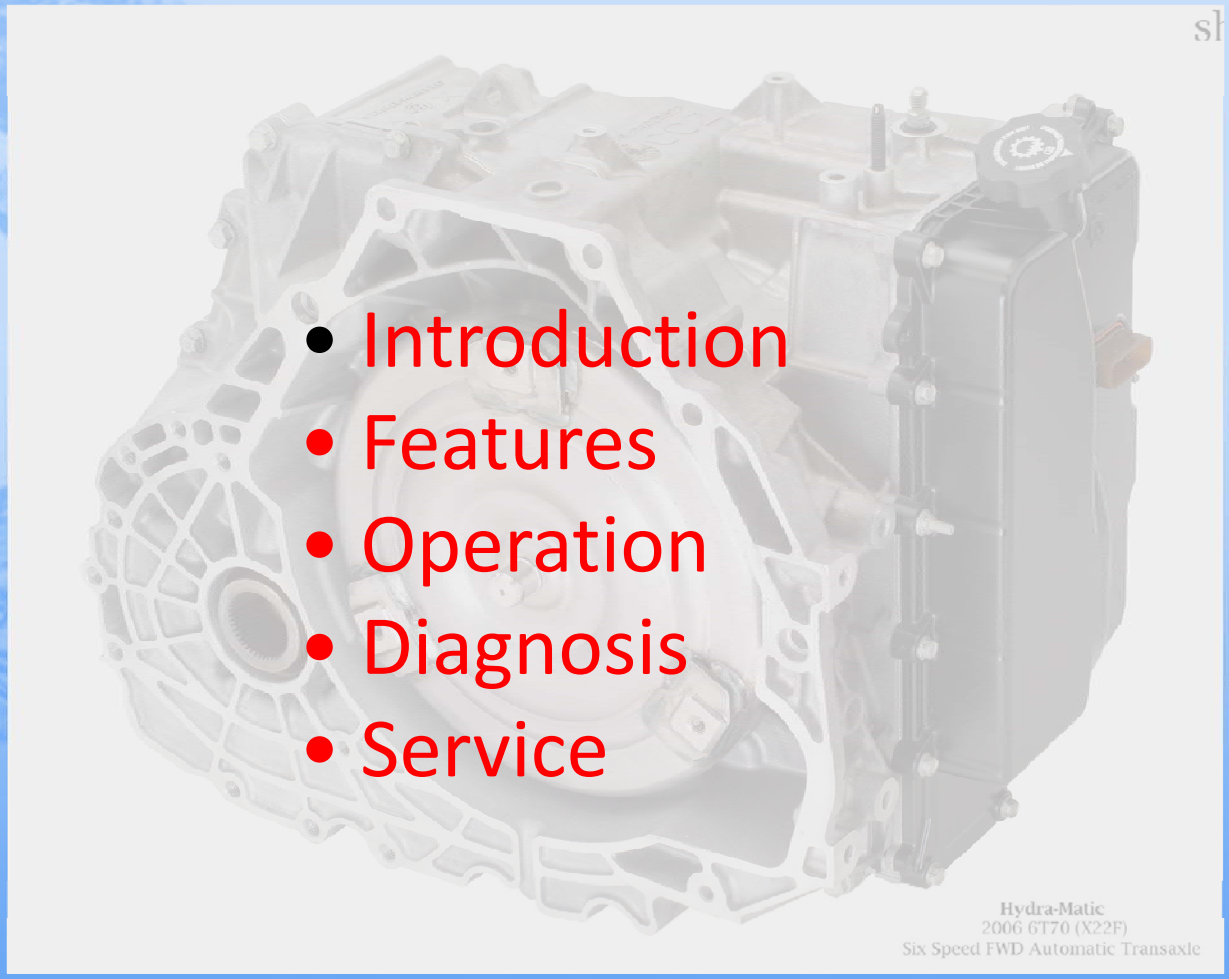
ATRA WEBINAR

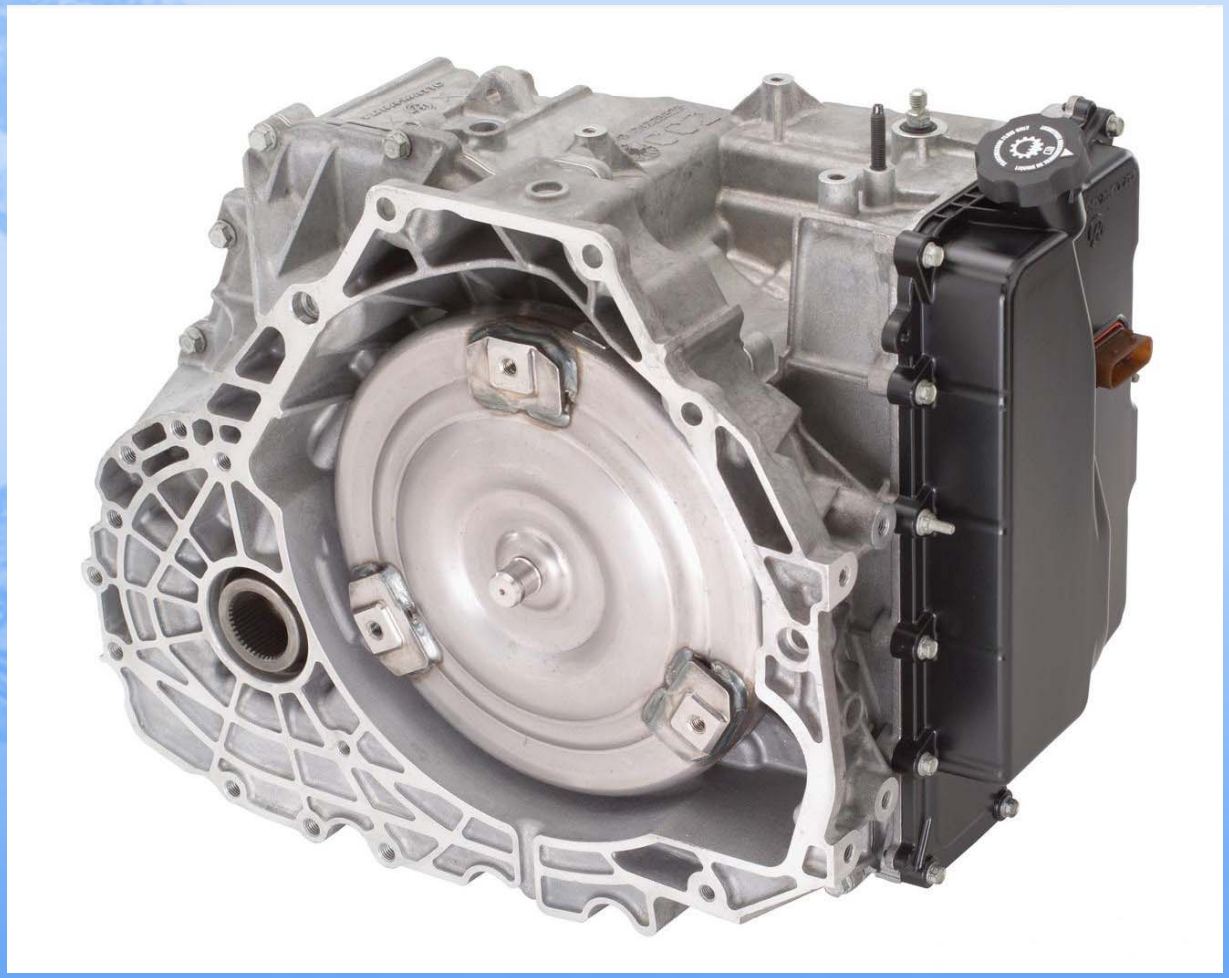
6T70 INTRODUCTION

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

6T70-6T75 Differences

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

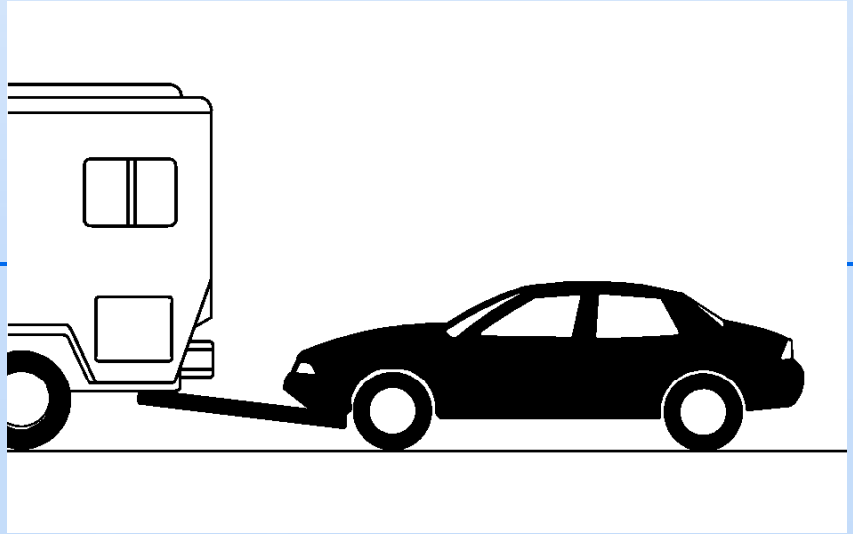
*Heavier ribbed case

