



**ALTRONIC RESEARCH, INC.**

**P.O. BOX 249, YELLVILLE, ARKANSAS, U.S.A. 72687-0249**

**PHONE 870-449-4093 FAX 870-449-6000**

**1-800-482-LOAD (5623) in US**

**altronic.com**

**MODEL 6705/6775**

**w/Opti-Cal<sup>®</sup>**

**COAXIAL LOAD RESISTOR**



6750/6775



6710/6735



6705



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

**DECLARATION OF CONFORMITY**

The Model 6700 Series RF Coaxial Loads conform to the following standards:

Low-Voltage Directive (2014/35/EU)

Electromagnetic Compatibility Directive (2014/30/EU)

Restriction of Hazardous Substances Directive (EU)2015\863

Machinery Directive (2009/127/EC)

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

As of the date of manufacture on the specifications page.

ATTEST:

A handwritten signature in black ink, appearing to read "John L. Dyess".

John L. Dyess,  
President

# LIMITED WARRANTY

## MODELS 6705 - 6775

### 5 KW to 75 KW AIR COOLED COAXIAL RESISTORS

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

## MODELS 6705 - 6775

<u>SECTION</u>	<u>PAGE</u>
Declaration of Conformity .....	3
Warranty .....	4
Warnings and Precautions.....	7,8
Introduction.....	9
Hazard Analysis .....	9,10
Air Flow vs Temperature Analysis .....	10
Electromagnetic Compatibility (EMC) Analysis.....	10
I. Description and Leading Particulars	
1-1 Purpose and Application of Equipment.....	11
1-2 Equipment Supplied .....	11
1-3 Equipment Required But Not Supplied .....	11
1-4 General Description .....	11
1-5 Electrical Description .....	12
1-6 Mechanical Description .....	12
1-7 General Principle of Operation.....	12
1-8 Operating and Adjustment Controls.....	13
1-9 Operator Training .....	13
II. Test Equipment and Special Tools	
2-1 Test Equipment Required .....	14
2-2 Special Tools Required.....	14
III. Preparation for Use and Reshipment	
3-1 Unpacking Equipment .....	15
3-2 Pre-Installation Inspection.....	15
3-3 Pre-installation Test.....	15
3-4 Installation .....	15
3-5 Location .....	15,16
3-6 Mounting .....	16
3-7 Connections .....	16
3-8 Ducting .....	16
3-9 Adjustments .....	17
3-10 Preparation for Reshipment.....	17
IV. Theory of Operation	
4-1 General .....	18
4-2 Control Circuits .....	18,19

**SECTION**

**PAGE**

V. Maintenance  
5-1 Cleaning.....20  
5-2 Lubrication.....20  
5-3 RF Circuit (including resistor replacement) .....20,21

VI. Diagrams  
6-1 Outline and Dimensions ..... 22-26  
6-2 Schematic Diagrams ..... 27-31  
6-3 How to Receive Replacement Parts .....32

VII. Specifications .....33

Appendix:  
Opti-Cal® Product Brief

# 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



## 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 Model 6705/6775 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 Models 6705-6775 Air-Cooled Coaxial Loads. 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

### A Hazard Analysis of the Models 6705 - 6775 Air-Cooled Coaxial Loads

1. The 6705/6775 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 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 an IEC 603203 pin connector with a cord set connector lock or hard wired connections.
  - The AC Mains power enters the control box and is immediately connected to a guarded terminal block;
  - AC Mains power is routed to a minimum of locations;
  - All control voltages are 28 volts AC or less;
  - 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:
  - Warnings placed in the manual and on the load state the load should be disconnected from the power source before performing any maintenance. This will prevent injuries from moving parts;
  - 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;
  - The fan and fan motor are in an enclosed shroud, preventing access to moving parts.

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 energized components are mounted in the load as far from personnel as is possible;
  - There are warning labels on the equipment stating that the RF connection should be removed before performing any maintenance.

## **AIR FLOW VS TEMPERATURE ANALYSIS**

The 6705/6775 was designed to cut off RF transmission when an overheat condition exists. This is accomplished by placing normally closed thermal switches in the resistor compartment. This limits exhaust air to 250°F. Installation instructions for indoor loads recommend ducting exhaust air from the building. Non-metallic ducting materials vary greatly in their heat resistance, especially with regard to their long-term stability. They also tend to have a higher resistance to airflow due to their rough surface. Therefore, metallic duct is preferred. However, the external surface of a metallic duct may become a hazard to personnel due to the discharge temperature from the load. For this reason, the exterior of the duct should either be guarded to prevent inadvertent contact or should be insulated with high temperature (i.e. 122C/250F) material. This will eliminate skin burns in the event contact is made with the duct.

## **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 Model 6705/6775 Coaxial Load is designed to safely dissipate a maximum of 5,000/75,000 watts of electrical energy over a frequency range of DC to 110 MHz and can be optimized for frequencies above 110 MHz.

