



ECONOLOAD[®] LOAD RESISTOR
SERIES 8730

INCLUDING MODELS 8730A, 8731
8732A, 8738A, AND 8738A110

OPERATION MANUAL

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INSTRUCTION BOOK P/N 920-8730S REV. G

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TRADEMARKS OF BIRD ELECTRONIC CORPORATION

Safety Precautions

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

WARNING

Keep Away From Live Circuits

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

WARNING

Shock Hazard

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

WARNING

Do Not Service Or Adjust Alone

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

WARNING

Safety Earth Ground

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

WARNING

Resuscitation

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

WARNING

Remove Power

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

Safety Symbols

WARNING

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

CAUTION

Caution 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 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.

pages 6 and 15.

WARNING

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

On page 16

Caution Statements

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

CAUTION

The load must be fully supported and remain parallel to the transmission line during all steps of installation. Never allow the load to be supported solely by the center conductor or center coupling element (center bullet).

pages 4, 6, 8, and 9

CAUTION

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

On page 5.

CAUTION

Never allow the load to be supported solely by the center conductor or center coupling element (center bullet). Damage to the resistor may result.

pages 7, 8, 10, and 13

CAUTION

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

On page 11.

CAUTION

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

On page 16.

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.

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.

About This Manual

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

8730A	8731	8738A
8732A	8738A110	

Changes to this Manual

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

Terminology

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.

TABLE OF CONTENTS

Safety Precautions	ii
Safety Symbols	iii
Warning Statements	iv
Caution Statements	v
Safety Statements	vi
Changes to this Manual	viii
Terminology	viii
Chapter 1 Introduction	1
Features	1
Items Supplied	1
Optional Equipment	1
Chapter 2 Theory Of Operation	3
Resistor	3
Coolant	3
Calorimetry	3
Chapter 3 Installation	4
Unpacking and Inspection	4
DC Resistance	4
Placement	4
Coolant	5
Hoses	5
Connecting the RF Power	6
Using a Swivel Flanged Coupling	6
Repositioning	7
Using an Unflanged Coupling	8
Repositioning	9
Using a Slotted Connector Sleeve (for Model 8738A110)	9
Repositioning	10
Chapter 4 Operating Instructions	11
Operation	11
Normal Operation	11
Shutdown	11
Emergency Shutdown	11
Chapter 5 Maintenance	12
Troubleshooting	12
Maintenance	12
Cleaning	12
Inspection	12
RF Assembly Resistance Test	13
DC Resistance Measurement	13
Repair	15
Removing the Resistor	16
Inspection	16

Replacing the Resistor	16
Replacing the Conductor	17
Storage and Shipment	17
Storing the Load Resistor	17
Shipping the Load Resistor	17
Customer Service	18
Specifications	19
Replacement Parts	20
Bird 8730A, 8732A, and 8738A	20
Bird 8731	20
Bird 8738A110	20
Limited Warranty	21

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.

Features

- Useable with CW, AM, FM, SSB, and TV modulation, and certain pulse types. Contact Bird for information on using Econoloads with pulsed signals.
- Designed for easy field repair of all components.

