

TT7693EN
August, 2015
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SUBJECT: C3/C4 Bonded Piston P/N 29552373 Failure – Capture of Relevant Information

MODELS AFFECTED: 3000, 3500 Models (All Variants), B300, B400, T Series (All Variants)

Introduction:

This Tech Tip describes the necessary actions to be performed by the service technician to obtain information related to 3000 series C3/C4 Bonded Piston failure.

Issue:

Water or coolant intrusion into the transmission fluid can cause C3/C4 Bonded Piston failure in a 3000 series transmission.

Symptoms:

When C3/C4 Bonded Piston failure occurs, the most frequently associated Diagnostic Trouble Codes (DTC) are shown in the table below (refer to [Table 1](#)).

Table 1. Associated DTCs

DTC	DTC Description
P0729	Incorrect 6th Gear Ratio
P0732	Incorrect 2nd Gear Ratio
P0733	Incorrect 3rd Gear Ratio
P0735	Incorrect 5th Gear Ratio
P0736	Incorrect Reverse Ratio
P0777	Pressure Control Solenoid (PCS2 Pressure Control Solenoid) Stuck On
P0796	Pressure Control Solenoid (PCS3) Stuck Off
P0797	Pressure Control Solenoid (PCS3) Stuck On
P088A	Transmission Filter Maintenance Alert
P0894	Unexpected Mechanical Gear Disengagement
P2714	Pressure Control Solenoid (PCS4) Stuck Off
P2715	Pressure Control Solenoid (PCS4) Stuck On

Attachment: Information Collection Worksheet – C3/C4 Bonded Piston failure P/N 29552373.

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Action 1:

When these DTCs occur, a clutch test should be performed. If the clutch test reveals turbine speed/slippage in 2nd or 3rd ranges, there should be a presumption that C3/C4 Bonded Piston failure may be the cause. This condition is often associated with refuse, dock spotter, street sweeper, and transit bus vehicles.

The technician must collect the following information on the attached form for submission to the Allison Transmission Service Department:

Prior to transmission removal and disassembly:

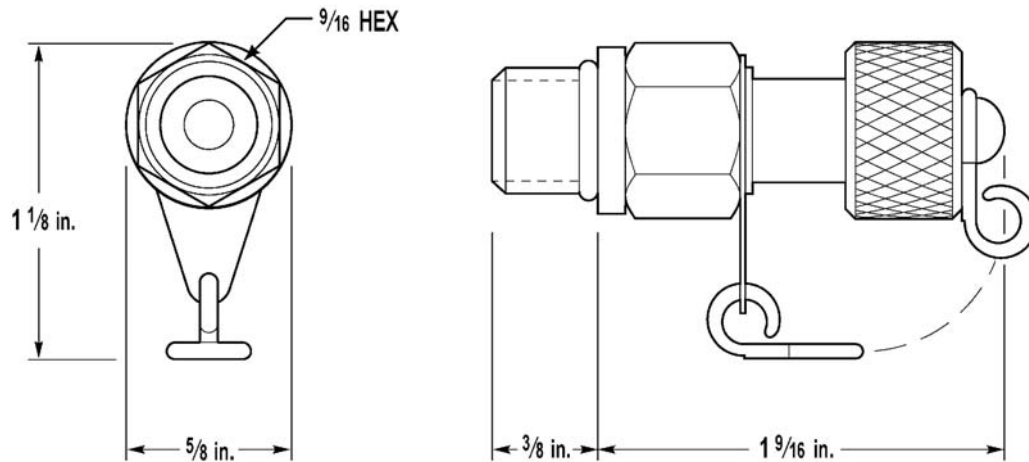
1. Record the following:
 - a. Transmission serial number
 - b. Mileage, kilometers, or hours accumulated
 - c. Mileage, kilometers or hours since last transmission fluid change
 - d. Transmission fluid level at operating temperature
 - e. Transmission cooler type: Remote/Integral & Model
 - f. Results of test for Ethylene Glycol in ppm



NOTE: Nelco Company offers a kit that detects the presence of ethylene glycol in oil. The kit is identified as “Gly-Tek Test Kit” and can be obtained from:

Nelco Company
1047 McKnight Road
South Saint Paul, MN 55119
651.738.2014
<http://www.gly-tek.com/>

