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INSTRUCTION BOOK

**ECONOLOAD<sup>®</sup> LOAD RESISTOR  
SERIES 8730**

INCLUDING MODELS 8730A, 8731  
8732A, AND 8738A

**BIRD<sup>®</sup>**  
**Electronic Corporation**  
**Cleveland (Solon) Ohio USA**

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Instruction Book P/N 920-8730S Rev. C

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## **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 applied 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 remove the RF transmission line while RF power is present.

### ***Do Not Service Or Adjust Alone***

Under no circumstances should any personnel 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.

### ***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.

### ***Chemical Hazard***

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

Coolant may contain ethylene glycol. Avoid ingestion, inhaling of vapors and eye and skin contact.

### ***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.



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:** Calls attention to supplemental information.

## Warning Statements

The following safety warnings appear in the text whenever the equipment is in danger of damage and are shown here for emphasis.

### WARNING

Disconnect the unit from all power sources before servicing.  
The unit may be energized from multiple sources.  
The potential for electric shock exists.

### WARNING

Improper wiring could result in electric shock and death.

### WARNING

If the resistor breaks, there may be splinters or sharp pieces inside the load housing. Be careful when repairing to avoid being cut.

### 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.

### **Caution Statements**

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

**CAUTION**

Incorrect hose connections will reverse coolant flow and could destroy the load.

**CAUTION**

Different control systems are used for 115 Vac and 230 Vac. Use the correct interlock control for your voltage.

**CAUTION**

If installed, connect optional interlock before applying RF power.

**CAUTION**

Do not interrupt coolant supply. Even momentary application of RF power while coolant is not circulating could cause immediate destruction of the load

**CAUTION**

Do not remove the resistor plug. Any attempt to do so will cause leakage and resistor damage.

### **Safety Statements**



#### **USAGE**

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

#### **USO**

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

#### **BENUTZUNG**

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

#### **UTILISATION**

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

#### **IMPIEGO**

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



#### **SERVICE**

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

#### **SERVICIO**

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

## WARTUNG

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

ZUR VERMEIDUNG GEFÄHRLICHER, ELEKTRISCHER 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 EFFETTUARE ALCUNA RIPARAZIONE A MENO CHE QUALIFICATI A FARLA.



CONNECT INTERLOCK TO TRANSMITTER/GENERATOR/  
AMPLIFIER BEFORE OPERATING.

BRANCHER LE VERROUILLAGE À L'ÉMETTEUR/  
GÉNÉRATEUR/AMPLIFICATEUR AVANT EMPLOI.

CONECTE EL INTERBLOQUEO AL TRANSMISOR/GENERADOR/  
AMPLIFICADOR ANTES DE LA OPERACION.

VOR INBETRIEBNAHME VERRIEGELUNG AM SENDER/  
GENERATOR/VERSTÄRKER ANSCHLIESSEN.

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

## About This Manual

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This manual covers the Bird 8730A, 8731, 8732A, and 8738A Econoload RF Load Resistor.

This instruction book is arranged so that essential information on safety is in the front of the book. Reading the Safety Precautions before operating the equipment is strongly advised. The remainder of this instruction book is divided into Chapters and Sections.

### **Operation**

First time operators should read Chapter 1 - Introduction, and Chapter 3 - Installation, to get an overview of equipment capabilities and how to install it. An experienced operator can refer to Chapter 4 - Operating Instructions. All instructions necessary to operate the equipment are contained in this chapter.

### **Maintenance**

All personnel should be familiar with preventative maintenance found in Chapter 5 - Maintenance. If a failure should occur, the troubleshooting section will aid in isolating and repairing the failure. Parts lists and repair instructions are also in this chapter.

### **Changes To The 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 comment 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.

### **Naming Conventions**

The following terms will be used throughout this manual to refer to certain components of the Econoload:

