The NVG246 Transfer Case, Part 2: System Diagnosis and Repair

The NVG246 transfer case control system. With this understanding of how the system works, it’s time to discuss diagnosing and repairing the control system.

In this article we will be discussing some of the common problems and solutions we’ve encountered on the ATRA HelpLine.

Where to Start

The first place to start with any diagnosis is to duplicate the symptom. If you can’t duplicate the symptom, it’s virtually impossible to diagnose the problem with any degree of certainty.

In the previous article we discussed the basic description and operation of the NVG246 transfer case control system. With this understanding of how the system works, it’s time to discuss diagnosing and repairing the control system.

With this understanding of the NVG246 control system, the “Service 4WD” light on the dash will light. Write down any codes you retrieve and clear them, to see if the codes return during your test drive.

How to Retrieve Codes

The Transfer Case Control System can be accessed with a scan tool through the DLC, just left of the steering column. Some aftermarket scan tools aren’t capable of communicating with the ATCM, so you may have to use an OEM scan tool or equivalent to gain access to the ATCM.

After connecting your scan tool and gaining access to the vehicle’s computer network, retrieve codes from the PCM. Engine performance codes usually won’t interfere with the Transfer Case Control System operation, but VSS problems can. In addition, problems in the Transfer Case Control System can interfere with transmission operation and shifting.

After retrieving codes from the PCM, you’ll need to access the ATCM. The ATCM can be accessed through the ATCM heading or the Other Modules heading, depending on the scan tool you’re using. Once you’ve accessed the ATCM, select Retrieve Codes: If there are any codes in the ATCM your scan tool will display them.

Write down any codes before clearing them, to see if they return after your test drive. If any codes return during your test drive, you’ll need to diagnose them.

Types of PCM and ATCM Codes

The PCM is capable of setting two types of codes:

- **P** codes indicate an Engine Performance System or Transmission System problem.
- **U** codes indicate a Communication System problem.

The ATCM is capable of setting two types of codes:

- **B** codes indicate a Body System problem.
- **C** codes indicate a Chassis System problem.

The PCM codes that usually interfere with the Transfer Case Control System operation are vehicle speed sensor related, as in P0500, P0502 and P0503, and communication system codes such as U1024 (No Communication with the ATCM).

Here’s a list of codes you may encounter in the ATCM:

- **B2725** — Range/mode switch circuit
- **C0300** — Rear propeller shaft speed sensor circuit
- **C0305** — Front propeller shaft speed sensor circuit
- **C0308** — Motor A/B circuit, short to ground
- **C0309** — Motor A/B circuit, short to voltage
- **C0310** — Motor A/B circuit, open circuit
- **C0315** — Module ground circuit

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Figure 1
C0323 — Lock solenoid circuit, open circuit
C0324 — Lock solenoid circuit, shorted to voltage
C0327 — Encoder feed circuit
C0367 — Front axle control circuit, shorted actuator or short to voltage
C0374 — Shift control module unable to control slip
C0376 — Front and rear propeller shaft speeds greater than 20% difference
C0387 — Unable to complete shift as commanded
C0550 — Failed shift control module test
C0611 — Shift control module didn’t receive VIN information per application

**Code Diagnosis**

Note: One very useful tool when diagnosing electrical problems is to locate a complete wire diagram for the vehicle you’re working on. For this article we’ve included one from a 2001 Chevrolet Silverado 1500 (Figure 1).

Now that you’ve retrieved the codes from the ATCM and the PCM, it’s time to diagnose them. The first thing you want to do is categorize your codes to the system you’re working on, for instance:

1. B2725 is related to the transfer case control switch circuit, which means you only need to check the transfer case control switch circuits.
2. C0300, C0305 and C0376 are related to front and rear drive-shaft or propeller shaft speed sensor circuits.
3. C0308, C0309 and C0310 are related to motor A/B circuit problems.
4. C0315 indicates a failure in the ATCM ground circuit.
5. C0323 and C0324 indicate a circuit problem in the lock solenoid circuit.
6. C0327 indicates the encoder feed circuit has a fault.
7. C0367 indicates a circuit failure in the front axle control system.
8. C0374 and C0387 indicate the ATCM wasn’t able to control the shift as commanded.
9. C0550 and C0611 indicate a failure in the ATCM module test or the ATCM VIN information doesn’t match the PCM.

As you can see from the code list breakdown, there are only nine problem areas for this transfer case control system. Now let’s take a look at diagnosing these codes.

**Code Diagnostic Procedures**

**Code B2725** — transfer case control switch circuit diagnosis: The ATCM is monitoring the voltage coming back from the transfer case control switch and has determined that the voltage has dropped out of specifications for more than 5 minutes.

The fastest way to diagnose this code is to verify the ATCM is delivering an 8-volt DC signal to the transfer case control switch on pin A of connector C1 (figure 2).

If the ATCM is delivering the 8-volt reference signal to the transfer case control switch, check the resistance of the switch between pin A and pin H of connector C2 (figure 2). The transfer case control switch resistance should be:

- Auto 4WD = 61.7-68.1 ohms
- 4HI = 656-760 ohms
- 2HI = 1.50-1.53 K ohms
- 4LO = 2.32-2.37 K ohms
- Neutral = 1.015-1.035 K ohms

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**Figure 2**

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If the resistance falls within range, the switch is good: You either have a wiring problem to the ATCM or the ATCM is faulty.

