
INSTRUCTION BOOK

**GE MEDICAL
3T POWER MEASUREMENT KIT**

Per GE Spec No. 5307511PSP

Prior approval required before making any changes that affect form, fit, or function. Release of manual changes required at least 15 days before delivery of changed product. Send 2 hard copies and 1 pdf to:

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GE Medical Systems

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BIRD[®]

**Electronic Corporation
Cleveland (Solon) Ohio USA**

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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 normal safety regulations. Do not replace components or make adjustments inside the equipment with high voltage turned on. To avoid casualties, always remove power.

Shock Hazard

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

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.

Chemical Hazard

Dry cleaning solvents for cleaning parts may be potentially dangerous. Avoid inhalation of fumes or prolonged contact with skin.

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.

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 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.



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



This symbol indicates that the unit radiates heat and should not be touched while hot.

 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

Never attempt to connect or disconnect RF equipment from the transmission line while RF power is being applied.
Leaking RF energy is a potential health hazard.

WARNING

Disconnect from external power before any disassembly.
The potential for electric shock exists.

WARNING

Load may be hot. Allow load to cool before touching.

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

Use a Bird adapter only and do not use the adapter with the batteries removed.

CAUTION

Make sure the load's fans are running before applying RF power. Failure to do so will damage the load and other system components.

CAUTION

Always turn off the DPM before connecting or disconnecting a sensor.

CAUTION

Packing foam may melt if heated. Allow load to cool before packing.

CAUTION

Cooling without fans running will damage load.

CAUTION

Harsh or abrasive detergents and some solvents can damage the display unit and information on the labels.

CAUTION

Replace only with Ni-MH rechargeable A batteries. Nominal Voltage 1.2V; Capacity 2700mAh. Use Bird P/N 5A2549, five per unit, or equivalent.

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 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.



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

DE LA TENSION H.F. PEUT 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.

PUEDA 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 guides users through the operation and maintenance of the GE Medical 3T Power Measurement Kit (GE3TKIT), including the Bird 5000-EX Digital Power Meter (DPM), Bird 5010G Directional Power Sensor (DPS) and Bird 8581A Forced-Air Load.

Typography

There are two types of keys on the DPM. A hard key has a specific function which is indicated on the key. The key names for hard keys are set in bold typeface, e.g. *Press the **ON** key.*

Speed keys, which are under the display, have a different label depending upon the function selected. The names appear at the bottom of the display, directly above the corresponding key. The key names for speed keys are set in bold italic typeface, e.g. *Press the **SCALE** Key.*

Chapter Layout

Introduction — Lists and describes the components of the kit. Also identifies the parts of the DPM, describes the functions of the keys, and explains the meaning of indicators which may be displayed.

Setup — Gives directions for setting up the kit and connecting the DPM, DPS, and load.

Operation — Explains how to make measurements with the DPM, and the special functions used with specific sensors.

Maintenance — Lists routine maintenance tasks for the kit, and troubleshooting tips for common problems. Specifications and battery information are also included.

Changes to this Manual

We have made every effort to ensure this manual is accurate at the time of publication. 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.

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The GE Medical 3T Power Measurement Kit is designed for use in the calibration and testing of MRI equipment.

Items Supplied

The 3T Power Measurement Kit has the following components:

Carrying Case — Hard case for storage of the kit. Wheeled for easier transport.

Bird 5000-EX (DPM) — Digital power meter used with the DPS. Has internal batteries, can also be powered from ac adapter. Can display average or peak power, forward and reflected power, and return loss.

