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## **MODEL 6510 / 6515 COAXIAL LOAD RESISTOR**





**ALTRONIC RESEARCH, INC.  
P.O. BOX 249  
YELLVILLE, ARKANSAS 72687, U.S.A.**

**DECLARATION OF CONFORMITY**

**The Omegaline RF Coaxial Load Model 6510 / 6515 conforms to the following standards:**

**Low-Voltage Directive (2014/35/EU)**

**Electromagnetic Compatibility Directive (2014/30/EU)**

**Machinery Directive (2009/127/EC)**

**Restriction of Hazardous Substances Directive (EU)2015/863**

**Safety Requirements for Radio Transmitting Equipment  
(IEC 215 / EN 60215)**

**As of the date of manufacture on the specifications page.**

**ATTEST:**

**John L. Dyess,  
President**

# 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 6510 / 6515

<u>SECTION</u>	<u>PAGE</u>
Declaration of Conformity .....	2
Warranty .....	3
Warnings and Precautions .....	6,7
Introduction.....	8
Hazard Analysis .....	8,9
Air Flow vs Temperature Analysis.....	9
Electromagnetic Compatibility (EMC) Analysis.....	9
I. Description and Leading Particulars	
1-1 Purpose and Application of Equipment.....	10
1-2 Equipment Supplied .....	10
1-3 Equipment Required But Not Supplied.....	10
1-4 General Description.....	10
1-5 Electrical Description .....	10
1-6 Mechanical Description.....	11
1-7 General Principle of Operation.....	11
1-8 Operating and Adjustment Controls.....	11
1-9 Operator Training .....	11
II. Test Equipment	
2-1 Test Equipment Required .....	12
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 .....	13
3-5 Location .....	13
3-6 Mounting .....	13
3-7 Connections .....	13
3-8 Ducting .....	14
3-9 Adjustments .....	14
3-10 Preparation for Reshipment .....	14
IV. Theory of Operation	
4-1 General .....	15
4-2 Control Circuits .....	15

**SECTION**

**PAGE**

V. Maintenance

- 5-1 Cleaning.....16
- 5-2 Lubrication .....16
- 5-3 RF Circuit .....16

VI. Diagrams

- 6-1 Outline and Dimensions .....17
- 6-2 Schematic.....18
- 6-3 Specifications .....19
- 6-4 Replacement Parts .....20

# **OPERATING TEMPERATURE WARNING**

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

**OPERATION ABOVE RATED AMBIENT  
TEMPERATURE CAN CAUSE MOTOR THERMAL  
PROTECTION TO SHUT OFF FAN, WHICH WILL  
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.**

# PRECAUTIONS

## 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 if large overloads are applied.

## ⚠CAUTION⚠

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

# INTRODUCTION

This handbook was prepared for technical personnel as an aid in understanding and performing installation, service and maintenance procedures for the OMEGALINE Model 6510 / 6515 Air-Cooled Indoor or Outdoor 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.

## HAZARD ANALYSIS

1. The OMEGALINE 6510 / 6515 loads are provided for indoor operation.
2. The hazards presented by these loads include:
  - electrical hazards envisioned by the Low Voltage Directive;
  - mechanical hazards envisioned by the Machinery Directive;
  - high voltage shock/burn hazard presented by the radio frequency energy which the load is designed to dissipate. This hazard is not directly addressed by any standard, but we have chosen to comply with the requirements of IEC 215/EN60215.
3. The electrical hazards arise from the connection of the equipment to 115/230 volts AC. The following measures were incorporated into the design to minimize the exposure of personnel to the mains voltage:
  - AC Mains power enters through a low voltage IEC female receptacle on the back of the load..
  - There is no low voltage to the load unless a 115/230-volt male power connector is plugged into the AC receptacle. By disconnecting the male power connection a worker is assured that low voltage is not present during maintenance.
  - AC Mains power is routed to a minimum of locations;
  - Exposed terminals which carry voltages greater than 28 volts AC are protected from accidental contact by polycarbonate panels which are not removable without tools;
  - Users are not required to remove any guard for normal system operation and adjustments;
  - Local control of the system is provided, lessening the chance that other personnel may accidentally start the fans or energize other components of the circuit.
4. The mechanical hazards arise from the operation of the fan, and motor. The following measures were incorporated into the design to minimize exposure of personnel to these hazards:
  - Power to the fan and motor can be removed by disconnecting the power supply from the back of the load;
  - The panels which protect personnel from contact with the rotating elements are not removable except with tools.
  - There are no operating controls or routine adjustments required within the fan compartment of the load;
  - Air inlet and outlet grills will not allow access for workers' fingers.



