



RETROFIT

PROVENTIA EMISSION CONTROL CARB-VERIFIED, LEVEL 2+ TRU FILTER



Owners Manual: Flow Through Filter (FTF) System

Installation Guide for Carrier models 622,
644, 722, 744, 750, 822, 844, 850, and R70
Truck TRUs with Kubota Engine Model D722



Proventia Americas, LLC ■ c/o Proventia Group, Tietotie 1, FI-90460
Oulunsalo, Finland ■ Tel. 800 609 4021 ■ www.proventiafilters.com

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OPERATION AND MAINTENANCE REQUIREMENTS

In order for the Proventia FTF system to meet the CARB Verification requirements, the Transport Refrigeration Unit (TRU) owner must meet these operation and maintenance requirements before installation:

- 1) TRU owner is responsible for checking engine backpressure level at every Preventive Maintenance Interval (PMI) to determine whether accumulated ash within the FTF needs to be cleaned out. With the TRU running at high speed, check the backpressure on the backpressure indicator gauge.
- 2) TRU owner is responsible for confirming normal oil consumption rate greater than 50 hours/quart of oil before installation of the Proventia FTF to ensure proper filter operation (a new engine gets about 120 hours/quart of oil).
- 3) Fuel requirement: Use only Ultra Low Sulfur Diesel (ULSD). In California, both On-road and Off-road diesel is ULSD. In the other 49 states, only On-road diesel is ULSD (In June 2010, Off-road diesel in the other 49 states will become ULSD). Use of higher sulfur diesel will clog FTF.



- 4) Mixing lube oil with fuel is not allowed because it will cause excessive ash accumulation in the filter.
- 5) Engine: This Proventia FTF kit is verified for use on Carrier bobtail TRU model years 1994-2004 with engine model D722.
- 6) Follow TRU engine maintenance schedule.
- 7) Recommended for maximum filter life, but not required, is to use low sulfate ash engine lubrication oil.
- 8) TRU engine injectors must be replaced with new or remanufactured injectors at the time of FTF installation.
- 9) This Proventia FTF system can impose a backpressure of up to 2.5 psi on the TRU engine at low-speed operation. There is a possible fuel consumption penalty of less than 1% when running with the Proventia FTF.
- 10) For the Bobtail FTF to operate properly, do not select the "hospital zone" high speed lockout feature on the TRU.
- 11) TRU engine must run at least two minutes each hour in high speed to ensure proper FTF operation.



DO NOT use high speed lockout for proper operation of exhaust DPF on refrigeration unit.
En español: DO NOT use high speed lockout for proper operation of exhaust DPF.

OPERATORS PRETRIP CHECK

Inspect backpressure indicator gauge with the TRU operating at high speed. If yellow gauge line is within the red service range of the gauge (see photo at left), the FTF filter should be serviced (see page 18). Photo at right shows the yellow indicator in the green normal range.





PERIODIC MAINTENANCE

At the regular TRU Preventive Maintenance Interval, check the Proventia FTF system:

- 1) Check to see if the yellow gauge line in the backpressure indicator gauge is within the red service range (shown in picture on page 3) while the TRU is running in high-speed mode. If so, this indicates that the filter may have an excessive accumulation of soot or ash. See troubleshooting on page 18.
- 3) If black smoke is visible during steady speed operation, see troubleshooting on page 19.

CARB COMPLIANCE SCHEDULE

Table shows compliance dates if Proventia FTF is installed.

TRU Model Year	TRU will be LETRU compliant until...	Total useful life of TRU
1987	December 31, 2015	28 years
1988	December 31, 2015	27 years
1989	December 31, 2015	26 years
1990	December 31, 2015	25 years
1991	December 31, 2015	24 years
1992	December 31, 2015	23 years
1993	December 31, 2015	22 years
1994	December 31, 2015	21 years
1995	December 31, 2015	20 years
1996	December 31, 2015	19 years
1997	December 31, 2015	18 years
1998	December 31, 2015	17 years
1999	December 31, 2015	16 years
2000	December 31, 2015	15 years
2001	December 31, 2015	14 years
2002	December 31, 2016	14 years
2003	December 31, 2017	14 years
2004	December 31, 2018	14 years



PREINSTALLATION CHECKS

Before installing the Proventia FTF system, the installer must confirm the oil consumption rate of the TRU engine and also replace the injectors.