**Econoload or Load:** The entire unit. It contains the RESISTOR.

**Resistor:** A subcomponent of the LOAD. This is the ceramic resistor which actually absorbs the RF power.



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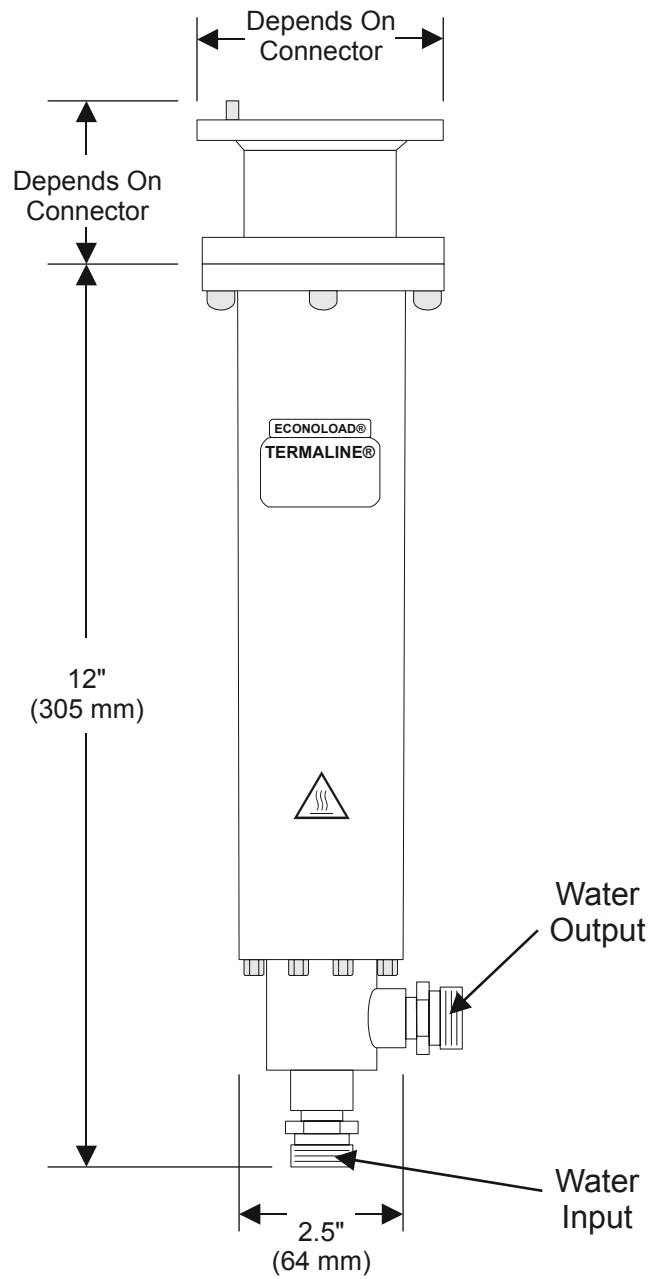
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Bird 8730 Series Econoloads are compact, nonradiating, low reflection terminations for medium power RF lines. They dissipate up to 10 kW with a VSWR of less than 1.1:1 from 1 kHz to 1000 MHz.

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|-----------------------|--|
| <b>Features</b>       | <ul style="list-style-type: none"><li>• Useable with CW, AM, FM, SSB, and TV modulation, and certain pulse types. Contact Bird Electronic Corporation for information on using Econoloads with pulsed signals.</li><li>• Make precise, calorimetric measurements by using an Econoload with a Bird 6085 Calorimeter.</li><li>• Designed for easy field repair of all components.</li></ul> |
| <b>Items Supplied</b> | <ul style="list-style-type: none"><li>• Load, Water-cooled</li><li>• Instruction Manual</li></ul>  |
| <b>Optional Items</b> | <ul style="list-style-type: none"><li>• Control system with red pilot light that turns on when the load is working properly. Also has flow switch and 12 second time delay interlock to ensure steady coolant flow before RF power is applied.</li></ul>   |

Figure 1  
8730 Series  
Econoload Outline  
Drawing



<b>Resistor</b>	Bird 8730 Series Econoloads consist of a thin-film-on-ceramic resistor immersed in externally-supplied coolant. The coolant flows directly over the resistor instead of using an intermediate heat transfer system, reducing the load size to a minimum. After passing over the entire length of the resistor, the coolant leaves the load and can either be discarded or cooled in a heat exchanger and reused.
<b>Coolant</b>	The load's electrical and thermal performance is reduced by impurities or chemical additives in the coolant, especially ones which are deposited as scale on the resistor. This may cause the load to overheat and fail. Salt water will have a similar effect and should not be used. For recommended coolant, refer to "Coolant" on page 6 and to "Specifications" on page 21.
<b>Optional Flow Interlock</b>	<p>A minimum coolant flow of four gallons per minute is required at all times to dissipate the heat from RF power. When the flow rate drops below this point, the flow switch opens causing immediate transmitter shutdown. The flow switch is a "normally open" type, and is closed during normal operation.</p> <p>After flow is restored, a time delay switch keeps the interlock open for an additional 12 seconds. This ensures proper operation of the cooling system before applying RF power, preventing resistor burnout.</p>
<b>Optional Thermal Interlock (8732A Only)</b>	The 8732A can be supplied with an optional passive overtemperature thermoswitch. Normally closed, it opens at a preset temperature, turning off transmitter power. The temperature setting is preset at the factory for either 72 or 79 °C (162 or 175 °F). The interlock system will not permit use of the transmitter until the load has reached a safe temperature.

