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**MODEL 6710 D
COAXIAL LOAD RESISTOR**



MODEL 6710D
10 KW DIGITAL UHF
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.**

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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 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.**

RF RADIATION HAZARD

**ALL PANELS, GRILL COVERS AND SCREWS
MUST BE PROPERLY INSTALLED AND TIGHT
TO AVOID RF RADIATION HAZARD.**

PRECAUTIONS

 **WARNING** 

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

CAUTION

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

CAUTION

Do not connect the unit to an RF power source without first ensuring that the load is connected to the proper line voltage and that the interlock circuit is properly attached to the transmitter. The interlock circuit is designed to indicate a fault and prevent operation when line voltage is not present. *Do not apply more than rated power to unit.* Damage will occur before thermal protectors can activate interlock circuit 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 Digital UHF Model 6710D 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 Model 6710D Coaxial Load is designed to safely dissipate a maximum of 10,000 watts of electrical energy over the UHF frequency range.

1-2. Equipment Supplied. The Model 6710D Coaxial Load is supplied with standard RF connectors. Their designations are:

3-1/8" EIA Swivel flange: Model # 6710DE3

3-1/8" Unflanged flush: Model # 6710DF3

3-1/8" Unflanged recessed: Model # 6710DR3

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 6710D 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 6710D Coaxial Load is enclosed in a single aluminum case which is painted with a durable acrylic finish. Power connection is made through an IEC connector on the rear panel of the enclosure. This panel also contains a 4-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 6710D contains a 50 ohm non-reactive resistor assembly capable of dissipating 10,000 watts of applied electrical energy at sea level at UHF band frequencies 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 contactor. Power is supplied to this contactor 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 thermal switches wired in series to control the interlock relay. Power is supplied to this relay whenever the equipment is attached to the correct power supply and the motor temperature senses a temperature equal to or less than 160°F and the resistor compartment temperature switch senses a temperature equal to or less than 250°(±7°)F. A lamp is provided to indicate when one or more of the over-temperature switches opens. It is labeled "OVERHEAT", indicating a change in state of the interlock.

- 1-6. Mechanical Description.** The Model 6710D RF Coaxial Load is a 50-ohm non-reactive resistor assembly which is cooled by forced ambient air. The blower assembly is a 3/4 HP direct-drive centrifugal blower depending on the voltage rating of the load. 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 6710D 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 the transmitter. Operate the transmitter as desired. To stop operation, it is necessary to first turn off the transmitter, then the main power switch on the Model 6710D. 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 6710D can be operated in a "Standby" or "Reject" mode with the blower off. Current draw in this mode is 60 milliamperes. To operate in this mode, connect the unit as before and leave the main power switch on the front panel "Off". It is highly recommended that the normally open pair on the interlock terminal board be used to control a user-supplied alarm circuit. This pair will close on power failure or overheat and the alarm, if independent of the AC power supply for the unit, will notify the operator of a fault.

- 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, 7/32" bit

1 Power screwdriver with 7/32" 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 ± 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 6710D 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 6710D 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 watts. This is equal to 34,152 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 6710D 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 6710D: the RF connector (3 1/8 inch EIA swivel flange or unflanged), the AC power supply and the transmitter interlock.

- a. The RF connector is on the top panel of the unit. Connect to the appropriate RF line from the transmitter.
- b. The AC power supply connector is an IEC style female power connector located on the rear panel of the enclosure.
- c. The transmitter interlock is attached to the normally closed terminals of the 4-position terminal strip located on the rear panel of the enclosure. The terminals are closed whenever AC power is supplied to the unit and no overheat condition exists. The normally open terminals are isolated from the normally closed terminals and are provided for an alarm circuit for reject (standby) mode operation or remote installations.

3-8. Ducting. In many installations it will be necessary to duct the discharge air from the Model 6710D 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 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 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 6710D 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 6710D 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 6710D 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.

4-2. Control Circuits. Control Power is derived from a Control Transformer that is fed by a 3 ampere circuit breaker. The Control Transformer provides power for the operation of the Transmitter Interlock Circuit and Blower Control. The blower assembly is powered by a separate breaker that can vary in ampacity depending on the current draw of the Blower Assembly (see Specifications).

Blower Control Circuit: Three thermal switches and one rocker switch are connected to AC Control Line 1. The thermal switches are Single Pole, Normally Open, and close at a specific temperature (as detailed in the schematics) and connect to Blower Contactor “RYI” 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.

Transmitter Interlock Circuit: Two thermal switches are connected in series from Control Line 1 to Interlock Relay “RY2” terminal 13. These thermal switches are Single Pole, Normally Closed, and open at a specified temperature (as detailed in the schematics). 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.

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 will be closed when there is AC main power to the load.

