

ALTRONIC RESEARCH, INC.

P. O. BOX 249

YELLVILLE, ARKANSAS 72687-0249

U.S.A.

MODEL 77450VEH-SW

COAXIAL LOAD 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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PRECAUTIONS

WARNING

This device may start automatically! If the ambient temperature exceeds the values set by the thermal protection circuit, *the fan will start automatically.*

⚡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.

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 77450 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 77450VEH-SW Coaxial Load is designed to safely dissipate a maximum of 450,000 watts of electrical energy over a frequency range of DC to 24 MHz.

1-2. Equipment Supplied. The Model 77450VEH-SW Coaxial Load is supplied with a standard RF connector. The designation is:

6-1/8" Fixed Flange: Model 77450VEH-SW-E6

The Model 77450VEH-SW is fitted with louvers to direct the air intake and discharge flows. The standard power supply voltage is:

380-460VAC, three-phase, 60 Hz

1-3. Equipment Required But Not Supplied. The Model 77450VEH-SW 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 77450VEH-SW Coaxial Load is enclosed in a single aluminum case which is painted with a durable acrylic finish. Two louvered end panels are provided. These panels are not installed prior to shipment and must be installed at the final use site. Power connection is made to the safety switch which is mounted on the side of the load enclosure

immediately beneath the control box. The enclosure contains one belt-driven 7.5 HP 42" diameter fan assembly.

- 1-5. Electrical Description.** The Model 77450VEH-SW contains a 75 ohm non-reactive resistor assembly capable of dissipating 450,000 watts of applied electrical energy at sea level at frequencies between DC and 24 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 contactor. Power is supplied to the contactor whenever the equipment is attached to the correct power supply, the Safety Switch is "ON" and the "OFF/ON" switch is placed in the "ON" position. The transmitter interlock circuit consists of three thermal switches, two limit switches and one differential pressure switch 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 properly installed, none of the over-temperature thermal switches sense an excessive temperature and the differential pressure switch senses positive pressure within the cabinet.
- 1-6. Mechanical Description.** The Model 77450VEH-SW RF Coaxial Load is a 75 ohm non-reactive resistor assembly which is cooled by forced ambient air. The fan assembly is a 7.5 HP belt-driven, 42-inch diameter device. Air is drawn in through a removable louver, enters the resistor assembly, flows horizontally through it and then out of the enclosure via a louvered panel.
- 1-7. General Principle of Operation.** After ascertaining that the Model 77450VEH-SW 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 fan.
- 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-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 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 and legs visually OK.
- Individual louver 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 ± 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 77450VEH-SW 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 77450VEH-SW should have an ambient temperature below 122°F(50°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 450,000 watts. This is equal to 1,535,850 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. Special motors, wiring and weatherproofing measures are incorporated at the factory. The load is designed to operate in ambient conditions without further modification.

3-6. Mounting. The Model 77450VEH-SW is designed to be trailer-mounted and should be securely attached to the floor. The enclosure rests on a fixed steel base which should be level when installed.

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 77450VEH-SW: 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 side 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 side of the enclosure. Customer connection of the power supply for the load is made to the safety switch located immediately below the control box.
- c. The remote control terminal strip is in the main control box. Connect a closed pair of terminals across this strip to force remote fan operation.
- d. The transmitter interlock is attached to two pairs of normally closed terminals on 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.

3-8. Adjustments. The drive belts for the fan 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).

The differential pressure switch is located inside the main control box. It is adjusted by starting the fan and adjusting the set point adjusting screw clockwise to increase the set point pressure or counter-clockwise to decrease the set point pressure. We recommend that the set point pressure be increased until the LOW FLOW lamp illuminates, then decrease the set point pressure until the lamp is dark. Stop the fan, then restart it to see if the lamp illuminates briefly, then goes dark. If necessary, decrease the set point pressure (by turning counter-clockwise) one-half turn at a time until the lamp is dark in normal fan operation.

SECTION IV

THEORY OF OPERATION

4-1. General. The Model 77450VEH-SW contains a 75 ohm non-reactive resistor assembly which is cooled by forced air supplied by a dual belt-driven fan assembly. Control of the fan and of the transmitter interlock circuit is accomplished with an OFF/ON switch, two microswitches and four thermal switches.

4-2. Control Circuits. There are two control circuits in the Model 77450VEH-SW. One circuit controls the fan and the other circuit controls the transmitter interlock system. Both circuits derive power from the 26VAC Control Transformer. The main ON-OFF switch [S10] is a turn-to-close switch on the side of the control box. It connects to transformer secondary terminal X1 and current flows through the two louver limit switches to Contactor terminal A2, thence through the contactor coil to terminal A1 and returns to transformer secondary terminal X2. Two 160°F thermal switches [S30 and S31] are connected in parallel with S10. When these switches sense a temperature of 160±7°F, they close and maintain fan operation as long as is necessary to cool the load. These switches may automatically start the fans under high ambient temperature conditions even when no operation has been attempted. This feature protects the load against early shutdown and reduces thermal stress on the load components.

