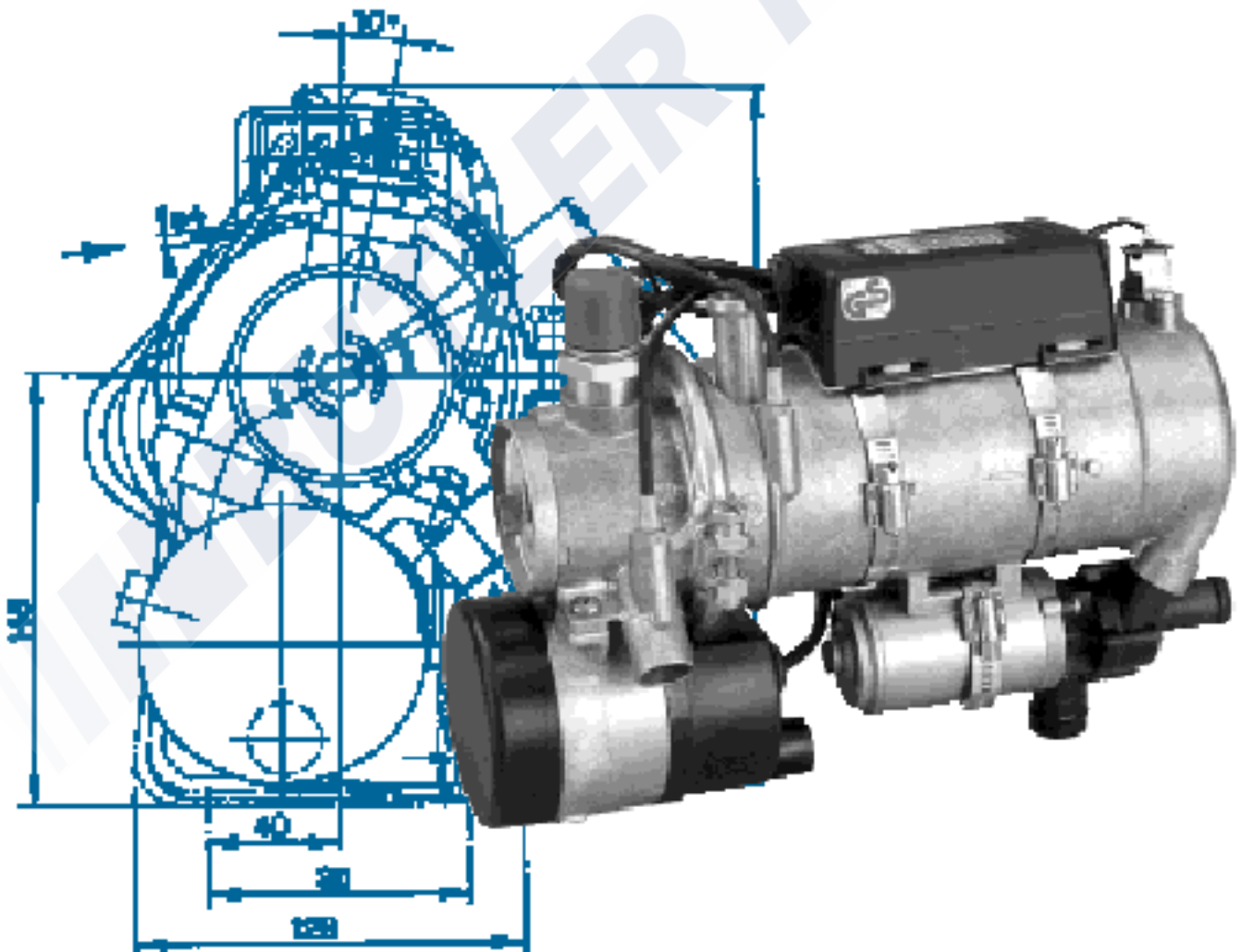


D7W Water Heater

Installation
Troubleshooting and
Repair manual



Model #'s
25 1807
25 1867
25 1866
20 1673



D7W Boxed

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Special Notes

Note: Highlight areas requiring special attention or clarification.

Caution: Indicates that personal injury or damage to equipment may occur unless specific guidelines are followed.



Warning: Indicates that serious or fatal injury may result if specific guidelines are not followed.

1. General Specifications

Model 25 1807 05

Heat Output ($\pm 10\%$)	24,000 BTU (7 Kw) -High 6,000 BTU (1.75 Kw) -Low
Current at 12v ($\pm 10\%$)	24.6 amps/hr - Start (1-2 minutes) 5.8 amps/hr - Running High 4.2 amps/hr - Running Low
Fuel Consumption ($\pm 5\%$)	High Heat Low Heat
	US Gal/hr 0.24 0.06
	Litre/hr 0.90 0.22
Coolant Pump Flow ($\pm 10\%$)	420 US Gal/hr 1600 Litre/hr
Coolant Temperature Range ($\pm 5\%$)	176° F to 201° F (80° C to 95° C)
Overheat Temperature Shutdown ($\pm 10\%$)	275°F (135°C)
Low Voltage Shutdown	10.5 Volts
High Voltage Shutdown	15 Volts



2. Heater Warnings



Warning To Installer: Correct installation of this heater is necessary to ensure safe and proper operation. Read and understand this manual before attempting to install a heater.



Warning - Explosion Hazard

- Heater must be turned off while re-fueling.
- Do not install heater in enclosed areas where combustible fumes may be present.
- Do not install heaters in engine compartments of gasoline powered boats.



Warning - Fire Hazard

- Install the exhaust system so it will maintain a minimum distance of 2" from any flammable or heat sensitive material.
- Ensure that the fuel system is intact and there are no leaks.



Warning - Asphyxiation Hazard

- Route the heater exhaust so that exhaust fumes cannot enter any passenger compartments.
- If running exhaust components through an enclosed compartment, ensure that it is vented to the outside.



Warning - Safety Hazard on Coolant Heaters Used With Improper Antifreeze Mixtures

- The use of ESPAR coolant heaters requires that the coolant in the system to be heated contain a proper mixture of water and antifreeze to prevent coolant from freezing or slushing.
- If the coolant becomes slushy or frozen, the heater's coolant pump cannot move the coolant causing a blockage of the circulating system. Once this occurs, pressure will build up rapidly in the heater and the coolant hose will either burst or blow off at the connection point to the heater.
- This situation could cause engine damage and/or personal injury. Extreme care should be taken to ensure a proper mixture of water and antifreeze is used in the coolant system.
- Refer to the engine manufacturer's or coolant manufacturer's recommendations for your specific requirements.

Note: During electrical welding work on the vehicle disconnect the power to the heater in order to protect the control unit.

Failure to follow all these instructions could cause serious or fatal injury.

Direct questions to Espar Heater Systems **USA 1-800-387-4800**

CDA 1-800-668-5676

www.butlertechnik.com

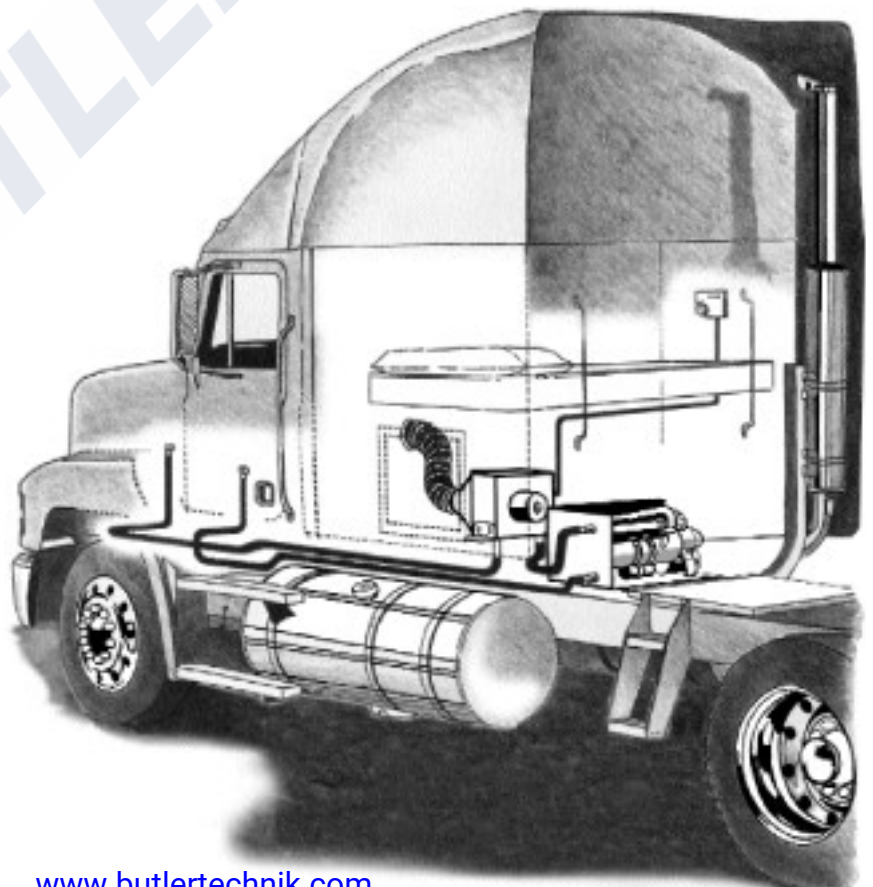
3. Introduction

The Espar D7W is a diesel fired 24,000 BTU/hr coolant heater, quality engineered to provide a dependable means of engine and sleeper heating. The heater can be purchased either in a weather-resistant steel box to protect it and provide for ease of installation or in a universal form.

The heater simply pumps coolant from the engine, heats it and returns it to the engine. When used to provide sleeper heat, the coolant is pumped through the sleeper heat exchanger prior to returning to the engine. Since the heater runs on diesel fuel and 12 volt power, it is able to perform this completely independent of the vehicle engine. A temperature regulating switch in the unit senses the coolant temperature and regulates the heater between a low of 176°F (80°C) and a high of 201°F (94°C).

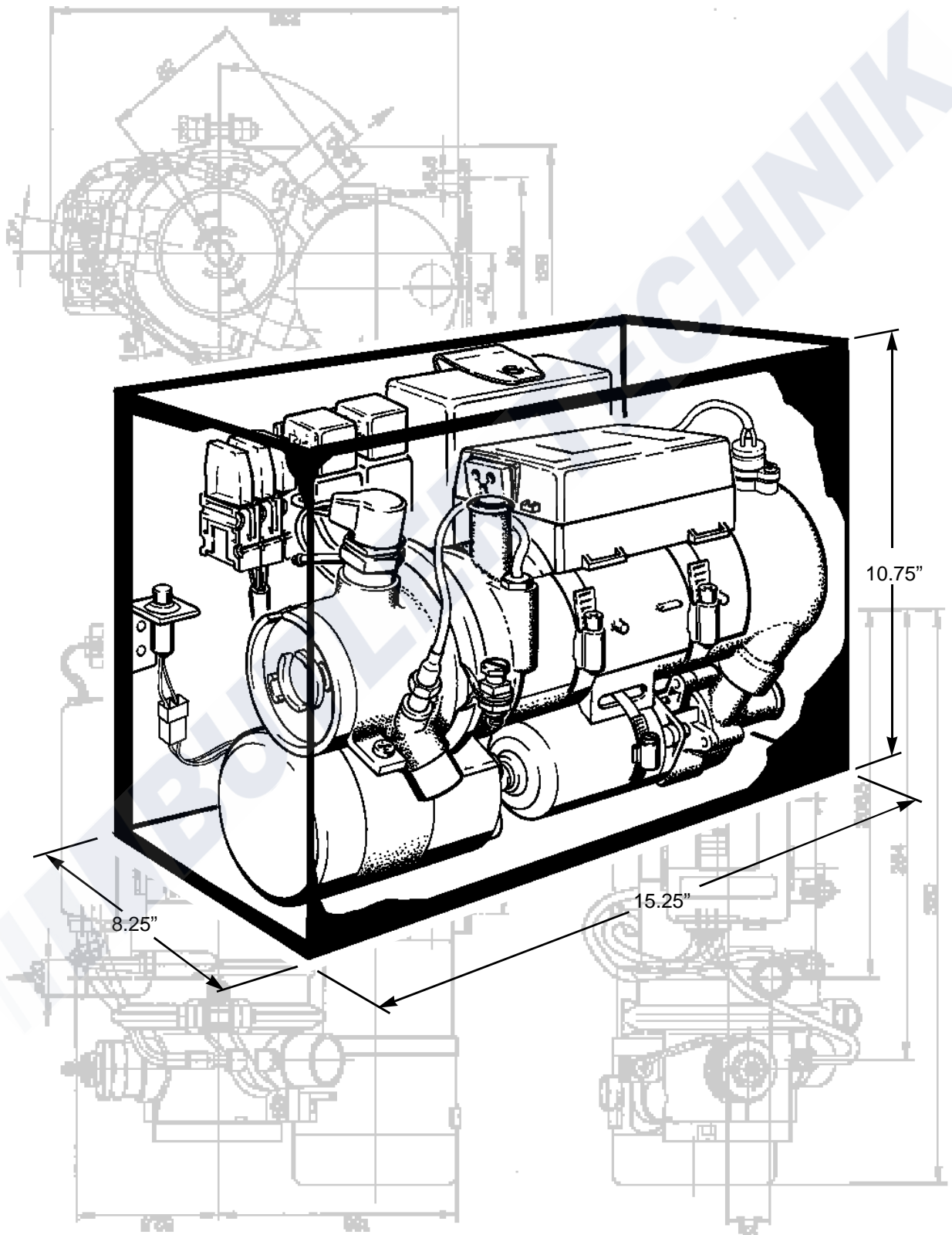
The heater may be operated from the vehicle cab by a push/pull switch, a pre-select timer or a combination of both.

The temperature sensor and overheat switch form only a part of the safety features which make this heater a safe and dependable unit.

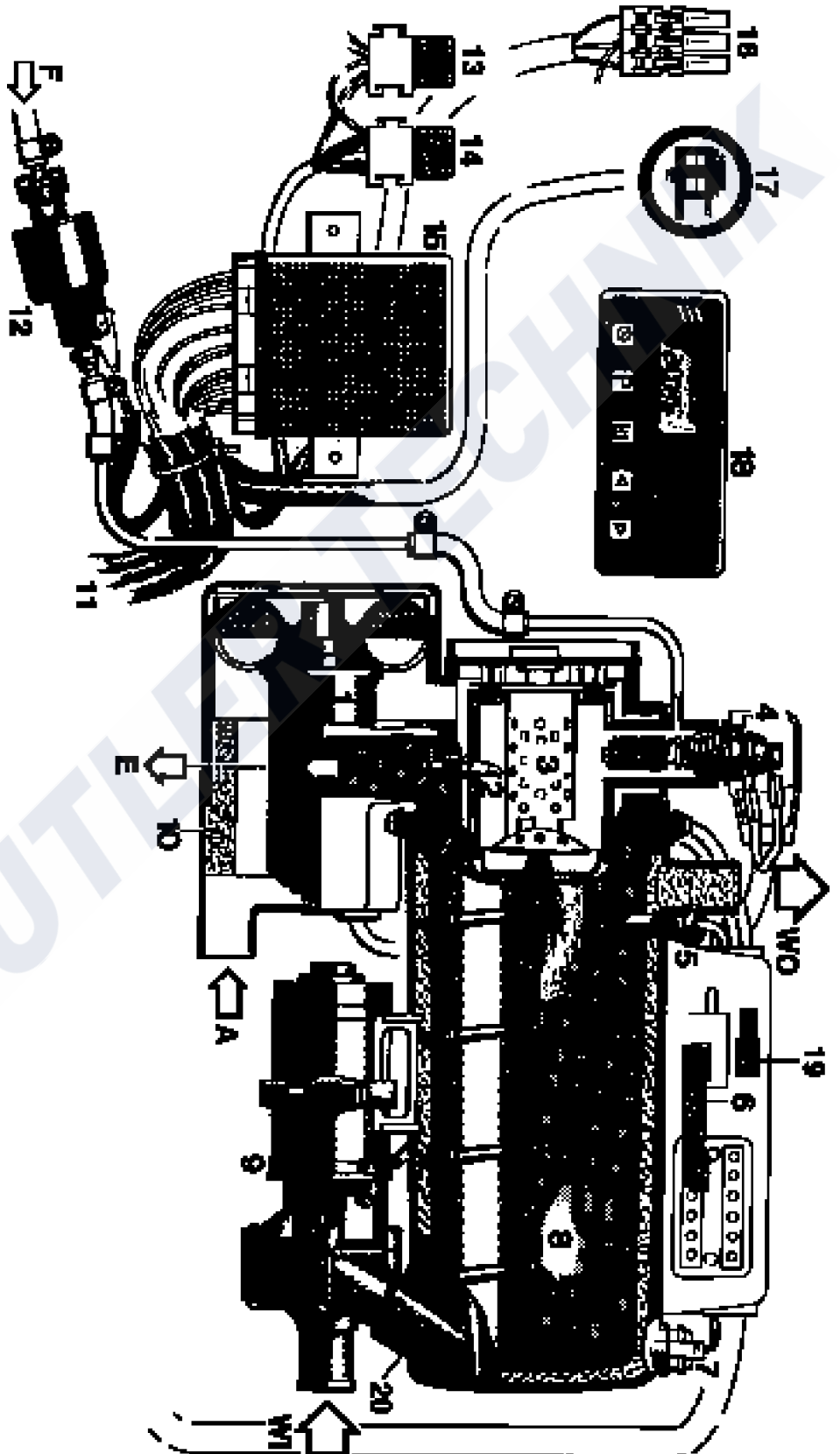


4. Principal Dimensions
D7W Boxed Model 25 1807

Figure 1A



5. Heater Components
Figure 1B



- 1 Combustion Air Blower
- 2 Flame Sensor
- 3 Flame Tube
- 4 Glow Plug
- 5 Temperature Sensor
- 6 Partial Load Resistor
- 7 Overheat Switch

- 8 Heat Exchanger
- 9 Water Pump
- 10 Silencer
- 11 Cable Tree
- 12 Fuel Metering Pump
- 13 Relay - Glow Plug
- 14 Relay To Switch - Vehicle Fan

Parts List

- 15 Control Unit
- 16 Fuses
- 17 99 Hour Digital Timer
- 18 7 Day Timer
- 19 Change Over Relay
- 20 Water Jacket

- WI = Water Inlet
- WO = Water Outlet
- F = Fuel
- A = Combustion Air
- E = Exhaust

II. Installation Procedures

1. Heater Locations

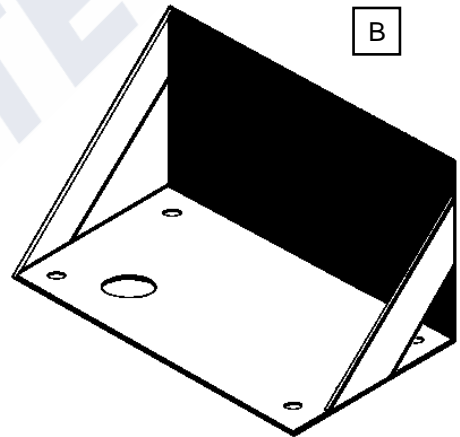
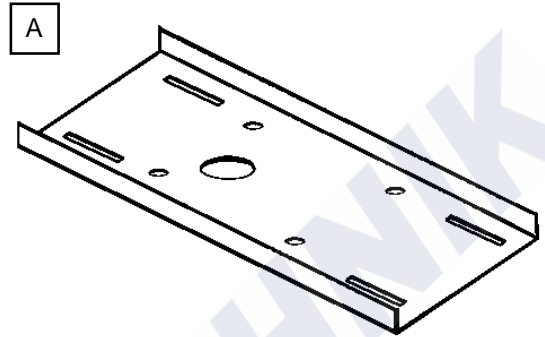
Select the best mounting location while adhering to the following conditions:

- Situate the heater below the normal coolant level of the engine.
- Guard against excessive road spray.
- Keep coolant hoses, fuel lines and electrical wiring as short as possible.

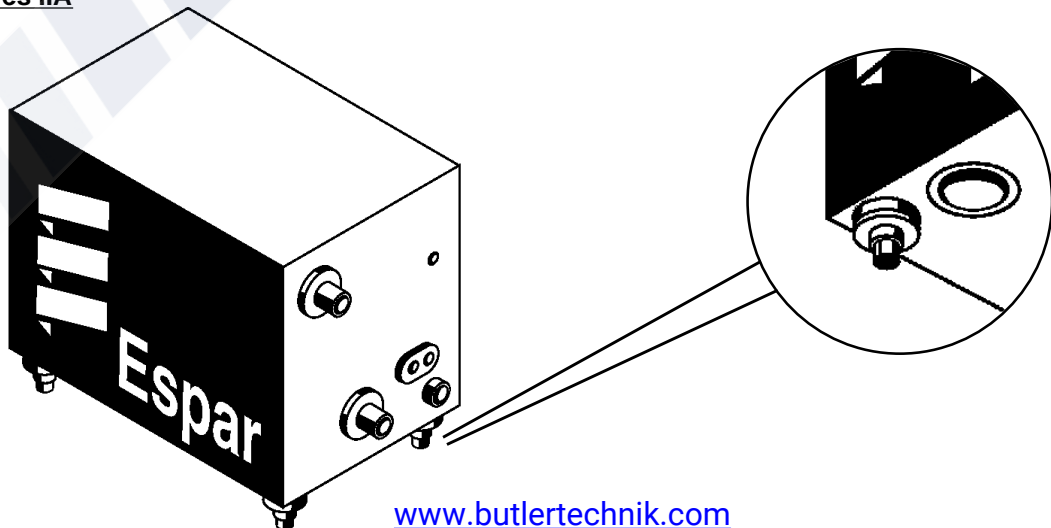
2. Heater Mounting

Mount the heater using the four (4) shock mounts provided and one of the following mounting methods: Figures IIA.

