
INSTRUCTION BOOK

OPERATING INSTRUCTIONS

**SERIES 4201 MULTI-CHANNEL
RF DIRECTIONAL
THRULINE[®] WATTMETER**

BIRD

Electronic Corporation
Cleveland (Solon) Ohio USA

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Instruction Book Part Number 920-4201S Revision A

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Safety Precautions

General 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.

Keep Away From Live Circuits

Operating personnel must at all times observe general safety precautions. Do not replace components inside equipment with the high voltage supply turned on. To avoid casualties, always remove power.

Shock Hazard

Do not attempt to disconnect an RF transmission line while RF power is present. Radiated RF power is a potential health hazard.

Resuscitation

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

Safety Symbols

WARNING


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

CAUTION

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



This symbol appears on the equipment indicating there is important information in the instruction manual regarding that particular area.

 Note: Calls attention to supplemental information.

Series 4201 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

Leaking RF energy is a potential health hazard. Never attempt to connect or disconnect equipment from the transmission line while RF power is being applied. Severe burns, electrical shock, or death can occur.

Series 4201 Caution Statements

The following equipment cautions appear in the text whenever the equipment is in danger of damage and are repeated here for emphasis.

CAUTION

Do not drop the instrument or Plug-In elements. The meter may be damaged, or the accuracy of the elements could be affected.

CAUTION

Do not attempt to check the microammeters with an ohmmeter. Damage to the movement or pointer will result.



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 PROIZIONE 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 HACERLO.

WARTUNG

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

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

ENTRETIEN

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 instruction book covers the Series 4201 Multi-Channel RF Directional Wattmeters. Specifically, the Models 4201A501, 4201A502, 4201A503, and 4201A504.

This instruction book is arranged so that essential information on safety appears in the front of the book. Reading the Safety Precautions section before operating the equipment is strongly advised.

The remainder of this instruction book is divided into Chapters. At the beginning of each chapter, a general overview describes the contents of that chapter.

Operation

First time users should read Chapter 1 - Introduction, and Chapter 2 - Installation, to get an overview of equipment capabilities and installation. An experienced operator can refer to Chapter 3 - Operating Instructions. All instructions necessary to operate the equipment appear in this chapter.

Maintenance

All personnel should be familiar with preventative maintenance found in Chapter 4 - Maintenance. If a failure should occur, the troubleshooting section will aid in isolating and repairing the failure.

Parts

For location of major assemblies or parts, refer to the parts lists and associated drawings in Chapter 4 - Maintenance.

Changes To This Manual

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

Table Of Contents

Safety Precautions.	i
Warning Statements.	ii
Caution Statements.	iii
About This Manual.	v
Introduction.	1
Wattmeter.	1
Purpose and Function.	1
Theory of Operation.	1
Specifications.	2
Models: 4201A501, 4201A502.	2
Models: 4201A503, 4201A504.	2
Items Required But Not Supplied.	2
Models: 4201A501, 4201A502.	2
Models: 4201A503, 4201A504.	2
Power Sensors.	4
Specifications.	4
Installation.	5
Site and Shelter Requirements.	5
Unpacking and Inspection.	5
Tools Required.	5
Power Sensor or Line Section.	5
Installation of Meter.	6
Phono Plugs.	6
Operating Instructions.	9
Description of Controls.	9
Models 4201A501 and 4201A503.	9
Models 4201A502 and 4201A504.	9
Zeroing Meters.	10
Using The Wattmeter.	10

Models 4201A501 and 4201A502.	10
Models 4201A503 and 4201A504.	10
VSWR Conversion Nomograph.	11
Maintenance.	13
General.	13
Customer Service.	13
Sales/Repair Facility.	13
Sales Facilities.	13
Troubleshooting.	14
Replacement Parts.	14
Cleaning.	15
Meter Replacement.	15
Cable Replacement.	15
4201A003.	15
4201A004.	16

