
2006
TECHNICAL SEMINAR
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CERTIFICATION
ATRA
AUTOMATIC TRANSMISSION
REBUILDERS ASSOCIATION



The

Automatic Transmission Rebuilders Association

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Dennis Madden
Chief Executive Officer

Welcome to the 2006 ATRA Technical Seminar!

Lance Wiggins and the ATRA Technical staff have really worked hard to get you the most up-to-date and relevant technical information that you can put to work right away… and again, in full color!

For those of you who have attended past ATRA seminars you'll be delighted to know this seminar material is just what you expected from ATRA, or even more. If you've never attended an ATRA seminar before you're in for a treat.

This seminar, along with everything else at ATRA is a group effort, with a lot of people working in the background to make this seminar a success. I am honored to be part of such a worthy organization and to work with such great people.

ATRA is changing all the time. Not only with the way we distribute technical material, but in almost every area where we serve our members, and the industry at large.

On behalf of the ATRA staff, and the ATRA Chapters that work so hard to bring you this seminar, welcome.

Sincerely,

Dennis Madden,

ATRA, CEO

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Lance Wiggins
Technical Director

ATRA is proud to be celebrating another year serving the automatic transmission repair industry. Many changes have taken place over the last year and it's because of those changes that technical training has become an integral part of today's transmission repair industry.

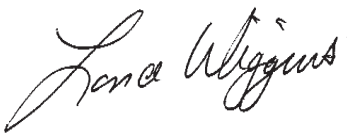
To that end, ATRA is pleased to present its 2006 Technical Seminar. Packed with countless hours of research and development, writing, editing, photography and layout, this year's seminar will stand out as one of the most demanding and useful technical training programs ever developed for this industry.

Once again, this year's technical manual has been produced in full color. With over 325 pages of up-to-the-minute technical information, the 2006 Technical Seminar Manual will remain a valuable resource long after the seminar is just a memory.

We're confident that you'll find this year's seminar presentation and technical manual both informative and profitable. In fact, we're so sure you'll be satisfied with what you learn in this program, we guarantee it!

This past year ATRA lost one of our own, Jim Lambos pasted away in December of 2005 from a vehicle accident. As a reminder of his countless hours speant helping our members, we have deticated this 2006 Technical Seminar Manual to him and his family.

On behalf of the entire ATRA staff, the international board of directors, and all of the ATRA members worldwide, we'd like to thank you for helping to make every day memorable.



Lance Wiggins
ATRA Technical Director

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In Memory Of Jim Lambos



Jim Lambos had been promoted to the rank of Master Sergeant, and he had received several awards and decorations for meritorious service.



IN MEMORY OF JIM LAMBOS

by Paul Morton

James J. "Jim" Lambos joined the technical staff of ATRA in April of this year, following a distinguished 25-year career with the U.S. Air Force. While in the Air Force, Jim held a number of increasingly responsible positions related to the repair and maintenance of vehicles. Not surprisingly, one of his specialties was the repair and rebuilding of transmissions. In fact, this skill was put to good use while he was stationed at the remote outpost of Shemya, Alaska, where Jim's ability to rebuild transmissions saved the Air Force thousands of dollars in unneeded shipping costs. At the time of his retirement, Jim had been promoted to the rank of Master Sergeant, and he had received several awards and decorations for meritorious service.

In 1985, Jim married the former Ronda McIntire, and together they had two sons; Jimmy, 14, and Zane, 10.

Following his retirement, Jim walked into the ATRA IBO and spoke with ATRA's Technical Director, Lance Wiggins. Though Lance will recall his relationship with Jim in his own words, he realized that Jim was someone he wanted on the ATRA Technical team. From the beginning, Jim began to make a contribution. In fact, his first technical article appears in this issue, with a forward written by Technical Editor Larry Frash.

On the evening of December 7, 2005, Jim was driving his GTO in nearby Ventura, when he was involved in an accident and killed. His contribution and his loss may best be described by Lance Wiggins, in his own words:



I try to learn from my mistakes, and the knowledge and opinions of others. It helps me grow into the person I want to become. Jim Lambos is one person who helped me in many different ways, in a short period of time. Jim came to the office about eight months ago, looking for a job after many years in the Air Force. His traits and qualities were clear and obvious; you don't find many people like that, just walking in off the street for an interview.

Jim's military background definitely influenced my decision to hire him, and what a good decision that was. He was a complete team player; always asking for more work and never complaining about a thing. For those of you who talked to Jim on the Technical Help line, you know how he always went out of his way to fix your problems.

I can tell you two things about Jim's character that sums it up for me. One, he was a Chicago Bears fan, and two, he was a Cubs fan. And if you support those two teams, you have to be special as well as brave! If I could, I would thank Jim for the time he spent with us, for his loyalty and sense of team play, and for being the person he was. I know I speak for the entire ATRA family, of which he will always be a part, the Tech Department, and for me as well … we will miss you. Rest in peace, my friend.

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In Memory of Jim Lambos:

Husband

Father

Friend

Airman

ATRA Tech

Thank you for allowing the ATRA Family to know you. Rest in Peace my Friend

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ATRA Staff

It's difficult enough getting the seminar book researched, written, pictured, edited, and printed let alone getting it out to the seminar attendees. This is where the ATRA Staff comes in.

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Without the ATRA team, it would be very hard to accomplish the task at hand. Please enjoy the seminar.

Lance Wiggins
ATRA Technical Director

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GM All

Body Style Identification

Several shops have indicated the need for an identification chart for GM body styles. Listed below are the body style codes for the various 2005/2006 GM applications. On passenger cars the body style is indicated by the 4th digit of the VIN. On truck applications the 5th digit indicates the body style.

2006 Models

CARS

A= CHEVROLET COLBALT, PONTIAC PURSUIT, SATURN ION
D= CADILLAC CTS, CADILLAC STS
H= BUICK LUCERNE
J= CHEVROLET OPTRA
M= CHEVROLET MATIZ, PONTIAC SOLTICE
K= CADILLAC DEVILLE
S= PONTIAC VIBE
T= CHEVROLET AVEO, PONTIAC WAVE
U= CHEVROLET U-100
V= CHEVROLET EPICA, PONTIAC GTO
W= CHEVROLET IMPALA, MONTE CARLO, PONTIAC GRAND PRIX, BUICK LACROSSE, BUICK ALLURE
Y= CHEVROLET CORVETTE, CADILLAC XLR
Z= CHEVROLET MALIBU, PONTIAC G6

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GM All

Body Style Identification

2006 Models
TRUCKS
A= CHEVROLET HHR, BUICK RENDEZVOUS 2WD
B= BUICK RENDEZVOUS 4WD
C= CHEVROLET SILVERADO 2WD, GMC SIERRA 2WD, CADILLAC ESCALADE, DENALI 2WD,
E= CADILLAC SRX
G= CHEVROLET EXPRESS VAN 2WD, GMC SAVANA VAN 2WD
H= CHEVROLET EXPRESS VAN AWD, GMC SAVANA VAN AWD
K =CHEVROLET SILVERADO 4WD, GMC SIERRA 4WD, CADILLAC ESCALADE, DENALI 4WD
L= CHEVROLET EQUINOX, PONTIAC TORRENT
N= HUMMER H2
S= 2WD CHEVROLET COLORADO, SSR, BLAZER, TRAILBLAZER,
2WD GMC ENVOY, CANYON, SONOMA, BUICK RAINER, ISUZU ACENDER 2WD
T= 4WD/AWD CHEVROLET COLORADO, SSR, BLAZER, TRAILBLAZER,
4WD/AWD GMC ENVOY, CANYON, SONOMA, BUICK RAINER, ISUZU ACENDER 4WD, SAAB 9-7, HUMMER H3
U= CHEVROLET UPLANDER 2WD, PONTIAC MONTANA
V= CHEVROLET UPLANDER EXPRESS/APV, PONTIAC AWD/EWB, BUICK TERRAZA, SATURN RELAY
X = SATURN RELAY AWD, BUICK TERRAZA AWD, CHEVROLET UPLANDER AWD
Z= SATURN VUE

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GM All

Body Style Identification

2005 Models

CARS

A= CHEVROLET COLBALT, PONTIAC PURSUIT, SATURN ION
C= BUICK PARK AVENUE
D= CADILLAC CTS, CADILLAC STS
H= BUICK LESABRE, PONTIAC BONNEVILLE
J= CHEVROLET CAVALIER, OPTRA, PONTIAC SUNFIRE, SATURN L300
N= CHEVROLET MALIBU CLASSIC, PONTIAC GRAND AM
M= CHEVROLET MATIZ
K= CADILLAC DEVILLE
S= PONTIAC VIBE
T= CHEVROLET AVEO, PONTIAC WAVE
U= CHEVROLET U-100
V= CHEVROLET EPICA, PONTIAC GTO
W= CHEVROLET IMPALLA, MONTE CARLO, PONTIAC GRAND PRIX, BUICK LACROSSE, BUICK ALLURE, BUICK CENTURY CUSTOM
Y= CHEVROLET CORVETTE, CADILLAC XLR
Z= CHEVROLET MALIBU, PONTIAC G6

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GM All

Body Style Identification

2005 Models
TRUCKS
A= BUICK RENDEZVOUS 2WD, PONTIAC AZTEK 2WD
B= BUICK RENDEZVOUS 4WD, PONTIAC AZTEK 4WD
C= CHEVROLET SILVERADO 2WD, GMC SIERRA 2WD, CADILLAC ESCALADE, DENALI 2WD,
E= CADILLAC SRX
G= CHEVROLET EXPRESS VAN 2WD, GMC SAVANA VAN 2WD
H= CHEVROLET EXPRESS VAN AWD, GMC SAVANA VAN AWD
K= CHEVROLET SILVERADO 4WD, GMC SIERRA 4WD, CADILLAC ESCALADE, DENALI 4WD
L= CHEVROLET EQUINOX, PONTIAC TORRENT
M= CHEVROLET ASTRO, GMC SAFARI
N= HUMMER H2
S= 2WD CHEVROLET COLORADO, SSR, BLAZER, TRAILBLAZER, 2WD GMC ENVOY, CANYON, SONOMA, BUICK RAINER, ISUZU ACENDER 2WD
T= 4WD/AWD CHEVROLET COLORADO, SSR, BLAZER, TRAILBLAZER, 4WD/AWD GMC ENVOY, CANYON, SONOMA, BUICK RAINER, ISUZU ACENDER 4WD, SAAB 9-7, HUMMER H3
U= CHEVROLET UPLANDER 2WD, PONTIAC MONTANA
V= CHEVROLET UPLANDER EXPRESS/APV, PONTIAC AWD/EWB, BUICK TERRAZA, SATURN RELAY
X = SATURN RELAY AWD, BUICK TERRAZA AWD, CHEVROLET UPLANDER AWD
Z= SATURN VUE

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Dexron® VI

New Fluid Introduced

Beginning in April 2005 a new fluid was introduced into the GM line. Designed for the new 6 speed automatic transmissions, Dexron VI has become the factory fill for GM applications. Dexron VI is designed to replace Dexron III as the service fill for GM applications. Dexron VI was developed by GM in conjunction with Petro Canada and Afton chemical company. Dexron VI is a significant advancement when compared to its counterpart Dexron III.
The following chart represents the improvement over Dexron III.

Extended factory fill Change interval	100,000 miles normal 50,000 miles severe
Clutch friction stability	Improved 100%
Clutch durability	Improved 120%
Oil film	Increased 20%
Fluid Oxidation	Improved 100%
Shear Stability	Improved 200%
Foam/Aeration	Improved 150%

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Dexron® VI

New Fluid Introduced

In addition Dexron VI also offers the following advantages over Dexron III:

- Reduces TCC shudder in PWM applications
- Improved low temperature operation
- Lower viscosity
- More consistent viscosity profile
- 99.9 % pure base stock profile

The following are the standards Dexron VI is designed to meet and maintain in production:

Property/test	Dexron VI
Density kg/l @15C	0.846
Color	Red
Flash Point	206C, 403 F
Viscosity cST@40 C cST@100 C	 29.8 6
Viscosity Index	151
Pour point	-54 C, -65F
Brookfield cP @-20C cP @ -30 C cP @ -40C	 1053 3164 12030
Sulphated ash %	0.02

88861003	1 Quart container	DEXRON® -VI GM Vehicle Care
88861037	1 Quart container	DEXRON® -VI AC Delco
88861004 In Canada	1 Liter container	DEXRON® -VI AC Delco
88861045	1 Gallon container	DEXRON® -VI Care
88861043 In Canada	4 Liter container	DEXRON® -VI AC Delco
88861046	55 gallon container	DEXRON® -VI GM Vehicle Care
88861044 In Canada	205 Liter container	DEXRON® -VI AC Delco

Dexron VI is required for clutch to clutch shift transmissions like the 6 speed applications released for the 2006 model year. Dexron VI is designed to back service all Dexron applications but it is not currently certified to meet the Mercon standard.

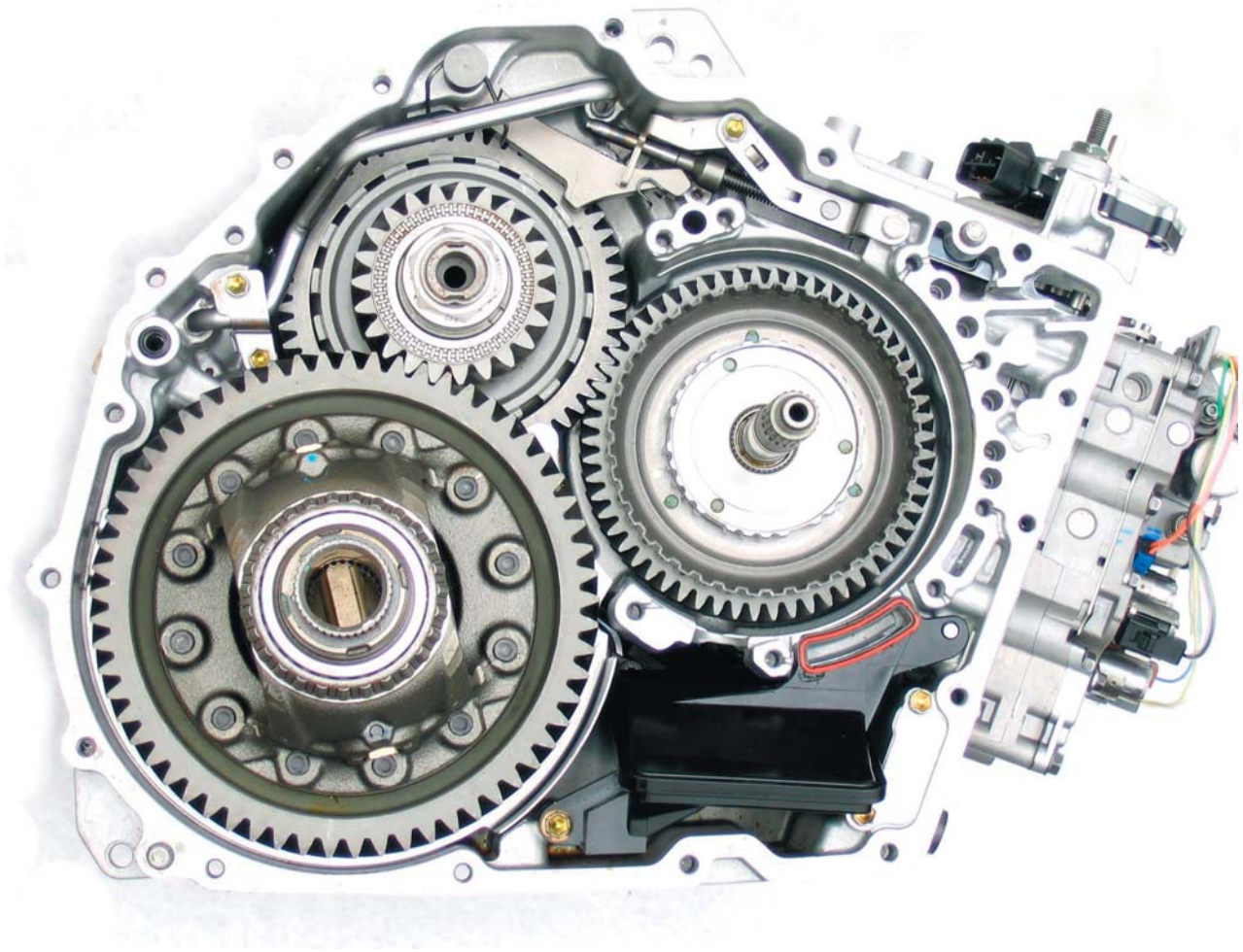
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AF23-5 Saturn ION

Whine Noise in 4th

A gear noise which is amplified by the drive axle may sound like a whine type noise while in 4th gear under light throttle, light load. This condition is most pronounced when the transaxle is warm.