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

Dingy Towing



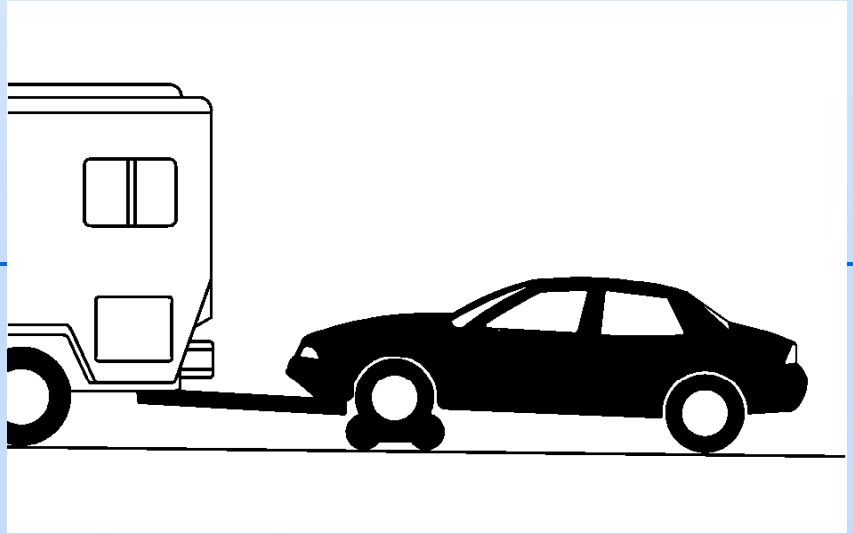
When dinghy towing your vehicle, the vehicle should be run at the beginning of each day and at each RV fuel stop for about 5 five minutes. This will ensure proper lubrication of transmission components.

