Transmitter Power Monitor/Meter

Model TPM series
&
3140A Power Meter Panel

Operation Manual

Instruction Book Part Number 920-TPM Rev. C

Safety Precautions

The following are general safety precautions that are not necessarily related to any specific part or procedure, and do not necessarily appear elsewhere in this publication. These precautions must be thoroughly understood and apply to all phases of operation and maintenance.

WARNING

Keep Away From Live Circuits

Operating Personnel must at all times observe general safety precautions. Do not replace components or make adjustments to the inside of the test equipment with the high voltage supply turned on. To avoid casualties, always remove power.

WARNING

Shock Hazard

Do not attempt to remove the RF transmission line while RF power is present.

WARNING

Do Not Service Or Adjust Alone

Under no circumstances should any person reach into an enclosure for the purpose of service or adjustment of equipment except in the presence of someone who is capable of rendering aid.

WARNING

Safety Earth Ground

An uninterruptible earth safety ground must be supplied from the main power source to test instruments. Grounding one conductor of a two conductor power cable is not sufficient protection. Serious injury or death can occur if this grounding is not properly supplied.

WARNING

Resuscitation

Personnel working with or near high voltages should be familiar with modern methods of resuscitation.

WARNING

Remove Power

Observe general safety precautions. Do not open the instrument with the power on.

Safety Symbols

WARNING
Warning notes call attention to a procedure, which if not correctly performed, could result in personal injury.

CAUTION
Caution notes call attention to a procedure, which if not correctly performed, could result in damage to the instrument.

Note: *Calls attention to supplemental information.*

Warning Statements

The following safety warnings appear in the text where there is danger to operating and maintenance personnel, and are repeated here for emphasis.

WARNING
Disconnect the unit from the RF power source and the ac line before any disassembly. The potential for electrical shock exists.

See page 17

Caution Statements

The following equipment cautions appear in the text and are repeated here for emphasis.

CAUTION
Pin 4 must be connected to power supply ground, other grounds can be left open if desired.

See page 3

CAUTION
DB9 are not serial connections. Serial connections to them could damage the equipment.

See page 6

CAUTION
A Bird Calibration Kit is recommended for this procedure. Performing a calibration with anything other than a Bird Calibration Kit voids Bird's accuracy guarantee.

Performing a field calibration will void any remaining warranty on this product. Bird recommends waiting until the terms of the warranty have passed before performing a field calibration.

See page 7

CAUTION
Do not use harsh or abrasive detergents for cleaning.

See page 17

Safety Statements

USAGE

ANY USE OF THIS INSTRUMENT IN A MANNER NOT SPECIFIED BY THE MANUFACTURER MAY IMPAIR THE INSTRUMENT'S SAFETY PROTECTION.

USO

EL USO DE ESTE INSTRUMENTO DE MANERA NO ESPECIFICADA POR EL FABRICANTE, PUEDE ANULAR LA PROTECCIÓN DE SEGURIDAD DEL INSTRUMENTO.

BENUTZUNG

WIRD DAS GERÄT AUF ANDERE WEISE VERWENDET ALS VOM HERSTELLER BESCHRIEBEN, KANN DIE GERÄTESICHERHEIT BEEINTRÄCHTIGT WERDEN.

UTILISATION

TOUTE UTILISATION DE CET INSTRUMENT QUI N'EST PAS EXPLICITEMENT PRÉVUE PAR LE FABRICANT PEUT ENDOMMAGER LE DISPOSITIF DE PROTECTION DE L'INSTRUMENT.

IMPIEGO

QUALORA QUESTO STRUMENTO VENISSE UTILIZZATO IN MODO DIVERSO DA COME SPECIFICATO DAL PRODUTTORE LA PROZIONE DI SICUREZZA POTREBBE VENIRNE COMPROMESSA.

SERVICE

SERVICING INSTRUCTIONS ARE FOR USE BY SERVICE - TRAINED PERSONNEL ONLY. TO AVOID DANGEROUS ELECTRIC SHOCK, DO NOT PERFORM ANY SERVICING UNLESS QUALIFIED TO DO SO.

SERVICIO

LAS INSTRUCCIONES DE SERVICIO SON PARA USO EXCLUSIVO DEL PERSONAL DE SERVICIO CAPACITADO. PARA EVITAR EL PELIGRO DE DESCARGAS ELÉCTRICAS, NO REALICE NINGÚN SERVICIO A MENOS QUE ESTÉ CAPACITADO PARA HACERIO.

WARTUNG

ANWEISUNGEN FÜR DIE WARTUNG DES GERÄTES GELTEN NUR FÜR GESCHULTES FACHPERSONAL.

ZUR VERMEIDUNG GEFÄHRLICHE, ELEKTRISCHE SCHOCKS, SIND WARTUNGSARBEITEN AUSSCHLIEßLICH VON QUALIFIZIERTEM SERVICEPERSONAL DURCHZUFÜHREN.

ENTRENTIEN

L'EMPLOI DES INSTRUCTIONS D'ENTRETIEN DOIT ÊTRE RÉSERVÉ AU PERSONNEL FORMÉ AUX OPÉRATIONS D'ENTRETIEN. POUR PRÉVENIR UN CHOC ÉLECTRIQUE DANGEREUX, NE PAS EFFECTUER D'ENTRETIEN SI L'ON N'A PAS ÉTÉ QUALIFIÉ POUR CE FAIRE.