- Use the Cross Frame Mounting Tray (A) to mount the heater behind the cab and on top of the frame rails.
- Use the Side Mount Bracket (B) to mount the heater on the side of the frame rail.
- Use a spare step box or battery box.



Figures IIA



3. Heater Plumbing

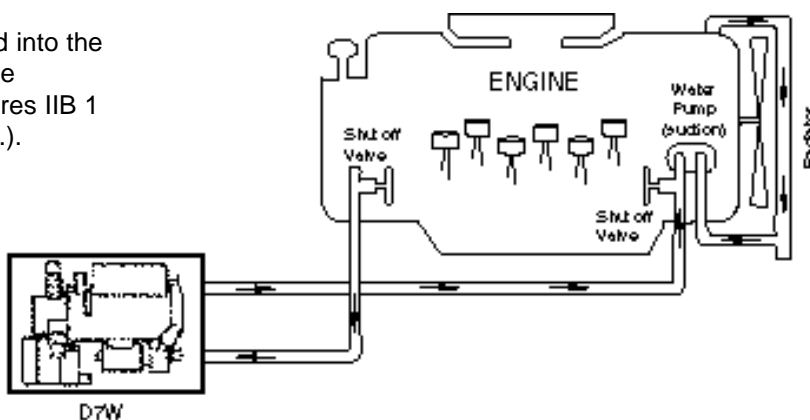
Connect the heater to the the engine coolant system while considering these following points

- Install hose fitting in existing holes in the engine block (these will have blanking plugs in them).
- Full flow shut off valves should be installed on the pickup and return hoses at the engine.
- Alternatively "T" piece connectors in existing coolant hoses can be used if no blanking plugs are available
- Ensure proper coolant flow by using a minimum of 3/4" hoses.
- Keep the coolant pick up point as low as possible on the engine to reduce air in the system.
- Take coolant from a high pressure point and return it to a lower pressure point. (eg. back of block to suction side of water pump). Ensure that engine and heater are pumping fluids in the same direction.
- Ensure proper heat distribution by keeping pick up point and return point as far apart as possible.
- Check flow rate through heater by measuring the incoming coolant temperature and the out going temperature. The rise in temperature should not exceed 18°F (10°C). If the temperature rise exceeds 18°F (10°C), modifications should be made to increase the flow rate. Check for restrictions in heat exchanger and fittings.
- If a bunk heat exchanger is incorporated into the system, proper plumbing layouts must be followed. (Refer to Figure II B and Figures IIB 1 on following page for specific guidelines.)

Caution: If your bunk heater exchanger has a flow control valve integrated into it, provisions must be made to ensure that flow through the Espar heater cannot be blocked.

D7WB plumbed for engine pre-heat

Figure IIB

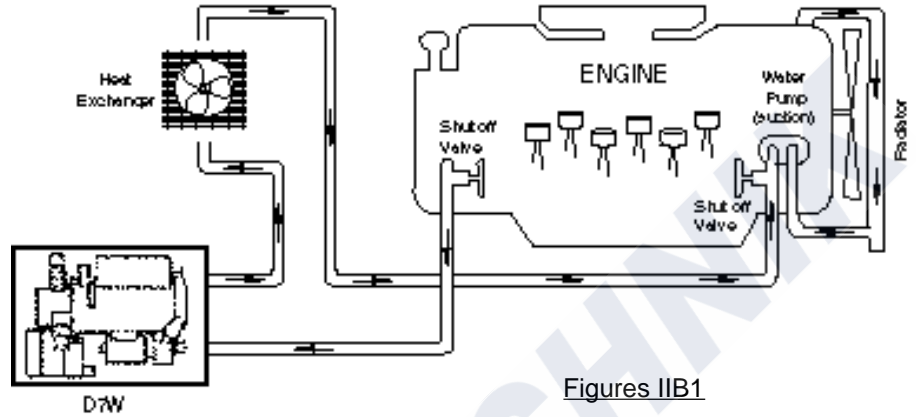


Note: The coolant must contain a minimum of 10% antifreeze at all times as a protection against corrosion. Fresh water will corrode internal heater parts.

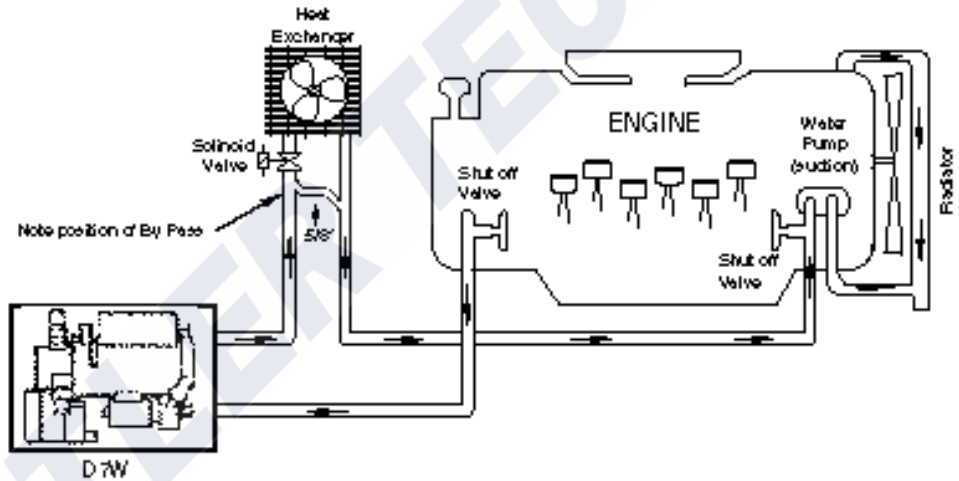


When being used to provide bunk heat with a heat exchanger the D7WB should be plumbed and wired to one of the following methods.

1. D7WB plumbed with an Espar heat exchanger.

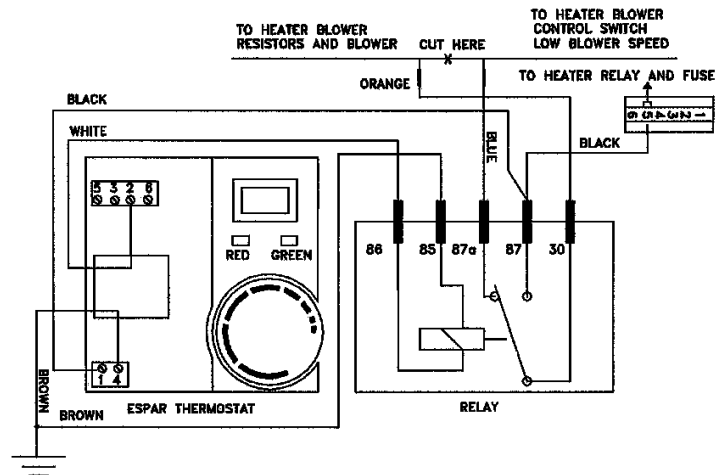
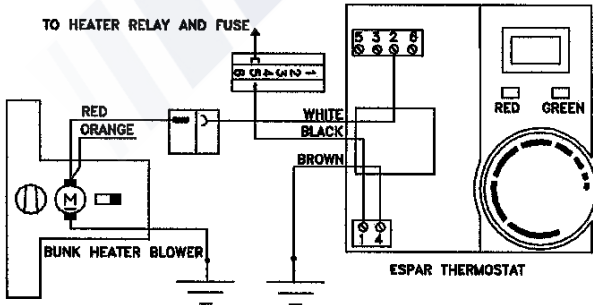


2. D7WB plumbed with an OEM heat exchanger.



Note: By pass must be used to ensure that coolant flow can't be completely stopped.

D7W Thermostat Options



1. D7WB wiring schematics for the Espar heat exchanger.

2. D7WB wiring schematics for OEM heat exchanger.

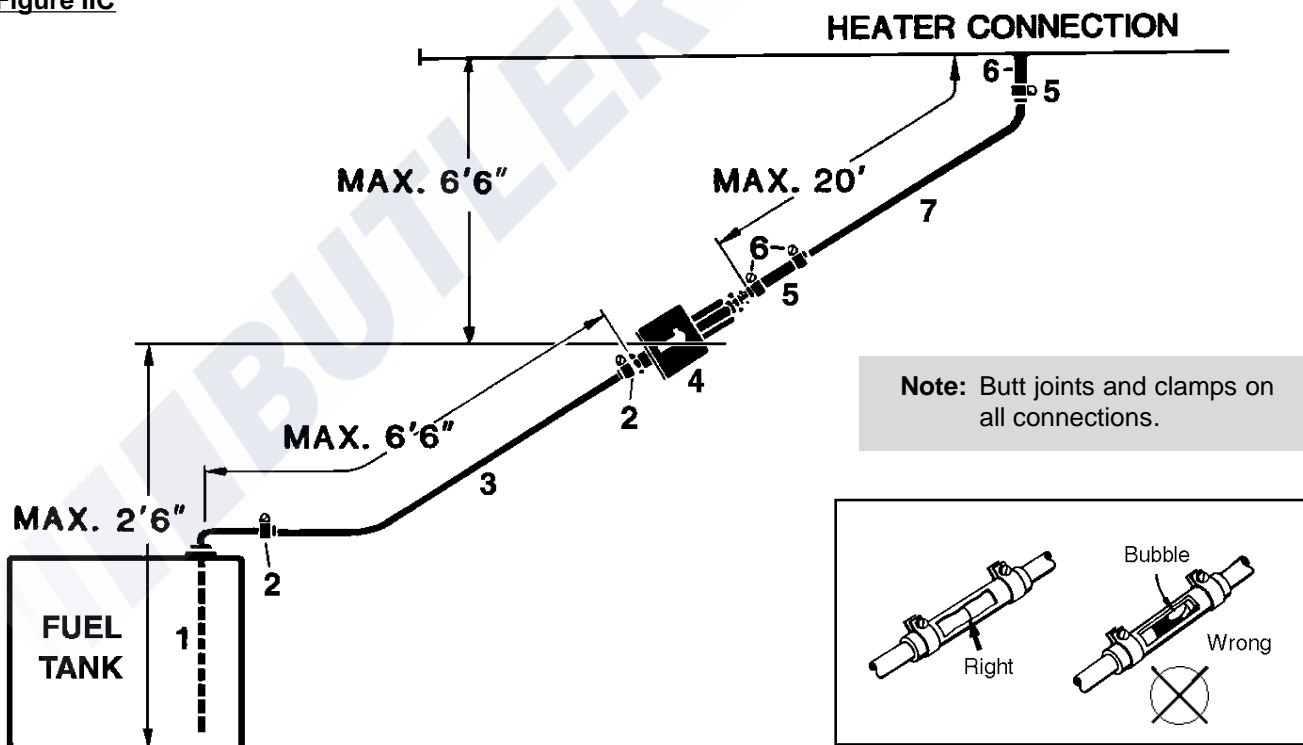
4. Fuel System

The D7WB is most commonly provided with the fuel metering pump mounted inside the box. This is to reduce installation time and to protect the pump from corrosion. If specifications cannot be met the pump must be mounted externally. Refer to Figure IIC for connections and specifications. All parts necessary to do the installation are included in the kit as shown in Figure IIC.

Note: Fuel line limits must not be exceeded. Ensure that the following conditions are met.
Bottom of the fuel metering pump must be within a height of 2'6" of the bottom of the fuel pick-up pipe.
Fuel metering pump must be within a total distance of 6'6" from the fuel pick-up pipe.

Fuel System Tolerances

Figure IIC



1. Fuel Pick-Up Pipe
2. 11mm Clamp
3. 5.0mm Fuel Line
4. Fuel Metering Pump

5. 9mm Clamp
6. 3.5mm Rubber Connector
7. 2.0mm White Plastic Fuel Line

B) Fuel Metering Pump

If the pump needs to be mounted externally follow these guidelines:

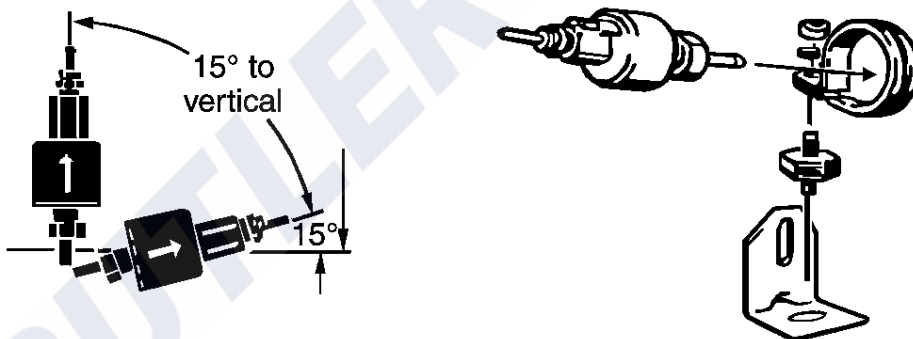
Choose a protected mounting location close to the fuel pick-up pipe and heater.

Using the bracket and rubber mount provided, install pump as shown in Figure II D.

Note: Proper mounting angle of the pump is necessary to allow any air or vapor in the fuel lines to pass through the pump rather than cause a blockage.

Fuel Metering Pump Installation

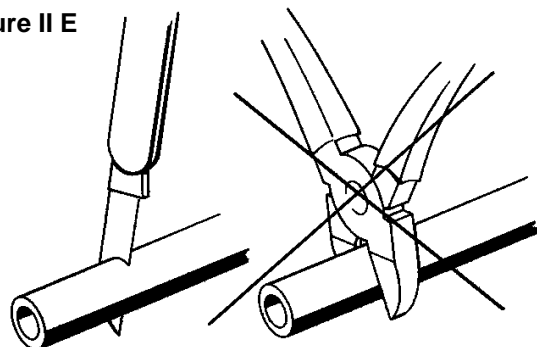
Figure II D:



C) Fuel Line

- Route fuel lines from the fuel pick-up pipe to the fuel metering pump then to the heater.
- Use fuel lines provided.
- Other sizes or types of fuel lines may inhibit proper fuel flow.
- Make proper butt joints using clamps and connector pieces as shown in Figure II E.
- Use a sharp utility knife to cut plastic fuel lines to avoid burrs.

Figure II E



D) Fuel Pick-Up Pipe Installation (Standard Pick-Up)

- Choose a protected mounting location close to the pump and heater. A spare fuel sender gauge plate provides an ideal mounting location.
- Drill the mounting holes as shown in Figure II F.
- Cut the fuel pick-up pipe to length.
- Mount the fuel pick-up pipe as shown in Figure II G.
- Lower the fuel pick-up pipe (with reinforcing washer) into the tank using the slot created by the two 1/4" holes.
- Lift the assembly into position through the 1" hole.
- Assemble the rubber washer, metal cup washer and nut.

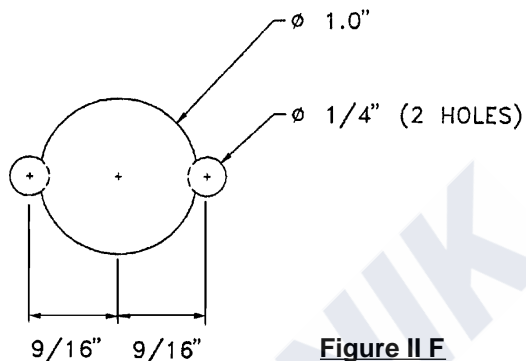
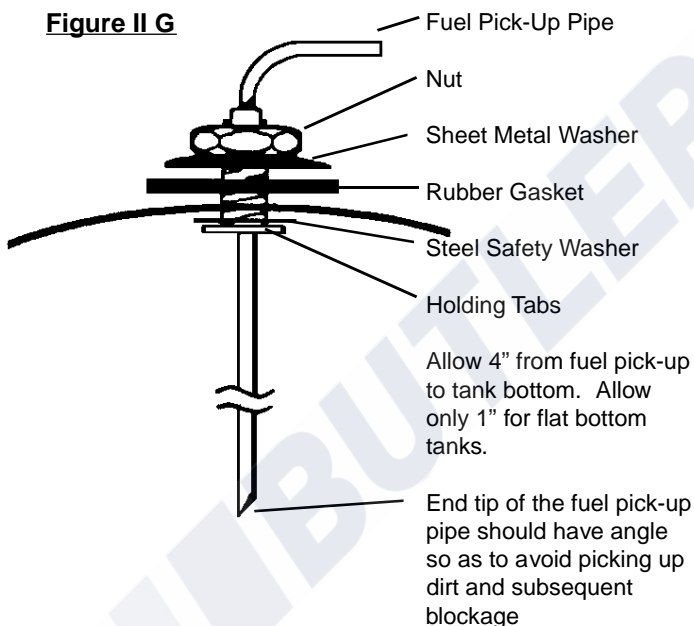


Figure II F

Note: Drill the two 1/4" holes first.

Figure II G



(Optional Pick-Up Pipe with NPT fitting)

- Remove an existing plug from the top of the fuel tank.
- Cut the fuel pick-up pipe to length.
- Secure the fuel pick-up pipe into position using the combined NPT compression fitting as shown in Figure II H.

Note: NPT fittings are available in various sizes (Refer to parts section).

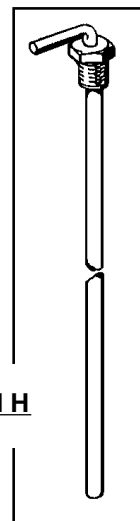


Figure II H

5. Electrical Connections

Caution: To avoid potential short circuit damage during installation, Make connection to the positive terminal at battery after all electrical connections are complete.

All harnesses should connect to mating plugs at the heater box.

A) Power Harness.....

- 2 core harness (red and brown).
- Connect red wire to vehicle battery (+), use ring terminal provided.
- Connect brown wire to vehicle battery (-), use ring terminal provided.

B) Switch Harness.....

- 5 core harness [(red, brown, yellow, blue) black-optional, for bunk fan power supply]

C) Fuel Metering Pump Harness.....

- Fuel Metering Pump Harness is pre-connected when box is provided with pump pre-mounted.
- If mounted externally, connect wires to fuel metering pump using single terminals and rubber protective boots provided with the heater- no polarity required).
- 2 core harness (green, green).
- Connect fuel metering pump harness using two single connectors. Figure IIa.

D) Bunk Heat Exchanger (optional).....

- single black wire from switch connector.
- connect as described in Heat Exchanger plumbing section. (pg.8)

Figure II I

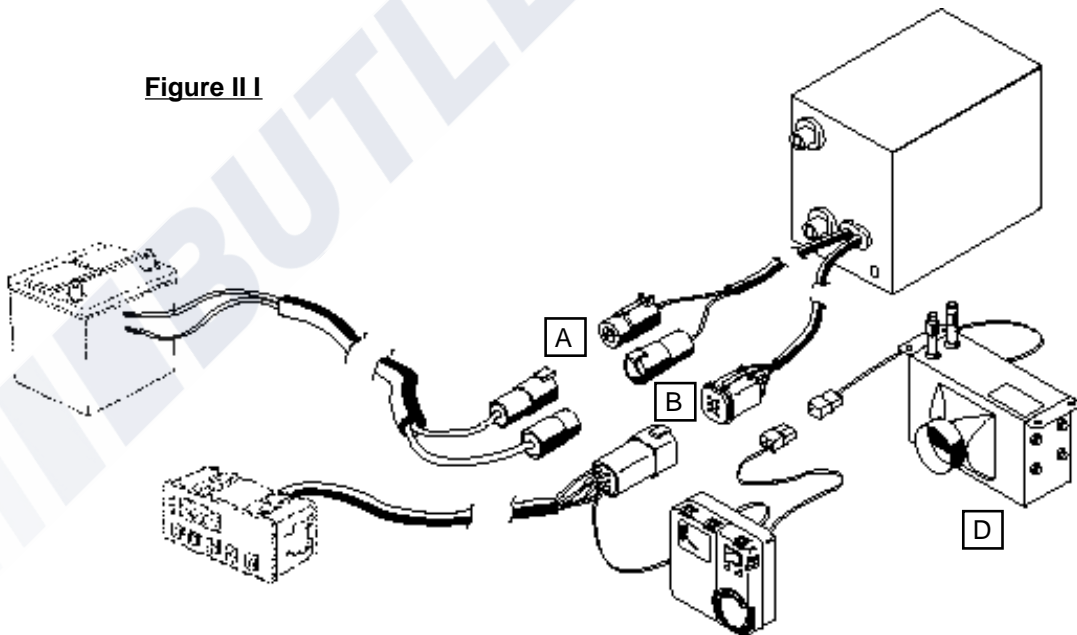
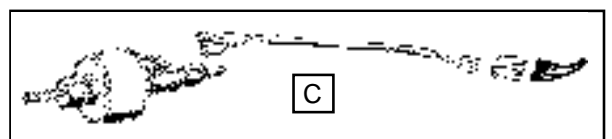


Figure II Ia



Note: All harnesses should be cut to length. All exposed electrical connections should be coated with protective grease.

6 Exhaust Connection

A 30mm flexible stainless steel exhaust pipe (1 meter long), exhaust clamps and holders are provided with the heater kit. Connect the exhaust as follows:

Caution: *Run exhaust so that it cannot be plugged by dirt, water or snow. Ensure the outlet does not face into the vehicle slip stream. Install exhaust pipe with a slight slope or drill 5mm holes in lowest point to allow water to run off. Any restriction in exhaust will cause operational problems.*

Feed the exhaust pipe through the silicone (white) gasket on the bottom of the box. Run to an open area to the rear or side of the vehicle so that fumes can not build up and enter the cab or the heater box.

