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# **FMi T Series High Power FM + HD Tube Transmitters**

## **Installation and Setup Guide**

597-0021-002, Revision B  
8/13/07

**FMi T Series**  
**High Power FM + HD**  
**Tube Transmitters**  
**Installation and Setup Guide**

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## 1 Purpose of this Document

The purpose of this document is to describe the necessary steps to install, setup, and tune an FMi T Series Transmitter and is intended to be supplementary to B.E. Product Manual 597-0096-014. It is important to note that the FMi 17T was derived from the FM-25T, the FMi 21T from the FM-30T, and the FMi 25T from the FM-35T. The FMi T Series and FM-T Series Transmitters are physically identical except for components and technology discussed in this document.

- FM-25T / **FMi 17T**
- FM-30T / **FMi 21T**
- FM-35T / **FMi 25T**

## 2 Additional Documentation to Review

In addition to this document and B.E Manual 597-0096-014, the following B.E. documents should also be reviewed. These documents are included in the shipment from B.E. and may also be found at [www.bdcast.com](http://www.bdcast.com) under "support".

- FXi 60/250 Exciter Manual, 597-0541
- FSi 10 HD Signal Generator, 597-0542-002
- FXi 60/250 Exciter w/Exgine and XPi 10 Exporter Quick Install Guide, 597-0542-XM3
- Transmitter Grounding Techniques – White Paper

## 3 FMi T Series Transmitter Overview

FMi T Series Tube Transmitters are specifically designed for High Power FM + HD Radio Broadcast applications. FMi T Series Transmitters are currently available in 3 models (FMi 17T, FMi 21T, and FMi 25T). An FXi Exciter and an FSi 10 FM HD Signal Generator (or XPi 10 Exporter) are standard equipment with these Transmitters.

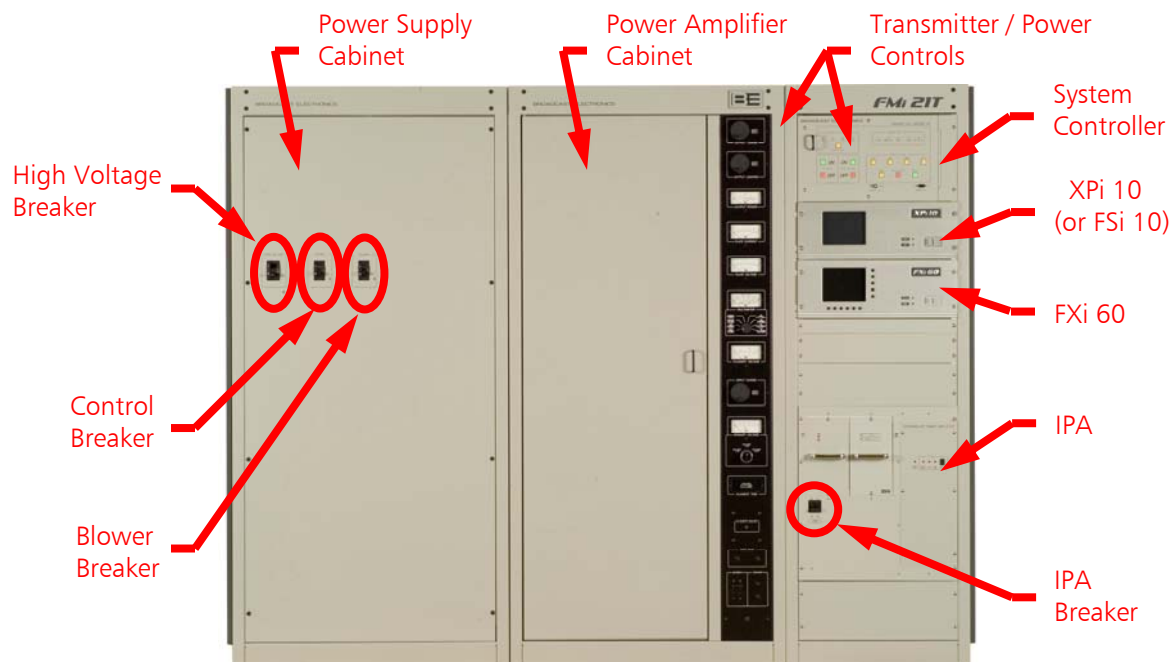


Figure 1 – FMi T Series Transmitter

## 4 Assembly and Installation of the Transmitter

**Note:** The instructions included in this document are intended to be supplementary to the assembly and installation information found in B.E. Manual 597-0096-014.

### 4.1 Unpacking, Assembling, and Locating the Transmitter Cabinets

Refer to the section in the front of B.E. Manual 597-0096-014 titled “**PUBLICATION ADDENDUM SPECIAL ASSEMBLY REQUIREMENTS FM-25T / FM-30T / FM-35T**” as these same instructions apply to the “**FMi 17T / FMi 21T / FMi 25T**” Transmitters respectively.

In addition, refer to B.E. Manual 597-0096-014 **Section I** for **General Information** and **Section II** for detailed **Installation Instructions**.

### 4.2 Primary AC Supply Requirements

FMi T Series Transmitters are designed to operate from the following AC Power sources only:

- 196 - 252VAC, 50 / 60 Hz, 3 phase (Closed Delta or Wye)
- 339 - 437VAC, 50 / 60 Hz, 3 phase (Wye only)

Refer to B.E. Manual 597-0096-014, **Section II, Installation Instructions (Page 2-28, Paragraph 2-121)**, for information on connecting Primary AC Power to the Transmitter.

### 4.3 Primary AC Supply Fused Disconnect and Wire Size Requirements

For operating safety, Primary AC Power **MUST** be routed through a Fused Disconnect (supplied by customer) and then to the FMi T Series Transmitter. The following disconnect sizes are recommended for FMi T Series Transmitters. Reference B.E. Manual 597-0096-014 (**Pages 2-28 and 2-29**) for additional Primary AC Power Connection information.

Transmitter	Fused Disconnect Size	Wire Size (Copper, type THHN or equivalent)
FMi 17T	200 Amps	250 KCMIL
FMi 21T	250 Amps	300 KCMIL
FMi 25T	300 Amps	400 KCMIL

Figure 2 – FMi T Series Transmitter Fused Disconnect Sizes

### 4.4 Primary AC Supply Surge Suppressor

It is highly recommended that customers install an adequate AC Surge Suppressor (supplied by customer) at the Service Entrance of the transmitter building, as close to the Fused Disconnect as possible, to protect the Transmitter and ancillary equipment from incoming line voltage spikes.

### 4.5 RF Output Line Assembly

Refer to B.E. Manual 597-0096-014, **Section II, Installation Instructions (Page 2-14, Paragraph 2-60)**, for information on Assembling and the RF Output Line Assembly.



## 4.6 Failsafe and Interlock Connections

Refer to B.E. Manual 597-0096-014, **Section II, Installation Instructions (Page 2-27, Paragraph 2-119)** for information on connecting the **Failsafe** and **Interlock** to the Transmitter.

## 4.7 Install the FXi 60 and the XPi 10 (or FSi 10)

Install the FSi 10 (or XPi 10) into the Transmitter as shown below using supplied rack hardware. Please Note that the FSi 10 (or XPi 10) must be mounted on top of the FXi 60 Exciter for mechanical reasons.

**Note:** The XPi 10 may be installed at the Studio Site if desired. See the HD System Configuration Drawings included in the **FXi 60/250 Exciter (w/Engine) and XPi 10 Exporter Quick Install Guide, 597-0542-XM3** for more information.

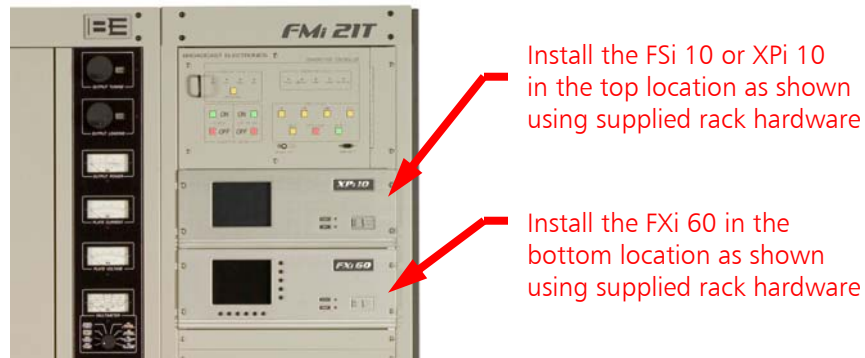


Figure 3 – XPi 10 / FSi 10

### 4.7.1 FXi 60 AC Power Connection

Connect the wires of the AC Power cord of the FXi Exciter into the AC Distribution Block as shown below. The AC Distribution block is located along the back rail of the Controller Cabinet.

Connect **WHITE** or **BLUE** wires to **Left Column**

Connect **GREEN** Wires to **Center Column (GROUND)**

Connect **BLACK** or **BROWN** wires to **Right Column**

The 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> rows of the terminal block have been configured for 120/240VAC.

1<sup>st</sup> Row – Transmitter Controller  
2<sup>nd</sup> Row – FXi Exciter  
3<sup>rd</sup> Row – FSi 10 or XPi 10 (optional, see section 4.7.2)

**NOTE:** The Center Column is GROUND.

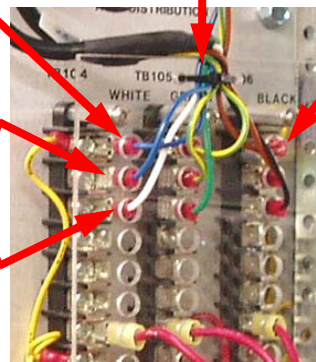


Figure 4 – AC Distribution Block Connections

#### 4.7.2 FSi 10 (or XPi 10) AC Power Connection

Due to the boot-up time of the FSi 10 (or XPi 10), it is recommended that the FSi 10 (or XPi 10) be powered from a separate 120V AC Power source other than the terminal block in the FMi T Series Transmitter cabinet.

#### 4.7.3 FXi 60 and FSi 10 Interconnect Cabling

If your FMi T Series Transmitter is configured with the FXi 60 Exciter and the FSi 10 HD Signal Generator, refer to the **FSi 10 HD Signal Generator Manual, 597-0542-002 (Page 69)**, for installation, cabling, and setup instructions.

Please note that the FXi Exciter and the FSi 10 MUST be installed at the Transmitter Site.

#### 4.7.4 FXi 60 and FSi 10 AES Bypass Configuration

Refer to the **FSi 10 HD Signal Generator Manual, 597-0542-002 (Page 69)**, for installation, cabling, and setup instructions regarding the use of a Broadcast Tools DMSIII Audio Switcher with the FXi Exciter and the FSi 10 HD Signal Generator.

#### 4.7.5 FXi 60 (w/Exgine) and XPi 10 Interconnect Cabling

If your FMi T Series Transmitter is configured with the FXi (w/Exgine) and the XPi 10 Exporter, refer to **FXi 60/250 Exciter (w/Exgine) and XPi 10 Exporter Quick Installation Guide, 597-0542-XM3**, for installation, cabling, and setup instructions. Please note that the FXi Exciter MUST be installed at the transmitter site. The XPi 10 Exporter may be installed at EITHER the Studio or Transmitter Site. See the HD System Configuration Drawings included in the Quick Installation Guide.

### 4.8 Check FXi Exciter IBOC Scale Factor and Operating Mode

Prior to operating the FMi T Series transmitter, ensure that the FXi IBOC Scale factor matches the factory test data ( $\approx 12,000$ ) and that the **IBOC Operating Mode** has been set to **FM + IBOC**.

