Federal Communications Commission
Washington, D. C. 20554

Approved by OMB
3060-0627
Expires 01/31/98

FOR FCC USE ONLY

FCC 302-AM
APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.

FOR COMMISSION USE ONLY
FILE NO. BAML-20170111ACP

SECTION I - APPLICANT FEE INFORMATION

1. PAYOR NAME (Last, First, Middle Initial)
MEMPHIS FIRST VENTURES, LP

Received & Inspected
JAN 12 2017
FCC Mail Room

MAILING ADDRESS (Line 1) (Maximum 35 characters)
230-2 Goodman Rd East

MAILING ADDRESS (Line 2) (Maximum 35 characters)
SUITE 202

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Southaven	MS	38671

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
901-272-0008	WUMY	

2. A. Is a fee submitted with this application? [✓] Yes [ ] No

B. If No, indicate reason for fee exemption (see 47 C.F.R. Section

[ ] Governmental Entity [ ] Noncommercial educational licensee [ ] Other (Please explain):

C. If Yes, provide the following information:

Enter in Column (A) the correct Fee Type Code for the service you are applying for. Fee Type Codes may be found in the "Mass Media Services Fee Filing Guide." Column (B) lists the Fee Multiple applicable for this application. Enter fee amount due in Column (C).

(A) FEE TYPE CODE	(B) FEE MULTIPLE	(C) FEE DUE FOR FEE TYPE CODE IN COLUMN (A)	FOR FCC USE ONLY
M O R	0 0 0 1	$ 805.00	

To be used only when you are requesting concurrent actions which result in a requirement to list more than one Fee Type Code.

(A)	(B)	(C)	FOR FCC USE ONLY
	0 0 0 1	$	

ADD ALL AMOUNTS SHOWN IN COLUMN C,
AND ENTER THE TOTAL HERE.
THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE.

TOTAL AMOUNT REMITTED WITH THIS APPLICATION	FOR FCC USE ONLY
$ 805.00	

CLEAR ALL PAGES

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT MEMPHIS FIRST VENTURES, LP		
MAILING ADDRESS 230-2 Goodman Rd East, Suite 202		
CITY Southaven	STATE MS	ZIP CODE 38671

2. This application is for:

☑ Commercial ☐ Noncommercial

☑ AM Directional ☐ AM Non-Directional

Call letters	Community of License	Construction Permit File No.	Modification of Construction Permit File No(s).	Expiration Date of Last Construction Permit
WUMY	Turrell, AR	Does not apply	Does not apply	Does not apply

3. Is the station now operating pursuant to automatic program test authority in accordance with 47 C.F.R. Section 73.1620?

☐ Yes ☐ No

If No, explain in an Exhibit.

Exhibit No. Does not apply

4. Have all the terms, conditions, and obligations set forth in the above described construction permit been fully met?

☐ Yes ☐ No

If No, state exceptions in an Exhibit.

Exhibit No. Does not apply

5. Apart from the changes already reported, has any cause or circumstance arisen since the grant of the underlying construction permit which would result in any statement or representation contained in the construction permit application to be now incorrect?

☐ Yes ☐ No

If Yes, explain in an Exhibit.

Exhibit No. Does not apply

6. Has the permittee filed its Ownership Report (FCC Form 323) or ownership certification in accordance with 47 C.F.R. Section 73.3615(b)?

☑ Yes ☐ No

☐ Does not apply

If No, explain in an Exhibit.

Exhibit No. Does not apply

7. Has an adverse finding been made or an adverse final action been taken by any court or administrative body with respect to the applicant or parties to the application in a civil or criminal proceeding, brought under the provisions of any law relating to the following: any felony; mass media related antitrust or unfair competition; fraudulent statements to another governmental unit; or discrimination?

☐ Yes ☑ No

If the answer is Yes, attach as an Exhibit a full disclosure of the persons and matters involved, including an identification of the court or administrative body and the proceeding (by dates and file numbers), and the disposition of the litigation. Where the requisite information has been earlier disclosed in connection with another application or as required by 47 U.S.C. Section 1.65(c), the applicant need only provide: (i) an identification of that previous submission by reference to the file number in the case of an application, the call letters of the station regarding which the application or Section 1.65 information was filed, and the date of filing; and (ii) the disposition of the previously reported matter.

Exhibit No. Does not apply

CLEAR ALL PAGES

8. Does the applicant, or any party to the application, have a petition on file to migrate to the expanded band (1605-1705 kHz) or a permit or license either in the existing band or expanded band that is held in combination (pursuant to the 5 year holding period allowed) with the AM facility proposed to be modified herein?

☐ Yes ☑ No

If Yes, provide particulars as an Exhibit.

Exhibit No.
Does not apply

The APPLICANT hereby waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because use of the same, whether by license or otherwise, and requests and authorization in accordance with this application. (See Section 304 of the Communications Act of 1934, as amended).

The APPLICANT acknowledges that all the statements made in this application and attached exhibits are considered material representations and that all the exhibits are a material part hereof and are incorporated herein as set out in full in

CERTIFICATION

1. By checking Yes, the applicant certifies, that, in the case of an individual applicant, he or she is not subject to a denial of federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. Section 862, or, in the case of a non-individual applicant (e.g., corporation, partnership or other unincorporated association), no party to the application is subject to a denial of federal benefits that includes FCC benefits pursuant to that section. For the definition of a "party" for these purposes, see 47 C.F.R. Section 1.2002(b).

☑ Yes ☐ No

2. I certify that the statements in this application are true, complete, and correct to the best of my knowledge and belief, and are made in good faith.