Secure the exhaust pipe internally at the heater and externally using clamps and holders provided. Figure II J.

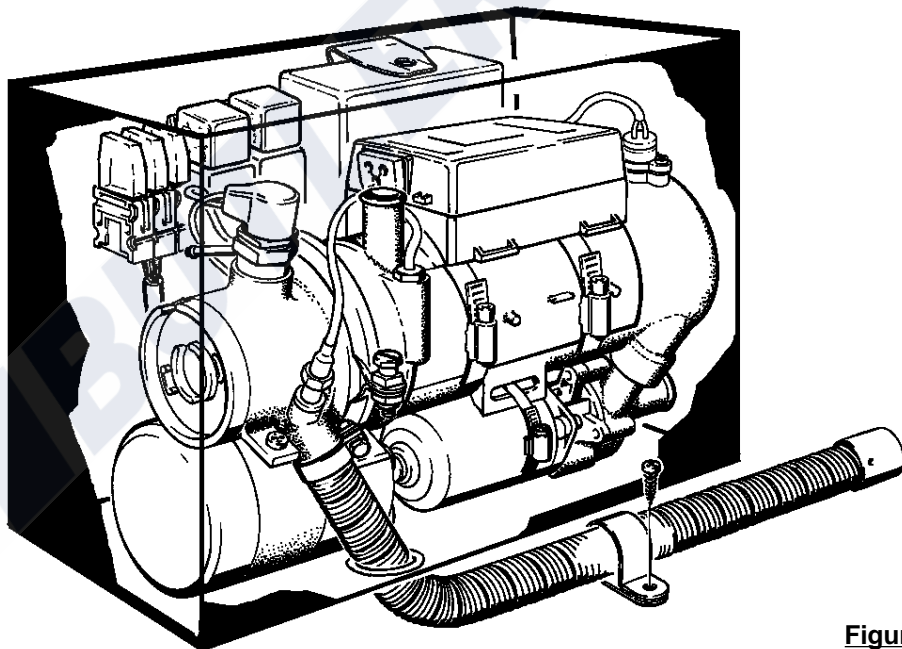


Figure II J



Warning: The exhaust is hot, keep a minimum of 2" clearance from any heat sensitive material



Warning: Route exhaust so that the exhaust fumes cannot enter the passenger compartment.

7. Operating Switches

A Push/Pull Switch is supplied with the heater, an optional 99 Hour Digital Timer or a 7 Day Timer are also available. Connect the operating switch as follows.

A. Push/Pull Switch

- Mount switch in a location where it is easily accessible.
- Mount using hardware supplied.
- Connect the 25' switch harness to the connector at the heater and run the harness to the switch location.
- Cut harness to length at the switch and install terminals.
- Connect wiring as shown in Figure II K.

Note Wired as above the switch light glows when pulled out and is off when pushed in.

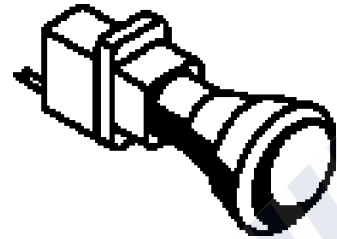
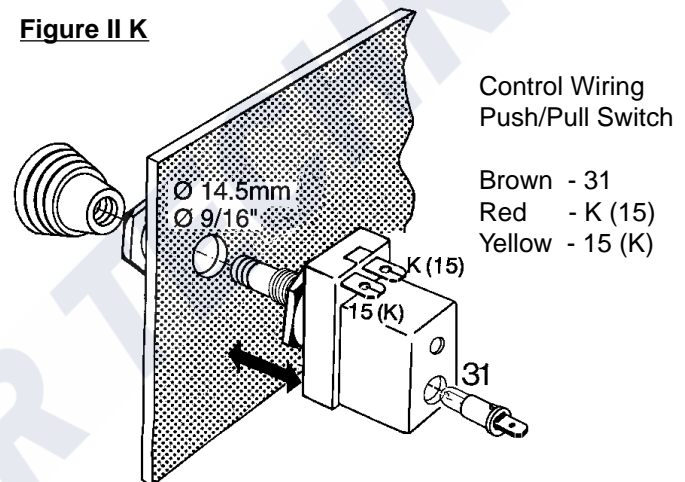


Figure II K



B. 99 Hour Digital Timer

This timer is pre-set by Espar to operate the heater for one (1) hour only. If an alternative run time setting is desired refer to the instructions provided with the timer.

- Mount the timer using a 2" hole in the dash or the optional mounting bracket.
- Mount timer using hardware supplied.
- Connect the 25' switch harness to the connector at the heater and run the harness to the switch location.
- Cut harness to length and terminate wires.
- Attach using connector provided.

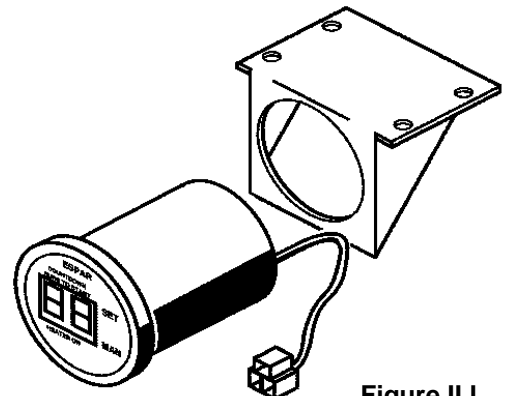


Figure II L

Red-Red
Yellow-Yellow
Brown-Brown

C. 7 Day Timer

The 7 day timer is capable of setting up to 3 preset start times within 24 hrs. or 1 start time with in 7 days. It also has other functions such as a current time display and a heater numeric fault code. Refer to instructions provided with timer for setting options.

- Mount timer and bracket in a suitable location.
- Connect the 25' switch harness to the connector at the heater and run the harness to the switch location.
- Cut harness to length at the switch and install terminals.
- Connect switch harness to timer..Figure II M
- Refer to timer instructions for other wiring options.

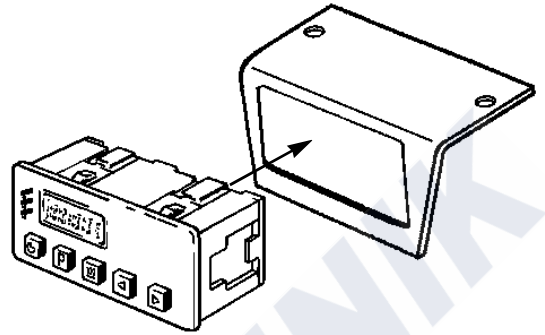
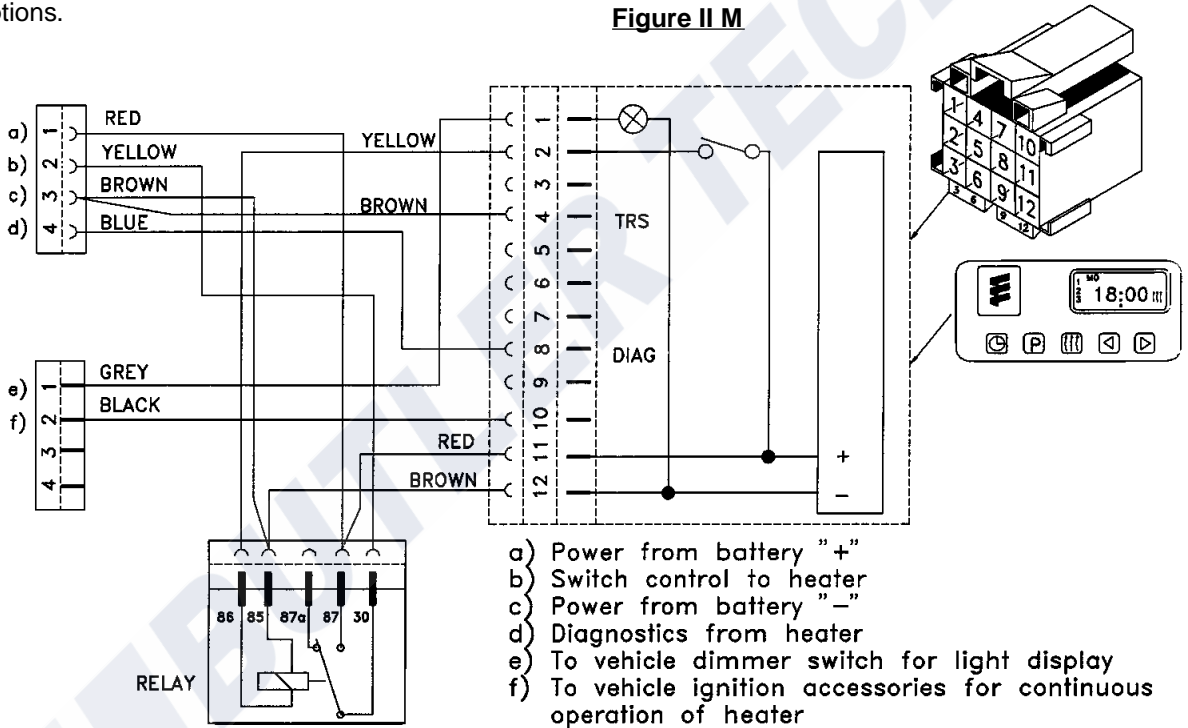


Figure II M



8. Optional Thermostat for Bunk Heat Exchanger

This thermostat is used to control the fan motor of the heat exchanger (OEM or optional Espar Heat Exchanger) inside the truck's sleeper, thereby allowing for interior cab heating.

- Mount the thermostat in a location where it is easily accessible and it's temperature sensor is representative of the area being heated.
- Mount using the mounting slots in it's base.
- Connect wiring as shown on page 8

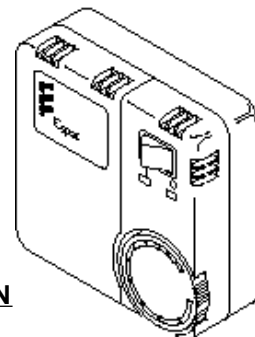


Figure II N



III Heater Operation

1. Pre-Start Procedures

Upon completion of installation prepare the heater as follows:

- Check all fuel, electrical and plumbing connections.
- Refill the engine coolant
- Bleed air from the coolant system by loosening the top heater hose to allow air to escape. Resecure the heater hose.
- Run engine to further bleed the system.
- Top up engine coolant.

2. Start Up

Once switched on the following sequence occurs:

- Combustion air blower starts.
- Water pump starts.
- Control unit checks all functions.
- Glow plug begins to preheat combustion chamber.
- Control unit checks input voltage (under or over voltage will cause heater to shut down).
- After the 20-50 second combustion chamber preheat the fuel pump will start.
- Once ignition takes place the flame sensor will automatically switch the glow plug off (ignition time: 1-3 minutes maximum).

Note: If the heater fails to start the first time it will automatically attempt a second start. If unsuccessful the heater will shut down completely.

Note: On initial start up the heater may require several start attempts to self prime the fuel system

3. Running

Once ignition is successful the following operations take place:

- Heater runs in full heat mode.
- Once coolant reaches 194°F (90°C) the heater automatically switches to low heat mode and continues to run.
- If coolant temperature drops to 176°F (80°C) the heater will automatically switch back to full heat mode.
- If coolant temperature continues to rise, the heater will automatically switch off once coolant temperature reaches 201°F (94°C).
- The water pump will continue to circulate coolant to allow the heater to monitor engine temperature.
- The heater will automatically re-start once coolant temperature reaches 176°F (80°C).
- The heater will continue to run as described above until it is switched OFF, either manually, automatically by a timer or heater malfunction shutdown.

Note: While in running mode if the heater should shut down due to flame out, it will automatically attempt one restart, if successful it will continue to run, if not it shuts down completely.

Note: During operation the heater continually senses the input voltage from the batteries, if the input voltage drops to approximately 10.0 volts (20.0 V for a 24 V system) the heater will automatically shut down.

4. Switching Off

When the heater is switched off, manually or automatically, it starts a controlled cool down cycle.

- The fuel metering pump stops delivering fuel and the flame is extinguished.
- The glow plug is re-energized for a 15 second after glow.
- The combustion air blower and water pump continue to run for a three (3) minute cool down cycle, then switch OFF.

Warning: The heater must be switched OFF while any fuel tank on the vehicle is being filled.



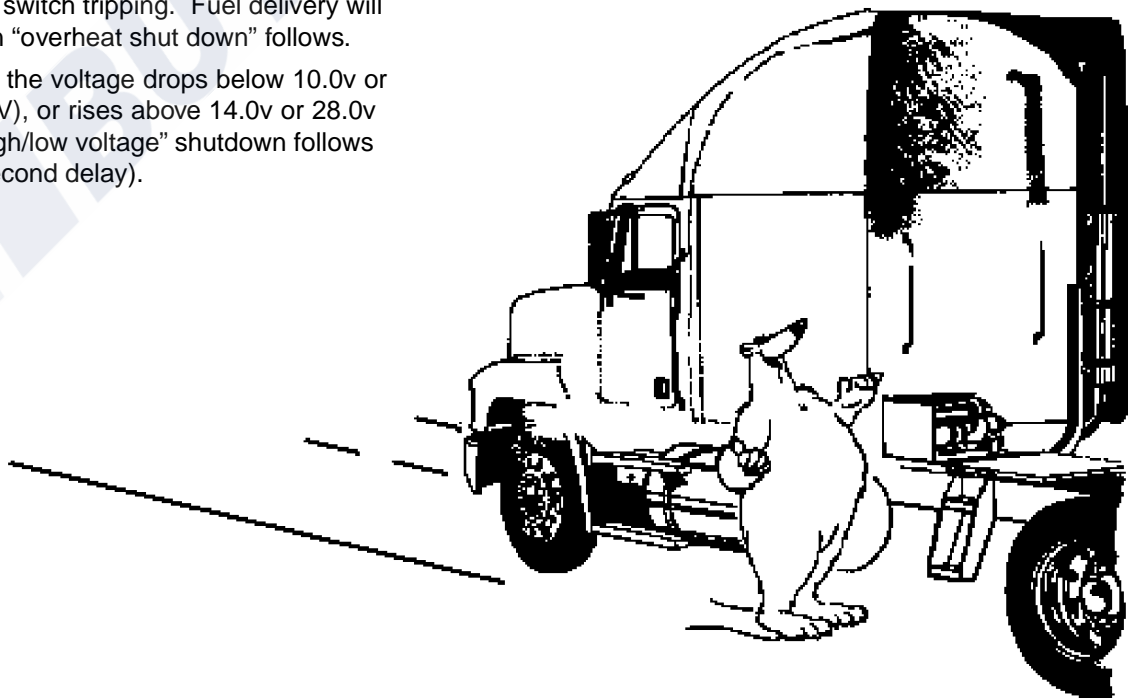
Warning: The heater MUST NOT be operated in garages or enclosed areas.



5. Safety Equipment

The control unit, overheat switch and flame sensor continually monitor heater functions and will shut down the heater in case of a malfunction.

- The control unit ensures electrical circuits (glow plug, fuel metering pump, combustion air blower etc.) are complete prior to starting the heater.
- If the heater fails to ignite within 90 seconds of the fuel pump being started, the starting procedure will be repeated. If the heater again fails to ignite after 90 seconds of fuel being pumped, a "no" start safety shutdown" follows.
- If the heater flames out during operation, the heater automatically attempts to restart. If the heater fails to ignite within 90 seconds of fuel delivery, or ignites but flames out again within 3 minutes, "flame out" shutdown follows.
- Overheating due to lack of water, a restriction or a poorly bled coolant system results in the safety cutout switch tripping. Fuel delivery will cease and an "overheat shut down" follows.
- If at any time the voltage drops below 10.0v or 20.0v (for 24V), or rises above 14.0v or 28.0v (for 24V), "high/low voltage" shutdown follows (after a 20 second delay).



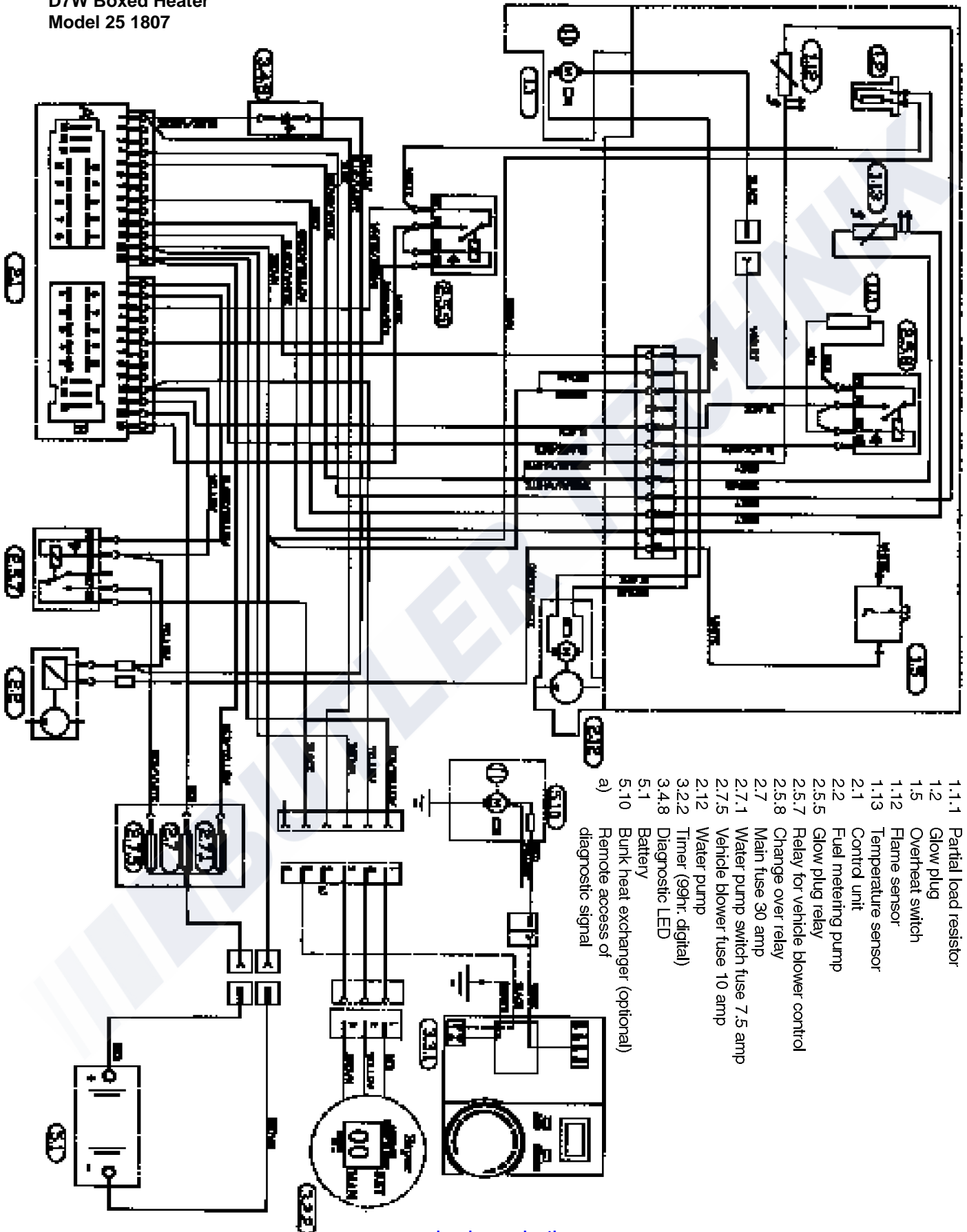


6. Operational Flow Chart

Operating Mode	STARTING PHASE				RUNNING PHASE		SHUT DOWN PHASE	
	Ignition attempt	Pre-heat 2nd. attempt	Ignition Attempt 2nd. attempt	Ignition attempt	Operational Heating	Ignition attempt	Ignition attempt	
	Off	On	On	Off	On	On	On	
	Off	On	On	Off	On	On	On	
	Off	On	On	Off	On	On	On	
	Off	On	On	Off	On	On	On	
	Off	Off	On	Off	On	On	On	
	Off	Off	On	Off	On	On	On	
	Off	Off	On	Off	On	On	On	
Time	10 sec. Ignition attempt 10 sec. Pre-heat attempt		Up to 90 sec. If Required		Up to 90 sec.		Up to 90 sec.	

Note: During the start-up phase the burner will switch off at the moment of a flameout.

7. Wiring Diagram
D7W Boxed Heater
Model 25 1807



- 1.1 Combustion air blower
- 1.1.1 Partial load resistor
- 1.2 Glow plug
- 1.5 Overheat switch
- 1.12 Flame sensor
- 1.13 Temperature sensor
- 2.1 Control unit
- 2.2 Fuel metering pump
- 2.5.5 Glow plug relay
- 2.5.7 Relay for vehicle blower control
- 2.5.8 Change over relay
- 2.7 Main fuse 30 amp
- 2.7.1 Water pump switch fuse 7.5 amp
- 2.7.5 Vehicle blower fuse 10 amp
- 2.12 Water pump
- 3.2.2 Timer (99hr. digital)
- 3.4.8 Diagnostic LED
- 5.1 Battery
- 5.10 Bunk heat exchanger (optional)
- a) Remote access of diagnostic signal

IV. Maintenance Troubleshooting and Repairs

1. Recommended Periodic Maintenance

- Remove the glow plug and inspect for carbon build up. Clean or replace.
- Remove the glow plug screen and inspect for carbon build up. Clean or replace. If cleaning is required, use brass brush (Espar part number CA0 05 003).
- Make sure vent hole is open. Espar recommends the use of non detergent 100% volatile carburetor cleaner and an air gun will also help. Remove loose carbon from the glow plug chamber.
- Check coolant hoses, clamps, and make sure all valves are open. Maintain the engine manufacturers recommended coolant level and ensure that the heater is properly bled after service on or involving the coolant system.
- Run your heater at least once a month during the year (for a minimum of 15 minutes).
- Maintain your batteries and all electrical connections in good condition. With insufficient power the heater will not start. Low and high voltage cutouts will shut the heater down automatically.
- Use fuel suitable for the climate (see engine manufacturers recommendations). Blending used engine oil with diesel fuel is not permitted.

