INSTRUCTION BOOK

FOR

MODEL 8215 TERMALINE®

RF LOAD RESISTOR

30303 Aurora Road, Cleveland, Ohio 44139-2794

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.

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

****
* C A U T I O N *
* *
* This equipment is designed for operation in a horizon- *
* tal position only. Do not operate in any other manner. *
****

****
* W A R N I N G *
* *
* Using this load in the upper end of its power dissipa- *
* tion range will cause the housing to become hot! Care *
* should be exercised in touching it. *
****

****
* C A U T I O N *
* *
* Do not operate this equipment continuously above the *
* rated 600W. *
****

****
* W A R N I N G *
* *
* Never attempt to disconnect the equipment from the *
* transmission line while RF power is being applied. *
* Leaking RF energy is a potential health hazard. *
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Continued

SAFETY PRECAUTIONS

****
* W A R N I N G *
* *
* When using dry cleaning solvents, provide adequate *
* ventilation and observe normal safety precautions. *
* Many dry cleaning agents emit toxic fumes that may be *
* harmful to your health, if inhaled. *
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MODEL 8215 TERMALINE® RF LOAD RESISTOR

INTRODUCTION

GENERAL

The Bird Model 8215 TERMALINE® Load Resistor is a portable, general purpose 50 ohm coaxial transmission line termination. It is a self-contained unit requiring no outside power source or additional equipment. The Model 8215 Load provides an accurate, dependable, and practically non-reflective termination for testing and adjusting transmitters under non-radiating conditions from dc to 1000MHz. See Specifications.

DESCRIPTION

The Model 8215 is rectangular in shape with transverse fins encasing a coolant cylinder of dielectric liquid . Extra thick fins at the front and rear are bent 90° to form special mounting flanges on four sides. These flanges are supports for free standing use, or brackets for special fixed mounting. Flange holes are provided for this purpose (see Installation Section I).

This model includes a pre-set thermoswitch installed on the radiator to provide overload protection for the equipment. The RF input is for 3-1/8 inch rigid, 50 ohm coaxial line with unflanged flush connector (see Operation - Section III).

PURPOSE AND FUNCTION

The Model 8215 is useful for the following purposes:

a. As a substitute antenna.

(1) For tuning transmitters - under non-radiating 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 transmited signal within its rating.

SPECIFICATIONS FOR MODEL 8215 TERMALINE® RF LOAD RESISTOR

Input Impedance	50 ohms nominal
VSWR	1.1:1 max. dc to 1000MHz
Input Connector	3-1/8" Unflanged
Power Range	600 watts continuous
Frequency Range	DC to 1000MHz
Accuracy	±5% of full scale
Dimensions	18-3/4"L x 8-1/16"W x 10-1/16"H (476 x 205 x 256mm)
Ambient Temperature	-40°C to +45°C (-40°F to +113°F)
Weight	22.5 lbs. (10.2 kg)
Operating Position	Horizontal only
Finish	Navy Gray Enamel (MIL-E-15090C)

SECTION I - INSTALLATION

1-1. LOCATION

1-2. Locate the Model 8215 TERMALINE® Load Resistor to provide ample free space around and above the unit, see below. Place the load to permit convenient rigid line connections between the unit and the transmitting equipment. Operate the Model 8215 in a horizontal position only.

