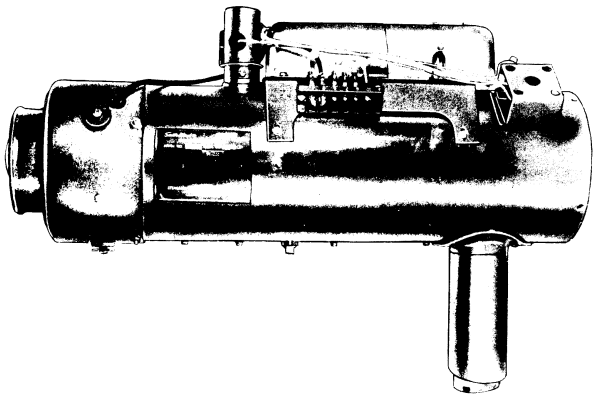
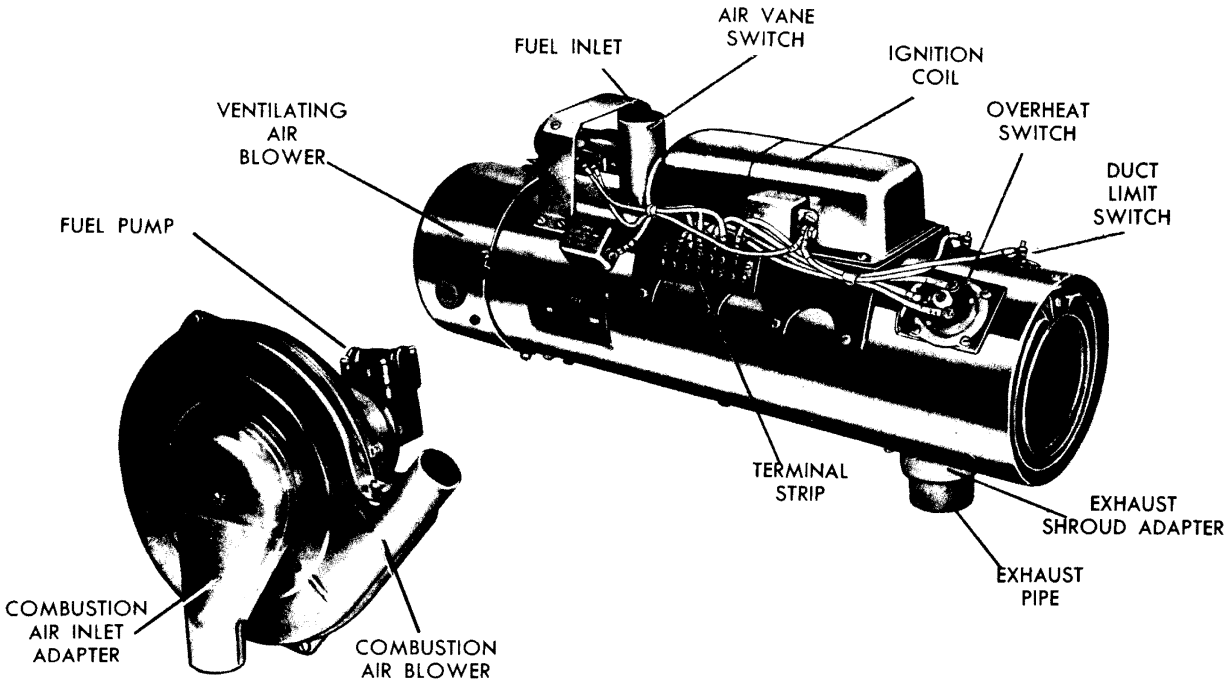
South Wind

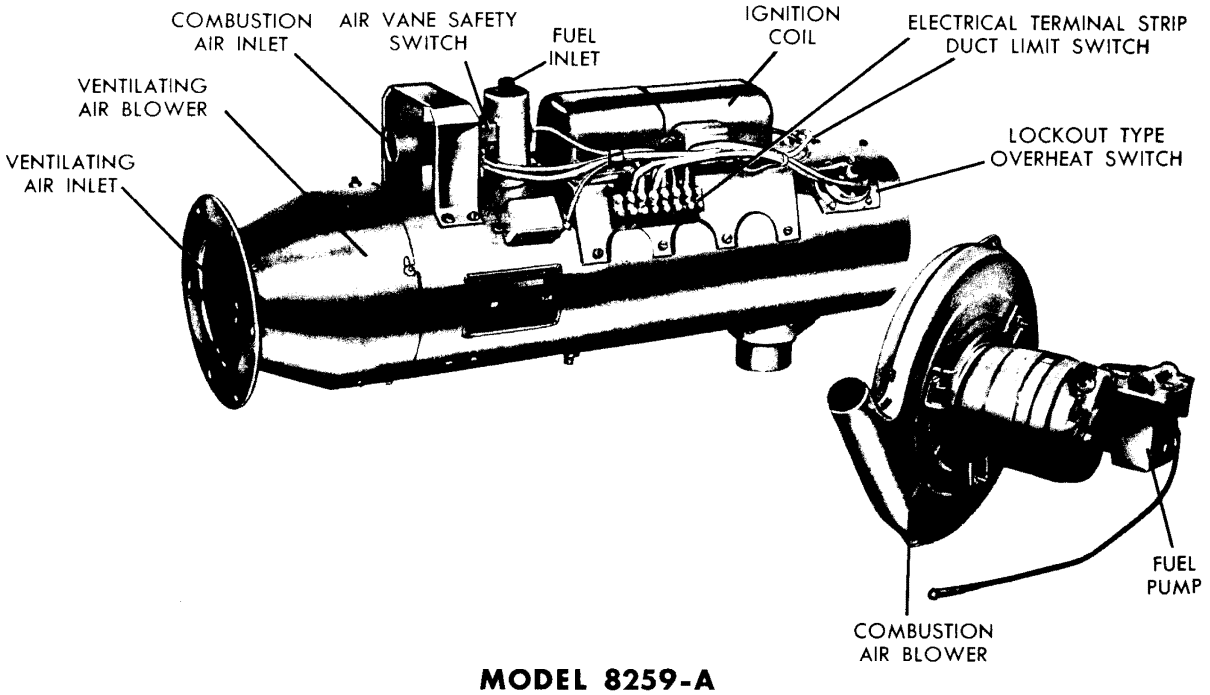


SERVICE MANUAL FOR:
STEWART WARNER SOUTH WIND AIRCRAFT HEATERS
8240-A
8240-C
8259-A
8259-C
8259-DL
8259-FL1
8259-GL1
8259-GL2

Form No. 09-998 (Rev. 12-69)
Stewart-Warner South Wind Corporation
1514 Drover Street Indianapolis, Indiana 46221



MODEL 8240-A



MODEL 8259-A

SPECIFICATIONS		
	8240 SERIES	8259 SERIES
Heat Output (BTU/HR at S.L.)	35,000	45,000
Fuel	Aviation Gasoline	Aviation Gasoline
Fuel Consumption (LB/MIN)	0.055 to 0.065	0.065 to 0.075
Power Supply	24 volts D.C.	24 volts D.C.
Current Requirements	4.25 Amp Max.	14 amps Max.
Duct Limit Switch Setting	215°±10°F	215°±10°F
Lockout Overheat Switch Outlet		
Air Temperature Setting	350°F	350°F
Fuel Pressure	20 to 25 psi	20 to 25 psi
Combustion Air Blower Speed	2800 RPM (Min.)	2800 RPM (Min.)
Ventilating Air Blower Speed	5600 RPM (Min.)	6000 RPM (Min.)
Thermostat Temperature Range	70° to 190°F	70° to 180°F
Ignition Breaker Point Gap	0.025 in.	0.025 in.
Exhaust Temperature	1,200°F Max.	1,200°F Max.

1. INTRODUCTION

GENERAL

The 8240 and 8259 Series aircraft heaters are very similar in design, except that the ventilating air blower of the 8259 heater is more powerful and the fuel rate is higher. Both models are available with solid state ignition, or with the conventional breaker point ignition system. All models consist of a complete heating system incorporating the ventilating air blower, combustion air blower, fuel pump and safety controls. The 8259-DL heater is the same as the 8259-A which is illustrated throughout this manual, except that it has a longer exhaust outlet and shroud adapter. A conversion kit (Part No. G-719951) is available to convert existing heaters with breaker point ignition to the solid-state system. The kit contains all necessary parts and complete installation instructions.

II. DESCRIPTION AND PRINCIPLES OF OPERATION

GENERAL

The Model 8240 and 8259 Heaters consist of four main subassemblies as follows:

a. The heat exchanger and burner assembly, which includes the ignition coil, combustion air flow safety switch, duct limit switch and overheat switch.

b. The ventilating air blower assembly, which mounts on the end of the heater by means of bayonet slots which engage studs on the heater case. On the 8240-A, 8259-A and 8259-DL this assembly also includes the ignition breaker points.

c. The combustion air blower and fuel pump assembly.

d. The thermostat or duct temperature control switch.

These components will be described separately in the following paragraphs.

HEAT EXCHANGER AND BURNER ASSEMBLY

The heat exchanger and burner assembly consists of a metal case that encloses an all-welded stainless steel heat exchanger that has a removable burner assembly at one end. The ignition coil, lockout overheat switch, duct limit switch, and components for radio noise suppression are mounted on the outside of the heater case. The airflow switch assembly is attached to the combustion air inlet of the burner that extends through an opening in the heater case.

HEAT EXCHANGER

The heat exchanger proper is a cylindrical stainless steel assembly with an inner wrap which provides a passage for ventilating air (Figure 1). One end of the heat exchanger is constructed in the form of a combustion chamber housing which acts as a sump and provides a mounting for the burner assembly. The spark plug screws into a threaded bushing at the top of the combustion chamber housing and a threaded drain fitting is provided at the bottom. The heat exchanger also contains

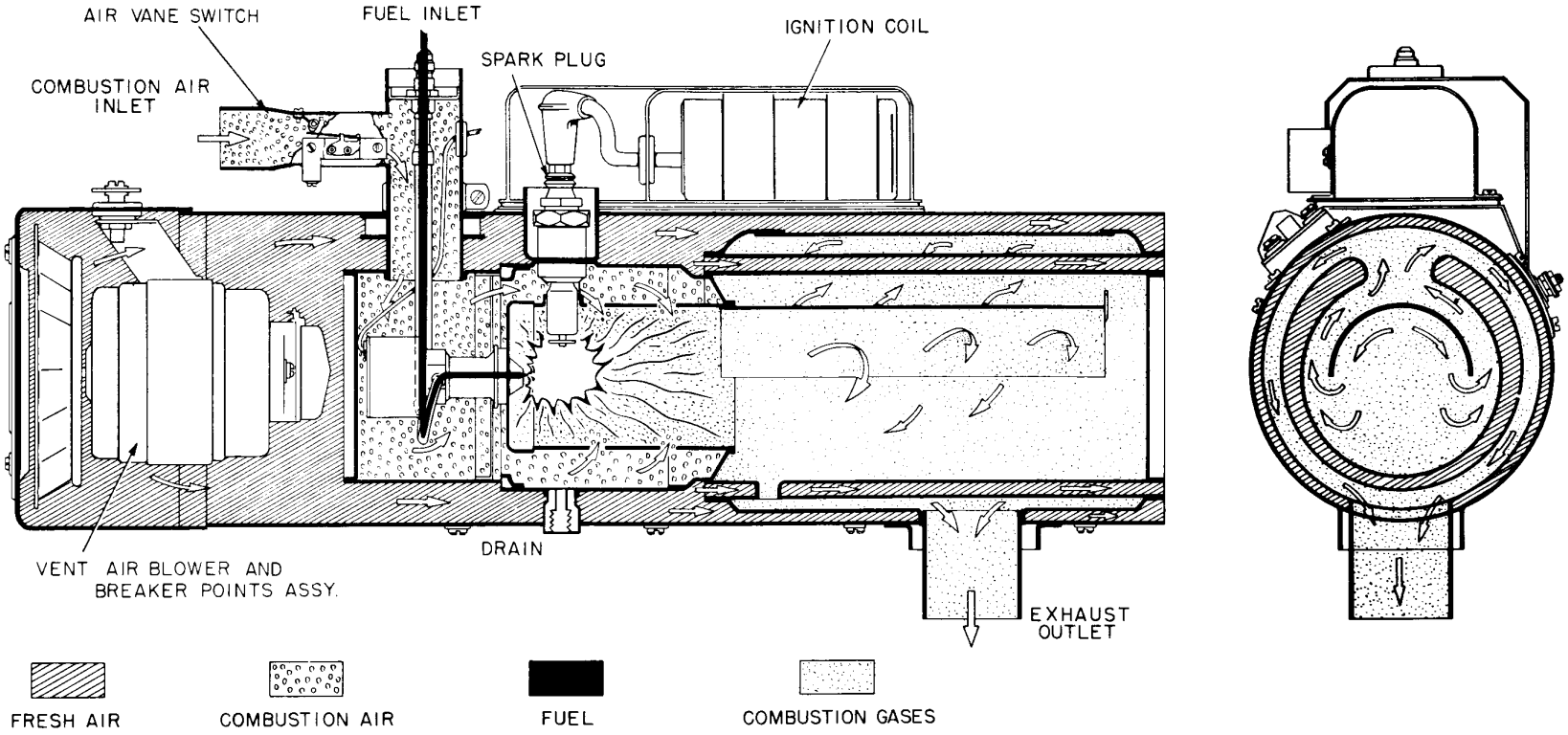


Figure 1 - Typical Flow System.

another internal drain which permits fuel in the central chamber to drain out through the exhaust.

BURNER ASSEMBLY

The burner assembly (Figure 10) consists of a combustion air chamber containing a solenoid valve, a nozzle, and a short length of flexible fuel line. The mixer is mounted on the end of the combustion air chamber and extends into the combustion chamber housing.

The solenoid valve and nozzle is mounted on opposite ends of a short nozzle holder to which the flexible fuel line is welded (Figure 11). By placing the seat of the solenoid valve very close to the nozzle, dripping and the formation of carbon, which often occur with a long fuel line and external solenoid is completely eliminated. A filler plug in the nozzle holder further reduces the amount of fuel between the shut-off valve seat and nozzle orifice.

The nozzle, solenoid valve and nozzle holder assembly are mounted as a unit on a bracket which also serves as the mounting for the mixer can (figure 10). This assembly in turn, mounts on the combustion air chamber in such a way that the entire burner assembly may be removed from the heat exchanger as a single unit.

AIR FLOW SWITCH

The airflow switch assembly (figure 4) is a safety device designed to prevent ignition of the heater at any time that combustion air flow is not sufficient for proper burning. It is attached to the combustion air inlet of the burner assembly by means of a clamp.

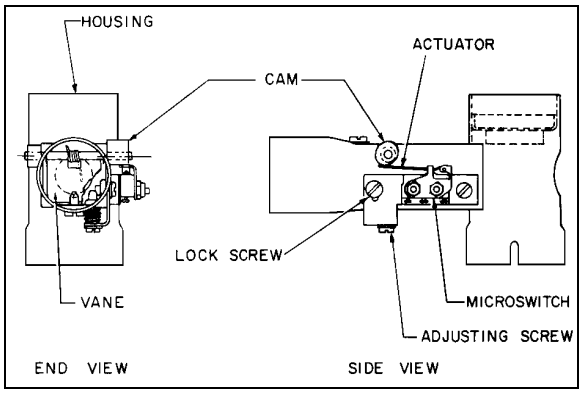


Figure 4 - Airflow Switch Assembly

This switch assembly is constructed in the form of a metal housing or elbow, which conducts the combustion air into the burner assembly. The flexible fuel line of the burner is terminated in a bulkhead fitting at the top of the housing and a microswitch is mounted on its side. Inside the housing, a vane operates on a shaft that has a cam on its end above the microswitch. The air vane is normally closed, but when combustion air flows through the elbow in sufficient quantity, the vane rises and closes the microswitch by action of the cam. The microswitch is connected into the electrical circuit so that the solenoid valve cannot open nor the spark plug fire until the airvane is actuated by the blower (See Figure 2 or Figure 3 according to heater model).

IGNITION COIL

The ignition coil is mounted inside a metal case on the top of the heater, near the spark plug, which projects through the heater case. Another housing covers the spark plug and ignition cable to insure suppression of radio noise. On the 8240-A, 8259-A and 8259-DL, two filters and a capacitor are also mounted on the case for radio noise suppression.

SOLID STATE IGNITION

On the 8240-A, 8259-A and 8259-DL, current to the ignition coil is interrupted by a set of breaker points on the end of the ventilating air blower motor to provide the spark at the spark plug. On all other models, the same purpose is accomplished by a solid state ignition unit that has no moving parts. The solid state unit is a capacitor discharge device that has the inherent capability of firing a spark plug under more adverse conditions than will a conventional ignition system.