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



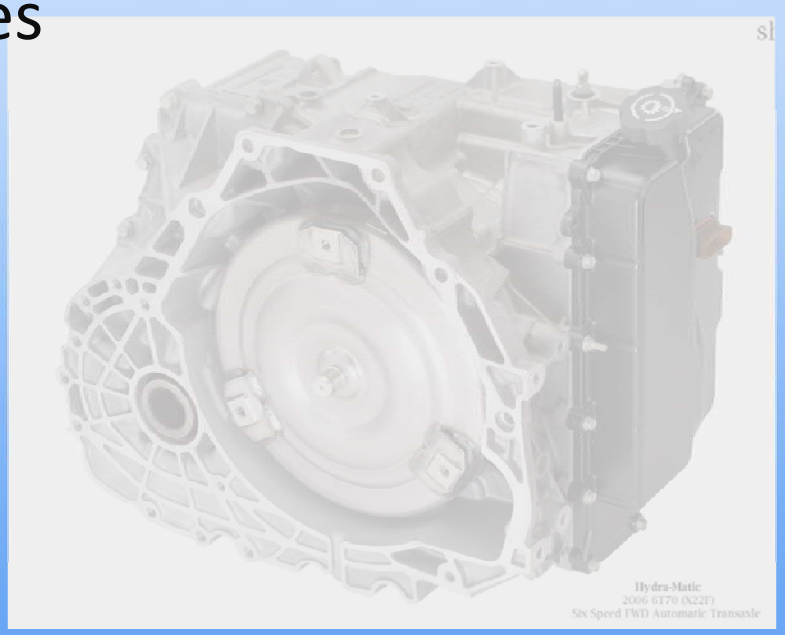
All-wheel-drive vehicles should not be towed with two wheels on the ground. To properly tow these vehicles, they should be placed on a platform trailer with all four wheels off of the ground or dingy towed from the front.