**1-2. Equipment Supplied.** The Model 6705/6775 Coaxial Load is supplied with standard RF connectors. Their designations are:

FLANGE SELECTION												
	E1	F1	R1	E3	F3	R3	E4	F4	R4	E6	F6	R6
6705	√	√	√									
6710	√	√	√	√	√	√						
6715	√	√	√	√	√	√						
6725				√	√	√						
6735				√	√	√	√	√	√			
6750				√	√	√	√	√	√			
6775				√	√	√	√	√	√	√		

EIA Swivel flange: **E**

Unflanged flush: **F**

Unflanged recessed: **R**

Other connectors may be supplied upon special order.

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

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

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

-380: 380-440VAC, three phase, 50/60 Hz

**1-3. Equipment Required But Not Supplied.** The Model 6705/6775 Coaxial Load is complete as supplied, but the user must furnish AC Mains input cable, RF input coaxial line, interlock control cable and ground cable appropriate to each installation.

**1-4. General Description.** The Model 6705/6775 Coaxial Load is enclosed in a single aluminum case which is painted with a durable acrylic finish. Power connections are made by conventional cord connections or by passing the AC cord through the access hole labeled AC main voltage on the fan compartment and fastening to the terminals for the AC Mains and Ground. This panel also contains an access hole for cables that attach to the 4 position screw terminal strip connections of the interlock circuit. The RF connector is located in the center of the top panel of the main unit.

**1-5. Electrical Description.** The Model 6705/6775 contains a 50-ohm non-reactive resistor assembly capable of dissipating 5,000/75,000 watts of applied electrical energy at sea level at frequencies between DC and 110 MHz and can be optimized for frequencies between 110 MHz and 240MHz 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 blower assembly. The blower control circuit consists of two or three switches wired in parallel to control the blower 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 120° ( $\pm 7^\circ$ ) F.

The transmitter interlock circuit consists of two switches wired in series to control the interlock relay. Models ordered with an airflow interlock switch have a third switch in series in this circuit. This switch closes only when it senses higher pressure internally, therefore confirming correct blower operation. When power is applied to the AC Mains of the load and the blower is not operating, a lamp labeled "LOWFLOW" is illuminated on the front panel. Power is supplied to control the interlock relay whenever the equipment is attached to the correct power supply and neither of the overtemperature thermal switches senses a temperature equal to or greater than 250° ( $\pm 7^\circ$ ) F or the differential pressure switch senses no differential between ambient and internal pressures on units so equipped. 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 6705/6775 RF Coaxial Load is a 50-ohm non-reactive resistor assembly which is cooled by forced ambient air. The blower assembly is a centrifugal blower. The blower moves air from floor level into a closed plenum surrounding the resistor assembly. Air then enters the resistor assembly and flows downward through it to the transition duct and then out of the enclosure via the discharge grill. 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 6705/6775 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 6705/6775. 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 6705/6775 can be operated in a "Standby" or "Reject" mode with the blower off. Current draw in this mode is 630 milliamperes. To operate in this mode, connect the unit as before and leave the main power switch on the front panel "Off".

**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-20 driver

1 Tee handle hex key, 6/16" bit

1 Power screwdriver with 3/16" hex key & torx T-20 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  $\pm 1$  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 disconnect the AC power from the unit. The indicator should change state (terminals open).

**3-4. Installation.** The Model 6705/6775 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 6705/6775 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 and Btu/hr. of the units is shown below, and may be ducted out of the building envelope.

<b>Model</b>	<b>Maximum Watts Dissipation</b>	<b>BTU/Hr.</b>
6705	5,000	17,076
6710	10,000	34,152
6715	15,000	51,228
6725	25,000	85,379
6735	35,000	119,531
6750	50,000	170,759
6775	75,000	256,138

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 6705/6775 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 four possible connections on the Model 6705/6775: the RF connector, the AC power supply, the remote operation terminals and the transmitter interlock.

- 3-8. Ducting.** In many installations it will be necessary to duct the discharge air from the Model 6705/6775 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 airflow is at a maximum temperature of 250°F. Due to the high temperatures involved, non-metallic duct materials should not be used for the discharge duct, but may be suitable for inlet duct. Attaching a discharge duct to the unit is easily accomplished:

1. Remove the 10 torx head screws at the discharge on the exhaust panel.
2. Then, attach a discharge air duct adapter to the exhaust panel.

Suitable ducting can then be attached to the adapter. This duct should be as short as possible to minimize backpressure. 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 6705/6775 by ducting into the room or by extending a supply duct to both intake grills of the blower enclosure.

