

**ALTRONIC RESEARCH, INC.**

**P. O. BOX 249**

**YELLVILLE, ARKANSAS 72687-0249**

**U.S.A.**

**MODEL 67300/77300**

**COAXIAL LOAD RESISTOR**



**MODEL 67300/77300**  
**300KW 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

<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 .....	8
1-5 Electrical Description .....	9
1-6 Mechanical Description .....	9
1-7 General Principle of Operation .....	9
1-8 Operating and Adjustment Controls.....	9
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	
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 Ducting .....	13
3-9 Adjustments .....	13
IV. Theory of Operation	
4-1 General .....	14
4-2 Control Circuits.....	14

**SECTION**

**PAGE**

V. Maintenance

5-1 Cleaning .....15  
5-2 Lubrication.....15  
5-3 RF Circuit (including resistor replacement).....15, 16

VI. Diagrams

6-1 Outline and Dimensions .....17  
6-2 Schematic Diagram.....18  
6-3 Parts List.....19

VII. Specifications.....21

Appendices

Component Manufacturer's Documents.....22

# PRECAUTIONS

## **⚠️WARNING⚠️**

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 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.

## ALTITUDE WARNING

**THIS LOAD IS DESIGNED FOR  
OPERATION ABOVE 8,500 FEET MSL.**

**OPERATION AT LOWER  
ALTITUDE MAY RESULT  
IN MOTOR OVERLOAD  
AND DAMAGE.**

## 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 77300 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 67300/77300 Coaxial Load is designed to safely dissipate a maximum of 300,000 watts of electrical energy over a frequency range of DC to 2 MHz.

**1-2. Equipment Supplied.** The Model 67300/77300 Coaxial Load is supplied with standard RF connectors. Their designations are:

4-1/16" Fixed Flange: Model 67300/77300E4  
6-1/8" Fixed Flange: Model 67300/77300E6

The Model 67300 is for indoor service. The Model 77300 is fitted with louvers and a roof for outdoor service. The standard power supply voltages and their designators after the model # are:

-230: 208-230VAC, three-phase, 50/60 Hz  
-460: 380-460VAC, three-phase, 50/60 Hz

**1-3. Equipment Required But Not Supplied.** The Model 67300/77300 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. Where ordered with an RF Ammeter assembly, it is necessary for the installer to furnish conduit space for the RF Ammeter instrumentation cable.

**1-4. General Description.** The Model 67300/77300 Coaxial Load is enclosed in a single aluminum case which is painted with a durable acrylic finish. For exterior installations, a three piece roof assembly and four louvered side panels are provided. These assemblies are shipped knocked down and must be installed at the final use site. Power connection is made through the bottom of the control enclosure which is located on the end of the load near

the RF connector. Figure 1-2 shows the load without the louvered fan panels. The enclosure contains two belt-driven 3 HP 42" diameter fan assemblies.

- 1-5. Electrical Description.** The Model 67300/77300 contains a 50 ohm non-reactive resistor assembly capable of dissipating 300,000 watts of applied electrical energy at sea level at frequencies between DC and 2 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 three switches wired in parallel to control the blower motor contactors. Power is supplied to these contactors whenever the equipment is attached to the correct power supply, the user-supplied Safety Switch is "ON" and the "OFF/ON" switch is placed in the "ON" position. The transmitter interlock circuit consists of three thermal switches and four limit 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 louver assemblies are all properly installed and none of the overtemperature thermal switches sense a temperature equal to or greater than its specified temperature ( $\pm 7^{\circ}\text{F}$ ).
- 1-6. Mechanical Description.** The Model 67300/77300 RF Coaxial Load is a 50 ohm non-reactive resistor assembly which is cooled by forced ambient air. The two fan assemblies are 3 HP belt-driven, 42 inch diameter devices. Air is drawn in through removable louvers or grill assemblies, enters the resistor assembly, flows horizontally through it and then out of the enclosure via louvered or perforated panels. When ordered for exterior operation, a roof assembly and louvered side panels are provided.
- 1-7. General Principle of Operation.** After ascertaining that the Model 67300/77300 is connected to the correct power supply, connect the transmitter interlock circuit and RF source. Close the Safety Switch and turn the "OFF/ON" 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, allow the load to cool for 10 minutes, then turn the "OFF/ON" switch "OFF". You can damage the load if you do not allow it to cool itself before stopping the fans.
- 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 motors and fans require periodic maintenance and the drive belts 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:

Torx T-15 driver

Tee handle hex key, 7/32" bit

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.