To repair the concern install a new transfer driven gear, output gear and differential assembly.



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4L60E/65E, 4T40E/45E, AF33-5

APP Signals and DTC Applications

Technicians that use a snap shot feature on their meter or use an oscilloscope to aid in diagnosis may misdiagnose the cause of APP DTCs. Your scan tool may register DTCs P0122, P0123, P0220, P0222, P1120, P1220, P1221, P1271, P1275, P1280, P1512, P1514, P1515, P1523, P2101, P2120, P2122 or P2123 on GM "T", "Z", "L" trucks and GM "A" and "Z" car applications. This may lead the technician to replace components that are not faulty.

NOTE: The body styles are as follows:

- T= Trailblazer, Envoy, Colorado, Canyon, H3, Bravada
- Z= Vue
- L= Equinox
- A= Cobalt, Pursuit
- Z= Malibu, G6, Ion

These applications utilize a special software algorithm that is used to locate faults in the APP and TP systems. When monitoring some APP or TP sensors the technician may notice that the voltage drops on the circuit. This condition only lasts for about 6.5ms. This test is performed to determine if there is a short in the sensors or the wiring is present. By monitoring the signal for the other sensors at the time the sensor signal is shorted to ground, the PCM can determine if a short to any of the other circuit are present. If APP, TP DTC's are not set, no repairs should be attempted. If a TP or APP DTC is set, refer to the service information to assist with diagnosis for the DTC's that are set.



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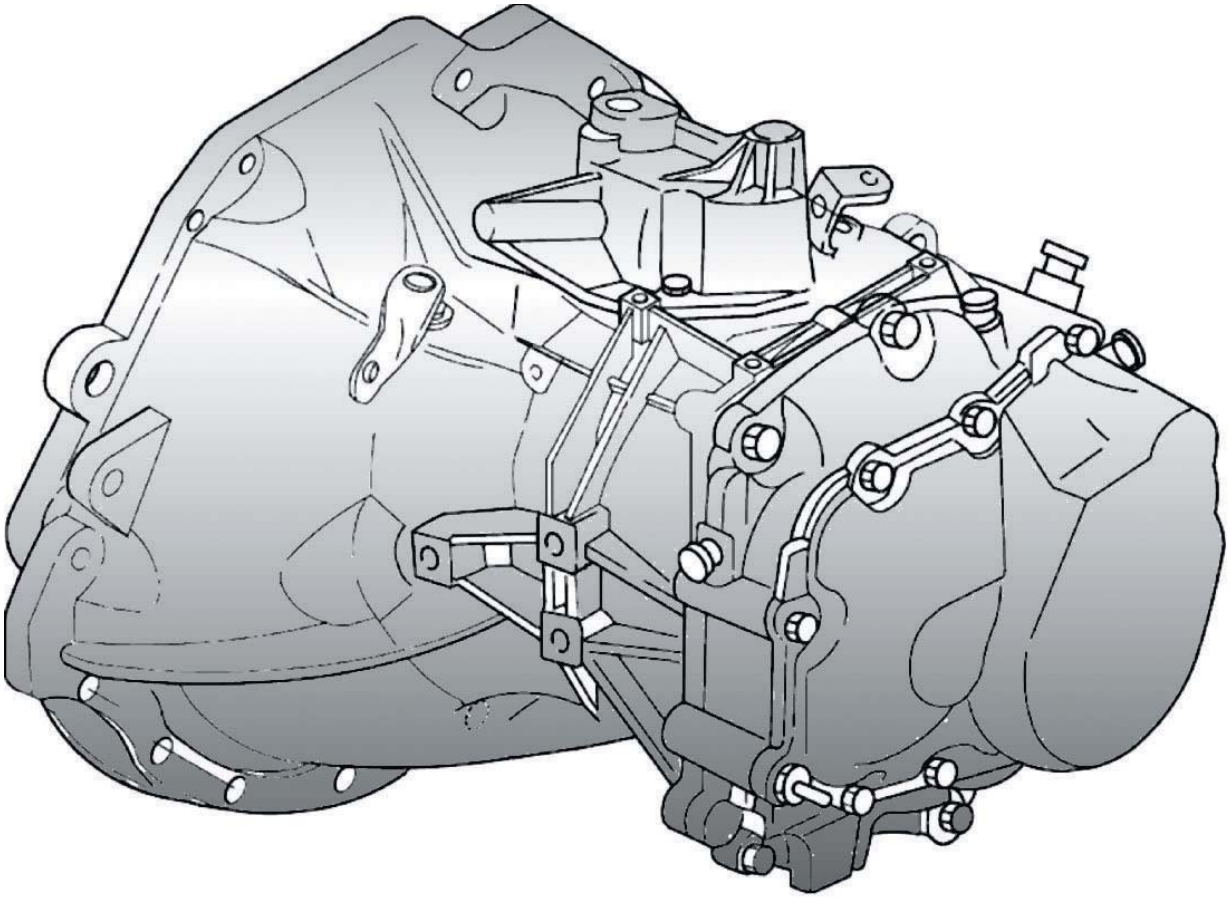
81-40LE

No 4th gear

Chevrolet Aveo, Pontiac Wave

Chevrolet Aveo or a Pontiac Wave equipped with an Aisin Warner 81-40LE (RPO MV6) automatic transmissions may exhibit a no shift into 4th gear at times. The customer may indicate that this is an intermittent condition and generally happens after a cold start.

The 81-40 LE is programmed to inhibit 4th gear anytime transmission temperature is below 59°F (15°C). This feature is designed to lower emissions and enhance heater operation during engine warm up. This should be considered a normal condition.



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5L40/50E

Downshift Related Concerns

Intermittent or Unwanted downshifts while operating the vehicle in a coast condition set, may be caused by a weak internal brake booster vacuum spring that prevents the brake booster pedal position sensor from returning to the released position. The pedal position sensor can be monitored using ABS data. The EBCM signals the PCM which then signals the TCM regarding the brake pedal sensor position via the scan data, causing the condition to occur. To repair replace the brake booster. This condition will not set a DTC.



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5L40/50E, 4T60E

3.6L (LY7) or 2.8L (LP1)

Shared 5-Volt Reference Circuit

Several GM vehicles equipped with a 3.6L (LY7) or 2.8L (LP1) engine share the PCM 5 volt reference circuit among several different sensors. Some vehicle families include the Cadillac CTS/SRX/STS as well as the Buick Lacrosse and Rendezvous to name a few.

The PCM/ECM is not equipped with a DTC for a 5 volt reference problem on the engine families listed above. Therefore, the computer will not set an individual DTC related to the 5 volt reference circuit if a short to ground or an open occur in the circuit. It is likely a low voltage DTC for one of the shared circuits will set a DTC but the problem may not necessarily be located in that circuit or component. As an example, it is likely a P0102 MAF DTC could set even though there is no problem with the sensor or it's circuit. The P0102 may set simply because it was the 1st diagnostic to run.

As an example lets look at a Cadiallic STS, 3.6L
The shared 5 volt reference "A" circuit includes the following circuits:

- MAF sensor
- IAT sensor
- BARO sensor
- Engine oil pressure sensor, EOP
- APP sensors
- A/C pressure sensor
- Fuel tank pressure sensor, FTP

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5L40/50E, 4T60E

3.6L (LY7) or 2.8L (LP1)

Shared 5-Volt Reference Circuit

The shared 5 volt reference “B” circuit includes the following circuits:

- Cam sensor bank 1 intake
- Cam sensor bank 1 exhaust
- Cam sensor bank 2 intake
- Cam sensor bank 2 exhaust

The shared 5 volt reference “C” circuit includes the following circuits:

- APP sensor
- TP sensor

To show you how this might vary lets look at a Buick Rendezvous 3.6L
The shared 5 volt reference “A” circuit includes the following circuits:

- Baro sensor
- EOP engine oil pressure sensor
- APP sensor

The shared 5 volt reference “B” circuit includes the following circuits:

- APP sensor
- MAF sensor
- AC pressure sensor
- FTP fuel tank pressure sensor
- Cam sensor bank 1 intake
- Cam sensor bank 1 exhaust
- Cam sensor bank 2 intake
- Cam sensor bank 2 exhaust

Reference “C” Includes:

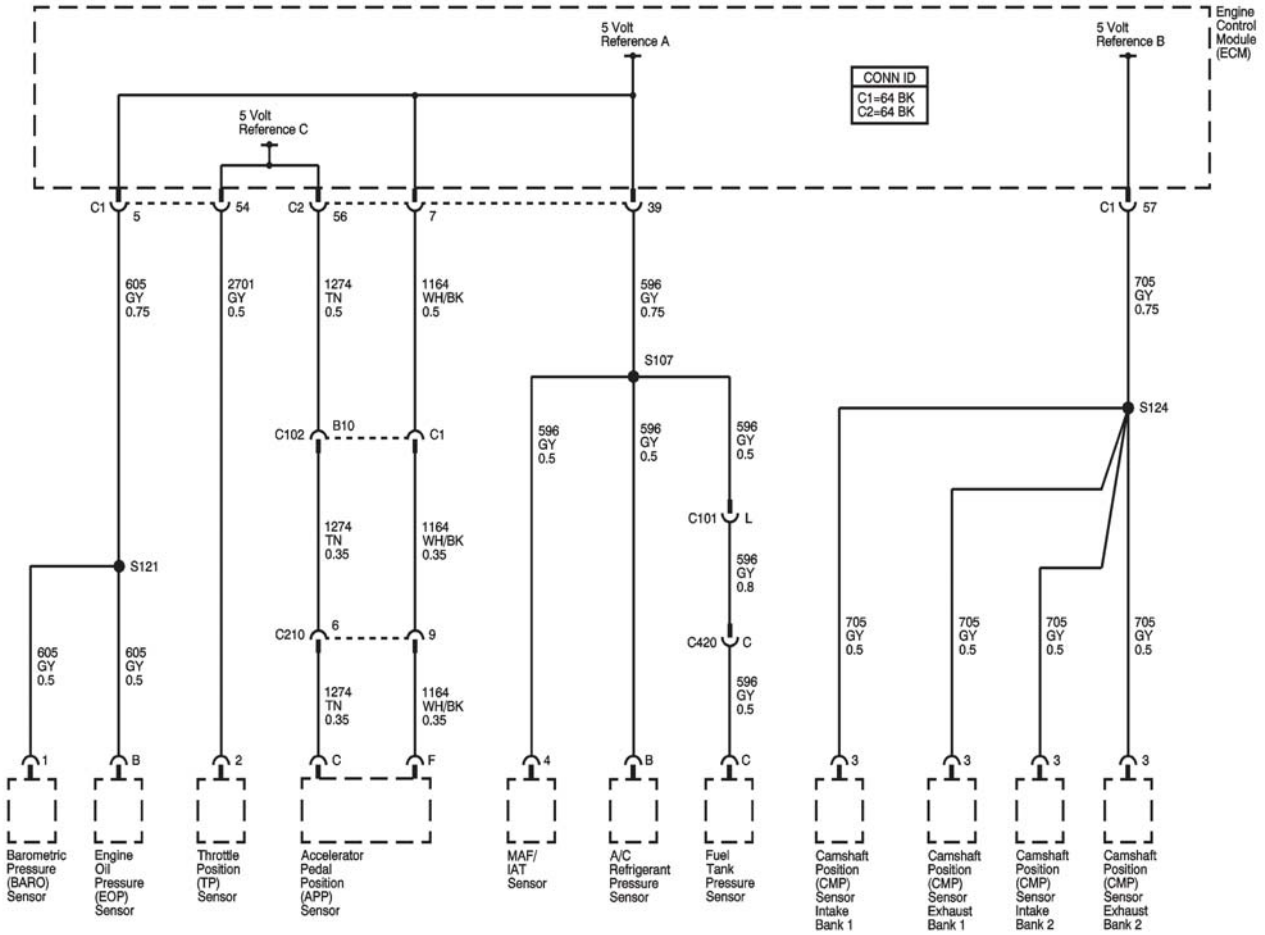
- TAC monitor

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5L40/50E, 4T60E

3.6L (LY7) or 2.8L (LP1)

Shared 5-Volt Reference Circuit



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4T40E/45E

No Upshift

1996-2003

The transmission will not upshift when the shift lever is placed in OD range. If the selector is placed in another gear range the transmission may shift but it may not have all of the shifts desired. As an example, if the shifter is placed in M3 the transmission may only shift as high as 2nd gear.

Like other GM transmission applications, the pressure switch assembly is a major input to the PCM regarding shift patterns. If circuit 1226 pin C becomes shorted to ground the voltage on the circuit will remain low all the time. This will be interpreted by the PCM as M1 range even though the range selector is in OD range. When placed in M3 range the PCM will interpret the range as M2. This type of failure will not set a DTC as the sequence is considered a valid PSA sequence. When monitoring the values with a scan tool you will note that the value remains low for all ranges selected. By comparing to the chart below, you will see the voltage should be high when M3 or OD ranges are selected. If you encounter the condition disconnect the transmission electrical connector while monitoring the PSA scan values. If circuit C goes to a HI status, the short to ground is located within the transmission internal harness or the PSA. If circuit 1226 pin C stays LOW, the short to ground is located between the transmission electrical connector and the PCM. Repair as necessary.

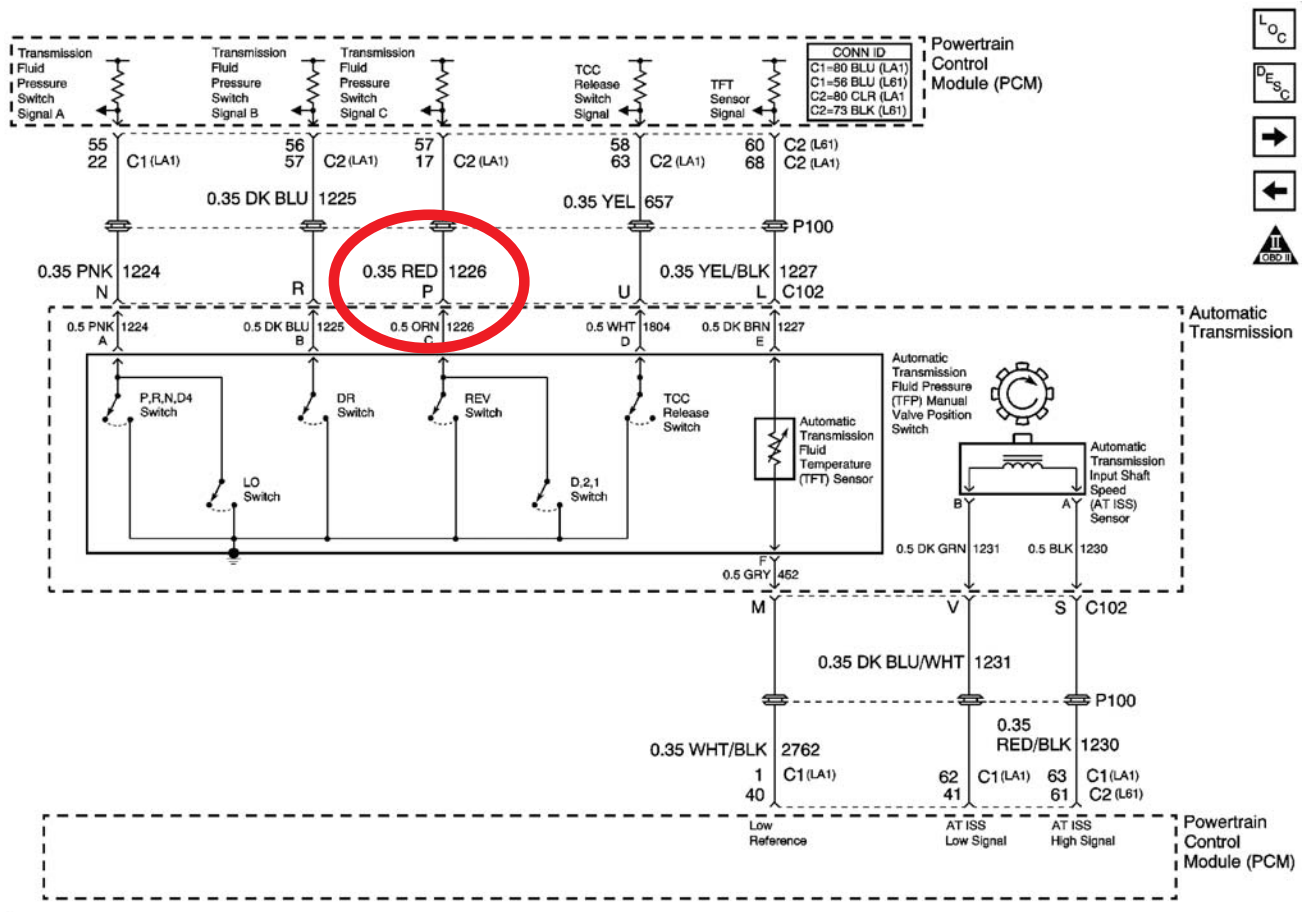
PSA OPERATION SEQUENCE								
	Fluid Pressure					Circuit		
Range Indicator	REV	PRND4	DR	D21	LO	A	B	C
PARK/NEUTRAL	0	1	0	0	0	LOW	HI	HI
REVERSE	1	1	0	0	0	LOW	HI	LOW
OVERDRIVE	0	1	1	0	0	LOW	LOW	HI
Manual THIRD	0	0	1	0	0	HI	LOW	HI
Manual SECOND	0	0	1	1	0	HI	LOW	LOW
Manual FIRST	0	0	1	1	1	LOW	LOW	LOW
1 = Pressurized 0 = Exhausted LOW = 0 volts HI = Ignition voltage								

