH PATTERN
Channel 207
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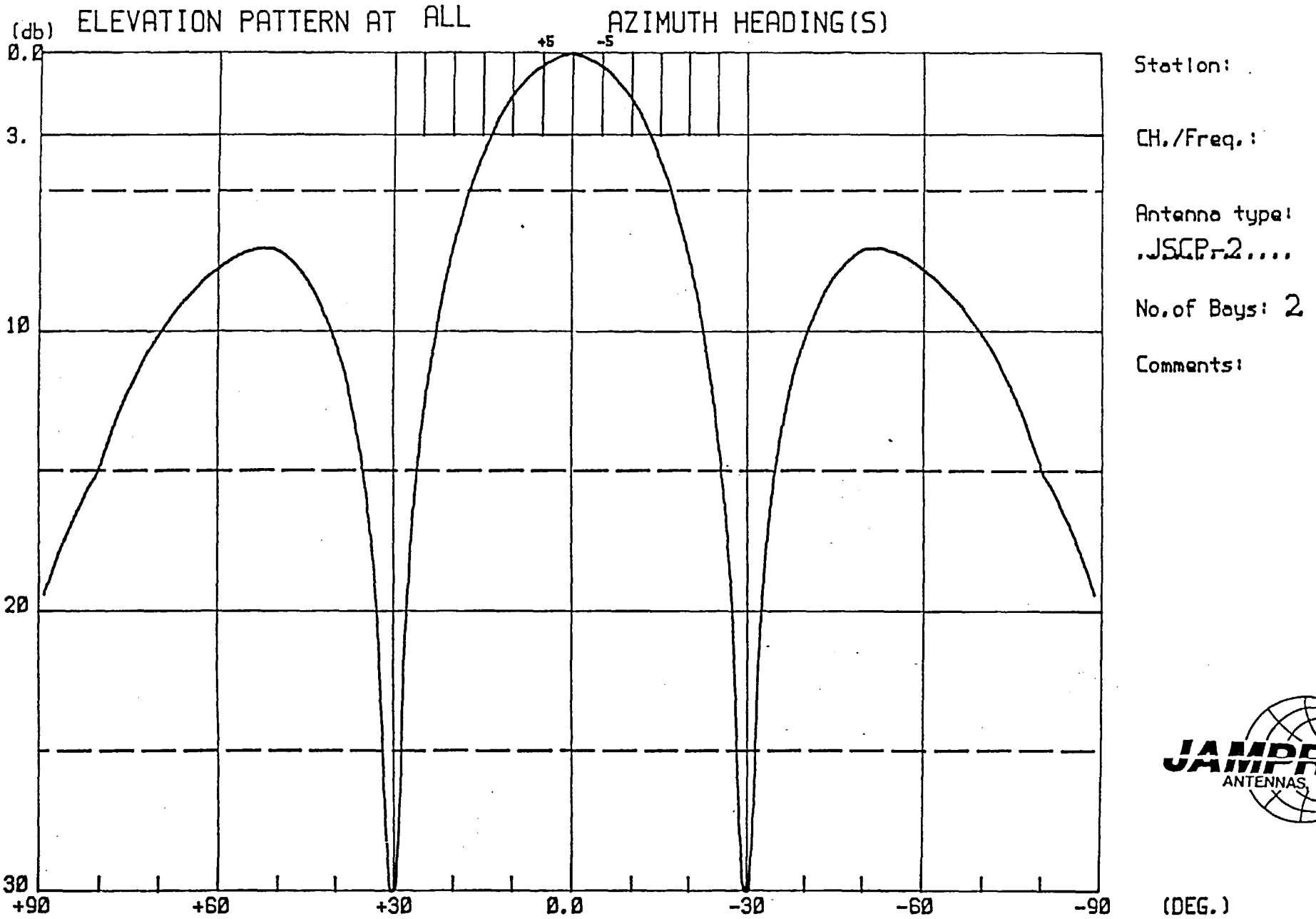
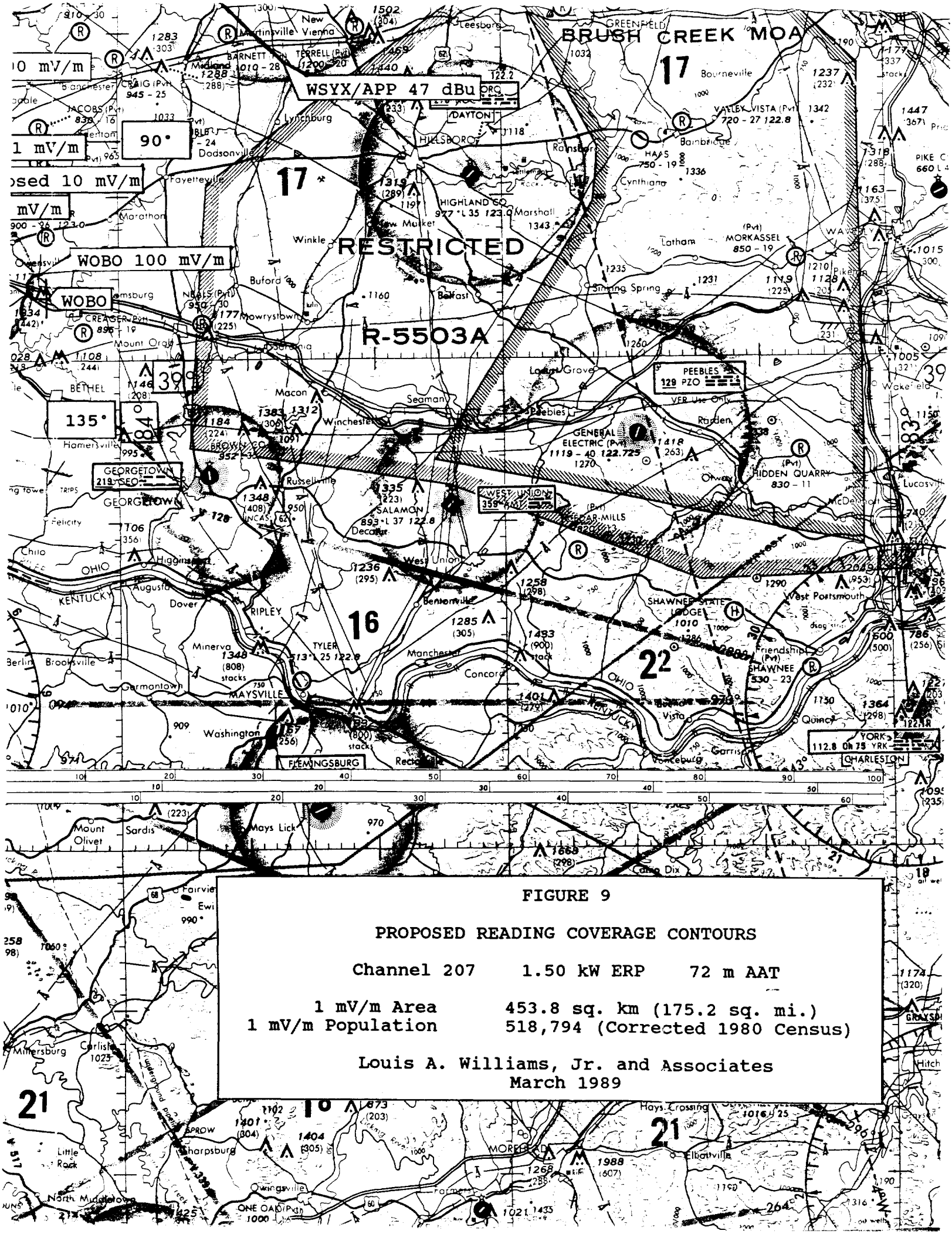
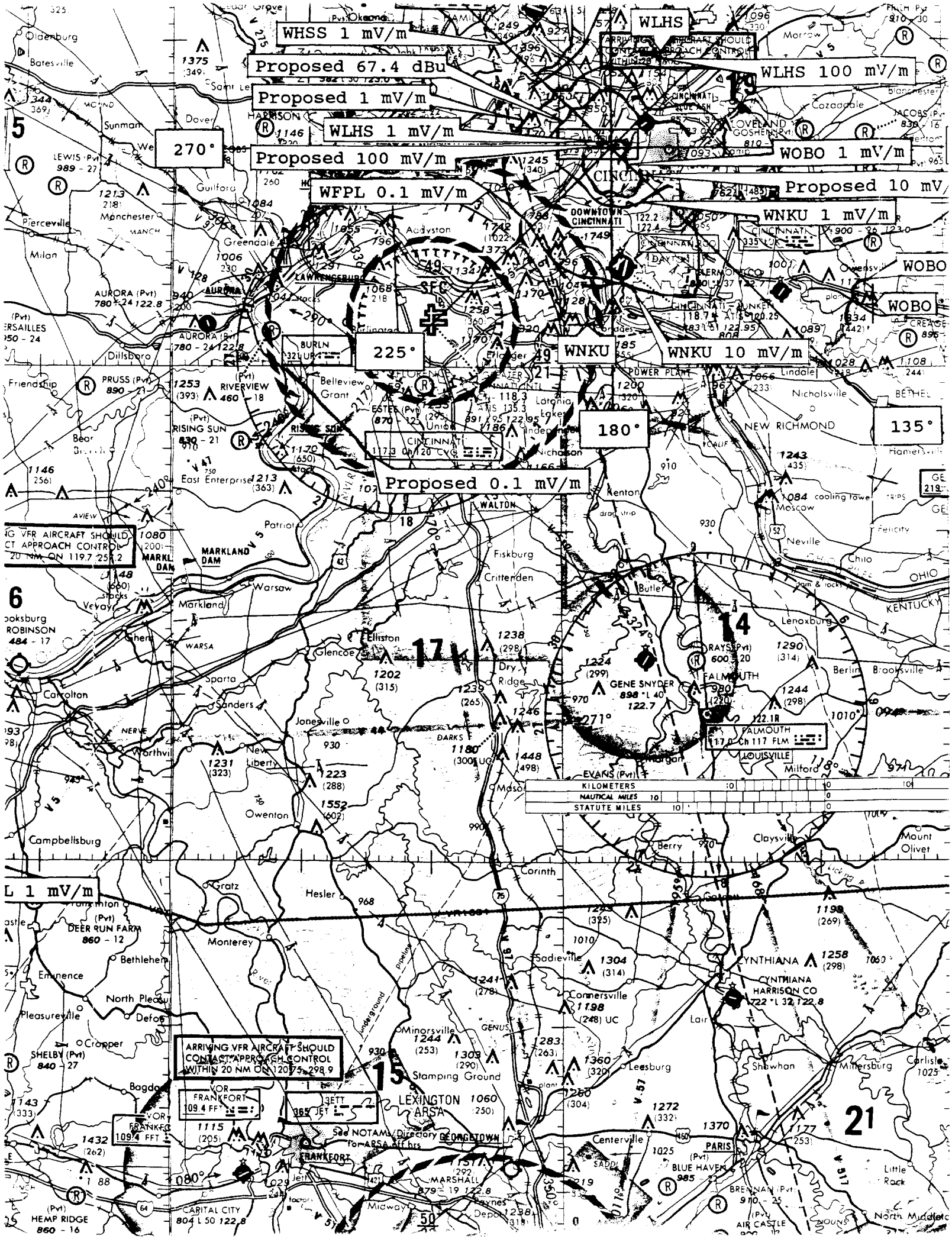


FIGURE 8

JAMPRO JSCP-2 ELEVATION PATTERN


BRUSH CREEK MOA
WSYX/APP 47 dBu
90°
RESTRICTED
R-5503A
WOBO 100 mV/m
WOBO
135°
PEEBLES
129 PZO
GEORGETOWN
219 SEO
WEST UNION
359 AMT
YORK
112.8 Ch 75 YRK
CHARLESTON
FLEMINGSBURG
MAYSVILLE
HILLSBORO
DAYTON
Lynchburg
Winchester
Seaman
Peebles
Russellville
Decatur
West Union
Bentonville
Manchester
Concord
Portsmouth
Ripley
Tyler
Washington
Dover
Augusta
Higginsport
Chilo
Brooksville
Germantown
Minerva
Felicity
Hamersville
Mount Orab