ASSISTENZA TECNICA

LE ISTRUZIONI RELATIVE ALL'ASSISTENZA SONO PREVISTE ESCLUSIVAMENTE PER IL PERSONALE OPPORTUNAMENTE ADDESTRATO. PER EVITARE PERICOLOSE SCOSSE ELETTRICHE NON EFFETTUARRE ALCUNA RIPARAZIONE A MENO CHE QUALIFICATI A FARLA.

RF VOLTAGE MAY BE PRESENT IN RF ELEMENT SOCKET - KEEP ELEMENT IN SOCKET DURING OPERATION.

DE LA TENSION H.F. PEAT ÊTRE PRÉSENTE DANS LA PRISE DE L'ÉLÉMENT H.F. - CONSERVER L'ÉLÉMENT DANS LA PRISE LORS DE L'EMPLOI.

HF-SPANNUNG KANN IN DER HF-ELEMENT-BUCHSE ANSTEHEN - ELEMENT WÄHREND DES BETRIEBS EINGESTÖPSELT LASSEN.

PUEDE HABER VOLTAJE RF EN EL ENCHUFE DEL ELEMENTO RF - MANTENGA EL ELEMENTO EN EL ENCHUFE DURANTE LA OPERACION.

IL PORTAELEMENTO RF PUÒ PRESENTARE VOLTAGGIO RF - TENERE L'ELEMENTO NELLA PRESA DURANTE IL FUNZIONAMENTO.

About This Manual

This manual covers the operating and maintenance instructions for the following models:

All TPM series 3140A4 3140A8

Changes to this Manual

We have made every effort to ensure this manual is accurate. If you discover any errors, or if you have suggestions for improving this manual, please send your comments to our Solon, Ohio factory. This manual may be periodically updated. When inquiring about updates to this manual refer to the part number and revision on the title page.

Terminology

There are some unique terms used throughout this literature. They are defined here clarify any misunderstanding.

TPM — Refer to the in-line Transmitter Power Monitor.

Display or Panel Meter — Refers to either the 3140A4 or 3140A8 meter.

Chapter Layout

Introduction — Describes the purpose and function of the TPM as well as a general overview of the product.

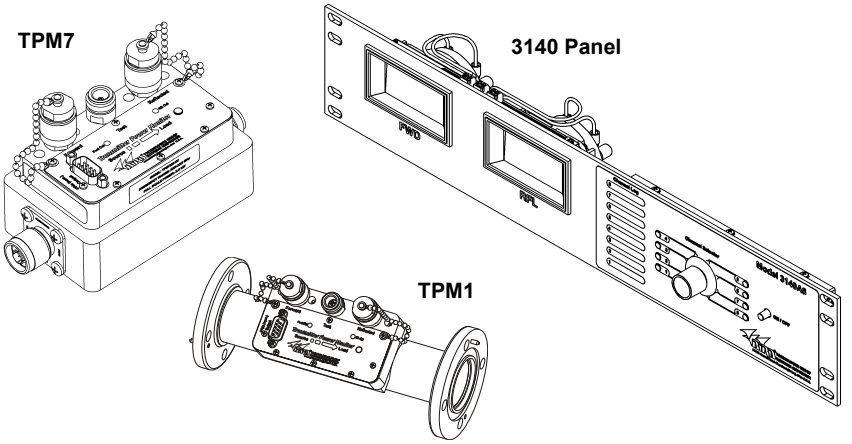
Installing & Operating Instructions - TPM — Describes the features of the Transmitter Power Monitor and provides power-up instructions.

Installing & Operating Instructions - 3140A Panel — Describes the features of the Power Meter Panel and provides power-up instructions.

Calibration — Describes different calibration methods and when to use them.

Performance Specifications — Specifications and parts information are also listed.

Table of Contents



Calibrated coupling ports and accurate power measurement combined in the same unit provides for easy use and accurate readings. The TPM is the first inline power monitor that can be calibrated in-line and on site minimizing downtime and optimizing on-air time. In addition, a simplified interface allows for a high level of customization and integration.

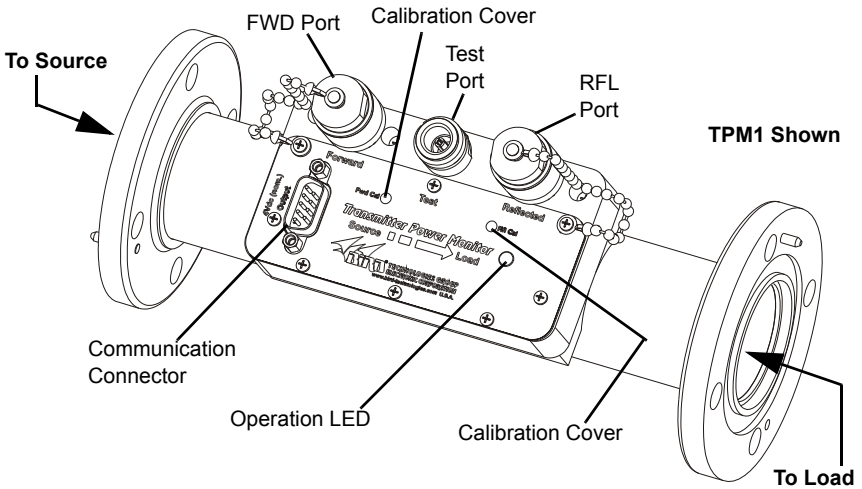
Purpose and Function

The TPM is used to measure power signals in broadcast systems. It is used directly in line with the system being tested. It's output provides a linear DC voltage output from 0 to 4 volts allowing for a wide variety of interface options. It's in-line calibration capability allows for greater accuracy in a single application (with an accurate power reference) and its integrated non-directional coupler allows for signal analysis in minimal space requirements. It is available in 7/8", 1 5/8", and 3 1/8", 50 ohm lines for FM, VHF, and UHF broadcast frequencies.

