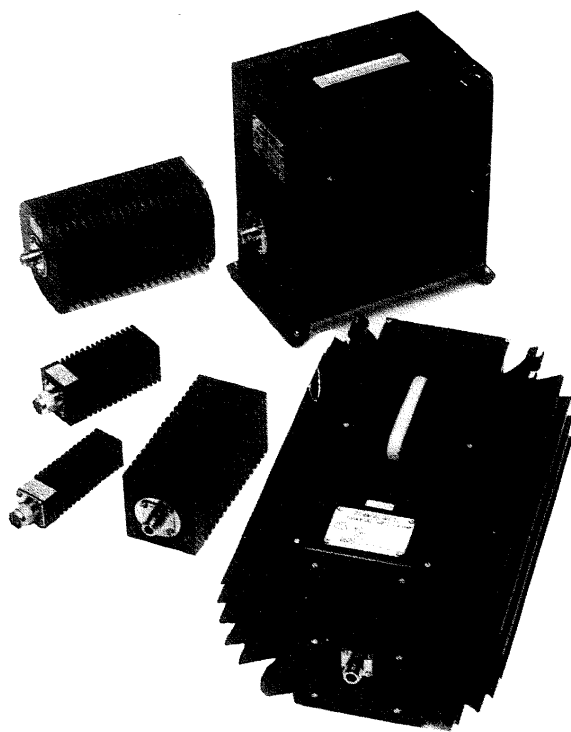


INSTRUCTION BOOK FOR
SERIES 8000
TERMALINE® COAXIAL
LOAD RESISTOR



BIRD

Electronic Corporation

30303 Aurora Road, Cleveland (Solon), Ohio 44139-2794

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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.

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.

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.

The following will appear in the text of this publication and are shown here for emphasis.

CAUTION

Do not operate these loads continuously above their maximum power rating. Load failure will result.

pg 3

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.

pg 4

Continued

WARNING

This product contains a resistor substrate made of beryllium oxide. This is a potentially toxic ceramic and may be harmful to your health. Beryllium oxide must be disposed of in accordance with the legal statutes dealing with hazardous material.

Do not attempt to repair this unit, but return to BIRD ELECTRONIC CORPORATION.

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WARNING

The resistor (Item No. 2) contains beryllium oxide as a major ingredient.

The following precautions should be observed:

1. Avoid breathing dust from these parts.
2. Avoid in any way allowing the ceramic from entering into the body. Be especially careful when handling small or sharp edged broken pieces.
3. Avoid coming in contact with the body where cuts or minor abrasions are present.
4. Wash hands after handling this material and before eating or smoking.
5. Great care should be taken when disposing of this material. All remains of the resistor should be carefully wrapped or placed in a separate container and disposed of according to the laws governing disposal of hazardous material in your locale.

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SERIES 8000 TERMALINE® LOAD RESISTORS

INTRODUCTION

PURPOSE AND FUNCTION

The Series 8000 TERMALINE® Load Resistors are portable, general purpose 50 ohm coaxial transmission line terminations. They are self-contained units, liquid free and air cooled, requiring no outside power source or additional equipment for operation. They provide accurate, dependable, and practically nonreflective terminations for testing and adjusting transmitters under nonradiating conditions. These loads are useful for the following purposes:

- a. As a substitute antenna.
 1. For tuning RF transmitters under nonradiating conditions.
 2. For making routine tests and adjustments.
- b. As a substitute for any circuit loading element.
- c. To measure, with a suitable indicating device, the power output of any coaxially transmitted RF signal within their rating.

PERFORMANCE CHARACTERISTICS AND CAPABILITIES

Series 8000 dry loads can absorb their individual maximum rated RF power levels continuously and dissipate them harmlessly as heat over their entire frequency range. Because they are dry, they are attitude insensitive and can therefore, with some restrictions, be used in any position. Consult the Specification Sheet, Page vii, for a listing of their individual power ratings, frequency ranges, and VSWR values.

DIMENSIONS AND WEIGHT

Consult the Specification Sheet on Page vii for the size and weight of each load.

POWER AND UTILITY REQUIREMENTS

These loads are passive devices that are self contained and do not require any external source of power or utility to function other than the RF input power.

ENVIRONMENTAL REQUIREMENTS

These loads should be operated in a dust and vibration-free environment. The ambient temperature range should remain between -40°C and +45°C (-40F and +113F) for proper operation. Allow at least six inches of clearance around the units to permit an unimpeded access of convection air currents for adequate heat dissipation.