Name	Signature	
Ronald A. Unkefer		
Title	Date	Telephone Number
CEO & General Partner	12/9/2016	(214) 273-6440

WILLFUL FALSE STATEMENTS ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION

FCC NOTICE TO INDIVIDUALS REQUIRED BY THE PRIVACY ACT AND THE PAPERWORK REDUCTION ACT

The solicitation of personal information requested in this application is authorized by the Communications Act of 1934, as amended. The Commission will use the information provided in this form to determine whether grant of the application is in the public interest. In reaching that determination, or for law enforcement purposes, it may become necessary to refer personal information contained in this form to another government agency. In addition, all information provided in this form will be available for public inspection. If information requested on the form is not provided, the application may be returned without action having been taken upon it or its processing may be delayed while a request is made to provide the missing information. Your response is required to obtain the requested authorization.

Public reporting burden for this collection of information is estimated to average 639 hours and 53 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, can be sent to the Federal Communications Commission, Records Management Branch, Paperwork Reduction Project (3060-0627), Washington, D. C. 20554. Do NOT send completed forms to this address.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), AND THE PAPERWORK REDUCTION ACT OF 1980, P.L. 96-511, DECEMBER 11, 1980, 44 U.S.C. 3507.

CLEAR ALL PAGES

SECTION III - LICENSE APPLICATION ENGINEERING DATA

Name of Applicant
MEMPHIS FIRST VENTURES, LP

PURPOSE OF AUTHORIZATION APPLIED FOR: (check one)

☐ Station License ☑ Direct Measurement of Power

1. Facilities authorized in construction permit

Call Sign	File No. of Construction Permit (if applicable)	Frequency (kHz)	Hours of Operation	Power in kilowatts	
				Night	Day
WUMY	Does not apply	1180	unlimited	0.026 (3.5 CH)	5.0

2. Station location

State	City or Town
Arkansas	Turrell

3. Transmitter location

State	County	City or Town	Street address (or other identification)
AR	Crittenden	West Memphis	South end of Legion Rd

4. Main studio location

State	County	City or Town	Street address (or other identification)
MS	DeSoto	Southaven	230-2 Goodman Road East, Suite 202

5. Remote control point location (specify only if authorized directional antenna)

State	County	City or Town	Street address (or other identification)
MS	DeSoto	Southaven	230-2 Goodman Road East, Suite 202

6. Has type-approved stereo generating equipment been installed? ☐ Yes ☑ No

7. Does the sampling system meet the requirements of 47 C.F.R. Section 73.68? ☑ Yes ☐ No ☐ Not Applicable

Attach as an Exhibit a detailed description of the sampling system as installed. Exhibit No. Eng Statement

8. Operating constants:

RF common point or antenna current (in amperes) without modulation for night system	RF common point or antenna current (in amperes) without modulation for day system
0.75 Amps (8.69 Amps CH)	10.39 Amps

Measured antenna or common point resistance (in ohms) at operating frequency		Measured antenna or common point reactance (in ohms) at operating frequency	
Night	Day	Night	Day
50 Ω (50 Ω CH)	50 Ω	+j 0 Ω (+j 0 Ω CH)	+j 0 Ω

Antenna indications for directional operation

Towers	Antenna monitor Phase reading(s) in degrees		Antenna monitor sample current ratio(s)		Antenna base currents	
	Night	Day	Night	Day	Night	Day
1 (W)	0.0° (0.0° CH)	0.0°	1.000 (1.000 CH)	1.000	no longer required	no longer required
2 (E)	+75.6° (-29.5° CH)	-115.3°	0.743 (0.200 CH)	0.079	no longer required	no longer required

Manufacturer and type of antenna monitor: Potomac Instruments 1901

CLEAR ALL PAGES

SECTION III - Page 2

9. Description of antenna system ((f directional antenna is used, the information requested below should be given for each element of the array. Use separate sheets if necessary.)

Type Radiator	Overall height in meters of radiator above base insulator, or above base, if grounded.	Overall height in meters above ground (without obstruction lighting)	Overall height in meters above ground (include obstruction lighting)	If antenna is either top loaded or sectionalized, describe fully in an Exhibit.
guyed towers	#1: 68.6; #2: 82.3	#1: 69.6; #2: 83.3	#1: 70.4; #2: 84.1	Exhibit No. Does not apply

Excitation ☑ Series ☐ Shunt

Geographic coordinates to nearest second. For directional antenna give coordinates of center of array. For single vertical radiator give tower location.

North Latitude	35	°	08	'	31	"	West Longitude	90	°	08	'	06	"

If not fully described above, attach as an Exhibit further details and dimensions including any other antenna mounted on tower and associated isolation circuits. Exhibit No. Eng Statement

Also, if necessary for a complete description, attach as an Exhibit a sketch of the details and dimensions of ground system. Exhibit No. DNA: unchanged

10. In what respect, if any, does the apparatus constructed differ from that described in the application for construction permit or in the permit?

Does not apply

11. Give reasons for the change in antenna or common point resistance.

Installation of FM translator antenna for K268DA

I certify that I represent the applicant in the capacity indicated below and that I have examined the foregoing statement of technical information and that it is true to the best of my knowledge and belief.

