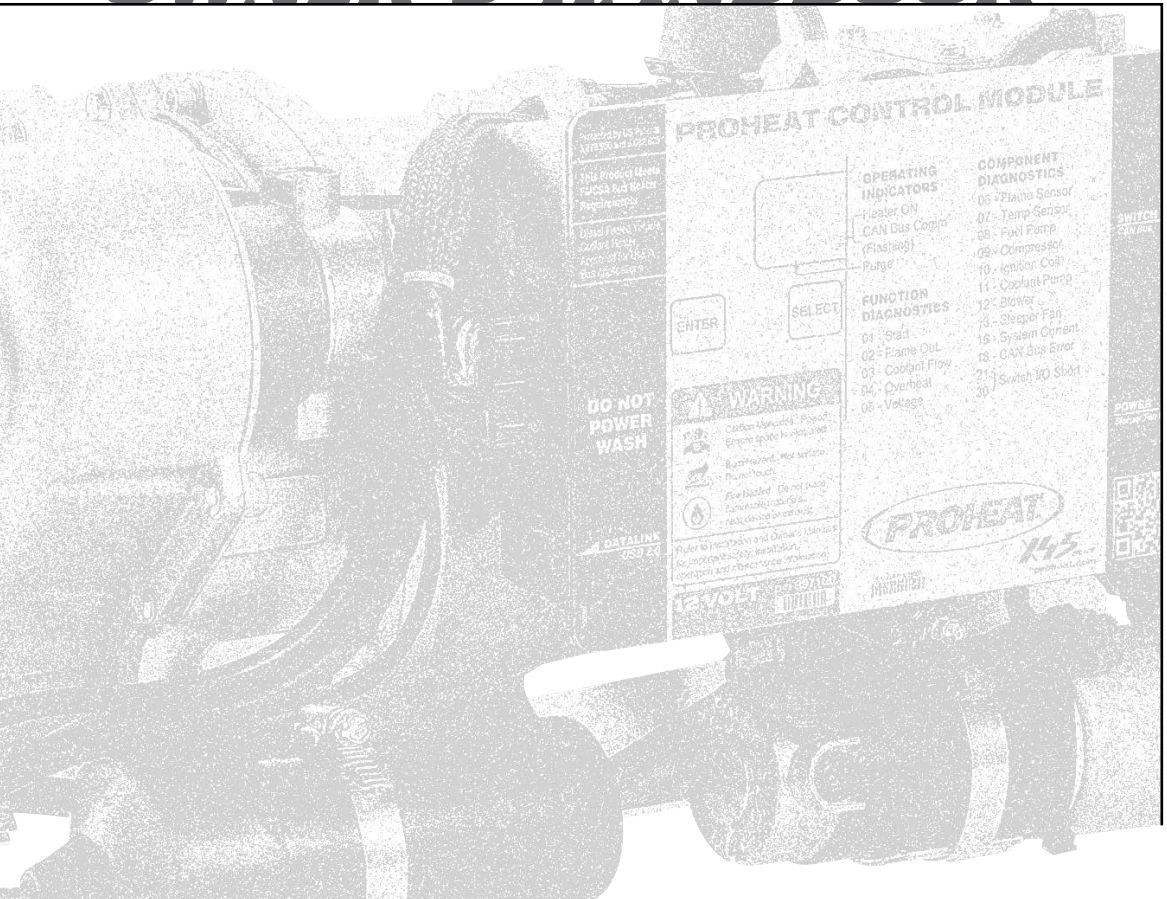
OWNER'S HANDBOOK



X45 PLUS

PROHEAT®

Contents

Introduction

Congratulations on your purchase of a PROHEAT X45 Plus diesel-fired heater. This handbook is provided to summarize the operation and maintenance of the PROHEAT X45 Plus for the Owner/Operator.

NOTE

For complete information, please refer to the Installation and Service manual 925860 at www.proheat.com

Although trucks have been used throughout this book, applications for PROHEAT are by no means limited to trucks. PROHEAT heaters are designed to be used on any diesel equipped vehicle including: trucks, buses (school, transit and coach), construction equipment, off road equipment, military equipment and cargo.

PROHEAT heaters are used in the following applications:

ENGINE BLOCK HEAT

- Preheats an engine block to ensure reliable cold weather starting. It is recommended that PROHEAT is used year round (winter and summer) to reduce engine wear associated with cold starting.

ENGINE & SLEEPER HEAT

- With the engine off—supplies heat to the engine and sleeper for comfort and reduced idle time resulting in cost savings through reduced fuel consumption and engine wear.

