

# Installing a Monitor in the RF System

By Lynn Strube

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## Introduction

The following installation instructions are for a Transmitter Power Monitor or TPM which will include both a 7/8" version along with the 1-5/8" and 3-1/8" flanged and unflanged versions.

Upon receiving the equipment, unpack the gear and inspect each part. If there are any problems resulting from shipping contact your carrier immediately. For any shipping problems with international customers, you must check the "Incoterms" which are standard trade definitions most commonly used in international sales contracts.

Before installing the Transmitter Power Monitor (TPM), ensure that the model number of the device ordered is the one specified and received. In co-located sites with TV and FM in the same building, ensure that the FM model is not placed in the TV transmission line or vice-versa. The model and serial number will be on separate labels on the side of the unit. The serial number is located on the label with the barcode. Make use of the product verification, at the end of the article, for the model nomenclature, which configures all TPM's. Record the model and serial number and put that information in a file for storage. If the TPM is installed 30 feet off the floor in an RF system, or the site is a long distance away, the information will be recorded in a safe location.

Once you have verified your equipment is correct and have recorded the serial and model numbers you are ready to begin. **Warning:** TURN OFF THE TRANSMITTER! Under no circumstance can any transmission line work even be considered unless the RF power is off. If you have a lock out, tag out procedure it is also a good idea to lock out the AC breakers to ensure no one could accidentally turn on the transmitter and produce RF power.

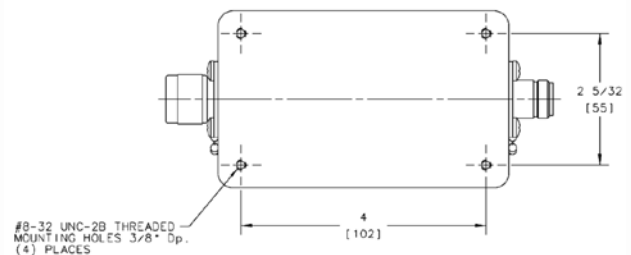
If installing a meter panel, select an available area in an equipment rack at or near eye level and fasten the meter securely. Placing the meter at or near eye level prevents the user from bending over or standing on a ladder to read the meters. The 3140 meter panel will fit any 19" EIA rack and will require two rack units of space and some hardware appropriate for the rack. An open area in the rear of the rack will need to be available as the connections to the TPM are made from the rear of the meter panel by means of a 9 pin "D" connector. If you are connecting multiple TPM's, then the open area will be used to route the

connection cables. A twenty-five foot cable is supplied with every TPM. Connections made to the 3140A4 or 3140A8 meter panel, are the same. The only difference in the two models is the A4 can support 4 TPM's, and the A8 can support 8 TPM's. Shown below is the 3140A4. A shunting wire is connected from the positive and negative terminals on the rear of the forward and reflected meters. These shunting wires need to be removed. They protect the meter by dampening needle action during handling and shipping. Once the meter panel is secure, plug the transformer to the AC and connect the DC input to the meter panel. Secure the wiring and ensure all hardware is firmly tightened.



Depending on the TPM used 1-5/8" or 3-1/8" flanged or un-flanged the installation will vary only slightly.

Installing a TPM7 differs in that it can actually be bolted to a mounting panel. There are four #8-32 threaded holes on the rear of the unit which can be utilized to securely mount the TPM to a convenient location. The dimensions showing the mounting holes are displayed in the drawing below.



Once the TPM7 is securely fastened, the RF connections need to be made. Every TPM, regardless of the size, has an indicating arrow which shows the RF flow from the source to the load. The Source is the RF input to the TPM, and the Load is the RF output connection. The Load is the antenna, or it can be placed in the path to your dummy or reject load.

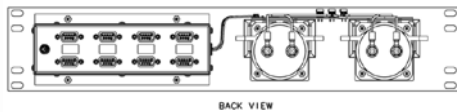
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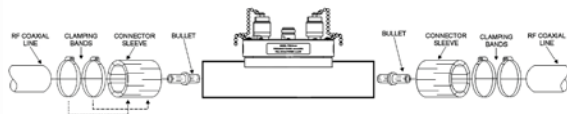
**Transmitter Power Monitor**  
Source □ □ → Load

The last connection is the DB9 interface connector. This cable supplies the DC voltage for the TPM to operate and delivers the voltage back from the TPM to the forward and reflected meters. Shown below is the rear panel of the meter illustrating all connections.



If using more than one TPM, then label the channel selector on the front of the meter panel with the position in the broadcast system where each TPM is located. In some installations, where multiple transmitters are routed to a combiner and the reject and dummy load have TPM's installed, it will be advantageous to know that the channel selector on the front of the meter panel selecting position #1 is transmitter output A, and selecting position #2 is transmitter output B.

Installing a flanged 1-5/8" or 3-1/8" TPM is a simple process and will require very little time. If using an unflanged TPM, the following steps will guide you through the process. Referring to the diagram below will help.

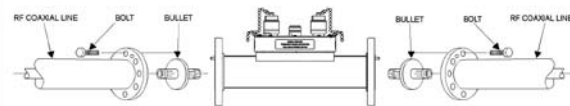


An unflanged 1-5/8" TPM will add 7-7/8" in length to the line. If using a 3-1/8" unflanged TPM, it will add 27/32" to the system.

1. Insert the center bullet and bottom it on the midpoint nibs.
2. Position the outer sleeve with clamping bands over the input connector.

