



AMT Gearbox 4320-07-03-01-Transmission And Clutch Pulling Position, Calibration And 4000-07-04-01-Transmission,Calibration(Transmission Removed)Explanations



> Internal Content

Click [here](#) for more information regarding the gearbox calibration function and explanations of what the results mean.

This CBR is subject to change or material may be added. Check back often.



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4320-07-03-01 - Transmission and Clutch, Pulling Position, Calibration

4000-07-04-01 - Transmission, Calibration (Transmission Removed)

4320-07-03-01 - Transmission and Clutch, Pulling Position, Calibration-run while the gearbox is installed in the vehicle to calibrate the gearbox after a repair or programming event.

4000-07-04-01 - Transmission, Calibration (Transmission Removed)-run while the gearbox is removed from the chassis to verify that the unit is assembled correctly after the shift cover has been off the unit. This option does not calibrate the clutch and ignores any condition that would only be available when the unit is installed in the vehicle.

There are four reasons why the calibration operation would need to be performed:

- The transmission ECU has been reprogrammed (this would include programming of a replacement ECU or reprogramming of the existing ECU)
- ~~The clutch cylinder (CCA) has been replaced. This is not a reason to recalibrate if it is the only thing that was replaced.~~
- The clutch has been replaced
- Transmission has been replaced

These options are presented to the user for selection at the beginning of the calibration procedure and it is important that the correct one is selected.

The option (clutch replacement) and replacing a non-functioning TECU requires connection to the Central Systems Clutch replacement causes the X-1 value for the new clutch to be measured and stored in VDA (the X-1 value is the measurement that the transmission ECU uses as reference in determining clutch wear status). Replacing a non-functioning TECU will need to retrieve the X-1 value that is stored in the central systems and program it into the new TECU if the clutch is not replaced. If the clutch is also replaced then the calibration option for replacing the SW or gearbox will need to be run first to set a valid X-1 in the TECU then the clutch replacement option will need to be performed to set the new X-1 in the central systems and the TECU SW for the new clutch.

For the test sequence in the vehicle the events are as follows:

Conditions to calibrate clutch and gearbox cylinders

All the following points must be true to start or continue the calibration.

- a) There is no fault on the clutch cylinder position sensor
- b) There are no faults on the gearbox position sensors
- c) There is no active fault code for low supply air pressure.
- d) There is no fault on the supply air pressure sensor
- e) There are no faults on the clutch valves (CVU)
- f) There are no faults on the gearbox valves

Conditions to calibrate the clutch cylinder

All the following points must be true to start or continue the calibration of the clutch cylinder.

- a) If replacing the clutch, the x1 value must be between the limits for the x1 value.
- b) The engine speed is defined. (TECU receives valid engine speed signal)
- c) The engine is not running.
- d) There is no fault on the main shaft speed sensor
- e) The main shaft is not rotating.
- f) The gearbox must be installed in the vehicle.

1) Clutch position and X1 value (PID 33 FMI13, P1052-54)

- a) The Clutch is disengaged and engaged to determine stroke and to set the X1 initial position. This tells the gearbox that the clutch can be controlled.

Conditions to calibrate cylinder for sleeve ULC

- a) Split shifter must be in Neutral
- b) There is no electrical faults on the position sensor for sleeve ULC
- c) No faults

2) Calibration of Cylinder Sleeve Ultra Low Crawler (ULC) (P10C6-54)

- a) The cylinder for sleeve ULC is shifted to each end position and the position of each end position is measured by the position sensor.

Conditions to calibrate the gearbox cylinders (Split, 1/R, 2/3 and range shifter)

All the following points must be true to start or continue the calibration of the gearbox cylinders.

- a) The engine speed is defined.
- b) The engine is not running.
- c) There is no fault on the main shaft speed sensor
- d) The main shaft is not rotating.
- e) The clutch cylinder (stroke) is calibrated.
- f) If the main box (1/R,2/3) is being calibrated, the split has to be calibrated.
- c) If the range is being calibrated, the main box has to be calibrated.

3) Splitter position (PID 32 FMI 13, P1051-54)

- a) This moves the Splitter shifter from front to rear in the gearbox and sets the values for direct split, indirect split and neutral.

4) Main box shifter positions (PPID 10 FMI 13, P105E-54, PPID 11 FMI 13, P105F-54)

- a) Same as the Splitter portion. It does this for the 1st/rev and the 2nd/3rd shifter

5) Range shifter positions (PID 31 FMI 13, P1050-54)

- a) Moves the range from high to low and records the values. There is no neutral position for the range.

Conditions to calibrate the clutch slip point.

All the following points must be true to start or continue the calibration of the clutch slip point.