When combined with a Bird model 3140A4 or 3140A8 Transmit Power Meter (TPM) display, a complete adjustment system is achieved. The display supplies a visual indication of Forward and Reflected power being sampled by the inline TPM. Multiple TPM's can be selected (only one per channel setting) to give the operator an overall condition of the transmitter system.

Chapter 2 Installing & Operating Instructions - TPM

Figure 2 TPM



Note: *Figure shown with terminations assembled.*

Note: *The label on the top of the unit identifies the connectors and ports. They are defined as follows:*

SOURCE	Connect to the source of the RF signal (transmitter side)
LOAD	Connect to the load of the RF signal (antenna/dummy load)
FORWARD	The forward directional coupler port. Terminate this port in 50 ohms at all times.[1]
REFLECTED	The reflected directional coupler port. Terminate this port in 50 ohms at all times.[1]
TEST	A non directional sample port. No termination is required.

1 If these ports are not terminated in 50 ohms, power measurements will not be accurate.

Note: *TPM units are terminated at the time of assembly.*

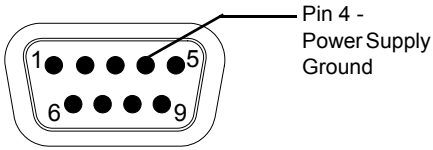
Installing the TPM

The TPM has two RF connectors (Source and Load) that connect to the transmission line, three test port connectors that are type N female connectors (Forward, Reflected, and Test), and one nine-pin sub-miniature communication connector (DB-9 Male).

1. Do the following:
   - Connect the RF connector labeled Source to the transmitter side of the transmission line.
   - Connect the RF connector labeled Load to the antenna or load side of the transmission line.
   - Use an appropriate coupling kit to secure the TPM in place.
2. Connect the DB-9 connector to a single channel on Model 3140A power meter panel, or to an alternate appropriate power supply and voltmeters that will indicate the forward and reflected power.

   Note: *The chart below Figure 2 identifies the signals on each pin of the DB-9 connector.*

Figure 4 DB-9 Connector



CAUTION
Pin 4 must be connected to power supply ground, other grounds can be left open if desired.

Pin	Description
1	Forward Voltage Output, 0 to 5 VDC, 1.0 kohm impedance
2	Ground
3	Reflected Voltage Output, 0 to 5 VDC, 1.0 kohm impedance
4	Power Supply Ground
5	DC Power Input, +11 to +18 VDC, <0.1 A current draw
6	Ground
7	Ground
8	Ground
9	Zero Calibration. **DO NOT** ground this pin. Leave this pin floating.

Note: *Above 4VDC, the accuracy spec does not apply.*

Normal Operation

> **Note:** *Coupler ports must be terminated to ensure accurate power measurements. Terminate both forward and reflected coupler ports in 50 ohms. Failure to terminate these ports will result in inaccurate power measurements.*

1. Install the TPM to the transmission line. See "Installing the TPM" on page 3.
2. Apply DC input power to the TPM.
3. Apply RF power to the TPM.
4. Use a voltmeter to measure the forward voltage and reflected voltage.

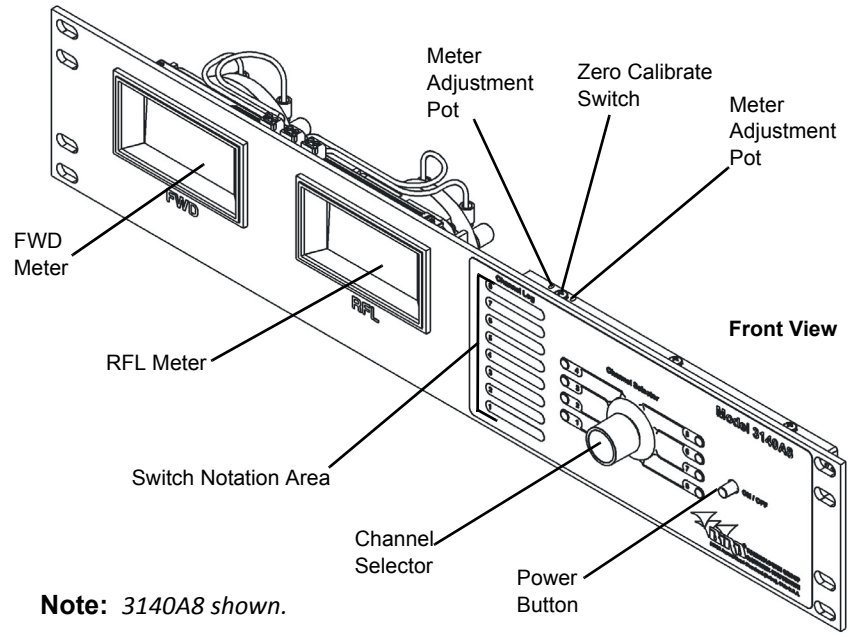
   > **Note:** *These voltages will be between 0 V (no power) and 4.0 V (full scale power). The forward and reflected voltages are linear.*

   > **Note:** *The full scale reflected power is 1/10 the value of the full scale forward power.*