2. Troubleshooting

A. Basic Troubleshooting

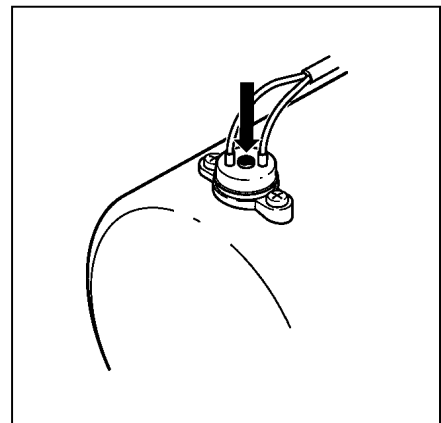
In the event of failure there are several items which should be checked first before any major troubleshooting is done.

Check

- Circuit breakers and Fuses.
- For breaks on Glow Plug coil.
- Electrical lines and connections
- For interference in Combustion air and Exhaust pipes.
- That there is fuel in the tank.
- Has the overheat switch triggered? Figure IV A

Press the raised knob of the rubber cover to reset the overheat switch located below.

Figure IV A



If a fault can't be detected follow one of the other troubleshooting methods outlined in this manual

B. Manual Troubleshooting

To manually troubleshoot the heater match the fault with the cause and prescribed remedy.

Fault	Cause	Remedy
Heater runs 5 seconds at start then shuts off.	Glow plug defective..... Electric motor defective or blower blocked..... Harness to fuel metering pump not connected. Overheat switch tripped..... Insufficient coolant..... Coolant circuit not properly bled..... Coolant pump defective..... Short circuit in the flame sensor.....	Replace glow plug. Replace blower. Check line. Reset overheat switch. Top up coolant. Bleed coolant circuit. Replace coolant pump, reset safety thermal switch. Replace flame sensor.
Heater runs for 30 seconds at start then shuts off.	Under voltage..... Overvoltage..... Corrosion on electrical connections.....	Check/Charge battery. Check vehicle charging system. Clean electrical connections.
Flame goes out in low mode.	Insufficient fuel..... Speed of blower not reduced from high to low.	Measure fuel quantity. Replace partial load resistor . Replace control unit. Replace change over relay
Flame goes out in high mode	Insufficient fuel..... Vapor lock in fuel line..... Flame sensor defective.....	Measure fuel quantity. Fuel gets too hot, change position of fuel lines Replace flame sensor.
Non-start. Safety time (90 sec.) exceeded and automatic cutout.	Fuel line not filled..... Insufficient fuel..... Defective glow plug..... No fuel..... Metering pump seizure..... Short circuit at metering pump..... No pulse at metering pump.....	Restart, check fuel line. Measure fuel quantity. Replace glow plug. Fill tank Replace metering pump. Check pump. Replace control unit.
Automatic cut-out after 3-5 minutes.	Flame sensor leads reversed..... Flame sensor interruption..... Insufficient fuel.....	Check connection against wiring diagram. Replace flame sensor. Measure fuel quantity.
Delayed start	Heater in cool down mode..... Water temperature still above the triggering point for the temperature sensor [approx. 176°F (80°C)]. Temperature sensor interruption.....	Wait for delayed shut-off. Wait until temperature falls below triggering point. Replace temperature sensor.

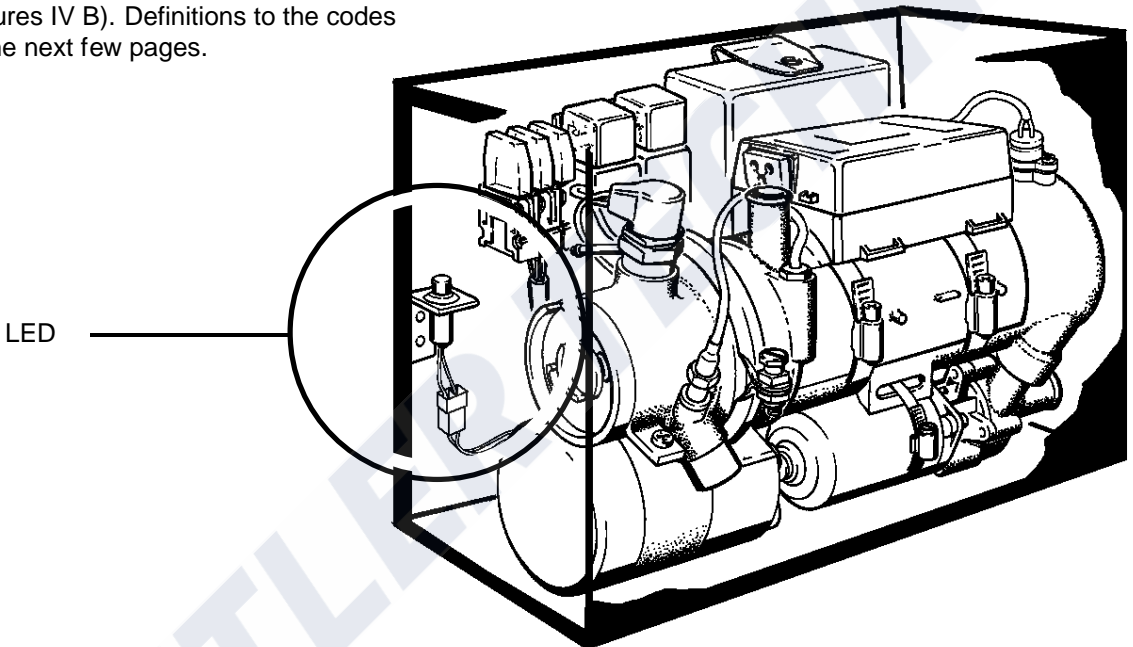


C. Self Diagnostics Troubleshooting

The D7WBoxed heater is equipped with an automatic testing capability which can be used to check for faults. A built-in LED provides a full time diagnostics display. The Optional 7 Day timer provides a numeric fault code display. Both are covered on the following pages.

1. Built-in LED and Diagnostic display.

The indicator and fault code chart are located within the box (Figures IV B). Definitions to the codes are found on the next few pages.














Figures IV B





DIAGNOSTIC SIGNALS

FALSE FLAME RECOGNITION	■	■
FLAME OUT IN LOW SETTING	■ ■	■ ■
FLAME OUT IN HIGH SETTING	■ ■ ■	■ ■ ■
GLOW PLUG	■ ■ ■ ■	■ ■ ■ ■
BURNER MOTOR DOES NOT TURN	▬	▬
UNDER VOLTAGE	▬ ■	▬ ■
OVERVOLTAGE	▬ ■ ■	▬ ■ ■
NO START SAFETY TIME EXCEEDED	▬ ■ ■ ■	▬ ■ ■ ■
GLOW PLUG RELAY	■ ▬	■ ▬
TEMPERATURE SENSOR	■ ■ ▬	■ ■ ▬
SHORT CIRCUIT, FUEL METERING PUMP	■ ■ ■ ▬	■ ■ ■ ▬
FLAME SENSOR	■ ■ ▬ ■	■ ■ ▬ ■
EXTERNAL ELECTRICAL INTERFERENCE	■ ▬ ■ ■	■ ▬ ■ ■
CONTROL UNIT	▬ ▬	▬ ▬
OVERHEATING	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■
NORMAL OPERATION	▬▬▬▬▬▬▬▬▬▬	▬▬▬▬▬▬▬▬▬▬
WARNING VOLTAGE - UNDER/OVER	■ ■ ▬▬▬▬▬▬▬▬▬▬	■ ■ ▬▬▬▬▬▬▬▬▬▬

■ 0.3 SECONDS
▬ 1.6 SECONDS

Fault Code	Fault description	Indication		Remedy
		Fault signal/flashing code		
000	No fault			
001	Pre-heating, overvoltage			Voltage at control unit (between A12 and B12) greater than 14.5 V.
002	Pre-heating, under voltage			Voltage at control unit (between A12 and B12) less than 11 V.
010	Overvoltage switch-off			Voltage at control unit (between A12 and B12) greater than 15 V for longer than 20 seconds.
011	Under voltage switch-off			Voltage at control unit (between A12 and B12) less than 10.2 V for longer than 20 seconds.
012	Overheating			Overheating switch has triggered, vent heater (lack of water), open heating valve, check water flow and switch.
013	Temperature at heat exchanger to high			Flame sensor has reported temperature >560°C (corresponding to 3000 Ω). Check sensor (connections A4 and A5 at control unit).
020	Glow plug defect			Check glow plug. Check connections to glow plug and to glow plug relay. Check connection to control unit.
022	Short circuit in current regulator contacts			Check glow plug relay (current regulator). Check connection to glow plug, check connection to control unit.
023	Interruption in current regulator			Check coil connection to glow plug relay (connections 85 and 86). Check connection to control unit (connection B6).
024	Short circuit in current regulator coil			Check coil connection at glow plug relay (connections 85 and 86). Check connection to control unit (connection B6).
025	Short circuit at diagnostic output	No flashing code		No flashing code. Check diagnosis lead (connection A1 at control unit). Check connection to control unit.

Fault Code	Fault description	Indication		Remedy
		Fault signal/flashing code		
030				
031	Combustion air fan does not rotate	■		Check combustion air fan. Check motor speed relay (2.5.8). Check connection to control unit (connections A11 and B1).
032				
033				
037	Water pump does not rotate	■ ■ ■ ■ ■ ■ ■ ■		Check water pump (external triggering). Check connections to control unit (connections A11 and A13).
047	Short circuit in metering pump	■ ■ ■ ■ ■ ■ ■ ■		Check metering pump. Check connections to control unit (connections A10 and B10).
051	Flame sensor defect	■		Temperature at flame sensor does not fall below 80°C (corresponding to 1300 Ω). Check flame sensor or combustion, possibly replace. (Set points: 900 Ω to -25°C, 1100 Ω to +25°C).
052	Failure to start/safety time expired	■ ■ ■ ■ ■ ■ ■ ■		No flame was detected during the start up phase . Flame sensor value less than 90°C (1350 Ω). Check the fuel supply, glow plug, exhaust piping, combustion air piping and flame sensor. (900 Ω at -25°C, 1100 Ω at +25°C)
053	Flame out in "high" mode	■ ■ ■ ■ ■ ■ ■ ■		Heater has started (flame detected) and indicates flame loss in power setting. Check fuel flow rate, blower speed, combustion is O.K, necessary. 055 Flame out in "low" mode 1100 Ω at +25°C)
check flame sensor, replace if Flame sensor values: (900 Ω at -25°C,		■ ■ ■ ■ ■ ■ ■ ■		Check water circulation (012) and temperature control sensor (060/061)
059	Water temperature rises too quickly	■ ■ ■ ■ ■ ■ ■ ■		Measured temperature lies outside measuring range. Check sensor. (Set points: 650Ω at -25C,1000Ω at +25C). Check connection to control unit (connections A5 and A8)
060	Interruption in temperature sensor	■ ■ ■ ■ ■ ■ ■ ■		Remedy
061	Short circuit in temperature sensor	■ ■ ■ ■ ■ ■ ■ ■	Indication	

Fault Code	Fault description	Fault-signal/flashing code	
064	Interruption in flame sensor		
065	Short circuit in temperature sensor		Measured temperature lies outside measuring range. Check sensor. (Set points: 900 at -25C, 1100 at +25C). Check connections to control unit (connection A4 and A5)
090	Control unit defect (internal reset)		
092	ROM fault		
093	RAM fault		
094	EEPROM fault		Replace control unit
095	Control unit defect (general fault)		
096	Control unit defect (general fault)		
097	Control unit defect or cable harness fault		Check and where necessary replace control unit. Check cable harness.
091	External interference voltage		Check voltage supply. Check connection to control unit (connection A12 and B12)



D. 7 Day Timer Troubleshooting

The 7 day timer (Figure IV C) has a fault code retrieval device built into the unit. This function automatically activates if the heater is experiencing problems.

- Fault codes appear on the LCD display screen.
- These codes can then be translated from the charts on the previous pages.

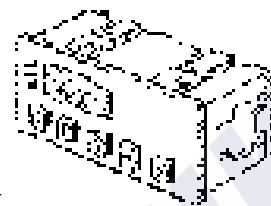


Figure IV C

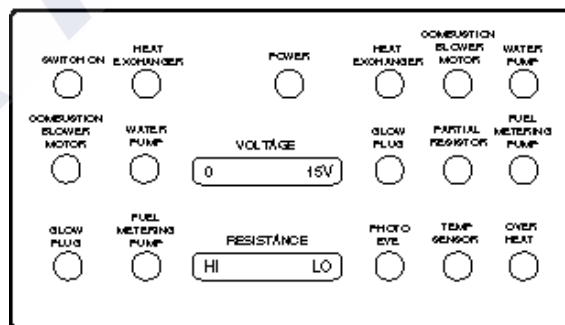
E. Circuit Tester Troubleshooting

The purpose of this tester is to help a service technician troubleshoot problems faster and more accurately. It tests individual electrical components, checks the continuity of each circuit and runs the heater manually.

Note: To use this tester (P/N CA1 05 010) with the D7W 25 1807 you will require an adapter-P/N CA1 05 023

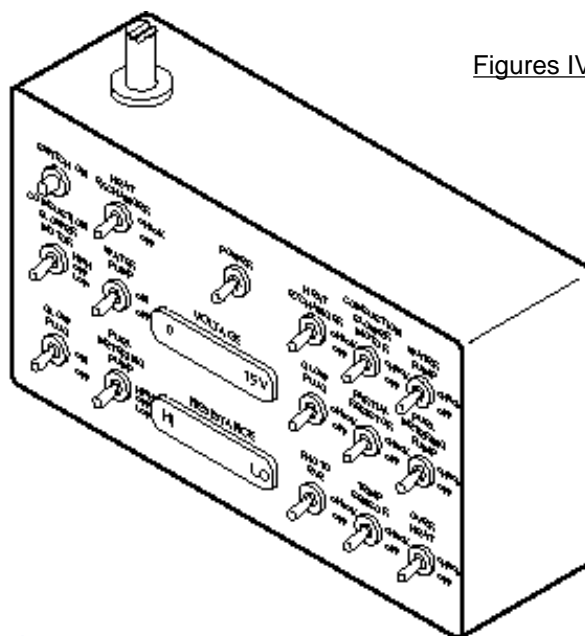
1. Initial Set Up

- All switches should be in the “Off” position.
- Plug in the connectors from the tester to the corresponding ones on the heater harness.
- Ensure proper power, fuel and coolant connections.



2. Operating Instructions

- Switch the power switch to the “On” position and the voltmeter will indicate the voltage across the control unit. The voltage must be between 10.0V and 14.0V, on a 12V system or between 20V and 28V on a 24V system.
- Set the heater switch or timer to run position.
- The red “Switch On” LED should illuminate.
- Test individual components by switching each of the nine switches on the right side of the tester to “CHECK” position.
- The ohmmeter will indicate the resistance value of each component as high or low.
- Compare measured value to componen resistance chart in Table 1.
- If any mismatch is indicated the component should be replaced.
- Do not measure more than one component at a time.



Figures IV D

Table 1 - Components Resistance Chart

Component	Resistance
Combustion Air Blower	Low
Water Pump	Low
Glow Plug	Low
Overheat Switch	Low
Fuel Metering Pump	Low
Temperature Sensor	Medium
Flame Sensor	High when exchanger is cool Low when exchanger is warm
Partial Load Resistor	Low
Heat Exchanger Relay	Low

3. To Manually Run Heater

Start Up:

- Switch combustion air blower switch to “High” position.
- Combustion motor will run at high speed.
- Switch water pump switch to “On” position.
- Water pump circulates coolant through the system.
- Switch glow plug to “On” position and wait for 30 seconds.
- Glow plug begins preheating.

Note: Combustion air blower motor speed will decrease due to voltage drop.

- Switch fuel metering pump switch to “High” position.
- Fuel metering pump delivers fuel to combustion chamber and establishes a flame.

Note: If the fuel metering pump does not receive the electric pulses then the overheat switch may be tripped. Reset the overheat switch. Check the fuse in tester - if blown replace with AGC-1.

High Heat: Once a flame is established (combustion is heard) wait 30 seconds then switch the glow plug off. The heater is now running in high heat mode.

Note: Combustion air blower motor speed and fuel metering pump pulse frequency will increase due to voltage increase.

Low Heat:

Switch combustion air blower motor switch to “Low” position.
Switch fuel metering pump switch to “Low” position.

Note: The heater is now running in low heat mode.

Cool Down:

Switch fuel metering pump switch to “Off” position.
Switch the combustion air blower motor switch to “High” position.
Wait for 3 minutes for the heater to cool down.
Switch combustion air blower motor switch to “Off” position.
Switch water pump switch to “Off” position.

Note: The heater is now off. Turn the power switch off and disconnect tester.

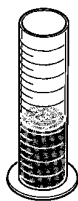
3. Fuel Quantity Test

The fuel Quantity should be tested if the heater has difficulty starting or maintaining a flame.

Note: Measure the fuel quantity when the battery is sufficiently charged. At least 11/22V and at most 13/26V should be applied at the control unit during measurement.

A). Preparation

- Detach the fuel line from the heater.
- Insert the fuel line into a measuring glass.
- Connect a voltmeter to terminals A13 (+) and A12 (-) of the control unit.
[C6 (+) and A4 (-) on models 25 1666/1667].
- Disconnect the glow plug leads from the glow plug and connect a test light across the two leads.
- Switch the heater on and allow the fuel line to bleed.(approx. 25-55 seconds)
- Switch off the heater and empty the measuring glass.



B). Measurement

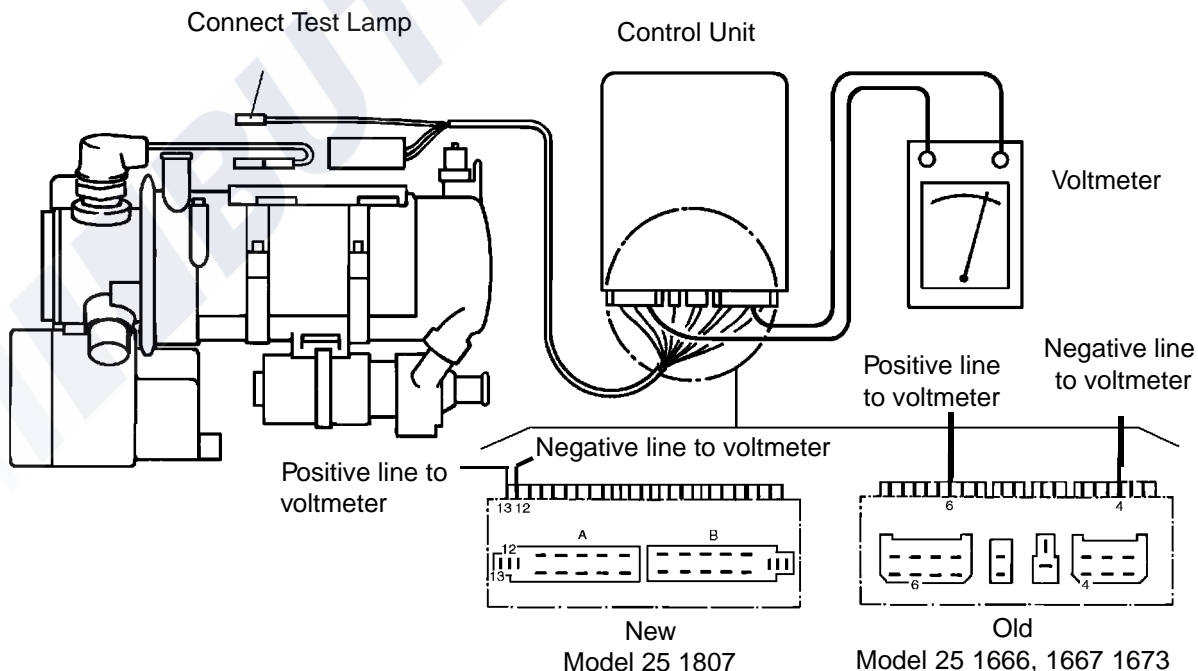
- Switch on the heater.
- Hold the fuel line in the measuring glass while fuel is being delivered.
- Fuel starts being pumped 25 - 55 seconds after switch-on.
- Hold the measuring glass at the level of the plug during measurement.
- Read the voltage at the voltmeter.
- The pump will stop delivering fuel automatically after 90 seconds.
- Switch off the heater.

C. Evaluation

- Read the fuel quantity in the measuring glass.
- Transpose the readings into the appropriate diagram. Figures IV F
- The fuel consumption is OK if the intersection of the two readings are within the limit curves.
- If the intersection is outside the limit curves, inspect the fuel system and replace fuel metering pump if necessary.

