ATRA WEBINAR

6T70

INTRODUCTION

Presented
By
Steve Garrett
ATRA Presenter
• Introduction
• Features
• Operation
• Diagnosis
• Service
6T70/75

New for Model year 2007
Part of a family of transmissions.

Co-engineered

Built in Warren, MI
APPLICATIONS

2007 Saturn Aura
2007 Pontiac G6
2007 Saturn Outlook
2007 GMC Acadia
The primary difference is the 6T75 is a heavy duty version of the 6T70. The heavy duty parts in the 6T75 include:

*A shot peened output carrier
*5 Pinion carrier
*Transfer Gear is wider
*Differential carrier is heavier duty
*Heavier ribbed case
Towing Capacity

6T70
- 1000lbs (454kg)
- Maximum Engine Torque: 280 lb-ft
- Maximum Horsepower: 300 hp

6T75
- 4500lbs (2041kg)
- Maximum Engine Torque: 299 lb-ft
- Maximum Horsepower: 300 hp

Can be dingy towed indefinitely
Can not dolly tow an AWD vehicle
Can not be towed with rear tires in the air
When dinghy towing your vehicle, the vehicle should be run at the beginning of each day and at each RV fuel stop for about 5 five minutes. This will ensure proper lubrication of transmission components.

Never exceed 65 mph (105 km/h) while towing your vehicle.

Never have your vehicle towed from the rear.

Don’t tow a vehicle with the front drive wheels on the ground if one of the front tires is a compact spare.
Dolly Towing

All-wheel-drive vehicles should not be towed with two wheels on the ground. To properly tow these vehicles, they should be placed on a platform trailer with all four wheels off of the ground or dingy towed from the front.
So what is so different?

Only 1 Accumulator (456)
No Shift Valves
Multifunctional Solenoids
Compensator Circuits (Clutch Release control)
Internal TCM
Clutch to Clutch Shifts
• RPO Codes  AWD  FWD
  Car  6T70  MH4*  MH2
  Truck  6T75  MH6  MY9
• 6 Forward Gears
• Clutch to Clutch Shifting
  5 clutches, 1 diode one way
• TCM Inside Transaxle, Includes
  Solenoids, Pressure Switches
  TFT
• Dexron VI

*MY09 release date
Why do you need to use Dexron VI?

* Reduced sump volumes
* Higher fluid turnover rates
* Increased energy densities
* Reduced cooling capacity
* Clutch to Clutch Shifting
* 50% improvement in film strength to reduce wear
Studded side cover bolts need to be re-torqued whenever cooler lines are removed.

Gasket not reusable.
*2 shift solenoids used (On/Off Design), SS1, SS2
* 6 Variable bleed solenoids, PCS1, PCS2, PCS3, PCS4, PCS5, TCC
*A Bosch built 32 bit TCM (TEHCM)
*A special spring loaded bracket is used to force the TCM against a heat sink on the valve body. Failure to install the bracket will result in TCM thermal shutdown
TCM & Solenoids

- TFP Switch 1
- TFP Switch 4
- TFP Switch 3
- TFP Switch 2

Shift Solenoid 1
PCS 3
PCS 5
TCC Solenoid
Shift Solenoid 2
PCS 2
PCS 4
PCS 1
(Line Pressure)
• Furnace brazed “squash turbine” design converter
• EC3 246 mm “hyper elliptical” furnace brazed torque converter.
• Torque converter contains a lip seal that will be damaged if the converter is removed or installed in any position other than “vertical”.
• Special tools are available J46409
*Remote mounted, off axis, Chain Driven Vane type oil pump
* Internal Mode Switch (IMS) equipped
* Performance Algorithm Shifting (PAS) programming
* Performance Algorithm Lift foot (PAL) programming
* Sport mode and TAP shift equipped
<table>
<thead>
<tr>
<th></th>
<th>6T70/75</th>
<th>4T65E</th>
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<tbody>
<tr>
<td>First</td>
<td>4.48</td>
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<td>Second</td>
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<td>Third</td>
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<td>1.41</td>
<td>0.70</td>
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<td>Fifth</td>
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<td>Sixth</td>
<td>0.74</td>
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<tr>
<td>Reverse</td>
<td>2.88</td>
<td>2.39</td>
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</table>
Diode One Way
Inputs
Internal Mode Switch

GROUND
A SIGNAL
B SIGNAL
C SIGNAL
P SIGNAL
P/N SIGNAL
Transmission Internal Mode Switch Logic