SUPPLEMENTAL HEAT

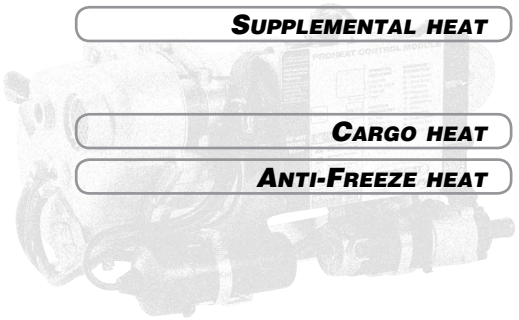
- With the engine running—adds heat to the coolant system when the engine does not provide adequate reject heat for the vehicles interior. PROHEAT can be operated when the engine is running.

CARGO HEAT

- Provides heat to protect valuable cargo from cold weather damage.

ANTI-FREEZE HEAT

- With the engine off - supplies minimal heat to prevent freezing over long periods of time.



Operating your PROHEAT

Your PROHEAT X45 Plus is controlled by either an ON/OFF manual toggle switch or by the optional PROHEAT 7-day timer. The timer can be controlled manually, or it can be set to start at a predetermined time. Both devices have a light that indicates when the heater is operational as well as flashing corresponding diagnostic codes indicated by the PCM. Your installer may have enabled optional features and heating modes. Please see the X45 Plus Installation and Service manual 928560 or your Dealer for more information.

Standard Mode Operating sequence

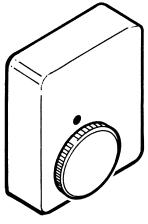
1. **SWITCH ON** – The ON/OFF switch (or Timer) lamp and the PCM "ON" LED will light. In addition, the Hour Meter (Auxiliary Output) will be powered. If the coolant temperature is below 150°F (65°C) the PROHEAT enters Pre-check. If the coolant temperature is above 150°F (65°C) the PROHEAT enters Standby.
2. **PRECHECK** – The PCM performs a short diagnostic cycle. This takes a few seconds to check components for proper ranges, checking for the presence of a flame, short-circuits and open circuits. If there are no errors indicated, the PROHEAT goes to "Ignition".
3. **IGNITION** – The blower starts first, followed by the coolant pump, ignition spark, air compressor and fuel pump. The ignition electrode sparks for up to 60 seconds. Once the flame sensor detects a good flame, the PROHEAT goes to "Full Output". The Sleeper Fan (if equipped) output then turns on.
4. **FULL OUTPUT** – The PROHEAT runs at Full Output until the coolant temperature reaches 185°F (85°C) at the heater outlet. The PROHEAT shuts the flame off and goes to "Cool down" (Purge).
5. **COOL DOWN (Purge)** – The air compressor and fuel pump shut off immediately. The blower and coolant pump continue to run. After 3 minutes, the blower stops and the PROHEAT goes to "Standby."
6. **STANDBY** – The coolant pump circulates the coolant through the system until the temperature drops to 150˚F (65˚C) at the heater outlet; then it will enter Precheck and repeat steps 2 to 6. The PROHEAT will continue to repeat steps 2 to 5 until it is switched "off."
7. **SWITCH OFF** – If PROHEAT is in Full Output, it will Cool Down (Purge) first, then shut "OFF". If PROHEAT is in Standby, it will shut "OFF" immediately.
   When switched OFF, the Sleeper Fan (if equipped) output turns off.
   When switched OFF, the Hour Meter (Auxiliary Output) will shut off.

Optional Sleeper Fan Operation

Today's sleepers are designed for maximum comfort for the vehicle operator. Generally the units are larger and have accessories that compete for battery power with auxiliary heaters. PROHEAT is a cost-saving component by reducing fuel consumption and engine maintenance. Therefore, it should be given priority over these accessories.

NOTE

For more information on Sleeper Fan installation, please refer to the Installation and Service manual 925830 at www.proheat.com



PROHEAT installation recommendations are designed to allow the operator to:

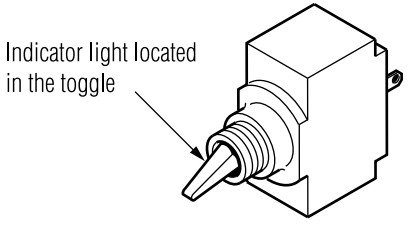
- Run the PROHEAT with the vehicle ignition key in the OFF position
- Set the desired sleeper ambient temperature using the dedicated Proheat thermostat

The vehicle operator's responsibility is to ensure that:

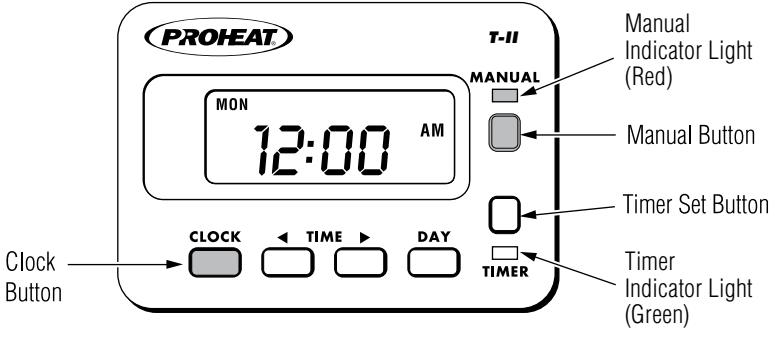
- Coolant valves used in the heating system are open: These can be manually or electrically operated (electrically operated valves must be opened before shutting the vehicle OFF)
- When operating the PROHEAT, power consuming accessories such as refrigerators, DVD's, TV's, satellites, heated mirrors, etc. are not used to ensure enough starting amperage for the engine
- Sleeper curtains are closed: The PROHEAT is designed to heat the sleeper and engine as efficiently as possible – heating the cab, fuel tanks and batteries means longer run time which will require more battery power

Toggle Switch – Timer

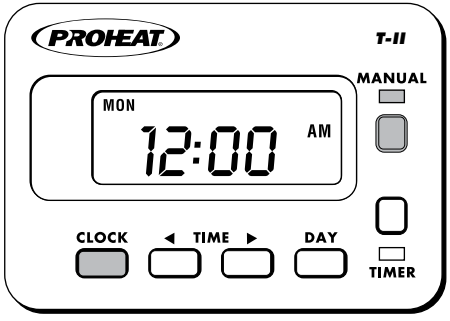
Toggle Switch



Timer



Timer Instructions



Setting clock

STEP 1 Press and hold "CLOCK"

STEP 2 Press "◄" or "►" to set time

STEP 3 Press "DAY" to advance the day.

STEP 4 Release "CLOCK".

Note

For complete Timer information, please refer to the T-II Timer Installation and Operating Instructions 958829 at www.proheat.com

Manual operation

MANUAL button is used to turn the PROHEAT On and Off when desired.

STEP 1 Press "MANUAL" to turn on the PROHEAT (red light will go on and the heater will operate indefinitely).

STEP 2 Press "MANUAL" again to turn Off the heater (red light and the PROHEAT will turn Off).

Timed Operation

STEP 1 Press and Hold "TIMER" (green light will turn on and "T1" will flash).

STEP 2 Press "◄" or "►" to set time

STEP 3 Press "DAY" to advance the day.

STEP 4 Release "TIMER". (green light and "T1" will remain lit to activate timer).

Caring for your PROHEAT

Your PROHEAT has been designed to operate with a minimum of maintenance. Always return to your authorized PROHEAT dealer for major service. Your PROHEAT dealer has the specialized equipment necessary to keep your PROHEAT running safely and reliably.

NOTE

For more maintenance information, refer to the Installation and Service manual 925860 at www.proheat.com

Operate the PROHEAT year round (winter & summer). Use the PROHEAT to preheat the engine before starting. Savings will result from reduced engine idle time and maintenance. This also keeps the PROHEAT components and fuel system in good running order.

PROHEAT annual maintenance:

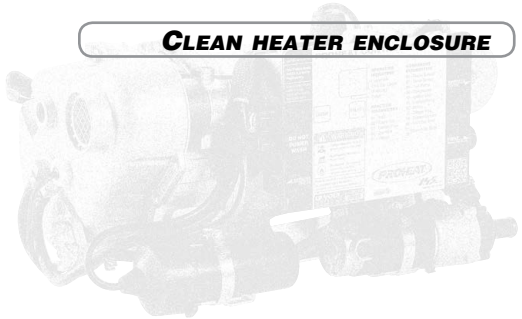
NOTE

A higher duty cycle may require a more frequent maintenance schedule.

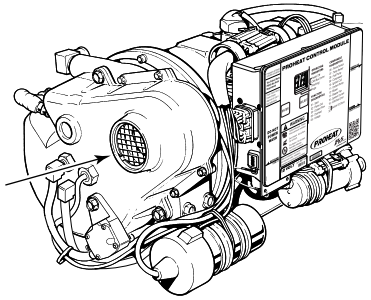
Proper maintenance will result in the following benefits:

- Maximum heat transfer to the coolant
- Minimum battery power draw
- Long term cost savings
- Increased reliability

CLEAN HEATER ENCLOSURE



- Remove the heater enclosure cover.
- Clean any accumulated debris or dust from the components.
- Blow out the compartment with compressed air.
- **Do not pressure wash.**
- Make sure the opening around the exhaust pipe is clear.
- Visually inspect all the components for wear or damage.



Check Combustion Air Inlet for restrictions. Clean as required.

