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INSTRUCTION BOOK

**OPERATING INSTRUCTIONS**

**TERMALINE® LOAD RESISTOR  
MODELS 8765/8766**



*Bird*  
**Electronic Corporation**

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### MODELS COVERED IN THIS INSTRUCTION BOOK

8765

8766

## **SAFETY PRECAUTIONS**

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

### **KEEP AWAY FROM LIVE CIRCUITS**

Operating personnel must at all times observe normal safety regulations. Do not attempt to replace parts or disconnect an RF transmission or any other high voltage line while power is applied. When working with high voltage always have someone present who is capable of rendering aid if necessary. Personnel working with or near high voltage should be familiar with modern methods of resuscitation.

### **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.

### **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.

### **SHOCK HAZARD**

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

### **CHEMICAL HAZARD**

Dry cleaning solvents used to clean parts may be potentially dangerous to your health. Avoid inhalation of fumes and also prolonged contact with skin.

### **RESUSCITATION**

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

### **SAFETY SYMBOLS**

**WARNING**

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

**CAUTION**

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

The following warnings appear in the text where there is procedures, that if not carefully followed, could be detrimental to operating and maintenance personnel and are repeated here for emphasis.

**WARNING**

Provide adequate ventilation and observe normal precautions when using dry cleaning solvents. Many dry cleaning agents emit toxic fumes that may be harmful to your health if inhaled.

**WARNING**

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

**WARNING**

The resistor used in this load consists of a resistive film on a special substrate. If the substrate is broken, there will probably be sharp pieces or splinters inside the load housing. Caution should be exercised to avoid possible injury.

The following cautions appear in the text whenever a procedure, if not properly followed, could put the equipment in danger of damage and are repeated here for emphasis.

**CAUTION**

The water flow must be kept in the right direction; opposite flow will cause almost immediate burnout.

**CAUTION**

Be sure cooling liquid is flowing through the load before RF power is applied and make sure the cooling liquid supply is not interrupted while load is in operation. Even momentary interruption of coolant supply while load power is applied will cause almost immediate burnout.

**CAUTION**

Never reverse the cooling water connections. It is very important for the safety of the load resistor to observe proper flow direction. Also, when the load is first installed or is reconnected, run the water for approximately a minute to fill the system and remove all bubbles before turning on the RF power.

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## SECTION I. INTRODUCTION

### 1.1. PURPOSE AND FUNCTION

The Model 8765/66 Series Load Resistor is designed as a compact, low-reflection and non-radiating termination for RF transmission lines. Cooled by internal water flow, it generates almost no ambient heat, making installation space minimal and convenient. It dissipates up to 40 kilowatts continuous power as used with 50 ohm coaxial transmission lines.

These models are designed for use with certain connector types of 3-1/8 inch coaxial lines. See Specifications for individual Models. It maintains a VSWR of less than 1.1 from 1000 Hz up to 900 MHz. These models are intended for use on CW, AM, FM, SSB and TV modulation envelopes, and within certain limitations on radar or pulse modes. Information on applications involving pulse-type signals should be obtained directly from Bird Electronic Corporation.

### 1.2. DESCRIPTION

The Model 8765/66 equipment consists basically of the Load Resistor unit. An accessory protective control system is available as optional equipment. When duly installed, this system protects the load by shutting off RF power when water flow is too low or interrupted. Discussions of the flow control (Installation and Maintenance Sections) herein should be ignored when not applicable. These models have the feature of field replacement of the resistive element. This procedure is described in Section V, Maintenance, paragraphs 5.3 and 5.6.

When used in conjunction with a Bird Model Series 4600 or 4800 Type THRULINE® Wattmeter, these load resistors may be used for direct reading of power measurements up to 40 kilowatts.

### 1.3. ACCESSORY ITEMS

When used in conjunction with a Bird Model 4800 Series THRULINE® Wattmeter, these RF load resistors may be used for direct reading power measurements up to 40 kilowatts.

Since these loads effectively dissipate RF power in a water supply, they are especially suited for calorimetry. When a Bird Model 6085 Digital

Calorimeter is connected to the input and output water source, the unit becomes a highly accurate device for measuring RF output power.