High = 8.8 Volts  
Low= 0 Volts

<table>
<thead>
<tr>
<th>Gear Selector Position</th>
<th>Signal A</th>
<th>Signal B</th>
<th>Signal C</th>
<th>Signal P</th>
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<tr>
<td>Park</td>
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<td>HI</td>
<td>HI</td>
<td>LOW</td>
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<td>Park/Reverse</td>
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<td>HI</td>
<td>LOW</td>
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<tr>
<td>Reverse</td>
<td>LOW</td>
<td>LOW</td>
<td>HI</td>
<td>HI</td>
</tr>
<tr>
<td>Reverse/Neutral</td>
<td>HI</td>
<td>LOW</td>
<td>HI</td>
<td>HI</td>
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<tr>
<td>Neutral</td>
<td>HI</td>
<td>LOW</td>
<td>HI</td>
<td>LOW</td>
</tr>
<tr>
<td>Neutral/Drive 6</td>
<td>HI</td>
<td>LOW</td>
<td>LOW</td>
<td>LOW</td>
</tr>
<tr>
<td>Drive 6</td>
<td>HI</td>
<td>LOW</td>
<td>LOW</td>
<td>HI</td>
</tr>
<tr>
<td>Drive 6/Drive 4</td>
<td>LOW</td>
<td>LOW</td>
<td>LOW</td>
<td>HI</td>
</tr>
<tr>
<td>Drive 4</td>
<td>LOW</td>
<td>LOW</td>
<td>LOW</td>
<td>LOW</td>
</tr>
</tbody>
</table>
Output Speed Sensor

Input Speed Sensor
ISS/OSS Input Test

1. Set the J 38522 Signal to 8 volts, the Frequency to 120 and the Percent Duty Cycle to 50.
2. Ignition On, observe either the scan tool parameter ISS Signal or OSS Signal.
3. The signal parameter should display between 100-400 RPM.
ISS Replacement

DT-47734
Fluid Pressure Switches

TCM & Solenoids
- TFP Switch 1
- TFP Switch 2
- TFP Switch 3
- TFP Switch 4

Shift Solenoid 1
- PCS 3
- PCS 5
- TCC Solenoid
- Shift Solenoid 2
- PCS 2
- PCS 4
- PCS 1 (Line Pressure)
Fluid Pressure Switch Operation
(Normally Closed)

Open 8 psi (55 Kpa) Close 12 psi (206 Kpa)

Function: Monitor Clutch regulator valve operation, Calculate Adaptive learn values

No pressure – Switch closed – Reads high on Scan tool

Pressure present – Switch open – Reads low on Scan tool

TFP Switch 1 monitors the 1-2-3-4 clutch regulator valve
TFP Switch 2 monitors the 3-5 & Reverse clutch regulator valve
TFP Switch 3 monitors the 2-6 clutch regulator valve
TFP Switch 4 monitors the R1 / 4-5-6 clutch regulator valve

Switches non-serviceable
Driver Shift Control

Saturn Aura – Electronic Range Selector Mode
Pontiac G6 – Manual Shift Mode
Saturn Outlook / GMC Acadia – Electronic Range Selector Mode

Allows driver to control transmission shifting either limiting top gear available or allowing the driver to manually shift the transmission. Will allow 2\textsuperscript{nd} and 3\textsuperscript{rd} gear starts and will not allow a downshift to a gear that is inappropriate for current driving conditions. Do not use 3\textsuperscript{rd} gear start when towing a trailer you could overheat and damage the transmission. Some models will hit fuel cut off if RPM’s are to high other models will up shift to the next higher gear.
Driver Shift Control
Saturn Aura – Electronic Range Selector Mode

To use this feature, do the following:

a. Move the shift lever from DRIVE (D) rearward to MANUAL (M). While driving in manual mode, the transaxle will remain in the driver selected gear. When coming to a stop in the manual position, the vehicle will automatically shift into FIRST (1) gear.

b. Press the (+) plus paddle located on top of the steering wheel controls forward to upshift, or push the backside of the shift paddle rearward to downshift.
Driver Shift Control

Pontiac G6 – Manual Shift Mode

To use this feature, do the following:

a. Move the shift lever from DRIVE (D) rearward and then to the right into the MANUAL MODE (M). While driving in manual shift mode, the transaxle will remain in the driver gear selected. When coming to a stop in the manual position, the vehicle will automatically shift to FIRST (1) gear.

b. Press the shift level forward to upshift or rearward to downshift.
Driver Shift Control
Saturn Outlook / GMC Acadia –
Electronic Range Selector Mode

Allows you to choose the top-gear limit of the vehicle's transmission and the vehicle's speed while driving down hill or towing trailer.