VENTILATING AIR BLOWER ASSEMBLY

The ventilating air blower assembly is a removable unit that mounts on the end of the heater housing. Its purpose is to provide a flow of ventilating air across the heat exchanger. On the 8240 Series, the blower motor is mounted in the housing on rubber vibration-absorbing grommets and has the fan blade at the inlet end. On the 8240-A, 8259-A and 8259-DL models, the ignition breaker points are mounted on the opposite end of the motor and are operated by a cam on the motor shaft. The breaker points interrupt primary current of the ignition coil to provide high-tension current for the spark plug. The blower of the 8259 series is larger and more powerful than the blower used on the 8240 heater and does not have the vibration absorbing grommets. On units with solid-state ignition, the breaker points are not used.

COMBUSTION AIR BLOWER AND FUEL PUMP

Combustion air for the heater is obtained from a separate blower that can be mounted in any convenient place near the heater (Figure 6). The blower outlet is connected to the combustion air inlet of the heater by a flexible or rigid duct (not supplied with the heater). This blower is similar for all heater models, the principle difference being in the mounting angle of the fuel pump on the blower motor.

In addition to providing combustion air, the blower assembly also supplies a source of fuel pressure for the heater. A small diaphragm-type fuel pump is mounted on the end of the blower motor and is driven by the motor shaft through a rubber coupling. By using the motor-driven fuel pump, a supply of fuel at the proper pressure is always available when the heater is in operation and an auxiliary electric fuel pump or booster pump is not required. The pump contains its own pressure-regulating device and is not adjustable.

OVERHEAT SWITCH AND DUCT LIMIT SWITCH

Two temperature-limiting switches are mounted on the heater case to protect the heater and associated components from overheating. These are the duct limit switch and lockout overheat switch (See Figure 2 or Figure 3).

The duct limit switch (or cycling switch) is a bimetal blade, which is normally closed but will open at an air temperature of 215°F and shut off burning in the heater. When the temperature drops, this switch will close and permit the heater to restart. This cycling will continue until the heater is turned off. This switch does not control the ignition system.

The lockout overheat switch is of the snap-action type with an external reset button. If the air temperature exceeds 350°F, this switch will snap open and shut off ignition, fuel, and the combustion air blower. The heater will then remain off until the overheat switch has been manually reset. When this switch operates, it is a strong indication that something is wrong with the heating system and service is required.

PRINCIPLES OF OPERATION

When the heater is turned on, the following sequence of events takes place (See Figure 2 or 3 according to heater model).

a. The ventilating air blower is energized through terminal 5 of the terminal strip.

b. The combustion air blower is energized through terminal 4, the overheat switch, and terminal 6.

c. As the combustion air blower gains speed, air velocity closes the airvane switch. Closing of the switch energizes the ignition coil through the filter, breaker points and 10-ohm resistor on the 8240-A, 8259-A, and 8259-DL, or through terminal 10 and the solid state ignition unit on heaters so equipped. Closing of the airvane switch also permits the fuel solenoid valve to be energized through the duct limit switch and the duct limit switch and the temperature control connected across terminals 7 and 8.

d. If the thermostat is calling for heat (contact closed), the fuel solenoid will open. Since the combustion air blower and fuel pump assembly is running, fuel will spray into the mixer and combustion air will be blown into the openings in the can to form a highly combustible mixture.

e. With the breaker points or solid-state ignition unit interrupting the primary current of the ignition coil, a hot spark appears at the electrodes of the spark plug. Ignition is instantaneous and an intense flame is established within the mixer assembly.

f. The hot gases of combustion are dispersed by the baffle on the mixer and then rise to the top of the heat exchanger where they are forced to turn and complete a second pass on the two sides. At the bottom of the heat exchanger, the gases are collected and pass out through the exhaust outlet.

g. The scrubbing action of the hot gases, as they pass through the channels, causes the heat to be transferred through the walls of the heat exchanger to the ventilating air, which is being blown over its outer surface and through the inner slot. The heated air is then conducted to the interior of the airplane.

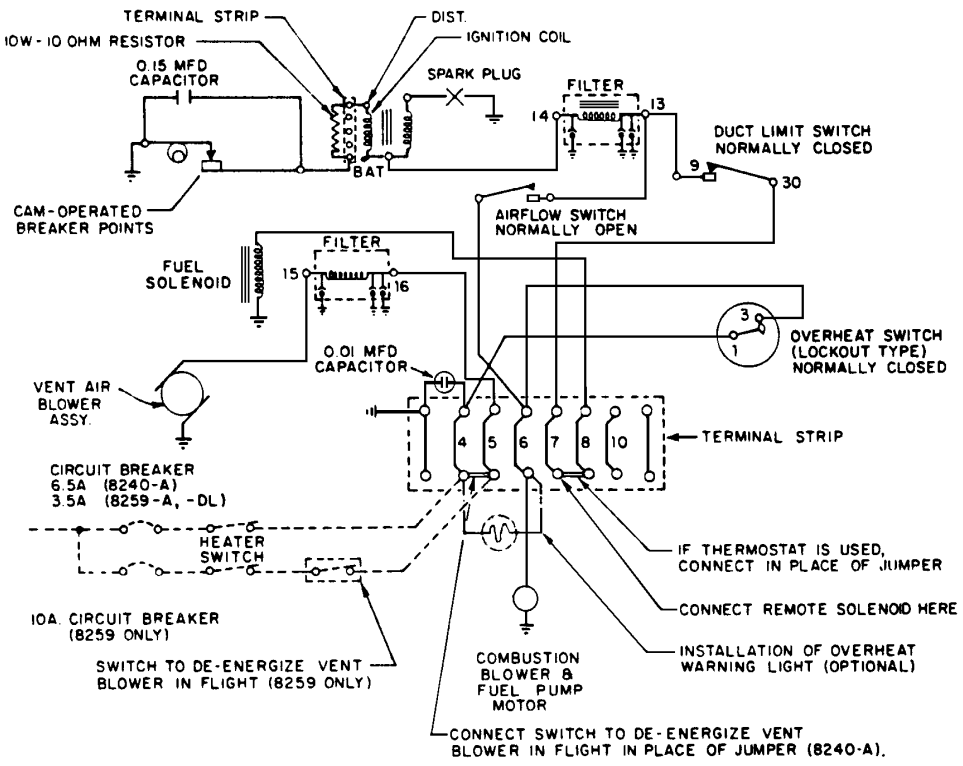


Figure 2 - Wiring, All Models with Ignition Breaker Points
(8240-A, 8259-A and 8259-DL)

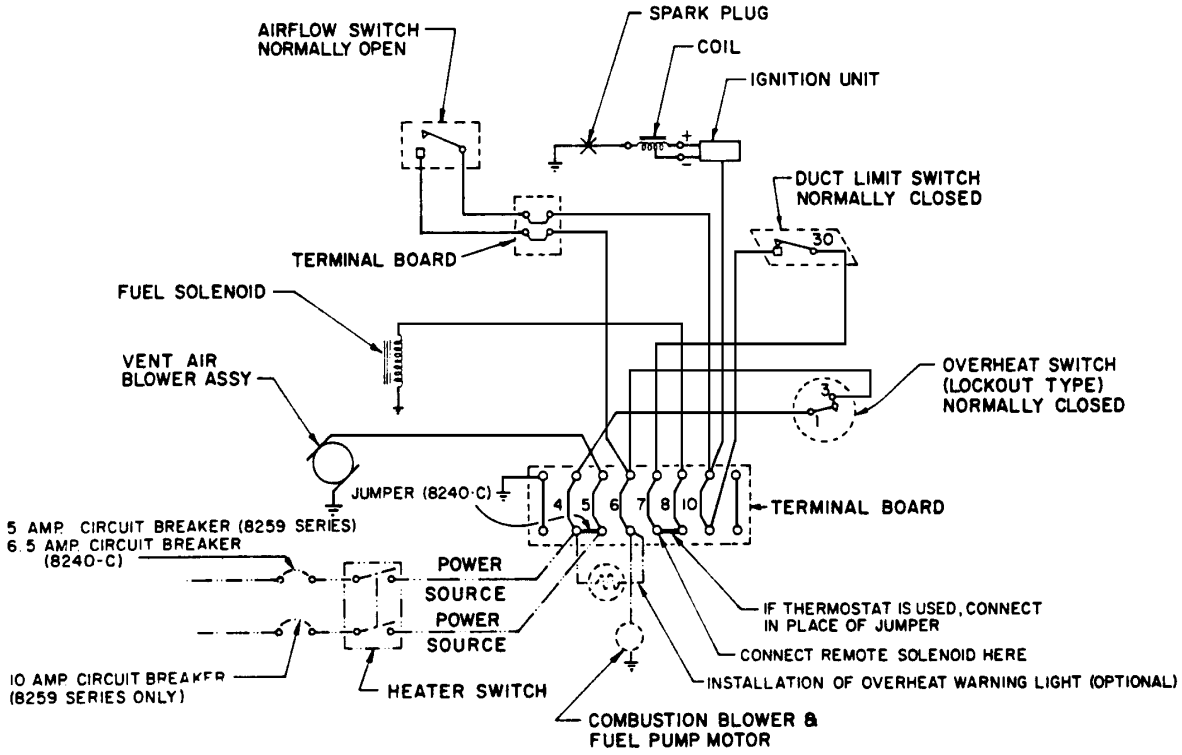


Figure 3 - Wiring, All Models with Solid State Ignition
(8240-C, 8259-C, 8259-FL1, 8259-GL1, 8259-GL2)

h. As the air passes through the duct, it flows around the bimetal helix of the ductstat. When the helix becomes warm, it tends to unwind, due to its bimetal construction, and the cam on the end of the shaft revolves, causing the microswitch to transfer and de-energize the fuel solenoid. Fuel flow stops and flame is extinguished, but the combustion air blower still runs and spark continues at the electrodes of the spark plug. As the ventilating air stream carries residual heat in the heat exchanger away, the temperature drops and the ductstat contacts close. The fuel solenoid then opens. Fuel enters the burner and the heater re-ignites. This cycle of operation will continue indefinitely, controlled by the ductstat action, as long as fuel, electric current, and air are available to the heater system and the control switch is turned on.

i. When the control switch is turned off, the entire system is de-energized and the blowers, fuel supply, and spark are shut off at once.

SAFETY FEATURES

The heater is equipped with several safety devices to prevent the possibility of damage to equipment or a hazardous operating condition. These include provision for all types recommended by F.A.A., including the pilot's instrument panel warning light for an overheat condition. This light if used should be connected as shown in the applicable wiring diagram.

Safety features include the following:

a. Burner drain and an additional drain in the heat exchanger. These eliminate the possibility of accumulating any quantity of unburned fuel in the event of ignition failure.

b. The airflow switch, which prevents starting of the heater with an inadequate combustion air supply and also shuts off the heater if combustion air should fail during operation.

c. The duct limit switch. In the event of a short-circuited thermostat, or stoppage of ventilating air flow so that the thermostat is not able to sense air temperature, the temperature within the heater will rise to 220°F, at which point the duct limit switch or cycling switch will open and shut off the fuel supply. The heater will then continue to cycle at a safe temperature until thermostat control is again restored by increasing the ventilating air rate or by a change in the thermostat adjustment.

d. Lockout overheat switch. This switch will function only if the duct limit switch fails and permits the temperature to rise to 350°F. If this should occur, the overheat switch will snap open and shut off all components except the ventilating air blower. The warning lamp will light and the heater will remain off until the overheat switch is reset by pushing the button.

III. MAINTENANCE

GENERAL

These heaters are specially designed to simplify service procedures. All heater controls are mounted in accessible positions outside the heater case and the ventilating air blower is attached by means of bayonet slots to simplify removal and replacement.

All maintenance in the aircraft should be confined to replacement of complete subassemblies as outlined below. Attempts to repair the blower assemblies, fuel pump, or breaker points without complete tools and test equipment are likely to result in equipment failure or inadequate operation. The following major subassemblies are to permit unit replacement and may safely be installed without further testing if the subassembly was tested in the shop prior to installation:

a. Combustion air blower and fuel pump assembly.
b. Ventilating air blower, complete with breaker points (if used).
c. Airflow switch assembly.
d. Spark plug.
e. Ignition coil.
f Ductstat.
g. Fuel pump assembly.

It is not advisable to replace the duct limit switch without a test of the entire heater assembly since the switch must be calibrated after being installed (See Section V). Replacement of the nozzle as a unit is not recommended since the trouble attributed to the nozzle may be caused by a leaking solenoid.

It should also be remembered that cleaning of the burner assembly will not bring about a permanent improvement in heater performance unless the cause of fouling is known and has been corrected.

If the heater cannot be repaired by replacement of the components listed above, the entire unit should

be removed from the airplane and returned to the shop for repair and testing.

Instruction for disassembly, repair and replacement of these parts appears in Section IV of the handbook.

PERIODIC SERVICE AND INSPECTION

The fuel filter should be cleaned at regular intervals to prevent the collection of water and formation of ice during cold weather. When the fuel filter is cleaned, all fuel connections should be checked for leaks, with fuel pressure applied.

PREFLIGHT

Before each flight, the air duct inlets, exhaust outlet, and heater drain outlet should be checked for clogging, ice, carbon or other obstructions.

250 HOURS OF HEATER OPERATION

After 250 hours of heater operation, remove the ventilating air blower and check breaker point gap on models so equipped. This should be within limits of 0.023" to 0.027". Also inspect the cam for signs of wear. If a groove or step is worn into the cam, install a new cam and recheck breaker point gap. At the 250-hour period, also remove and inspect the spark plug. If the plug shows signs of fouling or erosion, return the entire heater to the shop for repair and testing, since the nozzle is probably at fault. If the plug is in good condition, it should be cleaned and replaced.

Repeat the 250-hour inspection at 250-hour intervals up to 1,000 hours, at which time the heater should be overhauled.

ANNUAL CHECK OF FUEL PUMP

The fuel pump of any installation should be checked annually, at the beginning of each heating season, since it may be affected by gumming of fuel during a prolonged shutdown period. The pressure of the fuel pump can be checked without removing it from the combustion blower motor, or for that matter, without removing the combustion blower from its place of installation.

To check pressure:

a. Disconnect the fuel line from the outlet side of the heater fuel pump and install a pressure gage with tee fitting in the fuel pump outlet. Reconnect fuel line.

b. Apply power to the heater system.

c Turn the heater switch to ON position. The blowers should start and the heater should ignite. Allow time for air to bleed out of the fuel line. With the heater burning, the fuel pressure gage should indicate 18 to 24 psig.

d. Shut off the heater and disconnect the fuel solenoid lead from terminal No. 8 of the heater terminal strip, then turn the heater switch ON. This will start the blowers, but prevent flow of fuel.

e. With the fuel pump operating and the solenoid valve closed, pressure reading on the gage must not exceed 27 psig.

f. If fuel pressure fails to meet the requirements for either test, remove the fuel pump for servicing, or replace with a new pump.

NOTE: If the heater fails to ignite during the first part of the test, note pressure reading and discontinue the test as quickly as possible. Prolonged operation when the heater is not burning will permit raw gas to drip from the drains in the heat exchanger.

TROUBLE SHOOTING

Like any other device that burns fuel, this heater must have five supplies fed to it for operation. The first of these is fuel. The fuel pump on the combustion air blower will supply fuel to the heater under the proper pressure. The second supply required is combustion air. On the ground the combustion air blower will furnish the proper amount of air for combustion. In flight, particularly at altitude, the blower is apt to be marginal and for this reason it is recommended that the static pressure in the combustion air pickup be about 1.0 to 2.0 inches of water above the static pressure in the exhaust. This is a function of the installation and must be considered at the time the heater is designed into the aircraft. Next, the heater requires a source of ignition. The ignition system on the heater will fulfill this requirement. It is designed to operate all of the time that the heater is turned on, whether the heater is burning or not. Fourth, the heater requires air to keep it cool (ventilating air). This is the air used to heat the cabin. On the ground the ventilating air blower will supply as little as half the air required for the heater to operate at full output. In flight, when this blower is either supplemented or supplanted by ram air, there will probably be far more than the minimum requirement flowing through the heater.

The final requirement of the heater is a source of power for the control circuit, and to drive the

accessories listed above. While this is listed last, it is usually one of the first things to check when trouble shooting a heater that is not functioning properly. Most of the troubleshooting on this heater can be done with only a test light.

PRELIMINARY

The first thing to look for in troubleshooting is to see if both motors run. If neither one does the trouble is probably in the wiring up to the heater. If the ventilating air blower operates but the combustion blower does not, check the overheat switch - it may be tripped. If the overheat switch is not tripped, check with a test light to find the open circuit in the wiring to the combustion blower motor. If there is no open circuit and the blower does not run, the blower motor itself may be defective.

If both blowers run but the heater does not ignite, the next step would be to check the ignition system. First check with a test light to see if there is power being supplied to the filter on the side of the ignition coil cover on the 8240-A, 8259-A or 8259-DL. Check at terminal No. 10 on units with solid-state ignition. If there is no power and the combustion air blower is running, the trouble may be in the air flow switch, or in the wiring from the overheat switch to the ignition filter. If there is power at this point the next step is to check the spark plug. Remove the ignition cover, pull the high tension lead from the spark plug, and check to see if the ignition system is supplying high voltage to this point. If voltage is adequate, remove the spark plug and check. If there is no evidence of spark to the plug, the breaker point assembly, on the end of the ventilating blower motor, if used, should be checked for cam wear and proper gap. The points should also be inspected to see that they are not burned. If the points are in good condition the trouble may be either in the ignition coil itself, or in the wiring from the coil to the points (including the 10 ohm resistor). On units with solid-state ignition, substitute a new coil first, then a new ignition unit if this does not correct the fault.