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4T40E/45E

No Upshift (continued)

1996-2003



Circuit 1226 is for the reverse pressure switch and is connected to Pin "P"

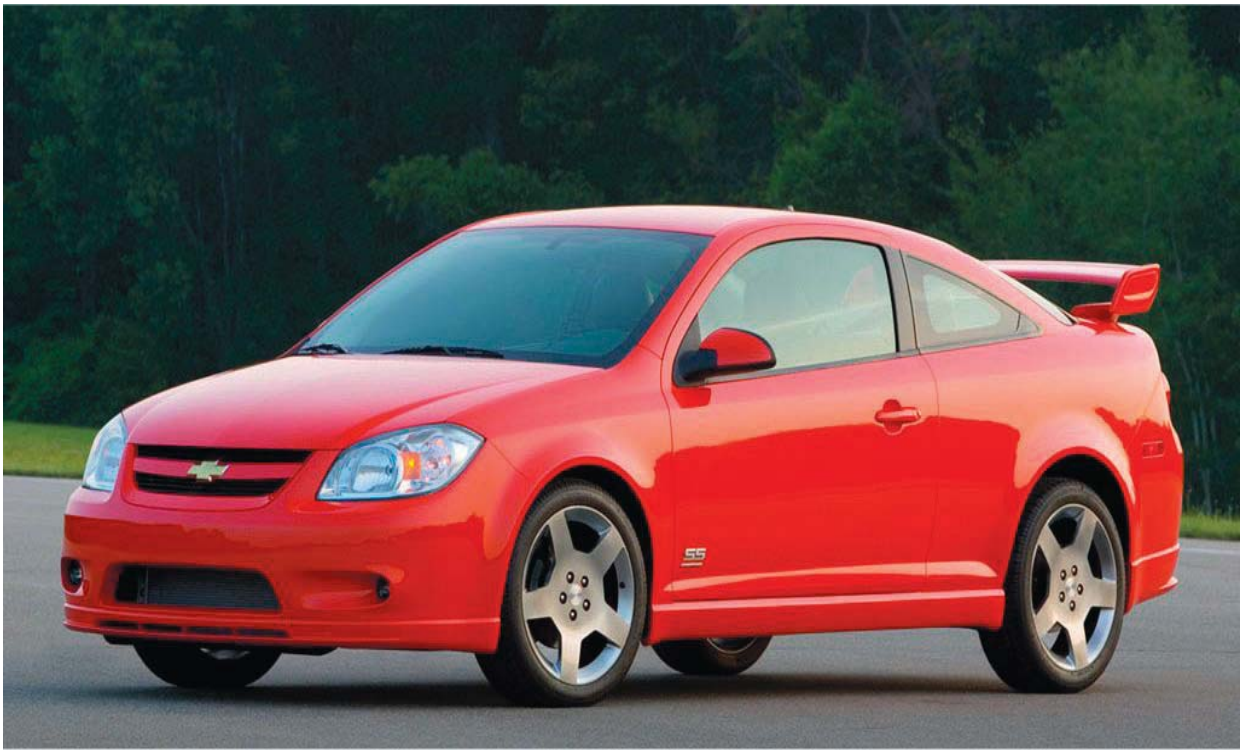
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4T40E

"A" Car Transaxle Characteristics

The "A" body style was introduced in 2005 as the Chevrolet Cobalt, Saturn Ion and Pontiac Pursuit. These applications are equipped with a 4T40E transaxle. The programming for this transmission varies slightly from some of the 4T40E applications. The transaxle is programmed to perform as follows:

- The low traction light will illuminate (if the car is equipped with ABS) anytime the transaxle is placed in M1 position
- The transaxle will upshift out of M2 into third at speeds above 40 MPH
- The transaxle will upshift out of M1



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4T40E

"A" Car DTC P2138 Set

Some Chevrolet Cobalt, Pontiac Pursuit applications may experience any or all of the following concerns:

- APP DTC P2138 set
- Possible DTC's P0532 (A/C), P1681 (TP/ECM) may be set
- Low power message
- Poor drivability
- Limp home mode
- Transmission shift timing complaints
- A/C compressor may be inoperative

P2138 will set if:

- DTC's P0641, P0651, P2120, P2125 are not set
- APP is above idle position
- A voltage correlation condition exists between APP 1 and APP 2 for longer than 2 seconds

P0532 will set if:

- ECM detects A/C pressure less than 34 Kpa (4.93 psi) (less than .25 volts)

P1681 will set if:

- A control module throttle position performance issue exists

If the A/C compressor is inoperative the problem is not likely to be repaired by replacing the APP sensor pedal assembly. If the compressor is inoperative the cause is generally the A/C high pressure switch. The ECM shares the 5 volt reference circuit with the APP and A/C system. Therefore a short to ground in the A/C pressure switch or its circuit will also pull the APP 5 volt reference circuit low. Inspect the A/C pressure switch circuit and if no problem is found replace the A/C pressure switch. If an A/C problem does not exist, follow the DTC chart for the P2138 code.

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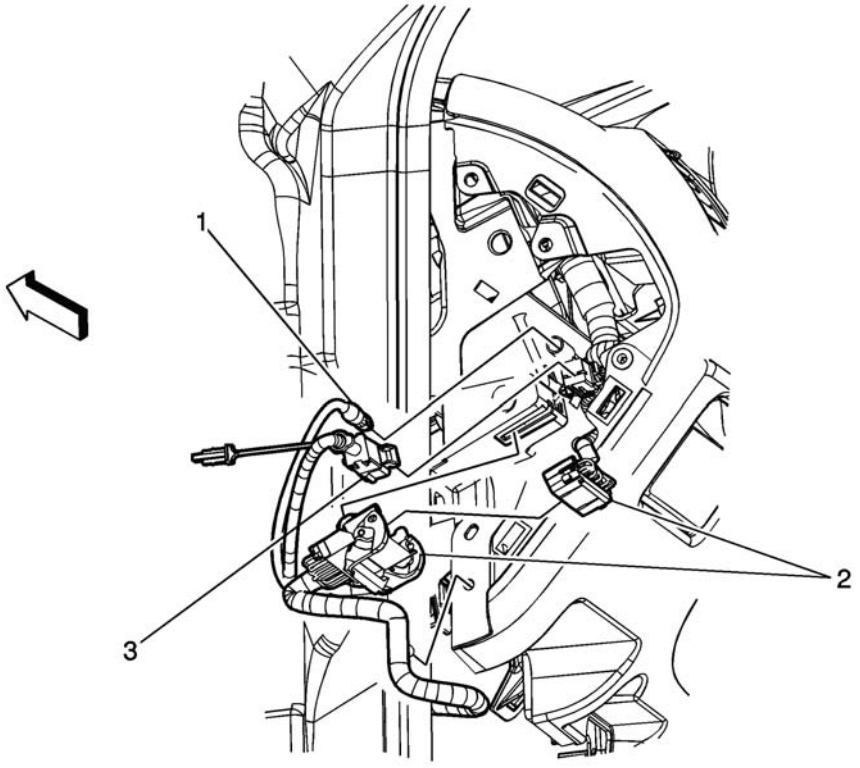
4T40E/45E

APP Sensor DTCs

Some Z car applications (Chevrolet Malibu, Pontiac G6) may exhibit various electrical related concerns including any or all of the following APP DTC's P2119, P2120, P2125, P2135, P2138 as well as possible codes related to the ETC or SVS system. In addition the SES light may be illuminated. Other electrical concerns such as head lamp, data bus, windshield wiper and radio problems may occur if the condition has been present for a long period of time, but generally the APP DTC' s will be the first to set.

Inspect connector C206 located on the left side of the instrument panel, "A" pillar area for corrosion or contamination. Inspect the top of the "A" pillar area for signs of water intrusion at the ditch molding or sunroof drain areas. If moisture has penetrated the connector, the terminal pins will need to be removed and cleaned or replaced.

1= Radio antenna connector
2= C206
3= C208



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4T65E

W-Car P2138 and/or P1125 Set

Pontiac Grand Prix, Chevrolet Impala, Monte Carlo, Buick Lacrosse applications equipped with the 3.8L may set a P2138 and/or P1125. In addition, the engine may be operating in the reduced power mode which can lead to transmission shift timing complaints. On some applications the DIC (Driver Information Center) may display TCS and/or VSES messages to the driver.

P2138 will set if:

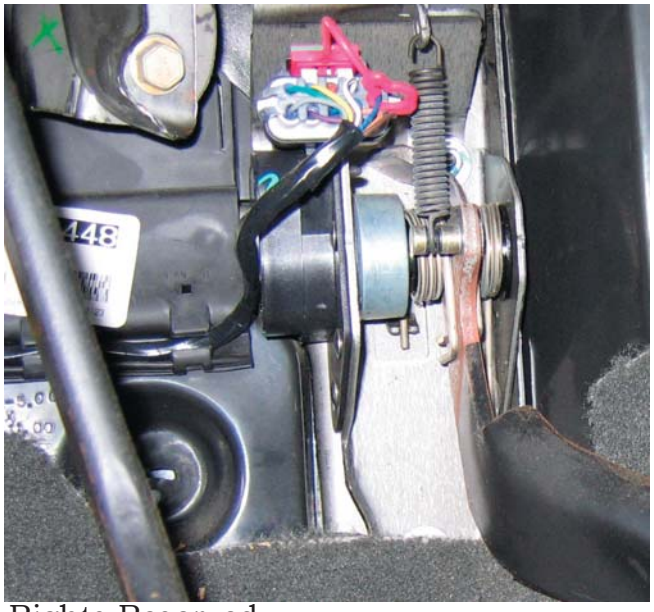
- DTC's P2107 or P2108 are not set
- The PCM determines the difference between APP 1 and APP 2 values are too great. (Greater than .269 volts)

P1125 will set if:

- DTC's P0606, P2108 and U0107 are not set
- APP values are out of range

If both the P1125 and the P2138 are set, replace the APP sensor pedal assembly

If the P1125 or the P2138 are set by themselves or if both are set in conjunction with a P2120 or P2125 inspect the wiring harness for damage. Generally the damage to the wiring harness occurs at the point where the harness is clipped to the ABS/EBCM bracket.



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4T65E

P0741 or P2761, TCC Related Concerns

Buick LaCrosse/Allure, LeSabre, Park Avenue Buick Rendezvous, Terraza/Terraza EXT Chevrolet Impala, Monte Carlo, Uplander, Venture Pontiac Aztek, Bonneville, Grand Prix, Montana, Montana SV6 Saturn Relay.
Several items can cause a P0741 DTC to set. In the above scenario either a P0741 or P2761 may be set. If only P0741 is set proceed with the information listed below, if that is not successful refer to the information in the previous 2002 and 2004 ATRA seminar manuals. If a P2761 is set refer to the information described below.

P0741 will set if:

- NO VSS, ISS DTC's are set
- P0742, P1887, P2761 DTC's are not set
- Engine speed greater than 500 RPM , torque greater than 21 lb ft
- TFT 68-266f (20-130c)
- TP 4-99%
- IMS indicates range is D4, D3 or D2
- TCC duty cycle greater than 50%
- Slip speed greater than 180 RPM for longer than 7 seconds, this condition must occur twice during the key cycle

P2761 will set if:

- Engine speed is greater than 500 RPM
- The PCM commands the TCC PWM duty cycle to 70% or greater and feedback voltage remains high
- The PCM commands the TCC PWM duty cycle to 10% or less and the feedback voltage remains low
- The above conditions are present for longer than 5 seconds

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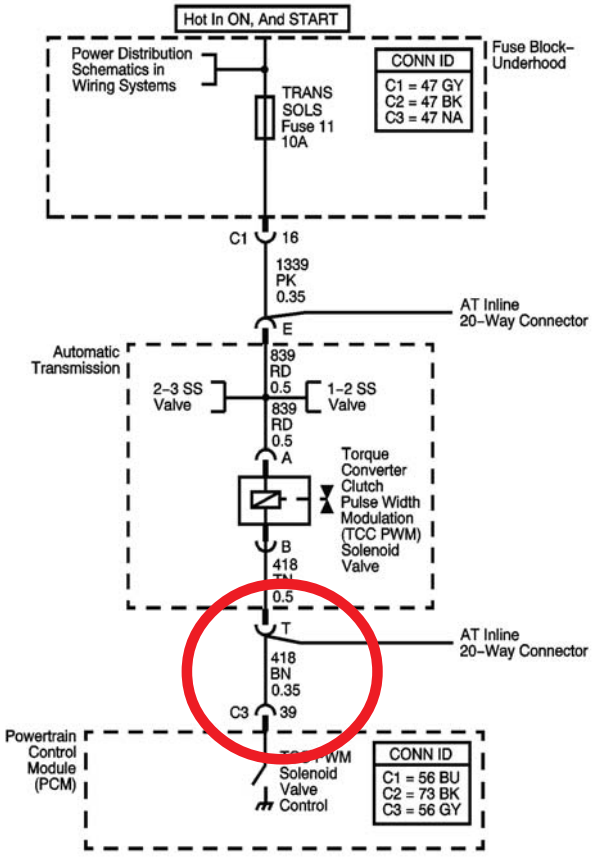
4T65E

P0741 or P2761, TCC Related Concerns (continued)

If the vehicle sets just a P2761 inspect the transmission harness for signs of damage. P2761 is typically set due to an open or short to ground in the TCC PWM circuit or solenoid. One area that has been common for this type of concern is an open in circuit 418 (Brown wire). If you remove the internal wiring harness, TPA (Terminal Position Assureance) clip and tug on circuit 418 you will generally see the terminal is loose and may it even come out of the connector.

On applications that are setting a P0741 it is highly unlikely that an electrical condition will cause the DTC to set, but it is possible if a high resistance condition is present. If you are unable to address the concern by inspecting the items high lighted in previous ATRA seminar manuals inspect circuit 418 for the condition described above.

If circuit 418 is found to be defective replace the terminal or the harness. Harness part number 24229643 is available from GM.



