INSTRUCTION BOOK

Model 8910 Termaline®

Coaxial Load Resistor

SPECIFICATIONS

Power Rating:	100kW continuous duty
Frequency:	200 MHz
Impedance:	50-ohms nominal
VSWR:	1.10 maximum
RF Input Connector:	6-1/8" EIA Flanged
Water Flow Required:	16-gallons per minute minimum
Water Temperature Operating Range:	+5°C to +60°C
Water Connections:	1" male water pipe
Weight:	125 lbs.
Physical Dimensions:	26-3/4" wide x 46-1/2" high x 11-1/4" deep
Power Required:	230Vac, 50Hz, 0.80 amps

MODEL 8910 TERMALINE® LOAD RESISTOR

DESCRIPTION

The Bird Model 8910 RF Coaxial Load Resistor is a 100kW, direct water-cooled termination designed for use with 50-ohm, 6-1/8" EIA flanged coaxial transmission systems at 200 MHz. It is non-radiating and virtually reflectionless making it suitable for use with CW, AM, FM, and TV transmitters.

All components of the Model 8910 are contained within one enclosure and consist of a quarter-wave impedance matching section, power splitter "tee", two 50kW load resistors connected in parallel and two water-flow protective switches. A 12-second time-delay relay controlling the transmitter interlock circuit and other associated "safe-guard" and operational electrical components are also contained in the enclosure.

Two BX-type cable connectors are mounted in the right-side panel of the enclosure to facilitate connecting the 230Vac supply and transmitter interlock leads to the unit. Power requirements are 230Vac, 50Hz, 0.80 amp.

Components and fittings used for circulating the cooling water are of either copper, brass or inert plastic tubing to minimize deposit build-up from water impurities. Cooling water flow must be 16-gallons per minute MINIMUM, and it must be of good potable quality.

THEORY OF OPERATION

RF power applied to the Model 8910 through the 6-1/8" EIA flanged input connector flows through a quarter-wave impedance matching section to a power splitting "Tee" assembly. The power splitter directs one-half of the total applied RF power to each of two 50kW rated load resistors where the RF power is converted to heat by the resistive film of the resistor element. Water flowing directly against the inner surface of the resistive element effectively absorbs the heat generated and the water is then discharged from the load resistor.

A protective time-delay relay circuit is provided to prevent premature application of RF power for approximately 12-seconds until the required minimum water-flow has been established. The delay ensures that trapped air bubbles have been discharged and the water supply has had adequate time to stabilize.

The incoming water-flow (16-gpm minimum) is divided internally to provide each 50kW load resistor with 8-gpm minimum water flow. Each load resistor is also provided with a protective water-flow switch whose electrical contacts are closed only when the minimum water-flow is maintained. The electrical contacts of both water-flow switches are connected in series with each other and with the coil of the time-delay relay. Less than 8-gpm of water flow through either water-flow switch will result in the de-energizing of the time-delay

relay and the instantaneous opening of the transmitter interlock circuit.

CAUTION

The resistive elements in the load resistors will burn out instantly if the unit is operated without water.

INSTALLATION

The load resistor assembly should be located so that it is relatively free from mechanical shock and excessive vibration. The cooling water supply temperatures at the inlet and outlet connections must be within the limits shown under "Specifications".

CAUTION

The following operations MUST be performed BEFORE the 230Vac supply leads or the transmitter interlock leads are connected to the Terminal Board.

1. Using a standard ohmmeter (low-resistance scale) measure as follows:

Between Terminals	Ohmmeter Reading
2 and 4	"Open" (no-reading)
4 and 5	"Open" (no-reading)
6 and 7	"Open" (no-reading)

2. Clean RF INPUT CONNECTOR using soft cloth only. DO NOT USE ANY SOLVENT.
3. Connect 6-1/8" transmission line from transmitter output to RF INPUT CONNECTOR.

