INSTRUCTION BOOK

TERMALINE®
LOAD RESISTOR
SERIES 8570A

Electronic Corporation
30303 Aurora Road, Cleveland, Ohio 44139-2794

Instruction Book Part Number 920-8570AS

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MODELS COVERED IN THIS INSTRUCTION BOOK

8570A-115-6	8571A-230-5	8573A-115-6	8574A-230-5
8570A-230-5	8572A-115-6	8573A-230-5	
8571A-115-6	8572A-230-5	8574A-115-6	

SAFETY PRECAUTIONS

The following are general safety precautions that are not necessarily related to any specific part or procedure and do not necessarily appear elsewhere in this publication.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must at all times observe normal safety regulations. Do not attempt to replace parts or disconnect an RF transmission or any other high voltage line while power is applied. When working with high voltage always have someone present who is capable of rendering aid if necessary. Personnel working with or near high voltage should be familiar with modern methods of resuscitation.

DO NOT SERVICE OR ADJUST ALONE

Under no circumstances should any person reach into an enclosure for the purpose of service or adjustment of equipment except in the presence of someone who is capable of rendering aid.

SAFETY EARTH GROUND

An uninterruptible earth safety ground must be supplied from the main power source to test instruments. Grounding one conductor of a two conductor power cable is not sufficient protection. Serious injury or death can occur if this grounding is not properly supplied.

SHOCK HAZARD

Do not attempt to remove an RF transmission line while power is present.

CHEMICAL HAZARD

Dry cleaning solvents used to clean parts may be potentially dangerous to your health. Avoid inhalation of fumes and also prolonged contact with skin.

RESUSCITATION

Personnel working with or near high voltages should be familiar with modern methods of resuscitation.

SAFETY SYMBOLS

WARNING

Warning: Warning notes call attention to a procedure, which if not correctly performed could result in personal injury.

CAUTION

Caution: Caution notes call attention to a procedure, which if not correctly performed could result in damage to the instrument.

The following safety warnings appear in the text where there is procedures, that if not carefully followed, could be detrimental to operating and maintenance personnel and are repeated here for emphasis.

WARNING

Do not insert a screwdriver or any thin metal objects through the perforated cooling air grilles while the load is in operation. The power within the unit could arc over and will cause serious injury to personnel and damage to the unit.

WARNING

When using dry cleaning solvents, provide adequate ventilation and observe normal safety precautions. Many dry cleaning agents emit toxic fumes that could be harmful to your health.

WARNING

Disconnect this unit from ac and RF power source before any disassembly for repair or replacement procedures. The potential for electrical shock exits.

The following cautions appear in the text whenever a procedure, if not properly followed, could put the equipment in danger of damage and are repeated here for emphasis.

CAUTION

Before any RF operation of the TERMALINE® is attempted, the transmitter interlock and ac line attachment to the equipment must be made. Attach the transmitter interlock connections to the two binding posts on the control panel.

CAUTION

Do not apply more than the rated RF power to load. Excessive RF power will damage the load resistor.

Do not block air flow. Air enters housing through perforated grilles at the top of the unit and exhausts through lower grilles of the unit. Blocking these grilles could cause unit failure.

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1.1. GENERAL

This new series air cooled high power TERMALINE® Load resistor was designed to be a quiet, rugged and trouble free rigid RF line termination as a dummy antenna or as a standby reject load. They are forced air cooled and are capable of dissipating RF line power up to 25 kW from dc to 250 MHz. Virtually maintenance free and simple to operate, these units should provide years of trouble free operation yet are field repairable in the event of failure of the load resistor or other components. The RF sections are composed of a series-parallel network of resistors which allow the unit to remain in operation even if one or two of the resistors should fail.

1.2. DESCRIPTION

The units are rectangular in shape and stand approximately six feet high. They are supported on the bottom by four cylindrical shaped feet. The RF input connectors are located at the top center of the units. Perforated side panel grilles at the top and bottom of the units allow for direct forced air cooling of the resistors. The ac power receptacle, ON/OFF switch and transmitter interlock are located on the front panel of the units or control panel. The rear panels are removable for service accessibility. Two lower exhaust grilles on the right and rear sides, are removable for installation of an optional exhaust ductwork adapter.

1.3. UNIT SPECIFICATIONS

SERIES 8570A TERMALINE® LOAD RESISTOR

Impedance	50 ohms nominal
VSWR	
All Units	1.1:1 maximum dc-110 MHz
8572A & 8573A Only	1.15:1 maximum 100-250 MHz
8570A/71A/74A	1.15:1 maximum 110-350 MHz
Connectors	
Model 8570A And 8572A	3 1/8" EIA Swivel Flanged
Model 8571A And 8573A	3 1/8" Unflanged
Model 8574A	1 5/8" EIA Swivel Flanged
Power Rating	
8572A & 8573A	25 kW continuous duty
Model 8570A, 8571A and 8574A	15 kW continuous duty
Frequency Range	
8572A & 8573A	DC-250 MHz
Model 8570A/71A/74A	DC-350 MHz
Dimensions (413 x 413 x 1797 mm)	16 1/4"L x 16 1/4"W x 70 3/4"H
Ambient Temperature	-40°C to +45°C (-40°F to +113°F)
Cooling Method	Forced air cooled
Weight	
8572A & 8573A	118 lb (54 kg)
Model 8570A, 8571A, 8574A	108 lb (49 kg)
Motor	
115 V 60 Hz...1/3HP @ 1725RPM	Prelubricated ball
230 V 50 Hz...1/3HP @ 1425RPM	Bearing, thermally protected
AC Power Requirements	
115 Vac	5 Amps, 60 Hz
230 Vac	3 Amps, 50 Hz
Finish	Light navy grey and lusterless black baked enamel

