



Response to  
Request for Quote

West Virginia Public  
Broadcasting  
Authority

Charleston WV.

RFQ #EBA392

5-Bay Side Mounted  
FM Antenna 88.5  
Vertical Polarization  
Only

January 18, 2012

RECEIVED

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REC'D DIVISION  
STATE OF WV

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2	Original Request for Bid Document With Addendum 1
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4	West Virginia Purchasing Affidavit
5	SPX Communication Technology Point-to-Point
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7	SPX Communication Technology Terms and Conditions
8	Tower Drawings
9	Model DCV Antenna Specifications
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14	SPX Communication Technology ISO Certificate
15	Capabilities Brochure



COMMUNICATION TECHNOLOGY

Shelly Murray  
West Virginia Educational Broadcasting Authority  
Department of Administration  
Purchasing Division  
Building 15  
2019 Washington Street, East  
Charleston, WV 25305-0130

RFQ Number EBA392  
Side Mount 5-Bay FM Antenna

Ms. Murray

Thank you for the opportunity to respond to the referenced solicitation. We are pleased to offer the following proposal for your review.

Since our inception in 1942, SPX Communication Technology (Dielectric Communications) has considered itself a solution-oriented engineering company, with pride in our depth of scientific knowledge, and our experience in both FM and TV.

We are the nation's largest manufacturer of broadcast antennas, transmission line, and RF Systems equipment, with over 60 years of continuous service, and equipment installed in thousands of transmission sites worldwide.

We look forward to this exciting project. A point to point response is included. We have also included our standard Terms and Conditions of Sale including Warranty, which would apply to the extent they are not in conflict with the bid documents.

If any information is missing it is not intentional. Any additional questions are welcome and an opportunity for any further clarification if needed is appreciated.

Kind regards,

A handwritten signature in cursive script that reads 'David Stout'.

David Stout  
Quotes Representative



State of West Virginia  
Department of Administration  
Purchasing Division  
2019 Washington Street East  
Post Office Box 50130  
Charleston, WV 25305-0130

## Request for Quotation

RFQ NUMBER

EBA392

PAGE

1

ADDRESS CORRESPONDENCE TO ATTENTION OF:

SHELLY MURRAY  
304-558-8801

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Dielectric  
22 Tower Road  
Raymond, ME 04071

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EDUCATIONAL BROADCASTING  
AUTHORITY  
600 CAPITOL STREET

CHARLESTON, WV  
25301-1223 304-558-3400

Vendor # C20082552

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS		
12/15/2011						
BID OPENING DATE: 01/19/2012		BID OPENING TIME 01:30PM				
LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1	LS		725-12		
<p>THE WEST VIRGINIA PURCHASING DIVISION, FOR THE AGENCY, THE WEST VIRGINIA EDUCATIONAL BROADCASTING AUTHORITY, IS SOLICITING BIDS FOR A SIDE MOUNT 5 BAY FM ANTENNA SYSTEM WITH VERTICAL POLARIZATION AND ANIT-ICING RADOMES PER THE ATTACHED SPECIFICATIONS.</p> <p>TECHNICAL QUESTIONS MUST BE SUBMITTED IN WRITING TO SHELLY MURRAY IN THE WEST VIRGINIA PURCHASING DIVISION VIA MAIL AT THE ADDRESS SHOWN AT THE TOP OF THIS RFQ, VIA FAX AT 304-558-4115, OR VIA E-MAIL AT SHELLY.L.MURRAY@WV.GOV. DEADLINE FOR ALL TECHNICAL QUESTIONS IS 01/03/2012 AT THE CLOSE OF BUSINESS. ALL TECHNICAL QUESTIONS RECEIVED, IF ANY, WILL BE ADDRESSED BY ADDENDUM AFTER THE DEADLINE.</p> <p>** CD ATTACHMENT OF ATTACHMENT 1</p> <p>CANCELLATION: THE DIRECTOR OF PURCHASING RESERVES THE RIGHT TO CANCEL THIS CONTRACT IMMEDIATELY UPON WRITTEN NOTICE TO THE VENDOR IF THE COMMODITIES AND/OR SERVICES SUPPLIED ARE OF AN INFERIOR QUALITY OR DO NOT CONFORM WITH THE SPECIFICATIONS OF THE BID AND CONTRACT HEREIN.</p>						
SEE REVERSE SIDE FOR TERMS AND CONDITIONS						
SIGNATURE <i>D.M. Stout</i>			TELEPHONE 207-655-8137		DATE 1-18-12	
TITLE Quotes Rep.		FEIN 38-1016240		ADDRESS CHANGES TO BE NOTED ABOVE		

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

## GENERAL TERMS & CONDITIONS REQUEST FOR QUOTATION (RFQ) AND REQUEST FOR PROPOSAL (RFP)

1. Awards will be made in the best interest of the State of West Virginia.
2. The State may accept or reject in part, or in whole, any bid.
3. Prior to any award, the apparent successful vendor must be properly registered with the Purchasing Division and have paid the required \$125 fee.
4. All services performed or goods delivered under State Purchase Order/Contracts are to be continued for the term of the Purchase Order/Contracts, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods this Purchase Order/Contract becomes void and of no effect after June 30.
5. Payment may only be made after the delivery and acceptance of goods or services.
6. Interest may be paid for late payment in accordance with the *West Virginia Code*.
7. Vendor preference will be granted upon written request in accordance with the *West Virginia Code*.
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10. The laws of the State of West Virginia and the *Legislative Rules* of the Purchasing Division shall govern the purchasing process.
11. Any reference to automatic renewal is hereby deleted. The Contract may be renewed only upon mutual written agreement of the parties.
12. **BANKRUPTCY:** In the event the vendor/contractor files for bankruptcy protection, the State may deem this contract null and void, and terminate such contract without further order.
13. **HIPAA BUSINESS ASSOCIATE ADDENDUM:** The West Virginia State Government HIPAA Business Associate Addendum (BAA), approved by the Attorney General, is available online at [www.state.wv.us/admin/purchase/vrc/hipaa.html](http://www.state.wv.us/admin/purchase/vrc/hipaa.html) and is hereby made part of the agreement provided that the Agency meets the definition of a Cover Entity (45 CFR §160.103) and will be disclosing Protected Health Information (45 CFR §160.103) to the vendor.
14. **CONFIDENTIALITY:** The vendor agrees that he or she will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the agency's policies, procedures, and rules. Vendor further agrees to comply with the Confidentiality Policies and Information Security Accountability Requirements, set forth in <http://www.state.wv.us/admin/purchase/privacy/noticeConfidentiality.pdf>.
15. **LICENSING:** Vendors must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, and the West Virginia Insurance Commission. The vendor must provide all necessary releases to obtain information to enable the director or spending unit to verify that the vendor is licensed and in good standing with the above entities.
16. **ANTITRUST:** In submitting a bid to any agency for the State of West Virginia, the bidder offers and agrees that if the bid is accepted the bidder will convey, sell, assign or transfer to the State of West Virginia all rights, title and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the State of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the State of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to the bidder.

I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm, limited liability company, partnership, or person or entity submitting a bid for the same material, supplies, equipment or services and is in all respects fair and without collusion or fraud. I further certify that I am authorized to sign the certification on behalf of the bidder or this bid.

### INSTRUCTIONS TO BIDDERS

1. Use the quotation forms provided by the Purchasing Division. Complete all sections of the quotation form.
2. Items offered must be in compliance with the specifications. Any deviation from the specifications must be clearly indicated by the bidder. Alternates offered by the bidder as **EQUAL** to the specifications must be clearly defined. A bidder offering an alternate should attach complete specifications and literature to the bid. The Purchasing Division may waive minor deviations to specifications.
3. Unit prices shall prevail in case of discrepancy. All quotations are considered F.O.B. destination unless alternate shipping terms are clearly identified in the quotation.
4. All quotations must be delivered by the bidder to the office listed below prior to the date and time of the bid opening. Failure of the bidder to deliver the quotations on time will result in bid disqualifications: Department of Administration, Purchasing Division, 2019 Washington Street East, P.O. Box 50130, Charleston, WV 25305-0130
5. Communication during the solicitation, bid, evaluation or award periods, except through the Purchasing Division, is strictly prohibited (W.Va. C.S.R. §148-1-6.6).



State of West Virginia  
Department of Administration  
Purchasing Division  
2019 Washington Street East  
Post Office Box 50130  
Charleston, WV 25305-0130

## Request for Quotation

RFQ NUMBER

EBA392

PAGE

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ADDRESS CORRESPONDENCE TO ATTENTION OF:

SHELLY MURRAY  
304-558-8801

RFQ COPY

TYPE NAME/ADDRESS HERE

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EDUCATIONAL BROADCASTING  
AUTHORITY  
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CHARLESTON, WV  
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DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
12/15/2011				

BID OPENING DATE:

01/19/2012

BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
BANKRUPTCY: IN THE EVENT THE VENDOR/CONTRACTOR FILES FOR BANKRUPTCY PROTECTION, THIS CONTRACT IS AUTOMATICALLY NULL AND VOID, AND IS TERMINATED WITHOUT FURTHER ORDER.						
NOTICE						
A SIGNED BID MUST BE SUBMITTED TO:						
DEPARTMENT OF ADMINISTRATION PURCHASING DIVISION BUILDING 15 2019 WASHINGTON STREET, EAST CHARLESTON, WV 25305-0130						
THE BID SHOULD CONTAIN THIS INFORMATION ON THE FACE OF THE ENVELOPE OR THE BID MAY NOT BE CONSIDERED:						
SEALED BID						
BUYER: SHELLY MURRAY						
RFQ. NO.: EBA392						
BID OPENING DATE: 01/19/2012						
BID OPENING TIME: 1:30 PM						
PLEASE PROVIDE A FAX NUMBER IN CASE IT IS NECESSARY TO CONTACT YOU REGARDING YOUR BID: 207-655-8173						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	DATE	TELEPHONE
<i>D.M. Stout</i>	1-18-12	207-655-8137
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE
Quotes Rep.	38-1016240	

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia  
Department of Administration  
Purchasing Division  
2019 Washington Street East  
Post Office Box 50130  
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## Request for Quotation

RFQ NUMBER

EBA392

PAGE

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ADDRESS CORRESPONDENCE TO ATTENTION OF:

SHELLY MURRAY  
304-558-8801

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EDUCATIONAL BROADCASTING  
AUTHORITY  
600 CAPITOL STREET

CHARLESTON, WV

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304-558-3400

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12/15/2011				

BID OPENING DATE:

01/19/2012

BID OPENING TIME

01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
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CONTACT PERSON (PLEASE PRINT CLEARLY):

David Stout

\*\*\*\*\* THIS IS THE END OF RFQ EBA392 \*\*\*\*\* TOTAL: \_\_\_\_\_

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE

D. M. Stout

TELEPHONE

207-655-8137

DATE

1/18/12

TITLE

Quotes Rep

FEIN

38-1016240

ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

**EBA392**

West Virginia Educational Broadcasting Authority (WVEBA) is seeking bids on a side mount 5 bay FM antenna system with vertical polarization and anti-icing radomes. The antenna shall operate on a frequency of 88.5 MHz.

Delivery of the antenna system shall be no later than March 1, 2012.

Specifications plus 4 attachments:

- Tower Drawing (6 Pages)
- Azimuth of Tower
- Antenna Pattern
- Antenna Pattern tabature

The successful vendor shall be a registered vendor with the State of West Virginia Purchasing Division and will pay the \$125 registration fee.

**ANTENNA****1. General description**

- 1.1. Antenna shall operate on a frequency of 88.5MHz
- 1.2. Antenna shall be 5 bays.
  - 1.2.1. Antenna shall utilize Full Wavelength spacing
  - 1.2.2. Polarization shall be vertical only
  - 1.2.3. Antenna system (antenna, line, and isolator) must deliver a power gain that will result in a 50 KW ERP using a maximum transmitter power of 10 kilowatts
- 1.3. Assembled antenna must accept 10 Kilowatts at a Frequency of 88.5 Megahertz
  - 1.3.1. No beam tilt is requested
  - 1.3.2. Input connector shall be vendor's discretion.
    - 1.3.2.1. All components must be rated to accommodate a power level greater than 10 KW.
  - 1.3.3. Entire antenna and feed mechanism must be pressurizable.
  - 1.3.4. Antenna shall be equipped with anti-icing radomes
    - 1.3.4.1. Antenna heaters will not be acceptable
  - 1.3.5. Antenna will be side mounted with a center of radiation of 54 meters on a self self-supporting AM tower. (Drawing attached- Attachment 1)
    - 1.3.5.1. Tower orientation is defined in Attachment 2
    - 1.3.5.2. Isolation**
  - 1.3.6. The tower is an insulated base AM facility
  - 1.3.7. Vendor shall provide an isolator to allow the FM antenna to be attached to the tower
    - 1.3.7.1. Isolator shall be rated greater than 10 KW input power
    - 1.3.7.2. Isolator shall pass dehydrated air to the transmission line going up the tower to the antenna

- 1.3.8. Vendor shall provide transmission line from the isolator to the transmitter inside the building

#### **1.4. Certification**

- 1.4.1. The mounted antenna must meet the azimuthal pattern described in the attached drawings and table (drawings and table attached- Attachment 3 and 4)
  - 1.4.1.1. Azimuthal pattern shall be verified by range testing or field measurements of the installed antenna.
    - 1.4.1.1.1. The successful vendor shall provide a complete proof of performance to verify the horizontal plane radiation pattern for both the horizontally and vertically polarized radiation components. This proof of performance may be accomplished using the full size antenna, or individual bays therefrom, mounted on a supporting structure of identical dimensions and configuration as the proposed structure, including all braces, ladders, conduits, coaxial lines, and other appurtenances; **or** by using a carefully manufactured scale model of the entire antenna; **or** the individual bays therefrom, mounted on an equally scaled model of the proposed supporting structure, including all appurtenances.
    - 1.4.1.1.2. The successful vendor shall provide a description of the antenna testing facilities and equipment employed, including appropriate photographs or sketches and a description of the testing procedures, including the scale factor, measurements frequency, and equipment calibration.
  - 1.4.1.2. Antenna shall be field matched to meet a VSWR of 1.1:1 or better.

#### **2. TRANSMISSION LINE**

- 2.1. Vendor shall supply Transmission line
  - 2.1.1. Line shall be of sufficient efficiency to allow 50 KW ERP using 10 KW TPO
  - 2.1.2. Antenna connector shall be at vendor's discretion
    - 2.1.2.1. All components shall be rated for a power level greater than 10 KW
    - 2.1.2.2. All connectors shall be gas pass with the exception of the connector in the building for the transmitter
    - 2.1.2.3. Vendor shall provide a 90 degree adapter to interface to the transmitter output
    - 2.1.2.4. Transmitter output is 1 5/8" EIA Flange
  - 2.1.3. Line shall be air dielectric and pressurized and shall provide pressurization to the antenna
  - 2.1.4. Vendor shall provide all hangers, angle adapters, hoisting kits, grounding kits and other items necessary for installation

- 2.1.4.1. Snap in hangers shall not be used
- 2.1.5. Vendor shall provide air dehydration/pressurization unit

### **MOUNTING HARDWARE**

- 3. Vendor must provide mounting hardware and adapters to interface between the tower and antenna.
  - 3.1. The attached fabrication drawing lists the material size for the legs and cross members.
  - 3.2. The orientation of the tower is defined in Attachment 2
    - 3.2.1.1. Antenna must be supported at a distance from the tower to minimize pattern interference.
    - 3.2.1.2. Antenna must be supported in a manner that minimizes flexing at interbay connections.
    - 3.2.1.3. Antirotation support shall be provided and fabricated to absolutely orient the antenna in the proper azimuth
    - 3.2.1.4. All mounting hardware must be galvanized or stainless steel.
    - 3.2.1.5. All hardware shall meet or exceed EIA/TIA RS-222G standard.

### **4. ATTACHMENTS**

- 4.1. Attachment 1 – Tower Fabrication Drawings (6 pages)
- 4.2. Attachment 2 – Tower orientation as surveyed
- 4.3. Azimuth Pattern Graphic
- 4.4. Azimuth Pattern Numeric Table

### **DELIVERY and SHIPPING**

- 5. Delivery of the antenna system shall be no later than March 1, 2012.
- 5.1 Shipping and handling shall be FOB Destination to the West Virginia Educational Broadcasting headquarters and shall be included in the price of the equipment.
- 5.2 The delivery address is West Virginia Public Broadcasting, 600 Capitol Street, Charleston, WV 25301
- 5.3 There shall be 24 hours notice prior to delivery, to the attention of Dave McClanahan, 304-556-4900.

### **6. Warranty**

- 6.1 All products shall be warranted for a minimum of one year.
- 6.1.1 Bidders should state their warranty policy with their bid. They must provide their warranty within 24 hours of a request for the information.

### **INVOICING**

- 7 Itemized invoice shall be sent to:
  - 7.1 West Virginia Educational Broadcasting Authority
    - 7.1.1 Attention Tammy Treadway
    - 7.1.2 P. O. Box 9004
    - 7.1.3 Beckley, WV 25802



State of West Virginia  
Department of Administration  
Purchasing Division  
2019 Washington Street East  
Post Office Box 50130  
Charleston, WV 25305-0130

## Request for Quotation

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PAGE

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ADDRESS CORRESPONDENCE TO ATTENTION OF:

SHELLY MURRAY  
304-558-8801

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*David Stout*

~~KIM SAVAGE~~

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EDUCATIONAL BROADCASTING  
AUTHORITY

600 CAPITOL STREET

CHARLESTON, WV

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DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
01/06/2012				

BID OPENING DATE: 01/19/2012

BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
----- ADDENDUM NO. 1 -----						
THIS ADDENDUM IS ISSUED TO ADDRESS THE QUESTIONS RECEIVED PRIOR TO THE QUESTION SUBMISSION DEADLINE OF 01/03/2012.						
001	1	LS		725-12		
ANTENNA						
EXHIBIT 10						
REQUISITION NO.: .....						
ADDENDUM ACKNOWLEDGEMENT						
I HEREBY ACKNOWLEDGE RECEIPT OF THE FOLLOWING CHECKED ADDENDUM(S) AND HAVE MADE THE NECESSARY REVISIONS TO MY PROPOSAL, PLANS AND/OR SPECIFICATION, ETC.						
ADDENDUM NO.'S:						
NO. 1 .....						
NO. 2 .....						
NO. 3 .....						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

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State of West Virginia  
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Post Office Box 50130  
Charleston, WV 25305-0130

## Request for Quotation

RFQ NUMBER

EBA392

PAGE

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ADDRESS CORRESPONDENCE TO ATTENTION OF:

SHELLY MURRAY  
304-558-8801

RFQ COPY

TYPE NAME/ADDRESS HERE

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EDUCATIONAL BROADCASTING  
AUTHORITY  
600 CAPITOL STREET

CHARLESTON, WV

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BID OPENING DATE: 01/19/2012 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
NO. 4 .....						
NO. 5 .....						
I UNDERSTAND THAT FAILURE TO CONFIRM THE RECEIPT OF THE ADDENDUM(S) MAY BE CAUSE FOR REJECTION OF BIDS.						
VENDOR MUST CLEARLY UNDERSTAND THAT ANY VERBAL REPRESENTATION MADE OR ASSUMED TO BE MADE DURING ANY ORAL DISCUSSION HELD BETWEEN VENDOR'S REPRESENTATIVES AND ANY STATE PERSONNEL IS NOT BINDING. ONLY THE INFORMATION ISSUED IN WRITING AND ADDED TO THE SPECIFICATIONS BY AN OFFICIAL ADDENDUM IS BINDING.						
				..... SIGNATURE		
				SPX Communication Technologies ..... COMPANY		
				1/18/12 ..... DATE		
NOTE: THIS ADDENDUM ACKNOWLEDGEMENT SHOULD BE SUBMITTED WITH THE BID.						
----- END OF ADDENDUM NO. 1 -----						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