**Calorimetry** Almost all the RF power in the load is transferred to the coolant as heat. There is no heat transfer to the outer housing of the load, leaving it at ambient temperature even at full power. The flow rate, and the difference between the input and output coolant temperatures, can be used to calculate the power dissipated in the load with the following formula:

$$P = k \times (T_{\text{out}} - T_{\text{in}}) \times F$$

where

P = Power in kilowatts

k = 0.263 for temperature in °C, 0.146 for temp. in °F

T<sub>out</sub> = Water temperature at the output of the load

T<sub>in</sub> = Water temperature at the input to the load.

F = Water flow rate in gallons per minute

👉 NOTE: This calculation is performed automatically in the Bird 6085 Calorimeter.

This chapter provides information on site requirements, unpacking, inspection, and preparing the Bird 8730 Series Econoload for use.

### **Unpacking and Inspection**

1. Carefully inspect the shipping container for signs of damage. If damage is noticed, do not unpack the unit. Immediately notify the shipping carrier and Bird Electronic Corporation.
2. If the container is not damaged, unpack the unit. Save the packing materials in case the unit should need to be shipped again.
3. Inspect all of the components for visible signs of damage. Immediately notify the shipping carrier and Bird Electronic Corporation of equipment damage or missing parts.

### **DC Resistance**

Before first using the load, get a resistance baseline for future maintenance. Refer to “DC Resistance” on page 14 for instructions.

### **Placement**

- Do not use outdoors or in areas of condensing humidity.
- Ventilation or buffer space is not required. The Econoload may be placed in very small spaces.
- The load may be mounted in any position. Rotate the load so that the warning label is visible and the water connections are easily accessible.
- Access to a coolant supply or pump is required. Make sure the coolant supply can meet the required flow rate.
- To use the optional interlock, AC power is required.

## Coolant

For operation at 1kHz or lower, use only distilled water as the coolant. For operation above 1kHz use distilled or potable water. Refer to the specifications for the definition of potable water. If the water quality is doubtful, use distilled water.

### Hoses

#### CAUTION

Incorrect hose connections will reverse coolant flow and could destroy the load.

The Econoload is supplied with standard 3/4" hose fittings. For rigid piping, replace the hose adapters with 1/2" male pipe fittings. If the optional flow switch is installed, it is attached to the water INPUT.

- The Econoload's water INPUT is located in the center of the back of the load. Connect the coolant supply to the load's INPUT. Secure with hose clamps.
- The Econoload's water OUTPUT is on the rear side of the load, at a 90° angle to the INPUT. Connect the coolant drain to the load's OUTPUT. Secure with hose clamps.



## Interlock (Optional)

### WARNING

Disconnect the unit from all power sources before servicing.  
The unit may be energized from multiple sources.  
The potential for electric shock exists.

### WARNING

Improper wiring could result in electric shock and death.

### CAUTION

If installed, connect optional interlock before applying RF power.

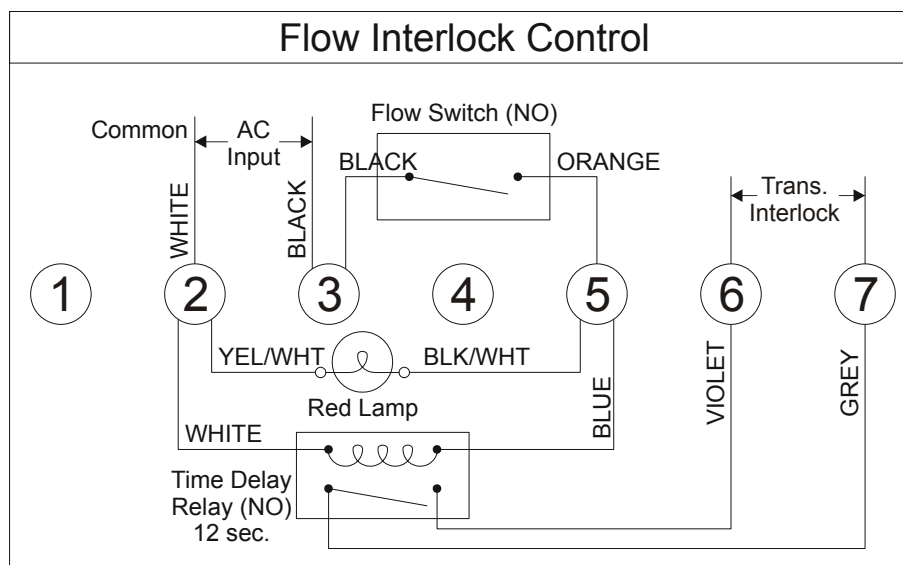
### CAUTION

Different control systems are used for 115 Vac and 230 Vac. Use the correct interlock control for your voltage.