**Step 1** – Next, go to the FXi Exciter GUI Main Menu and select **OPER MODE**.

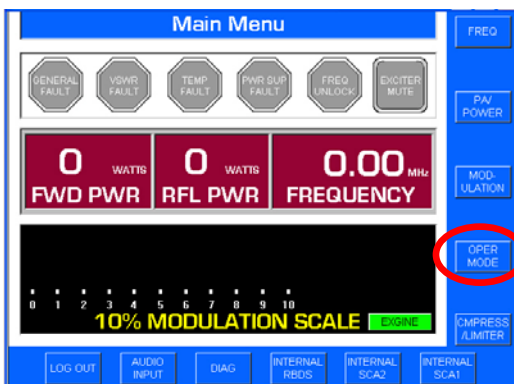
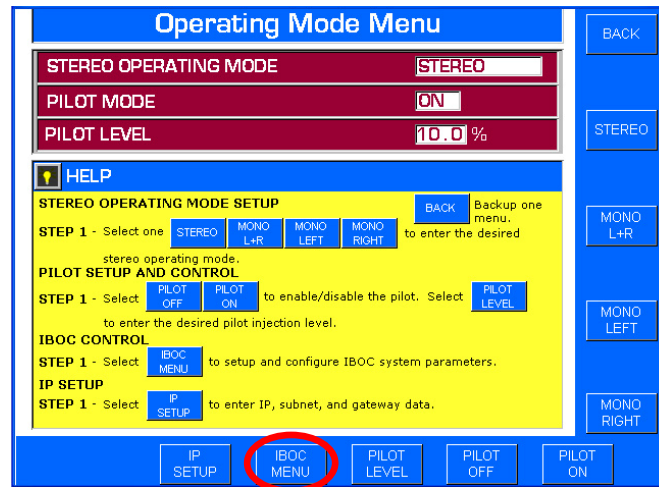


Figure 5 – FXi Main Menu





**Step 2 – Select IBOC MENU.**

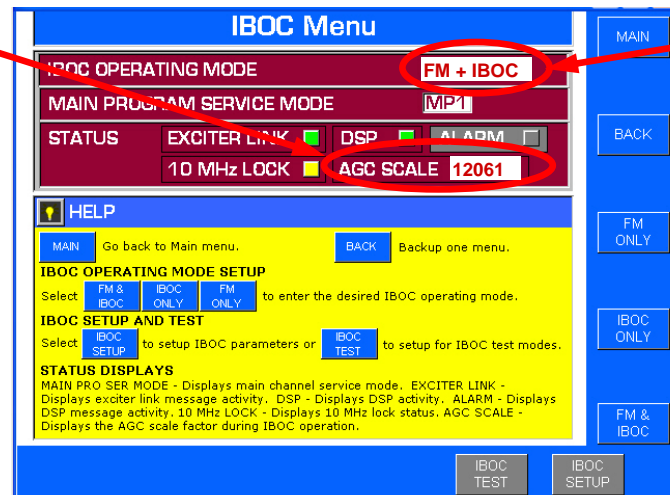


**Figure 6 – Operating Mode Menu**

**Step 3 – Ensure that the IBOC OPERATING MODE is set to FM + IBOC (Hybrid).**

Ensure that the Scale Factor Setting agrees with the factory test data.

Ensure that the Scale Factor Setting matches the Factory Test Data



The IBOC Operating Mode **MUST** be set to **FM + IBOC** (Hybrid)

**Figure 7 – IBOC Menu**

## 5 Initial System Checkout and Tuning

### 5.1 Primary AC Supply Voltage Check

Once the Primary AC Input / GROUND Connections have all been properly made to the Transmitter and the Service Entrance Breaker has been turned ON, turn the **Blower Breaker ON** and use the **PRIMARY VOLTAGE METER** on the Transmitter to check **PHASE 1-2**, **PHASE 1-3**, and **PHASE 2-3** voltages to ensure that they are within the required ranges for FMi T Series Transmitters.

Required AC Input Voltage Ranges for FMi T Series Transmitters:

- 196-252VAC, 50 / 60 Hz, 3 phase (Closed Delta or Wye)
- 339-437VAC, 50 / 60 Hz, 3 phase (Wye only)



Figure 8 – Primary AC Voltage Meter

### 5.2 Turn the AC Breakers ON

Turn the **High Voltage** and **Controller Breakers ON**. Also, ensure that the **IPA Breaker** is **ON**. The Failsafe, Interlock, and Blower Transmitter Status Indicators should now illuminate. Ensure that the FXi Exciter and FSi 10 (or XPi 10) are ON and operational before proceeding.

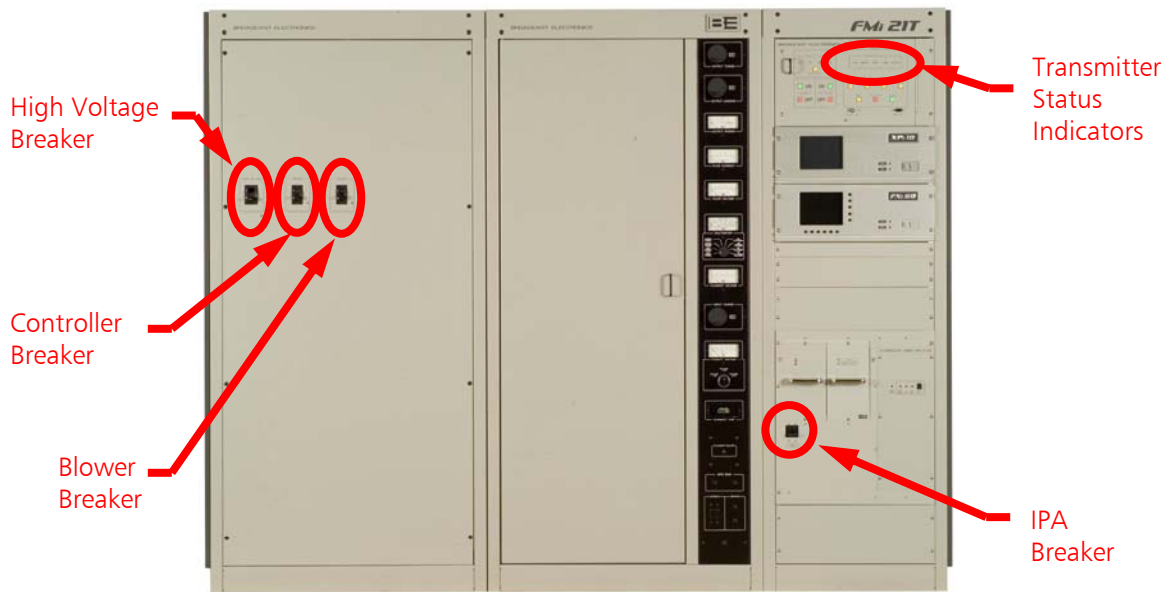


Figure 9 – FMi T Series Transmitter



### 5.3 Turn the Transmitter ON

Depress the **Filament ON** button, then depress the **High Voltage ON** button. Moments later the Filament Status Indicator will illuminate, in a few more moments the High Voltage Status indicator will illuminate. The Transmitter's RF Output Power will go to the Default Power Level (see Section 6 of this document).

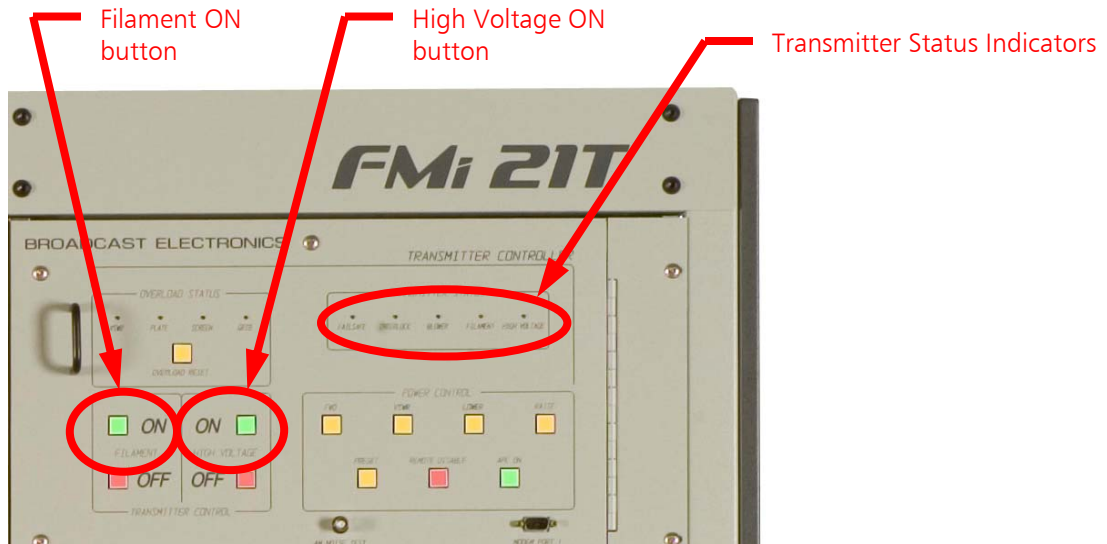


Figure 10 – Controls and Status Indicators

### 5.4 Programming APC (Automatic Power Control) Set Point

Depress the **APC ON** button (will illuminate when ON). Next, use the **RAISE** power button to raise the Power to 100% on the Output Power Meter. You have just established the APC set point at the TPO as set from the factory. When APC is ON and the RAISE /LOWER buttons are used, the APC set point will be re-programmed. Ensure that the TPO matches the factory test data.

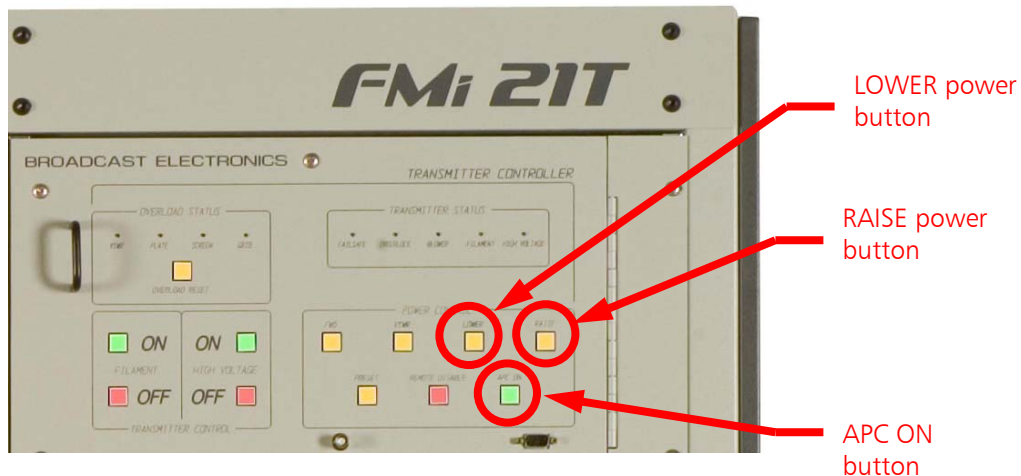


Figure 11 – Setting APC

## 5.5 Check Plate, PA Control Grid and PA Screen Voltages

Plate, PA Control Grid and PA Screen Grid voltages are all functions of AC line voltage. Your transmitter was configured at the factory for the AC line voltage specified in your sales order. With the transmitter running at TPO, check the plate, grid and screen voltages and verify that each is within  $\pm 3\%$  of the values given in the Factory Test Data. If these values are not correct, recheck the primary AC voltage as shown in **Figure 8** while running at TPO. If the primary AC voltage differs from the sales order voltage by more than  $\pm 3\%$  it will be necessary to re-tap the Plate (T300), PA Control Grid (T200) and PA Screen Grid (T202) transformers to the setting closest to the actual AC line voltage.

