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77000 SERIES
COAXIAL LOAD RESISTOR

7775
OUTDOOR

77100/77150
INDOOR

77100/77150
OUTDOOR
MECHANICAL
LOUVERS

77200/77300
INDOOR

77200/77300
OUTDOOR
FIXED
LOUVERS

77450/77600
INDOOR

77450/77600
OUTDOOR
FIXED
LOUVERS

77900/771500
OUTDOOR
FIXED
LOUVERS

77900/771500
OUTDOOR
MECHANICAL
LOUVERS

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DECLARATION OF CONFORMITY

The Omegaline® RF Coaxial Load Model 77000 Series conforms to the following standards:

Low-Voltage Directive (2014/35/EU)

Electromagnetic Compatibility Directive (2014/30/EU)

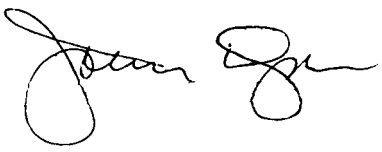
Machinery Directive (2009/127/EC)

Restriction of Hazardous Substances Directive (EU)2015/863

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

As of the date of manufacture on the specifications page.

ATTEST:



John L. Dyess,
President

77000 SERIES 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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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 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.

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® 77000 Series 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.

HAZARD ANALYSIS

1. The 77000 Series Coaxial load is designed to dissipate RF power in the frequency range of 540 to 1750 kHz.
2. The hazards presented by the load includes:
   - 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.
   - An additional hazard may present itself only in case of abnormal operation of the load. When the load has RF energy present and the fans are not operating, the fiberglass pultrusion, which is used as an electrical insulator, may emit smoke and fumes. The manufacturer of the material specifies the emitted materials as "Carbon monoxide and other organic compounds". (See Material Safety Data Sheet in Appendices.) Emission will cease and the pultrusions will self-extinguish shortly after removal of the input energy. Personnel should not remain in the area and firefighters should use Self-Contained Breathing Apparatus until all visible smoke has dissipated.
3. The electrical hazards arise from the connection of the equipment to 230/480 volts AC, 3 phase, 50/60Hz mains. The following measures were incorporated into the design to minimize the exposure of personnel to the mains voltage:
   - All AC Mains power enters through the user-supplied safety switch which is mounted on the end of the load. By operating this switch and placing a padlock on the operating lever, a worker is assured that lethal voltage is not present during maintenance;
   - 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 fans, motors and, in the case of an outdoor model, the motorized louver assemblies. The following measures were incorporated into the design to minimize exposure of personnel to these hazards:
   - There is a Safety Switch located at the control box on the end of the load. This switch will remove all AC Mains power from the load;
   - The panels which protect personnel from contact with the rotating elements are not removable except with tools.
   - The louvers and grill assemblies are guarded with limit switches which break the control circuit when opened, preventing accidental operation of the motors/fans;
   - There are no operating controls or routine adjustments required within the fan compartment of the load;
   - The fans are mounted in the load with the blades as far from personnel as is possible.
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.
   - The louvers and grill assemblies are guarded with limit switches which break the interlock circuit when opened, preventing accidental operation of the transmitter;
   - 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;
   - A manual grounding stick is provided at the entrance to the interior of the high voltage compartment. Maintenance personnel are instructed to use this device to ground the high voltage components prior to work in the compartment.

AIR FLOW VS TEMPERATURE ANALYSIS

Minimum airflow calculations are based on worst-case steady-state conditions, and air being an ideal gas. These values were used to determine dissipation of the required power while keeping the outlet air temperature safe for anyone coming in contact with it.

The specific heat for air was found at the average operating temperature for the worst case allowable. The maximum ambient temperature is 40°C. The maximum allowable exhaust temperature is 121°C.

Specific Heat Air "C_p"

40 + 121 = 161

161 / 2 = 80.5°C

= 353.65K

From Properties of Gases at 1 atm

C_p = 1008 J/kg • °C

Heat loss to the frame will not be considered for these calculations. It would decrease the outlet air temperature by a small amount if calculated. The heat to be dissipated is the rated load kW value "Ld". This can be used to calculate the mass airflow "m•".

$$m\bullet = Ld\ kW/(C_p(T_{out} - T_{in}))$$

$$= Ld\ kJ/S/(1008\ J/kg \bullet °C * (121°C - 40°C))$$

$$= \ kg/\ min$$

Pressure at sea level 101.33 kPa

In the worst case, the fan will see air at 40°C. Then the density of the air and the volume flow rate become

$$\rho = P / (R * T)$$

Where ρ = density,

P = Pressure

R = Gas Constant Air

T = Max. Air Temp. Exhaust

$$\rho = 101.33\ kPa / (.287\ kPa \bullet m^3/kg * 40°C + 273.15)$$

$$= 1.128\ kg/m^3$$

$$V\bullet = m\bullet / \rho$$

Where V• = the volumetric flow rate

$$V\bullet = (m\bullet\ kg / min) / (1.128\ kg / m^3)$$

$$V\bullet = m^3 / min$$

$V\bullet = ft^3/min$

This method is used to determine the minimum air flow allowable to cool the resistors and keep the load in equilibrium. The minimum air flow is then doubled and in some cases tripled to increase the life of the air cooled load and lower the exhaust air temperature. Figure 1 shows the air flow requirements vs. the air flow produced by the fan and motor assemblies.

AIR FLOW REQUIREMENTS			AIR FLOW PRODUCED	
AT SEA	V•	V•	V•	V•
LEVEL	m^3 / min	ft^3/ min	m^3 / min	ft^3/ min
7775	48.8	1724	283.1685	10000
77100	65.1	2299	339.8022	12000
77150	97.6	3448	339.8022	12000
77200	130.2	4597	792.8719	28000
77300	195.3	6896	849.5056	30000
77450	292.9	10344	906.1393	32000
77600	390.5	13792	1132.674	40000
77900	585.8	20688	2458.639	86826
771200	781.1	27583	2458.639	86826
771500	976.3	34479	2458.639	86826

Fig. 1 Air Flow Chart

ELECTROMAGNETIC COMPATIBILITY (EMC) ANALYSIS

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

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

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

SECTION I

DESCRIPTION AND LEADING PARTICULARS

1-1. Purpose and Application of Equipment. The OMEGALINE® 77000 Series Coaxial Load is designed to safely dissipate a maximum rated value of electrical energy over a frequency range of 540 to 1750 kHz.

1-2. Equipment Supplied. The 77000 Series Coaxial Load is supplied with standard RF connectors. Their designations are listed in the following table. The connectors types supplied are: EIA swivel flange, Unflanged flush, and Unflanged recessed.

	FLANGE SELECTION			
	3 1/8"	4 1/16"	6 1/8"	9 3/16"
7775	√	√	√	
77100	√	√	√	
77150	√	√	√	
77200	√	√	√	
77300	√	√	√	
77450		√	√	√
77600		√	√	√
77900			√	√
771200				√
771500				√

Fig. 2 Load Size and Flange Selection

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

-115: 110-120VAC, single phase, 60 Hz
-230: 208-230VAC, single phase, 50/60 Hz
-230: 208-230VAC, three-phase, 50/60 Hz
-460: 415-480VAC, three-phase, 50/60 Hz

1-3. Equipment Required But Not Supplied. The 77000 Series Coaxial Load is complete as supplied, but the user must furnish AC Mains input, RF input, interlock control cable, emergency stop cable, alarm 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. The alarm circuit provided must be connected to a user-supplied alarm.

1-4. General Description. The 77000 Series Coaxial Load is enclosed in a single aluminum case which is painted with a durable acrylic finish. For exterior installations, louvered side panels are provided. Power connection is made through the bottom of the control enclosure, which is located on the end of the load near the RF connector. The enclosure contains belt-driven fan assemblies.

1-5. Electrical Description. The 77000 Series contains a 50-ohm non-reactive resistor assembly capable of dissipating a rated kilowatt value of applied electrical energy at sea level at frequencies between 540 and 1750 kHz with a maximum VSWR of 1.1 to 1 (1.05 or better available). 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 three switches wired in parallel and fan switches wired in series to control the fan 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", the safety interlock switches on the louvers are closed and the "OFF/ON" switch is placed in the "ON" position. Additionally, thermal switches are wired in parallel with the contactor control circuit to force fan operation during cool-down periods or when RF power is applied to the load without the fans operating. The transmitter interlock circuit consists of 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, the louver assemblies are all properly installed and none of the over temperature thermal switches sense a temperature equal to or greater than its specified temperature (±7°F). The emergency stop circuit consists of thermal switches wired in series. This normally closed circuit should be wired to the transmitter emergency stop. If the temperature in the air intake or the air exhaust compartment reaches or exceeds a specified temperature (±7°F), this circuit will open, shutting down the transmitter. The alarm circuit consists of normally open thermal switches wired in parallel. This circuit will close when a temperature equal to or greater than its specified value (±7°F) is reached.

1-6. Mechanical Description. The 77000 Series RF Coaxial Load is a 50-ohm non-reactive resistor assembly which is cooled by forced ambient air. The fan assemblies are belt-driven. Air is drawn in through removable louvers or grills, enters the resistor assembly, and 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 77000 Series 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 the transmitter. Operate the transmitter as desired. To stop operation it is necessary to first turn off the transmitter, allow the load to cool for 10 minutes, and 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. If the Safety Switch is left ON, the thermal switches in the load will maintain fan operation until it has cooled sufficiently.

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. The differential pressure switch will need to be adjusted during installation. Further adjustment should not be 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-20 driver

Tee handle hex key, 7/32" bit

Power screwdriver with 7/32" hex key & Torx T-20 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 AND RESHIPMENT

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 visually OK.
- Individual louvers assemblies visually OK.
- RF connector visually OK.

While inspecting the RF connector, measure the D.C. resistance of the unit by reading the ohms from the center conductor to the outer conductor. Compare this reading with the one listed in the specification sheet at the end of this manual. Reading should be ± 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 77000 Series Coaxial Load 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 77000 Series Coaxial Load 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 the rated value in kilowatts of the load. This is equal to the rated value in 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 77000 Series Coaxial Load 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 six connections on the 77000 Series Coaxial Load: the RF connector, the AC power supply, the remote control terminal strip, the transmitter interlock terminal strip, the alarm circuit terminals and the transmitter emergency stop terminals.

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 control terminal strip is attached to a pair of normally open terminals. This 2-pole 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 is isolated and is provided for a remote alarm circuit.
e. The alarm circuit has a pair of normally open contacts located on a 2-pole terminal strip and labeled TB3 (alarm). Connect the terminals in series with a self-powered alarm. If an overheat condition exists, the pair will close and complete the alarm circuit.
f. The transmitter emergency stop circuit has normally closed terminals labeled TB4 (transmitter emergency stop) on a 2-pole terminal strip in the control box. This pair should be connected to the transmitter emergency stop circuit. In the event of an overheat, this pair will open and cause the transmitter to shut down.

3-8. Ducting. It will be necessary to duct the discharge air from the 77000 Series Coaxial Load 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 has a maximum temperature of 250° F.

3-9. Adjustments

a. The drive belts for the fans must be periodically adjusted to maintain proper tension. It is important not to over tension 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).

b. The differential pressure switch/switches are located inside the main control box. They are adjusted by starting all fans and adjusting the set point adjusting screw clockwise to increase the set point pressure or counterclockwise to decrease the set point pressure. When ordered with mechanical louvers, two switches are provided. We recommend the lower pressure switch be turned clockwise until it stops for initial set up. Adjust the top pressure switch until the set point pressure is appropriate. Then adjust the lower pressure switch by closing or blocking louver assemblies. After blocking louver assemblies, turn the lower switch set screw clockwise until the low flow lamp lights. Open the louver and make sure the low flow light goes out. Readjust the switch until the light comes on and goes out in approximately 1 minute. The low flow light is an indication of the interlock circuit. When the light is on, the interlock circuit is open. When the light is off, the circuit is closed.

SECTION IV

THEORY OF OPERATION

4-1. General. The 77000 Series Coaxial Load contains a 50-ohm non-reactive series-parallel resistor assembly which is cooled by forced air supplied by single or dual belt-driven fan assemblies. Control of the fans is accomplished with an OFF/ON switch, micro-switches and thermal switches. Control of the transmitter interlock circuit is accomplished with a differential pressure switch and thermal switches.