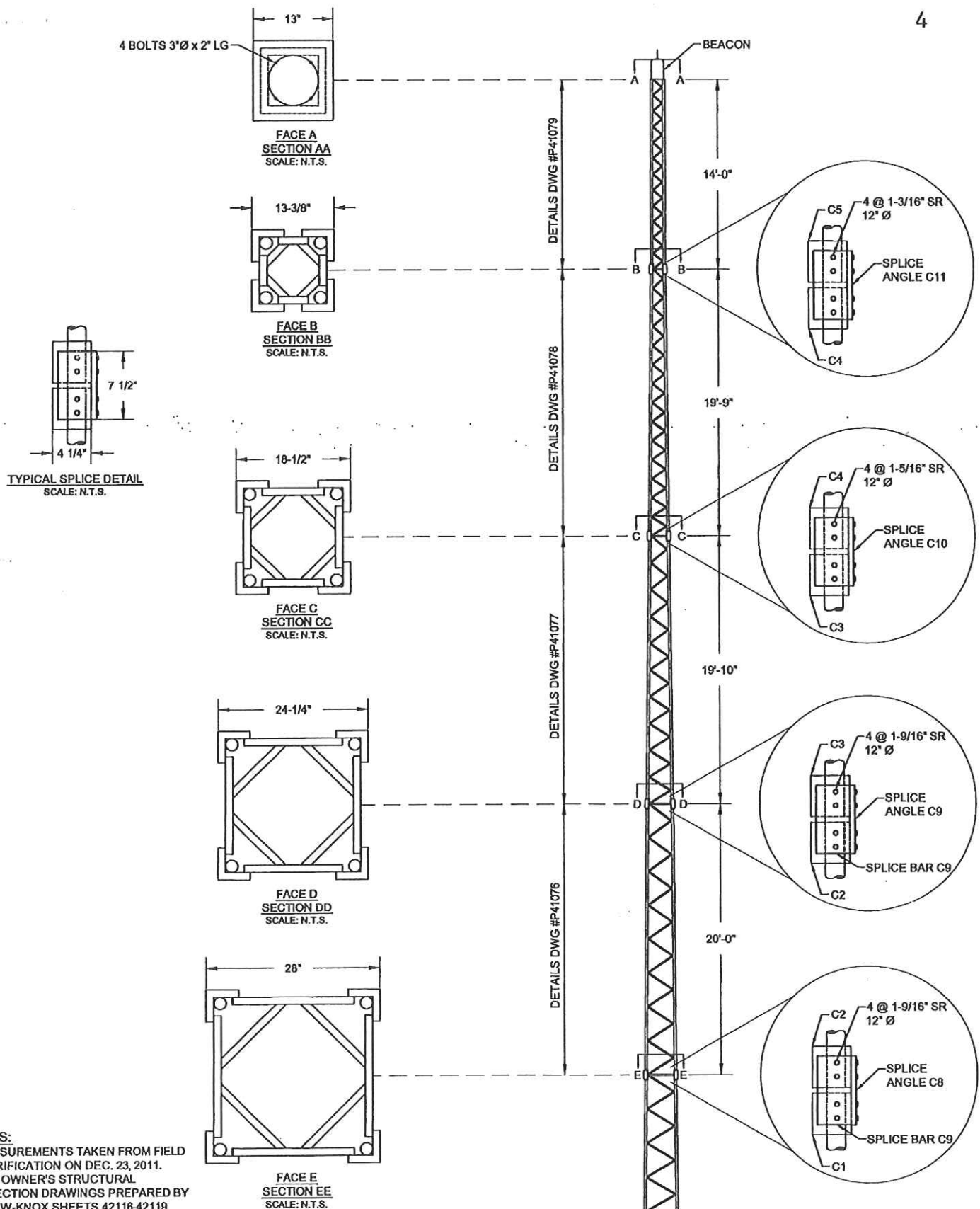
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TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

**EBA392****Addendum No. 1****Question:**

The tower drawing provided ("Drawing 42075.pdf") does not include the face dimensions for sections labeled C5, C4, C3, C2, and C1. Can the detail drawings P-41079, P-41078, P-41077, P-41076, and P-41075 be provided or at minimum can the Drawing 42075.pdf be annotated with the face dimensions at the top and bottom of each tower section? This information is necessary to develop the directional FM antenna design.

**Response:** Please see attachment with inserted tower details.



## NOTES:

1. MEASUREMENTS TAKEN FROM FIELD VERIFICATION ON DEC. 23, 2011.
2. SEE OWNER'S STRUCTURAL ERECTION DRAWINGS PREPARED BY BLAW-KNOX SHEETS 42116-42119 DATED: NOV. 18, 1946.

PROJECT:

BLUEFIELD

SCALE: 1" = 10'

DATE: 01/04/12

DWG. NO.:

## EBA392 Pricing Page 5 Bay FM Sidemount Antenna

Shipping costs shall be included in equipment cost.

<u>Item</u>	<u>Quantity</u>	<u>Description</u>	<u>Price</u>
1	1	Antenna	<u>\$ 43,420.00</u>
2	1	Transmission Line	<u>\$ 11,509.25</u>
3	1	Mounting Hardware	<u>\$ 1,278.00</u>
TOTAL			<u>\$ 56,207.25</u>

Includes: DVS Bay Ant  
with Radomes  
Ant Mounts  
Pattern Study  
Isolator

Includes 1 5/8 Flex line (227')  
Connectors with Flanges  
Dehydrator  
90° 1 5/8 El Bow To interface  
To The Transmitter outlet

D. M. Stout  
Signature of Vendor Representative submitting bid

Date 1/18/12

STATE OF WEST VIRGINIA  
Purchasing Division

# PURCHASING AFFIDAVIT

**West Virginia Code §5A-3-10a states:** No contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and the debt owed is an amount greater than one thousand dollars in the aggregate.

## DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Debtor" means any individual, corporation, partnership, association, limited liability company or any other form or business association owing a debt to the state or any of its political subdivisions. "Political subdivision" means any county commission; municipality; county board of education; any instrumentality established by a county or municipality; any separate corporation or instrumentality established by one or more counties or municipalities, as permitted by law; or any public body charged by law with the performance of a government function or whose jurisdiction is coextensive with one or more counties or municipalities. "Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceeds five percent of the total contract amount.

**EXCEPTION:** The prohibition of this section does not apply where a vendor has contested any tax administered pursuant to chapter eleven of this code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

Under penalty of law for false swearing (*West Virginia Code §61-5-3*), it is hereby certified that the vendor affirms and acknowledges the information in this affidavit and is in compliance with the requirements as stated.

## WITNESS THE FOLLOWING SIGNATURE

Vendor's Name: SIX Communication Technologies

Authorized Signature: [Signature] Date: 1-18-12

State of Maine

County of Cumberland, to-wit:

Taken, subscribed, and sworn to before me this 18<sup>th</sup> day of January, 2012.

My Commission expires November 14, 2015.

AFFIX SEAL HERE

NOTARY PUBLIC

Tamara Jean White

TAMARA JEAN WHITE  
Notary Public, Maine  
My Commission Expires November 14, 2015

RFQ # EBA392  
West Virginia Educational Broadcasting Authority  
5-Bay Side Mounted FM Antenna System

SPC Communication Technologies Point-by-Point Response

**Section 1 Antenna General Description**

- 1.1 Comply
  - 1.2 Comply
  - 1.2.1 Comply
  - 1.2.2 Comply
  - 1.2.3 Comply
  - 1.3 Comply
  - 1.3.1 Comply
  - 1.3.2 Understood. We are proposing an 1-5/8 antenna input
    - 1.3.2.1 Comply
  - 1.3.3 Comply
  - 1.3.4 Comply. NOTE: The radomes themselves are not "anti-icing", however, they **do not** allow ice to form on the antenna element themselves which is the most sensitive to VSWR.
    - 1.3.4.1 Understood
  - 1.3.5 Understood
  - 1.3.5.1 Understood
  - 1.3.5.2 Understood
  - 1.3.6 Understood
  - 1.3.7 Comply
    - 1.3.7.1 Comply
    - 1.3.7.2 Comply
  - 1.3.8 Comply
- 1.4 Certification**
- 1.4.1 Understood
    - 1.4.1.1 Understood
      - 1.4.1.1.1 Understood
      - 1.4.1.1.2 Comply. See Pattern Study Brochure within bid response

**Section 2 Transmission Line**

- 2.1 Comply
- 2.1.1 Comply
- 2.1.2 Understood
  - 2.1.2.1 Comply
  - 2.1.2.2 Comply
  - 2.1.2.3 Comply
  - 2.1.2.4 Understood
- 2.1.3 Comply
- 2.1.4 Comply
  - 2.1.4.1 Understood
- 2.1.5 Comply

**Section 3 Mounting Hardware**

- 3. Comply
- 3.1 Understood
- 3.2 Understood
  - 3.2.1.1 Understood

- 3.2.1.2 Understood
- 3.2.1.3 Understood
- 3.2.1.4 Comply
- 3.2.1.5 Comply

#### Section 4 Attachments

- 4.1 Received and Understood
- 4.2 Received and Understood
- 4.3 Received and Understood
- 4.4 Received and Understood

#### Section 5 Shipping and Handling

- 5. SPX Complies with an award of the bid no later than 1/23/12
- 5.1 Comply
- 5.2 Understood
- 5.3 Understood

#### Section 6 Warranty

- 6.1 Comply.
- 6.1.1 Comply. SPX Comm. Tech. warranty is for a period of 5 years. See attached T's & C's

#### Section 7 Invoicing Understood



COMMUNICATION TECHNOLOGY

22 Tower Road  
Raymond, ME 04071  
Phone: 207-655-4555  
Fax: 207-655-8173  
Internet: www.spxcomtech.com



## Quotation

### Customer

WEST VIRGINIA PUBLIC BROADCASTING  
PO Box 9004  
BECKLEY WV 25802  
USA

### Information

Quote Number 2027174  
Quote Date 01/17/2012  
Customer No. 112919  
Currency USD  
Validity Start Date 01/17/2012  
Validity End Date 03/17/2012

### Ship-To-Party

WEST VIRGINIA PUBLIC BROADCASTING  
600 CAPITOL STREET  
CHARLESTON WV 25301  
USA

### Header Information

Terms of payment: Net due in 30 days

\*\* PAYMENT TERMS ARE SUBJECT TO CHANGE PENDING CREDIT APPROVAL \*\*

Incoterms: FOB DESTINATION PPD

Item	Material Number / Cat. Num / Description	Quantity	Unit Price	Amount
10	11000000077/ ANT DCV5R V-POL	1 EA	18,850.00	18,850.00
			Item Discount %25.000-	-4,712.50
			Item NET Price	14,137.50
20	11000000077/ MOUNTS FOR TAPERED TOWER	1 EA	3,000.00	3,000.00
			Item Discount %25.000-	-750.00
			Item NET Price	2,250.00
30	11000000077/ PATTERN STUDY	1 EA	12,000.00	12,000.00
40	RCUSTOM/ ISOCOUPLER 20 KW MAX. POWER, 88-108 MHZ	1 EA	19,210.00	19,210.00
			Item Discount %25.000-	-4,802.50
			Item NET Price	14,407.50
50	RFLEX/ FLEX LINE RUN 177' VERTICAL 50' HORIZONTAL	1 EA		
	With the following configuration			
	FACTORY INSTALL BOT CONN?: NO			
	SELECT TOP CONNECTOR: 1 5/8" MALE GPASS CONN EIA 1"			
	SELECT BOTTOM CONNECTOR: 1 5/8" MALE GSTOP CONN EIA 1"			
	ENTER VERTICAL LENGTH: 177 Foot			
	ENTER HORIZONTAL LENGTH: 50 Foot			
	ENTER DESIRED FREQUENCY: 88.5 MHz			
	ARE MOUNTING REQMTS KNOWN?: NO			
	ATTENUATION (dB): 0.43 dB			
	EFFICIENCY (%): 90.52 %			
	SYSTEM MAX AVG PWR (KW): 17.6 KW			
60	11000006463/ FLEXLINE 1-50 ANDREW HJ7-50A	227 FT	31.00	7,037.00
	FL-46 1 5/8" AIR FLEXLINE, 50 OHM TRANSMISSION LINE			

Item 70 on next page



COMMUNICATION TECHNOLOGY

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Fax: 207-655-8173  
Internet: www.spxcomtech.com



# Quotation

Quote Number 2027174

Quote Date 01/17/2012

Customer No. 112919

Item	Material Number / Cat. Num / Description	Quantity	Unit Price	Amount
70	11000002341/ CONN 1 5/8 EIA GAS PASS 46-EM158P 1 5/8" EIA MALE CONNECTOR	1 EA	465.00	465.00
80	11000002342/ FLEXLINE CONN 1-50 GAS BLOCK 46-EM158B 1 5/8" EIA MALE CONNECTOR	1 EA	509.00	509.00
90	11000006622/ FLEXLINE CONN INSTALL 7/8 & 1 5/8" AIR	1 EA	32.00	32.00
100	11000002346/ BUTTERFLY HANGER 1 5/8 FLEX 10PK HBF-46 1 5/8" FLEXLINE	8 EA	52.00	416.00
110	11000002446/ FLEXLINE RMA6 10PK RMA6: ROUND MEMBER ADAPTER FOR 6-8" DIA LEG/POLE  **NOTE** ASSUMED LEG DIAMETER, MAKE CERTAIN OF CORRECT DIAMETER FOR LEGS BEFORE ORDERING THE ROUND MEMBER ADAPTERS. MOST TOWERS WILL HAVE VARIOUS SIZES AT DIFFERENT LEVELS OF TOWER	6 EA	67.00	402.00
120	11000002449/ FLEXLINE HARDWARE KIT 3/8 X 1" 10PK HW1:3/8"X 1 BOLT KIT FOR HANGER ATTACHMENT	2 EA	14.00	28.00
130	11000002345/ FLEXLINE WALL/ROOF FEED THRU FL-46 WFT-46-1E 1 5/8" FLEXLINE SINGLE PORT	1 EA	144.00	144.00
140	11000002344/ FLEXLINE HOISTING GRIP FL-46 HSTG-46 1 5/8" FLEXLINE	2 EA	67.00	134.00
150	11000002343/ FLEXLINE GROUNDING KIT FL-46 GRD-46 1 5/8" FLEXLINE	3 EA	40.00	120.00
160	11000002385/ FLEXLINE WEATHERPROOF KIT - 221213 WPKIT: CONNECTOR WEATHERPROOF KIT	1 EA	34.00	34.00
170	R96604/ GASSING KIT W/1/8 BSPT/NPT AD	1 EA	160.00	160.00
172	R66788 / 300TLS 115 / DEHYDRATOR 300TLS 115 VAC	1 EA	3,025.00	3,025.00
			Item Discount %25.000-	-756.25
			Item NET Price	2,268.75
175	R0021460501 / DC 275-017 / ELBOW 1-50 EQUAL LEG 3X3 CU "QS"	1 EA	550.00	550.00
			Item Discount %25.000-	-137.50
			Item NET Price	412.50
180	RFREIGHT/ FREIGHT, SHIPPING, AND HANDLING	1 EA	1,250.00	1,250.00
	Note: The quoted price is subject to change to reflect			

Item 180 on next page



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Fax: 207-655-8173  
Internet: [www.spxcomtech.com](http://www.spxcomtech.com)



# Quotation

Quote Number 2027174

Quote Date 01/17/2012

Customer No. 112919

Item	Material Number / Cat. Num / Description	Quantity	Unit Price	Amount
	increases in fuel costs, shipper surcharges, etc.  This is for freight only and excludes any off loading of equipment unless specified. If off loading is required please notify the customer service rep.			
Items total:				56,207.25
Total Tax				
Final amount:				56,207.25

**ACCEPTANCE:**

By execution below, or by sending a Purchase Order referencing this proposal, the undersigned accepts this proposal to furnish equipment and services on this schedule subject to the Terms and Conditions of Sale for Broadcast, Lighting, Monitoring and Related Products and Services (Rev P) ("SPX Communication Technology Terms") attached hereto and/or incorporated by reference herein, and authorizes SPX Communication Technology to proceed with the procurement and fabrication of this equipment. Your acceptance of this proposal is conditioned upon your acceptance of the SPX Communication Technology Terms and your agreement to be bound by and comply with the SPX Communication Technology Terms. SPX Communication Technology's failure to object to provisions contained in any Purchase Order or other document from you shall not be construed as a waiver by SPX Communication Technology of the SPX Communication Technology Terms or an acceptance of any such provisions. Any conflicting or additional terms or conditions set forth in a Purchase Order or other document from you are not binding upon SPX Communication Technology, and SPX Communication Technology hereby expressly objects thereto.

Signature \_\_\_\_\_ Date \_\_\_\_\_

Requested Ship Date: \_\_\_\_\_

This requested ship date is subject to review by Dielectric. If Dielectric can not meet the requested ship date, you will be contacted to work out a mutually acceptable shipment date. Dielectric requires that the customer take ownership of the product no later than 14 calendar days after the agreed-upon ship date.



COMMUNICATION TECHNOLOGY

## Terms and Conditions of Sale for Broadcast, Lighting, Monitoring and Related Products Rev P (Products)

### General Terms and Conditions

#### 1. DEFINITIONS.

- a) *Terms* means these Terms and Conditions of Sale for Broadcast, Lighting, Monitoring and Related Products;
- b) *Proposal* means the proposal or quotation document provided to Customer by SPX into which these Terms are incorporated by reference;
- c) *Customer* means the purchaser to whom the Proposal is addressed and to whom these Terms apply, including, where applicable, all individual and/or corporate guarantors;
- d) *SPX* means SPX Communication Technology (a division of SPX Corporation);
- e) *Custom-built* means equipment set forth in the Proposal which is built by SPX to Customer's specifications;
- f) *Product* means the applicable broadcast, lighting, monitoring and related equipment to be sold by SPX to Customer as set forth in the Proposal;
- g) *Price* means the price to be paid by Customer for the Products and/or Services listed in the Proposal, including any changes agreed to in writing by the parties.
- h) *Shipping Date* means the shipping date(s) that SPX has communicated to customer
- i) *Services* means any consulting services to be furnished by SPX to Customer as set forth in the Proposal;
- j) *Rigging* means the labor, materials and machinery required to remove or install any Products.
- k) *Low-Power Broadcast Product* means any Broadcast Product identified as a Low Power Product in the Proposal or in SPX's Product Catalog.

**PROPOSAL, ACCEPTANCE AND GOVERNING PROVISIONS.** A Proposal will automatically expire if not accepted by Customer within sixty (60) days from its date or any extension of such date approved in writing by SPX, and Customer's acceptance of the Proposal, by purchase order or signature, shall constitute Customer's offer and will evidence Customer's intent that the sale of the Products and the furnishing of any Services shall be governed by the Proposal and the Terms. SPX's acceptance of Customer's offer is conditioned upon Customer's acceptance of the Terms set forth herein and Customer's agreement to be bound by and comply with the Terms. The Terms, the Proposal, and all referenced attachments constitute the entire agreement between Customer and SPX ("Agreement"), and no amendment or modification shall be binding on SPX unless in writing and signed by an officer of SPX. The failure of SPX to object to provisions contained in any purchase order or other document of Customer's shall not be construed as a waiver by SPX of the Terms or an acceptance of any such provisions. Any conflicting or additional terms or conditions set forth by Customer in a purchase order or other document are not binding upon SPX, and SPX hereby expressly objects thereto. No purchase order shall be binding upon SPX until accepted by a written acknowledgment by an authorized representative of the company.

