

ALTRONIC RESEARCH, INC.

P.O. BOX 249

YELLVILLE, ARKANSAS 72687-0249

U.S.A.

MODEL 7740

COAXIAL LOAD RESISTOR



MODEL 7740
40KW AIR COOLED COAXIAL RESISTOR

LIMITED WARRANTY

We take pride in manufacturing products of the highest quality and we warrant them to the original purchaser to be free from defects in material and workmanship for the period of one year from date of invoice. Additionally, products of our manufacture repaired by us are warranted against defects in material and workmanship for a period of 90 days from date of invoice, with the provisions described herein.

Should a product, or a portion of a product of our manufacture prove faulty, in material or workmanship, during the life of this warranty, we hereby obligate ourselves, at our own discretion, to repair or replace such portions of the product as required to remedy such defect. If, in our judgment, such repair or replacement fails to be a satisfactory solution, our limit of obligation shall be no more than full refund of the purchase price.

This warranty is limited to products of our own manufacture. Equipment and components originating from other manufacturers are warranted only to the limits of that manufacturer's warranty to us. Furthermore, we shall not be liable for any injury, loss or damage, direct or consequential, arising out of the use, or misuse (by operation above rated capacities, repairs not made by us, or any misapplication) of the equipment. Before using, the user shall determine the suitability of the product for the intended use; and the user assumes all risk and liability whatsoever in connection therewith.

The foregoing is the only warranty of Altronic Research Incorporated and is in lieu of all other warranties expressed or implied.

Warranty returns shall first be authorized by the Customer Service Department and shall be shipped prepaid. **Warranty does not cover freight charges.**

TABLE OF CONTENTS

MODEL 7740

<u>SECTION</u>	<u>PAGE</u>
Warranty	3
Precautions	6,7
Introduction	8
I. Description and Leading Particulars	
1-1 Purpose and Application of Equipment	8
1-2 Equipment Supplied	8
1-3 Equipment Required But Not Supplied	8
1-4 General Description	9
1-5 Electrical Description.....	9
1-6 Mechanical Description.....	9
1-7 General Principle of Operation.....	9
1-8 Operating and Adjustment Controls.....	10
1-9 Operator Training	10
II. Test Equipment and Special Tools	
2-1 Test Equipment Required.....	11
2-2 Special Tools Required.....	11
2-3 Materials Required	11
III. Preparation for Use and Reshipment	
3-1 Unpacking Equipment	12
3-2 Pre-Installation Inspection	12
3-3 Pre-installation Test	12
3-4 Installation	12
3-5 Location	12
3-6 Mounting	13
3-7 Connections	13
3-8 Adjustments	13
IV. Theory of Operation	
4-1 General	14
4-2 Control Circuits.....	14

SECTION

PAGE

V. Maintenance

- 5-1 Cleaning.....16
- 5-2 Lubrication16
- 5-3 RF Circuit (including resistor replacement)17

VI. Diagrams

- 6-1 Outline and Dimensions18
- 6-2 Schematic Diagram.....19
- 6-3 Parts List.....20

VII. Specifications21

APPENDIX

- Corrosion Prevention Manual
- Manufacturer's Documents
- Test Records

PRECAUTIONS

⚠️WARNING⚠️

This equipment can start automatically. Do not attempt any service or parts replacement without first disconnecting all AC power and RF power. Failure to do so may result in serious or *fatal electrical shock*.

CAUTION

Do not block air grills or restrict airflow when ducting inlet and discharge air. Restrictions in airflow limit the load's ability to dissipate RF power and could damage and/or cause the unit to fail.

CAUTION

Do not connect the unit to an RF power source without first ensuring that the load is connected to the proper line voltage and that the interlock circuit is properly attached to the transmitter. The interlock circuit is designed to indicate a fault and prevent operation when line voltage is not present. Do not apply more than rated power to unit. Damage will occur before thermal protectors can activate interlock circuit.

☠️CAUTION☠️

When using any cleaning solvents or solutions, assure that there is adequate ventilation to protect personnel from breathing any irritable or possibly toxic fumes.

