

Please read and save these instructions. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

Dayton® Propane Construction Heater

Description

Dayton model 3VG81 is a 150,000 Btu/Hr propane construction heater with built-in thermostat. This heater uses propane gas for combustion. It is primarily intended for temporary heating of buildings under construction, alteration, or repair. This heater should only be used indoors but never in occupied dwellings. Products of combustion are vented into the area being heated.

Unpacking

1. Remove all packing items applied to heater for shipment. Keep plastic cover caps (attached to inlet connector and hose/regulator assembly) for storage.
2. Check all items for shipping damage. If heater is damaged, promptly inform dealer where you bought heater.



Figure 1 – Model 3VG81



▲ GENERAL HAZARD WARNING

Failure to comply with the precautions and instructions provided with this heater can result in death, serious bodily injury, and property loss or damage from hazards of fire, explosion, burn, asphyxiation, carbon monoxide poisoning, and/or electrical shock.

Only persons who can understand and follow instructions should use or service this heater.

If you need assistance or heater information such as an instructions manual, labels, etc. contact the manufacturer.

▲ WARNING Fire, burn, inhalation, and explosion hazard. Keep solid combustibles such as building materials, paper or cardboard, a safe distance away from the heater as recommended by the instructions. Never use the heater in spaces which do or may contain volatile or airborne combustibles, or products such as gasoline, solvents, paint thinner, dust particles, or unknown chemicals.

▲ WARNING Not for home or recreational vehicle use.

The heater is designed for use as a construction heater under ANSI Z83.7/CSA 2.14. The primary purpose of construction heaters is to provide temporary heating of buildings under construction, alteration or repair, and to provide temporary emergency heat. Properly used, the heater provides safe economical heating. Products of combustion are vented into the area being heated.

We cannot foresee every use which may be made of our heaters. Check with your local fire safety authority if you have questions about heater use.

Other standards govern the use of fuel gases and heat producing products for specific uses. Your local authorities can advise you about these.

Dayton® Propane Construction Heater

3VG81 Specifications

Output Rating	150,000 Btu/Hr
Fuel	Propane Vapor Only
Fuel Consumption	7.0 Pounds/Hour (1.6 Gallons/Hour)
Regulator Input Pressure	Minimum: 10 Psig Maximum: Tank Pressure
Regulator Output Pressure	12.5" WC (Factory Preset)
Manifold Pressure	9.8" WC (Factory Preset)
Ignition	Electronic direct spark, D.S.I.
Ignitor Gap	Minimum: 0.13" Maximum: 0.15"
Temperature Control	Built-In Thermostat
Air Flow	550 Cfm
Volts	120 Vac 60 Hz I Phase
Amps	2.2
Motor HP	1/8
Motor RPM	3,450
Dimensions	36 ¹ / ₄ " L x 20" H x 14 ¹ / ₂ " W
Heater Weight	27 Lb
Shipping Weight	35 Lb

Product Identification

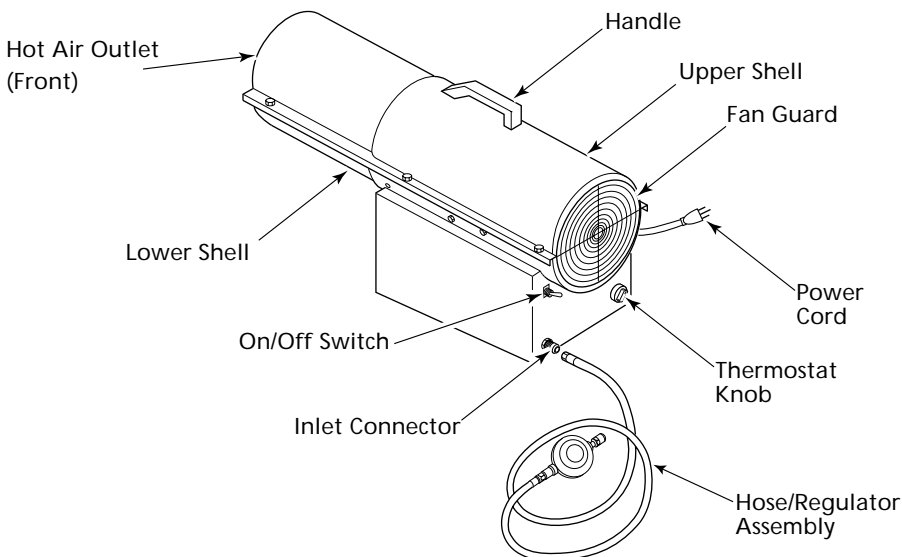


Figure 2 - Product Identification

General Safety Information

IMPORTANT: Make certain you read and understand all warnings. Keep these instructions for reference. They are your guide to safe and proper operation of this heater.

