

# **SERVICE BULLETIN No.1147**

Addressees: ABC Customer Care and Parts Source

TERMS & CONDITIONS	: No claims will be accepted with reference to this Bulletin.
SUBJECT	: Driver's front unit - water valve conversion
DATE	: July 2nd, 2009
PARTS BOOK REVISION	: Yes
MANUAL & SECTION	: Spare Parts Manual: Section 771009 - Heating
BULLETIN TYPE	: Product Improvement
COACH MODEL	: T2145

### APPLICATION:

The conversion subject of this Bulletin is applicable to following units:

Model	Engine	VIN		Model	Engine	VIN
T2140	Cummins	→ 40144		T0145	Cummins	→ 44268
	Detroit Diesel	→ 40605	12143		Detroit Diesel	→ 44585

#### **DESCRIPTION:**

- 1. The purpose of this Bulletin is to show how the electrically operated Sonna water valve, which controls the flow of hot water to the driver's front unit, can be replaced by a pneumatically operated Burkert valve. The conversion enables owners and operators to upgrade earlier T2100 units to the new specification laid out in Van Hool Service Bulletin #1114.
- 2. The job breaks down into three separate parts or sections, each dealing with a specific aspect of the modification. All sections should be completed before the new installation can be put into operation. The Sonna-to-Burkert water valve conversion includes changes to:
  - Plumbing (Section 1)
  - Pneumatics (Section 2)
  - Electrics (Section 3)
- 3. The parts required to convert one coach can be ordered as kit VH# 10900228.
- 4. If you do not have the expertise to carry out the procedures in this Bulletin, do not hesitate to go to your nearest ABC Customer Care & Parts Source dealership.

Service Parts Warranty Workshop				Service	
Manager	Manager	Administrator	Foreman	Technician	

Service personnel: please read, initial and circulate.

# PARTS AND PRODUCTS:

Order one kit VH 10900228 for one T2100 unit to modify. The kit contains following parts:

#### Plumbing (refer also to Section 1)

Position	n Part No. Description		Qty.	
7	VH 10835796	Tube assembly, single elbow	1	
8	VH 660203101	Nut M6	5	
9	VH 660636300	Lock washer M6	5	
10	VH 660623501	Plain washer M6	5	
11	VH 611217490	Support bracket	2	
12	VH 660220304	Bolt, M6x20	5	
13	VH 637100170	Clamp	1	
14	VH 635102530	Connector	2	
15	VH 10830469	Pneumatically operated water valve, Burkert	1	
16	VH 625100490	Hose, transition, 28 to 34 mm	1	
N/S	VH 10716348	Hose clamp for VH 625100490	1	
17	VH 10835795	Tube assembly, double elbow	1	
20	VH 10835797	Tube assembly, U	1	
21	VH10 716348	Hose clamp	2	
22	VH 625101030	Throttle insert, 28 mm $\emptyset$ hose	1	
23	VH 621401460	Hose, elbow, 28 mm $\varnothing$	1	
24	VH 10835798	Tube assembly, T branch		
N/S	VH 660613601	Rivet nut, 6 mm		
N/S	Local purchase	Loctite #577, pipe sealant	#	

#### Pneumatics (refer also to Section 2)

Position	Part No.	Description	Qty.
1	VH 637211940	Solenoid valve	1
2	VH 637317600	Fitting, elbow, adjustable w/ throttle insert	1
3	VH 637307010	Insert, tube	2
4	VH 637307060	Cutting ring	2
5.1	VH 637302850	Nut, 6 mm Ø for VH 637317600	1
5.2	VH 637314350	Nut, 6 mm Ø for VH 637306490	1
6	VH 660515907	Tube, plastic, black, 6 mm $\emptyset$	#
18	VH 637306490	Fitting, elbow ¼ inch - 6 mm	1
19	VH 10516489	Muffler	1
N/S	Local purchase	Mounting clips, self adhesive	4

#### Electrics (refer also to Section 3)

Part No.	Description		
VH 11038448	Temperature control switch, UWE 18571	1	
VH 10875691	Connector, 7-pin, UWE 17271, for VH 11038448	1	
VH 10832235	Air temperature sensor	1	
Local purchase	Automotive electrical wire, 16 AWG, brown	#	
Local purchase	Automotive electrical wire, 16 AWG, red-yellow	#	
Local purchase	Automotive electrical wire, 12 AWG, blue	#	

• Parts may be purchased from your nearest ABC Companies Parts Source dealership.