2. Take photos that clearly show the Transmission Breather location in the vehicle, particularly in relationship to wheel splash, splash that occurs as a result of vehicle use/vocation (example – near fluid collection tanks), or direct exposure (example – breather between cab and body). This requirement applies to both transmission mount breather (direct mount) and remote breather installations.
3. Take photos of both sides of transmission showing fill tube port seals, stopper, fill tube, and dipstick. Inspect for evidence of water entry or leakage. Consider: If condition is found showing point of water entry, take clear photographs showing this condition.
4. Collect a valid transmission fluid sample to be analyzed for contamination of transmission fluid by water or engine coolant. Follow the process defined in Allison Instruction Sheet #297 found on the Allison Transmission Extranet (<https://sap.allisontransmission.com>).
 - a. When sampling fluid for the 3000 series based transmissions, use Sampling Valve KST, 7/16” ORB (-4) - Stock Number VC716 from Polaris Industries (refer to [Figure 1](#)). Refer to Allison Instruction Sheet #297.



SAE STRAIGHT THREAD QUICK DRAW VALVE

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Figure 1. Sampling Valve

- b. Operate the transmission until sump temperature is above 60°C (140°F). If transmission temperature is not available, transmission must be at operating temperature.
- c. Operate the engine at idle and transmission in Neutral during the collection process.



WARNING: To help avoid injury or property damage caused by sudden and unexpected vehicle movement:

- Apply the parking and service brake.
- Chock the vehicle wheels and take any other steps necessary to prevent the vehicle from moving.

Warn personnel to keep clear of the vehicle and its path.

- d. Install the sampling valve in one of three main pressure ports (refer to [Figure 2](#) and [Figure 3](#)).