- 2. **PRICES.** All Prices are subject to adjustment by SPX if: (a) the required down payment has not been made with Customer's acceptance of the Proposal, or (b) shipment is delayed by Customer beyond the Shipping Date(s). Prices for Products do not include any special packing or crating materials, which may be required for Custom-built equipment. All costs of special packing shall be paid by Customer and shall be paid prior to shipment or as soon as all packing costs are determined.
- 3. **TAXES.** The Prices do not include any applicable foreign, federal, state or local taxes. The amount of such taxes payable or paid by or assessed against SPX will be billed to, and shall be paid by, Customer. No tax exemption shall be recognized unless Customer has completed and returned to SPX the Tax Questionnaire provided with the Proposal.
- 4. **PAYMENT TERMS.** (a) The Price for all Products shall be paid to SPX in accordance with the payment schedule shown in the Proposal. Absent specific agreement to the contrary, all amounts owed to SPX, including but not limited to the Price for Services hereunder, shall be payable within 30 days after shipment; provided, however, that if shipment of the Products is delayed beyond the Shipping Date by the action or inaction of Customer, payment will be due 30 days after the Shipping Date. (b) Overdue payments shall accrue interest at the rate of 16% per annum (or the maximum percentage allowed by applicable law, if lower) from the due date. Customer shall also be required to pay SPX any and all collection costs and expenses SPX incurs (including without limitation reasonable attorneys' fees) to collect overdue payments. (c) SPX may make partial shipments of Products, and pro-rata payments shall be due for such partial shipments of Products. (d) All down payments shall be made to SPX Communication Technology, P.O. Box 277883, Atlanta, GA 30384-7883, unless otherwise directed in writing by SPX. SPX may, at its option, decline to deliver Products or to provide Services, or may stop shipment of Products in transit, whenever, for any reason, SPX has concerns about a Customer's financial status. In such event, SPX may require payment in full prior to shipping a Product or providing any Services.
- 5. **DELIVERY.** (a) SPX will deliver Products FOB point of shipment, with delivery to the initial carrier constituting delivery to Customer. All transportation charges will be Customer's responsibility; however, upon Customer's request, SPX will prepay transportation charges for which Customer shall reimburse SPX (together with an administrative fee payable to SPX). Customer shall have sole responsibility for filing any claims with any carrier for delay, loss or damage. (b) Any Shipping Dates are predictions made by SPX of the times within which it is likely the Products will be shipped; however, due to the difficulties inherent in predicting future delivery dates or periods, SPX does not promise, guarantee or otherwise obligate itself to have the Products shipped on or before that time. **SPX will endeavor to meet the Shipping Date(s), but shall not be liable in damages or otherwise, nor shall Customer be relieved of performance, because of failure to meet them.** However, as to Products which, without Customer's fault, have not been shipped to Customer within three (3) months after the Shipping Date(s) applicable to such Products, Customer may, by providing written notice to SPX, delete from this Agreement any such Products that have not been shipped to Customer before SPX receives Customer's written notice of deletion, and the Price shall be proportionately reduced. **The foregoing right is Customer's exclusive remedy for any delays in shipment.** SPX may, in its discretion, accept standard Products returned for credit (shipping prepaid) within 60 days of receipt subject to a restocking fee.
- 6. **DELIVERY TO STORAGE.** Customer agrees to authorize and accept shipment of Products on the Shipping Date(s). To the extent Customer is unable or otherwise fails to accept shipment of Products on the Shipping Date(s), or if Customer has failed to timely provide SPX with payment due and delivery instructions, Customer agrees that SPX is authorized to deliver the Products into storage and bill Customer as though shipment had been made to Customer, subject to SPX's security interest. Title to such Product(s) and the risk or loss thereof or damage thereto shall pass to Customer when placed in storage. Customer shall be responsible for all storage charges and expenses and, to the extent any storage charges and expenses are incurred by SPX, Customer shall reimburse SPX for such storage charges and expenses (together with an administrative fee payable to SPX).

7. **TITLE, INSURANCE AND RISK OF LOSS.** Subject to SPX's security interest, and except as provided in Section 6, both title to the Products and risk of loss or damage passes to Customer upon delivery to the initial carrier.

**SECURITY INTEREST.** Until the Price has been paid in full, SPX reserves, and Customer hereby grants to SPX, a first priority security interest under the Uniform Commercial Code in the Products. Customer also agrees to execute such documents and to take such other actions as are reasonably requested by SPX to perfect its security interest in the Products. SPX further retains a right of set-off against any obligations owing by Customer, whether or not related to this order.

9. **PATENT LIABILITY.** Customer agrees that SPX has the right to defend, or at its option to settle, and SPX agrees, at its own expense to defend or, at its option, to settle, any claim, suit or proceeding brought against Customer on the issue of infringement of any United States patent by any Product, or any part thereof, supplied by SPX to Customer under this Agreement. SPX agrees to pay, subject to the limitations hereinafter set forth in this paragraph, any final judgment entered against Customer on such issue in any such suit or proceeding defended by SPX. Customer agrees that SPX at its sole option shall be relieved of the foregoing obligations unless Customer notifies SPX promptly in writing of any such claim, suit or proceeding, and at SPX's expense gives SPX proper and full information and assistance to settle and/or defend any such claim, suit or proceeding. If the Product, or any part thereof furnished by SPX to Customer hereunder becomes, or in the opinion of SPX may become, the subject of any claim, suit or proceeding for the infringement of any United States patent, or in the event of any adjudication that such Product or part infringes any United States patent, or if the use, lease or sale of such Product or part is enjoined, SPX may at its option and its expense: (a) procure for Customer the right under such patent to use, lease or sell, as appropriate, such Product or part, or (b) replace such Product or part, or (c) modify such Product or part, or (d) remove such Product or part and refund the aggregate payments and transportation costs paid therefore by Customer, less a reasonable sum for use, damage and obsolescence. SPX shall not be liable for any costs or expenses incurred without SPX's written authorization. The foregoing constitutes the entire liability of SPX and Customer's sole and exclusive remedy for intellectual property infringement related to the Products. Notwithstanding the foregoing, the remedy described in this paragraph shall not apply to any suit or proceeding alleging infringement resulting from or related to SPX's compliance with Customer's specifications or design or the use of Products in combination with other goods or materials. In no event shall SPX's total liability to Customer under, or as a result of compliance with, the provisions of this section exceed the aggregate sum paid to SPX by Customer for the allegedly infringing Product or part.
10. **WARRANTY.** Except as otherwise specified in the Proposal or other written material provided to Customer, SPX warrants new Products purchased by Customer hereunder to be free from defects in material and workmanship, as follows:
- a) **Broadcast Products** – The warranty period for any Broadcast Product, except for Low-Power products, is five (5) years from the date of shipment. The warranty period for any Low-Power Broadcast Product is one (1) year from the date of shipment.
  - b) **Lighting Products** – The warranty period for lighting Products is one (1) year from the date of shipment for halogen/incandescent light source equipment, two (2) years from date of shipment for control devices and strobe light source equipment, or five (5) years from the date of shipment for LED light source equipment.
  - c) **Monitoring Products** – The warranty period for monitoring Products shall be one (1) year from the date of shipment.
  - d) **Repaired or Refurbished Products** – The warranty period for repaired or refurbished Products (other than Products repaired under warranty) shall be ninety (90) days from date of shipment, unless otherwise provided in the applicable Proposal.

**All Products –**

SPX shall, during the applicable warranty period and subject to the right to inspect such Product, repair or replace, at SPX's sole discretion, such warranted Product as is found to be defective, subject to the conditions of these Terms. For returns, the warranted Product must be properly authorized for return (with a Return Materials Authorization (RMA) number), packed and returned to SPX, transportation prepaid. Replacement parts will be sent only upon receipt of a valid purchase order. If determined by SPX to be a valid warranty claim, the purchase order obligation will be voided; otherwise, Customer shall be responsible for the purchase order obligation.

For products that cannot reasonably be returned, Customer has the obligation to provide photographic or other evidence to document a claim. SPX may agree to send a representative to the Customer's site to inspect the warranted Product if Customer has demonstrated a sufficient basis for concluding that there is, in fact, a Product defect. In the event that SPX sends such a representative, and in the event that the inspection determines that the Product is not, in fact, defective, then Customer shall compensate SPX at its standard rates for all of its direct and indirect costs for the inspection.

Replacement of any original SPX parts with non-SPX parts will take the Products out of compliance and void this warranty.

If SPX fails to repair or replace any defective Product, Customer agrees that the exclusive measure of damages shall be the reasonable cost of the repair or replacement of the defective product at the time. SPX's warranty obligation is conditioned on Customer's payment of all amounts due under these terms as well as Customer's compliance with its obligations hereunder.

Repair or replacement of defective Products does not re-start the warranty periods defined above; the warranty period commences upon initial delivery or installation of the original Product, as described above.

The Customer's warranty rights under these Terms shall apply only if SPX receives prompt written notice of any alleged defect within the applicable warranty period defined above, the Product has been operated in accordance with SPX's written instructions, and SPX's examination discloses that such Product has not been damaged through accident or negligence, misuse, alteration, or improper maintenance, repair, or installation.

No warranty shall apply: (a) to any Products that have been repaired, worked upon, disassembled or altered by persons not authorized by SPX in such a manner as to injure the stability or reliability of such Products, (b) to any Products that have been subject to misuse, negligence or accident other than by DC, (c) to any Products that have not been connected, installed, used, maintained, inspected or adjusted by appropriately qualified personnel in accordance with the written instructions furnished by SPX, (d) with respect to any Product that has had its serial number altered, effaced or removed, (e) to damage resulting from: Force Majeure; intentional acts, such as sabotage, terrorism, or vandalism; accidents; extreme weather, the impact of ambient chemicals, and/or flying objects, (f) to ordinary wear and tear resulting from use and exposure or (g) to any party other than the original purchaser of the Products.

The foregoing warranties are in lieu of, and SPX expressly disclaims, all other warranties, express or implied in fact or by law, including without limitation all warranties of merchantability or fitness for a particular purpose or otherwise, and the foregoing warranties state SPX's entire and exclusive liability, and Customer's sole and exclusive remedy, in connection with the sale or furnishing of service, products or parts, their design, suitability for use, installation or operation. Without limiting the foregoing, SPX shall in no event be liable for rigging charges connected with repair or replacement of defective Products or Services covered by these warranties, or for any third party

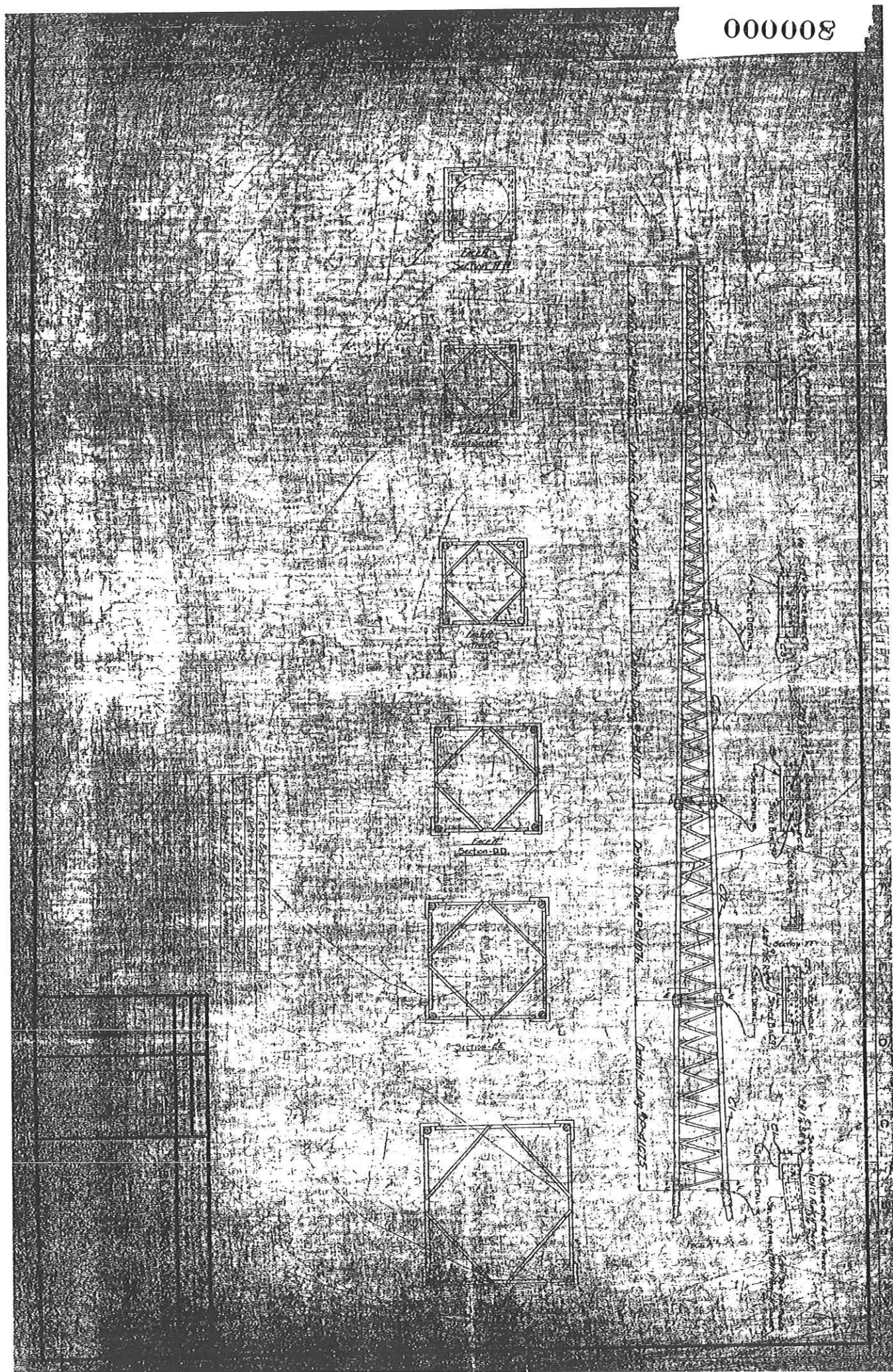
engineering or consulting fees. Equipment furnished by SPX but not bearing its trademark or trade name shall carry no warranties, except those, if any, extended by and enforceable against the manufacturer at the time of delivery to SPX.

1. **LIMITATION OF LIABILITY.** SPX shall not be liable under any theory of relief, including without limitation breach of warranty, breach of contract, tort (including negligence), strict liability, or otherwise, arising out of or related to these Terms or products or services provided hereunder or SPX's acts or omissions for: (i) any indirect, incidental, special or consequential damages whatsoever (including without limitation, loss of anticipated value of a business or its reputation) or (ii) any damage or loss in excess of the price actually paid by Customer. Any action by Customer must be commenced within one year after the cause of action has accrued.
12. **FORCE MAJEURE.** SPX shall not be liable for delay in performance or failure to perform any of its obligations, if the delay or failure results directly or indirectly from Force Majeure. Force Majeure means any law, order, regulation, direction, request, action or failure to act of Customer or of any government having jurisdiction over SPX, its subcontractors and/or its suppliers, or of any department, agency or corporation of one or more of such governments; failure or delay of transportation; suspension or cancellation of any required license; insurrection; riots, national emergencies; war; acts of public enemies, strikes or other labor difficulties; inability to obtain necessary labor, manufacturing facilities, materials or components from SPX's usual sources; fires, floods, earthquakes, lightning or other catastrophes; acts of God; extreme weather conditions; or any cause of like or different kind beyond the control of SPX. SPX shall notify Customer in writing if performance of any of its obligations under this Agreement is delayed by reasons of Force Majeure.
13. **PROPRIETARY INFORMATION.** SPX retains title to and ownership of all engineering and production prints, drawings, technical data, and other information and documents that relate to the Products and Services sold to Customer and any intellectual property rights embodied therein. Unless advised by SPX in writing to the contrary, all such information and documents disclosed or delivered by SPX to Customer are to be deemed proprietary to SPX and shall be used by Customer solely for the purpose of inspection, installation, maintenance and use of the Products purchased hereunder and not used by Customer for any other purpose. Customer shall maintain such proprietary information with a standard of care no less stringent than it uses with its own confidential information.
14. **TERMINATION/SUSPENSION.** Without prejudice to its other rights, SPX may immediately terminate this Agreement by giving notice to Customer or suspend the performance of SPX's obligations if Customer:
  - a) Breaches this Agreement and fails to remedy that breach within 14 days of a request by SPX; or
  - b) Ceases business operations, is unable to pay Customer's debts as they fall due, makes an assignment for the benefit of creditors, commences winding-up, has a receiver or liquidator appointed over any of Customer's assets, or becomes subject to a bankruptcy or insolvency proceeding.

#### OTHER CONDITIONS.

- a) Modifications of Products may be made by SPX or its suppliers prior to delivery for reasons such as improvement in performance, simplifications in design, availability of materials, etc., but not to such an extent that the performance will be materially affected.
- b) Customer shall not assign this Agreement, or any rights thereunder, without the prior written consent of SPX.
- c) SPX shall not be deemed to have waived any term or condition of this Agreement or to have assented to any exception to or modification of such terms and conditions unless such waiver or assent is in writing and signed by an authorized officer of SPX. SPX's failure at any time to require strict performance by Customer of any provision in this Agreement shall not waive or diminish SPX's right thereafter to demand strict performance therewith or with any other provision. Waiver of any default shall not waive any other default.
- d) In the event that any part of this Agreement is or becomes invalid or illegal in whole or in part, such part shall be deemed amended so as to, as nearly as possible, be consistent with the intent expressed in the Agreement. If this is impossible, such part shall be deemed to be deleted, but shall not in any way invalidate any of the remaining provisions of this Agreement.
- e) Notices shall be mailed, certified mail, or sent by or fax to Customer at the address given on the cover sheet of the Proposal and to SPX, Attention: Director of Contracts, PO Box 949, 22 Tower Road, Raymond, Maine 04071, fax: 207-655-8174. Notice shall be effective from date of receipt by addressee.
- f) This Agreement, including without limitation the Proposal and all schedules attached hereto and/or incorporated herein by reference, expresses the entire agreement between the parties regarding the subject matter contained herein, and conclusively supersedes all prior agreements, writings and negotiations with respect to the subject matter hereof, and any such previous agreement is modified by the deletion of the items listed herein.
- g) The rights and duties of the parties to this Agreement shall be governed by and construed in accordance with the laws of the State of Maine.
- h) All disputes, differences, or questions arising out of or relating to this Agreement, or the validity, interpretation, breach, violation, or termination of this Agreement shall be resolved solely by arbitration through the CPR Institute for Dispute Resolution ("CPR") by a sole arbitrator in the city of Portland, Maine. The arbitration proceedings shall be governed by and decided in accordance with the CPR Rules for Non-Administered Arbitration then in effect, unless the parties shall mutually agree otherwise in writing. Any evidentiary rules not expressly provided by the CPR Rules shall be determined in accordance with the Federal Rules of Evidence. Notwithstanding anything to the contrary provided in this Agreement, the arbitration shall be governed by the United States Arbitration Act, 9 U.S.C. § 1, et seq. The arbitration proceeding must be completed through the rendering of the award within six months of the selection of the arbitrator. The award of the arbitrator may be monetary damages, an order requiring performance of obligations under this Agreement or an award of injunctive, declaratory, or equitable relief or any other appropriate award or remedy. However, in no event may the arbitrator issue an award of any form of exemplary or punitive damages, nor may the arbitrator make any ruling, finding or award that does not conform to the terms and conditions of this Agreement. The award rendered by the arbitrator shall be final and binding upon the parties, and judgment may be entered by any competent court having jurisdiction. The award of the arbitrator shall be accompanied by a written explanation of the basis for the award. Notwithstanding anything to the contrary provided in this paragraph and without prejudice to the above procedures, any of the parties may apply to any court of competent jurisdiction for injunctive or other equitable relief if such action is necessary to avoid irreparable damage or to preserve the status quo.

**CONSULTING SERVICES.** SPX will, at Customer's request, furnish a representative to consult regarding the installation of the Products. Charges for furnishing such representative shall be at SPX's per diem rate in effect at the time, plus transportation and reasonable living expenses, including standard general and administrative charges. Such consulting service shall not include the furnishing or arranging for the furnishing of any equipment, materials or services required for the actual installation of Products.