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4T65E

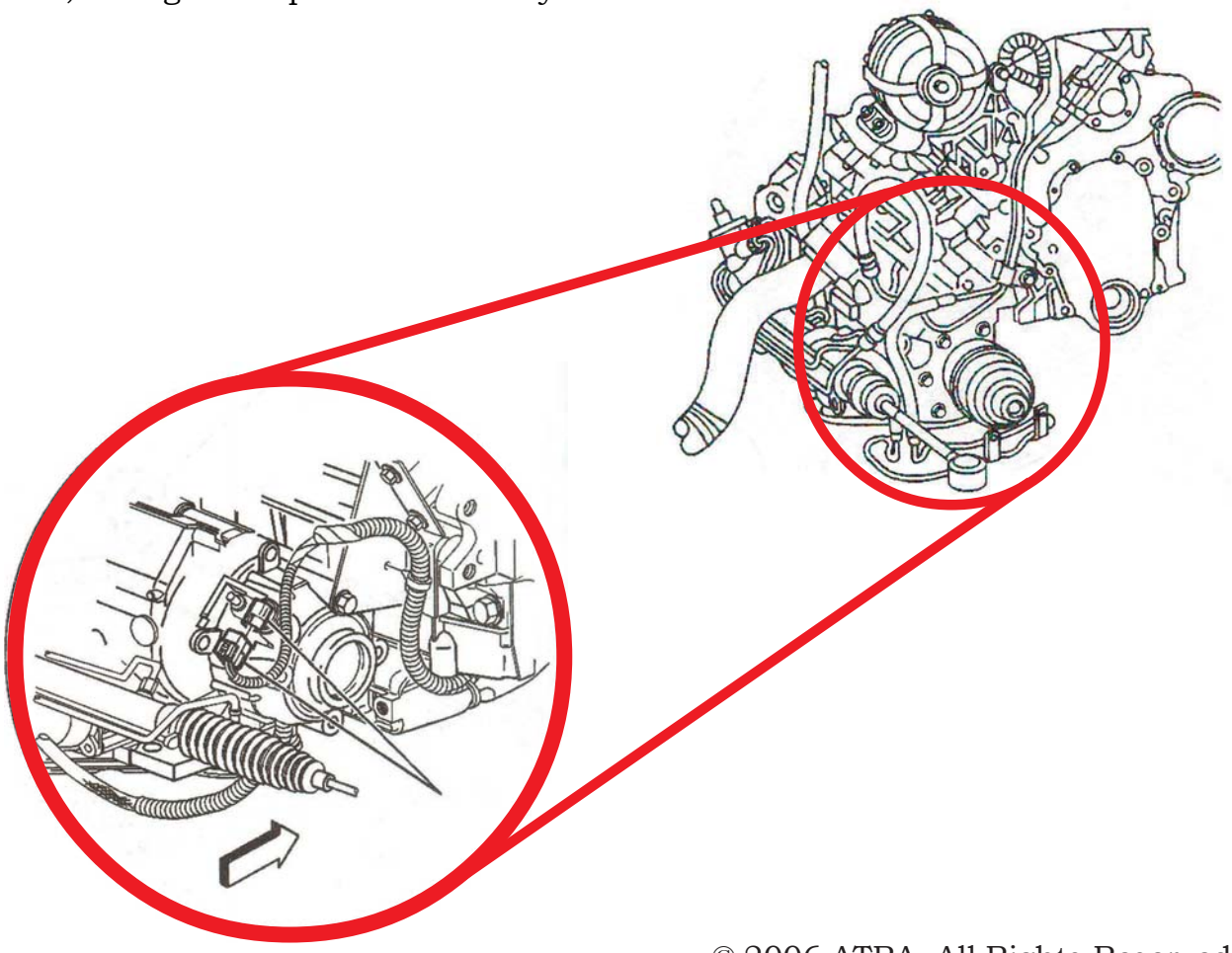
Intermittent Speedometer, Erratic Shifts

W Car Applications

Some W car (Monte Carlo, Impala, Grand Prix) applications may exhibit a condition that causes the speedometer to fluctuate or drop out intermittently. In addition, the transmission may intermittently change gears in response to the change in VSS value. VSS related DTC's may or may not be set

The VSS connector/wiring may come into contact with the power steering hose. As the engine moves in it's mounts the connector may develop an open circuit, resulting in the above condition.

Reposition the power steering hose so it can no longer come into contact with the vehicle speed sensor connector/wiring. Check the condition of the connector, pin tension, wiring and repair as necessary.



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4T65E

Intermittent Hard Garage Shift

Owners of 1999-2005 GM vehicles equipped with the 4T65E may complain regarding an aggressive garage shift engagement, especially when the engine is cold.

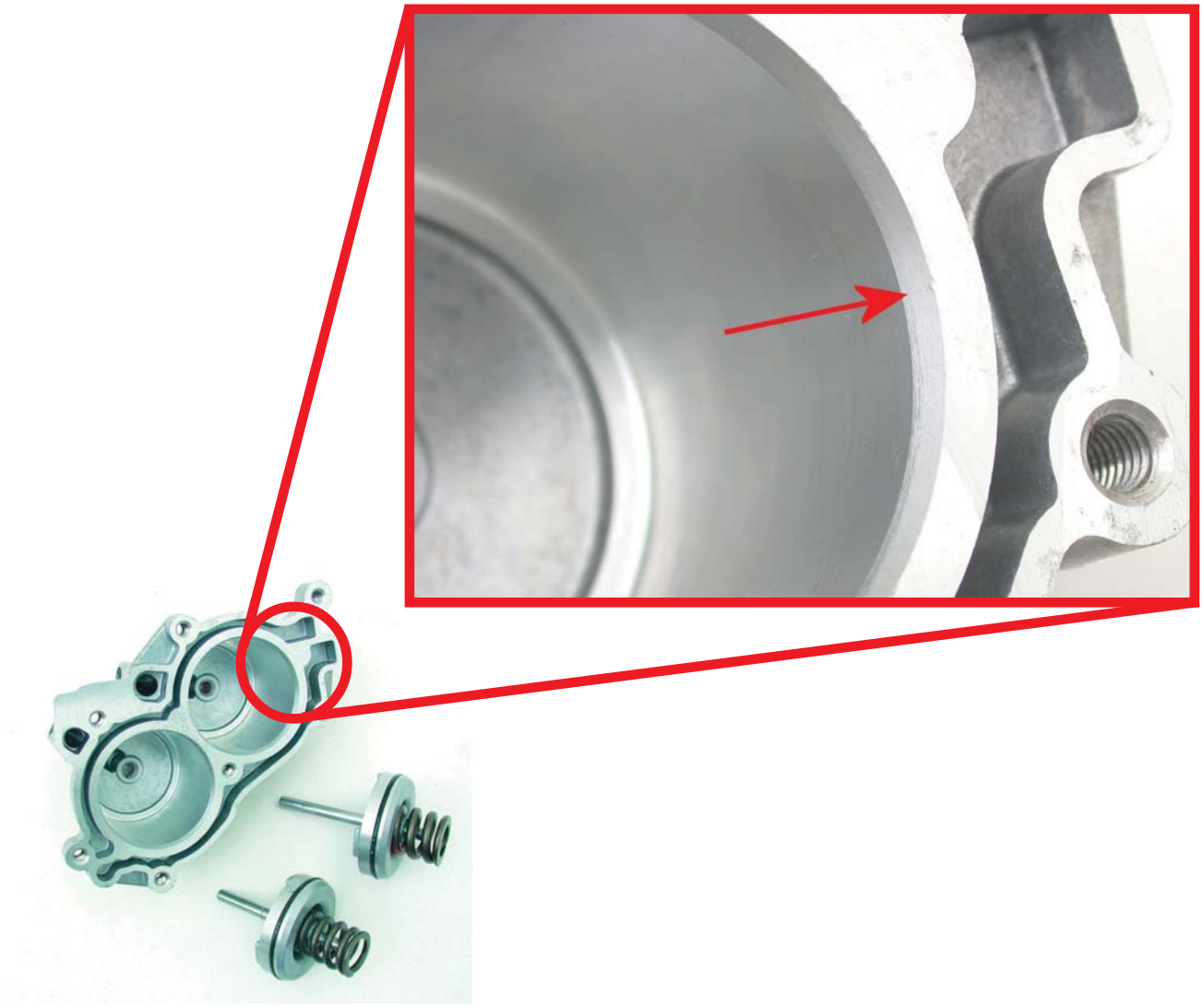
Starting with the 1999 model year the software was changed to increase idle speed for the engine to 1100-1300 rpm for the first 30 seconds of engine run time. After the engine run timer has expired the engine speed will drop to approximately 650 RPM and the garage shift engagement will be much smoother. The update was done to reduce emissions during cold start conditions. This should be considered a normal condition and corrective action should not be attempted.

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4T65E

2006 Updates

1-2 and 2-3 accumulator housing bore machining process has been updated. One of the areas that can cause clutches to burn/slip or shudder during apply is the chamfer depth and angle machined into the accumulator housing. The updated accumulator housings have changed the angle of the chamfer from 15 degrees to 10 degrees. In addition, the depth of the chamfer has been changed from 2.7mm deep to 1.8 mm deep. The updated housing will back service previous model year applications.

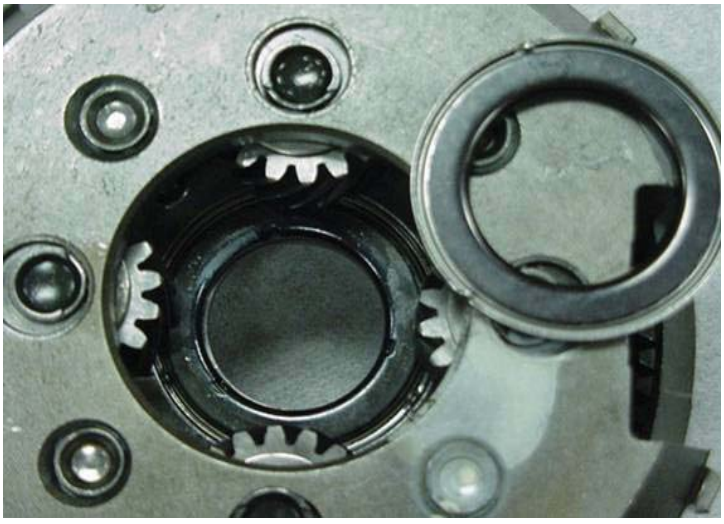


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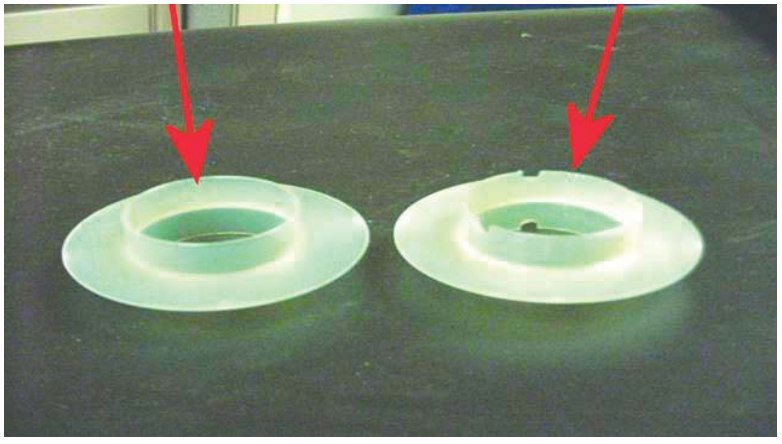
4T65E

2006 Updates (continued)

A new input sun gear bearing and lube dam will be released in 2006 to enhance lube flow to the planetary and lower the stress on the race from axial load. The updated bearing no longer has 3 lube notches in its inner race. The updated lube dam contains three lube slots and is designed to be used with the updated bearing. The updated lube dam part number is 24225905.



Previous **New**

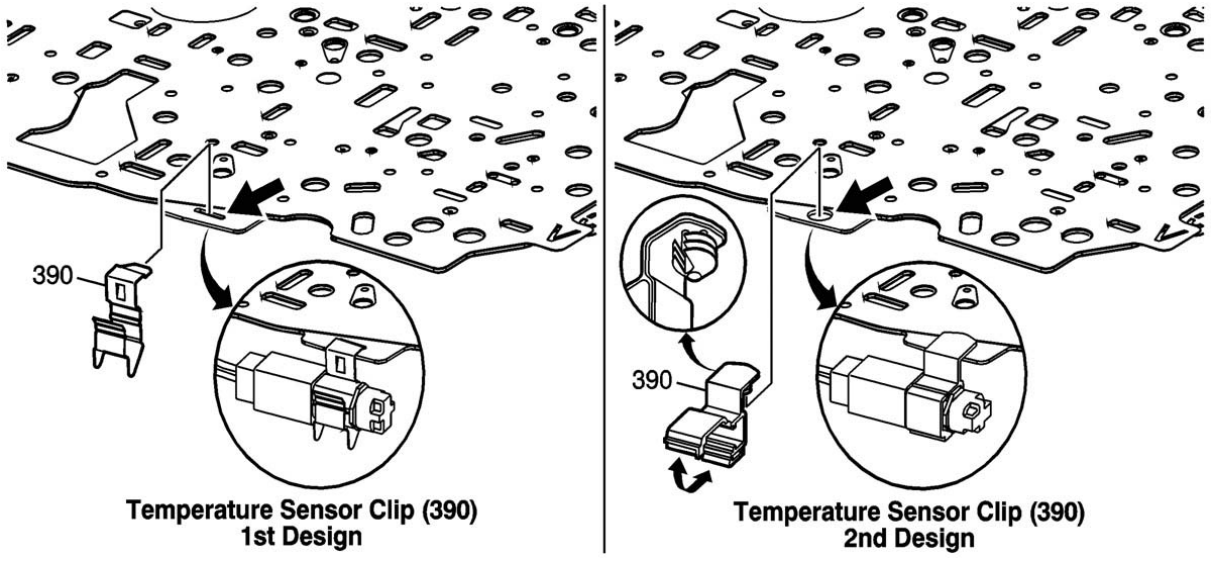


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4T65E

2006 Updates (continued)

Another running change will be availible for the 4T65E. This change includes both an update to the spacer plate as well as an update to the temperature sensor mounting clip. The updated mounting clip is designed to make assembly easier. To install the updated clip an updated spacer plate must also be installed. The updated spacer plate is identical to the previous design except for the area where the clip mounts.



Temperature Sensor Clip (390)
1st Design

Temperature Sensor Clip (390)
2nd Design

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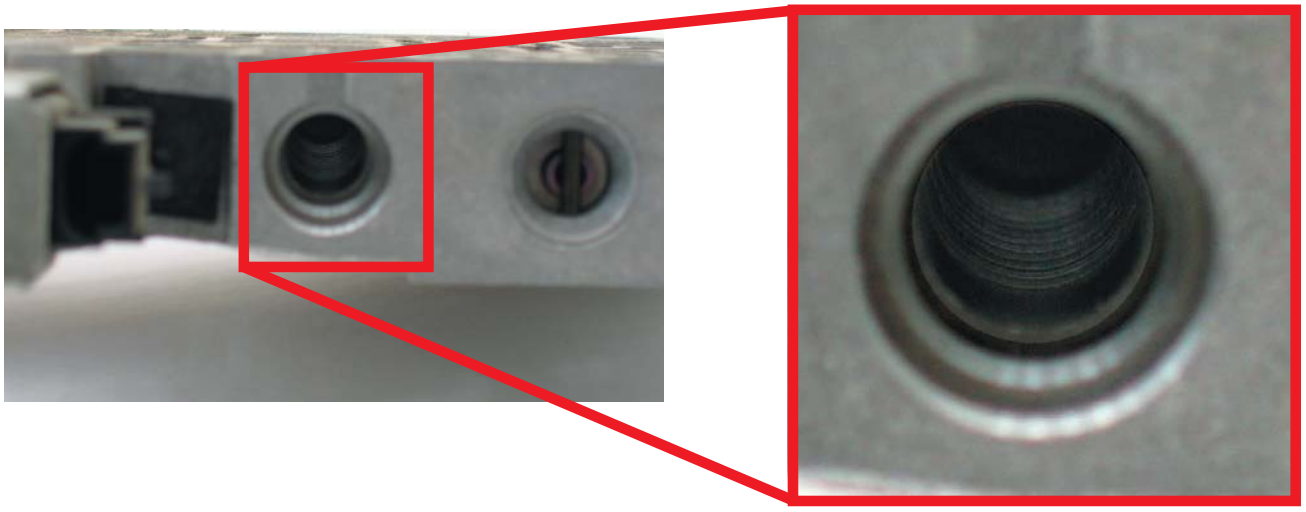
4T80E

3rd Gear Start, No 3rd Gear or Shift Related Concerns

4T80E transmissions may exhibit one or more of the following concerns:

- 3RD gear starts, even though the PCM is commanding the transmission to start in 1st gear
- No 3rd gear, even though the PCM is commanding the transmission to shift to 3rd gear
- No 2nd or 3rd gear even though the PCM is commanding the transmission to those gears
- Incorrect Ratio DTC's set

Remove the 2-3 shift valve and inspect the bore and valve for signs of wear. In most instances the bore starts to score which leads to the shift valve related concerns. To repair the condition, the Lower valve body will require replacement. At this time no one is making service tools to address this issue. Prior to replacement, contact the various companies to be sure service kits are not available to address this concern.



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4L60E/65E, 4L80E/85E, NP 236/246

4wd Service Lamp On, DTC C0327 Set

One of the most common problems with the NP126/NP136/NP 236/NP 246/ NP263 transfer case applications is a loss of 4wd and T- case operation. In addition to an inoperative 4wd system the service 4wd lamp may be illuminated. The customer may also comment that the LED's located in the selector switches are blinking and they may hear a grinding noise coming from the front axle area. Any combination of DTC's may/may not be set such as P0452, P0453, P0461, P0462, P0464, P0836, P0500, P1875, U1088, B0790, CO186, C0196, C0300, C0305, C0306, C0321, C0327, C0359, C0374, C0379, C0455, or C0550 which can be stored in various modules such as the PCM, TCM, TCCM or BCM. Typically the DTC that is most common is a C0327 and it can be accessed by communication with the TCCM via a scan tool.

A C0327 will be set if:

The TCCM expects to see a valid voltage sequence from the Transfer case encoder motor sensor based on the input it receives from the range selector buttons. The DTC will set if the value falls outside of the value it expects to see.