The interlock control box has four 1/4" mounting holes in a 5" x 5" (127 x 127 mm) square. Mount it where the safety light will be clearly visible. Wire the control box as follows (refer to Figure 2):

- Connect the flow switch leads to terminals 3 and 5.
- Connect the transmitter interlock to terminals 6 and 7.
- Connect the ac power source to terminals 2 and 3, making sure that ac common is connected to terminal 2.

Figure 2  
Interlock  
Connections



## Thermoswitch (8732A Only) (Optional)

### CAUTION

If installed, connect optional interlock before applying RF power.

The 8732A, only, can be equipped with an optional interlock thermoswitch, P/N 2450-095-x. To install or replace this:

1. Stand the unit with the water connectors up to prevent spills.
2. Remove the water outlet connector.
3. Replace the connector with the thermoswitch. Sparingly apply pipe sealing compound to the external threads, only, of the thermoswitch. Do not contaminate the coolant with pipe sealant.
4. Check for coolant leaks upon completion.

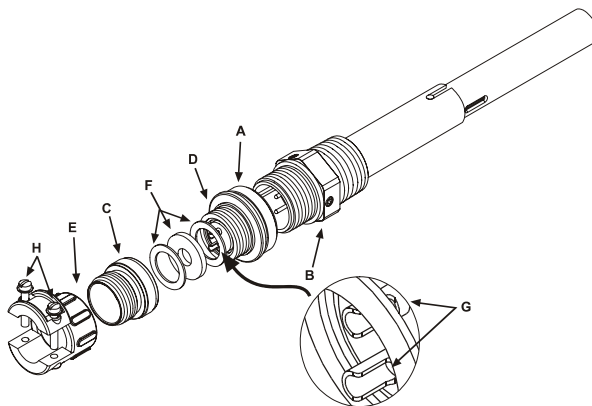
Connect the thermoswitch to the interlock as follows (see Figure 3):

1. Unscrew the large knurled ring-nut [A] at the lower end of the coupling jack assembly. Pull it off the thermoswitch jack [B]. Unscrew the small knurled cover fitting from the base plug [D] of the connector to release the base.
2. Thread the control switch wires through the clamp [E] with the washers [F] inside and its threaded fitting in place. Use short tips on the wires and put spaghetti sleeves over the ends if necessary.
3. Solder the switch leads to the lugs [G] of the connector base.

⚠ NOTE: The ring-nut [A] must be in place over the base plug [G] with the knurled end facing out.

4. Screw on the cover ring, then fasten the cable clamp [E] in place and tighten both yoke screws [H].
5. Put the plug back on the thermoswitch and tighten the nut [A].

Figure 3  
Thermoswitch  
Assembly



## Connecting RF Power

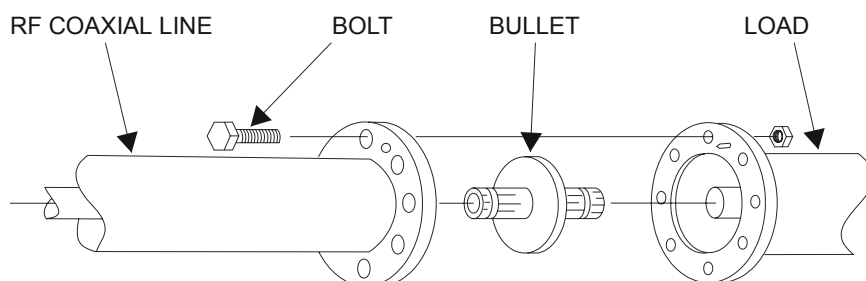
After installing the Econoload, the RF transmission line can be attached using standard coaxial line coupling kits.

### 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.

**Swivel Flanged Coupling:** To couple the swivel flange with a flanged RF transmission line, use an appropriate coupling kit. Refer to Figure 4 while following the instructions below:

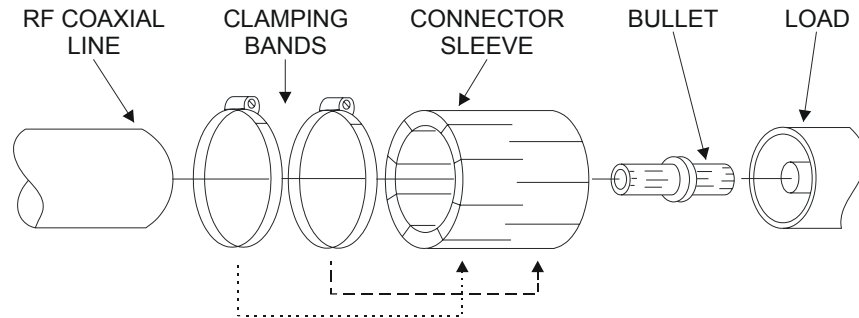
*Figure 4  
Swivel Flanged  
Coupling*



- Insert the center bullet and push it in until it is fully seated.
  - Connect the coaxial input in a straight line and push carefully on the center conductor to close.
- NOTE: The swivel flange on the load makes connection independent of the orientation of the fixed flange on the coaxial input outer conductor.
- Insert the bolt sets and tighten evenly all around to transmission line manufacturer's recommended torque. Use all of the bolts.

