

Instruction Sheet  
for

INSTALLATION - OPERATION - MAINTENANCE  
Bird Model 887  
TERMALINE LOAD RESISTOR

GENERAL

This Load Resistor is a general purpose coaxial line termination for use with 51.5 ohm radio frequency transmission lines. It has a continuous load capacity of 1200 watts in normal ambient temperatures (up to 45°C) and a frequency range from 0 to approximately 2500 megacycles per second. Under these conditions the Model 887 therefore provides a 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. The Model 887 is equipped with 3-1/8 inch unflanged type input connector. See paragraph on Fittings below for methods of connecting to it.

ELECTRICAL CHARACTERISTICS

The Model 887 is designed to match the most common high frequency transmission media; i.e., 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 Mc. and the calibration results of this particular resistor are tabulated below. In the frequency region 1000 to 2000 Mc. calibration is not normally performed. However, tests on typical units of this equipment show VSWR's to be less than 1.25 in this range. Below 50 Mc, the input impedance of the Dummy Load is very nearly a pure resistance to equal to the DC resistance to equal to the DC resistance. The production tolerance on the DC resistance is  $\pm 3\%$  from the nominal 51.5 ohms, and exact values for this particular resistance are given below. Below 30 Mc, power output measurements are most conveniently made by the  $E^2/R$  method, using a vacuum tube voltmeter across the Dummy Load. Thermo-ammeters may also be used, usally with less convenience and accuracy.

RESISTANCE and VSWR on Model 887, Serial No. \_\_\_\_\_

DC Resistance \_\_\_\_\_ ohms.

Frequency	100 Mc.	300 Mc.	500 Mc.	700 Mc.	1000 Mc.
VSWR	_____	_____	_____	_____	_____

VSWR is below 1.25 at frequencies up to 2500 Mc.  
All VSWR measurements with 51.5 ohm slotted line

Max. continuous load power - 1200 watts.

Max. load for 1/2 hour - 1500 watts.

## DESCRIPTION

The Model 887 equipment consists essentially of a carbon film-on-ceramic resistor immersed in dielectric coolant. The resistor, particularly selected for its uniform accuracy, is enclosed in a specially tapered housing. This provides a reduction in surge impedance directly proportional to the distance along the resistor. When surrounded by the dielectric coolant, the characteristic impedance is therefore 51.5 ohms at the front, and zero ohms at the rear - where the housing joins the resistor forming the return conductor. This produces the uniform, very low reflectivity line termination over stated frequencies of the load resistor.

The dielectric fluid of the load resistor is chosen for its chemical inactivity (to prevent damage to the resistor), its heat capacity and high flash point, and its low dielectric constant, to which the diameters of the resistor housing are matched. A teflon window provides an insulator which supports the central resistor, while introducing only very slight interruption to the requisite coaxial line impedance. The insulator seals against coolant seepage by use of precise longitudinal compression around its edges, and by a radially compressed O-Ring in the perimeter. The outside head of the center conductor (resistor) ass'y forms a mount on which the center contact of the 3-1/8 inch 51.5 ohm coaxial input is sprung.

The outer conductor tube of the input connector is rigidly fastened to the resistor housing by means of an externally threaded retaining ring. This retaining screw is tightened at the factory with special tools, and should not be loosened by field personnel, as this will disturb the insulator seal.

Another synthetic rubber O-ring around the outside of the resistor housing mount furnishes a seal for the radiator opening. A beveled flange retains the O-ring. This flange with the O-ring inside is pressed against the radiator face by the resultant action of the drawing up the radial V-Clamp band around the radiator and mount flanges.

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. 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-dia. holes on a 2 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 air space all around the radiator.

**Note:** The coolant in this Model freezes at 10°C (50°F). If the equipment has been kept below this temperature, apply moderate power (100 watts) to permit thaw of coolant before applying higher loads.

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Model 887 Load Resistor

SPECIAL CAUTION

Do not apply any electrical power (rf load) to the Termaline Load Resistor until the Vent Plug is removed. It is very essential to do this to allow for expansion of the heated dielectric oil. The Vent Plug is screwed directly inside the filler plug at the top and front of the radiator tank. It is painted red on top face and has a hex socket. The plug is unscrewed by use of the 3/16-in. Allen key that is taped to the front handle of the radiator. If the equipment should be moved, replace the plug to prevent oil spillage during transit.