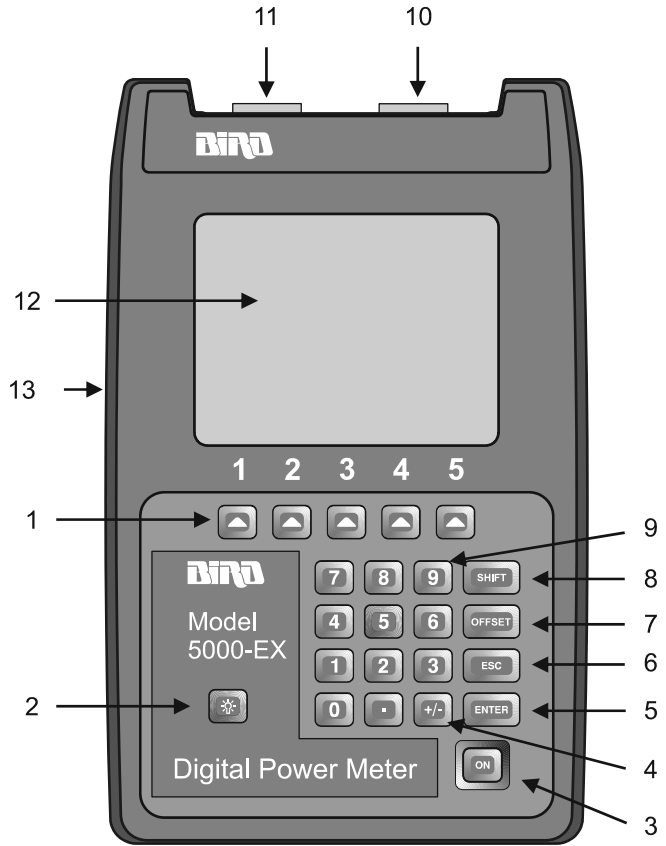
Bird 5010G (DPS) — Directional power sensor used with the DPM. Thruline measurement. Bird 43-Type Elements are provided. Can also use Bird APM-Type elements.

Bird 8581A Forced-Air Load — Forced-air cooled load. The load fans are powered from an ac adapter. The load has no controls - fans turn on as soon as the load is plugged in.

Assorted elements, cables, and adapters are also included in the kit (See “Parts List” on page 18 for an exploded view and a complete list).

DPM Keys and Connections

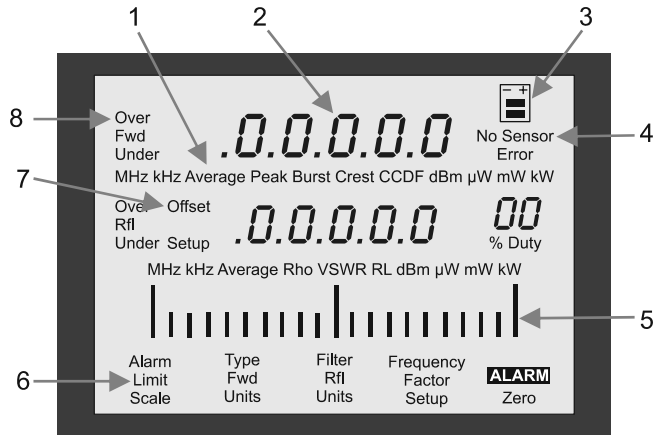
Figure 1
DPM Keys



1. **Speed Keys** Activates the command displayed above it.
2. **Backlight Key** Turns the backlight on momentarily.
3. **On Key** Turns the DPM on or off.
4. **+/- Key** Toggles between positive and negative numbers.
Toggles between the first and second set of speed key functions.
5. **Enter Key** Completes data entry.
6. **Escape Key** Aborts data entry without accepting changes.
7. **Offset Key** Enter offset values in dB.
8. **Shift Key** Toggles between different sets of speed key functions.
9. **Numeric Keys** Input numeric values.
10. **Sensor Port** Connection for power sensors.
11. **RS-232 Port** Connection for an optional PC 9-pin RS-232 (DB9) connector, compatible with PC serial port. 9600 baud, 8 data bits, 1 stop bit, and no parity.
12. **LCD Display** Backlit liquid crystal display.
13. **External DC Connector** Connection for the ac adapter. External supplies power the unit and charge the internal battery.

DPM Display

Figure 2
DPM Display



1. **Display Units** Shows the measurement mode and units for the display directly above.
2. **Display** The DPM has two measurement displays. The top displays forward average power, peak power, or the average of the max. and min. peaks. The bottom displays reflected power and reflection measurement (VSWR).
3. **Battery Level Indicator** When the external adapter is connected, the indicator blinks until the battery is fully charged. When using the battery, the indicator is on continuously and the black bars show the battery charge remaining. When the battery is low, the indicator will be empty and will blink. Recharge the batteries.
4. **No Sensor Indicator** Turns on when no sensor is connected to the sensor port.
5. **Analog Bar Graph** Proportional to the forward average power. Minimum at 0 W or -20 dBm. Max at full scale power.