# SECTION III

## PREPARATION FOR USE

**3-1. Unpacking.** 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:

- All screws in place and tight.
- All panels and grills free of dents and scratches.
- Base assembly and legs visually OK.
- Individual louvers assemblies visually OK.
- RF connector visually OK.

While inspecting RF connector, measure D.C. resistance of the unit by reading from the center conductor to the outer conductor. Compare this reading with that listed in the specification sheet at the end of this manual. Reading should be  $\pm 1$  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 67300/77300 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.**

a. Interior Installations. The location selected for the Model 67300/77300 should 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 300,000 watts. This is equal to 1,024,554 Btu/hr, which ordinarily will 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.

b. Exterior Installations. 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 67300/77300 is designed to be floor-mounted and should be securely attached to the floor. The enclosure rests on a welded steel frame.

**NOTICE!**

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

**3-7. Connections.** There are four connections on the Model 67300/77300: the RF connector, the AC power supply, the remote control terminal strip and the transmitter interlock terminal strip.

- 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 Control Box on the RF connector end panel of the enclosure.
- c. The remote terminal strip is attached to a pair of normally closed terminals. The 4-position terminal strip is mounted in line with the transmitter interlock strip. This connection is used for remote operation of the load.
- d. The transmitter interlock is attached to one set of the 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. The spare set of normally closed terminals are isolated and are provided for an alarm circuit for reject (standby) mode operation or remote installations.

**3-8. Ducting.** It will be necessary to duct the discharge air from the Model 67300 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 25,000 SCFM at a maximum temperature of 250° F.

**3-9. Adjustments.** No field adjustments of the electronics or electrical controls are necessary or possible. The drive belts for the fans must be 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).

## SECTION IV

### THEORY OF OPERATION

**4-1. General.** The Model 67300/77300 contains a 50 ohm non-reactive resistor assembly (308 @ 960 ohms in series-parallel) which is cooled by forced air supplied by a dual belt-driven fan assembly. Control of the fans and of the transmitter interlock circuit is accomplished with an OFF/ON switch, four thermal switches, and one differential pressure switch. In the case of the 77300 there are also four micro switches.

**4-2. Control Circuits.** There are 2 control circuits in the Model 67300/77300. One circuit controls the fans and the other controls the transmitter interlock circuit. The fan control circuit derives its power from the 24-26VAC control transformer. One OFF/ON switch is connected to AC Control Circuit LX1. This switch connects to overload relay terminals 96 through the louver interlock switches (S40...S43). Contactor terminal A1 connects to AC Control Circuit LX2. Terminals 1 & 2 of TB2 are in parallel with S10 and may be used for remote fan operation. Two SPNO thermal switches (S30 and S31) also connect from LX1 to Overload Relay terminals 96 through the louver interlock switches. These switches sense residual heat and maintain fan operation until the load has cooled sufficiently to prevent damage.

The transmitter interlock circuit also derives its power from the control transformer. Three SPNC thermal switches are connected in series from AC Control Circuit LX2 via the normally open pair of the differential pressure switch to interlock relay terminal IR1. The overheat lamp is connected from LX1 to interlock relay terminal IR1. Interlock relay terminal IR3 is connected to AC Control circuit LX1.

Interlock relay terminals 4 and 12 are connected to normally closed pair 1 and 2 on the interlock terminal board. This terminal pair is normally closed when AC power is supplied to the unit. Interlock relay terminals 5 and 9 are normally closed when AC power is supplied to the unit and are connected to terminals 3 and 4 on the rear panel terminal board.

**The logic of operation is:**

1. If AC power is applied to the load, the overtemperature thermal switches sense normal temperatures and 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 the overtemperature thermal switches sense excessive temperatures, or the differential pressure switch is open or the louvered panel limit switches sense the absence of a panel, the interlock relay will open, disabling the transmitter.

## 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 67300/77300 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 fans, enclosure and motors by vacuuming. Do not use solvents to clean the motors or fan pillow block assemblies. 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 are lubricated at the factory with a 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 relubricated 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.