1-3. MOUNTING

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**************************************************************
*                        C A U T I O N                       *
*                                                            *
* This equipment is designed for operation in a horizon-     *
* tal position only.  Do not operate in any other manner.    *
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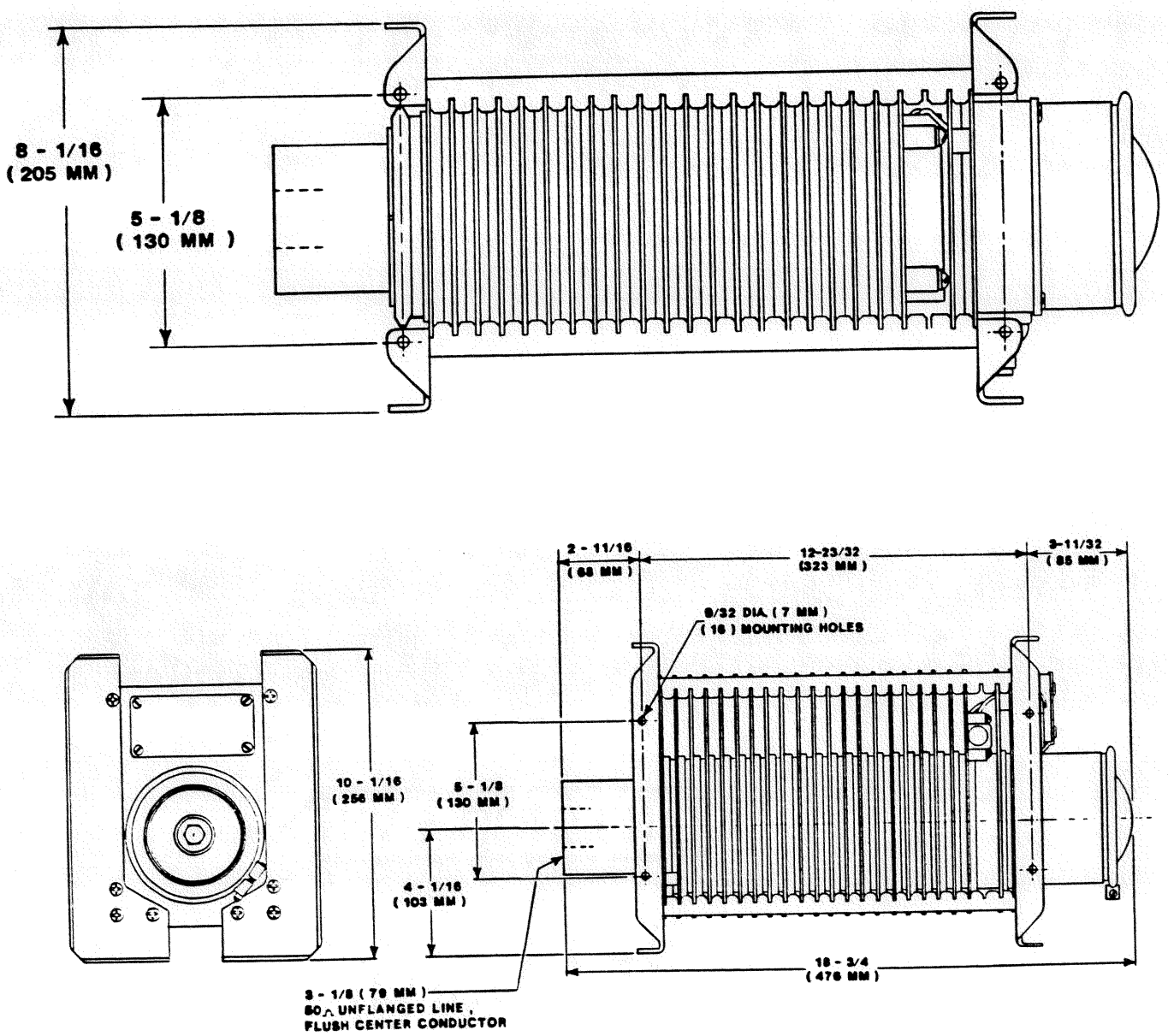
1-4. This load is not primarily intended for portable operation, but for specific fixed installations. It has specially designed, reinforced flanges at the front and back of the radiator for attachment on any of its four sides. The 9/32 inch holes are placed on a 5-1/8 inch x 12-23/32 inch rectangle (130.2 x 323.1mm) on all four faces. Fasten with four 1/4 inch screw and nut sets where indicated. Position the radiator for operation in the horizontal plane only in its usual upright position; i.e., with RF section (tank) below and the thermoswitch block above. In mounting, make sure there is at least 18 inches (457mm) of unobstructed space above the radiator and 6 inches (152mm) to the side and below the unit. Operate only in horizontal positions (fins vertical) and with sufficient ventilation (as explained).

1-5. THERMOSWITCH

1-6. Wire the thermoswitch in series with the transmitter interlock. Remove the four 8-32 screws on the cover of the terminal box at the rear of the radiator to gain access to the terminal block connections. Attach interlock leads thru BX cable clamp on side of box and screw down firmly to respective posts. The thermoswitch is factory preset for safe cut-off temperature to shut off transmitter.