- a) There is no fault on the counter shaft speed sensor*
- b) The engine speed is defined.*
- c) The engine is running.*
- d) There is no fault on the main shaft speed sensor*
- e) The main shaft is not rotating.*
- f) The clutch cylinder (stroke) is calibrated.*
- g) The gearbox brake valve is not short circuit to the battery.*
- h) The main box is calibrated.*
- i) The range is calibrated.*

6) Clutch slip point calibration. (PPID 51 FMI 13, P1061-54)

- a) Once all the rest of the items are calibrated the gearbox knows that it can control the clutch and can detect neutral. If those things cannot be achieved it will not allow the unit to crank. The engine can be cranked and the slip point will be calibrated.
- b) The test will ask the technician to crank the engine and wait. The TECU sees that the engine is running and the conditions are met for the test.
 - i) Clutch is disengaged
 - ii) Countershaft brake is engaged to stop the gearbox and clutch disk from turning.
 - iii) The clutch is then slowly engaged until the TECU senses that the gears are starting to turn in the gearbox.
 - iv) iii is performed several times to fine tune the slip point calibration value.
 - v) TECU then saves this clutch position as the slip point position.

Note: Clutch slip point calibration is checked automatically every time the engine is started if the air pressure is good and the unit is allowed to sit and idle before engaging a gear and moving the vehicle.

If the calibration fails at any point during this test then the faults should be checked to see what fault codes are still active with an FMI 13 or 54 to determine what part of the test failed and then the focus should be on investigating that portion of the test.

There are several reasons for a calibration to fail including:

Improperly assembled gearbox

If the gearbox has been apart and the calibration is run to verify the unit is assembled properly then the most likely cause for a failure is a misaligned shift fork/shift collar. The calibration will stop at the point of failure and return an error code (126).

Failed component, which was not detected or properly diagnosed prior to a SW programming event, which will not allow the calibration to pass.

Calibrations and test for OBD13 and newer are called 'Routines'. Tech tool will tell you what routine failed during a calibration but does not tell what that routine is for. Depending on the error code that is returned with the routine it can be determined what is failed. The calibration routines are as follows:

R1AAB	Calibration of Split Cylinder
R1AAC	Calibration of Main box Cylinders
R1AAD	Calibration of Range Cylinder
R1AAE	Calibration of Clutch Cylinder Stroke
R1AAF	Calibration of Clutch Cylinder Slip Point
R1AJS	Calibration of Cylinder Sleeve Ultra Low Crawler (ULC)

OBD13 and newer units will return a code between 8 and 126 when a failure occurs in the calibration. The most common error codes seen are listed below.

#10	The engine speed is undefined	This means that the engine is running when it shouldn't be or is not running when it should be.
#14	To low supply air pressure.	Units with air leaks may not hold pressure long enough to complete the test. If air pressure is too low before the test is started in Tech tool the tool will not enter the test. This code will appear if the fault occurs while the test is being run.
#18	The clutch cylinder (stroke) is not calibrated.	This error can appear when the clutch calibration is run and the calibration fails. The indication of failure may not be seen in the clutch calibration but may appear as the gearbox calibration is requested. A requirement of calibrating the gearbox in the chassis is a properly calibrated clutch position.
#19	The clutch is not disengaged.	If the clutch is required to disengage for a calibration and does not disengage this is the result.
#33	It takes too long time to shift the split	Typically seen when the split shift fork is not properly engaged in the shift collar after reassembly of the gearbox or there may be an air leak that or other reason to prevent the shifter from moving.
#40	X1 Value is not allowed	This error can be seen after clutch replacement if there is a problem with the clutch HW or the installation of the clutch. It can also be seen when the wrong clutch calibration option is run in Tech Tool. If the clutch has not been replaced and the wear limit (X2 value) is less than the MIN allowed Value of X1 the calibration cannot use that value. A clutch only calibration cannot be used with an old clutch.
#45	The clutch torque is undefined.	This indicates that the expected reaction from the clutch was not seen. This is seen most times during the clutch slip point calibration and could be a clutch or pressure plate issue, a countershaft brake issue. Normally the TECU expected to see the clutch disengage and stop turning the input shaft but that did not happen.
#49	The engine is not running	Some tests need the engine to be running to function correctly. Normally this is as simple as starting the engine and restarting the test.
#50	It takes too long time to move the clutch to the requested position.	The clutch did not move fast enough when commanded to do so. Things that can cause this include: air leak, air restriction or a bad component.
#52	The main shaft is rotating	Normally seen during the clutch slip point calibration. This is typically seen if the driveshaft is not installed during the test.
#126	Test was completed OK but errors were detected	This is seen when the test routine requests a test or calibration to run and the response it receives back does not

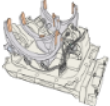
		indicate there was an electrical problem but the sensor values received were not in the range that was expected. Normally an assembly issue when received during a calibration.
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1





2





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4





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4320-07-03-01 Transmission, clutch, engagement point

Simulation

Information >> Conditions >> Execution >> Result

Calibration in progress

1 Clutch
2 Transmission
3 Start the engine
4 Clutch engagement point
5 Ignition ON, engine OFF

Successful completed steps

Calibration in process

1





2





3




4





5




4320-07-03-01 Transmission, clutch, engagement point

Information >> Conditions >> Execution >> Result

Error

Technical error

The conditions for the function are not fulfilled

Recommended actions

- Check that the conditions are met
- Check that no relevant active or intermittent DTCs are set
- Restart the operation

If the problem remains, contact Prevost technical support for assistance

Detailed information

- Code: 16
- Description: The clutch cylinder (stroke) is not calibrated (72071)
- Electronic Control Unit: TECU
- R1AAE

Continue

Return code from test failure

Description of reason for failure

Continue

Routine that returned the failure code

[illegible]