If the ignition system checks out satisfactory, the next step is to check the fuel system. For ease in checking, loosen the fuel fitting on the heater to see if there is fuel under pressure at that point. If so, check with a test light to see if there is power at terminal No. 8 on the terminal strip. If power is indicated the trouble may be in the fuel solenoid, or the fuel nozzle, and the heater will have to be disassembled to correct the problem. If this terminal is dead, check terminal No.7. Power at this point but not at No. 8 would indicate the trouble was in the thermostat, or the thermostat wiring. If there is no indication of power at No. 7, check back with the test light, through the duct limit switch to the airflow switch, using the applicable wiring diagram as a guide. Power at the airflow switch, but not at terminal 7 would indicate a defective duct limit switch. Replace the airflow switch if there is power at terminal 6, but none at terminal 10 on the solid state models (or terminal 13 on 8240-A, 8259-A and 8259-DL).

NOTE: The combustion air blower must be running when performing these tests.

Trouble shooting a heater that burns but does not have sufficient output is the most difficult type of trouble shooting, and requires the use of a thermometer which can be put into the ventilating air duct at a point about 12 to 18 inches downstream from the heater, preferably around a bend in the hot air ducting. With the heater in operation and the thermostat set to the maximum heat position, the thermometer should read about 180° to 190°F. If the thermometer does not register this, the test light should be used to determine if the thermostat or the duct limit switch is properly cycling the heater fuel supply on and off. If the thermostat is cycling, but at a lower temperature, it should be recalibrated. If the duct limit switch cycles but the thermostat does not, the setting of the duct limit should be raised until the thermostat just cycles.

WARNING: The duct limit switch must not be set above 225°F since the residual heat in the heat exchanger, at the time the heater is shut down, can trip the manual reset overheat switch if the heater is permitted to operate at a higher temperature level. This is particularly true when the heater is shut down with the aircraft on the ground, as there is no ram air available to cool the heater after shut down. It will be noted that this heater does not have an automatic ‘purge’, or cooling period after shut down.

TROUBLE SHOOTING CHART

TROUBLE	PROBABLE CAUSE	REMEDY
Heater will not start and blowers do not run.	1. Open circuit breaker. 2. Defective heater switch or wiring	1. Reset circuit breaker. 2. Replace switch or replace wiring
Vent air blower runs but combustion air blower does not start.	1. Overheat switch tripped. 2. Defective combustion air blower motor.	1. Reset switch (find cause of overheating). 2. Replace blower.
Both blowers run but heater fails to start.	1. Breaker points defective or out of adjustment. (8240-A, 8259-A or 8259-DL only) 2. Defective spark plug. 3. Obstruction in comb. air passage. 4. Defective ignition coil. 5. Defective solid-state ignition unit. 6. Open circuit in thermostat. 7. Defective solenoid coil or clogged nozzle. 8. Open circuit in duct limit switch. 9. Defective fuel pump. 10. Remote solenoid closed. 11. Open circuit in radio noise filter. 12. Airflow switch open.	1. Replace breaker points assembly, cam or both parts. 2. Replace Plug. 3. Remove obstruction. 4. Replace coil. 5. Replace ignition unit. 6. Replace thermostat. 7. Replace nozzle holder and solenoid assembly. 8. Replace switch. 9. Replace or overhaul pump. 10. Repair or replace solenoid. 11. Replace filter.(8240-A, 8259-A or 8259-DL only) 12. Recalibrate switch or correct cause of low comb. air flow
Heater burns but thermostat will not control temperature.	1. Defective thermostat. 2. Defective fuel solenoid.	1. Replace or adjust thermostat. 2. Replace solenoid.
Outlet air temperature too high.	1. Insufficient vent air. 2. Defective thermostat.	1. Increase vent air flow. 2. Replace or adjust thermostat.
Outlet air temperature too low.	1. Excessive vent air flow. 2. Defective thermostat. 3. Defective duct limit switch. 4. Low fuel pressure. 5. Dirty fuel nozzle.	1. Reduce vent air flow. 2. Replace or adjust thermostat. 3. Replace or adjust switch. 4. Repair or replace pump. 5. Replace nozzle.
Heater trips overheat switch.	1. Defective overheat switch. 2. Defective duct limit switch.	1. Replace switch. 2. Replace or adjust duct limit switch.
Smoking heater exhaust.	1. Defective nozzle. 2. Slow combustion blower. 3. Leaking solenoid valve.	1. Replace nozzle. 2. Replace combustion motor. 3. Repair valve.
Heater pops or bangs when starting or cycling.	1. Leaking solenoid. 2. Delayed ignition caused by intermittent spark. 3. Defective fuel nozzle.	1. Repair valve. 2. Replace spark plug - check coil, ignition unit or beaker points. 3. Replace nozzle.
Rumble or combustion noise in heater.	1. Loose burner assembly mounting screws. 2. Defective nozzle.	1. Tighten mounting screws. 2. Replace nozzle.

Testing for low heat output when neither the duct limit switch nor the thermostat is cycling the fuel on and off. This step requires the use of a pressure gage tapped into the fuel line between the fuel pump and the heater. The fuel pressure at this point should be at least 18 psig, and in most installations it should be 20 to 24 psig. If the fuel pressure is less than is required, the fuel pump, or the fuel system up to the pump may be defective. Many times the apparent fuel pump problems can be traced to a very small air leak into the system on the suction side of the pump. A hot spot in the fuel line up to the pump can cause vapor bubbles in the line. Since the fuel pump is small, it will not pump air or vapor, and sufficient fuel for the heater at the same time. Also, bubbles in the line require time to go through the nozzle and stop the flow of fuel during that time. In some installations a powerful fuel solenoid valve in the fuel line up to the

pump, has been found to generate enough heat to vaporize the fuel in the line and cause what appears to be a defective fuel pump.

If the fuel pressure to the heater is adequate and the heater still does not cycle on the thermostat, the trouble may be in the fuel nozzle in the heater. In this case the heater would have to be removed from the installation, disassembled, and the fuel nozzle replaced.

The Trouble Shooting Chart is provided as an aid in diagnosing the cause of heater failure, or improper operation. The chart lists Trouble, Probable Cause, and Remedy, for all conditions that are likely to be encountered. Most repairs can be made by replacement of components as directed above.

LEGEND FOR FIGURE 5

1. Ventilating Air Blower
2. Nut (4 reqd)
3. Nut
4. Washer
5. Screw (2 reqd)
6. Washer (2 reqd)
7. Airflow Switch Assembly
8. Screw (2 reqd)
9. Grommet
10. Igniter Cover
11. Screw & Gasket (6 reqd)
12. Spark Plug
13. Noise Filter
14. Wire Assembly
15. Wire Assembly
16. Screw (2 reqd)
17. Nut (2 reqd)
18. Ignition Unit Housing
19. Nut
20. Ignition Coil
21. Ignition Cable
22. Insulator
23. Wire Assembly
24. Screw (2 reqd)
25. Overheat Switch
26. Screw (4 reqd)
27. Speed nut (4 reqd)
28. Switch Guard
29. Wire Assembly
33. Duct Limit Switch
31. Nut (2 reqd)
32. Washer (2 reqd)
33. Screw (2 reqd)
34. Wire Assembly
35. Filter
36. Nut (2 reqd)
37. Screw (2 reqd)
38. Terminal Strip
39. Marker Strip
40. Screw (4 reqd)
41. Jumper
42. Bracket
43. Capacitor
44. Screw (14 reqd)
45. Jumper
46. Jumper
47. Fanning Strip
48. Shelf Assembly
49. Screw (8 reqd)
50. Grommet (2 reqd)
51. Shielding, Gasket
52. Shielding, Gasket
53. Shroud Adapter
54. Screw (6 reqd)
55. Screw (5 reqd)
56. Burner Assembly
57. Screw (3 reqd)
58. Gasket
59. Shielding, Gasket
60. Heat Exchanger
61. Ground Lead
62. Screw (2 reqd)
63. Nut
64. Terminal Block & Resistor
65. Insulator
66. Screw (2 reqd)
67. Nut (2 reqd)
68. Bracket
69. Heater Case
70. Thermostat
71. Combustion Air Blower Assembly
72. Pad (2 reqd)
73. Wire Assembly
74. Wire Assembly
75. Nameplate

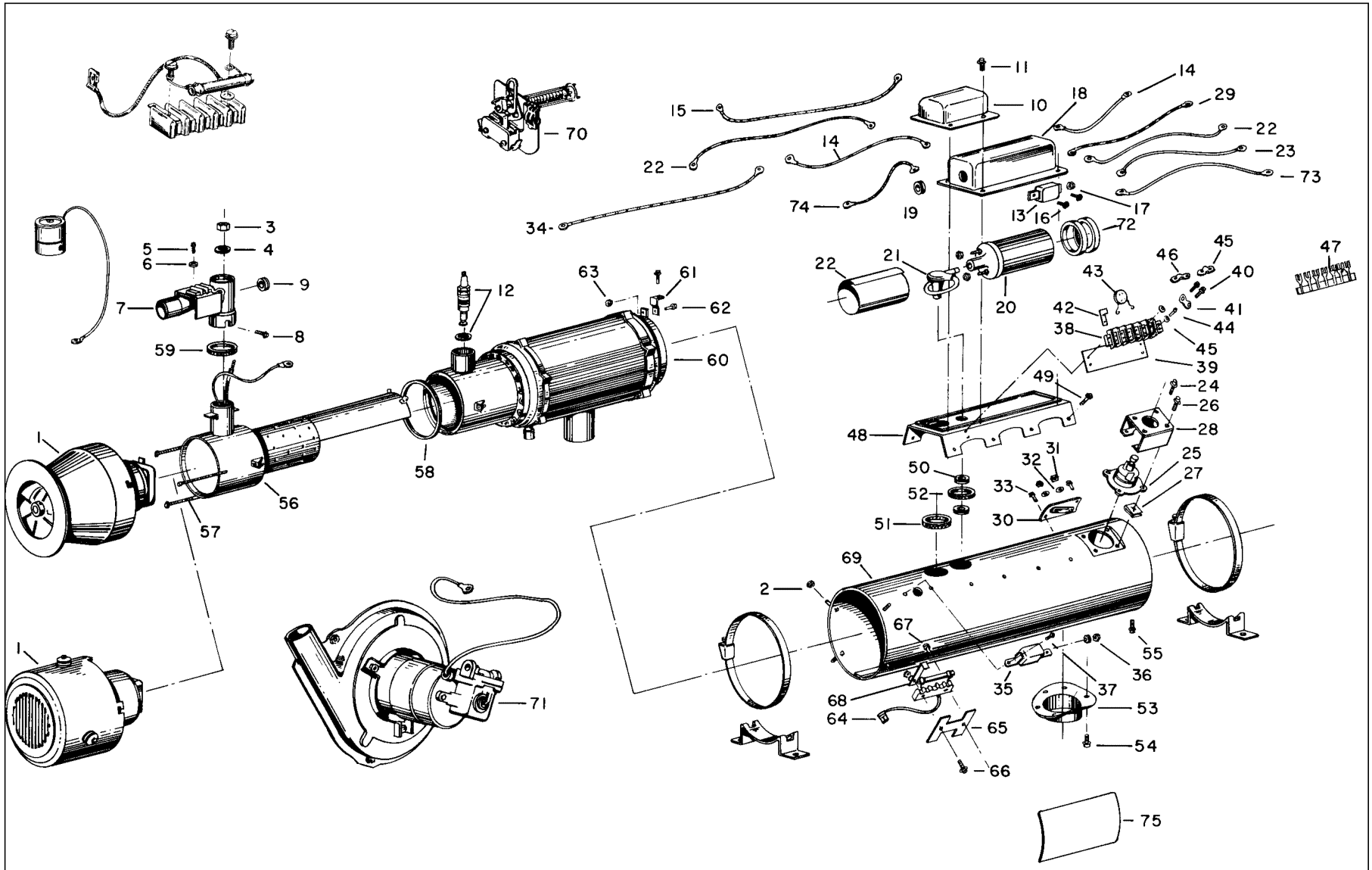


Figure 5 - Exploded Parts View, 8240-A, 8259-A and 8259-DL.

LEGEND FOR FIGURE 6

1. Ventilating Air Blower
2. Nut (2 reqd)
3. Nut 23.
Duct Limit Switch
4. Washer
5. Air Flow Switch
6. Screw (2 reqd)
7. Washer (2 reqd)
8. Grommet
9. Screw (2 reqd)
10. Housing
11. Screw (6 reqd)
12. Spark Plug
13. Gasket
14. Ignition Cable
15. Nut (2 reqd)
16. Wire Assembly
17. Wire Assembly
18. Wire Assembly
19. Ignition Unit
20. Ignition Coil
21. Pad (2 reqd)
22. Ductstat
24. Screw (2 reqd)
25. Nut (2 reqd)
26. Washer (2 reqd)
27. Overheat Switch
28. Screw (4 reqd)
29. Speed Nut (4 reqd)
30. Screw (2 reqd)
31. Terminal Strip
32. Guard
33. Screw (4 reqd)
34. Jumper (2 reqd)
35. Combustion Air Blower
36. Marker Strip
37. Screw (12 reqd)
38. Jumper (2 reqd)
39. Washer
40. Screw (8 reqd)
41. Shelf Assembly
42. Shielding, Gasket
43. Seal (2 reqd)
44. Shroud Adapter
45. Screw (6 reqd)
46. Burner Assembly
47. Screw (3 reqd)
48. Gasket
49. Screw (2 reqd)
50. Ground Lead
51. Nut
52. Screw (5 reqd)
53. Housing
54. Heat Exchanger Assembly
55. Seal
56. Seal
57. Seal
58. Nameplate

IV. DISASSEMBLY, REPAIR AND REASSEMBLY

OVERHAUL

An overhaul of any heater model consists of complete disassembly, cleaning, repair, and testing, as outlined in this section, plus final test of the complete heater as directed in Section V. The information is presented in overhaul sequence, but it should be noted that parts are not necessarily removed in the order shown and, for maintenance most subassemblies can be removed without disturbing other components.

SPECIAL SERVICE TOOLS

No special tools are required for repair or servicing of these heaters. Test equipment is described in Section V.

DISASSEMBLY

Normally the heater will be disassembled first by major subassemblies, and then each subassembly will be disassembled, repaired and tested as a unit prior to final assembly and testing of the complete heater. For convenience, these operations will be treated under separate headings in the following procedure.

HEATER DISASSEMBLY 8240-A, 8259-A and 8259-DL (See figure 5)

1. Disconnect the ventilating air blower lead from the No. 15 terminal of the radio noise filter (33) by removing the radio noise filter from the heater case and disconnecting the lead from the inside terminal. Loosen the four hex nuts (2) on the end of the heater housing. Turn the blower (1) in a counterclockwise direction to free the bayonet slots and pull straight out gently. When the blower is clear, disconnect the lead from the breaker points on the end of the motor and remove the blower.

2. Disconnect the solenoid valve lead from terminal No. 8 of the terminal strip. On older models, remove the airflow switch guard by removing the four screws (Guard is not used on late models). Remove the nut (3) and washer (4) from the fuel line bulkhead fitting and disconnect the airflow switch leads from terminals No. 6 (on terminal strip) and 13 (on ignition coil cover). Remove the airflow switch (7) by pushing the grommet (8) into the airflow switch so that it remains on the solenoid lead. The grommet may be removed from the lead after the switch is removed. The switch leads may also be removed from the switch after it has been removed from the heater by removing the terminal screws (6).