Safety information appears throughout these instructions. Pay close attention to them. Below are definitions for the safety information listed throughout this manual.

▲ DANGER Under this heading, installation, operating and maintenance procedures or practices will be found that, if not carefully followed, WILL result in IMMEDIATE serious personal injury or death.

▲ WARNING Under this heading, installation, operating, and maintenance procedures or practices will be found that, if not carefully followed, COULD result in severe personal injury or death.

▲ CAUTION Under this heading, installation, operating, and maintenance procedures or practices will be found that, if not carefully followed, MAY result in minor personal injury, product or property damage.

IMPORTANT: Not every possible circumstance that might involve a hazard can be anticipated. The warnings in this manual and on tags or decals affixed to the unit are therefore not all-inclusive. If a procedure, work method, or operating technique not specifically recommended by Dayton is used, you must make sure it is safe for you and others. You should also ensure that equipment will not be damaged or made unsafe by the operating or maintenance method you choose.

Model 3VG81

General Safety Information (Continued)

▲ WARNING This product contains and/or generates chemicals known to the State of California to cause cancer or birth defects, or other reproductive harm.

▲ DANGER Carbon monoxide poisoning: Some people are more affected by carbon monoxide than others. Early signs of carbon monoxide poisoning resemble the flu, with headaches, dizziness, and/or nausea. If you have these signs, the heater may not be operating properly. Get fresh air at once! Have heater serviced.

Propane Gas: Propane gas is odorless. An odor-making agent is added to propane gas. The odor helps you detect a propane gas leak. However, the odor added to propane gas can fade. Propane gas may be present even though no odor exists.

▲ WARNING Make certain you read and understand all Warnings. Keep this manual for reference. It is your guide to safe and proper operation of this heater.

- This product has been approved for use in the Commonwealth of Massachusetts.
- Install and use heater with care. Follow all local ordinances and codes. In the absence of local ordinances and codes, refer to the National Fuel Gas Code handbook NFPA54/ANSI Z223.1 and the Natural Gas Installation Code, CAN/CGA B149.2. This instructs on the safe storage and handling of flammable gases.

- Use only the electrical voltage and frequency specified on model plate. The electrical connections and grounding of the heater shall follow the National Electric Code, ANSI/NFPA 70 or the Canadian Electrical Code, Part 1.
- Provide adequate ventilation. Before using heater, provide at least a three-square-foot opening of fresh, outside air for each 100,000 Btu/Hr of rating.
- For indoor use only. Do not use heater outdoors.
- Keep heater away from strong drafts, wind, water spray, rain, or dripping water.
- Do not use heater in occupied dwellings or in living or sleeping quarters.
- Keep appliance area clear and free from combustible materials, gasoline, paint thinner, and other flammable vapors and liquids. Do not use heater in areas with high dust content.
- This heater is equipped with a thermostat. Heater may start at anytime.
- Check heater for damage before each use. Do not use a damaged heater.
- Use only propane gas set up for vapor withdrawal.
- Keep propane tank(s) below 100° F.
- Keep heater at least six feet from propane tank(s). Do not point heater at propane tank(s) within 20 feet.
- Do not use heater below ground level.
- Electrical grounding instructions — This appliance is equipped with a three-prong (grounding) plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptacle or extension cord.
- Use only the hose and factory preset regulator provided with the heater.
- Inspect hose before each use of heater. If highly worn or cut, replace before using heater. Use the replacement hose assembly specified in this manual.
- Minimum heater clearances from combustibles:

Outlet: 8 Ft.	Sides: 2 Ft.
Top: 6 Ft.	Rear: 2 Ft.
- Locate heater on stable and level surface if heater is hot or running.
- Keep children and animals away from heater.
- Turn off propane supply and unplug heater when not in use.
- Never block air inlet (rear) or air outlet (front) of heater.
- Never move, handle, or service a hot, operating, or plugged-in heater. Severe burns may result. You must wait 20 minutes after turning heater off.
- To prevent injury, wear gloves when handling heater.
- Do not alter heater. Keep heater in its original state.
- Do not use heater if altered.
- Never attach duct work to front or rear of heater.
- Use only original replacement parts. This heater must use design-specific parts. Do not substitute or use generic parts. Improper replacement parts could cause serious or fatal injuries.