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.** When shipping Models 6705 through 6735, place the right side of the load down as you face the control panel. This will keep the motor from moving in the fan housing. For 6750/6775 Models, ship the blower unit upright resting on the feet. No other special measures are required to prepare the units 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 6705/6775 contains a 50-ohm non-reactive resistor assembly 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 five thermal switches.

Model	Resistor Assembly $\Omega$
6705	4 @ 200
6710	8 @ 400
6715	10 @ 500
6725	20 @ 250
6735	24 @ 300
6750	36 @ 200
6775	54 @ 300

**4-2. Control Circuits.** There are 2 control circuits in the Model 6705/6775. One circuit controls the blower, and the other controls the transmitter interlock circuit. On models 6705 through 6735 a control transformer (T1) is used to control the fan and interlock circuits. On model 6750/6775 a power supply (PS) is used to control the fan and interlock circuits.

On models with a control transformer, three thermal switches and one rocker switch are connected to AC Control Line 1. The thermal switches are SPNO and connect to blower contactor "RY1" terminal 0, as does the SPST rocker switch. Blower contactor "RY1" terminal 1, connects to AC Control Line 2. The blower indicator lamp is connected in parallel with the contactor coil.

On models with a control transformer, the transmitter interlock circuit has two SPNC thermal switches connected in series from Control Line 1 to interlock relay "RY2" terminal 13. The overheat lamp is connected from Line 1 to interlock relay "RY2" Terminal 13. Interlock relay "RY2" terminal 14 is connected to Control Line 2.

On models with a power supply, the blower circuit has three thermal switches and one rocker switch connected to PS+. The thermal switches are SPNO and connect to contactor terminal A2, as does the SPST rocker switch. Contactor terminal A1 connects to PS-. The blower indicator lamp (DS1) is connected in parallel with the contactor coil.

On models with a power supply, two SPNC thermal switches are connected in series from PS+ to interlock relay terminal 14. The overheat lamp is connected from interlock PS- to interlock relay terminal 13. Interlock relay terminal 14 is connected to PS+.

Interlock relay (RY2) terminals 5 & 6 are paralleled and are connected to interlock terminal strip (TB1)-1. Interlock relay (RY2) terminals 9 & 10 are paralleled and are connected to interlock terminal strip (TB1) terminal 2. This terminal pair is NC when there is AC main power to the load.

When sold with two sets of NC terminals at TB1 interlock relay (RY2) terminals 7 & 8 are paralleled and are connected to interlock terminal strip (TB1) terminal 4. Interlock relay terminals 11 & 12 are paralleled and are connected to interlock terminal strip (TB1) terminal 3. This terminal pair is normally closed when AC power is supplied to the load.

When sold with one set of NC terminals and one set of NO terminals at TB1 interlock relay (RY2) terminals 3 & 4 are paralleled and are connected to interlock terminal strip (TB1) terminal 4. Interlock relay terminals 11 & 12 are paralleled and are connected to interlock terminal strip (TB1) terminal 3. This terminal pair is NO when AC power is supplied to the load.

# SECTION V

## MAINTENANCE



***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 6705/6775 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.