Note: Do not adjust fuel metering pump. Adjustments will only provide a temporary fix.

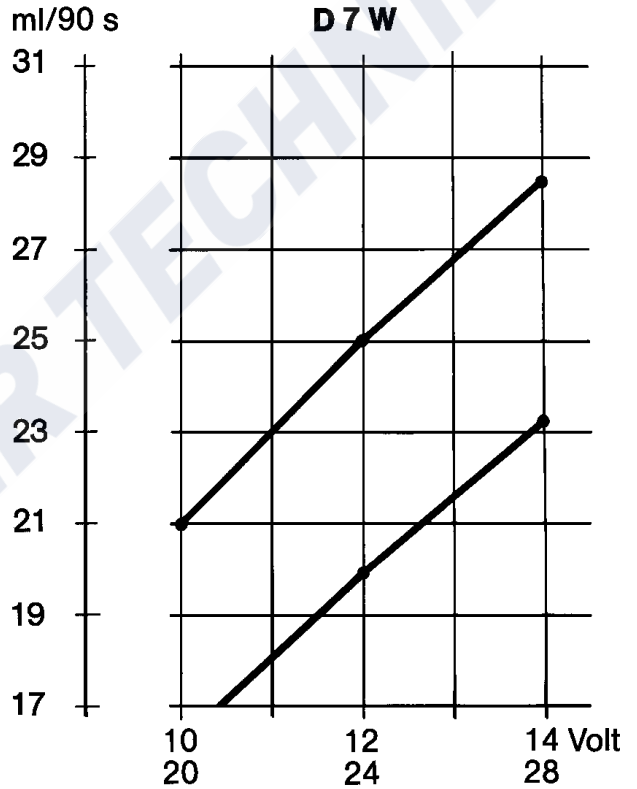
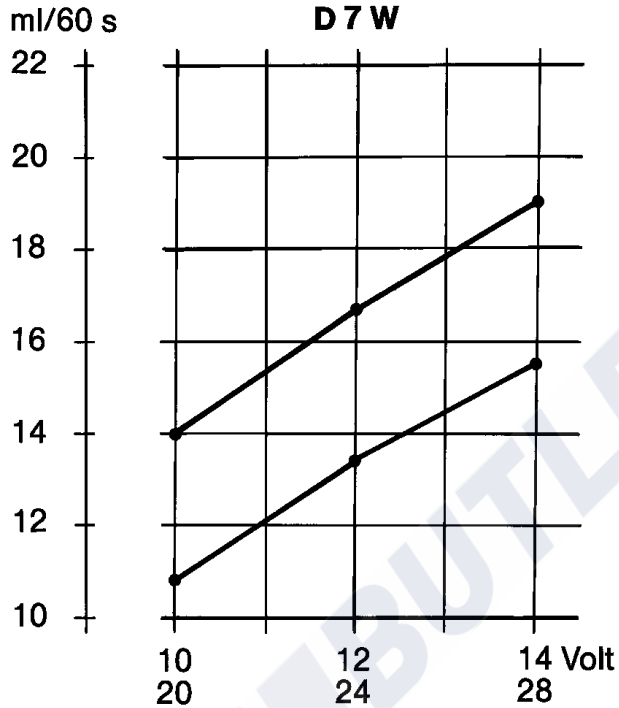
Figure IV E



Continued on next page.....

Connection of voltmeter to control unit

Figures IV F



4. Repair Steps

1. Glow Plug Removal, Inspection and Replacement
2. Glow Plug Screen Removal, Inspection and Replacement
3. Series Resistor Removal
4. Cover Removal
5. 12-pin Plug Removal
6. Temperature Sensor Replacement
7. Flame Sensor Replacement
8. Overheat Switch Removal
9. Partial-Load Resistor Removal
10. Water Pump Replacement
11. Combustion Air Blower Removal
12. Flame Tube Removal
13. Heat Exchanger Removal, Inspection and Replacement
14. Cover and Bracket Removal

Figure IV G

1. Glow Plug Removal, Inspection and Replacement

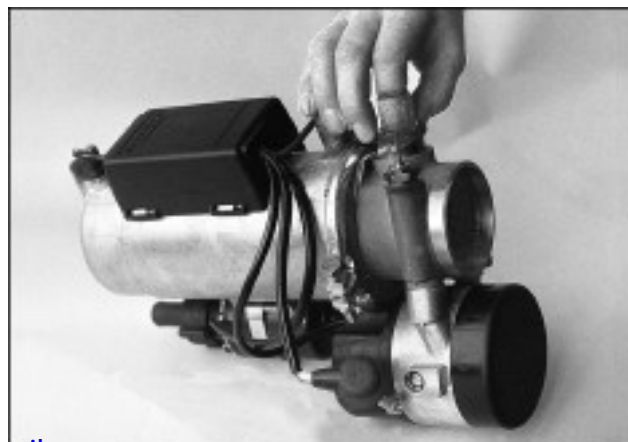
- Take off the plug cap
- Loosen the hex nut and detach the plug cable
- Unscrew the glow plug
- Inspect glow plug and coil for carbon build up breaks or metal fatigue
- Clean or replace if necessary
- Re-install in reverse order



2. Glow Screen Removal, Inspection and Replacement

- Remove the glow plug
- Remove screen and clean using varsol, brass wire brush and compressed air
- Replace if necessary
- Clean glow plug chamber to remove carbon build up
- Re-install screen

Figure IV H



continued....

When replacing the glow plug screen, be sure to insert it in the manner shown in Figure IV I

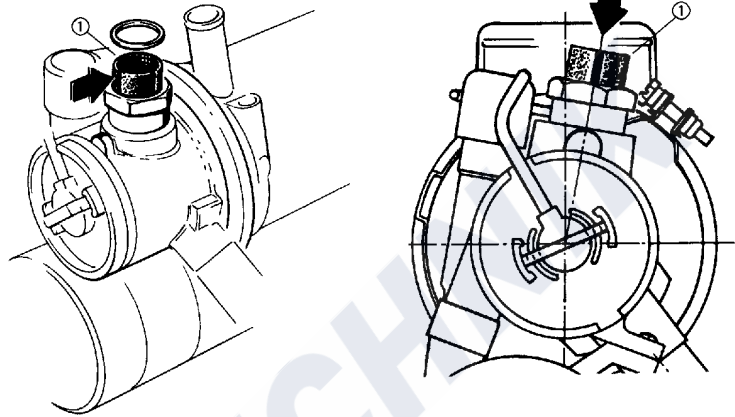
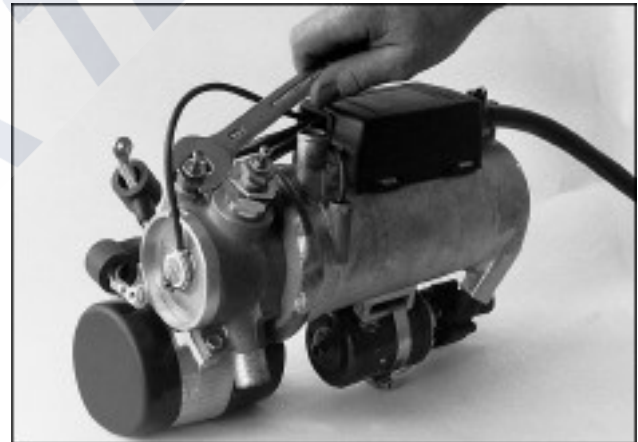


Figure IV I

3. Series Resistor Removal (24 volt only)

- Remove the cap from the series resistor
- Loosen the hex nut
- Detach the cable
- Unscrew the series resistor

Figure IV J



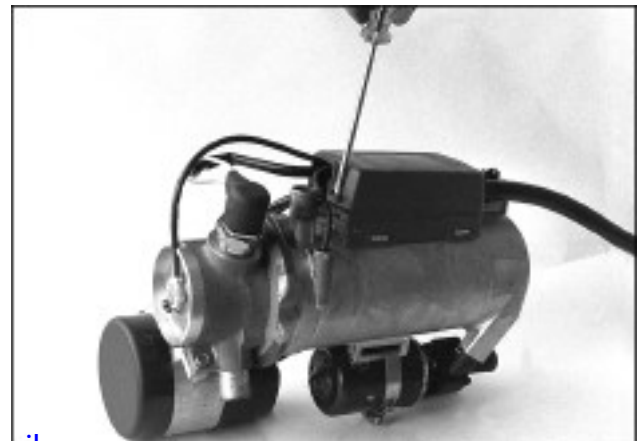
4. Cover Removal

- Unclip the cover from the holder using a screwdriver

Note when re-installing:

- The cover cap must be fitted splash-water tight, ensure that all grommets are properly positioned

Figure IV K



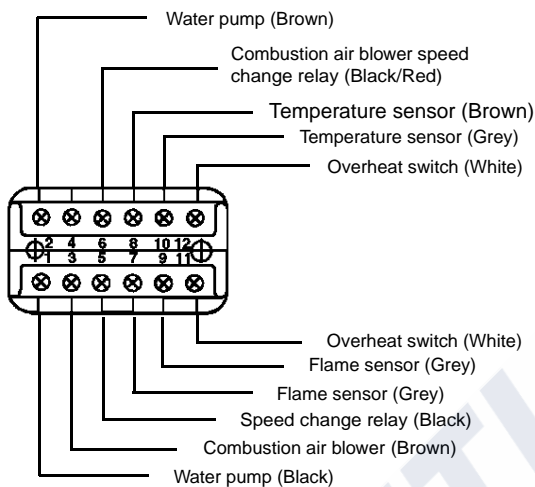
5. 12 pin Plug Removal

- Remove the cover
- Unclip the plug from the holder using a screwdriver
- Dismantle the plug

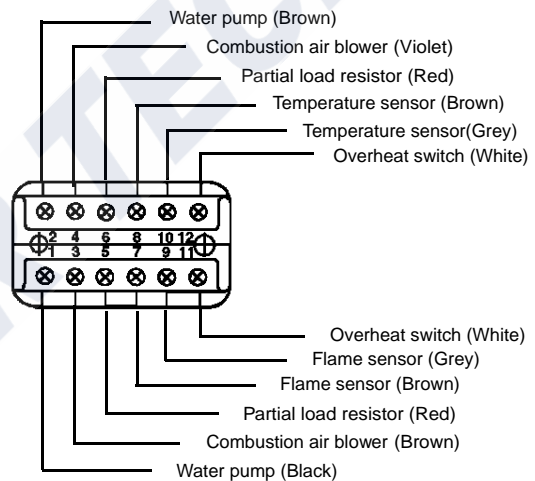


Figure IV L

Figures IV M



D7WBoxed
Model 25 1807



Model 20 1673
25 1666
25 1667

Figure IV

6. Temperature Sensor Replacement

- Before removing the sensor, reduce the excess pressure in the cooling system by opening the radiator filler cap
- To prevent the coolant from flowing out pinch the water supply and return hoses shut
- Remove the cover
- Remove the 12 pin plug
- Remove pins 8 and 10 from plug housing (see Figure IV M).
- Unscrew the temperature sensor
- After reinstallation, bleed the water circuit
See repair procedure 15.

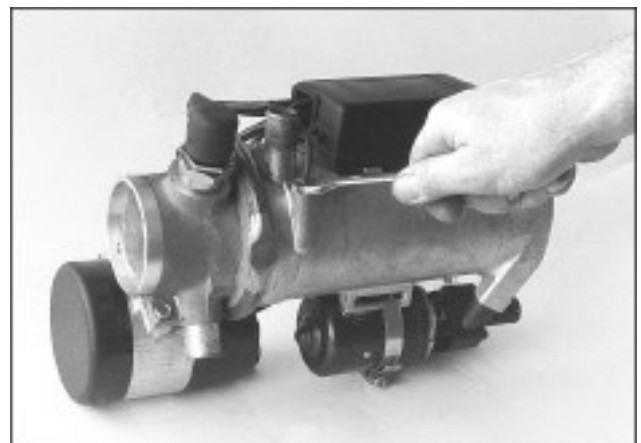
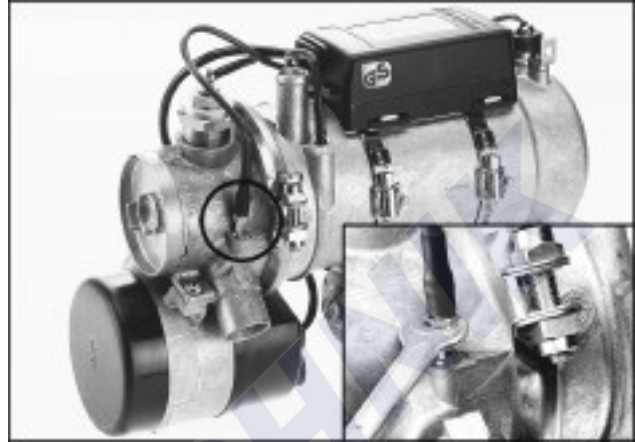


Figure IV O

**7A. Flame Sensor Replacement
Model 25 1807**

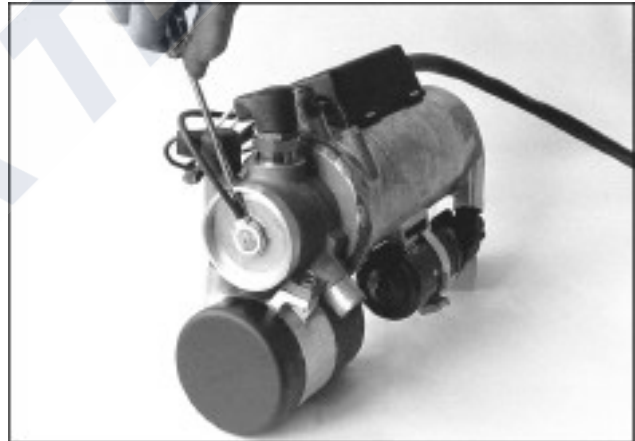
- Remove the cover
- Remove the 12 pin plug
- Remove pins 7 and 9 from plug housing
- (see Figure IV M)
- Unscrew the flame sensor from the heat exchanger exhaust port



**7B. Flame Sensor Replacement
Model 20 1673
25 1666
25 1667**

- Remove the cover
- Remove the 12 pin plug
- Remove pins 7 and 9 from plug housing (see Figure IV M).
- Unclip the retaining spring
- Remove the flame sensor from the holder

Figure IV P



**8A. Overheat Switch Removal
Model 25 1807**

- Before removing these, reduce the excess pressure in the cooling system by opening the radiator filler cap
- To prevent the coolant from flowing out pinch the water supply and return hoses shut
- Remove the cover
- Remove the 12 pin plug
- Remove pins 11 and 12 from plug housing (see Figure IV M).
- Unscrew the cross-recessed screws
- Remove the (spring-loaded) overheat switch

Figure IV Q



Continued....

Note when re-installing:

- Use new O ring and seal
- Lubricate prior to installing
- After installation, bleed the water circuit

8B. Overheat Switch Removal

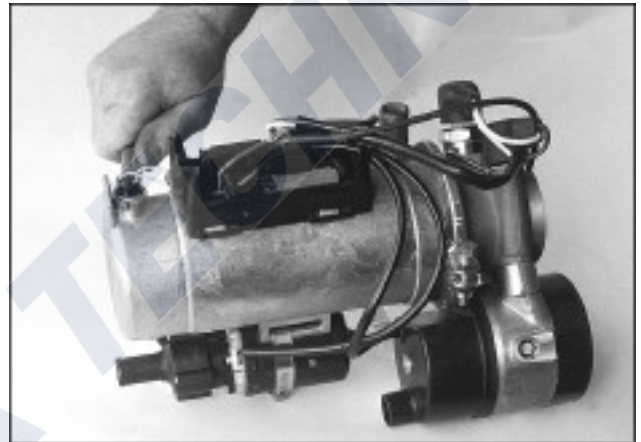
Model 20 1673

25 1666

25 1667

- Before removing, reduce the excess pressure in the cooling system by opening the radiator filler cap
- To prevent the coolant from flowing out pinch the water supply and return hoses shut.
- Remove the cover
- Remove the 12 pin plug.
- Remove pins 11 and 12 from plug housing (see Figure IV M).
- Unscrew the overheat switch

Figure IV R



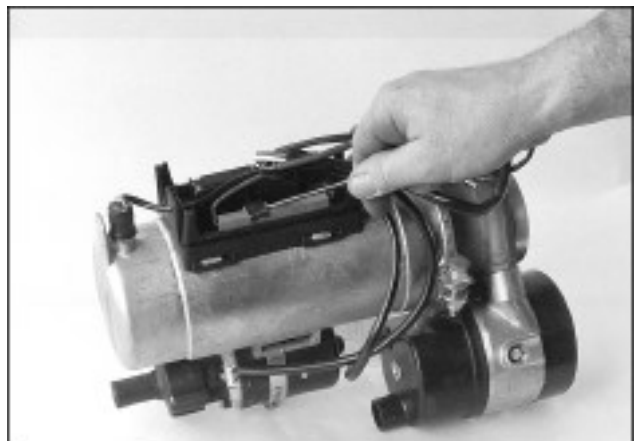
Note when re-installing:

- Use new O ring and seal
- Lubricate prior to installing
- After installation, bleed the water circuit

9. Partial-Load Resistor Removal

- Remove the cover
- Remove the 12 pin plug
- Remove pins 5 and 6 from plug housing (see Figure IV M)
- Remove the retaining clips from the partial-load resistor
- Remove the partial-load resistor

Figure IV S



10. Water Pump Replacement

- Before removing the pump, reduce the excess pressure in the cooling system by opening the radiator filler cap.
- To prevent the coolant from flowing out pinch the water supply and return hoses shut.
- Remove the cover.
- Remove the 12 pin plug.
- Remove pins 1 and 2 from plug housing (see Figure IV M).
- Undo the fastening clip of the water pump.
- Remove the water pump.

Note when re-installing:

- Use new O ring
- Lubricate prior to installing
- After installation, bleed the water circuit

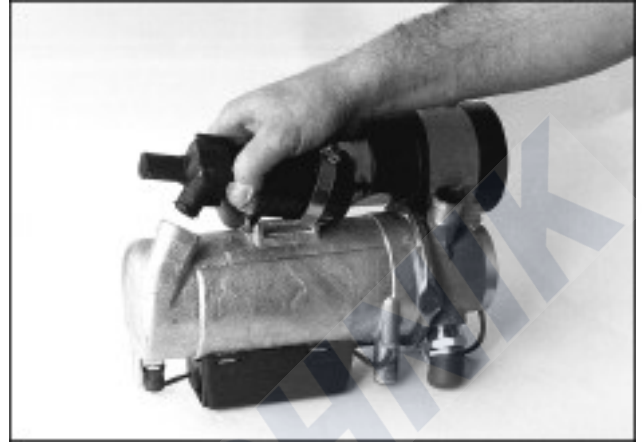


Figure IV T

11. Combustion Air Blower Removal

- Remove the cover.
- Remove the 12 pin plug.
- Remove pins 3 and 4 out of the plug housing (see Figure 4 M).
- Loosen the fastening screw and remove the combustion air blower.