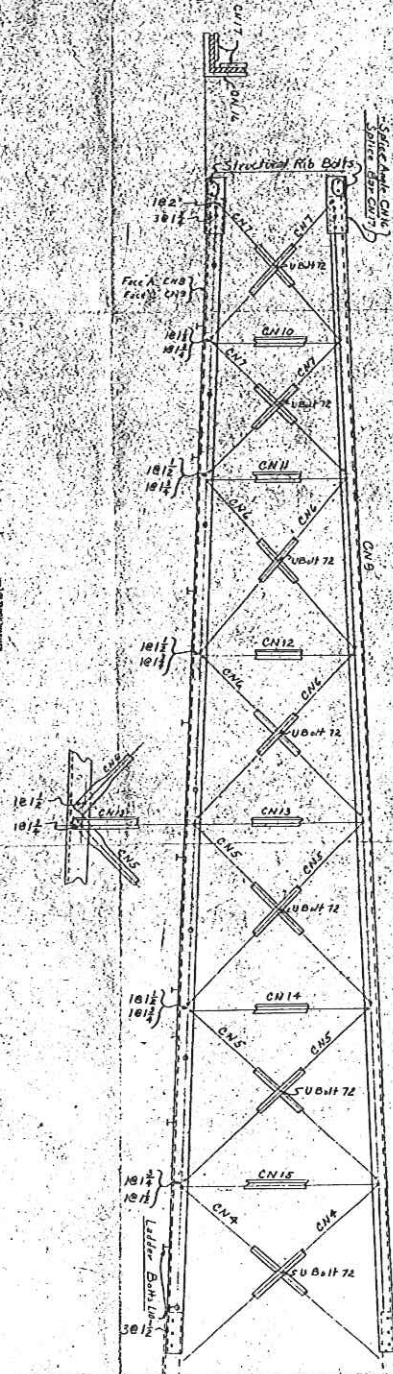


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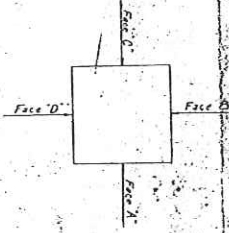
DRAWING NO. P 42115

ITEM	DESCRIPTION	QTY	UNIT
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19	STEEL RIB BOLTS	10	EA
20	STEEL RIB BOLTS	10	EA

USE THIS DRAWING FOR THE  
CONSTRUCTION OF THE  
TOWER. THE TOWER SHALL  
BE CONSTRUCTED IN  
ACCORDANCE WITH THE  
SPECIFICATIONS AND  
STANDARDS OF THE  
AMERICAN SOCIETY OF  
MECHANICAL ENGINEERS.



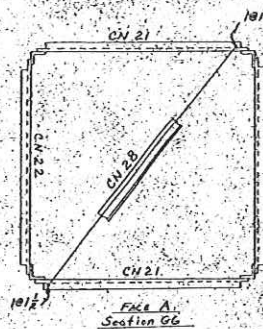
Face A  
All Views Alike - Except  
As Noted



PLAN OF TOWER  
Views Of All Faces Taken  
Looking In Direction Of Arrows

ITEM	DESCRIPTION	QTY	UNIT
1	STEEL RIB BOLTS	10	EA
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3	STEEL RIB BOLTS	10	EA
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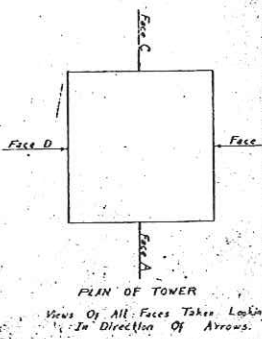
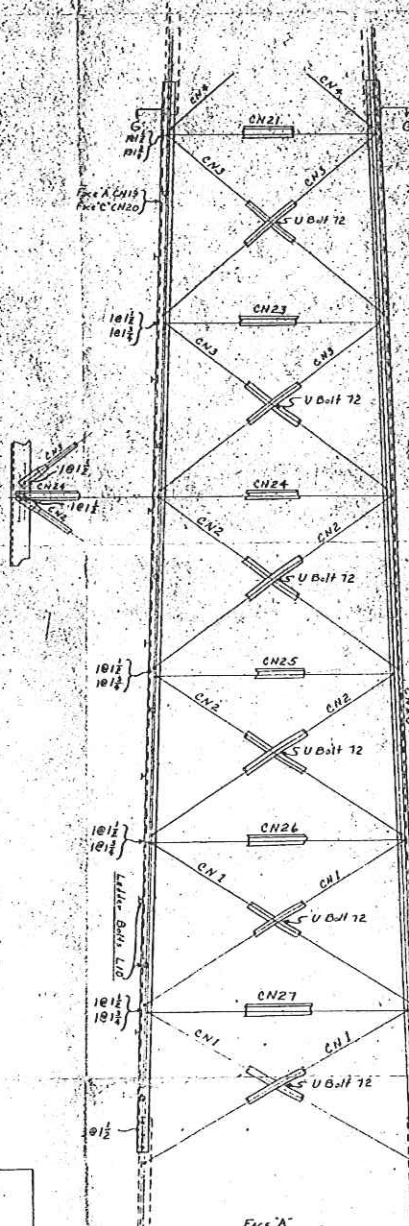
BLANKEN DIVISION



US PLANT WHICH PRODUCES WITH TOWER  
TO TOWER PLANT PLACED ON ALL BOLTS IN THE  
TOWER SHOWN



Field	Notes	From	By	Date
1	Designation	10/1/51	10/1/51	10/1/51
2	Designation	10/1/51	10/1/51	10/1/51
3	Designation	10/1/51	10/1/51	10/1/51
4	Designation	10/1/51	10/1/51	10/1/51
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6	Designation	10/1/51	10/1/51	10/1/51
7	Designation	10/1/51	10/1/51	10/1/51
8	Designation	10/1/51	10/1/51	10/1/51
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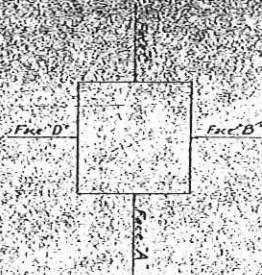


PROJ. NO.	REV.	DATE	BY	CHKD.	APP.
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3	1	10/1/51	10/1/51	10/1/51	10/1/51
4	1	10/1/51	10/1/51	10/1/51	10/1/51
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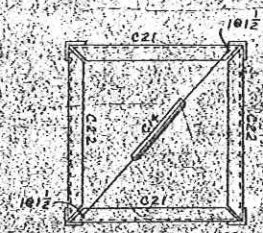
BLAW-KNOX DIVISION  
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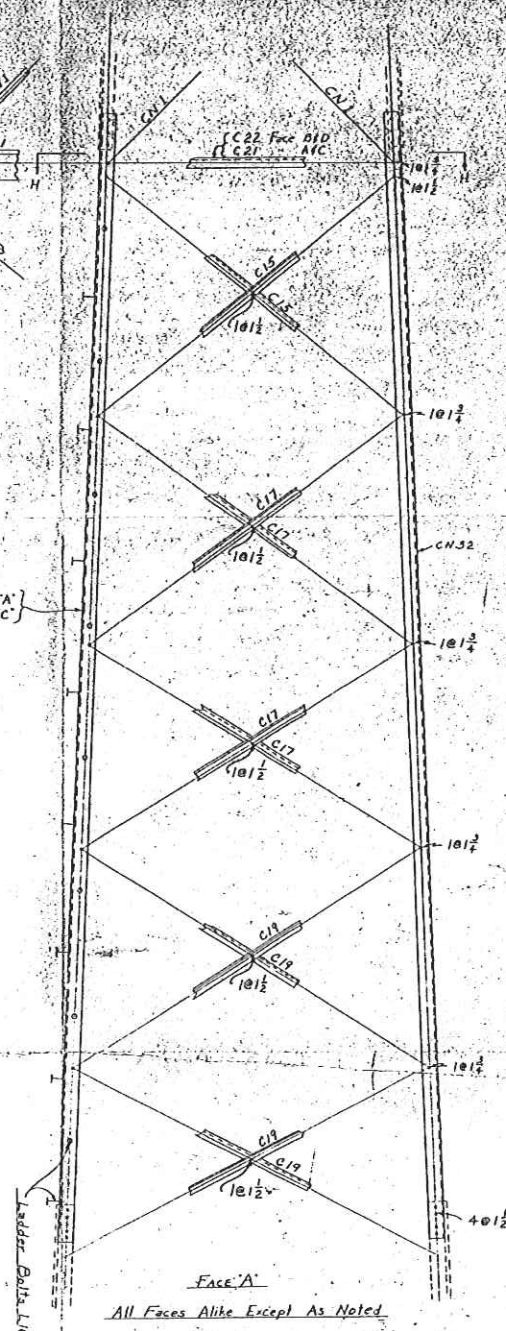
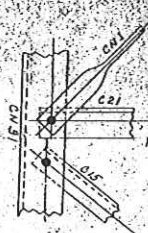
Drawing No. P-4217



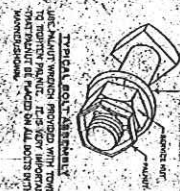
Plan Of Tower  
Views of all Faces Taken Looking  
In Direction of Arrows



Section H-H



FACE 'A'  
All Faces Alike Except As Noted



TOTAL BARS REQUIRED  
FOR EACH FACE OF TOWER  
TO BE PLACED IN ALL BARS WITH  
HOOKS AND BENDS

PERSONAL DATA		REVISIONS	
APPROVAL	DATE	NO.	REVISION MADE
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FIELD BOLTING FOR PAPER

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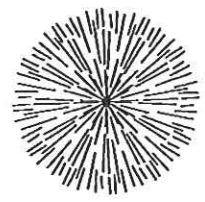
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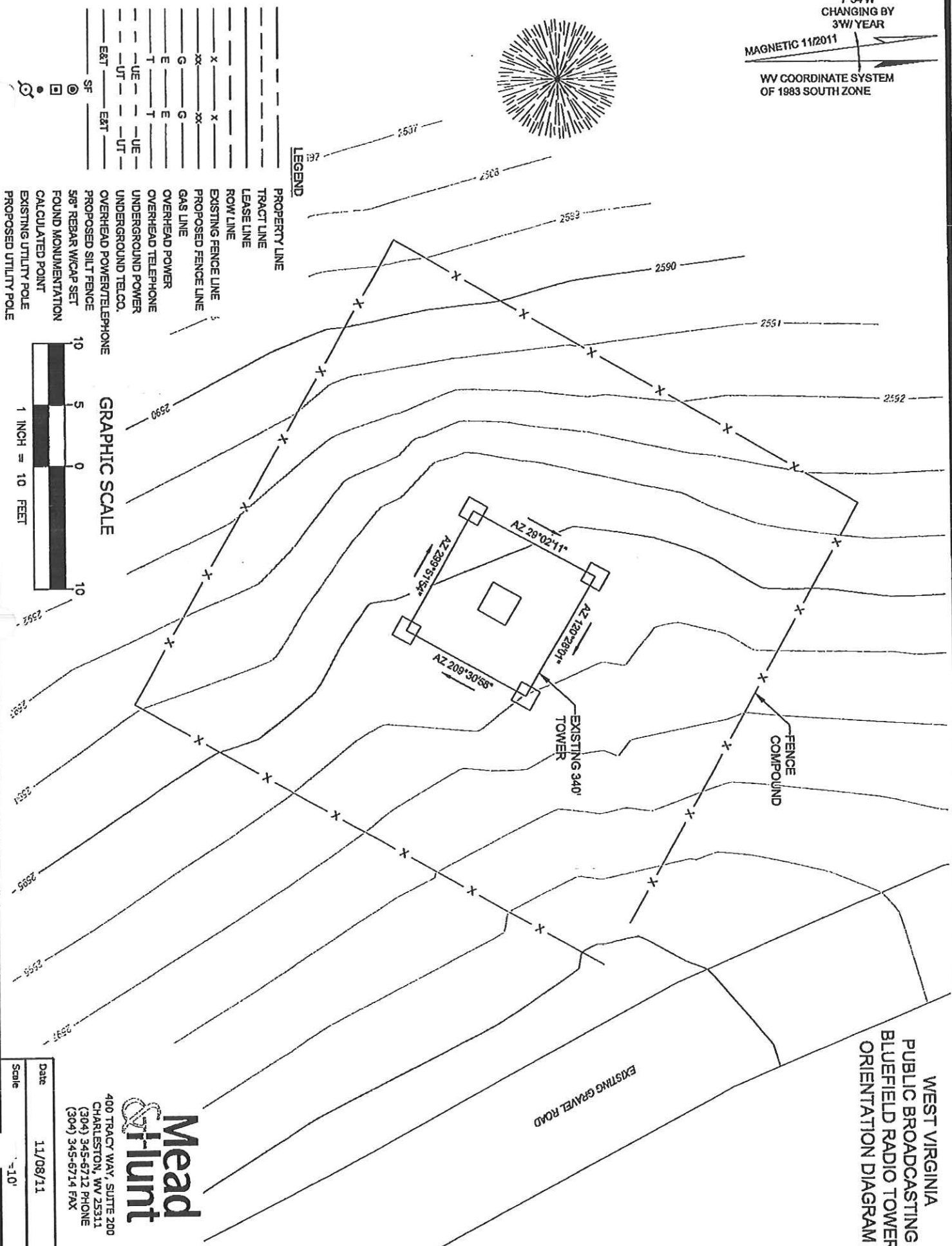
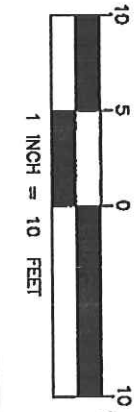


7°34'W  
CHANGING BY  
3W/YEAR  
MAGNETIC 11/2011  
WV COORDINATE SYSTEM  
OF 1983 SOUTH ZONE



- PROPERTY LINE
- TRACT LINE
- LEASE LINE
- ROW LINE
- X- EXISTING FENCE LINE
- X- PROPOSED FENCE LINE
- G- GAS LINE
- E- OVERHEAD POWER
- T- OVERHEAD TELEPHONE
- UE- UNDERGROUND POWER
- UT- UNDERGROUND TEL.CO.
- EAT- OVERHEAD POWER/TELEPHONE
- SF- PROPOSED SILT FENCE

GRAPHIC SCALE  
10 5 0 10  
1 INCH = 10 FEET

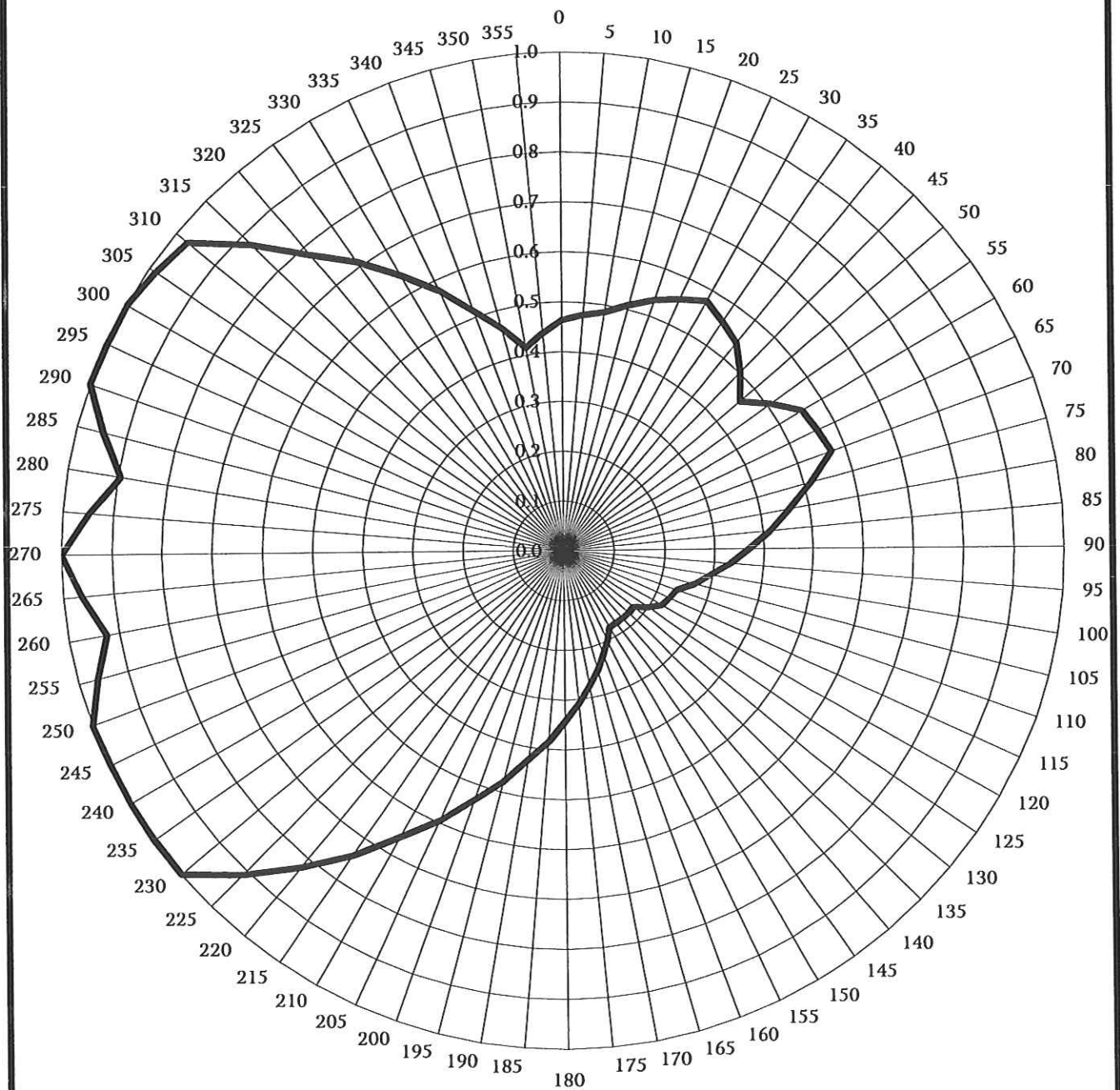


WEST VIRGINIA  
PUBLIC BROADCASTING  
BLUEFIELD RADIO TOWER  
ORIENTATION DIAGRAM

**Mead**  
**Siunt**  
400 TRACY WAY, SUITE 200  
CHARLESTON, WV 25311  
(304) 345-6712 PHONE  
(304) 345-6714 FAX

Date 11/08/11  
Scale 1"=10'

## RELATIVE FIELD AZIMUTH PATTERN



**KESSLER & GEHMAN**  
TELECOMMUNICATIONS CONSULTING ENGINEERS  
507 N.W. 60th Street, Suite C  
Gainesville, Florida 32607

WVDM(FM)  
BLUEFIELD, WV

20110608

EXHIBIT 24.4

TABULATION OF RELATIVE FIELD FOR PROPOSED DIRECTIONAL ANTENNA

<u>AZIMUTH</u>	<u>RELATIVE FIELD</u>	<u>AZIMUTH</u>	<u>RELATIVE FIELD</u>
N000°E	0.463	N180°E	0.343
N010°E	0.486	N190°E	0.427
N020°E	0.534	N200°E	0.531
N030°E	0.575	N210°E	0.661
N040°E	0.541	N220°E	0.823
N050°E	0.462	N230°E	1.000
N060°E	0.555	N240°E	1.000
N070°E	0.571	N250°E	1.000
N080°E	0.459	N260°E	0.925
N090°E	0.369	N270°E	1.000
N100°E	0.296	N280°E	0.895
N110°E	0.238	N290°E	1.000
N120°E	0.222	N300°E	1.000
N130°E	0.178	N310°E	0.971
N140°E	0.178	N320°E	0.780
N150°E	0.178	N330°E	0.641
N160°E	0.222	N340°E	0.515
N170°E	0.276	N350°E	0.414


**KESSLER & GEHMAN**

TELECOMMUNICATIONS CONSULTING ENGINEERS

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BLUEFIELD, WV

20110608

EXHIBIT 24.3



## DCV VERTICALLY POLARIZED Medium Power FM Antenna

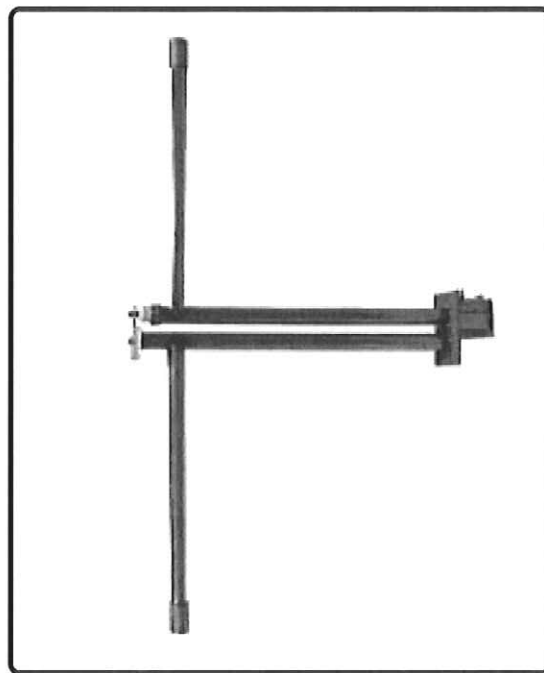
- ◆ Low Cost
- ◆ Low Windload
- ◆ Vertical Polarization
- ◆ High Power Handling
- ◆ Lightweight aluminum construction
- ◆ Input Power up to 40 kW
- ◆ VSWR Field Adjustable

### **General Description**

The DCV antenna is designed for installations where a high power vertical polarization antenna is desired. It has an input power rating of 5 kW per bay. It is available in stacked arrays of up to 8 sections with an input power rating of 40 kW.