Figure 1-1. Series 8570A Outline Drawing

SECTION II. INSTALLATION

2.1. LOCATION

Being forced air cooled, the Series 8570A Load Resistor have no intermediate dielectric fluids or coolant and require no cooling water hookups. The unit may be placed conveniently anywhere adequate space is available for air circulation and an ac power source is handy. Do not enclose the unit in a small room or closet that has no means of ventilation. The heat given off by the unit may raise the ambient temperature to an unacceptable level for sufficient cooling of the resistors.

Since 15 kW is equivalent to 51,000 Btu/h and 25 kW is equivalent to 85,000 Btu/h a sufficient quantity of air must be provided for cooling. Be sure the intake and exhaust grilles are unobstructed. As an optional item, an adaptor kit is available for outside exhaust duct work. Contact the factory for information.

2.2. MOUNTING

There are no provisions for permanent mounting of these units, and the feet must not be removed to mount the unit to the floor. The cooling fan motor derives its cooling air from the bottom of the load; therefore, clearance underneath the load must be maintained. These units were designed for use in a vertical position, however, if the situation should arise, they may be used at any attitude. If the unit is to be used in any other position, be sure the mounting is substantial and clearance around the load is maintained for cooling. Do not cover any grill openings. The feet of these units may be adjusted for uneven floor conditions. Turn the rubber feet in a clockwise direction to desired length than secure by tightening the lock nut that is provided.

2.3. INTERLOCK CONNECTIONS

CAUTION

Before any RF operation of the TERMALINE® is attempted, the transmitter interlock and ac line attachment to the equipment must be made. Attach the transmitter interlock connections to the two binding posts on the control panel.

Always make the connection to the transmitter interlock first as a safety precaution in the unlikely event of the blower activating switch failure. Applying high RF power to the load without the blower fan running will cause failure of resistive elements.

There are three terminals on the interlock connection of the load. One terminal is a common tie point and the other two are labeled for normally open or normally closed contact connection, depending on the requirements of the transmitter used. Check the requirements of the transmitter interlock and make the connections to the appropriate terminals as required.

2.4. LINE ATTACHMENT

AC power, 115 or 230 V depending on the unit requirements, is supplied to the Power Entry Module by means of the ten foot, 3.05 m, cable and matching plug that is furnished with the load equipment. The third wire in the cable, coded green or green yellow, is the ground. For proper protection if a 3-wire type plug and outlet is not used, fasten the green wire at the supply end to a satisfactory ground. Do not detach the ac cable, only when necessary or when disconnection of the RF power supply to the load is definitely assured. Observe the warning label on the front panel. Do not apply RF power to the unit unless the power cord is connected and the ON/OFF switch is in the ON position as shown by the red "ON" indicator. When the manual/automatic switch is in the automatic position, the Blower motor will come on shortly after RF power is applied. This feature makes the load especially suited as a reject load for standby operation.

2.5. CONNECTING RF LINE TO LOAD

After installation, the coaxial RF transmission line may be attached. For the respective Series 8570A, the connections are as follows:

a. Models 8570A and 8572A, 3 1/8 inch EIA, 50 ohm with swivel flange.

   1. Use 3-1/8 inch EIA coupling kit, P/N 4600-020, which includes: six each 3/8 16 x 1 1/2 bolt and nut sets, O-Ring, and insulated center bullet.

   2. Insert the center bullet, push in until insulator is seated in facing, and install O-Ring in groove.

   3. Connect coaxial input in straight line, push carefully on center contact to close. The swivel flange on the load makes connection independent of a fixed flange on the coaxial input outer conductor.

   4. Insert bolt sets, tighten evenly all around.

b. Models 8571A and 8573A, 3 1/8 inch unflanged, 50 ohm.

1. Use 3 1/8 inch unflanged coupling kit, P/N 5-726 or RCA MI-27791-4A, which includes: an outer sleeve with two clamping bands, and the center conductor coupling bullet.

2. Insert center bullet and bottom it on the midpoint nibs.

3. Position the outer sleeve, with clamps, over input connector.

4. Introduce transmission line and seat snugly against the coupling stops.

5. Position clamp bands evenly about 3/4 inch from ends of sleeve and tighten.

c. Model 8574A, 1-5/8 inch EIA, 50 ohm, with swivel flange.

1. Use 1 5/8 inch EIA coupling kit, P/N 4712-020 which includes: four each 5/16-18 x 1 1/2 bolt and nut sets, O-Ring, and insulated center bullet.

2. Insert the center bullet, push in to seat insulator in facing, and install O-Ring in groove.

3. Connect coaxial input in straight line, push carefully on center contact to close. The swivel flange on the load makes connection independent of a fixed flange on the coaxial input outer conductor.