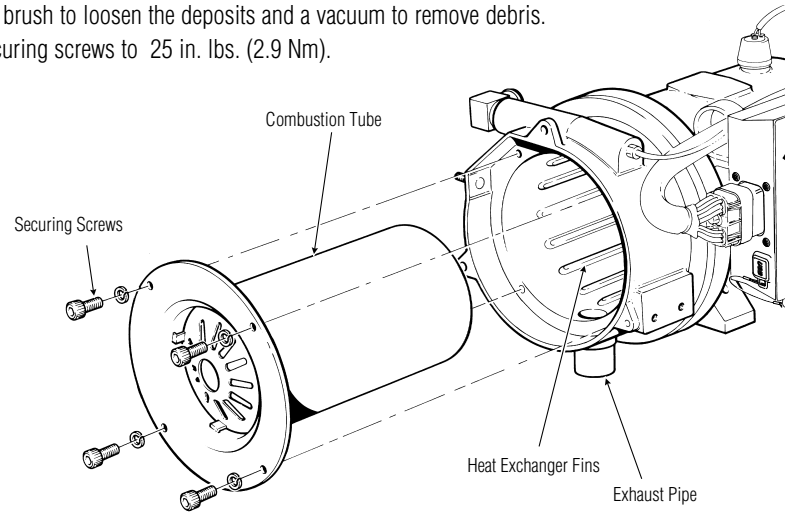
Caring for your PROHEAT

Check Exhaust System

- Make sure the exhaust pipe is fully installed and vents outside if the engine compartment.
- Check the pipe for dents, restrictions or severely corroded areas.
- Ensure exhaust pipe clamps are tight.
- Replace the exhaust pipe and clamps if necessary.

Check Heat Exchanger

- To maintain optimum heat output, clean any combustion deposits that may have accumulated on the heat exchanger fins.
- Remove the fan end assembly and combustion tube to access the inside of the heat exchanger.
- Ensure exhaust pipe is clean and free from restriction.
- Use a wire brush to loosen the deposits and a vacuum to remove debris.
- Torque securing screws to 25 in. lbs. (2.9 Nm).



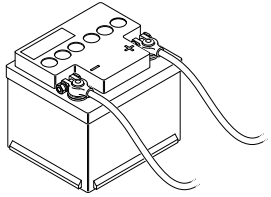
Caring for your PROHEAT

Check Cooling System

- Check coolant pump, all coolant hoses and connections for signs of leakage or damage.
- Repair or replace as required.

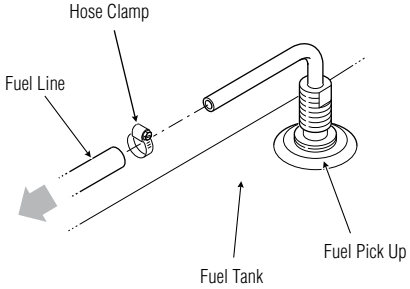
Check Batteries

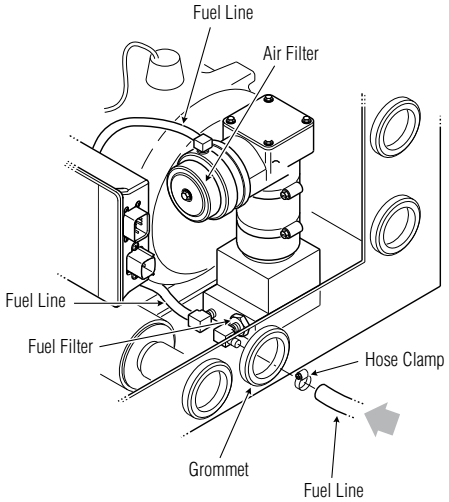
- Check the condition of batteries and the power connections. The heater will not function properly with weak batteries or corroded connections.
- **Note** For best results load test each battery individually.



Check Fuel System

- Check Fuel Pick-Up tube and line to the heater for damage, cracks from aging or leakage.
- Check Internal Fuel and Air hoses for damage and cracks from aging or leakage.
- Check Fuel Regulator for damage or leakage.
- Ensure all Fuel and Air line clamps are secure.

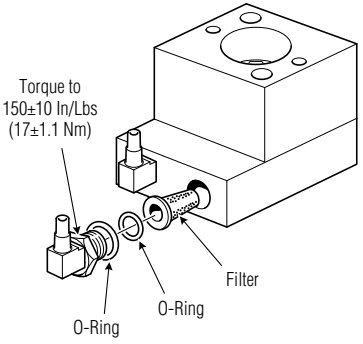




Caring for your PROHEAT

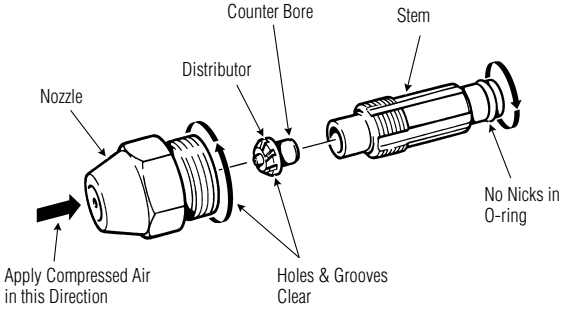
Check Fuel Filter

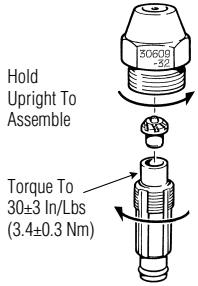
- Remove and inspect filter. Replace as necessary.