1.4. UNIT SPECIFICATIONS

Series 8765/66 TERMALINE® LOAD RESISTOR

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<b>Power Rating</b> .....	40,000 Watts
<b>Impedance</b> .....	50 ohms
<b>VSWR</b> .....	1:10 maximum 1000 Hz - 900 MHz
<b>Connectors</b>	
Model 8765 .....	3-1/8 EIA Flanged, (50 ohm)
Model 8766 .....	3-1/8 Unflanged, (50 ohm)
<b>Frequency Range</b> .....	1 kHz to 900 MHz
<b>Modes</b> .....	CW, AM, FM, SSB, TV, and certain pulse types
<b>Cooling Methods</b> .....	City Water or any potable supply
<b>Input Water Temperature Range</b> .....	5°C to 60°C (41°F to 140°F)
<b>AC Power Required</b> .....	115 V 50/60 Hz or 230 V 50/60 Hz (with optional items only)
<b>Water Flow - Minimum Rate</b> .....	8 GPM @ 5°C - 10 GPM @ 60°C (30.3 to 37.9 lpm)
<b>Water Connections</b> .....	3/4 inch Standard Hose Thread
<b>Weight</b>	
Model 8765 .....	15 lb 13 oz. (7.2 kg)
Model 8766 .....	15 lb 5 oz. (7.0 kg)
<b>Dimensions</b>	
Length Overall .....	19-1/2" (495.3 mm)
Housing Diameter .....	3-1/2" (88.9 mm)
Model 8765 Maximum Diameter (Input Flange) . . . .	5-3/16" (131.8 mm)
Model 8766 Maximum Diameter (Housing Flange) . .	5" (127.0 mm)
<b>Finish</b> .....	Lusterless Black Enamel
<b>Housing Material</b> .....	Aluminum Alloy and Brass
<b>Operating Position</b> .....	Any

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## SECTION II. PREPARATION FOR USE

### 2.1. GENERAL

The compact design of the Models 8765/66 enables the load to be installed in very small spaces. It requires no ventilation and may be placed at any attitude. Do not install where it will be subjected to severe vibration or physical shock.

The load is ready for connection as received from the factory. It is useful to check the 50 ohm input resistance of the load and record this information before attachment, see Maintenance Section.

### 2.2. LOAD RESISTOR ATTACHMENT

#### WARNING

Provide adequate ventilation and observe normal precautions when using dry cleaning solvents. Many dry cleaning agents emit toxic fumes that may be harmful to your health if inhaled.

Clean all conductors and insulator surfaces on transmission line face if required and check RF input connector. Use any commercial dry cleaning solvent on a cotton swab stick.

Attach the load resistor to the RF line, but do not tighten. Use connector kits for respective Models as follows:

1. Model 8765 - 3-1/8 inch EIA flanged, 50 ohm; use a 3-1/8 inch EIA Coupling Kit (Bird P/N 4600-020) which includes six (6) 3/8-16 x 1-1/2 inch bolt sets, O-ring, and center conductor anchor bullet.
2. Model 8766 - 3-1/8 inch unflanged, 50 ohm flush center conductor. Use Bird Coupling Kit P/N 5-726, consisting of an outer sleeve with two clamping bands and the center conductor coupling bullet.

Rotate the load so that the Warning Label shows and the Outlet water tube is placed to best advantage. Tighten the RF connection, securing the clamps or bolt sets firmly and evenly.

Do not disturb the socket head cap screws joining the connector section to the main housing.

### 2.3. WATER LINE ATTACHMENT

#### CAUTION

The water flow must be kept in the right direction; opposite flow will cause almost immediate burnout.

The RF load comes supplied with standard 3/4 inch hose fittings. The water "INLET" at the back on center and water "OUTLET" adjacent, at 90° to Inlet mate with 3/4 inch water hose connectors. If the unit is factory equipped with the optional control system, the Water Flow Switch is installed on the water inlet line. For field installation see paragraph 2.5. For rigid piping connections, replace both the water inlet and outlet hose adapters (Bird P/N 6-065-2) with 1/2 inch male pipe or pipe fittings.

### 2.4. COOLING WATER QUALITY

Water quality is important. Refer to paragraph 3.3 for explanation and description. In general, any potable water is satisfactory. This would include: purified, filtered water, city supply or soft water.

### 2.5. OPTIONAL FLOW SWITCH

The ports of the Flow Switch are 3/4 inch NPT Female. The direction of flow is marked on the casting of the flow tube and on the operating head, observe carefully, opposite connection will restrict water flow and cause load failure. The flow switch may be connected to the inlet or the outlet pipe of the load, but be certain the water flow through the switch is in correct direction. Connect with 1/2 inch NPT nipple and 1/2 inch to 3/4 inch bushing, P/N's 5-489-1A and 5-490-1A. Or connect by hose or pipe, with the flow switch not over 20 feet from the load. Attach the hose to the switch with 3/4 inch hose nipple P/N 5-903.

- a. Do not connect flow switch electrical leads at this time.
- b. Turn on the water and check the system

## 2.6. CONTROL BOX (OPTIONAL ITEM)

The wiring center and remaining elements of the control system are contained in the control box. This includes the terminal strip and three "BX" cable clamps for the input connections, a pilot lamp and the delay timer. Only wiring material is needed. The control unit operates on 115 Vac, P/N 8750-101-1, or 230 Vac, P/N 8750-101-2, depending on unit ordered to fulfill the need of requirements.

The pilot lamp atop the box is a "safe operation" signal; it lights only when ac power is on and adequate water supply is flowing. After pilot goes "on" a 12 ±2 second timer delay allows time for water flow to stabilize before closing transmitter interlock.

The control box is mounted through four 1/4 inch holes on a 5 x 5 inch (127 x 127 mm) square on the back. Position it for the best view of the pilot light and easy attachment of "BX" cable and wiring. Connect the control leads for either voltage models as follows:

- a. Water Flow switch leads to terminals 3 and 5.
- b. Interlock Switch leads to 6 and 7.
- c. AC power source to terminals 2 and 3 for either 115 or 230 Vac models.