ITEMS FURNISHED

Series 8000 Loads are normally equipped with a Quick-Change "QC" connector for convenient and easy interchange with other type "QC" connectors. Model 8431 has a Small Quick-Change "SQC" connector which is not interchangeable with "QC" types. Consult the Specification Sheet, Page vii, for the connector type normally supplied with each load.

ITEMS REQUIRED

The only other item required is a mating connector on the coaxial transmission line to which the load will be connected.

TOOLS AND TEST EQUIPMENT

Only a screwdriver will be necessary for changing the "QC" connectors. None of these loads are subject to any further disassembly. An ohmmeter or resistance bridge with an accuracy of 1 percent or better at 50 ohms is useful for checking the resistance value of the RF section assembly.

SPECIFICATIONS FOR 8000 SERIES TERMALINE® LOAD RESISTOR

Impedance	50 ohms nominal
Ambient Temperature	-40°C to +45°C (-40F to +113F)
Cooling Method	Natural air convection
Operating Position	Any attitude ††

MODEL	MAX. VSWR	CONN.	MAX. WATTS	FREQ. MHz	SIZE	WT. OZ
8080	1.1 dc-1000 1.25 1000-3500	N-M†	25	dc-3500	5-9/64"L x 1-1/4"sq (130.6 x 31.8 mm)	9 (255 g)
8085	1.1 dc-1000	N-M†	50	dc-3500	5-9/64"L x 1-3/4"sq	15 (425 g)
8164	1.1 dc-1000 1.2 1000-2500	N-F†	100	dc-2400	6-63/64"L x 2-3/4"sq (177.4 x 69.9 mm)	48 1.36 kg
8166	1.1 dc-1000 1.2 1000-2500	N-M†	150	dc-2500	7-31/64"L x 4"sq (190 x 101.6 mm)	96 (2.72 kg)
8173	1.1 dc-1000 1.25 1000-2000	N-F†	300	dc-2000	9"L x 9-9/16"H x 5-1/8"W (228.6 x 242.9 x 130.2 mm)	100 (2.84 kg)
8431	1.1 DC-1000	N-F*	500/600	dc-2500	13-7/64"L x 7-1/8"H x 9-1/4"W (333 x 181 x 235 mm)	206 (5.9 kg)

† "QC" Connector
 * "SQC" Connector
 †† See Text

SECTION I - INSTALLATION

1-1. LOCATION

1-2. Allow at least six inches of clearance around these units to permit an unimpeded access of natural air convection for adequate heat dissipation. Place the loads to permit the shortest possible cable length between the unit and the transmitting equipment.

1-3. GENERAL

1-4. These loads may be used for portable operation or fixed installation. The Models 8080, 8085, and 8164 are, in general, light enough to be attached directly to the mating RF connector of another device such as a Bird THRULINE® Wattmeter or simply set on the workbench like the Models 8166, 8173, and 8431. Attach the load resistor as close as possible to the transmitter's output and use only suitable connectors. Try to connect direct to minimize cable length and avoid the use of adapters as much as possible. The Model 8166, because of its weight, has a provision for special mounting. The housing has four tapped mounting holes on one side. They are 1/2 inch (13 mm) deep for 8-32 screws and arranged in a 6-3/8 x 1-3/4 inch (162 x 44.5 mm) rectangle. The Model 8431, mounted horizontally, will dissipate up to 500 Watts, and mounted vertically, up to 600 Watts. Model 8173 should be operated only in a horizontal position.

SECTION II - THEORY OF OPERATION

2-1. GENERAL

2-2. The resistive element, in these dry TERMALINE® Loads, is individually selected for its accuracy, and enclosed in a heat sink housing. The housing is specially contoured inside to provide the load with its unusually low reflection characteristics throughout its entire frequency range. The housings for the 25, 50, 100, and 150 Watt models are deeply slotted and painted black with a lusterless finish to improve their heat dissipation. Models 8173 and 8431 are fabricated with sheet metal fins to more efficiently meet their higher heat dissipation requirements.

SECTION III - OPERATING INSTRUCTIONS

3-1. USE AND FUNCTION OF CONTROLS

3-2. These loads, being passive devices, have no indicators or operating controls.

3-3. INITIAL ADJUSTMENTS

3-4. No initial adjustments are required other than to connect the load to the RF source by means of a coaxial cable equipped with a suitable matching connector plug.