Wattmeter

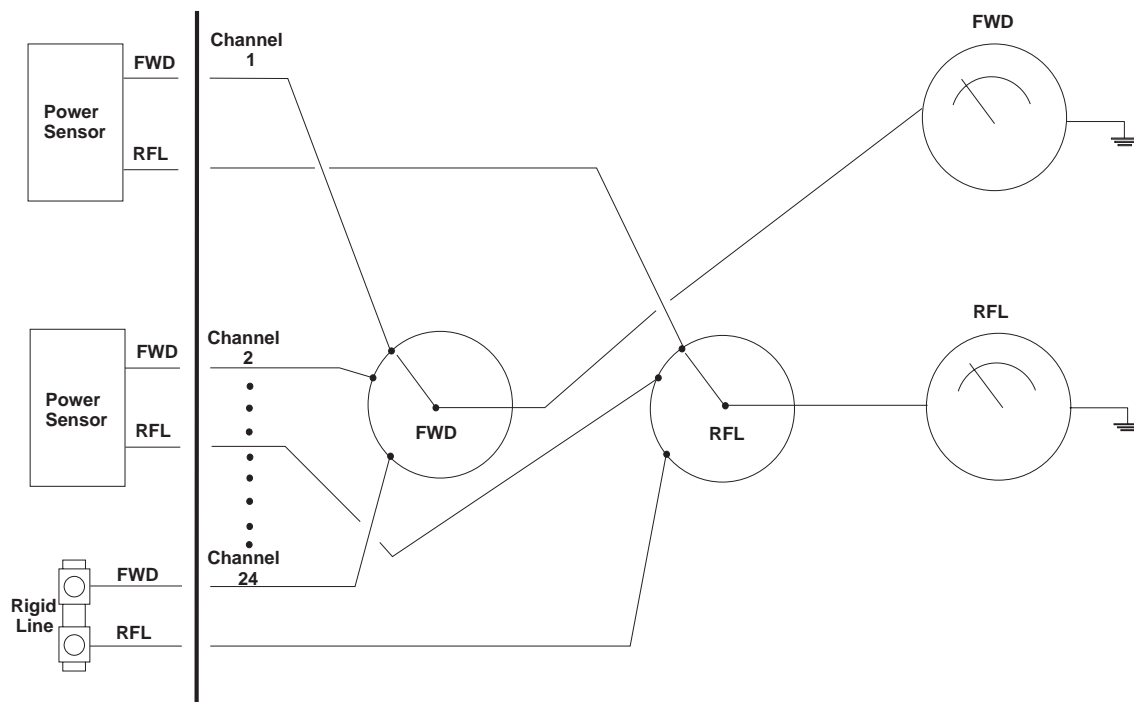
Purpose and Function

The 4201 Series Multi-Channel RF Directional Wattmeter is used in conjunction with Bird Power Sensors, or rigid line sections and elements. Together these components build a RF power measurement system capable of displaying RF power of up to 24 transmitters, depending on the model used. Dual meters simultaneously display forward and reflected power in a 50 ohm transmission line.

Theory of Operation

The Series 4201 Multi-Channel Wattmeter accepts dc inputs from remotely located Bird Power Sensors, or rigid line sections with elements. Forward and reflected signals are applied to a manual switching network which selects one of 12 or 24 channels. The output of the switching network is connected to the meters for direct readout. The meter scaling is in accordance with input requirements and must be the same for all inputs to the wattmeter. Refer to figure 1.

Figure 1
Block Diagram



The Model 4201 wattmeter is a panel mount type. These units are intended for fixed installation, generally in rack mounts requiring 19 inch panels. A slotted screw is provided on the lower front face of the meter for zeroing the pointer. The rotary switch (or switches) on the front of the panel, is for selecting the channel to be monitored. The Models 4201A501 and 4201A502 have an enable/disable push button switch. The Models 4201A503 and 4201A504 have an A/B push button switch.

Specifications

Model	Channels	Meter Scale	Each Transmitter Requires
4201A501	24	25/50/100 W	Dual Rigid Line Section and Elements
4201A502	12	25/50/100 W	Dual Rigid Line Section and Elements
4201A503	24	15/30/60 W	Power Sensor
4201A504	12	15/30/60 W	Power Sensor

**Models: 4201A501,
4201A502**

Power Range	10 mW to 10 kW using Bird Plug-In-Elements
Freq. Range	450 kHz to 2.7 GHz (dependent on elements)
Accuracy	± 5% of full scale
Meter Scales	FWD and RFL 25/500/100 W
Meter Sensitivity	30 μ A/1400 Ω
Front Panel Controls	One or two rotary channel selector switches, channel A/B push button on the 24 channel unit, enable/disable push button on the 12 channel unit.
Connectors	RCA Phono Jacks
Finish	Grey Powder Coat
Nominal Size	19" W x 5-7/32" H x 5" D (483 x 133 x 127 mm)
Nominal Weight	
4201A501	3 lbs., 11 oz. (1.67 kg)
4201A502	2 lbs. 14 oz. (1.3 kg)

**Models: 4201A503,
4201A504**

Power Range	Power Sensor Dependent
Freq. Range	Power Sensor Dependent
Accuracy	± 5% of full scale
Meter Scales	FWD and RFL 15/30/60 W
Meter Sensitivity	30 μ A/1400 Ω
Front Panel Controls	One or two rotary channel selector switches, channel A/B push button on 24 channel, enable/disable push button on 12 channel.
Connectors	RCA Phono Jacks
Finish	Grey Powder Coat
Nominal Size	19" W x 5-7/32" H x 5" D (483 x 133 x 127 mm)
Nominal Weight:	
4201A503	3 lbs. 11 oz. (1.67 kg)
4201A504	2 lbs. 14 oz. (1.3 kg)