## 2.7. PREOPERATIONAL CHECKOUT

BEFORE ATTEMPTING TO OPERATE THE RF LOAD either under test or actual operating conditions, TEST the complete water system and INTERLOCK CONTROL as follows:

- a. Make sure ac and transmitter interlock power are OFF.
- b. Connect an ohmmeter across terminals 6 and 7 (Interlock).
- c. Turn on ac power.
- d. Turn on water supply and note when water flow switch operates (audible click).
- e. In not less than 10 seconds (12 ±2) the ohmmeter reading on 6 and 7 should drop, indicating operation of the time delay switch.
- f. Water flow from water "OUTLET" connection of load must be at least 8 gpm (30.3 lpm) at 5°C (41°F).

Note - As a precautionary measure, the preoperational checkout should be performed each time the load is to be put into service.

## SECTION III. PRINCIPLES OF OPERATION

### 3.1. GENERAL

This TERMALINE® Coaxial Load Resistor is unique in that it employs primarily external water cooling of the resistor element. By using this technique, the need for an intermediate dielectric fluid to transfer the heat generated in the resistor element has been eliminated, reducing the physical size of the load to virtually a minimum. This simplified system allows use of the loads in more varied environments, and attachment at any attitude.

### 3.2. HEAT TRANSFER

The 50 ohm resistor consists of hi-temp substrate with a deposited resistive film. The heat generated by absorption of RF power is transferred from the heated film to the water flowing over it - through a restricted chamber surrounding the resistor body. This water, first conducted to the front of the load resistor, passes over the entire length of the resistor and discharges through the sealed water chamber at the rear. The dielectric characteristics and distinctive design of these enclosures provided a very accurate 50 ohm termination over the specified frequency range of this load, 1000 Hz to 900 MHz.

The absence of intermediate cooling fluids considerably simplifies the construction and sealing of this unit. It can be readily disassembled in the field for resistor element replacement, see Maintenance, Section V.

There is practically no heat transfer to the outer housing of the load, it remains at ambient temperature even under full power application. Virtually all of the power input to the load is transformed into heat which is carried away by the cooling water. Therefore, the differential in output and input temperatures of the water times the amount of flow constitutes a very accurate measurement of the power consumed by the load. The amount of this power dissipation may be calculated from the following formula:

$$P = 0.263 (T_1 - T_2) \text{ GPM}$$

where;

$$P = \text{Power in kilowatts}$$

$$T_1 = \text{Outlet water temperature in } ^\circ\text{C}$$

$$T_2 = \text{Inlet water temperature in } ^\circ\text{C}$$

GPM = Water flow in gallons per minute

In  $^\circ\text{F}$  the formula is:  $P = 0.146 (T_1 - T_2) \text{ GPM}$

### 3.3. COOLING WATER

The electrical performance of these RF loads is affected by impurities or other chemical additives in the water. The presence of salts in the water definitely make the device unusable because of its causing rapid increase in VSWR. Therefore, sea water or silty water should not be used for cooling the loads.

The thermal performance of this series of loads is affected by impurities, particularly those minerals that accumulate in the form of scale on the exposed surfaces of the water conducting members of the load assembly. This may result in an increase in the thermal and/or fluid resistance of the load and in turn cause the load to overheat and fail.

The following types of water are considered safe for the cooling of the 8765/66 Series Loads: purified, filtered city or soft water (demineralized). In general, any potable water is suitable for cooling the load.

### 3.4. FLOW INTERLOCK CONTROL CIRCUIT (OPTIONAL)

The optional accessory, interlock control circuit provides instantaneous fail-safe protection of the transmitter and load in the event of even momentary interruption of the cooling water supply. This protection is necessary because dissipation of the heat generated by the RF power absorption is critically dependent upon a required minimum water flow regardless of inlet water temperature.

The water flow switch, attached to the water inlet of the load, is factory calibrated to open the electrical contacts whenever water flow drops below eight gallons per minute and close when water flow exceeds this value. When the water flow switch contacts open, the time delay relay switch is deactivated, which in turn, opens the interlock switch causing immediate shutdown of the

transmitter or other signal source. The time delay switch also keeps the interlock switch "open" for a  $12 \pm 2$  second interval after the minimum flow of eight gallons per minute has been reestablished. This safeguarding feature is 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 control assembly also includes a large, torpedo-lens pilot light set on top of the box. As normally mounted, this red pilot lamp should be freely visible from nearly all front angles in the operating vicinity of the load unit/control assembly. After proper installation, described in Section II, lighting of this pilot lamp will serve as visible indication that the RF load is ready to receive power, or of trouble in the cooling supply (control) if it is not lighted.

## SECTION IV. OPERATING INSTRUCTIONS

### 4.1. GENERAL

The TERMALINE® RF Load is not equipped with any operating controls, therefore, requires no operator present while in use. Proper operation of the equipment is assured if the instructions contained in Section II, Preparation for Use, are followed exactly. In reality, adequate and uninterrupted full water flow is more critical than temperature.