Dayton® Propane Construction Heater

Theory of Operation

THE FUEL SYSTEM

The hose/regulator assembly attaches to the propane gas supply. The propane gas moves through the solenoid valve and out the nozzle.

THE AIR SYSTEM

The motor turns the fan. The fan pushes air into and around the combustion chamber. This air is heated and provides a stream of clean, hot air.

THE IGNITION SYSTEM

The direct spark ignitor (DSI) sends voltage to the ignitor, which ignites the fuel and air mixture.

THE SAFETY CONTROL SYSTEM

This system causes the heater to shut down if the flame goes out.

TEMPERATURE CONTROL SYSTEM

Built-in thermostat allows heater to cycle on and off to maintain consistent area temperature.

Propane Supply

Propane gas and propane tank(s) must be provided by the user.

Use this heater only with a propane vapor withdrawal supply system. See Chapter 5 of the Standard for Storage and Handling of Liquefied Petroleum Gas, ANSI/NFPA 58. The local library or fire department will have this booklet.

The amount of propane gas ready for use from propane tanks varies. Two factors determine this amount:

1. The amount of propane gas in tank(s)
2. The temperature of tank(s)

The chart below shows the number of 100 pound tanks needed to run this heater.

Do not operate this product with any tank smaller than 100 pounds.

Temperature (°F) at Tank	Number of 100 Lb. Tanks
32°	2
20°	2
10°	3
0°	3
-10°	Use larger tank
-20°	Use larger tank

Less gas is vaporized at lower temperatures. You may need two or more 100 pound tanks or one larger tank in colder weather. Your local propane gas dealer will help you select the proper supply system. The minimum surrounding-air temperature rating for each heater is -20°F.

Installation

⚠ WARNING Review and understand the warnings in the Safety Information Section, pages 2 and 3. They are needed to safely operate this heater. Follow all local codes when using this heater.

⚠ WARNING Test all gas piping and connections for leaks after installing or servicing. Never use an open flame to check for a leak. Apply a mixture of liquid soap and water to all joints. Bubbles forming show a leak. Correct all leaks at once.

1. Provide propane supply system (See Propane Supply).
2. Connect POL fitting on hose/regulator assembly to propane tank(s). Turn POL fitting counterclockwise into threads on tank. Tighten firmly using wrench. Tighten regulator with vent pointing down.
3. Connect hose to inlet connector. Tighten firmly using a wrench.

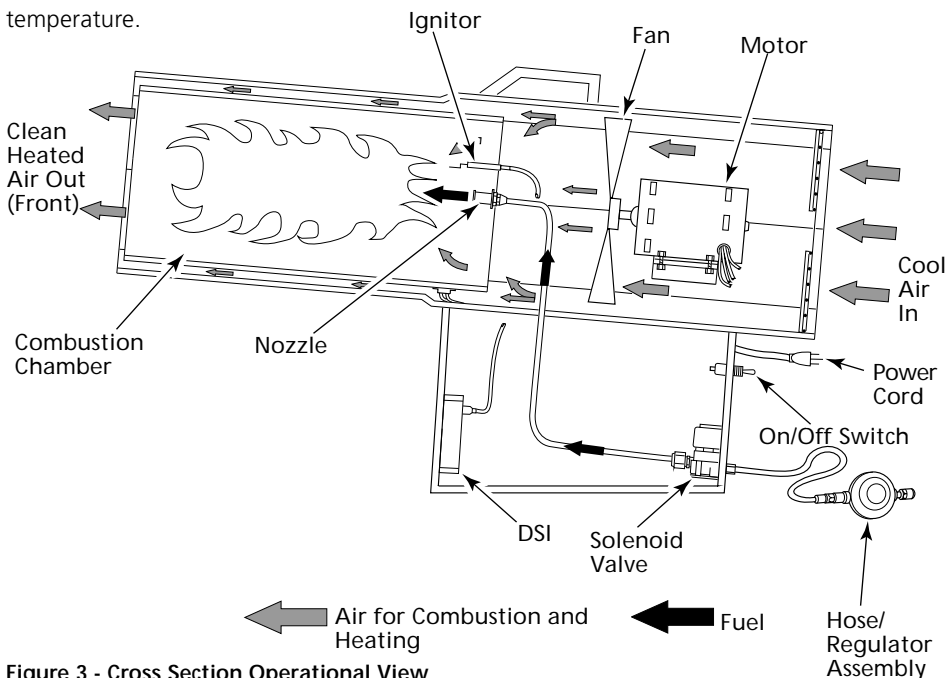


Figure 3 - Cross Section Operational View

Model 3VG81

Installation (Continued)