Items Required But Not Supplied

**Models: 4201A501,
4201A502**

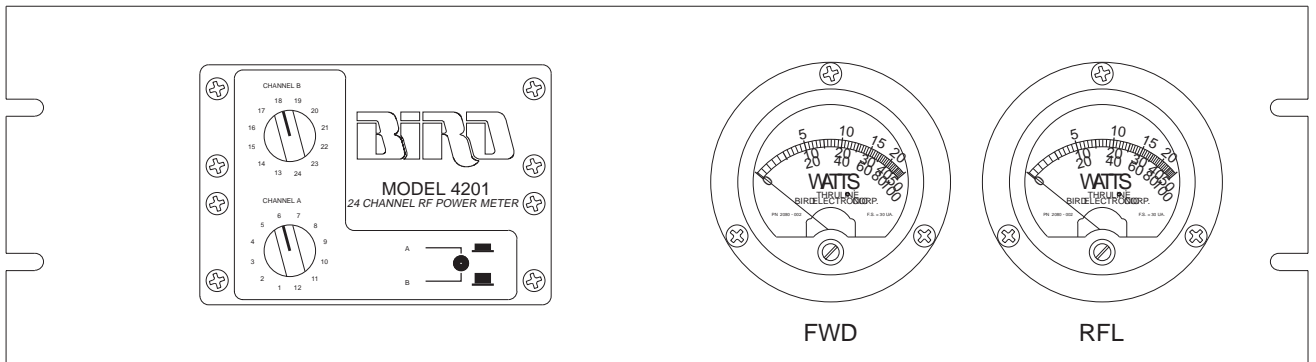
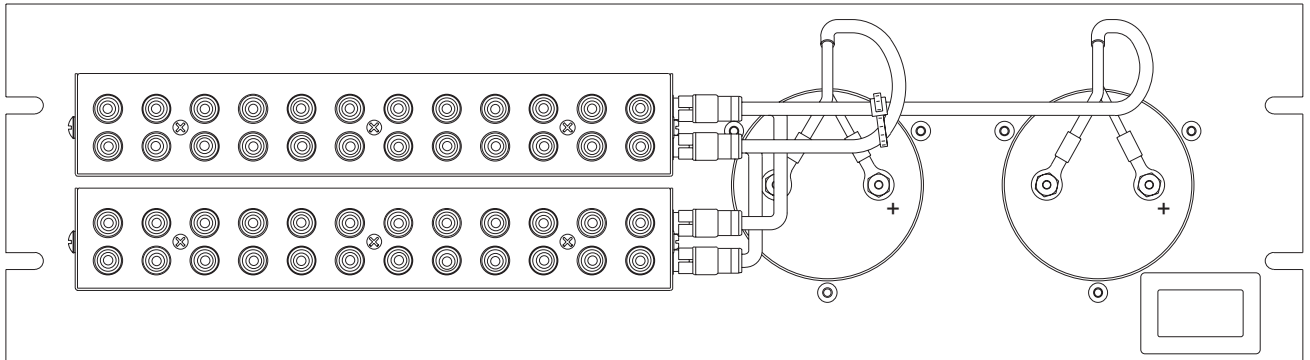
Line Section: 4230-053 or 4522-002-5
 Elements: Contact bird Electronic Corporation
 Cables: 10 ft. — 4201A008-1, 15 ft. — 4201A008-2, 25 ft. — 4201A008-3

**Models: 4201A503,
4201A504**

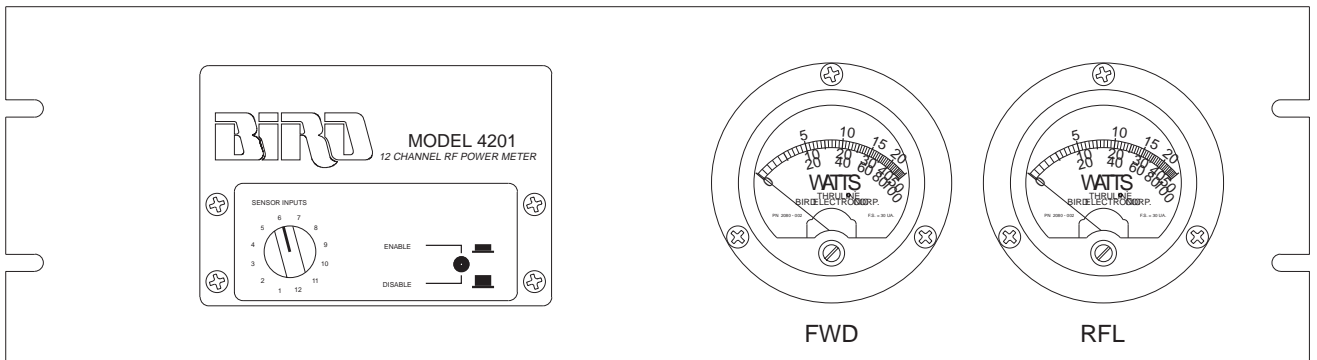
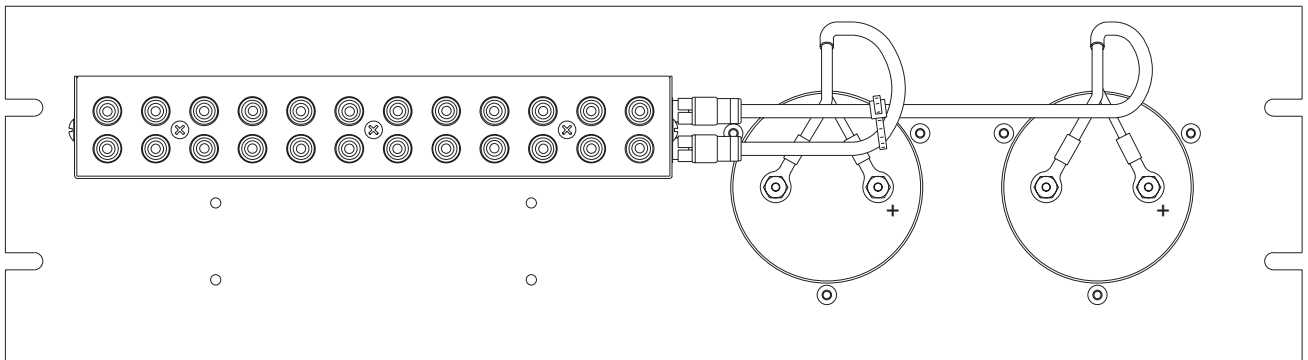
Power Sensor: Contact Bird Electronic Corporation
 Cables: 10 ft. — 4201A007-1, 15 ft. — 4201A007-2, 25 ft. — 4201A007-3

Series 4201 Outline Drawing

Models 4201A501 and 4201A503



Models 4201A502 and 4201A504



Power Sensors

Power Sensors, for use with Models 4201A503 and 4201A504 Series Wattmeters, currently available are listed below.