Plate Voltage  
Meter on the  
Front of the  
Transmitter

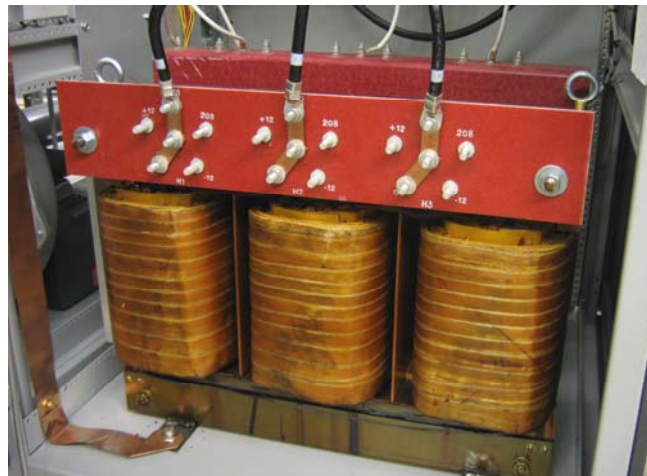


Use the Multimeter  
on the Front of the  
Transmitter to  
check the PA  
Control Grid and  
PA Screen Voltages

Figure 12 – Check Plate Voltage, PA Control Grid, and PA Screen Voltages

### 5.5.1 Re-Tapping the Plate Transformer

To adjust the Plate Voltage, the Plate Transformer must be re-tapped. See **Figure 1 (Page 3-4)** in B.E. Manual 597-0096-014 for Plate Transformer tapping instructions.

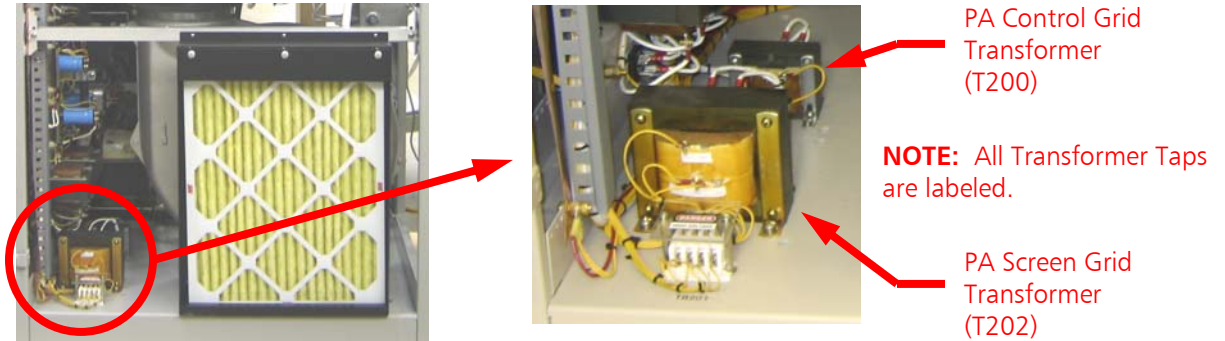


**NOTE:** The Plate Transformer (T300) in this photo is tapped for 240VAC.

Figure 13 – Plate (T300) Transformer (Rear of Power Supply Cabinet)

### 5.5.2 Re-Tapping the PA Control Grid and PA Screen Grid Transformers

To adjust the PA Control and PA Screen Voltages, the Grid Transformers must be re-tapped. See **Figure 2-7 (Page 2-23)** in B.E. Manual 597-0096-014 for Grid Transformer tapping instructions.



**Figure 14 – PA Control Grid (T200) and PA Screen Grid (T202) Transformers (Rear of Power Amplifier Cabinet)**

### 5.6 Check Plate Current

Next, with the Transmitter operating at TPO, check the Plate Current to ensure that it is within  $\pm 3\%$  of the Factory Test Data. If the Plate Current is not within  $\pm 3\%$  of the Factory Test Data, adjust using the procedure in **Section 5.7**.

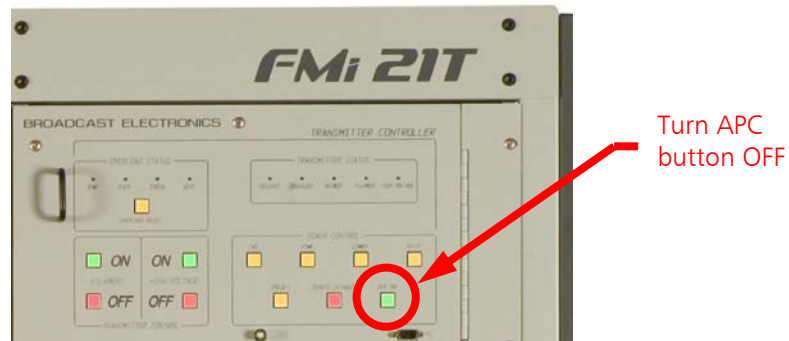


**Figure 15 – Plate Current**

### 5.7 Adjusting Plate Current

To adjust Plate Current:

**Step 1 – Turn APC OFF**



**Figure 16 – APC OFF**

**Step 2** – Adjust the **OUTPUT LOADING** knob for slightly less Power (decrease  $\approx 500\text{W}$ ).



**Figure 17 – Output Loading Knob and Output Power Meter**

**Step 3** – Push the **RAISE** button on the Control Panel and return the Power to where it was prior to Step 2.



**Figure 18 – Raise Power**

**Step 4** – The Plate Current should now be slightly higher on the meter.

**NOTE:** During the Plate Current Adjustment process, it is necessary to do the following:

- Ensure **OUTPUT TUNING** is adjusted for maximum output power by moving the OUTPUT TUNING knob a few turns one way and then the other and observing the OUTPUT POWER panel meter.
- Ensure **INPUT TUNING** is adjusted for minimum IPA reflected power by moving the INPUT TUNING knob a few turns one way and then the other and observing the IPA REFLECTED POWER panel meter (be sure the multi-function panel meter is set for IPA RFL POWER.)
- Adjust **OUTPUT POWER** to the correct level using the RAISE or LOWER buttons as necessary.

**Step 5** – Repeat entire process as necessary until the desired Plate Current is achieved.

## 5.8 Calculate Plate Efficiency / Plate Current

Calculate Plate Efficiency and compare to factory test data to ensure that it is within  $\pm 2\%$ .

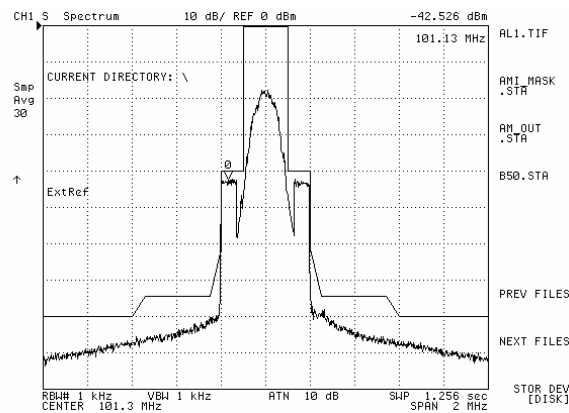
- $\% \text{ Plate Efficiency} = [\text{RF Output Power} / (\text{Plate Voltage} \times \text{Plate Current})] \times 100$

If the Plate Efficiency is not within tolerance, calculate the required Plate Current. Next, adjust the Plate Current as discussed in Section 5.7.

- $\text{Plate Current} = (\text{RF Output Power} \times 100) / (\text{Plate Efficiency} \times \text{Plate Voltage})$

## 5.9 Check Spectrum

If available, connect a Spectrum Analyzer to the port located on the RF Output transmission line elbow located between the Transmitter and the Low Pass filter. With the Transmitter running at TPO, look at the Spectrum and compare to the plot provided in the factory test data. On the Spectrum Analyzer, set the Resolution Bandwidth to 1 kHz, Detector to Sample, Span to 2 MHz, and Average to 30.



**Figure 19 – Typical FMI T Series Transmitter Spectral Plot**

This completes the initial system checkout for the FMI T Series Transmitter.



## 6 Programming the Default Power Level

The Default Power Level is the initial power control setting assumed by the Power Control Board (919-0299) any time AC line voltage to the exciter goes from OFF to ON. This determines the initial value of transmitter output power at AC startup or in the event of a temporary loss of AC power. The Default Power Level is programmed at the factory for minimum power but can be altered if desired. If APC is ON when AC line voltage is cycled transmitter power will first go to the Default Power Level and then automatically adjust to the APC set point. If APC is OFF while AC line voltage is cycled the transmitter power will go to the Default Power Level and remain there. It is recommended that the transmitter run with APC ON while unattended so that recovery from an AC fault will occur in the most controlled manner possible.

**Step 1** – Ensure that the **Transmitter** and **Exciter** are both **ON** and operational.

**Step 2** – Turn **APC OFF**.

**Step 3** – Use the **RAISE / LOWER** buttons to adjust the Transmitter's RF Output power to the desired level Default Power Level.

**Step 4** – Turn the **Transmitter's RF Output OFF** (the Exciter **MUST** be left ON).

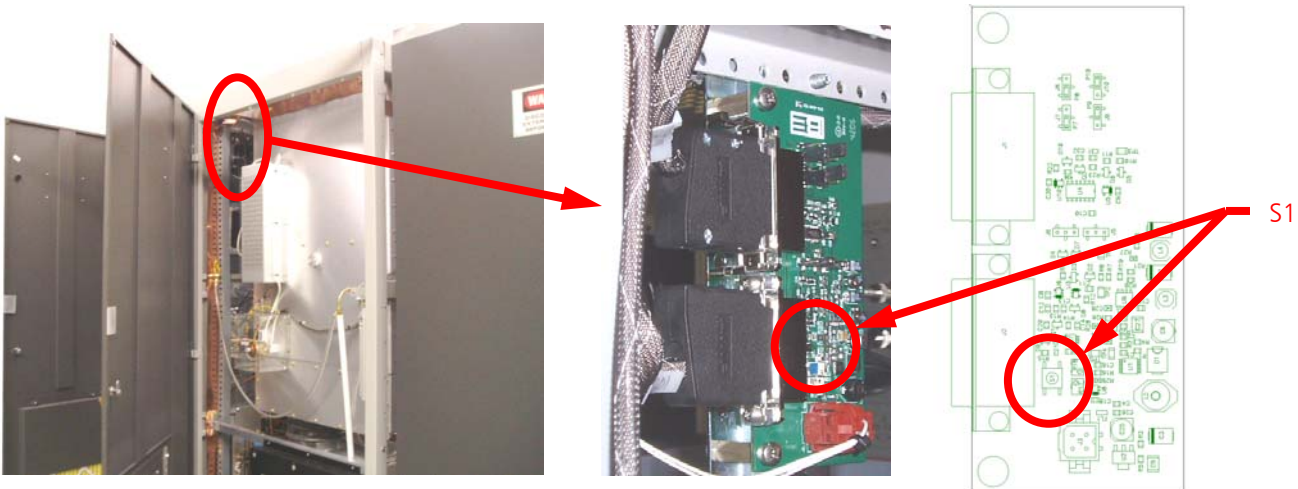


Depress both the **Filament** and **High Voltage OFF** buttons

**Figure 20 – Turn the Transmitter's RF Output OFF**

**Step 5** – Next, open the rear door of the Power Amplifier Cabinet.

**Step 6** – Locate the **Power Control Board** (919-0299) and depress push button **S1**.



**Figure 21 – Power Control Board Pushbutton Switch – S1**



**Step 7** – Close and lock the rear door of the Power Amplifier Cabinet and turn the **Transmitter's RF Output** back **ON**. The transmitter will now go to the Power Level as set in **Step 3**.



Depress the **High Voltage ON** button. Both buttons will now illuminate.

**Figure 22 – Turn the Transmitter's RF Output ON**

## 7 FMi 17T/21T/25T and FM-25T/30T/35T Notable Differences

The chart below shows the notable differences between the FMi T (HD ready) and FM-T (FM only) Series Tube Transmitters.