If a C0327 sets the TCCM will:

- Lock the T case in the position it was in at the time the problem occurred as the TCCM will no longer command shifts to occur. This condition may lead to a lack of 4wd operation.
- Illuminate the Service 4WD lamp for the remainder of the key cycle

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4L60E/65E 4L80E/85E NP 236/246

4wd Service Lamp On, DTC C0327 Set (continued)

Multiple items can cause the above related concerns including any of the following:

AREA OF CONCERN	INSPECT FOR	REPAIR
Software Mode Lockout		Remove the Fuse, generally called out as the TREC located in the engine compartment fuse block Reinstall the fuse after 30 seconds
Software update	Updates	Updates have been released for some applications
Moisture intrusion (C/K truck)	Corrosion on the TCCM connector pins	Replace the damaged pins, Locate the leak, generally the windshield seal and repair
Internal T- case Damage	Metal in the fluid	Repair as necessary Inspect bearings, and shift lever closely. Inspect for shift lever over travel Inspect clutches for wear
TCCM Harness Damaged/pinched	Inspect for damage in the park brake cable release spring area	Repair the harness
Encoder motor Terminals	Inspect the condition and pin tension for the encoder motor connector	Replace the terminal
TCCM, Body and Chassis Grounds	Inspect/measure voltage drop/clean the following: faulty grounds Pay special attention to G110 and G203. Also inspect the following, G101, G102, G103, G105 G106, G107, G108, G109 G201, G302, G303, G304 G305, G306, G401, G402 A ground problem in another circuit can cause TCCM problems as the other circuit may seek ground through the TCCM and it's circuits.	Clean/ Repair/ Replace

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4L60E/65E 4L80E/85E NP 236/246

4wd Service Lamp On, DTC C0327 Set

AREA OF CONCERN	INSPECT FOR	REPAIR
TCCM and Under hood Relay center	Check pin tension and terminal condition at the TCCM connectors Pay close attention to Terminal A7 in connector C1. Inspect relay center pins	Repair, replace damaged terminals
C-151 (Some Applications)	Inspect connector C151 for corrosion/damage Located at Left fender well area	Repair/replace terminals
C-101 (Some Applications)	Inspect connector C101 for corrosion/backed out Located in the under hood Fuse block area	Repair/replace terminals. Reroute the harness to remove stress
Encoder Signal voltages	Measure encoder voltages compare to the charts in the service manual. Measure voltage for each range.	Repair the circuit, wiring or replace the Encoder assembly
Encoder/sensor installation	Encoder was not properly timed or sensor was installed incorrectly	Properly time and install sensor or encoder motor correctly
Front axle damage	Inspect the front axle	Repair/replace the Shift fork, shift sleeve

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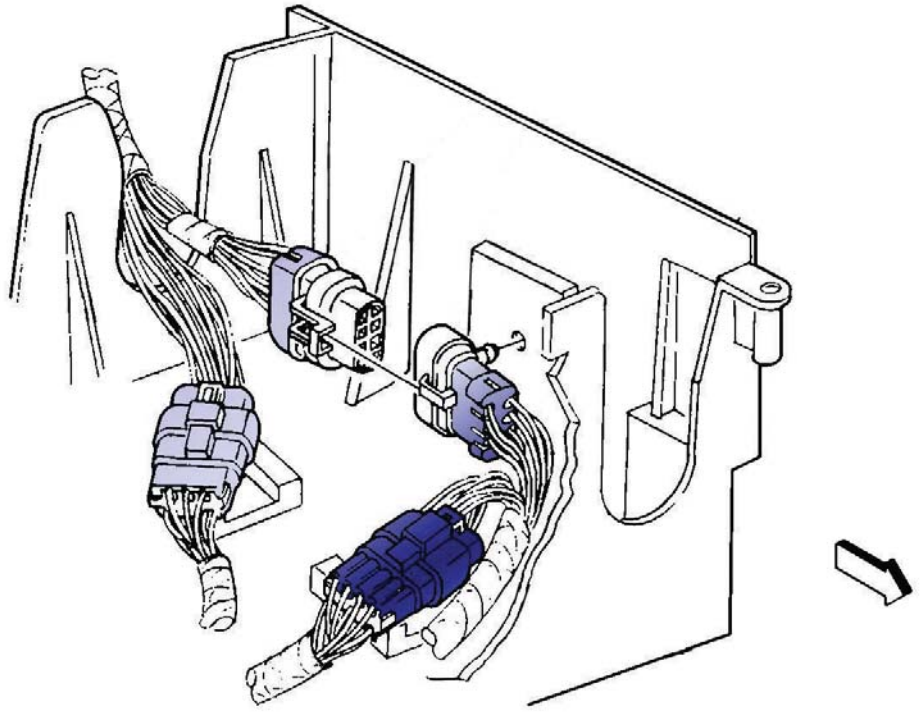
4L60E/65E, 4L80/85E, LCT 1000

PRNDL Inoperative

The PRNDL may be inoperative or it may only operate intermittently. On some applications such as the LCT 1000 you will not be able to communicate with the TCM when using a scan tool.

Circuit 2470 (Yellow wire) may be damaged or the terminal may be backed out of connector C-100. Circuit 2470, terminal "R" may be pulled partially out of the connector.

Locate connector C-100 terminal R (Located in the IP to engine harness under the fuse block) (UBEC). Install the terminal back into the connector and inspect the wiring for damage. Reposition the harness to eliminate the strain on the wiring.



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4L60E/65E

Flare On the 2-3 Shift

4L65E/60E applications may exhibit a 2-3 shift flare. This condition may be present prior to you working on the vehicle or it may develop after you have replaced hard parts during a rebuild. Some of the items that can cause a flare will also lead to 3rd clutch damage while others will not cause clutch damage. Some of the items listed will also lead to 2-4 band failure as well as 3-4 clutch distress.

Several items may cause this concern including:

- Leaking clutch piston seals
- Leaking input shaft seal rings
- Incorrect clutch clearance
- Debris in orifice #7
- The sleeve in the pump stator support may have rotated slightly
- Leak in the 2-4 band release circuit
- Incorrectly assembled 3-4 clutch assembly
- Orifice cup plug missing/damage in input housing or the servo bore
- Check ball capsule not sealing in input housing
- Cracks in the input shaft seal ring area
- Damaged/faulty/leaking 3rd accumulator check valve
- Leaking check ball located in the end of the input housing
- Incorrect pump or pump parts
- Damaged/warped case or valve body
- Incorrect spacer plate or gaskets
- Sticking 2-3 shift valve or damaged/cracked 2-3 shift solenoid
- 3-4 clutch feed hole in the input housing may be incorrectly machined. The chamfer for the hole may be too large which exposes it to the area where the seal groove is machined in the housing. This will cause the clutch to leak. This is fairly common on some of the later model applications and you should inspect for this condition as part of your rebuild or prior to installing a new input housing.
- Incorrect Pressure rise

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4L60E/65E

Flare On the 2-3 Shift (continued)

3-4 Clutch feed Hole



3-4 clutch feed hole in the input housing may be incorrectly machined. The chamfer for the hole may be too large which exposes it to the area where the seal groove is machined in the housing. This will cause the clutch to leak. This is fairly common on some of the later model applications and you should inspect for this condition as part of your rebuild or prior to installing a new input housing.

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4L60E

Lack Of Communication

ECM or TCM, Possible DTC's Set

T- Truck (Rainier, Trailblazer, Envoy, Saab) V-8 applications with the adjustable brake pedal feature, may experience scan tool communication concerns. This may include no or intermittent communication with the PCM and/or TCM. If you are able to scan the vehicle you may find any/all of the following DTC's set:

- P0700
- U0101
- U0073
- U0001
- U2100
- U2105

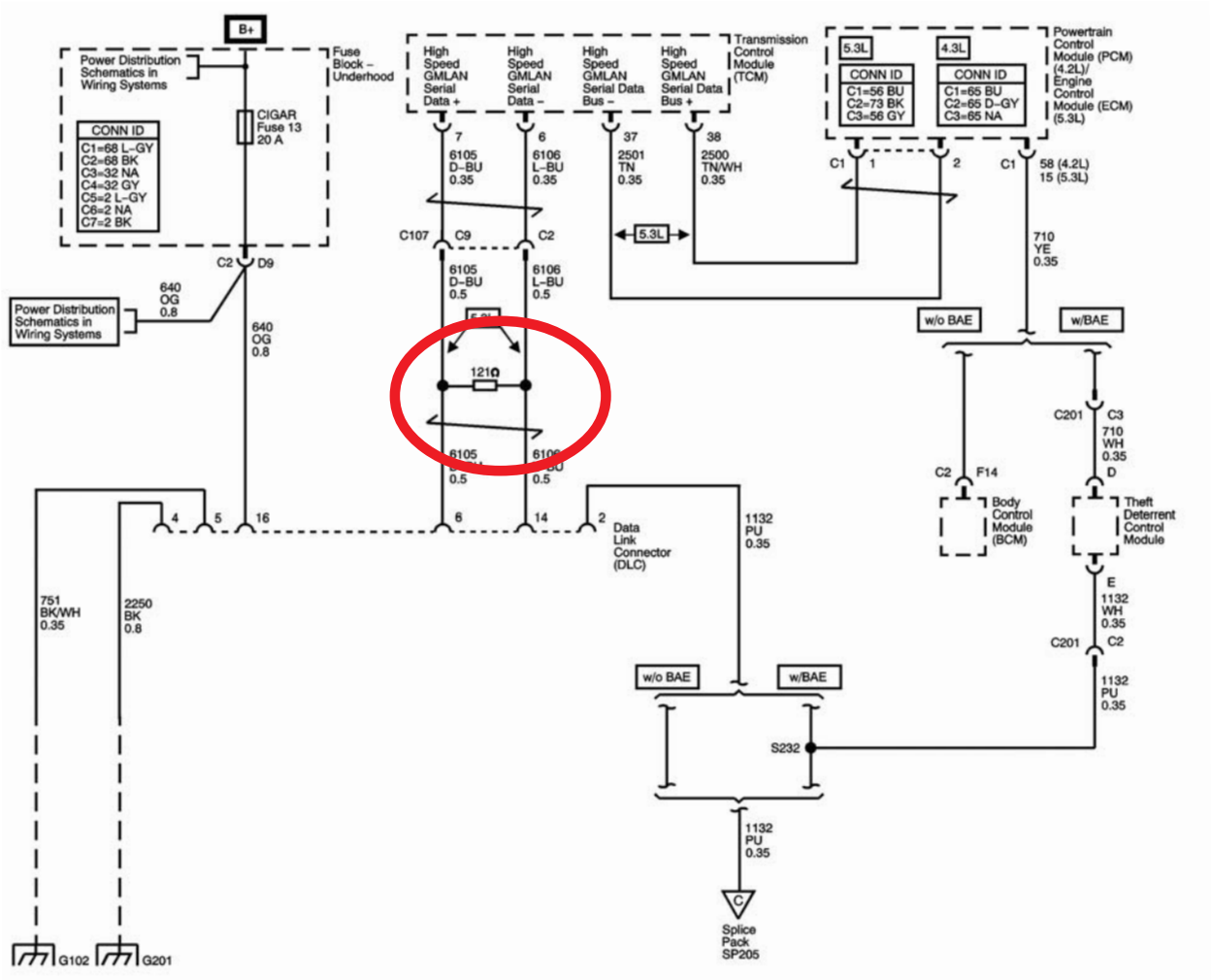
Inspect the 121 ohm GM LAN terminating resistor located in the harness near the DLC. Locate the terminating resistor and inspect the insulating tape. In many instances the resistor may become damaged from the movement of the adjustable brake pedal. If the resistor is touching ground, or if the resistor appears as though the pedal linkage has been hitting it, relocate the resistor and cover it with fresh tape.

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4L60E

Lack Of Communication (continued)

ECM or TCM, Possible DTC's Set



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4L60E/65E

2006 Updates

A new design bearing in position #31 (Input sun gear to carrier) will be availible as a running change for the 4L65E/60E applications. The new bearing offers a significant reduction in race/retainer stress while improving bearing life. The updated bearing will back service previous applications.



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4L60E/65E

2006 Updates (continued)

A new design extension housing seal is planned as a running change for the 2wd applications. This new seal is designed to improve high mileage dependability and will back service the previous applications. The updated seal coating is tan in color.



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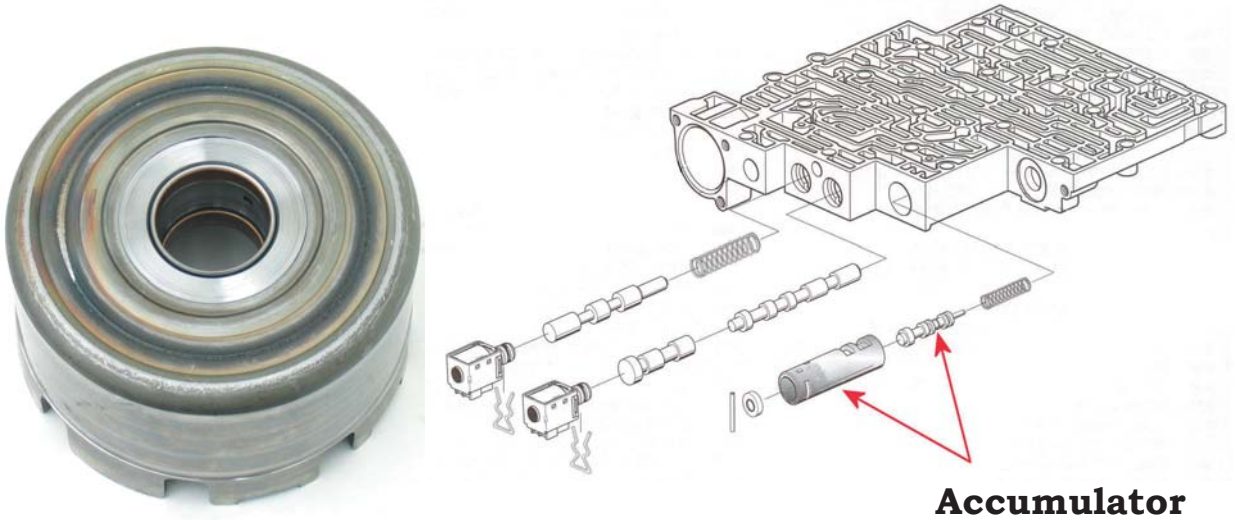
4L60E/65E

1-2 Shift Shudder

4L60E/65E applications may exhibit a shudder on the 1-2 shift. Generally you will not notice this condition during the 3-4 shift and if it does occur it will be less pronounced. This condition may get worse with use and may not have occurred until you replaced hard parts during and overhaul.

Several items may cause the above condition including:

- Valve body face warped
- Defective PCS
- Worn boost valve and sleeve
- Leaking/cracked 1-2 solenoid
- 1-2 shift valve sticking, sediment is a common issue
- Accumulator valve sticking
- Accumulator sleeve rotated in the valve body
- 1-2 accumulator piston cracked, damaged, leaking seal, worn pin hole
- Accumulator housing damaged, Porous
- Servo apply pin length incorrect
- Servo seals damaged leaking
- Servo bore damaged, porous
- 4-3 sequence valve, 3-4 relay valve sticking
- 3-2 downshift valve sticking/leaking
- Gasket or spacer plate mispositioned or incorrect
- Wrong band material
- **Warped/out of round reverse input housing. We have been seeing some with as much as .030" warpage/out of round. Replacing the drum and band will generally fix the concern. Common on 2003-2005 models**



Accumulator Valve and Sleeve

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4L80E/80EHD/85E

Planetary Carrier Service

2001 and earlier 4L80E/4L80E HD/4L85E applications utilized an output planetary carrier that may appear different in appearance when compared to later applications or the service replacement part.

Early applications were machined to fit a steel thrust washer that utilized 4 tabs. The later model and service part was manufactured to accept a 2 tab thrust washer. The new thrust washer is plastic rather than steel.

NOTE: Both parts are interchangable, however you will have to remove 2 of the tabs from the steel washer in order to adapt it to updated carrier. If you install the plastic washer no changes will be required.