Note when re-installing:

- Use new O-ring
- Lubricate before installing

Figure IV U



12. Flame Tube Removal

- Before removing the flame tube, reduce the excess pressure in the cooling system by opening the radiator filler cap
- To prevent the coolant from flowing out pinch the water supply and return hoses shut
- Remove the heater
- Remove the combustion air blower
- Remove the glow plug cable and - in the case of 24 volt heaters - also the cable from the series resistor
- Remove the flame sensor
- Undo the clamping clip and remove the burner

Note when re-installing:

- Use new O ring
- Lubricate prior to installing
- After installation, bleed the water circuit



Figure IV V



13. Heat Exchanger Removal

- Before removing the heat exchanger, reduce the excess pressure in the cooling system by opening the radiator filler cap
- To prevent the coolant from flowing out pinch the water supply and return hoses shut
- Remove the heater
- Remove the flame tube
- Lift the safety over heat switch off the heat exchanger
- Remove the temperature sensor.
- Lever the heat exchanger out of the water jacket using screwdrivers
- Remove the heat exchanger from the water jacket (Figure IV X)



Figure IV W

Note when re-installing:

- Use new O ring
- Lubricate prior to installing
- After installation, bleed the water circuit

Figure IV X



14. Cover and Bracket Removal

- Remove the cover
- Remove the 12 pin plug
- Detach the 2 pin plug
- Remove the partial-load resistor
- Remove all grommets
- Take the bracket off the jacket

Figure IV Y

Note when re-installing:

- The cover cap must be fitted so that it is splash-water tight, ensure that all grommets are properly positioned



25 1807

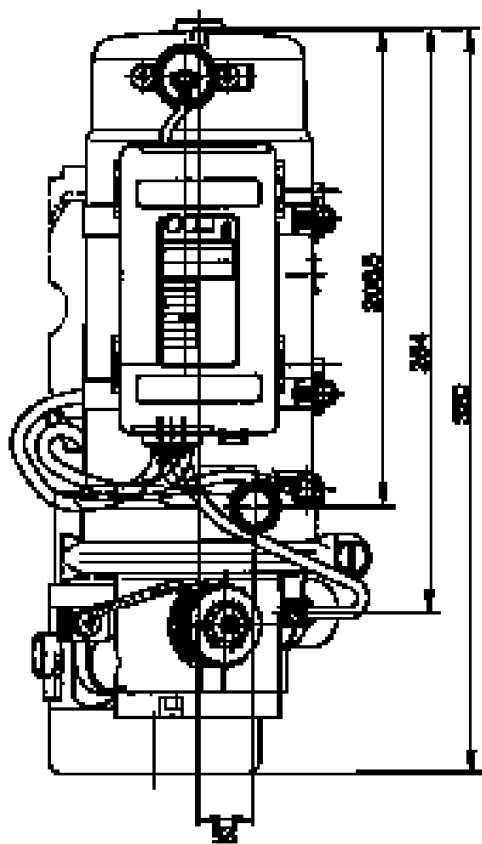
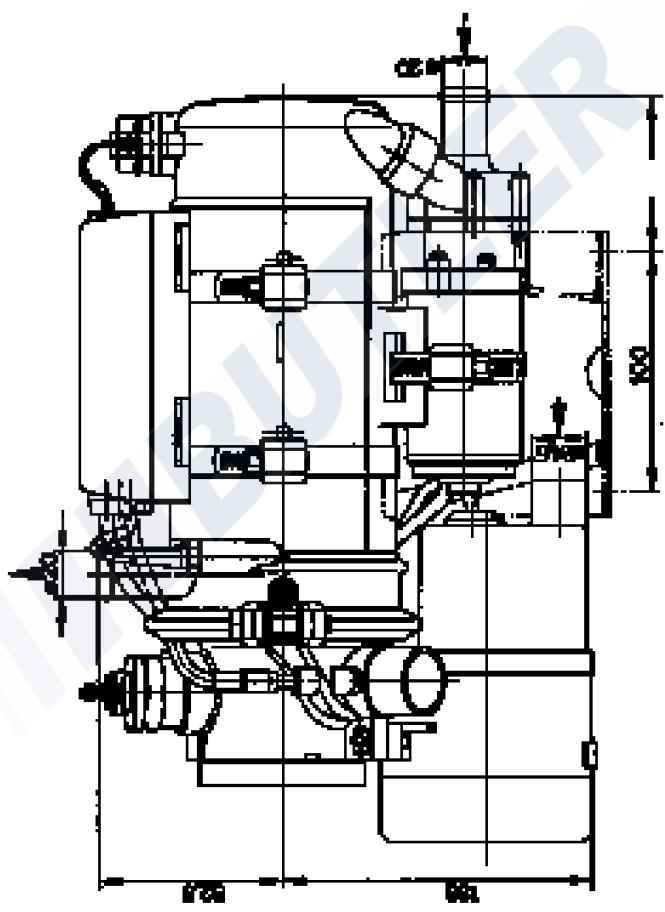
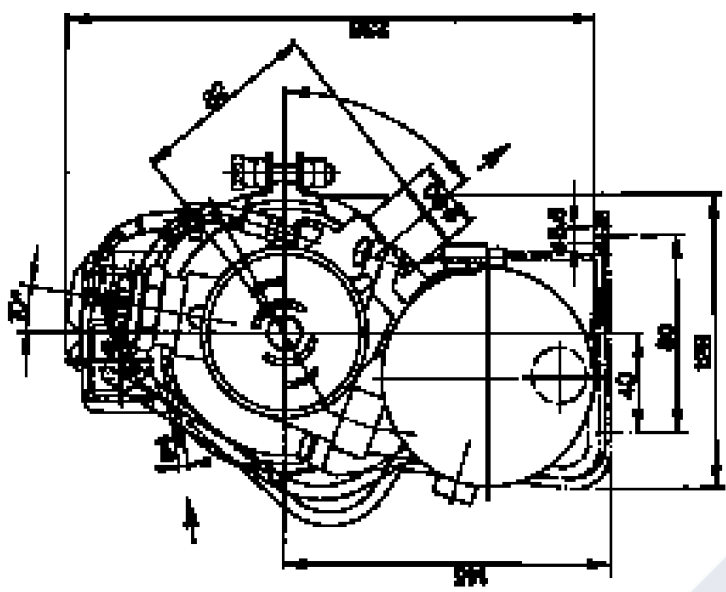
25 1666 (12V)

25 1666

25 1667 (24V)

25 1667

Freightliner



1. Principal Dimensions (Universal Model 25 1807)



2. General Specifications

D7W Universal Model 25 1666 05
25 1667 05

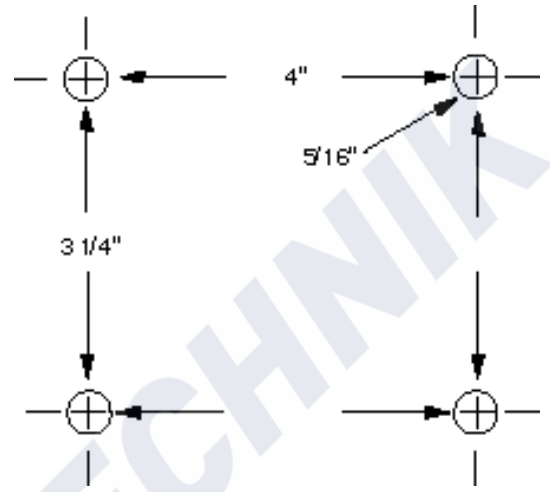
Heat Output (±10%).....	24,000 BTU (7 Kw) -High 6,000 BTU (1.75 Kw) -Low												
Current at 12v (±10%).....	26.0 amps/hr - Start (1-2 minutes) 7.5 amps/hr - Running High 4.2 amps/hr - Running Low												
Current at 24v (±10%).....	22.0 amps/hr - Start (1-2 minutes) 3.8 amps/hr - Running High 2.0 amps/hr - Running Low												
Fuel Consumption (±5%).....	<table border="0"> <tr> <td></td> <td>High</td> <td>Low</td> </tr> <tr> <td></td> <td>Heat</td> <td>Heat</td> </tr> <tr> <td>US Gal/hr</td> <td>0.24</td> <td>0.06</td> </tr> <tr> <td>Litre/hr</td> <td>0.90</td> <td>0.22</td> </tr> </table>		High	Low		Heat	Heat	US Gal/hr	0.24	0.06	Litre/hr	0.90	0.22
	High	Low											
	Heat	Heat											
US Gal/hr	0.24	0.06											
Litre/hr	0.90	0.22											
Coolant Pump Flow (±10%).....	420 US Gal/hr 1600 Litre/hr												
Coolant Temperature..... Range (±5%)	176° F to 201° F (80° C to 95° C)												
Overheat Temperature Shutdown (±10%)	275°F (135°C)												
Operating Voltage Range.....	10.5 to 14.0 vdc at 12vdc 21.0 to 28.0 vdc at 24 vdc												

Note: The heater control box is equipped with a low voltage cutout to prevent battery drain and a high voltage cutout to protect the heater's electrical parts.

3. Universal Models 25 1807, 25 1666, 25 1667, 25 1673

1. Heater Location and Mounting

- Locate heater in a protected area (eg. storage compartment, step box, engine compartment).
- Situate heater below the normal coolant level of the engine.
- Guard against excessive road spray.
- Keep coolant hoses, fuel lines and electrical wiring as short as possible.
- Do not mount heater inside the vehicle passenger area.
- Mount using saddle bracket provided (refer to template pattern shown).



2. Heater Plumbing

- Refer to D7W Boxed plumbing section (pg. 7)

3. Fuel System

- Refer to D7W Boxed fuel system section (pg. 9).

4. Electrical Connections

(Universal 25 1666/67 & Boxed 25 1666)

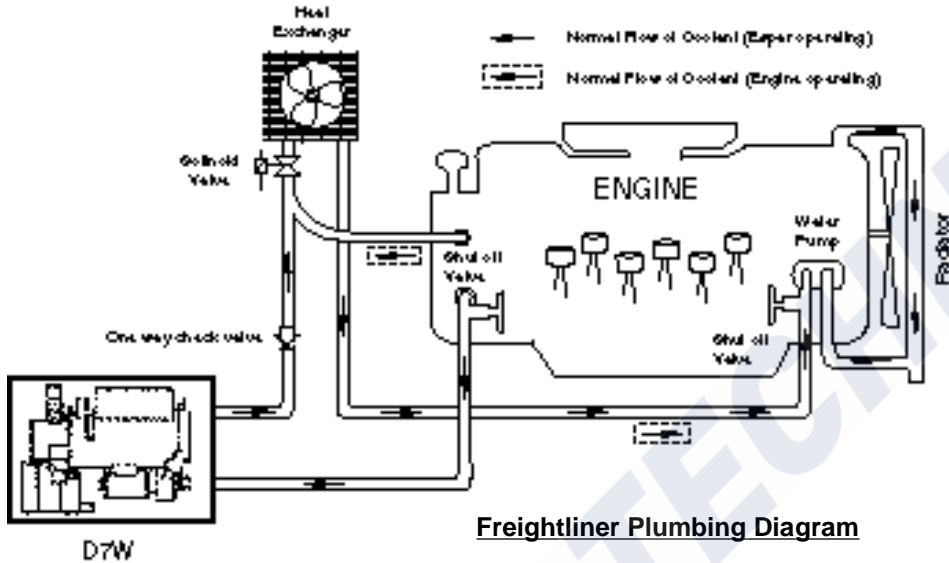
- | | |
|-----------|--|
| Power | - 2 core harness (red & brown). |
| Harness | - Red wire direct to vehicle battery (+) in line fuse. |
| | - Brown wire to battery ground. |
| Switch | - 3 core harness (red, brown & yellow) |
| Harness | Run to location of switch. |
| Fuel Pump | - 2 core harness (green & green) |
| Harness | - Run to location of fuel pump |

5. Exhaust Connections

- A 24mm flexible stainless steel exhaust pipe (50"long), exhaust clamp and holder are provided with the kit.
- Secure pipe to heater exhaust outlet and run to an open area to the side or rear of the vehicle so that fumes cannot build up and enter the cab or be sucked in by the heater combustion air blower.
- Refer to safety warnings on pg.13 of D7W Boxed version.

4. Freightliner

Plumbing



Wiring (pg.46)

Freightliner Fuel & Electrical Accessories

Part #

Internal Harness (complete)

806 103 006

Packard Connectors:

Switch

- Female, 3 hole housing CA1 91 001
- Terminal seal CA1 91 003
- Lock CA1 91 004
- Terminals CA1 90 015
- CA1 90 091

Thermostat

- Housing (female 1-hole) CA1 91 042
- Lock CA1 91 045

Power

- Male, 3 hole housing CA1 91 031
- Lock CA1 91 032
- Seal CA1 91 034
- Terminals CA1 90 062

Fuel connectors

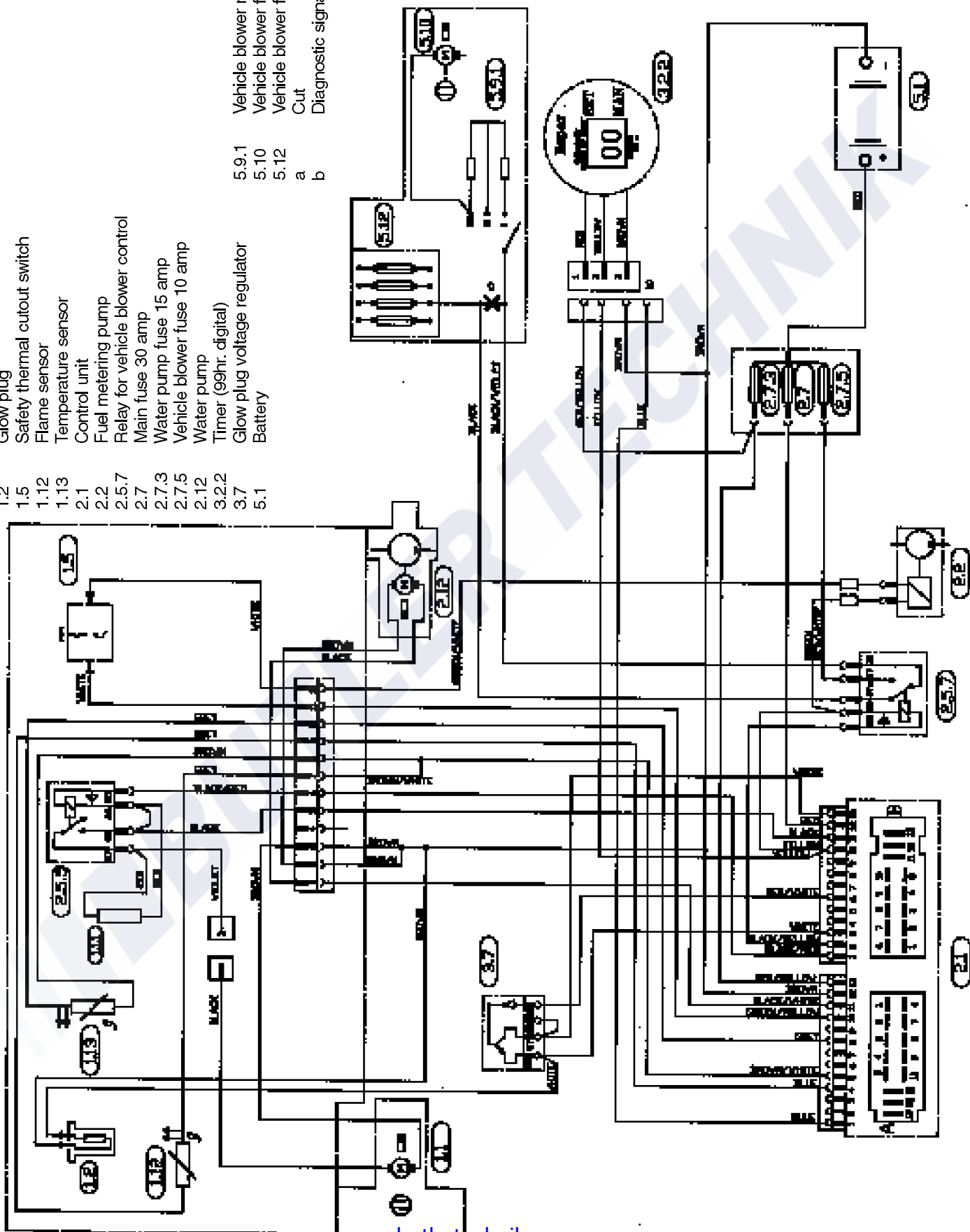
- Hose barb CA0 12 008
- Adapter CA0 12 007
- Washer CA3 00 322

90° Bulkhead CA0 11 037

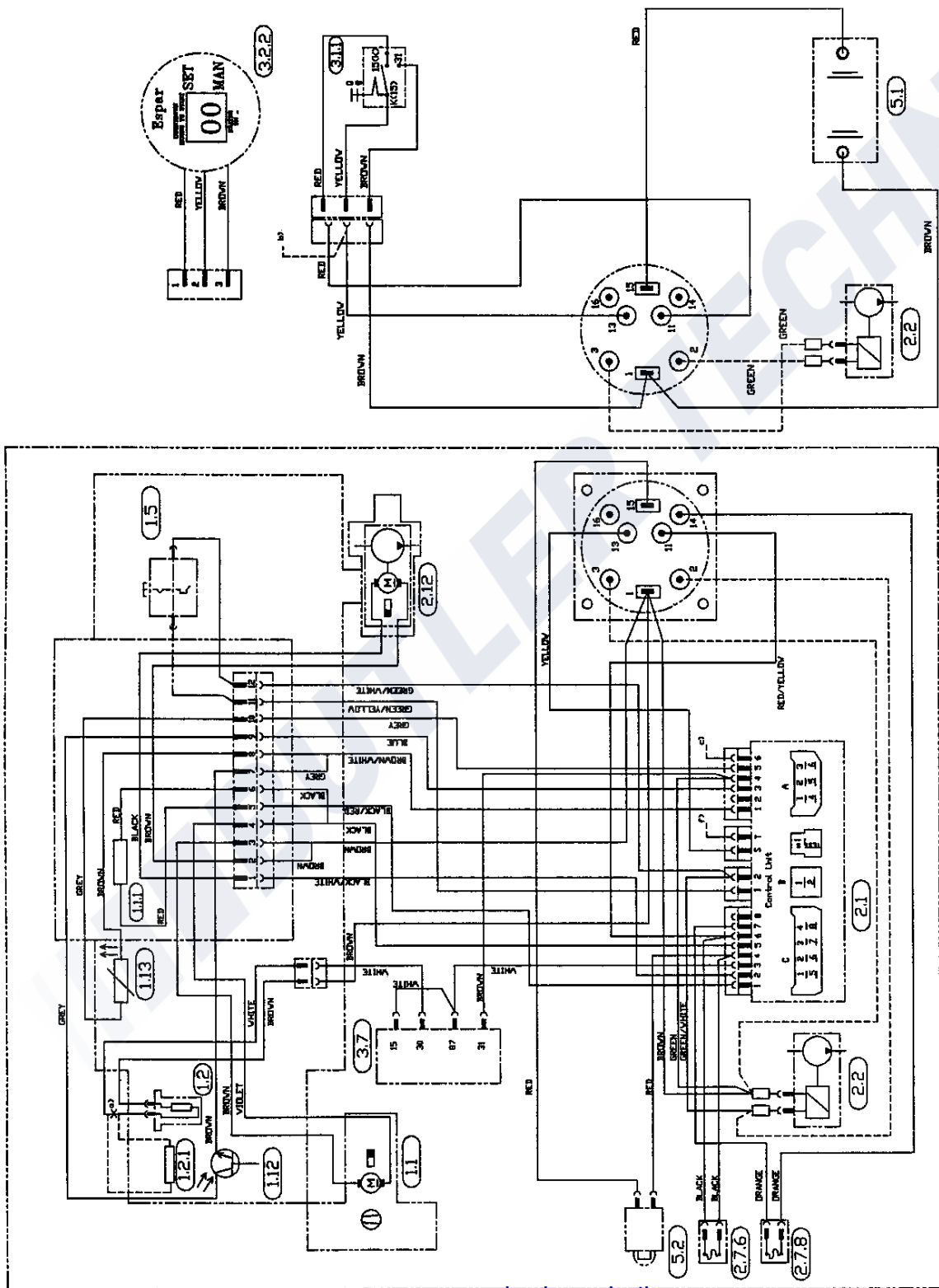
D7W Universal
Model 25 1807

- 1.1 Burner motor
- 1.1.1 Series resistor for partial load
- 1.2 Glow plug
- 1.5 Safety thermal cutout switch
- 1.12 Flame sensor
- 1.13 Temperature sensor
- 2.1 Control unit
- 2.2 Fuel metering pump
- 2.5.7 Relay for vehicle blower control
- 2.7 Main fuse 30 amp
- 2.7.3 Water pump fuse 15 amp
- 2.7.5 Vehicle blower fuse 10 amp
- 2.12 Water pump
- 3.2.2 Timer (99hr. digital)
- 3.7 Glow plug voltage regulator
- 5.1 Battery

- 5.9.1 Vehicle blower resistors
- 5.10 Vehicle blower fan
- 5.12 Vehicle blower fuses
- a Cut
- b Diagnostic signal

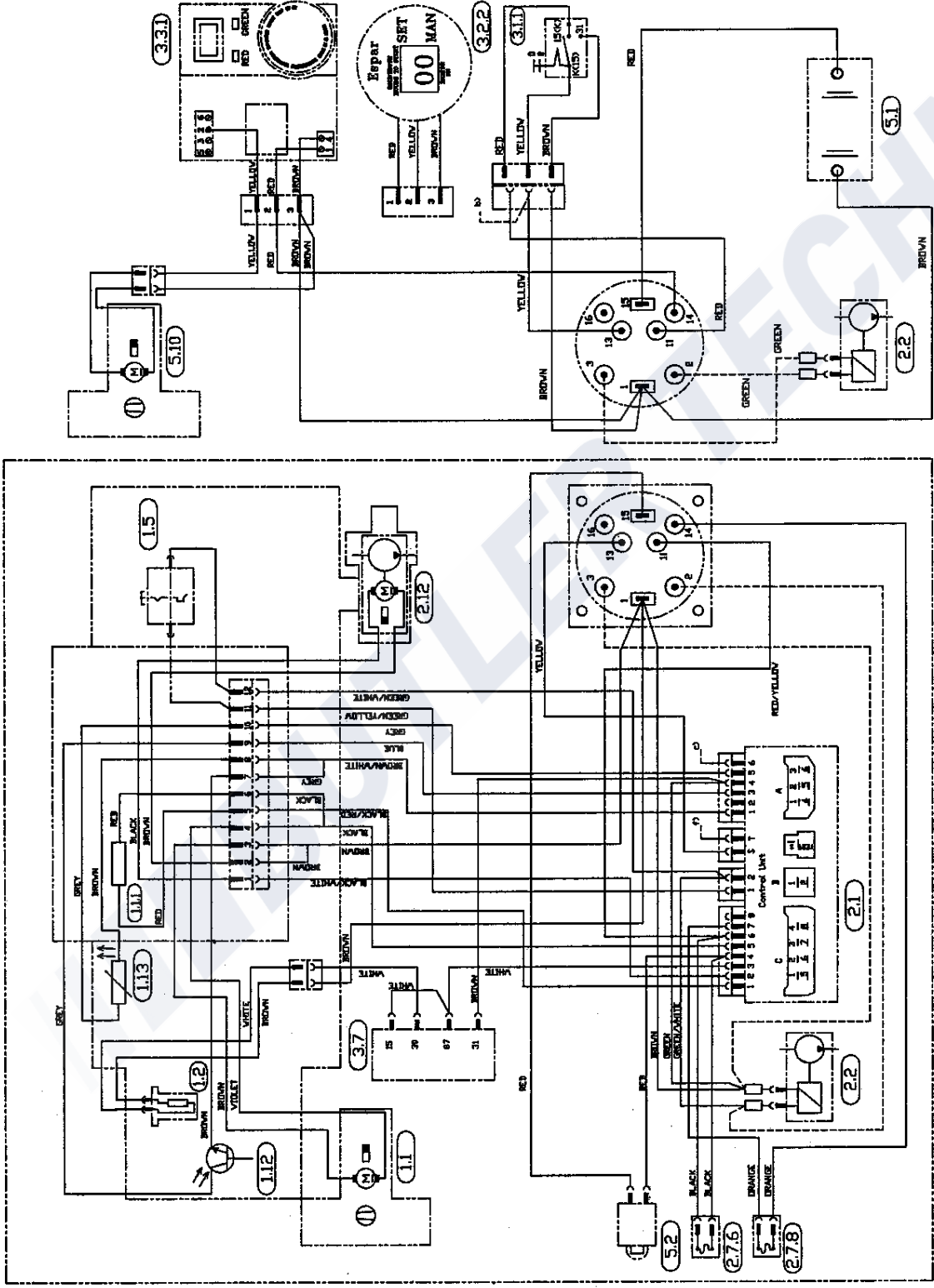


D7W Boxed
 Model 25 1666 (12V)
 25 1667 (24V)