Clean Nozzle

- Remove and install Nozzle as per Service manual 925860. Torque to 150 in. lbs. (17.35 Nm).
- To properly clean the nozzle use a degreaser/ cleaner or carburetor cleaner in a spray can. This will wash any dirt out and leave no residue. When using compressed air, blow into the nozzle orifice **from the head end ONLY**.

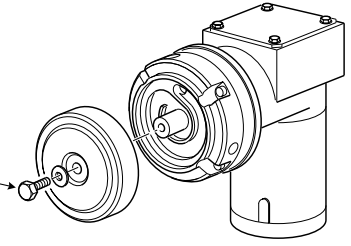




Caring for your PROHEAT

Compressor Air Filter

- Replace inlet air filter annually or more often if dusty conditions are encountered.



Electrical System

- Check the internal and the external wire harnesses for damage. Replace if required.
- Refer to Service Bulletin SB0049 'Annual Servicing Instructions for X45 Ignition Lead and Ignition Coil'.

Timer / Toggle Switch

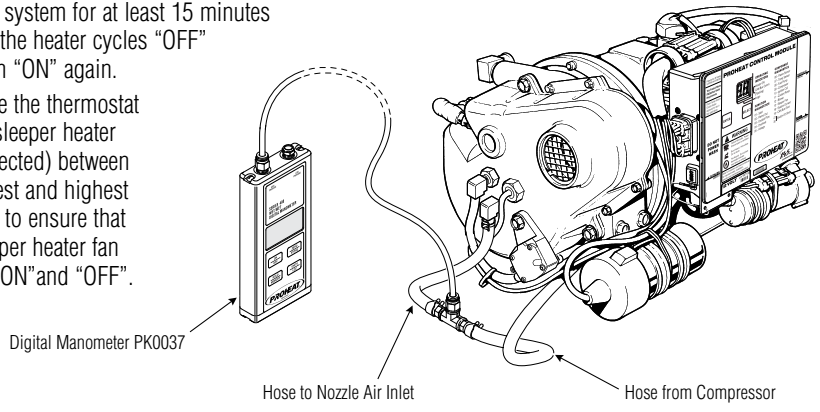
- Check to see that both operate as described in the Operation Manual.

Air Pressure Check

- Correct air pressure is important – refer to the X45 Plus Service manual 925860 for further information.

Operation Test

- Run the system for at least 15 minutes or until the heater cycles "OFF" and then "ON" again.
- Alternate the thermostat for the sleeper heater (if connected) between the lowest and highest settings to ensure that the sleeper heater fan cycles "ON"and "OFF".



Troubleshooting

The PCM (PROHEAT Control Module) has self diagnostics for reliable operation, safety and protection of the PROHEAT. If a problem is detected it shuts the PROHEAT OFF and a diagnostic code is displayed on the PCM Diagnostic Panel. The toggle switch or timer will flash a corresponding number of times.

NOTE

For more detailed troubleshooting information, refer to the Installation and Service manual 925860 at www.proheat.com

PROHEAT will attempt one (1) re-start after a Function or Component Diagnostic Code has been indicated. The re-start will not occur during a Cool Down (Purge) cycle or if the coolant temperature is above 150°F (65°C). ALWAYS let the PROHEAT attempt two (2) starts so that the PCM can point you to the problem area.

TROUBLESHOOTING STEPS

1. Switch the PROHEAT ON using the toggle switch or timer.
2. Let the PROHEAT run or attempt two (2) starts.
3. Count the number of flashes on the toggle switch or timer.
4. Function Diagnostic codes 01 to 05 are usually caused by vehicle system interface problems.
5. Components Diagnostic codes 13, 14, 19 and 21 to 29 indicate an electrical problem ONLY, with PROHEAT components, wiring or the PCM. Refer to your Installation and Service manual 925860 for further information.
6. For an up to date Installation and Service manual 925860 or a Distributor/Dealer near you, go to www.proheat.com

Troubleshooting

Operation Indicators/Diagnostic Codes

PROHEAT CONTROL MODULE (PCM) DISPLAY PANEL DETAIL & ERROR FLASH CODES

CODE No.	Description of Operating State and Diagnostic Codes	No. of Flashes
Operation Indicators		
CC	Configuration Not Selected *(see page 15)*	No indicator
Function Diagnostics		
01	Start *(Lockout mode after 10 consecutive start faults)*	1
02	Flame Out	2
03	Coolant Flow	3
04	Overheat	4
05	Voltage	5

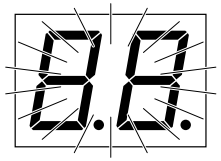
NOTE

LOCKOUT MODE – After 10 consecutive start faults (Code 01) or after two Cool Down (Purge) attempts (Code 06) the X45 Plus PCM will go into Lockout mode, Power to the X45 Plus PCM must be removed and reapplied to exit Lockout mode.