4-2. Control Circuits. There are 2 control circuits on 77000 Series Coaxial Loads. 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. The main OFF/ON switch is connected to the Control Transformer (T1) and to Terminal A2 of the fan motor contactors. (The Model 77000 Coaxial Load signal line passes through the louver/grill micro switches prior to Terminal A2.) Contactor Terminal A1 connects to Differential Pressure Switch (S20) common and to the other terminal of the control transformer. When there is a fault condition, i.e. no fan operation, the signal passes through the differential pressure switch normally closed terminal and illuminates the "Low Pressure" lamp. When all fans are operating, the differential pressure switch transfers and the signal passes through all of the over temperature thermal switches, the fan motor starter auxiliary contacts, and when mechanical louvers are installed the actuator motor limit switches, before terminating at coil terminal 14 on the Interlock Relay (K30). This extinguishes the Low Pressure lamp and provides operating voltage to the "Overheat" lamp. As long as all of the over temperature switches are closed, the motor starter contacts are closed, and the louver actuator motors have completed the cycle and opened the louvers, the Overheat lamp is off. The interlock relay (K30) closes when the load is ready to accept RF power. It will open, indicating a fault, whenever one of the following events occur:

1. AC power is disconnected,
2. Any over temperature switch is open,
3. Differential pressure switch/switches S20/S21 senses a fault, or
4. The motor starter overload has tripped.
5. An actuator motor has not completed its cycle.

The Interlock Relay furnishes 2 pairs of terminals which are isolated and rated for 1 ampere @ 30VDC or 120VAC resistive. Terminal pairs are numbered 1+2 and 3+4. The relay contacts are gold-diffused to provide reliable switching of low signal voltages.

The logic of operation is:

1. If AC power is applied to the load, all motor starters are engaged, the over temperature thermal switches sense normal temperatures, the actuator motors have turned completing their cycle, 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 over temperature thermal switches sense excessive temperatures, or the differential pressure switch is open, or the louver/grill limit switches sense the absence of a panel, or a motor starter overload has tripped, or an actuator motor has not completely turned completing its cycle, 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 77000 Series Coaxial Load 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 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, 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 or support portions of the resistor assembly or the replacement of resistors.

NOTE: The resistor clips are quality fuse clips which are silver-plated before installation. The clips have a tension spring which is carbon steel. Due to the nature of this material and limitations of the plating process, it is not possible to completely eliminate rust on the spring. We have evaluated the springs after several years of service. While they are rusted, they still maintain tension satisfactorily and do not affect the performance of the load. There is no need to replace the clips or the springs due to visible rust on the springs.

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. Remove the RF connection on the front panel of the load. Make sure to place the RF grounding strap assembly on the RF input flange as further protection from inadvertent RF discharge.
- 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.

5-4 Louver Details. *(Instructions for models with mechanical louvers only.)* This load is fitted with motorized louvers on both intake and exhaust sides. The louvers are operated by a geared motor which is located on the intake side of the load, mounted on the interior floor. The motor operates one intake and one discharge louver via cables which attach to the louver operating levers. In order to open the louvers and service the interior components of the load, it is necessary to disconnect the louver operating cables:

Procedure for Models 7775 – 77150 with louvers on the ends of the load:

- Remove the four screws that attach the access panel on the side of the louver assembly.
- Reach into the opening and, using a 3/16 Allen wrench, remove the screws that fasten the louver to the load.
- Reach in the access hole; unclip the cable connector from the louver bracket as shown in Figure 5-1. The louver may have to be slightly opened to allow removal of the cable connector.

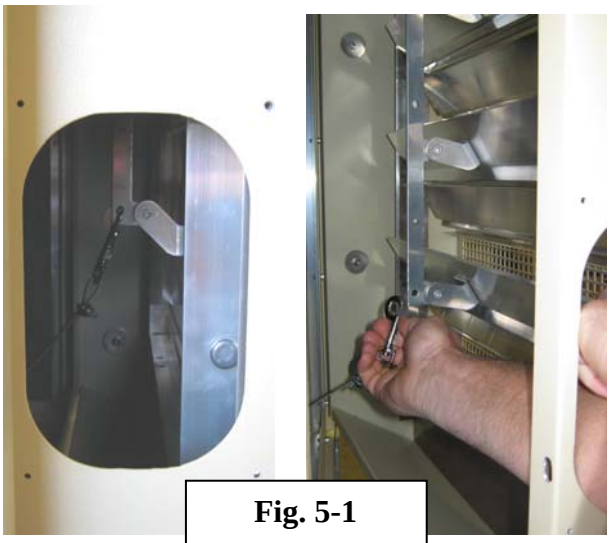


Fig. 5-1

- You may now swing the louver assembly fully open and block it in the open position for servicing.

  Reconnecting the cable requires that you:

- Swing the louver assembly toward the closed position.
- Open the louvers from the inside, by grasping a louver panel and rotating it until it is horizontal.
- Pull the loose end of the louver operating cable up to meet the louver operating bracket and fasten them together with the quick connect clasp.
- Swing the louver assembly fully closed and reinstall all removed screws and access panels.

Procedure for Models 77200 – 771500:

- Remove the two screws which attach the access panel on the bottom of the louver assembly. [This is the sloped surface at the bottom of the assembly.]
- Reach into the opening and, using a 7/16 inch wrench, remove the nut which fastens the louver operating cable to the louver operating rod.
- Replace the access panel, as the reassembly procedure does not require access from the bottom of the panel.
- You may now swing the louver assembly fully open and block it in the open position for servicing.

  Reconnecting the cable requires that you:

- Swing the louver assembly toward the closed position, leaving about a 30cm opening.
- Open the louvers from the inside, by grasping a louver panel and rotating it until it is horizontal.
- Block the louvers open with an object such as a 150mm block of wood.
- Pull the loose end of the louver operating cable up to meet the louver operating rod and fasten them together with the ¼-20 UNC nut removed previously. See illustrations below.

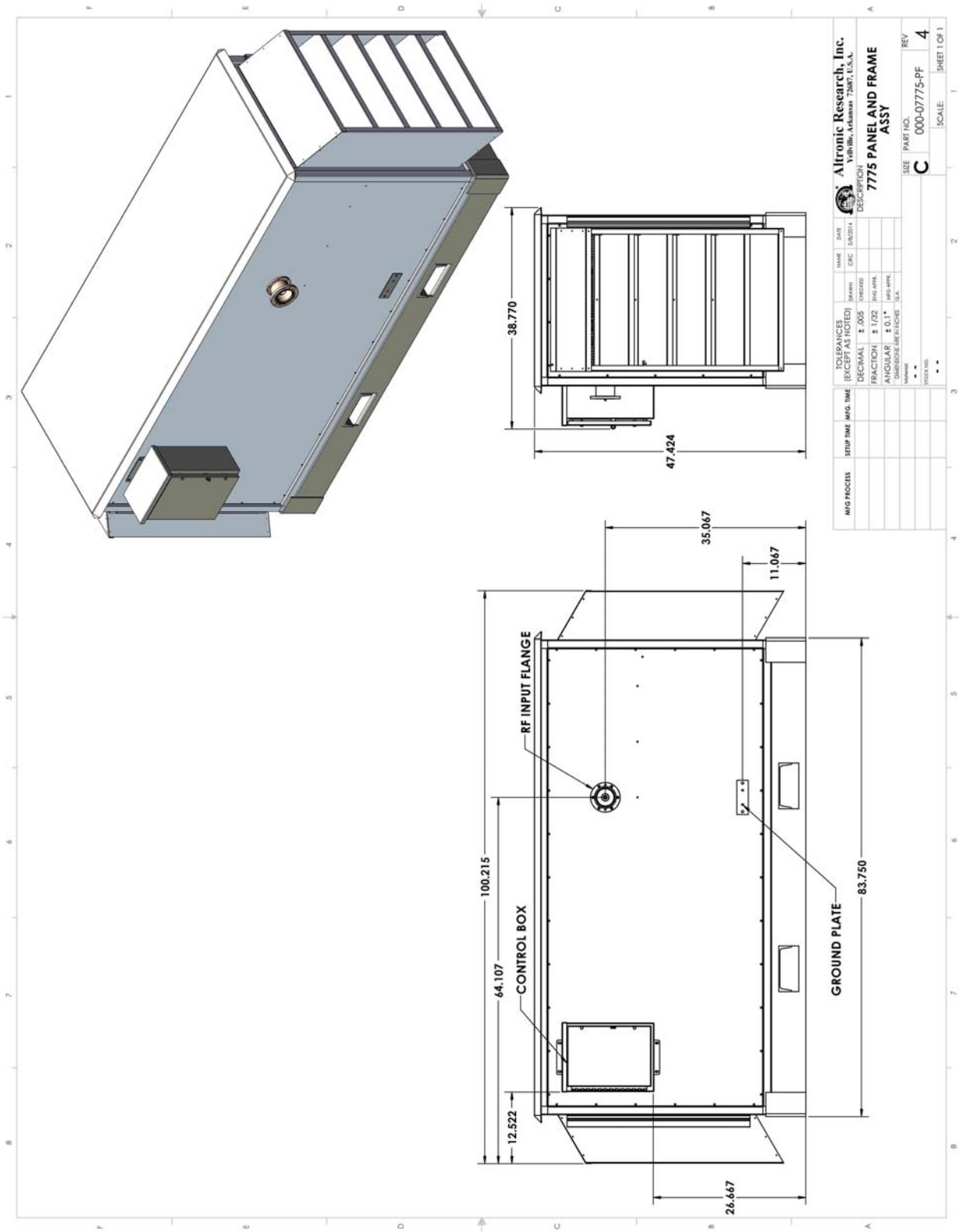
- Remove the block which is holding the louvers open.
- Swing the louver assembly fully closed and install 6 socket head screws with flat washers (3 at the top of the assembly and 3 at the bottom.)

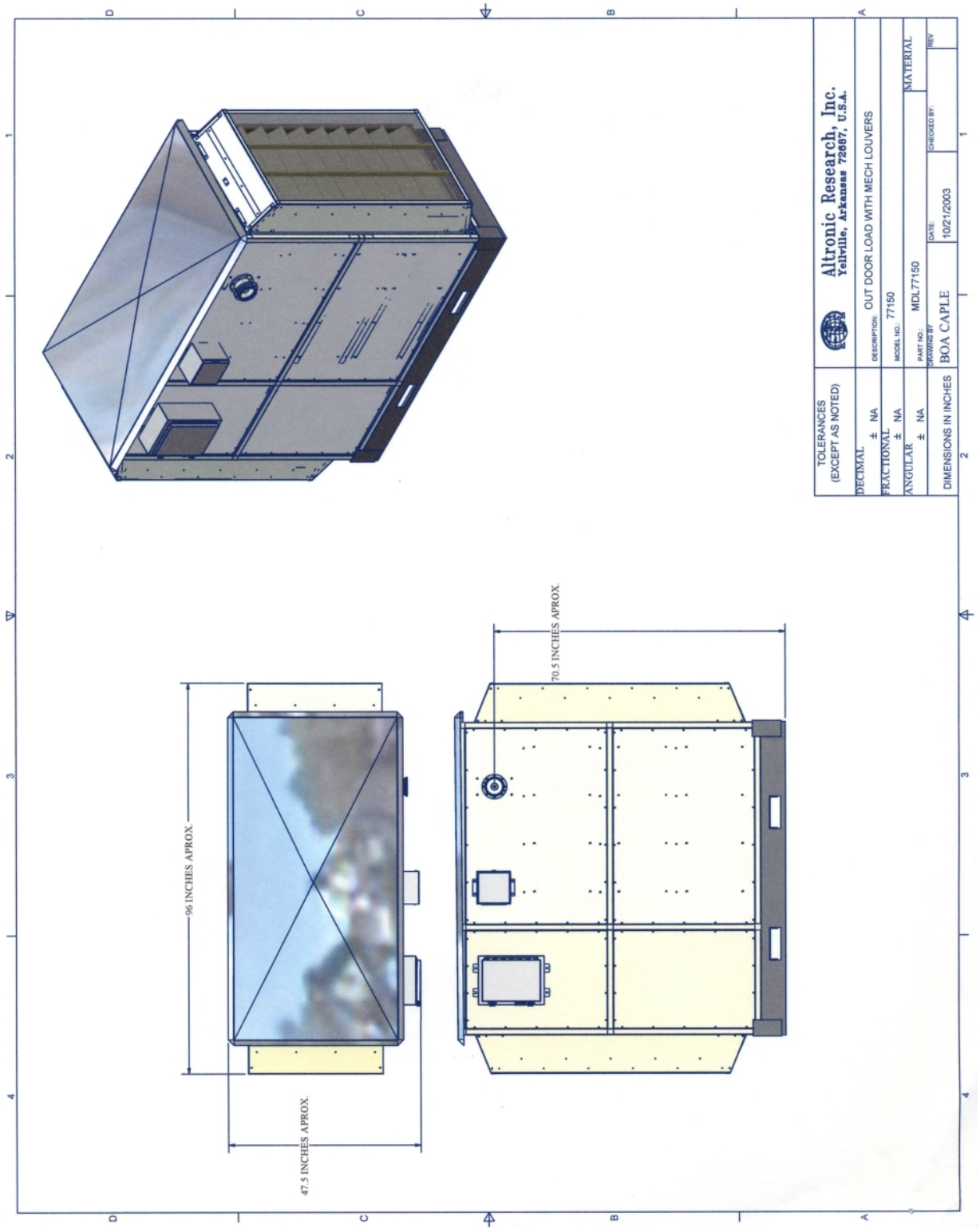
Fig. 5-2.
Tightening nut after attaching cable to louver operating rod

