

Model 8832 TERMALINE

—

Coaxial Load Resistor

Instruction Book  
for

INSTALLATION-OPERATION-MAINTENANCE  
Bird Model 8832  
TERMALINE LOAD RESISTOR

GENERAL

This Load Resistor is a general purpose coaxial line termination for use with nominal 50 ohm radio frequency transmission lines. It has a continuous load capacity of 1000 watts in normal ambient temperatures (up to 45°C) and a frequency range from D.C. to about 3300 megahertz. Under these conditions the Model 8832 therefore provides a very low reflection (non-radiating) line termination. This is useful as a substitute antenna to assist in tuning RF transmitter within its range, and for other routine maintenance or special checks on coaxial transmission equipment. Summary of characteristics:

|                          |                                                                       |
|--------------------------|-----------------------------------------------------------------------|
| Characteristic Impedance | 50 ohm nominal                                                        |
| Power Input              | 1000 watts continuous duty                                            |
| Ambient Temperature      | -40°C to +45°C                                                        |
| Frequency Range          | DC to 3300 MHz.                                                       |
| VSW Ratio                | 1.10 to 1.0 max, 0 to 1000 MHz.<br>1.30 to 1.0 max, 1000 to 3300 MHz. |
| Input Connector          | Female "LT"                                                           |

ELECTRICAL CHARACTERISTICS

The Model 8832 is designed to match the most common high frequency transmission media, i.e., 50/51.5 ohm coaxial lines. The impedance, in the VSWR (voltage standing wave ratio) language of such transmission, is quite independent of frequency and almost purely resistive. VSWR values are maintained below 1.1 up to 1000 MHz, and the calibration results of this particular resistor are tabulated on the blue ticket attached to the equipment.

In the frequency region 1000 to 3300 MHz, calibration is not normally performed; however, tests on typical units of this equipment shows VSWR's to be less than 1.30 in this range. Below 50 MHz, the input impedance of the Dummy Load is very nearly a pure resistance to equal to the DC resistance. The production tolerance on DC resistance is  $\pm 4\%$  from the nominal 50 ohms, and the exact value for this particular resistance is inscribed under "RDC" at the bottom of the ticket. Power output measurements are conveniently made by means of the Bird THRULINE Wattmeter attached to the dummy load input - measurements may be made in frequency ranges upwards from 2 MHz.

The Model 8832 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 coaxially transmitted power within its rating.

#### THEORY OF OPERATION

The Model 8832 equipment consists essentially of a carbon film-on-ceramic resistor immersed in a dielectric coolant. The resistor, individually selected for its accuracy, is enclosed in an 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 50.0 ohms at the front (connector end) and 25.0 ohms halfway down, to compensate for resistance already passed over. It is 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 stated

frequencies of the load resistor.

The dielectric oil is chosen for chemical inactivity (to prevent damage to the resistor), high flash point, and its dielectric constant, to which the diameters of the resistor housing are matched. The input connector is constructed with a compressed teflon insulator surrounding the center contact. This connector body, and the resistor housing are both pressed on synthetic rubber O-ring seals, preventing coolant leakage at the front end of the unit. The resistor housing is kept in place by the resultant action of drawing up the radial V-clamp band.

When input power is applied, the resistor generates heat in the adjacent coolant oil. By convection, the heated oil flows thru slotted openings in the coaxial shell to the walls of the fabricated metal tank. The series of radiating fins brazed to the tank transmit the heat of the dielectric oil into the surrounding air.

#### INSTALLATION

The TERMALINE Resistor is intended for operation in a horizontal position only. Do not operate in any other manner. It may be placed loose on an appropriate surface, or permanently fastened in a level position by means of its base mounting flanges. The flanges have four 3/8-diam. holes on a 21-1/4" by 5-3/8" base rectangle, for use with screws up to 5/16-inch size. Position the unit for ample air circulation with at least 6 inches of free space all around the unit.