4. Insert bolt sets, tighten evenly all around.

SECTION III. THEORY OF OPERATION

3.1. GENERAL

The Series 8570A are high power air cooled RF loads for termination of coaxial transmission lines. The RF energy, converted into heat, is transmitted directly to the surrounding area by forced air without any intermediate dielectric transfer fluid or finned heat exchangers.

3.2. RF SECTION DESCRIPTION

The RF section, of the Series 8570A, is composed of a series-parallel array of tubular resistors. These resistors are carefully positioned to provide a reduction in surge impedance proportional to the distance along the resistive system which finally terminates to the housing forming the return path for the coaxial circuit. This produces a very uniform and almost reflectionless line termination over the stated frequencies of the load resistor.

An advantageous feature of this series-parallel resistor network design is that it allows the unit to remain in operation in the unlikely event of failure of one or two of the resistive elements with little or no increase in reflected power.

Consider if one resistor in a parallel circuit of ten would be completely removed. That would mean a 10 percent increase in resistance. If these resistors are in series with another parallel circuit of ten resistors, there would be an increase of only 5 percent or as much as 8.5 percent in a twelve resistor arrangement. This is an acceptable level and will not affect, to an appreciable amount, the operation of the load or readings if used with a THRULINE® Wattmeter. We do not mean to imply that these loads should be used this way continuously, but merely that they may be used with a defective element until the load can be repaired or the defective element replaced.

3.3. HEAT TRANSFER

WARNING

Do not insert a screwdriver or any thin metal objects through the perforated cooling air grilles while the load is in operation. The power within the unit could arc over and will cause serious injury to personnel and damage to the unit.

The resistors used in the Series 8570A are of a tubular type, situated in a vertical position within their housing. When the unit is in operation, a fan located at the bottom of the unit draws air into the top grille openings and directs it over the RF resistor network. The heat, developed in the resistors from dissipation of the RF energy, is carried off by the flow of air over the resistors surface. This hot air is

then exhausted through the lower grille openings in the unit. With this forced air entering at the top and being directed downwards, the RF input connector and coaxial line, or as the case may be a THRULINE® Wattmeter mounted in the coaxial line, remain cool. This is helpful in maintaining the accuracy of a THRULINE® as well as in permitting disconnection of the coaxial line section immediately after the RF power has been turned off without the discomfort of handling a hot coaxial line connection.

3.4. INTERLOCK CONTROL CIRCUIT

The interlock control circuit provides fail-safe protection of the transmitter and load resistor in the event of ac power failure to the cooling fan motor. This protection is necessary because dissipation of the heat generated by the RF power is critically dependent upon a required minimum flow of cooling air at all times. Without this air flow, the power handling capabilities of the load are reduced to approximately 2 kW of power for models 8572/73 and 1.5 kW for models 8570/71/74.

The blower actuation and interlock system are controlled by an infrared heat sensing device which actuates the cooling motor and interlock relays. The heat sensor housing is located on the RF housing above the front panel and just below the air intake grille. When ac power is applied to the load, the relay circuits are energized and the contacts of the interlock relay actuates for normally open or normally closed operation as labeled above the interlock connections. The circuit to the transmitter interlock is complete allowing the transmitter to turn on. NOTE: The interlock may be wired for normally open or normally closed operation to accommodate the requirements of the transmitter, see paragraph 1.6, Interlock Connections. The RF power then flows into the load and is absorbed by the resistive elements which in turn releases the RF power in the form of heat. The infrared heat sensor unit detects the increase in resistor temperature and turns on the blower motor when the MANUAL/AUTOMATIC switch is in the automatic mode. In the manual position the heat sensor and motor relay is bypassed and the fan motor should be running before the RF power is applies.

The fan, when running, draws air through the top grille openings and over the resistor network. The hot air is then vented through the lower vent openings disbursing the heat into the surrounding air. If the air flow over the resistor array should stop or be restricted and the temperature in the RF chamber should rise beyond a safe limit, the heat sensor unit will sense the change and actuate the interlock relay to reverse the process and turn off the transmitter. The interlock system will not permit reoperation of the transmitter until the air flow is restored and a safe low temperature in the RF housing is once again attained.

The whole system is controlled by an infrared sensor which reacts to the amount of infrared radiation given off by the resistor network. This sensor is in series with a resistor that forms a voltage divider network. This section is followed by a set of comparators with individual set levels for either blower actuation or the interlock system. Each of these comparators controls a relay that turns on the blower fan or actuates the interlock relay system.

SECTION IV. OPERATING INSTRUCTIONS

4.1. GENERAL

CAUTION

Do not apply more than the RF power to the load. Resistor failure could result.

Do not block air flow. Air enters housing through perforated grilles at the top of the unit and exhausts through lower grilles of the unit. Blocking these grilles could cause unit failure.

The Series 8570A have only two operating controls, the ON/OFF switch. and the Manual/Automatic switch. When installed according to Section I, Installation, the only requirement is for the ON/OFF switch to be placed in the ON position and the Manual/Automatic switch in the automatic position when used as a standby reject load. Notice that the red power light is on before any operation. The unit is now ready to accept RF power. Once the unit is set, there is no need for the presence of an operator.