Do not apply more than rated RF power to the load. The water flow rate and inlet temp 5°C to 60°C (41°F to 140°F) must be as specified.

### 4.2. NORMAL OPERATION

#### CAUTION

Be sure cooling liquid is flowing through the load before RF power is applied and make sure the cooling liquid supply is not interrupted while load is in operation. Even momentary interruption of coolant supply while load power is applied will cause almost immediate burnout.

#### CAUTION

Never reverse the cooling water connections. It is very important for the safety of the load resistor to observe proper flow direction. Also, when the load is first installed or is reconnected, run the water for approximately a minute to fill the system and remove all bubbles before turning on the RF power.

#### WARNING

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

For ordinary operation of the RF load, without the

optional controls described in Section II, proceed carefully as follows.

Before turning on the RF power, cooling water must be freely flowing through the load. A minimum flow of eight gallons (30.3 liter) per minute at 5°C must be increased in proportion, to 10 GPM (37.9 liter) at 60°C. There must be no interruption in this water flow during any power application to the load; almost instantaneous resistor burnout may occur. Also, be sure to shut off RF power well before turning off water flow.

### 4.3. OPERATING WITH OPTIONAL CONTROLS

- a. Turn on ac power.
- b. Turn on water supply.
- c. Turn on interlock supply.
- d. Check that all coaxial power line connections are properly tightened.
- e. Apply RF power to load. Proceed according to instructions pertaining to the specific transmitting equipment.

### 4.4. OPERATING AS AN RF WATTMETER

The RF load can be combined with a Bird Rigid Line Series THRULINE® Wattmeter to form an absorption type wattmeter by inserting the wattmeter line section just ahead of the RF load. Installation and operation of the wattmeter is covered in the THRULINE® Wattmeter Instruction Book. Select the wattmeter type appropriate to the input connector of the load resistor, consult the Bird catalog.

- a. Proceed with operating functions the same as in paragraphs 4.2 or 4.3.
- b. Rotate the element in the THRULINE® Wattmeter's socket to monitor incident or reflected power. Measurements are taken as indicated by direction of the arrow on the element.

#### 4.5. OPERATION AS A CALORIMETER

The RF load may be used with a Bird Model 6085 installed to form a highly accurate digital absorption calorimeter. Unlike the THRULINE® Wattmeter, the sensor unit of the calorimeter is connected to the coolant supply lines. Operation of the calorimeter will be covered in the Model 6085 Calorimeter Instruction Book.

#### 4.6. SHUTDOWN PROCEDURE

- a. Turn off RF power to the load.
- b. Wait at least one minute for load resistor to cool.
- c. Turn interlock and ac power off.
- d. Turn off the water supply. Always do this last.

## SECTION V. MAINTENANCE

### 5.1. GENERAL

The Model 8765/66 TERMALINE® Coaxial Load Resistor are rugged units of simple design, requiring only nominal and routine attention. The load is designed to operate for long periods of time if care is taken not to exceed its power handling capabilities.

#### WARNING

Provide adequate ventilation and observe normal precautions when using dry cleaning solvents. Many dry cleaning agents emit toxic fumes that may be harmful to your health if inhaled.

The outside surface of the unit should be wiped free of dust and dirt at regular intervals if necessary. Disconnect the load resistor from the transmission line and clean the RF input connector both metallic and insulator surfaces. Use an aerosol type contact cleaner or any good dry cleaning solvent on a cloth. Always handle the load with care to prevent subjection to unnecessary shock or impact.

### 5.2. RF ASSEMBLY TEST

The electrical condition of the load resistor itself may be ascertained generally from its dc resistance at room temperature.

It must be remembered that VSWR and RF impedance are the prime requisites of a good dummy load, however, occasionally checking the dc resistance will offer an indication of a failing load.

Normally the dc resistance of the load will be a nominal 50 ohms. Stabilization of the resistive film or temperature can cause a change in the dc resistance. Always check the load when its temperature is between 20 and 25 degrees Celsius.

Check and record the dc resistance value of the load before it is put into service. Use a resistance bridge or ohmmeter with an accuracy of one percent or better at 50 ohms for this purpose.

If the load is used frequently, daily to weekly, it would be wise to check the resistance on a monthly schedule. If however, the load is used more infrequently you may want to set up a six month to yearly schedule accordingly. If there is no change or even a slight change in dc resistance there is no cause for alarm, however, if there is a drastic change greater than two ohms, this could be an indication of a failing load.

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

### 5.3. REPLACEMENT PROCEDURE FOR RESISTIVE ELEMENT

#### NOTE

A load that has failed, can either be returned to an authorized factory service facility for repair or can be repaired in the field. If field service is preferred than proceed with the instructions that follow.

This series of water cooled loads is designed to be quickly and easily repaired in the field. If in performing the dc resistance check described previously in paragraph 5.2, a significant change in resistance is noted, or if for any reason the resistive element should fail, inexpensive replacement resistors are available. They can be installed in the load, using the following procedures:

Note - Part numbers designated by brackets "[ ]" in text are so indicated on figures 5-1 and 5-2.