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

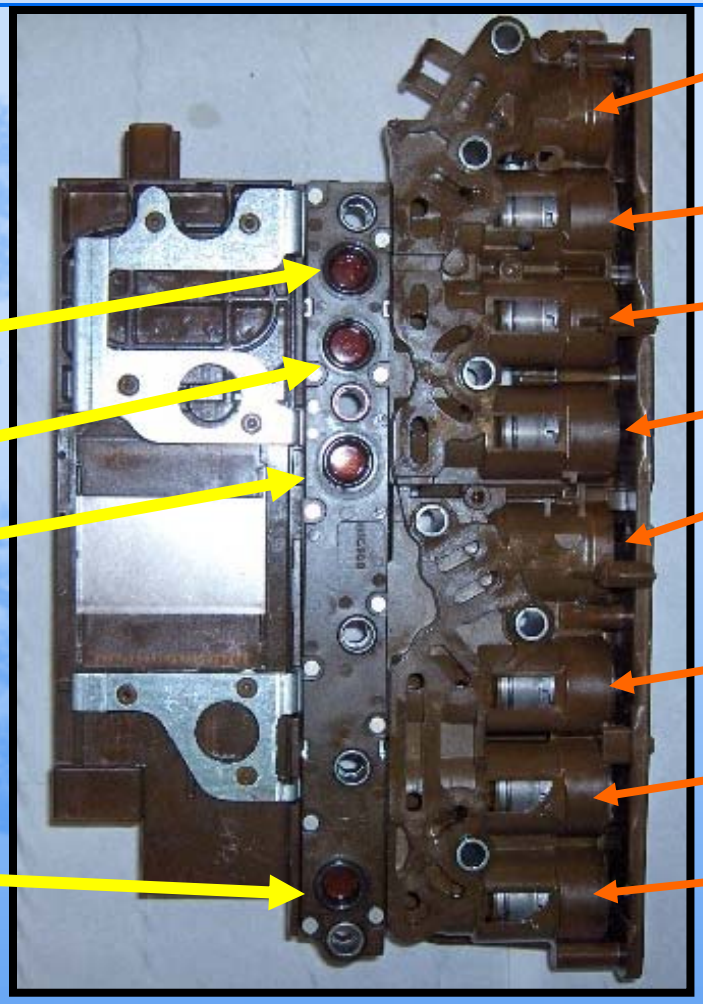
Dipstick

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

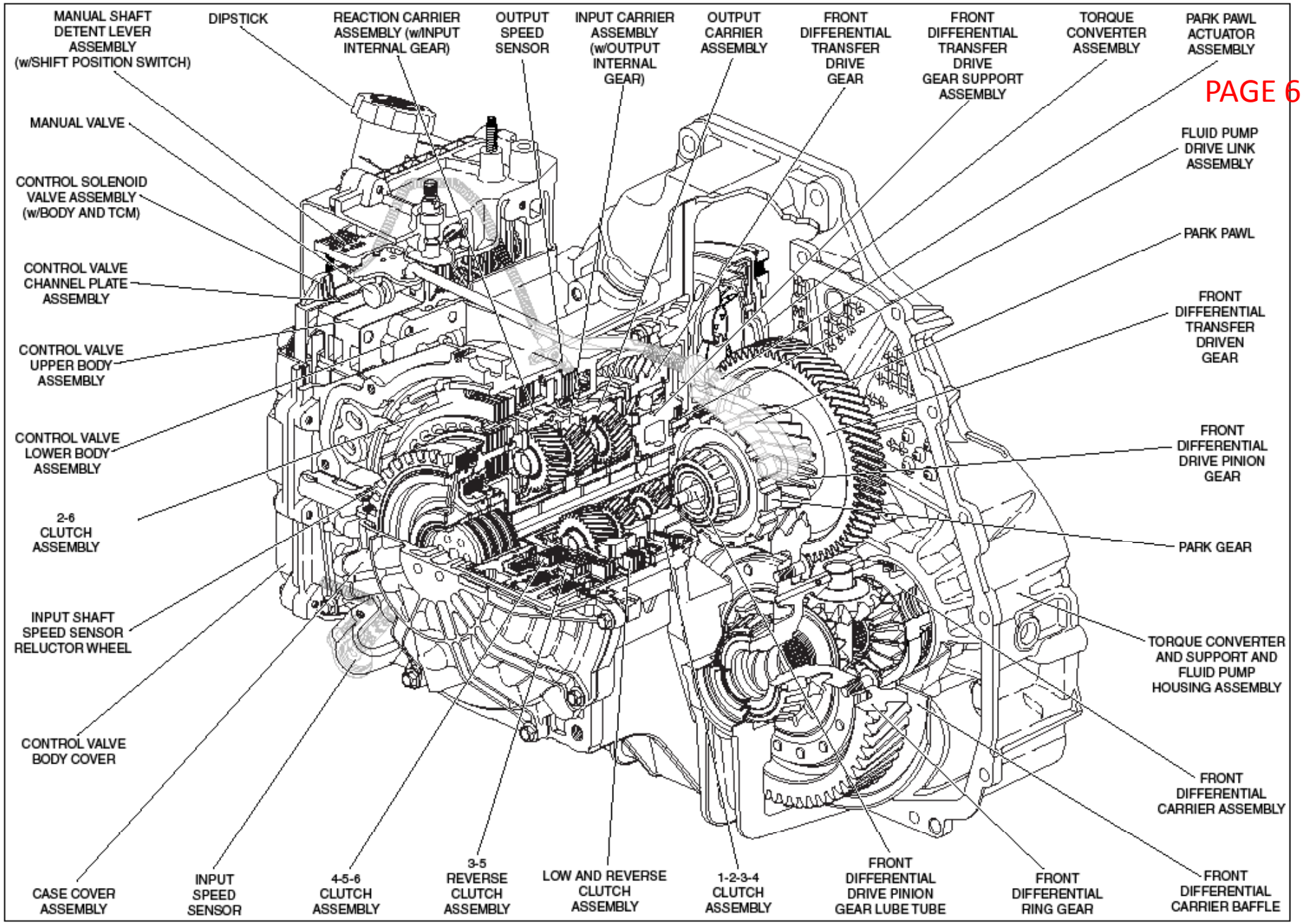
PCS 1
(Line Pressure)

- 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

Gear ratios

	6T70/75	4T65E
First	4.48	2.92
Second	2.87	1.57
Third	1.84	1.00
Fourth	1.41	0.70
Fifth	1.00	
Sixth	0.74	
Reverse	2.88	2.39