4.2. LOAD POWER

It is advised that these units are not operated above their rated capacity; i.e.,15 or 25 kW of power. The units will handle a small percentage of overload until the interlock system's sensor relay opens due to over temperature and turns off the transmitter. If a large amount of overloading occurs, resistor failure is eminent before the interlock system reacts.

4.3. OPERATION UNDER NORMAL AND ABNORMAL CONDITIONS

The sensor unit is set at the factory for normal operation of blower actuation and interlock system for ambient temperatures up to 30°C (86°F). At normal ambient temperatures these units operate with enclosure temperatures just warm to the touch; therefore, presents no danger of burns when touched by operating personnel.

If the units are to be used in extreme temperature conditions, the sensor unit may not activate the fan motor at the proper time. If this condition occurs, the unit may be reset by using the following procedure.

Figure 4-1. Series 8570A Sensor Box (Open View)

Figure 4-2. Interlock Terminals

a. Equipment required

1. A Hewlett Packard, Model 3478A, digital multimeter with shielded test probes. A digital voltmeter with an input impedance of greater than 10 meghoms may be used in lieu of the H.P.

2. A flat blade alignment tool or small screwdriver.

b. The unit should be installed per the instructions of Section I. Turn on the switch of the power module and put the manual/automatic switch in the automatic position. Be sure of motor operation by momentarily switching the manual/automatic switch to the manual position if the switch was already in the automatic mode.

c. The red indicator lamp on the power module and the "automatic"indicator lamp should be lit.

d. Carefully remove the cover from the sensor box by unscrewing the four Phillips head screws holding it.

e. For the following refer to figure 4-1. Insert the negative (black) test probe into T-P5, circuit ground, and hold the positive (Red) test probe, of the voltmeter, on TP-1. Adjust R2 until this voltage (V-Ref.) equals 5.0 volts, plus or minus 10 Millivolts. Record data and remove the red test probe.

f. Replace the cover on the sensor box and fasten securely with the Phillips head screws.

g. Insert the red test probe into TP-2, measure and record this voltage as (V-1). It should be approximately 2.0 V.

h. Insert the positive (red) test lead into T-P3. Adjust R1 until this voltage (V-2) is equal to (V-1) plus 100 MV and record this data. Blower activation should now be set.

NOTE: In the following steps, maximum input power will be applied to the unit. If the blower fan does not come on within 60 seconds, after applying power, turn off transmitter immediately and switch the manual/automatic switch to the manual mode. When the unit has cooled, recheck the steps of the procedure above and try again.

i. Apply maximum RF input power to the unit. 15 kW for the Models 8570A/71A/74A and 25 kW for the models 8572A/73A or maximum station power if less than load limitations. Notice how long it takes for the blower fan to activate, and record this information. Allow the unit 15 minutes to stabilize under power.

j. With the black test probe in T-P5, insert the red test probe into T-P2. Measure and record this voltage as V-3. It should be approximately 3.8 volts for the 15 kW models and 3.5 volts for the 25 kW models.

k. Insert the red test probe into T-P4 and adjust R-3 until this voltage (V4) equals V3 plus 200 MV. Record this data.

l. Refer to figure 4-2 and check continuity between the common and normally open terminals and also the common and normally closed terminals.

m. Recalibration is now complete. Turn off the RF input power and switch the unit to the manual mode. Allow the blower fan to cool the load for 15 minutes.

When these units are used in a confined area or a small room, they will cause the ambient temperature to rise considerably. This can be avoided by adding an optional duct work adaptor kit and venting the exhaust air to the outside. This is recommended only when absolutely necessary. Duct work must be properly designed with elbows and lengths held to a minimum, no 90° bends, so excessive back pressure is not created. Duct work may exceed dimensions but must not be smaller than the adapter. Included with the duct work adapter kit, P/N 8572-090, are two exhaust grille plates to stop the air flow of the hot exhaust air from the front and left side grilles. Without these plates installed only about 50 percent of

the warm exhaust air will be vented to the duct work and 50 percent directed back into the room. The exact amount of exhausted air vented into the room will depend on the amount of back pressure created by the installed duct work. Consult with the factory for further information.

4.4. SHUTDOWN

When operation of the load has been completed, always turn off the transmitter first. Before turning the ac power off, allow the fan motor to run a few minutes without RF power being applied. Normally the heat sensor relay will keep the fan motor running as long as the main power has not been turned off or the power cord disconnected. This allows the resistive elements to cool. Disconnection of the coaxial RF line may be made immediately after the RF power has been turned off, even though the cooling fan is still running.

4.5. MEASUREMENT AND MONITORING OF RF POWER

The Series 8570A Load Resistor may be used in conjunction with any one of the various Bird rigid coaxial line THRULINE® Wattmeters. When fitted with the appropriate line section and wattmeter, either model becomes a useful tool for tuning and adjusting a transmitter as well as monitoring RF power directly in watts. Consult with the factory for available THRULINE® Wattmeters and other pertinent information.

