

ALTRONIC RESEARCH, INC.

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U.S.A.

MODEL 6410 / 6415

COAXIAL LOAD RESISTOR



MODEL 6410/6415
RF COAXIAL AIR COOLED LOAD

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.**

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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.**

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 or physical injury*.

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. 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 possibly 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 6410/6415 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 6410/6415 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 220 MHz.

1-2. Equipment Supplied. The Model 6410/6415 Coaxial Load is supplied with standard RF connectors. Their designations are:

3-1/8" EIA Swivel flange: Model # 6410/6415E3

3-1/8" Unflanged flush: Model # 6410/6415F3

3-1/8" Unflanged recessed: Model # 6410/6415R3

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 6410/6415 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 6410/6415 Coaxial Load is enclosed in a single aluminum case which is coated with a chromic acid conversion coating. Power connection is made through an IEC connector on the front panel of the fan enclosure. This panel also contains a 2-screw barrier terminal strip for connection of the interlock circuit. The RF connector is located on the front of the load.

1-5. Electrical Description. The Model 6410/6415 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 240 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 fan assembly. The fan control circuit consists of two switches wired in parallel to control the fan motor contactor. Power is supplied to this contactor and to the "Fan On" lamp whenever the equipment is attached to the correct power supply and the main power switch is "ON" or when the fan thermostats sense a temperature equal to or greater than 120° ($\pm 7^\circ$) F. The transmitter interlock circuit consists of one thermal switch wired to the interlock terminal board on the front panel of the fan enclosure. This switch closes whenever it senses a temperature equal to or greater than 140°F ($\pm 7^\circ$).

1-6. Mechanical Description. The Model 6410/6415 RF Coaxial Load is a 50-ohm non-reactive resistor assembly, which is cooled by forced ambient air. The Model 6410 fan assembly consists of one 175-watt nine-bladed fan and the Model 6415 fan assembly consists of two 175-watt nine-bladed fans. Air flows from the base of the load through the resistor assembly and discharges out the top of the load.

1-7. General Principle of Operation. After ascertaining that the Model 6410/6415 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 6410/6415. 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. The Model 6410/6415 can be operated in a "Standby" or "Reject" mode with the blower off. Current draw in this mode is 60 mill amperes. To operate in this mode, connect the unit as before and leave the main power switch on the front panel on "Standby".

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 AND SPECIAL TOOLS

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.

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, 1/8" bit

1 Power screwdriver with 1/8" hex key & torx T-15 bit

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 ± 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 fan enclosure and connect to a suitable source of AC power.
 - b. Turn power switch on and check for quiet fan operation.
- 3-4. Installation.** The Model 6410/6415 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.** The location selected for the Model 6410/6415 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.

- 3-6. Mounting.** The Model 6410/6415 is designed to be floor, wall or bench mounted and should be securely attached to the mounting surface. The enclosure rests on two fixed aluminum feet. These are drilled for 1/4-20 machine screws.

CAUTION!

THE UNIT MUST 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 6410/6415: the RF connector, the AC power supply and the transmitter interlock.
1. The RF connector is on the front panel of the unit. Connect to the appropriate RF line from the transmitter.
 2. The AC power supply connector is an IEC 320 power connector located on the front panel of the enclosure.
 3. The transmitter interlock is attached to the 2-position terminal strip located on the front panel of the fan enclosure.
- 3-8. Adjustments.** No field adjustments are necessary or possible.
- 3-9. Preparation for Reshipment.** No special measures are required to prepare the Model 6410/6415 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. Special containers are available from the factory. Please inquire.

SECTION IV

THEORY OF OPERATION

- 4-1. General.** The Model 6410/6415 contains a 50-ohm non-reactive resistor assembly (8 @ 400 ohms or 10 @ 500 ohms) which is cooled by forced air supplied by a 10 inch, nine-bladed fan assembly. Control of the fan and of the transmitter interlock circuit is accomplished with a single rocker switch and two thermal switches.
- 4-2. Control Circuits.** There are 2 control circuits in the Model 6410/6415. One circuit controls the fan, and the other controls the transmitter interlock circuit. The fan control circuit derives its power from the AC line. One thermal switch and one rocker switch are connected to AC Control Line. The thermal switch is SPNO and connects in parallel with the DPST rocker switch. The fan indicator lamp is connected in parallel with the fan motor. The transmitter interlock circuit consists of one thermal switch connected to TB1-1 and TB1-2. This terminal pair is normally closed and opens at 140°F ±7°F.