FIGURE 1-1. OUTLINE DRAWING - MODEL 8215 TERMALINE® LOAD RESISTOR.



SECTION II - THEORY OF OPERATION

2-1. BASIC PRINCIPLE

2-2. The Model 8215 TERMALINE® Load consists essentially of a resistive film-on-ceramic resistor immersed in a dielectric coolant. The resistor, individually selected for its accuracy, is enclosed in a special exponentially tapered housing. This provides a linear reduction in surge impedance directly proportional to the distance along the resistor. When surrounded by the dielectric coolant, the characteristic impedance is therefore 50 ohms at the front (connector end), 25 ohms at the mid-point to compensate for the resistance already passed over, and zero ohms at the rear where the resistor joins the housing, forming the return conductor of the coaxial circuit. This produces the uniform, practically reflectionless line termination over the stated frequencies of the load resistor.

2-3. COOLING

2-4. The dielectric coolant is chosen for its desirable dielectric and thermal characteristics. Cooling of the Model 8215 is accomplished by natural fluid, and air convection. The dielectric coolant carries the electrically generated heat from the resistor to the walls of the cylindrical cooling tank. This tank is encased in a set of radiating fins constructed from heavy gauge aluminum alloy, which are firmly pressed on the cylinder. The heat from the dielectric liquid is transferred to the surrounding air by radiating fins.

2-5. Expansion of the coolant with the rise in temperature is allowed for by means of a synthetic rubber diaphragm (not visible) in the rear cover dome of the unit.

SECTION III - OPERATING PROCEDURE

3-1. GENERAL OPERATING NOTES

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*                      W A R N I N G                     *
*                                                        *
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**********************************************************
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3-2. Having no indicators or controls, the dummy load requires no special operating procedures or surveillance when properly used. When the unit is power loaded in the upper range of its capacity the radiator will become hot - care should be used in contacting the equipment.

3-3. Connect the Model 8215 TERMALINE® Load to the transmitting equipment under test with 50 ohm, 3-1/8 inch rigid coaxial line which mates with the RF input connector of the load.

3-4. Locate the load for the most convenient arrangement of the rigid coaxial line (short and with fewest angles). Connect to the Model 8215 with a 3-1/8 inch, unflanged, flush connector kit such as Bird P/N 5-726 or RCA MI-27791-K4A. Be sure to bottom center conductor bullet to seat and place sleeve, with clamps, over the coaxial line before attaching. Pull sleeve up evenly over connection and clamp both sides. Be sure thermoswitch interlock is connected.

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*                      W A R N I N G                     *
*                                                        *
* Never attempt to disconnect the equipment from the     *
* transmission line while RF power is being applied.     *
* Leaking RF energy is a potential health hazard.        *
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3-5. After the transmitter has been connected to the load, proceed according to the equipment manufacturer's instruction. When reconnecting the antenna, it may be necessary to slightly readjust the transmitter due to possible difference in VSWR between load and antenna system.

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**********************************************************
*                      C A U T I O N                     *
*                                                        *
* Do not operate this equipment continuously above the   *
* rated 600W.                                            *
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3-6. The unit will sustain an input greater than 600 watts for short periods of time. Such loading must be spaced at reasonable intervals. Allow reasonable time for the load to cool between periods of excessive loading.

SECTION IV - MAINTENANCE

4-1. OPERATOR'S MAINTENANCE

4-2. The principle preventive maintenance required by the operator will be cleanliness of the radiator and connector. If the insulator or metallic contact surfaces of the connector should become dirty or grimy, clean carefully with a dry cleaning solvent such as trichlorethylene or freon on a cotton swab stick. Keep the radiator of the Model 8215 TERMALINE® Load clean and free of dust. Dust or dirt on the fins of the radiator can impede the cooling action of natural air connections.

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**********************************************************
*                      W A R N I N G                     *
*                                                        *
* When using dry cleaning solvents, provide adequate     *
* ventilation and observe normal safety precautions.     *
* Many dry cleaning agents emit toxic fumes that may be  *
* harmful to your health, if inhaled.                    *
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4-3. If any portions of the radiator are corroded or rusted, clean the area with a fine flint sandpaper, and touch up with gray enamel.