SECTION V. MAINTENANCE

5.1. GENERAL

Since the Series 8570A are of a relative simple yet rugged design, only a moderate amount of preventive maintenance is required. Use reasonable care in handling; do not subject the unit to hard blows or jarring. These loads are designed to operate for long periods of time without failure if care is taken not to exceed their power handling capabilities.

5.2. CLEANING

WARNING

When using dry cleaning solvents, provide adequate ventilation and observe normal safety precautions. Many dry cleaning agents emit toxic fumes that could be harmful to your health.

A main factor in effective preventive maintenance is cleanliness, for optimum performance and service life, the load must be kept in a clean and dust-free condition. During periods of inaction, or if the unit is to be stored for a period of time, keep the unit covered with a cloth or plastic sheet to prevent the intrusion of dust, dirt or moisture, especially the RF connector.

The outside surface of the unit should be wiped free of dust and dirt occasionally. When necessary the inner RF housing and the outside housing may be cleaned with a mild detergent solution on a cloth. The back and right side panels may be removed without difficulty for cleaning purposes, see paragraph 5.4. Give particular attention to the air intake and exhaust grilles. These grilles must be kept clear of dust, lint or any matter that may cause restriction of air flow.

Occasionally check the condition of the RF coaxial connection. If required, disconnect the unit from the transmission line and clean the RF connector parts, both metallic and insulator surfaces. When cleaning these parts and all other electrical parts, use an aerosol contact cleaner or any dry cleaning solvent. Use a cloth to wipe the surfaces; a swab stick is also useful for this purpose.

5.3. RF LOAD RESISTORS

Measurement of the dc resistance between the inner and outer conductors of the RF input connector will provide a relative check on the condition of the load resistors. Use an accurate ohmmeter or resistance bridge equipped with clip leads for this measurement. The resistance should be close to 50 ohms nominal. It is recommended that this resistance check be performed at room temperature and recorded for future reference before and after each operation of the load. If at any

time a drastic change in resistance is noticed, or if you have reason to believe one or more resistors have been damaged, the unit must be opened and each resistor checked individually to determine which, if any, are defective. Follow the resistor removal and replacement procedure, see paragraph 5.4.

5.4. ENCLOSURE DISASSEMBLY AND RESISTOR REPLACEMENT

WARNING

Disconnect this unit from ac and RF power source before any disassembly for repair or replacement procedures. The potential for electrical shock exits.

As mentioned previously, the Series 8570A RF Load are field repairable. For assistance before and during disassembly, see figures 5-1, 5-2, 5-3, 5-4. To change the resistive elements proceed with the following steps:

a. Remove the 12 8-32 x 5/16 Phillips head machine screws from the edges of the right side access panel. The panel is now free to be removed.

b. With the outer housing, upper panel removed, the RF section housing is exposed. The side panel of this housing must now be taken off.

c. Remove the 16 8-32 x 9/32 Phillips head screws on the right and left edges of this panel. Note - There are three Phillips head screws at the top edge of the RF housing panel and one in the upper center of this panel, do not remove these screws. Remove the three Phillips head 8-32 x 9/32 screws located on the edge of the top RF input flange support panel.

d. Remove the three 8-32 x 9/32 Phillips head screws from the outer edge of the side small rectangular breather grille, on the top step of the outer housing. Also remove four 10-32 x 2 screws from the lower edge of the RF housing, just above the bottom flange. These 10-32 x 2 screws project through the RF housing panel and through the lower resistor support bracket, and are captivated by a self clinching floating fastener, attached to the support bracket.

e. The RF support angle bracket must be removed. Unscrew the 8-32 X 5/16 Phillips head machine screws that hold the angle bracket in place. One is located on the top edge of the grillwork panel and the other on the lip of the RF section panel.

f. The RF housing panel is now loose and ready to be taken off. There are metal plates fastened on the inside at the top of the side RF housing panels. When it is removed, the top of the panel must be pulled out to clear a supporting rail. The panels may then be lifted upwards to clear the top frame work of the outside housing.

g. With the right RF housing panel removed, the resistors on the right blank of the RF load assembly can be tested and replaced if necessary. To test and replace the resistors on the left bank, the left side of the unit must be removed by this same procedure as used for the right side.

h. The resistors are held very firmly in their clips and are captivated by resistor locking straps. Remove these straps by carefully bending the ends up using a flat blade screw driver and slipping the strap out of the slots in the retaining clips. Use caution and carefully remove one end of the resistors at a time. Do not use excessive force as there is the possibility of the resistors chipping or cracking.

i. Due to the close proximity of the resistor clips at the upper end of the RF assembly, ie., the end closest to the RF coaxial input, it may be possible to slip the resistors out of the retaining clips with out removing the locking straps. Lift the ends of the straps with a flat blade screw driver enough to relieve any tension on the resistor clips. Spread the clips slightly to relieve the tension on the resistor terminal and pull the resistor straight out the side of the clip.

j. To reassemble the RF assembly and panels, reverse the disassembly instructions given above. Be sure to rebend the ends of the locking straps on the resistor clips.

Figure 5-1. Series 8570A Side Panel Removal

Remove screws marked "X" for side panel removal.

Figure 5-2. Series 8570A RF Housing Panel Removal

Remove screws marked "X" for RF section side panel removal. Do not remove any screws marked by an "0".