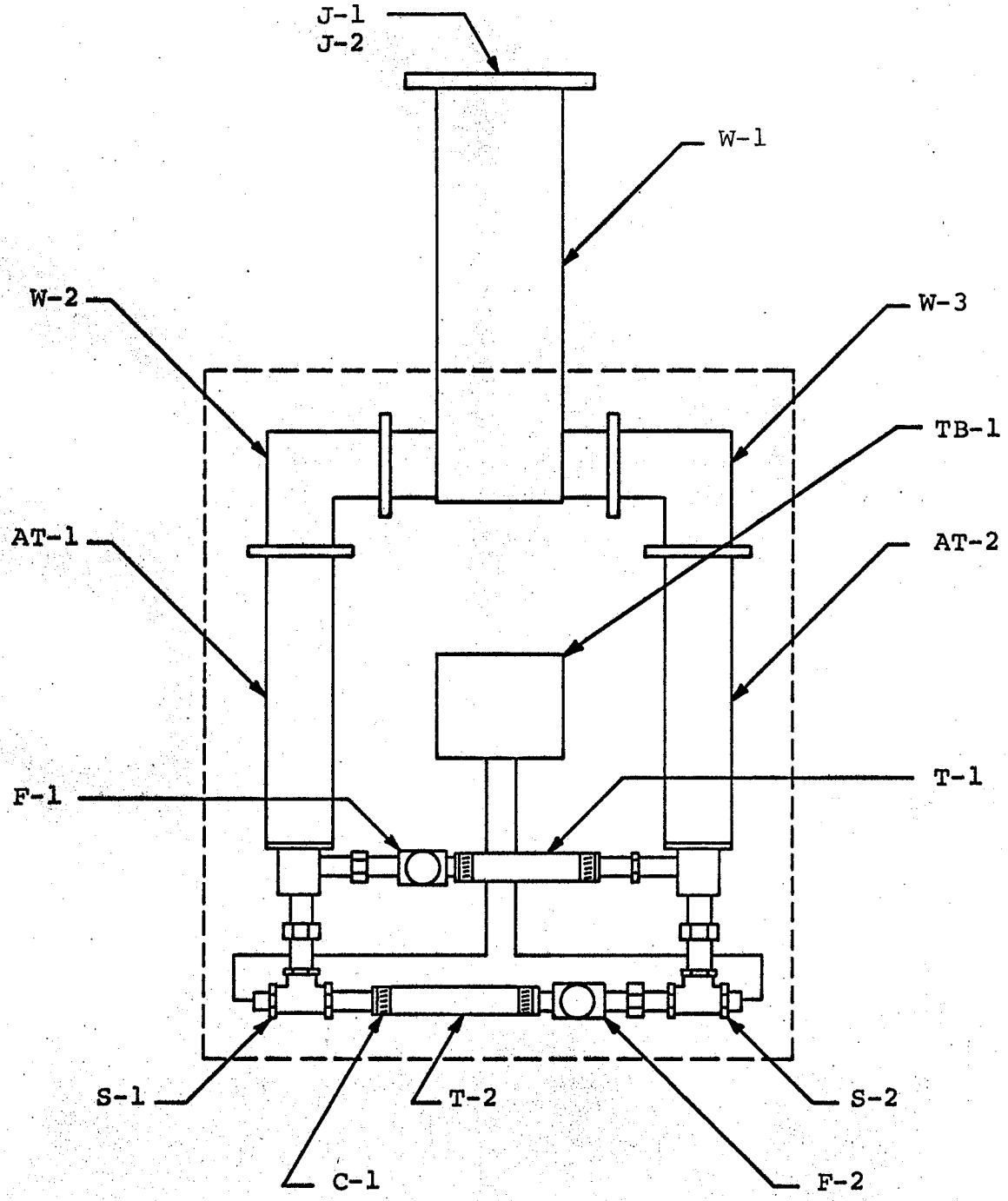

Fig. 3, Pictorial Diagram--Functional Components and replaceable Parts

Reference	Description	BEC Part Number
AT-1	Load Resistor Assy, 50kW (not interchangeable with AT-2)	8910-030
AT-2	Load Resistor Assy, 50kW (not interchangeable with AT-1)	8910-031
C-1	Clamp, Water-Flow Tubing	2-742

Fig. 3 - Continued

Reference	Description	BEC Part Number
F-1, F-2	Tee Assy.	8910-010
J-1	Connector, RF Input, 6-1/8" EIA Flange	4902-012
J-2	Bullet, Anchor, 6-1/8" EIA, 50-ohm	4902-015
S-1	Switch Assy, Water-Flow (not interchangeable with S-2)	8910-011
S-2	Switch Assy, Water-Flow (not interchangeable with S-1)	8910-012
T-1	Tubing, Water-Flow	8671-024-2
T-2	Tubing, Water-Flow	8671-024-3
TB-1	Terminal Board	See Fig. 4
W-1	Impedance Matching Section and Power Splitter Assy.	8910-040
W-2, W-3	Elbow, 90°, 3-1/8" EIA Flanged	5-948

4. Attach water supply line to WATER INLET pipe and drain line to WATER OUTLET pipe.

CAUTION CAUTION CAUTION

USE EXTREME CARE IN ATTACHING DRAIN LINE TO WATER OUTLET PIPE!!!!! The use of excessive force in making the connection can result in rupturing the joint between the WATER OUTLET pipe and the LOAD RESISTOR housing.