**Unflanged Coupling:** To couple the unflanged connector with an unflanged RF line, use an appropriate coupling kit. Refer to Figure 5 while following the instructions below:

*Figure 5  
Unflanged  
Coupling*




- Insert the center bullet and bottom it on the midpoint nibs.
- Position the outer sleeve, with clamping bands, over the input connector.
- Set the transmission line snugly against the coupling stops.
- Position the clamping bands evenly about 3/4" from the ends of the sleeve.
- Tighten the clamping bands.

**Operation without Interlock****Normal Operation****CAUTION**

Do not interrupt coolant supply. Even momentary application of RF power while coolant is not circulating could cause immediate destruction of the load.

1. Turn on the coolant supply.

 **NOTE:** Minimum flow rate is 4 gal/min (15 L/min) at 5 °C (40 °F). The minimum flow increases linearly up to 6 gal/min (23 L/min) at 60 °C (140 °F.)

2. Wait for the coolant flow to stabilize.
3. Apply RF power.

**Shutdown**

1. Turn off RF power at the source.
2. Wait at least five minutes for the Econoload to cool.
3. Turn off the water supply. *Always* do this last.

**Emergency  
Shutdown**

Turn off RF power at the source.

## Operation with the Optional Interlock

### CAUTION

If installed, connect optional interlock before applying RF power.

1. Turn on ac power to the interlock control box.
  2. Turn on the coolant supply.
- 🔊 NOTE: Minimum flow rate is 4 gal/min (15 L/min) at 5 °C (40 °F). The minimum flow increases linearly up to 6 gal/min (23 L/min) at 60 °C (140 °F).
3. Listen for the flow switch to close (it will click when it closes).
  4. Wait about 12 seconds. The time delay switch should close and the red light on the control box should turn ON.
  5. Apply RF power.

### Shutdown

1. Turn off RF power at the source.
2. Wait at least five minutes for the Econoload to cool.
3. Turn off ac power to the interlock control box.
4. Turn off the water supply. *Always* do this last.

### Emergency Shutdown

Turn off RF power at the source.

## Troubleshooting

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
Transmitter won't turn on or shuts off repeatedly	Overheating	Increase water flow Lower the ambient temperature
	Insufficient water flow	Check the coolant circulation system
Excessive reflected power	DC resistance of the load has changed	Check DC resistance (see "DC Resistance" on page 14)
	Contaminated water	Check the resistor for scaling. Replace if necessary. Check that the water meets the standards listed in the specifications. Use distilled water if necessary.

## Maintenance

### WARNING

Disconnect the unit from all power sources before servicing.  
The unit may be energized from multiple sources.  
The potential for electric shock exists.

### Cleaning

The outside surface of the unit should be wiped free of dust and dirt when necessary. Clean the RF connector, both metallic and insulating surfaces, with a dry, non-residue forming solvent.

If the optional water flow switch is installed, periodically remove it from the load and clean off any dirt or scale which might prevent the switch from functioning.

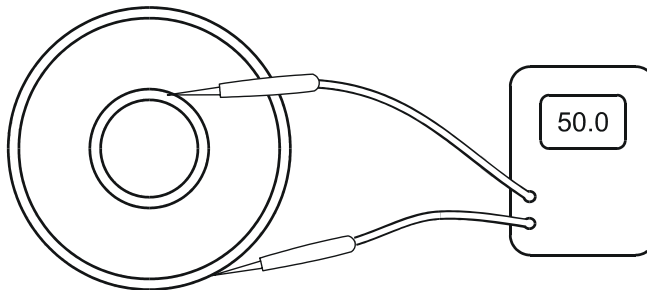
**Inspection** Routinely inspect the following components:

- Load: Check the center and outer conductors for visible damage or excessive wear
- Hoses: Check for cracks or deterioration. Make sure the hoses are securely fastened to the load.

**DC Resistance** Measuring the dc resistance between the inner and outer conductors of the RF connector shows changes in the load over time, a good check of the resistor's condition. Under normal operating conditions, the resistor should provide at least 5,000 hours of operation before requiring any additional service. DC resistance tracking must start before the load is put into service, and should be measured annually.

Perform the following steps and record the value for future comparison. Make sure that you have an ohmmeter with an accuracy of  $\pm 1\%$  at 50 ohms and that the load temperature is between 20 and 25 °C (68 to 77 °F) before starting.