Items Supplied

- Load, Water-cooled
- Instruction Manual

Optional Equipment

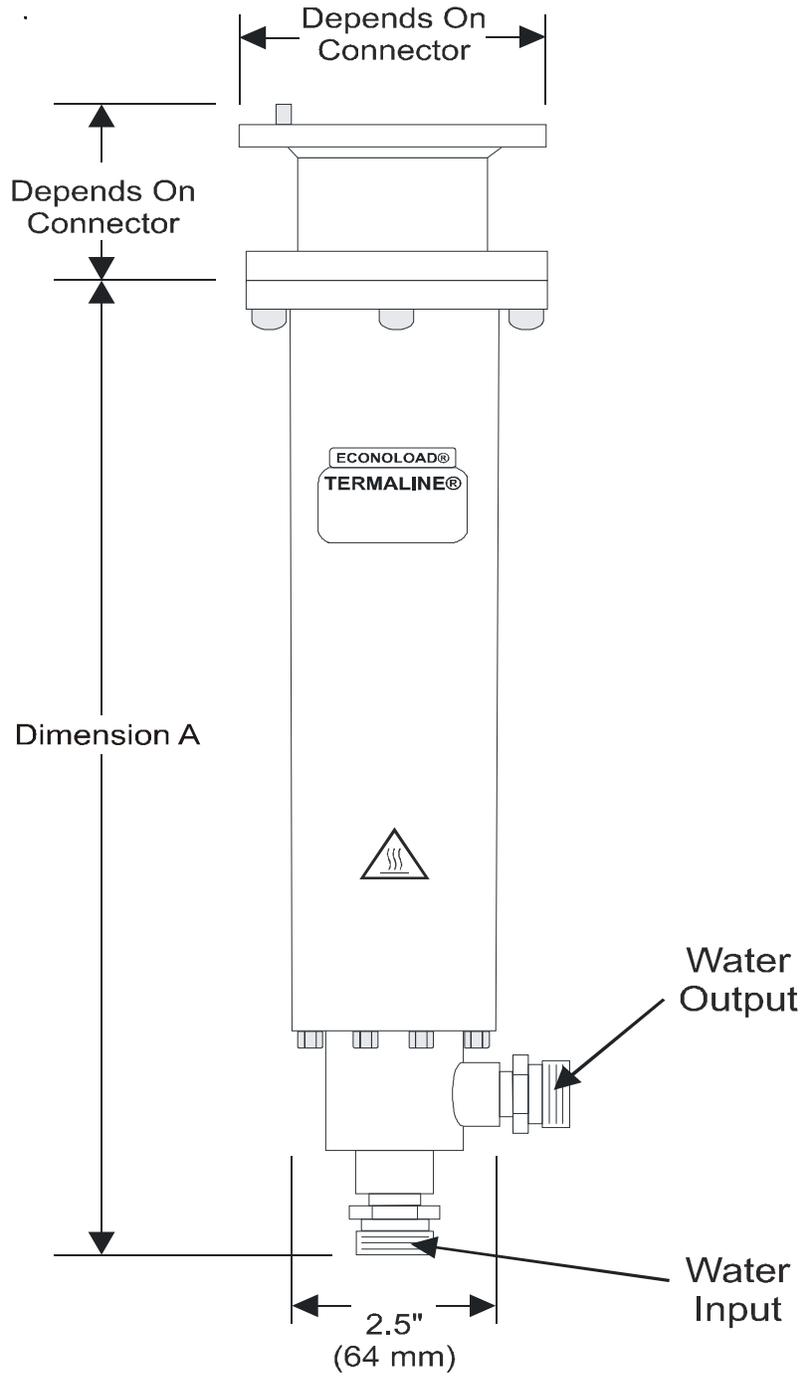
Bird recommends the installation of an interlock control circuit to provide instantaneous fail-safe protection of the transmitter and load in the event of even a momentary interruption of the cooling water supply. This protection is beneficial because dissipation of the heat generated by the RF power absorption is critically dependent upon a required minimum water flow rate regardless of inlet water temperature.

A water flow switch, attached to the water inlet of the load, should be calibrated to open whenever the water flow drops below that specified in "[Specifications](#)" on page 19, and close when the water flow exceeds those values.

When the water flow switch contacts open, the interlock switch opens, causing immediate shutdown of the transmitter or other signal source. It is recommended to utilize a time delay relay to assure proper operation of the cooling system before RF power can be applied to the load, preventing damage or burnout of the resistor element.

The direction of water flow is marked on the casting of the flow tube and on the operating head. Observe flow direction carefully, as incorrect connection will restrict the water flow and cause load failure. The flow switch may be connected to the inlet or the outlet side of the load, preferably as close to the load as possible. Be certain the water flow through the switch is in the correct direction. If installed, the flow switch should not be over 20 feet from the load.

Figure 1 8730 Series Econoload Outline Drawing



Model	Dimension A
8731	12"
8730A, 8732A, & 8738A	13"
8738A110	13-3/8"

Resistor

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.

Coolant

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 5](#) and to ["Specifications" on page 19](#).

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:

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

where

P = Power in kilowatts

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

T_{out} = Water temperature at the output of the load

T_{in} = Water temperature at the input to the load.

F = Water flow rate in gallons per minute

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

Unpacking and Inspection

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.

DC Resistance

Before first using the load, get a resistance baseline for future maintenance. Refer to "[RF Assembly Resistance Test](#)" on page 13 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.

CAUTION

The load must be fully supported and remain parallel to the transmission line during all steps of installation. Never allow the load to be supported solely by the center conductor or center coupling element (center bullet).

NOTE

It is recommend that additional mechanical support is used to support the load in addition to the RF swivel flange. The load must have additional mechanical support if an unflanged connection or 7-16 jack(8732A only) is used

- 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.