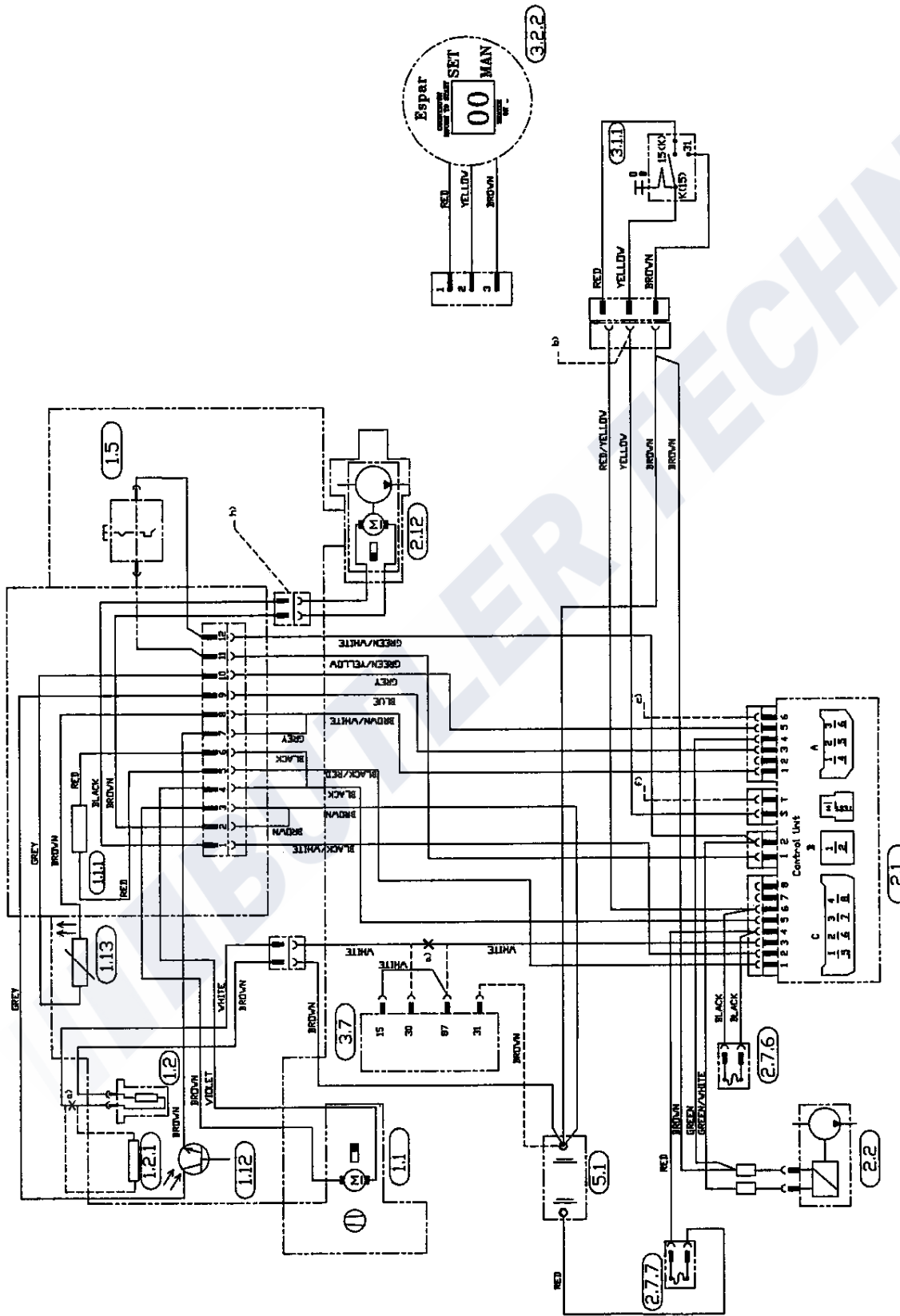
- | | | | |
|-------|----------------------------------|-------|--|
| 1.1 | Burner motor | 2.2 | Fuel metering pump (mounted inside or outside of box) |
| 1.1.1 | Series resistor for partial load | 2.7.6 | Water pump/blower fuse 20 amp |
| 1.2 | Glow plug | 2.7.8 | Heat exchanger blower fuse 3A |
| 1.2.1 | Series resistor (24V only) | 2.12 | Water pump |
| 1.5 | Safety thermal cutout switch | 3.1.1 | On /off switch |
| 1.12 | Flame sensor | 3.2.2 | Timer (99hr. digital) |
| 1.13 | Temperature sensor | 3.7 | Glow plug voltage regulator |
| 2.1 | Control unit | | |
| | | 5.1 | Battery |
| | | 5.2 | Main circuit breaker 30A |
| | | a | Cut |
| | | b | Relay connection for triggering water solenoid valve (if required) |
| | | c | External control of water pump (if required) |
| | | f | Test connection (work shop) |

D7W Boxed with Espar Heat Exchanger
Model 25 1666 (12V)



- 1.1 Burner motor
- 1.1.1 Series resistor for partial load
- 1.2 Glow plug
- 1.5 Safety thermal cutout switch
- 1.12 Flame sensor
- 1.13 Temperature sensor
- 2.1 Control unit
- 2.2 Fuel metering pump (mounted inside or outside of box)
- 2.7.6 Water pump/blower fuse 20 amp
- 2.7.8 Heat exchanger blower fuse 3A
- 2.12 Water pump
- 3.1.1 On /off switch
- 3.2.2 Timer (99hr. digital)
- 3.3.1 Room thermostat
- 3.7 Glow plug voltage regulator
- 5.1 Battery
- 5.2 Main circuit breaker 30A
- 5.10 Water pump/blower motor
- b Bunk heater blower motor
- c Relay connection for triggering water solenoid valve (if required)
- f External control of water pump (if required)
- Test connection (work shop)

D7W Universal
 Model 25 1666 (12V)
 25 1667 (24V)



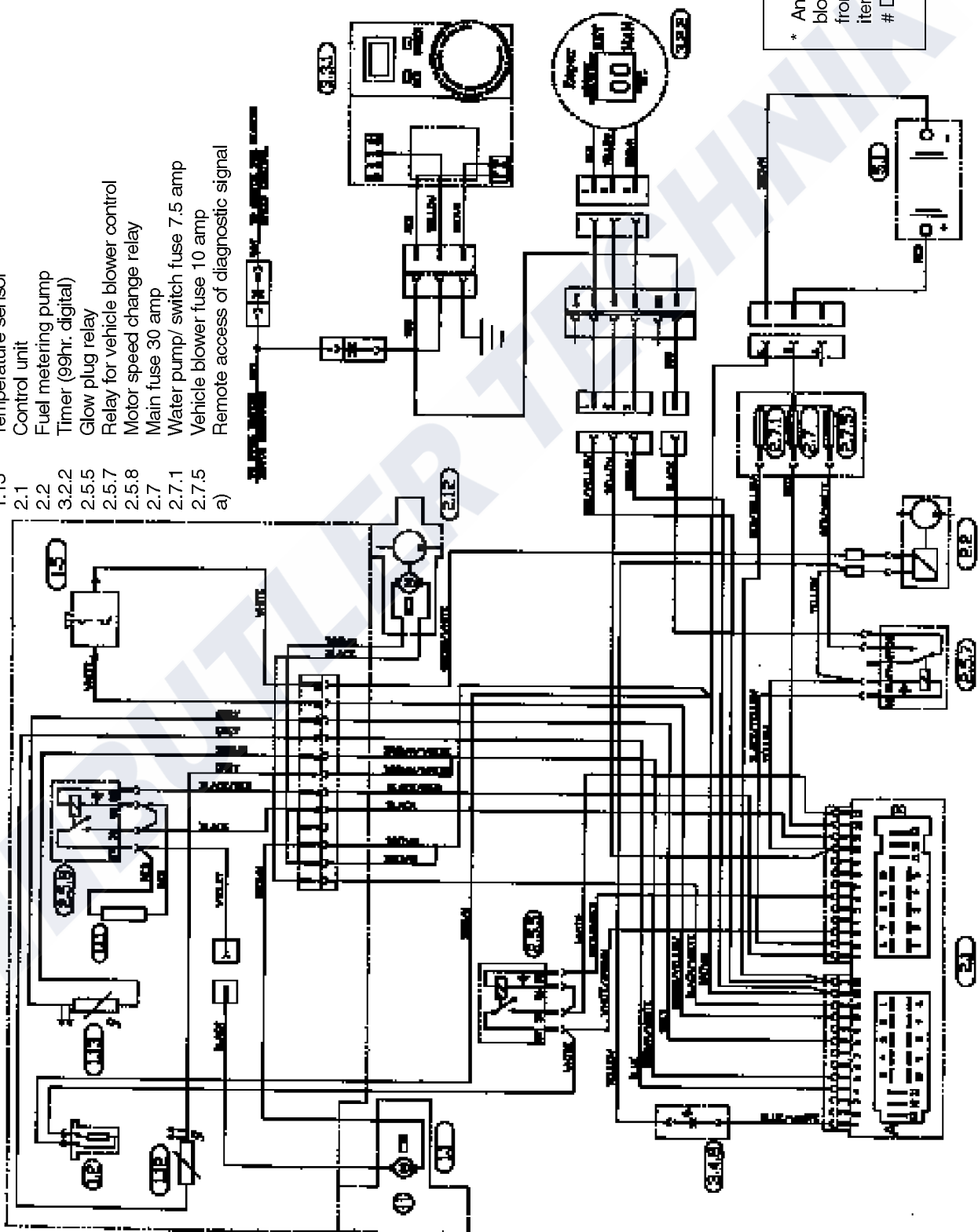
- | | | | | | |
|-------|----------------------------------|-------|-------------------------------|---|--|
| 1.1 | Burner motor | 2.2 | Fuel metering pump | a | Cut |
| 1.1.1 | Series resistor for partial load | 2.7.6 | Water pump/blower fuse 20 amp | b | Relay connection for triggering water solenoid valve (if required) |
| 1.2 | Glow plug | 2.7.7 | Main fuse 30 amp | c | External control of water pump (if required) |
| 1.2.1 | Series resistor (24V only) | 2.12 | Water pump | f | Test connection (work shop) |
| 1.5 | Safety thermal cutout switch | 3.1.1 | On / off switch | h | Only with separate water pump |
| 1.12 | Flame sensor | 3.2.2 | Timer (99hr: digital) | | |
| 1.13 | Temperature sensor | 3.7 | Glow plug voltage regulator | | |
| 2.1 | Control unit | 5.1 | Battery | | |

D7W Boxed Freightliner
Model 25 1807

- 1.1 Burner motor
- 1.1.1 Series resistor for partial load
- 1.2 Glow plug
- 1.5 Safety thermal cutout switch
- 1.12 Flame sensor
- 1.13 Temperature sensor
- 2.1 Control unit
- 2.2 Fuel metering pump
- 3.2.2 Timer (99hr. digital)
- 2.5.5 Glow plug relay
- 2.5.7 Relay for vehicle blower control
- 2.5.8 Motor speed change relay
- 2.7 Main fuse 30 amp
- 2.7.1 Water pump/ switch fuse 7.5 amp
- 2.7.5 Vehicle blower fuse 10 amp
- 2.12 Remote access of diagnostic signal

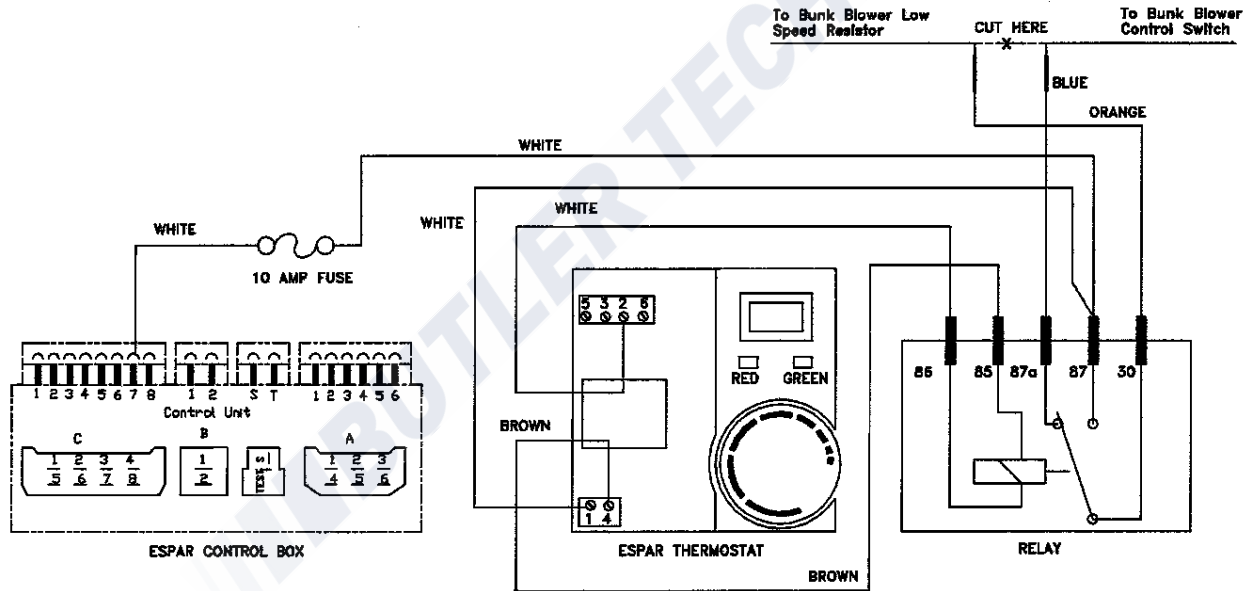
- Water pump
- Diagnostic LED
- Battery

- 2.12
- 3.4.8
- 5.1



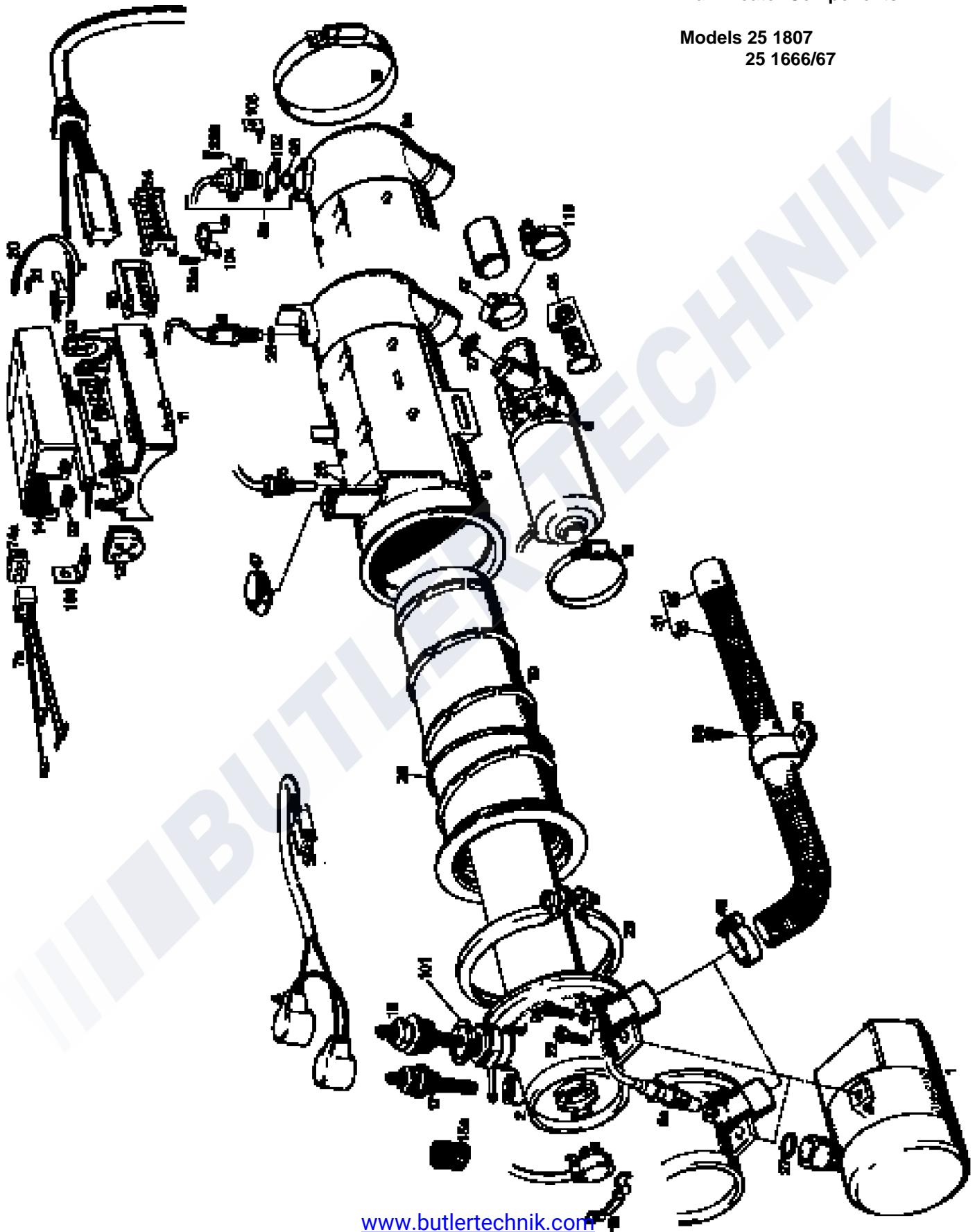
* An upgrade to medium blower speed is available from Freightliner item/ drawing # D06 24758000