5. The high voltage shock/burn hazards arise from the connection of the load to the transmitter. The following measures were incorporated into the design to minimize exposure of personnel to these hazards:
- The panels which protect personnel from contact with the high voltage elements are not removable except with tools.
  - There are no operating controls or routine adjustments required within the high voltage compartment of the load;
  - The interlock connections located on the back of the load are easily removed thereby opening the interlock circuit;
  - Warning labels on the load instruct personnel to first remove AC and RF connections before performing any maintenance.

## **AIR FLOW VS TEMPERATURE ANALYSIS**

The 6510 / 6515 loads were designed to cut off RF transmission when temperature in the load reaches 160°F. This allows for cooling of the load while keeping the outlet air temperature cool enough to prevent burning if personnel come in contact with the air flow.

## **ELECTROMAGNETIC COMPATIBILITY (EMC) ANALYSIS**

This device is a finished apparatus available on the commercial market and is subject to conformity with the Electromagnetic Compatibility Directive (2014/30/EU). The compliance of this apparatus with The Directive has been established in accordance with Annex II thereof.

This apparatus has been determined to be immune to electromagnetic energy which is radiated or conducted by the associated transmitting apparatus. It will accept without malfunction the entire output of the transmitter for which it is designed.

The design of the control circuitry and the components thereof has been optimized for immunity from electromagnetic disturbances and will accept disturbances on the AC Mains without malfunction. This apparatus may introduce disturbances upon the AC Mains during starting and stopping events. These disturbances are not expected to last longer than 25 cycles (1/2 second) and are of a normal nature for motor-driven machinery. No special measures have been taken to reduce or to mitigate these effects.

# SECTION I

## DESCRIPTION AND LEADING PARTICULARS

- 1-1. Purpose and Application of Equipment.** The OMEGALINE Model 6510 / 6515 Coaxial Load is designed to safely dissipate a maximum of 10,000/15,000 watts of electrical energy over a frequency range of DC to 110 MHz.
- 1-2. Equipment Supplied.** The Model 6510 / 6515 Coaxial Load is supplied with standard RF connectors. Their designations are:
- |                            |                       |
|----------------------------|-----------------------|
| 3-1/8" EIA Swivel flange:  | Model # 6510 / 6515E3 |
| 3-1/8" Unflanged flush:    | Model # 6510 / 6515F3 |
| 3-1/8" Unflanged recessed: | Model # 6510 / 6515R3 |
| 1-3/8" EIA Swivel flange:  | Model # 6510 / 6515E1 |
| 1-3/8" Unflanged flush:    | Model # 6510 / 6515F1 |
| 1-3/8" Unflanged recessed: | Model # 6510 / 6515R1 |

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

-110: 110-120VAC, single phase, 50/60 Hz

-230: 208-230VAC, single phase, 50/60 Hz

- 1-3. Equipment Required But Not Supplied.** The Model 6510 / 6515 Coaxial Load is complete as supplied, but the user must furnish AC Mains input, RF input, interlock control cable and ground cable appropriate to each installation.
- 1-4. General Description.** The Model 6510 / 6515 Coaxial Load is enclosed in a single aluminum case which is painted with a durable acrylic finish. Power connection for interior loads is made through an IEC male connector on the front panel of the enclosure. This panel also contains a 2-screw barrier terminal strip for connection of the interlock circuit and a 1/4-20 UNC-2B stud for attachment of the ground. The RF connector is located in the center of the top panel.
- 1-5. Electrical Description.** The Model 6510 / 6515 contains a 50 ohm non-reactive resistor assembly capable of dissipating 10,000/15,000 watts of applied electrical energy at sea level at frequencies between DC and 110 MHz with a maximum VSWR of 1.15 to 1. No provisions are made for tuning the resistor assembly and all operating controls relate to the operation of the blower assembly. The blower control circuit consists of one switch wired to control the blower motor. Power is supplied motor whenever the equipment is attached to the correct power supply and the main power switch is "ON".