OPERATING TEMPERATURE WARNING

**CARE SHOULD BE TAKEN TO OPERATE UNIT BELOW
STATED MAXIMUM AMBIENT OPERATING TEMPERATURE.**

**OPERATION ABOVE RATED AMBIENT
TEMPERATURE MAY CAUSE MOTOR
THERMAL PROTECTION TO SHUT OFF FAN,
WHICH MAY CAUSE DAMAGE TO UNIT.**

**PROVISIONS ARE MADE TO TRIP THE INTERLOCK
IN THE EVENT OF OVERHEAT, BUT THE INTERLOCK
MUST BE PROPERLY CONNECTED TO THE RF SOURCE
FOR THIS FUNCTION TO OPERATE.**

**NEVER OPERATE WITH INTERLOCK
BYPASSED OR MALFUNCTIONING.
TO DO SO WILL VOID THE WARRANTY.**

INTRODUCTION

This handbook was prepared for technical personnel as an aid in understanding and performing installation, service and maintenance procedures for the OMEGALINE® Model 7740 Air-Cooled Coaxial Load. Personnel are considered to be skilled if they have the necessary knowledge and practical experience of electrical and radio engineering to appreciate the various hazards that can arise from working on radio transmitters, and to take appropriate precautions to ensure the safety of personnel.

SECTION I

DESCRIPTION AND LEADING PARTICULARS

1-1. Purpose and Application of Equipment. The OMEGALINE® Model 7740 Coaxial Load is designed to safely dissipate a maximum of 40,000 watts of electrical energy over a frequency range of 540 to 1750 KHz.

1-2. Equipment Supplied. The Model 7740 Coaxial Load is supplied with standard RF connectors. Their designations are:

3-1/8" EIA Swivel flange: Model # 7740E3
3-1/8" Unflanged flush: Model # 7740F3
3-1/8" Unflanged recessed: Model # 7740R3

The standard power supply voltages and their designators after the Model # are:

-115: 110-120VAC, single phase, 50/60 Hz
-230: 208-230VAC, single phase, 60 Hz
-230: 208-230VAC, three phase, 50 Hz

1-3. Equipment Required But Not Supplied. The Model 7740 Coaxial Load is complete as supplied, but the user must furnish RF input, power input, interlock control cable and ground cable appropriate to each installation.

1-4. General Description. The Model 7740 Coaxial Load is enclosed in a single aluminum case. Electrical connection is made to a multi-terminal distribution block located within the electrical control enclosure. A four-screw barrier style terminal strip is also located within the electrical control enclosure. This terminal strip is for connection to the interlock circuitry. A 5/16-18 UNC-2B stud for attachment of system ground is located on the front panel below the RF connector. The RF connector is located on the front panel.

1-5. Electrical Description. The Model 7740 contains a 50 ohm non-reactive resistor assembly capable of dissipating 40,000 watts of applied electrical energy at sea level at frequencies between 540 and 1750 KHz with a maximum VSWR of 1.15 to 1 at room temperature. Some VSWR variation may occur at operating temperatures. No provisions are made for tuning the resistor assembly and all operating controls relate to the operation of the fan assembly. The fan control circuit consists of four switches wired in parallel to control the fan motor relay. Power is supplied to this relay and to the "Blower On" lamp whenever the equipment is attached to the correct power supply and the main power switch is "ON" or when one of the fan thermostats senses a temperature equal to or greater than 140° ($\pm 7^\circ$) F.

The transmitter interlock circuit consists of two thermal switches wired in series to control the interlock relay. Power is supplied to this relay whenever the equipment is attached to the correct power supply, the fan overtemperature thermal switch senses a temperature equal to or less than 160°($\pm 7^\circ$)F and the resistor overtemperature thermal switch senses a temperature equal to or less than 250° ($\pm 7^\circ$) F. A lamp is provided to indicate when one or more of the overtemperature switches opens. It is labeled "OVERHEAT", indicating a change in state of the interlock.

1-6. Mechanical Description. The Model 7740 RF Coaxial Load is a 50 ohm non-reactive resistor assembly which is cooled by forced ambient air. The fan assembly is a 1 HP belt-drive multi-blade fan. The fan moves air horizontally through the load. Air enters through the intake louver, flows through the resistors and exits through the exhaust louver.