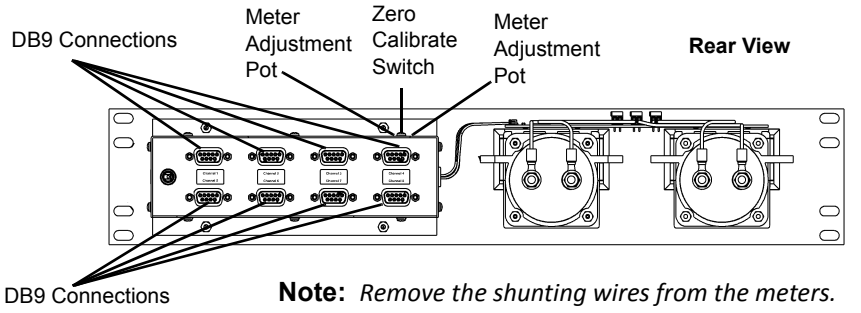
Chapter 3 Installing & Operating Instructions - 3140A Panel

The 3140A is the standard display and power supply for the TPM. It comes in both 4 Channel TPM and 8 Channel TPM models. It fits in a standard 2U rack and requires a single 15V power supply (supplied with panel).

Figure 5 3140 Panel



Note: *3140A8 shown.*



Note: *Remove the shunting wires from the meters.*

CAUTION
DB9 are not serial connections. Serial connections to them could damage the equipment.

FWD/RFL Meter	Provides visual indication of measured power for selected TPM.
Meter Adj Pot	Provides full scale meter calibration.
Channel Selector	Selects either one of four (3140A4) or one of eight (3140A8) connected TPM's.
Power Button	Applies DC input power to panel meter.
Zero Calibrate Switch	Grounds pin 9 to Zero calibrate the selected TPM.
DB9 Connection	Interface connection to TPM's. Provides power and Zero adjust to connected TPM's. Receives TPM output to drive meters.

Installing the Panel

1. Place panel in an empty slot on the rack and attach with mounting screws (optional).
2. Connect the panel to a power supply.
3. Attach a TPM to one of the available channels on the back of the panel.
4. Label what TPM is attached to which channel in the switch notation area on the front of the panel.

   Note: *User should note each unit's full scale power and location in the notation area. Use a water soluble marker to avoid permanent entries.*

5. Repeat steps 3 through 5 for other TPM's, if necessary.
6. Turn the panel on.

   Note: *All TPMs are powered, but only one TPM output is displayed at a time.*

7. Select the desired TPM to be measured by using the channel selector.

   Note: *The pots adjust the meter independently of TPM calibration. The appropriate meter scale (1/2.5/5) must be used with each TPM.*

CAUTION

A Bird Calibration Kit is recommended for this procedure. Performing a calibration with anything other than a Bird Calibration Kit voids Bird's accuracy guarantee.

Performing a field calibration will void any remaining warranty on this product. Bird recommends waiting until the terms of the warranty have passed before performing a field calibration.

Every calibration procedure will finish by providing a table of voltages that correspond to power levels at the calibration frequency (f_0). It will be up to the user to use those voltages to generate an equation or fill in a look up table on whatever they choose to use as an output.

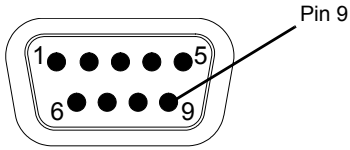
Zero Calibrating

Note: *This procedure can be performed any time the RF is off and the TPM is on. There is no need to cycle power again on the TPM.*

1. Do one of the following:
   - Locate pin 9 on the TPM's DB9 connector and short it to ground.
   - If connected to a display panel, press the zero calibration switch. Refer to Figure 4 for Zero Calibration Switch location.

     Note: *Zero calibrate will set both the FWD and RFL at the same time.*

Figure 7 Pin 9



Passive Calibration

Calibrate the TPM on the transmitter it is monitoring. Also a reference power meter is needed to measure the output of the test port on the TPM (model 7006A250). This calibration can be performed while transmitting on air (forward only) or into a dummy load. Coupling calibration data for the TPM is also needed.

By using several different power levels, an equation or lookup table can be generated for the voltage output of the TPM as a function of power level at the frequency of calibration.

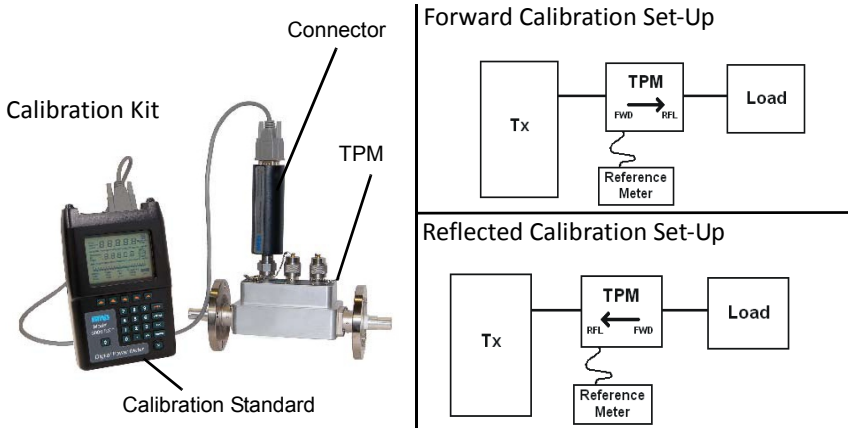
1. Install the TPM to the transmission line. See "Installing the TPM" on page 3.
2. Remove the load from the Fwd testport.
3. Connect the calibration standard to the Fwd testport.
4. Apply RF power.
5. Record the transmitter frequency displayed and find the listing closest to it on the TPM's coupling calibration data card.