3-5. START-UP

3-6. Connect these loads to the transmitting equipment under test with 50 ohm coaxial cable where necessary (RG-8A/U, RG-9/U, RG-213/U or equal) equipped with a suitable plug which mates with the RF input connector of the load. After the load has been connected to the transmitter, proceed according to the transmitter manufacturer's instructions. When reconnecting the antenna, it may be necessary to slightly readjust the transmitter due to possible differences in VSWR between the load and the antenna system.

3-7. NORMAL OPERATION

CAUTION

Do not operate these loads continuously above their maximum power rating. Load failure will result.

3-8. Having no indicators or operating controls, these loads require no special operating procedures or surveillance when the stated performance limits are not exceeded.

3-9. OPERATION UNDER EMERGENCY, ADVERSE, OR ABNORMAL CONDITIONS

3-10. These units will sustain an input moderately greater than their maximum power rating for short periods of time. Such loading must be spaced at reasonable intervals to allow sufficient time for cooling to a safe temperature. Apply the excessive power for a few minutes at most and allow at least a half hour for adequate cooling before reapplying power. Because of the excessive heat generated by overloading, touch the load with caution to avoid painful burns.

3-11. **SHUTDOWN**

3-12. These loads, being passive devices, have no operating controls to be turned off. Their source of RF power must be turned off instead.

3-13. **EMERGENCY SHUTDOWN**

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.

3-14. Turn off the RF power at its source.

SECTION IV - MAINTENANCE

4-1. TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
Excessive overheating	Transmitter power too high	Reduce transmitter power.
	Faulty RF resistor	Return to factory for repair.
High or low dc resistance values per para 4-12	Faulty RF input "QC" connector	Replace.
	Loose "QC" connector	Tighten with screwdriver.
	Faulty RF resistor	Return to factory for repair.

4-2. CLEANING

4-3. The outside surface of these loads should be wiped free of dust and dirt when necessary. The principle maintenance required by the operator will be to periodically wipe the accumulated dust and lint off of the radiator fins. Excessive collection of dust and lint on the cooling fins will interfere with efficient dissipation of heat. If the Teflon insulator or metallic contact surfaces of the connector should become dirty or grimy, wipe them off with a soft cloth. Use a contact cleaner that is self-drying and leaves no residue to clean the hard to reach internal portions. Observe any safety precautions that may be listed on the contact cleaner container and provide adequate ventilation.

4-4. INSPECTION

4-5. With the rugged and simple construction of the loads, periodic inspection will be necessary at only about six-month intervals. Inspection should include the items listed below:

- a. Cleanliness - Keep the housing and connector free of grime (see para 5-3).

b. Inspect the load for completeness and general condition of the equipment.

c. A Troubleshooting Chart, para 5-1, lists the commonly encountered problems, their possible causes and remedies. Use this chart as a guide when analyzing symptoms.

4-6. PREVENTIVE MAINTENANCE

4-7. Due to the basic simplicity of construction, the major requirement for preventive maintenance is to keep the equipment clean, particularly the radiator fins. It is important to maintain the heat transfer efficiency of the cooling fins.

4-8. REPAIRS

WARNING

This product contains a resistor substrate made of beryllium oxide. This is a potentially toxic ceramic and may be harmful to your health. Beryllium oxide must be disposed of in accordance with the legal statutes dealing with hazardous material.

Do not attempt to repair this unit, but return to BIRD ELECTRONIC CORPORATION.

4-9. Due to the unitized nature of the construction, these loads are not field repairable other than replacement of the "QC" connector.

4-10. Repairs beyond what is covered in this instruction book will require return of the equipment to Bird Electronic Corporation for service. Please consult the factory.

4-11. RF ASSEMBLY TEST

4-12. DC Resistance - Check the condition of these load resistors by accurate measurement of the dc resistance between the inner and outer conductors of the RF input connector. Use a resistance bridge or ohmmeter with an accuracy of 1 percent or better at 50 ohms for this purpose. The measured resistance should be a nominal 50 ohms. It should not deviate by more than ± 2 ohm from this value. However for greater accuracy, check and record the resistance value before the load is put into service. Thereafter when the resistance is measured, the value obtained should not deviate by more than ± 2 percent from the original value.

4-13. **DISASSEMBLY**

4-14. Except for the "QC" connector, "SQC" on Model 8431, there is no disassembly possible with these loads. To change the connector use the following procedure.