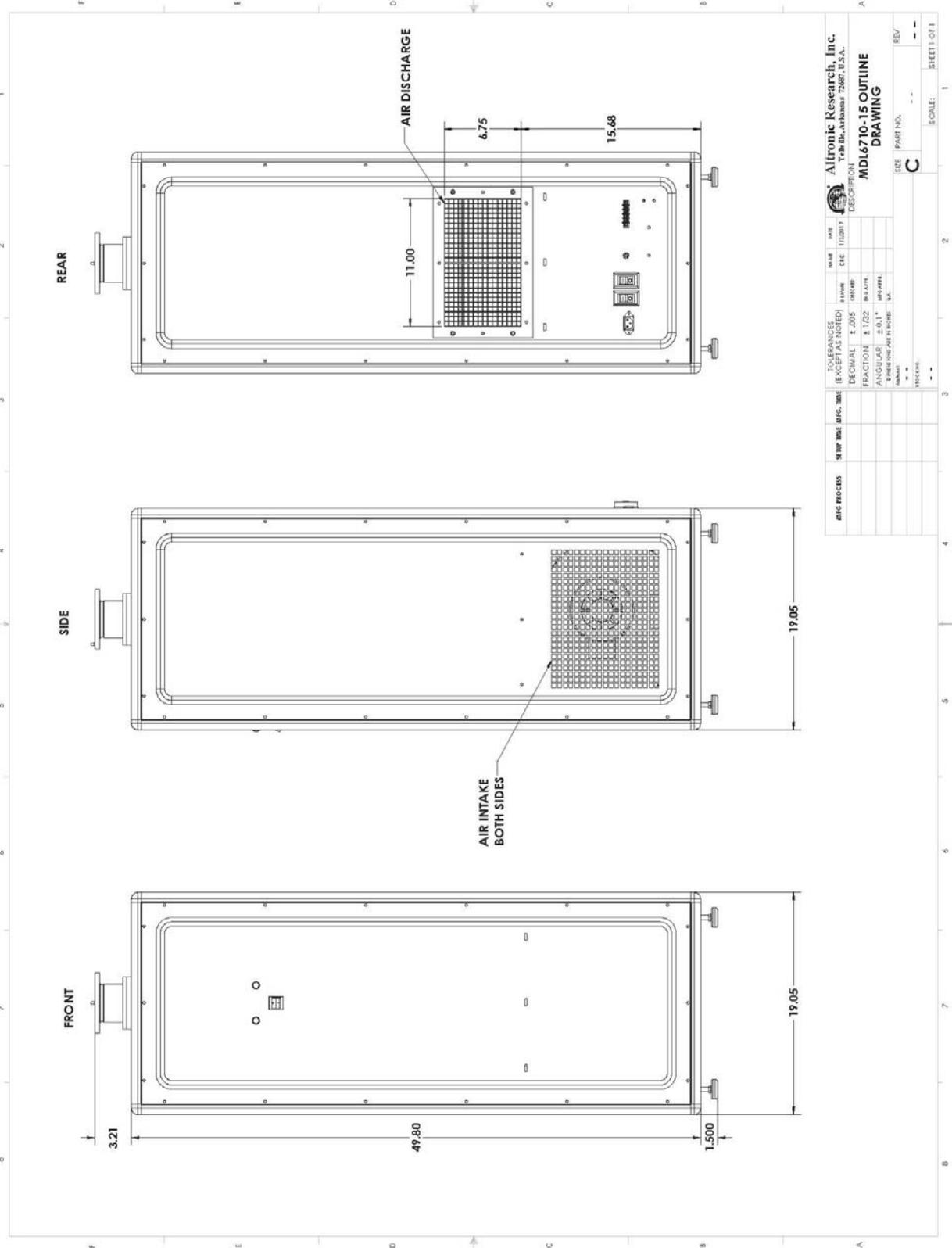
To replace resistors it is necessary to remove the panels as follows:

- Remove the 8-32 X 1/2" torx head screws holding the rear panel and set this panel aside.
- Remove screws from the vertical sides of the exposed inner panel.
- Remove the two 1/4-20 X 2 hex head cap screws at the bottom.
- Remove three 8-32 1/2 torx head screws from top of unit. You can now remove panel by bowing it out. With this panel removed, you will have access to the resistor bank.
- It is usually not necessary to remove any other panels, but you may find it easier to fit some resistors if you remove the opposite inner panel.
- Reverse procedure to reinstall.

**CAUTION!**

**When installing the 1/4-20 X 2 screws, take care not to overtighten them and fracture the resistors. The resistors are hard, brittle ceramic material. It is very important to avoid impact and excessive force when installing or removing them.**