Name (Please Print or Type)	Signature (check appropriate box below)
George Michael Patton	G. Michael Patton
Address (include ZIP Code) 12231 Industriplex Blvd Suite C Baton Rouge, LA 70809	Date December 9, 2016 Telephone No. (Include Area Code) 225-752-4189

☐ Technical Director ☐ Registered Professional Engineer

☐ Chief Operator ☑ Technical Consultant

☐ Other (specify)

CLEAR ALL PAGES

Engineering Statement

in support of

FCC Form 302-AM

December, 2016

WUMY

Turrell, Arkansas

licensed to:

MEMPHIS FIRST VENTURES, LP

prepared by:

Michael Patton & Associates
Baton Rouge, Louisiana
www.michaelpatton.com

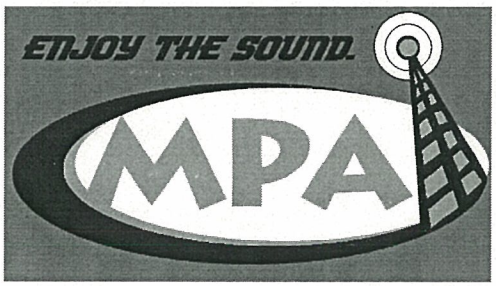

Table of Contents:

Narrative Statement

Overview: MEMPHIS FIRST VENTURES, LP, licensee of WUMY, Turrell, Arkansas, recently constructed an FM translator associated with WUMY, callsign K268DA (Construction Permit # BPFT-20160129ADF), on one of the two towers of their DA array located in West Memphis, Arkansas. Memphis First Ventures engaged my firm, Michael Patton & Associates, to fulfill the requirements of Special Operating Condition 2 of that CP, which called for new base impedance measurements on WUMY after the installation of the translator antenna and associated isolation networks, and, if required, a new moment method proof and Form 302-AM preparation and filing. Out of an abundance of caution, we made before and after measurements of the base impedances, so as to rule out as a variable any changes caused by the use of different measurement equipment from that used in the original moment method proof for WUMY, filed several years ago. These measurements have been made, and the addition of the translator antenna and coax did indeed cause the base impedance of the tower it is mounted on to change more than by the limits specified in Section 73.151(c)(1) of the FCC's rules, triggering the need for a new moment method proof, changed operating parameters for all DA modes, and the filing of Form 302-AM for WUMY. A new moment method model was developed for the array, new operating parameters were calculated and dialed into the array for all three patterns, and new reference field strength measurements were made for all patterns. This engineering statement contains the results of this work, and is filed in support of that Form 302-AM.

Description of array: There are two towers in the WUMY array; the station operates with 3 modes, day, night, and critical hours, all with different directional patterns and power levels. Both towers are series-fed, uniform cross-section, guyed towers.

Description of translator facility: K268DA's antenna is side-mounted well below the top of tower 2, the east tower. It is fed with a 7/8" coax cable which crosses the base insulator using an iso-coupler from Kintronic Labs. The coax cables on both the hot and cold sides of this iso-coupler are carefully bonded to the tower and the ground system, respectively.

Effect of iso-coupler on tower base impedance: Kintronic Labs' published specifications for the iso-coupler used indicates that it is approximately a 50 pF capacitive load, and the addition of a capacitor of this value closely corresponds to the observed change in base impedance on tower 2 after the installation.

Method of Moments Proof Methodology: This instant proof of performance was completed using the Method of Moments techniques, as outlined in Section 73.151(c) of the FCC Rules. Included in this Engineering Statement are the required mathematical model parameters, sample system measurements and certifications, and reference field strength measurements.

Model Software Used: The mathematical model used to compute the operating parameters for the array is the WCAP program, written by Jerry Westberg and incorporated into Westberg Consulting's Phasor Pro, v2.1.1.21.

Narrative Statement (continued)

Matrix of Impedance Measurements: Impedance measurements were made at each tower's ATU output j-plug, with the other tower's base open-circuited at its ATU's output j-plug. The electrical height and equivalent tower radius for both towers used in the model were then varied to obtain good agreement between the predicted base impedances and the actual measured base impedances, while keeping the inputs to the model within the required limits relative to the actual physical tower specifications. The model allows for this method of compensating for the addition of shunt capacitance, by granting enough leeway in modeled versus actual height and effective radius. And indeed, the model developed closely agrees with the measured base impedances and reasonable assumptions about the feedline series inductance. See Page 5 for the mathematical model data and Page 6 for the notes.

Certification of Tower Distance and Orientation: Since this is a re-certification of an array that has previously been licensed using a moment method proof, WUMY is exempt from any requirements for tower geometry measurements or cerfication.

Sample System Requirements and Certifications: Delta TCT-3 toroidal current sample transformers are used at both towers, mounted in each ATU in series with the output j-plug. Both towers are less than 120° tall, so current samples are allowed by 73.151(c). These samples are brought back to the antenna monitor using the phase-stabilized version of Andrew LDF4-50A ½" Heliax-type cable, which has solid outer and center conductors and a foam dielectric, and which are of equal length and buried. Because the physical cable run distance to tower 2 is shorter than that to tower 1, the excess sample coax for tower 2 is coiled and buried near the transmitter building, thus ensuring that the entire length of both cables will be subject to similar environmental conditions. The antenna monitor is a Potomac 1901 and was verified to meet its manufacturer's specifications. Both sample transformers were tested by feeding them in series from the same RF source and connecting their outputs directly to the antenna monitor using identical short cables; both transformers gave identical current and zero relative phase shift indications. The measurements of sample coax length and characteristic impedance are included here on Page 7.

Antenna Monitor Parameters: The array was adjusted so that the actual parameters measured on the antenna monitor agreed with the predicted antenna monitor parameters, as generated by the Westberg Consulting Phasor Pro computer program.

Reference Field Strength Measurements: The requisite reference field strength measurements were made on the same azimuths used in the original method moment proof, which corresponded to the various patterns' maxima and minima. These measurements, a description of each measurement point, and its GPS coordinates are included on Page 9. **Note:** the proximity of the array to the Mississippi River constrained the available locations on several radials, which is why some points are spaced far apart, where others are close together. However, since there are no distance or separation standards in the Rules for these measurements, and with a lack of other available measurement points, these measurement locations must suffice and are submitted for use. The measurement point locations used here are the same as or very close to the ones in the original moment method proof for this array.