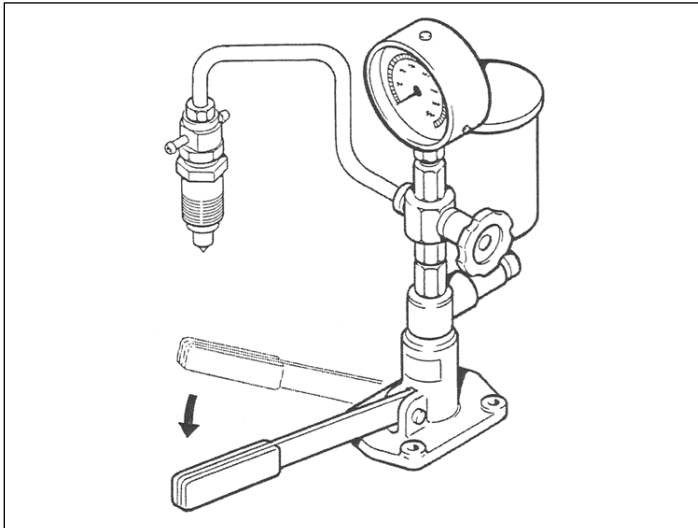
- 1) Check the oil consumption rate using the following procedure (or confirm from recent TRU service records that oil consumption rate was at least 50 hours/qt):
 - a. Add oil to the engine to the full mark on the dipstick.
 - b. Record the engine hourmeter reading with engine oil at full: _____ hours
 - c. Run TRU for about 50 hours under normal operation. The TRU can be used on normal routes and deliveries. It is not necessary to remove the TRU from service during this oil consumption rate check.
 - d. Again add oil to the engine to the full mark on the dipstick.
 - e. If the engine used less than a quart (32 ounces) of oil in 50 hours, the oil consumption is okay. Proceed to number 2 (Replace injector assemblies).
 - f. If the engine used more than a quart of oil in 50 hours, service the TRU engine per TRU manufacturer's guidelines to reduce the amount of oil the engine is burning before installing the Proventia FTF system.
- 2) Replace injector assemblies with new or remanufactured injectors. Remanufactured injectors should be set at 1991 to 2133 psi on Kubota injectors for D722 engine.

INJECTOR REMANUFACTURE

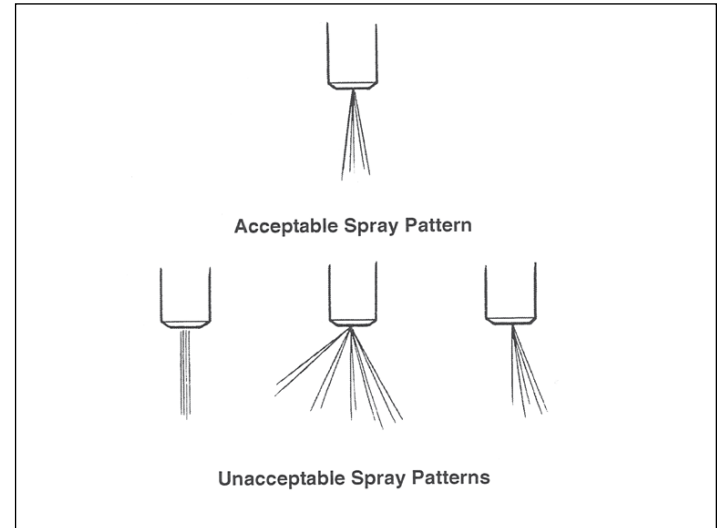
TOOLS: Injection nozzle test stand

PARTS: Injector nozzle shims (as needed), nozzle valve and seat (if needed)

- 1) Remove injectors from engine and install on injection nozzle test stand.

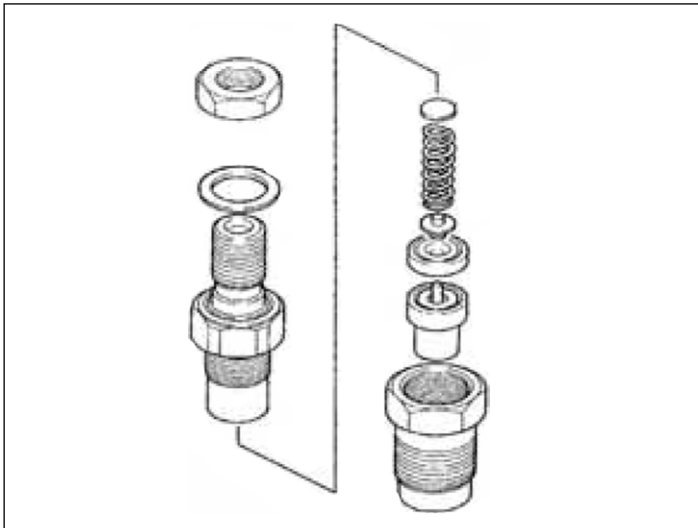


- 2) The spray pattern should be a perfect conical shape and should not dribble. If spray pattern is not good, it is necessary to replace the nozzle valve and seat.