Fig. 5-3.
Reaching into partially opened louver to fasten and tighten cable

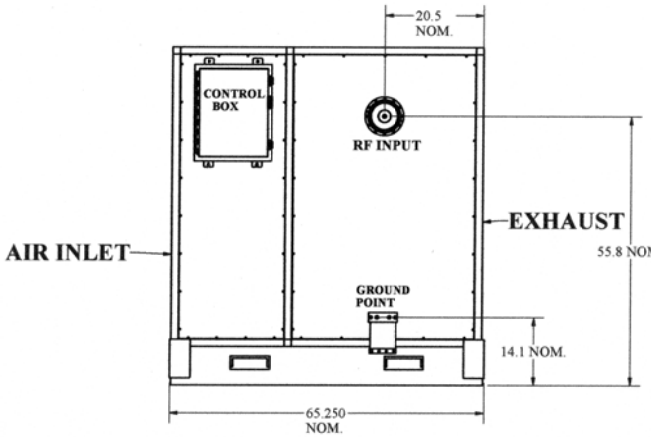
Fig. 5-4.
Reaching through the access port to disconnect cable

6-1. OUTLINE AND DIMENSIONS

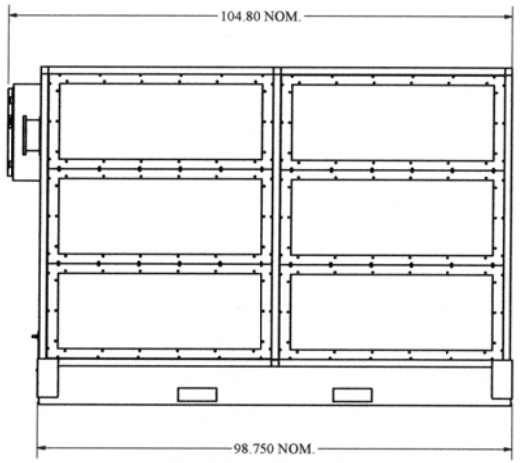



Altronic Research, Inc.
Yellville, Arkansas 72687, U.S.A.
TOLERANCES (EXCEPT AS NOTED)
DECIMAL ± NA
FRACTIONAL ± NA
ANGULAR ± NA
DESCRIPTION: OUT DOOR LOAD WITH MECH LOUVERS
MODEL NO.: 77150
PART NO.: MDL77150
MATERIAL
DRAWN BY: BOA CAPLE
DATE: 10/21/2003
CHECKED BY:
REV
DIMENSIONS IN INCHES
70.5 INCHES APROX.
96 INCHES APROX.
47.5 INCHES APROX.

77200/77300 INDOOR



RF VIEW

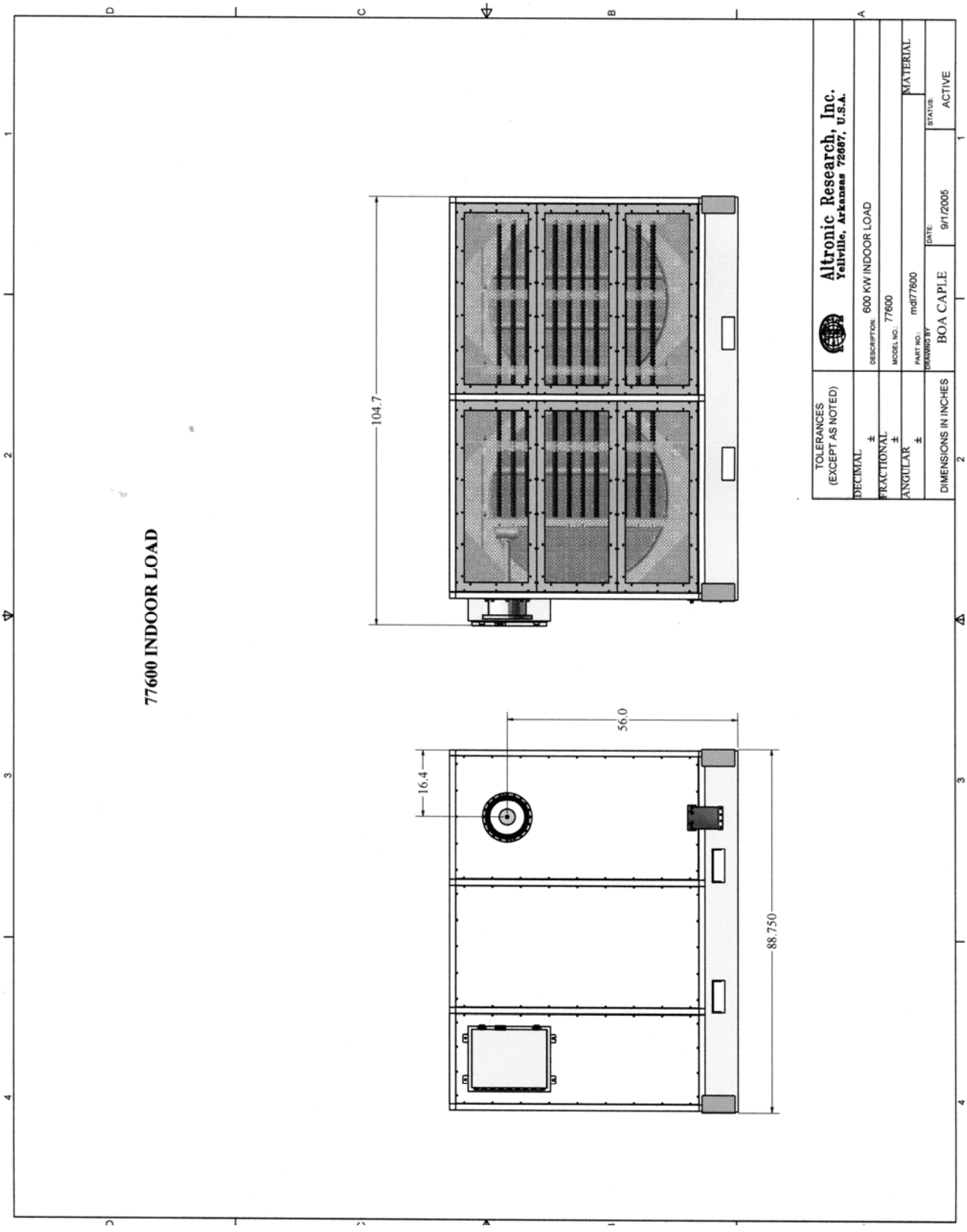


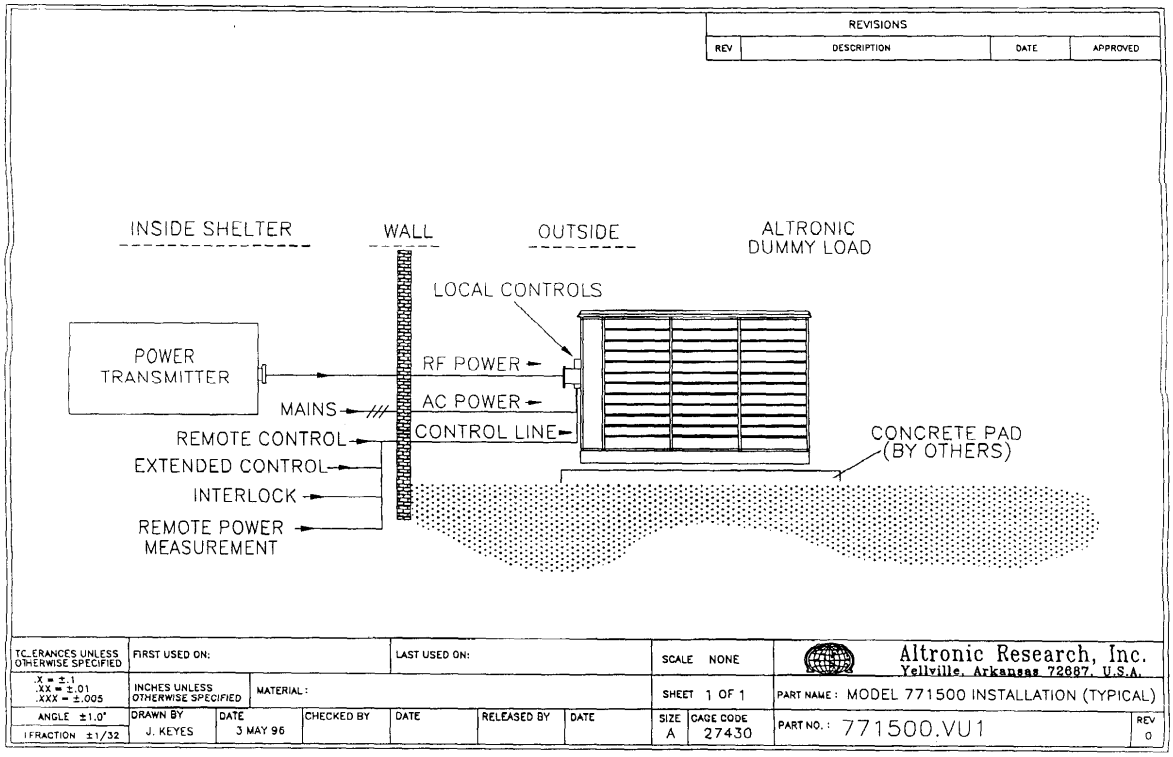
EXHAUST VIEW

NOTE:

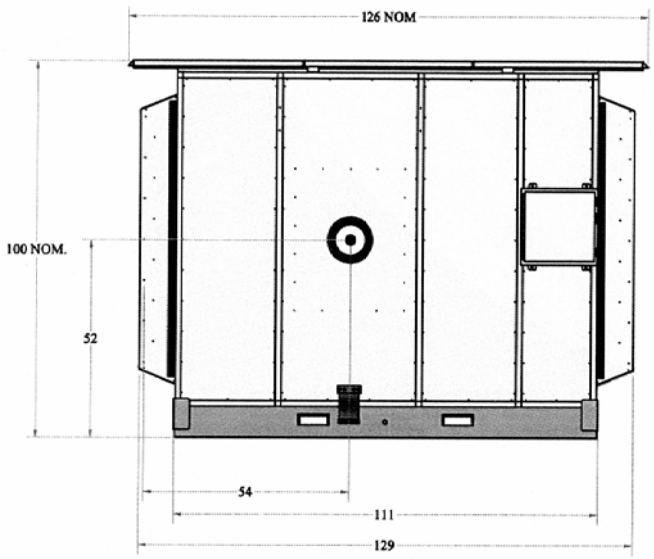
1. ALL DIMENSIONS ARE NOMINAL

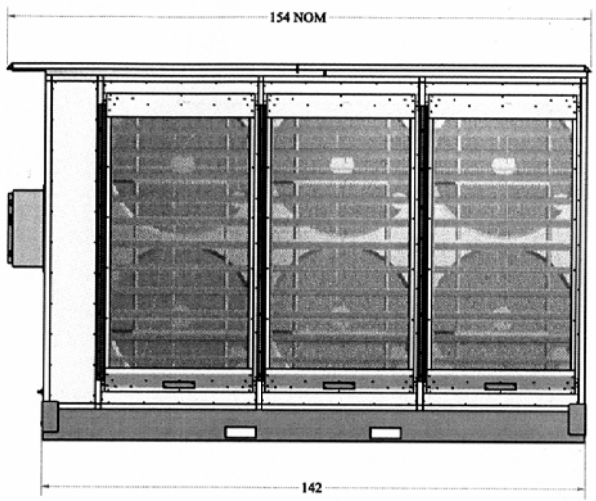
TOLERANCES (EXCEPT AS NOTED)	Altronic Research, Inc. Yellville, Arkansas 72687, U.S.A.			
DECIMAL ± NOM.	DESCRIPTION: 200/300 KW AIR COOLED LOAD			
FRACTIONAL ± NOM.	MODEL NO.: 77200/77300-INDOOR			
ANGULAR ± NOM	PART NO.: MDL77200-INDOOR			MATERIAL
DIMENSIONS IN INCHES	DRAWING BY: BOA CAPLE	DATE: 7/31/2002	CHECKED BY:	REV


77600 INDOOR LOAD
104.7
56.0
16.4
88.750
Altronic Research, Inc.
Yellville, Arkansas 72687, U.S.A.
TOLERANCES (EXCEPT AS NOTED)
DECIMAL ±
FRACTIONAL ±
ANGULAR ±
DIMENSIONS IN INCHES
DESCRIPTION: 600 K/W INDOOR LOAD
MODEL NO.: 77600
PART NO.: mdl77600
DRAWING BY: BOA CAPLE
DATE: 9/1/2005
MATERIAL
STATUS: ACTIVE


REVISIONS
REV
DESCRIPTION
DATE
APPROVED
INSIDE SHELTER
WALL
OUTSIDE
ALTRONIC
DUMMY LOAD
LOCAL CONTROLS
POWER
TRANSMITTER
RF POWER
MAINS
AC POWER
REMOTE CONTROL
CONTROL LINE
CONCRETE PAD
(BY OTHERS)
EXTENDED CONTROL
INTERLOCK
REMOTE POWER
MEASUREMENT
TOLERANCES UNLESS OTHERWISE SPECIFIED
.X = ±.1
.XX = ±.01
.XXX = ±.005
ANGLE ±1.0°
FRACTION ±1/32
FIRST USED ON:
LAST USED ON:
INCHES UNLESS OTHERWISE SPECIFIED
MATERIAL:
DRAWN BY
J. KEYES
DATE
3 MAY 96
CHECKED BY
DATE
RELEASED BY
DATE
SCALE NONE
SHEET 1 OF 1
SIZE
A
CAGE CODE
27430
Altronic Research, Inc.
Yellville, Arkansas 72687, U.S.A.
PART NAME: MODEL 771500 INSTALLATION (TYPICAL)
PART NO.: 771500.VU1
REV
0

77900 TO 771500



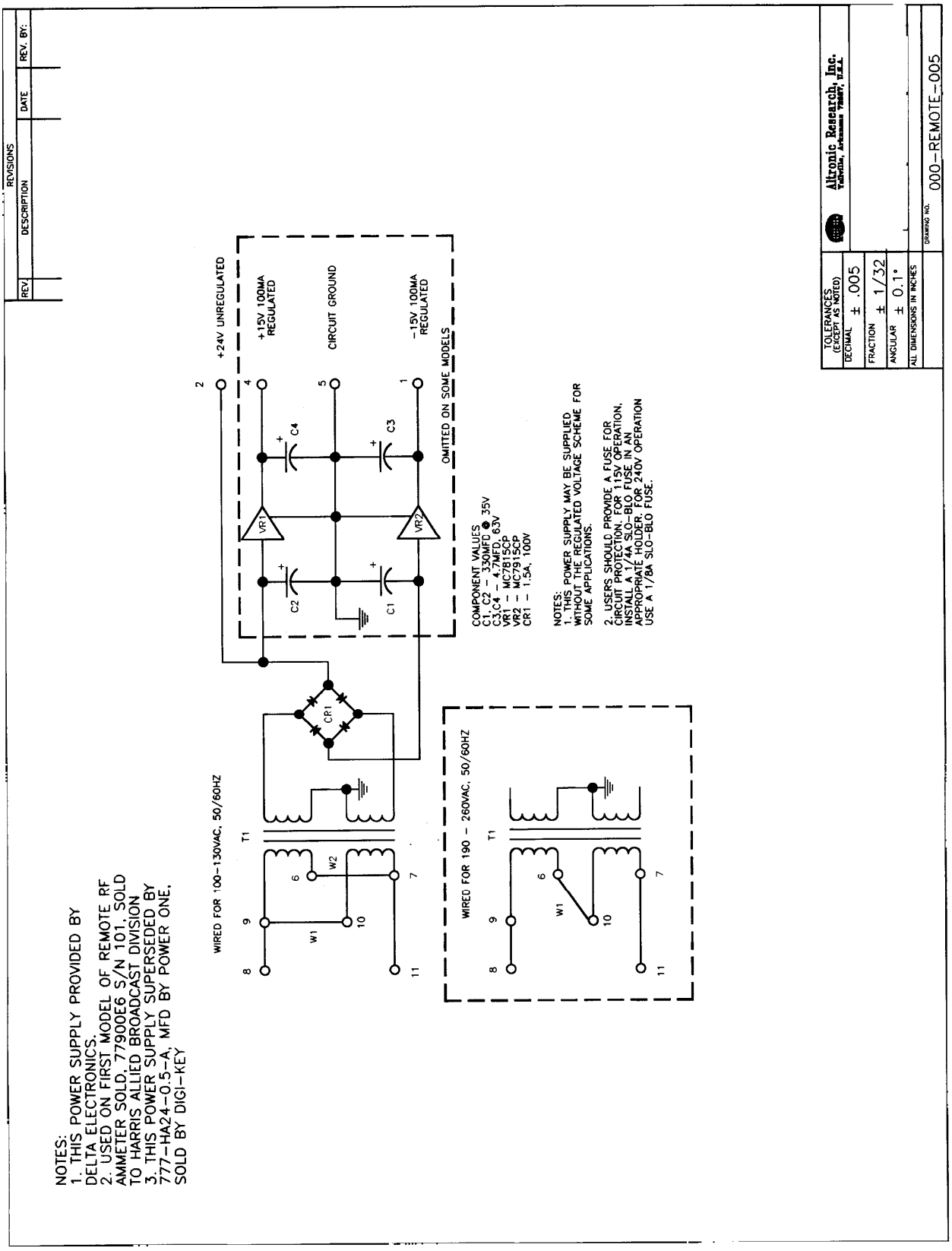


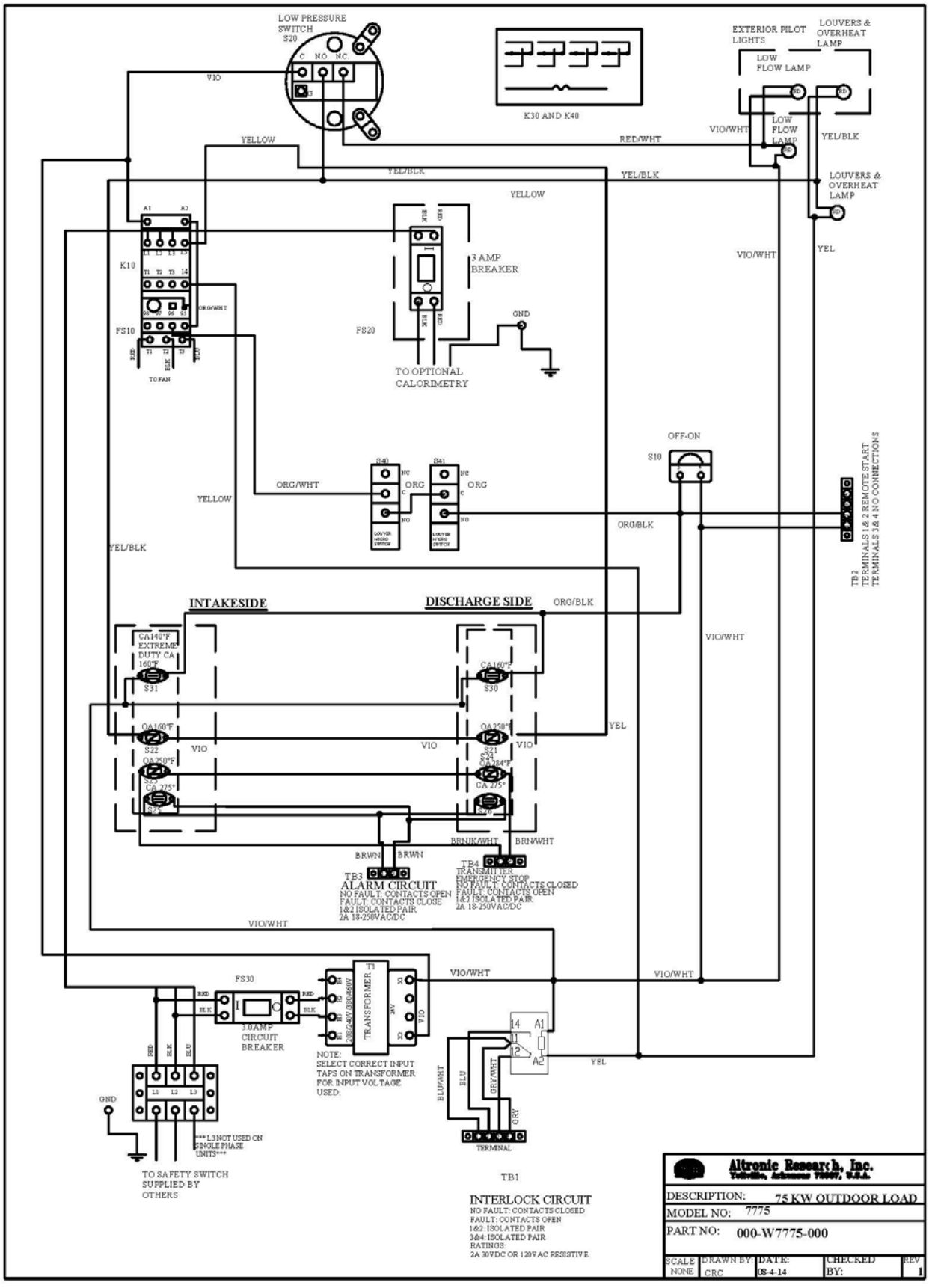
NOTE:

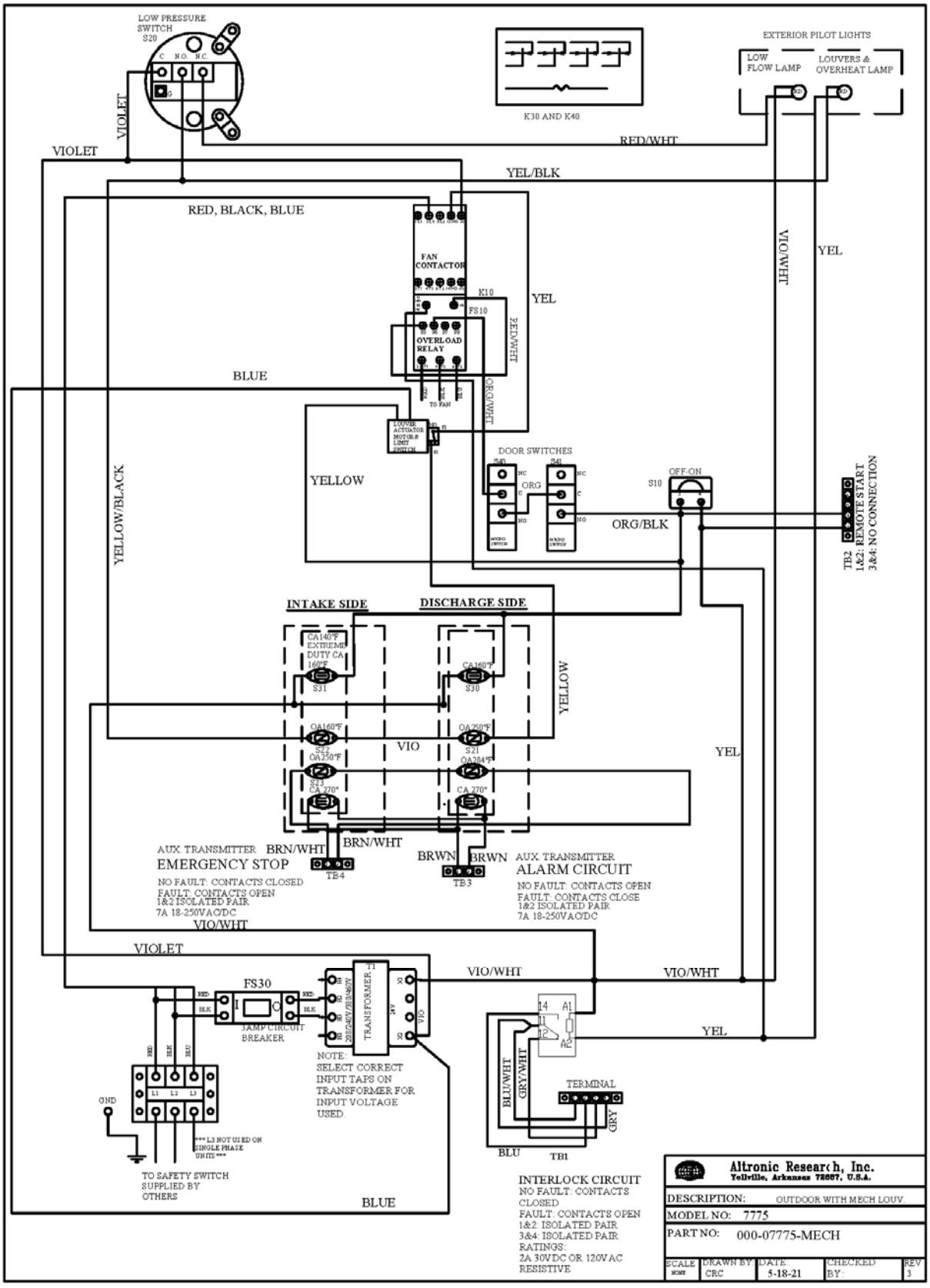
1. ALL DIMENSIONS ARE NOMINAL
2. SHOWN WITH MECHANICAL LOUVERS FIXED LOUVERS WILL BE WITHIN THE SAME FOOT PRINT

TOLERANCES (EXCEPT AS NOTED)	Altronic Research, Inc. Yellville, Arkansas 72687, U.S.A.		
DECIMAL ± NOM	DESCRIPTION: OUTLINE DRAWING		
FRACTIONAL ± NOM	MODEL NO.: 77900 / 771500		
ANGULAR ± NOM	PART NO.: MDL771500		MATERIAL
DIMENSIONS IN INCHES	DRAWING BY: BOA CAPLE	DATE: 7/23/2004	STATUS: ACTIVE