Narrative Statement (continued)

Calibration of Instruments Used: The Field Intensity Meter used in this proof was calibrated earlier this year. The impedance bridge and vector network analyzer used were checked against known standards as part of this project. Data on the calibration of all equipment used in this Proof are given on Page 8.

Conclusions: The translator installation on the WUMY array has been competently completed, and the changes to the array have been modeled and compensated for, using the variables allowed in the model, as set forth in the FCC Rules. The procedures for using and documenting the moment method proof have been followed, and the array is operating in accordance with the requirements for such arrays. The instant application has been carefully prepared in all particulars and should be granted.

Respectfully Submitted,

George Michael Patton
Michael Patton & Associates
December 9, 2016

Moment method tower impedance model data

Parameter/item:	Tower 1 (W):	Tower 2 (E):
FCC Antenna registration #	1035168	1035169
Physical height of radiator	97.2°	116.6°
Modeled velocity factor	0.9235	0.9037
Modeled height of radiator	105.3°	129.0°
Modeled/physical height ratio [1]	108.3%	110.7%
Actual tower face width (uniform cross-section)	24"	24"
Equivalent physical tower radius	11.46"	11.46"
Equivalent modeled tower radius	9.70"	14.78"
Modeled/physical radius ratio [2]	84.6%	129.0%
Measured tower base impedance (at ATU output) [3]	62.9 +j 124.2 Ω	218.9 +j 271.1 Ω
Assumed tower feedline inductance [4]	3.0 uH	2.5 uH
Assumed tower feedline reactance	+j 22.2 Ω	+j 18.5 Ω
Assumed actual tower base impedance (at tower)	62.9 +j 102.0 Ω	218.9 +j 252.6 Ω
Modeled tower base impedance [5]	63.0 +j 102.0 Ω	218.9 +j 252.3 Ω
Modeled/actual impedance deviation [6]	0.1 +j 0.0 Ω	0.0 -j 0.3 Ω
Modeled/actual impedance tolerance [6]	+/- 4.5 +/-j 6.1 Ω	+/- 10.8 +/-j 12.1 Ω
Modeled parameters, day mode [7]	1.000 ∠ +0.0°	0.079 ∠ -115.3°
Modeled parameters, night mode [7]	1.000 ∠ +0.0°	0.743 ∠ +75.6°
Modeled parameters, critical hours mode [7]	1.000 ∠ +0.0°	0.200 ∠ -29.5°

Moment method tower impedance model notes:

[1] The electrical height of the radiators used in the model meets the criteria for such set forth in section 73.151(c)(1)(v) of the FCC Rules: *"For uniform cross-section towers represented by vertical wires, each wire used for a given tower shall be between 75 to 125 percent of the physical length represented."*

[2] The equivalent radius of the radiators used in the model meets the criteria for such set forth in section 73.151(c)(1)(i) of the FCC Rules: *"For arrays using vertical wires to represent each tower, the radii of cylinders shall be no less than 80 percent and no more than 150 percent of the radius of a circle with a circumference equal to the sum of the widths of the tower sides."*

[3] These impedances were measured using an AIM-120 Vector Network Analyzer at each tower's ATU output j-plug, with the other tower in the array open-circuited at the output j-plug in its ATU.

[4] The reactances shown are those needed to make the model's tower base reactance agree with the measured reactances at the ATU output j-plugs. These assumed values are quite reasonable, consistent with each other, and within the tolerance for such allowed by section 73.151(c)(1)(vii) of the FCC Rules: *"The lumped series inductance of the feed system between the output port of each antenna tuning unit and the associated tower shall be no greater than 10 µH unless a measured value from the measurement point to the tower base with its insulator short circuited is used."*

[5] Modeled using Westberg Consulting's Phasor Pro 2.1.1.21, using the parameters shown for tower height and face width.

[6] The modeled base impedances, calculated using the data shown here, agree with the measured base impedances, within the tolerances shown here, which were calculated from the limits specified in section 73.151(c)(2)(ii) of the FCC Rules: *"The measured matrix impedances must agree with the moment method model within +-2 ohms and +-4 percent for resistance and reactance."*

[7] Calculated using Westberg Consulting's Phasor Pro 2.1.1.21, using the measurements and assumptions detailed here.

Sample system data:

Parameter:	Tower 1 (W):	Tower 2 (E):
Sample device used	Delta TCT-3 S/N 17833	Delta TCT-3 S/N 17841
Measured open-circuit resonant frequency nearest station carrier frequency (1180 kHz)	2502.0 kHz	2502.9 kHz
Calculated line length at station carrier frequency	127.3°	127.3°
Sample coax cable velocity factor (% of C)	88%	88%
Calculated coax length	79.1 meters	79.1 meters
Coax resonant frequency + 1/8 λ	2085.0 kHz	2085.8 kHz
Coax resonant frequency - 1/8 λ	2919.0 kHz	2920.1 kHz
Measured coax impedance at $F_{resonance}$ + 1/8 λ	3.3 -j 50.8 Ω	3.3 -j 50.7 Ω
Measured coax impedance at $F_{resonance}$ - 1/8 λ	4.3 +j 49.1 Ω	4.3 +j 49.3 Ω
Calculated average characteristic impedance	50.1 Ω	50.1 Ω
Measured terminated coax impedance at station frequency	49.2 -j 1.1 Ω	49.4 -j 1.0 Ω