1-7. General Principle of Operation. After ascertaining that the Model 7740 is connected to the correct power supply, connect the transmitter interlock circuit and RF source. Turn the main power switch "ON" to start the fan and enable transmitter. Operate transmitter as desired. To stop operation, it is necessary to first turn off the transmitter, then the main power switch on the Model 7740. The fan may continue to run for some time. This depends upon the power level at which the load was operating and upon the ambient air temperature. This feature is necessary to prevent damage to the load.

1-8. Operating and Adjustment Controls. The only operating control is the main power switch. No electronic or electrical field adjustments are necessary or possible. The differential pressure switch must be adjusted at commissioning. Thereafter, it should not be necessary to adjust it. The motor and fan require periodic maintenance and the drive belt must be adjusted to maintain proper tension. No other mechanical adjustments are necessary.

1-9. Operator Training. The operator of this equipment must have the following skills/knowledge:

- An understanding of the purpose of the equipment;
- An understanding of the principles of operation of the equipment;
- An understanding of the normal operating procedures for the equipment;
- An understanding of the normal and abnormal indications which may be presented at the control point;
- The proper procedures for starting, using and stopping the equipment under normal conditions;
- The proper procedure for stopping the equipment under abnormal or emergency conditions;
- The proper procedure to lock out and mark controls prior to allowing or commencing maintenance on the equipment;
- The proper procedure to obtain clearance to remove lockouts and out-of-service marks and return the equipment to normal service.

SECTION II

TEST EQUIPMENT AND SPECIAL TOOLS

2-1. Test Equipment Required. No test equipment is required for routine maintenance.

2-2. Special Tools Required. Although no non-standard tools are required for routine maintenance, we recommend the technician have the following specialized tools available:

1 Torx T-15 driver

1 Tee handle hex key, 7/32" bit

1 Power screwdriver with 7/32" hex key & torx T-15 bit

2-3. Materials Required. One type of grease is required for routine servicing of fans. Use any quality lithium-based grease to lubricate the pillow-block bearings. The materials required for corrosion protection and preservation are considered in the section of this manual which deals with corrosion prevention.

SECTION III

PREPARATION FOR USE AND RESHIPMENT

3-1. Unpacking Equipment. The units should be handled and unpacked with care. Inspect outer cartons for evidence of damage during shipment. *Claims for damage in shipment must be filed promptly with the transportation company involved.* No internal packaging or bracing is used for shipments and the units should not rattle when being unpacked.

3-2. Pre-installation Inspection. Conduct a thorough inspection of the units, paying particular attention to the following items:

- Screws in place and tight.
- All panels and grills free of dents and scratches.
- Base assembly visually OK.
- Interlock terminal strip visually OK.
- RF connector visually OK.
- All resistors in their clips.

While inspecting RF connector, measure DC resistance of the unit by reading from the center conductor to the outer conductor. Compare this reading to that on the specification sheet at the end of this manual. Reading should be ± 1 ohm. If not, consult factory.

3-3. Pre-installation Tests. No tests are necessary or possible prior to installation, except resistance test specified in 3-2.

3-4. Installation. The Model 7740 must be installed in a location convenient for servicing. Consideration should be given to adequate accessibility for maintenance and unit replacement. No attempt is made in this handbook to present complete installation instructions, since physical differences in plant will determine the installation procedure. General guidelines are outlined in subsequent paragraphs.

3-5. Location. When ordered for exterior installation, special motors, wiring and weatherproofing measures are incorporated at the factory. In addition, a roof assembly is provided. The load is designed to operate in ambient conditions without further modification.

3-6. Mounting. The Model 7740 is designed to be floor-mounted and should be securely attached to the floor or mounting pad. It is intended that the forklift pockets be used to route four tiedown lines through the base frame of the load.

NOTICE!

The frame of this load is subject to racking. This may interfere with operation and installation of louver assemblies. When installing the unit, it should be leveled and adjusted to allow easy operation of the louvers.

3-7. Connections. There are five connections on the Model 7740: the RF connector, the AC power supply, the remote control terminal strip, the transmitter interlock and the system ground terminal point.