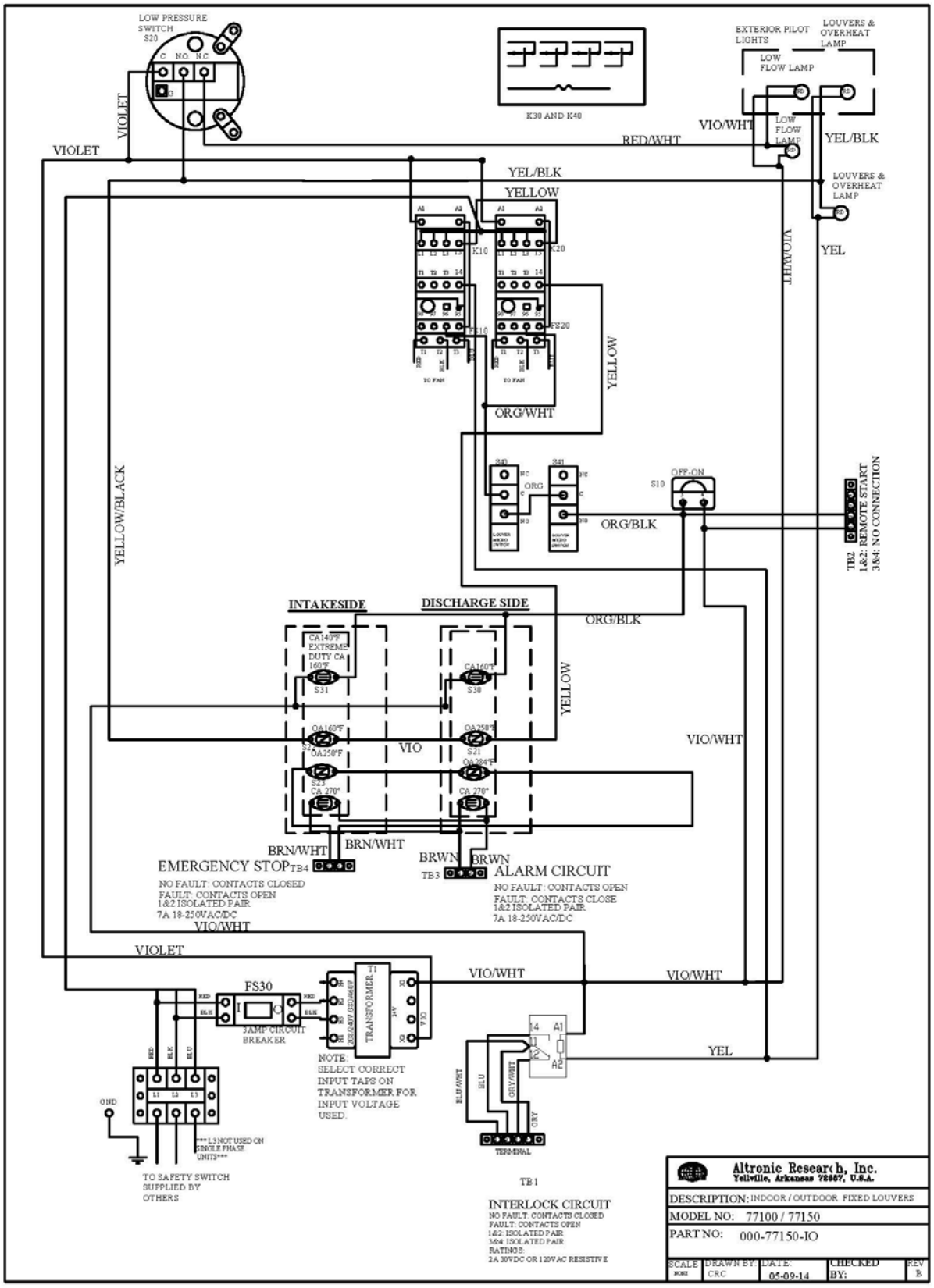
6-2. SCHEMATIC DIAGRAMS

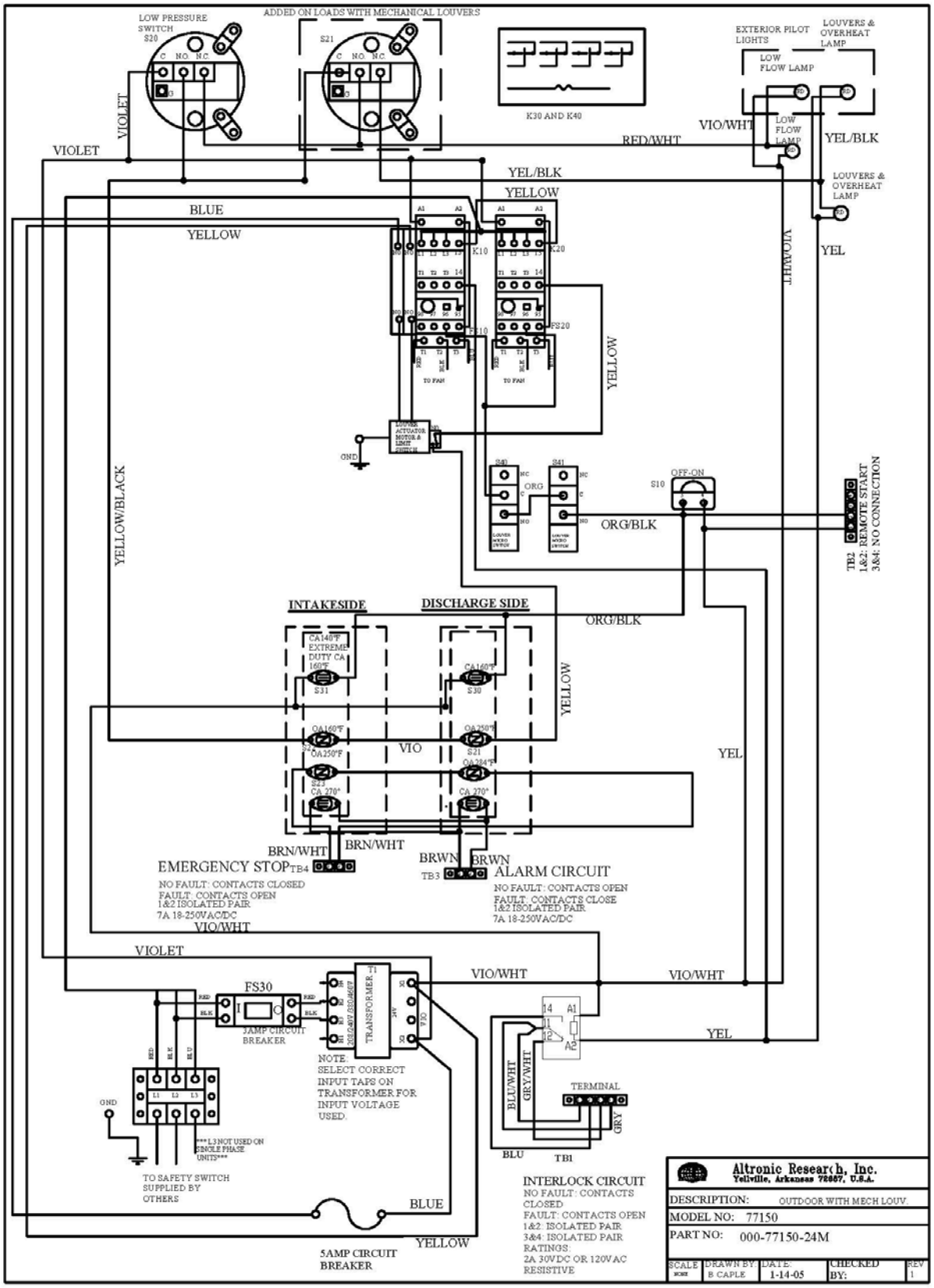


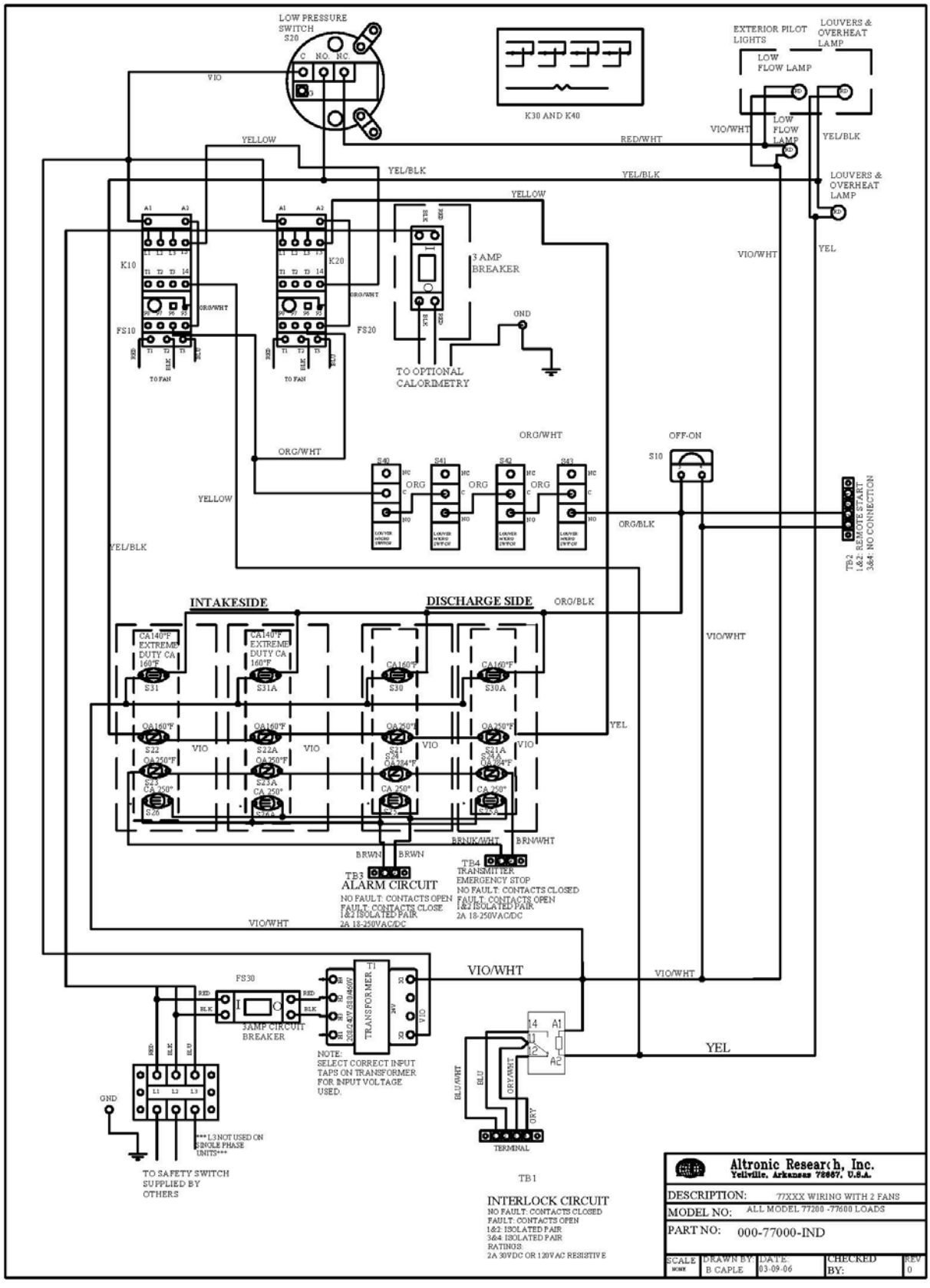

LOW PRESSURE SWITCH S20
C NO NC
VIO
K30 AND K40
EXTERIOR PILOT LIGHTS
LOUVERS & OVERHEAT LAMP
LOW FLOW LAMP
VIO/WHT
RED/WHT
YEL/BLK
YELLOW
LOUVERS & OVERHEAT LAMP
K10
FS10
TO FAN
3 AMP BREAKER
FS20
GND
TO OPTIONAL CALORIMETRY
OFF-ON
S10
S40
S41
ORG/WHT
ORG
ORG/BLK
TB2 TERMINALS 1&2 REMOTE START TERMINALS 3&4 NO CONNECTIONS
INTAKESIDE
DISCHARGE SIDE
CA140°F EXTREME DUTY CA 160°F
S31
S30
OA160°F
S22
OA250°F
S23
CA 275°
S24
S21
OA 284°F
CA 275°
S20
BRN/WHT
BRN
TB4
TRANSMITTER EMERGENCY STOP
NO FAULT: CONTACTS CLOSED
FAULT: CONTACTS OPEN
1&2 ISOLATED PAIR
2A 18-250VAC/DC
TB3
ALARM CIRCUIT
NO FAULT: CONTACTS OPEN
FAULT: CONTACTS CLOSE
1&2 ISOLATED PAIR
2A 18-250VAC/DC
FS30
3.0AMP CIRCUIT BREAKER
TRANSFORMER T1
NOTE:
SELECT CORRECT INPUT TAPS ON TRANSFORMER FOR INPUT VOLTAGE USED.
*** L3 NOT USED ON SINGLE PHASE UNITS***
TO SAFETY SWITCH SUPPLIED BY OTHERS
TERMINAL
TB1
INTERLOCK CIRCUIT
NO FAULT: CONTACTS CLOSED
FAULT: CONTACTS OPEN
1&2: ISOLATED PAIR
3&4: ISOLATED PAIR
RATINGS:
2A 30VDC OR 120VAC RESISTIVE
Altronic Research, Inc.
DESCRIPTION: 75 KW OUTDOOR LOAD
MODEL NO: 7775
PART NO: 000-W7775-000
SCALE NONE
DRAWN BY: CRC
DATE: 08-4-14
CHECKED BY:
REV 1