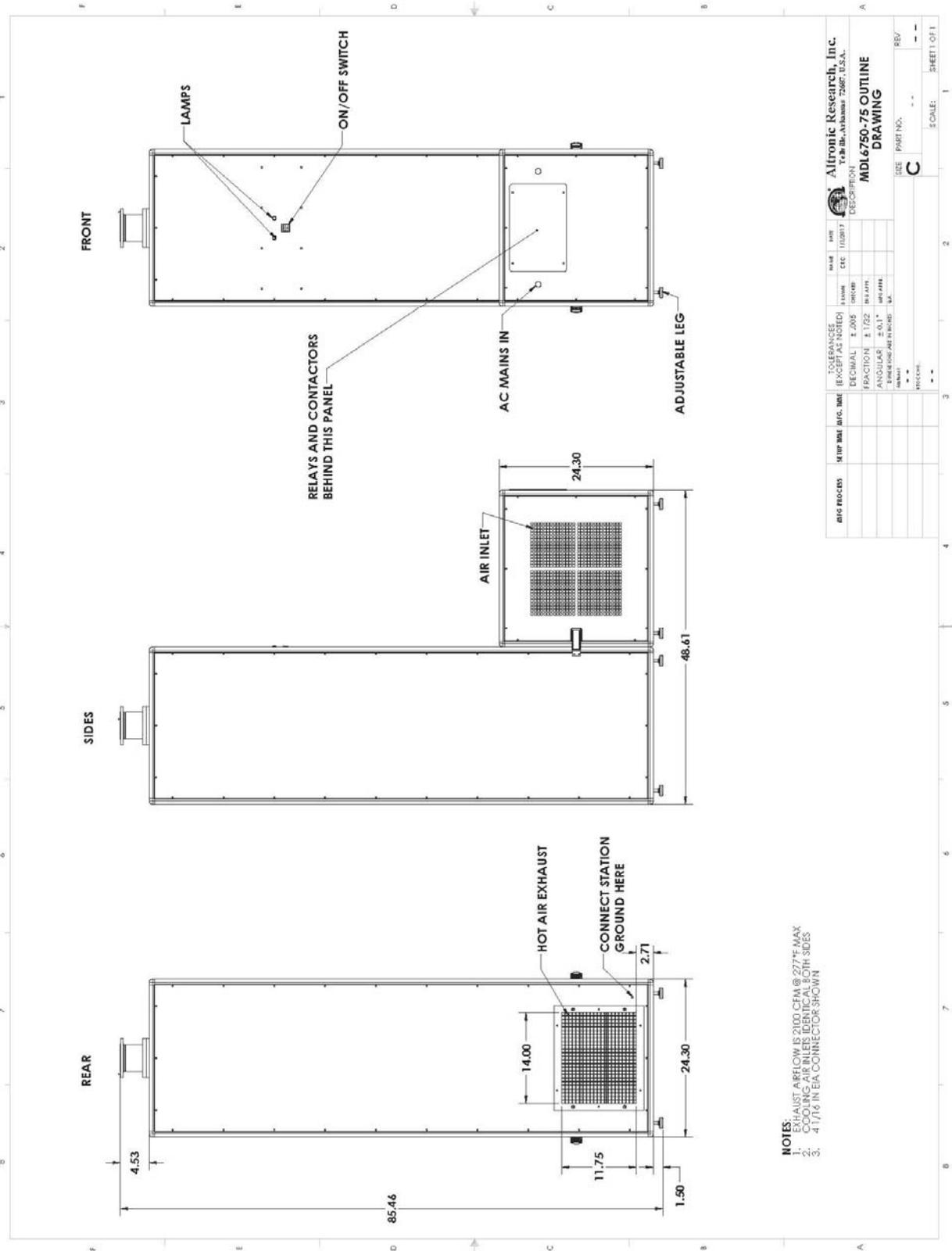




<b>Altronic Research, Inc.</b> Tybelle, Arkansas 72667, U.S.A.		DATE: DEC 11/2017 DRAWN:
DESCRIPTION: <b>MD16710-15 OUTLINE DRAWING</b>		TOLERANCES: (EXCEPT AS NOTED) DECIMAL ± .005 FRACTION ± 1/32 ANGULAR ± 0.1° UNLESS OTHERWISE SPECIFIED
REV:	PART NO.:	SCALE:
SHEET:	OF:	1







MFG PROCESS		MFG. TIME		MFG. PRICE		MFG. DATE		MFG. NO.		MFG. REV.	

TOLERANCES (EXCEPT AS NOTED)		MFG. DATE		MFG. NO.		MFG. REV.	
DECIMAL	±.005						
FRACTION	± 1/32						
ANGULAR	± 0.1°						

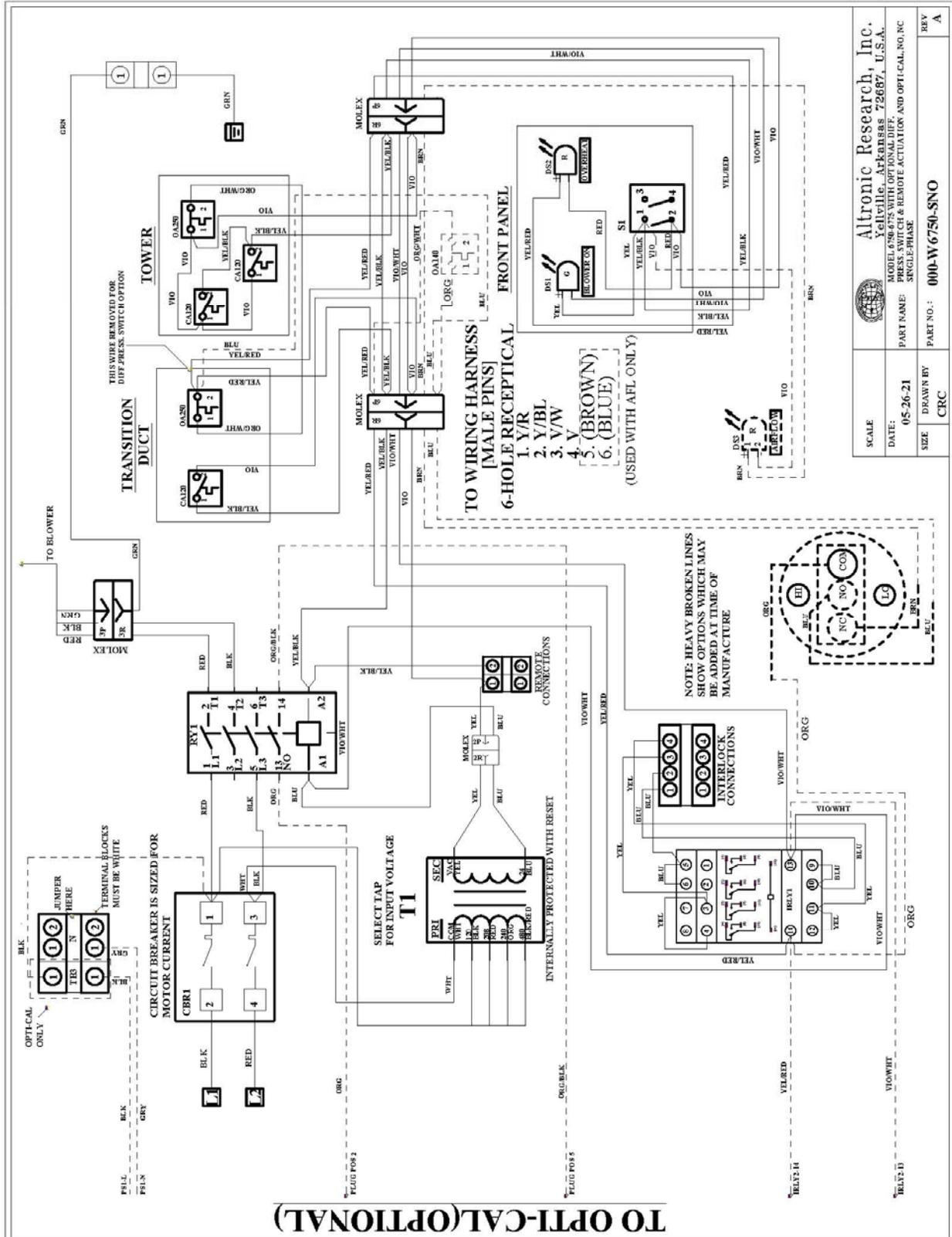
ALTRONIC RESEARCH, INC.		MFG. DATE		MFG. NO.		MFG. REV.	
1000 W. 10th St., Ames, IA 50010							