- a. The RF connector is on the end panel of the unit. Connect to the appropriate RF line from the transmitter.
- b. The AC power supply connector is a pressure-style female receptacle located in the Safety Switch on the RF connector end panel of the enclosure.
- c. The remote control terminal strip provides connection points for a user-supplied signal which closes, starting the fans and initiating louver operation.
- d. The transmitter interlock is attached to one pair of normally closed terminals of the 4-position terminal strip located on the inner panel of the control box which is mounted on the RF connector end of the enclosure. The terminals are closed whenever AC power is supplied to the unit and no overheat condition exists.
- e. There is a ground terminal provided on the end panel beneath the RF connector. Connect the load to system ground at this point.

3-8. Adjustments. The drive belts for the fans must be checked at this time and periodically adjusted to maintain proper tension. It is important not to overtension the belts.

**Tension belt to require a force of 6.1 pounds (~ 2.75 kg)
to deflect center of belt 13/64 inch (0.503 cm).**

The differential pressure switch must be adjusted when the system is set up and the fans are operating normally. The complete procedure for this is contained in the manufacturer's instruction sheet which you will find in the appendix of this manual.

SECTION IV

THEORY OF OPERATION

- 4-1. General.** The Model 7740 contains a 50 ohm non-reactive resistor assembly (40 @ 1970 ohms in parallel) which is cooled by forced air supplied by a multi-blade fan assembly. Control of the fan and of the transmitter interlock circuit is accomplished with a single 2 position switch and five thermal switches.
- 4-2. Control Circuits.** There are three control circuits in the Model 7740. One circuit controls the fans, one controls the remote operation of the load and the other controls the transmitter interlock circuit. All circuits derive their internal power from the 24-28VAC control transformer. The main ON/OFF switch (S10) is a turn-to-close switch on the side of the control box. It connects to AC Control Circuit X1 and current passes through the two louver interlock switches (S40, S41) to FAN CONTACTOR terminal A2. From terminal A2, current travels through the contactor coil to terminal A1 and thence to AC Control Circuit X2. One 140°F thermal switch (S31) is connected in parallel with S10, as is one 160°F thermal switch (S30). These are the HOLD-ON THERMAL SWITCHES. When they sense a temperature of 140°(±7°F) or a temperature of 160°(±7°F), they close and keep the fans in operation. This protects the load against early shutdown and reduces thermal stress on the load components.

The transmitter interlock circuit is a series circuit. Current flows from X1 to Interlock Relay (K30) terminal 13, through the coil to terminal 14, thence to two thermal switches (S21@250°F; S22@160°F), thence to the Normally Open contact of Differential Pressure Switch (S20). When S20 senses adequate pressure, current then flows to X2. This causes K30 to close, enabling the transmitter.

There are two lamps inside the control box. The AIRFLOW lamp is illuminated when there is low differential pressure (as when a fan is not operating). The OVERHEAT lamp is illuminated when there is low differential pressure and one of the thermal switches (S21 or S22) is open.

The Interlock Relay (K30) is a 4PDT relay which has been wired as a DPDT unit in order to gain current-carrying capacity. As it is wired, it is rated for 2 amperes DC or 120vac resistive. The relay is wired to provide identical action pairs at TB1. With no fault, the pair TB1-1 + TB1-2 is closed and the pair TB1-3 + TB1-4 is closed. When a fault occurs, the relay changes state and the pairs change sense. K30 should close as soon as the fans are up to full speed,

the louvers are fully opened and no overtemperature thermal switch fault exists. It should open on loss of power, louver position fault or thermal switch actuation.

The logic of operation is:

1. If AC power is applied to the load, the overtemperature thermal switches sense normal temperatures, the differential pressure switch is closed, the interlock relay will close and enable the transmitter.
2. If AC power is not applied to the load, or if the overtemperature thermal switches sense excessive temperatures, or if the differential pressure switch is open or if the louver limit switches sense an unopened louver, the interlock relay will open, disabling the transmitter.
3. If AC power is applied to the load, the louver assemblies are properly installed and at least one of the HOLD-ON THERMAL SWITCHES senses an overtemperature condition, AC power is applied to the contactor coils to maintain fan operation until the load cools down and the switch changes state.