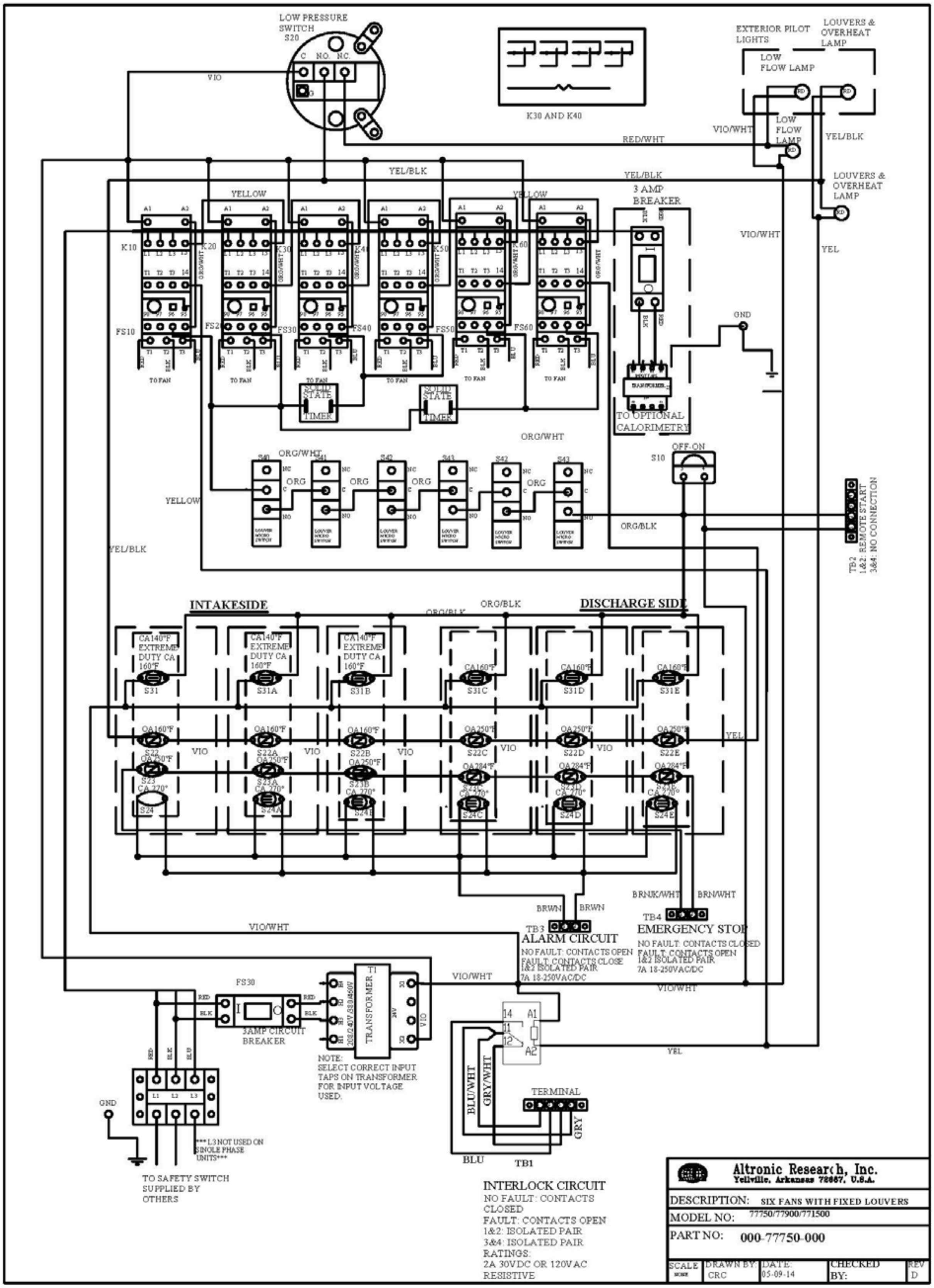


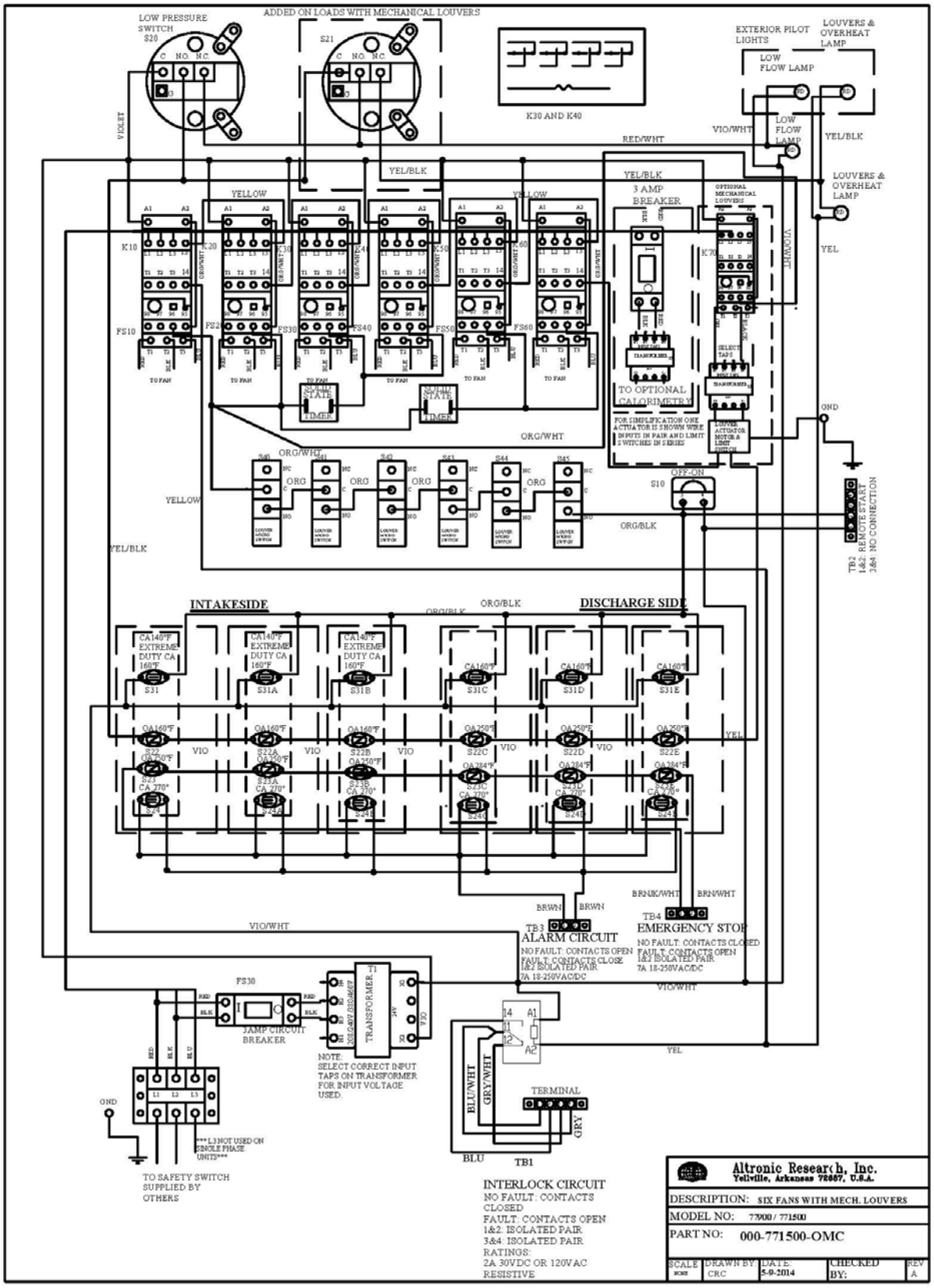
Model 7775 with Mechanical Louvers


LOW PRESSURE SWITCH S20
C NO NC
VIOLET
K30 AND K40
EXTERIOR PILOT LIGHTS
LOUVERS & OVERHEAT LAMP
LOW FLOW LAMP
VIO/WHT
RED/WHT
YEL/BLK
YELLOW
YEL
K10
K20
FS10
FS20
TO FAN
ORG/WHT
YELLOW/BLACK
S40
S41
ORG
OFF-ON
S10
ORG/BLK
TB2
1&2: REMOTE START
3&4: NO CONNECTION
INTAKESIDE
DISCHARGE SIDE
CA140°F EXTREME DUTY CA 160°F
S31
CA160°F
S30
OA160°F
OA250°F
S22
VIO
S21
OA250°F
OA284°F
S23
CA 270°
BRN/WHT
BRWN
EMERGENCY STOP TB4
NO FAULT: CONTACTS CLOSED
FAULT: CONTACTS OPEN
1&2 ISOLATED PAIR
7A 18-250VAC/DC
TB3
ALARM CIRCUIT
NO FAULT: CONTACTS OPEN
FAULT: CONTACTS CLOSE
1&2 ISOLATED PAIR
7A 18-250VAC/DC
VIOLET
FS30
3 AMP CIRCUIT BREAKER
T1
TRANSFORMER
NOTE:
SELECT CORRECT INPUT TAPS ON TRANSFORMER FOR INPUT VOLTAGE USED.
GND
L1 L2 L3
*** L3 NOT USED ON SINGLE PHASE UNITS***
TO SAFETY SWITCH SUPPLIED BY OTHERS
14 A1
A2
TERMINAL
TB1
INTERLOCK CIRCUIT
NO FAULT: CONTACTS CLOSED
FAULT: CONTACTS OPEN
1&2: ISOLATED PAIR
3&4: ISOLATED PAIR
RATINGS:
2A 30VDC OR 120VAC RESISTIVE
Altronic Research, Inc.
Yellville, Arkansas 72687, U.S.A.
DESCRIPTION: INDOOR / OUTDOOR FIXED LOUVERS
MODEL NO: 77100 / 77150
PART NO: 000-77150-IO
SCALE NONE
DRAWN BY: CRC
DATE: 05-09-14
CHECKED BY:
REV B


LOW PRESSURE SWITCH S20
ADDED ON LOADS WITH MECHANICAL LOUVERS
S21
K30 AND K40
EXTERIOR PILOT LIGHTS
LOUVERS & OVERHEAT LAMP
LOW FLOW LAMP
VIO/WHT
RED/WHT
YEL/BLK
VIOLET
YELLOW
BLUE
K10
K20
FS10
FS20
TO FAN
YELLOW/BLACK
GND
S40
S41
ORG
S10
OFF-ON
ORG/BLK
TB2
1&2: REMOTE START
3&4: NO CONNECTION
INTAKESIDE
DISCHARGE SIDE
CA140°F EXTREME DUTY CA 160°F
S31
CA160°F
S30
CA250°F
S21
CA 270°
S23
CA284°F
VIO
YEL
BRN/WHT
BRWN
EMERGENCY STOP TB4
NO FAULT: CONTACTS CLOSED
FAULT: CONTACTS OPEN
1&2 ISOLATED PAIR
7A 18-250VAC/DC
TB3
ALARM CIRCUIT
NO FAULT: CONTACTS OPEN
FAULT: CONTACTS CLOSE
1&2 ISOLATED PAIR
7A 18-250VAC/DC
FS30
3AMP CIRCUIT BREAKER
TRANSFORMER
NOTE:
SELECT CORRECT INPUT TAPS ON TRANSFORMER FOR INPUT VOLTAGE USED.
L1 L2 L3
*** L3 NOT USED ON SINGLE PHASE UNITS***
TO SAFETY SWITCH SUPPLIED BY OTHERS
5AMP CIRCUIT BREAKER
BLU/WHT
GRY/WHT
TERMINAL
GRY
BLU
TB1
INTERLOCK CIRCUIT
NO FAULT: CONTACTS CLOSED
FAULT: CONTACTS OPEN
1&2: ISOLATED PAIR
3&4: ISOLATED PAIR
RATINGS:
2A 30VDC OR 120VAC
RESISTIVE
Altronic Research, Inc.
Yellville, Arkansas 72687, U.S.A.
DESCRIPTION: OUTDOOR WITH MECH LOUV.
MODEL NO: 77150
PART NO: 000-77150-24M
SCALE: NONE
DRAWN BY: B CAPLE
DATE: 1-14-05
CHECKED BY:
REV: 1


LOW PRESSURE SWITCH S20
C NO NC
VIO
K30 AND K40
EXTERIOR PILOT LIGHTS
LOUVERS & OVERHEAT LAMP
LOW FLOW LAMP
VIO/WHT
RED/WHT
YEL/BLK
YELLOW
K10
K20
FS10
FS20
3 AMP BREAKER
TO OPTIONAL CALORIMETRY
GND
ORG/WHT
OFF-ON
S10
S40
S41
S42
S43
ORG
ORG/BLK
TB2 REMOTE START 1&2: NO CONNECTION 3&4: NO CONNECTION
INTAKE SIDE
DISCHARGE SIDE
CA140°F EXTREME DUTY CA 160°F
S31
S31A
CA160°F
S30
S30A
OA160°F
S22
S22A
OA250°F
S21
S21A
OA284°F
S23
S23A
CA 250°
S26
S27A
S24
S24A
VIO
YEL
BRN/WHT
BRN
TB3 ALARM CIRCUIT
NO FAULT: CONTACTS OPEN
FAULT: CONTACTS CLOSE
1&2 ISOLATED PAIR
2A 18-250VAC/DC
TB4 TRANSMITTER EMERGENCY STOP
NO FAULT: CONTACTS CLOSED
FAULT: CONTACTS OPEN
1&2 ISOLATED PAIR
2A 18-250VAC/DC
FS30
3AMP CIRCUIT BREAKER
T1 TRANSFORMER
NOTE: SELECT CORRECT INPUT TAPS ON TRANSFORMER FOR INPUT VOLTAGE USED.
RED
BLK
BLU
L1 L2 L3
*** L3 NOT USED ON SINGLE PHASE UNITS***
TO SAFETY SWITCH SUPPLIED BY OTHERS
14 A1 12 A2
BLU/WHT
ORY/WHT
ORY
TERMINAL
TB1
INTERLOCK CIRCUIT
NO FAULT: CONTACTS CLOSED
FAULT: CONTACTS OPEN
1&2: ISOLATED PAIR
3&4: ISOLATED PAIR
RATINGS:
2A 30VDC OR 120VAC RESISTIVE
Altronic Research, Inc.
Yellville, Arkansas 72687, U.S.A.
DESCRIPTION: 77XXX WIRING WITH 2 FANS
MODEL NO: ALL MODEL 77200 -77600 LOADS
PART NO: 000-77000-IND
SCALE NONE
DRAWN BY B CAPLE
DATE 03-09-06
CHECKED BY:
REV 0


LOW PRESSURE SWITCH S20
K30 AND K40
EXTERIOR PILOT LIGHTS
LOUVERS & OVERHEAT LAMP
LOW FLOW LAMP
3 AMP BREAKER
TO OPTIONAL CALORIMETRY
OFF-ON
S10
TB2
1&2: REMOTE START
3&4: NO CONNECTION
INTAKESIDE
DISCHARGE SIDE
TB3
ALARM CIRCUIT
NO FAULT: CONTACTS OPEN
FAULT: CONTACTS CLOSE
1&2 ISOLATED PAIR
7A 18-250VAC/DC
TB4
EMERGENCY STOP
NO FAULT: CONTACTS CLOSED
FAULT: CONTACTS OPEN
1&2 ISOLATED PAIR
7A 18-250VAC/DC
FS30
3AMP CIRCUIT BREAKER
TRANSFORMER
NOTE: SELECT CORRECT INPUT TAPS ON TRANSFORMER FOR INPUT VOLTAGE USED.
L3 NOT USED ON SINGLE PHASE UNITS
TO SAFETY SWITCH SUPPLIED BY OTHERS
TERMINAL
TB1
INTERLOCK CIRCUIT
NO FAULT: CONTACTS CLOSED
FAULT: CONTACTS OPEN
1&2: ISOLATED PAIR
3&4: ISOLATED PAIR
RATINGS:
2A 30VDC OR 120VAC RESISTIVE
Altronic Research, Inc.
Yellville, Arkansas 72687, U.S.A.
DESCRIPTION: SIX FANS WITH FIXED LOUVERS
MODEL NO: 77750/77900/771500
PART NO: 000-77750-000
SCALE NONE
DRAWN BY CRC
DATE 05-09-14
CHECKED BY:
REV D


ADDED ON LOADS WITH MECHANICAL LOUVERS
LOW PRESSURE SWITCH S20
S21
K30 AND K40
EXTERIOR PILOT LIGHTS
LOUVERS & OVERHEAT LAMP
LOW FLOW LAMP
VIO/WHT
YEL/BLK
RED/WHT
3 AMP BREAKER
OPTIONAL MECHANICAL LOUVERS
K10
K70
FS10
FS20
FS30
FS40
FS50
FS60
SOLID STATE TIMER
TO OPTIONAL CALORIMETRY
ORG/WHT
ORG/BLK
OFF-ON
S10
GND
TB2
1&2: REMOTE START
3&4: NO CONNECTION
INTAKE SIDE
DISCHARGE SIDE
CA140°F EXTREME DUTY CA 160°F
OA160°F
OA250°F
OA284°F
CA 270°
VIO
YEL
BRWN
BRN/WHT
TB3
ALARM CIRCUIT
NO FAULT: CONTACTS OPEN
FAULT: CONTACTS CLOSE
1&2 ISOLATED PAIR
7A 18-250VAC/DC
TB4
EMERGENCY STOP
NO FAULT: CONTACTS CLOSED
FAULT: CONTACTS OPEN
1&2 ISOLATED PAIR
7A 18-250VAC/DC
FS30
JAMP CIRCUIT BREAKER
T1
TRANSFORMER
NOTE:
SELECT CORRECT INPUT TAPS ON TRANSFORMER FOR INPUT VOLTAGE USED.
GND
*** L3 NOT USED ON SINGLE PHASE UNITS***
TO SAFETY SWITCH SUPPLIED BY OTHERS
TERMINAL
BLU/WHT
GRY/WHT
GRY
BLU
TB1
INTERLOCK CIRCUIT
NO FAULT: CONTACTS CLOSED
FAULT: CONTACTS OPEN
1&2: ISOLATED PAIR
3&4: ISOLATED PAIR
RATINGS:
2A 30VDC OR 120VAC RESISTIVE
Altronic Research, Inc.
Yellville, Arkansas 72687, U.S.A.
DESCRIPTION: SIX FANS WITH MECH. LOUVERS
MODEL NO: 77000 / 771500
PART NO: 000-771500-OMC
SCALE: NONE
DRAWN BY: CRC
DATE: 5-9-2014
CHECKED BY:
REV A

6.3 REPLACEMENT PARTS LIST

77000 SERIES

(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

77000 SERIES COAXIAL LOAD

Impedance..... 50 ohms nominal

VSWR @ 540 to 1750 kHz ..... 1.1:1 (1.05 or better available)

Connectors:

Model 77000E3 3-1/8" EIA swivel flange
Model 77000F3 3-1/8" Unflanged flush
Model 77000R3 3-1/8" Unflanged recessed
Model 77000E4 4-1/16" EIA fixed flange
Model 77000E6 6-1/8" EIA fixed flange
Model 77000E9 9-3/16"EIA fixed flange

Power Rating @ Sea Level.....50 to 1500 kW

Frequency Range .....540 to 1750 kHz

Cooling Method..... Forced Air

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

Fan Assembly ..... Belt-drive six-bladed cast aluminum

AC Power Requirements:

7775..... 115 VAC @ 15 Amp., 1 phase 60 Hz
7775..... 208-230 VAC @ 7 Amp., 1 phase 50/60 Hz
77100/77150..... 230 VAC @ 10 Amp., 1 phase, 50/60 Hz
77100/77150..... 230 VAC @ 14 Amp., 3 phase, 50/60 Hz
77100/77150..... 400 VAC @ 8 Amp., 3 phase, 50/60 Hz
77100/77150.....460 VAC @ 7 Amp., 3 phase, 50/60 Hz
77200/77300..... 200-240 VAC @ 20 Amp. 3 phase, 60/50 Hz
77200/77300..... 380-460 VAC @ 10 Amp. 3 phase, 50/60 Hz
77450/77600..... 208-230 VAC @ 20 Amp., 3 phase, 60/50 Hz
77450/77600..... 380-460 VAC @ 10 Amp., 3 phase, 60/50 Hz
77900/771500.....200-240 VAC @ 50 Amp., 3 phase, 50/60 Hz
77900/771500.....400-480 VAC @ 38 Amp., 3 phase, 50/60 Hz

Finish..... Beige Splatter

Serial No._____Frequency_____Resistance_____ dBA@3ft 90dBA

Model_____Inspected by_____Date_____

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

CRAFTED WITH PRIDE IN ARKANSAS, U.S.A

APPENDIX A

COMPONENT MANUFACTURER'S DOCUMENTS

PO BOX 249
YELLVILLE AR 72687-0249
USA

Altronic Research Inc.