*Figure 6  
Measuring  
Resistance*



**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.

- Turn off the RF power and interlock circuitry.
- Disconnect the RF line.
- Connect the multimeter test leads to the center and outer conductor of the load. Refer to Figure 6.
- Compare the measured value with the previous measurement and with the baseline resistance, measured when the load was put into service. If the new value differs from either of these by more than 2 ohms this could indicate a failing resistor.



## Repair

**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 the unit from all power sources before servicing.  
The unit may be energized from multiple sources.  
The potential for electric shock exists.

**Flow Switch**

To replace the water flow switch, proceed as follows:

1. Turn off the RF power and interlock circuitry, and disconnect the RF line and ac line.
2. Disconnect the water flow switch leads at the control box.
3. Remove the defective switch and replace it..
4. Connect the flow switch leads to terminals 3 and 5.
5. Turn on the interlock ac power.
6. Turn on the coolant system and make sure the flow switch functions properly.

**Time Delay Switch**

The time delay relay cannot be repaired in the field. To replace it:

1. Turn off the RF power and interlock circuitry, and disconnect the RF line and ac line.
2. Open the control box door by turning the slotted screw 1/4 turn.
3. Loosen the screw at the top of the relay clamp, then press the clamp legs in slightly to release the relay.
4. Pull the relay cartridge straight out of its socket.
5. Insert the new relay cartridge and rotate it to align the opening in the cartridge with the center post nub in the socket.
6. Make sure that the clamping prongs fit into their matching slots. Tighten the clamp screw to secure it.
7. Turn on the interlock ac power.
8. Turn on the coolant system and make sure the time delay switch functions properly.

- Safety Light**    To replace the red safety light on the interlock control box:
1. Turn off the RF power and interlock circuitry, and disconnect the RF line and ac line.
  2. Unscrew the lens cover at the top of the control box to expose the bulb.
  3. Gently push down on the bulb and twist counterclockwise to remove the old bulb.
  4. Reverse these steps to install the new bulb.