- 6. **Speed Key Labels** Press the speed key below the label to activate the displayed function.
- 7. **Offset Indicator** Blinks when an offset is in use.
- 8. **Power Indicator** If the power exceeds 100% of full scale, “Over” will be displayed. If the power is less than zero, “Under” will be displayed. If the power exceeds 120% of full scale, the display will show a line of dashes and the bar scale will be filled.

Speed Keys

Set 1 These speed keys are initially displayed when a DPS is first connected. Press **SHIFT** to switch to Set 2.

Scale —Sets the forward full scale power. This is listed on the forward element’s nameplate. Reflected full scale power is automatically set to 10 dB below the forward full scale.

Fwd Units —Selects the units for the major display.

Rfl Units —Selects the units for the minor display.

Set 2 Press **SHIFT** to switch to Set 1.

Type —Sets the power measurement mode. Bird 43 Elements can measure average, peak, and average of max. and min. power. Bird APM Elements can only measure average power.


Setup —Sets the element type. Press **Type** to switch between 43 (default) and APM elements. Press **ENTER** when done.

To set up the kit to make measurements, follow the steps below. They are described in detail later in this chapter.

1. Turn off the signal source.
2. Connect the load to an ac supply and check that the fans turn on.
3. Connect the source to the power sensor (DPS), the DPS to the load, and the DPS to the meter (DPM).
4. Put the appropriate elements in the DPS.
5. Turn on the DPM and set the full scale power.

Power Supply

DPM The Bird DPM uses a rechargeable Nickel-Metal Hydride battery pack. Charge life is a minimum of 100 hours continuous usage. “Low Bat” is displayed when the batteries require charging.


 **NOTE:** For optimum battery life, charge the batteries only after “Low Bat” is displayed.

The DPM can use an external power source. Using the DPM with the ac adapter will also charge the battery. Charging time is 8 hours from full discharge.

CAUTION

Use a Bird adapter only and do not use the adapter with the batteries removed.

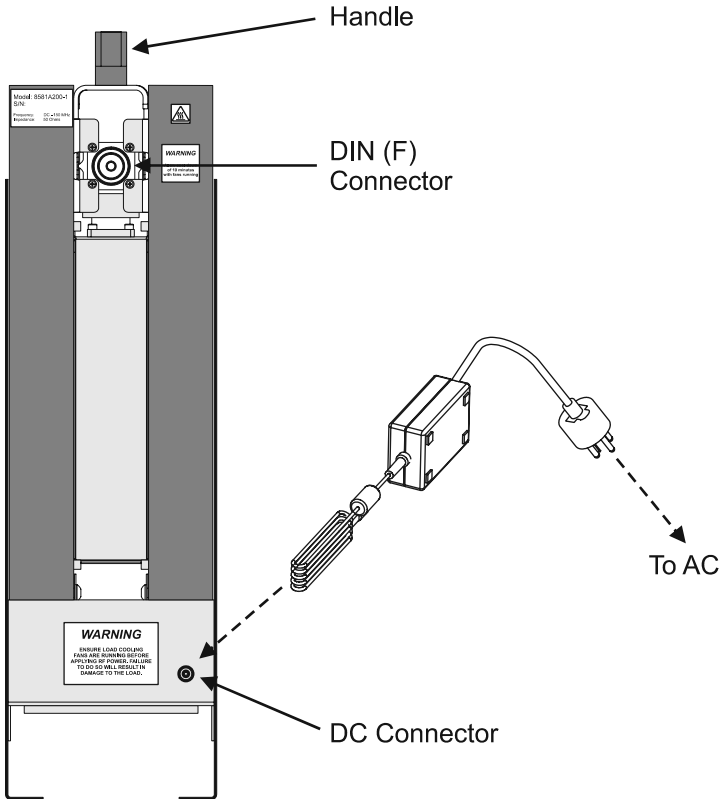
To use the ac adapter, insert the adapter’s barrel connector into the DPM’s dc connector (Figure 1 on page 2, Item 13). Insert the adapter plug into a wall receptacle.

 **NOTE:** The DPM batteries are shipped uncharged for safety. Charge the batteries before using.

Load Insert the ac adapter's barrel connector into the load's dc connector. Plug the adapter into a wall receptacle.