CODE No.	Description of Operating State and Diagnostic Codes	No. of Flashes
Component Diagnostics		
06	Flame Sensor *(Lockout mode after 2 consecutive Cool Down (Purge) attempts*	6
07	Temp Sensor	7
08	Fuel Pump *(See note on page 14)*	8
09	Compressor	9
10	Ignition Coil	10
11	Coolant Pump	11
12	Blower	12
13	Sleeper Fan	13
14	Hour Meter *(Auxiliary Output)*	14
15	Not Used	-
16	System Current	16
17	Not Used	-
18	CANbus	18
19	High Ambient PCM Temperature	19
20	Not Used	-
21–29	Outputs 1–9 Fault	

Troubleshooting

Operation Indicators/Diagnostic Codes



OPERATION STATE INDICATORS:

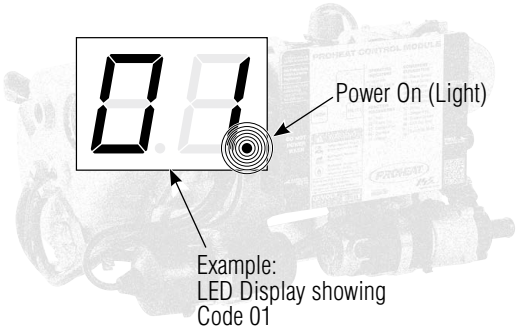
8.8. flashes when power is applied. **ON** LIGHT is lit whenever the PROHEAT is enabled. **Pu** or Cool Down (Purge) indicates that the heater is in the cool down state for 3 minutes after stopping burning fuel.

FUNCTION DIAGNOSTIC CODES:

Function codes indicate why the PROHEAT was shut down. It is possible to have two or more codes alternating at the same time. For example, 03, 04, 03, 04, etc. A function code may be displayed in conjunction with a component code. These codes indicate problems with the system interface to the coolant, fuel and power system of the vehicle as well as mechanical failures of the components.

COMPONENT DIAGNOSTIC CODES:

This section covers individual electrical components. These codes indicate electrical faults **ONLY**. Mechanical failures of a component are not detected electronically and will be indicated by a Function Diagnostic Code. These diagnostic codes are not covered in this handbook. Refer to Installation and Service manual 925860 at www.proheat.com



NOTE

- *Diagnostic codes 13, 14, 19 and 21 to 29 will not shut the PROHEAT down. The heater will continue to run, maintaining heat to the engine.*
- *The fuel pump is driven by the compressor. The Fuel Pump code (08) is retained only for use on earlier model PROHEATs.*
- *The code number corresponds to the flashes indicated on the toggle switch or timer. Refer to the PROHEAT Installation and Service manual 925860 at www.proheat.com for details.*

Troubleshooting
Function Diagnostics

CONFIGURATION

A configuration code is displayed if the PCM is powered up and no configuration number is set.

- No heater operation will occur until heater has been configured
- No response to CAN commands
- No analog outputs will occur

First Time Power Up

When the replacement X45 Plus PCM is powered up for the first time the display will be flashing "CC" and requires a configuration number to be selected before the PCM will function.

	OLD			NEW		
	G-I PCM	G-II PCM	G-III PCM	X45 Plus Config file	2 digit code	
X45 12V Sleeper Fan	~	903100	999100	999110	10	All 12 Volt models Standard Voltage and Temperature Range
X45 12V Aux Input	~	904200	999100			
X45 12V School Bus	~	904300	904300	999130	30	All 12 Volt School Buses Standard Voltage and Temperature Range
X45 12V School Bus Special	~	~	999350	999135	35	12 Volt School Bus Special • Voltage range 11.2–16VDC • Temperature range 160–185°F (71–85°C)

	G-I PCM	G-II PCM	G-III PCM	X45 Plus Config file	2 digit code	
X45 24V Aux Input	985628	905300	999400	999140	40	All 24 Volt models Standard Voltage and Temperature Range

Troubleshooting
Function Diagnostics

1. Use the (right) SELECT button to toggle up through the configuration numbers, configuration display should continue to flash during setting (10, 30, 35, and 40) until the desired configuration number is displayed.
2. Press the (left) ENTER button and hold for 2 seconds to lock in configuration. The configuration number will flash 4 times to indicate confirmation and then go ON solid for 2 seconds before the display is turned off.
3. Once the configuration number has been set, apply the correct identification decal.
   - Red for all 12 volt models
   - Yellow for all School Bus models
   - Green for all 24 volt models
4. PCM is now in the off state and is ready to use.