Steel Washer: Part # 8626372 **Plastic Washer: Part #24214809**

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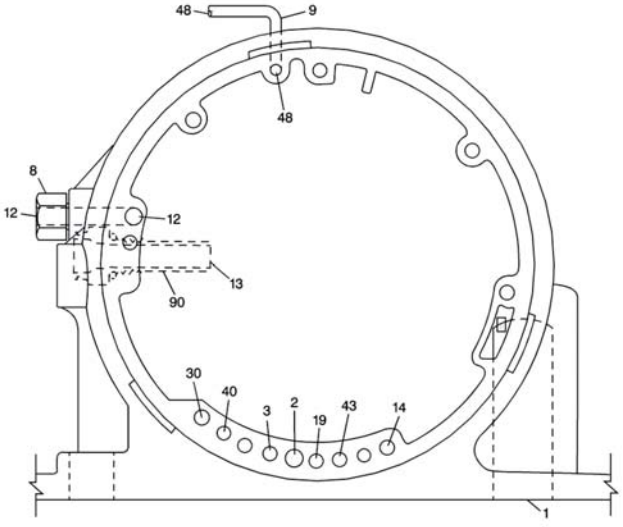
4L80E/85E

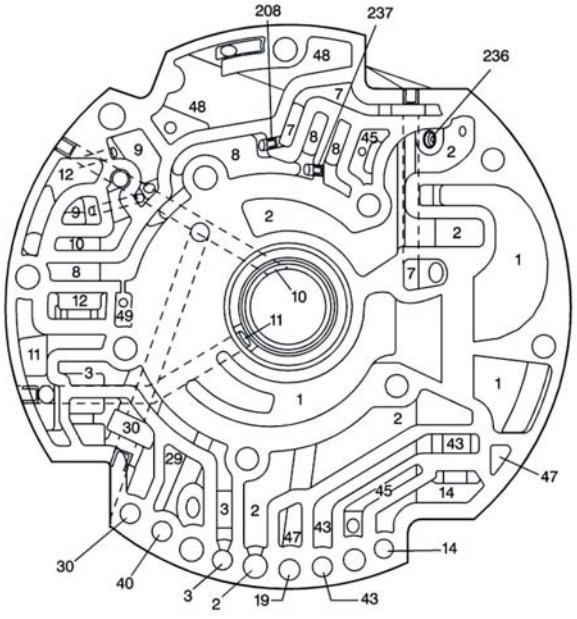
Updated Pump Cover

An update to the pump cover occurred for 2004-06 model years on all 4L80E/85E applications. The pump cover part number was changed to accommodate interim case changes that occurred. The following part numbers for the pump cover based on model year.

These parts are not interchangable.

1997-2003 24204303
2004-2006 24232405



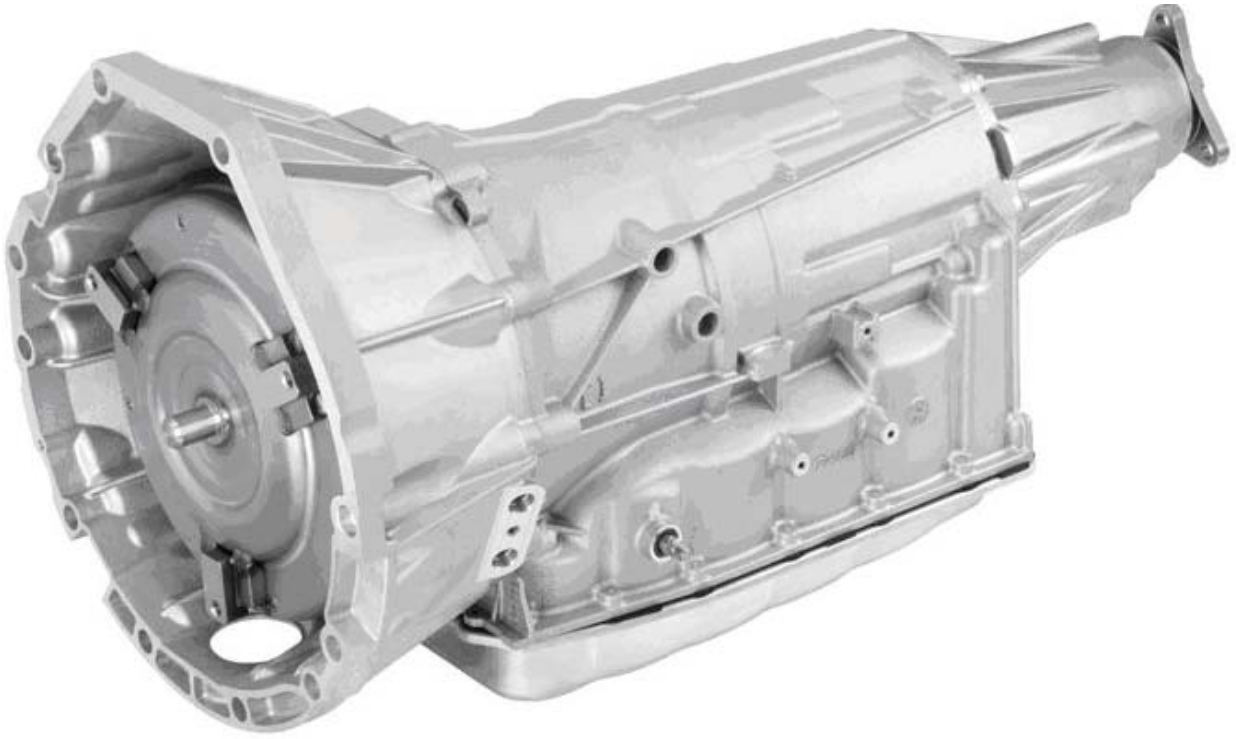


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6L80 (RPO MYC)

Introduction

The first of ten 6 speed automatics has been introduced for the 2006 model year. The 6L80 (RPO MYC) is currently available in the Chevrolet Corvette, Cadillac XLR-V and the Cadillac STS-V applications. The 6L80 will be introduced into several “up level” SUV applications for the 2007 model year. The 6L80 is built in the Willow Run plant in Ypsilanti Michigan. The new plant utilizes several industry first technical innovations and production processes and is unlike any other assembly plant in the world.



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6L80 (RPO MYC)

Introduction (continued)

The 6L80 is equipped with the following features:

- RPO MYC
- Input torque capacity 430 lb ft (583 Nm)
- Output torque capacity 664 lb ft (900 Nm)
- Ratios
  1st – 4.02-1
  2nd – 2.36-1
  3rd – 1.53-1
  4th – 1.15-1
  5th - .85-1
  6th - .67-1
- Maximum shift speed 6500 RPM
- Maximum GVW 8600 lb
- Maximum GCVW 14000 lb
- PRNDL positions P, R, N, D, (S or M)
- 2 shift solenoids used (On/Off Design), SS1,SS2
- 6 PWM controlled pressure control solenoids, PCS, PCS1, PCS2, PCS3, PCS4, PCS5, TCC
- 32 bit TCM mounted internal to the transmission on the valve body (Referred to as the "control solenoid valve assembly") TCM incorporates Solenoids, pressure switches, TFT and it is bolted to the valve body using 6 bolts.
- EC3 Converter 300mm (Corvette) 258mm twin plate (XLR-V and STS-V)
- Fluid required, Dexron VI
- Fluid capacity, 9.5L (10 qts.) model 6CDA, 9.7L (10.2 qts.) model 6CZA, 11.9 L (12.6 qts.) model CYA
- Clutch to clutch shifts, 5 clutches, 1 sprag
- Planetary assemblies, input (Simpson) Output (Dual pinion design)
- Vane style oil pump
- Internally mounted TISS and TOSS hall effect type speed sensors
- Internal Mode Switch (IMS) equipped
- Performance Algorithm Shifting (PAS) programming
- Performance Algorithm Lift foot (PAL) programming
- Sport mode and TAP shift equipped
- Adaptive Strategies with fast learn capabilities
- 75 transmission only DTC's Learn diagnostic process used

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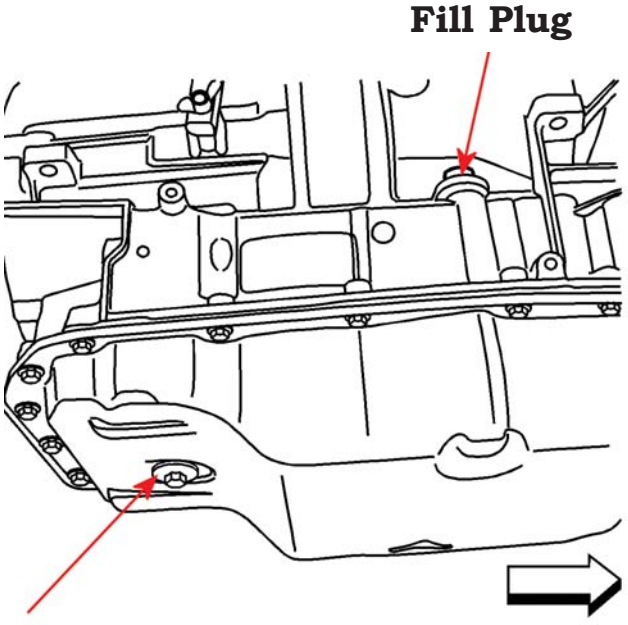
6L80 (RPO MYC)

Checking the Fluid Level

The 6L80 transmission utilizes a very unique process for checking the fluid levels. Most 6L80 applications do not utilize a dipstick. Instead a plug has been placed into the dipstick hole. The plug can be removed and the hole can be used as a fill point for transmission fluid. To check the fluid level the following procedure should be followed:

- The transmission temperature must be between 86-122 °F (30-50°C) a scan tool, the driver information center or the transmission gauge can be used to verify the temperature
- Start the engine and let it idle, Shift the transmission in and out of range pausing in each range for approximately 3 seconds
- Place the transmission in park range
- With the vehicle level, remove the level control plug located in the transmission oil pan.
- If fluid does not drip from the level control hole, add Dexron VI fluid until fluid starts to drip from the hole. If fluid runs from the hole wait until the fluid stops running from the hole. The level is correct when fluid drips slightly from the hole. If a steady stream is present or no flow is present the fluid level is incorrect. Install the fill plug and the level control plug.

NOTE: Fluid may be added through the dipstick hole or through the level control hole.



Level Control Plugs

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6L80 (RPO MYC)

Component Application Chart

RANGE	PARK	REV	NEUTRAL	1ST BRAKING	1ST	2ND	3RD	4TH	5TH	6TH
1-2-3-4 Clutch				ON	ON	ON	ON	ON		
3-5 Clutch		ON					ON		ON	
4-5-6 Clutch								ON	ON	ON
2-6 Clutch						ON				ON
L/R Clutch	ON	ON	ON	ON						
Low Sprag				ON	ON					

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6L80 (RPO MYC)

Control Solenoid Operation

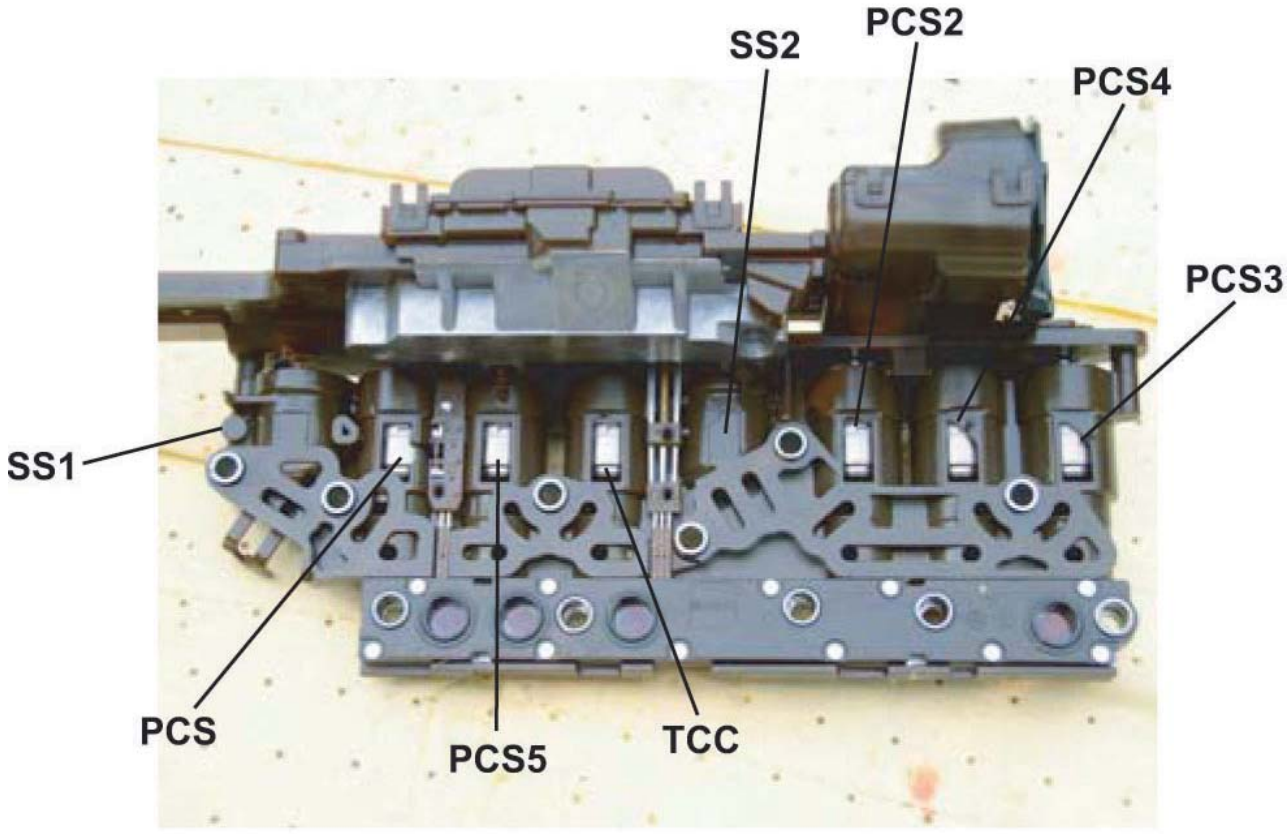
GEAR	Shift Sol 1	Shift Sol 2	1-2-3-4 Clutch Pres Control Solenoid Solenoid 5	2-6 Clutch Pres Control Solenoid Solenoid 4	3-5 Clutch Pres Control Solenoid Solenoid 2	Low/Rev 4-5-Clutch Pres Control Solenoid Solenoid 3
PARK	ON	ON	OFF	OFF	OFF	ON
REV	ON	OFF	OFF	OFF	ON	ON
NEU	ON	ON	OFF	OFF	OFF	ON
1St Braking	ON	ON	ON	OFF	OFF	ON
1st	OFF	ON	ON	OFF	OFF	OFF
2nd	OFF	ON	ON	ON	OFF	OFF
3rd	OFF	ON	ON	OFF	ON	OFF
4th	OFF	ON	ON	OFF	OFF	ON
5th	OFF	ON	OFF	OFF	ON	ON
6th	OFF	ON	OFF	ON	OFF	ON

SHIFT PRESSURE CONTROL SOLENOID ON=PRESSURIZED, OFF= NO PRESSURE
SHIFT SOLENOIDS, ON= PRESSURIZED, OFF= NO PRESSURE

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6L80 (RPO MYC)

Shift and Control Solenoids



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6L80 (RPO MYC)

IMS Operation

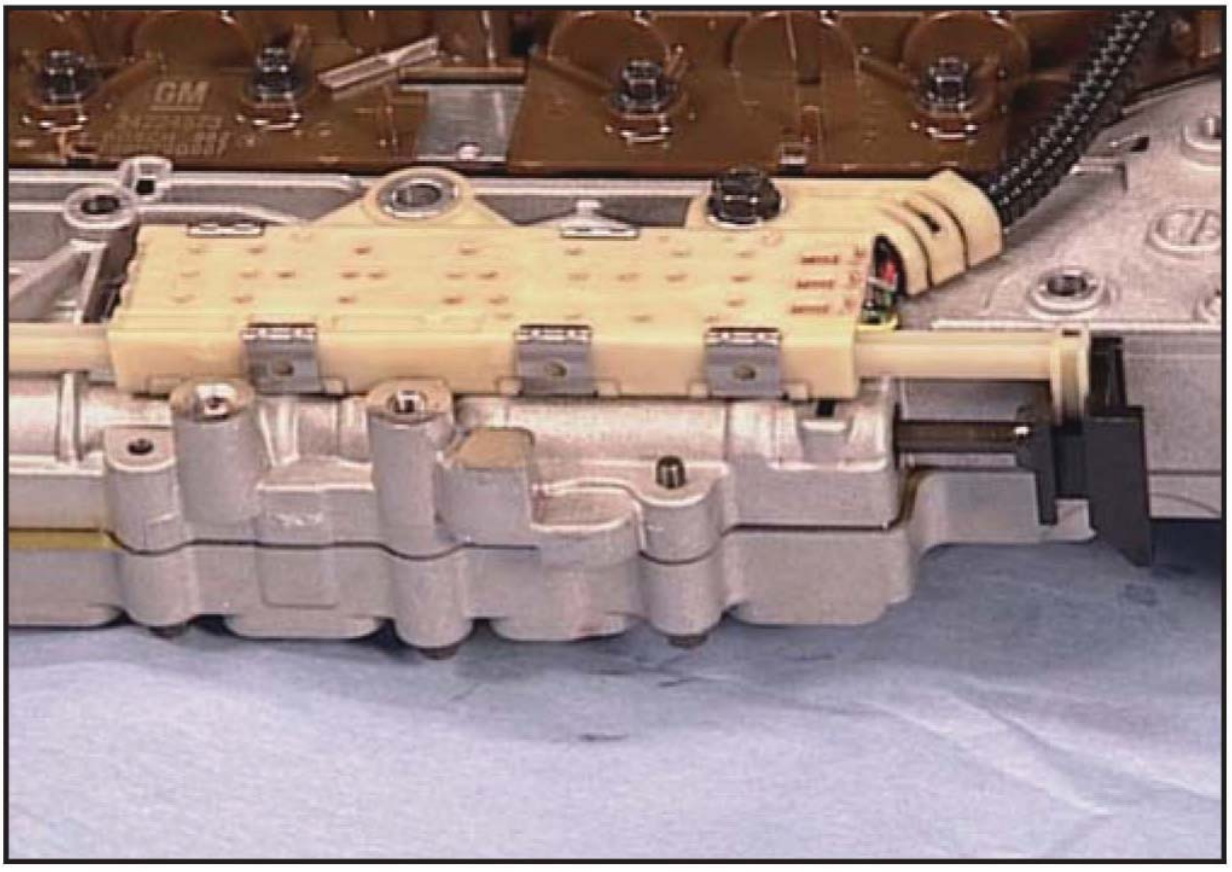
INTERNAL MODE SWITCH LOGIC				
GEAR SELECTOR POSITION	SIGNAL A	SIGNAL B	SIGNAL C	SIGNAL P
PARK	LOW	HIGH	HIGH	LOW
PARK/REV	LOW	LOW	HIGH	LOW
REV	LOW	LOW	HIGH	HIGH
REV/NEU	HIGH	LOW	HIGH	HIGH
NEUTRAL	HIGH	LOW	HIGH	LOW
NEU/D6	HIGH	LOW	LOW	LOW
D6	HIGH	LOW	LOW	HIGH
D6/D4	LOW	LOW	LOW	HIGH
D4-(S)	LOW	LOW	LOW	LOW
D4/D3	LOW	HIGH	LOW	LOW
D3	LOW	HIGH	LOW	HIGH
D3/D2	HIGH	HIGH	LOW	HIGH
D2	HIGH	HIGH	LOW	LOW
OPEN	HIGH	HIGH	HIGH	HIGH
INVALID	HIGH	HIGH	HIGH	LOW
INVALID	LOW	HIGH	HIGH	HIGH