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.

NOTE

With the exception of Model 8738A110, which is equipped with 1/2" barbed hose fittings

- 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.

Connecting the RF Power

The Econoload can be attached to the RF transmission line 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.

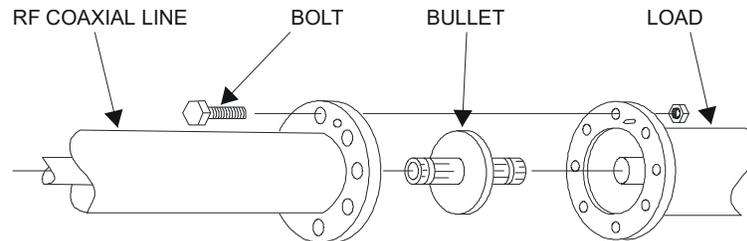
Using a Swivel Flanged Coupling

NOTE

The center bullet (coupling element) and transmission line must be in dimensional tolerance as specified by IEC339-2, "General purpose rigid coaxial transmission lines and their associated flange connectors, Second edition, Part 2" 339 IEC 50-40-3 or 339 IEC 50-80-3.

To couple the swivel flange with a flanged RF transmission line, use an appropriate coupling kit. Refer to [Figure 2](#) while following the instructions below.

Figure 2 Swivel Flanged Coupling



CAUTION

The load must be fully supported and remain parallel to the transmission line during all steps of installation. Never allow the load to be supported solely by the center conductor or center coupling element (center bullet).

NOTE

It is recommended that additional mechanical support be provided for the load if a swivel flange connection is used.

1. Install support for the load, the load must be fully supported and remain parallel to the transmission line.
 - Extreme care must be taken to ensure the center bullet is inserted parallel to the loads' center conductor.
 - Under no circumstances, should the center bullet be twisted or rocked during insertion.
 - Under no circumstance should tools be used to insert the center bullet.
 - If difficulty is encountered, stop and inspect the center bullet for damage or out-of-tolerance dimensions.
2. Insert the center bullet and push it in until it is fully seated.
 - Extreme care must be taken to ensure the load is inserted parallel to the RF transmission line.
 - Under no circumstances, should the load be twisted or rocked during insertion.
 - Under no circumstance should tools be used to attach the load to the transmission line.

- If difficulty is encountered, stop and inspect the transmission line or center bullet for damage or out-of-tolerance dimensions.
3. Connect the coaxial input in a straight line and push carefully on the center conductor to close.

CAUTION

Never allow the load to be supported solely by the center conductor or center coupling element (center bullet). Damage to the resistor may result.

- The swivel flange on the load makes connection independent of the orientation of the fixed flange on the coaxial input outer conductor.
 - The load must be fully supported and remain parallel to the transmission line during all steps of the installation.
4. Insert the bolt sets and tighten evenly all around to transmission line manufacturer's recommended torque.

NOTE

Use all of the bolts.

Repositioning

Following installation, if the load must be moved for any reason, follow the guidance below:

- Never twist/rotate the load if the orientation must be changed (example: the orientation of the coolant connection needs to be adjusted). The load must be removed, repositioned then re-installed per steps [3](#) & [4](#).
- The load must be fully supported and remain parallel to the transmission line during all steps of repositioning.
- Never allow the load to be supported by the center conductor or center coupling element (center bullet).
- Under no circumstances, should the load be twisted or rocked during removal or re-installation.

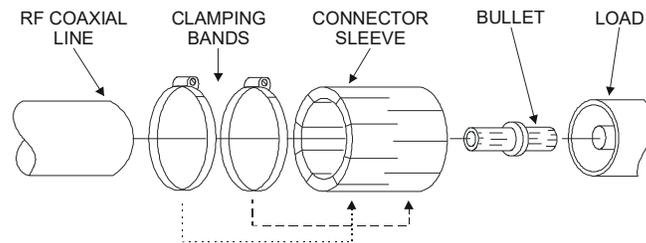
Using an Unflanged Coupling

NOTE

The center bullet (coupling element) and transmission line must be in dimensional tolerance as specified by IEC339-2, "General purpose rigid coaxial transmission lines and their associated flange connectors, Second edition, Part 2" 339 IEC 50-40-3 or 339 IEC 50-80-3.