   Note: *Make note of the calibration factor.*
6. Enter the calibration factor into the calibration standard's offset function.
7. Measure the power on the calibration standard and voltage on the TPM output simultaneously.
8. Record the voltage verses power.
9. Turn the unit around and repeat steps 1 to 7 for Reflected calibration.

   Note: *Reflected full scale is 1/10th of forward full scale.*

   Note: *Calibrating the reflected port is often optional. Check with the FCC or other ruling body to determine if it is necessary or not.*

Figure 8 Calibration



Active Calibration

The active method will recalibrate the TPM completely. This procedure will void the calibration and accuracy specifications for the unit. The accuracy will be based on the accuracy of the reference power meter used for this procedure. In addition to the equipment needed for the active calibration, a Bird 6A340-ADJ Potentiometer Adjustment Tool to adjust the potentiometers on the TPM is also needed.

Set the transmitter's RF output to a desired power level using the reference meter on the test port and the test port calibration data. Then, using a Bird 6A340-ADJ Potentiometer Adjustment Tool, turn the potentiometers until the desired voltage output is reached. Extra data points can be taken at different power levels to confirm the linearity and generate a lookup table to drive the rest of the power levels.

The benefit of this calibration method is that the customer can set the output voltage they want to drive their external meter. With the other calibration methods, the customer simply uses TPM output voltages as set at the factory.

1. Install the TPM to the transmission line. See "Installing the TPM" on page 3.
2. Remove the load from the Fwd testport.
3. Connect the calibration standard to the Fwd testport.
4. Apply RF power.
5. Record the transmitter frequency displayed and find the listing closest to it on the TPM's calibration data card.

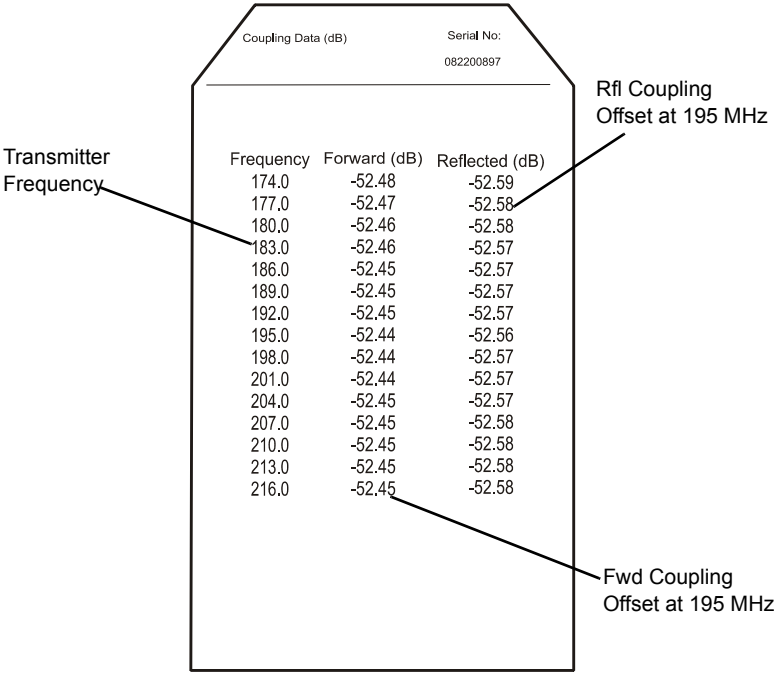
   Note: *Make note of the calibration factor.*
6. Enter the calibration factor into the calibration standard's offset function.
7. Break the seal over the Fwd Cal hole.
8. Adjust the potentiometer manually until the voltage is such that the calibration standard reads full scale power = 4.00V.

Example: *If the power is exactly 50% of full scale, adjust the potentiometer to get V=2.00V.*

9. Repeat steps 1 to 9 for Reflected calibration.

   Note: *Calibrating the reflected port is often optional. Check with the FCC or other ruling body to determine if it is necessary or not.*

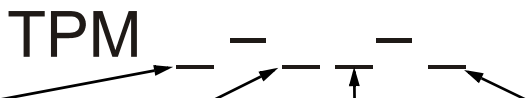
Figure 9 Calibration Data Card



Chapter 5 Performance Specifications

Transmitter Power Meter (TPM)

Model Naming Table



Line Size and Interface Style	Frequency Band*	Power Range	UHF Sub-Band
7xy = 7/8" with QC connectors, where x is the input connector and y is the output connector. Possible values of x and y are: A =N(F) B = N(M) C = LC(F) D = 7/8" Flange H = 7-16 DIN(F) J = 7-16 DIN(M) K = UHF(F) L = UHF(M)	L = 54 - 88 MHz F = 88 - 108 MHz H = 174 - 216 MHz U = 470 - 806 MHz	V = Very Low L = Low M = Medium H = High S = Very High	A = 470 - 554 MHz B = 554 - 638 MHz C = 638 - 722 MHz D = 722 - 866 MHz
1 = 1-5/8" Flanged 1U = 5/8" Unflanged "recessed" 1UF = 1-5/8" Unflanged "flush"			
3 = 3-1/8" Flanged 3U = 3-1/8" Unflanged "recessed" 3UF = 3-1/8" Unflanged "flush"			

Note: *Models TPM 3 x - LV and models TPM x - US are not offered for sale.*

Frequency Range - Model dependent. See table above

Forward Full scale Power - Model dependent. See table below.