1. Make sure the RF power and water supply are turned off. If the load is not already removed from the system, disconnect the water hoses at the hose fittings [5] on load and disconnect unit from the RF transmission line. Completely drain excess water from the load.

2. Set the load on end, with the water connections up, and using a 3/16 inch hex Allen wrench, unscrew the six 1/4-20 x 2-1/2 inch socket head cap screws [6] holding the

water chamber [3] to the main load housing. When all screws are loose, pull the water chamber assembly (with screws) straight off. It may be necessary to rock the chamber gently while carefully pulling it off.

3. The inner flow tube [9] will usually come out with the water chamber assembly, being held to it by the compression of the inner O-ring [4] (water input) seal. This is normal, and if the resistor body is unbroken, there will be no need to remove the inner flow tube from water chamber assembly. The ground cap assembly [10] is fitted tightly within the water chamber and should normally remain with it. If the inner flow tube has stayed in the resistor section, simply grasp the resistor stop sleeve [7] on the flow tube and pull out the assembly. Note - This includes the cushioning O-Ring [8] which fits loosely below the stop sleeve - always take care not to lose it by falling off. Also, if the brass stop sleeve [7] is removed at all, notice that it has a small escape hole at the side and an access counterbore leading to it. In reassembly, be sure this counterbore is facing toward the O-Ring and the resistor [1]. This is essential for internal water venting. Notice the water output holes and also the small shoulder at the base of the inner flow tube. At reassembly, this must fit into a mating recess in the input fitting at the bottom.

4. If the resistor [1] is intact it may be easily pulled straight out of the load housing, and is ready for replacement. The outer flow tube is captive, and will not come out of the housing at this stage.

#### 5.4. INSPECTION

At this point, if the resistor has been successfully removed, inspect it carefully to insure that it is not fractured. In the majority of cases, even in the event of resistor failure, the resistor substrate will remain intact. Next, examine the inside of the load housing assembly for any apparent damage to the internal parts. If no damage had been found, proceed with resistor replacement paragraph 5.5, following. If, however, the resistor is broken, other internal parts appear to be damaged, or if they do not fit together properly, proceed to paragraph 5.6,

Replacement Procedure for Fractured Resistors.

#### 5.5. RESISTOR REPLACEMENT

1. Examine the inside of the load housing assembly for any apparent damage to the internal parts.

2. Insert new resistor [1] into the load housing until it reaches its fitting. Push in the resistor until it bottoms snugly. If resistor seems to be loose, refer to the procedure for the replacement of fractured resistors for instructions on how to tighten the resistor fitting.

3. Place the inner flow tube [9] inside the resistor and lower it until it reaches the resistor fitting. Gently work and twist the inner flow tube until it seats in the bottom of the input resistor fitting. (This operation may also be done if the inner flow tube is still in position in the water chamber.)

4. Make sure that the O-Ring [8] cushion is placed on the inner flow tube next to the resistor and the "backup" resistor sleeve [7] is right behind it. Watch orientation of the sleeve, see paragraph 5.3, step 3. (There is no need to disturb the resistor cap assembly [10] in the water chamber for this procedure.)

5. Now replace the water chamber [3], gently rocking and twisting the chamber to achieve the proper flat seat on the outer housing. Note - If water chamber [3] does not seem to fit properly, refer back to step 3. to see that the inner flow tube is properly in place.

6. Then tighten the six (6) 1/4-20 x 2-1/2 inch socket head cap screws [6]. Check the dc resistance between the inner and outer conductors - it should be approximately 50 ohms, see paragraph 5.4 above. Then connect the load to a water source and check for leaks. If none appear, the load is ready for service.



## 5.6. REPLACEMENT PROCEDURE FOR FRACTURED RESISTORS

**WARNING**

The resistor used in this load consists of a resistive film on a special substrate. If the substrate is broken, there will probably be sharp pieces or splinters inside the load housing. Caution should be exercised to avoid possible injury.

When disassembling a unit when a resistor has been broken, carefully follow the steps below to avoid errors or assembly problems.

1. The load should already be disassembled to the point of step 4 of paragraph 5.3. Now turn the load on end, with the RF input connector up to allow any loose pieces of resistor to fall out of the load housing.
2. Using a 3/16 inch Allen wrench, loosen and remove the six (6) 1/4-20 x 1-1/2 inch socket head cap screws [16] from the flanged end of the load housing, as shown in figure 5-2. The outer conductor assembly [12] or [14] may now be easily removed.
3. Next remove the input center conductor assembly [11] or [13], figure 5-2, by pulling it out of the load housing, and then carefully remove any remaining pieces of the resistor. Normally, at this disassembly, the outer flow tube will remain with the load housing. Restore it to this position after inspection and cleaning if it should come out. Inspect the inside of the load housing for any apparent damage.
4. Also, if it is in place in the water chamber, pull out the inner flow tube. Inspect carefully for broken pieces. Then grasp the projecting hub of the resistor cap assembly [10] firmly with your fingers and pull straight off with a strong even force.
5. Under clear running water thoroughly wash all the inside portions of the three assemblies; i.e., input section, load housing, and water chamber. Replace the resistor

cap assembly in the water chamber at this time - push in firmly to bottom.