To couple the unflanged connector with an unflanged RF line, use an appropriate coupling kit. Refer to [Figure 3](#) while following the instructions below:

Figure 3 Unflanged Coupling



CAUTION

The load must be fully supported and remain parallel to the transmission line during all steps of installation. Never allow the load to be supported solely by the outer connector sleeve only.

NOTE

The load must have additional mechanical support if an unflanged coupling is used. The load must not be supported solely by the outer connector sleeve only.

1. Install support for the load, the load must be fully supported and remain parallel to the transmission line.
 - Extreme care must be taken to ensure the center bullet is inserted parallel to the loads' center conductor.
 - Under no circumstances, should the center bullet be twisted or rocked during insertion.
 - Under no circumstance should tools be used to insert the center bullet.
 - If difficulty is encountered, stop and inspect the center bullet for damage or out-of-tolerance dimensions.
2. Insert the center bullet and maintain at least 1/8" (3mm) gap between the midpoint nibs and the center conductor.
 - Extreme care must be taken to ensure the load is inserted parallel to the RF transmission line.
 - Under no circumstances, should the load be twisted or rocked during insertion.
 - Under no circumstance should tools be used to attach the load to the transmission line.
 - If difficulty is encountered, stop and inspect the transmission line or center bullet for damage or out-of-tolerance dimensions.
3. Position the outer sleeve, with clamping bands, over the input connector.
4. Set the transmission line snugly against the coupling stops.
5. Position the clamping bands evenly about 3/4" from the ends of the sleeve.

CAUTION

Never allow the load to be supported solely by the center conductor, center coupling element (center bullet) or connector sleeve. Damage to the resistor may result.

NOTE

The load must be fully supported and remain parallel to the transmission line during all steps of the installation.

6. Tighten the clamping bands.

Repositioning

Following installation, if the load must be moved for any reason, follow the guidance below:

- Never twist/rotate the load if the orientation must be changed (example: the orientation of the coolant connection needs to be adjusted). The load must be removed, repositioned then re-installed per steps 4 through 6 of installation.
- The load must be fully supported and remain parallel to the transmission line during all steps of repositioning.
- Never allow the load to be supported by the center conductor, center coupling element (center bullet), or connector sleeve.
- Under no circumstances, should the load be twisted or rocked during removal or re-installation.

Using a Slotted Connector Sleeve (for Model 8738A110)

NOTE

The center bullet (coupling element) and transmission line must be in dimensional tolerance as specified by IEC339-2, "General purpose rigid coaxial transmission lines and their associated flange connectors, Second edition, Part 2" 339 IEC 50-40-3 or 339 IEC 50-80-3.

To couple the slotted connector, use an appropriate coupling kit.

CAUTION

The load must be fully supported and remain parallel to the transmission line during all steps of installation. Never allow the load to be supported solely by the outer connector sleeve only.

NOTE

The load must have additional mechanical support if an unflanged coupling is used. The load must not be supported solely by the outer connector sleeve only.

1. Install support for the load, the load must be fully supported and remain parallel to the transmission line.
 - Extreme care must be taken to ensure the center bullet is inserted parallel to the loads' center conductor.
 - Under no circumstances, should the center bullet be twisted or rocked during insertion.
 - Under no circumstance should tools be used to insert the center bullet.
 - If difficulty is encountered, stop and inspect the center bullet for damage or out-of-tolerance dimensions.
2. Insert the center bullet and maintain at least 1/8" (3mm) gap between the midpoint nibs and the center conductor.
 - Extreme care must be taken to ensure the load is inserted parallel to the RF transmission line.
 - Under no circumstances, should the load be twisted or rocked during insertion.
 - Under no circumstance should tools be used to attach the load to the transmission line.
 - If difficulty is encountered, stop and inspect the transmission line or center bullet for damage or out-of-tolerance dimensions.

3. Position a clamping band over the input connector.
4. Slide the slotted outer conductor of the load input over the unflanged transmission line until it is seated.

CAUTION

Never allow the load to be supported solely by the center conductor, center coupling element (center bullet) or connector sleeve. Damage to the resistor may result.

NOTE

The load must be fully supported and remain parallel to the transmission line during all steps of the installation.

5. Tighten the clamping band.

Repositioning

Following installation, if the load must be moved for any reason, follow the guidance below:

- Never twist/rotate the load if the orientation must be changed (example: the orientation of the coolant connection needs to be adjusted). The load must be removed, repositioned then re-installed per steps [4](#) through [6](#) of installation.
- The load must be fully supported and remain parallel to the transmission line during all steps of repositioning.
- Never allow the load to be supported by the center conductor, center coupling element (center bullet), or connector sleeve.
- Under no circumstances, should the load be twisted or rocked during removal or re-installation.