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.**

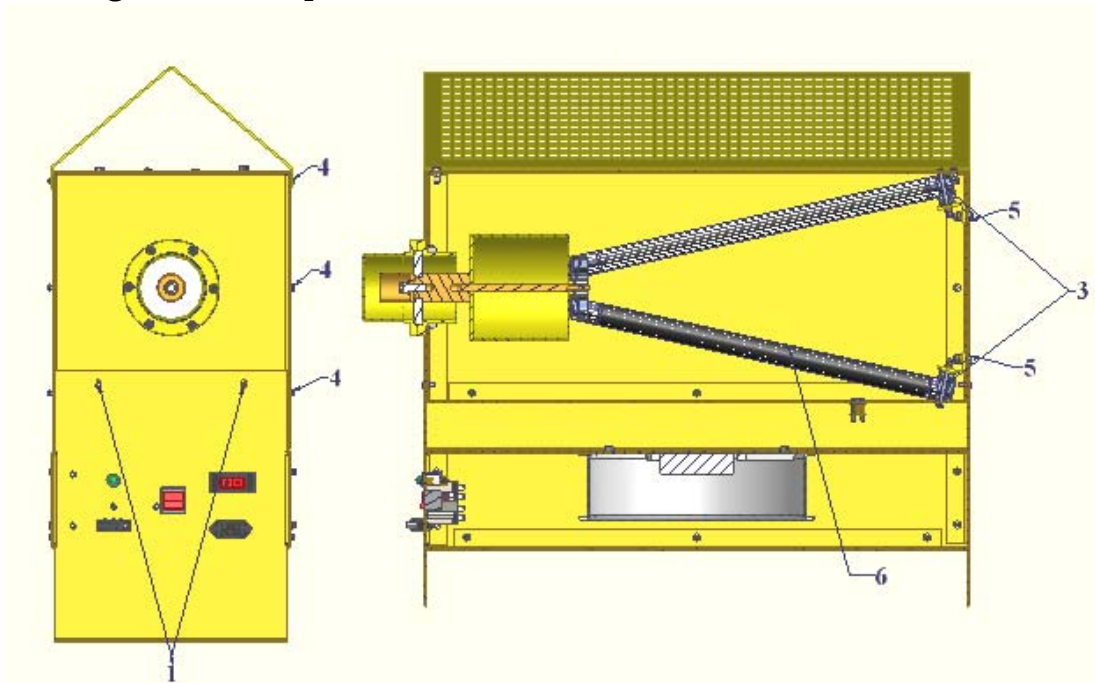
***FAILURE TO FOLLOW THESE DIRECTIONS
MAY CAUSE FATAL ELECTRICAL SHOCK!***

5-1. Cleaning. The enclosure of the Model 6410/6415 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. RF Circuit. The RF Load Resistor 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 the resistors.

To remove resistors it is first necessary to separate the fan housing from the load.

1. Remove the four 8-32 screws from the RF and back panels that hold the fan assembly to the load.
2. Lift the load from the fan assembly while allowing the wiring to slide out of the fan housing. Remember when reassembling to slide the wires back into the fan housing. Loose wiring will get into the fan and cause damage to the load.
3. Next remove the four 10-32 x 2" Grounding Screws from the top and bottom of the load.
4. Remove all 8 – 32 Torx from the shroud and remove the shroud from the resistor assembly.
5. Remove the four ¼ - 20 bolts securing the resistor brackets to the resistor assembly housing. When replacing these bolts leave them loose until the grounding screws are tightened. Failure to tighten the grounding screws before the resistor bracket screws will cause the VSWR to be out of the acceptable range.
6. Replace resistors as necessary.
7. Assembly is the reverse procedure. The resistor bracket with the thermal switch goes to the top of the load.