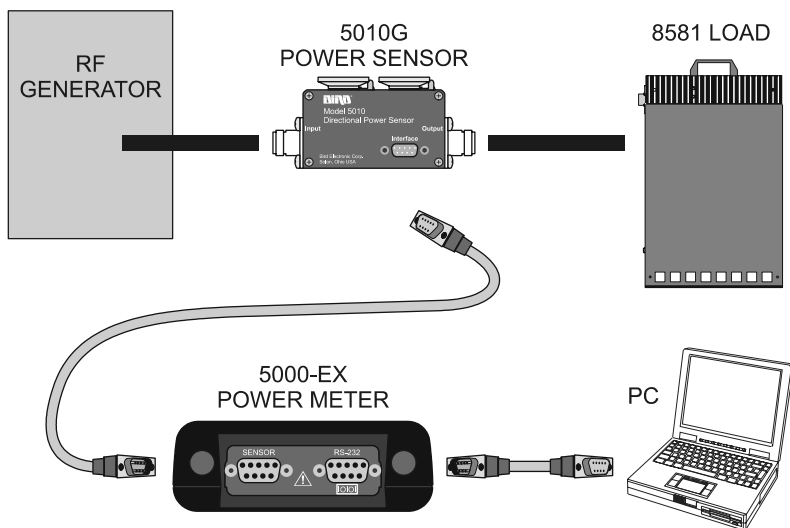
CAUTION
Make sure the load's fans are running before applying RF power. Failure to do so will damage the load and other system components.

*Figure 3
Load Connections*



Connections

Figure 4
DPM Connections



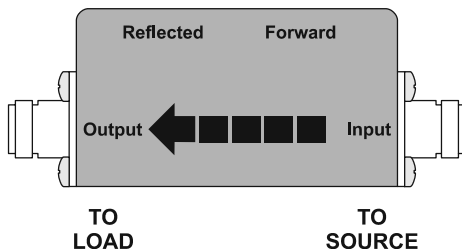
WARNING

Never attempt to connect or disconnect RF equipment from the transmission line while RF power is being applied. Leaking RF energy is a potential health hazard.

Connecting to RF Power

1. Connect the DPS Output to the load using the 7/16 to 7/16 cable provided. The arrow on the DPS should point towards the load (see Figure 5 below).
2. Use the supplied adapters and cables to connect the DPS Input to the RF source.

Figure 5
DPS RF Connections



Connecting to the DPM

CAUTION
Always turn off the DPM before connecting or disconnecting a sensor.

Although unlikely, it is possible to corrupt the power sensor firmware by connecting it to the DPM while the DPM is on. To prevent this, always turn the DPM off before connecting or disconnecting a sensor.

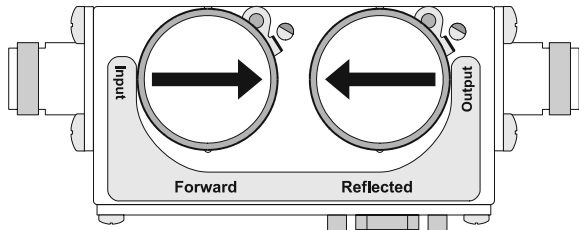
Connect the power sensor to the “Sensor” port on the DPM using the sensor cable provided. If you are using the optional PCTool software, connect the PC’s serial port to the “RS-232” port on the DPM.

Elements

The Directional Power Sensor (DPS) uses Bird Plug-In Elements. These are labeled with a max power and a frequency range. The generator frequency should be within the element range, and the forward element power should be 10x the reflected element power.

The element in the forward socket should be inserted with its arrow pointing in the direction of forward power, as shown below. The reflected element should point in the direction of reverse power.


*Figure 6
Element
Orientation*



Setting Forward Scale

For the DPS, the forward full scale power and element type must be entered manually. The reflected full scale power is automatically set to 1/10 of the forward full scale.

- Press **SCALE**.
- Change the units with the **FWD Units** key until the DPM units match the units on the forward element.
- Use the numeric keypad to enter the maximum power of the element in the forward element socket.

 NOTE: The element's max power is listed on the element nameplate.

- Press **ENTER**.