Sardis
Mays Lick
Mount Olivet
Carlisle
Millersburg
Sharpsburg
Elizabethville
Hays Crossing
Morehead
Farmers
Owingsville
Little Rock
North Middletown
Fairview
Ewing
Garrison
Vanceburg
Quincy
Friendship
Shawnee State Lodge
Hidden Quarry
General Electric
Cedar Mills
Salamon
Haas
Valley Vista
Morkassel
Bainbridge
Cynthiana
Ripley
Latham
Winkle
Buford
Belfast
Mowrystown
Macon
Marshall
Highland Co
Fayetteville
Dodsonville
Marathon
Leesburg
New Vienna
Martinsville
Greenfield
Bourneville
Sinking Spring
Lower Grove
Orden
Otway
Lucasville
Wakefield
Pikeville
Waverly
Berlin
Cairo
Dix
Hitch
Grayson
Little Rock
Sharpsburg
Elizabethville
Hays Crossing
Morehead
Farmers
Owingsville
North Middletown
Carlisle
Millersburg
Fairview
Ewing
Garrison
Vanceburg
Quincy
Friendship
Shawnee State Lodge
Hidden Quarry
General Electric
Cedar Mills
Salamon
Haas
Valley Vista
Morkassel
Bainbridge
Cynthiana


WHSS 1 mV/m
Proposed 67.4 dBu
Proposed 1 mV/m
WLHS 1 mV/m
Proposed 100 mV/m
WFPL 0.1 mV/m
WLHS
WLHS 100 mV/m
WOBO 1 mV/m
Proposed 10 mV/
WNKU 1 mV/m
WOBO
WOBO
WNKU
WNKU 10 mV/m
Proposed 0.1 mV/m
L 1 mV/m
270°
225°
180°
135°
080°
271°
324°
CINCINNATI
DOWNTOWN CINCINNATI
LOUISVILLE
LEXINGTON ARSA
ARRIVING VFR AIRCRAFT SHOULD CONTACT APPROACH CONTROL WITHIN 20 NM ON 120.75 298.9
See NOTAM/Directory for ARSA eff hrs
KILOMETERS
NAUTICAL MILES
STATUTE MILES