Note: *Maximum safe line power may be lower than full scale power. See Line Section Max RF Power vs Frequency table on page 20 for recommended max safe line powers at the active frequency.*

Line Size	Power Range	Full scale (kW)
7/8”	Very Low	0.1
	Low	0.5
	Medium	1.0
	High	2.5
	Very High	5.0
1 - 5/8”	Very Low	0.5
	Low	1.0
	Medium	2.5
	High	5.0
	Very High	10.0
3 - 1/8”	Very Low	2.5
	Low	5.0
	Medium	10.0
	High	25.0
	Very High	50.0

RF Specs	
FWD / RFL Ratio	Reflected full scale power is 1/10 of forward full scale power.
Peak/Average Ratio	10 dB min*
Main Line Insertion Loss	0.2 dB max, 0.08 dB typical
Main Line VSWR	1.1 max
Testport VSWR	1.5 max, 1.3 typical
Accuracy	± 5% of reading (2s) after zeroing sensor, if calibrated by Bird. This does not include user mismatch uncertainty and user voltmeter uncertainty. If not calibrated by Bird, add the uncertainty of the calibration method and reference standard. Derate accuracy by 1% if not at 25 ± 10 °C.
Dynamic Range	16 dB min
Directivity, Rfl	26 dB min, 30 dB typical
Measurement type	In-line, true-average power
Calibration	Unit can be calibrated by user by adjusting pot to get 4V output for a full scale RF input.
Recommended Cal Interval	1 year

Note: *Peak to Average ratio is specified based on the full scale power of the specific TPM model. For example, a TPM with a full scale forward power rating of 1 kW will provide accurate readings for signals with peak powers up to 10 kW. If the TPM is operated below its full scale power rating, the peak / average rating will increase by the difference between the full scale value and the operating power.*

Example - *If a 1 kW TPM is operated at 700 W, the new peak/ average ratio would be 11.5 dB.*

Interface Specs	
Main line	Diameters and center conductor setbacks per Bird drawings.
Connectors	One DB9(M), three N(F)
DB9 connector pinout	
Pin 1 = "FWD"	Analog output for forward RF power. 0 – 5.0 Vdc proportional to RF power, 1 kohm impedance. full scale RF input = 4.0V output.
Pin 3 = "RFL"	Analog output for reflected RF power. 0 – 5.0 Vdc proportional to RF power, 1 kohm impedance. full scale RF input = 4.0V output.
Pin 5 = "Power"	Power supply input. +11 to +18 Vdc, < 0.1 A.
Pin 9 = "Zeroline"	Short this pin to ground to zero out any input offsets. Normally floating. Unit can be zeroed whenever the unit is powered up and there is no RF power being applied.
Pins 2,4,6–8 = GND	
N(F) Testports	Ports are labeled Forward, Test, and Reflected. Forward and reflected testports include attached loads. These testports must be terminated with the load, or some other good termination such as a power sensor, during normal operation to prevent measurement errors. Loads can removed from the unit if desired without affecting calibration.
Forward	Testport output is a sample of the forward RF signal.
Test	Testport output is a non-directional sample of the RF.
Reflected	Testport output is a sample of the reflected RF signal.

Environmental Specs	
Temperature, Operating	0 to +50 °C (32 to 122 °F)
Temperature, Storage	–20 to +80 °C (–4 to +176 °F)
Altitude, Max	3,000 m (10,000 ft) above sea level
Humidity, Max	95% non-condensing
CE	CE compliant
ROHS	ROHS compliant
Dimensions	See "Dimensions" on page 14.
Weight	See table below.

Line Size	Weight, Max
7/8"	3 lbs (1.5 kg)
1-5/8", unflanged	3.5 lbs (1.6 kg)
1-5/8", flanged	5.5 lbs (2.5 kg)
3-1/8", unflanged	4.5 lbs (2.0 kg)
3-1/8", flanged	8 lbs (3.6 ks)