Note: All of the measurements shown here were made in accordance with the provisions of Section 73.151(c)(2)(i): "*Sample lines from the sensing element to the antenna monitor must be equal in both length (within one electrical degree) and characteristic impedance (within two ohms), as established by impedance measurements, including at the open-circuit resonant frequency closest to carrier frequency to establish length, at frequencies corresponding to odd multiples of 1/8 wavelength immediately above and below the open circuit resonant frequency closest to carrier frequency, while open circuited, to establish characteristic impedance, and at carrier frequency or, if necessary, at nearby frequencies where the magnitude of the measured impedance is no greater than 200 ohms with the sampling devices connected.*"

Operating Parameters & Equipment List:

Directional Antenna Operating Parameters:

Mode:	Power:	CP Current [1]:	Tower 1 (W):	Tower 2 (E):
Day:	5.4 kW	10.39 A	1.000 ∠ 0.0°	0.079 ∠ -115.3°
Night:	0.028 kW	0.75 A	1.000 ∠ 0.0°	0.743 ∠ +75.6°
Critical Hours:	3.8 kW	8.69 A	1.000 ∠ 0.0°	0.200 ∠ -29.5°

Equipment List:

Type of Instrument:	Manu-facturer:	Model Number:	Serial Number:	Calibration Date:	By Whom Calibrated:
F. I. Meter	Potomac	FIM-41	2028	06/16/2016	Mooretronix
VNA	Array Solutions	AIM-120	1011	11/2009 [2]	Array
Imp. Bridge	Delta	OIB-3	216	08/2016 [2]	Patton
RF Ammeter	Delta	TCA-5/20EXR	15384	12/2009 [3]	Delta

Notes:

[1] Common point impedance in all modes is 50 +j 0.0 Ω.

[2] The VNA and bridge were checked against known standards as part of this project.

[3] This RF ammeter was new when this array was built.

Field measurement reference data:

Point #:	GPS lat/lon:	Dis-tance:	Description of measurement location:	Day (mV/m):	Night (mV/m):	CH (mV/m):
Radial 55.0°						
55-1	35°08'49.3" 90°07'34.7"	1.01 km	WB I 55 srvc rd west of Levee Bd office in line with large overhead sign	850	630	19.5
55-2	35°11'21.9" 90°03'03.9"	9.32 km	Stiles Wastewater Treatment admin bldg @ mailbox (marked 2303 N Second St)	48.0	36.0	1.20
55-3	35°12'01.6" 90°02'04.5"	11.3 km	Hwy 51 SB @ at ramp from Hwy 101 in "vee" at S end of cloverleaf ramp	25.5	19.5	0.72
Radial 189.5°						
189-1	35°04'06.0" 90°09'04.5"	9.15 km	3231 Riverport Rd (@ Electrolux entrance) West edge of road at main entrance sign	16.8		
189-2	35°03'37.7" 90°09'07.5"	9.70 km	Riverport Rd south of Electrolux plant center of road @ culvert under road	10.0		
189-3	35°03'21.6" 90°09'06.1"	10.4 km	Riverport Rd at Nucor steel plant center of access rd at gate	16.0		
Radial 235.0°						
235-1	35°06'40.4" 90°11'22.9"	6.03 km	CR 310 (Port Road) north of Tetra Tech across from power pole "345 WMU 00787"		34.0	7.20
235-2	35°05'19.0" 90°13'46.5"	10.4 km	SE corner of Waverly Rd & E St. John Rd		17.2	4.20
235-3	35°04'53.4" 90°14'18.1"	11.6 km	496 Caldwell Road (small white house) south edge of rd @ mailbox		17.5	3.70
Radial 280.5°						
280-1	35°08'47.9" 90°09'55.9"	2.81 km	1510 E Broadway (on north side) parking lot of Auto Mart at Auto Mart sign	125		
280-2	35°08'53.1" 90°10'32.2"	3.73 km	207 N Seventh St center of Garret Hardware parking lot	98.0		
280-3	35°08'55.8" 90°10'51.3"	4.22 km	215 Graham St (closed auto shop) east side of road in line with bldg front door	85.0		

Notes:

Suitable measurement points on radials 55.0° and 189.5° are severely limited due to the proximity of the site to the Mississippi River; these readings were taken at the few accessible locations, near or far from the site.

All readings were taken on November 18 & 19, 2016.

All GPS figures shown are using the WGS84 datum reference. Distances were measured from the center of the array.

Certifications:

I, George Michael Patton, do hereby swear to and affirm the following:

That I am a broadcast engineer regularly engaged in the design, construction and repair of AM directional antennas, and my qualifications are a matter of record with the FCC;

That MEMPHIS FIRST VENTURES, LP, licensee of WUMY, Turrell, Arkansas, contracted my firm to make a moment method proof of performance on the WUMY array, and to prepare this form and report;

That all measurements made during the course of this work were made by me or under my direct supervision, and that all the measurements made by me are true and correct, and, as regards all measurements made by others, that I believe them to be both true and correct.