Specifications

Model	FWD Max. Power	RFL Max. Power	Frequency Range
4152-220	150 W	15 W	30-88 MHz
4163-240	150 W	15 W	118-250 MHz
4164-240	150 W	15 W	420-512 MHz
4169-300	60 W	6 W	805-960 MHz

Insertion VSWR	1.1 max.
Insertion Loss	0.2 dB
Directivity	25 dB min.
Accuracy	± 5% of full scale
Connectors:	
RF Input	Female N
RF Output	Female N
DC Outputs	Solder Lugs
Finish	Grey Powder Coat
Nominal Size (Including connector)	4-1/2" W x 1-1/4" H x 1" D (114 mm x 32 mm x 25 mm)
Nominal Weight	4.5 oz. (128 grams)

This chapter provides information for on site requirements, unpacking, inspection, and preparing the equipment for use.

The 4201 Series Multi-Channel RF Wattmeter is designed to be used with either rigid line sections and elements, or power sensors. Throughout this section, refer to the instructions that apply to your system.

Site and Shelter Requirements

The 4201 Series Wattmeter should not be used outdoors or in areas of condensing humidity.

Unpacking and Inspection

Follow the steps below when unpacking the equipment.

1. Inspect the shipping container for signs of damage. If damage is noticed, do not unpack the equipment. Immediately notify the shipping carrier and Bird Electronic Corporation of the damage.
2. If the shipping container is not damaged, unpack the unit. Save all shipping materials for repackaging.
3. Inspect all components for visual signs of damage. Immediately notify the shipping carrier and Bird Electronic Corporation of equipment damage or missing parts.

Tools Required

- ♦ Screwdriver
- ♦ Soldering Iron - For connecting meter to power sensor.

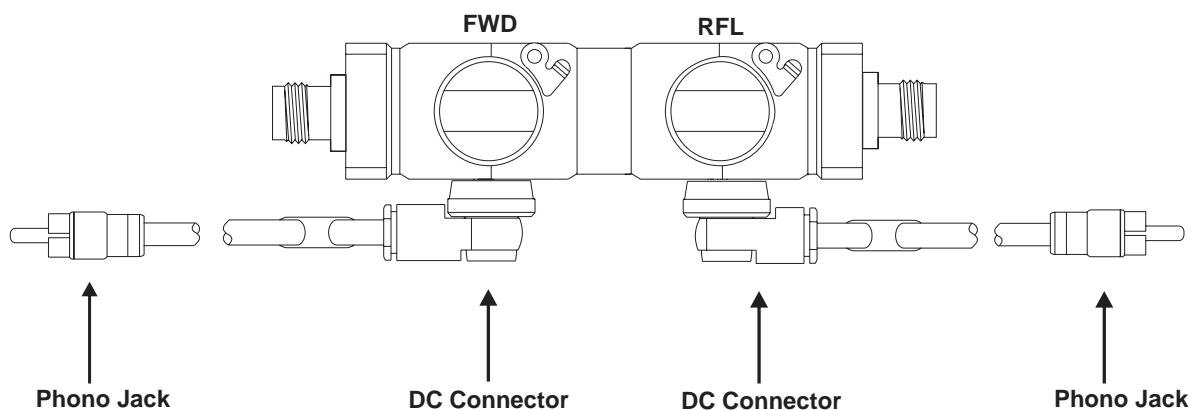
WARNING

Leaking RF energy is a potential health hazard. Never attempt to connect or disconnect equipment from the transmission line while RF power is being applied. Severe burns, electrical shock, or death can occur.

Power Sensor or Line Section

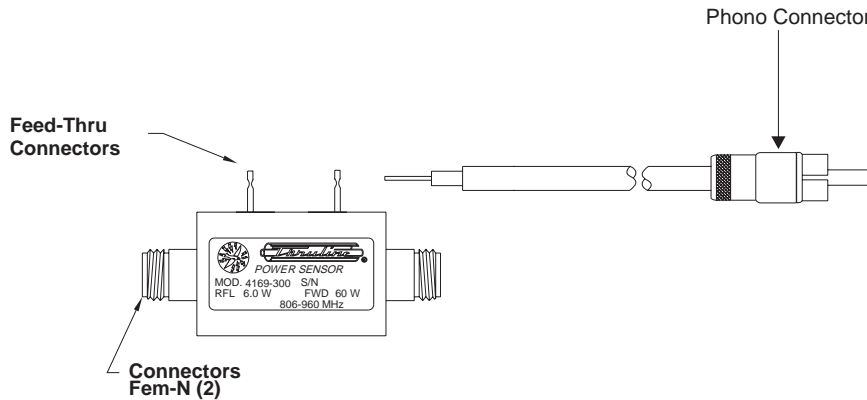
1. If you are using a line section, screw the dc connector of each cable onto the line section. Repeat for each transmitter. Refer to figure 2.