3. Remove the spark plug cover (10) by removing four screws (11) and remove the ignition

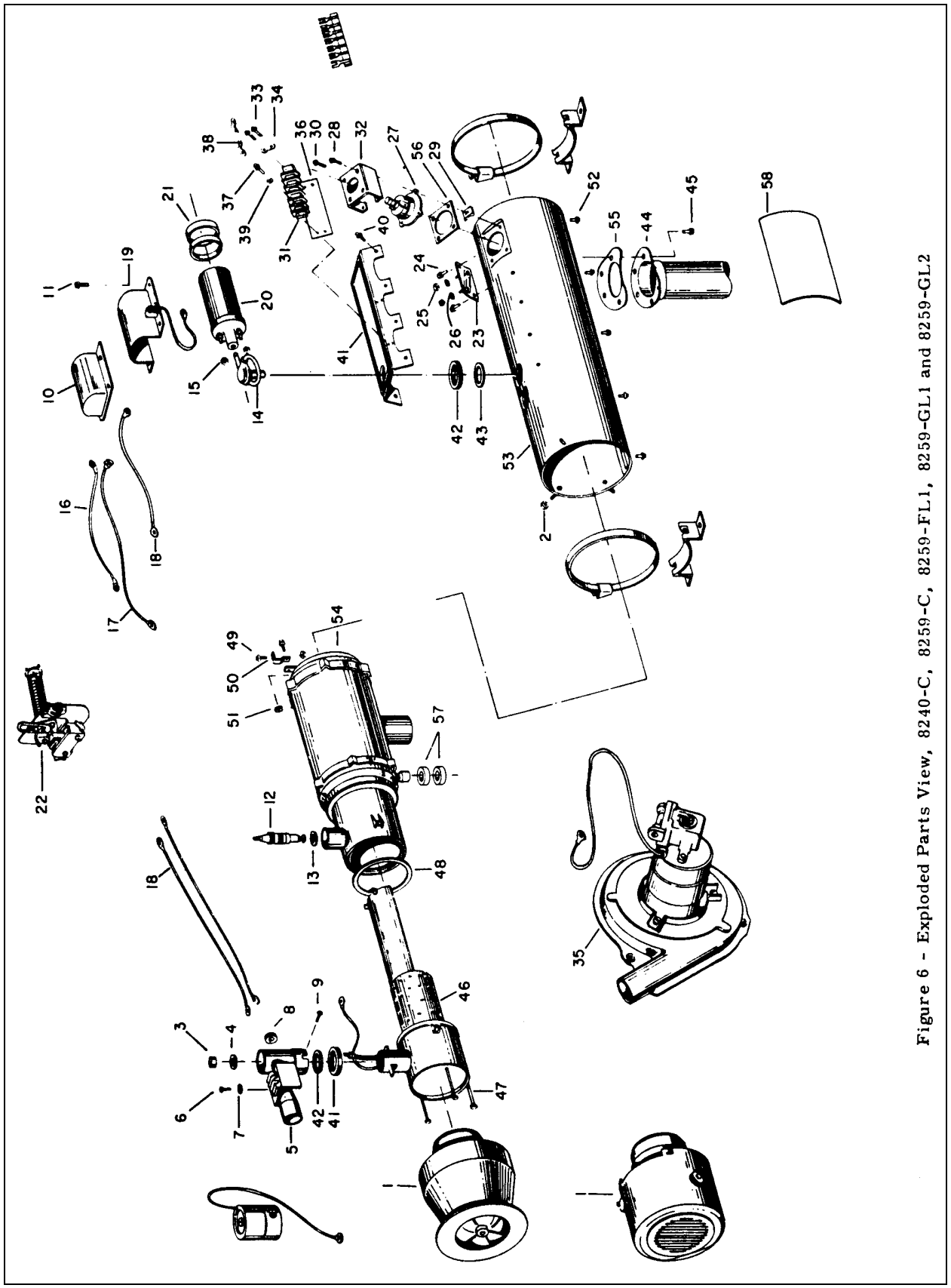


Figure 6 - Exploded Parts View, 8240-C, 8259-C, 8259-FL1, 8259-GL1 and 8259-GL2

cable (21). Remove the plug (12) with a l-inch deep socket.

4. Remove the radio noise filter (13) by disconnecting the limit switch lead (14) then remove the two screws (16). Pull the filter out and disconnect the coil hot lead by removing the terminal nut. Remove the ignition unit housing (18) by removing the remaining two screws (11). Disconnect the coil lead from the small terminal strip inside the blower end of the heater case and remove the ignition coil (20). The insulator (22) is held on the coil by the pads (72) and need not be removed.

5. Remove the three wires from the overheat switch and terminal strip and remove the overheat switch (25) by removing the four screws (26).

6. Remove the two wires from the duct limit switch (30) and remove the two screws (33) to free the switch. Note carefully the position of the switch on the heater housing. It is very important that the switch be reinstalled in the proper position (It will fit either way). The No. 9 terminal must be nearest the blower end of the heater, and this should be the 'hot' lead to the switch.

7. Disconnect and remove the wire from the blower filter (35) to the terminal strip.

8. Remove the remaining wire from the terminal strip (38) and remove the terminal strip and marker strip (39) by removing the mounting screws (40). The bracket (42) and capacitor (43) can then be removed. The fanning strip (47) will normally remain in the airplane when the heater is removed.

9. Remove the shelf assembly (48) by removing the eight screws (49) and remove the two grommets (50) and shielding gaskets (51 and 52).

10. Remove the exhaust shroud adapter (53) from the bottom of the case by removing the six screws (54) and remove five screws (55) from the seam of the case.

11. To remove the burner (56) and heat exchanger (58), remove the ground strap (61) and spread the heater case to clear the exhaust outlet.

CAUTION: Push the solenoid lead back into the combustion air tube and be careful not to damage the fuel line when removing heat exchanger.

The terminal block and resistor assembly (64) can be removed from inside the heater case if replacement is required. Remove the burner assembly (56) by removing the burner mounting screws (57). Also remove the burner gasket (58) and shielding gasket (59).

HEATER DISASSEMBLY 8240-C, 8259-C, 8259-FL1, 8259-GL1 and 8259-GL2 (See Fig. 6)

1. Disconnect the ventilating air blower lead from terminal 5 of the terminal strip and remove the blower (1) by loosening four nuts (2) at the end of the heater case (53). Turn the blower (1) in a counterclockwise direction to free the bayonet slots and pull straight off.

2. On older model heaters, remove the airflow switch guard by removing the four screws (guard is not used on late model heaters). Remove the nut (3) and washer (4) from the fuel line bulkhead fitting and disconnect the airflow switch leads from terminal 6 and 10 of the terminal strip. Remove the airflow switch (5) by removing the two screws (9) and pushing the grommet (8) into the airflow switch so that it remains on the solenoid lead. Disconnect the lead from terminal 8 of the terminal strip.

3. Remove the ignition housing (10) by removing four screws (11) and remove the ignition cable (14) from the spark plug (12) and coil (20). Remove the spark plug (12) with a 1-inch deep socket and remove gasket (13). Disconnect leads from the overheat switch (27) and duct limit switch (23).

4. Disconnect the ignition unit lead from terminal no. 10 of the terminal strip and remove the remaining screws (11) from the ignition unit flange. Lift off the ignition unit (19). Remove ignition coil (20) and pads (21). Leave pads on the coil unless the coil is to be replaced.

5. Remove the duct limit switch **(**23) by removing two screws (24).

6. Remove the overheat switch (27) by removing four screws (28). Leave the speed nuts (29) in the housing if undamaged.

7. The terminal strip (31) and marker strip (36) need not be removed from the shelf assembly (41), unless replacement is required. Remove the shelf assembly (41) by removing eight screws (40). This will also free the shielding gasket (42) and seal (43) from models so equipped.

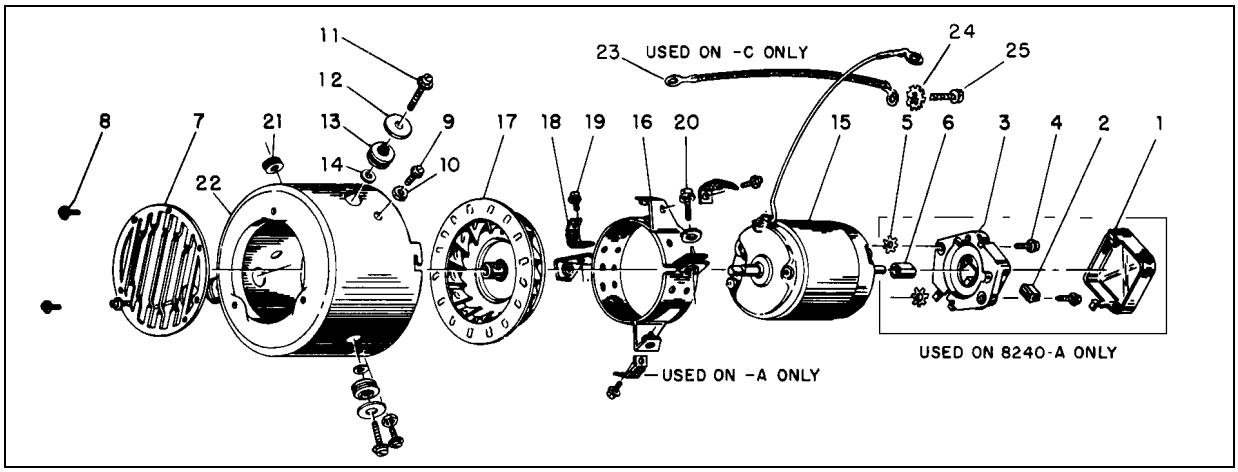


Figure 7 - Ventilating Air Blower, 8240-Series Heaters.

1. Cover
2. Grommet
3. Breaker Points Assembly
4. Screw (2 req.)
5. Lockwasher (2 reqd)
6. Cam
7. Louver Plate
8. Screw (3 reqd)
9. Screw (3 reqd)
10. Nut (3 reqd)
11. Screw (3 reqd)
12. Lockwasher 3 reqd)
13. Grommet (3 reqd)
14. Washer (3 reqd)
15. Motor
16. Bracket
17. Blower Wheel
18. Strap
19. Screw
20. Screw
21. Grommet
22. Blower Housing
23. Ground Lead
24. Washer
25. Screw

8. Remove the shroud adapter (44) by removing six screws (45). This will also release the seal (55) on sealed heater units.

9. Remove the burner assembly (46) by removing the three long screws (47) and breaking the seal of the gasket (48). Pull burner straight out of the heat exchanger (54).

10. To remove the housing (53), disconnect the ground strap (50) and remove the 5 screws (52) from the seam at the bottom. Spread the housing just enough to clear the exhaust and slide it off the heat exchanger (54).

VENTILATING AIR BLOWER AND BREAKER POINTS DISASSEMBLY
MODEL 8240-A (See Figure 7)

1. Snap off the breaker points cover (1) and grommet (2). Remove the breaker points assembly (3) by removing the two screws (4) and lockwashers (5). Note relationship of breaker points casting to the three holes on the end of the motor. Remove the louver plate (7) from the end of the housing by removing the three screws (8). Remove the cam (6) by holding the fan and turning the cam clockwise (this is a left-hand thread). Remove the three screws and nuts (9 and 10) which attach the motor bracket bonding straps to the housing and then remove the three long screws (11) which pass through the vibration absorbing grommets (13), and small washers (14), then remove the motor (15) mounting bracket (16) and blower wheel (17) as a unit. Mark the position of the mounting bracket on the motor both longitudinally and rotationally. Remove the blower wheel (17) by loosening the setscrew, then remove the mounting bracket (16) by loosening the screw (20). Do not remove the bonding straps (18) unless replacement is required.

VENTILATING AIR BLOWER DISASSEMBLY
MODEL 8240-C (See Figure 7)

Disassembly of the ventilating air blower of the 8240-C is similar to the 8240-A blower except that this unit does not have the ignition breaker points. Follow instructions given above but ignore reference to breaker points. The motor on this blower is grounded by a single lead to the housing (23).

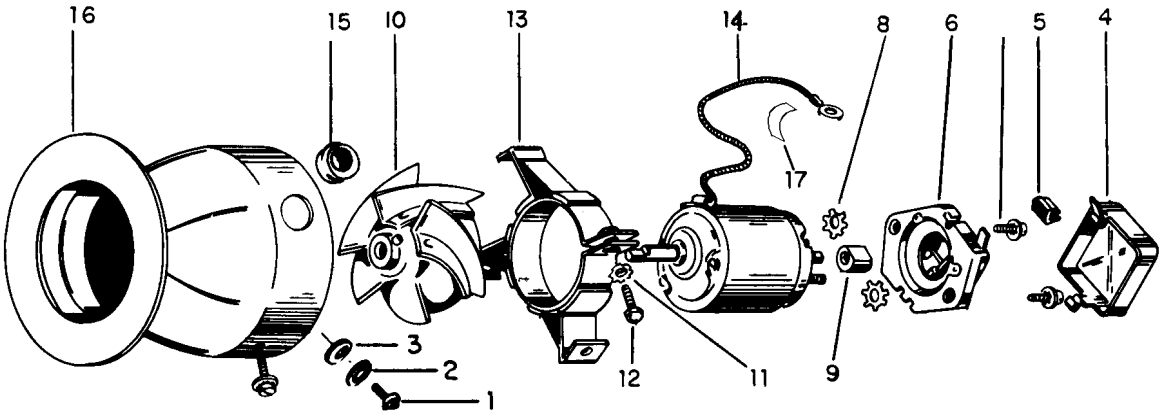


Figure 8 - Ventilating Air Blower, 8259 Series Heaters

1. Screw (3 reqd)
2. Washer (3 reqd)
3. Seal.(3 reqd)
4. Cover
5. Grommet
6. Base
7. Screw (2 reqd)
8. Lockwasher (2 reqd)
9. Cam
10. Blower Wheel
11. Washer
12. Screw
13. Bracket
14. Motor
15. Grommet
16. Housing
17. Label
18. Terminal (Not Shown)

VENTILATING AIR BLOWER DISASSEMBLY
MODEL 8259-A, 8259-C & 8259-DL (See Figure 8)

1. Remove the three screws (1) from the blower housing. This will free the motor, fan, and breaker points assembly (if used) from the housing.

2. Carefully pull the entire motor, breaker points and fan assembly straight out of the housing. Avoid excessive twisting movement that may damage the fan blades. The blades on this fan are aluminum and are easily bent.

3. Carefully mark location of the motor mounting bracket on the motor. This is necessary to insure proper clearance of the fan when these parts are reassembled.

4. Remove the fan (10) by loosening the setscrew and sliding it off the motor shaft.

5. On models that have the ignition breaker points, remove the cover (4) from the base (6) and save the grommet (5). The base (6) can then be removed by removing the two screws (7), and lockwashers (8). Remove the cam (9) by holding the motor shaft and turning in a clockwise direction (this is a left-hand thread). Remove the motor mounting bracket (13) by loosening the screw (12) and sliding it off the motor.

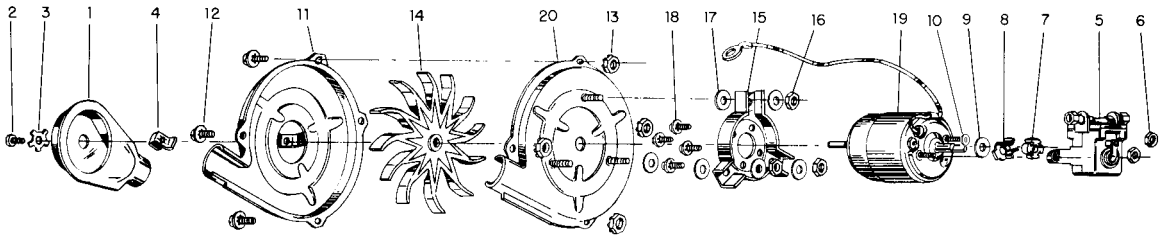


Figure 9 - Combustion Air Blower Assembly (All Models)

1. Adapter
2. Screw
3. Lockwasher
4. Speed Nut
5. Fuel Pump
6. Nut (2 reqd)
7. Coupling
8. Connector (2 reqd)
9. Washer
10. Washer (2 reqd)
11. Housing
12. Screw (4 reqd)
13. Nut (4 reqd)
14. Fan
15. Bracket
16. Screw (3 reqd)
17. Washer (6 reqd)
18. Screw (4 reqd)
19. Motor
20. Housing

COMBUSTION AIR BLOWER AND FUEL PUMP DISASSEMBLY (See Figure 9)

1. Remove the air inlet adapter (1) by removing the screw (2) and lockwasher (3). Remove the fuel pump (5) by removing the two nuts (6) from the motor studs. Do not lose the coupling (7) which will fall out when the pump is removed. The two connectors (8) have left-hand threads. Remove the outer housing (11) by removing the four screws (12) and (13), then loosen the setscrew in the blower wheel (14) and slide it off the motor shaft. Remove the rear housing (20) from the motor mounting bracket (15) by removing the three nuts (16) and six washers (17) from the housing studs, then remove the bracket (15) from the motor by removing the four screws (18).

NOTE: Be sure to mark position of bracket on motor, and of the housing on the bracket, before disassembly since, by varying these two positions, it is possible to point the combustion blower outlet in twelve different directions, 30° apart, around the motor shaft.

BURNER DISASSEMBLY (See Figure 10)

1. Remove the burner support (1) from the burner-housing cap (8) by removing the three screws (2). This will also release the combustion air orifice (3). Separate the burner support from the mixer (4) by removing three screws (5) from the mixer, then release the fuel nozzle and solenoid assembly (6) from the burner support by removing the retaining ring (7).