The transmitter interlock circuit is a series circuit. Current flows from transformer secondary terminal X1 to interlock relay [K30] terminal 13, through the coil to terminal 14, thence through two thermal switches, [S21 @ 250°F and S22 @ 160°F] thence to the Normally Open contact of the Differential Pressure Switch [S20]. When S20 senses adequate positive pressure within the load, it closes and current flows to transformer secondary terminal X2. This causes K30 to close and enables the transmitter.

There are two lamps inside the control box. The AIRFLOW lamp is only illuminated when there is low differential pressure (as when a fan is not operating). The OVERHEAT lamp is only illuminated when there is normal differential pressure and one of the thermal switches (S21, S22) is open.

The Interlock Relay (K30) is a 4PDT relay which has been wired as a DPDT unit in order to gain current-carrying capacity. As it is wired, it is rated for 2 amperes DC or 120vac resistive. The relay is wired to provide two normally closed pairs at TB1. With no fault, the pairs TB1-1 - TB1-2 and TB1-3 - TB1-4 are closed. When a fault occurs, the relay changes state and the pairs change

sense. K30 should close as soon as AC Mains power is provided and should only open on loss of power or thermal switch actuation.

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 77450VEH-SW is finished with an acrylic finish or other durable coating system. It should be cleaned with a neutral plastic and glass cleaner such as Windex or Glass Plus. The RF connector should be cleaned with a non-residue contact cleaner such as Miller-Stephenson MS-171/CO2. Remove dirt accumulations from the fan, 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

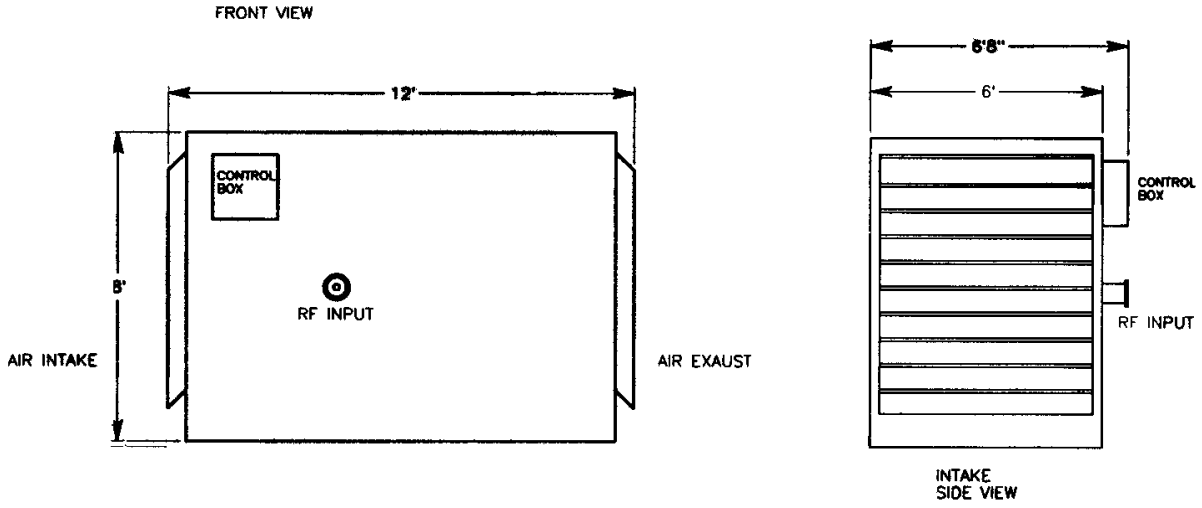
Prior to attempting resistor replacement, you must make the load safe for servicing. Begin by placing the Safety Switch in the OFF position and locking the handle with a padlock. Next, remove all power from the transmitter and exciter and lock them out.