<b>FMi 17T/21T/25T (FM + HD )</b>	<b>FM 25T/30T/35T (FM only)</b>
- comes standard with FXi 60 Digital Exciter with new Controller Board and Internal Attenuator	- comes standard with FX-50 Analog Exciter
- comes standard with either an FSi 10 Signal Generator or XPi 10 Exporter.	n/a
- an additional Power Control Board and associated cabling to adjust attenuation internal to the Exciter and control the Exciter's power output.	n/a
- addition of a Line Stretcher between the output of the IPA and the input of the Tube for phase matching.	n/a
- addition of filtering on the Filament	n/a
- IPA Power Adjust setting is factory set for FMi T Series Transmitters and should not require Adjustment.	- IPA Power Adjust settings vary from transmitter to transmitter. Typical range is $\approx +30$ to $+35$ VDC for FM-T Series Transmitters.
- ESP Technology	n/a

**Figure 23 – Notable Differences Between FMi T Series and FM-T Series Transmitters**

### 7.1 FXi 60 Exciter

The FXi 60 Exciter comes standard with the FMi T Series Transmitters. The FXi 60 is now equipped with a new Controller Board and Internal Attenuator designed specifically for use with the FMi T Series Transmitters. If you ordered an XPi 10 Exporter, the FXi 60 Exciter will also be upgraded with the Exgine Card. If you ordered an FSi 10 HD Signal Generator, the FXi 60 Exciter will not have the Exgine Card installed.



**Figure 24 – FXi 60 Digital Exciter**



## 7.2 XPi 10 Exporter (or FSi 10) Signal Generator

Depending upon the HD System Architecture you are implementing, the XPi 10 Exporter or the FSi 10 HD Signal Generator will be shipped with the FMi T Series Transmitter. If you ordered the XPi 10 Exporter, the FXi 60 Exciter will be equipped with the Exgine Card. See the HD System Interconnect Diagrams in the back of this document for additional information.

**Note:** The XPi 10 may be located at either the Studio or Transmitter Site.



**Note:** The FSi 10 must be located at the Transmitter Site.

Figure 25 – XPi 10 (or FSi 10)

## 7.3 Power Control Board and Cabling

FMi T Series Transmitters are equipped with a Power Control Board (919-0299) that is mounted on the rails between the System Controller and PA Amplifier Cabinets. The Power Control Board automatically adjusts attenuation internal to the FXi 60 Exciter to control the Exciter's RF Output which in turn controls the Transmitter's RF Output Power.

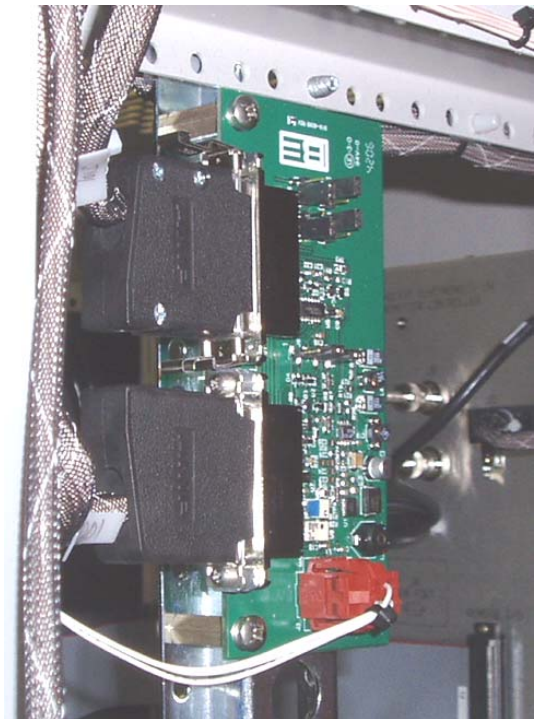
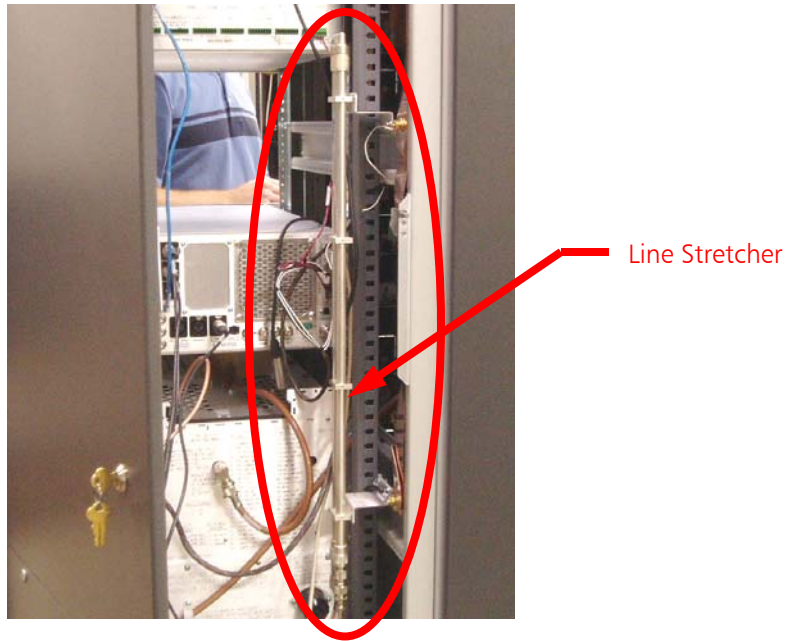


Figure 26 – Power Control Board

## 7.4 Line Stretcher for Phase Matching

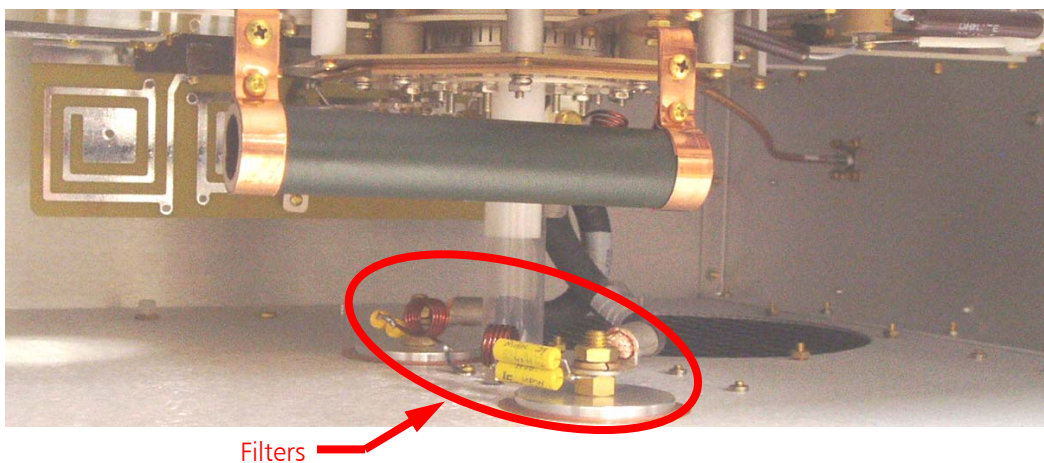
FMi T Series transmitters are equipped with a line stretcher between the output on the IPA and the Input of the Tube for phase matching. The line stretcher is mounted at the rear of the System Controller Cabinet as shown below. It is used to optimize spectral performance and comes preset from the factory.



**Figure 27 – Line Stretcher Mounted at the Rear of the Controller Cabinet**

## 7.5 Filament Filters

Filters have been installed on the Filament as shown below for optimization.



**Figure 28 – Filament Filters**

## 7.6 IPA Power Adjust Setting

The IPA Power Adjust (located on the front of the IPA module) setting is factory set and should not require adjustment.

## **7.7 ESP**

Last but not least, all FMi T Series Transmitters are equipped with B.E.'s exclusive ESP Technology for optimum FM + HD performance.

