

Instruction Sheet  
for

INSTALLATION-OPERATION-MAINTENANCE  
Model 888 THERMALINE  
Coaxial Load Resistor

GENERAL

This load resistor is a general purpose coaxial line termination for use with 50 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 888 therefore provides a low reflection (non-radiating) line termination. This is useful as a substitute antenna to assist in tuning RF transmitters within its range, and for other routine maintenance or special checks on coaxial transmission equipment. The Model 888 is equipped with 3-1/8 inch flanged type (EIA) input connector. See paragraph on Fittings below for methods of connecting to it.

ELECTRICAL CHARACTERISTICS

The Model 888 is designed to match the most common high frequency transmission media; i.e., 50 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 2500 mc, individual 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. The production tolerance of the DC resistance on these equipments is held within close limits, and the value for this particular resistor is inscribed in the table included below.

Power measurements may be made on the dummy load by attachment of an Bird Model 460 THRULINE Wattmeter on the coaxial input circuit, see Fittings Section. Using the appropriate measuring Elements, reading can be obtained within the operating range of the Model 888 (up to 1000 mc).

Results of VSWR checks on Model 888, Serial No. \_\_\_\_\_

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 taken with slotted line of 50 ohm impedance.

Max. continuous load power - 1200 watts in still air.

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

## DESCRIPTION

The Model 888 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 50 ohms at the front, 25 ohms halfway down the resistor, and zero ohms at the rear - where the resistor joins the housing, 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) assy forms a mount on which the center contact of the 3-1/8 inch 50-ohm coaxial input is sprung.

The outer conductor tube of the flanged 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. The outer conductor holds captive a free swivel flange for 3-1/8 inch EIA standard UHF flanged connector.

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 of 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-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 air space all around the radiator.

**NOTE:** The coolant in the 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.

## SPECIAL CAUTION

Do not apply any electrical power (rf load) to the THERMALINE 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 the top face and has a 3/4-in. hex body. 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 888 is provided with a closed circuit 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 cable clamp at the back of the 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 EIA 50-ohm UHF coaxial lines. The center conductor will require an anchor bullet, Mectron #330-14 or Andrew K-15093, and the flanges are pulled up with (6) 3/8-inch x 1-1/2 long cap screws with appropriate nuts and washers. Make sure the Load Resistor is kept in accurate alignment with the input lines.

The Model 888 will also mate directly with the Bird Electronic Model 460 THRU-LINE Section. It attaches just the same as the 3-1/8 inch UHF line. With the inclusion of the Model 460, the Model 888 THERMALINE may be used as an absorption type wattmeter. This will permit certain direct reading power measurements within the capacity of the load resistor (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 (Inhibisol\* or its equivalent, or trichlorethylene) on a cotton swab stick.

\* A non-toxic, non-flammable dry cleaning agent, manufactured by the Penetone Company, Tenafly, New Jersey.

If the Resistor Housing Assy, #351027 should need replacement, proceed as follows: To avoid the possibility of coolant spillage, replace Vent Plug #245049 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 the clamping band 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, the Resistor Housing #351027 is not subject to further disassembly. Replace a defective unit in its entirety. Resistor housings 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 level of the dielectric coolant in the dummy load should remain constant after prolonged usage under normal operating conditions. Inspect occasionally around lower portion of the clamping band for possibility of coolant leakage. Tighten clamping screw if required. Under very unusual conditions it might be necessary to replace the resistor housing seal O-Ring #81139. Proceed as described in paragraphs above.

To check the coolant level, measure through the filler and vent socket on the top surface of the unit. Unscrew the plug with a 3/4-inch wrench if it should be in place. Coolant level should be within 2 to 2-1/4 inches below the top surface of the filler socket. The unit is factory-filled to the proper level with 1.7 gallons of Dowtherm A Coolant. NO OTHER COOLANT MAY BE USED, as it will not match the characteristics of this load resistor. Reasonable amounts of fluid loss will not seriously reduce the capacity of the equipment.

#### LIST OF REPLACEABLE PARTS

<u>Qty.</u>	<u>Part No.</u>	<u>Name</u>
1	245003	Radiator
1	245039	Sleeve, Adapter
1	245049	Plug, Shipping
1	245007	Thermoswitch
1	245018	Connector Assy, Thermoswitch
1	24343	Band, Clamping
1	81139	O-Ring Linear #11-242
1	351027	Housing Assy, Resistor
-	Std.	1.7 Gal. Dowtherm A Coolant

Bird Electronic Corporation  
Cleveland 39, Ohio

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