DESCRIPTION		MFG. DATE		MFG. NO.		MFG. REV.	
MDL6750-75 OUTLINE DRAWING							

- NOTES:**
1. EXHAUST AIR FLOW IS 2100 CFM @ 277°F MAX.
  2. COOLING AIR INLETS IDENTICAL BOTH SIDES.
  3. 4 1/16" IN EA. CONNECTOR SHOWN.











**6-3 HOW TO RECEIVE REPLACEMENT PARTS**  
**MODEL 6705/6775**

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

**When consulting the factory for replacement parts, please have the model and the serial number of loads requiring service.**

# SPECIFICATIONS

Model 6705/6775

Impedance ----- 50 ohms nominal

6705 VSWR @ DC to 110MHz 1.10:1 110 to 240MHz 1.15:1  
6710 VSWR @ DC to 110MHz 1.10:1 110 to 240MHz 1.15:1  
6715 VSWR @ DC to 110MHz 1.10:1 110 to 240MHz 1.15:1  
6725 VSWR @ DC to 110MHz 1.10:1 110 to 240MHz 1.15:1  
6735 VSWR @ DC to 110MHz 1.10:1 110 to 240MHz 1.15:1  
6750 VSWR @ DC to 110MHz 1.10:1 110 to 240MHz 1.15:1  
6775 VSWR @ DC to 110MHz 1.15:1 Consult Factory

Power Rating @ Sea Level ----- 05/75 KW

Frequency Range----- DC to 110 MHz

Cooling Method ----- Forced Air Ductable

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

Fan Assembly ----- 1/6 hp /1½ hp (50 Hz /60 Hz) centrifugal

AC Power Requirements: 6705 3 amp at 115 Volts  
6710 9 amp at 115 Volts 5 amps at 230 Volts  
6715 9 amp at 115 Volts 5 amps at 230 Volts  
6725 9 amp at 115 Volts 5 amps at 230 Volts  
6735 18 amp at 115 Volts 5 amps at 230 Volts  
6750 15 amp at 115 Volts 15 amps at 230 Volts  
6775 25 amp at 115 Volts 15 amps at 230 Volts

Finish ----- Beige Splatter

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

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

☆☆

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

## Appendix:

### **Opti-Cal<sup>®</sup> Product Brief** For inclusion in Opti-Cal<sup>®</sup> enabled device manuals, Model OPC-3 (Opti-Cal 3.2")

#### OVERVIEW

The OPC-3 system software (Fig. 1) displays measured RF power in a manner similar to an RF watt-meter. The measured power is displayed in kilowatts with a fine resolution of ten watts. The minimum displayed power is 1/10 of the load's rated maximum RF power or 1kW; whichever is greater. The maximum displayed power is 99.99 kW.