## **8 RF Customer Service Contact Information**

RF Customer Service -

Telephone: (217) 224-9617

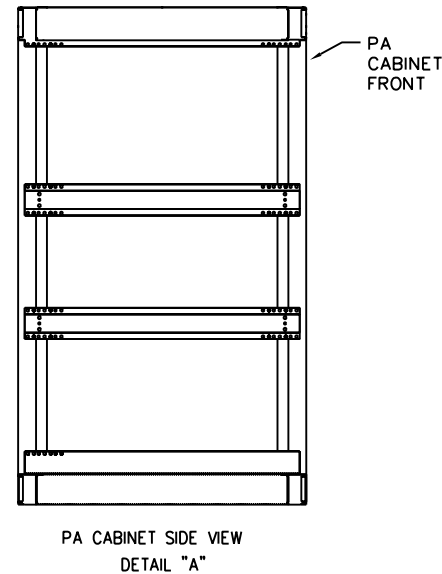
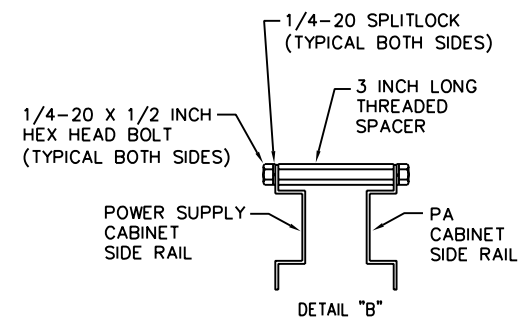
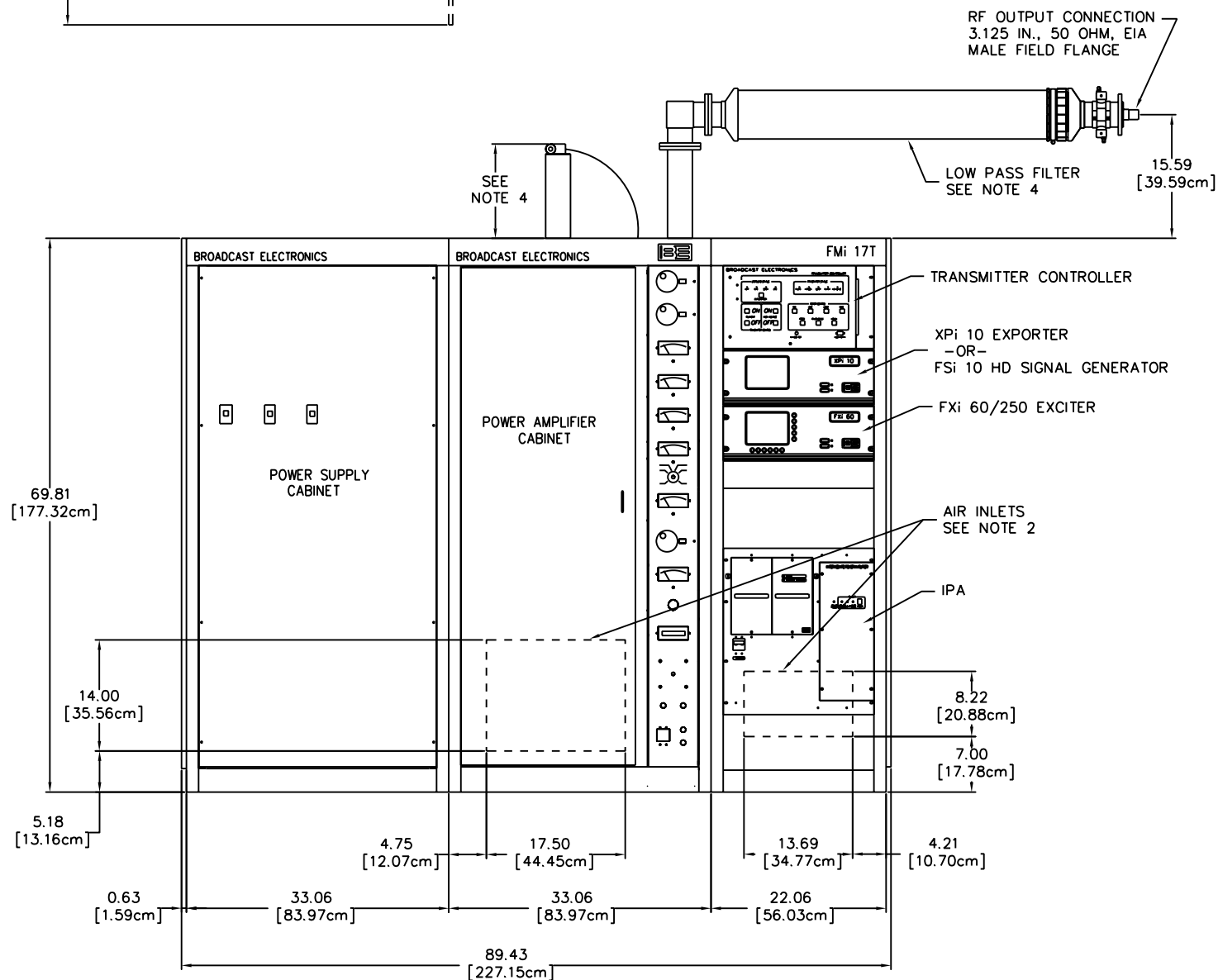
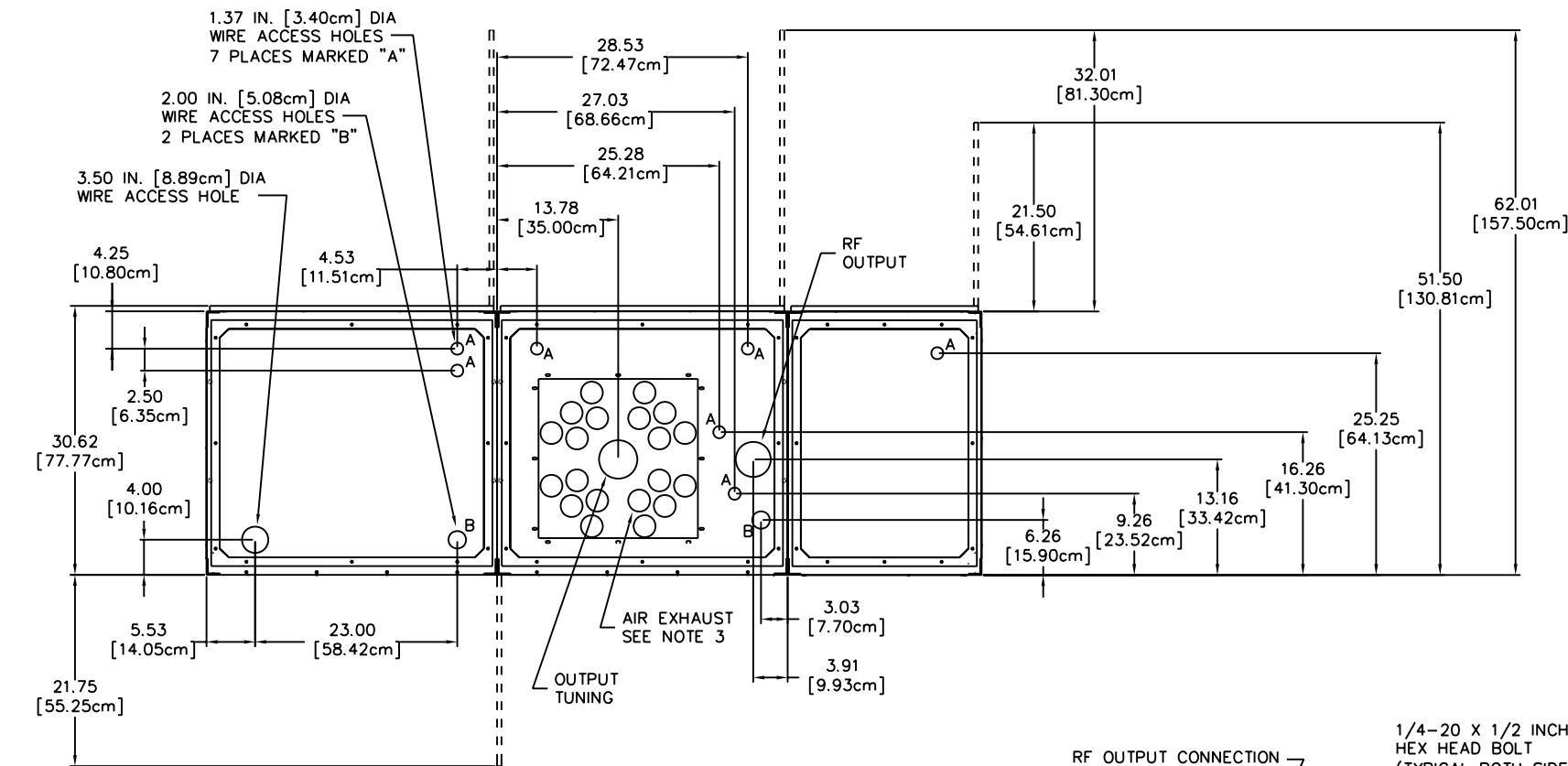
E-Mail: [rfservice@bdcast.com](mailto:rfservice@bdcast.com)

Fax: (217) 224-9607

## **9 FMi T Series Drawings and Schematics**

- 9.1 FMi 17T Installation Drawing (597-0017-001)**
- 9.2 FMi 21T Installation Drawing (597-0021-001)**
- 9.3 FMi 25T Installation Drawing (597-0025-001)**
- 9.4 Schematic, FXi Exciter (J3) System Cable (597-0552)**
- 9.5 Schematic, FMi T Series Power Control Board (919-0299)**



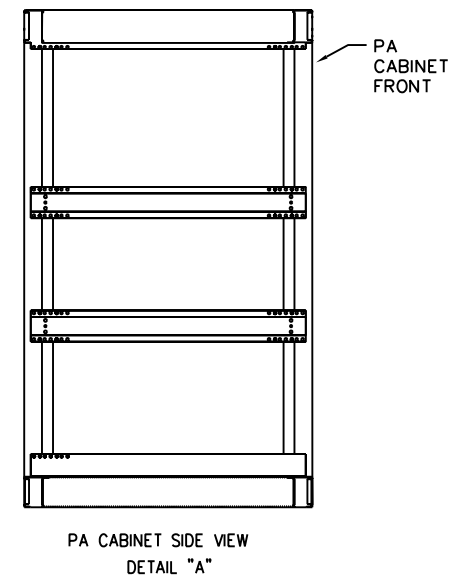
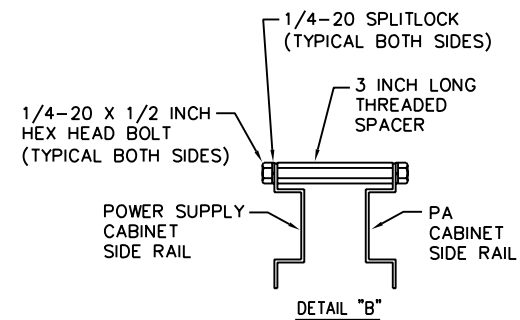
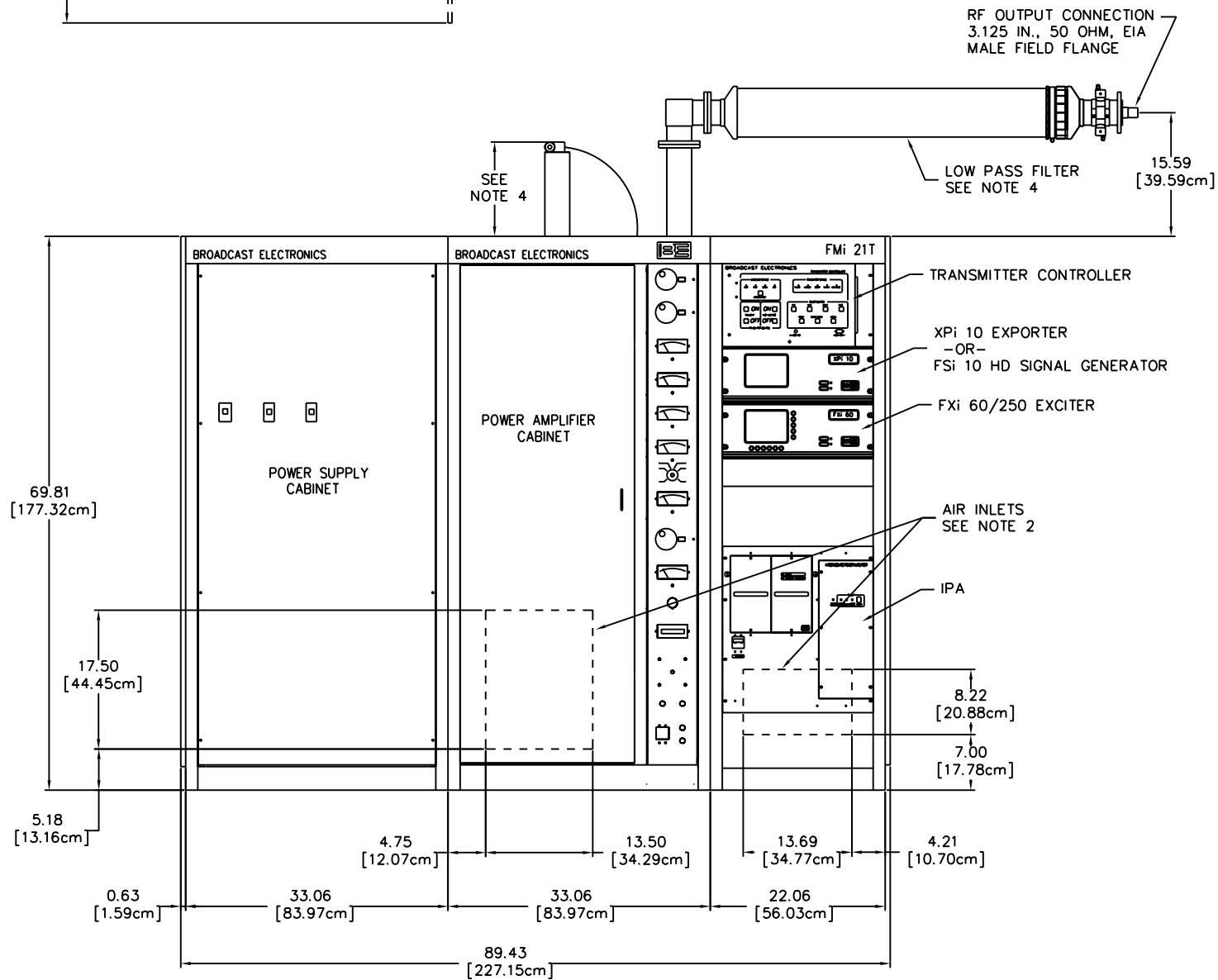
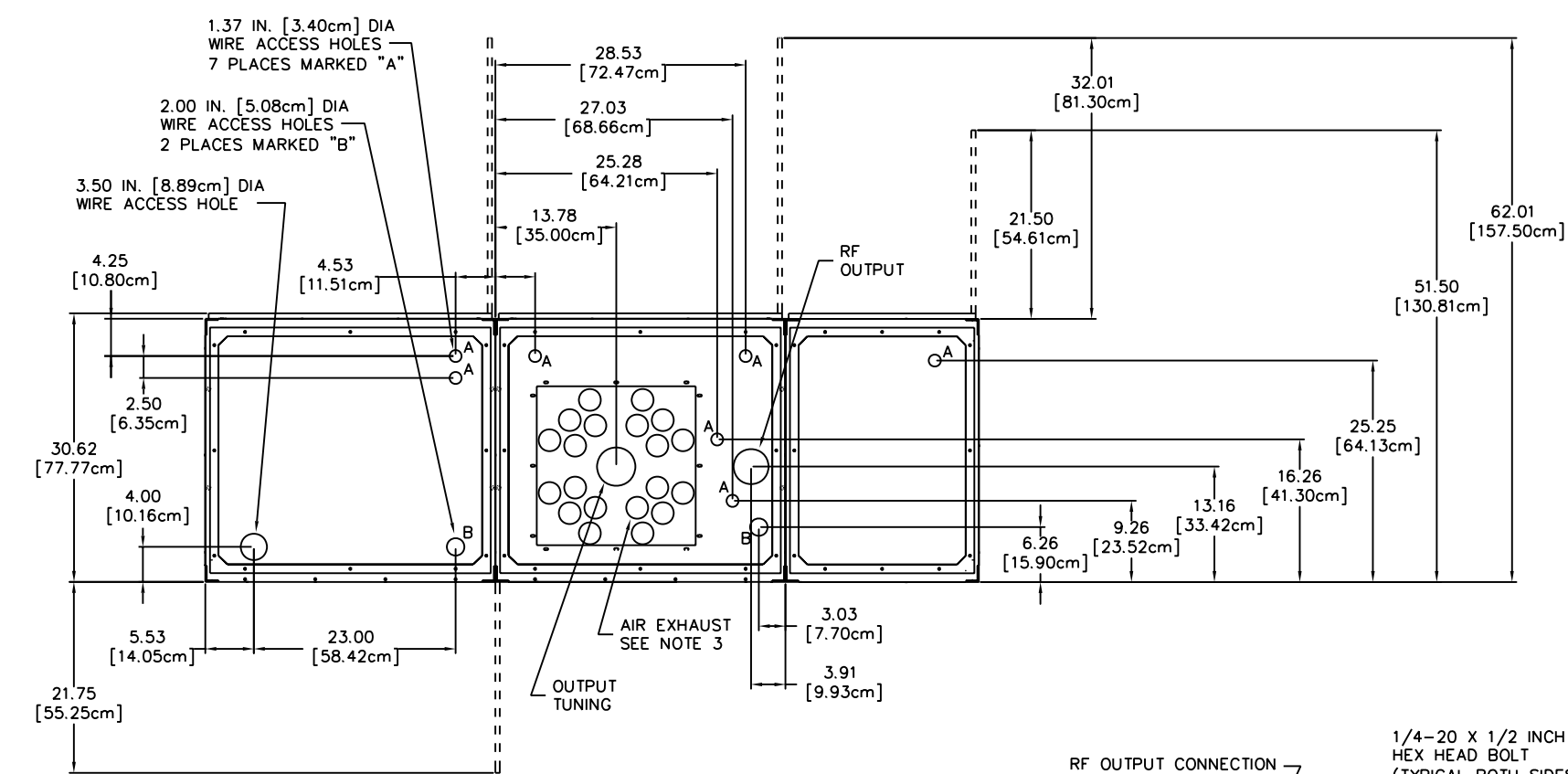