Changing Element Type

Bird 43-Type elements are included with the kit. To use Bird APM-Type elements, the DPM will need to change modes:

- Press **SHIFT**.
- Press **Setup**.
- Change the element type with the **Type** key until the display agrees with the description on the element nameplate. **A** is displayed for APM type elements. **43** is displayed for 43 Type elements.
- Press **ENTER**.
- Press **SHIFT**.

Once the kit is set up, the load is plugged in, and the element settings are entered into the DPM, the DPM is ready to make measurements.

- Select the measurement by pressing **SHIFT**, then pressing **Type** until the correct measurement is shown. Press **SHIFT** to return to the main menu.
- Set the measurement units by pressing **FWD Units** and **RFL Units**.
- If you know the system loss or are using an attenuator, add the losses (in dB) of all components in the system. For attenuators and other frequency-dependent components, use the loss at the measured frequency. Then, press **OFFSET** and enter the total loss in dB. This will allow you to read the actual line power. The DPM accepts offsets from 0 to 100 dB.
- Turn on the RF source.
- Read the measurement on the display.

 **NOTE:** The bar graph will respond immediately to changes in the RF power. The major and minor displays will respond after a one second delay.

WARNING

Load may be hot. Allow load to cool before touching.

CAUTION

Packing foam may melt if heated.
Allow load to cool before packing.

CAUTION

Cooling without fans running will damage load.

- When done, turn off the RF source and the DPM. Do not turn off the load fans.
- Wait 10 minutes for the load to cool to room temperature before disconnecting the load from ac power.
- Put kit components back into case.

Chapter 4


Maintenance

Troubleshooting

PROBLEM	POSSIBLE CAUSE	REMEDY
Nothing shown on display	Unit is off	Momentarily press the ON key.
	Batteries are drained	Use external power source. Replace the batteries.
Display shows dashes and “Over”; bar scale is full	Unit is overrange	Use higher power elements or reduce RF power.
Erratic power readings	Element contact out of alignment	Align the contact. It must be far enough out to make good contact, but must not restrict entry of the element body.
	Damaged element	Replace element.
	Sensor is damaged	Replace sensor.

Charging Batteries

Fully charged batteries provide a minimum of 100 hours of continuous operation. Charging time is typically 8 hours using the ac adapter. The batteries charge whenever the DPM is connected to ac power sources with the ac Mains adapter. The unit will charge with its power turned either on or off.

 **NOTE:** For optimum battery life, charge the batteries only after “Low Bat” is displayed.

Cleaning

CAUTION

Harsh or abrasive detergents and some solvents can damage the display and information on the labels.

Clean the Bird Digital Power Meter and its display with a soft cloth dampened with mild detergent and water only. Clean sensors with a dry cleaning solvent that leaves no residue.

Battery Replacement

The Nickel-Metal Hydride (Ni-MH) batteries do not normally need replaced. If necessary however, follow these instructions (see Figure 7 below).

WARNING

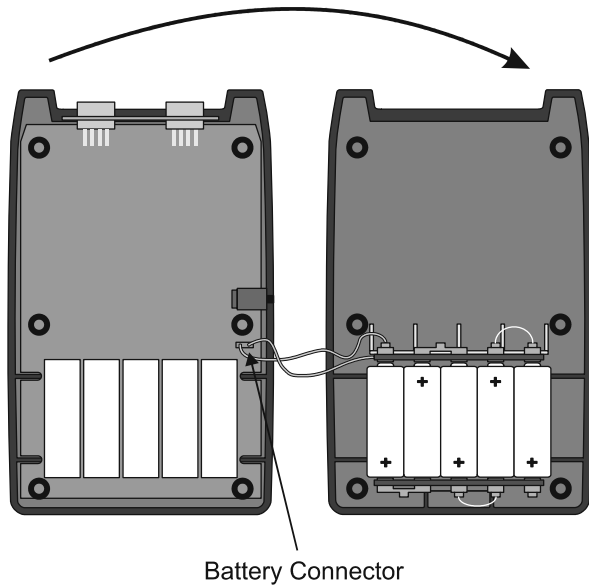
Disconnect from external power before any disassembly. The potential for electric shock exists.

CAUTION

Replace only with Ni-MH rechargeable A batteries. Nominal Voltage 1.2V; Capacity 2700mAh. Use Bird P/N 5A2549, five per unit, or equivalent.