4-15. RF Connector - The connector is a "QC" design which permits easy interchange with the use of only a screwdriver. This process does not interfere with the essential coaxial continuity of the load resistor RF input. For replacement, proceed as follows:

- a. Remove the four 8-32 x 5/16 inch pan head machine screws from the corners of the RF connector.
- b. Pull the connector straight out of its socket.

4-16. **REASSEMBLY**

4-17. RF Connector - To install a new connector, reverse the procedures in Paragraph 5-13, Disassembly. Be sure that the projecting center pin on the connector is carefully engaged and properly seated with the mating socket of the load resistor input.

SECTION V - PREPARATION FOR RESHIPMENT

5-1. GENERAL

5-2. Wrap the RF connector with padding and tape securely in place. Pack and brace the load in a suitable shipping container; a corrugated paper box should suffice.

SECTION VI - STORAGE

6-1. GENERAL

6-2. No special preparations for storage are necessary other than to cover the equipment to keep out dust and dirt. Store these units in a dry and dust-free environment where the ambient temperature will remain within the -40°C to $+45^{\circ}\text{C}$ (-40F to $+113\text{F}$) working range of the loads.

MODEL 8164-045 TERMALINE LOAD RESISTOR

GENERAL

This section contains an illustrated list of all replacement parts for the Model 8164-045 Termaline Coaxial Load Resistor. The parts are grouped into one major assembly.

PARTS LIST

Figure 1 is a parts illustration of the Coaxial Load Resistor. Along with the illustration is a parts list containing all of the replaceable components of the Coaxial Load Resistor. If a part is found to be defective, and is not contained in this list, it is not available for replacement and the assembly to which it belongs must be replaced. The parts list is broken down into the following column structure:

- a. INDEX NO. The numbers in this column identify the location of parts within an illustration. For example, the INDEX NO. 1-3 describes item 3 located with Figure 1.
- b. DESCRIPTION. The full name and descriptive data needed to identify and order replacement parts are contained within this column. The descriptions are indented to indicate relationship to the next higher assembly.
- c. CAGE CODE. Parts manufacturers are identified in this column by their Commercial and Government Entity (CAGE) codes. Bird Electronic Corporation (70998) is the only producer of replacement parts for the Load Resistor.
- d. MFG PART NO. The original manufacturer's part number is contained in this column.
- e. QTY. This column indicates the quantity of each part used in the assembly but not necessarily the total quantity used in the unit.

QUICK CHANGE CONNECTORS

The quick change input connector can easily be changed to mate with the most common RF connector types. The following is a list of all of the "quick change" connectors manufactured by Bird Electronic Corp. for use with the 8164-045 Coaxial Load Resistor:

N-Female	4240-062	LT-Female	4240-018
N-Male	4240-063	LT-Male	4240-012
HN-Female	4240-268	C-Female	4240-100
HN-Male	4240-278	C-Male	4240-110
LC-Female	4240-031	UHF-Female (SO-239)	4240-050
LC-Male	4240-025	UHF-Male (PL-259)	4240-179
	7/8" EIA Air Line	4240-002	

WARNING

The resistor (Item No. 2) contains beryllium oxide as a major ingredient.

The following precautions should be observed:

1. Avoid breathing dust from these parts.
2. Avoid in any way allowing the ceramic from entering into the body. Be especially careful when handling small or sharp edged broken pieces.
3. Avoid coming in contact with the body where cuts or minor abrasions are present.
4. Wash hands after handling this material and before eating or smoking.
5. Great care should be taken when disposing of this material. All remains of the resistor should be carefully wrapped or placed in a separate container and disposed of according to the laws governing disposal of hazardous material in your locale.

LEGEND FIGURE 1

INDEX NO	DESCRIPTION 1 2 3 4 5 6 7	CAGE CODE	MFG PART NO.	QTY
1-	LOAD RESISTOR, Coaxial Model 8164-045, Assembly	70998	8165A-046	REF
-1	• HOUSING, Load resistor	70998	9164-042	1
-2	• RESISTOR	70998	8160-010	1
-3	• CLAMP, Resistor	70998	8160-008	1
-4	• SCREW, Clamp, resistor	70998	8160-011	1
-5	• PLUG	70998	8164-003	1
-6	• CONNECTOR, Male N, assembly	70998	4240-063	1
-7	• SCREW, Machine, pan head, 6-32 X 1/4 inch lg.		COML	4
-8	• NAMEPLATE, Model 8164-045, metal	70998	8164B-051	1
-9	• SCREW, Set, cone point 10-32 x 3/16 inch lg. stl. pk.		COML	4
-10	• EMBLEM, Bird	70998	4600-012	1
-11	• LABEL, Caution	70998	8080-014	1
-12	• LABEL, Warning	70998	8164-049	1
-13	• ROD, Support	70998	8164-048	1
-14	• RING, Mounting	70998	8160-006	1
-15	• INSULATOR, Teflon	70998	8160-009	1
-16	• FITTING, Resistor	70998	8160-007	1