Figure 5-3. Models 8570A/71A/74A Inside View

Inner and outer side panels removed showing RF Load resistor array.

Figure 5-4. Models 8570A/71A/74A Center Resistor Support Inside View

Close up of center resistor support and resistor clips.

Figure 5-5. Models 8572A/73A Inside View

Inner and outer side panels removed showing RF load resistor array.

Figure 5-6. Models 8572A/73A Center Resistor Support and Resistor Clips

5.5. DIAGNOSING THE RF ASSEMBLY

As mentioned, the RF section is comprised of a series-parallel configuration. There are two networks of parallel resistors in series. The 25 kW models have two branches, each with five 250 ohm resistors in parallel. The 15 kW models have two branches with three 150 ohm resistors in paralleled. These two branches are in parallel with each other resulting in a 25 ohm network. When one of these networks is in series with a similar network, the total resistance is a nominal 50 ohms.

If there has been a drastic change in the resistance of the load or if you have reason to suspect a resistor has failed, the following procedure may be helpful in finding a faulty resistor.

First make a visual inspection of all the resistors. Check for cracks or burned spots on the surface of each resistor. If no visual discrepancies are found to indicate resistor failure, it will be necessary to make resistance measurements. A suggested method is outlined below:

a. Use an accurate ohmmeter and measure the resistance of the top resistor network, from the top resistor support to the center or mid resistor support. Record this resistance measurement.

b. Check the lower resistor network by attaching the ohmmeter leads between the center resistor support and a good ground or preferably the lower resistor supports. Record this resistance measurement and compare this data.

1. If the resistance of one network exceeds the other by more than five ohms, 20 percent of a nominal 25 ohm, check each resistor of that network.

2. If one or both networks exceed a ±5 ohm limit of a nominal 25 ohms; i.e., less than 20 ohms or more than 30 ohms, then each resistor of that or, as the case may be, both networks will have to be checked. Remove each resistor of each branch and check individually.

c. None of the resistors should exceed a ±20 percent tolerance. If a resistor is found to exceed 300 ohms or be less than 200 for the 25 kW models or 180 and 120 ohms for the 15 kW models that resistor should be replaced.

5.6. INFRARED SENSOR UNIT REPLACEMENT

The infrared sensor circuit board assembly and sensor box are supplied as a complete unit. Replacement of this unit is very simple, should it become necessary.

The sensor box is located on the RF housing just above the front panel. Replace as follows:

a. Unscrew the cable connector and detach the cable from the bottom of the sensor box.

b. Remove the sensor box cover by unscrewing the four 6-32 x 1/2 Phillips oval head screws that secure it in place.

c. Inside the box, remove the four 6-32 x 1/2 Phillips oval headscrews that hold the box to the RF panel. Do not remove the screws that hold the circuit board in the sensor box. The box is now free and will come off in its entirety.

d. Reinstall a sensor box by reversal of this procedure.

5.7. POWER SUPPLY BOARD REPLACEMENT

The power supply board contains the motor controlling and interlock system relays. To simplify repairs this board is supplied as a complete assembly.

For ease in replacement, it is best if the entire load is placed on its back on a low padded work surface. Position the load so the bottom and lower front panel is accessible. Remove the board by the following instructions.

a. Approximately midway between the bottom edge of the front panel and an imaginary line drawn through the power supply module and interlock terminals are two 8-32 Phillips truss head screws. These screws, which are about one third of the distance from each side, hold the power supply bracket.

b. Unscrew and remove the screws that hold the power supply bracket. This will allow the bracket to be pulled down through the bottom of the load far enough for disconnection.

c. Disconnect the wires leading to the board by detaching the quick disconnects.

d. The power supply board and bracket may be removed from the load for further disassembly.

e. Remove the five 4-40 x 1/4 pan head screws that secure the circuit board to the mounting bracket. There is one screw on each corner and one in the center of the circuit board. Notice the position of the one nylon stand-off. Return to this Position on the Circuit board when reinstalling.

f. To reinstall the power supply circuit board, reverse the procedure above. Take care to rewire the connections of TB1, TB2 and TB3 correctly.

5.8. MOTOR AND PROPELLER REPLACEMENT

When replacing the motor or propeller, the entire unit must be placed on the left-hand side. Place it gently on a padded or cloth covered surface so not to mar its finish. The bottom and middle right and rear grilled panels must be removed to replace the motor and/or propeller. The steps following, detail the disassembly procedure.

a. Remove the five 8-32 Phillips truss head screws that secure the middle grille panel of the right and back side. When these panels are removed, the bottom 2/3 portion of the propeller will be exposed. The propeller must be positioned the same way at reassembly. It may be useful to mark one or two of the blades at the bottom of the propeller shroud for alignment when reassembling.

b. Now remove the ten each, 8-32 Phillips head screws that secure the right and grilled rear panels in place. The removal of these panels is not absolutely necessary, but does assist for this operation.

c. Loosen the two 5/16-24 socket head set screws on the propeller hub using a 5/32 Allen wrench. The propeller is not removed at this time.

d. Disconnect the wires that attach from the motor to the power supply board. These are quick disconnects and may be easily detached at the circuit board.