- 3) Check the opening pressure by pushing the hand lever down. The opening pressure should be 1991 to 2133 psi. To increase opening pressure add shims and to decrease opening pressure remove shims. A shim thickness of .0004" (.01mm) will change pressure by 34 psi.
- 4) Install remanufactured injectors with new gasket. Installation torque is 36–50 ft.-lb.



INSTALLATION

1 HOUR INSTALLATION TIME

SAFETY PRECAUTIONS

- 1) Disconnect positive battery cable from battery to prevent TRU from starting during installation.
- 2) Do not touch hot exhaust components; make sure TRU exhaust system is at room temperature before installing Proventia FTF system.
- 3) Use safety glasses and make sure to have a safe work platform when installing the Proventia FTF system.

REMOVE MUFFLER

Tools: 13mm open end and socket wrenches

1) Remove four 8mm nuts/bolts from the exhaust flange.



2) Remove muffler mounting bracket on left end of muffler. There are several versions of this bracket.





3) Remove muffler from engine.



INSTALL THE FTF

Tools: 7/16" open end wrench, 13mm wrench

Parts: FTF, elbow compression fitting, stainless steel 4" tube, 8 mm bolts (4), 5/16" x 1.5" bolt, FW, nut (1 set)

1) Install elbow compression fitting onto 1/8" pipe thread boss on FTF elbow. Use teflon thread sealer on threads.



2) Insert stainless steel tube into compression fitting and tighten.



3) Install filter mounting bracket.





4) Slide filter into filter mounting bracket.



5) Install new exhaust manifold gasket.



- 6) Reuse existing mounting flange bolts/studs, or install four new 8mm bolts with 13mm wrench.



- 7) Tighten 5/16" mounting bracket bolt with 1/2" wrenches.





INSTALL LABELS

Parts: CARB label, High speed lockout label, ULSD label, tailpipe

- 1) Remove CARB label from inside of exhaust outlet tube on FTF.

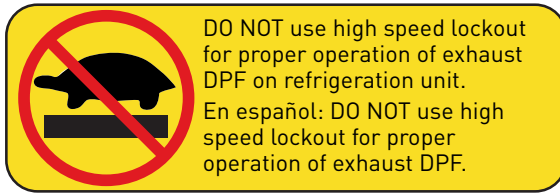


PROVENTIA EMISSION CONTROL OY
 TIETOTIE1, OULUNSAALO, FINLAND, 90460
 FOR SERVICE CALL: 800-609-4021
 VDECS FAMILY: CA/PEC/2008/PM2+/N06/OF/FF01
 SERIAL NUMBER: DDYTFP13SS3 SERVICE PARTS NUMBER: F00688
 MONTH AND YEAR OF MANUFACTURE DD-YY

- 2) Install CARB label on frame, under the engine service door where it will be visible to CARB inspectors.



- 3) Install label “DO NOT use high speed lockout for proper operation of exhaust DPF on refrigeration unit” on dashboard next to refrigeration unit in-cab controller.



- 4) Install label “Caution: Ultra Low Sulfur Diesel Only for Proper operation of TRU exhaust filter” near filler cap on fuel tank. Clean and degrease the surface before installing the label.



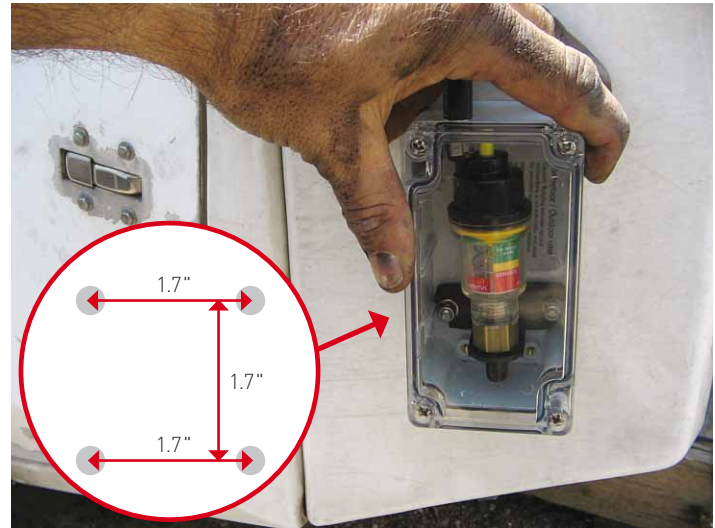


INSTALL BACKPRESSURE GAUGE

Tools: Cordless drill with 3/8" nut driver, 3/16" drill bit

Parts: Backpressure indicator gauge assembly,
#8 screws (4), P-clamps (2), self-tapping screws (2),
hose spring clamp

- 1) Drill four 3/16" holes using neoprene gasket as template. Install backpressure indicator gage on engine-side panel of refrigeration unit using four #8 screws.