*Figure 2
Line
Section
and Cable.*



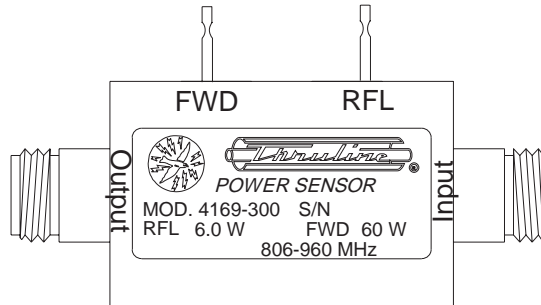
2. If you are using power sensors, attach the cables to the power sensors. Attach the forward meter cable to the forward feed-thru on the power sensors, and the reflected meter cable to the reflected feed-thru. Attach by soldering the cable to the feed-thru. Repeat for each transmitter. Refer to figure 3.

Figure 3
Power
Sensor and
Cable



3. Install the line sections, or power sensors, into the transmission lines. Refer to figure 4 for the proper direction of installation.

Figure 4
Forward and
Reflected
Designations



CAUTION
Do not drop the instrument or Plug-In Elements. The meter may be damaged, or the accuracy of the elements could be affected.

Installation of Meter

The wattmeter is for rack mount purposes. Four machine screws fasten the wattmeter panel in the selected position on a relay rack, using the pattern of tapped holes regularly provided in standard racks. Follow these instructions for mounting.

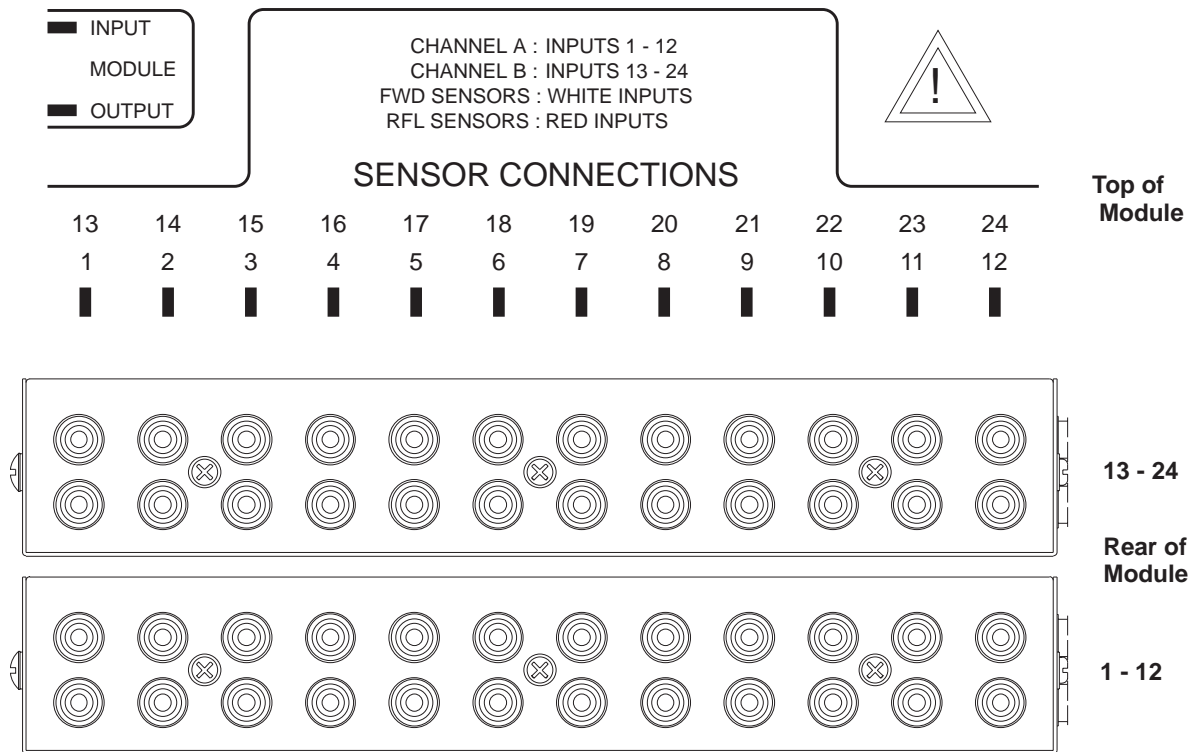
1. Choose a location for easy reading and operation of the wattmeter. Place the wattmeter where the cable lengths will be short and can be installed without tight bends in the cables.
2. Using the four screws, install the wattmeter to the rack. Make sure all connections are secure.

Phono Plugs

The phono plugs are color coded for ease of installation. Forward inputs are white, Reflected inputs are red.

Note: Make sure to attach the forward meter to the forward side of the line section or power sensor. Attach the reflected meter to the reflected side of the line section or power sensor.

Figure 5
Input
Designations



On the top of the module, the sensor connections are labeled. The inputs are on the rear of the module. Models 4201A502 and 4201A504 have 12 sets of phono jacks, while the models 4201A501 and 4201A503 have 24 sets. Refer to figure 5. Follow the instructions below to install the cables

1. Push the cable phono plugs into the phono inputs on the rear of the wattmeter.
2. Make sure there are no sharp bends in the cables.

The line section (if used) must have two elements installed in it. One for the forward direction and one for the reflected direction. Choose the correct frequency and power rated elements for your system. Contact Bird Electronic Corporation for more information.

A description of all operator controls and indicators are provided in this chapter. Read and become familiar with the following instructions *before* operating the wattmeter.