SECTION V

MAINTENANCE

⚡WARNING⚡

***PERSONNEL WORKING ON THIS LOAD MUST BE
CONSIDERED SKILLED AS DEFINED BY
EN60215 SECTION 3.1 AND APPENDIX D***

BEFORE PERFORMING ANY MAINTENANCE:

- 1. DISCONNECT POWER AND ALLOW MOTOR TO COME TO A FULL STOP.**
- 2. DISCONNECT RF CONNECTOR ASSEMBLY AND LOCK OUT TRANSMITTER OPERATING CONTROLS.**
- 3. DISCONNECT TRANSMITTER INTERLOCK LINE.**

***FAILURE TO FOLLOW THESE DIRECTIONS
MAY CAUSE FATAL ELECTRICAL SHOCK!***

5-1. Cleaning. The enclosure of the Model 7740 is finished with an acrylic finish or other durable coating system. It should be cleaned with a neutral plastic and glass cleaner such as Windex or Glass Plus. The RF connector should be cleaned with a non-residue contact cleaner such as Miller-Stephenson MS-171/CO₂. Remove dirt accumulations from the fan and motor by vacuuming. Do not use solvents or an air jet, as these can damage the motor. Remove dirt and dust accumulations from the grills and resistor assembly with an air jet and a soft brush.

5-2. Lubrication. The only lubrication required is for the sleeve bearings in the fan motor and the fan pillow block bearings. Motors in continuous service should be re-oiled annually, intermittent duty units every two years and occasional duty units every three years. Re-oil by removing the plastic plugs in the lubrication ports and applying 30 to 35 drops of SAE 20 non-detergent

motor oil. DO NOT OVER OIL. The pillow block bearings should be lubricated annually with a quality lithium-based grease.

5-3. RF Circuit. The RF circuit does not require any periodic maintenance and the only repairs possible are the replacement of parts in the connector, the support portions of the resistor assembly or the replacement of resistors.

Resistor Replacement

Prior to attempting resistor replacement, you must make the load safe for servicing. Begin by placing the user-supplied Safety Switch in the OFF position and locking the handle with a padlock. Next, remove all power from the transmitter and exciter and lock them out.

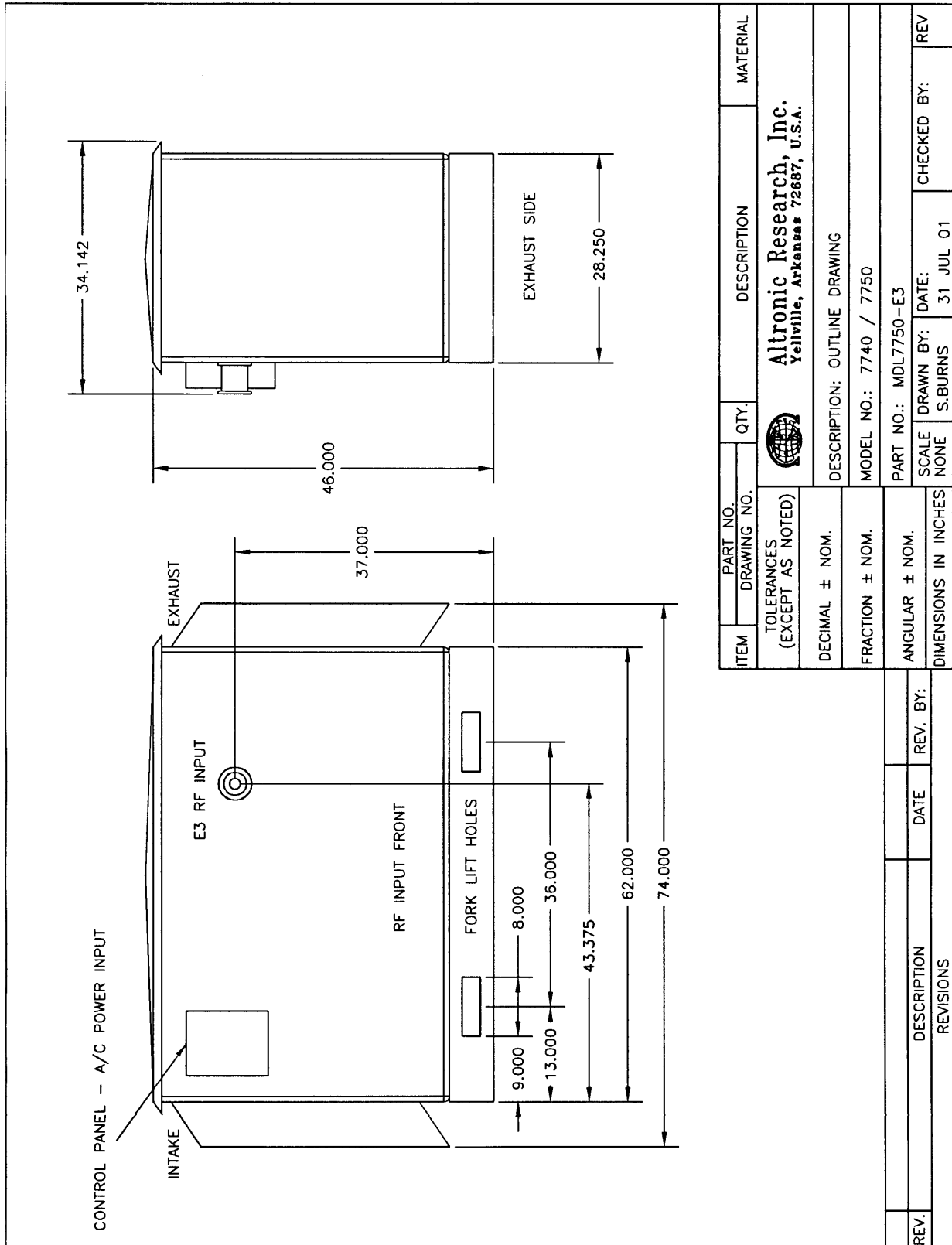
To replace resistors it is necessary to remove the exhaust panel from the load and set it aside.


