



TERMALINE<sup>®</sup> SEMICONDUCTOR  
LOAD RESISTOR  
SERIES 8860SC

OPERATION MANUAL

**WARNING**

**This unit requires the supplied vent plug be installed prior to use.  
Operating the unit without the vent plug installed WILL result in equipment damage and may  
cause personal injury.**



## Safety Precautions

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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

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### WARNING

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

### CAUTION

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



This symbol indicates that a shock hazard exists if the precautions in the instruction manual are not followed.



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

*Notes call attention to supplemental information.*

## Warning Statements

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

**WARNING**

**The vent plug must be installed at all times when the unit is in operation or cooling. Always check to ensure vent plug is installed prior to operation. Failure to do this could result in damage to the equipment and endanger the operator's safety.**

On page 4, 5, 8, and 14.

**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.**

On page 7, 8, 9 and 11.

**WARNING**

**Do not touch the load during operation. During operation, load surfaces are extremely hot. Touching the load during or after operation may cause burns.**

On page 8

## Caution Statements

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

**CAUTION**

**This load is designed for operation in a horizontal position only, with the mounting brackets down. Operation in any other orientation will cause insufficient cooling of the unit leading to premature failure.**

On page 4.

**CAUTION**

**Blocking should be used to support the load to avoid damage to the RF connector. The RF connector could extend up to 4.5 inches from the body of the load (depending on configuration).**

On page 5 and 13.

**CAUTION**

**If installed, connect optional interlock before applying RF power.**

On page 8.

**CAUTION**

**Use only Bird coolant, P/N 5-1070, to prevent damage to the load.**

On page 11.

**CAUTION**

**Blocking should be used to support the load to avoid damage to the interlock thermoswitch.**

On page 13.

## Safety Statements

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### 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 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.



**CONNECT INTERLOCK TO TRANSMITTER BEFORE OPERATING.**

**BRANCHER LE VERROUILLAGE À L'ÉMETTEUR AVANT EMPLOI.**

**CONECTE EL INTERBLOQUEO AL TRANSMISOR ANTES DE LA OPERACION.**

**VOR INBETRIEBNAHME VERRIEGELUNG AM SENDER ANSCHLIESSEN.**

**PRIMA DI METTERE IN FUNZIONE L'APPARECCHIO, COLLEGARE IL DISPOSITIVO DI BLOCCO AL TRASMETTITORE.**

## About This Manual

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

8865SC13

## Changes to this Manual

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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.

## Chapter Layout

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**Introduction** — Describes the features of the Bird Termaline, Semiconductor, RF Load Resistor, lists equipment supplied and optional equipment, and provides power-up instructions.

**Theory of Operation** — Describes how to connect Semiconductor, RF Load Resistor to the user's system, describes the vector network analyzer measurements, and provides quick start steps for each measurement.

**Installation** — Describes the power measurement feature, lists compatible power sensors, describes how to connect SignalHawk to the user's system, and provides quick start steps to make power measurements.

**Operating Instructions** — Describes procedures required for operating the load resistor.

**Maintenance** — Lists routine maintenance tasks as well as troubleshooting for common problems. Specifications and parts information are also included.

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Bird 8860 Series Semiconductor Loads are portable 50 ohm coaxial RF transmission line terminations. They are designed for frequency ranges of DC – 28 MHz, specially calibrated for greater stability at 13.56 MHz. They provide accurate, dependable, and low reflection line terminations. Up to 1000 watts of RF power can be dissipated.

The load has a coolant chamber surrounded by radiator fins. The front and rear fins form mounting flanges which can be used as supports for freestanding use or as brackets for fixed mounting. A vent plug at the top of the unit relieves internal pressure from coolant expansion. The load's simple and rugged design minimizes maintenance requirements.