IMPORTANT: Extra hose or piping may be used if needed. Install extra hose or piping between hose/regulator assembly and propane tank. You must use the regulator supplied with heater.

4. Open propane supply valve on propane tank(s) slowly.

NOTE: If not opened slowly, excess-flow check valve on propane tank will stop gas flow. If this happens, close propane supply valve and open again slowly.

5. Check all connections for leaks.

▲WARNING *Never use an open flame to check for a leak. Apply a mixture of liquid soap and water to all joints. Bubbles forming show a leak. Correct all leaks at once.*

6. Close propane supply valve.

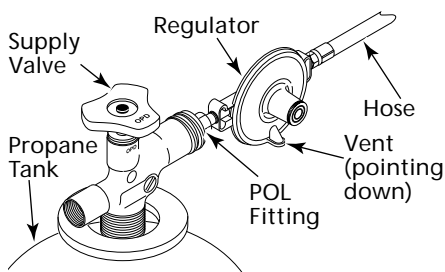


Figure 4 - Regulator With Vent Pointing Down

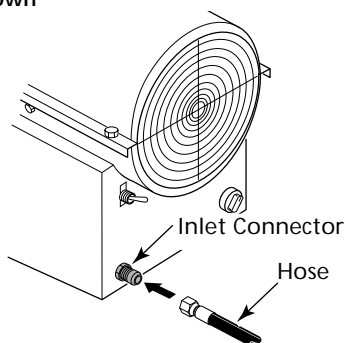


Figure 5 - Hose and Inlet Connector

Ventilation

▲WARNING *Follow the minimum fresh, outside air ventilation requirements. If proper fresh, outside air ventilation is not provided, carbon monoxide poisoning can occur. Provide proper fresh, outside air ventilation before running heater.*

Provide a fresh air opening of at least three square feet for each 100,000 Btu/Hr rating. Provide extra fresh air if more heaters are being used.

Operation

▲WARNING *Review and understand the warnings in the Safety Information Section, pages 2 and 3. They are needed to safely operate this heater. Follow all local codes when using this heater.*

TO START HEATER

1. Follow all installation, ventilation and safety information.
2. Locate heater on stable and level surface. Make sure strong drafts do not blow into front or rear of heater.
3. Plug power cord of heater into a three-prong, grounded extension cord. Extension cord must be at least six feet long. Extension cord must be UL listed.

Extension Cord Size Requirement

Up to 50 feet long, use 18 AWG rated cord.

51 to 100 feet long, use 16 AWG rated cord.

101 to 200 feet long, use 14 AWG rated cord.

4. Plug extension cord into a 120 volt/60 hertz, three-hole, grounded outlet.

5. Open propane supply valve on propane tank(s) slowly.

NOTE: If not opened slowly, excess-flow check valve on propane tank will stop gas flow. If this happens, close propane supply valve and open again slowly.

6. Turn thermostat control knob fully counterclockwise to the "COOLER" position. Turn ON/OFF switch to the ON position. Turn thermostat control knob slowly clockwise until electric motor and fan begin to run. Heater will start in approximately 3 seconds. Adjust thermostat control knob to WARMER or COOLER setting as needed.

NOTE: If heater does not start after 3 seconds, the ignition control will automatically attempt to start heater one time. If heater fails to start on this attempt, the safety control will "lock out" and no further automatic restarts will be attempted. This could occur if air remains in fuel line. If heater fails to start on this attempt, turn ON/OFF switch to OFF position. Wait ten seconds for safety control to reset, then turn ON/OFF switch back to ON position and try to start heater again.

7. **Thermostat Operation Only:** During normal thermostat operation, heater will cycle off when air temperature rises to thermostat setting. When air temperature drops sufficiently below thermostat setting, the electric motor and fan will begin to run. After 15 to 60 seconds, heater burner should automatically ignite and provide heat to maintain temperature setting.