Sworn to this day, December 9, 2016

George Michael Patton

STATION INFORMATION		
Call Letters	No. Towers	Frequency
WUMY	2	1.1800

TOWER INFORMATION						
	Tower Height (°)	Spacing (°)	Orientation	Face Width (in.)	Radius (in.)	Velocity Factor
Tower 1	97.2000	0.0000	0.0000	21.0000 / 21.0000	9.6995 / 9.6995	0.923500
Tower 2	116.6000	72.7000	55.0000	32.0000 / 32.0000	14.7802 / 14.7802	0.903700

MATRIX INFORMATION		
	Impedance (other towers open)	Impedance (other towers shorted)
Tower 1	63.00 + j102.00	83.37 + j120.14
Tower 2	218.89 + j252.29	283.02 + j293.08

DETUNED TOWER CURRENTS
Tower 1
0.000000 > 0.000000 - 97.20° above ground
0.131547 > -131.243752 - 87.48° above ground
0.204851 > -131.294859 - 77.76° above ground
0.238262 > -131.178202 - 68.04° above ground
0.231185 > -130.843638 - 58.32° above ground
0.182946 > -130.131310 - 48.60° above ground
0.093173 > -128.016854 - 38.88° above ground
0.039091 > 40.844219 - 29.16° above ground
0.213481 > 48.134599 - 19.44° above ground
0.434837 > 49.507691 - 9.72° above ground
0.789975 > 50.569067 - 0.00° above ground
Tower 2
0.000000 > 0.000000 - 116.60° above ground
0.175903 > -109.218046 - 106.88° above ground
0.282887 > -109.695254 - 97.17° above ground
0.348477 > -110.346441 - 87.45° above ground
0.371241 > -111.169196 - 77.73° above ground
0.349798 > -112.192942 - 68.02° above ground
0.283053 > -113.587386 - 58.30° above ground
0.170676 > -116.319297 - 48.58° above ground
0.018886 > -163.550566 - 38.87° above ground
0.192444 > 71.781457 - 29.15° above ground
0.442427 > 68.777164 - 19.43° above ground
0.742521 > 67.570948 - 9.72° above ground
1.231642 > 66.655974 - -0.00° above ground

ZMatrix	
63.00 + j102.00	67.94 - j67.05
67.94 - j67.05	218.89 + j252.29

YMatrix	
0.003899 - j0.005618	0.001674 + j0.001009
0.001674 + j0.001009	0.001705 - j0.001766

HMatrix - [I] = [H] X [F]	
0.016580 + j0.002265	0.000466 + j0.001493
0.000683 + j0.002452	0.008452 + j0.003430

HMatrix-inverse - $[F] = [H]^{-1}$ X [I]	

58.661225 - j6.649416	-7.268396 - j7.045217
-11.469481 - j11.826320	101.270275 - j38.421198

TOWER CURRENTS
Mode 1
Tower 1
0.000000 > 0.000000 - 97.20° above ground
2.360622 > -9.488442 - 87.48° above ground
4.244852 > -8.978459 - 77.76° above ground
5.914126 > -8.441627 - 68.04° above ground
7.346095 > -7.853943 - 58.32° above ground
8.510675 > -7.193035 - 48.60° above ground
9.376917 > -6.428327 - 38.88° above ground
9.917492 > -5.513725 - 29.16° above ground
10.108139 > -4.370835 - 19.44° above ground
9.925598 > -2.857125 - 9.72° above ground
9.143501 > -0.000000 - 0.00° above ground
Tower 2
0.000000 > 0.000000 - 116.60° above ground
1.017825 > -136.269907 - 106.88° above ground
1.777661 > -136.188942 - 97.17° above ground
2.419520 > -136.110090 - 87.45° above ground
2.932220 > -136.013793 - 77.73° above ground
3.302902 > -135.879668 - 68.02° above ground
3.518404 > -135.683245 - 58.30° above ground
3.567828 > -135.391746 - 48.58° above ground
3.443118 > -134.953463 - 38.87° above ground
3.138228 > -134.269781 - 29.15° above ground
2.644704 > -133.103927 - 19.43° above ground
1.952000 > -130.718271 - 9.72° above ground
0.715605 > -115.249714 - -0.00° above ground
Mode 2
Tower 1
0.000000 > 0.000000 - 97.20° above ground
0.105602 > -18.618272 - 87.48° above ground
0.188259 > -17.757395 - 77.76° above ground
0.259940 > -16.820907 - 68.04° above ground
0.319744 > -15.766841 - 58.32° above ground
0.366434 > -14.553358 - 48.60° above ground
0.398750 > -13.120265 - 38.88° above ground
0.415619 > -11.371761 - 29.16° above ground
0.416123 > -9.136158 - 19.44° above ground
0.399470 > -6.082243 - 9.72° above ground
0.354186 > 0.000000 - 0.00° above ground
Tower 2
0.000000 > 0.000000 - 116.60° above ground
0.076573 > 47.374094 - 106.88° above ground
0.136730 > 48.442380 - 97.17° above ground
0.190667 > 49.560504 - 87.45° above ground
0.237620 > 50.766345 - 77.73° above ground
0.276702 > 52.085549 - 68.02° above ground
0.306988 > 53.553561 - 58.30° above ground
0.327691 > 55.223284 - 48.58° above ground
0.338224 > 57.176832 - 38.87° above ground
0.338207 > 59.548161 - 29.15° above ground
0.327353 > 62.580719 - 19.43° above ground
0.305644 > 66.720298 - 9.72° above ground

0.261453 > 75.579002 - -0.00° above ground
Mode 3
Tower 1
0.000000 > 0.000000 - 97.20° above ground
1.499859 > -12.006304 - 87.48° above ground
2.701945 > -11.341503 - 77.76° above ground
3.772184 > -10.644360 - 68.04° above ground
4.696563 > -9.884046 - 58.32° above ground
5.456033 > -9.032266 - 48.60° above ground
6.030907 > -8.050769 - 38.88° above ground
6.403847 > -6.882573 - 29.16° above ground
6.559862 > -5.432054 - 19.44° above ground
6.485598 > -3.528671 - 9.72° above ground
6.056232 > -0.000000 - 0.00° above ground
Tower 2
0.000000 > 0.000000 - 116.60° above ground
0.768773 > -95.598862 - 106.88° above ground
1.340101 > -94.814999 - 97.17° above ground
1.820447 > -93.956243 - 87.45° above ground
2.202402 > -92.955723 - 77.73° above ground
2.477904 > -91.742618 - 68.02° above ground
2.639229 > -90.217611 - 58.30° above ground
2.680976 > -88.228450 - 48.58° above ground
2.600893 > -85.517886 - 38.87° above ground
2.400534 > -81.599784 - 29.15° above ground
2.086130 > -75.404736 - 19.43° above ground
1.682586 > -64.290299 - 9.72° above ground
1.211329 > -29.445134 - -0.00° above ground