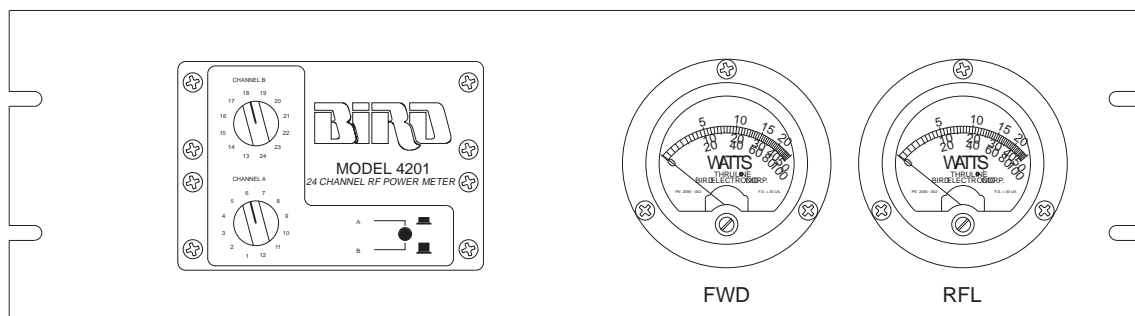
Description of Controls

The controls of the wattmeter are on the front of the unit. Refer to the proper section for your model.

Models 4201A501 and 4201A503

These models have 24 channels for transmitters. They have two rotary channel selector switches and a channel A/B push button. Refer to figure 6.

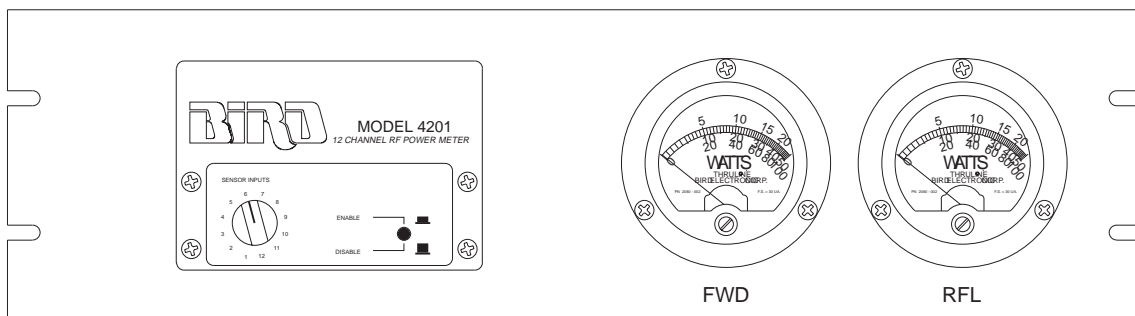
Figure 6
Front Panel of
Model
4201A501



Models 4201A502 and 4201A504

These models have 12 channels for transmitters. They have one rotary channel selector switch and an enable/disable push button. Refer to figure 7.

Figure 7
Front Panel of
Model
4201A502

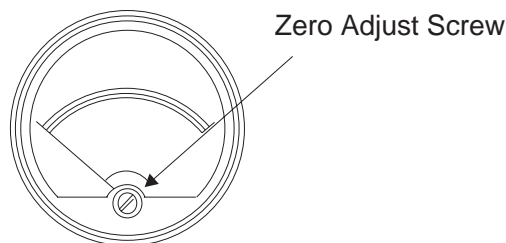


All models include two meters for simultaneous display of forward and reflected power at $\pm 5\%$ of full scale.

Zeroing Meters

Before any power measurements are made, be sure the pointer rests on the zero mark. If not, adjust the zero adjustment screw clockwise or counterclockwise until the pointer rests on the zero mark. The adjusting screw is located at the bottom center of the meter bezel face. Perform this adjustment, if needed, on both meters. Refer to figure 8.

Figure 8
Zero
Adjustment



Using The Wattmeter

Models 4201A501 and 4201A502

Operation of the Wattmeter using line sections and elements.

1. Make sure the Plug-In-Elements, in the line sections of the transmission lines, are properly positioned and directed.
2. Turn the switch, or switches, to a channel that is connected to the transmitter to be monitored. If applicable, press the push button to enable.
3. Turn on the transmitter.
4. Read the actual power values directly on the meters. The wattmeters have triple-range scales on both the forward and reflected powers. The full scale value shown on the element cap determines the power scale to be read.

Models 4201A503 and 4201A504

Operation of the Wattmeter using Power Sensors.

1. Make sure the power sensors are properly positioned and directed in the transmission line
2. Turn the switch, or switches, to a channel that is connected to the transmitter to be monitored. If applicable, press the push button to enable.
3. Turn on the transmitter.
4. Read the actual power values directly on the meters. The wattmeters have triple-range scales on both the forward and reflected powers.

The Multi-Channel Wattmeter provides continuous, uninterrupted observation of the RF transmission equipment's performance. The advantage of simultaneous surveillance of the meters is that the indication is always present without having to rotate the Plug-In-Element to obtain forward or reflected power values. The forward/reverse RF power ratio is readily calculated from the readings, and the VSWR may be determined from figures 9 and 10.

**VSWR Conversion
Nomograph**

Using the VSWR Nomograph, determine the intersection of the forward and reflected power values. The slanted line passing closest to this point indicates the VSWR.