NOTE: High= 12 volts, Low= 0 volts
NOTE: Not all applications utilize all ranges shown

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6L80 (RPO MYC)

Transmission Manual Shaft Switch

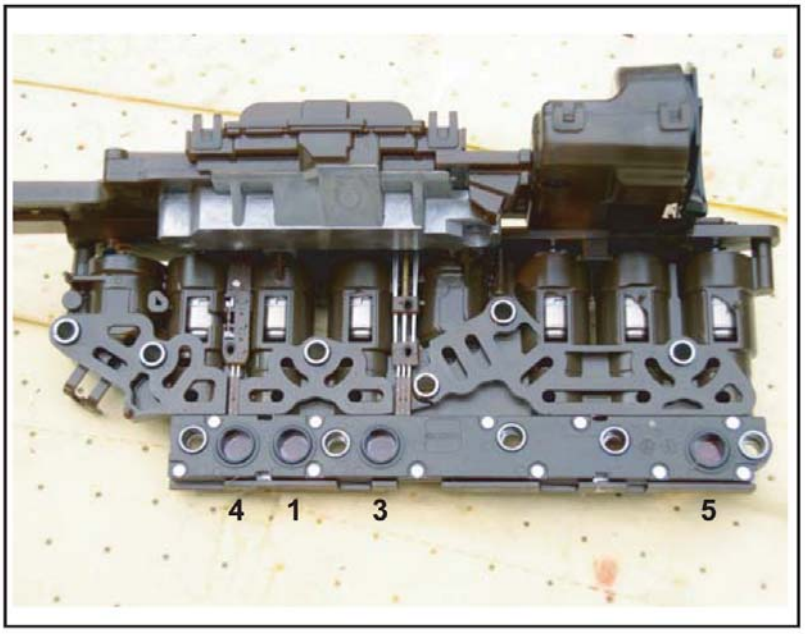


Transmission Manual Shift Shaft Switch Assembly

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6L80 (RPO MYC)

Transmission Fluid Pressure Switch



TFP Switches

TFP SWITCH	CLUTCH MONITORED
1	3-5 clutch
3	2-6 clutch
4	1-2-3-4 clutch
5	4-5-6 clutch Low/Rev Clutch

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6L80 (RPO MYC)

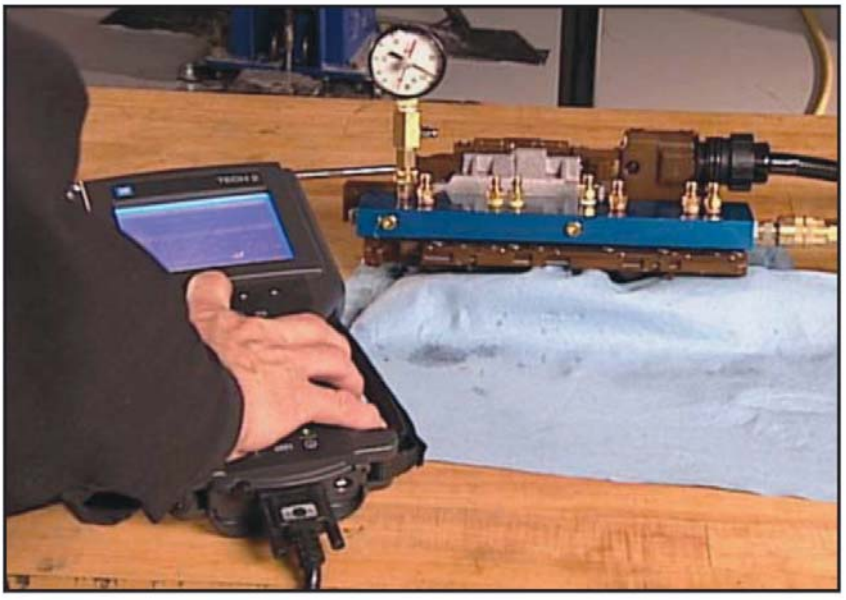
Solenoid and Valve Body Diagnosis

Solenoid and valve body diagnosis requires the following tools:

- A quality scan tool capable of communicating and commanding the TCM and it's solenoids.
- Tool number J 47825-1 Solenoid test plate and jumper harness

Remove the Control Solenoid Valve Assembly from the transmission. Install tool J47821-1 onto the Control Solenoid Valve Assembly (5Nm 44 Lb In). Apply regulated shop air (90-100 psi) to the tool. Connect the scan tool to the Control Solenoid Valve Assembly.

- Command the solenoid ON/OFF air pressure should be present on the gauge and then it should exhaust as the solenoid is cycled. If the solenoid or valve are malfunctioning the gauge pressure will not change as you cycle the solenoid. If a malfunction is determined to be present, replace the complete Control Solenoid Valve Assembly.
- If the solenoid checked OK, install the gauge on another solenoid port and command that solenoid ON/OFF with the scan to repeat the process.



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6L80 (RPO MYC)

Solenoid and Valve Body Diagnosis (continued)

Control Solenoid Valve Assembly Test chart	
COMPONENT	**PORT ON TEST**
PCS 1	G
PCS 2	C
PCS 3	A
PCS 4	B
PCS 5	F
TCC	E
SS 1	H
SS 2	D

NOTE: The TCM will normally cycle several of the solenoids ON/OFF to help keep the solenoids and the valves free of debris. Therefore this cleaning function (Dither) may cause the gauge to flicker when the TCM is cleaning the solenoid you are testing.

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6L80 (RPO MYC)

Adaptive Learning

Adaptive Learning

The 6L80 is fully equipped with several adaptive learning strategies. As with some other GM applications you will need to erase the adaptive values and perform a "Fast Learn" prior to operating the vehicle. Adapts and fast learn procedures should be perform if any of the following occur:

- Internal Transmission repairs have been performed
- The valve body was replaced
- The Control Solenoid valve assembly was replaced
- The TCM was recalibrated
- Internal repairs were performed that could effect shift quality

NOTE: Fast learn is not required if a GM New or Rebuilt 6L80 is used. The transmission is fast learn prior to it being shipped from the plant

To perform a fast learn:

- Use a scan tool capable of performing the fast learn procedure
- TFT 158-230°F (70-110°C)
- Select Fast learn process from the scan tool menu
- Place the transmission in Drive with the vehicle stationary. The TCM will individually apply the clutches and calculate the clutch volume
- Place the transmission in Reverse with the vehicle stationary. The TCM will individually apply the clutches and calculate the clutch volume
- Shut off the engine, power off the scanner
- The process is now complete

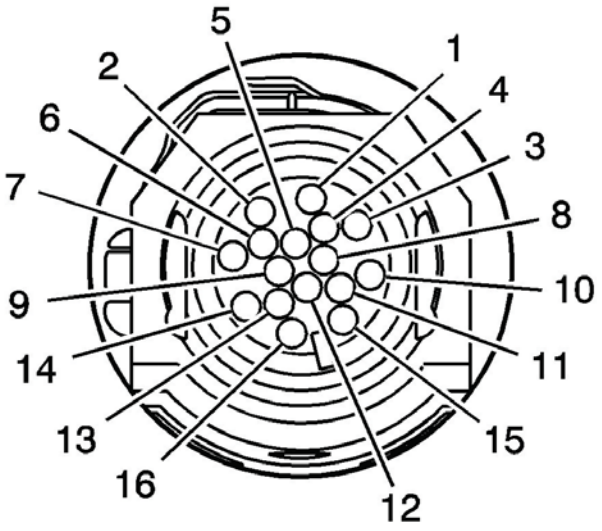
The fast learn procedure will not run if:

- DTC's are set
- TFT is not between 158-230 °F (70-110°C)
- The brake switch is not working
- TP is 0% but engine RPM increases during the test
- P/N switch is improperly adjusted or is not functioning correctly
- Line pressure control system is malfunting

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6L80 (RPO MYC)

Pass-thru Connector ID



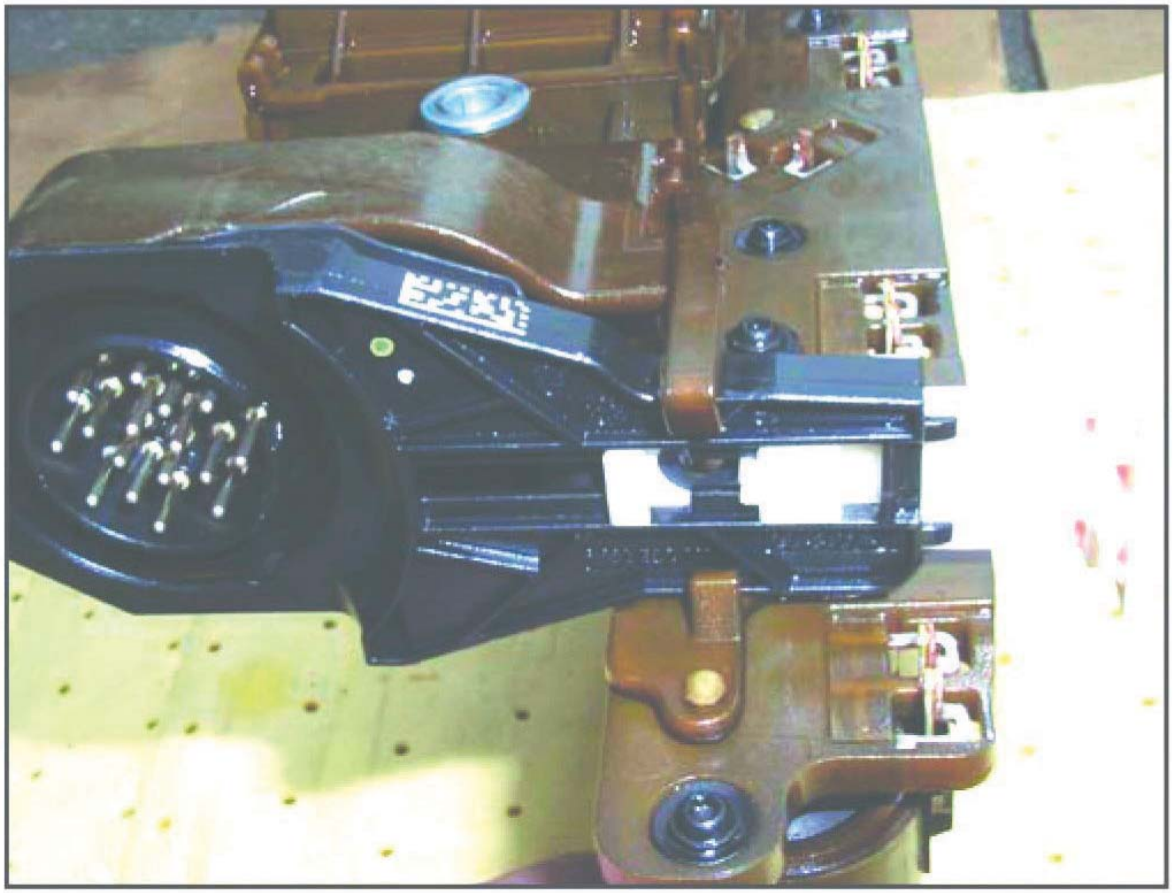
Pin	Wire Color	Circuit No.	Function
1-2	--	--	Not Used
3	OG/BK	1786	Park/Neutral Signal
4	RD/WH	2440	Battery Positive Voltage
5	BK/WH	451	Ground
6	WH	17	Brake Pedal Apply Signal
7	PU	5526	Tap Up/Tap Down Switch
8	--	--	Not Used
9	YE	43	Accessory Voltage Power
10	TN/BK	2500	CAN Hi
11	TN	2501	CAN Lo
12	PK	1339	Run/Crank Voltage
13	TN	2501	CAN Lo 2
14	TN/BK	2500	CAN Hi 2
15-16	--	--	Not Used

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6L80 (RPO MYC)

Pass-thru Connector Location

The pass through connector is located on the valve body and is a hard connection to the solenoids. During disassembly of the valve body, use care in the removel of the hard wire harness and connector.



Connector and Pass-thru Sleeve

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4L70E

(M70) Introduction

The 4L70E was introduced in the 2006 Chevrolet Trailblazer SS equipped with the 6.0L (LS2). The 4L70E (M70) is a heavy duty version of the 4L65E (M32) that was introduced a few years ago. The 4L70E will be used in some full size pickup applications equipped with the 6.0L (LQ9) engine during the 2006 model year.



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4L70E

(M70) Introduction

The 4L70E specifications/features are as follows:

- RPO M70
- Engine horsepower capacity 400 HP
- Input torque capacity 430 Lb ft
- Gear ratios 1st 3.06-1, 2nd 1.63-1, 3rd 1-1, 4th .7-1, Rev 2.29-1
- Converter 300mm, EC3
- SUV application model codes SKD or TKD
- Pickup application model codes CMD, CWD or KMD
- Some applications are equipped with and input speed sensor assembly (Models SKD & TKD use an ISS)
- 5 Pinion planetaries
- 7 plate 3-4 clutch (7 friction, 6 steels) Premium frictions
- 2-4 Band with Premium friction material. .64 ratio servo
- Updated HD rear internal gear assembly
- Shot peened HD output shaft (8620 Steel)
- HD Low roller clutch
- HD input gear and input sprag assembly
- Input shaft equipped for an input speed sensor
- Pump stator support passages updated for input speed sensor design
- Pump casting changes updates, relocation of S3 bore for pressure regulator valve train.
- HD heat treated stator support splines