## Items Supplied

### NOTE

*Load Resistor is pre-filled with coolant at the factory*

- Load Resistor
- Shipping Plug
- Vent Plug
- Instruction Manual

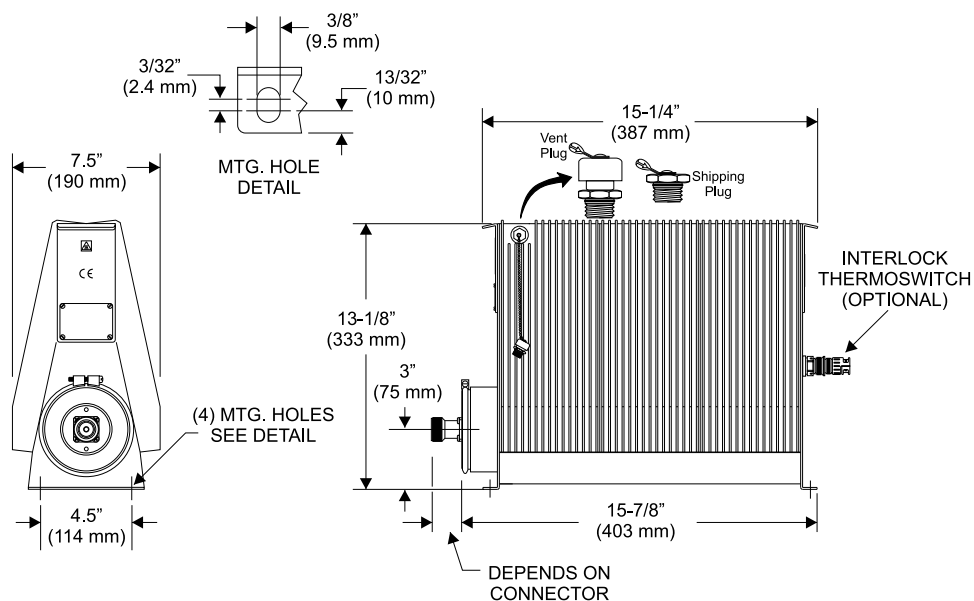
## Items Required but not Supplied

**Coupling Kit:** Connects the load to the RF line.

## Optional Accessories

**Interlock Thermoswitch:** Automatically shuts off the generator to prevent overheating of the load.

**Figure 1 Bird 8860 Series Outline Drawing**



## Load Resistor

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Bird 8860 series loads consist of a thin-film-on-ceramic resistor immersed in a dielectric coolant. The resistor, individually selected for its accuracy, is enclosed in a special housing. When surrounded by the coolant, this produces a uniform, practically reflection-less line termination over the specified frequencies.

## Coolant

---

The load is cooled by natural fluid and air convection currents. The coolant, chosen for its dielectric and thermal characteristics, carries heat from the resistor to the walls of the cooling tank, where radiator fins surrounding the tank transfer the heat to the air.

When the coolant is heated, thermal expansion causes an increase in the internal pressure. The vent plug relieves this pressure while protecting the opening from dirt or other contaminants.

## Thermal Interlock (Optional)

---

Loads can be supplied with an optional passive over-temperature thermostic switch. Normally closed, it opens at the maximum safe load temperature of 236 °C (457 °F), turning off power to the RF generator. The interlock system will not permit reoperation of the generator until the load has reached a lower, safe temperature.

## Unpacking and Inspection

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1. Carefully inspect shipping container for signs of damage.
  - If the shipping container is damaged, do not unpack the unit. Immediately notify the shipping carrier and Bird Technologies.
  - If the shipping container is not damaged, unpack the unit. Save shipping materials for repackaging.
2. Inspect unit for visual signs of damage.

**NOTE**

*If there is damage, immediately notify the shipping carrier and Bird Technologies.*

## Site and Shelter Requirements

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The unit should be operated in a dry, dust and vibration free environment.

The ambient temperature range should remain between +5 to +40 °C (+41 to +104 °F) for proper operation.

Allow at least 12" (305 mm) of clearance around the unit to permit an unimpeded access of convection air currents for adequate heat dissipation.

Place the unit as close as possible to the transmitting equipment, to permit the shortest possible cable length.

## Tools Required

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The following tools and supplies will be required to prepare the unit for use:

- Wrenches
- Screwdrivers
- Bolt and nut sets or lag screws for mounting) ( $\frac{3}{8}$ " (9.53 mm) max. diameter)

These tools and supplies are required for optional thermoswitch installation:

- 9/16 Hex wrench
- Pipe sealing compound (Loctite 567, or equivalent)
- Soldering Iron and solder
- Torque Wrench

## Mounting the Load Resistor

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**CAUTION**

**This load is designed for operation in a horizontal position only, with the mounting brackets down. Operation in any other orientation will cause insufficient cooling of the unit leading to premature failure.**

These loads are equipped for either portable use or fixed installation. The mounting brackets on the front and rear faces have four mounting slots arranged in a  $4\frac{1}{2}$ " x  $14\frac{7}{32}$ " rectangle (114.3 x 361.2 mm). Use a screw with a  $\frac{3}{8}$ " (9.53 mm) diameter max.