Dayton® Propane Construction Heater

Operation (Continued)

TO STOP HEATER

1. Tightly close propane supply valve on propane tank(s).
2. Wait a few seconds. Heater will burn gas left in supply hoses.
3. Turn on/off switch to the OFF position.
4. Unplug heater.

Storage

▲ CAUTION

Disconnect heater from propane

supply tank(s).

1. Store propane tank(s) in safe manner. See Chapter 5 of *Standard for Storage and Handling of Liquefied Petroleum Gases, ANSI/NFPA 58*. Follow all local codes.
2. Place plastic cover caps over brass fittings on inlet connector and hose/regulator assembly.
3. Store in dry, clean, and safe place. Do not store hose/regulator assembly inside heater combustion chamber.
4. When taking heater out of storage, always check inside of heater. Insects and small animals may place foreign objects in heater. Keep inside of heater free from combustible and foreign objects.

Maintenance

▲ WARNING

Never service heater while it is

plugged in, connected to propane supply, operating, or hot. Severe burns and electrical shock can occur.

1. Keep heater clean. Clean heater annually or as needed to remove dust and debris. If heater is dirty or dusty, clean heater with a damp cloth.
2. Inspect heater before each use. Check connections for leaks. Apply mixture of liquid soap and water to connections. Bubbles forming show a leak. Correct all leaks at once.
3. Inspect hose/regulator assembly before each use. If hose is highly worn or cut, replace.
4. Have heater inspected yearly by a qualified service agency.
5. Keep inside of heater free from combustible and foreign objects.

Service Procedures

▲ WARNING

Never service heater while it is

plugged in, connected to propane supply, operating, or hot. Severe burns and electrical shock can occur.

UPPER SHELL REMOVAL

1. Remove screws along each side of heater. These screws attach upper and lower shells together.
2. Lift or slide upper shell off.
3. Remove fan guard.

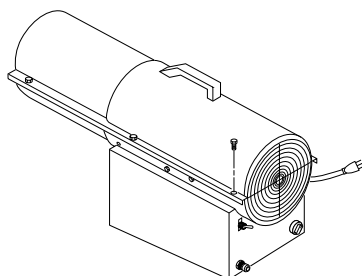


Figure 6 - Upper Shell Removal

FAN

IMPORTANT: Remove fan from motor shaft before removing motor from heater. The weight of the motor resting on the fan could damage the fan pitch.

1. Remove upper shell (See Upper Shell Removal).
2. Use hex wrench to loosen setscrew which holds fan to motor shaft.
3. Slip fan off motor shaft.
4. Clean fan using soft cloth moistened with kerosene or solvent.
5. Dry fan thoroughly.
6. Replace fan on motor shaft. Make sure setscrew is touching back of flat surface on motor shaft (See Figure 8).
7. Place setscrew on flat of shaft. Tighten setscrew firmly (40-50 inch-pounds).
8. Replace fan guard and upper shell.

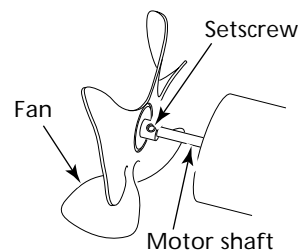


Figure 7 - Fan, Motor Shaft, and Setscrew Location

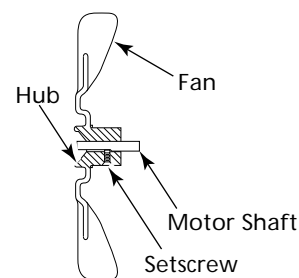


Figure 8 - Fan Cross Section

Model 3VG81

Operation (Continued)

IGNITOR

Make sure gap between ignitor electrode and burner nozzle is .13 min./ .15" max. Access ignitor electrode from inside combustion chamber. No other maintenance is needed for ignitor.