The transmitter interlock circuit consist of a open at 160°F  $\pm 7^\circ$  thermal switch wired to control the interlock circuit.

**1-6. Mechanical Description.** The Model 6510 / 6515 RF Coaxial Load is a 50 ohm non-reactive resistor assembly which is cooled by forced ambient air. The blower assembly is a direct-drive centrifugal blower. The blower draws air from the inlet into a closed plenum surrounding the resistor assembly. Air then enters the resistor assembly and flows through it to the transition duct and then out of the enclosure via the discharge. This places the RF input connector at the coolest point in the air stream and affords exceptionally quiet operation.

**1-7. General Principle of Operation.** After ascertaining that the Model 6510 / 6515 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 6510 / 6515. The fan should be allowed to continue to run for some time after RF transmission has stopped. This will prevent damage from an increased temperature rise to the load.

**1-8. Operating and Adjustment Controls.** The only operating control is the main power switch. No field adjustments are necessary or possible.

**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

- 2-1. Test Equipment Required.** No test equipment is required for routine maintenance. In some circumstances it may be desirable to determine the temperature differential (outlet air minus inlet air) and ambient air temperature which the equipment is experiencing. We recommend the John B. Fluke Mfg. Co. Model 52 or equivalent instrument for this function.

## 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.
  - AC input receptacle visually OK.
  - Interlock terminal strip visually OK.
  - RF connector visually OK.

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  $\pm 1$  ohm. If not, consult factory.

- 3-3. Pre-installation Tests.** Prior to installation, connect the load to AC Mains power for the following tests:
- a. Read data plate on lower rear panel of resistor enclosure and connect to a suitable source of AC power.
  - b. Turn main switch on and check for quiet blower operation.
  - c. Connect an ohmmeter or a battery operated test lamp across the normally closed terminal pair on the interlock terminal board.
  - d. Turn the main power switch off, observing the indicator (ohmmeter or test lamp). It should remain as it was.
  - e. Now remove AC power from the unit. The indicator should change state (terminals open).

**3-4. Installation.** The Model 6510 / 6515 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. Interior Installations** - The location selected for the Model 6510 / 6515 should be dry, free of excessive dust and have an ambient temperature below 104°F (40°C). The room should be well ventilated to prevent excessive temperature rise and consequent derating of the unit. The maximum dissipation of the unit is 10,000/15,000 watts. This is equal to 34,152/51,228 Btu/hr., which may be ducted out of the building envelope.

The unit should be oriented to provide a short, direct duct run in order to avoid high static pressure and loss of cooling efficiency. The assistance of a competent heating and air conditioning installer will help avoid over-or-under-specifying the duct system.

**3-6. Mounting.** The Model 6710/15 is designed to be a free-standing device. It rests on four adjustable-length leveling feet.

**CAUTION!**

THE UNIT SHOULD BE ATTACHED TO THE PROPER AC POWER SUPPLY WITH INTERLOCK CONNECTED WHENEVER THE RF CONNECTOR IS ATTACHED TO THE SOURCE. INADVERTENT APPLICATION OF RF POWER TO THE UNIT WITHOUT AC POWER MAY DAMAGE OR DESTROY THE RESISTOR ASSEMBLY.

**3-7. Connections.** There are three connectors on the Model 6510 / 6515: the RF connector (EIA swivel flange or unflanged), the AC power supply, and the transmitter interlock.

- a. The AC power supply connector is a 3-pin IEC male power connector located on the rear panel of the enclosure on the indoor unit and through a user-supplied safety switch on the outdoor unit.
- b. The transmitter interlock is attached to the normally closed terminals of the 2-position terminal strip. The terminals are closed whenever AC power is supplied to the unit and no overheat condition exists.
- c. The RF connector is on the top panel of the indoor unit and the end panel of the outdoor unit. Connect to the appropriate RF line from the transmitter.