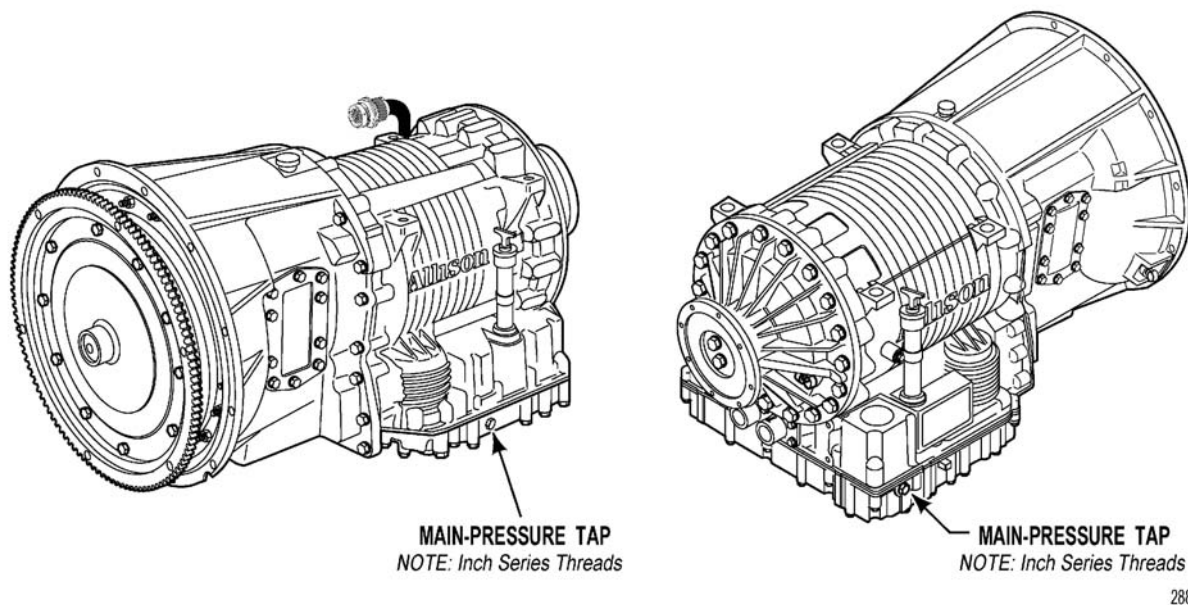


Figure 2. Side Main Pressure Taps

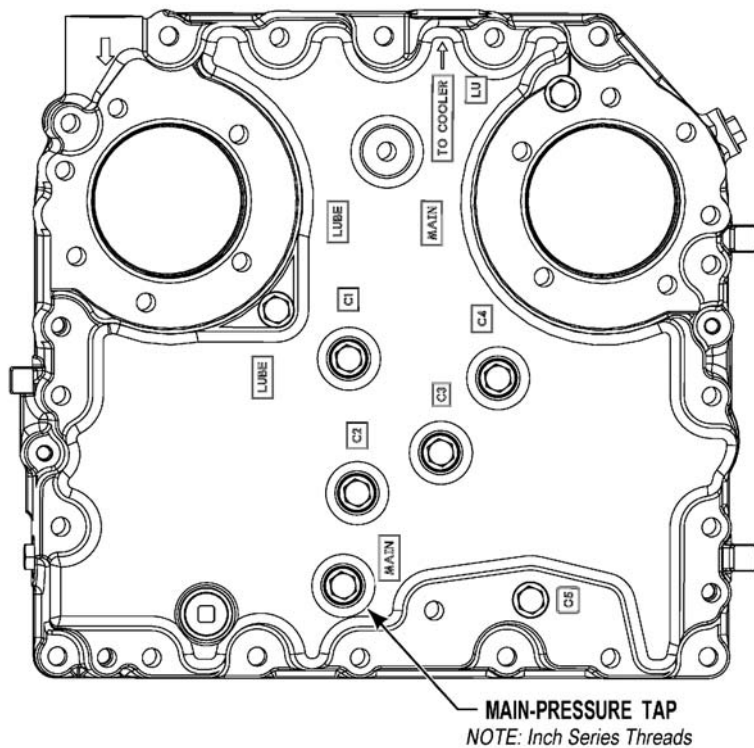


Figure 3. Bottom Main Pressure Tap

- e. Before attaching the collection bottle, install needle/cap assembly into Quick Draw valve to allow a minimum of three fluid ounces (90 ml) to purge into a container. This removes oil/debris trapped in Quick Draw valve and/or remote oil sample hose. Once Quick Draw valve and/or remote oil sample

hose has been purged, install collection bottle to the needle/cap assembly and fill approximately $\frac{3}{4}$ full. Discard the used tube and probe properly. Use Transmission Fluid Sampling and Analysis Kit P/N 29537805 to hold sample. Fill out label included in kit completely, including transmission S/N, hour meter/mileage/Km reading, and sample date. Attach label to sample bottle. If local analysis is to be performed, split sample into two labeled bottles and hold one bottle until local analysis is complete and results have been forwarded to Allison Transmission Service department.

5. Record a Power Off Static Data file using Universal Allison DOC® v13.0.0 or later (instructions in the User Guide under the Help Menu contained in Universal Allison DOC®):
 - a. Action Request
 - b. Read Static Data

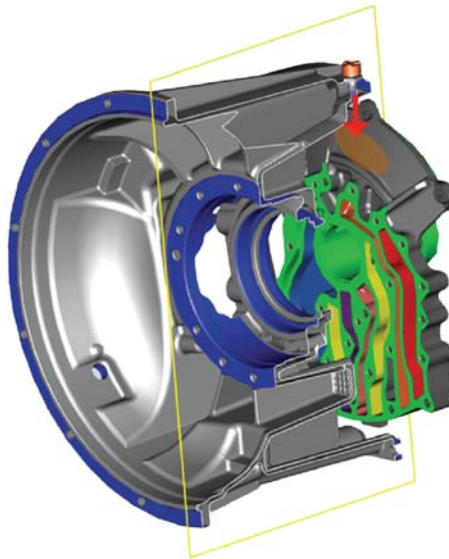
Action 2:

After removal and disassembly:



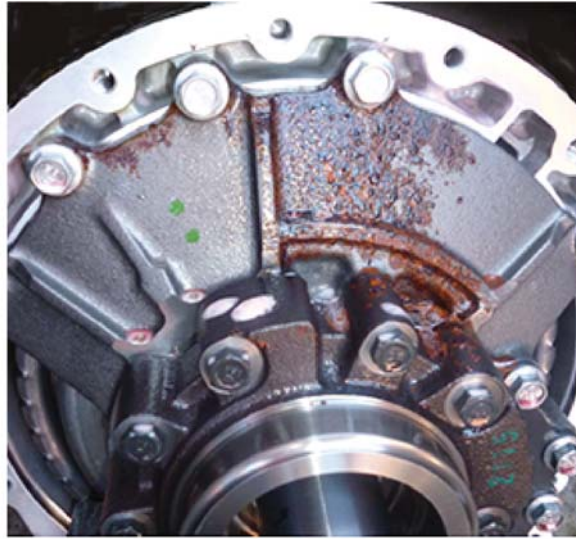
NOTE: The transmission breather port is located directly above the Front Support Assembly. When water enters the transmission through the breather port, often there is physical evidence inside the Torque Converter Housing and on the face of the Front Support Assembly of this water entry (refer to [Figure 4](#)).