Figure 9
VSWR Conversion Nomograph

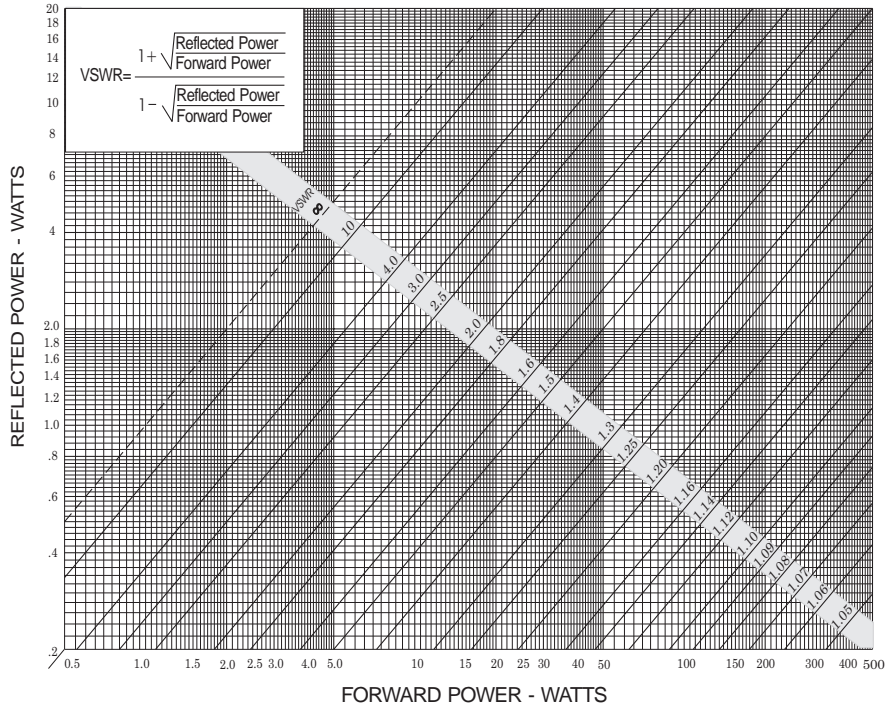
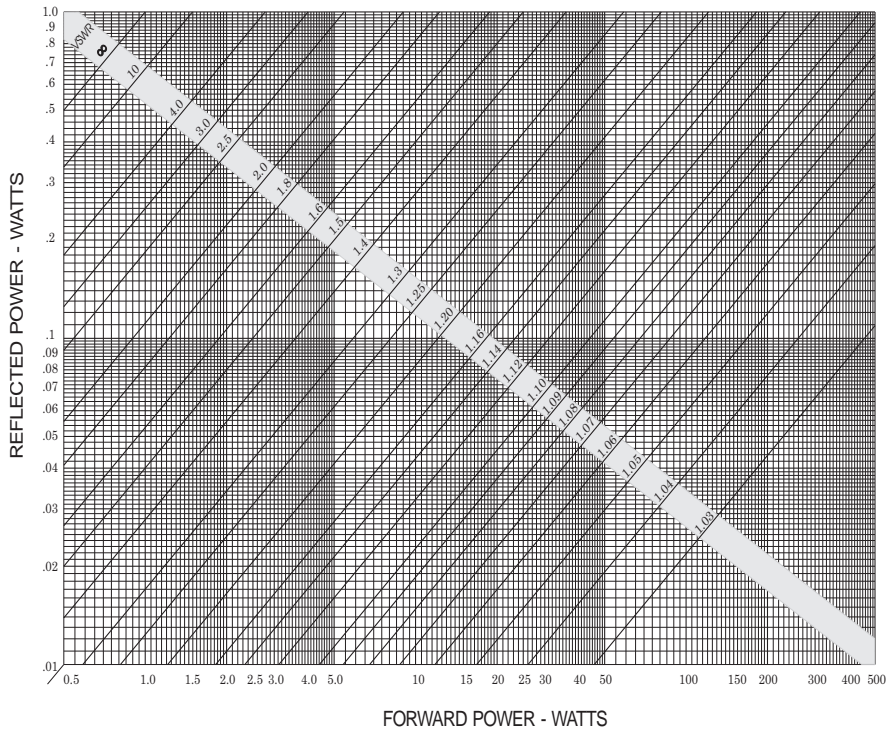


Figure 10
VSWR Conversion Nomograph



General This chapter includes cleaning, inspection, troubleshooting, and performance information.

The Wattmeter Models 4201A501, 4201A502, 4201A503, and 4201A504 require only simple, and routine maintenance such as the following:

- ♦ Avoid subjecting the wattmeter to rough treatment.
- ♦ Wipe off dust and dirt regularly.
- ♦ Check connectors for damage.
- ♦ Inspect all cables for damage.

Customer Service

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

All instruments returned for service must be shipped prepaid and to the attention of the Customer Service Group.

Sales/Repair Facility **U.S.A. Sales and Manufacturing**
Service Group
Bird Electronic Corporation
30303 Aurora Road
Cleveland (Solon), Ohio 44139-2794
Phone: (440) 248-1200
Fax: (440) 248-5426

Sales Facilities For the location of the sales office nearest you, give us a call, or visit our Web site at:

<http://www.bird-electronic.com>

Troubleshooting

Use the following table to aid in isolating problems, their cause, and possible corrections.