Install a replacement resistor as follows.

1. Insert replacement resistor [1] into the resistor fitting of the input center conductor assembly to test its tightness. The resistor should not have to be forced into the fitting, but it should be quite snug.
2. If the resistor is loose in the fitting, press the slotted finger contacts of the fitting together slightly and try the resistor again. Continue closing the ends of the resistor fitting until a snug fit is obtained. Then bottom the resistor in the fitting.
3. With the resistor still in place in the resistor fitting, insert the resistor and the input center conductor assembly into the load housing, as illustrated in figure 5-2, reversing procedure in paragraph 5.6, step 3, above. Then replace the outer conductor assembly and the six (6) 1/4-20 x 1-1/2 inch socket head cap screws, and tighten.
4. Stand the load on end with the RF input connector down, place the inner flow tube inside the resistor and lower it until it reaches the resistor fitting. Gently move and twist the inner flow tube until it seats in the bottom of the resistor fitting.
5. Continue the same procedure as given in paragraph 5.5, steps 4 through 6, above.

## 5.7. FRONT CONNECTOR ASSEMBLY

This portion of the load unit consists of the inner conductor [11] or [13] and the outer conductor [12] or [14], respectively. They may be released by removing the six screws [16] at the front of the housing flange, as described in paragraph 5.6, step 2. When the inner conductor has been pulled out, the O-Ring [15] seal (to the outer water flow tube) may be readily changed, if desired. Do not attempt further disassembly of this part.

Any maintenance or service procedure beyond scope of those provided in this section should be referred to a qualified service center. Bird Electronic Corporation maintains complete repair and calibration facility at following address:

Service Group  
Bird Electronic Corporation  
30303 Aurora Road  
Cleveland (Solon) Ohio 44139-2794

Phone: (216) 248-1200  
Fax: (216) 248-5426  
Cable: BIRDELEC  
Telex: 706898 Bird Elec UD

European Sales Office:

Bird Electronic Ltd.  
Unit 1  
Shannon Business Centre  
Towne Centre  
Shannon  
County Clare Ireland

	(Country Code)	(City Code)	(Number)
Phone:	353	61	360583
or	353	61	360577
Fax:	353	61	360585