Wiring Diagrams

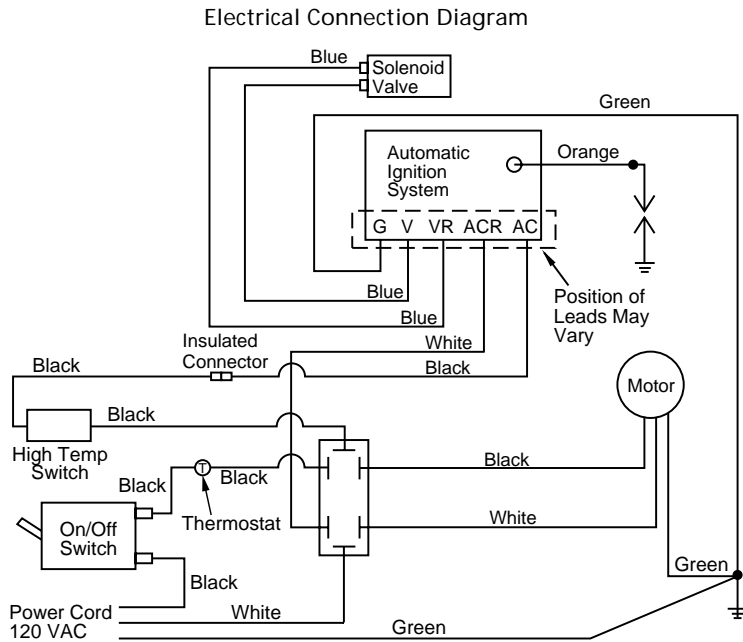
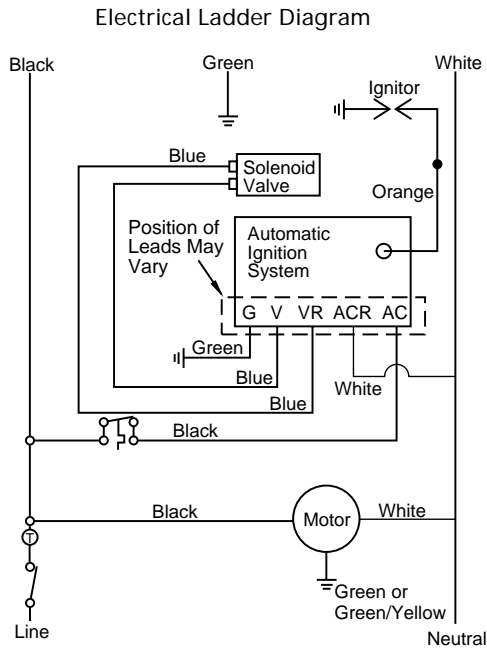


Figure 9 - Electrical Ladder Diagram

Figure 10 - Electrical Connection Diagram

Accessories

Description	Part No. For Model 3VG81
Hose and Regulator Assembly	LPA3070
Fuel Gas Connector (a POL adapter with excess-flow check valve)	LPA4020

For Repair Parts, call 1-800-323-0620

24 hours a day — 365 days a year

Please provide following information:

- Model number
- Serial number (if any)
- Part description and number as shown in parts list

Address parts correspondence to:

Grainger Parts
P.O. Box 3074
1657 Shermer Road
Northbrook, IL 60065-3074
U.S.A.