Note: Certain units may have an automatic relief type filler installed. This is identified by the sintered filter disk in the center of the plug. If this filter disk is present, vent plug removal is not necessary.

It is possible to manage power loads greater than 1.2 KW by use of auxiliary ventilation of the equipment. If an effective fan or blower is placed transverse to the radiator, it may be permissible to increase the load power to approximately 2.5 KW under the proper conditions.

OVERLOAD THERMOSWITCH

The Model 887 is provided with a closed circuit (optional) thermoswitch for protection of the Load Resistor against possible overheating. This thermoswitch should be wired in series with the transmitter interlock. The switch is immersed in the resistor coolant, and will open when the coolant temperature reaches 165°C, cutting off the output power of the transmitter.

To make the interlock connection, unscrew (counter clockwise) the large knurled nut at the face end of the female type plug and pull off the plug assembly. Unscrew the clamp at back of plug and thread over interlock cable. Solder wires to prongs, and reassemble plug securely, tightening clamp to cable with the two transverse screws.

FITTINGS

The Load Resistor is designed for connection directly to 3-1/8 inch 51.5 ohm UHF coaxial lines using Coupling Kit #5039. Make sure the Load Resistor is kept in accurate alignment with the input lines.

The Model 887 also couples directly with the Bird Electronic Model 480 THRULINE section. This permits its use in conjunction with a THRULINE Meter and Measuring Element to form an absorption-type wattmeter. Direct reading power measurements are then obtainable, within the range and capacity the THRULINE Measuring Element. Consult Bird Electronic catalogs for further information.

MAINTENANCE

This equipment is rugged and simple, and should require only nominal routine care. Keep the radiator dusted off and the electrical parts free of dirt. If the connector contacts or faces should become dirty, wipe off with a little dry solvent on a cotton swab stick. When using carbon tetrachloride, exercise caution to avoid fumes.

If the Resistor Housing Assy #351052 should need replacement proceed as follows: To avoid the possibility of coolant spillage, restore Vent Plug #245006 to Vent Hole before proceeding. Place the radiator #245003 on its back end (connector up). Then loosen and remove the screw on the clamping band #24343 at the base of the front connector. Remove clamping band and carefully lift out the Resistor Housing unit in a vertical direction, allowing the coolant to drip back into the tank (be sure the radiator unit is properly held).

With the exception of the circumferential O-Ring #81139, this Unit is not subject to further disassembly - replace a defective Resistor Housing #351052 in its entirety. Units may be returned to the factory for repair - consult with the company. Do not re-use the O-Ring unless it is in fine condition. Before replacing the resistor housing, check that the O-Ring is pushed snugly against the inside of the beveled lip around the housing. Also, 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 Assy by reversing the procedure described above. Position the stamp mark "UP" in the proper place, 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 coolant leakage. Before using equipment, reopen the Vent Plug, and if deemed necessary recheck the coolant level - see Coolant Section below.

COOLANT

The Dummy Load is factory filled to the proper coolant level (with Dowtherm Type "A" Coolant) at room temperature. Expansion of the coolant with rise in temperature is taken care of by means of the vent plug previously discussed. The coolant level should be about 2-1/4 to 2-1/2 inches below the top face of the filler hole. Reasonable amounts of fluid loss will not seriously reduce the capacity of the equipment.

List of Replaceable Parts

Qty.	Part No.	Name
1	245003	Radiator
1	245004	Gasket, Vent Plug
1	245005	Plug, Filler
1	245006	Plug, Vent Plug
1	245007	Thermoswitch
1	245018	Connector Assy, Thermoswitch
(1)	245032	Plug, Relief Valve Type (When this item is present, parts numbered 245004, -5, -6 respectively are not used).
1	24343	Clamping Band
1	81139	O-Ring Linear #11-242
1	351052	Resistor Housing Assy
-	Std.	1.7 Gal. Dowtherm Type "A" Coolant

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