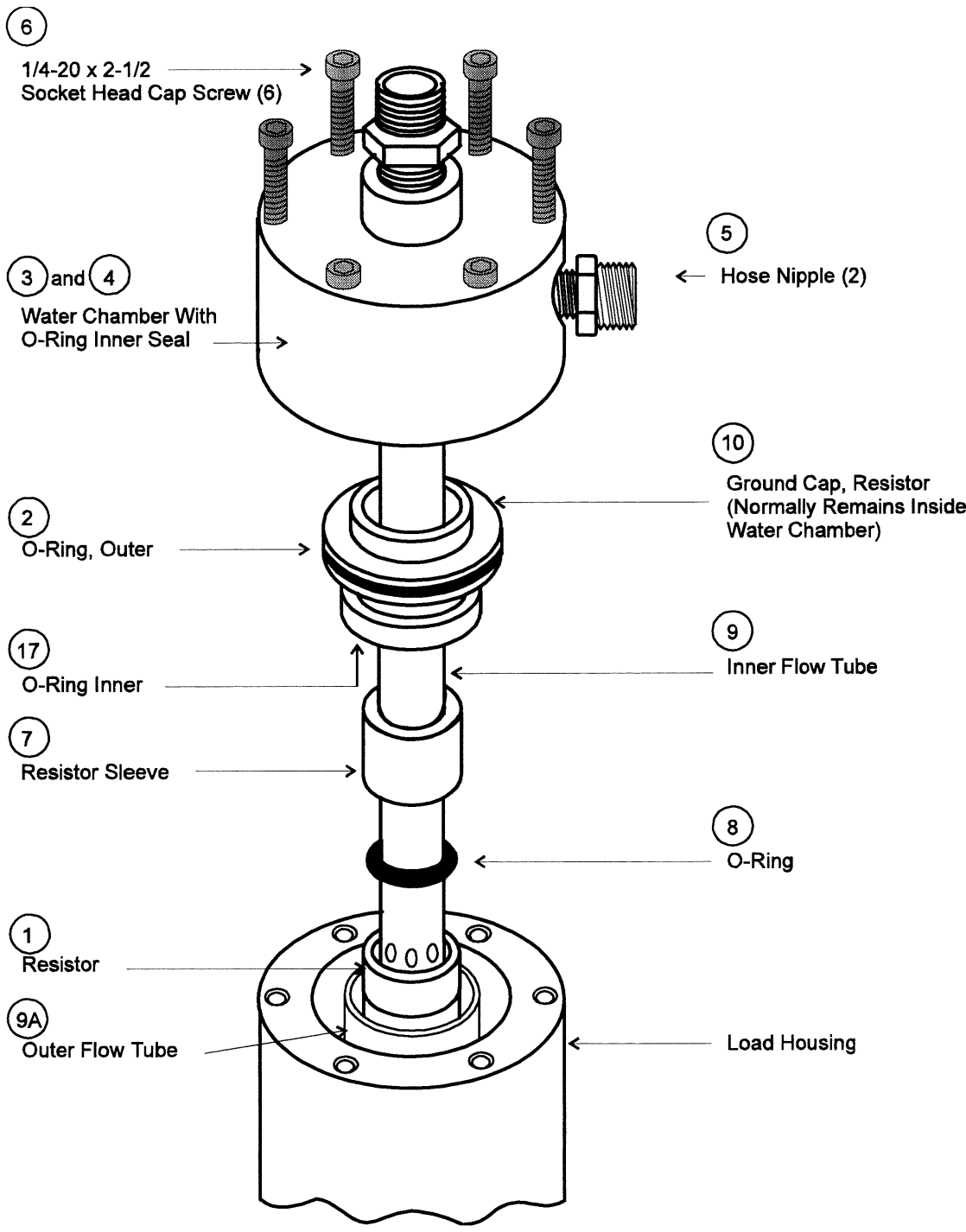


Figure 5-1. Resistor Removal (Exploded View)

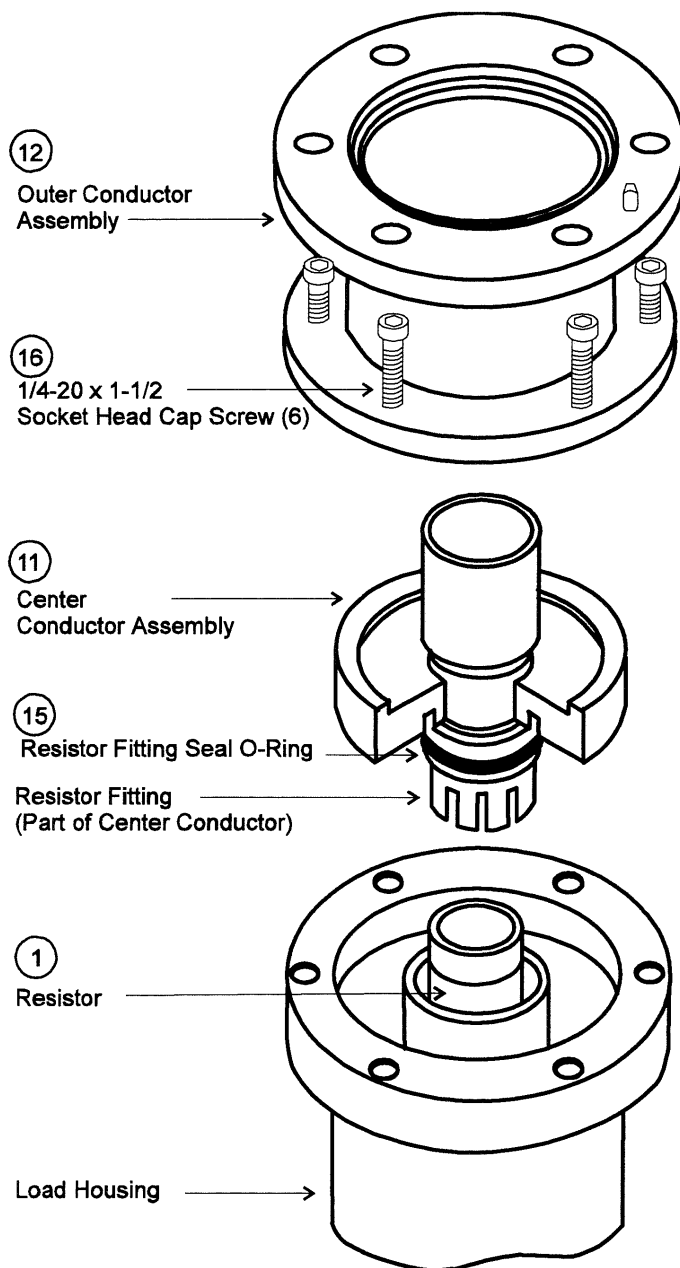


Figure 5-2. RF Input Assembly (Exploded View)

## SECTION VI. STORAGE

### 6.1. GENERAL

If the load is to be unused or stored for any length of time, completely drain it of any coolant and cap the openings.

The unit should be contained or covered with plastic and stored in a cool, dust free and dry area. Ambient storage temperatures are not critical, however, extreme temperatures should be avoided.



## SECTION VII. SHIPMENT

### 7.1. GENERAL

If the load is to be shipped, completely drain the unit of all coolant and cap all openings. Pad the RF connector securely and pack the load in a sturdy cardboard carton with sufficient padding to avoid shock damage.

If possible, keep the original shipping carton for reshipment.