MANUAL SHAFT DETENT LEVER ASSEMBLY (w/SHIFT POSITION SWITCH)
DIPSTICK
REACTION CARRIER ASSEMBLY (w/INPUT INTERNAL GEAR)
OUTPUT SPEED SENSOR
INPUT CARRIER ASSEMBLY (w/OUTPUT INTERNAL GEAR)
OUTPUT CARRIER ASSEMBLY
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY
TORQUE CONVERTER ASSEMBLY
PARK PAWL ACTUATOR ASSEMBLY
MANUAL VALVE
CONTROL SOLENOID VALVE ASSEMBLY (w/BODY AND TCM)
CONTROL VALVE CHANNEL PLATE ASSEMBLY
CONTROL VALVE UPPER BODY ASSEMBLY
CONTROL VALVE LOWER BODY ASSEMBLY
2-6 CLUTCH ASSEMBLY
INPUT SHAFT SPEED SENSOR RELUCTOR WHEEL
CONTROL VALVE BODY COVER
CASE COVER ASSEMBLY
INPUT SPEED SENSOR
4-5-6 CLUTCH ASSEMBLY
3-5 REVERSE CLUTCH ASSEMBLY
LOW AND REVERSE CLUTCH ASSEMBLY
1-2-3-4 CLUTCH ASSEMBLY
FRONT DIFFERENTIAL DRIVE PINION GEAR LUBE TUBE
FRONT DIFFERENTIAL RING GEAR
FRONT DIFFERENTIAL CARRIER BAFFLE
FRONT DIFFERENTIAL CARRIER ASSEMBLY
TORQUE CONVERTER AND SUPPORT AND FLUID PUMP HOUSING ASSEMBLY
PARK GEAR
FRONT DIFFERENTIAL DRIVE PINION GEAR
FRONT DIFFERENTIAL TRANSFER DRIVEN GEAR
PARK PAWL
FLUID PUMP DRIVE LINK ASSEMBLY