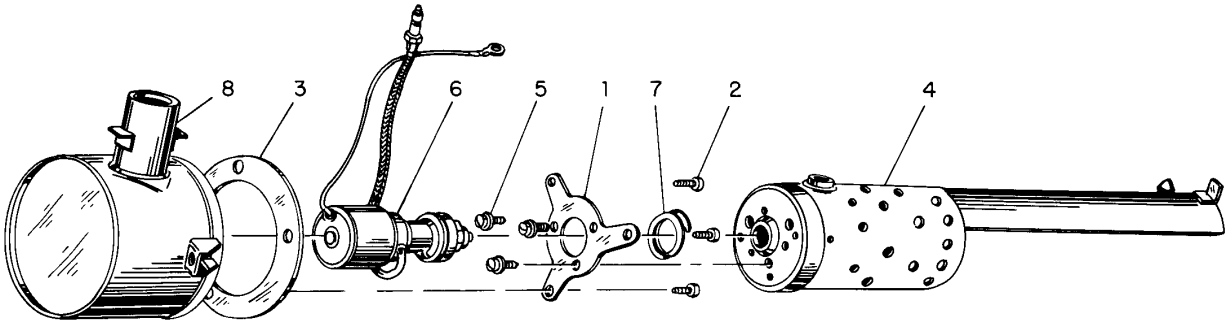


Figure 10 - Burner Assembly

1. Burner Support
2. Screw (2 reqd.)
3. Orifice
4. Mixer Assembly
5. Screw (3 reqd.)
6. Fuel Nozzle & Solenoid Assembly
7. Retaining Ring
8. Burner Housing Cap

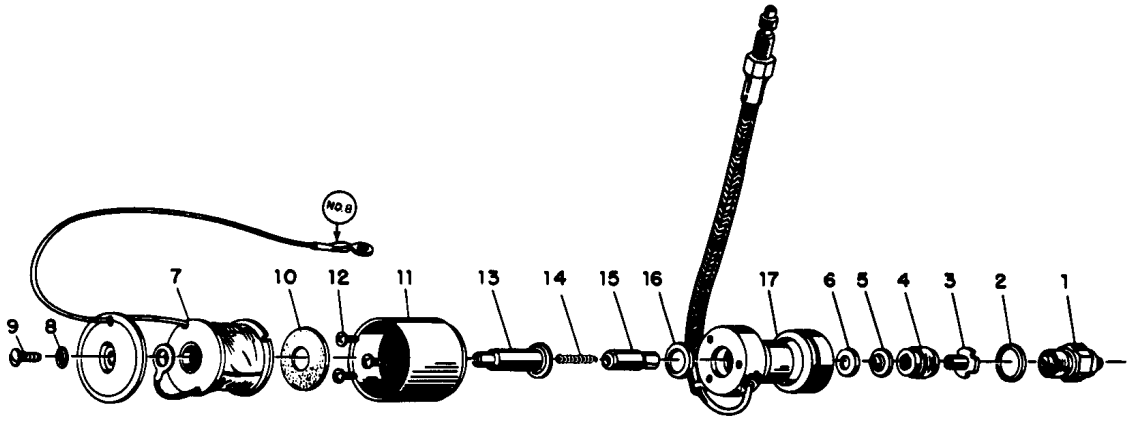


Figure 11 - Fuel Nozzle and Solenoid Valve Assembly

1. Nozzle
2. Gasket
3. Spacer
4. Valve Seat Screw
5. Valve Seat
6. Gasket
7. Coil & Cover Assembly
8. Lockwasher
9. Screw
10. Washer
11. Solenoid Cup
12. Screw (3 reqd)
13. Core Assembly
14. Spring
15. Plunger
16. Gasket
17. Fuel Tube & Nozzle Holder

FUEL NOZZLE AND SOLENOID DISASSEMBLY
(See Figure 11)

1. Remove the nozzle (1) with a socket and remove the gasket (2)* and spacer (3). Unscrew the valve seat screw (4) with an Allen wrench 1/4-inch across flats, and remove the valve seat (5) and gasket (6)*. Remove the solenoid coil and cover assembly (7) by removing the screw (9) and lockwasher (8). Lift out the rubber washer (10) and remove the three screws (12) from the bottom of the cup (11). This will release the core (13), spring (14), plunger (15), and gasket (16)*.

*These three gaskets should not be re-used.

CLEANING, INSPECTION AND REPAIR

1. Heater Assembly. Clean the airflow switch assembly with dry cleaning solvent, if required. Inspect the airvane for freedom of movement and test the microswitch for continuity with a volt-ohmmeter. Replace the entire assembly if the vane does not move freely, or if the microswitch is defective. The fiber airvane shaft bushings must be clean and dry and should not be lubricated.

2. The burner assembly should be carefully inspected before disassembly since its appearance will be an indication of burning conditions within the heater. The nozzle and the inside of the mixer will normally be covered with a thin layer of black carbon around the nozzle. The outer end of the mixer will be burned to a gray, or reddish, color and some scaling, or loose particles are usually present. These are indications of normal operation and should not be regarded as defects. A heavy, one-sided build-up of black carbon, or an excessively burned or eroded spot on the mixer will indicate an unsymmetrical spray or dripping from the nozzle. A badly burned, fouled, or pitted spark plug is also an indication of a defective nozzle. If carbon builds up below the nozzle, the nozzle seat is probably dripping, indicating a loose nozzle or scored seat, or possibly a solenoid valve that does not seal. A heavy deposit of soft black carbon may be caused by an oversize nozzle, or insufficient combustion air. This condition can also be caused by a nozzle, which has a coarse spray (large droplet size), or one which has too wide a spray angle. After noting condition of the burner, it should be disassembled and repaired as noted elsewhere in this section.

3. Examine the spark plug for erosion, fouling, burning or pitting. Such conditions, as previously noted are usually an indication of a defective nozzle. If the plug is defective, it must be replaced and the cause of damage corrected. If in good condition, the plug may be cleaned with a wire brush and reinstalled in the heater. The spark plug may be disassembled for cleaning.

4. Inspect the heat exchanger for leaks, cracks, clogged drain openings, and carbon deposits. The interior will normally contain a deposit of carbon and lead by-products. Remove as much of this as possible, with a flexible scraper. Remove combustion residue from inside heat exchanger by soaking this assembly in a 20% by weight solution of ammonium acetate at a temperature of 180°F, for a period of 5 to 10 hours. Flush out exchanger with water after cleaning, and dry as well as possible with compressed air. Check for warping of inner passages, or bulging of the header plate. Replace the heat exchanger if warping or bulging is excessive, or if any part is burned through. Small cracks may be repaired by welding, provided they are accessible and the heat exchanger is otherwise in good condition. Do not attempt to repair large cracks, or to straighten a deformed heat exchanger. When welding cracks in the heat exchanger, Type 347 or 309 weld rod is preferred, although Type 321, or 310 may be used. Before welding, it is very important to clean all combustion deposits away from the area to be welded, since the lead compounds in the exchanger can contaminate the weld to such an extent that a tight weld is almost impossible. Keep all weld beads as small as possible, preferably not over 1/8-inch.

5. Examine the shielding gaskets to make sure they retain sufficient resiliency to make good electric contact. Replace gaskets, if permanently compressed, or if torn or seriously deformed.

6. Inspect the filters (if used) for electrical continuity and leakage of oil. Replace if defective.

7. Inspect all electric wiring for condition of insulation and tightness of terminals. Repair by soldering, if required.

8. Replace all rubber grommets at each overhaul.

9. Clean the duct limit switch and lockout switch with dry cleaning solvent. Contacts of the duct limit switch may be cleaned by sliding a piece of bond paper between contacts, but the overheat switch must be replaced if defective in any way.

10. Clean the heater case, shelf assembly, ignition, covers, and outside of coil with cleaning solvent before reassembly. Do not dissolve potting compound of coil.

11. Ventilating Air Blower (See Figure 7 or 8). Clean the housing, fan, bracket and outside of motor

with cleaning solvent. Replace vibration grommets on fans so equipped at each overhaul. On models equipped with breaker points, inspect cam for wear, and check condition of breaker points. If the breaker arm has worn a groove in the cam, replace the cam. If the points are pitted or burned, replace the entire breaker point assembly, and cam. For most efficient heater operation, the breaker point gap must be set at .025 plus or minus .002 in. Inspection of this adjustment should be performed at every third 100 hour inspection of the aircraft. The normal wear will change this adjustment during 300 hours of plane operation due to the wind milling of the blower assembly.

If the inspection indicates that the adjustment is out of tolerance, readjustment may be performed after examination of the cam bearing surface for the presence of a groove and examination of the points for pitting and excessive wear. The presence of a groove in the cam is cause for replacement as is pitting or excessive wear in the points. The adjustment should be made using a feeler gage, which has been cleaned with alcohol, just prior to use.

Three methods of locking the adjusting screw have been used on these heaters. One is simply to solder the adjusting screw after adjustment. Another is the use of a locking screw and jam nut on the adjusting screw and the third method is the use of a locking nut, which jams against the shoulder of the adjusting boss. Whichever method is used, the screw must be securely locked in position after adjustment.

It should only be necessary to replace the ignition base unit (3), at such time as the point surface exhibits pitting or excessive wear.

Care should be taken to replace the rubber insulator (2) when replacing the point cover (1). Failure to do so could result in premature failure of the ignition coil.

12. Motor Overhaul Kit. An overhaul kit (Part No. G-720466) is available for all motors used on the combustion and ventilating air blowers of the 8240 and 8259 Series Heaters. This kit contains new bearings, new brushes and other parts required for the installation of these parts. At overhaul, these motors should be disassembled, the commutator cleaned, or turned, as required, and the new kit parts installed.

13. Combustion Air Blower (See Figure 9). Clean the inlet adapter (1), housings (11 and 20), fan (14), and outside of motor (19) with cleaning solvent. Inspect the two connectors (8). Discard the connectors if they are bent or broken. Install a new coupling (7) at each overhaul.

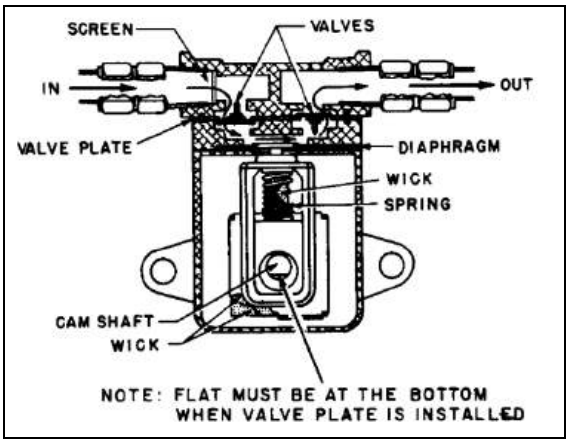


Figure 12 - Fuel Pump

14. Fuel Pump (See Figure 12). Replace the valves in the fuel pump at each overhaul using the part no. G-735736 Overhaul Kit, which contains a new valve plate and gaskets. Valves are already installed in the plate. Remove the four screws from the cover of the fuel pump assembly and lift off the cover. Remove the valve plate and gaskets and replace with new parts from the overhaul kit. Make sure the new valve plate is installed the same as the one which was removed. The valve at the inlet side of the pump must have the pointed side up. The outlet valve will then have the circular disc exposed. Loosen the clip and remove the bearing from the end of the camshaft before tightening cover screws. The flat of the camshaft must be at the bottom when the cover is installed. Add one cc of Winsor Lube no. L-245X (mfg'd. by F.E. Anderson Oil Co., Portland CT) to wick through the bearing opening before the bearing is reinstalled. Tighten cover screws securely to prevent leakage.

15. Burner Assembly (See Figure 10). Clean inside and outside of mixer assembly (4) with a wire brush, and blow out with compressed air (or sandblast, if available). Inspect burner cap (8) for dents, and clean out carbon deposits, if any.

16. Fuel Nozzle and Solenoid Assembly (See Figure 11). Inspect the solenoid and cover assembly (7) for condition of insulation and electric continuity. Inspect nozzle holder and fuel line (17) for clogging

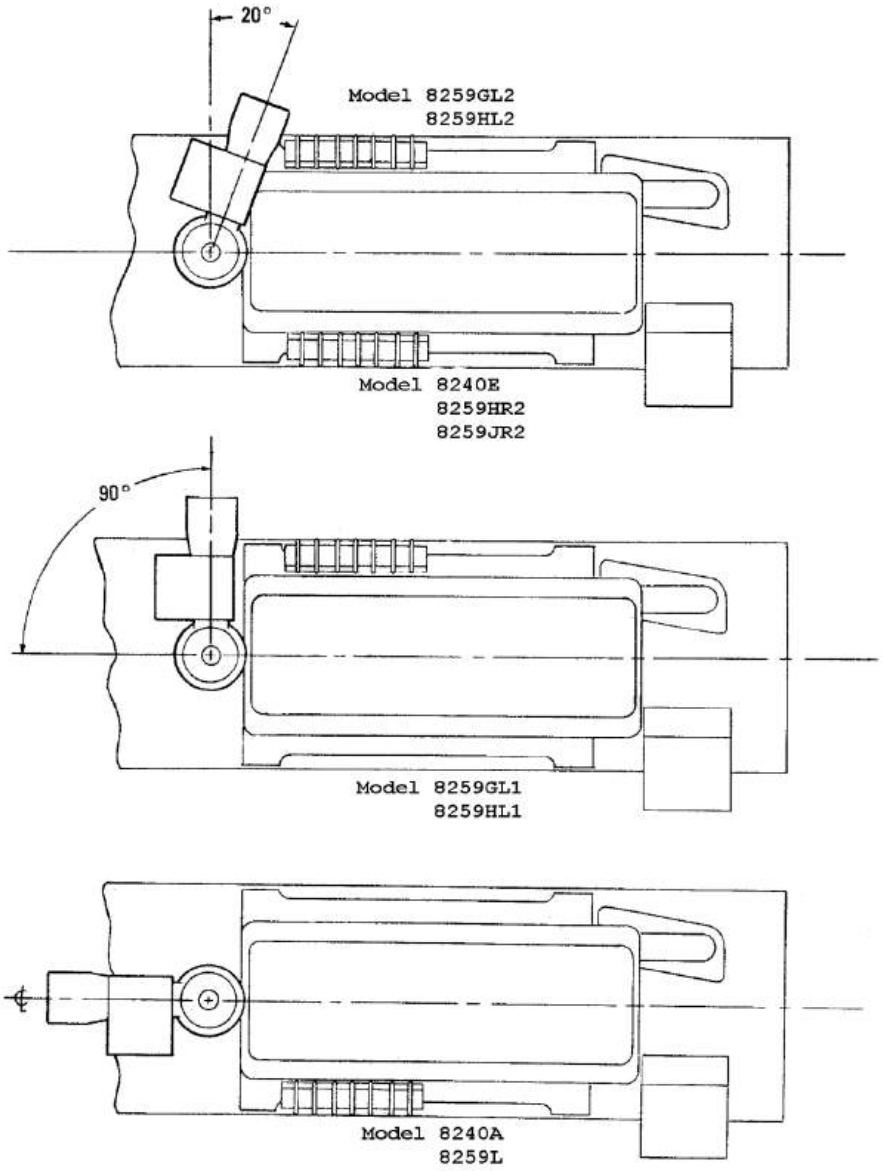


Figure 12-1 - Airflow Switch Positions For Different Heater Models

and condition of threads and welds. Clean inside passage with methyl alcohol, or carburetor cleaning solution. Inspect plunger (15) for condition of rubber tip at the end. If tip is swollen or has a deep impression from the valve seat, replace the plunger. Inspect the valve seat (5) for condition of seating surface, and replace if surface is scored or corroded. Install a new nozzle (1) gaskets (2, 6, 16), and spacer plug (3) at each overhaul.

REASSEMBLY

1. Fuel Nozzle and Solenoid Assembly (See Figure 11). Reassemble in reverse order of index numbers in Figure 8, using a new nozzle (1), gaskets (2, 6, 16) and spacer plug (3). Make sure cover screw (9) passes through eyelet of the coil ground lead, when the cover is reinstalled.

2. Burner Assembly (See Figure 10). Test assembled nozzle holder and fuel line assembly, as directed in Section V, before reassembly. Reassemble burner in reverse order of index numbers in Figure 7, making sure the retaining ring (7) is securely seated in the groove of the nozzle holder (6).

CAUTION: Do not overtighten screws (5) mounting nozzle holder to burner. Before tightening these screws, the nozzle holder should be rotated so that the fuel line is on the same side of the mixer as the spark plug and parallel to the centerline of the spark plug hole.

3. Combustion Air Blower (See Figure 9). Reassemble the combustion air blower in reverse order of index numbers in Figure 9, using a new rubber coupling (7). Note that connectors (8) on

motor shaft, and fuel pump, have left-hand threads. Be sure washers (9) are in place under connectors. Make a trial fit of fuel pump to determine if spacing is correct between the two connectors (8) before installing the pump. Use additional spacer washers (9) if required. The two connectors must fit snugly around the coupling (7) to insure pump operation and prevent breaking of the connector tabs. Before installing inlet adapter (1), loosen setscrew of blower wheel (14) and adjust the wheel to clear the front housing (11) by 3/16 - inch.