Operation

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.

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
Excessive reflected power	DC resistance of the load has changed	Check DC resistance (" RF Assembly Resistance Test " on page 13)
	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

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.

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. Resistance measurements should be taken periodically according to use.

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.

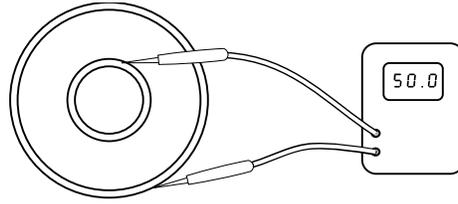
CAUTION

Never allow the load to be supported solely by the center conductor, center coupling element (center bullet) or connector sleeve. Damage to the resistor may result.

Extreme care must be taken to ensure the load is removed parallel to the RF transmission line.

2.
 - Extreme care must be taken to ensure the load is removed parallel to the RF transmission line.
 - Under no circumstances, should the load be twisted or rocked during removal.
 - Under no circumstance should tools be used to remove the load from the transmission line.
 - Never allow the load to be supported by the center conductor or center coupling element (center bullet).
3. Disconnect the RF coaxial line. Refer to "[Connecting the RF Power](#)" on page 6.
4. Connect the multimeter test leads across the center and outer conductor of the load resistor. See [Figure 4](#).
5. 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 2 ohms this could be an indication of a failing resistive element.