- Lay the DPM, display side down, on a clean surface.
- Use a small screwdriver to remove all six screws from the back cover.
- Taking care to not disconnect the battery connector, lift the back cover off, flip it over, and lay it, battery side up, next to the front cover.
- Remove the old batteries.
- Install the new batteries checking the orientation of the positive and negative terminals.
- Be sure the battery connector is connected.
- Taking care to not pinch the battery connector cables, place the back cover onto the front and make sure it is properly seated.
- Replace the screws.

Figure 7
Back Cover
Removal



Customer Service

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

If you need to return the unit for any reason, contact the Bird Service Center for a return authorization. All instruments returned must be shipped prepaid and to the attention of Bird Service Center.

Bird Service Center

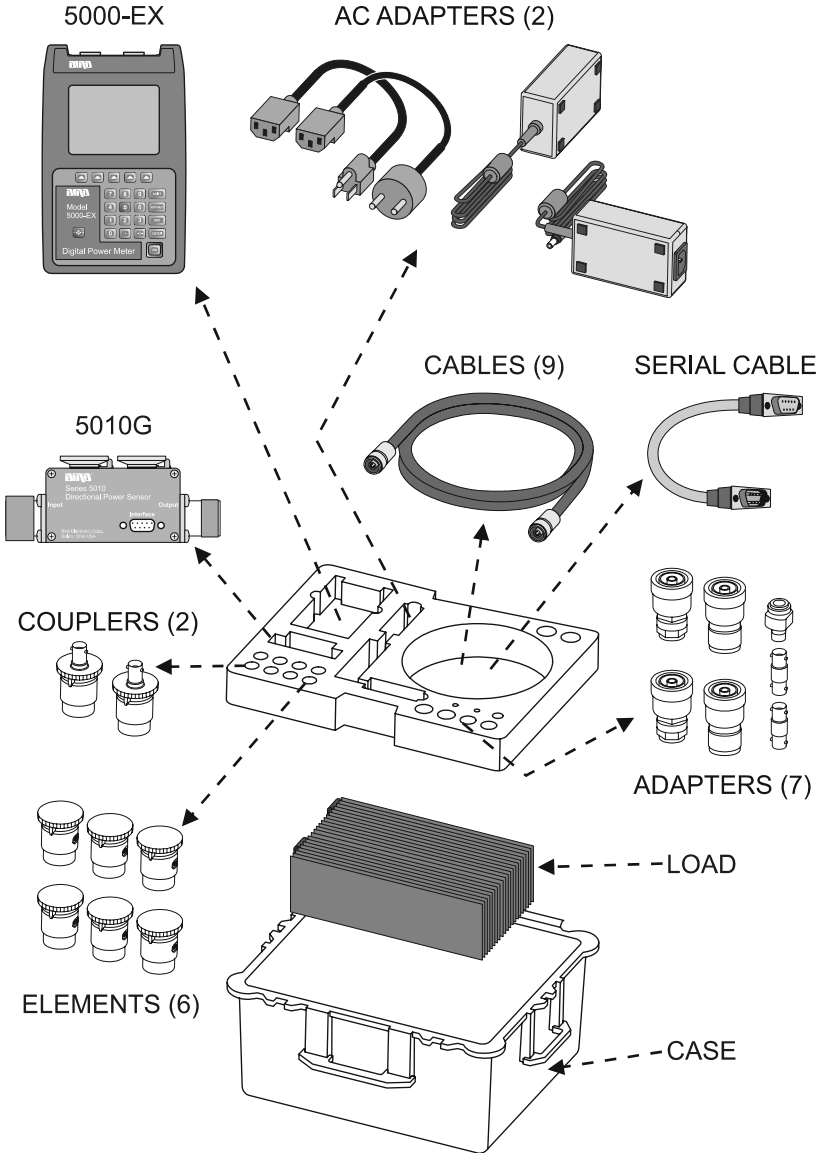
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Phone: (440) 519-2298
Fax: (440) 519-2326
E-mail: bsc@bird-technologies.com