**3-8. Ducting.** In many installations it will be necessary to duct the discharge air from the Model 6510 / 6515 to the exterior of the building. In some installations it will also be necessary to supply inlet air from outside of the climate controlled portion of the building.

The discharge air flow is approximately 325 SCFM at a maximum temperature of 250°F. Due to the high temperatures involved, non-metallic duct materials should not be used. Attaching a discharge duct to the unit is easily accomplished:

1. Remove the 10 torx head screws attaching the discharge grill.
2. Then, replace the discharge grill with a discharge air duct adapter.

Suitable ducting can then be attached to the adapter. This duct should be as short as possible to minimize back pressure. Design of the ducting and wall or ceiling penetrations should be referred to a competent heating and air conditioning firm.

"Make-up air" is a ventilation term used to indicate the supply of outdoor replacement air to a building in a controlled manner. It may be provided for the Model 6510 / 6515 by ducting into the room or by extending a supply duct to either intake grill of the blower enclosure and installing a blanking plate on the other grill.

Make-up air will enter the building to equal the volume actually exhausted, whether or not provision is made for this replacement. However, the actual exhausted volume may not equal the design volume unless an adequate supply is provided.

**3-9. Adjustments.** No field adjustments are necessary or possible.

**3-10. Preparation for Reshipment.** No special measures are required to prepare the Model 6510 / 6515 for reshipment. Care must be taken to protect the RF connector and to immobilize the swivel flange. Packaging should provide protection against abrasion and impact.

# SECTION IV

## THEORY OF OPERATION

- 4-1. General.** The Model 6510 / 6515 contains a 50 ohm non-reactive resistor assembly (8 @ 400 ohms or 10 @ 500 ohms) which is cooled by forced air supplied by a centrifugal blower assembly. Control of the blower and of the transmitter interlock circuit is accomplished with a single rocker switch and thermal switch.
- 4-2. Control Circuits.** There are 2 control circuits in the Model 6510 / 6515. One circuit controls the blower, and the other controls the transmitter interlock circuit.

# 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 6510-6515-6525GS 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. 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 fan pillow blocks, if used, are lubricated at the factory with quality lithium-based high temperature grease. Each pillow-block assembly has a bearing which must be lubricated periodically with ordinary lithium-based grease designed for ball-bearing lubrication. The motors are factory lubricated and are not designed to be lubricated in the field except under severe conditions.

**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, quick-step or support portions of the resistor assembly or the replacement of resistors.