The Dipole element is made of lightweight aluminum tubing with a protective coating of iridite, resulting in a strong and lightweight structure. Where required, low windload radomes are available as an option.

Power gain is proportional to the number of dipoles in the array. Each dipole provides approximately 1.0 gain (0 dB). This factor



improves slightly with the number of sections in the array as well as with directional patterns. *Contact the factory to determine the gain for your application.*

The bandwidth of the DCV antenna allows for the use with multi-station applications. The VSWR over a 6 MHz band using a branch feed system is 1.2:1.0. The VSWR using an end fed configuration is 1.2:1.0 over a 3 MHz band.

Diplexing equipment and transmission line for multi-station systems can be provided by Dielectric Communications allowing one supplier for all your RF requirements.

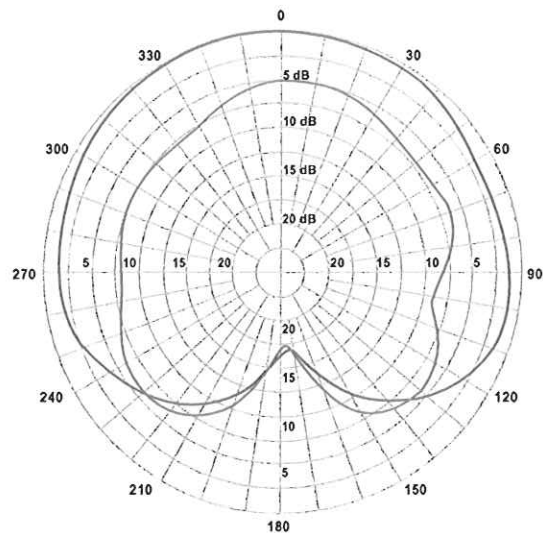


# Pattern Optimization

## Pre-Optimization

Pattern exemplifies vertical component distortion caused by mounting structure.

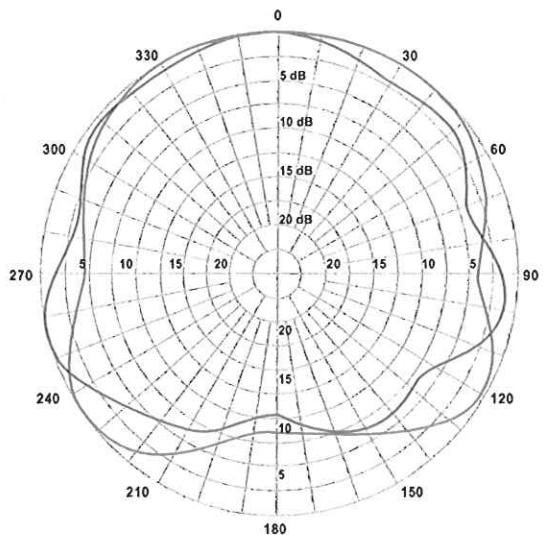
Horizontal —  
Vertical —



## Post Optimization

Using two parasitic elements vertical circularity has improved to near free space performance.

Horizontal —  
Vertical —





A Unit of SPX Corporation

IB-388-B

# **FM ANTENNA INSTALLATION AND MANTAINENCE MANUAL**

Dielectric Communications  
22 Tower Road  
Raymond, Maine 04071  
Phone: 800-341-9678  
207-655-4555  
FAX: 207-655-4669

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### ***Warnings:***

The purchaser is responsible for determining if the support structure, (pole, tower, or mast) will safely handle the antenna array. The weight and wind load is listed in this instruction book. These weights and wind loads are calculated assuming no ice buildup on the array and a two-foot face tower with a constant wind load velocity of 112 miles per hour.

For reliable, moisture free operation maintain 5 psig of dry air or dry nitrogen to the antenna system at all times. Failure to keep the transmission line and antenna pressurized, may allow moisture to remain within the system. This moisture will condense when the weather cools causing arcing and physical damage of the coaxial system. The damage degrades the performance and eventually antenna failure. Failure or reduced performance of the antenna due to moisture in the system is not warranted by the manufacturer.

This antenna system, when energized by an RF transmitter, will present a high intensity RF field. **DO NOT touch the antenna system when energized.** Personnel should not remain in the aperture of the antenna for extended periods of time while the antenna system is energized. **All maintenance or repairs should be done with the primary voltage to the transmitter disconnected and all transmitter remote controls disabled.**

### **Return Policy**

Prior to returning any material to the factory, call your sales representative to obtain a material return authorization (MRA) number. Use this number in all correspondence. Returned material may be refused and sent back at the customer's expense without this number.

### **Factory Tests**

The antenna array has been completely assembled and tested at the factory. Each system has been electrically tuned to the required frequency(ies). Electrical connection to each element in the array is checked by short circuiting each element feed individually.

Each element in the array is adjusted such that the resonance of the array is at the design frequency when observed through the use of a 50 ohm input system.

The antenna is fine matched with tuning slugs located in the input feedline section. The resultant input VSWR of the array, as measured on a standard tuning rack, is 1.10:1 or better at the frequency band for the station. When mounted on a tower, there may be tower effects that could alter the VSWR. These effects may be tuned out with the variable transformer after the antenna has been installed, (see section D page 8).

Each component is pressure tested to 15 psig prior to assembly and 5 psig after assembly.

## **Delivery and Storage**

Upon receiving the crate(s) or skids, inspect for shipping damage. Notify the *carrier* immediately upon observation of any damage.

Dielectric typically ships the antenna foamed into cartons. One of the boxes contains a shipping list and information to be used during installation of the antenna.

Store the crated antenna array and any transmission line in a clean, dry and well protected location.

**Note:** The shipping cartons are not water proof.

## **Uncrating**

Open each crate and verify its contents with shipping list. Inspect crate contents for possible shipping damage. Notify your Dielectric Communications sales representative immediately if parts are missing or damaged.

**Note:** If any parts are found damaged, *Promptly notify the Carrier*. Shipping crates may be used to return damaged parts.

## **Bay Assemblies**

Antenna bays are fully assembled with hardware and seal rings, and created individually.

## **Transmission Line, Inter Bay & Input Feed Lines**

Interbay transmission line(s) and the input feedline may be crated together within one or box. All interbay transmission line(s) are match marked so that the antenna array will perform as tuned by the factory.

**Note:** Tarnish on transmission line exterior surface is normal from handling and exposure to the elements during tuning. Antenna array internals were kept dry and free of contamination with dry pressurized air when on tuning rack.

## **Mounts**

Mounts may be crated on a pallet or in a box. Check quantities and for damage prior to removal.

**Note:** If any parts are found damaged, *promptly notify the Carrier*. Shipping crates may be used to return damaged parts.

## **Assembly and Installation**

**Notes:** Refer to supplied installation drawing and bills of materials.

### **1. Input Feed Transmission Line**

Do not disassemble the input feedline. The inner conductor is usually slugged during the tuning process of the antenna. If for some reason the inner conductor has been removed, **the orientation of the slug(s) is important, do not change their position.** The directional arrow points up with the male connector on the upper end.

### **2. O-ring Installation**

All flange joints are provided with black buna-N rubber O-ring seals. Prior to assembly, ensure that all seal grooves are free of debris, and apply a light coat of supplied Dielectric lubricant non-melting silicon, (Dow Corning no. 4 compound), to the O-rings at time of assembly. The lubricant will aid in holding the O-ring in the seal groove. Always be sure the lubricant is applied very lightly. If applied too freely, lubricant can get onto the flange contact surface and prevent good power transmission and degrade antenna performance, and eventually leading to antenna failure.

Be sure not to pinch an O-ring between the contact surfaces of flanges, as this may also cause arcing.

Dielectric has supplied sufficient quantities of O-rings and silicon dielectric lubricant.

### **3. Inner Conductor Connections**

While assembling and installing the antenna, care must be exercised when inserting the inner conductor connector (i.e. bullet) into a mating coaxial inner conductor. While engaging, the connector should be aligned perfectly with the mating inner conductor to prevent damage to connector.

### **4. Bay Sequence Numbers**

The antenna bay numbering sequence is from bottom to top; (i.e. number one is located in the bottom bay position). Each bay, junction block and interbay feed line section has been match marked. Assembly by the number sequence ensures that the antenna array will be assembled as tuned by the factory.

## **5. Handling & Alignment**

Install one bay level at a time. Hoist an element, junction block, and the transmission line section. Hoisting more than one bay level at a time can cause structural damage to the feedlines.

The elements and their support brackets should be installed so that the interbay transmission line(s) is not subject to any type of mechanical stress.

## **6. Hardware**

All hardware supplied is stainless steel. Dielectric has supplied sufficient quantities for the installation of the antenna array.

### **A. Bay Assembly and Orientation**

Fasten each bay to the number matched junction block/ feedline assembly. All antenna bays must be attached with arrow on the stem facing up. This orientation is critical to assure proper phasing of the elements.

Fasten the variable transformer to the input end of the input feed section.

Fasten the ice shield, (where applicable), to the input feed section just above the flange on the input end and align with the adjusting probes of the variable transformer under the shield, (refer to Illustration A page 16).

### **B. Mounting Bracket Installation**

#### **1. End Fed Arrays (refer to the enclosed Installation Drawing)**

- a. Measure up from center of radiation to locate the top bay position. Fasten the mount to the tower or pole using the provided mount with supplied mounting hardware.
- b. Measure down from the top bracket to locate and install the next mounting bracket. Distance between bays is based on the frequency of the antenna, (refer to the enclosed installation drawing). Repeat the process for the remaining bay mounts.
- c. Locate the termination mount in the approximate location shown on the antenna installation drawing, below bay number one's mount.

**Note:** For an exact location measure from the bay block 1 to mid way between the two lowest probes on variable transformer.

**2. Center Fed Arrays** (refer to the enclosed Installation Drawing)

- a. Measure up from center of radiation to locate the top bay. Fasten the mount to the tower or pole using the provided mount with supplied mounting hardware.
- b. Measure down from the top bracket to locate and install the next mounting bracket. Distance between bays is based on frequency of antenna, (refer to the installation drawing). Repeat the process for the remaining bay mounts.
- c. Locate and install the termination mounts approximately as shown on the antenna installation drawing. One (1) termination mount should be placed on the elbow if possible. The other on the variable transformer.

**Note:** For an exact location measure from the bay block 1 to mid way between the two lowest probes on variable transformer.

**3. Branch Fed Arrays** (refer to the Installation Drawing, in packet)

- a. Measure up from center of radiation to locate the top bay. Fasten the mount to the tower or pole using the supplied mount with supplied mounting hardware.
- b. If input feedline mount was provided, measure down from the bay bracket to locate and install per Installation Drawing.
- c. Measure down from the top bracket to locate and install the next mounting bracket. Distance between bays is based on frequency of antenna, (refer to the installation drawing).
- d. Repeat step b where required.
- e. Repeat the process for the remaining bay mounts.
- f. Position and fasten the power divider mounts as shown on the antenna installation drawing (supplied in packet).

## **C. Bay and Feed Line Installation**

**1. End Fed Arrays** (refer to the enclosed Installation Drawing)

- a. Raise bay one assembly and fasten to its mount.
- b. Fasten the input feedline to the termination mount.
- c. Raise bay two assembly, insert the interbay feedline into the junction block/tee (refer to **Note 3, page 3**) and fasten together.
- d. Fasten the bay to its mount.

**Note:** Mount position may need to be adjusted to align with bay.  
(Reference note 5, page 4)

- e. Repeat step c and d for the remaining bays.

2. **Center Fed Arrays** (refer to the enclosed Installation Drawing)

- a. Raise bay one assembly and fasten to its mount.
- b. Raise bay two assembly, insert the interbay feed line into the junction block/tee (refer to Note 3, page 3), and fasten together.
- c. Fasten the bay to its mount.

**Note:** Mount position may need to be adjusted to align with bay.  
(Reference note 5, page 5)

- d. Repeat step b and c for the remaining bays.
- e. Connect and fasten the elbow to the feed junction block/tee, orient longer leg as shown by Installation Drawing (in packet).
- f. Connect and fasten the input feed line to the elbow.
- g. Clamp the input feed line to the termination mount located below input tee and to the lower termination mount.
- h. Ground the input feed line every 30 inches in the antenna aperture.
- i. In areas where feedlines are not grounded they should be at least 1/2" from any tower member or rigid component.

1. Cut ground strap lengths to reach the nearest tower member plus 2" from the roll provided.
2. Clamp ground strap ends to feedline and tower with the hose clamps. Refer to Illustration E page 19.
3. Wrap with weather proofing, provided. Refer to installation instructions provided with the weather proofing kit.

**Note:** Any elevator or power cables, within 6 feet of the radiating bays, must be shielded and the shield grounded in the same manner as explained in h.

3. **Branch Fed Arrays** (refer to the enclosed Installation Drawing)

- a. Raise each bay assembly and fasten to its mount(s).
- b. Raise and mount the Power Divider.
- c. Install the feedlines between the Power Divider and each bay.

**Note:** Ensure that the match markings on feed lines correspond with those on the Power Divider and the bay junction block.

- d. Secure the feedlines to the tower at regular intervals with the wrap-lock kit
- e. Ground the feedline every 30 inches.

- f. In areas where feedlines are not grounded they should be at least 1/2" from any tower member or rigid component.

1. Strip a 1" wide section fully around the coax cable jacket.

**Caution:** Take care not to damage or cut through the outer coax housing.

2. Cut ground strap lengths to reach the nearest tower member plus 2" from the roll provided.
3. Clamp ground strap ends to feed line and tower with the hose clamps. Refer to Illustration E page 19
4. Wrap with weather proofing, provided. Refer to installation instructions provided with the weather proofing kit.

**Note:** Any elevator or power cables, within 6 feet of the radiating bays, must be shielded and the shield grounded in the same manner as explained in e.

5. Connection To Feedline

Connect and fasten the customer's transmission line to the input feedline.

**Note:** The input feedline is equipped with a standard EIA flange.

The antenna array is not designed to support the customer's transmission line. The customer shall be responsible for any transmission line hangers supporting the transmission line.

If flexible continuous air dielectric cable is installed for the feedline, make certain that the feedline can be pressurized. The cable should have a gas barrier at the transmitter end and not at the antenna end. The gas barrier is usually found at the end of the shipping reel, which comes off last.

**Warning:** The antenna must be pressurized at all times once installed on the tower to prevent condensation inside the antenna resulting in possible antenna failure. Refer to "WARNINGS" on page 1 for more information.

#### 4. Optional Equipment

#### **Parasitic Elements**

- a. Mounting brackets for parasitic elements are usually incorporated onto the bay mounts. Note the parasitic layout on the supplied antenna installation drawing.

**Note:** Antenna array and parasitic orientation must be as shown on the installation drawing to obtain the coverage pattern approved.

#### **Radomes**

- a. Radomes are pre-assembled and mounted on the bay element. If a field replacement is required see appendix 2 for radome installation instruction.

#### **De-icer System**

See the appendix 1 for installation instructions.

### **D. Initial Characterization and Impedance Matching**

Documentation of initial character is valuable information and can be used for possible future trouble shooting.

#### **1. Transmission Line VSWR Reading**

The VSWR of the transmission line should be within the manufacturer's specifications. If not, call the manufacturer and bring the VSWR into compliance before attaching the antenna. A high VSWR may indicate damaged transmission line and may cause future equipment damage in the future.

- a. Terminate the transmission line into an instrument quality 50 ohm load.
- b. Measure and record the voltage standing wave ratio (VSWR).
- c. Record this data in appendix 6.

#### **2. System VSWR**

**Note:** After adjustment the VSWR should be less than 1.25:1. If readings can not be adjusted to less than 1.25 contact Dielectric Communications to help identify any issues which may be present.

- a. Remove the load.
- b. Connect the transmission line to the input transformer (if provided).
- c. Install an O-ring and seal the connection.
- d. Record the VSWR reading in the log sheet, see appendix 6. Use the variable transformer, see instructions below, to adjust the VSWR as necessary.

## Adjustable Fine Matcher

The adjustable fine matcher has been shipped with all probes fully inserted. After installation on the tower, the adjustments should be made by following the described steps below. These adjustments can be made with the system pressurized but the system need not be purged of moisture.

To prevent excessive radiation exposure to personnel, adjustments should be made using low power test equipment

1. Loosen the clamp nuts on all four adjusting probes and pull out fully.
2. Slide the bottom adjustment probe in by  $\frac{1}{4}$ " increments until the lowest VSWR is obtained.
3. Hand-tighten the lock nut until it is snug.
4. Repeat steps 2 and 3 for the remaining probes.
5. Starting with the bottom probe, move probe in and out by  $\frac{1}{4}$ " increments until the lowest VSWR is obtained.
6. Hand-tighten the locknut, snug.
7. Repeat steps 2 and 3 for the remaining probes.
8. Repeat steps 5 thru 7 until the lowest VSWR has been obtained and tighten lock nuts for all four probes.

## 3. Bay Function

- a. Apply a low wattage (1.5 to 2 watts) to the antenna system and read the VSWR.
- b. Detune each bay in turn by shorting the bay. The deflection in VSWR should be apparent. The deflection for various bays should be similar, but not necessarily the identical.

**Note:** If the system has radome(s) installed do not remove. Place a square section of metal wire mesh, approximately the area of a radome, on the top of each radome in turn.

## E. Leak Testing

After the antenna is installed and all transmission lines are connected, check the system for leaks.

1. Connect a source of dry gas or air from a cylinder of dry nitrogen or a compressor-dehydrator.

## CAUTION

Never use a "garage" air compressor to feed compressed air to the system. The compressor will not provide clean air and could add moisture as well as contaminants such as oil and graphite.

**Note:** Use a good quality gauge which reads accurately in the 1-20 psig range. Do not depend on the cylinder regulator gauge.

2. Pressurize the system to 5 psig.
3. Close the shutoff valve.
4. Give the system approximately one half hour to stabilize, then record the pressure and the temperature.
5. Wait twenty-four hours, then read the pressure and the temperature again. Use the following formula to obtain a corrected pressure for comparison:

$$PC = (PR + 14.7)(T1 + 460)/(T2 + 460) - 14.7$$

PC = corrected final pressure, psig

PR = final pressure as read, psig

T1 = beginning temperature, degrees F

T2 = final temperature, degrees F

**Note:** As a rule of thumb, the final pressure should not be less than half the initial pressure after twenty-four hours.

6. If the system loses pressure at an unacceptably high rate, re-pressurize and leave the gas/air supply on. Using a leak detector or bubble soap, find and repair any and all leaks
7. Repeat steps 2 thru 5.

## F. Purging the System

The transmission line and the antenna system should be purged prior to applying power and placing into service.

1. Purge by pressurizing the antenna to approximately 5 psi with compressed dehydrated air or cylinder nitrogen
2. Open petcock valve(s) on the top junction block and bay #1 junction block (center fed antennas only).
3. Purge until all signs of moisture have disappeared.

**Note:** Usually allow three volume changes of dry gas/air for a system. Refer to the table below for approximate volumes inside various transmission line sizes. Add the length of the antenna plus seven feet for each

antenna bay to the length of the transmission line, attached to the antenna input, to determine the overall system length.

VOLUME OF COAX PER  
1000 FEET OF LENGTH

Diameter	Volume
1-5/8"	13 cu. ft.
3-1/8"	50 cu. ft.
4-1/16"	90 cu. ft.
6-1/8"	200 cu. ft.

One full nitrogen cylinder, size K, contains about 240 cubic feet of gas.

For systems pressurized via dehydrator compressor use the following equation to calculate the venting time required.

$$\text{Time (hrs.)} = \text{System Volume} / (335) * (\# \text{Relief Valves})$$

End fed systems have (1) one relief valve, typically located on top bay junction block.

Center fed systems have (2) two relief valves.