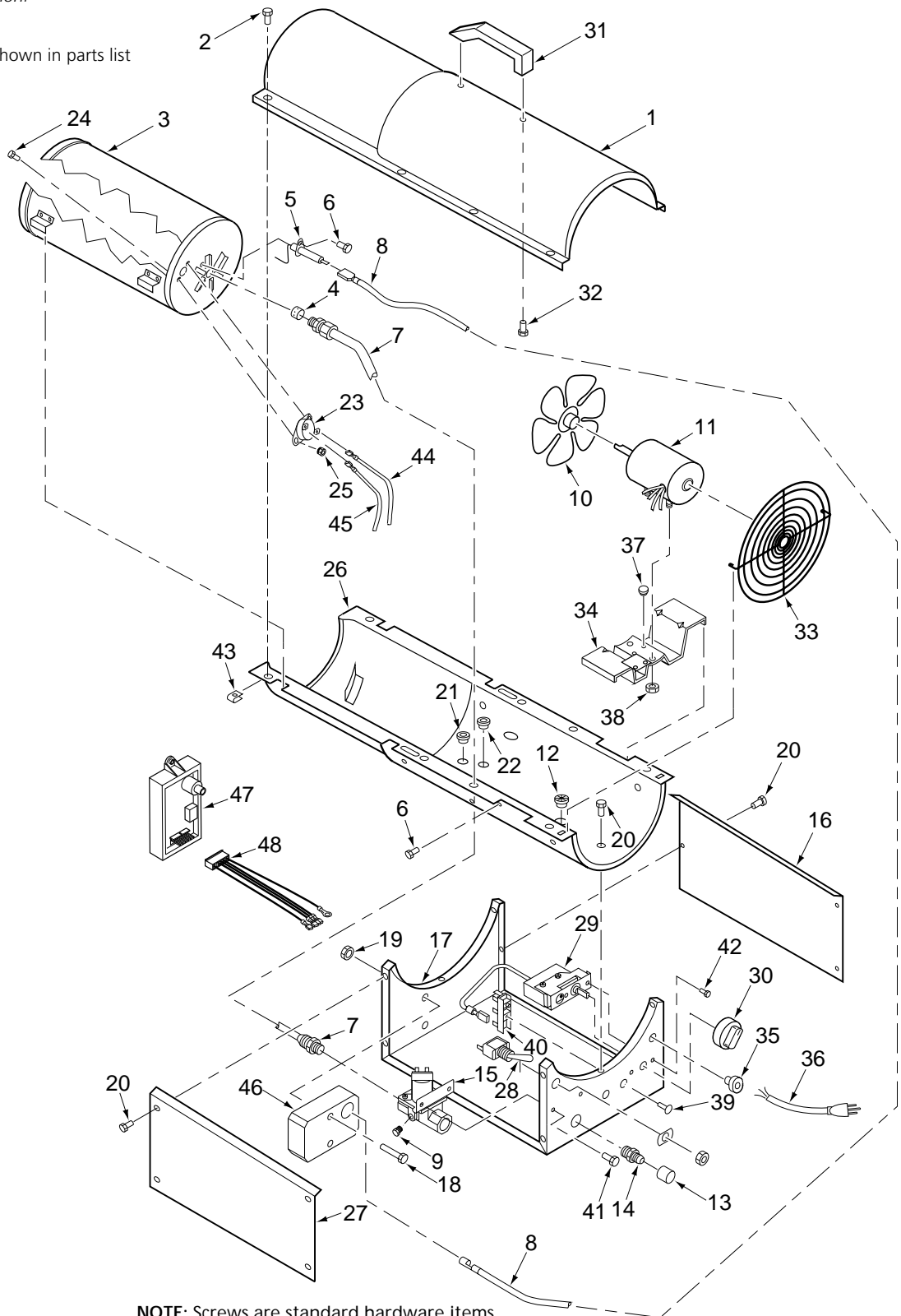


Figure 9 - Repair Parts Illustration

Model 3VG81

Repair Parts List

▲WARNING Use only original repair parts. This heater must use design-specific parts. Do not substitute or use generic parts. Improper replacement parts could cause serious or fatal injuries. This will also protect your warranty coverage for parts replaced under warranty.

Reference Number	Description	Part No. For Model 3VG81	Quantity
1	Upper Shell	098511-116	1
2	* #10-16 x 1/2" Screw	M15823-27	8
3	Combustion Chamber Kit	098512-35	1
4	Nozzle	099138-01	1
5	Ignitor	099133-01	1
6	* #8-18 x 3/8" Screw	M11084-38	2
7	Fuel Tube Kit	099334-01	1
8	Ignitor Cable	097806-02	1
9	Plug 1/8 NPTF Hex	098276-01	1
10	Fan	M51153-01	1
11	Motor	105336-01	1
12	Universal Bushing	097776-01	1
13	Sleeve Cap	078978-01	1
14	Male Connector	M51572-02	1
15	Solenoid Valve	103015-01	1
16	Side Cover	098450-03	1
17	Base	099161-10	1
18	* #6-32 x 1" Screw	M12461-7	2
19	#6-32 Hex Nut	099432-01	2
20	* #10-16 x 3/8" Screw	M11084-26	13
21	Shorty Bushing	M50104-05	1
22	Shorty Bushing	M50104-01	1
23	Thermal Limit Switch	101732-01	1
24	* #4-40 x 1/2" Screw	097968-05	2
25	#4-40 Captive Washer Hex Nut	097384-04	2
26	Lower Shell	098511-129	1
27	Side Cover	098447-03	1
28	On/Off Switch	098226-01	1
29	Built-in Thermostat	097657-03	1
30	Thermostat Knob	104905-01	1
31	Handle	M51104-01	1
32	* #10-16 x 3/4" Screw	M11084-29	2
33	Fan Guard	097964-03AA	1
34	Motor & Relay Support Bracket Assy.	101206-01	1
35	Strain Relief Bushing	M11143-1	1
36	Power Cord	098219-17	1
37	Rubber Bumper	M50631	2
38	Lock Nut	NTC-4C	2
39	3/16" Break Mandrell Rivet	099157-01	1
40	Terminal Board	099125-01	1

() Not shown.