3. Set the transmission line firmly against the coupling stops.
4. Position the clamping bands evenly about 3/4" from the ends of the sleeve.
5. Tighten the clamping bands.
6. Connect the 9 pin "D" connector to the TPM

Installing a flanged 1-5/8" or 3-1/8" TPM is another easy task requiring only a short duration of time and a set of 9/16" wrenches.



1. Insert the center bullet and push it in until it is fully seated.
2. Connect the transmission line in a straight line and push carefully on the center conductor to close.
3. Insert the bolt sets and tighten evenly all around to transmission line manufacturers recommended torque. Use all of the bolts.
4. Connect the 9 pin "D" connector to the TPM

If you need to cut a section of transmission line to fit the TPM into the system, use a "cut-off guide" is recommended. Transmission line suppliers have cut-off guides for all sizes of transmission line. Using the guide ensures the cut will be square and precise. If you do not have one, then it can be accomplished easily by using a hose clamp, a hacksaw and a tubing cutter. Support the transmission line on both sides of the area to be cut. Measure and mark around the line and make sure the marks are evenly spaced. The old adage of measure twice cut once really fits here. Place the hose clamp beside the marks you have made on the line and then tighten it. If using the hacksaw, score the transmission line all the way around. This creates a groove for the tubing cutter cutting wheel to follow. Tubing cutters have a

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tendency to walk or to spiral. Having a cut groove to follow will prevent the tool from walking. Once the groove is established, remove the clamp and make the final cut with the tubing cutter. Cutting the line using the hacksaw takes a little more time. Just make certain you have a square cut. Use a de-burring tool to remove the rough unfinished edge produced by the cut.

The last cut will be the inner conductor. Follow the above procedure and make sure there is a square edge. There is a cut-back dimension to follow which is made up by the bullet. The following dimensions are industry standard for transmission line, for flanged line the cut back is measured from the outside edge of the flange to the inner conductor the cutback dimensions are;

<b>1-5/8"</b>	<b>.625</b>	<b>5/8</b>
<b>3-1/8"</b>	<b>1.015</b>	<b>1-1/164</b>

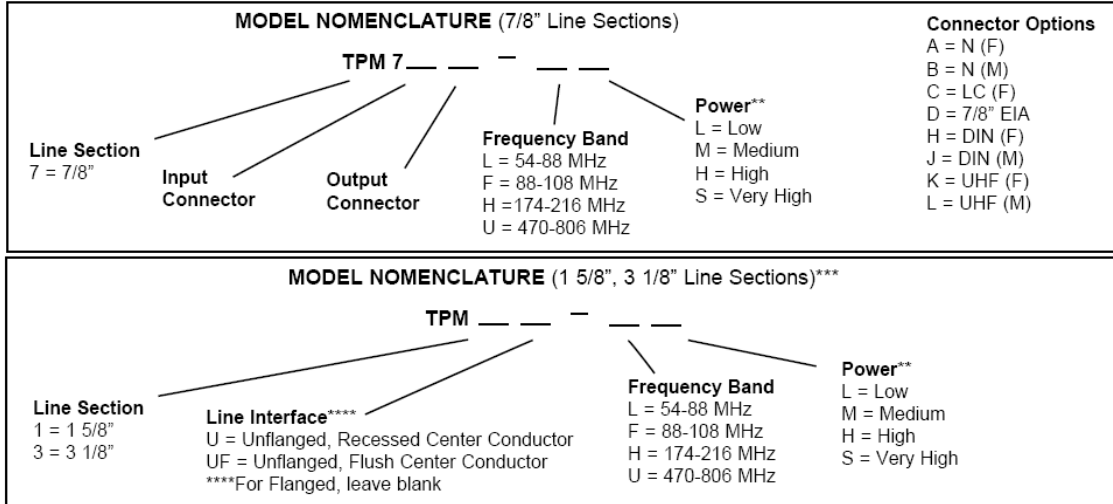
The following are the cutback dimensions for unflanged line which is measured from the outside edge of the outer conductor to the inner conductor;

<b>1-5/8"</b>	<b>.437</b>	<b>7/16</b>
<b>3-1/8"</b>	<b>.765</b>	<b>49/64</b>

Once installed the TPM will be a NIST traceable power monitoring source that can be depended upon for the life of the system.

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\* Patent Pending  
\*\* see Chart A for power ranges on backside.  
\*\*\* Other sizes and power ranges available upon request.

Chart A	VHF (54-216 MHz)		UHF (470-806 MHz)	
	Power Designator	Forward Power Range	Power Designator	Forward Power Range
7/8"	Low Medium High Very High	15 W - 500 W 30 W - 1.0 kW 80 W - 2.5 kW 150 W - 5.0 kW	Low Medium High	15 W - 500 W 30 W - 1.0 kW 80 W - 2.5 kW
1 5/8"	Low Medium High Very High	30 W - 1.0 kW 80 W - 2.5 kW 150 W - 5.0 kW 300 W - 10 kW	Low Medium High	30 W - 1.0 kW 80 W - 2.5 kW 150 W - 5.0 kW
3 1/8"	Low Medium High Very High	150 W - 5.0 kW 300 W - 10 kW 800 W - 25 kW 1.5 kW - 50 kW	Low Medium High	150 W - 5.0 kW 300 W - 10 kW 800 W - 25 kW

Note: For best accuracy, pick the lowest power range that includes your maximum average operating power.



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