START (01) & FLAME OUT (02) Diagnostic Code

PROHEAT is designed to burn ULSD, #1, #2 diesel and kerosene. During cold weather, the correct grade of fuel or fuel blend **MUST** be used to prevent gelling and to ensure fuel flow. Problems with the fuel system are indicated by the above codes.

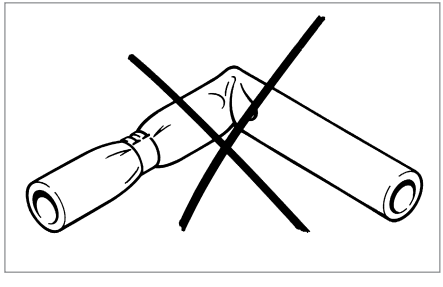
CHECK

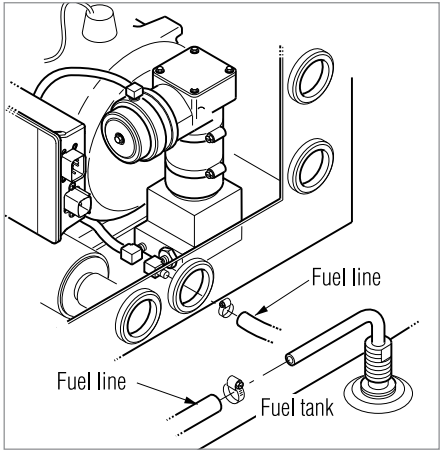
Fuel level in tank and quality of fuel:

- Fuel line routing for kinks and restrictions (wire ties too tight, etc.)
- Fuel line condition (cracks, abrasions, etc.)
- Fuel filter (see Installation and Service manual 925860 at www.proheat.com)

NOTE

On a new installation, running out of fuel or after servicing, the fuel lines may be empty and two (2) ignition cycles may be required in order to purge the air from the fuel system when starting.





NOTE

10 consecutive start (01) faults will put the PROHEAT into Lockout Mode. It requires power to the X45 Plus PCM to be removed for 30 seconds and reapplied to clear the code.

Troubleshooting
Function Diagnostics

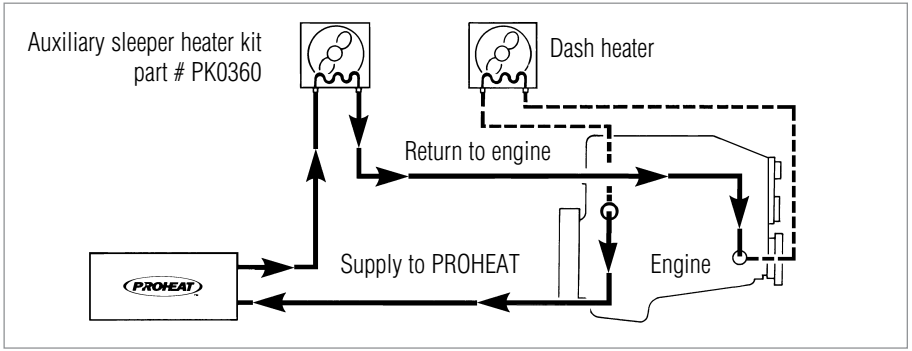
COOLANT FLOW (03) & OVERHEAT (04) Diagnostic Codes

Efficient operation of the heater requires a sufficient amount of coolant in the system and coolant flow. Problems with the vehicle and PROHEAT coolant system are indicated by the above diagnostic codes.

The OVERHEAT sensor has a manual reset. This device protects the heater from damage and the coolant system must be checked thoroughly before resetting. See Installation and Service manual 925860 at www.proheat.com for details.

CHECK

- For at least 3 gallons of coolant in the system, ensure the radiator is topped up
- That coolant line shut off valves are open
- That sleeper heater coolant controls are in the full heat position



This is an example only. Vehicle may have specialized plumbing. Contact your Distributor/Dealer for details.

Troubleshooting
Function Diagnostics

VOLTAGE (05) DIAGNOSTIC CODE:

PROHEAT constantly monitors voltage at the heater. The range for a 12-volt heater is 9.5 to 16 volts and for a 24-volt heater, 19.5 to 32 volts. Should the voltage go out of this range for longer than 10 seconds, the PROHEAT will shut down and the above code will be indicated.