The flow capacity of each valve varies depending on the size of the valve and the pressure in the system. The typical 1/4" draincock valve has a flow rate of approximately 2 cfm at a typical line pressure of 3-5 psi. You must ensure that the compressor-dehydrator capacity is adequate or the purge time will increase proportionately.

## G. Pressurized System

After system purge, reduce the supply pressure to approximately 5 psig. After the pressure has stabilized, dehydrator compressor running or radical cylinder pressure drops are an indicator of large system leaks. Pressure observation is especially important immediately after installation or any subsequent opening and re-assembly.

## H. Pre-Operation Inspection

Perform the following inspection before powering the system;

1. Antenna system has been installed per the installation drawing(s). Particularly parasitic installation if applicable.
2. The system is gas tight and purged.
3. Fine Matcher setting and initial characterization data have been recorded.
4. All bays are operating; impedance has been trimmed and VSWR <1.25.
5. De-icer system, if applicable, has been checked out.

## I. Operational Inspection

The following shall be performed when the wind aloft is relatively calm and the temperature is relatively warm.

1. Bring up RF power slowly and observe transmitter readings, stability, and general operation.
2. Run at about half power for at least an hour, reading forward and reflected power, stability, etc.
3. If the system is stable and operating properly, increase output to full power.
4. Take an initial set of readings.
5. Operate at full power for several hours.
6. Repeat recording of readings periodically.
7. Turn power off and inspect the entire system. Note the temperature and condition of the bays, feedline and joints.

**Note:** Performance readings should not change over this period. No evidence of heating in the antenna system should be observable. Any problems or heating found must to be corrected before re-powering.

Call Dielectric Communications if assistance or advice is needed.

## **OPERATION**

### **A. Antenna System**

After the antenna system has been installed and successfully completed tests outlined in the installation section of this manual, the antenna is operational.

To start up apply transmitter signal. Do not exceed the power rating for the antenna.

For best performance and reliability of you new Dielectric antenna, follow the "Maintenance" section of this manual.

### **B. De-icer System (Optional)**

The de-icer system was designed for prolonged operating periods. If icing conditions are expected, the de-icer system should be turned on prior as a preventative measure. Automatic systems and the control switched to AUTOMATIC. The ice detector monitors air temperature and moisture. Heaters operate at temperatures below 38° F during precipitation and for the hold-on timer interval (1/2 to 5 hours) thereafter. The sensor prevents heater operation below 20° F to save electricity and to prevent partial ice melting. Heaters operate for the hold-on time as the temperature increases through 20° F if precipitation occurred during lock out.

## **MAINTENANCE**

**Note:** Whenever the system has been open for repair. Purge with dry nitrogen gas or dehydrated-compressor air as described in section E of the Installation instructions. Never operate the system under power until all moisture has been purged. Otherwise permanent damage may occur to the entire system, including the transmitter and transmission line.

## Maintenance Log

Keep a maintenance log, see Appendix 6, to record performance parameters (i.e. VSWR, de-ice current draw, etc.). The information contained in this log will be invaluable for spotting and identifying problems.

## Inspection

The antenna system should be inspected every six months, or whenever riggers are on the tower. Items to look for but are not limited to include, electrical damage, loose hardware, proper de-icer function (if applicable) and general condition.

Observe the dry nitrogen gas/dehydrated-compressor air usage as an indication for possible system leaks.

Annually, check the condition of the de-icer wiring with an ammeter; compare the legs of the system with each other and with initial readings taken at time of installation. If an ammeter is not available, resistance readings of each leg will suffice.

A bay, (if necessary to repair damage, etc.), may be removed by taking out the mounting bolts and sealing the bay block with an emergency sealing cap (not supplied, listed below), using the same or a new O-ring. Operation of the antenna may then continue with a slightly increased VSWR, while the bay is returned to the factory for repair.

For example, the removal of a bay from a six bay antenna that was trimmed to a VSWR of 1.05 or less will cause the VSWR to increase to about 1.2. The gain will drop to about 83% of normal.

Sealing Cap (Not Supplied)	
<u>Antenna Model</u>	<u>P/N</u>
C & M	59051
H	0029153501

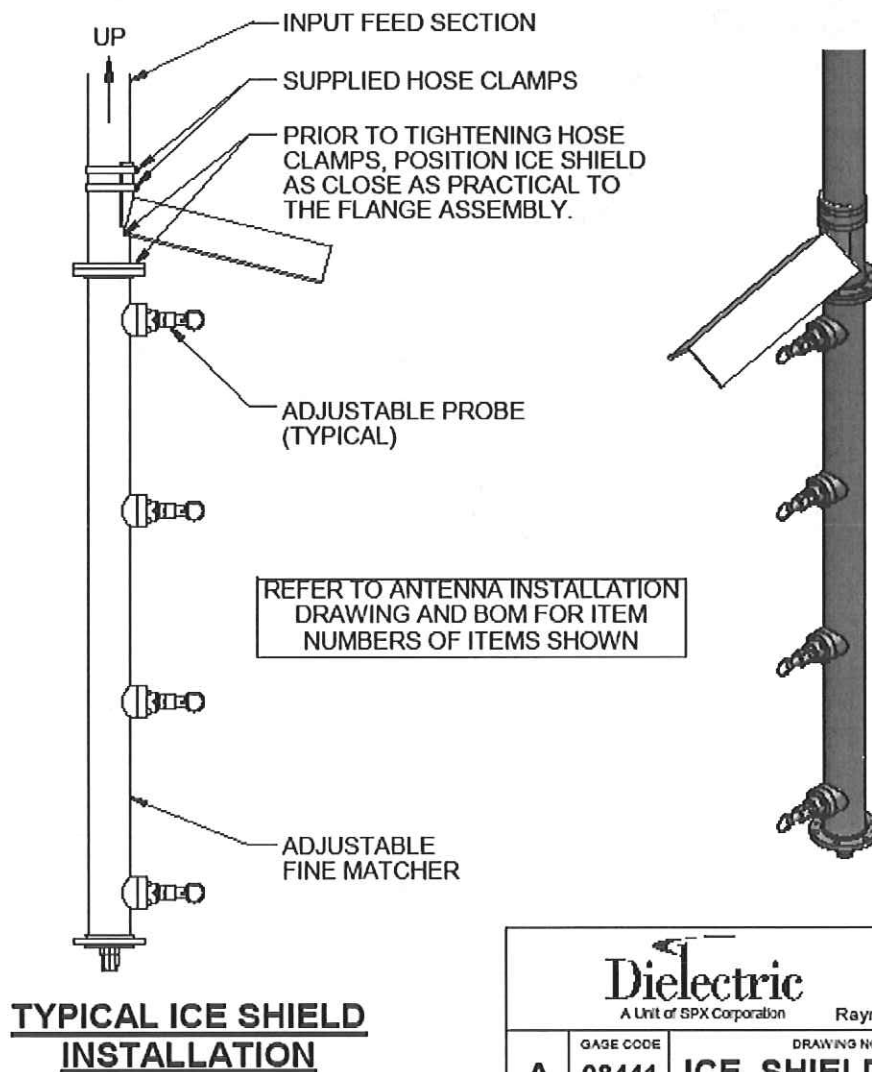
## ILLUSTRATIONS INDEX

### Installation Drawings: (In Packet)

- A. Ice Shield Kit Installation
- B. Typical Standard Leg Mount Drawing
- C. Typical Face Mount
- D. Typical Termination Leg Mount
- E. Grounding Detail, Round Tower Legs  
Grounding Detail, Angular Tower Legs
- F. Torque Specification

REV:	REVISION NOTE CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.
A	

## ILLUSTRATION A



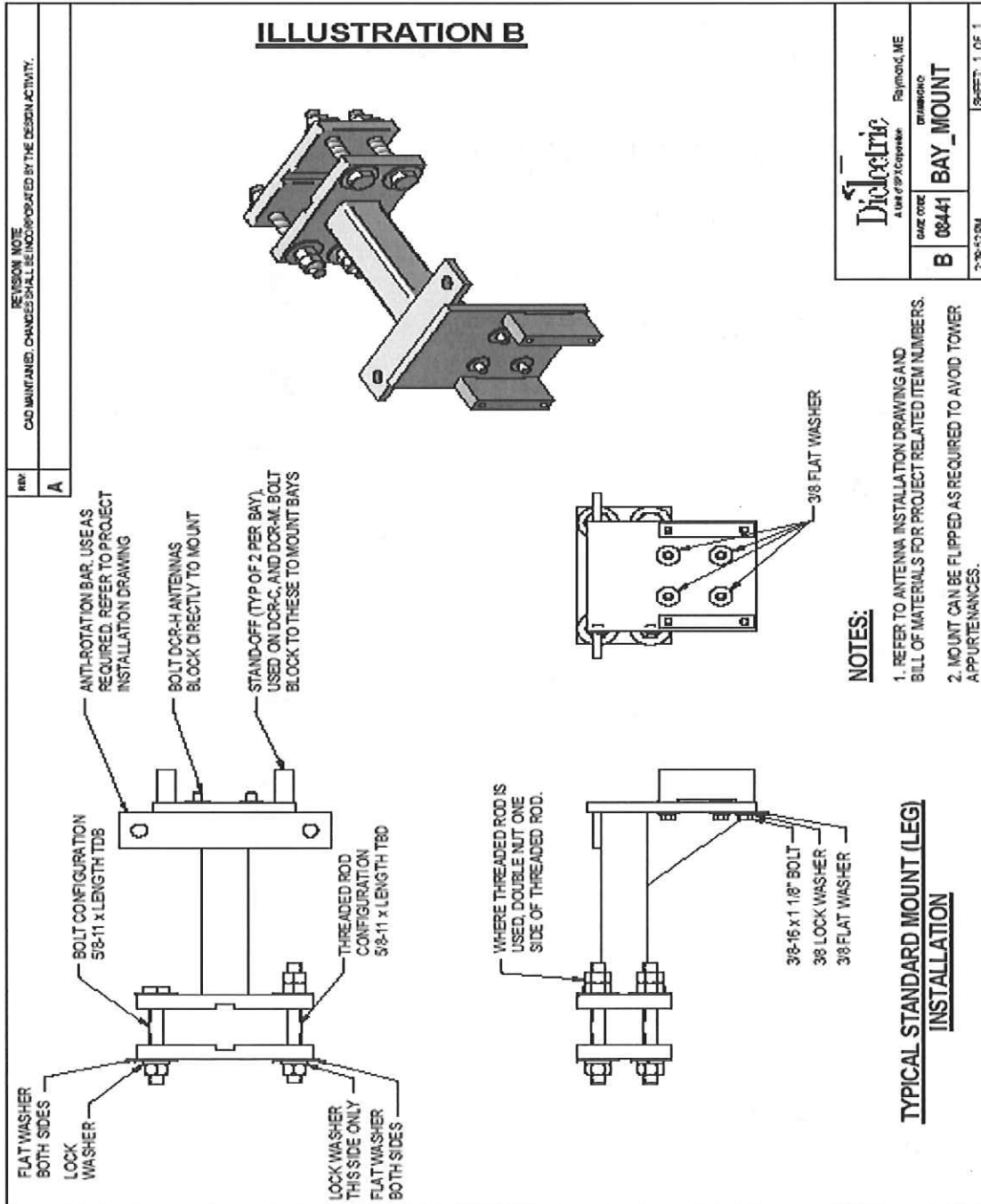
**Dielectric**  
A Unit of SPX Corporation

Raymond, ME

<b>A</b>	GAGE CODE	DRAWING NO:
	<b>08441</b>	<b>ICE_SHIELD</b>

2:24:41 PM

SHEET: 1 OF 1



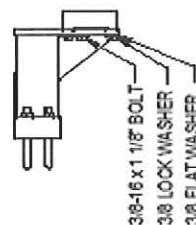
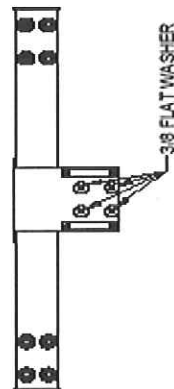
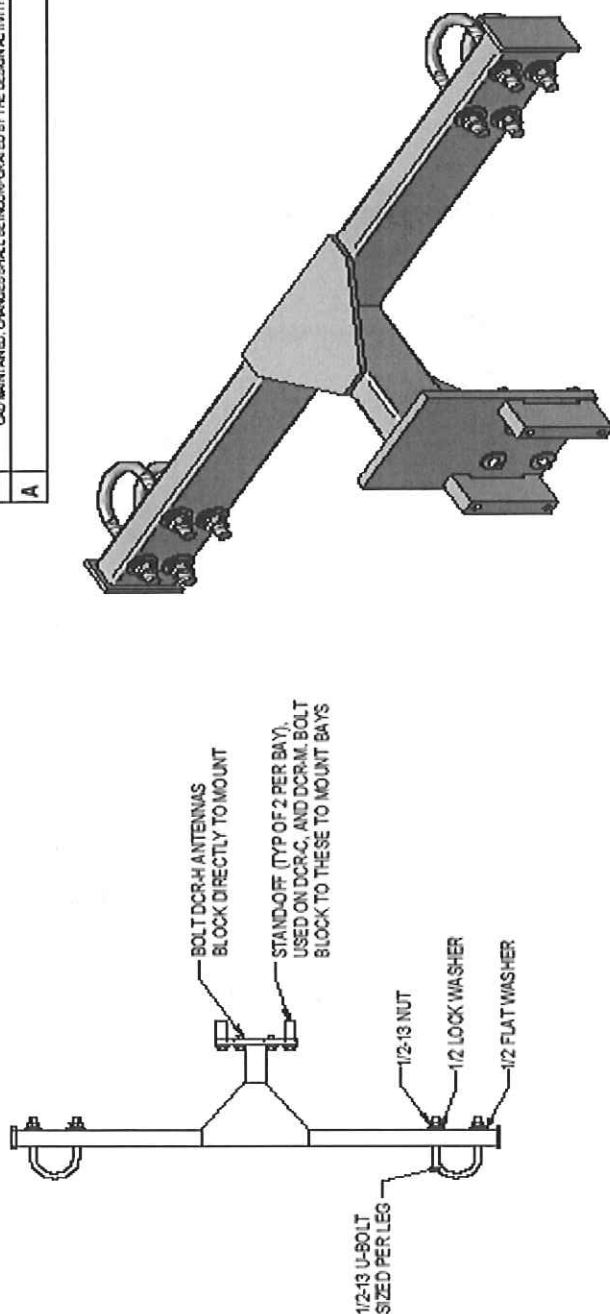
**Dicor**  
A Unit of PPG Industries

Raymond, ME  
04070

**B 00441 BAY\_MOUNT**

2:30:52 PM  
SHEET 1 OF 1

REV:	REVISION NOTE
A	CAD MOUNTED, CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.




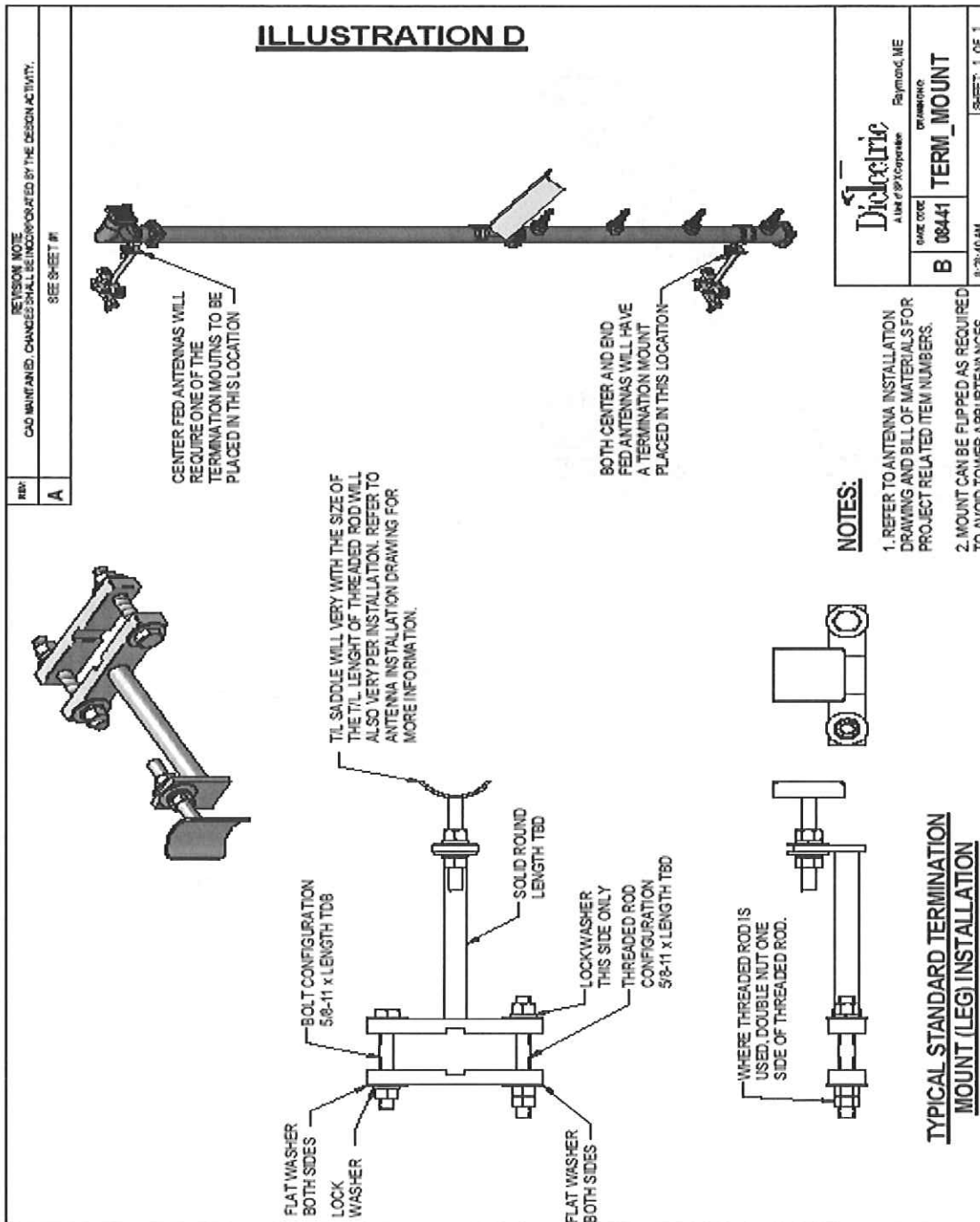
#### NOTES:

1. REFER TO ANTENNA INSTALLATION DRAWING AND BILL OF MATERIALS FOR PROJECT RELATED ITEM NUMBERS.
2. FOR FINAL MOUNT CONFIGURATION, REFER TO ANTENNA INSTALLATION AND MOUNT DRAWINGS FOR MORE INFORMATION.
2. IN CERTAIN INSTANCES MOUNT CAN BE FLIPPED AS REQUIRED TO AVOID TOWER APPURTENANCES. REFER TO ANTENNA INSTALLATION DRAWING FOR MORE INFORMATION.