The following instructions are for mounting the unit to a suitable surface.

1. Place the unit on a flat surface.
2. Insert the bolts through the surface and the mounting slots.
3. Secure the bolts with nuts and lock washers.

## Vent Plug

---

**WARNING**

**The vent plug must be installed at all times when the unit is in operation or cooling.  
Always check to ensure vent plug is installed prior to operation.  
Failure to do so WILL result in damage to the equipment and endanger the operator's safety.**

Before placing the attenuator into service, the solid shipping plug, P/N 2450-049, must be removed and replaced by the spring loaded vent plug, P/N 2450-094. The two plugs are linked together by a short length of bead chain.

1. Locate the vent hole for the plug, located at the top left hand side near the front.  
See [Figure 1 on page 1](#).
2. Remove the shipping plug.
3. Verify the O-Ring is installed on the vent plug.
4. Install the vent plug.



## Thermoswitch

As an option, the load may be provided with a thermoswitch assembly, P/N 8890-008. The thermoswitch is used as an interlock switch to disable transmitter power if the coolant temperature exceeds a preset temperature, thus preventing possible damage from accidental power overloading from the transmitter or equipment malfunction.

The thermoswitch is normally closed and opens at a maximum safe temperature. Since the thermoswitch is connected in series with the transmitter interlock, it cuts off transmitter power if the coolant temperature exceeds this value.

The assembly consists of:

- Thermoswitch - P/N 8890-005
- Connector - P/N 2450-018

## Thermoswitch Installation

1. Remove the vent plug.
2. Verify the O-Ring is installed on the shipping plug.
3. Install the shipping plug.

### CAUTION

**Blocking should be used to support the load to avoid damage to the RF connector. The RF connector could extend up to 4.5 inches from the body of the load (depending on configuration).**

4. Stand the unit on its front, supporting it so that the connector is not damaged.

### NOTE

***In this position, there is no danger of the coolant pouring out through the socket plug hole.***

5. Remove the socket plug from the location of the thermoswitch, using a  $\frac{9}{16}$ " hex wrench. See [Figure 1 on page 1](#)

### NOTE

***Do not contaminate the coolant with pipe sealing compound.***

6. Sparingly apply pipe sealing compound to the external threads, only,
7. Install the thermoswitch in place of the plug. Torque to 40 +/-2 ft-lbs.
8. Lower the unit back onto its feet.
9. Check for coolant leaks.

### WARNING

**The vent plug must be used at all times when the unit is in operation or cooling. Always check to ensure vent plug is installed prior to operation. Failure to do so WILL result in damage to the equipment and endanger the operator's safety.**

10. Remove the shipping plug.
11. Verify the O-Ring is installed on the vent plug.
12. Install the vent plug.

## Thermoswitch Wiring Installation

---

1. Unscrew the large knurled ring-nut (A) at the lower end of the coupling jack assembly.
2. Pull the large knurled ring-nut (A) off the thermoswitch jack (B). See [Figure 2 on page 6](#).
3. Unscrew the small knurled cover fitting (C) from the base plug (D) of the connector to release the base.
4. Thread the control switch wires through the clamp (E) with the washers (F) inside and with its threaded fitting in place.
5. Service the control switch wire with short tips and put spaghetti sleeves over the wire ends if necessary.
6. Securely solder the control switch leads to the lugs (G) of the connector base.