4. 8240 Series Ventilating Air Blower (See Figure 7). Reassemble in reverse order of index numbers in Figure 7 using new grommets (13). After installing bracket (16) as previously marked, and blower fan (17) on motor (15), try this assembly in housing and adjust position of fan on shaft and bracket on motor, to obtain a fan clearance of 1/16 inch from the end of the housing. Check clearance of breaker points (3) by turning fan until points reach their widest gap. The gap should be .023 - .027 inches. If not within limits, install new breaker points or adjust gap, then lock breaker point adjusting screw securely. Do not attempt to readjust an old set of breaker points if badly pitted or burned. Points in good condition may be readjusted and reused. Note that cam (6) has left-hand thread. Reassembly of the 8240-C blower is similar to the 8240-A except that it has no breaker points and has a single ground lead.

5. Ventilating Air Blower Reassembly - 8259 Series (See Figure 8). Replace the motor mounting bracket (13) on the motor (14) in its original position (as previously marked) and tighten the screw (12) securely. Make sure the motor is straight in the bracket and is securely clamped in position. On models so equipped, reinstall the ignition unit base (6) on the end of the motor, placing the lockwashers (9) between the base and the motor, and then reinstall the two screws (7). Tighten securely. Install the cam (9) by turning the motor shaft counterclockwise from the opposite end, making sure the cam seats tightly on the shoulder of the shaft. Adjust breaker points as directed in paragraph 4 above before replacing cover (4) and insulator (5) on the base (6). Fit the blower fan on the motor shaft, but do not tighten the setscrew. Slide this assembly into the blower housing until the motor mounting bracket is aligned with the screw holes in the housing, then reinstall the three screws (1), washers (2) and seal (3). Slide the blower fan toward the end of the housing until the edges of the fan blades have a clearance of 1/16 inch all around the housing, and then tighten setscrew. Washers and seals are used only on 8259-FL1, -GL1 and -GL2 models.

6. Different models of the heater assembly require different positioning of the inlet port of the airflow switch (5). Refer to figure 12-1 for information regarding airflow switch orientation at reassembly.

7. Heater Assembly (See Figure 5 or 6). Test combustion air blower assembly, ventilating air blower assembly, and airflow control switch assembly, as directed in Section V, before replacing these parts. Reassembly of the heater is essentially the reverse of disassembly, using new parts, as determined by inspection. Make sure the tower of ignition coil is in alignment with the grommet in the coil cover when these parts are reinstalled. Consult the appropriate wiring diagram for wiring connections.

V. TESTING

Testing of the heater must be accomplished in two stages. First, the testing and adjusting of major subassemblies before final assembly of the heater, then burning and final adjustment of the fully assembled unit. The entire test must be performed on a heater, which has been disassembled for overhaul, and the applicable test and adjustment must be made of any subassembly, which may be removed for separate servicing.

TEST EQUIPMENT

The following test equipment and apparatus is required for testing.

a. An adjustable source of D.C. voltage with a range of 0-30 volts at 5 amperes for 8240 Series heaters, or 15 amperes for 8259 Series.

b. A source of aviation fuel with pressure regulation within the range of 20 to 25 psi. The combustion air blower and fuel pump assembly of the heater is suitable for this purpose.

c. A water manometer, and a draft gage or inclinometer.

d. A thermometer with a range to include 250°F, for measuring air temperature.

e. An orifice tube consisting of a tube 1-1/4 O.D. x 0.25 wall, 15 inches long with a 0.860 round orifice at the end, and a static pressure tap midway of its length. This can be constructed of thin wall tubing.

f. An orifice tube consisting of a 1-1/4 inch O D. duct, 15 inches long, with a 0.937 diameter round, thin-plate orifice in its end, and a static pressure tap midway of the tube. This duct must also be fabricated by the user.

g. A buzzer, or vibrator to simulate mild vibration for the airflow switch test.

h. A method of measuring the fuel rate. This may be measured by a flowmeter, a calibrated container, or by weight.

j. A thermocouple and potentiometer will be required for testing the 8259 Series heaters. The thermocouple must be mounted in a duct to measure heater exhaust temperature. The exhaust duct may be a section of two-inch tubing or pipe 18 or more inches long, with the thermocouple installed at a distance of 18 inches from the heater outlet.

FUEL NOZZLE AND SOLENOID TEST
(Figure 11)

WARNING: SINCE THE SPRAY FROM THE FUEL NOZZLE IS HIGHLY INFLAMMABLE, PROPER PRECAUTIONARY MEASURES MUST BE OBSERVED.

1. Connect the fuel line of the fuel nozzle and solenoid assembly to a source of gasoline, ground the solenoid cup, and connect the solenoid lead to a source of 24 volts D.C.

2. Apply fuel pressure and energize solenoid until air has been bled from the system. De-energize the solenoid and increase fuel pressure to 40 psi. Examine nozzle (1) carefully for signs of leakage, and check for leakage around the core gasket (16). No leakage is permitted. If leakage occurs through nozzle, replace the plunger (15). If leakage occurs at the core gasket, tighten cup screws (12), or replace gasket (16). Energize the solenoid and examine for leaks around the nozzle. If leakage is detected, replace nozzle gasket (6).

3. Energize solenoid by varying voltage, and note pull-in voltage. Pull-in voltage must not be more than 20 volts. Replace core (13), spring (14), and plunger (15), or replace coil and cover assembly (7) as required, if pull-in voltage is too high.

4. Reduce fuel pressure to 20 psi, energize solenoid, and examine spray from nozzle. The spray must be uniform in shape without heavy or light areas, gaps, or drippings; and the spray angle must be approximately 80°. Replace the nozzle if not within limits.

COMBUSTION AIR BLOWER AND FUEL PUMP TEST

1. Mount the combustion air blower in a fixture and attach the 1-1/4 inch duct with 0. 860 orifice to the outlet of the blower. Leave the fuel pump disconnected for the first test. Connect the water manometer to the pressure tap of the duct.

2. Connect the blower motor to a source of 24 volts D.C., with a voltmeter and ammeter in the circuit.

3. Energize the blower and adjust voltage to 24 volts. Read static pressure in the duct as indicated by the water manometer. This must be 3.0 inch H_20 or more, and current draw must not exceed 2.4 amperes.

4. Replace or rebuild the blower motor, if not within limits.

5. Increase voltage to 28.5 V.D.C. and close off blower outlet. Let fan gain maximum speed. The fan must run free, without striking the housing. Readjust fan on the motor shaft, or replace the fan if scraping occurs.

FUEL PUMP AND NOZZLE TEST

1. Connect a fuel line to the inlet of the fuel pump, to provide a measured source of fuel. This can consist of a fuel source with a flowmeter upstream of the fuel pump, a calibrated container, or an uncalibrated container with provision to accurately weigh the contents before and after the test.

2. Install a tee fitting in the fuel pump outlet, with a pressure gage in the side, and a short section of fuel line having a 3/16 flare nut and sleeve to mate with the fitting on the end of the fuel nozzle and solenoid assembly. Connect the previously tested nozzle holder and solenoid valve assembly to the fuel line. Make provision to energize the solenoid valve.

3. Energize the blower assembly and solenoid valve. Permit fuel to flow until air has been purged from the system, then shut off solenoid valve. Read fuel pump outlet pressure with the blower running and the solenoid off. This pressure must not exceed 27 psi. Overhaul fuel pump, using G-735736 kit, if not within limits.

4. Energize the solenoid and read fuel pressure with fuel flowing through the nozzle. This pressure must be within the limits of 20 to 24 psi. Replace or overhaul the fuel pump if not within limits.

5. With fuel flowing, read fuel flow rate on the flowmeter, or conduct a timed test-run with a calibrated, or weighed, amount of fuel to determine fuel rate. Fuel rate must be within the shaded area in Figure 13 or Figure 14 depending on heater model, according to pressure. If fuel rate is not within limits, reclean or replace the nozzle.

CAUTION: Be sure to use the proper graph for fuel rates.

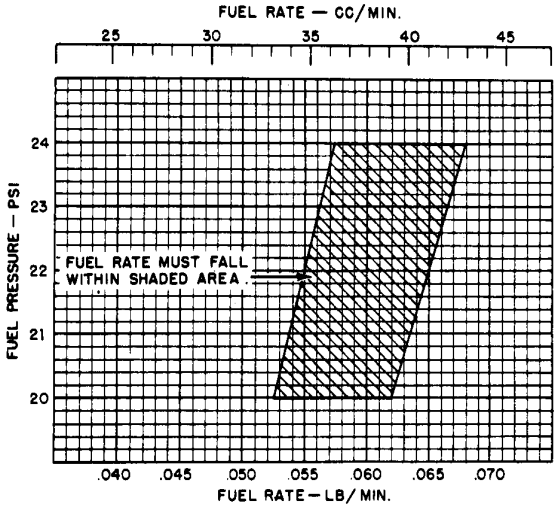


Figure 13 - Fuel Rate, 8240 Series Heater

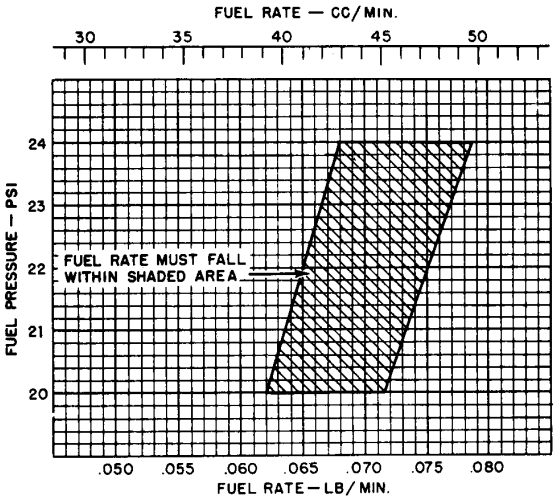


Figure 14 - Fuel Rate, 8259 Series Heater

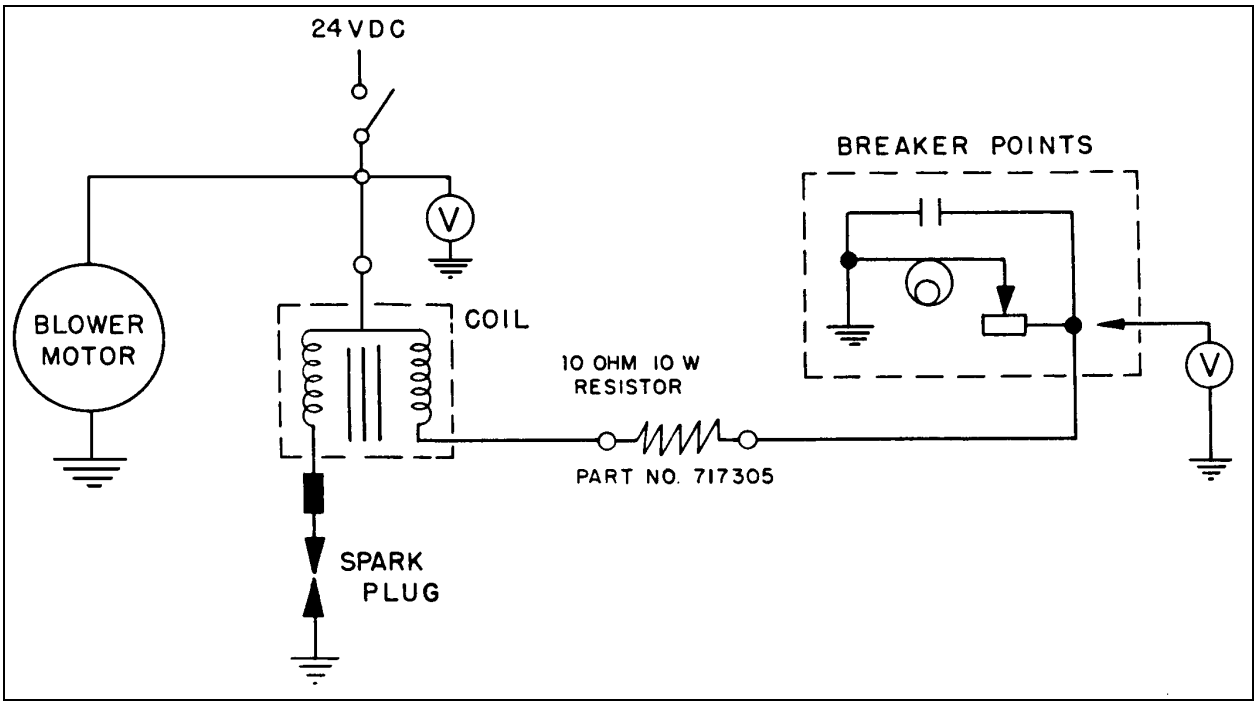


Figure 15 - Ignition Test Wiring (Heater with breaker points)

IGNITION SYSTEM TEST 8240-A, 8259-A and 8259-DL

1. Construct a fixture as shown in Figure 15, with provision to operate the ventilating air blower, coil, breaker points, and spark plug. This test should be conducted with a new spark plug, but the coil and blower of the heater under test should be used.

2. Connect parts, as shown in the wiring diagram, and energize the vent blower and ignition coil at 24 volts. Measure voltage across the points by connecting a D.C. voltmeter between the contact screw bracket and ground. This reading must be 13.5 to 14.5 volts. Check gap, reset if necessary, and retest points if not within limits.

3. Observe spark at the spark plug. It must be even and steady without interruption of any kind. Replace the ignition coil or breaker points if spark fails, is weak or is unsteady.

TEST SPECIFICATIONS FOR AIRFLOW SWITCH		
	Old switch G-714718 (Large Microswitch)	New Switch G-717570 and G-720765 (Small Microswitch)
Closing Pressure	1.15 tol.35 IN. H_20	1.5 to 2.1 IN. H_20
Opening Pressure	0.2 to 0.5 IN. H_20	0.4 to 0.8 IN. H_20

AIRFLOW SWITCH TEST

1. Two types of airflow switches have been used on these heaters. Prior to serial no. 701 on 8240 heaters, the unit with the large microswitch was used. On serial numbers 701 and higher and all models of the 8259 heater, the unit illustrated in Figure 4, with small microswitch, was used. A new switch is now being used which is similar to G-717570 but has a built-in guard. The new switch is interchangeable with the old and will be supplied as a replacement for all heaters. When testing the switch, it will be necessary to note the type, since test specifications are slightly different as outlined above. To test the switch, proceed as follows:

a. Mount a tested combustion air blower in the test fixtures and connect the inlet of the airflow switch assembly to the blower outlet. Attach the 1-1/2 inch O.D. orifice tube with 0.625 orifice to the outlet of the switch housing. Plug the fuel line opening and the opening for the solenoid lead wire with masking tape.

b. Connect a variable source of 24 volts D.C. to the blower motor and a water manometer or draft gage, to the static pressure tap of the orifice tube. Also attach the vibrator, or buzzer, to the orifice tube to simulate normal vibration during operation of the equipment.

c. Loosen microswitch adjustment locking screw on the new type switch, or loosen microswitch attaching screws on the old type. Attaching screws of the large microswitch should be snug, but not tight.

NOTE: Do not loosen attaching screws of the new, small, microswitch.

d. Energize the blower and adjust blower speed by controlling voltage so that the draft gage reads 1.25 In. H_20 for the old switch, or 1.8 In. H_20 for the new switch.

e. Adjust the microswitch by turning the adjusting screw until the test lamp just comes on at this static pressure.

NOTE: Back off the screw and make adjustment by turning in slowly until the lamp comes on.

f. Cycle the switch on and off several times by adjusting blower voltage. The switch must close each time within limits stated below. Replace the entire assembly if it cannot be adjusted within limits. It is not a repairable part.

OVERHEAT SWITCH TEST

1. Connect wires to terminals 1 and 3 of the overheat switch, and provide a test light to indicate switch operation. Suspend the switch in an oven with a thermometer and gradually raise temperature until the switch opens. Note oven temperature at this time. Switch opening temperature must be within the limits of 227°±22°F for models 8240-A, 8240-C and 8259-C, and 300°±29°F for models 8259-FL1, 8259GL1 and 8259-GL2. Replace the switch if not within limits. It is not adjustable.

BURN TEST AND DUCT LIMIT SWITCH ADJUSTMENT
(All Models)

1. Mount the fully assembled heater and combustion air blower in a test fixture, and provide a source of fuel and 24 volts D.C. Also, make provision for the heater exhaust duct and thermocouple to measure exhaust temperature, as previously directed.

2. Turn on the heater and allow it to burn until it begins to cycle on the duct limit switch. Note outlet air temperature. This must be within the limits of 200°F to 230°F. If not within limits, heat solder on adjusting screw of duct limit switch, and reset, or replace the entire switch.

NOTE: The apparent discrepancy in having an overlap in temperature settings for the duct limit switch and overheat switch is due to the different methods used in adjusting these switches. The overheat switch is set according to an oven temperature, which is even and which completely surrounds the switch. The duct limit switch is set according to air temperature at a distance from the switch, rather than the actual switch temperature. The purpose of the duct limit switch is to prevent operation of the overheat switch. If the switch setting is above the limit specified, it is possible that residual heat in the exchanger may trip the overheat switch after the heater is shut off under certain conditions. When this occurs, it will be impossible to restart the heater until the overheat switch reset button has been pressed. If such a condition should be encountered in the field, it can be corrected by reducing the duct limit switch setting to the lower limit of the tolerance.