2) Install two P-clamps with self-tapping screws.



3) Install hose onto stainless steel tube with hose spring clamp.





WARRANTY REGISTRATION AND INSTALLER'S CHECKLIST

After installing the FTF system, mail in the warranty postcard or register at www.proventiafilters.com. Proventia will keep the information for 3 years:

TRU owner's name: _____
TRU owner's contact phone number: _____
TRU owner's e-mail _____
Installer's name: _____
Installer's contact phone number: _____
Installer's e-mail _____
Installation date: _____
TRU hourmeter reading on installation date: _____ hours
TRU model name: (Supra 622, 644, 722, 744, etc): _____
TRU unit serial number: _____
TRU unit model year: _____
TRU engine model: [D722]: _____
TRU engine serial number: _____
Proventia FTF serial number: _____
Oil consumption: _____ ounces/50 hours
Injectors remanufactured at : _____ hourmeter reading
Installer initial that oil rate was measured and injectors were remanufactured _____

CARB IDENTIFICATION NUMBER (IDN) REGISTRATION

After installing the Proventia FTF system, the TRU owner may apply for CARB IDN at: www.arb.ca.gov/diesel/tru/application.htm

CLEANING THE FTF AND SAFE ASH-HANDLING GUIDELINES

If there is excessive ash accumulation within the FTF (see page 18), the FTF will need to be cleaned. Clean the FTF by removing it from the TRU and blowing compressed air into the FTF outlet (seal around air hose), in the direction opposite of the exhaust flow. However, ash that would be blown out of the FTF inlet must be collected using a vacuum with a HEPA filter that collects the particulates for hazardous waste disposal. Call 800-609-4021 for recommendations of companies capable of removing ash from the FTF. Individuals who own, operate, or maintain diesel engines equipped with diesel particulate filters must manage hazardous ash waste generated by these devices. Follow ash-handling guidelines as prescribed by CARB at: www.arb.ca.gov/diesel/tru/documents/ashguide.pdf

TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
Backpressure indicator gauge is in the red service range.	Soot or ash accumulation inside of FTF	Check if yellow gauge line in backpressure indicator gauge is within red service range during high-speed operation (see picture on page 3). If so, this is an indication that the FTF may have an excessive accumulation of soot or ash. The soot can be regenerated (cleaned out of the FTF) by running at high speed for 10 minutes and then shutting TRU off manually for 5 minutes. Repeat this cycle 5 times, then check backpressure indicator gauge reading again. If the yellow gauge line in backpressure indicator gauge continues to be within the red service range, this is an indication that the FTF may have an excessive accumulation of ash. Follow the filter cleaning and ash guidelines on page 17.



PROBLEM	CAUSE	SOLUTION
Black smoke is visible from exhaust during steady speed operation	Poor combustion	<p>Visible smoke is normal when TRU shifts from low- to high-speed operation or high- to low-speed operation. If black smoke is visible during steady speed operation, injectors need to be serviced or replaced.</p> <p>To service the TRU engine injectors, follow the TRU engine manufacturer guidelines:</p> <ol style="list-style-type: none">a. Check the injector spray pattern on a nozzle test stand. The spray pattern should be a perfect conical shape and should not dribble.b. Check the opening pressure of the nozzles:<ol style="list-style-type: none">i. Kubota injectors should be 1991 to 2133 psiii. Adjust nozzle opening pressure with shims as needed to meet the specification.



PARTS LIST

Replacement parts available at www.proventiafilters.com.