Figure 4 *Measuring DC Resistance*



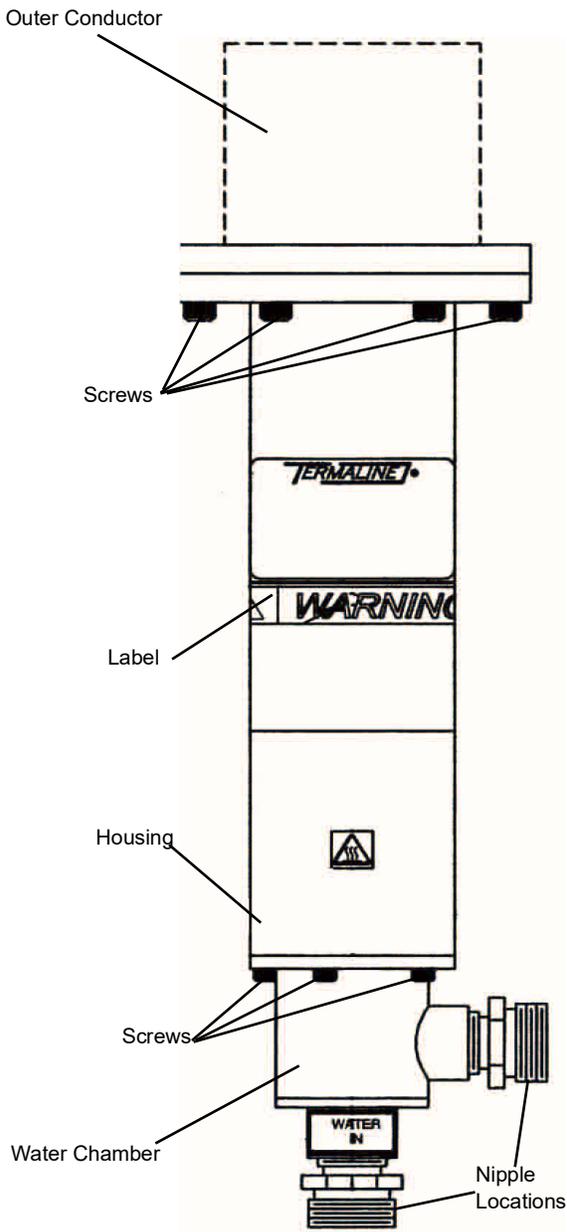
Repair

WARNING

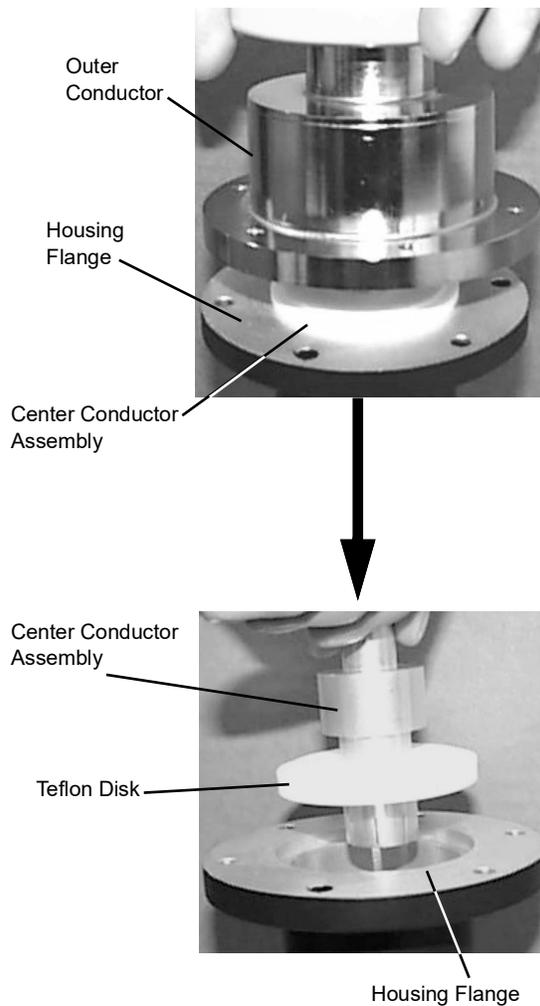
Never attempt to connect or disconnect RF equipment from the transmission line while RF power is being applied.
Leaking RF energy is a potential health hazard.

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.

Figure 5 Load Exploded View - Model 8730



DETAIL - Center Conductor Assembly



Removing the Resistor

Numbers in brackets [] refer to the labeled parts in [Figure 5](#). 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 from the back of the water chamber assembly. 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.

NOTE

It may be necessary to rock the chamber gently while pulling.

NOTE

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.

Replacing the Resistor

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.

NOTE

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.

Replacing the Conductor

1. Remove the screws [9] from the RF connector.
2. Remove the outer conductor assembly [12].

NOTE

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].
4. Make sure the resistor [1] and inner flow tube [9] do not come out with the center conductor.
5. Insert the new center conductor assembly into the load housing.
6. Make sure the resistor fitting makes a snug fit with the resistor.
7. Replace the outer conductor and screw it into place.

Storage and Shipment

Storing the Load Resistor

- Cover Bird 8730 Loads before storing to keep out dust and dirt.
- It is not necessary to install the shipping plug.
- 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

1. Drain any remaining coolant from the load.
2. Wrap the load in a generous amount of padding for protection during transfer.
3. Pack and brace the load in a sturdy wooden crate for shipment.

Customer Service

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

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

Bird Service Center

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

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

<http://www.birdrf.com>

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 at (8732A) Power Min Flow 60° C (140° F)
	10 kW 6 gal. / min. (23 L / min.)
	8 kW 4 gal. / min. (15 L / min.)
	4 kW 1.1 gal. / min (4 L / min.)
	5 kW contin. 2.6 gal. / min. 10 kW pulse (10 L / min.)
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
	8738A110 Unflanged with integrated, slotted outer conductor adapter
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. ¹
Coolant Connections	3/4" standard hose thread 1/2" barbed hose fitting (model 8738A110)
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)
Max Water Pressure	80 PSI (5.52 bar)
Dimensions, Nominal	2.5" diameter x 12" long (64 x 305 mm) 2.5" diameter x 13-3/8" long (64 x 340 mm) - Model 8738A110
Weight, Nominal	8 lb. (3.6 kg)

1. 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	8738A052
Hose Connector	2	5-065-2
Housing, Rear	1	8738A071
Housing, Front	1	8738A054
Socket Head Cap Screw, 8-32 x 3/4"	5	1118-1208-00
Socket Set Screw, 10-32 x 1/4" Cone pt.	1	1129-0400-25
Socket Head Cap Screw, 1/4-20 x 3/4"	6	1121-1208-00
Center Conductor Assembly		
8732A	1	8732A053
8730A		8730A053
8738A		8738A056
Outer Conductor Assembly		
8732A	1	8732A052
8730A		8730A052
8738A		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

Bird 8738A110

Description	Qty	Part No.
Hose Connector	2	5A2857-1
Center Conductor Assembly	1	8738A113
Outer Conductor Assembly	1	8738A112

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.