e. Using a 7/16-inch socket or box wrench, loosen and remove the four 1/4-20 hex head screws that secure the motor base to the motor mounting bracket. Be sure to support the motor when removing these screws.

f. Hold the propeller and slide the motor straight out the bottom of the unit. The propeller will slide off of the motor shaft as the motor is retracted. If there is any restriction the set screws may have to be loosened a bit more.

g. With the motor removed, the propeller will have to be turned or manipulated to free it from the unit. It may be necessary, especially with the 50 Hz propeller, to remove the two 8-32 Phillips truss head screws from the front panel at the base of the pyramid air deflector. This will allow the deflector to be pushed down somewhat in order to free the propeller from the propeller cavity. This may still take some manipulation, but be careful not to bend the blades of the propeller out of shape as this could cause undesirable vibration.

h. When reinstalling the motor/propeller assembly, install the propeller in its cavity first with the hub facing down then, if removed, replace the two 8-32 screws at the base of the pyramid.

i. With the propeller in its cavity, insert the motor in the bottom of the unit with its shaft going through the hole in the bottom side of the air deflector pyramid. At the same time, hold the propeller so the shaft enters the hole in the hub. Slide the propeller slightly on the shaft, but do not tighten.

j. Insert the 1/4-20 hex screws through the motor base and screw them into the motor mounting bracket until it is snug but not tight. Position the propeller so that about 2/3 of the blades are showing below the shroud, or until the previously made marks are aligned at the bottom of the shroud. Tighten the set screws slightly on the hub.

k. Turn the propeller and notice if it hits the shroud. The motor will possibly have to be repositioned on the mounting bracket until the propeller spins freely without hitting the shroud.

l. When the propeller spins freely without touching the shroud, tighten the motor mounting screws securely and also the socket set screws on the propeller hub. Complete the reassembly by reversing the disassembly procedures previously listed and test the motor/propeller operation under ac power. It may be useful to test the unit with ac power before the side panels are reattached in case realignment of the motor is required.

5.9. FUSES AND POWER ENTRY MODULE

The fuses are located in a fuse drawer in the power entry module. Remove this drawer by squeezing the small rectangular clip, with your fingernail or any flat object, and pulling the drawer straight out. The fuses are replaced in the drawer and the drawer is pushed back into the power entry module until it snaps in place. Be sure to replace the fuses with the same rating as the ones replaced, 3 Amp for 230 volts and 5 Amp for 115 volts.

For replacement of the power entry module, unplug the power cord from the module then;

a. Remove the 4-40 Phillips oval head screws at each end of the module. The power entry module can be pulled straight out through the front panel.

b. Detach the three wires that connect to the module. These are quick disconnects and can be pulled off.

c. Replace the power module by reversing this procedure.

5.10. MANUAL/AUTOMATIC SWITCH

To replace the MANUAL/AUTOMATIC switch, the front panel will have to be taken loose. Complete disassembly is not necessary as long as access to the back of the switch is obtained. Follow the steps outlined below for switch removal.

a. Unscrew the cable connector nut from the sensor box and disconnect the cable. Unscrew the four 6-32 x 3/8 Phillips truss head screws that secure the cable feed through plate to the top grill work.

b. Remove enough of the 8-32 x 3/8 Phillips truss head screws, that hold the upper portion of the front panel, to allow the panel to be pulled away far enough to allow access. About 14 of these screws should be sufficient.

c. Disconnect the wires from the back of the switch by putting off the quick disconnects. It is helpful to mark the wire placement for your convenience when reconnecting.

d. Press in on the spring clips at the top and bottom of the switch and push it out through the front panel.