When sold with two sets of Normally Closed 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 will be closed when AC power is supplied to the load.

When sold with one set of Normally Closed terminals and one set of Normally Open 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 will be open when AC power is supplied to the load.

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!***

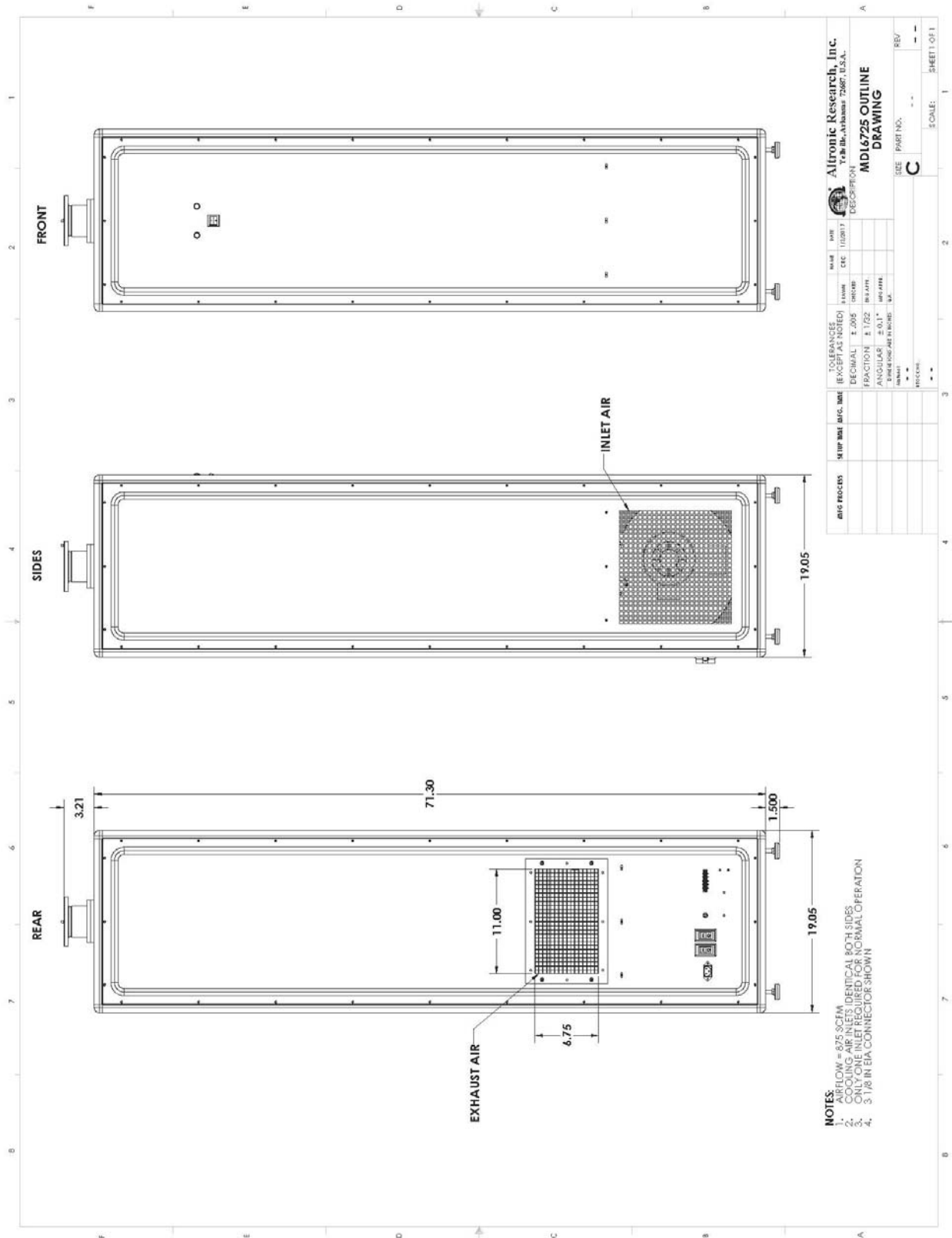
- 5-1. Cleaning.** The enclosure of the Model 6710D is finished with an acrylic finish or other durable coating system. It should be cleaned with a neutral plastic and glass cleaner such as Windex or Glass Plus. The RF connector should be cleaned with a non-residue contact cleaner. Remove dirt accumulations 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.** Lubricate motor with 10-30 drops of SAE 30 motor oil applied to each bearing oil tube annually.
- 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!