FIELD INFORMATION - DAY		
	Field Ratio	**Field Phase**
Tower 1	1.0000	0.0000
Tower 2	0.4250	231.0000

FIELD INFORMATION - NIGHT		
	Field Ratio	**Field Phase**
Tower 1	1.0000	0.0000
Tower 2	1.0000	69.0000

FIELD INFORMATION - CH		
	Field Ratio	**Field Phase**
Tower 1	1.0000	0.0000
Tower 2	0.5000	282.0000

TOWER DRIVE INFORMATION - DAY					
	Field Ratios	**Field Phase**	**Drive Imped. (Ω)**	**Current**	**Power (W)**
Tower 1	1.0000	0.0000	55.99 + j99.42	9.14 ∠ 0.00	4680.7095
Tower 2	0.4250	231.0000	623.51 + j1402.82	0.72 ∠ -115.25	319.2905

TOWER DRIVE INFORMATION - NIGHT					
	Field Ratios	**Field Phase**	**Drive Imped. (Ω)**	**Current**	**Power (W)**
Tower 1	1.0000	0.0000	123.42 + j138.24	0.35 ∠ 0.00	15.4832
Tower 2	1.0000	69.0000	153.85 + j140.54	0.26 ∠ 75.58	10.5168

TOWER DRIVE INFORMATION - CH					
	Field Ratios	**Field Phase**	**Drive Imped. (Ω)**	**Current**	**Power (W)**

Tower 1	1.0000	0.0000	68.24 + j83.64	6.06 ∠ 0.00	2502.9757
Tower 2	0.5000	282.0000	679.46 + j127.36	1.21 ∠ -29.45	997.0243

TRANSMISSION LINE INFORMATION - DAY				
	Length (ft.)	**Velocity**	**Z_0**	**Phase**
Tower 1	200.0000	88.0000	50.0000	-98.1153
Tower 2	50.0000	88.0000	50.0000	-24.5288

TRANSMISSION LINE INFORMATION - NIGHT				
	Length (ft.)	**Velocity**	**Z_0**	**Phase**
Tower 1	200.0000	88.0000	50.0000	-98.1153
Tower 2	50.0000	88.0000	50.0000	-24.5288

TRANSMISSION LINE INFORMATION - CH				
	Length (ft.)	**Velocity**	**Z_0**	**Phase**
Tower 1	200.0000	88.0000	50.0000	-98.1153
Tower 2	50.0000	88.0000	50.0000	-24.5288

SYSTEM PHASING INFORMATION - DAY					
	PD Type	**PD Phase**	**PShifter**	**ACU Phase**	**I Phase**
Tower 1	Shunt	0.0000	0.0000	-86.8800	0.0000
Tower 2	Shunt	-32.6100	0.0000	116.8900	-115.2466

SYSTEM PHASING INFORMATION - NIGHT					
	PD Type	**PD Phase**	**PShifter**	**ACU Phase**	**I Phase**
Tower 1	Shunt	0.0000	0.0000	-81.8800	0.0000
Tower 2	Shunt	-16.7200	0.0000	-63.1700	75.5787

SYSTEM PHASING INFORMATION - CH					
	PD Type	**PD Phase**	**PShifter**	**ACU Phase**	**I Phase**
Tower 1	Shunt	0.0000	0.0000	-86.8800	0.0000
Tower 2	Shunt	-30.0300	-85.0000	-74.8900	-29.4456

COMMON POINT TEE - DAY			
	Input Leg	**Shunt Leg**	**Output Leg**
Reactance(Ω)	44.8922	-44.8922	28.7049
Inductance(μH)	6.0549	5.0376	5.6908
Capacitance(μF)	0.000000	0.001640	0.010000
Current(RMS Amps)	10.0000	14.9683	11.1378
Cap. Volts(RMS)	0.0000	1231.0260	150.2233

ZERO DEGREE PHASE SHIFTER - Tower 1 - DAY	
Capacitance(μF)	0.003000
Inductance(μH)	6.0639
Current(RMS Amps)	9.6754
Cap. Volts(RMS)	434.9985

ACU - Tower 1 - DAY			
	Input Leg	**Shunt Leg**	**Output Leg**
Reactance(Ω)	50.2620	-52.9874	-49.4888
Inductance(μH)	6.7792	6.2296	7.3188
Capacitance(μF)	0.000000	0.001360	0.001300
Current(RMS Amps)	9.6754	12.9456	9.1435
Cap. Volts(RMS)	0.0000	1283.8678	948.6528

ZERO DEGREE PHASE SHIFTER - Tower 2 - DAY	
Capacitance(μF)	0.003000
Inductance(μH)	6.0639
Current(RMS Amps)	2.5270
Cap. Volts(RMS)	113.6122

ACU - Tower 2 - DAY			
	Input Leg	Shunt Leg	Output Leg
Reactance(Ω)	-223.3260	197.9705	-1916.9805
Inductance(μH)	6.2621	26.7017	0.0000
Capacitance(μF)	0.000500	0.000000	0.000070
Current(RMS Amps)	2.5270	2.9212	0.7156
Cap. Volts(RMS)	681.6730	0.0000	1371.7990