Parts and products disposition : discard according to applicable environmental regulations.



# SECTION 1: SONNA-TO-BURKERT WATER VALVE CONVERSION - PLUMBING

#### Plumbing - parts required:

Refer to Figures 1 and 2, and to the parts list on page 2 of this Bulletin.



Figure 2: Burkert replacement valve VH 10577844. On coach installation of major components

## PROCEDURE:

#### 1. General:

- This section explains how to:
  - → isolate the electrically operated water valve from the heating system
  - → remove the valve, its associated hardware and electronics from the valve panel
  - $\rightarrow$  install the pneumatically operated value and tubing
- For your information only: the labor estimate for this conversion is approximately 4 hours.
- This job should be executed by a technician experienced in HVAC maintenance.
- For more information refer to the coach Maintenance Manual, the Operator's Guide Book, and the Spare Parts Manual.

#### 2. Special tools, equipment or services:

• No special tools, equipment or services are required.

#### 3. Preparations:

- Park the coach on a level-surfaced service pit with the front wheels straight. Apply the parking brake and shut down the engine.
- Switch off all systems with the exception of the HVAC system. Leave the battery master switch on.
- Put a "DO NOT OPERATE" tag on the instrument panel.

#### Procedure continued on page 6 of 20



Figure 3: Location of gate valves in the T2145 combustion heater compartment (valves in the closed position)



front unit. The engine main supply and return valves are in the open position.

#### Preparations continued from page 4:

- Install wheel chocks.
- Allow coolant to cool down to approximately 95 𝑘 (35 𝔅).
- Read the entire procedure before beginning to work.

#### **<u>CAUTION</u>**: Observe safe shop practices at all times.

#### 4. To drain the heating system for water valve replacement:

- 1) Turn the driver's temperature selector knob counterclockwise to the zero position.
- 2) Switch-off and disconnect the combustion heater.
- 3) Close the combustion heater gate valves.
  - → T2140: The gate valve in the heating supply line is located behind the right-hand engine compartment door. The gate valve in the heating return line is accessible via the interior access trap above the transmission.
  - → T2145: Both valves are located in the combustion heater compartment on the left-hand side of the coach (see Figure 3).
- 4) At the back of the luggage compartment, open the access door to the heating system valve and pump panel. Close the ball valves in the engine main supply (2, Figure 4) and return lines (3, Figure 4). In the closed position, the valve levers should be at 90° to the tubing.
- 5) Working underneath the coach, in front of the drive axle, attach a suitable hose to the drain pipe of the drip pan below the heating system valve and pump panel. Install a suitable clean container to catch approximately 3 gallons of coolant.
- 6) Undo the lower hose clamp of the engine main supply hose beneath the water valve (refer to 1, Figure 4). Carefully remove the hose from its fitting and allow coolant to drain.

#### 5. <u>To remove the electrically operated water valve and ancillaries (see Figure 5)</u>:

- 1) Undo and remove the bolts, nuts and washers securing the T-branch tube assembly (return from front heater) to its mounting bracket (1, Figure 5). Withdraw the clamp
- 2) Unscrew the large nut securing the T-branch tube assembly to the ball valve (2, Figure 5).
- 3) Unscrew and back-up the clamp securing the lower by-pass hose to the T-branch tube assembly (3, Figure 5)
- 4) Unscrew and back-up the clamp securing the front heater supply hose to the elbow tube assembly, which connects to the valve (4, Figure 5).
- 5) Unscrew and back-up the clamp securing the front heater return hose to the T-branch tube assembly (5, Figure 5).
- 6) Unscrew and back-up the clamp securing the main supply from engine hose to the U-tube assembly (6, Figure 5).
- 7) Undo and remove the two bolts securing the water valve mounting bracket to the valve panel (7, Figure 5).



Figure 5: T2100 heating valve installation – early specification with electrically operated valve for front unit. Valve removal squence.

- 8) Cut the tie wrap securing the water valve-to-control box multiwire connector. Separate the connector terminals (8, Figure 5).
- 9) Pry-loose the hose ends of which the clamps have been undone and withdraw the valve assembly from the water valve and pump compartment.
- Undo and remove the screws securing the valve control box to the valve and pump compartment wall (see Figure 6). Tie the control box out of the way. It will be removed later in the procedure (see Section 3: Sonna-to-Burkert water valve conversion – Electrics).