1. Take photos of the face of the Front Support Assembly as shown below (refer to [Figure 4](#) and [Figure 5](#)).



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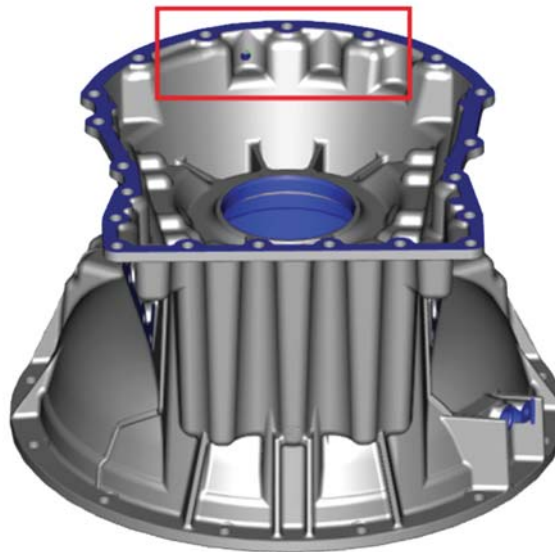
Figure 4. Front Support Assembly



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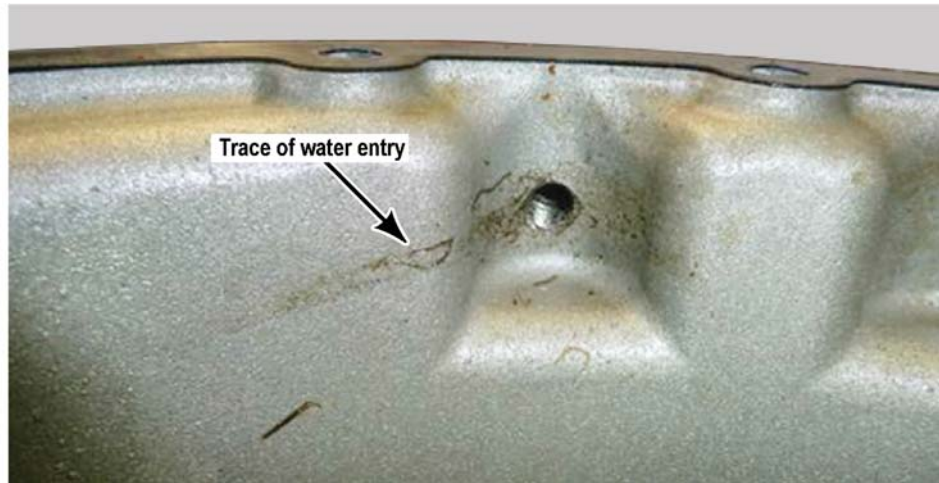
Figure 5. Front Support Assembly With Damage

2. Take photos inside the Torque Converter Housing showing traces of water entry as shown below (refer to [Figure 6](#) and [Figure 7](#)).



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Figure 6. Breather Location



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Figure 7. Water Entry Torque Converter Housing

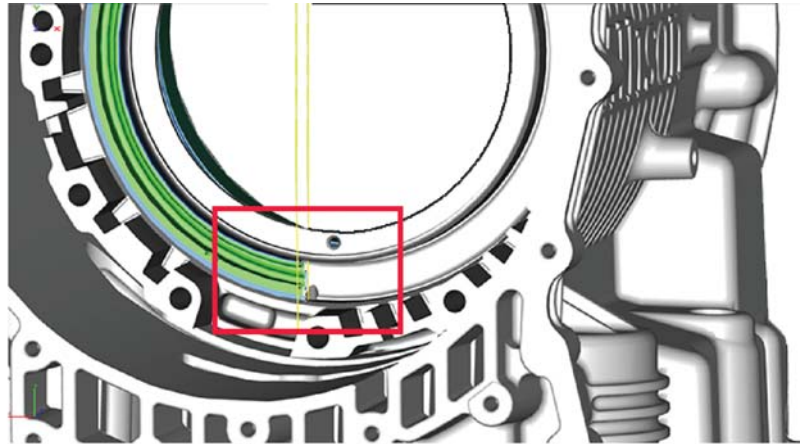
3. Prior to removal of Bonded Piston P/N 29552373, take photos of C3/C4 Clutch Housings clearly showing the location of the tear in the seal (refer to [Figure 8](#)).