COMMON POINT TEE - NIGHT			
	Input Leg	Shunt Leg	Output Leg
Reactance(Ω)	36.4070	-36.4070	27.1021
Inductance(μH)	6.7297	7.2174	5.4746
Capacitance(μF)	0.010000	0.001500	0.010000
Current(RMS Amps)	0.7211	1.2251	0.9903
Cap. Volts(RMS)	9.7261	110.1555	13.3575

ZERO DEGREE PHASE SHIFTER - Tower 1 - NIGHT	
Capacitance(μF)	0.003000
Inductance(μH)	6.0639
Current(RMS Amps)	0.5565
Cap. Volts(RMS)	25.0186

ACU - Tower 1 - NIGHT			
	Input Leg	Shunt Leg	Output Leg
Reactance(Ω)	72.2187	-79.3526	-76.4980
Inductance(μH)	9.7407	7.4890	12.4220
Capacitance(μF)	0.000000	0.001000	0.000800
Current(RMS Amps)	0.5565	0.6160	0.3542
Cap. Volts(RMS)	0.0000	83.0819	59.7144

ZERO DEGREE PHASE SHIFTER - Tower 2 - NIGHT	
Capacitance(μF)	0.003000
Inductance(μH)	6.0639
Current(RMS Amps)	0.4586
Cap. Volts(RMS)	20.6192

ACU - Tower 2 - NIGHT			
	Input Leg	Shunt Leg	Output Leg
Reactance(Ω)	72.9976	-98.2873	-120.0681
Inductance(μH)	9.8457	9.4831	14.1253
Capacitance(μF)	0.000000	0.000800	0.000600
Current(RMS Amps)	0.4586	0.4129	0.2615
Cap. Volts(RMS)	0.0000	69.6065	58.7734

COMMON POINT TEE - CH			
	Input Leg	Shunt Leg	Output Leg
Reactance(Ω)	38.6984	-38.6984	25.5120
Inductance(μH)	7.0387	6.9084	7.0794
Capacitance(μF)	0.010000	0.001500	0.005000
Current(RMS Amps)	8.3666	13.6695	10.8100

Cap. Volts(RMS)	112.8463	1229.1378	291.6043

ZERO DEGREE PHASE SHIFTER - Tower 1 - CH	
Capacitance(μF)	0.003000
Inductance(μH)	6.0639
Current(RMS Amps)	7.0753
Cap. Volts(RMS)	318.0974

ACU - Tower 1 - CH			
	Input Leg	**Shunt Leg**	**Output Leg**
Reactance(Ω)	55.7745	-58.4999	-28.8570
Inductance(μH)	7.5227	6.1034	8.2357
Capacitance(μF)	0.000000	0.001300	0.001500
Current(RMS Amps)	7.0753	9.0594	6.0562
Cap. Volts(RMS)	0.0000	939.9293	544.5646

PHASE SHIFTER - Tower 2 - CH			
	Input Leg	**Shunt Leg**	**Output Leg**
Reactance(Ω)	45.8166	-50.1910	45.8166
Inductance(μH)	7.9988	7.2241	6.1796
Capacitance(μF)	0.010000	0.001300	0.000000
Current(RMS Amps)	4.4655	6.0337	4.4655
Cap. Volts(RMS)	60.2290	626.0024	0.0000

ACU - Tower 2 - CH			
	Input Leg	**Shunt Leg**	**Output Leg**
Reactance(Ω)	177.4181	-190.9185	-119.9047
Inductance(μH)	23.9296	10.6331	74.7867
Capacitance(μF)	0.000000	0.000500	0.000200
Current(RMS Amps)	4.4655	4.3114	1.2114
Cap. Volts(RMS)	0.0000	1163.0052	816.9181

IMPEDANCE BANDWIDTH - DAY		
Frequency	**Common Point Impedance**	**VSWR**
1.1700	49.73 + j6.39	1.1367
1.1800	50.00 + j0.00	1.0000
1.1900	46.62 - j6.42	1.1619

FIELD RATIOS - DAY			
	-0.010 MHz	**Carrier**	**+0.010 MHz**
Tower 1	1.00 ∡ 0.00	1.00 ∡ 0.00	1.00 ∡ 0.00
Tower 2	0.41 ∡ -128.48	0.42 ∡ -129.00	0.44 ∡ -129.81

IMPEDANCE BANDWIDTH - NIGHT		
Frequency	**Common Point Impedance**	**VSWR**
1.1700	52.75 + j3.94	1.0980
1.1800	50.00 - j0.00	1.0000
1.1900	45.84 - j2.89	1.1115

FIELD RATIOS - NIGHT			
	-0.010 MHz	**Carrier**	**+0.010 MHz**
Tower 1	1.00 ∡ 0.00	1.00 ∡ 0.00	1.00 ∡ 0.00
Tower 2	0.95 ∡ 61.64	1.00 ∡ 68.99	1.21 ∡ 74.52

IMPEDANCE BANDWIDTH - CH		

Frequency	Common Point Impedance	VSWR
1.1700	51.43 + j4.00	1.0875
1.1800	50.00 - j0.00	1.0000
1.1900	47.04 - j3.47	1.0985

FIELD RATIOS - CH			
	-0.010 MHz	Carrier	+0.010 MHz
Tower 1	1.00 ∠ 0.00	1.00 ∠ 0.00	1.00 ∠ 0.00
Tower 2	0.46 ∠ -78.22	0.50 ∠ -78.01	0.54 ∠ -78.95