- 11) Proceed with Section 2: Sonna to Burkert water valve conversion Pneumatics.
- 12) Proceed with Section 3: Sonna to Burkert water valve conversion Electrics;

#### 6. To install the pneumatically operated water valve and tubing



- 1) If not already fitted, install the fittings (14, Figure 1) into the water valve body. Use Loctite adhesive #577 on the threads and secure hand tight.
- Assemble the valve (position 15), the single elbow (position 7), double elbow (position17) and U-tube (position 20) as shown in Figure 1 for a loose fit. Use Loctite adhesive #577 on the threaded part of the double elbow tube assembly (4, Figure 5). Note that the valve is installed with the actuating cylinder pointing down.
- If not already fitted, install the throttle insert halfway (22, Figure 1) into the elbow hose (23, Figure 1). On the outside of the tube, mark the location of the insert with green tape.
- 4) Using recovered hose clamps, attach the elbow hose (23, Figure 1) to the U-tube (20, Figure 1) and the T-branch tube assembly (24, Figure 1).
- 5) Hook-up the new valve and tube assembly to the coach heating system as shown in Figures 2 and 7. Refer to Figure 8 if a mismatch exists between the main supply (Figure 4) tube diameter and the double elbow tube assembly (17, Figure 2).
- 6) Attach the lower by-pass hose to the new T-branch tube assembly.
- 7) To connect the new T-branch tube assembly to the ball valve (see 2, Figure 5), run up the large nut to finger tight.



Figure 8: Burkert pneumatic water valve plumbing – installation recommendations

- 1. Early T2100s have a 28 mm (1-7/64 inch) OD tube
- 2. Later T2100s have 34 mm (1-11/32 inch) OD tubing.
- 3. The double elbow tube assembly is 34 mm OD only. To connect 28 mm OD tubing to the 34 mm OD double elbow tube assembly, fit 28 to 34 mm transition hose VH 625100490.
- 4. The threaded part of tube assembly VH 10835795 screws into the Burkert valve.
- 5. Use Loctite 577 pipe sealant on threaded parts of valve.
- 8) Install the valve mounting bracket (11, Figure 1) and clamp (13, Figure 1) for a loose fit using the associated fasteners.
- 9) On the valve panel, mark the point where the mounting bracket (11, Figure 1) should be attached to it. Remove the bracket and clamp assembly.
- 10) In the valve panel, using the mark from step nine as a reference, drill a suitable hole to accept a 6 mm rivet nut. Install the rivet nut.
- 11) Reinstall the bracket and clamp assembly. Secure the bracket to the valve mounting plate with a 6 mm bolt and the rivet nut installed in step 10. Tighten all bolts to 80 in.lbf (9 Nm).
- 12) Make sure all hoses fit the tubing properly. Secure the constant torque hose clamps as shown in the chart below.

Туре	Width	Washers	Torque	Tip extension @ torque
Constant torque A	9/16 inch	4	40 → 70 in.lbf	7/32 inch
Constant torque B	5/8 inch	5	90 → 125 in.lbf	1⁄4 inch

- 13) Check the large nuts of the T-branch, double elbow and U-tube assemblies for tightness (tubing seated + finger tight +  $\frac{1}{2}$  turn).
- 7. To add coolant to the engine cooling and heating system:
  - With the lower hose of the engine main supply line refitted, and the hose clamp properly torqued, open the ball valves in the engine main supply (2, Figure 4) and return lines (3, Figure 4). Open the gate valves (see Figure 3).
  - 2) Refill the cooling system, referring to Chapter 2 of the Maintenance Manuals. Drained coolant may be recovered if it is not contaminated and meets the specifications in the Maintenance Manual.
  - 3) While running the engine for about 20 minutes, check cooling system plumbing for leaks. Rectify if necessary.
  - 4) Reconnect the combustion heater.
  - 5) Check "all systems go" on the multifunction display (indicated by an asterisk on the bottom middle of the display).
  - 6) Shut down the engine. Remove the wheel chocks and the warning label on the instrument panel.
  - 7) Remove the drain pan and hose underneath the coach.

Procedure "Section 1 – Plumbing" complete.

#### SECTION 2: SONNA-TO-BURKERT WATER VALVE CONVERSION - PNEUMATICS

#### Pneumatics – parts required:

Refer to Figure 1, and to the parts list on page 2 of this Bulletin.

#### PROCEDURE:

#### 1. <u>General</u>:

- This job should be executed by a technician experienced in air system service.
- For more information refer to the Pneumatics Diagram Booklet that comes with the coach.