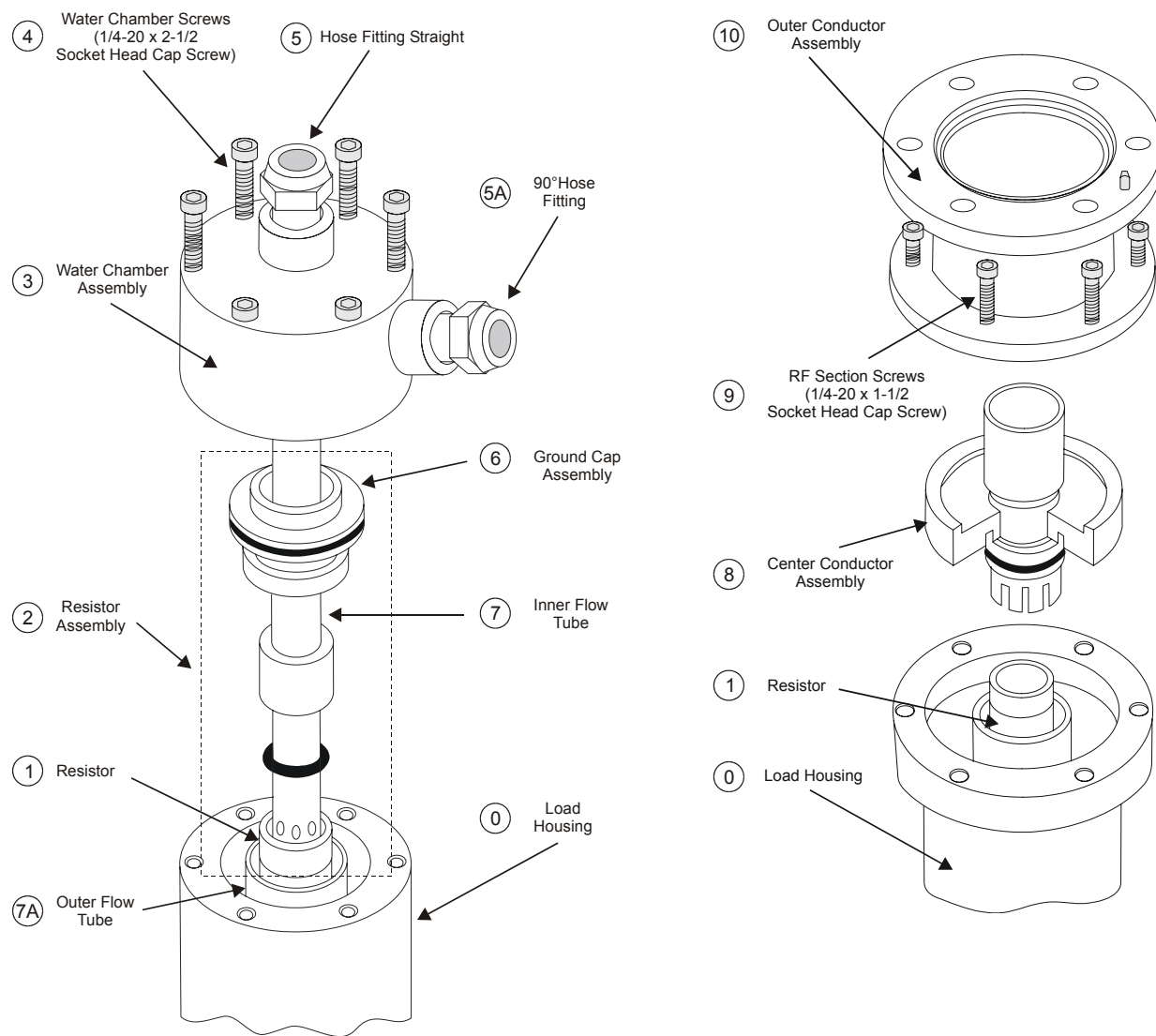
## Resistor Servicing

The load is designed to be quickly and easily repaired in the field. If a significant change in the dc resistance is noted or if the resistor should fail, inexpensive replacement resistors are available.

### WARNING

Disconnect the unit from all power sources before servicing.  
The unit may be energized from multiple sources.  
The potential for electric shock exists.

*Figure 7  
Load Exploded View*



## Resistor Removal

Numbers in brackets [ ] refer to the labeled parts in Figure 7. Parts may appear slightly different than what is shown for some models.

1. Disconnect the load from the RF line and the interlock control box, remove the water hoses, and drain off any water still in the load.
2. Turn the load on end with the hose fittings up.
3. Remove the screws [4] from the back of the water chamber assembly [3]. These secure the water chamber assembly to the load housing [0].

ⓘ NOTE: The 8731 has only one screw, on the side of the water chamber assembly. Also, the water chamber is threaded, and screws into place. Turn the water chamber counterclockwise until the threads disengage before pulling the assembly out.

4. Pull the water chamber assembly out. It may be necessary to rock the chamber gently while pulling.
5. If the resistor is intact then the entire resistor assembly [2] may be pulled straight out of the load housing.

## Inspection

When the resistor has been successfully removed, inspect it carefully to insure that it has not been fractured. In most cases, even in the event of complete resistor burnout the resistor will remain intact.

Examine the inside of the load housing and water chamber for damage to internal parts, especially the resistor O-Ring seal and the resistor contact strip. If the O-Ring has cracks or if the contact strip has missing fingers, replace them. If the resistor did fracture, thoroughly rinse all parts under clear running water and dry before any assembly.

## Resistor Replacement

### WARNING

If the resistor breaks, there may be splinters or sharp pieces inside the load housing. Be careful when repairing to avoid being cut.


### CAUTION

Do not remove the resistor plug. Any attempt to do so will cause leakage and resistor damage.

1. Insert the plugged end of the new resistor into the resistor fitting of the center conductor assembly [8] to test its tightness.
2. The resistor should be snug but should not have to be forced into the fitting. If the resistor is too loose, press the fitting fingers together slightly and try the resistor again. Continue closing the ends of the resistor fitting until a snug fit is obtained.

3. Bottom the resistor in the fitting.
4. Put the resistor and center conductor in the load housing [0].
5. Screw the flow tube [7] into the water chamber assembly. Make sure it is screwed in completely to avoid damaging the resistor.
6. Put the water chamber [3] back into the load, gently rocking and twisting the chamber to achieve a flat seat on the outer housing. Line up the holes with the holes in the load.
7. Tighten the water chamber screws [4].
8. Check the dc resistance between the inner and outer conductors; it should be about 50 ohms. Record this measurement as the new baseline reading.
9. Connect the load to the coolant supply and cycle the coolant for five minutes. Check for leaks.

**Conductor Replacement**

1. Remove the screws [9] from the RF connector.
  2. Remove the outer conductor assembly [12].
-  **NOTE:** To only replace the outer conductor, install it now and screw it into place.
3. Remove the center conductor assembly [11] by pulling it carefully out of the load housing [0]. Make sure the resistor [1] and inner flow tube [9] do not come out with the center conductor.
  4. Insert the new center conductor assembly into the load housing. Make sure the resistor fitting makes a snug fit with the resistor.
  5. Replace the outer conductor and screw it into place.

## Preparation for Storage or Shipment

Store the Bird 8730 in a cool, dry area. Drain the coolant and cap the openings if the unit will be stored for more than 30 days.

To ship, drain the coolant and cap the openings. Pack the unit in its original shipping container. If this is not available, securely pack and seal it in a sturdy wooden box or equivalent, with sufficient padding to avoid shock damage.