Table 1
Troubleshooting Table

Problem	Possible Cause	Correction
Meter does not indicate power	No transmitted power.	Turn on power source.
	No connection from signal source to input channels of wattmeter.	Connect remote signal source to input connector on rear of unit.
	Poor contact between mating connectors.	Check and clean all surfaces of mating connector parts.
	Broken or damaged cable connection.	Visual inspection of all cables and connections. Repair or replace where necessary.
	Channel selector switch on wrong channel.	Select proper channel.
	Meter is damaged.	Replace the meter.
Meter power reading is incorrect.	Meter is not zeroed.	Zero the meter.
	Output from sensor or element does not match meter scale.	Change sensor or element to one with the proper output to match the scale.
		Change wattmeter to one with the proper meter scales.

Replacement Parts

This section provides the user with spare parts lists. Quantities used in the wattmeter are listed. Refer to the tables below.

Table 2
Model 4201A501
Replacement Parts

Qty.	Description	Part Number
2	Cable, Interconn. / Assy.	4201A004
2	Cable, Meter / Assy.	4201A003
2	Meter 25/50/100 W	2080-002

Table 3
Model 4201A502
Replacement Parts

Qty.	Description	Part Number
2	Cable, Meter / Assy.	4201A003
2	Meter 25/50/100 W	2080-002

Table 4
Model 4201A503
Replacement Parts

Qty.	Description	Part Number
2	Cable, Interconn. / Assy.	4201A004
2	Cable, Meter / Assy.	4201A003
2	Meter 15/30/60 W	2080A069


Table 5
Model 4201A504
Replacement Parts

Qty.	Description	Part Number
2	Cable, Meter / Assy.	4201A003
2	Meter 15/30/60 W	2080A069

Cleaning

The outside surface of the unit may be cleaned occasionally with a soft cloth dampened with a mild detergent solution.

Clean the connectors frequently with alcohol, or an acceptable dry cleaning solvent that does not leave a residue.

 Note: Do not wipe the meter glass with a dry cloth, a static charge will develop and cause an erroneous indication on the meter scale.

Meter Replacement

CAUTION


Do not attempt to check the microammeters with an ohmmeter. Damage to the movement or pointer will result.

WARNING

Leaking RF energy is a potential health hazard. Never attempt to connect or disconnect equipment from the transmission line while RF power is being applied. Severe burns, electrical shock, or death can occur.

The microammeters (meters) are accurate and reliable current measuring instruments which should give long, trouble-free service. The meters are not field repairable, but may be replaced using the following procedure.

1. Use a screwdriver and remove the four screws for rack mounting.
2. Remove the leads, making note of the wire locations.
3. Remove the three screws holding the meter in place.
4. Remove the defective meter and replace with the new one.
5. Install the three screws previously removed.
6. Install the leads, making sure of correct polarity.
7. Install the panel into the rack.

 Note: The new meter may need to be zeroed before use. Refer to the zeroing meters section earlier in this chapter.

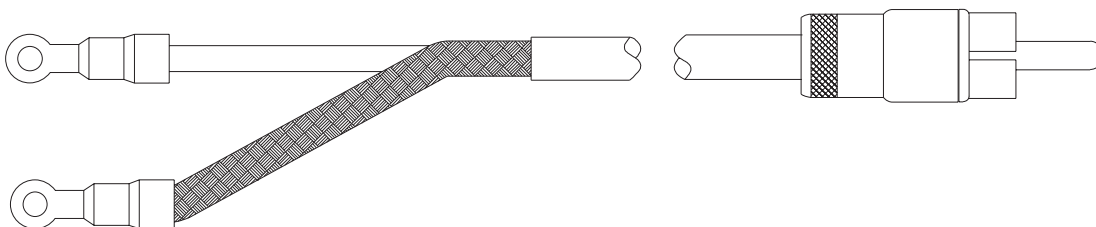
Cable Replacement

The cables, used on these models, are replaceable. If clarification of the cable connections is necessary, refer to figure 1 (Block Diagram).

4201A003

The 4201A003 cable is used from the meter to the phono jacks. Each unit uses two of these cables, refer to figure 11. To replace the cable or cables, use the following instructions.

Figure 11
4201A003 Cable

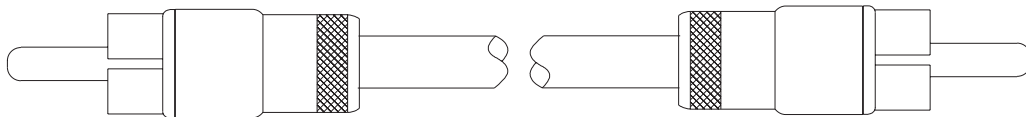


1. Remove the meter from the rack by removing the four screws holding the panel in place.
2. Remove the leads from the meter, make a note of the locations.
3. Remove the leads from the phono jacks.
4. Attach the new cable to the meter.
5. Push the cable plug into the phono jack.
6. Repeat if necessary with the second cable.
7. Install the panel in the rack, using the four screws removed previously.

4201A004 The 4201A004 cables are also replaceable. Two of these cables are used per unit. The 4201A004 cable is an interconnecting cable used between the Input and the Output on the module. For identification, refer to figure 12. Replace by following the instructions below.

1. Remove the defective cable by pulling the plugs out of the phono jacks.
2. Label the locations if replacing more than one cable.
3. Install the new cable by pushing the plugs into the same phono jacks as used by the defective cable.

Figure 12
4201A004
Interconnecting
Cable



If the problem is not corrected by any of the remedies in this chapter, contact a qualified service center.

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. 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.