3. Permit the heater to cycle on the duct limit until it has become thoroughly heated. Then, with the heater burning, read exhaust temperature. This temperature must be less than 1100°F for the 8240 Series or 1200°F for the 8259 Series. If temperature is higher than this value, recheck fuel flow rate and install a nozzle-fuel pump combination that will bring the fuel rate within limits. Also check cycling switch adjustment and correct if necessary.

If exhaust temperature cannot be brought within limits with rated fuel input and correct cycling switch adjustment, the heat exchanger or mixer is defective and must be replaced.

THERMOSTAT CALIBRATION

There are three thermostats that may be used with this type of heater, and they vary mostly in calibration.

Thermostat Part No.	Temperature Setting °F
G-714127	60°
G-715072	40°
G-715996	70°

The thermostats are adjustable and the settings given in this table are the settings at the low end of the adjustment range. All of these thermostats should have a range of about 120° from low to high setting.

Preliminary adjustment of switch position: Loosen the two screws which secure the microswitch to the switch base, and adjust the position of the switch so that the contacts are closed when the switch operating lever bears against the circular portion of the nylon cam, and open when the lever bears against the midpoint of the lobe of the cam.

CAUTION: Be sure that the normal play of the camshaft, bushing, etc., does not alter these results. When the switch is properly positioned, tighten the switch mounting screws and place a drop of Ambroid or Duco cement around the screw heads.

Cam Setting Procedure:

Place the thermostat in an ambient temperature equal to the thermostat setting. After the thermostat has had time to stabilize at this temperature, rotate the pivot plate counterclockwise (looking at the cam end of the thermostat) against the stop. Loosen the allen head set screw in the nylon cam and rotate the cam on the cam shaft to the point where the cam just opens the switch contacts. With the cam in this position, re-tighten the setscrew securely. After setting the cam position, check the thermostat to make sure that the cam rotates freely.

PARTS LIST -- 8240 and 8259 SERIES AIRCRAFT HEATERS

CODE	MODEL USED ON	CODE	MODEL USED ON
A	8240-A	E	8259-DL
B	8240-C	F	8259-FL-1
C	8259-A	G	8259-GL-1
D	8259-C	H	8259-GL-2

Part No.	Description	Qty. Per Unit	Usable On Code
76528	Screw, No. 10-32 x 2-1/4 rd hd	3	ALL
76784	Nut, No. 6-32 hex	2	ALL
77878	Nut, 3/8-24 hex	1	ALL
79372	Washer, Lock No. 6 int. tooth	3	ALL
79404	Washer, No. 8	2	ACE
94291	Nut, No. 8-32 hex	2	ACE
474363	Gasket	1	ALL
477727	Gasket, Fuel Line	1	ALL
484079	Screw, No. 8-32 x 9/16 fil hd int. 1/w	4	ALL
484140	Strip, Terminal	1	ALL
485152	Jumper, Ground Terminal	2	ALL
487370	Nut, 10-32 "Keps"	2	ALL
488066	Screw, No. 6-32 x 5/16 pan hd int. 1/w	16	ALL
488290	Clamp	2	
488589	Grommet	1	ALL
488993	Grommet	3	ALL
489145	Lead Assembly, Ground	1	ALL
489544-1	Bracket	2	CDEFGH
700380	Jumper	2	ALL
G-700748	Valve, Fuel Solenoid	1	BCDEFGH
700841	Nut, No. 8-32 "Keps"	10	ALL
702692	Screw, No. 8-32 x 3/4	2	ACE
711205	Nut, No. 6-32 type "I" speed	4	ALL
G-714716	Burner Assembly	1	AB
G-714717	Blower Assembly, Breaker points and	1	A
G-714720	Exchanger Assembly, Heat	1	ABCD
714722	Pad	2	ALL
G-714725	Housing Assembly, Heat Exchanger	1	ACE
G-714726	Shelf Assembly	1	ACE
G-714750	Blower Assembly, Fuel Pump and	1	ABCDEF

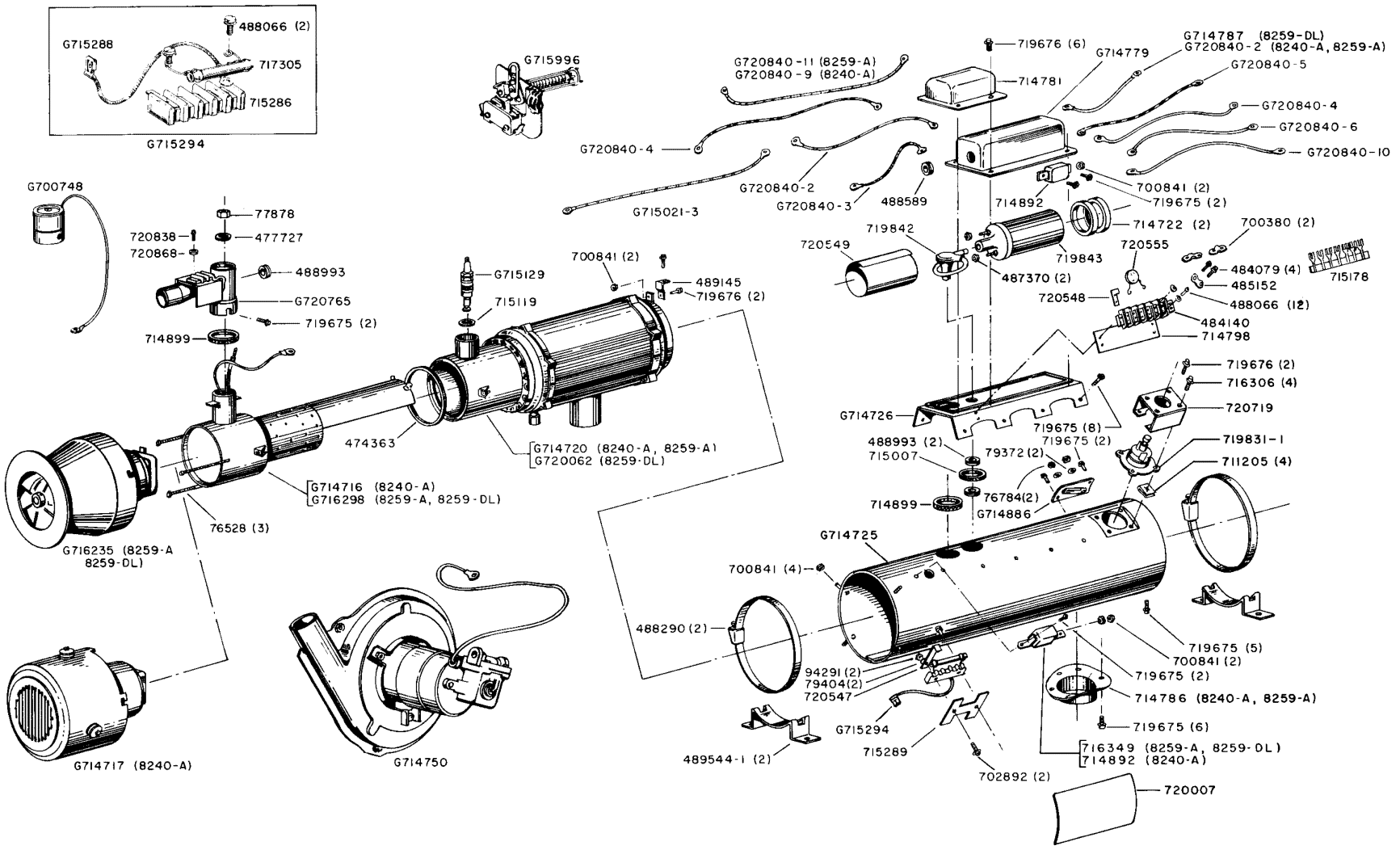


Figure 16 - Exploded Parts View, Models 8240-A, 8259-A and 8259-DL

Part No.	Description	Qty. Per Unit	Usable On Code
G-714779	Housing Assembly, Ignition Unit	1	ACE
714781	Cover, Igniter	1	ACE
714786	Adapter, Exhaust Shroud	1	ABCD
G-714787	Cable Assembly	1	E
714798	Strip, Double Marker	1	ALL
G-714886	Switch Assembly, Duct Limit	1	ACE
714892	Filter, Radio Interference	1 or 2	ACE
714899	Gasket, Electronic Shielding	2	ALL
715007	Gasket, Electronic Shielding	1	ACE
G-715021-3	Cable Assembly	1	ACE
715119	Gasket, Igniter	1	ALL
G-715129	Spark Plug, Ventilated	1	ALL
715178	Strip, Fanning	1	ALL
715286	Terminal Block	1	ACE
G-715288	Cable Assembly	1	ACE
715289	Insulator	1	ACE
G-715294	Terminal Block, Resistor and	1	ACE
G-715996	Thermostat	1	ALL
G-716235	Blower Assembly (See Fig. 19)	1	CE
G-716298	Burner Assembly (See Fig. 22)	1	CDEFG
716306	Screw, No. 6-32 x 1/4	4	ABCDE
716349	Filter	1	CE
717305	Resistor, 10-ohm, 10-watt	1	ACE
719675	Screw, No. 8-32 x 1/4	29	ALL
719676	Screw, No. 8-32 x 3/8	10	ALL
719831-1	Switch Assembly, Overheat	1	ABCDE
719831-3	Switch Assembly, Overheat	1	FGH
719842	Cable, Ignition	1	ALL
719843	Coil, Ignition	1	ALL
719953	Housing, Left-Hand	1	BDFGH
G-719983	Switch Assembly, Duct Limit	1	BDFGH
G-719998	Housing Assembly	1	BD
G-719999	Blower Assembly, Vent Air (See Fig. 18)	1	B
G-720000	Blower Assembly, Vent Air (See Fig. 19)	1	D
720007	Nameplate	1	ALL
G-720009	Shelf Assembly	1	BDFGH
G-720062	Heat Exchanger Assembly	1	EFG
G-720065	Adapter, Exhaust Shroud	1	EFG
720547	Bracket	1	ACE
720548	Bracket	1	ACE
720549	Insulator	1	ACE
G-720555	Capacitor (Use 714995)	1	ACE
720719	Guard, Overheat Switch	1	ALL
G-720765	Switch Assembly, Air Flow	1	ALL
G-720768	Blower Assembly, Fuel Pump and	1	G
720838	Screw No. 5-40 x 1/4 sl. pan hd	2	ALL
G-720840-2	Cable Assembly	2	AC
720840-3	Cable Assembly	1	E
720840-4	Cable Assembly	2 or 3	ALL
720840-5	Cable Assembly	1	ALL
720840-6	Cable Assembly	1 or 2	DEFGH
720840-9	Cable Assembly	1	A

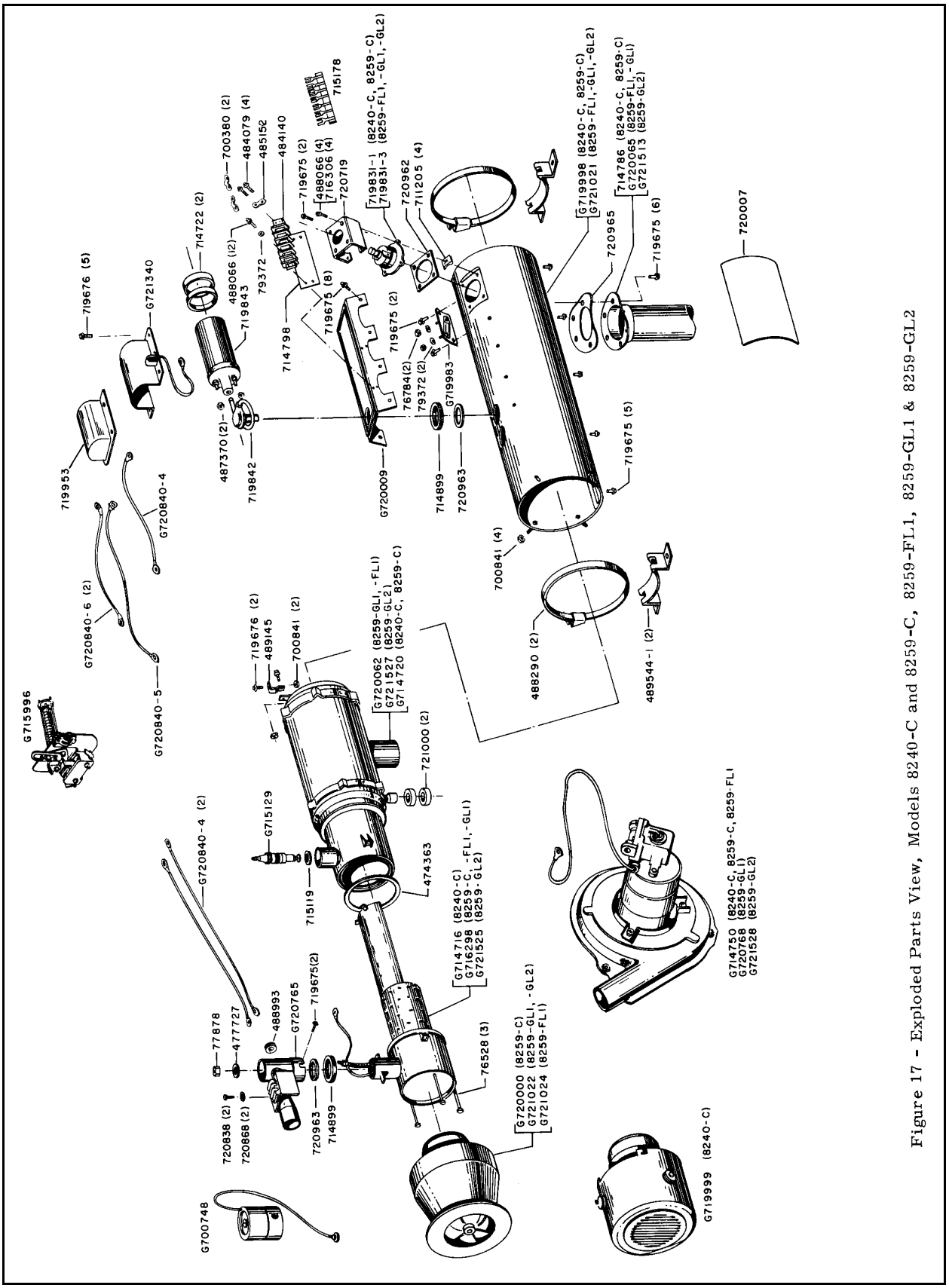


Figure 17 - Exploded Parts View, Models 8240-C and 8259-FL1, 8259-GL1 & 8259-GL2

Part No.	Description	Qty. Per Unit	Usable On Code
720840-10	Cable Assembly	1	ACE
720840-11	Cable Assembly	1	A
720868	Lockwasher, No. 5 int tooth	2	ALL
720962	Gasket, Overheat switch	1	FGH
720963	Gasket, Air Tube	2	FGH
720965	Gasket, Exhaust shroud	1	FGH
721000	Seal, Drain tube	1	FGH
G-721021	Housing Assembly	1	FGH
G-721022	Blower Assembly, Vent Air	1	GH
G-721024	Blower Assembly, Vent Air	1	F
G-721340	Ignition Unit (Super'd by G722081)	1	DFGH
G-721513	Adapter, Exhaust shroud	1	H
G-721525	Burner Assembly	1	H
G-721527	Heat Exchanger	1	H
G-721528	Blower Assembly, Fuel pump and	1	H