To use this feature, do the following:

a. Move the shift lever to the LOWER RANGE GATE (L).
b. Press the plus/minus button located on the shift lever, to increase or decrease the gear range available based upon your current driving conditions and needs.
Operation
## Range Reference Chart

<table>
<thead>
<tr>
<th>RANGE</th>
<th>GEAR</th>
<th>1-2-3-4 CLUTCH</th>
<th>3-5 REV CLUTCH</th>
<th>4-5-6 CLUTCH</th>
<th>2-6 CLUTCH</th>
<th>LOW &amp; REV CLUTCH</th>
<th>LOW ONE-WAY CLUTCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARK</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ON</td>
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<tr>
<td>REV</td>
<td>R</td>
<td></td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td>ON</td>
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<tr>
<td>NEU</td>
<td>N</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>ON</td>
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<tr>
<td>D</td>
<td>1ST BRAKING</td>
<td>ON</td>
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<td></td>
<td></td>
<td>HOLDING</td>
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<tr>
<td></td>
<td>1ST</td>
<td>ON</td>
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<td></td>
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<td>HOLDING</td>
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<tr>
<td></td>
<td>2ND</td>
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<td>3RD</td>
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</table>
**Solenoid Application Chart**

Solenoid command status ON/OFF refers to hydraulic operation, not electrical operation.

<table>
<thead>
<tr>
<th>RANGE</th>
<th>GEAR</th>
<th>SHIFT SOL 1</th>
<th>SHIFT SOL 2</th>
<th>1234 CL PC SOL 5 NL</th>
<th>26 CL PC SOL 4 NL</th>
<th>35 REV CL PC SOL 2 NH</th>
<th>LOW REV 456 CL PC SOL 3 NH</th>
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<tbody>
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<td>ON</td>
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<td>ON</td>
</tr>
</tbody>
</table>
Solenoids

2. ON/OFF SHIFT SOLENOIDS: N/C, GROUND SIDE CONTROLLED

3. VBS NORMALLY “LOW” SOLENOIDS, TCC, #4, #5

3. VBS NORMALLY “HIGH” SOLENOIDS, PCS, #2, #3

NORMALLY HIGH = SOLENOID OFF, PRESSURE IS ALLOWED TO TRAVEL TO THE CLUTCH

NORMALLY LOW = SOLENOID OFF, NO PRESSURE IS ALLOWED TO TRAVEL TO THE CLUTCH

VBS SOLENOIDS ARE “POSITIVE DUTY CYCLE” CONTROLLED, 3000 HZ, 5.5 OHMS AT 70F, CURRENT LIMITED TO .9A, SOLENOID FEED VOLTAGE REGULATED FROM TCM IS 8.3-9.3 VOLTS
Solenoids

Solenoid 1 and 2 are ON/OFF solenoids and are used to control whether the transmission is in Reverse or Forward.

VBS solenoids 2, 3, 4, and 5 control when a shift occurs and how aggressive the shift is. Shift feel is also controlled by the compensator circuit. Solenoid cleaning cycle every 30 seconds while in P/N or when you run the cleaning process with the scan tool.
Valve Function

The two major hydraulic/valve changes for the 6-speed transmission are the addition of 2 valve families, “Clutch Select” Valves and “Clutch Regulator” valves.

Clutch select valves control which clutch is allowed to apply/release.

Clutch regulator valves control how aggressive the clutch apply will be as well as control the actual shift for that specific gear.
Valves Upper valve body

10 valves total
* Manual valve
* Clutch select 2
* R1/456 clutch regulator
* Clutch select 3
* TCC Regulator
* TCC Control
* 2/6 Clutch Regulator
* Isolator
* 3-5 reverse Clutch Regulator
* Pressure Regulator
Valves Lower Valve Body

5 valves total, 1 accumulator

*1-2-3-4 Clutch regulator
*1-2-3-4 Clutch Boost
*4-5-6 Clutch Boost
*3-5 Clutch Boost
*Actuator Feed Limit

*4-5-6 Accumulator
Solenoid Function

Shift Solenoid 1 controls Clutch Select Valve 2
Shift Solenoid 2 controls Clutch Select Valve 3
TCC Solenoid controls TCC operation

Pressure Control Solenoid 1 controls Line Pressure
Pressure Control Solenoid 2 controls 3-5-Reverse Clutch Regulator Valve
Pressure Control Solenoid 3 controls R1/4-5-6 Clutch Regulator Valve
Pressure Control Solenoid 4 controls 2-6 Clutch Regulator Valve
Pressure Control Solenoid 5 controls 1-2-3-4 Clutch Regulator Valve
Thank you for Attending!

If you have any questions or comments please email Lance at lwiggins@atra.com