Bunk Blower Wiring Adapter Model 25 1666



D7W Parts Diagram
Main Heater Components

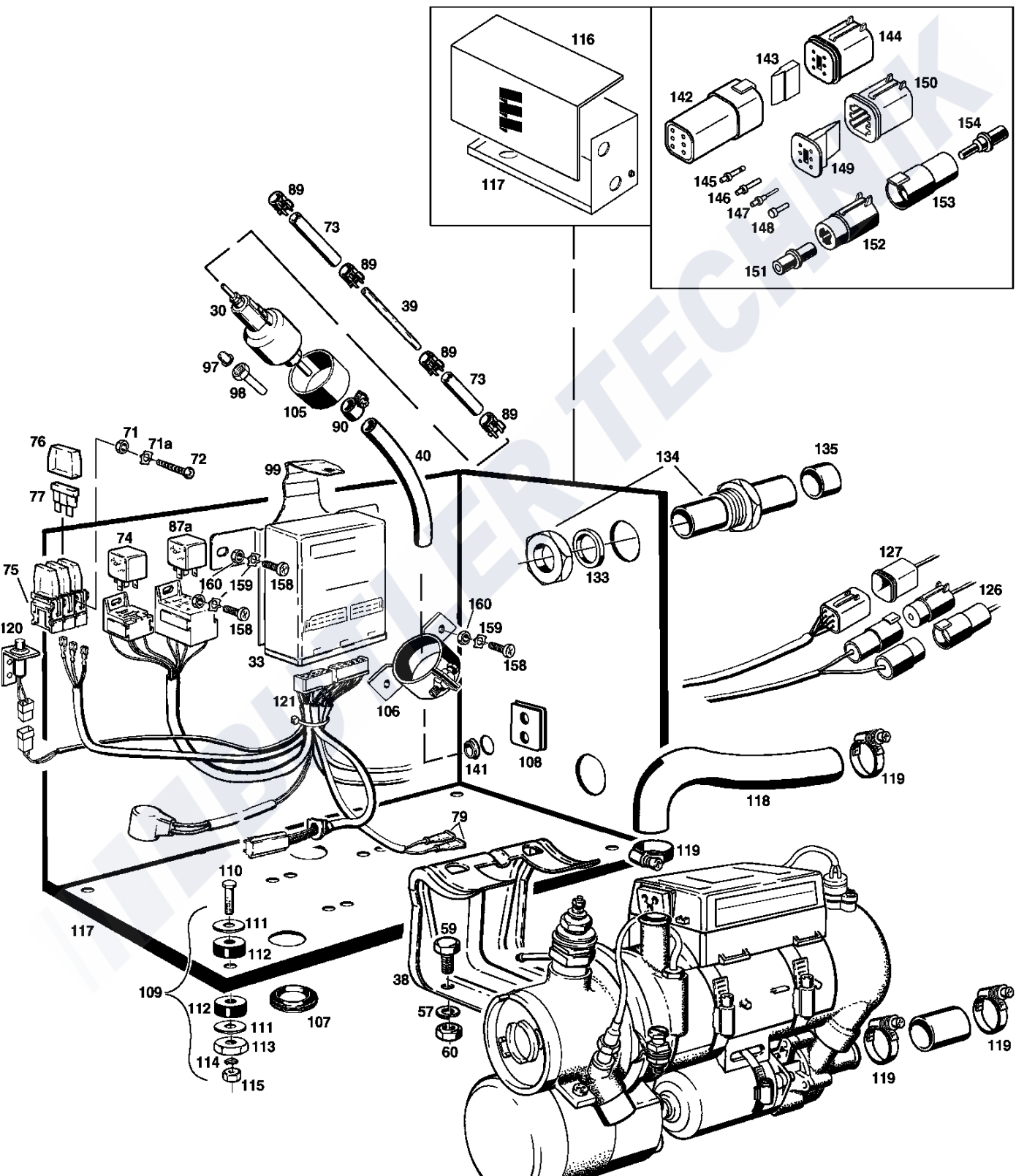
Models 25 1807
25 1666/67





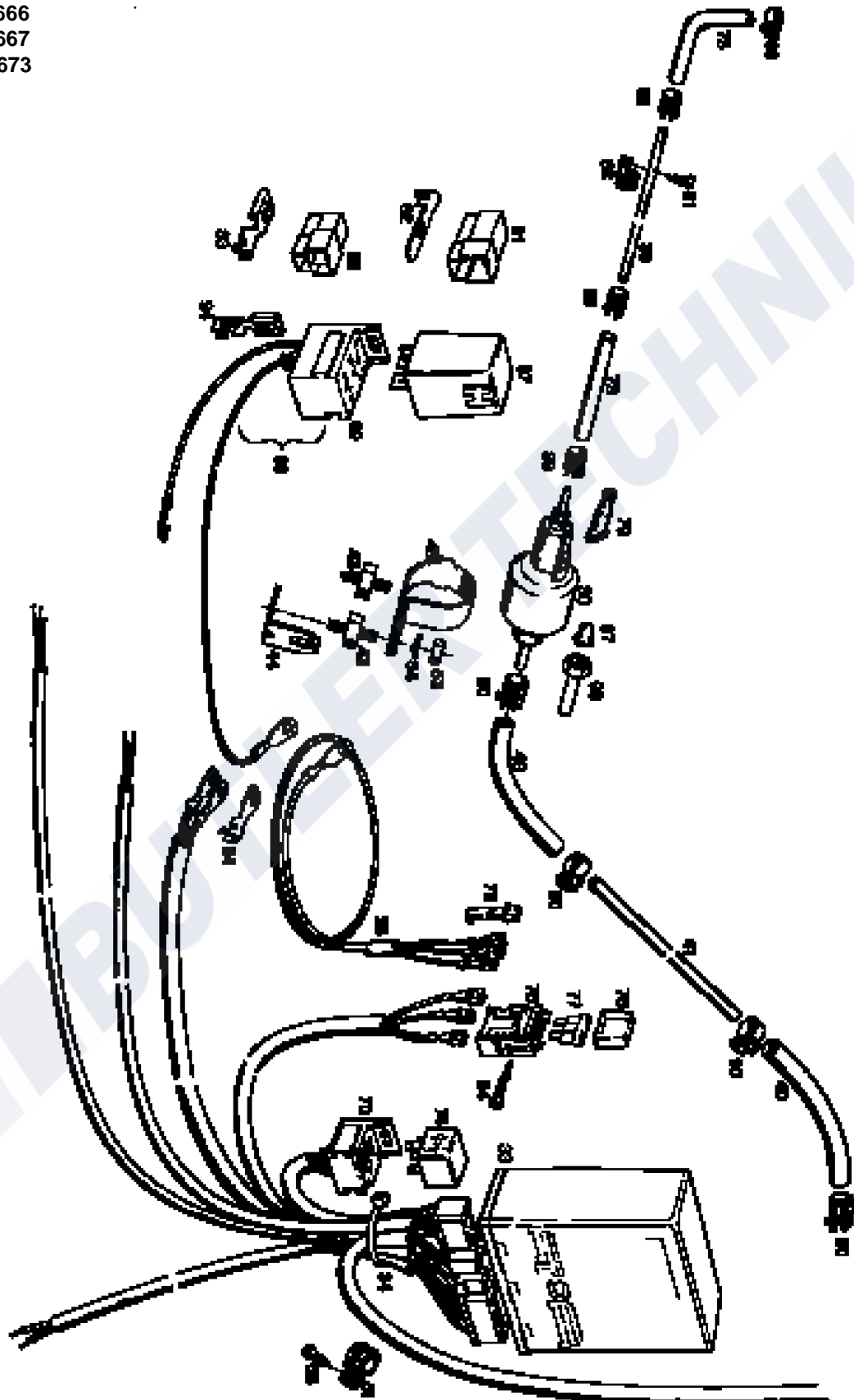
D7W Boxed Parts

Models 25 1807/25 1666



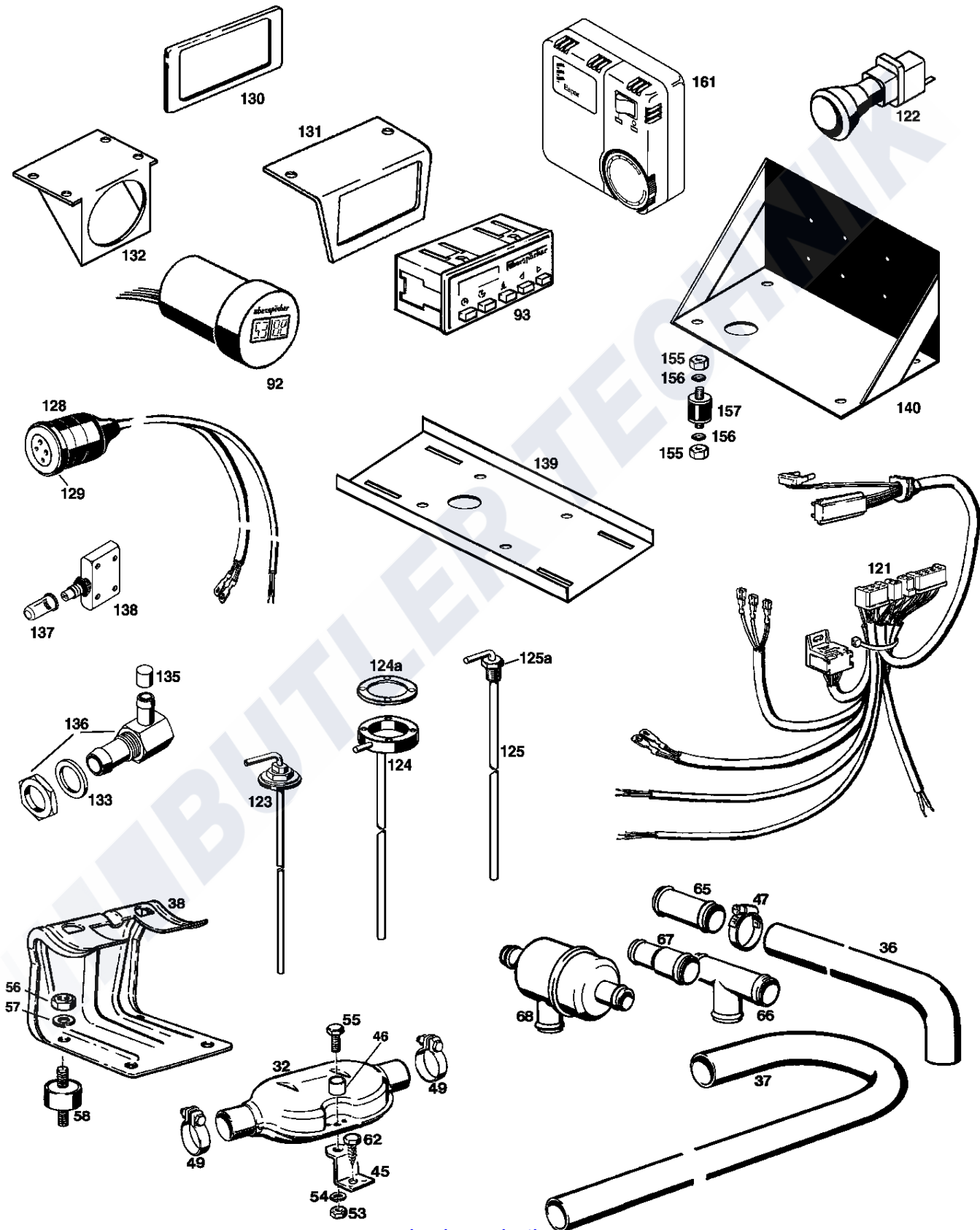
Universal Parts

- Models 25 1807
- 25 1666
- 25 1667
- 25 1673





D7W Parts & Accessories



Ref. No.	Description	Part Number	Model #	25 1807	25 1667	25 1666	20 1673
1	Combustion air blower	24 V	25 1667 99 15 00		•		
		12 V	20 1673 99 15 00			•	•
		12 V	25 1807 99 15 00	•			
2	Flame tube		25 1667 19 00 00		•		
			20 1673 19 00 00				•
			25 1666 19 00 00			•	
			25 1806 19 00 00	•			
3	Water pump	12 V	20 1673 25 01 00	•		•	•
		24 V	25 1667 25 01 00		•		
4	Glow plug harness		25 1667 01 04 00		•		
			20 1673 01 04 00			•	•
5	Temperature sensor		25 1670 01 05 00		•	•	•
			25 1806 99 01 05	•			
6 6a	Flame sensor		20 1645 01 06 00		•	•	•
			25 1769 01 02 00	•			
7	Partial-load resistor	12 V	20 1673 01 07 00			•	•
		24 V	25 1667 01 07 00		•		
7a	Cable section with partial-load resistor		25 1807 01 01 00	•			
8	Resettable overheat switch		20 1677 41 00 00		•	•	•
8a			25 1806 99 40 00	•			
9	Water jacket		20 1673 99 01 01		•	•	•
9a			25 1806 01 03 00	•			
10	Heat exchanger		20 1673 01 00 01	•	•	•	•
11	Base		25 1676 01 00 03	•	•	•	•
12	Grommet		20 1645 01 00 05	•	•	•	•
13	Grommet		20 1645 01 00 06	•	•	•	•
14	Cover		20 1645 01 00 11	•	•	•	•
15	Glow plug		25 1830 01 01 00	•	•	•	•
15a	Glow plug screen		25 1666 10 00 01	•	•	•	•
16	Retaining spring		20 1673 01 00 08		•	•	•
17	Series resistor		25 1667 01 00 01		•		
18	Clamp 90mm-110mm		10 2065 09 01 10	•	•	•	•
19	Clamp 46mm - 70mm		CA1 10 047	•	•	•	•
20	Holding strap		209 31 074	•	•	•	•
21	Snap ring		171 19 250		•	•	•
22	Self tapping screw(hardware)		109 10 022		•	•	•
22a			103 10 310		•	•	•
22b			109 00 042	•			



Ref. No.	Description	Part Number	Model #	25 1807	25 1667	25 1666	20 1673
23	Clip	151 10 051		•	•	•	•
24	Terminal holder	206 31 346		•	•	•	•
25	Terminal holder cover	206 31 347		•	•	•	•
26	O-ring 89x4	320 75 002		•	•	•	•
27	O-ring 17x2.5	320 75 001		•	•	•	•
28	O-ring 7x2	320 75 111		•	•	•	•
29	Clamp for flame tube	152 00 155		•	•	•	•
30	Fuel metering pump	12 V	20 1673 45 00 00				•
		12 V	25 1666 45 00 00	•		•	
		24 V	25 1667 45 00 00		•		
31	Exhaust pipe w/cap 30mmx1.3M	25 1816 80 08 00		•	•	•	•
32	Exhaust muffler 24mm 30mm	20 1690 80 02 00			•	•	•
		25 1806 80 01 00		•			
33	Control unit	12 V	25 1666 50 00 00			•	•
		24 V	25 1667 50 00 00		•		
		12 V	25 1732 50 00 04	•			
34	Cable harness, universal	20 1673 80 07 00			•	•	•
		25 1807 80 04 00		•			
35	Cable	20 1668 80 05 00		•	•	•	•
36	Coolant hose 90°	20 1673 80 00 01		•	•	•	•
37	Coolant hose 180°	20 1673 80 00 03		•	•	•	•
38	Heater mounting bracket	20 1673 80 00 02		•	•	•	•
39	Plastic fuel line 2mm	090 31 117		•	•	•	•
40	Fuel hose 5mm	360 75 350		•	•	•	•
41	Plastic fuel line 4mm	090 31 101		•	•	•	•
42	Rubber mount 6mm	20 1185 00 00 01		•	•	•	•
43	Rubber mount self tapping	20 1673 80 01 01		•	•	•	•
44	FMP angle bracket	20 1348 03 00 04		•	•	•	•
45	Double angle bracket 90°	20 1533 88 00 07		•	•	•	•
46	Sleeve	20 1668 80 01 01		•	•	•	•
47	Clamp 20mm-32mm	10 2065 02 00 32		•	•	•	•
48	Pipe clamp 41mm, FMP holder	152 10 040		•	•	•	•
49	Flex. exhaust clamp 26mm 30-32mm	152 61 102		•	•	•	•
		152 10 061		•			
50	Pipe clamp 28mm 34mm	152 10 051		•	•	•	
		152 10 043					•
51	Pipe clamp 12mm	152 10 058		•	•	•	•
52	Pipe clamp 10mm	152 00 147		•	•	•	•
53	Hex nut M6	CA3 00 208		•	•	•	•
54	Spring washer 6mm	CA3 00 308		•	•	•	•

Ref. No.	Description	Part Number	Model #	25 1807	25 1667	25 1666	20 1673
55	Bolt M6x16	CA3 00 126			•	•	•
56	Hex nut M8	CA3 00 209		•	•	•	•
57	Spring washer 8mm	CA3 00 309		•	•	•	•
58	Rubber mount 8mm	330 00 036		•	•	•	•
59	Hex bolt 5/16"x1/2"	CA3 00 102		•			
60	Hex nut 5/16"	CA3 00 203		•			
61	Sheet-metal screw, B3.9x19	H		•	•	•	•
62	Sheet-metal screw, B6.3x13	CA3 00 402		•	•	•	•
63	Sheet-metal screw, B4.8x19	H		•	•	•	•
64	Sheet-metal screw, B3.9x32	H		•	•	•	•
65	Connecting pipe 20mm	20 1534 88 00 01		•	•	•	•
66	T-piece, 20x20x20mm	20 1673 80 11 00			•	•	•
67	Reducing piece, 20x18mm	20 1645 89 00 06		•	•	•	•
68	Water thermostat 3x18mm	330 00 160			•	•	•
69	Current regulator block	203 31 000		•		•	
70	Relay block	203 00 085		•	•	•	•
71	Hex nut 3mm	CA3 00 215		•			
71a	Lock washer 3mm	CA3 00 315		•			
72	Bolt M3x30	CA3 00 115-001		•			
73	Fuel hose 3.5mm	360 75 300		•	•	•	•
74	Relay	12 V 24 V		•		•	•
					•		
74a	Relay	12 V		•			
75	Fuse holder, bottom	204 31 004		•	•	•	•
76	Fuse holder, cover	204 31 005		•	•	•	•
77	Fuse insert 10A	CA1 07 006		•	•	•	•
	15A	CA1 07 002		•	•	•	•
	25A	204 00 089		•	•	•	•
78	Terminal fuse holder, AWG12	206 73 058		•	•	•	•
79	Rubber boot	320 31 120		•	•	•	•
80	Socket male 3 hole	206 31 303			•	•	•
81	Socket female 3 hole	206 31 012			•	•	•
82	Flat-pin terminal AWG 14-18	CA1 90 005		•	•	•	•
83	Terminal AWG 14-18	CA1 90 003		•	•	•	•
84	Ring Terminal AWG 10-12	CA1 90 014		•	•	•	•
85	End cap 24mm	25 1482 80 00 01			•	•	•
	30mm	25 1785 80 02 00		•			
86	Flex. exhaust tube 24mm x 1.3 M	360 61 292			•	•	•
	30mm x 1.3 M	360 61 300		•			
87	Current regulator	12 V				•	•
87a	Current regulator	12 V		•			



Ref. No.	Description	Part Number	Model #	25 1807	25 1667	25 1666	20 1673
88	Cable section	20 1673 80 05 00				•	•
89	Clamp 9mm	10 2063 00 90 98		•	•	•	•
90	Clamp 11mm	10 2063 01 10 98		•	•	•	•
92	Timer, 99 hour without bracket	CA1 00 050 CA1 00 051		•	•	•	•
93	Timer, 7 day	12 V 22 1000 30 12 00 24 V 22 1000 30 13 00		•	•	•	•
94	Wide terminal	CA1 90 013				•	•
95	Coolant pump seal kit	20 1673 25 04 00		•	•	•	•
96	Screw M6x20	H		•	•	•	•
97	Integrated fuel filter	20 1312 00 00 06		•	•	•	•
98	Fuel hose nipple	20 1621 45 00 02		•	•	•	•
99	Holder, control unit	25 1714 80 05 01		•			
100	Holder	25 1806 01 00 02		•			
101	Seal ring, glow plug	25 1830 01 01 01		•	•	•	•
102	Seal, overheat switch	25 1806 01 00 03		•			
103	Bracket, overheat switch	25 1806 01 00 02		•			
104	Bracket, overheat switch	20 1673 01 00 10			•	•	•
105	Rubber ring for fuel metering pump	20 1449 00 10 01		•		•	
106	Fuel metering pump holder	25 1156 20 00 11		•		•	
107	Exhaust seal	25 1216 88 03 01		•		•	
108	Cable grommet, square	CA0 00 042		•			
109	Heavy duty shock mount kit, 8mm	CA0 00 062		•		•	
110	Bolt M8x50	CA3 00 128		•		•	
111	Washer fender 5/16" x1.25" OD	CA3 00 305		•		•	
112	Shock mount 8mm 2 piece	CA3 00 128		•		•	
113	Threaded washer M8	CA3 00 333		•		•	
114	Spring washer 8mm	CA3 00 302		•		•	
115	Hex nut 8mm	CA3 00 209		•		•	
116	Box, cover	CA0 10 031		•		•	
117	Box, base	CA0 10 067		•		•	
118	Molded hose	CA0 11 023		•		•	
119	Spring loaded clamp	CA1 10 046		•		•	
120	LED, panel mount kit	CA1 00 096		•			
121	Internal control harness complete (short harness)	CA1 60 713 CA1 60 708		•		•	
122	Push pull switch	12V CA1 00 003		•		•	
123	Fuel pick-up 4mm	CA0 12 058		•	•	•	•
124	Custom ring type fuel pick up pipe	CA0 12 012		•	•	•	•
124a	Gasket	CA0 10 040		•	•	•	•

Ref. No.	Description	Part Number	Model #	25 1807	25 1667	25 1666	25 1673
125	Custom straight pick up pipe 16" length	CA0 00 030		•	•	•	•
	24" length	CA0 12 053		•	•	•	•
125a	Compression fittings 1/4" NPT	CA0 12 044		•	•	•	•
	3/8" NPT	CA0 00 031		•	•	•	•
	1/2" NPT	CA0 12 005		•	•	•	•
126	Power cable	CA1 65 713		•			
127	Switch cable	CA1 70 713		•			
128	Power and switch cable complete	CA1 60 702			•	•	
129	Replacement coupling ring for power switch cable	CA1 91 014-001				•	
130	Bezel (7 Day timer)	25 1482 70 01 00		•	•	•	•
131	Mounting bracket (7 Day timer)	CA0 10 061		•	•	•	•
132	Mounting bracket (99 hr timer)	CA0 00 032		•	•	•	•
133	Washer - bulkhead	CA 00 311		•		•	
134	Bulkhead hose connector	CA0 11 011		•		•	
135	End cap	CA0 11 016		•		•	
136	90° Bulkhead hose connector	CA0 11 037		•		•	
137	Cap for circuit breaker	CA1 04 106				•	
138	Circuit breaker 30 AMP with cap	CA1 07 101				•	
139	Cross frame mounting tray	CA0 10 022		•		•	
140	Side frame mounting tray	CA0 10 057		•		•	
141	Grommet for fuel line	20 1280 09 01 03				•	
142	Switch connector female	CA1 91 071		•			
143	Lock for CA1 91 071	CA1 91 073		•			
144	Switch connector male	CA1 91 072		•			
145	Socket AWG 18 for CA1 91 072	CA1 90 258		•			
146	Socket AWG 14 for CA1 91 072	CA1 90 259		•			
147	Pin AWG 18 for CA1 91 071	CA1 90 257		•			
148	Seal plug for CA1 91 072 or CA1 91 071	CA1 91 063		•			
149	Lock for CA1 91 072	CA1 91 074		•			
150	Switch connector male	CA1 91 072		•			
151	Power socket AWG10 for CA1 91 062	CA1 90 262		•			
152	Power connector male	CA1 91 062		•			
153	Power connector female	CA1 91 061		•			
154	Power pin AWG10 for CA1 91 061	CA1 90 261		•			
155	Hex nut 5/16"	CA3 00 203				•	
156	Spring washer 8mm	CA3 00 309		•	•	•	•
157	Shock mount 5/16" - 1 piece	CA0 00 040				•	
158	Hex bolt M6x12	CA3 00 103		•			
159	Hex nut M6	CA3 00 208		•			
160	Washer 6mm	CA3 00 308		•			
161	Thermostat	301 00 135		•	•	•	•

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