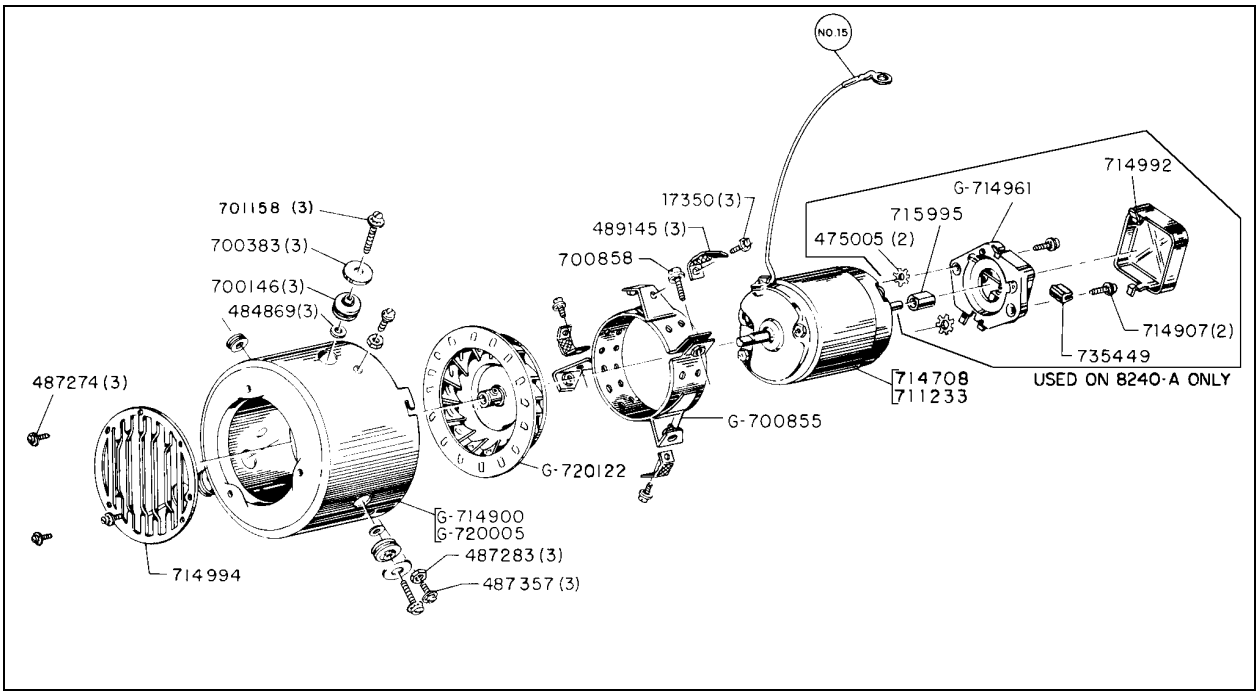


FIGURE 18
G-714717 & G-719999 Vent Air Blower for 8240-A and 8240-C Heater

Part No.	Description	Qty. Per Unit
17350	Screw, No. 8-32 x 5/16 slotted pan hd	3
475005	Washer, Lock No. 8,int tooth	2
484869	Washer	3
G-486216	Lead Assembly, Ground	1
487274	Screw, No. 8-32 x 1/4 pan hd ext tooth 1/w	3
487283	Nut, No. 8-32 "Keps"	3
487357	Screw, No. 8 x 3/8 pan hd ext tooth 1/w	3
488993	Grommet (8240-C)	1
489145	Lead Assembly, Ground	3
700146	Mount, Shock	3
700383	Washer	3
G-700855	Bracket Assembly, Motor mtg.	1

Part No.	Description	Qty. Per Unit
701158	Screw	3
701372	Washer	1
701429	Screw, 1/4-28 x 1	1
711233	Motor, 24VDC (8240-C)	1
714708	Motor, 24VDC (8240-A)	1
G-714900	Housing Assembly, Blower	1
714907	Fastener No. 8-32 x 1/2 "Sems"	2
714961	Base Assembly, Ignition Unit (8240-A)	1
714992	Cover	1
714994	Louver, Air Inlet	1
715995	Cam, Breaker (8240-A)	1
G-720005	Housing, Blower (8240-A)	1
G-720122	Wheel Assembly, Blower	1
735449	Grommet (8240-A)	1

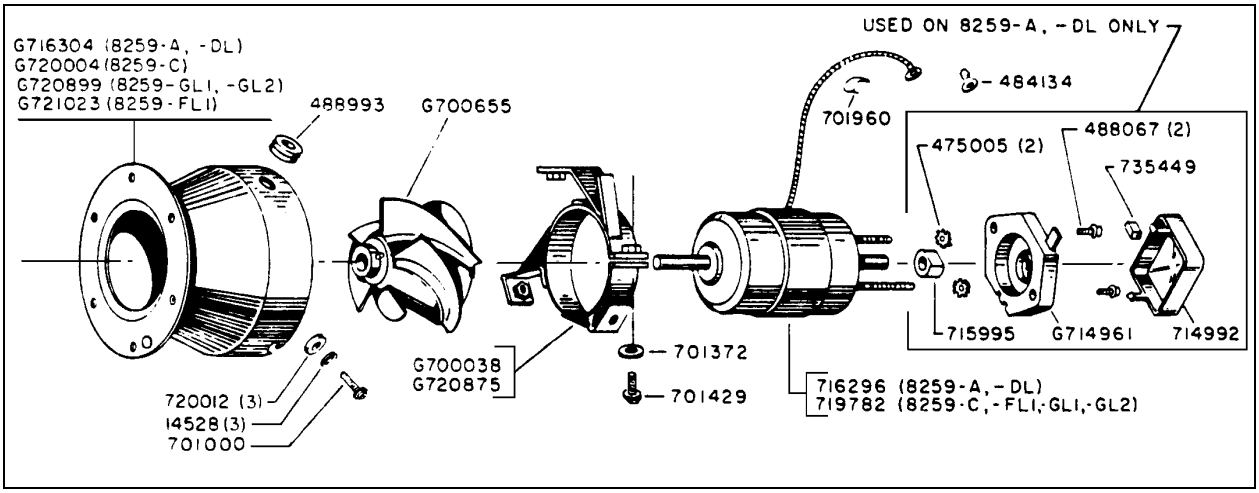


FIGURE 19

G-716235 Vent Blower for 8259-A and 8259-DL
G-720000 Vent Blower for 8259-C
G-721022 Vent Blower for 8259-GL1 and 8259-GL2
G-721024 Vent Blower for 8259-FL1

Part No.	Description	Qty. Per Unit
14528	Washer, No. 10 plain (8259FL1, -GL1, -GL2)	3
475005	Washer, Lock No. 8 int - ext. tooth	2
484134	Label, Wire (8259-C, 8259-FL1)	1
488067	Screw, No. 8-32 x 5/8 sl "Sems" (825-A,-DL)	2
488993	Grommet (8259-C, -GL1,-GL2,-FL1	1
G-700038	Bracket, Motor mounting	1
G-700655	Wheel Assembly, Blower	1
701000	Screw, No. 10-32 x 3/8 sl pan hd 1/w	3
701372	Washer	1
701429	Screw, 1/4-28 x 1	1
701960	Band, Ident. (8259-C, -FL1)	1
714907	Fastener, No. 8-32 x 1/2 fil hd. "Sems"	2
G-714961	Base Assembly, Ignition Unit (8259-A, -DL only)	1
714992	Cover (8259-A, -DL only)	1
715995	Cam, Breaker (8259-A, -DL only) (Super'd by 705189)	1
716296	Motor, Blower (8259-A, -DL only	1
G-716304	Housing Assembly, Vent Blower (8259-A, -DL only)	1
719782	Motor, Blower (8259-C, -FL1, -GL1, -GL2)	1
G-720004	Housing Assembly, Vent Blower (8259-C only)	1

Part No.	Description	Qty. Per Unit
720012	Seal, Fastener (8259-FL1, -GL1, -GL2)	3
G-720875	Bracket, Motor mtg. (8259-GL1, -GL2)	1
G-720899	Housing Assembly, Vent Blower (8259-GL1, -GL2)	1
G-721023	Housing Assembly, Vent Blower (8259-FL1)	1
735449	Grommet (8259-A, -DL)	1

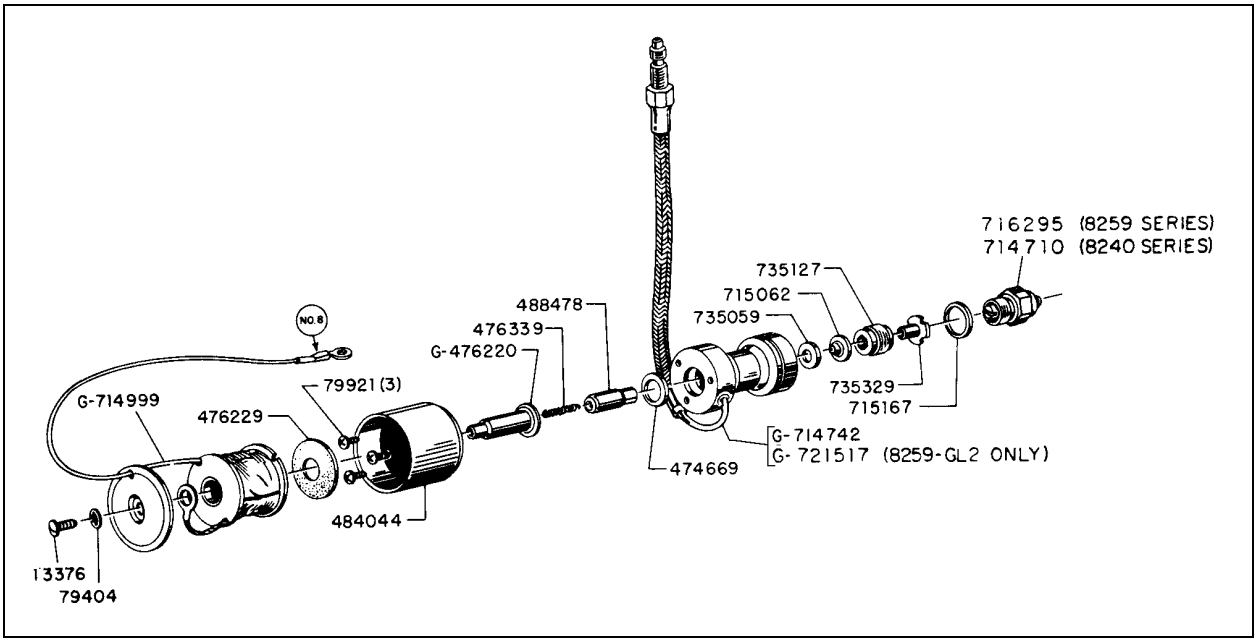


FIGURE 20

G-714739 Fuel Nozzle and Solenoid Valve for 8240-A and 8240-C
G-716297 Fuel Nozzle and Solenoid Valve for 8259-A, -C, -FL1 and – GL1
G-721524 Fuel Nozzle and Solenoid Valve for 8259-GL2

Part No.	Description	Qty. Per Unit
13376	Screw, No. 8-32 x 5/16 blind hd mach	1
79404	Washer, Lock No. 8 int. tooth	1
79921	Screw, No. 6-32 x 1/4 fil. hd. mach	3
474669	Gasket	1
G-476220	Core Assembly, Sleeve and	1
476229	Washer	1
476330	Spring, Valve	1
488478	Plunger Assembly	1
484044	Cup, Solenoid	1
G-700637-34	Coil Assembly (24V)(Use 705792 Solenoid Coil Kit)	1
714710	Nozzle, Fuel (For 8240 Series)	1
G-714742	Holder Assembly, Nozzle (All except 8259-GL2)	1
715062	Seat, Valve	1
715167	Gasket, Fuel Nozzle	1
716215	Nozzle, Fuel (for 8259 Series)	1
G-721517	Holder Assembly, Nozzle (8259-GL2 only)	1
735059	Gasket	1
735127	Screw, Valve Seat	1
735329	Spacer	1

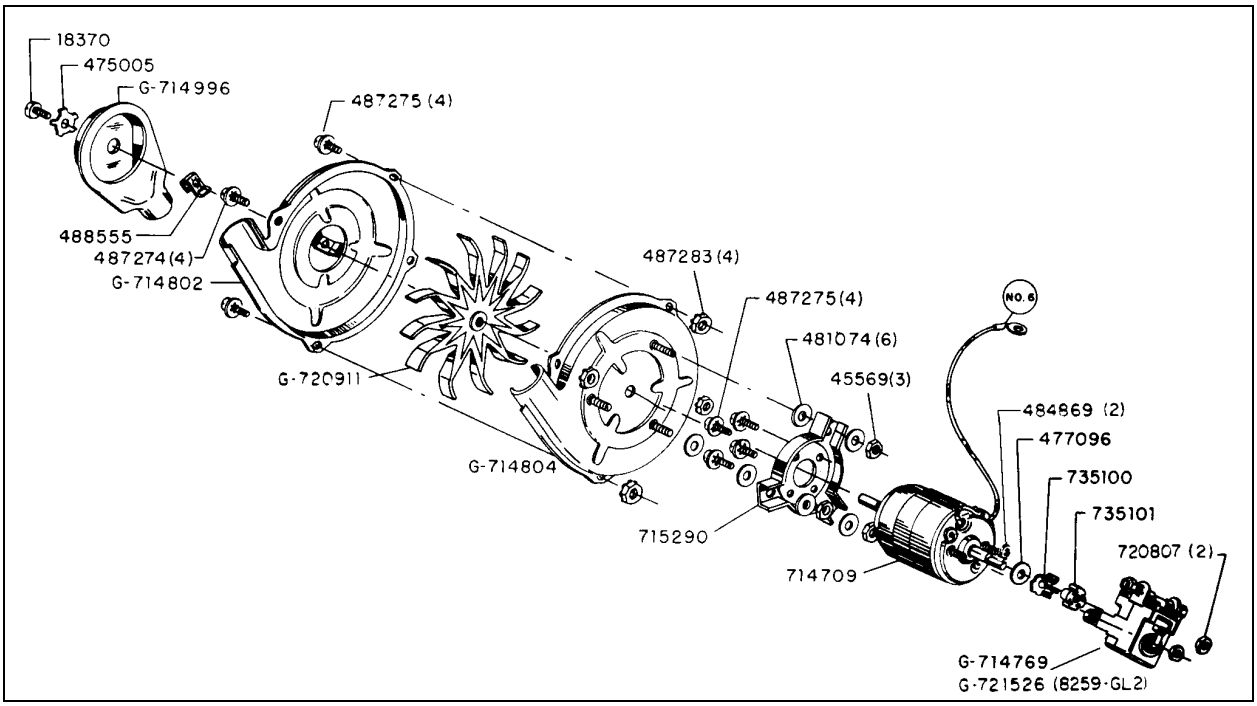


FIGURE 21

G-714750 Combustion Air Blower & Fuel Pump Assembly for 8240-A, -C, 8259-A, -C, -DL, -FL1
G-720768 Combustion Air Blower & Fuel Pump Assembly for 8259-GL1
G-721528 Combustion Air Blower & Fuel Pump Assembly for 8259-GL2

Part No.	Description	Qty. Per Unit
18370	Screw, Rd lid sheet - metal	1
45569	Nut, No. 10 plain	3
475005	Washer, Lock No. 8 int-ext tooth	1
477996	Washer, Plain flat	1
481074	Washer, Lock No. 10 int. tooth	6
484869	Washer	2
487275	Screw, No. 8-32 x 5/16 pan hd "Sems"	8
487283	Nut, No. 8-32 "Kep"	3
488555	Nut, No. 8-32, type "J" speed	1
714709	Motor, Combustion Air (24 VDC)	1
G-714769	Pump Assembly, Fuel (all except 8259-GL2)	1
G-714802	Housing Assembly, Blower front	1
G-714804	Housing Assembly, Blower rear	1
G-714996	Adapter Assembly, Inlet	1
715290	Bracket, Motor mtg.	1
720807	Nut, Locking No. 10-32	2
G-720911	Wheel Assembly, Blower	1
G-721526	Pump Assembly, Fuel (for 8259-GL2)	1
735100	*Connector	1
735101	*Coupling	1

*Available only in kit G-735405

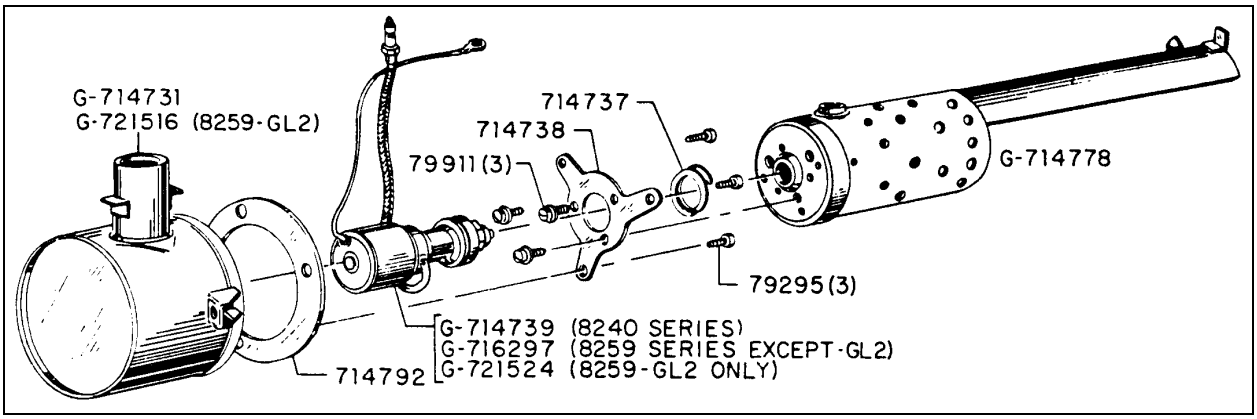


FIGURE 22 - Burner Assembly (All Models)

Part No.	Description	Qty. Per Unit
79295	Screw, No. 10-32 x 1/2 fil hd mach	3
79911	Screw, No. 10-32 x 3/4 pan hd ext l/w	3
G-714731	Cap Assembly, Burner Housing (all except 8259-GL2)	1
714737	Ring, Retaining	1
714738	Support, Burner	1
G-714739	Solenoid Assembly, Fuel nozzle and (8240 Series)	1
G-714778	Mixer Assembly, Baffle and	1
714792	Orifice, Combustion Air	1
G-716297	Solenoid Assembly, Fuel nozzle and (8259 Series except 8259-GL2)	1
G-721516	Cap Assembly, Burner housing (8259-GL2 only)	1
721524	Solenoid Assembly, Fuel nozzle and (8259-GL2 only)	1