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

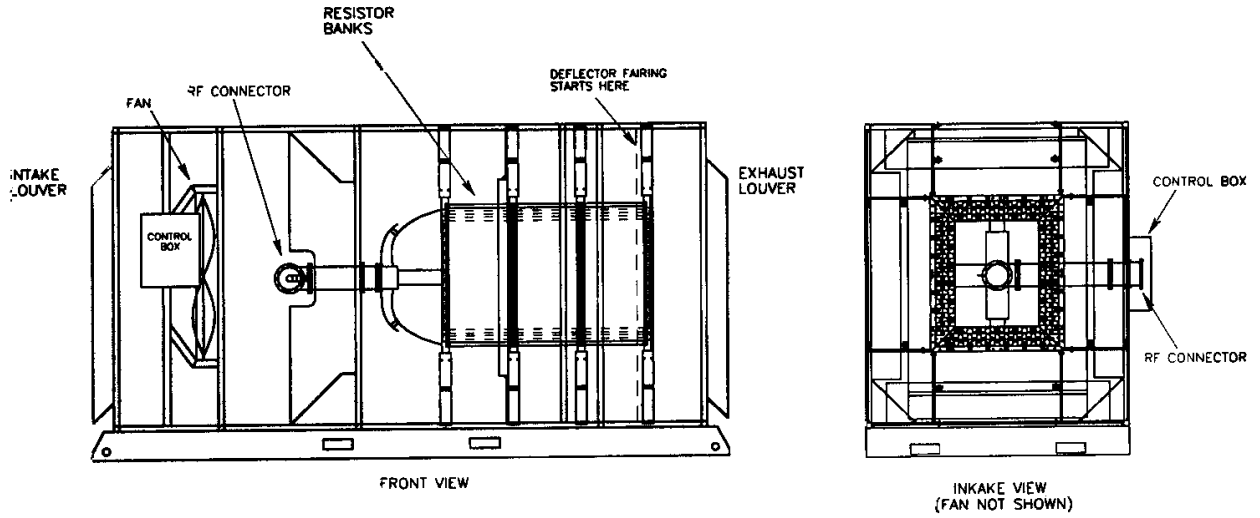
Resistor replacement is tedious, but not difficult. It will probably be necessary to remove many resistors in order to replace a few.

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 & DIMENSIONS



DRAWING PRELIMINARY- SUBJECT TO CHANGE
DIMENSIONS NOMINAL



6-3. REPLACEMENT PARTS LIST

MODEL 77450VEH-SW

<u>Qty. Required</u>	<u>Description</u>	<u>P/N</u>
864	Clip Resistor M164 Plated (STD 1")	077-10000-000
432	PFS18-342 CPKS Resistor	091-77450-000
1	Muffler, Exhaust 1/8" Speed Aire	161-1A325-000
1	Muffler, Exhaust 1/4" Speed Aire	161-1A326-000
1	Motor 230/460V GE	161-5N058-000
2	Belt, V (Browning B-46)	161-3X637-000
1	Bushing, Motor (Browning 1 3/8)	161-3X482-000
1	Bushing, Blower (Browning 1 3/16)	161-3X578-000
1	Sheave (Browning 5.25)	161-3X558-000
1	Sheave (Browning 9.75)	161-3X567-000
1	Switch, 2 position selector, Telem ZA2-BD2/GE080	161-4B364-000
1	Block, Contact ZA2-BZ101/GE080BF10V	161-4B656-000
1	Relay, Overload, Telem 9-13 amp. LR201316	161-4B856-000
1	Contact, 12 amp., 24V Telem LC1D1210	161-4B890-000
1	Transformer 230/480 50/60 24V T100D2	161-4R830-000
1	Block, Dist. 175A 3P 63133 Bussman 16220-3	161-5A672-000
1	Fan BFL Penn Vent 67150 VAT42	161-3C607-000
2	Block, Terminal 4 pin, Beau 72204 NWRK14F2019	304-10000-050
2	Lamp, Red 24V 1091QMX1	304-10000-117
1	Circuit Breaker, 1A,2P,C-H SPCL201	313-10000-031
1	Relay, Intrlk. 24V50/60 Brmfld. KHUA- 17A1624	339-10000-001
1	Switch, Thermal OA250F	413-10000-058
1	Switch, Pressure 1910-0 for Megas 114030-10	514-10000-002
1	Switch, Thermal OA160F	566-10000-002
1	Switch, Thermal CA140 (was 2E248)	566-10000-005
1	Switch, Thermal CA160 (was 2E250)	566-10000-006
1	Switch, Operator On/Off	161-4B634-000
2	Switch, Micro (limit)	161-2W939-000
1	Switch, Safety	161-1H375-000
1	Spring, Relay Holdown	339-10000-005

SPECIFICATIONS

MODEL 77450VEH-SW

Impedance..... >75 ohms nominal

VSWR @ DC to 24 MHz.....>1.15:1 max.

Connectors:

Model 77450VEH-SW-E6..... >6 & 1/8" fixed flange

Power Rating @ Sea Level>450 KW

Frequency Range >DC to 24 MHz

Cooling Method.....>Forced Air

Ambient Temperature.....> -30° C to 50° C

Fan Assembly: 1 x 7.5 hp belt-drive six-bladed cast aluminum

Nominal Weight3500 lbs. (1587 kg.)

AC Power Requirements:

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

Finish >Beige Splatter

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

Model _____ Inspected by _____ Date _____



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



MODEL 77450VEH-SW