#### 2. Special tools, equipment or services:

• No special tools, equipment or services are required.

#### 3. Preparations:

- Make sure all systems have been switched off and that the battery master switch is off.
- Vent the auxiliary air tank.
- Read the entire procedure before beginning to work.

#### 4. To install supplementary solenoid valve V115:

CAUTION: Observe safe shop practices at all times.

<u>CAUTION</u>: Never connect or disconnect a hose, tube or line containing air pressure. It may whip as air escapes. Never remove a component or open a line unless you are certain that all system air pressure has been vented.

# <u>CAUTION</u>: Never exceed the recommended air pressure and always wear safety glasses when working on air systems.

• To operate the Burkert water valve, a supplementary solenoid valve should be installed next to the existing solenoid valve bank on the heating system valve and pump panel in the luggage compartment (see Figure 9). Proceed as follows:



Figure 9: Location of solenoid valve V115 on new production coaches.

1) With the Sonna water valve and associated tubing removed from the coach, cut loose the tie wraps securing the solenoid valves' wiring harness.

2) With a 4 mm Allen wrench, undo and remove the two Allen bolts securing the solenoid valve bank to the water valve mounting plate (see Figure 10). Take care not to drop the nylon back-up washers separating the valve bank from the mounting plate.



Figure 10: Location of solenoid valve bank retaining bolts

- 3) Withdraw the solenoid valve bank and separate solenoid valve #V127 from the rest by undoing the angled Allen screw between valve #V127 and valve #V126.1. Use a 3 mm Allen wrench. Make sure not to drop the #1 port O-ring.
- 4) Fit male stud elbow VH 637317600 to the #2 port of the supplementary solenoid valve. Point the connector in the 4 o' clock position and secure in this position with the jam nut with recessed O-ring. Make sure the transit port to the next valve is open. Open-up if necessary.
- 5) Apply some Vaseline to the O-ring counterbore of the #1 port of the supplementary valve and fit the O-ring.
- 6) Attach the supplementary valve to the rest of the valve bank using the 4 mm Allen screw included with the valve. Secure hand tight.
- 7) Repeat steps 5 and 6 for solenoid valve #V127.
- 8) Reinstall the complete valve bank making sure to refit the nylon spacers between the valve bank van the water valve mounting plate. Secure the Allen bolts hand tight. Switch the yellow valve lever to the "0" position (see Figure 11).



Figure 11: Solenoid valve with yellow lever in the "0" position

9) Using an insert, a nut and a cutting ring, attach approximately 11/2 ft of 6 mm tubing to the elbow fitting installed in the #2 port of the supplementary solenoid valve. Refer to the plastic tubing installation techniques below.



- 10) Route the plastic tubing to the pneumatic water valve location. Attach the tubing to the water valve mounting plate with self-adhesive mounting clips.
- 11) Install the water value and tube assembly referring to section 1 of this work procedure.
- 12) Install elbow fitting VH 637306490 and muffler VH 10525687 in the water valve actuating cylinder as shown in Figure 12.Make sure to apply a drop of Loctite 577 pipe sealant to the tapered studs. The elbow should point approximately 45° from the vertical.
- 13) Cut the plastic tubing to length. Using an insert, a nut and a cutting ring, attach the tubing to the elbow fitting installed in step 12.

14) Attach the plastic tubing to the elbow fitting of the water valve actuating cylinder as shown in Figure 12.



Procedure "Section 2 – Pneumatics" complete.

Figure 12: Solenoid valve actuating cylinder – elbow fitting and muffler installation

#### SECTION 3: SONNA - TO- BURKERT WATER VALVE CONVERSION - ELECTRICS

#### **Electrics - parts required:**

Refer to Figures 13 and 14, and to the parts list on page 2 of this Bulletin.



Figure 13: UWE 18571 defroster control switch VH 11038448 and 7 pin, secondary lock connector. Arrows indicate the screws which secure the connector to the housing.

Figure 14: VH 10832235 Front unit air temperature sensor fits in windscreen ventilation duct

#### PROCEDURE:

#### **<u>CAUTION</u>**: Observe safe shop practices at all times.

#### 1. General:

- This job should be executed by an experienced automotive electrician.
- The wiring diagram with the new heating water valve control has been included in this Service Bulletin (see "Attachment 1: T2100 New spec wiring diagram for front heating with pneumatic water valve" at the end of this section).
- For more information refer to the Electrical Wiring Diagram Booklet that comes with the coach.