Dimensions

Figure 10 VPM7

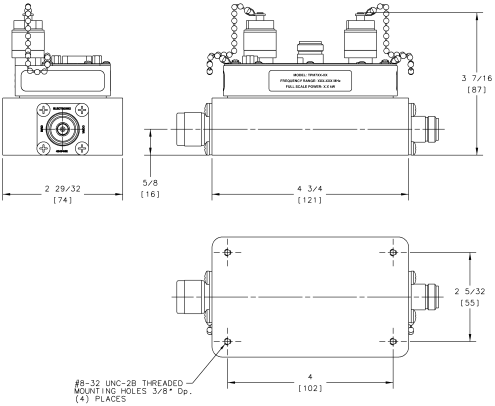


Figure 11 Unflanged 1-5/8" TPM

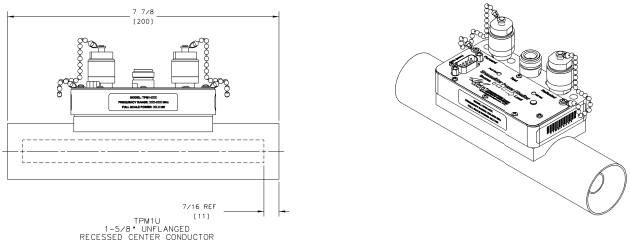


Figure 12 Flanged 1-5/8" TPM

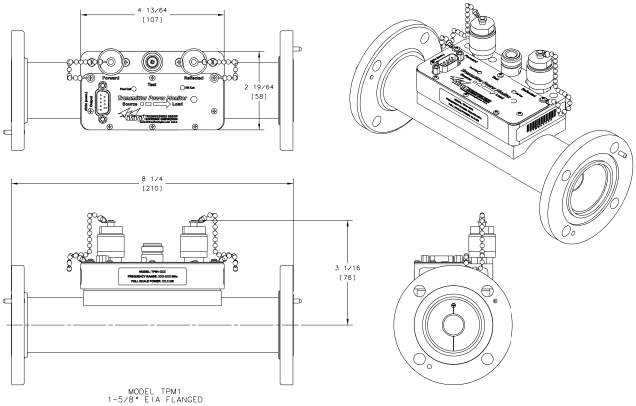


Figure 13 Unflanged 3-1/8” TPM

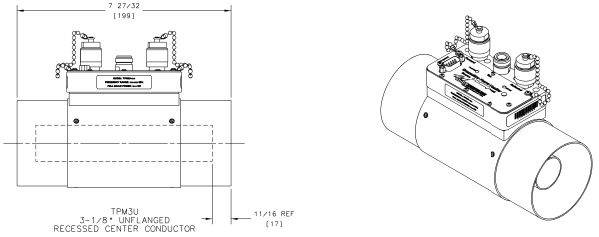
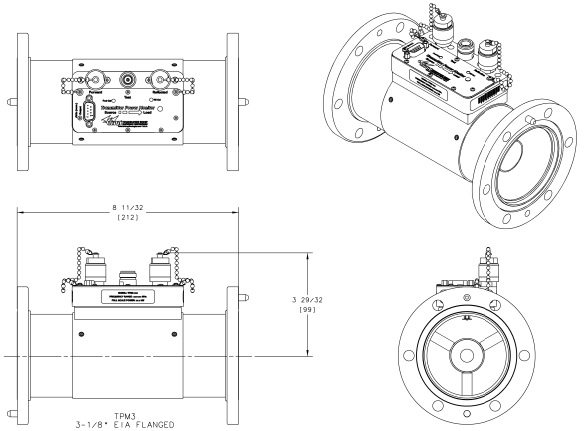


Figure 14 Flanged 3-1/8” TPM



3140A Meter Panel

General Specs	
Function	Provide power to multiple TPM units. Display Fwd and Rfl readings from one of the connected TPMs, chosen with a switch.
Models 3140A4 3140A8	 Supports up to 4 TPMs Supports up to 8 TPMs
Display	Two backlit analog meters. One displays forward power as measured on the selected TPM, the other displays reflected power. Which TPM's readings are displayed on the meters is controlled by a switch on the front panel.
Power requirements	Units are provided with Bird 5A2436 power supply. 5A2436 requires 115/230 Vac @ 50/60 Hz, < 1.0 A Panel requires 11 to 16 Vdc, < 1.0 A. Jack connector is compatible with 5A2436.
TPM Connectors	DB9(F), either 4 or 8 connectors on the back panel
DB9 Pinout	Same as TPM DB9 pinout
Calibration	Panel Meters can be calibrated independently of the TPMs. There is one user-adjustable pot for each meter.

Environmental Specs	
Temperature, Operating	0 to +50 °C (32 to 122 °F)
Temperature, Storage	–20 to +80 °C (–4 to +176 °F)
Altitude, Max	3,000 m (10,000 ft) above sea level
CE	CE compliant
ROHS	ROHS compliant
Dimensions	2U EIA
Weight, Max	2.5 lbs (1.0 kg)

Inspection and Cleaning

This unit requires only simple and routine maintenance.

> WARNING
> Disconnect the unit from the RF power source and the ac line before any disassembly. The potential for electrical shock exists.

> CAUTION
> Do not use harsh or abrasive detergents for cleaning.

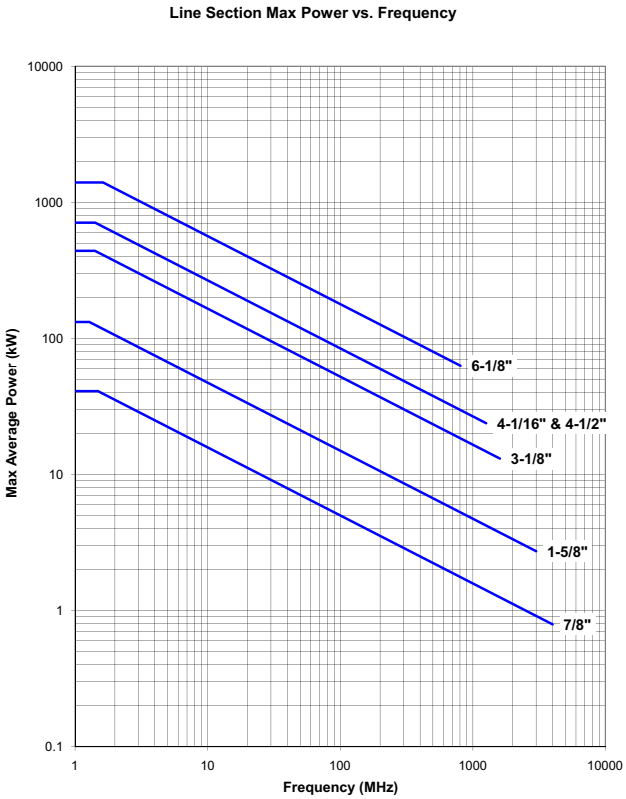
1. Wipe off dust and dirt regularly. Use a soft, clean cloth dampened with mild detergent.