### **Resistor Replacement**

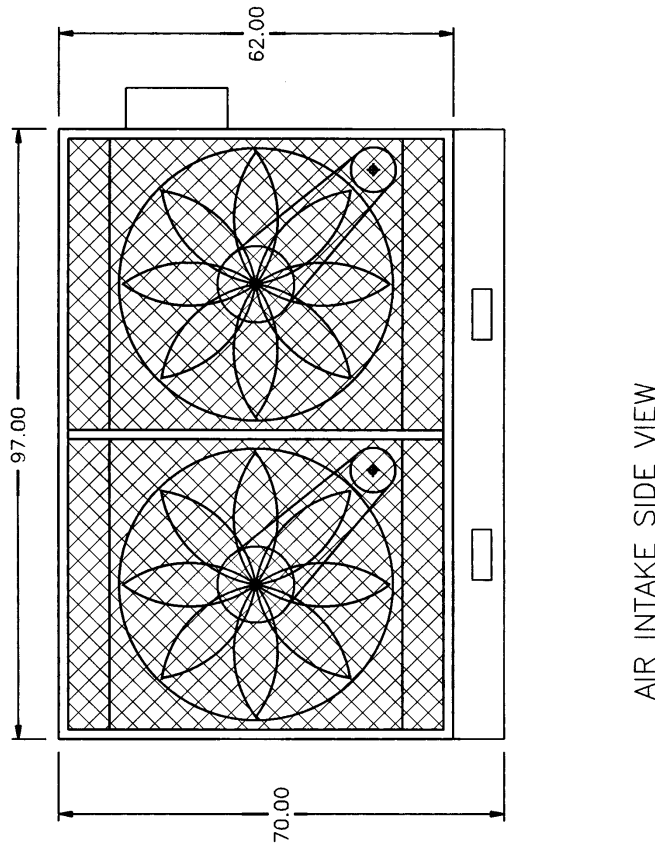
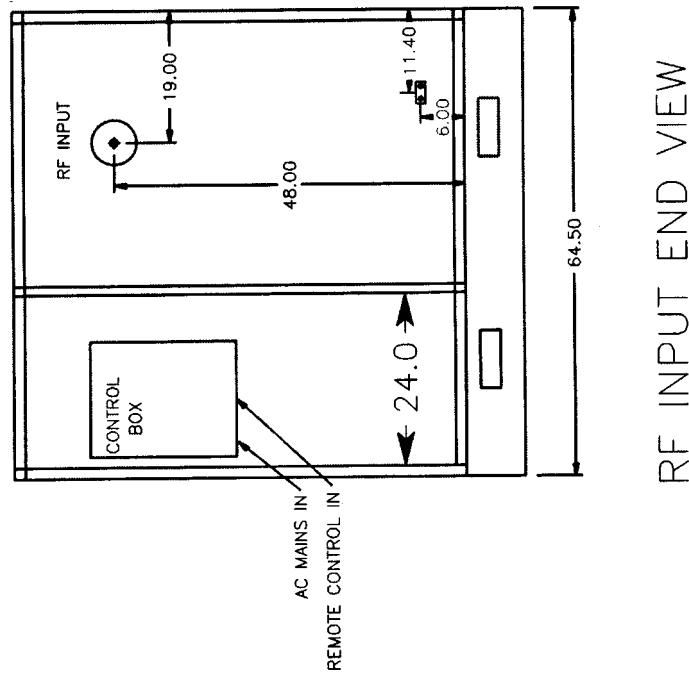
Prior to attempting resistor replacement, you must make the load safe for servicing. Begin by placing the Safety Switch in the OFF position and locking the handle with a padlock. Next, remove all power from the transmitter and exciter and lock them out.

To replace resistors it is necessary to remove the air discharge louvers from the load and set them aside. Remove five 1/4-20UNC machine screws from the top of one louver assembly. Lift the louver up approximately one inch (2.5 cm) and carry it to an area clear of your walking/working space. Repeat this procedure if necessary to remove the other louver.