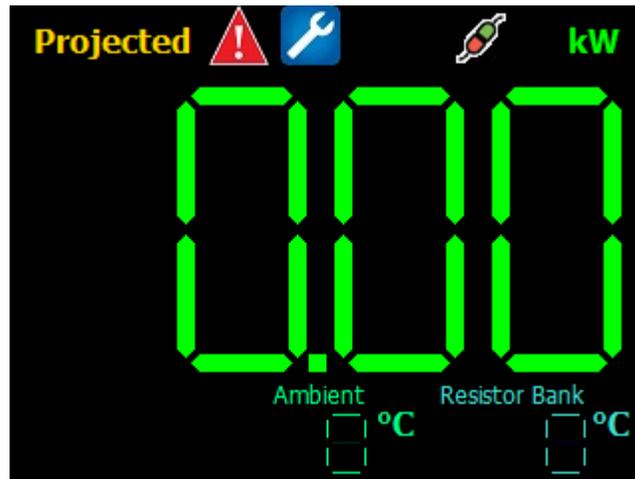


Fig. 1

The pseudo-LED digits will change from green to red (Fig. 2) when measured power meets or exceeds 1kW PLUS the maximum rated power of the load that the OPC-3 is installed in. For example the power-readout on an OPC-3 installed in a 3kW load will turn red to indicate over-power at 4kW.

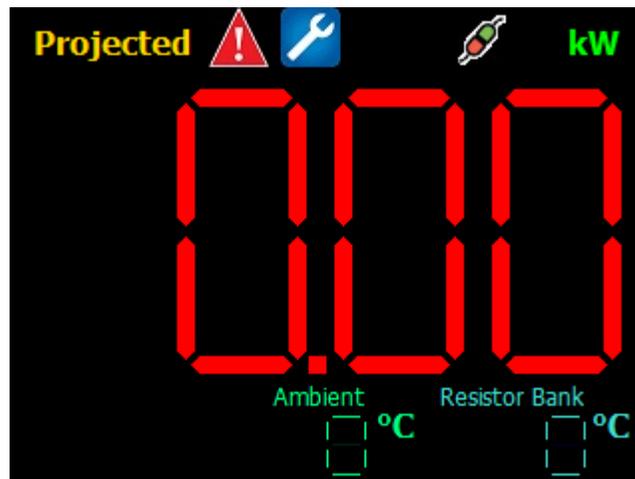


Fig. 2

All Opti-Cal<sup>®</sup> models utilize passive infrared measurement to indicate RF power. Because load elements heat up slowly a “look-ahead” feature has been implemented to give a highly accurate projection of RF power based on thermal rise-time. The power-projection feature is active before the load reaches thermal-equilibrium and is indicated by a yellow “Projected” label in the upper left corner of the display (Fig. 3). Testing (at 60Hz) indicates that projected power settles near 96% of actual power within a minute of power application.

**Note: The unit will fluctuate with wide variability for several seconds upon power up if RF is being applied, i.e. when the unit is operated in standby mode. Please wait until this initial fluctuation is settled before making measurements.**

After approximately seven minutes of continuous operation, under RF power, the load will reach a maximum temperature (thermal-equilibrium). At this point the yellow “Projected” label will disappear (Fig. 1). Measurements taken at thermal-equilibrium correlate closest to actual applied RF power and are assumed to be the most accurate readings. Testing (at 60Hz) indicates that the power displayed at thermal-equilibrium tends to be between 98% and 102% of actual power when the OPC-3 is properly calibrated.



Fig. 3

The following icons shown at the top of the screen (Fig.3) are touch-responsive:

**Projected**

Estimated, non-settled power. Nominally 96% of actual power after one minute of applied maximum rated RF power. When this label disappears the displayed power is nominally between 98% and 102% of actual at applied maximum rated RF power.<sup>1</sup>



Alarms are active. Touch the icon or refer to the device webpage for descriptions of active alarms. Alarms can include: Over-Power, Coolant-Flow<sup>2</sup>, Ambient Temperature, and Interlock Disengaged.



Settings. Touch to modify device settings. See Fig. 4



Ethernet plugged and carrier detected. Does not indicate proper network configuration. This device only supports DHCP configuration. All network settings are the user’s responsibility and there are no user-alterable network settings in the device. If you require an alternate configuration I will try to accommodate but these configurations are not officially supported or included in the standard device pricing.