4-4. PERIODIC INSPECTION

4-5. With the rugged and simple construction of the Model 8215 TERMALINE® Load Resistor, periodic inspection will be necessary at only about six-month intervals. Inspection should include the items listed below:

a. Oil Leakage. Check for coolant oil seepage around the radiator tank, particularly at the front and back around the underside of the clamping band. See Paragraph 4-8, Troubleshooting Chart, if leakage is observed. Check tightness of the clamping band screw and the fasteners around the front cylinder.

b. DC Resistance. Check the condition of the load resistor 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 one percent or better at 50 ohms for this check. The measured resistance should be a nominal 50 ohms, ±2 ohms.

c. Inspect the Model 8215 TERMALINE® Load Resistor for completeness and general condition of the equipment.

d. A troubleshooting chart, Paragraph 4-8, lists the symptoms of commonly encountered troubles, causes, and suggested corrective measures. Use this chart as a guide when analyzing symptoms.

4-6. REPAIRS

4-7. There are no special techniques required for the repair or replacement of components in the Model 8215 TERMALINE® Load. A screwdriver is the only tool needed. The steps below outline component removal:

a. RF Input Connector Replacement. This cannot be replaced except by changing the entire RF load resistor assembly (see step c. below).

b. Diaphragm and Coolant Oil. Remove the diaphragm to replace or examine the coolant oil. Replacement of the diaphragm and coolant oil are listed in the steps below.

1. Stand the load vertically, with the back end up.

2. Loosen the clamp screw until the clamping band is released.

3. Remove the diaphragm cover and carefully lift the diaphragm from the back end of the radiator tank.

4. The coolant oil level should be about 2-5/32 inches below the top edge of the radiator cylinder. If the oil appears to be contaminated, i.e., other than clear to light yellow in color, it should be replaced.

5. To reassemble, reverse the above procedures.

c. RF Load Resistor Assembly. To replace the load resistor assembly, it is not necessary to drain the unit of coolant oil as above. Proceed with the steps below.

1. Stand the load vertically, with front end up.

2. Loosen the clamp band screw until the clamping band is released.

3. Hold the load assembly by the RF input connector and pull the assembly slowly out of the radiator. Allow coolant excess to drip back into the radiator tank.

4. Inspect the O-Ring seal which is located just inside the mounting flange of the resistor assembly. Do not re-use the O-Ring if it appears to be deteriorated or shows signs of nicks or cracks.

5. To replace the assembly, reverse the above procedure.

d. Thermoswitch. The thermoswitch is preset at factory for a maximum safe cut-off temperature and it is sealed within its heat sink. Do not disturb the setting. It is not recommended that this part be replaced in the field. Consult with the Company.

TABLE 4-1. TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
Leakage of coolant oil around clamping band or radiator housing	Clamping band not tight	Tighten slightly with a screwdriver.
	Faulty O-Ring (front)	Replace per paragraph 4-7,c.
	Faulty diaphragm (rear)	Replace per paragraph 4-7,b.
Excessive overheating of the radiator	Transmitter power too high	Reduce transmitter power.
	Coolant oil level too low	Add more coolant oil to the radiator per paragraph 4-7,b.
	Faulty RF Section Assembly	Replace per paragraph 4-7,c.
High or low dc resistance values per paragraph 4-5,b	Faulty RF Section Assembly	Replace per paragraph 4-7,c.
Transmitter power off	Thermoswitch has opened	Check for overload. Faulty thermoswitch.

SECTION V - REPLACEMENT PARTS LIST

5-1. MODEL 8215 TERMALINE® RF LOAD RESISTOR

ITEM	QUANTITY	DESCRIPTION	PART NUMBER
1	1	Radiator Assembly	2430-142
2	1	RF Section Assembly	8897-003
3	-	Dielectric Coolant 0.7 gal. (2.6 liters)	5-1070 (1 gal. container)
4	1	Resistor	3510-026-2
5	1	Diaphragm	2430-015
6	1	Cover, Diaphragm	2430-148
7	2	Clamp Band	2430-055
8	1	O-Ring, Seal (P/O RF Section)	5-230
9	(1)	Coupling Kit (RCA MI-27791-K4A) (Optional - Extra)	5-726
10	1	Compensation Sleeve	8215-004
11	1	Socket Set Screw - Cone-point, steel parkerized	Std. 8-32 x 1/4