



## LOAD PROTECTION SWITCH

### OPERATION MANUAL

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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 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**

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.

**Note:** *Calls 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**

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

On page 3.

**WARNING**

Disconnect the unit from the RF power source and the AC line before any disassembly. The potential for electrical shock exists.

On page 7.

## Caution Statements

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

**CAUTION**

When the protection switch is deactivated, high VSWR is present. Ensure actively transmitting components can withstand high levels of reflected power or have a means to stop or lock-out transmission if the interlock is inactive.

On page 4.

**CAUTION**

The Moduload connected to the Load Protection Switch **MUST** be operating with the interlock circuit active (green indicator illuminated) **BEFORE** RF is applied to the transmission line.

On page 6.

**CAUTION**

Do not use harsh or abrasive detergents for cleaning.

On page 7.

## **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 EFFETTUARE ALCUNA RIPARAZIONE A MENO CHE QUALIFICATI A FARLA.

## **About This Manual**

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

8640A930-1, Load Protection Switch

## **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** — Identifies the parts and functions of the Load Protection Switch.

**Installation** — Provides information on installing the unit.

**Operating Instructions** — Describes operation of the unit

**Maintenance** — Lists basic troubleshooting information, routine maintenance



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## General Description

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The Load Protection Switch is designed to be inserted in the transmission between an RF generator and a Bird Moduload. The purpose of the switch is to disconnect RF passing through the Switch should the load's interlocks be tripped. The Load Protection Switch contains a high voltage relay, which is used to open or close the flow of RF through the Switches line section.

## Features

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- Protects Bird Moduloads, liquid cooled loads, when internal coolant interlocks are tripped.
- May be used at any point in the transmission line

## Items Supplied

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- Load Protection Switch
- 65 W, 24 VDC Power supply
- Coupling Kit, one
- Instruction Manual

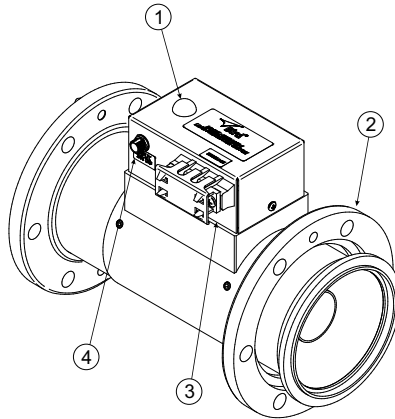
## Items Required but not Supplied

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- Wire, 22 AWG, with ring terminals, for interlock connection

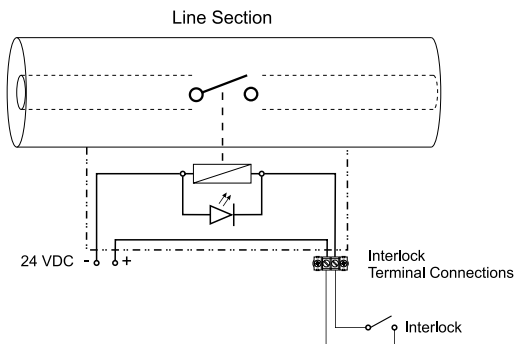
## Equipment Description

**Figure 1 Load Protection Switch**



Item	Function	Description
1	Operation Indicator	Indicator illuminates green, when the Load Protection Switch is closed allowing RF to pass through the switch.
2	Flanged Line Section	3-1/8 inch Flange on each end of an 8 inch line section.
3	Interlock Terminal	Interlock terminal provides connection for a two wire interlock to control the position of the Load Protection Switch.
4	Power Supply Input	Input connector for the 24 VDC power supply input.

**Figure 2 Load Protection Switch Schematic**



## 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.*

## Tools Required

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- Phillips head screw driver
- 3/8 inch wrenches

### **WARNING**

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

## Mounting the Load Protection Switch

### CAUTION

When the protection switch is deactivated, high VSWR is present. Ensure actively transmitting components can withstand high levels of reflected power or have a means to stop or lock-out transmission if the interlock is inactive.

**Note:** Use 3-1/8" EIA Coupling Kit, Bird P/N 4600-020, which includes six 3/8-16 x 1-1/2" bolt and nut sets, O-Ring, and insulated center bullet.

Refer to [Figure 3 on page 4](#) when connecting the Load Protection Switch. The load protection Switch may be installed in any orientation.

**Note:** The Load Protection Switch is non-directional and may be mounted in either direction.

1. Insert the center connector (bullet).

**Note:** Push the connector until it is fully seated.

2. Connect the coaxial input in a straight line.

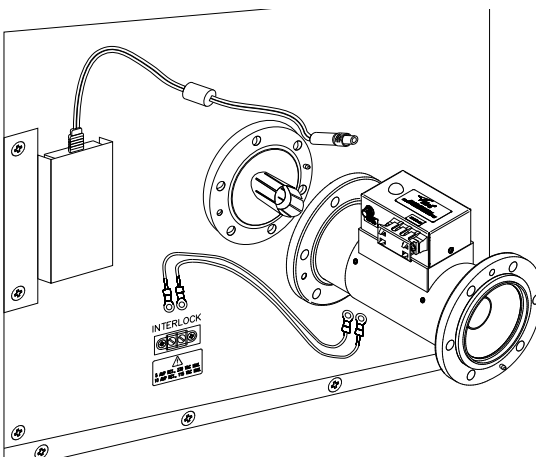
**Note:** Push carefully to close.