#### PA/POWER SUPPLY CABINET ASSEMBLY NOTES:

- REFER TO DETAIL "A" TO LOCATE THE SPACERS. REFER TO DETAIL "B" AND SECURE THE SPACERS TO THE SIDE RAILS OF THE PA CABINET WITH THE 1/4-20 HARDWARE AS SHOWN.
- REMOVE THE POWER SUPPLY SIDE-PANEL. POSITION THE POWER SUPPLY CABINET UNTIL THE SPACERS ARE ALIGNED WITH IDENTICAL HOLES IN THE POWER SUPPLY CABINET SIDE RAILS.
- REFER TO DETAIL "B" AND SECURE THE CABINETS WITH 1/4-20 HARDWARE AS SHOWN. REPLACE THE POWER SUPPLY SIDE-PANEL.

#### NOTES:

- POWER SUPPLY CABINET MAY BE LOCATED REMOTELY FROM THE PA/DRIVER CABINET IF DESIRED. 30 FEET (9.14 m) STANDARD.
- AIR INLET:
  - LOCATION: PA CABINET REAR-PANEL  
DIMENSIONS:  
WIDTH: 17.5 INCHES (44.45 cm)  
HEIGHT: 14.0 INCHES (25.56 cm)  
FILTER: 16 INCHES X 20 INCHES X 1 INCH NOMINAL. BEI P/N 407-0062.
  - LOCATION: DRIVER CABINET REAR-PANEL  
DIMENSIONS:  
WIDTH: 13.69 INCHES (34.77 cm)  
HEIGHT: 8.22 INCHES (20.88 cm)  
FILTER: 16 INCHES X 20 INCHES X 1 INCH NOMINAL. BEI P/N 407-0062.
- AIR OUTLET: PRIMARY - TOP OF PA CABINET  
SECONDARY - TOP OF POWER SUPPLY AND DRIVER CABINETS
- RF OUTPUT ASSEMBLY:  
CONNECTION: 3.125 INCH EIA 50 OHM MALE FIELD FLANGE.  
LOW-PASS FILTER (BEI P/N 339-0022):  
DIMENSIONS:  
LENGTH: 52.12 INCHES (132.38cm)  
DIAMETER: 6.13 INCHES (15.57 cm)  
MOUNTING: MECHANICAL SUPPORT REQUIRED EXTERNAL TO TRANSMITTER.  
WEIGHT: 65 POUNDS (29.48 kg)  
TUNING LINE HEIGHT (DETERMINED BY TRANSMITTER FREQUENCY):  
MAXIMUM: 15.5 INCHES (39.37 cm) @ 108 MHz  
MINIMUM: 4.5 INCHES (11.3 cm) @ 88 MHz
- CUBAGE:  
PA/DRIVER CABINET: 72 CUBIC FEET (2 m<sup>3</sup>)  
POWER SUPPLY CABINET: 44 CUBIC FEET (1.25 m<sup>3</sup>)
- WEIGHT:  
PA/DRIVER CABINET: 1500 POUNDS (682 kg)  
POWER SUPPLY CABINET: 1750 POUNDS (794 kg)
- COOLING AIR REQUIREMENTS:  
PA CABINET: 1200 CUBIC FEET PER MINUTE (34 m<sup>3</sup>/min)  
DRIVER CABINET: 500 CUBIC FEET PER MINUTE (14.2 m<sup>3</sup>/min)  
POWER SUPPLY CABINET: NATURAL CONVECTION
- AC INPUT REQUIRMENTS:  
196V TO 252VAC, 50/60 Hz, 3 PHASE, CLOSED DELTA OR WYE  
339V TO 437VAC, 50/60 Hz, 3 PHASE, WYE.  
250 AMPERES PER PHASE MAXIMUM.  
FUSED DISCONNECT RECOMMENDED.
- HEAT DISSIPATION:  
TYPICAL: 14.3 kW (48,806 BTU/HR) @ 17.5kW RF OUTPUT POWER  
MAXIMUM: 17.5 kW (59,728 BTU/HR) @ 17.5kW RF OUTPUT POWER
- AC POWER CONSUMPTION:  
TYPICAL: @ 17.5 kW RF OUTPUT POWER, 31.8 kW  
MAXIMUM: @ 17.5 kW RF OUTPUT POWER, 34 kW



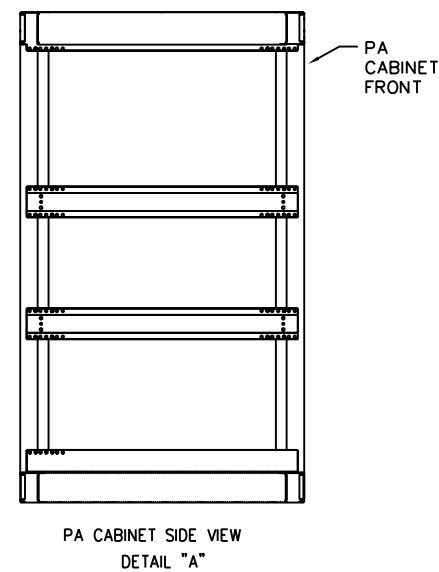
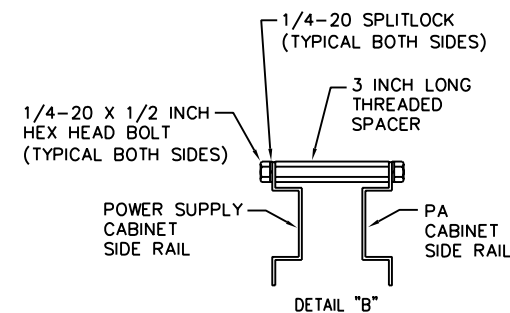
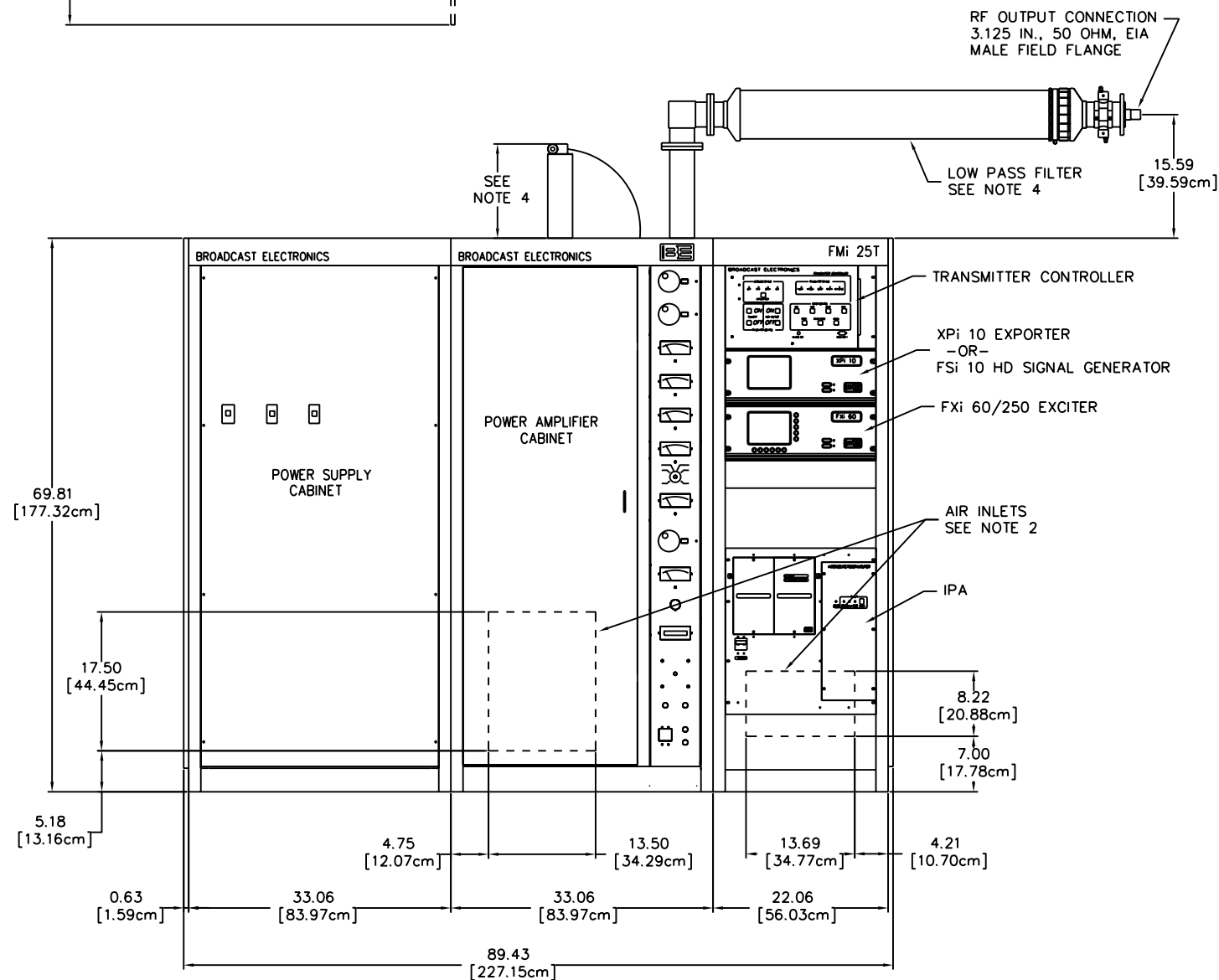
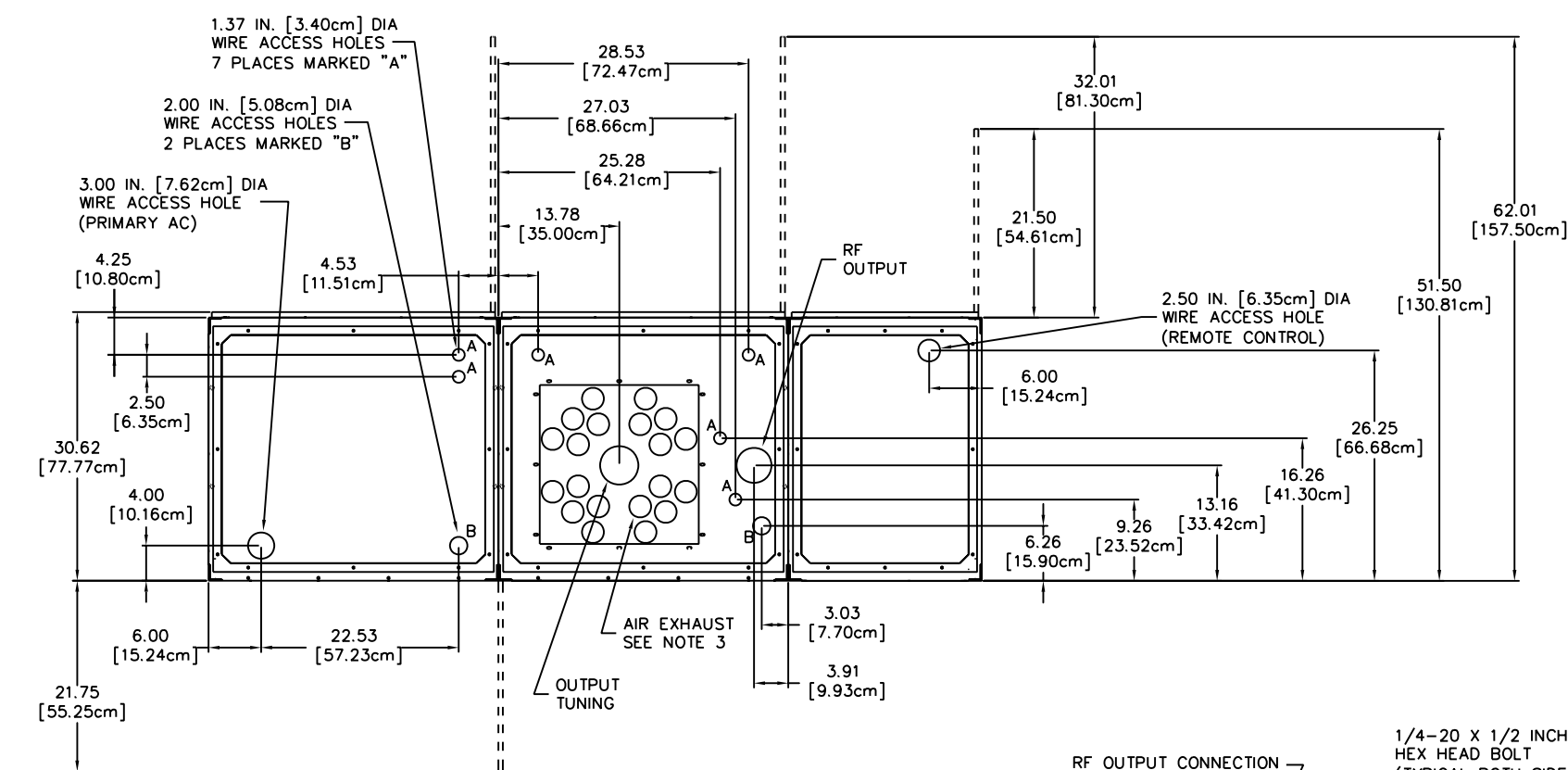
#### PA/POWER SUPPLY CABINET ASSEMBLY NOTES:

- REFER TO DETAIL "A" TO LOCATE THE SPACERS. REFER TO DETAIL "B" AND SECURE THE SPACERS TO THE SIDE RAILS OF THE PA CABINET WITH THE 1/4-20 HARDWARE AS SHOWN.
- REMOVE THE POWER SUPPLY SIDE-PANEL. POSITION THE POWER SUPPLY CABINET UNTIL THE SPACERS ARE ALIGNED WITH IDENTICAL HOLES IN THE POWER SUPPLY CABINET SIDE RAILS.
- REFER TO DETAIL "B" AND SECURE THE CABINETS WITH 1/4-20 HARDWARE AS SHOWN. REPLACE THE POWER SUPPLY SIDE-PANEL.

#### NOTES:

- POWER SUPPLY CABINET MAY BE LOCATED REMOTELY FROM THE PA/DRIVER CABINET IF DESIRED. 30 FEET (9.14 m) STANDARD.
- AIR INLET:
  - LOCATION: PA CABINET REAR-PANEL  
DIMENSIONS:  
WIDTH: 13.5 INCHES (34.29 cm)  
HEIGHT: 17.5 INCHES (44.45 cm)  
FILTER: 16 INCHES X 20 INCHES X 1 INCH NOMINAL. BEI P/N 407-0062.
  - LOCATION: DRIVER CABINET REAR-PANEL  
DIMENSIONS:  
WIDTH: 13.69 INCHES (34.77 cm)  
HEIGHT: 8.22 INCHES (20.88 cm)  
FILTER: 16 INCHES X 20 INCHES X 1 INCH NOMINAL. BEI P/N 407-0062.
- AIR OUTLET: PRIMARY - TOP OF PA CABINET  
SECONDARY - TOP OF POWER SUPPLY AND DRIVER CABINETS
- RF OUTPUT ASSEMBLY:  
CONNECTION: 3.125 INCH EIA 50 OHM MALE FIELD FLANGE.  
LOW-PASS FILTER (BEI P/N 339-0022):  
DIMENSIONS:  
LENGTH: 52.12 INCHES (132.38cm)  
DIAMETER: 6.13 INCHES (15.57 cm)  
MOUNTING: MECHANICAL SUPPORT REQUIRED EXTERNAL TO TRANSMITTER.  
WEIGHT: 65 POUNDS (29.48 kg)  
TUNING LINE HEIGHT (DETERMINED BY TRANSMITTER FREQUENCY):  
MAXIMUM: 15.5 INCHES (39.37 cm) @ 108 MHz  
MINIMUM: 4.5 INCHES (11.3 cm) @ 88 MHz
- CUBAGE:  
PA/DRIVER CABINET: 72 CUBIC FEET (2 m<sup>3</sup>)  
POWER SUPPLY CABINET: 44 CUBIC FEET (1.25 m<sup>3</sup>)
- WEIGHT:  
PA/DRIVER CABINET: 1500 POUNDS (682 kg)  
POWER SUPPLY CABINET: 1750 POUNDS (794 kg)
- COOLING AIR REQUIREMENTS:  
PA CABINET: 1500 CUBIC FEET PER MINUTE ( 43 m<sup>3</sup>/min)  
DRIVER CABINET: 500 CUBIC FEET PER MINUTE (14.2 m<sup>3</sup>/min)  
POWER SUPPLY CABINET: NATURAL CONVECTION
- AC INPUT REQUIRMENTS:  
196V TO 252VAC, 50/60 Hz, 3 PHASE, CLOSED DELTA OR WYE  
339V TO 437VAC, 50/60 Hz, 3 PHASE, WYE.  
250 AMPERES PER PHASE MAXIMUM.  
FUSED DISCONNECT RECOMMENDED.
- HEAT DISSIPATION:  
TYPICAL: 17kW (58,021 BTU/HR) @ 21kW RF OUTPUT POWER  
MAXIMUM: 21kW (71,673 BTU/HR) @ 21kW RF OUTPUT POWER
- AC POWER CONSUMPTION:  
TYPICAL: @ 21kW RF OUTPUT POWER, 38 kW  
MAXIMUM: @ 21kW RF OUTPUT POWER, 42 kW





#### PA/POWER SUPPLY CABINET ASSEMBLY NOTES:

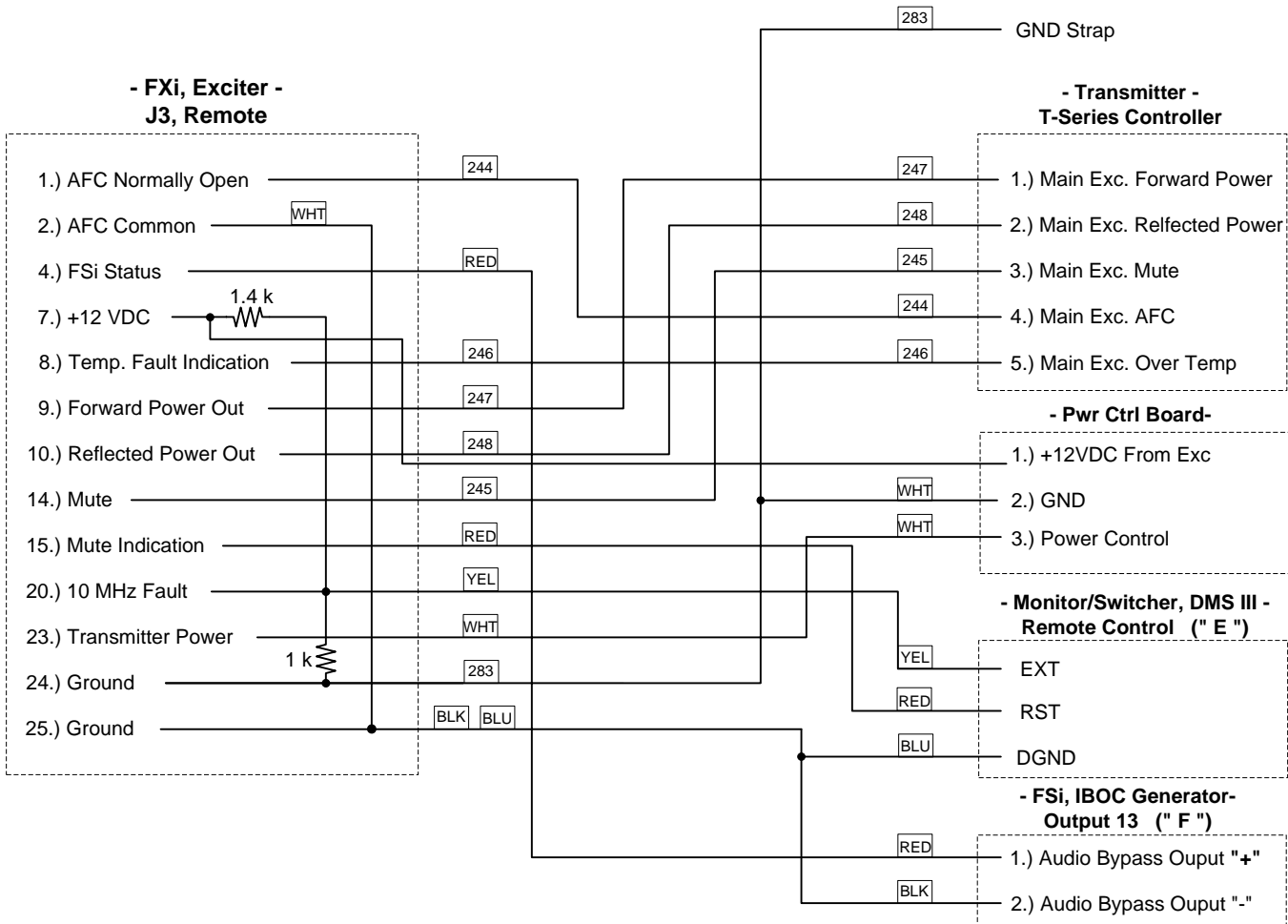
- REFER TO DETAIL "A" TO LOCATE THE SPACERS. REFER TO DETAIL "B" AND SECURE THE SPACERS TO THE SIDE RAILS OF THE PA CABINET WITH THE 1/4-20 HARDWARE AS SHOWN.
- REMOVE THE POWER SUPPLY SIDE-PANEL. POSITION THE POWER SUPPLY CABINET UNTIL THE SPACERS ARE ALIGNED WITH IDENTICAL HOLES IN THE POWER SUPPLY CABINET SIDE RAILS.
- REFER TO DETAIL "B" AND SECURE THE CABINETS WITH 1/4-20 HARDWARE AS SHOWN. REPLACE THE POWER SUPPLY SIDE-PANEL.