CHECK

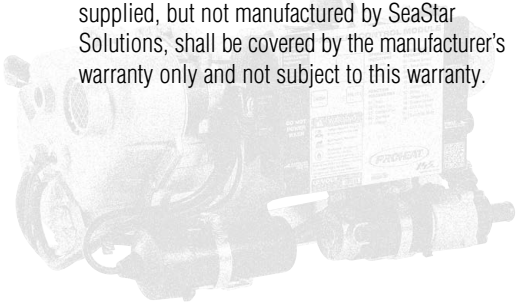
- Voltage with the heater running or trying to start to ensure that the system is loaded
- Wire connections at the battery and the connector at the PROHEAT PCM
- The power harness for routing and abraded areas
- For faulty connections at PROHEAT components and internal harness
- Battery condition (dead cells, cleanliness). Load test if necessary
- That batteries are at least 900 CCA (4 Group 31's recommended) to ensure an 8 to 9 hour use of the PROHEAT and sleeper fan
- Use of accessories such as heated mirrors, satellites, refrigerators, DVD's, etc. (will shorten the time the PROHEAT can operate)
- Fan speed required in order to move the hot air throughout larger sleepers.

Warranty

NOTE

SeaStar Solutions warrants the PROHEAT Heater to be free of defects in material and workmanship under design usage and service conditions for two (2) years on parts and labour from the date of first installation. Replacement parts are covered for the remainder of the heater's warranty or ninety (90) days, which ever is greater.

This warranty does not apply to damage or failure of the PROHEAT Heater or the vehicle into which it was installed due to improper installation, assembly, maintenance, abuse, neglect, accident, or the use of parts not supplied by SeaStar Solutions. Accessories supplied, but not manufactured by SeaStar Solutions, shall be covered by the manufacturer's warranty only and not subject to this warranty.



This is a warranty summary. For the complete warranty manual, please go to www.proheat.com

Non-standard installations, that is, those requiring a departure from published installation instructions, should not be undertaken without first having consulted SeaStar Solutions.

Coverage for warrantable parts, at the discretion of SeaStar Solutions will be made to the claimant in the form of repair, replacement or credit. Warranty labour payments will be made only to Registered PROHEAT Service Centres in accordance with the Standard Repair Times (SRT's) as published by SeaStar Solutions.

Marine installations

The purchaser and installer are advised that specific rules and regulations are in effect with respect to the installation of heaters in marine applications. These rules and regulations are enforced by regional and federal agencies and/or other agencies having jurisdiction. It is the installer's responsibility to review and comply with all such rules and regulations.

In addition each marine installation must be inspected and approved by an Authorized PROHEAT Dealer. Only those installations which are approved, and so registered, will be eligible for warranty coverage of one (1) year on parts and labour.

THE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY SEASTAR SOLUTIONS IN REGARD TO THE PROHEAT HEATER SYSTEM. SEASTAR SOLUTIONS MAKES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Owner's responsibility

Before the expiration of the warranty, Owner must give notice to a Registered PROHEAT Dealer of failures, if any, considered to be warrantable and deliver the defective heater system to such dealer. Owner is responsible for the cost of all repairs made to the engine or equipment in which it is installed, other than the PROHEAT Heater system. Owner is responsible for lodging, meals and incidental costs incurred by the Owner as a result of a warrantable failure. Owner is responsible for "down-time" expenses, and all business costs and losses resulting from a warrantable failure.

SEASTAR SOLUTIONS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

Items Covered Under This Warranty

1. Basic Heater including combustion chamber components, fuel system components, air compressor, ignition components, coolant pump, air blower.
2. Electrical controls provided by PROHEAT including cab mounted controls and PCM.
3. PROHEAT supplied accessories and mounting hardware.

Items Not Covered Under This Warranty

1. PROHEATs no longer within the warranty period.
2. Normal wear and maintenance parts, including fuel filter, air filter, nozzle, and clamps.
3. Parts which malfunction due to improper installation, causing inadequacies in: air, fuel or coolant flow; voltage due to wiring; shock or vibration protection.
4. Any progressive damage to the engine or vehicle arising out of failure of the PROHEAT.
5. PROHEATs which have been modified or use of non-standard parts not approved by SeaStar Solutions.
6. PROHEATs that have been abused or damaged.
7. Travel time by a PROHEAT Dealer.
8. Diagnosis or repairs when caused by problems not directly related to the heater or due to empty fuel tanks or poor fuel quality.

IF YOU HAVE ANY QUESTIONS OR CONCERNS ABOUT THE PROHEAT WARRANTY, CONTACT YOUR NEAREST PROHEAT DISTRIBUTOR OR SEASTAR SOLUTIONS AT (604) 270-6899.

PROHEAT

SeaStar Solutions
3831 No.6 Road
Richmond, B.C.
Canada V6V 1P6

Tel: 604-270-6899
Fax: 604-270-7172

www.proheat.com

Certified System ™
ISO 9001

Designed and Manufactured
in North America

PID# 925855 REV. A

Printed in Canada 100–07/17