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

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

Parts List

Figure 8
Supplied Items



Description	GE P/N	Bird P/N
Kit, Complete	5307511	GE3TKIT
Case, including cards and manual	2372868-2	2372868-2
5000-EX Digital Power Meter	2372868-3	2372868-3
AC Adapters (Two Provided)	2372868-4	2372868-4
5010G Directional Power Sensor, Elements, and Offset Card Kit	2372868-5	2372868-5
9-pin Serial Cable, Meter/Sensor	2372868-6	5A2264-09-MF-10
Cables		
7/16 DIN (M) – 7/16 DIN (M), 6 ft (Two provided)	2372868-7	4300A676-8
BNC (M) – BNC (M), 6 ft	2372868-8	4300A676-6
BNC (M) – SMB (M), 4 ft	2372868-9	4300A676-5
BNC (M) – SMB (F), 4 ft	2372868-10	4300A676-9
BNC (M) – SMA (F), 4 ft	2372868-11	4300A676-4
BNC (M) – SMA (M), 4 ft	2372868-12	4300A676-3
BNC (M) – Phoenix (M), 4 ft	2372868-13	4300A676-2
BNC (M) – Phoenix (F), 4 ft	2372868-14	4300A676-1
Adapters		
7/16 DIN (F) – HN (M)	2372868-15	4240-500-7
7/16 DIN (F) – N (M)	2372868-16	PA-MNFE
7/16 DIN (M) – HN (F)	2372868-17	4240-500-9
7/16 DIN (M) – N (F)	2372868-18	PA-FNME
N (F) – BNC (F)	2372868-19	4240-500-8
BNC (F) – BNC (F) (Two provided)	2372868-20	4240-500-20
Dust Plug (Two provided)	2372868-21	4230-022
Coupling Element		
60 dB	2372868-22	4300A375-1
40 dB	2372868-23	4300A375-2
8581A Forced-Air Cooled Load	2372868-24	8581A200-1

Color Codes

Sensor Elements

Frequency Range	Color
10 – 30 MHz	Black
30 – 60 MHz	Green
60 – 130 MHz	Blue

Coupler Elements

Coupling Factor	Color
40 dB	Red
60 dB	Brown

Cables

Connectors	Color
7/16 DIN (M) – 7/16 DIN (M)	Red
BNC (M) – BNC (M)	Orange
BNC (M) – SMB (M)	Yellow
BNC (M) – SMB (F)	Green
BNC (M) – SMA (F)	Blue
BNC (M) – SMA (M)	Violet
BNC (M) – Phoenix (M)	Blue/Green
BNC (M) – Phoenix (F)	Red/Yellow

Specifications

Overall Kit

Frequency Range	10 – 130 MHz
RF Power	
Average, Max.	2.2 kW
Peak, Max.	37 kW
Pulse Width, Max.	10 ms
Duty Cycle	Duty cycle such that average power rating is never exceeded
AC Input	120 ± 10% Vac @ 50/60 ± 3 Hz, single phase, current ≤ 10A. Output +15 Vdc, 0 to 2.7A
Maintenance Interval	≥ 1 year
Calibration Interval	≤ 6 months
Temperature	
Operating	5 to 40 °C (41 to 104 °F)
Storage	–20 to +70 °C (–40 to +158 °F)
Humidity, Relative	
Operating	30% to 75%
Storage	95% noncondensing max.
Altitude, Above Sea Level (ASL)	
Operating	–984 to +11,800 ft ASL (–300 to +4000 m)
Storage	–984 to +18,000 ft ASL (–300 to +5490 m)
Dimensions, Nominal, Kit in Case	21" x 15" x 25" (535 x 381 x 635 mm)
Weight, Max, Kit in Case	75 lbs (34.1 kg)
Material	No toxic materials Metals are corrosion resistant No sharp edges or projections on accessible components
Acceleration, Max.	± 1.5 G along any axis

Magnetic Field, Max.	500 G
Acoustic Noise	75 dBA max, 1m from external surfaces
Shock and Vibration, Kit in case	Complies with GE # 46-316745, “Mechanical Environmental Test Guidelines”, sections: Shipping & Handling Tests Elevator threshold test Impact test
Packaging	Complies with GE # 46-268564, “Packaging Best Practice for Supplied Items” Complies with GE # DWG2100268PRE, “Global Packaging Guideline for International Shipments” Capable of being shipped common carrier Has outer surface protection

Meter (Model 5000-EX)