**kW**

Kilo-Watt. It’s camelCased because programmer != graphicDesigner;<sup>3</sup> A green “K” permanent-decal can be provided if it becomes a source of contention.<sup>4</sup>

**Note: The interlock connectors presented on the back of the load and the interlock alarm on the Opti-Cal<sup>®</sup> are separate, isolated systems.**

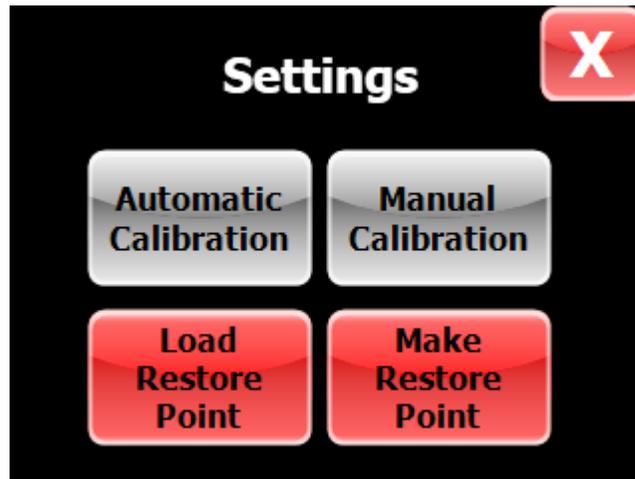


Fig. 4

### Settings Menu

**Note:** The OPC-3 is calibrated at the factory for the full rated power of the load. If field calibration becomes necessary it may be accomplished as described below.

#### Automatic Calibration:

This device can be field calibrated with the aid of another power-meter or if the RF power level is known. To field calibrate access the settings menu as previously described and touch "Automatic Calibration." Follow the prompts on the screen. **Note: Field calibrating this device will require the actual RF power level in watts. To complete the automatic calibration you will need to either know what the RF power level is or refer to another calibrated power-meter. Attempting to calibrate the device without this information may cause the calibration to fail and the device to be inaccurate. (See Footnote 1)**

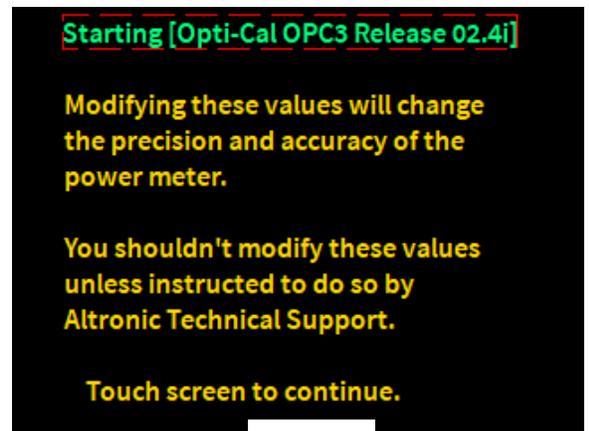


Fig. 5

### Manual Calibration:

This button provides access to the calibration constants. This functionality is for fine tuning at the direction of Altronic technical support. (See Footnote 1.)



Fig. 6

### Load Restore Point:

In the event that the device calibration fails you may reset to factory defaults using this button. The boot loader will then guide you through the rest of the restore process.

### Make Restore Point:

This button can be used to set a system restore point. All software, updates and configuration data are saved to flash. Only one restore point may be saved at a time. The user is responsible for ensuring that the configuration state is appropriate for their purposes before setting a restore point as it overwrites the default factory state. However, the default settings and software for this device are archived and available upon request.

### Device-Status web page



Fig. 7

The device serves a status page over HTTP port 80 and additionally port 8080. The page can be accessed via any modern browser at [HTTP://<device IP address>](http://<device IP address>). As an example, the above image was captured from Google Chrome at [HTTP://192.168.2.8](http://192.168.2.8). The status page displays the current power and any active alarms and is scaled to be easily readable on a mobile device.

Footnotes:

1. The device is calibrated at full rated RF power. If you are using a significantly smaller fraction of that power you will notice measurements that progressively differ from actual power. The solution to this is to modify the calibration constants. The simplest and most accurate method for doing this is via the Automatic Calibration method. This method requires the utilization of another calibrated power meter or otherwise trusted (for your purposes) measurement. The alternative is to find the power range you are using in the following chart and enter the corresponding calibration constants manually.

Power Range	IRM	SLM
5KW to 15 KW	24	39
15KW to 25KW	23	37
25KW +	22	35

2. Or in this case “Air”-Flow.

3. Also programmer != manualDesigner; Hence the voluminous and overly familiar Footnotes section.

Note to technicians:

If you require some alternate configuration or functionality I will try to work with you to meet your needs. This is not an official guarantee that any non-standard modification will be possible (or free) and will involve a group effort to implement. (That’s not meant to discourage; I’m quite happy to help if I can.) If that’s OK I’m [jdyess426@gmail.com](mailto:jdyess426@gmail.com).

---

This is release edition 02.4i of the Opti-Cal<sup>®</sup> device. All prior testing has been done in a laboratory environment and the operation and error margins described in this document are representative of measurements taken there. Your experience of its operation may vary from those described herein.

The engineering team at Altronic Research welcome and greatly appreciate your questions, comments, or other feedback in regards to this device. Please do not hesitate to contact us anytime by any means you see fit. A copy of our complete contact information will accompany this manual.