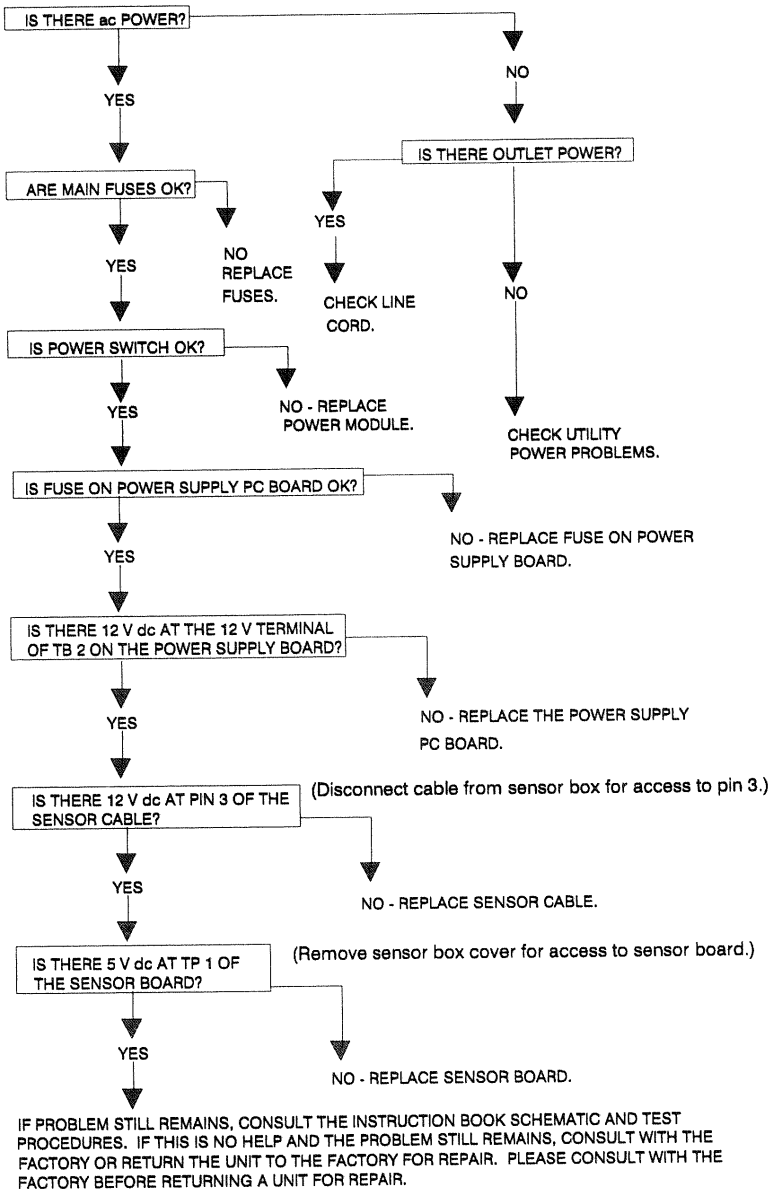
e. The replacement switch is pushed in through the front panel and snapped into place. Final assembly is accomplished by reversing the steps of this procedure.

5.11. MANUAL/AUTOMATIC INDICATOR

The MANUAL/AUTOMATIC indicator lamp may be replaced by prying it out of the front panel using a small flat blade screwdriver. Once it is free of the front panel the connecting wires can be pulled off at the quick disconnects.

The replacement is snapped in place after the wires are reconnected. The alternative to this procedure is to remove the front panel, as in the procedure above for replacement of the MANUAL/AUTOMATIC mode switch, and pushing the lamp out from the back.

Table 5-1. Troubleshooting Flow Chart - Series 8570A TERMALINE® Load Resistors



SECTION VI. PREPARATION FOR RESHIPMENT

6.1. GENERAL

To reship or return the unit to the factory, first secure all loose parts such as the power cord and swivel flange. Pack it and seal securely in a sturdy wooden box or equivalent, with sufficient padding to avoid shock damage. If possible, keep the original shipping carton for reshipment.

SECTION VII. STORAGE

7.1. GENERAL

If the unit is to be unused or stored for any length of time, cover it with a cloth or plastic sheet and store it in a moisture free, cool, dry place. There is no special preparation to the unit; however, moisture will be the greatest concern. Ambient storage temperatures are not critical, but the relative humidity percent should be low.

SECTION VIII. REPLACEMENT PARTS LIST

8.1. **Series 8570A**

ITEM	QTY	DESCRIPTION	PART NUMBER
1	20	Load Resistors Models 8572A/73A	8572-021
1B	12	Load Resistors Models 8570A/71A/74A	8570-032
2	1	Fan motor 115/230 V, 50/60 Hz	8570-413
3	1	Fan propellers	
		50 Hz	5-1850
		60 Hz	5-1851
4	1	Sensor & housing assembly	8570-472
5	1	Sensor cable	8570-473
6	1	Power supply board assembly, 115 V	8570-479-1
6A		Power supply board assembly, 230 V	8570-479-2
7	1	Power supply board fuse 3AB 1/10A slo-blow	5-1828-4
8	1	Power entry module	5-1816
9	1	Fuse; 3AB, 5A slo-blow	5-1828-28
9A		Fuse; 3AB, 3A slo-blow	5-1828-30
10	1	Fuse drawer	5-1822
11	1	Power cord, 115 V	5-1836
11A		Power cord, 230 V	5-1837
12	1	Manual/Automatic, rocker switch	5-1815
13	1	Manual/Automatic indicator lamp	5-1814-1
13A		Manual/Automatic indicator lamp	5-1814-2
14/14B	20/12	Resistor clip	8450-014
15/15B	20/12	Resistor locking strap	8570-445
16	4	Mounting foot	8570-434
17	4	Mounting foot bumper	5-1821
18	4	Ceramic standoff	8540-052
19	1	Interlock terminal strip	5-1840-3
20	1	Connector RF input	
		Models 8570A, 8572A	
		3-1/8-inch EIA swivel flange	8570-460
		Center conductor	8570-463
		Model 8571A & 8573A 3-1/8" unflanged	8571-403
		Center conductor	8571-405
		Model 8574A	
		1-5/8 inch EIA flanged	8574-403
		Center conductor	8574-406
21	1	Adapter, duct work (optional item)	8572-078
		Includes exhaust grille plates	8572-087

(A) Indicates alternate 230 volt item only.
(B) Indicates 15 kW model only.

Figure 8-1. Models 8570A Series Motor/Propeller Installed

Figure 8-2. Models 8570A Series Wiring Diagram

Right Side View

Right and Back Panel View.

Figure 8-3. Model 8572 with Optional Duct Work Adapter