**NOTE**

*The ring-nut (A) must be in place over the base plug (D) with the knurled end facing out.*

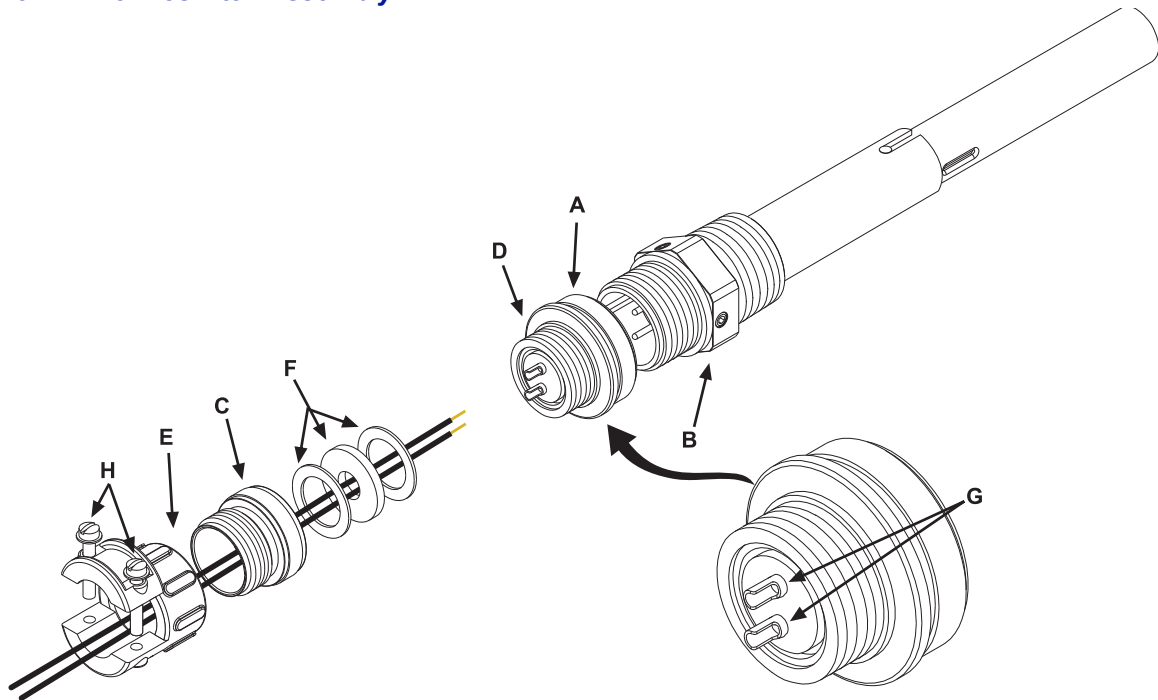
7. Screw on the cover ring (C).
8. Fasten the cable clamp (E) in place.
9. Tighten both yoke screws (H).
10. Push the plug back on the thermoswitch.
11. Tighten the knurled ring-nut (A).

**NOTE**

*Do not attempt to operate the equipment without the interlock attached.*

12. Connect the Thermoswitch wiring to the transmitter's interlock.

**Figure 2 Thermoswitch Assembly**



## Connecting the RF Power

---

Before first using the load, perform the following steps.

1. Wipe all connectors and insulator surfaces on the transmission line face with a clean soft cloth.
2. Check the RF input connector for signs of wear, damage, or dirt.
3. Clean the connector if necessary. Use a self-drying, non-residue forming contact cleaner on the interior portions of the connector.
4. Check the input resistance of the load. Refer to "[RF Assembly Resistance Test](#)" on page 11 for details.
5. The RF transmission line can be attached using standard coaxial line coupling kits.

**WARNING**

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

**“QC” Connector Coupling** — Use 50 ohm coaxial cable such as RG-218/U or -220/U (-17A or -19A), appropriate for the frequency and power level of operation. Use a cable connector which will mate with the one on the load.

**WARNING**

The vent plug must be installed at all times when the unit is in operation or cooling.  
Always check to ensure vent plug is installed prior to operation.  
Failure to do this could result in damage to the equipment and endanger the operator's safety.

**WARNING**

Do not touch the load during operation. During operation, load surfaces are extremely hot.  
Touching the load during or after operation may cause burns.

**CAUTION**

If installed, connect optional interlock before applying RF power.

## Normal Operation

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Bird 8860 series loads have no indicators or operating controls. They require no special operating procedures or surveillance when their performance limits are not exceeded. Follow the instructions for the specific generator equipment.

## Operation Under Abnormal Conditions

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The load can be subjected to moderate overloads for short periods. If this is likely, make sure the interlock is properly connected to prevent damage to the load.