Preservation and Corrosion Prevention Techniques

for

Omegaline® Air-Cooled RF Loads

Improving product life in hostile environments

1. Purpose

The purpose of this manual is to provide instructions for technical personnel who are required to operate and maintain air-cooled RF loads in hostile environments.

2. Applicability

These instructions are applicable to equipment designed and manufactured by Altronic Research Inc. for use by the broadcast and scientific industries. These instructions do not apply to equipment manufactured by others which may, from time-to-time, be supplied as accessory equipment for use with Altronic Research Inc. loads or systems.

3. General Procedure

The object of any preservation program is to maintain and extend the useful life of the target equipment. The essential elements of the program are:

A. Preservation of the finish

B. Prevention of dissimilar metals corrosion

C. Prevention of surface corrosion and pitting

D. Preservation of the electrical components

E. Resistor maintenance

The procedures set forth in this manual are the same procedures that one would use to preserve and protect an aircraft exposed to hostile environments. We have consciously copied the basic procedures recommended for aviation because of the similarity of materials and the requirement for active intervention to prevent damage.

In many cases, the remedy prescribed will be the same regardless of the material. The primary emphasis in any corrosion prevention program is cleanliness. When components are clean and dry, they do not corrode.

It is important for the technician to understand that the chemicals and procedures prescribed are the minimum satisfactory measures. It may be necessary to alter the frequency of application in order to obtain satisfactory control. Therefore, frequent inspections of the equipment are recommended until the operator has experience with the equipment and site conditions and can predict with some accuracy the need for preventive measures.

4. Safety Precautions

This equipment presents an extreme hazard to technicians and mechanics if it is not properly prepared for servicing. Prior to any attempt to work on this equipment, take the following safety precautions:

a. Disconnect or lockout all sources of RF energy

b. Disconnect or lockout AC Mains power

c. Prepare a safe area to receive the louver assemblies from the load.
[These assemblies are lightweight and subject to being blown about. Use 2 persons to handle them and lay them flat if they are detached from the load.]

5. Specific procedures

A. Preservation of the finish.

This equipment is finished with a durable semi-gloss enamel paint system applied over a pretreated surface. The finish is very durable and needs only regular washing to maintain its appearance and corrosion protection properties. There is no advantage to using strong detergents on the finish. We recommend that products suitable for washing an automobile be used at the dilution recommended by the manufacturer.

In the event that the finish of the load has been mechanically damaged, it will be necessary to prepare the surface and recoat it. We recommend that this procedure be undertaken by a person who has dealt with corrosion on aircraft surfaces.

a. Clean the surface to be repaired. Use fresh water and mild detergent to remove all traces of sand, salt or oil.

b. Lightly sand the damaged area with 360 grit wet or dry silicon carbide paper. Use care to feather all edges of broken paint. Never use steel wool, a steel brush, jeweler's rouge or emery abrasives for this step.

c. Some areas may have progressed to a stage where pitting is evident. Pits should be treated with a phosphoric acid base corrosion removing compound and thoroughly cleaned prior to conversion coating and painting. Use MIL-C-10578D Compound, Corrosion Removing and Metal Conditioning, Type IV in accordance with the included instructions. Available from Altronic Research Inc. [Part Nr. 000-77000-CCR].

d. Clean the surface again.

e. Use Gardobond EPP pretreatment (formerly called Permatreat EPP) available from the factory or www.ChemetallOakite.com to prepare the surface of the metal for new paint. Ensure that the directions are followed and that excess product solution is properly disposed of.

f. Allow the conversion coating to air dry, then wipe the surface with a clean cotton towel.

g. The surface is now ready to be painted, if that is required. For areas less than 12 square inches [about 80 square centimeters], it is best to brush the paint on the surface. Use a single coat and allow it to air dry for ~2 hours before handling. In cold or damp conditions, the paint may require much longer to dry fully. We do not recommend application of paint or conversion coating when the temperature of the surface is less than 50°F [15°C].

h. Paint which matches the finish and color of the load is available from the factory. Order Paint, Modular Ivory, Touchup [Part Nr. 000-77000-PNT].

In the event that the finish of the base frame of the load has been mechanically damaged, it will be necessary to prepare the surface, prime the base metal and recoat it.

i. Clean the surface to be repaired. Use fresh water and mild detergent to remove all traces of sand, salt or oil.

j. Lightly sand the damaged area with 360 grit wet or dry silicon carbide paper. Use care to feather all edges of broken paint.

k. Some areas may have progressed to a stage where pitting is evident. Pits should be treated with a phosphoric acid base corrosion removing compound and thoroughly cleaned prior to conversion coating and painting. Use MIL-C-10578D Compound, Corrosion Removing and Metal Conditioning, Type IV in accordance with the included instructions. Available from Altronic Research Inc. [Part Nr. 000-77000-CCR].

l. Clean the surface again.

m. Use the Altronic Research Inc. Paint, Oil Base Metal Primer [Part Nr. 000-77000-PRI] to prepare the surface of the metal for new paint. Ensure that the directions in the kit are followed and that excess product is properly disposed of.

n. Allow the primer coat to air dry.

o. The surface is now ready to be painted. For areas less than 12 square inches [about 80 square centimeters], it is best to brush the paint on the surface. Use a single coat and allow it to air dry for ~2 hours before handling. In cold or damp conditions, the paint may require much longer to dry fully. We do not recommend application of paint or conversion coating when the temperature of the surface is less than 50°F [15°C].

p. Paint which matches the finish and color of the base frame is available from the factory. Order Paint, Rust Resist, Seal Brown [Part Nr. 000-77000-BSP].

B. Prevention of dissimilar metals corrosion

This is a matter which was addressed in the design of the load to the extent possible. There are areas where dissimilar metals are necessarily in close proximity, if not in contact. These areas need more frequent attention, including regular washings and treatment with a moisture-displacing corrosion preventive compound. These areas are: the resistor clip/resistor interface, the resistor clip/mounting strip interface, the RF conductor/load face panel interface and the RF conductor/RF connector center conductor interface.

a. Make unit safe for servicing in accordance with paragraph 4 above.

b. Open all louver assemblies on the load.

c. Wash entire unit inside with potable water. Pay particular attention to the resistor strips.

d. Allow the inside of the unit to completely dry.

e. Spray a light coating on the resistor ends, the resistor clips and the RF conductor attachments with "Boeshield T-9®".

f. Allow the T-9® to air dry. When the load is brought back to full power, smoke could be present temporarily.

C. Prevention of surface corrosion and pitting

Generally, this process is devoted to maintaining the integrity of the finish on the load components. Surface corrosion and pitting are the result of electrolytic cells on the surface of the material. These cells are usually composed of mineral or metallic contaminants, moisture and the base metal. There must be a break in the surface finish for a cell to be established. The paint system prevents cell establishment by encapsulating the metal underneath it. A conversion coating prevents corrosion by reacting with the upper layer of the metal and "passivating" it. The process of passivation is basically one of capturing all of the metal ions which might react with contaminants and moisture to form a cell. The conversion coating is not a sacrificial element, but instead one which forms a very thin layer of non-reactive metal on the surface of exposed material. Any break in the non-reactive layer will quickly allow corrosion attack.

Prevention of corrosion attack on the surface of metals requires cleanliness and denial of access to the metal underneath the finish. It is obvious that this requires cleaning, inspection and prompt treatment of problem areas.

a. Inspect the exterior of the load, especially seams, crevices and the area around bolt heads. Look for white deposits which may indicate the presence of corrosion. Use a soft brush, similar in stiffness to a toothbrush, to brush away any deposits found. Examine the freshly brushed area for signs of failure of the conversion coating or the paint.
b. If any failed areas are found, treat them in accordance with paragraph 5A.

D. Preservation of electrical components

The electrical components of the load are designed for continuous service in hostile environments provided that the integrity of the control box is maintained and provided that it remains latched except when required to be opened for service.

We do not recommend the application of sprays, conformal coatings or dielectric compounds inside the control box. The factory treatment of all electrical components is designed to minimize exposure rather than encapsulate the components.

In the event that the interior of the control box becomes contaminated and there is the possibility of corrosion, we recommend that the user wash the interior of the control box and installed components with a fine mist of distilled water. Following the washing process, dry the box completely with a dry source of warm, clean air.

E. Resistor Maintenance

During the course of operation of the load, the contact between the ends of the resistors and the clips may deteriorate. This problem has only been reported in situations where corrosive atmospheric conditions prevail. We have applied extra metallization to the ends of the resistors in this load and do not expect this to be a problem. However, the user should be aware of the nature of the problem, the probable indications of the problem and the solution.

- Since this is a contact degradation problem, the usual indication is some degree of arcing in the resistor bank. This is very modest arcing and may go unnoticed for some time. For this reason, it is good practice to periodically observe the operating load, especially if it is possible to do so in low light conditions.

- Look for arcs, and even if intermittent, attempt to identify their location. It will be necessary to investigate further to determine the extent and nature of the problem.

- The solution is to remove the resistors and return them to the factory for reprocessing. If the condition is discovered early in the failure, there is every likelihood that all of the resistors can be reused. If the failure is allowed to progress, resistor replacement becomes necessary.

6. Materials

a. Compound, Corrosion Removing and Metal Conditioning, Type IV [P/N 000-77000-CCR]

This is a kit of the materials required to clean pits and larger areas of physical damage. The kit contains 250ml of compound, an assortment of corrosion removal brushes and acid

application brushes, 360 grit silicon carbide abrasive paper and a supply of paper towels. Instructions are enclosed in the kit.

b. Gardobond EPP Pretreatment (formerly called Permatreat EPP)
This product is available from the factory or at www.ChemetallOakite.com.

c. Paint, Oil Base, Grey, Metal Primer [Part Nr. 000-77000-PRI]
This product is available in quarts (.947liters) and gallons (3.785 liters). It may be purchased locally or from the factory.

d. Paint, Rust Resist, Seal Brown [Part Nr. 000-77000-BSP].
This product is available in quarts (.947liters) and gallons (3.785 liters). It may be purchased locally or from the factory.

e. Boeshield T-9® This is a preservative compound which dries to leave a waxy surface film. It is available directly from the manufacturer, PMS Products, Holland, Michigan, USA. The Sales Department telephone number is 800-962-1732.

7. Factory Assistance

The technicians at the factory are always available for advice and assistance. You may contact them via FAX, e-mail or telephone. Our numbers are:

FAX 001-870-449-6000

Email customerservice@altronic.com

Telephone: US WATS = 800-482-5623

Direct dial: 001-870-449-4093