3. Insert the bolt sets.

4. Tighten the bolt sets evenly all around to transmission line manufacturer's recommended torque.

**Note:** Use all of the bolts.

**Figure 3 Load Protection Switch Installation**

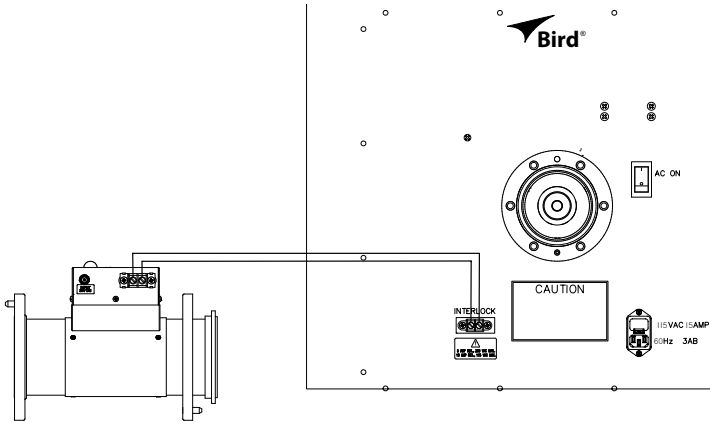


## Interlock Connection

The Interlock connection is design to be controlled by an external switching circuit capable of 200mA. When continuity is present across the two terminals, the RF switch will close, allowing RF power to travel in the transmission line.

1. Using number 22 AWG (or heavier) wire, attach solder-less ring terminals to the wire.
2. Remove protective cover from the Load Protection Switches interlock terminal.
3. Connect one end of the interlock wires to the Load Protection Switch's terminal strip.
4. Install the terminal's protective cover.

**Figure 4 Terminal Connections**



**Note:** For long wire runs, twist the interlock wires together to minimize potential false deactivation.

5. Connect the other end of the interlock wires to the load's interlock terminal strip.

**Note:** DC input power must be provided to the Load Protection Switch for it to properly activate.

6. Connect the DC power supply to the input connector on the Load Protection Switch.

There are no operating controls on the Load Protection Switch. However, prior to applying RF power to the transmission line ensure the Load Protection Switch is properly installed and the Load is on and operating normally.

#### CAUTION

The Moduload connected to the Load Protection Switch **MUST** be operating with the interlock circuit active (green indicator illuminated) **BEFORE** RF is applied to the transmission line.

When the interlock terminals are open circuit, the RF switch is off and it presents a high-VSWR/open circuit to the transmitter thus protecting the load or downstream device.

When the interlock terminals are closed (i.e. continuity across the terminals), the interlock circuit activates the RF switch and allows RF power to continue down the transmission line.

## Normal Operation

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**Note:** *"Hot-switching" i.e. activating the RF switch with RF power present in the transmission line is not recommended.*

1. Check the Interlock connection between the Load Protection Switch and the Moduload.
2. Perform the power-on procedure for the Moduload.
3. Verify the indicator on the Load Protection Switch is illuminated green.
4. Apply RF Power.

**Note:** *If the interlock is properly connected, the Load Protection Switch will open if a fault occurs in the Moduload.*

## Shutdown

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1. Turn off RF Power at the Source.
2. Perform the power-off procedure for the Moduload.

This chapter contains cleaning, troubleshooting, specifications, and part information for the Bird Load Protection Switch.

## Inspection and Cleaning

This unit requires only simple and routine maintenance.

**WARNING**

Disconnect the unit from the RF power source and the AC line before any disassembly. The potential for electrical shock exists.

**CAUTION**

Do not use harsh or abrasive detergents for cleaning.

1. Wipe off dust and dirt regularly. Use a soft, clean cloth dampened with mild detergent.
2. Check connectors, connector pins, and cables for damage. If needed, clean the connectors using a self-drying contact cleaner that leaves no residue.

## Troubleshooting

The Bird Load Protection Switch has no operator serviceable parts. Any required service must be performed at an authorized service facility.

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.

<b>PROBLEM</b>	<b>POSSIBLE CAUSE</b>	<b>CORRECTION</b>
<b>Load Protection Switch deactivated.</b>	Interlock open.	Check Interlock, if interlock is open determine and correct cause.
	No power.	Check load protection switch power supply.
	Loose wiring connections.	Check wiring between Load Protection Switch and Moduload Interlock Connector.
<b>Excessive reflected power.</b>	Load Protection Switch deactivated.	Check Interlock, if interlock is open determine cause. If interlock is closed, see Load Protection Switch deactivated.



## Specifications

Frequency Range	1kHz to 120MHz
Insertion Loss*	0.05 dB max, up to 120 MHz
VSWR*	1:02:1 max, up to 120 MHz
Max Power	60 kW at 2 MHz 20 kW at 60 MHz 16 kW at 120MHz
Dimensions	
RF Line Size, Flange	
Length	3-1/8 inch
Weight	8-3/4 inch
Input Power	24 VDC
Switch Position Indicator	Switch Position
Off	Open
Green	Closed
Interlock Control	Two Wire, 0.2A nominal
Interlock Status	Load Protection Switch Position
Open	Open
Closed	Closed
Hot Switching	Not recommended

\* Values are with the Load Protection Switch in the closed position.

## 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](mailto:bsc@birdrf.com)

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

<http://www.birdrf.com>

# 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.