PART#	DESCRIPTION
M00700	FLOW THROUGH FILTER, FTF FOR Kubota D722
T004	BACKPRESSURE INDICATOR GAUGE
T008	BACKPRESSURE HOSE, 48" LENGTH
T076	BACKPRESSURE GAGE ASS'Y (INCL BOX AND HOSE)
T010	HOSE SPRING CLAMP
T011	BACKPRESSURE TUBE
T070	BACKPRESSURE ELBOW FITTING
T013	ULSD DIESEL FUEL LABEL
T071	HIGH SPEED LOCKOUT LABEL
T072	EXHAUST FLANGE GASKET
T085	OWNERS MANUAL FOR CARRIER BOBTAIL FTF
T075	BOX WITH CLEAR COVER FOR BACKPRESSURE GAUGE
T084	FTF MOUNTING BRACKET FOR KUBOTA D722

WARRANTY STATEMENTS

YOUR WARRANTY RIGHTS AND OBLIGATIONS

Proventia Americas, LLC will warrant the Proventia FTF for the Transport Refrigeration Unit (TRU) for which it is sold or leased to be free from defects in design, materials, workmanship, or operation of the Proventia FTF that cause the Proventia FTF to fail to conform to the emission control performance level the Proventia FTF was verified to, or to the other requirements of the California Code of Regulations Title 13CCR sections §2700-2706 and 2710 for the period of 3 years, or 1,600 hours, whichever occurs first, provided there has been no abuse, neglect, or improper maintenance of the TRU, TRU engine, or Proventia FTF system, as specified in the owner's manuals. Where a warrantable condition exists, this warranty also covers the TRU engine from damage caused by the Proventia FTF system, subject to the same exclusions for abuse, neglect, or improper maintenance of the TRU or TRU engine. Please review the owners manuals for other warranty information. The Proventia FTF system may include a core part (e.g. particulate filter) as well as hoses, connectors, a backpressure monitor, and other emission-related



assemblies. Where a warrantable condition exists, Proventia will repair or replace the FTF system at no cost to you including diagnosis, parts, and labor.

WARRANTY COVERAGE

For a TRU engine used in a TRU, the warranty period is 3 years or 1,600 hours of operation, whichever occurs first. If any emissions-related part of the Proventia FTF system is defective in design, materials, workmanship, or operation of the Proventia FTF system thus causing the Proventia FTF system to fail to conform to the emission control performance level it was verified to, or to the requirements in the California Code of Regulations Title 13CCR sections §2700-2706 and 2710, within the warranty period, as defined above, Proventia Americas, LLC will repair or replace the Proventia FTF system, including parts and labor.

In addition, Proventia Americas, LLC will replace or repair the TRU engine components to the condition they were in prior to the failure, including parts and labor, for damage to the TRU engine proximately caused by the Proventia FTF system. This also includes those relevant diagnostic expenses in the case in which a warranty claim is valid. Proventia Americas, LLC may, at its option, instead pay the

fair market value of the TRU engine prior to the time the failure occurs.

OWNER'S WARRANTY RESPONSIBILITY

As the TRU and Proventia FTF system owner, you are responsible for performing the required maintenance described in the TRU and Proventia FTF owners manuals. Proventia Americas, LLC recommends that you retain all maintenance records and receipts for maintenance expenses for your TRU and Proventia FTF system. If you do not keep your receipts or fail to perform all scheduled maintenance, Proventia Americas, LLC may have grounds to deny warranty coverage. You are responsible for presenting your TRU and Proventia FTF system to a Proventia Americas, LLC dealer as soon as a problem is detected. The warranty repair or replacement should be completed in a reasonable amount of time, not to exceed 30 days. If a replacement is needed, this may be extended to 90 days, should a replacement not be available, but must be performed as soon as a replacement becomes available.

If you have questions regarding your warranty rights and responsibilities, contact Proventia Americas, LLC at 800-609-4021 or the California Air Resources Board

at Stationary Source Division - TRU, 1001 I Street, Sacramento, CA 95814, (888) 878-2826, or e-mail: tru@arb.ca.gov

The installer will furnish the Proventia FTF owner with a copy of the following statement:

YOUR WARRANTY RIGHTS AND OBLIGATIONS

(Installer's name) _____ (Installer's phone number) _____ will warrant that the installation of the Proventia FTF system is free from defects in workmanship or materials which cause the Proventia FTF to fail to conform to the emission control performance level it was verified to or to the requirements in the California Code of Regulations Title 13CCR sections §2700-2706. The warranty period and the extent of the warranty coverage provided by the installer will be the same as the warranty provided by Proventia Americas, LLC, and the same exclusions apply.

OWNER'S WARRANTY RESPONSIBILITY

As the TRU owner and Proventia FTF system owner, you are responsible for presenting your TRU and Proventia

FTF system to the installer as soon as a problem with the installation is detected. If you have questions regarding your warranty rights and responsibilities, you should contact the Installer of the Proventia FTF system or the California Air Resources Board at Stationary Source Division - TRU, 1001 I Street, Sacramento, CA 95814, (888) 878-2826, or email: tru@arb.ca.gov