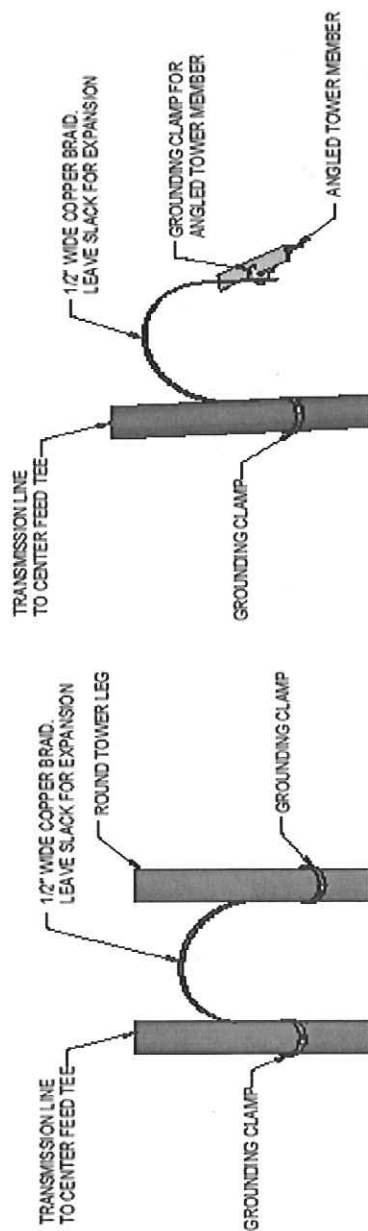
#### TYPICAL FACE MOUNT INSTALLATION

#### ILLUSTRATION C

 A Unit of 3M Corporation Raymond, ME	
DATE 0002	OF 0000
B 08441	FACE_MOUNT
8:34:53 AM	SHEET: 1 OF 1



REV	REVISION NOTE
A	OLD UNWANTED CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY. SEE SHEET #



#### TYPICAL GROUNDING DETAIL FOR ROUND TOWER LEGS

REFER TO NOTES

#### TYPICAL GROUNDING DETAIL FOR ANGLE TOWER MEMBERS

REFER TO NOTES

### ILLUSTRATION E

#### NOTE:

1. THE TRANSMISSION LINE FEEDING THE CENTER FEED TEE, MUST BE GROUNDED TO THE TOWER AT APPROXIMATELY 30 INCH INTERVALS STARTING AT THE TEE INPUT AND ENDING AT THE ADJUSTABLE FINE MATCHER.
2. ANY ELEVATOR OR POWER CABLES WITHIN 6 FEET OF THE TRANSMISSION LINE IN THE RADIATION REGION MUST BE SHIELDED, WITH THE SHIELD BEING GROUNDED TO THE TOWER AT APPROXIMATELY 30 INCH INTERVALS. DIELECTRIC IS NOT RESPONSIBLE FOR THE CABLE SHIELDS OR THE GROUNDING OF SAID SHIELDS.

 A Unit of 891 Corporation Raymond, ME 04071		DRAWING GROUNDING_DETAILS		SHEET 1 OF 1
DATE CODE B 08441				

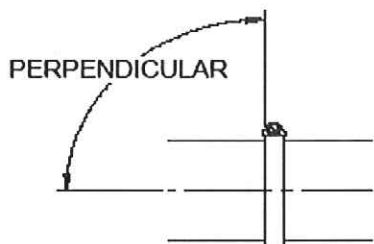
REV:	REVISION NOTE CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.
A	SEE SHEET #1

## ILLUSTRATION F

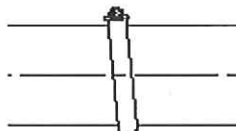
### DIELECTRIC TORQUE SPECIFICATION

#### HARDWARE TORQUE SPECIFICATIONS

HARDWARE DESCRIPTION	RECOMMENDED TORQUE	
	MATERIAL 18-8 SST	MATERIAL CS GRADE 5
1/4-20	70 IN/LB	96 IN/LB
5/16-18	130 IN/LB	204 IN/LB
3/8-16	210 IN/LB	380 IN/LB = 30 FT/LB
1/2-13	480 IN/LB = 40 FT/LB	900 IN/LB = 75 FT/LB
5/8-11	1080 IN/LB = 90 FT/LB	1800 IN/LB = 150 FT/LB
3/4-10	1440 IN/LB = 120 FT/LB	260 FT/LB
1-8	285 FT/LB	640 FT/LB
1 1/8-7	413 FT/LB	800 FT/LB
1 1/4-7	623 FT/LB	1120 FT/LB
1 3/8-6	889 FT/LB	1480 FT/LB
1 1/2-6	889 FT/LB	1940 FT/LB
HOSE CLAMPS	40 - 50 IN/LB	-



**GOOD**



**NOT GOOD**

#### **NOTE:**

HOSE CLAMPS MUST BE ORIENTATED PERPENDICULAR TO THE AXIS OF THE OBJECT ON WHICH THE ARE TO BE MOUNTED, (HOSE CLAMP BAND, FLAT ON THE OBJECT SURFACE).

**Dielectric**

A Unit of SPX Corporation      Raymond, ME

<b>A</b>	GAGE CODE <b>08441</b>	DRAWING NO: <b>HOSECLAMP_POSITION</b>
	3:22:01 PM	SHEET: 1 OF 1

## **APPENDIX**

1. De-icer Installation (where applicable)
2. Radome Kit Installation
3. Antenna Finish
4. Electrical & Mechanical Specification
5. Trouble Shooting
6. Log Sheet

## APPENDIX 1

### De-Icer Installation

## Antenna Deicer Operation and Installation

### Introduction and Planning Information

#### Theory of Operation

The deicers on the antenna systems consist of immersion heaters located within each dipole arm of the antenna. This results in *four* heaters in the DCRC/H and *eight* heaters in the DCRM. Each heater produces approximately 150 watts at 120 volts and two heaters are wired in series (internal to the antenna) to allow a supply voltage to the antenna of between 200 and 240 Volts. Each radiator is provided with a weather resistant connector which power (between 200 and 240 volts) is supplied. A mating connector is provided on the wiring harness, supplied with the deiced antenna.

#### Estimating Power and Current

The pair of heaters operating at 200 - 240 volts nominally dissipates 300 watts of power but this is dependent on the supply voltage. The heat produced by these heaters is sufficient to satisfactorily de-ice the antenna even when the supply voltage is reduced. If the supply voltage is reduced, the dissipated power can be calculated from:

$$\text{Power} = (\text{Supply Voltage} / 240)^2 * 300 \text{ Watts.}$$

For example, let's look at an eight bay DCRM operating at 208 volts. At 208 volts phase-to-phase the power is reduced to approximately

$$\text{Power} = (208/240)^2 * 300 = (.867)^2 * 300 = 225.3 \text{ Watts per heater pair.}$$

There are four heater pairs per DCRM radiator therefore the total dissipation per radiator is 901.2 watts. For the eight bay antenna the total dissipation is 7209.6 Watts.

Maximum current can then be estimated as follows by dividing the total dissipation by the voltage.

For example: an 8 bay antenna operating at 208 volts. Each heater pair would dissipate 901.2 Watts (from above). There are eight bays so that the antenna would actually dissipate about 7209.6 watts. By dividing this by the 208 volts will results in 34.7 amperes, the maximum per current required by this antenna.

$$I = (N) \times (\text{Per Radiator Power}) / \text{Voltage}$$

$$I = (8) \times (901.2) / 208$$
$$I = 7209.2 / 208 = 34.7 \text{ A}$$

The amperage number can be used to plan for tower and building wiring required for the deicer system.

### Control System

Ice only forms on antennas under limited conditions of temperature and humidity. Outside of these conditions, deicers can be deactivated. With the standard manual system, power to the de-ice system must be turned on/off by station personnel. When the optional control system is used, power to the heaters automatically activates and deactivates.

A manual system includes only the heaters in the radiator arms and the inter bay wiring harness. The customer/installer is responsible for all other components.

The automatic control system includes a heater controller and temperature/humidity sensor.

The heater-controller operates on 120 volts, single phase with a neutral. The sensor is connected to the heater-controller. The controller monitors the current drawn by the sensor to monitor atmospheric conditions. When icing conditions exists, the controller activates a pair of internal contacts. The controller sends a power signal to a relay switch, **(supplied by the customer)**, to power the heaters. The relay switch must be capable of interrupting the voltage and current draw of the heaters as calculated previously. The relay switch must use the 120 volt control voltage or a transformer maybe needed to step the voltage as required. The relay switch is **not** supplied with the deicer system and must be purchased by the customer.

For best results, the temperature/humidity sensor for this system should be mounted in close proximity to the antenna. A run of three #12 (for runs of 500 – 2000') or #18 (for runs up to 500') AWG wires should be used between the controller, (which should be located at the base of the tower in the transmitter building), and the sensor.

### Tower Cabling

Cabling is required for power capable of safely carrying the estimated current of the heaters. The current may be estimated as shown above. The cabling is to be provided by the customer and must reach from the relay switch on the ground to the connection point of the wiring harness for the antenna.

A heater harness is provided which distributes power from a single connection point (at the bottom or center of the antenna array, depending on the number of bays) to each of the radiators. The customer-supplied cable connects to the Dielectric supplied harness inside of a water-resistant junction box. The Dielectric cable (s) enter the box through water-resistant fittings. There is room to install a fitting for the customer-supplied cable. The customer is responsible for the fitting and installation of this cable in the junction box. A terminal strip is located in the junction box for wire connections. At the terminal strip are two power leads (black and white) and the green ground. For antennas with less than six bays, the connection point is at the bottom of the antenna array. Antennas with more than six bays, the connection point is in the middle of the array.

## **Installation**

**Note:** The installer/customer must ensure that all components and the installation meet all applicable codes.

1. Connect wiring harness to the antenna bay connectors and secure bay cables to tower.
2. Mount junction boxes and wire harness. The cover on the main junction box (gray) should be installed hinge down for ease of access.
3. Run power cable into the main junction box (gray).
4. Connect power wires to terminal strip (black to black & white to white).
5. Connect ground wire to terminal strip (green to green).
6. Secure power cable to tower and run to relay switch location.
7. Mount the temperature/humidity sensor in close proximity to the antenna array.
8. Run a shielded cable to the controller location from the sensor.
9. Mount the control box and connect to 120 volt single phase power source as well as sensor input cable.
10. Mount, **(customer supplied)**, relay switch and connect to power source and to array power cable.
11. Wire control signal from controller to input on relay switch.

## **Inspection**

1. Measure the resistance across each power leg and record in the log sheet, see appendix 6.
2. Switch controller to manual and turn on.
3. Measure the current draw for each power leg and record in the log sheet, see appendix 6.

## APPENDIX 2

### Radome Kit Installation

## **DCR-C AND DCR-H Antenna Radome Assembly Instructions**

The radome option, (part number 35880) includes the following items:

P/N	ITEM	QTY	Item on drawing. (SEE NEXT SHEET)
54698	Radome Upper & Lower halves	1	1
20899	Support, Radome	1	3
0142520000	Hex. Nut, 1/4-20	4	4
0162500000	Lock Washer 1/4"	8	5
0152500000	Flat Washer, 1/4" Heavy	8	6
0252520100	1/4"-20 Self-threading Screw	8	8
0022520075	1/4-20 x 3/4 long Hex Bolt	8	9
0002187007	Hose Clamp	1	10

Tools required for assembly:

Two 7/16" wrenches, a philips and a regular screw driver, a #7 (.201 diameter) drill bit and drill.

### **Assembly:**

1. Insert the rear support (3) and hose clamp (10) over the end of the horizontal support tube. Do not tighten the clamp at this time.

2. Place the upper half of the radome (1) over the antenna bay radiator.

**Note:** *Only* the lower half of the radome has drain holes.

3. Fasten the front end of the radome (near the input flange) to the support plate using four 1/4-20 x 3/4" long bolts (9), washers (6) and lock washers (7) in the upper holes only.

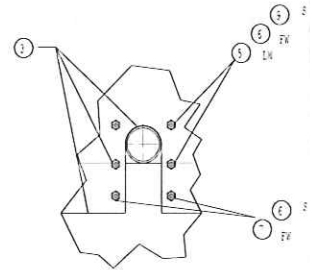
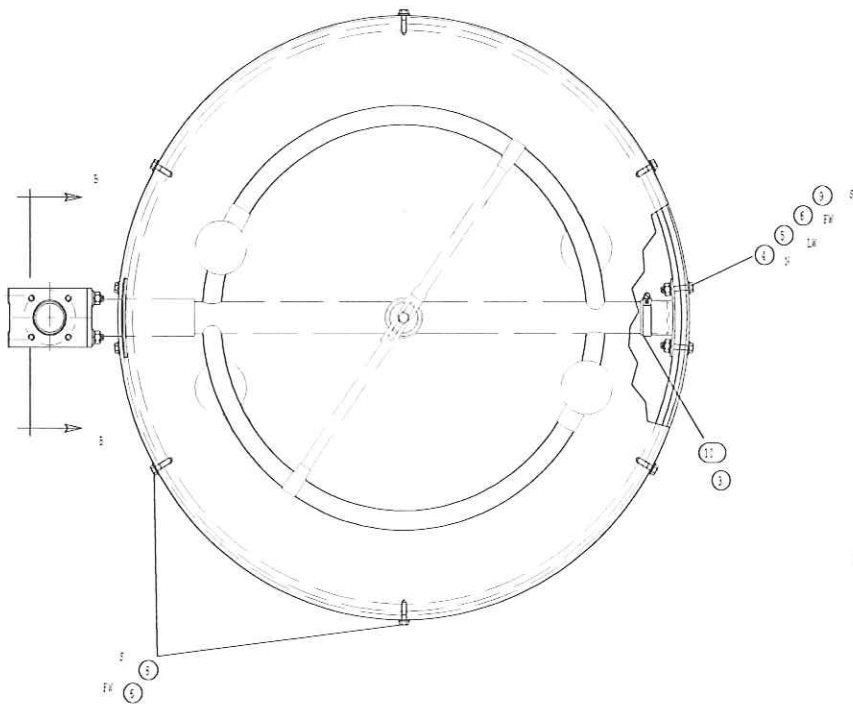
4. Fasten the rear support to the radome with four 1/4-20 x 3/4" long bolts (9), washers (6) and lock washers (7) and nuts (4).

5. Tighten hose clamp around rear support.

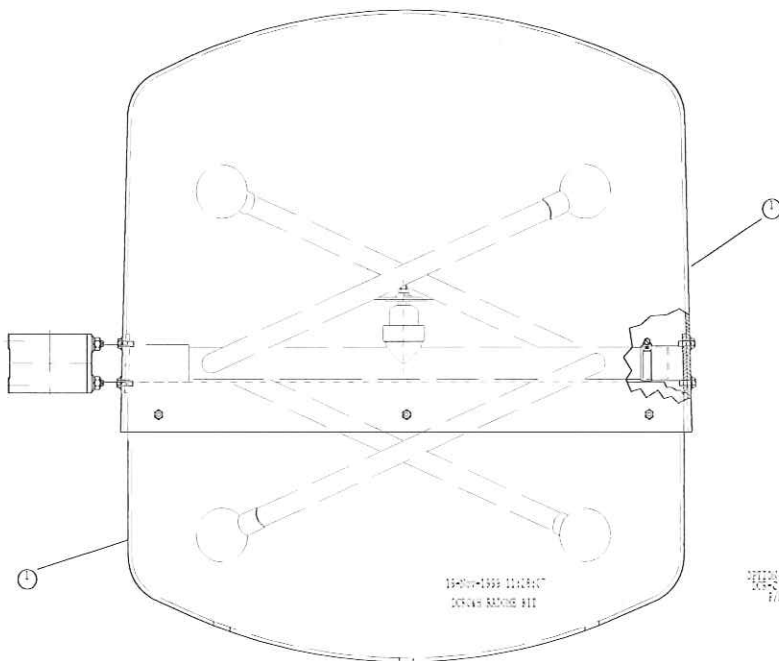
6. Place the lower half of the radome over the bay radiator inside the upper half of the radome. The radome will rest against the support plate.

7. Using the pre-drilled holes in the top half of the radome as a guide, drill eight places around through the bottom half of the radome.

8. Fasten the lower half of the radome to the upper half of the radome using the self threading screws (8) and flat washers (6).



1/2" 10 - 5"



10-000-1000 1111111  
DOOR HATCH

10-000-1000 1111111  
DOOR HATCH

### APPENDIX 3

#### ANTENNA FINISH

### **Antenna Finish**

The antenna elements and interbay feed lines do not require painting since all components are either, stainless steel, copper or brass. The mounting brackets are galvanized steel or stainless steel. All hardware used is stainless steel.

**Do not paint the stainless steel bays!**

### Electrical and Mechanical Specifications

### Electrical and Mechanical Specifications

- 31 -

Antenna TYPE	Dimensions				Windload1 (at 50/30 lbs/ft2)		
	Hc Top	Hc Side	H Top	H Side	Less Deicers	With Deicers	With Radomes
	Feet (meters)	Feet (meters)	Feet (meters)	Feet (meters)	lbs(kgs)	lbs(kgs)	lbs(kgs)
DCR-C1	5.0 (1.5)	0.8 (0.24)	8.0 (2.4)	1.7 (0.52)	178 (81)	185 (84)	332 (151)
DCR-C2	10.0 (3.0)	5.8 (1.8)	19.0 (5.8)	11.7 (3.6)	327 (148)	341 (154)	635 (288)
DCR-C3	15.0 (4.6)	10.9 (3.3)	28.9 (8.8)	21.8 (6.6)	475 (215)	396 (179)	937 (425)
DCR-C4	20.0 (6.1)	15.9 (4.8)	38.4 (11.7)	31.8 (9.7)	623 (283)	651 (294)	1239 (562)
DCR-C5	25.0 (7.6)	20.9 (6.3)	49.4 (15.0)	41.8 (12.7)	791 (359)	826 (373)	1541 (699)
DCR-C6	30.0 (9.1)	25.4 (7.7)	59.3 (18.0)	51.9 (15.5)	920 (417)	962 (435)	1824 (827)
DCR-C7	35.1 (10.7)	dc	68.7 (20.9)	61.9 (18.9)	1068 (484 )	1117 (505)	2123 (963)
DCR-C8	40.1 (12.2)	35.9 (10.9)	78.9 (24.0)	71.9 (21.9)	1238 (562)	1294 (585)	2454 (1113)
DCR-C10	50.1 (15.3)	46.0 (14.0)	98.6 (30.0)	92.0 (28.0)	1535(696)	1598 (722)	3075 (1395)
DCR-C12	60.1 (18.3)	56.0 (17.1)	119.8 (36.6)	112.1 (34.1)	1832 (831)	1902 (859)	3680 (1669)
DCR-H1	5.0 (1.5)	0.8 (0.24)	8.0 (2.4)	1.7 (0.52)	135 (61)	155 (70)	289 (131)
DCR-H2	10.0 (3.0)	5.8 (1.8)	19.0 (5.8)	11.7 (3.6)	243 (110)	283 (128)	551 (250)
DCR-H3	15.0 (4.6)	10.9 (3.3)	28.9 (8.8)	21.8 (6.6)	349 (158)	409 (185)	811 (368)
DCR-H4	20.0 (6.1)	15.9 (4.8)	38.4 (11.7)	31.8(9.7)	456 (207)	536 (213)	1072 (486)
DCR-H5	25.0 (7.6)	20.9 (6.3)	49.4 (15.0)	41.8 (12.7)	582 (262)	662 (300)	1332 (604)
DCR-H6	30.0 (9.1)	25.4 (7.7)	59.3 (18.0)	51.9 (15.5)	670 (304)	790 (358)	1574 (714)
DCR-H7	35.1 (10.7)	30.9 (9.4)	68.7 (20.9)	61.9 (18.9)	777 (352)	917 (416)	1832 (831)
DCR-H8	40.1 (12.2)	35.9 (10.9)	78.9 (24.0)	71.9 (21.9)	905 (410)	1065 (483)	2121 (962)
DCR-M1	5.0 (1.5)	1.2 (0.37)	8.0 (2.4)	2.4 (0.73)	214 ((97)	225 (102)	
DCR-M2	10.0 (3.0)	6.2 (1.9)	18.0 (5.5)	12.4 (3.8)	388 (176)	400 (181)	
DCR-M3	15.0 (4.6)	11.2 (3.4)	28.1 (8.6)	22.5 (6.9)	563 (256)	594 (268)	
DCR-M4	20.1 (6.1)	16.3 (5.0)	38.1 (11.6)	32.5 (9.9)	736 (335)	780 (352)	
DCR-M5	25.1 (7.6)	21.3 (6.5)	48.1 (14.7)	42.5 (13.0)	910 (411)	963 (435)	
DCR-M6	30.1 (9.2)	26.3 (8.0)	58.2 (17.7)	52.6 (16.0)	1085 (493)	1159 (524)	
DCR-M7	35.1 (10.7)	31.3 (9.5)	68.2 (20.8)	62.6 (19.1)	1259 (572)	1343 (607)	
DCR-M8	40.1 (12.2)	36.3 (11.1)	78.3 (23.9)	72.7 (22.2)	1450 (659)	1545 (698)	
DCR-M10	50.2 (15.3)	46.4 (14.1)	98.3 (30.0)	92.7 (29.3)	1798 (817)	1903 (860)	
DCR-M12	60.2 (18.3)	56.4 (17.2)	118.4 (36.1)	112.8 (34.4)	2147 (976)	2273 (1027)	

	Power			Weight		
	Gain	Rating		Less Deicers	With Deicers	With Radomes
Type	db	KW		lbs (kg)	lbs (kg)	lbs (kg)
DCR-C1	0.46 (-3.37)	10 kW		109 (49)	114 (52)	140 (63)
DCR-C2	1.0 ( 0 )	20 kW		173 (78)	182 (82)	235 (107)
DCR-C3	1.5 (1.76)	30 kW		237 (108)	251 (113)	310 (141)
DCR-C4	2.1 (3.22)	40 Kw		301 (137)	320 (145)	425 (193)
DCR-C5	2.7 (4.31)	40 kW		365 (166)	390 (176)	520 (236)
DCR-C6	3.2 (5.05)	40 kW		429 (195)	458 (207)	615 (278)
DCR-C7	3.8 (5.80)	40 kW		493 (224)	526 (238)	710 (322)
DCR-C8	4.3 (6.34)	40 kW		582 (264)	620 (280)	830 (376)
DCR-C10	5.5 (7.40)	40 kW		710 (322)	757 (342)	1020 (462)
DCR-C12	6.6 (8.20)	40 kW		838 (380)	895 (404)	1210 (549)
DCR-H1	0.46 (-3.37)	4 kW		42 (19)	130 (59)	57 (26)
DCR-H2	1.0 ( 0 )	8 kW		89 (40)	238 (108)	119 (54)
DCR-H3	1.5 (1.76)	12 kW		136 (62)	373 (169)	181 (82)
DCR-H4	2.1 (3.22)	12 kW		183 (83)	481 (218)	243 (110)
DCR-H5	2.7 (4.31)	12 kW		230 (104)	616 (279)	305 (138)
DCR-H6	3.2 (5.05)	12 kW		277 (126)	724 (328)	367 (167)
DCR-H7	3.8 (5.80)	12 kW		324 (147)	859 (390)	429 (195)
DCR-H8	4.3 (6.34)	12 kW		371 (168)	967 (439)	491 (223)
DCR-M1	0.46 (-3.37)	18 kW		112 (51)	121 (55)	
DCR-M2	1.0 ( 0 )	36 kW		197 (89)	215 (97)	
DCR-M3	1.5 (1.76)	40 kW		282 (128)	319 (144)	
DCR-M4	2.1 (3.22)	40 Kw		367 (166)	403 (182)	
DCR-M5	2.7 (4.31)	40 kW		452 (205)	497 (225)	
DCR-M6	3.2 (5.05)	40 kW		537 (244)	591 (267)	
DCR-M7	3.8 (5.80)	40 kW		622 (282)	685 (309)	
DCR-M8	4.3 (6.34)	40 kW		732 (332)	804 (363)	
DCR-M10	5.5 (7.40)	40 kW		902 (409)	992 (448)	
DCR-M12	6.6 (8.20)	40 kW		1072 (486)	1180 (533)	

## Trouble Shooting

## Trouble Shooting

### STARTUP PROBLEMS

#### 1. Internal Arcing

Arcing is an indication that water and/or foreign debris remains inside the antenna, transformer, or transmission line.