## SECTION VIII. REPLACEMENT PARTS LIST

### 8.1. Models 8765/66

ITEM	QUANTITY	DESCRIPTION	PART NUMBER
1	1	Resistor	8755-027-4
2	1	Outer resistor cap seal, O-Ring	8410-009
	1	Water chamber assembly	8755-008
3	1	Water chamber	8755-014
4	1	Inlet seal O-Ring	5-099
5	2	Hose nipple	5-065-2
6	6	Socket head cap screws, 1/4-20 x 2-1/2", stainless steel	1121-2608-00
7	1	Resistor sleeve	8755-026
8	1	Sleeve backup O-Ring	8110-059
9	1	Inner flow tube	8755-025
10	1	Resistor ground cap assembly	8755-005

#### Front Connector Parts Assigned Per Model Type:

##### Model 8765 - 3-1/8" EIA Connector 50 ohms

11	1	Center conductor input, assembly	8755-007
12	1	Outer conductor assembly	8755-004

##### Model 8766 - 3-1/8" Unflanged Connector Flush Center Conductor 50 ohms

13	1	Center conductor input, assembly	8756-003
14		Outer conductor assembly	8756-002

#### For Both Models

15	1	Center conductor assembly O-Ring	5-1127
16	1	Socket head cap screws, 1/4-20 x 1-1/2", stainless steel	1121-1808-00
17	1	Inner resistor cap seal O-Ring	5-567

#### Accessory Connector Kits

18		Model 8765 Coupling Kit - 3-1/8" EIA consisting of:	4600-020
		Anchor bullet	4600-021
		O-Ring	4600-022
		Mounting hardware	4600-023
19		Model 8766 Coupling Kit - 3-1/8" Unflanged Flush - 50 ohm	5-726



## SECTION IX. OPTIONAL EQUIPMENT

### 9.1. GENERAL

Procurement and use of the accessory protective control system, comprising the water flow switch and control box, is optional. Consider the replaceable parts described in paragraphs 9.2, 9.3, and 9.4 when applicable (see list following these sections).

### 9.2. WATER FLOW SWITCH

The Water Flow Switch, P/N 5-898-6, should be checked and cleaned of any accumulated dirt or scale that might impede free movement of the control gate in the switch. This should be done after several months use, or if otherwise indicated. This component is non-repairable; if found defective it must be replaced. For replacement proceed as follows:

1. Make certain RF power, 115/230 Vac, and transmitter interlock supply are turned off.
2. Disconnect water flow switch leads at the control box.
3. Remove defective switch and replace with new unit.
4. Connect flow switch leads to terminals 3 and 5.
5. Perform preoperational checkout (see paragraph 2.7).

### 9.3. TIME DELAY RELAY

The Relay Cartridge, P/N 5-1664 or 5-1665, in the control box cannot be disassembled or repaired in the field. A faulty unit should simply be replaced according to the following procedure:

1. Be sure RF power, 115/234 Vac, and transmitter interlock supply are turned off.
2. Open the door of the control box by turning slotted screw head one quarter turn.
3. Loosen the 8-32 pan head screw at the top of the relay clamp, P/N 8630-193, then

press legs in slightly to release the retaining prongs of the clamp.

4. Pull the delay relay cartridge straight out of the socket.

5. To replace the relay, reverse the procedure above. The socket is an ordinary octal type. When inserting the relay, rotate the cartridge carefully for alignment of the center post nub in the socket.

6. Prongs of the clamp match side slots in the socket holder. Fit the clamp in the slots and turn the head screw up snugly.

7. Reverse procedures in paragraph 9.3, steps 1 and 2.

8. Perform preoperational checkout (see paragraph 2.7).

### 9.4. PILOT LIGHT

The pilot lamp, P/N 5-970 (-1 or -2), may be reached simply by unscrewing the pilot lamp lens, P/N 8750-106, on the topside of the control box. The bulb is a two contract bayonet type. It is easily removed by pushing down gently and slightly twisting counterclockwise. Reverse to replace.

A list of replaceable parts for the optional equipment follows.

9.5. REPLACEMENT PARTS LIST

Control and water flow parts are not shown on any figures.

ITEM	QUANTITY	DESCRIPTION	PART NUMBER
1	1	Water flow switch	5-898-6
2	1	Control assembly	
		115 V operation	8750-101-1
		230 V operation	8750-101-2
3	1	Relay retainer clamp	8630-193
4	1	Time delay relay	
		115 V operation	5-1664
		230 V operation	5-1665
5	1	Indicator light	8750-106
6	1	Incandescent lamp	
		115 V operation	5-970-1
		230 V operation	5-970-2
7	1	Pipe nipple (flow switch)	5-489-1A
8	1	Hex bushing (flow switch)	5-490-1A
9	1	Model 8738 coupling kit 3-1/8" unflanged, flush, 50 ohm	5-726

# DECLARATION OF CONFORMITY

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

Product: TERMALINE RF COAXIAL LOAD RESISTOR  
Models: 8765 8766

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;

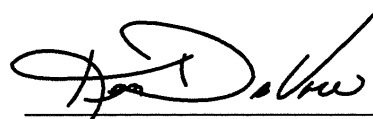
1. European Standard EN 61010-1:1993 - Safety, Group II.

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.

If you are located in Europe and have any questions, please contact:

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Berkhamsted House  
121 High Street  
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HP4 2DJ England  
Phone: (44) (1) 442 870097  
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