Display	Backlit LCD with major and minor displays and analog bar graph
Major Display	5 digits, 5/16" high
Minor Display	5 digits, 1/4" high
Analog Bar Graph	20 segment, horizontal orientation. Tracks the major digital display.
Sensor Interface	9-pin D-shell RS-232 serial connector. Sensor is powered from the 5000-EX.
PC Interface	9-pin RS-232 serial port
Measurements	Forward average power, reflected average power, and forward peak power W or dBm units
Display Backlight	Backlight on for 12 sec. min. when triggered
Battery	Field-replaceable rechargeable NiMH
Battery Life, Min.	100 hours per charge
Charge Time	8 hours for full charge
AC Input	Operates from ac mains using supplied adapter. Will operate on discharged battery 120 ± 10% Vac @ 50/60 ± 3 Hz, single phase, current ≤ 10A. Output +15 Vdc, 0 to 2.7A
Dimensions, Nominal	8" x 4-5/8" x 2" (203 x 118 x 51 mm)
Weight, Nominal	2 lbs. (0.9 kg)

Sensor (Model 5010G)

RF Power Handling	As specified under General Specification
Frequency Range	10 – 130 MHz, with additional calibration at specified freq and power levels
Cal freq & nominal power level	
127.72 MHz	35 kW, 25 kW, 4.5 kW, 3.3 kW
63.86 MHz	16 kW, 2 kW
51.70 MHz	8 kW, 4 kW, 2.5 kW
Settling Time	< 3 sec.
Accuracy	
General	± 8%
@ cal freq & power	± 3%
Elements*	Can use Bird 43 or APM Elements. 43 elements are standard
Connectors	
Input	7/16 (M)
Output	7/16 (F)
Insertion VSWR, Max	1.05:1
Insertion Loss, Max	0.1 dB
Dynamic Range	20 dB
Dimensions, Nominal	2.5" x 5.0" x 2.0" (64 x 127 x 51 mm)
Weight, Nominal	1.25 lb. (0.6 kg)

* RFL element power must be 1/10 of FWD power.

Elements

Dynamic Range	20 dB
Labeling, Element	Label lists max power (W)

Coupling Elements

Coupling	<u>10 – 60 MHz</u>	<u>60 – 130 MHz</u>
60 dB	-60 ± 2.5 dB	-60 ± 0.5 dB
40 dB	-48 dB min.	-40 ± 0.5 dB
Connector	BNC (F)	
Labeling, Coupler	Label lists GE P/N, coupling factor (dB), and max power (W)	

Cables

Connectors	7/16 (M) to 7/16 (M) BNC (M) to BNC (M) BNC (M) to SMB (M) BNC (M) to SMB (F)	BNC (M) to SMA (M) BNC (M) to SMA (F) BNC (M) to Phoenix (M) BNC (M) to Phoenix (F)
Material	7/16 cable: BNC to BNC: BNC to Phoenix: All others:	RG393 RG58 Double screen RG316 RG316
Strain Relief	(7/16 cable only) 30 lb. min.	
Length	7/16, BNC to BNC: All others:	6 ft 4 ft
Coiling	Velcro wrap provided with each cable to keep it coiled while stored	
Labeling	Color band at both ends indicates cable type. Label in middle lists P/N.	

Adapters

Connectors	7/16 (F) to HN (M) 7/16 (F) to N (M) BNC (F) to N (F) 7/16 (M) to HN (F) 7/16 (M) to N (F) BNC (F) to BNC (F)
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Load (Model 8581A)

Frequency Range	10 – 130 MHz
RF Power	
Average, Max.	2.2 kW
Peak, Max.	37 kW
Pulse Width, Max.	10 ms
Duty Cycle	Duty cycle such that average power rating is never exceeded
Impedance, Nominal	50 ohm
VSWR, Max.	1.1:1
VSWR Stability over 10 minute interval	± 0.1 dB
Connector	7/16 (F)
AC Input	120 ± 10% Vac @ 50/60 ± 3 Hz, single phase, current ≤ 10A. Output +15 Vdc, 0 to 2.7A
Operating Position	Vertical only
Cooling method	Forced air convection
Dimensions, Nominal	13" x 5.75" x 20.5" (330 x 145 x 521 mm)
Weight, Max	32 lb. (14.6 kg)
Finish	Black Powder Coat

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.

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