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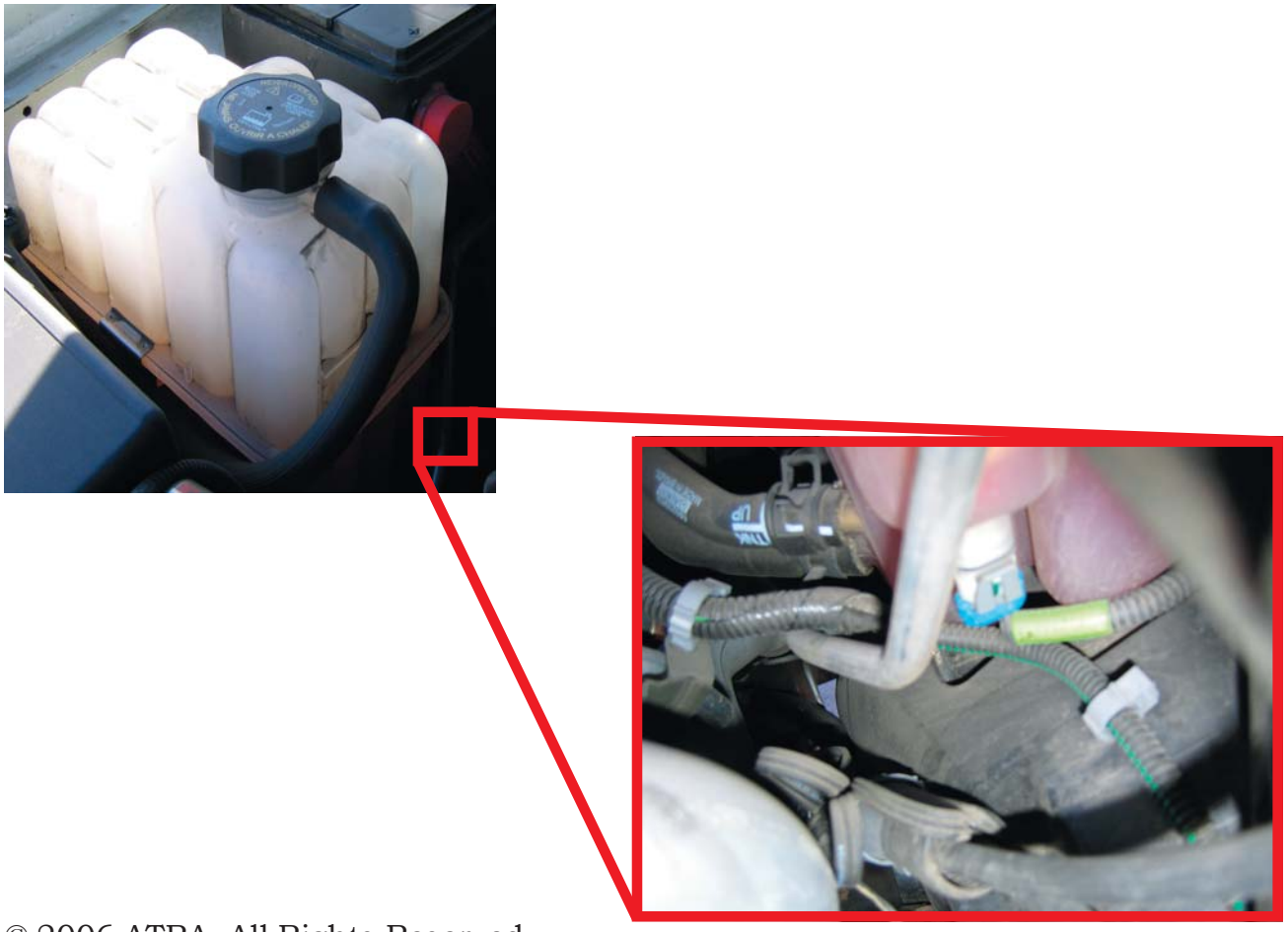
LCT 1000

Misfire, Surge, Chuggle

6.6L Duramax

Duramax Diesel applications may develop a misfire, surge or chuggle related concern that is difficult to diagnose and repair using current techniques and procedures. The complaint is sometimes misdiagnosed as being transmission related.

6.6L Duramax applications have experienced problems with coolant getting into the ECM and/or the ECM connector. The coolant wicks up the surge tank coolant level sensor and into the wiring. If other attempts to repair the concern have been unsuccessful, remove the ECM connector and inspect the connector and the ECM pins for evidence of corrosion or Dexcool contamination. If contamination is found the ECM may need to be replaced if there is evidence of any corrosion or damage. If only light residue is found you can generally clean the connector and ECM pins with electric circuit board cleaner. If coolant contamination is found, the wire and the coolant switch must be replaced. Make sure to replace the wire and the terminals.



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LCT 1000

(RPO M74) PTO Applications

If the PTO option was not ordered when the vehicle was new, you may need to add additional hard parts to the transmission to allow for PTO operation on some applications. On those applications the transmissions may not be equipped with a rotating housing that has the PTO gear installed. Instead they may have a tone ring for the turbine sensor mounted to the housing. Use the chart below to identify your application:

2001-2004	**6.6L LB7 (VIN 1)**	**PTO gear installed**
2001-2006	**8.1L L18 (VIN G)**	**PTO gear installed**
2004-2006	**6.6L LLY (VIN 2) Pickup**	**No PTO gear**
2004-2006	**6.6L LLY (VIN 2) Cab/Chassis**	**PTO gear installed**

If a customer wants to install a PTO on an application that is not equipped with a PTO it will be necessary to install a PTO equipped rotating assembly part number 29540518. In addition to the transmission hardware that will need to be added, a PTO, PTO relay, PTO solenoid, a PTO switch, an updated floor pan section as well as updated calibrations for the PCM/ECM may need to be installed to make the PTO system operational.



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LCT 1000

2006 Updates

Several areas have been updated for the 2006 model year. The changes were primarily designed to accommodate the higher torque capacity engine applications that were released for 2006. The 2006 part numbers are not designed to be interchangeable with the previous applications. They include the following:

Part Changed	Previous part number	2006 Part number
P1 Carrier Assembly	29531096	29541704
P1 Carrier/Bushing	29531249	29541705
P1 Carrier	29536583	29541708
P2 Ring Gear	29536863	29541707
Snap Ring	29531104	29541011
P2 Carrier Assembly	29536971	29539510
P2 Carrier/Bushing	29536961	29539509
P2 Carrier	29536959	29539502
P2 Pinions	29531113	29541700
P2 Spindle	29537889	29541703
P2 Bearing	29531116	29541706
P3 Ring	29537311	29539499
T-5 Bearing	29531095	29541702
P2 Sun Gear	29536960	29541701
Sun Spacer	29536128	29541728
P3 Sun Gear	29540499	29539498
P3 Carrier and Race Assembly	29540500	29539512
P3 Carrier Assembly	29539575	29539511
P3 Pinion	29531126	29539497
P3 Roller Bearing	29531127	29539500

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LCT 1000

2006 Updates

****This Kit allows 2006 pump assembly to be used in prior model year applications. Kit includes Main pump 29542796, Wear plate 29542799, O-Ring 29537620, Instruction Sheet 29543308 (Pump and wear plate must be used together)

Part Changed	Previous part number	2006 Part number
Rotating Clutch/Shaft PTO	29539507	29542801
Housing and PTO Gear Assembly	29540518	29542802
Rotating Clutch/Shaft NO PTO	29539508	29542803
Housing with tone wheel	29536097	29542804
Housing and Bushing	29543232	29542699
Housing	29543233	29542700
C2 Piston	29539653	29542807
Seal C1/C2 Outer	29536101	29542809
Seal C2 Inner	29536103	29542808
C2 return spring	29536104	29542810
C1 Housing	29537993	29542811
Seal ring C1, OD		29542812
C1 Piston	29536109	29543239
C1 Piston with Balance hole	29536203	29542815
Retaining ring	29536204	29541011
C1 Return Spring	29536198	29542814
P1 Ring Gear	29531055	29541008
P2 Ring Gear	29536863	29541818
P3 Ring Gear	29537311	29541010
Detent Spring	29536922	29542698
Detent Lever	29537169	29542692
Front Support Assembly	29541134	29542792
Front Support Assembly Ground Sleeve/Bearing	29541135	29542793
Pump	29541145 (31 Tooth)	29542796 (22 Tooth)
Pump Body/Gear Assembly	29541146	29542797
Pump body	29541147	29542798
Pump Wear Plate	29541149	29542799
Pump Kit ****		29543078

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LCT 1000 6 Speed

(RPO MW7) Introduction

New Product Introduction

A new 6 speed LCT 1000 was added to the General Motors lineup for the 2006 model year. Available in the 2500HD and 3500/3600 series trucks equipped with either the 8.1L V8 gas or 6.6L Duramax diesel the MW7 LCT 1000 offers some advancements over the 2005 and earlier applications. The updates for the MW7 LCT 1000 include the following:

* 6 Speeds, uses the current LCT 1000 clutch design, No new clutches added
* Tap shifts
* Increased torque capacity
* Internal Mode switch replaces the NSBU switch
* A new transmission control module, 80 pin connector
* A updated valve body with a revised design TCC solenoid
* A 20 pin pass through harness
* An updated pump design for quieter operation



Specifications

The LCT 1000 MW7 applications offers the following ratios:

1st-3.10-1
2nd-1.81-1
3rd-1.41-1
4th- 1-1
5th- .71-1
6th- .61-1
Rev- 4.49-1
Maximum shift speed 4850 RPM
Input Torque capacity 650 lb-ft, 2005 applications 565 lb-ft
Maximum GCWR 23,500 lb
PRNDL positions: PRNDM1
Fluid capacity: 13qt (12 Liter) Dexron VI only

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LCT 1000 6 Speed

(RPO MW7) Features

Features:

- Tap shifts
- Grade Braking
- Cruise control grade braking (Diesel only)
- Tow/Haul Mode
- Shift Stabilization and adaptive shift control algorithm
- Heater Performance mode (Diesel only)
- Low Traction Mode (Diesel only)

Gear Range	1-2/3-4 Clutch	4-5-6 Clutch	$3^{rd}/5^{th}$/Rev Clutch	2/6 Clutch	Low/Rev clutch
P/N					X
REVERSE			X		X
1^{ST}	X				X
2^{ND}	X			X	
3^{RD}	X		X		
4^{TH}	X	X			
5^{TH}		X	X		
6^{TH}		X		X	

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LCT 1000 6 Speed

(RPO MW7) Updates

2006 Valve body Updates
On the 2005 applications the valve body utilized the following solenoids:

- Trim A
- Trim B
- Shift solenoid C
- Shift solenoid D
- Shift solenoid E
- TCC-PWM
- Modulated main solenoid

On the 2006 MW7 applications the following solenoids/components are used:

- The trim solenoids were replaced by PCS 1 and PCS 2 solenoids
- The modulated main pressure solenoid
- Modulated detent spring contacts to the internal mode switch
- IMS replaces the NSBU switch
- PWM TCC solenoid was replaced by a PCS variable bleed solenoid
- 20 way connector which includes a different harness design and part number
- 6 Speed feed pipe

2006 TCM updates include:
* Model A40-1000 TCM
* Class 2 data communications for gas applications
* GM LAN communications for diesel applications
* 80 Pin Connector with a cam lock as part of the connector
* TCM mounted on the radiator fan shroud

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LCT 1000 6 Speed

(RPO MW7) Updates (continued)

Tap Shifts (Range Selection Mode)

Like several other GM applications, the MW7 features tap shifts are standard equipment. Unlike other applications the tap shift function is controlled by a thumb activated switch mounted on the gear shift lever. The range selection feature will hold the vehicle in the gear selected unless the driver commands a gear change or the TCM determines that engine damage may occur and commands a shift to occur. To activate the tap shift feature the shift selector lever must be in the M position.

Tow/Haul/Grade Braking

As with other GM applications, the tow haul feature is activated by a button located in the end of the shift lever. Tow/Haul should be selected anytime the vehicle load exceeds 75% of the GCWR for the application. Tow/Haul mode changes the shift points of the transmission to reduce shift cycling and improve vehicle performance. Tow/Haul mode also changes the TCC apply, which enables TCC in 2nd and 3rd gears as well as commands TCC to stay applied during deceleration. This prevents heat build up due to oil shear within the converter. In addition spark timing is retarded more during the shifts to lower the impact of the shift. The Grade braking feature or the cruise grade braking feature can only be activated if the tow haul feature is active and the shift lever is not in the M position. Grade braking can command downshifts to ranges as low as 2nd gear.

Heater Performance Mode

In the diesel applications the heater performance mode is designed to shorten the length of time it takes for the engine/transmission to reach operating temperature. This algorithm improves heater performance by decreasing the warm up time. The PCM/TCM monitors ambient temperatures and when the vehicle is being operated in cold weather the TCM will raise the 2-3,3-4,4-5 and 5-6 shift points to increase engine speed resulting in quicker warm up.

Low Traction Mode

Diesel power applications are equipped with a Low Traction Algorithm to improve traction during slippery conditions. By selecting a manual range while at a stop the TCM will command the transmission to start and stay in 2nd gear

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LCT 1000 6 Speed

(RPO MW7) Updates (continued)

Shift Stabilization

Like other GM applications, the shift stabilization algorithm monitors VSS and load inputs to minimize upshift/downshift cycling. If the current speed cannot be maintained in a higher range, the TCM will command the transmission to hold the gear and the PCM will lower the engine torque output.

Cold Operation

When operating in cold temperatures the TCM will prevent specific operations to prevent damage to the transmission. When the cold mode is active the DIC will display the message "Trans in Warm Up". The modes of operation are as follows:

- -13f or above transmission temp, transmission operates normally
- -13 to -31f transmission temp, 2nd and 3rd gears available only
- -31f or below transmission temp, 2nd gear available only

On diesel powered applications TCC will be inhibited based on both transmission and ambient air temperatures. The modes of operation are as follows:

- IAT below 32f, TCC will not apply until Transmission temperature is above 88F
- IAT 32-50f, TCC will not apply until Transmission temperature is between 50-80f
- IAT above 50f, TCC operates normally

Gas Applications:

- Transmission temperature below 68f, TCC inhibited

MODES OF OPERATION	6.6L Duramax	8.1L Gas
Range Selection Mode	X	X
Grade Braking	X	X
Cruise Grade Braking	X	
Tow/Haul	X	X
Shift Stabilization	X	X
Adaptive shifts	X	X
Heater Performance	X	
Low Traction	X	

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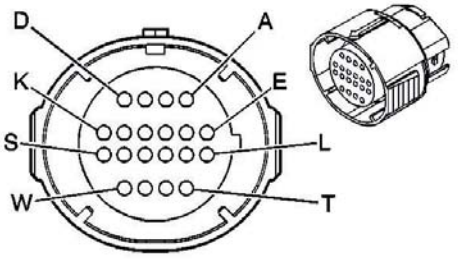
LCT 1000 6 Speed

(RPO MW7) Updates (continued)

Pump

The gear style pump used in the MW7 LCT 1000 is a gear style unit with 22 teeth as opposed to the 31 tooth design used in the previous application. This new design lowers the frequency of the pump noise into a range that can be masked by the engine

LCT 1000 6 speed pass through connector ID Harness



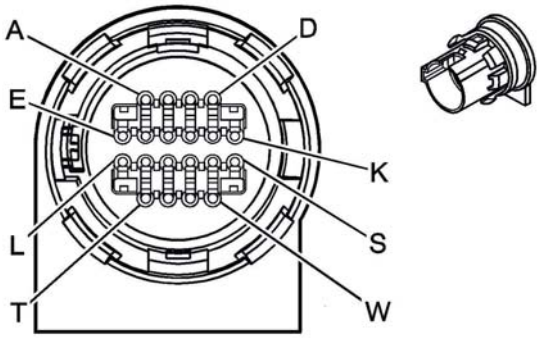
PIN	Wire Color	Circuit #	Function of the Circuit
A	LTGRN	1222	SS1 SHIFT SOL 1
B	YEL/BLK	1223	SS2 SHIFT SOL 2
C	OR/WHT	2557	SS3 SHIFT SOL 3
D	PK	1224	PS1 PRESS SW
E	RED	1226	PS3 PRESS SW
F	DK BLUE	1225	PS2 PRESS SW
G	YEL/BLK	1227	TFT SIGNAL
H	BK	2762	TFT LOW
J	BRN	418	TCC PCS
K	LTGRN/BK	2529	PS4 PRESS SW
L	RED/BLK	1228	HSD1 ACTUATOR SUPPLY
M	LT BLU/WHT	1229	PCS2 PCS LOW
N	BRN	323	HSD2 ACTUATOR SUPPLY
P	BRN/WHT	2469	PCS1 PCS LOW
R	OR/BLK	1786	P/N SIGNAL
S	DK BLUE	1530	MOD MAIN LOW
T	GRAY	773	IMS SIGNAL C
U	YEL	772	IMS SIGNAL B
V	BLK/WHT	771	IMS SIGNAL A
W	WHT	776	IMS SIGNAL P

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LCT 1000 6 Speed

(RPO MW7) Updates (continued)

LCT 1000 6 speed pass through connector ID Transmission



PIN	Wire Color	Circuit #	Function of the Circuit
A	DKGRN	1222	SS1 SHIFT SOL 1
B	LT GRN	1223	SS2 SHIFT SOL 2
C	PURPLE	2557	SS3 SHIFT SOL 3
D	OR	1224	PS1 PRESS SW
E	GRAY	1226	PS3 PRESS SW
F	WHT	1225	PS2 PRESS SW
G	TAN	1227	TFT SIGNAL
H	BK	2762	TFT LOW
J	PK	418	TCC PCS
K	BRN	2529	PS4 PRESS SW
L	RED	1228	HSD1 ACTUATOR SUPPLY
M	DK BLU	1229	PCS2 PCS LOW
N	RD/BK	323	HSD2 ACTUATOR SUPPLY
P	LT BLU	2469	PCS1 PCS LOW
R	PURPLE	1786	P/N SIGNAL
S	YEL	1530	MOD MAIN LOW
T	BLK	773	IMS SIGNAL C
U	PK/BLK	772	IMS SIGNAL B
V	YEL/BLK	771	IMS SIGNAL A
W	WHT	776	IMS SIGNAL P

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