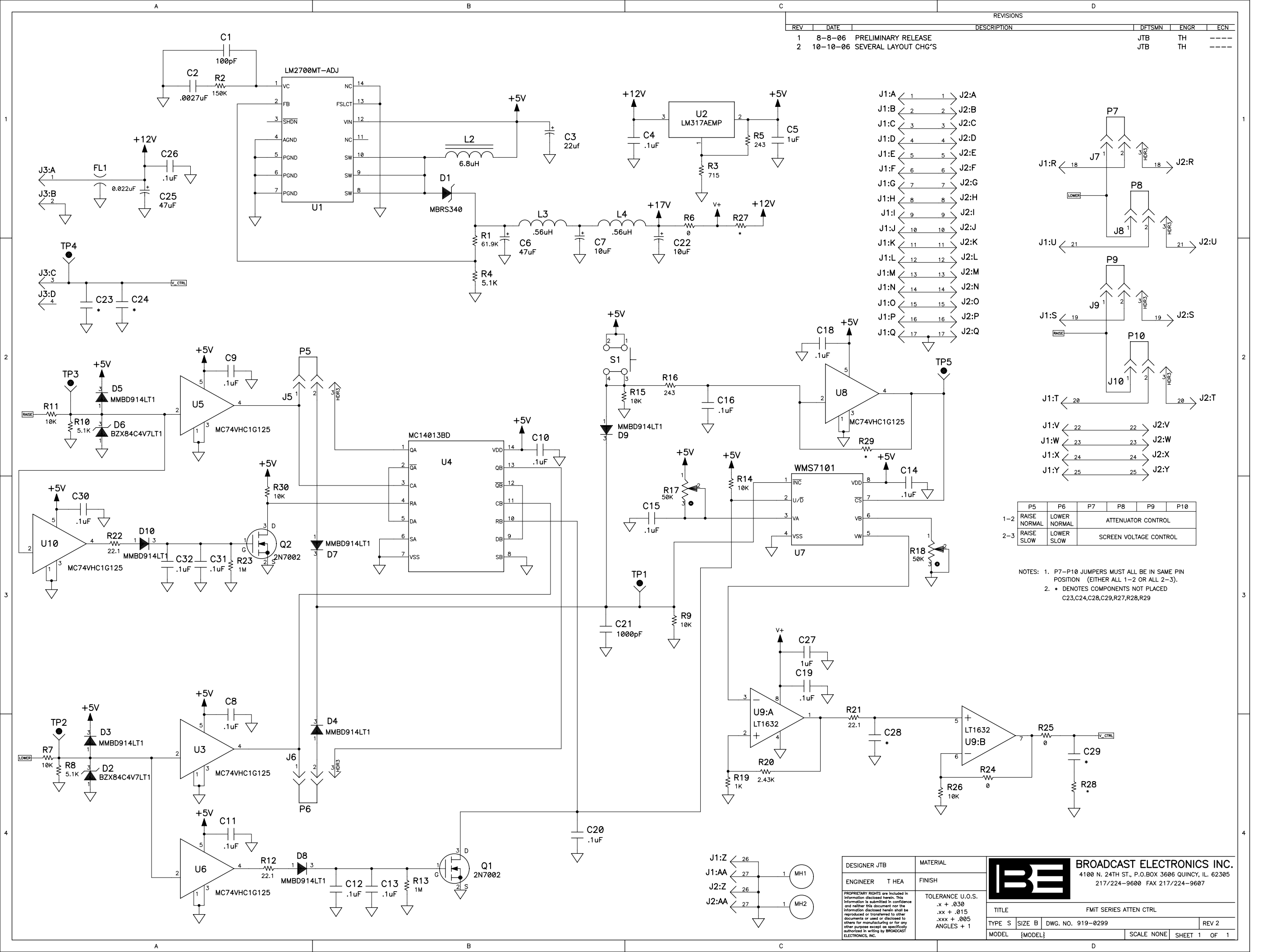
#### NOTES:

- POWER SUPPLY CABINET MAY BE LOCATED REMOTELY FROM THE PA/DRIVER CABINET IF DESIRED. 30 FEET (9.14 m) STANDARD.
- AIR INLET:
  - LOCATION: PA CABINET REAR-PANEL  
DIMENSIONS:  
WIDTH: 13.5 INCHES (34.29 cm)  
HEIGHT: 17.5 INCHES (44.45 cm)  
FILTER: 16 INCHES X 20 INCHES X 1 INCH NOMINAL. BEI P/N 407-0062.
  - LOCATION: DRIVER CABINET REAR-PANEL  
DIMENSIONS:  
WIDTH: 13.69 INCHES (34.77 cm)  
HEIGHT: 8.22 INCHES (20.88 cm)  
FILTER: 16 INCHES X 20 INCHES X 1 INCH NOMINAL. BEI P/N 407-0062.
- AIR OUTLET: PRIMARY - TOP OF PA CABINET  
SECONDARY - TOP OF POWER SUPPLY AND DRIVER CABINETS
- RF OUTPUT ASSEMBLY:  
CONNECTION: 3.125 INCH EIA 50 OHM MALE FIELD FLANGE.  
LOW-PASS FILTER (BEI P/N 339-0022):  
DIMENSIONS:  
LENGTH: 52.12 INCHES (132.38cm)  
DIAMETER: 6.13 INCHES (15.57 cm)  
MOUNTING: MECHANICAL SUPPORT REQUIRED EXTERNAL TO TRANSMITTER.  
WEIGHT: 65 POUNDS (29.48 kg)  
TUNING LINE HEIGHT (DETERMINED BY TRANSMITTER FREQUENCY):  
MAXIMUM: 15.5 INCHES (39.37 cm) @ 108 MHz  
MINIMUM: 4.5 INCHES (11.3 cm) @ 88 MHz
- CUBAGE:  
PA/DRIVER CABINET: 72 CUBIC FEET (2 m<sup>3</sup>)  
POWER SUPPLY CABINET: 44 CUBIC FEET (1.25 m<sup>3</sup>)
- WEIGHT:  
PA/DRIVER CABINET: 1500 POUNDS (682 kg)  
POWER SUPPLY CABINET: 1750 POUNDS (794 kg)
- COOLING AIR REQUIREMENTS:  
PA CABINET: 1500 CUBIC FEET PER MINUTE ( 43 m<sup>3</sup>/min)  
DRIVER CABINET: 500 CUBIC FEET PER MINUTE (14.2 m<sup>3</sup>/min)  
POWER SUPPLY CABINET: NATURAL CONVECTION
- AC INPUT REQUIRMENTS:  
196V TO 252VAC, 50/60 Hz, 3 PHASE, CLOSED DELTA OR WYE  
339V TO 437VAC, 50/60 Hz, 3 PHASE, WYE.  
300 AMPERES PER PHASE MAXIMUM.  
FUSED DISCONNECT RECOMMENDED.
- HEAT DISSIPATION:  
TYPICAL: 20 kW (68,260 BTU/HR) @ 25 kW RF OUTPUT POWER  
MAXIMUM: 25 kW (85,325 BTU/HR) @ 25 kW RF OUTPUT POWER
- AC POWER CONSUMPTION:  
TYPICAL: @ 25 kW RF OUTPUT POWER, 45 kW  
MAXIMUM: @ 25 kW RF OUTPUT POWER, 50 kW

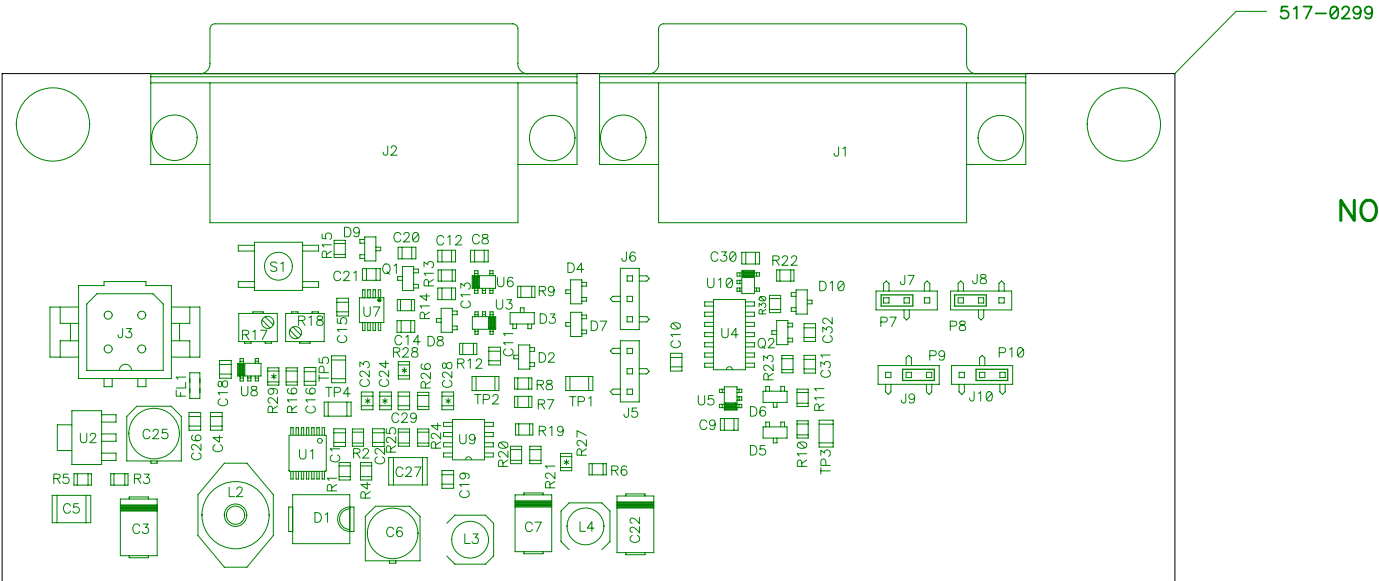


**(Wire harness with FMI 17T, FMI 21T, & FMI 25T BE Transmitters)**





REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
1	9-13-06	PRELIMINARY RELEASE	JTB	TH	-----
2	10-11-06	SEVERAL LAYOUT CHG'S	JTB		-----



NOTES:

P5	P6	P7	P8	P9	P10
RAISE NORMAL	LOWER NORMAL	ATTENUATOR CONTROL			
RAISE SLOW	LOWER SLOW	SCREEN VOLTAGE CONTROL			

1. P7-P10 JUMPERS MUST ALL BE IN SAME PIN POSITION (EITHER ALL 1-2 OR ALL 2-3).
2. \* DENOTES COMPONENTS NOT PLACED C23,C24,C28,C29,R27,R28,R29

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	DESIGNER(S)  T. HEA						
	PROJ. LEADER		FINISH	TITLE  FMT SERIES ATTENUATOR CONTROL V 2			
	MFG.						
	TOLERANCE (DECIMAL) U.O.S. .X + .030      .XXX + .005 .XX + .015     ANGLES + 1°		NEXT ASSY.	TYPE A	SIZE B	DWG No.  919-0299	REV  2
			MODEL   NNNN		SCALE   1/1	SHEET   1 OF   1	