**Solution:** Check transmission components and replace any that are damaged.  
Clean any foreign matter from the system before re-assembly.

#### 2. High VSWR

High VSWR is caused by any factor which changes the impedance match between the transmitter and the antenna system. Refer to the following table for a common list of causes and possible solutions.

Causes	Solutions
<u>Split bullet</u> in the transmission line or in the bay connection. An inner conductor's bullet splits when misaligned such that one or more of the contact arms is stuck outside the conductor instead of inside. (A missing bullet will cause infinite VSWR.)	Replace the inner conductor connector. If damaged the inner conductor section may need to be replaced.
<u>Mechanical Damage</u> to any of the components.	Replace the damaged component(s). Check carefully for hidden damage to other components.
<u>Mismatched assembly</u> of the antenna. The bays must be assembled to the number matched components and positioned with arrows pointing in the proper direction as shown on the installation drawing. The antenna system must be installed exactly as shown on the installation drawing.	Assemble according to the installation drawing.
<u>Radiators out of sequence</u> (especially on a center-fed, null-filled or half-wave-spaced system)	Assemble the antenna exactly as shown by the installation drawing and as labeled.
<u>Paint on radiators:</u> Someone may have painted the radiators.	Remove the paint from the radiators.

### 3. Pressure Loss

If the system will not hold pressure as described in “Leak Testing”; refer to the following table for a common list of causes and possible solutions.

Causes	Solutions
Loose hardware fastening feed lines, bays and junction blocks together.	Check all fasteners for tightness.
<u>O-ring missing or poorly installed</u> in transmission line, feedline, or bay mounting flange.	Find the leaking O-ring using bubble soap solution. Replace the O-ring.
<u>Leaking end seal</u>	Replace the leaking end seal.
<u>Mechanical damage</u> to transmission line, transformer, or antenna.	Replace damaged components.

### 4. Erratic VSWR during Impedance Trimming

During impedance trimming, if VSWR does not respond reasonably to transformer adjustments, then there may be residual water in the transformer.

Solution: Before completing impedance trimming, repeat the purging sequence described on page 10.

## OPERATIONAL PROBLEMS

### 1. Internal Arcing

Arcing is typically due to moisture in the system. Refer to the following table for a common list of causes and possible solutions.

Causes	Solutions
<u>Damage</u> to transmission line, feed line, or radiators	Locate the leak visually or using bubble soap solution. Replace damaged components
<u>Missing or misaligned O-ring</u> , if the system has been opened recently.	Locate the O-ring leak, using bubble soap solution. Replace the O-ring if damaged.
<u>Loss of pressurization</u>	Restore pressurization

### 2. High VSWR

High VSWR (Voltage Standing Wave Ratio) is caused by any factor which changes the impedance match between the transmitter and the antenna system. Refer to the following table for a common list of causes and possible solutions.

Causes	Solutions
<u>Paint</u> applied to radiators	Remove paint from radiators
<u>Components of other services</u> have entered the RF field	Remove any broken components. Rearrange tower components as necessary to correct the VSWR.
<u>Physical damage</u> to the transmission line, feed line, parasitic elements or radiators. (i.e. from ice, lightning, tower work, etc.)	Replace damaged components
<u>Failure of de-icers</u> may have allowed excessive ice accumulation on radiator(s). Check for the following; Heater burnout Fuse blown or circuit breaker tripped Thermostat setting incorrect Thermostat failure Heater wiring burnout Broken wire Loose wiring connection No power to heater system Lightning damage	Correct the cause of the heater failure.

### 3. Excessive Gas Usage

If system pressurization gas usage increases suddenly, a leak has occurred in the system. Check the transmission line, feedline, and radiators for loose hardware or damage using bubble soap solution.

Check the system pressure. If the pressure is higher than 7 psig then gas will escape through the vent valves.

#### Solutions

Set pressure to 5 psig.

Tighten any loose hardware.

Replace any damaged components.

**Note:** If the leak was small, purging the system may not be necessary as the escaping gas should have prevented moisture from entering the system.

### 4. Change in Coverage

**Note:** Apparent changes in coverage may be due to subjective factors or faults of the receiving equipment. Be sure that an actual coverage change has occurred before checking more than the VSWR.

Broadcast coverage changes may be caused by any factor which changes impedance match between the transmitter and the antenna system. See the table below refer to the following table for a common list of causes and possible solutions.

Causes	Solutions
Paint applied to radiators	Remove paint from radiators
<u>Components of other services</u> have entered the RF field	Remove any broken components. Rearrange tower components as necessary to correct the VSWR.
<u>Physical damage</u> to the transmission line, feed line, or radiators. (i.e. from ice, lightning, tower work, etc.)	Replace damaged components
<u>Failure of de-icers</u> may have allowed excessive ice accumulation on radiator(s). Check for the following; Heater burnout Fuse blown or circuit breaker tripped Thermostat setting incorrect Thermostat failure Heater wiring burnout Broken wire Loose wiring connection No power to heater system Lightning damage	Correct the cause of the heater failure.

## APPENDIX 6

### Log Sheet



# Product Specifications

## HJ7-50A

HJ7-50A, HELIAX® Standard Air Dielectric Coaxial Cable, corrugated copper, 1-5/8 in, black PE jacket



## CHARACTERISTICS

### Construction Materials

Jacket Material	PE
Dielectric Material	PE
Flexibility	Standard
Inner Conductor Material	Copper tube
Jacket Color	Black
Outer Conductor Material	Corrugated copper

### Dimensions

Nominal Size	1-5/8 in
Cable Volume	14.0 ft³/kft   1300.6 L/km
Cable Weight	1.55 kg/m   1.04 lb/ft
Diameter Over Jacket	50.292 mm   1.980 in
Inner Conductor OD	18.0340 mm   0.7100 in
Outer Conductor OD	46.482 mm   1.830 in

### Electrical Specifications

Cable Impedance	50 ohm ±0.5 ohm
Capacitance	22.1 pF/ft   72.5 pF/m
dc Resistance, Inner Conductor	0.722 ohms/km   0.220 ohms/kft
dc Resistance, Outer Conductor	0.328 ohms/km   0.100 ohms/kft
dc Test Voltage	11000 V
Inductance	1.870 µH/m   0.570 µH/ft
Insulation Resistance	100000 Mohms•km
Jacket Spark Test Voltage (rms)	10000 V
Operating Frequency Band	1 – 2700 MHz
Peak Power	305.0 kW
Power Attenuation	3.356
Velocity	92%

### Environmental Specifications

Installation Temperature	-40 °C to +60 °C (-40 °F to +140 °F)
Operating Temperature	-55 °C to +85 °C (-67 °F to +185 °F)
Storage Temperature	-70 °C to +85 °C (-94 °F to +185 °F)

# Product Specifications

HJ7-50A

## General Specifications

Brand HeliAX®

## Mechanical Specifications

Bending Moment	40.7 N-m   30.0 ft lb
Flat Plate Crush Strength	175.0 lb/in   3.1 kg/mm
Minimum Bend Radius, Multiple Bends	508.00 mm   20.00 in
Number of Bends, minimum	15
Number of Bends, typical	30
Pressurization, maximum	0 N/mm <sup>2</sup>   30 psi
Tensile Strength	340 kg   750 lb

## Standard Conditions

Attenuation, Ambient Temperature	20 °C   68 °F
Average Power, Ambient Temperature	40 °C   104 °F
Average Power, Inner Conductor Temperature	100 °C   212 °F

# Product Specifications

HJ7-50A



## Attenuation

Frequency (MHz)	Attenuation (dB/100 m)	Attenuation (dB/100 ft)	Average Power (kW)
0.5	0.045	0.014	243.45
1	0.064	0.02	171.92
1.5	0.079	0.024	140.23
2	0.091	0.028	121.34
10	0.204	0.062	53.85
20	0.291	0.089	37.86
30	0.358	0.109	30.77
50	0.465	0.142	23.67
88	0.623	0.19	17.67
100	0.666	0.203	16.53
108	0.693	0.211	15.88
150	0.824	0.251	13.37
174	0.891	0.271	12.36
200	0.959	0.292	11.48
300	1.19	0.363	9.25
400	1.389	0.423	7.92
450	1.481	0.451	7.43
500	1.569	0.478	7.02
512	1.589	0.484	6.93
600	1.733	0.528	6.35
700	1.887	0.575	5.84
800	2.032	0.619	5.42
824	2.066	0.63	5.33
894	2.162	0.659	5.09
960	2.25	0.686	4.89
1000	2.302	0.702	4.78
1250	2.611	0.796	4.22
1500	2.898	0.883	3.80
1700	3.114	0.949	3.54
1800	3.219	0.981	3.42
2000	3.422	1.043	3.22
2100	3.521	1.073	3.13
2200	3.619	1.103	3.04
2300	3.714	1.132	2.96
2500	3.902	1.189	2.82
2700	4.084	1.245	2.70

\* Values typical, guaranteed within 5%

## Regulatory Compliance/Certifications

### Agency

RoHS 2002/95/EC

China RoHS SJ/T 11364-2006

ISO 9001:2008

### Classification

Compliant by Exemption

Above Maximum Concentration Value (MCV)

Designed, manufactured and/or distributed under this quality management system



# Product Specifications

87R

1-5/8 in EIA Male Flange without gas barrier for 1-5/8 in HJ7-50A air dielectric cable



## CHARACTERISTICS

### General Specifications

Interface	1-5/8 in EIA Male Flange
Body Style	Straight
Brand	HELIAX®
Gas Barrier	No
Mounting Angle	Straight

### Electrical Specifications

Connector Impedance	50 ohm
Operating Frequency Band	0 - 2700 MHz
Cable Impedance	50 ohm
RF Operating Voltage, maximum (vrms)	3880.00 V
dc Test Voltage	11 kV
Insulation Resistance, minimum	5000 MOhm
Average Power	4.9 kW @ 900 MHz
Peak Power, maximum	300.00 kW
Insertion Loss, typical	0.05 dB

### Mechanical Specifications

Outer Contact Attachment Method	Tab-flare
Inner Contact Attachment Method	Thread-in stub
Outer Contact Plating	Unplated
Inner Contact Plating	Unplated

### Dimensions

Nominal Size	1-5/8 in
Diameter	61.11 mm   2.41 in
Length	125.81 mm   4.95 in
Weight	1.72 kg   3.80 lb

### Environmental Specifications

# Product Specifications

87R

Operating Temperature	-40 °C to +150 °C (-40 °F to +302 °F)
Storage Temperature	-70 °C to +100 °C (-94 °F to +212 °F)

## Return Loss/VSWR

Frequency Band	VSWR	Return Loss (dB)
45-1000 MHz	1.02	40.00
1000-2000 MHz	1.04	35.00
2000-3000 MHz	1.05	32.00
3000-4000 MHz	1.17	22.00
4000-5200 MHz	1.42	15.20

## Regulatory Compliance/Certifications

### Agency

RoHS 2002/95/EC  
China RoHS SJ/T 11364-2006  
ISO 9001:2008

### Classification

Compliant by Exemption  
Above Maximum Concentration Value (MCV)  
Designed, manufactured and/or distributed under this quality management system



### \* Footnotes

Insertion Loss, typical  $0.05\sqrt{\text{freq (GHz)}}$  (not applicable for elliptical waveguide)

# Product Specifications



87G

1-5/8 in EIA Male Flange with gas barrier for 1-5/8 in HJ7-50A air dielectric cable



## CHARACTERISTICS

### General Specifications

Interface	1-5/8 in EIA Male Flange
Body Style	Straight
Brand	HELIAX®
Gas Barrier	Yes
Mounting Angle	Straight

### Electrical Specifications

Connector Impedance	50 ohm
Operating Frequency Band	0 – 2700 MHz
Cable Impedance	50 ohm
RF Operating Voltage, maximum (vrms)	3880.00 V
dc Test Voltage	11 kV
Insulation Resistance, minimum	5000 MOhm
Average Power	4.9 kW @ 900 MHz
Peak Power, maximum	300.00 kW
Insertion Loss, typical	0.05 dB

### Mechanical Specifications

Outer Contact Attachment Method	Tab-flare
Inner Contact Attachment Method	Thread-in stub
Outer Contact Plating	Unplated
Inner Contact Plating	Silver

### Dimensions

Nominal Size	1-5/8 in
Diameter	61.11 mm   2.41 in
Length	146.05 mm   5.75 in
Weight	1.75 kg   3.86 lb

### Environmental Specifications

Operating Temperature	-40 °C to +150 °C (-40 °F to +302 °F)
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# Product Specifications

87G

Storage Temperature -70 °C to +100 °C (-94 °F to +212 °F)

## Return Loss/VSWR

Frequency Band	VSWR	Return Loss (dB)
45-1000 MHz	1.02	40.00
1000-2000 MHz	1.04	35.00
2000-3000 MHz	1.05	32.00
3000-4000 MHz	1.17	22.00
4000-5200 MHz	1.42	15.20

## Regulatory Compliance/Certifications

### Agency

RoHS 2002/95/EC  
 China RoHS SJ/T 11364-2006  
 ISO 9001:2008

### Classification

Compliant by Exemption  
 Above Maximum Concentration Value (MCV)  
 Designed, manufactured and/or distributed under this quality management system



## \* Footnotes

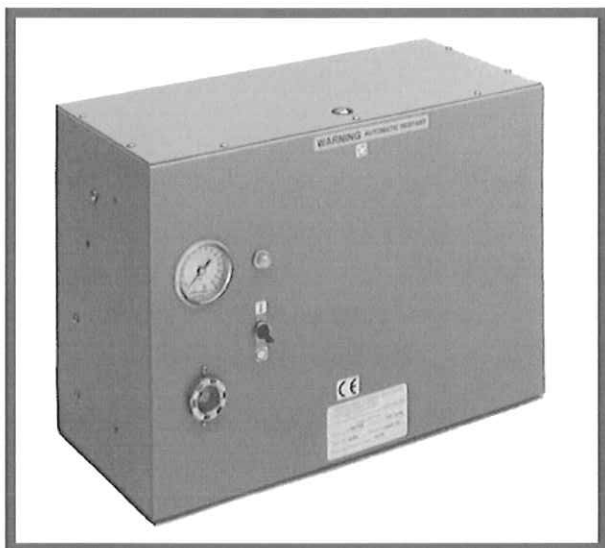
Insertion Loss, typical  $0.05\sqrt{\text{freq (GHz)}}$  (not applicable for elliptical waveguide)



**Radiodetection**  
Dielectric Technologies  
AN SPX BRAND

## Model 300TLS

### Air Dryer



115V Model - P/N 66788  
230V Model - P/N 66789

The 300TLS heatless compressor dehydrator is specifically designed as an economical pressurization system for coaxial transmission line and waveguide systems. Using a heatless self-regenerating drying system, the 300TLS automatically regenerates the drying media and provides years of trouble free service. The unit is equipped with a visual humidity indicator and a low pressure alarm.

The 300TLS provides up to 300 SCFD of air at a -40° dew point with a selectable output pressure range of 2-15 PSIG and a 4.5 PSIG differential. The tankless design utilizes the volume of the coax or waveguide as the storage vessel and can be equipped with panel mounting brackets or a .4 cubic foot storage tank (optional).

The reliable 1/8 HP oilless compressor is available for application in 115V/50-60Hz as well as 230V/50-60Hz environments. This compressor requires minimal maintenance that can be performed on-site and will provide years of service.

#### SPECIFICATIONS

CHARACTERISTICS	Model 300TLS
Normal Capacity	200 SCFD (160 SCFD @ 50Hz)
Maximum Capacity	300 SCFD (240 SCFD @ 50Hz)
Dew Point	-40°F (-40°C)
Operating Voltage	115V/60-50Hz, 230V/60-50Hz
Operating Amps	1.0 Amps (230V), 2.0 Amps (115V)
Circuit Protection (manual reset) Compressor	1.25 Amp (230V), 5 Amp (115V)
Width	17.0 Inches
Height	12.0 Inches
Depth	8.0 Inches
Weight	34 lbs.
Air Outlet	1/4" NPT Fitting



# PERRY JOHNSON REGISTRARS, INC.

## *Certificate of Registration*

*Perry Johnson Registrars, Inc., has assessed the Quality Management System of*

***Dielectric Communications, a Division of SPX Corporation***  
***22 Tower Road, Raymond, ME 04071 United States***

*(Hereinafter called the Organization) and hereby declares that  
Organization is in conformance with:*

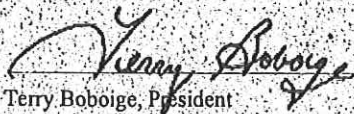
***ISO 9001:2008***

*This Registration is in respect to the following scope of supply:*

***Design and Manufacture of RF Broadcast and RF Custom Products  
for Military and Scientific Applications and Related Test Equipment***

*Such products shall be manufactured by the Organization at, or such processes or services shall be offered at or from, only the address given above. This Registration is granted subject to the system rules governing the Registration referred to above, and the Organization hereby covenants with the Assessment body duty to observe and comply with the said rules.*

For PJR:

  
Terry Boboige, President

Perry Johnson Registrars, Inc. (PJR)  
26555 Evergreen, Suite 1340  
Southfield, Michigan 48076  
(248) 358-3388



*The validity of this certificate is mandated through ongoing surveillance.*

*Effective Date:*  
March 10, 2009

*Revision Date:*  
August 12, 2009

*Expiration Date:*  
March 9, 2012

*Certificate No.:*  
C2009-00683-R1