Resistor replacement is tedious, but not difficult. It will probably be necessary to remove many resistors in order to replace a few. Therefore, allow at least eight hours to accomplish this task.

The resistors are made of a durable ceramic and will withstand normal handling, but they must not be struck with any tool.

SECTION VI

6-1 OUTLINE AND DIMENSIONS



ITEM	PART NO. DRAWING NO.	QTY.	DESCRIPTION	MATERIAL
 Altronic Research, Inc. Yellville, Arkansas 72687, U.S.A.				
TOLERANCES (EXCEPT AS NOTED)				
DECIMAL ± NOM.				
FRACTION ± NOM.				
ANGULAR ± NOM.				
DIMENSIONS IN INCHES				
DESCRIPTION			DATE	REV. BY:
REVISIONS				
MODEL NO.: 7740 / 7750			PART NO.: MDL7750-E3	
DESCRIPTION: OUTLINE DRAWING			DRAWN BY: S.BURNS	
SCALE: NONE			DATE: 31 JUL 01	
CHECKED BY:			REV	

6-3 REPLACEMENT PARTS LIST
MODEL 7740

(CONSULT FACTORY)

SPECIFICATIONS

Model 7740

Impedance----- > 50 ohms nominal

VSWR @ 540 to 1750 KHz ----- > 1.15:1 max.

Connectors:

Model 7740E3*----- > 3-1/8" EIA swivel flange

Model 7740F3*----- > 3-1/8" Unflanged flush

Model 7740R3* ----- > 3-1/8" Unflanged recessed

* -115 after the model number denotes 115VAC, 60 Hz

* -230 after the model number denotes 208-230VAC, 50/60 Hz

Power Rating @ Sea Level----- > 40 KW

Frequency Range----- > 540 to 1750 KHz

Cooling Method ----- > Forced Air Ductable

Ambient Temperature ----- > -30°C to +40°C

Fan Assembly ----- > Multi-blade 1 hp

AC Power Requirements:

115 VAC ----- > 12 Amps

230 VAC ----- > 5 Amps

Finish----- > Beige Splatter

Serial No. _____ Frequency _____ Resistance _____ dBA@3ft < 80dBA

Model _____ Inspected by _____ Date _____

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CRAFTED WITH PRIDE IN ARKANSAS, U.S.A.

APPENDIX