#### 2. Special tools, equipment or services:

• No special tools, equipment or services are required.

#### 3. Preparations:

- Make sure all systems have been switched off and that the battery master switch is off.
- Read the entire procedure before beginning to work.

#### 4. To change the water valve wiring - dashboard:

1) Undo and remove the screws securing the dashboard switch panel, which is located to the right of the steering wheel. Withdraw the panel to gain access to the defroster air duct, which runs directly behind the panel (see Figure 15).



Figure 15: Defroster air duct and temperature sensor VH 10832235

2) Drill an 8 mm diameter hole in the duct, approximately in the location indicated in Figure 15. Install the sensor and grommet in the hole. Route the attached sensor wires towards the lower HVAC control panels below (see Figure 16). Secure the sensor wires with tie wraps.



Figure 16: Early HVAC control panel with digital passenger compartment temperature control, auxiliary heater controls and temperature controls for the driver's compartment. 1. Passenger compartment temperature control. 2. HVAC system auto ON. 3. Fresh air control switch. 4. Auxiliary heater switch. 5. Auxiliary heater tell -tale lamp (KL117). 6. Driver's fresh/recirculated air control switch. 7. Defroster switch (S115). 8. Blank. 9. Temp control driver's compartment (R120).

- 3) Reinstall the dashboard switch panel.
- 4) To gain access to the rear of the HVAC controls, undo and remove the control panel mounting screws. Withdraw the panels.
- 5) Unplug the Sonna temperature control switch (see Figure 17). Remove the control knob, unscrew the nut securing the switch to the panel, remove the dial

plate and withdraw the switch and attached wiring (see Figure 17). Mark the control switch counter plug (connector) for future reference.



#### Figure 17: Sonna temperature control switch

- 6) Remove the switch blanking plate (8, Figure 16). In this location, install UWE Easy Term temperature control switch VH 11038448.
- Behind the HVAC control panels, locate the connector marked in step 5. Separate the connector from its wiring. From the connector wiring loom, cut-off the blue, and yellow-green wires. Using a butt connector, attach a piece of red-yellow wire to the brown wire of the wiring loom. Connect the red-yellow wire to terminal #3 of the new temperature control switch (see Figure 20).
- 8) Connect the temperature sensor wires to terminals #5 and #6 of the new temperature control switch (see Figure 20).
- 9) Install a length of brown wire between terminal #1 of the new temperature control switch and the ground wire of auxiliary heater tell-tale lamp KL117 (5, Figure 16).
- 10) Install a length of blue 12 AWG wire between terminal #2 of the new temperature control switch and terminal #3 of defroster switch S115 (7, Figure 16 and Figure 20).
- 11) Check that the secondary lock connector of the new switch is secured properly to the switch housing.
- 12) Reinstall the HVAC control panels.

#### 5. <u>To change the water valve wiring – main junction box</u>:

1) In the luggage compartment, open the main junction box and locate connector P900 at the bottom of the left hand connector rack (see Figures 18 and 20). Cut-off the 12 AWG blue wire from terminal #2 of the plug. Tape the wire.



Figure 18: Location of connector #P900

2) Close the main junction box.

#### 6. To change the water valve wiring - water valve and pump panel:

- In the water valve and pump compartment, disconnect the electric water valve control box, which has been removed in step 10 of "Section 1 – Sonna to Burkert water valve conversion – plumbing"
- At the control box wiring loom (3 wires) cut-off the blue, and yellow-green wires (Figure 20). Extend the brown wire and route it and connect it to terminal #1 (Figure 19) of the newly installed solenoid valve connector (Figures 19 and 20) Connect a suitable ground wire to terminal 2, Figure 18 of the solenoid valve connector.
- 3) Install the connector onto the solenoid valve and secure with the mounting screw.



Procedure "Section 3 – Electrics" complete.

Figure 19: Solenoid valve hook-up

- 1. Live wire
- 2. Ground

#### DISCLAIMER:

The procedures contained herein are not exclusive. Van Hool cannot possibly know, evaluate, or advise the transportation industry of all conceivable ways in which a procedure may be undertaken or of the possible consequences of each such procedure. Other procedures may be as good, or better, depending upon the particular circumstances involved.

Each carrier who uses the procedures herein must first satisfy itself thoroughly that neither the safety of its employees or agents, nor the safety or usefulness of any products, will be jeopardized by any procedure selected.

Page 18 of 20