## Shutdown

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**WARNING**

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

Turn off RF power at the source.

These loads are passive devices, so have no way of being turned off. Turn off RF power at the source.

## Emergency Shutdown

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Turn off RF power at the source.

If the interlock thermoswitch is properly connected, RF power will be automatically turned off when the coolant temperature reaches an unsafe level.

This chapter contains operator maintenance instructions, troubleshooting, and parts information.

**WARNING**

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

## Troubleshooting

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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.

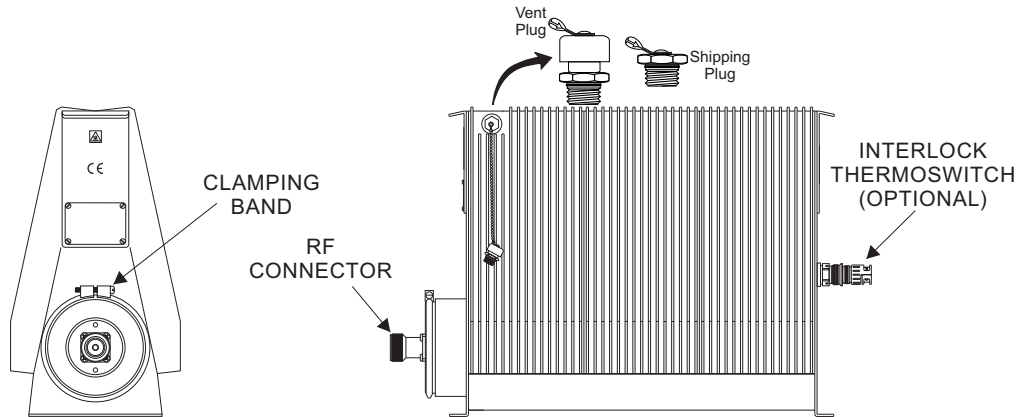
Problem	Possible Cause	Correction
Overheating radiator.	RF power too high.	Lower RF power. See " <a href="#">Specifications</a> " on <a href="#">page 16</a> for maximum RF power.
	Coolant level too low.	Check the coolant level. Add coolant if necessary. See " <a href="#">Inspect the Coolant</a> " on <a href="#">page 10</a> .
	Coolant degraded.	Replace the coolant. See " <a href="#">Inspect the Coolant</a> " on <a href="#">page 10</a> .
	Faulty resistor.	Replace the resistor. See " <a href="#">Repairing the Load Resistor</a> " on <a href="#">page 13</a> .
Leaking coolant.	Loose clamping band.	Tighten the clamping band.
	Defective or improperly installed O-ring.	Replace the O-ring. See " <a href="#">Repairing the Load Resistor</a> " on <a href="#">page 13</a> .
High or low DC resistance.	Loose RF input connector.	Tighten connector.
	Faulty RF input connector.	Replace connector. See " <a href="#">Repairing the Load Resistor</a> " on <a href="#">page 13</a> .
	Faulty resistor.	Replace the resistor. See " <a href="#">Repairing the Load Resistor</a> " on <a href="#">page 13</a> .

## Routine Maintenance

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Figure 3 shows the location of components which may be referred to in this section.

Figure 3 Maintenance and Repair Locations



### Inspect the Load

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- Inspect the unit every six months.
  - a. Check for coolant leakage around the clamping band.
  - b. Check for coolant leakage around the thermoswitch.
  - c. Check for corrosion.

### Clean the Load

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- The outside surface of the unit should be wiped free of dust and dirt when necessary.
- Clean the cooling fins.

**NOTE**

*Excessive dust on the cooling fins will interfere with heat dissipation.*

- Clean the RF connector, both metallic and insulating surfaces, with a dry, non-residue forming solvent.

### Inspect the Coolant

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Coolant lifetime will vary greatly depending on the operating temperature.

- **Heavy Use (full RF power for long times, high ambient temperature, 50 Hz AC supply):**  
Inspect the coolant every 500 hours.
- **Light Use (fraction of full power, low ambient temperature, 60 Hz AC supply):**  
Inspect coolant every 2,000 hours.