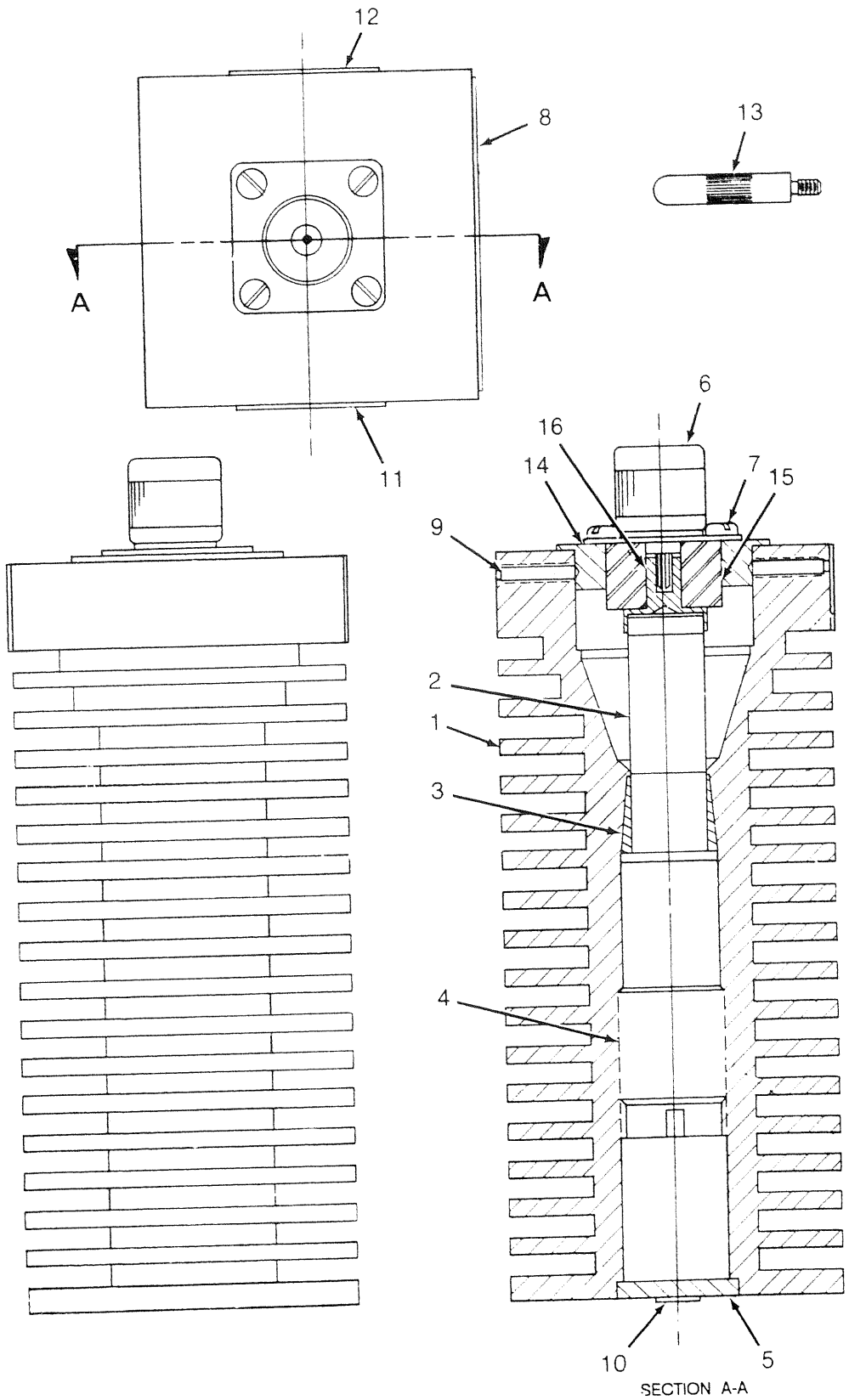


FIGURE 1. MODEL 8164-045 TERMALINE® LOAD RESISTOR