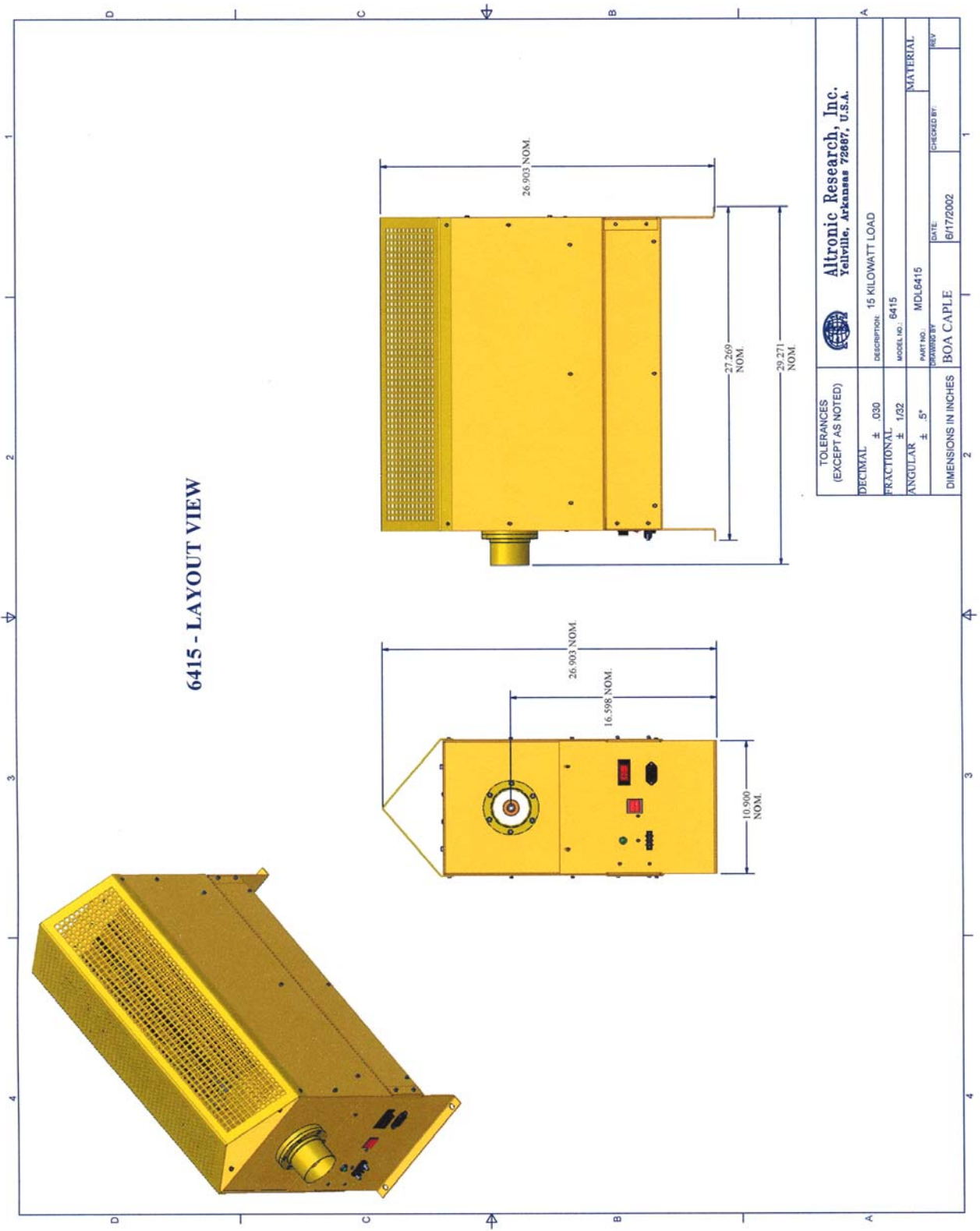


CAUTION!

Take care when tightening the ¼-20 x 2" screws securing the lower resistor bracket to the flex panel. Overtightening can fracture the resistors. The resistors are hard, brittle ceramic material. Avoid impact and excessive force when installing or removing them.

SECTION VI

6-1 OUTLINE AND DIMENSIONS



6-3 REPLACEMENT PARTS LIST

(CONSULT FACTORY)

SPECIFICATIONS

MODEL 6410/6415

Impedance-----> 50 ohms nominal

VSWR @ DC to 240MHz-----> 1.15:1 max.

Connectors:

Model 6410/6415E3----- > 3-1/8" fan EIA swivel flange

Model 6410/6415F3----- > 3-1/8" fan unflanged flush

Model 6410/6415R3----- > 3-1/8" fan unflanged recessed

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

Frequency Range -----> DC to 240 MHz

Cooling Method -----> Forced Air

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

Fan Assembly -----> 9-blade, 10" diameter

AC Power Requirements:

115 VAC, 50/60Hz, 3/5 Amp, 1 Phase

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

Finish----- > Chromate Conversion Coating

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

Model_____ **Inspected by**_____ **Date**_____



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