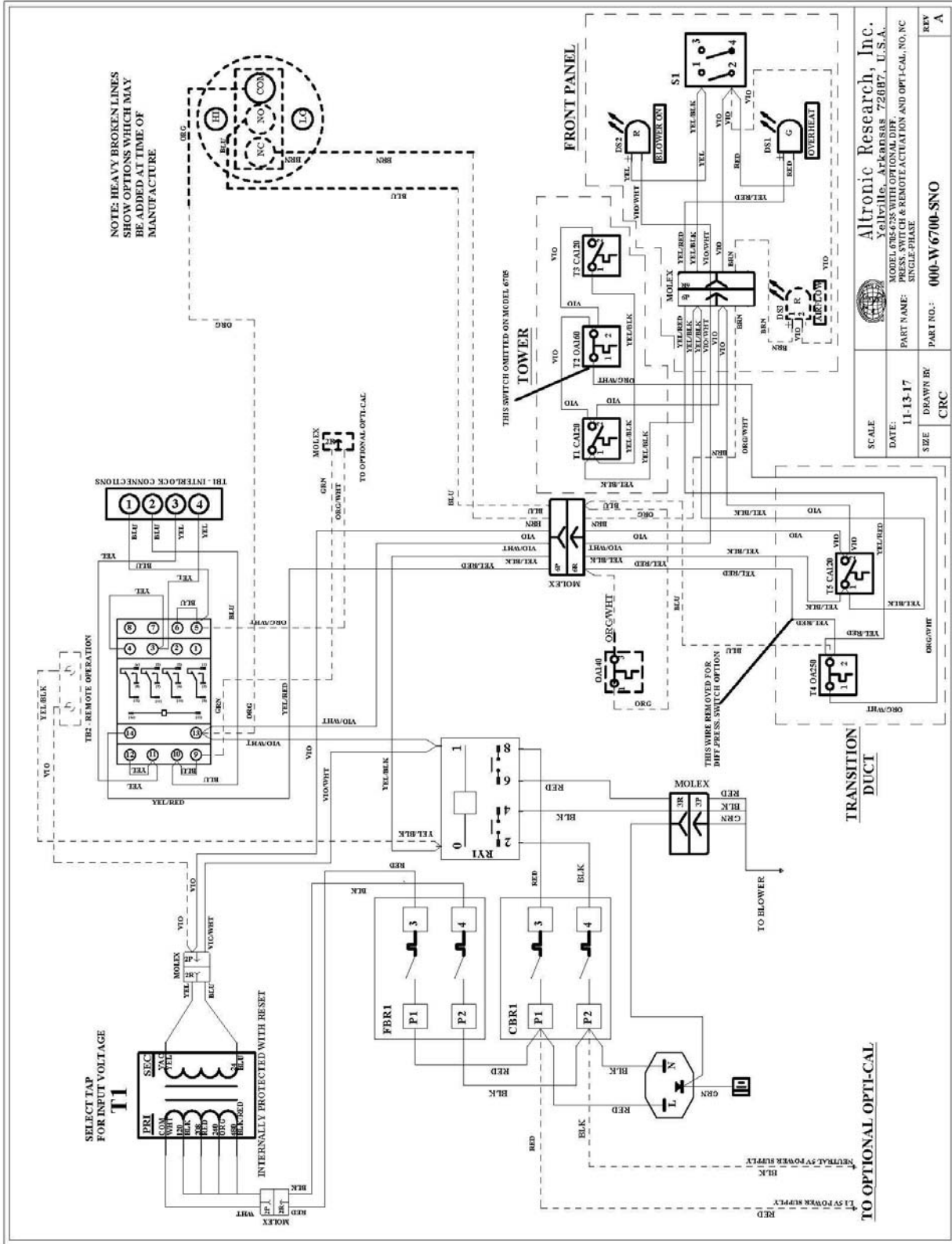
The resistors are hard, brittle ceramic material. It is very important to avoid impact and excessive force when installing or removing them.

SECTION VI

6-1 OUTLINE AND DIMENSIONS



6-2 SCHEMATIC DIAGRAM



6-3 REPLACEMENT PARTS LIST
MODEL 6710D

(CONSULT FACTORY)
1-870-449-4093

SPECIFICATIONS

Model 6710D

Impedance ----- 50 ohms nominal

VSWR @ 490MHz to 1GHz----- 1.15:1 max.

Connectors:

Model 6710DE3----- 3-1/8" EIA swivel flange

Model 6710DF3----- 3-1/8" Unflanged flush

Model 6710DR3----- 3-1/8" Unflanged recessed

Power Rating @ Sea Level ----- 10 KW

Frequency Range----- Optimized Digital

Cooling Method ----- Forced Air Ductable

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

Fan Assembly ----- 3/4 hp direct-drive centrifugal

AC Power Requirements:

115 VAC, 60 Hz, 9 Amp., 1 Phase

230 VAC, 50/60 Hz, 4 Amp., 1 Phase

Finish ----- Beige Splatter

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

Model _____ Inspected by _____ Date _____



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