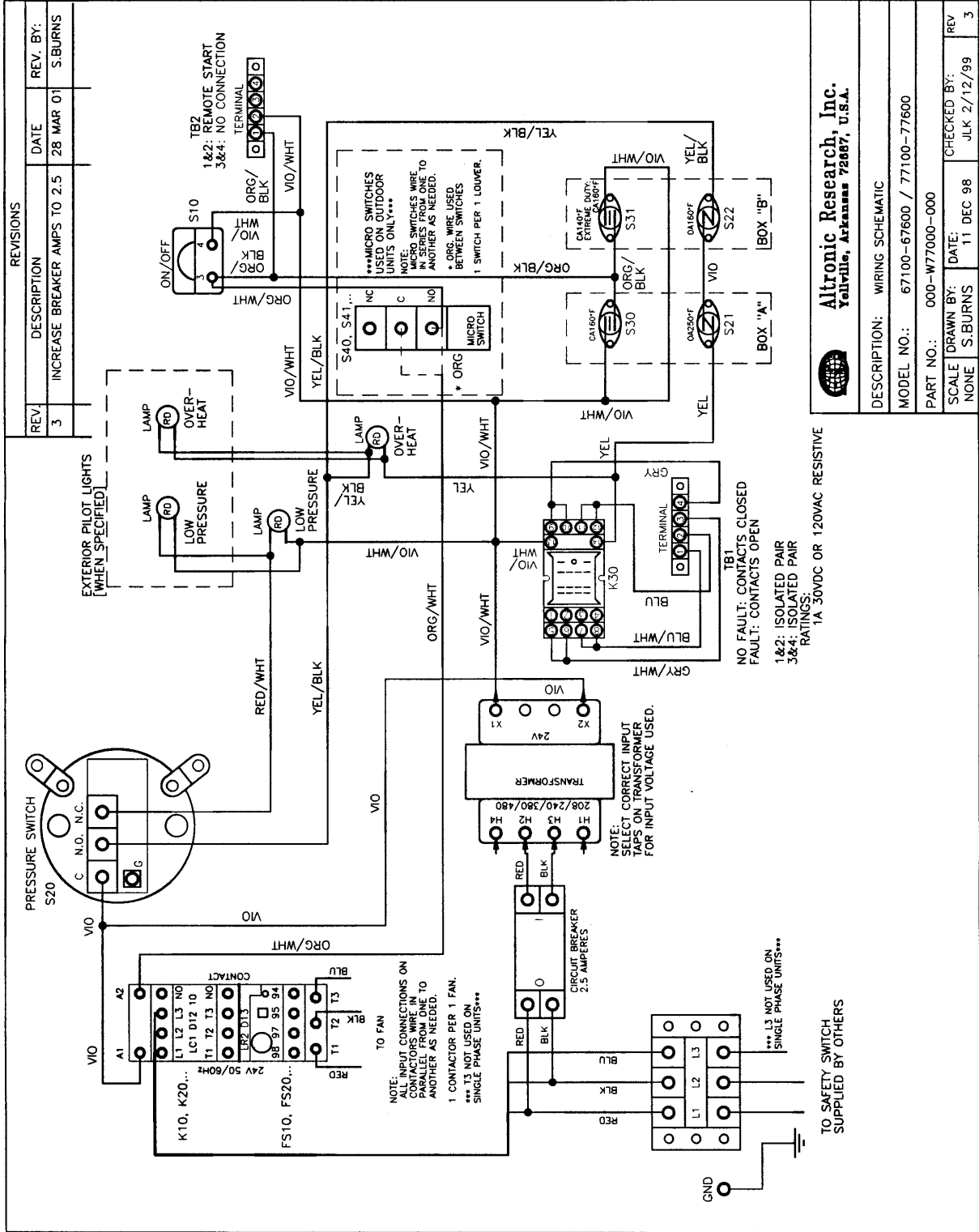
Resistor replacement is tedious, but not difficult. It will probably be necessary to remove many resistors in order to replace a few. Therefore, allow at least eight hours to accomplish this task.

During resistor installation at the factory, resistors are selected by resistance value to provide the proper final load impedance. For this reason, it is unwise to move resistors from one bank to another. We recommend that you work in one bank at a time, finishing that bank before commencing another. The resistors are made of a durable ceramic and will withstand normal handling, but they must not be struck with any tool.

# 6-1. OUTLINE AND DIMENSIONS



# 6-2. SCHEMATIC DIAGRAM



**6-3. REPLACEMENT PARTS LIST**

**MODEL 67300/77300**

**(CONSULT FACTORY)**



# SPECIFICATIONS

## MODEL 67300/77300

Impedance..... >50 ohms nominal

VSWR @ DC to 2 MHz.....>1.15:1 max.

### Connectors:

Model 67300/77300E4 ..... >4 & 1/16" fixed flange

Model 67300/77300E6 ..... >6 & 1/8" fixed flange

Power Rating @ Sea Level..... >300 KW

Frequency Range .....>DC to 2 MHz

Cooling Method.....>Forced Air

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

Fan Assembly: 2 x 3 hp belt-drive six-bladed cast aluminum

### AC Power Requirements:

200-240 VAC @ 20 Amp., 3 phase, 60/50 Hz

380-460 VAC @ 10 Amp., 3 phase, 50/60 Hz

Finish ..... >Beige Splatter

Serial No 108                      Frequency DC-2 MHz                      Resistance 49.3

Model 67300HA                      Inspected by R.R.                      Date 5/25/01

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

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

# **APPENDICES**

## **COMPONENT MANUFACTURER'S DOCUMENTS**