

GM · POWERTRAIN

P1871

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P1871 · GM

Undefined Gear Ratio

P1871 on GM vehicles means the transmission control module (TCM) has calculated an undefined or implausible gear ratio from the input and output speed sensors, so it cannot confirm which gear the transmission is actually in. The computer compares expected ratio against measured ratio and flags the code when the calculated value falls outside every programmed gear ratio for a set time.

SYSTEM	CODE TYPE	SEVERITY	FIX DIFFICULTY	AREA
Powertrain	GM specific	Medium	Professional	Transmission

Symptoms you may notice

- Often no symptoms besides the warning light, especially if the fault is intermittent
- Harsh or delayed shifts as the TCM defaults to a limp or fixed gear strategy
- Transmission stuck in a single gear or refusing to downshift at stops
- Speedometer fluctuation or incorrect reading if the output speed signal is affected
- Slipping sensation or engine flare between shifts under load
- Reduced fuel economy on vehicles that default to a higher gear ratio

Common causes, most likely first

- 1 Low or degraded automatic transmission fluid (ATF) causing slipping and ratio error
- 2 Faulty input or output speed sensor (VSS) sending an erratic signal
- 3 Damaged or corroded wiring and connectors between the speed sensors and the TCM
- 4 Valve body wear or sticking shift solenoids causing the transmission to engage the wrong gear
- 5 Internal clutch or band wear allowing slip that changes the effective ratio
- 6 TCM software calibration issue or faulty TCM on older GM units
- 7 Contaminated fluid or a clogged filter restricting hydraulic pressure

How to diagnose and fix it

- 1 Scan all modules and record freeze-frame data for P1871, then check for related transmission codes
- 2 Check ATF level, condition, and smell; service fluid and filter if degraded or overdue
- 3 Inspect input and output speed sensor connectors and harness for chafing, corrosion, or loose pins
- 4 Compare live input and output speed sensor readings against expected values during a road test
- 5 Perform a resistance and signal test on both speed sensors and replace any that drop out
- 6 Check shift solenoid operation and valve body condition if ratio error persists after sensor and fluid service
- 7 Verify TCM calibration and reprogram or replace the TCM only after electrical and hydraulic checks pass



What the ratio error really tells you

- A ratio code is a calculated mismatch, not a direct sensor failure, so a good speed sensor can still be present while the real fault is internal slip.
- Low fluid level from a slow leak is one of the most common causes on high-mileage GM transmissions and is often missed because there is no puddle under the car.
- Intermittent P1871 that clears after a key cycle frequently traces to a chafed harness near the transmission connector rather than a failed sensor.
- A worn valve body can command the correct gear while hydraulic pressure loss makes the actual ratio differ, so replacing sensors alone will not fix it.
- After any transmission repair, the TCM adaptive learning must be reset or the code can return until the module relearns the new clutch volumes.

Can I keep driving with P1871?

You can usually drive to a shop if the transmission still engages gears and the light is steady, but avoid heavy throttle, towing, and long highway trips because limp mode can drop you into a single gear without warning. Stop driving if the transmission slips badly or refuses to move.

Tools that help

- OBD-II scan tool with GM transmission live data and freeze-frame capability
- Digital multimeter for sensor resistance and wiring continuity checks
- Transmission fluid level dipstick or scan-tool fluid temperature procedure
- Jack and stands or a lift for harness and sensor access
- Factory service information for ratio specifications and TCM relearn

Reading P1871

P	Powertrain: engine, transmission and emissions.
1	Manufacturer-specific code (GM): its meaning depends on the make.
8	Transmission.
71	The exact fault within that area.

Often seen with

P1870 Transmission Component Slipping · **P0700** Transmission Control System Malfunction · **P0715** Input/Turbine Speed Sensor Circuit Malfunction · **P0720** Output Speed Sensor Circuit Malfunction · **P0730** Incorrect Gear Ratio



See it working

Watch the animated explainer [How an Automatic Transmission Works, Gear by Gear](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/gm-p1871/>