## 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**

30303 Aurora Road  
Cleveland (Solon), OH 44139-2794  
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>*

## Specifications

### Frequency Range

8730A	dc - 1000 MHz
8731	1 kHz - 1000 MHz
8732A	dc - 45 MHz
8738A	1 kHz - 1000 MHz

### Power Rating

All models except 8732A	10 kW average
8732A	Depends on flow rate. See table below.

Max (8732A)	Power Min Flow at 60° C (140° F)	Thermoswitch P/N	Thermoswitch Open Temp
10 kW	6 gal. / min. (23 L / min.)	N/A	N/A
8 kW	4 gal. / min. (15 L / min.)	2450-095-1	72° C
4 kW	1.1 gal. / min (4 L / min.)	2450-095-3	79° C
5 kW contin. 10 kW pulse	2.6 gal. / min. (10 L / min.)	2450-095-3	79° C

### Mode

CW, AM, FM, SSB, TV and certain pulse types

### Impedance

50 ohms nominal

### VSWR

1.10 max.

### Connectors

8730A	1-5/8" EIA Flanged	8732A	7/16 Jack, IEC Type 169-4
8731	3-1/8" EIA Flanged	8738A	3-1/8" Unflanged

### Operating Position

Any

### Coolant

For operation at 1kHz or lower, use only distilled water as the coolant.

For operation at greater than 1kHz use distilled or potable water.\*

### Coolant Connections

3/4" standard hose thread

### Temperature Range

5 to 60 °C (41 to 140°F)

### Flow Rate, Min

4 gal./min (15.2 L/min) @ 5 °C (41 °F)  
6 gal./min (22.7 L/min) @ 60 °C (140 °F)

### Flow Rate, Max.

12 gal./min (45.4 L/min)

### Dimensions, Nominal

2.5" diameter x 12" long (64 x 305 mm)

### Weight, Nominal

8 lb. (3.6 kg)

\* Potable Water: Standards for potable water have been established by the U.S. Public Health Service at a maximum of 500 ppm of total dissolved solids (ppm - parts per million or 1 mg per liter). Hardness of water (content of calcium and magnesium salts) should be less than 75 ppm. If the quality of the available water supply is doubtful or the mineral content is questionable, use distilled water.

## Replacement Parts

### Bird 8730A, 8732A, and 8738A

DESCRIPTION	QTY	PART NO.
Resistor Assembly	1	8738A072
Water Chamber Assembly	1	8738A073
Hose Connector	2	5-065-2
Housing, Rear	1	8738A071
Housing, Front	1	8738A054
Phillips Head Screw, 8-32 x $\frac{3}{4}$ "	5	1118-1211-00
Socket Set Screw, 10-32 x $\frac{1}{4}$ " Cone pt.	1	1129-0400-25
Socket Set Screw, $\frac{1}{4}$ -20 x $\frac{3}{4}$ "	6	1121-1208-00
Center Conductor Assembly 8730A, 8732A 8738A	1	8730A053 8738A056
Outer Conductor Assembly 8730A, 8732A 8738A	1	8730A052 8738A053
7/16 Jack, IEC Type 169-4 (8732A only)	1	4240-344

### Bird 8731

DESCRIPTION	QTY	PART NO.
Water Chamber Assembly	1	8731-003
Center Conductor Assembly (includes resistor)	1	8731-005
Outer Conductor Assembly	1	8731-004



<b>Interlock (Optional)</b>	<b>DESCRIPTION</b>	<b>QTY</b>	<b>PART NO.</b>
	Flow Switch	1	5-898-6
	Interlock Control Assembly	1	
	115 Vac		8750-101-1
	230 Vac		8750-101-2
	Interlock Control Assembly Components		
	Relay Clamp	1	8630-193
	Time Delay Relay	1	
	115 Vac		5-1664
	230 Vac		5-1665
	Indicator Light	1	
	115 Vac		5-970-1
	230 Vac		5-970-2
	Thermoswitch (8732A Only)	1	
	Opens at 72 °C		2450-095-3
	Opens at 79 °C		2450-095-1

## **Limited Warranty**

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

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

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

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

# DECLARATION OF CONFORMITY

Manufacturer: Bird Electronic Corporation  
30303 Aurora Road  
Cleveland, Ohio 44139-2794

Product: Econoload

Models: 8738A 8730A

The undersigned hereby declares, on behalf of Bird Electronic Corporation of Cleveland, Ohio, that the above-referenced product, to which this declaration relates, is in conformity with the provisions of the following standards:

1. European Standard EN 61010-1:1993 - Safety, Group II.

This standard is in accordance with Council Directive 73/23/EEC and 93/68/EEC.

The technical documentation file required by this directive is maintained at the corporate headquarters of Bird Electronic Corporation, 30303 Aurora Road, Cleveland, Ohio.



Ken DeVore  
QA/Metrology Manager  
Bird Electronic Corporation