You can also perform this resistance test at ATCM terminals F14 and F16 connector C1 (figure 3).

Codes C0300, C0305 and C0376 — front and rear driveshaft speed sensors: The ATCM monitors the AC signal produced by the front and rear speed sensor circuits and has determined the speed sensor signal isn’t within specifications.

Connect your scan tool and monitor the front and rear driveshaft speed sensors output signals. If the speed sensor values change with vehicle speed, the ATCM is receiving the speed sensor signals.

Next, check the speed sensors’ resistances. Sensor resistance should be between 1300-2700 ohms. If resistance is correct, monitor the speed sensor AC signal right at the ATCM connector, at pins F5 and F6 (rear speed sensor) and at pins E12 and E13 (front speed sensor) at the ATCM connector C1 (refer to figure 3). The AC signal voltage should rise to about 3.25 VAC at 5 MPH.

If the signal is correct the problem is either intermittent or the ATCM is faulty. Code C0376 will set if there’s more than 15 RPM difference between the front and rear driveshafts’ RPM.

Codes C0308, C0309 and C0310 indicate a circuit problem in the motor A/B circuit. The ATCM monitors the motor A/B circuit and has determined that the circuit is shorted, grounded, or open.

Check the shift motor circuits for continuity at the shift motor itself. The resistance across the shift motor terminals should be between 0.5 – 35 ohms (figure 4).

If the motor circuit resistance is within specification, suspect a problem with the wiring, connections or an ATCM failure.

Code C0315 indicates the ATCM has lost its ground circuit. This code requires checking the power and ground circuits to the ATCM.

Check B+ supplied voltage at ATCM pin D at connector C2 and ignition feed circuit at pin E10 at connector C1 (figure 3).

Check the ATCM ground circuit on pin C at connector C2 (figure 3). If power and grounds are okay, suspect a possible ATCM failure.

Codes C0323 and C0324 indicate the ATCM has detected a short in the lock solenoid circuit. The quickest way to diagnose this code is to check the power feed circuit at pin C of the encoder motor C1 connector (figure 4).
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If battery voltage is present, check the resistance across the lock solenoid circuit at the encoder motor assembly. The resistance across the lock solenoid circuits at pins C and D of the encoder motor C1 connector should be between 18-25 ohms.

If the resistance isn’t within specifications, replace the encoder motor assembly. If the lock solenoid resistance is correct, suspect a problem in the wiring, connections or a faulty ATCM.

**Code C0327** indicates the ATCM has detected an encoder circuit problem. The first test to perform is to check the 8-volt reference going to the encoder circuit on pin E of the encoder motor C2 connector (figure 4).

If the 8-volt reference is okay, check the voltage from the encoder on each of the pins of the encoder motor C2 connector (figure 4).
channel circuits, at pins A, B, C, D and F. If you have continuity through the encoder, suspect a problem in the wiring, connections or an ATCM failure.

**Code C0367** indicates the ATCM has detected a failure in the front axle control system. The fastest way to diagnose this code is to check the circuits going to the front axle actuator.

Check power and ground circuits. Bypass the control system and energize the front axle actuator to engage 4X4 operation. Common failures in this circuit are related to the actuator itself, wiring, connections or the ATCM.

**Codes C0374 and C0387** indicate the ATCM wasn’t able to control the shift as commanded. The first test to perform is to remove the encoder motor assembly from the transfer case and try to shift the transfer case manually by turning the sector shaft to engage all ranges.

If you can engage all ranges, this code is usually caused by a faulty encoder motor assembly.

**Codes C0374 and C0387** indicate a failure in the internal ATCM module test and the ATCM programmed VIN doesn’t match the PCM VIN information. Both codes require replacing the ATCM, after verifying proper power and grounds at the ATCM.

### Common Problems

**B2725** is almost always a circuit problem at the transfer case control switch or a faulty transfer case control switch. Replace the transfer case control switch.

**C0300, C0305 and C0376** are almost always related to connection problems or the speed sensors themselves.

**C0323 and C0324** are usually caused by an internal lock solenoid failure or a connection problem at the encoder motor assembly connector. Replace the encoder motor.

**C0327** is usually a connection problem at the encoder motor or an internal encoder problem. Replace the encoder motor assembly.

**C0367** is usually caused by a faulty front axle actuator or a connection at the actuator.

**C0374 and C0387** are usually caused by an internal transfer case problem or an encoder motor assembly. Verify the transfer case can be shifted manually.

**C0550 and C0611** are almost always an internal ATCM failure. Always check power and ground circuits before replacing the ATCM. The new ATCM must be flashed with the specific vehicle information to operate properly.

Well there you have it. We’ve covered the basic description, operation and diagnosis of the NVG246 transfer case control system. With this information, a correct wire diagram and a little bit of patience you should be able to diagnose and repair just about any problem you may encounter in this system. I encourage you to become familiar with the NVG246 transfer case control system, so you can do your part to keep those trannys rolling.