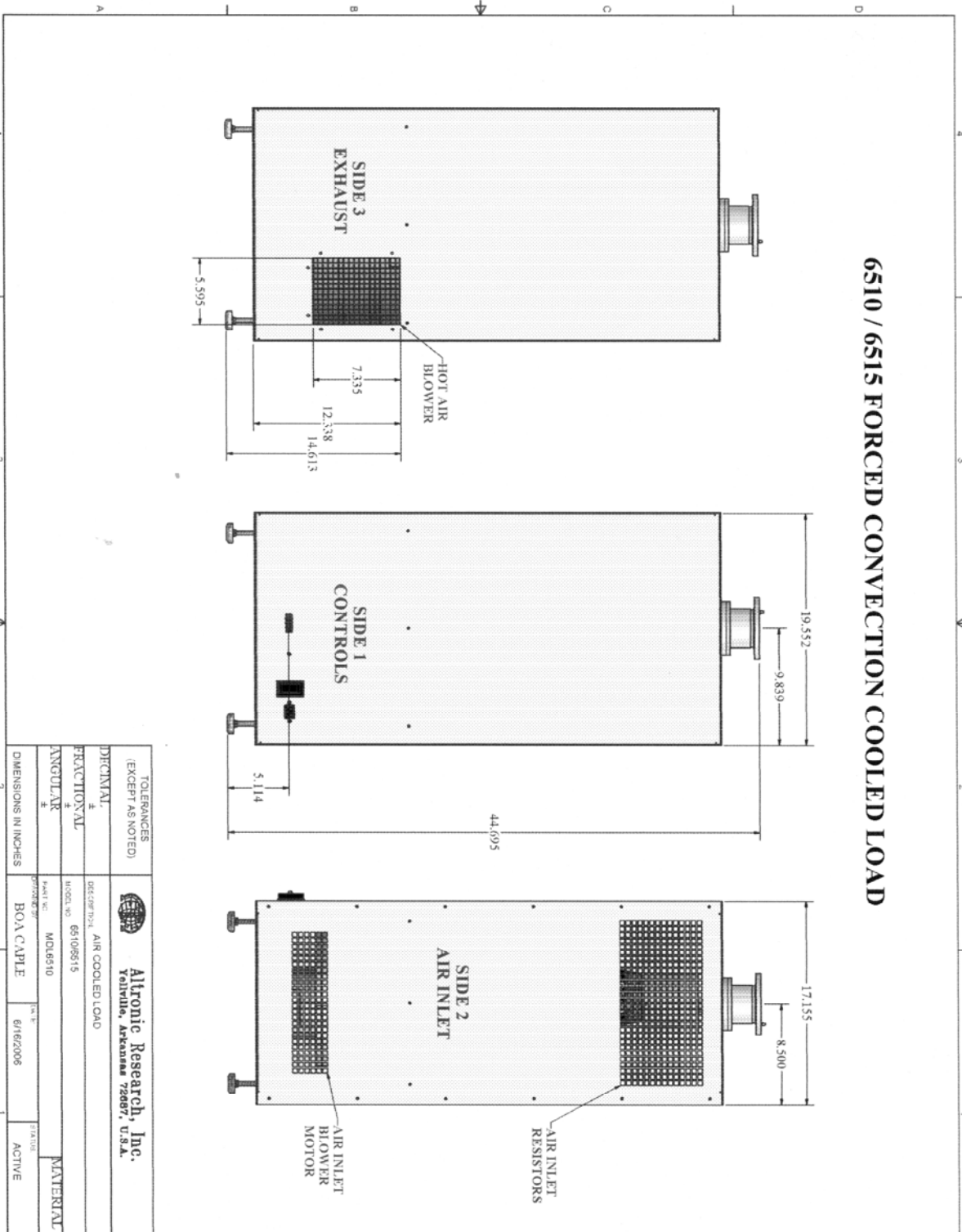
### **CAUTION!**

**The resistors are hard, brittle ceramic material. It is very important to avoid impact and excessive force when installing or removing them.**



# SECTION VI

## 6-1 OUTLINE AND DIMENSIONS





## 6-3 SPECIFICATIONS

### Model 6510 / 6515

Impedance ----- > 50 ohms nominal

VSWR @ DC to 110MHz----- > 1.10:1 max.

#### Connectors:

Model 6510 / 6515E3----- > 3-1/8" EIA swivel flange

Model 6510 / 6515F3----- > 3-1/8" Unflanged flush

Model 6510 / 6515R3----- > 3-1/8" Unflanged recessed

Model 6510 / 6515E1----- > 1-3/8" EIA swivel flange

Model 6510 / 6515F1----- > 1-3/8" Unflanged flush

Model 6510 / 6515R1----- > 1-3/8" Unflanged recessed

Power Rating @ Sea Level----- > 10/15 KW

Frequency Range----- > DC to 110 MHz

Cooling Method ----- > Forced Air Ductable

Ambient Temperature ----- > -30°C to 43°C

Fan Assembly ----- > 1/6 hp direct-drive centrifugal

#### AC Power Requirements:

115 VAC, 60 Hz, 3 Amp., 1 Phase

230 VAC, 50/60 Hz, 3 Amp., 1 Phase

Finish ----- > Beige Splatter

Serial No. \_\_\_\_\_ Frequency \_\_\_\_\_ Resistance \_\_\_\_\_ dBA@3ft < 80dBA

Model \_\_\_\_\_ Inspected by \_\_\_\_\_ Date \_\_\_\_\_

☆☆

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

**6-4 REPLACEMENT PARTS LIST**  
**MODEL 6510 / 6515**

**(CONSULT FACTORY)**  
**1-870-449-4093**

**When ordering replacement parts please have the model and serial number of the load available.**