5. Connect terminal "3" (chassis ground for safety purposes) to a reliable common ground point.

6. Connect transmitter interlock leads to TERMINAL BOARD Terminals "6" and "7".

CAUTION

The transmitter interlock circuit must be wired so the transmitter will be disabled when terminals "6" and "7" are open.

7. Connect 230Vac, 50Hz supply to Terminals "1" and "2" of TERMINAL Board.

INSTALLATION CHECK OUT

1. System Condition: Turn water supply "on". Wait several minutes; turn 230Vac power "on". In approximately 12-seconds a "click" will be heard indicating the TIME-DELAY RELAY has closed.

   a. Disconnect transmitter interlock lead from Terminal "6".

   b. Measure with ohmmeter between Terminals "6" and "7". Ohmmeter should indicate "shorted condition".

NOTE

"Shorted condition" indicates that water flow has closed the contacts of both water-flow switches causing the TIME-DELAY RELAY to actuate closing the interlock circuit between Terminals "6" and "7".

   c. Replace transmitter interlock lead on Terminal "6".

   d. Turn 230Vac power "off"; turn water supply "off".

   e. The system is now ready for operation.

OPERATION

1. "Turn-on" Procedure

   a. Turn water supply "on". Ensure that water flows at a steady 16-gpm minimum rate for at least 3-minutes.

   b. Turn 230Vac power "on" and wait approximately 12-seconds for time-delay relay to close.

c. Turn RF power from transmitter "on".

2. "Shut-down" Procedure

a. Turn RF Power from transmitter "off".

b. Turn 230Vac power "off".

c. Wait several minutes, then turn water supply "off".

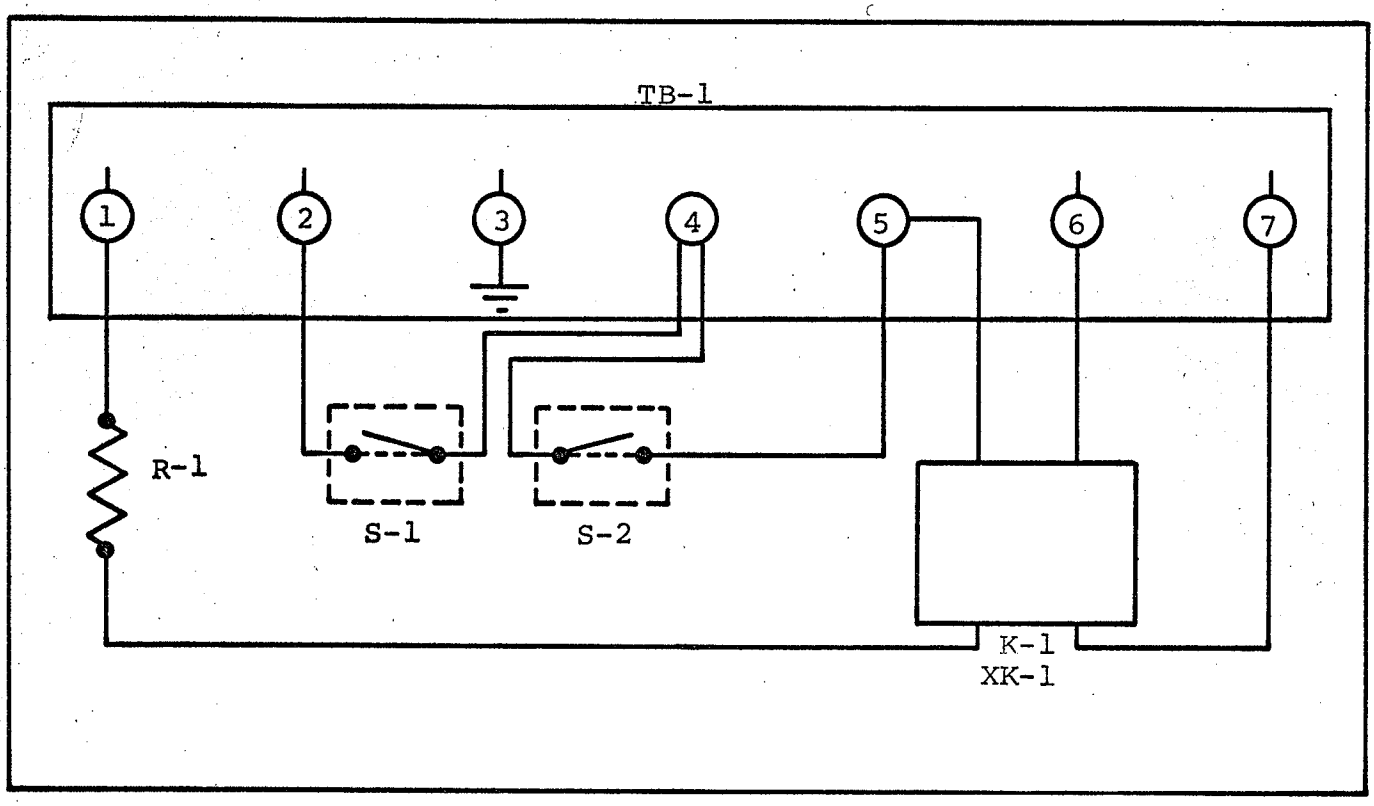

Fig. 4. Schematic Wiring Diagram--Terminal Board Connections and Electrical Components