**NOTE**

*Correct any coolant leakage before inspection. (See "[Troubleshooting](#)" on page 9).*

To inspect the coolant:

1. Remove the load resistor (See "[Repairing the Load Resistor](#)" on page 13).

**CAUTION**

**Use only Bird coolant, P/N 5-1070, to prevent damage to the load.**

- The coolant should be clear, with a faint yellow tinge, and have a slightly sweet smell.
  - If coolant is black with a burnt or acrid smell, drain it and add about 1.5 gal (5.7 L) of coolant.
2. With the load still on end, the coolant level should be  $3\frac{5}{8}$  (92 mm) below the top surface of the resistor assembly mounting ring, at ambient temperature.
  3. Add coolant if necessary.
  4. Install the load resistor (See "[Repairing the Load Resistor](#)" on page 13).

## RF Assembly Resistance Test

**NOTE**

***These tests are by no means a necessity to the operation of the load but merely guidelines for the users information.***

Accurate measurement of the DC resistance between the inner and outer conductors of the RF input connector will provide a good check of the condition of the load resistor.

Checking the DC resistance is simply used to measure a change in the resistance over time. Tracking the DC resistance should start *before* the unit is first put into service. Perform the following steps and record the value for future comparison. The resistor should provide at least 5,000 hours of operation before requiring any additional service. DC resistance should be measured annually.

Preparation:

- Tools: Common hand tools.
- Ohmmeter with an accuracy of  $\pm 1\%$  at 50 ohms (or use a resistance bridge).
- Use low resistance leads, preferably a short piece of 50 ohm coaxial cable fitted with an appropriate connector or alligator clips.
- Temperature of the load should be stabilized between 20°C to 25°C (68°F to 77°F).

## DC Resistance Measurement

**WARNING**

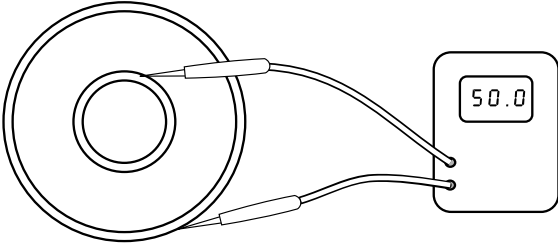
**Never attempt to connect or disconnect RF equipment from the transmission line while RF power is being applied. Leaking RF energy is a potential health hazard.**

**NOTE**

***It is recommended that this resistance check be performed each time the load is to be used.***

1. Turn off RF power and interlock circuitry before making any disconnections.
2. Disconnect the RF coaxial line.
3. Connect the multimeter test leads across the center and outer conductor of the load resistor. See [Figure 4](#).
4. Record the value of the resistance *before* the load is put into service. Compare subsequent values with the latest reading. If the values vary more than 1 ohm this could be an indication of a failing resistive element.

**Figure 4** Measuring DC Resistance





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## Repair

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[Figure 3 on page 10](#) shows the location of components which may be referred to in this section.

### Replace RF Connector

---

The following procedure may be used to remove and relace Bird QC connectors.

**NOTE**

*If not using the LC connector normally supplied, the frequency and power must be limited to the capabilities of the connector.*

1. Remove four 8-32 round head machine screws from the corners of the connector flange.
2. Pull the connector straight out.
3. Align the replacement connectors center contact pin with the socket and seat QC connector.
4. Install four 8-32 round head machine screws in the corners of the connector flange to secure the QC connector in place.

### Repairing the Load Resistor

---

1. Remove the vent plug.
2. Verify the O-Ring is installed on the shipping plug.
3. Install the shipping plug.

**CAUTION**

**Blocking should be used to support the load to avoid damage to the interlock thermostwitch.**

4. Supporting the unit to prevent damage to the interlock thermostwitch, stand it on its back with the RF connector end up.

**NOTE**

*In this position there is no danger of the coolant pouring out through the resistor hole.*

5. Unscrew and remove the clamping band.
6. Lift the load resistor assembly out of the tank.
7. Allow any coolant to drip back into the tank.

**NOTE**

*The O-Ring should be free of twists and positioned evenly around the flange of the resistor housing. If the O-ring shows signs of deterioration (e.g. is no longer pliable or has surface cracks) replace it.*

8. Inspect the coolant, see ["Inspect the Coolant" on page 10](#).
9. Install the load resistor assembly.

**NOTE**

*The load resistor assembly cannot be disassembled any further.*

10. Put the clamping band in place and tighten it.
11. Lower the unit back onto its feet.
12. Check all seals for signs of leaks.