#### C A U T I O N

Shipping plug must be removed before the unit is placed in operation. Use 3/4-inch flat end wrench. Do not lose the O-ring seal. This vent

hole must remain open at all times when the unit is in operation or is cooling. Failure to do this could result in damage to equipment and danger to safety. Shipping plug (with O-ring seal) should be replaced whenever the unit is to be shipped.

A specially shielded breather plug is provided for use with this equipment, and should be screwed into the filler hole after the shipping plug is removed. It is held captive to the filler socket by a short length of bead chain. Use of this plug protects the filler opening against intrusion of foreign material while allowing unobstructed venting of the tank.

#### OPERATION

Connect the Model 8832 to power source under test by means of applicable 50 ohm coaxial power cable. Check that all coaxial power line connections are properly tightened. Avoid use of extraneous adapters and elbows where possible.

#### MAINTENANCE

The Model 8832 is rugged and simple and should require only nominal routine attention. It is designed to operate for long periods of time if care is taken not to exceed its power handling capabilities.

The outside surface of the instrument should be wiped free of dust and dirt when necessary. Clean the RF input connector with Inhibisol, or its equivalent, or trichlorethylene, on a cotton swab stick. Take special care to clean the metallic contact surface and the exposed face of the teflon insulator. Provide adequate ventilation and observe other normal precautions when using solvents, particularly carbon tetrachloride.

Accurate measurement of the DC resistance between the inner and outer conductors of the input coupling will provide a good check of the condition of the load resistor. For this instrument, use a Resistance Bridge with an accuracy of one percent or better at 50 ohms, such as Leeds & Northrup Model 5305 Test Set. Use low Resistance leads, preferably a short piece of cable attached to a mating plug to the input connector.

If the Resistor Housing Assembly #8221-002 should need replacement, proceed as follows: To avoid the possibility of coolant spillage, replace Shipping Plug #2450-049 before proceeding. Place the Radiator #2450-003 and its back end (connector up). Then loosen and remove the screw on the Clamping Band #2430-043 at the base of the front cone. Remove clamping band and carefully lift out the Resistor Housing unit in a vertical direction, allowing the oil to drip back into the tank (be sure the radiator unit is properly held). The O-Ring #8110-039 will probably remain nested in the cylindrical facing of the radiator tank. Do not re-use the O-ring unless it is in good condition.

Before reassembling the equipment, check the coolant level - it should be four inches below the bare edge of the cylindrical flange when the radiator is on end. Replace the Resistor Housing Assembly by reversing the procedure described above, and tighten the #10-32 clamping screw securely, making sure that the clamping band is on evenly. Then restore the Load Resistor to a horizontal position, and inspect carefully for oil leakage. Before using equipment, remove Shipping Plug and install the Vent Breather Plug.

COOLANT

The Dummy Load is factory filled to the proper coolant level (with G.E. 10C Transformer Oil) at room temperature. Expansion of the coolant with rise in temperature is taken care of by means of the vent plug that is vented to the atmosphere to prevent excessive pressure build-up inside the radiator. The oil level should be about 2-3/4 to 3 inches below of the top face of the vent hole. Small amounts of oil loss will not seriously reduce the capacity of the equipment.

List of Replaceable Parts

| <u>Qty</u> | <u>Part No.</u>                 | <u>Description</u>                                    |
|------------|---------------------------------|-------------------------------------------------------|
| 1          | 2450-003                        | Radiator                                              |
| 1          | 8221-002                        | Assy, RF Section                                      |
| 1          | 2430-043                        | Assy, Clamp Band                                      |
| 1          | #10-32 x 1-1/2 Fil Hd.<br>Mach. | Screw                                                 |
| 1          | 2450-049                        | Shipping Plug                                         |
| 1          | 2430-081                        | Vent Breather Plug                                    |
| 1          | 5-131                           | O-Ring, Vent Plug                                     |
| 1          | 8110-039                        | O-Ring, RF Section                                    |
| 1          | 7500-040                        | Filler Plug                                           |
| 1          | 8110-041                        | O-Ring Filler Seal                                    |
| 1 Gal.     | 5-030                           | G.E. 10C Transit Oil<br>(1.5 Gal. To Fill Completely) |

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