Reference	Description	BEC Part Number
K-1	Relay, Time-Delay (12-second)	5-825-1
R-1	Resistor, 3000-ohm ±5%, 10 watt	5-827
S-1	Switch Assy, Water-Flow	See Fig. 3
S-2	Switch Assy, Water-Flow	See Fig. 3
TB-1	Terminal Board	5-048-7
XK-1	Socket (for K-1)	8910-032-2

MAINTENANCE NOTES

In the event of unsatisfactory operation, the following checks may be made to assist in determining the malfunction:

1. Determine that the proper water flow, 16-gpm minimum, is being supplied to the WATER INLET fitting.
2. Ensure that 230Vac, 50Hz power is being applied to Terminals "1" and "2" of TERMINAL BOARD, TB-1.
3. Control Circuitry: refer to INSTALLATION and INSTALLATION CHECK-OUT to determine whether flow switches and TIME-DELAY RELAY are working properly.
4. Ensure that transmitter interlock circuitry is wired correctly in the transmitter.
5. Resistance checks:
    a. An ohmmeter measuring DC resistance between the inner conductor and outer conductor of the 6-1/8" RF input connector should read 25-ohms ±5%.
    b. With POWER SPLITTER disassembled from the 50kW LOAD RESISTORS, the ohmmeter should indicate 50-ohms ±2% across the 3-1/8" EIA flanged RF input connector of each load resistor.
6. Ensure that the proper impedance is presented by the transmitter to the load resistor (50-ohms).

Properly used, the Model 8910 should provide trouble-free service over an extended period of time. Excessive power

levels or use of inadequate or contaminated water may materially shorten the useful life and affect the product warranty.

NOTE

Field repair of the 50kW load resistors is not advised. The resistive elements must be carefully selected and power tested. Proper alignment of the water flow tube and impedance matching section is critical.

Please consult the factory in the event that a defective part is discovered or cause of the malfunction cannot be determined.

CAUTION

Use extreme care in handling the beryllium resistors if the 50kW Load Resistors are disassembled. Ensure that beryllium dust or fragments do not enter the bloodstream through respiratory processes or tissue cuts.

CUSTOMER SERVICE GROUP

Bird maintains a complete repair and recalibration department at the factory. This department is set up to provide the best possible service for the maintenance of Bird equipment. Repairs will proceed as soon as the instrument is received with your authorization. Repair charges are kept at a minimum. If you require a firm quotation covering the cost of repair before authorization is given to proceed, please advise and a quotation will be sent promptly. All

instruments returned for repair or calibration must be shipped prepaid to:

BIRD ELECTRONIC CORPORATION
30303 Aurora Road
Cleveland, (Solon) Ohio 44139
ATTENTION: Customer Service Department

When returning instruments for repair, send complete information as to difficulty encountered and any other pertinent details available.

Each instrument repaired is thoroughly checked and recalibrated to original specifications. The material used and work performed are warranted for 90 days with the exception of tubes, semi-conductor devices, fuses and batteries.

We have direct teleprinter connections with the three wire services:

1. Western Union
2. Telex, No. 098-5298
3. TWX No. 810-427-2687

Our cable address is BIRDELEC

Our telephone number is, 216-248-1200

WARRANTY

We warrant to the original purchaser only that each new instrument of our manufacture will for a period of one year after original shipment be free from defects in material and workmanship under normal and proper operating conditions and that properly used during such period it will perform in

accordance with our applicable specifications. Our obligation and the purchaser's exclusive remedy for any defect or failure to meet specifications shall be limited, at our option, to repair or replacement or if we determine said defect or failure to be so defective as to preclude remedying by repair or replacement, the purchaser's sole and exclusive remedy shall be limited to refund of the purchase price. We shall have no obligation if defects result from improper use, operation above rated capacities, repairs not made by us, or misapplication of the equipment. Our warranty does not extend to the failure of tubes, semiconductor devices, fuses, and batteries, or to equipment and parts made by others except to the extent of the original manufacturer's warranty to us. Warranty returns must first be authorized by the factory office and are to be shipped prepaid.