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Figure 8. Torn C4 Clutch Piston Seal

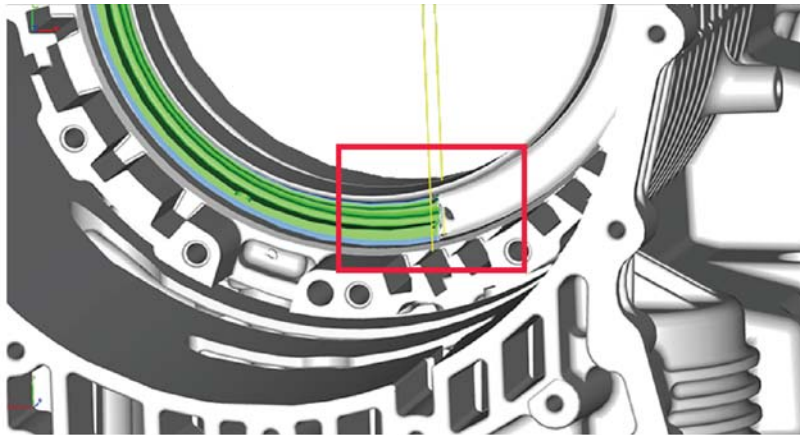
- a. C3 Clutch Housing with Piston Installed (refer to [Figure 9](#)) (Piston sectioned over feed port).



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Figure 9. C3 Clutch Piston Section Cut

b. C4 Clutch Housing with Piston Installed (refer to [Figure 10](#)).



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Figure 10. C4 Clutch Piston Section Cut

Tech Tip Worksheet - P/N 29552373 C3/C4 Bonded Piston Failure – Information

Transmission S/N _____ Vocation _____ OEM _____ Model _____

Vehicle Miles/Km/Hours _____ Miles/Km/Hours since last trans fluid change _____

Transmission Fluid Level (qts. or liters - low/high) _____

Transmission Cooler Type Remote/Integral & Model _____

Results of test for presence of Ethylene Glycol (ppm) _____

(Gly-Tek TestKit - Nelco Company - 1047 McKnight Road South Saint Paul, MN 55119 651.738.2014 - <http://www.gly-tek.com/index.htm>)

Are any of the DTC's shown below active or inactive in the failure records? Indicate "active", "inactive" or "no"

Active / Inactive / No	DTC	DTC Description
	P0729	Incorrect 6th Gear Ratio
	P0732	Incorrect 2nd Gear Ratio
	P0733	Incorrect 3rd Gear Ratio
	P0735	Incorrect 5th Gear Ratio
	P0736	Incorrect Reverse Ratio
	P0777	Pressure Control Solenoid (PCS2) Stuck On

Active / Inactive / No	DTC	DTC Description
	P0796	Pressure Control Solenoid (PCS 3) Stuck Off
	P0797	Pressure Control Solenoid (PCS 3) Stuck On
	P088A	Transmission Filter Maintenance Alert
	P0894	Unexpected Mechanical Gear Disengagement
	P2714	Pressure Control Solenoid (PCS 4) Stuck Off
	P2715	Pressure Control Solenoid (PCS 4) Stuck On

Clutch Test:

Yes / No	Turbine Speed in 2nd range? (circle Yes or No)
Yes / No	Turbine Speed in 3rd range? (circle Yes or No)

Vehicle and Installation Photographs:

	Breather location - showing in particular exposure to splash from wheels, operation, etc.
	Both sides of transmission - showing dipstick, fill tube, fill tube seal, stopper, stopper seal, etc.
	Any point of water entry into transmission.

Transmission Fluid Sample:

☐ Collected per Allison Instruction Sheet #297 (on the Allison Transmission Extranet)

Note: Allison Transmission uses ASTM D6304 Titration method to determine water content in transmission fluid

☐ % If transmission fluid sample is analyzed locally reported water content in percent (%)

Note: New Transynd has water content of approximately 0.03%. Test results below this level should be considered inaccurate.

Conversion from ppm to percent (%): $\text{ppm} \times 0.0001 = \%$

Conversion from percent (%) to ppm: $\text{X}\% \times 10,000 = \text{ppm}$

Collect Power Off Static Data file:

☐ Yes / No Has the TCM in the vehicle ever been replaced? (circle Yes or No)

☐ Connect to transmission with Allison DOC - Action Request -> Read Static Data

Disassembly Photos:

☐ Photo of Front Support Assembly below Converter Housing Breather Port

☐ Photo inside Converter Housing - cast surface below Breather Port

☐ C3 Stationary Clutch front view prior to removing Bonded Piston - location of failure

☐ C4 Stationary Clutch front view prior to removing Bonded Piston - location of failure

☐ Failed Bonded Piston - location of failure seen after removal from Clutch Housing