(*) Standard hardware item, available locally.

Dayton® Propane Construction Heater

Repair Parts List (Continued)

Reference Number	Description	Part No. For Model 3VG81	Quantity
41	* #10-32 x 1/4" Screw	M12461-25	2
42	* Hex TPG "F" 6-32 s 1/4" Screw	M10908-1	2
43	Clip Nut	M11271-8	8
44	High Temperature Wire Assembly	101480-10	1
45	High Temperature Wire Assembly	101480-11	1
47	DSI Control No. 2003-19	M51605-02	1
47	DSI Control No. 2003-45	110287-01	1
48	DSI Wire Harness (DSI Control 2003-45 only)	110267-01	1
	Wire Assembly (DSI Control 2003-45 only)	M9900-170	1
	Wiring Decal (DSI Control 2003-45 only)	103402-03	1
	Wiring Decal (DSI Control 2003-19 only)	103402-01	1
	Service Center List	M50985-01	1
	Tradename Decal	097940-07	2
	General Information Decal	103017-02	1
	Thermostat Decal	103021-01	1
	Warning Decal	099504-01	2

() Not shown.

(*) Standard hardware item, available locally.

LIMITED WARRANTY

DAYTON ONE-YEAR LIMITED WARRANTY. Dayton propane construction gas heater, models covered in this manual are warranted by Dayton Electric Mfg. Co. (Dayton) to the original user against defects in workmanship or materials under normal use for one year after date of purchase. Any part which is determined to be defective in material or workmanship and returned to an authorized service location, as Dayton designates, shipping costs prepaid, will be, as the exclusive remedy, repaired or replaced at Dayton's option. For limited warranty claim procedures, see PROMPT DISPOSITION below. This limited warranty gives purchasers specific legal rights which vary from jurisdiction to jurisdiction.

LIMITATION OF LIABILITY. To the extent allowable under applicable law, Dayton's liability for consequential and incidental damages is expressly disclaimed. Dayton's liability in all events is limited to, and shall not exceed, the purchase price paid.

WARRANTY DISCLAIMER. Dayton has made a diligent effort to provide product information and illustrate the product in this literature accurately; however, such information and illustrations are for the sole purpose of identification, and do not express or imply a warranty that the products are MERCHANTABLE, or FIT FOR A PARTICULAR PURPOSE, or that the products will necessarily conform to the illustrations or descriptions.

Except as provided below, no warranty or affirmation of fact, expressed or implied, other than as stated in "LIMITED WARRANTY" above is made or authorized by Dayton.

PRODUCT SUITABILITY. Many jurisdictions have codes and regulations governing sales, construction, installation, and/or use of products for certain purposes, which may vary from those in neighboring areas. While Dayton attempts to assure that its products comply with such codes, it cannot guarantee compliance, and cannot be responsible for how the product is installed or used. Before purchase and use of a product, review the product applications, and all applicable national and local codes and regulations, and be sure that the product, installation, and use will comply with them.

Certain aspects of disclaimers are not applicable to consumer products; e.g., (a) some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you; (b) also, some jurisdictions do not allow limitations on how long an implied warranty lasts, consequently the above limitation may not apply to you; and (c) by law, during the period of this Limited Warranty, any implied warranties of implied merchantability or fitness for a particular purpose applicable to consumer products purchased by consumers, may not be excluded or otherwise disclaimed.

PROMPT DISPOSITION. Dayton will make a good faith effort for prompt correction or other adjustment with respect to any product which proves to be defective within limited warranty. For any product believed to be defective within limited warranty, first write or call dealer from whom product was purchased. Dealer will give additional directions. If unable to resolve satisfactorily, write to Dayton at address below, giving dealer's name, address, date and number of dealer's invoice, and describing the nature of the defect. Title and risk of loss pass to buyer on delivery to common carrier. If product was damaged in transit to you, file claim with carrier.

Manufactured for Dayton Electric Mfg. Co., 5959 W. Howard St., Niles, Illinois 60714 U.S.A.

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