Check connectors, connector pins, and cables for damage. If needed, clean the connectors using a self-drying contact cleaner that leaves no residue.

ROHS

Part Name	**Toxic or hazardous Substances and Elements**					
	Lead (Pb)	**Mercury (Hg)**	**Cadmium (Cd)**	**Hexavalent Chromium (Cr(VI))**	**Polybrominated biphenyls (PBB)**	**Polybrominated diphenyl ethers (PBDE)**
Copper Alloy	X	O	O	O	O	O

O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.
X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirements in SJ/T11363-2006.


Line Section Max Power vs. Frequency
Max Average Power (kW)
10000
1000
100
10
1
0.1
1
10
100
1000
10000
Frequency (MHz)
6-1/8"
4-1/16" & 4-1/2"
3-1/8"
1-5/8"
7/8"

Troubleshooting

The TPM has no operator serviceable parts. Any required service must be performed at an authorized service facility.

The table below contains troubleshooting information for problems which can occur during normal operation. This manual cannot list all malfunctions that may occur or their corrective actions. If a problem is not listed or is not corrected by the listed actions, notify a qualified service center.

Transmitter Power Monitor		
Problem	**Possible Cause**	**Correction**
Power LED does not illuminate	No DC power	Check power source, and cable
	Defective LED	Return the unit to an authorized service center
High VSWR	Dirty connectors	Clean connectors
	Defective connectors	Replace connectors
	Shorted or open transmission line	Have the line serviced.

3140 Panel		
Problem	**Possible Cause**	**Correction**
Display does not light	Unit is not turned on	Set AC Power Switch to ON
	Unit is not plugged in	Connect ac power cord

Parts List

Customer Replacement Part	Consists of	Description
RPK7006B112 - Replacement Digital Board	7006B112	Digital PC Board
	920-RPK7006B112	Instruction Sheet
RPK7006A1000 - Replacement Lid	7006A109	Metal Lid
	7006A124	Label
	5A2833-LPC020CTP	Light Pipe
	5A2833-RTN150	Rubber Ring
	920-RPK7000A1000	Instruction Sheet
2-T-MN-2 - Replacement Terminations	2-T-MN-2	Terminations
5A2211-2 - Replacement Calibration Data	5A2211-2	Data
5A2264-09-MF-25 Replacement Cable	5A2264-09-MF-25	Cable, 9-pin Male/ Female, 25 ft
6A340-ADJ - Calibration Adjustment Tool	6A340-ADJ	Calibration Tool
7006A250 - TPM Transfer Standard	7006A250	Calibration Standard

Customer Service

Any maintenance or service procedure beyond the scope of those in this chapter should be referred to a qualified service center.

If the unit needs to be returned for any reason, request an Return Material Authorization (RMA) through the Bird Technologies website. All instruments returned must be shipped prepaid and to the attention of the RMA number.

Bird Service Center
30303 Aurora Road
Cleveland (Solon), Ohio 44139-2794
Fax: (440) 248-5426
E-mail: *bsc@birdrf.com*

For the location of the Sales Office nearest you, visit our Web site at:

http://www.birdrf.com

Limited Warranty

All products manufactured by Seller are warranted to be free from defects in material and workmanship for a period of one (1) year, unless otherwise specified, from date of shipment and to conform to applicable specifications, drawings, blueprints and/or samples. Seller's sole obligation under these warranties shall be to issue credit, repair or replace any item or part thereof which is proved to be other than as warranted; no allowance shall be made for any labor charges of Buyer for replacement of parts, adjustment or repairs, or any other work, unless such charges are authorized in advance by Seller.

If Seller's products are claimed to be defective in material or workmanship or not to conform to specifications, drawings, blueprints and/or samples, Seller shall, upon prompt notice thereof, either examine the products where they are located or issue shipping instructions for return to Seller (transportation-charges prepaid by Buyer). In the event any of our products are proved to be other than as warranted, transportation costs (cheapest way) to and from Seller's plant, will be borne by Seller and reimbursement or credit will be made for amounts so expended by Buyer. Every such claim for breach of these warranties shall be deemed to be waived by Buyer unless made in writing within ten (10) days from the date of discovery of the defect.

The above warranties shall not extend to any products or parts thereof which have been subjected to any misuse or neglect, damaged by accident, rendered defective by reason of improper installation or by the performance of repairs or alterations outside of our plant, and shall not apply to any goods or parts thereof furnished by Buyer or acquired from others at Buyer's request and/or to Buyer's specifications. Routine (regularly required) calibration is not covered under this limited warranty. In addition, Seller's warranties do not extend to the failure of tubes, transistors, fuses and batteries, or to other equipment and parts manufactured by others except to the extent of the original manufacturer's warranty to Seller.

The obligations under the foregoing warranties are limited to the precise terms thereof. These warranties provide exclusive remedies, expressly in lieu of all other remedies including claims for special or consequential damages. SELLER NEITHER MAKES NOR ASSUMES ANY OTHER WARRANTY WHATSOEVER, WHETHER EXPRESS, STATUTORY, OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS, AND NO PERSON IS AUTHORIZED TO ASSUME FOR SELLER ANY OBLIGATION OR LIABILITY NOT STRICTLY IN ACCORDANCE WITH THE FOREGOING.