**WARNING**

**The vent plug must be installed at all times when the unit is in operation or cooling.**

**Always check to ensure vent plug is installed prior to operation.**

**Failure to do this could result in damage to the equipment and endanger the operator's safety.**

13. Remove the shipping plug.
14. Verify the O-Ring is installed on the vent plug.
15. Install the vent plug.

## Storage and Shipment

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### Storing the Load Resistor

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1. Cover Bird 8860 Loads before storing to keep out dust and dirt.

**NOTE**

***When storing the load it is not necessary to install the shipping plug.***

2. Store in a dry, dust-free environment where the ambient temperature will remain between  $-40$  and  $+45$  °C ( $-40$  to  $+113$  °F).

### Shipping the Load Resistor

---

The unit may be shipped with its dielectric coolant; however, do not ship the unit with its dielectric coolant if the unit has developed a leak. Drain the coolant first.

1. Remove the vent plug.
2. Verify the O-Ring is installed on the shipping plug.

**NOTE**

***With the shipping plug installed, it is not necessary to empty out the coolant.***

3. Install the shipping plug.
4. Wrap the vent plug with padding and tape it to the side of the load for protection.
5. Wrap the connector in padding.
6. Pack and brace the load in a sturdy wooden crate for shipment.

**NOTE**

***All instruments returned for service must be shipped prepaid and to the attention of the Customer Service Group. See ["Customer Service"](#) on page 15.***

## Customer Service

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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](mailto:bsc@birdrf.com)

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

<http://www.birdrf.com>

## Specifications

Frequency Range	DC – 28 MHz
Power Rating	1000 W continuous duty
Impedance, Nominal	50 ohms
VSWR	1.1 max
VSWR Stability	< 0.1 dB, from 0 to 100% rated power at stability frequency
Stability Frequency	13.56 MHz ± 10 kHz
Connector	“QC” Type, Female LC normally supplied
Interlock Thermoswitch (Optional)	Normally closed. Opens at 236 °C (457 °F)
Thermoswitch Rating 115 VAC 230 VAC	10 A 5 A
Temperature, Operating	+5 to +40 °C (+41 to +104 °F)
Temperature, Storage	–40 to +45 °C (–40 to +113 °F)
Altitude	1520 m (5000 ft.)
Humidity	95% noncondensing max
Cooling method	Oil dielectric and convection currents
Dimensions	17.5" L x 7.5" W x 13 <sup>1</sup> / <sub>8</sub> " H (445 x 190 x 334 mm)
Weight, Nominal	27.8 lb. (12.6 kg)
Finish	Black Epoxy Resin

\* Derate RF power by 250 W for every 305m (1,000 ft.) above 1,520m (5,000 ft.)

## Replacement Parts

Description	Qty	Part Number
RF Load Resistor	1	8890-060
Resistor O-Ring	1	5-230
Clamping Band Assembly	1	2430-055
Plug Vent Shipping	1	2450-094 2450-049
Overtemp Thermoswitch	1	8890-008
Coolant, 1.5 gal (5.7 liter)	1	5-1070-3
Radiator Assembly	1	8860-002-2
Access Plug 3/4"-14 Hex Socket	1	5020-103

## Available “QC” Type Connectors

Connector	Part Number
BNC-Female	4240-125
BNC-Male	4240-132
C-Female	4240-100
C-Male	4240-110
HN-Female	4240-268
HN-Male	4240-278
LC-Female*	4240-031
LC-Male	4240-025
Open Term. # 10-32 Nut	4240-080
LT-Female	4240-018
LT-Male	4240-012
N-Female	4240-062
N-Male	4240-063
SC-Female	4240-090
SMA-Female	4240-336
SMA-Male	4240-334
7/16 Jack, IEC Type 169-4	4240-344
7/16 Plug, IEC Type 169-4	4240-363
Mini UHF-Female	4240-346
UHF-Female	4240-050
UHF-Male	4240-179
1-5/8" EIA Fixed	4240-096
1-5/8" EIA Swivel	4240-208
7/8" EIA	4240-002
TNC-Female	4240-156
TNC-Male	4240-160

\* Normally supplied

## 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 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.