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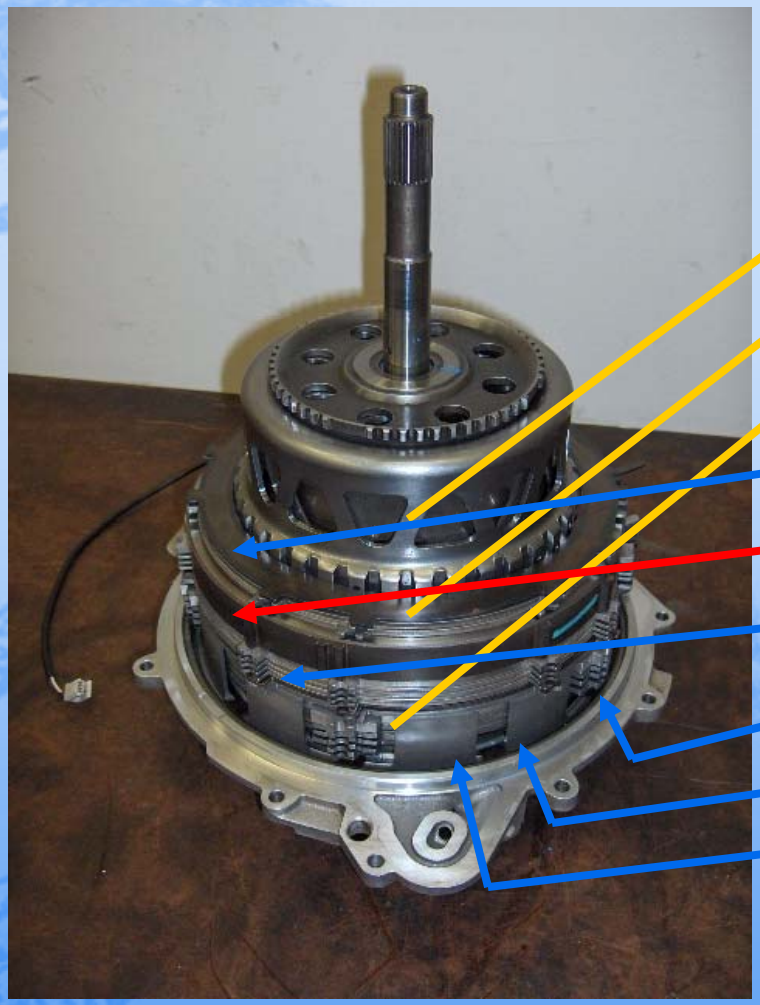
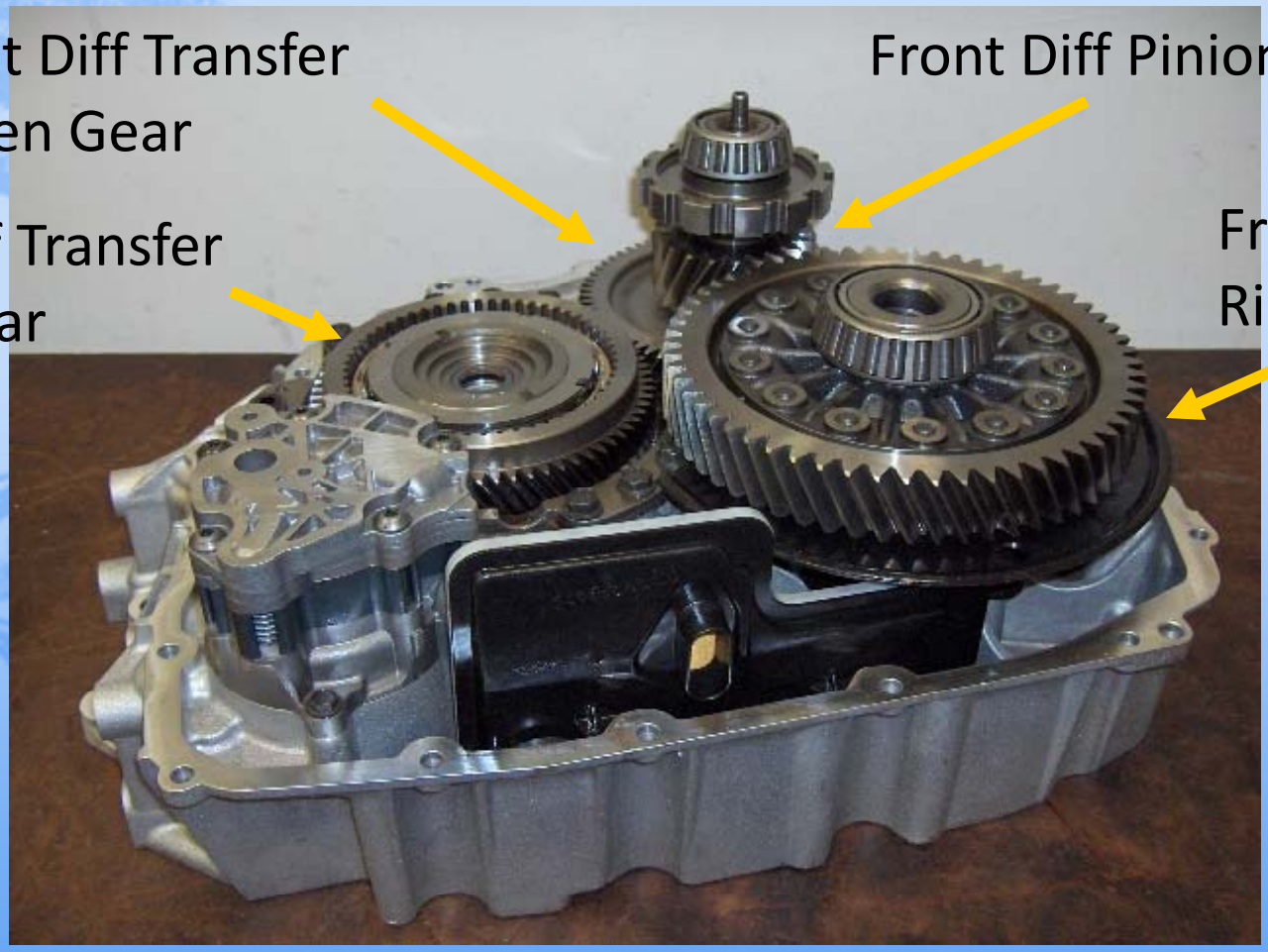


Output Gear Set
Input Gear Set
Reaction Gear Set

1-2-3-4 Clutch
Low One-Way Clutch
Low & Reverse Clutch
2-6 Clutch
3-5-Reverse Clutch
4-5-6 Clutch


Front Diff Transfer
Driven Gear
Front Diff Pinion Gear
Front Diff Transfer
Drive Gear
Front Diff
Ring Gear

Diode One Way

Inputs

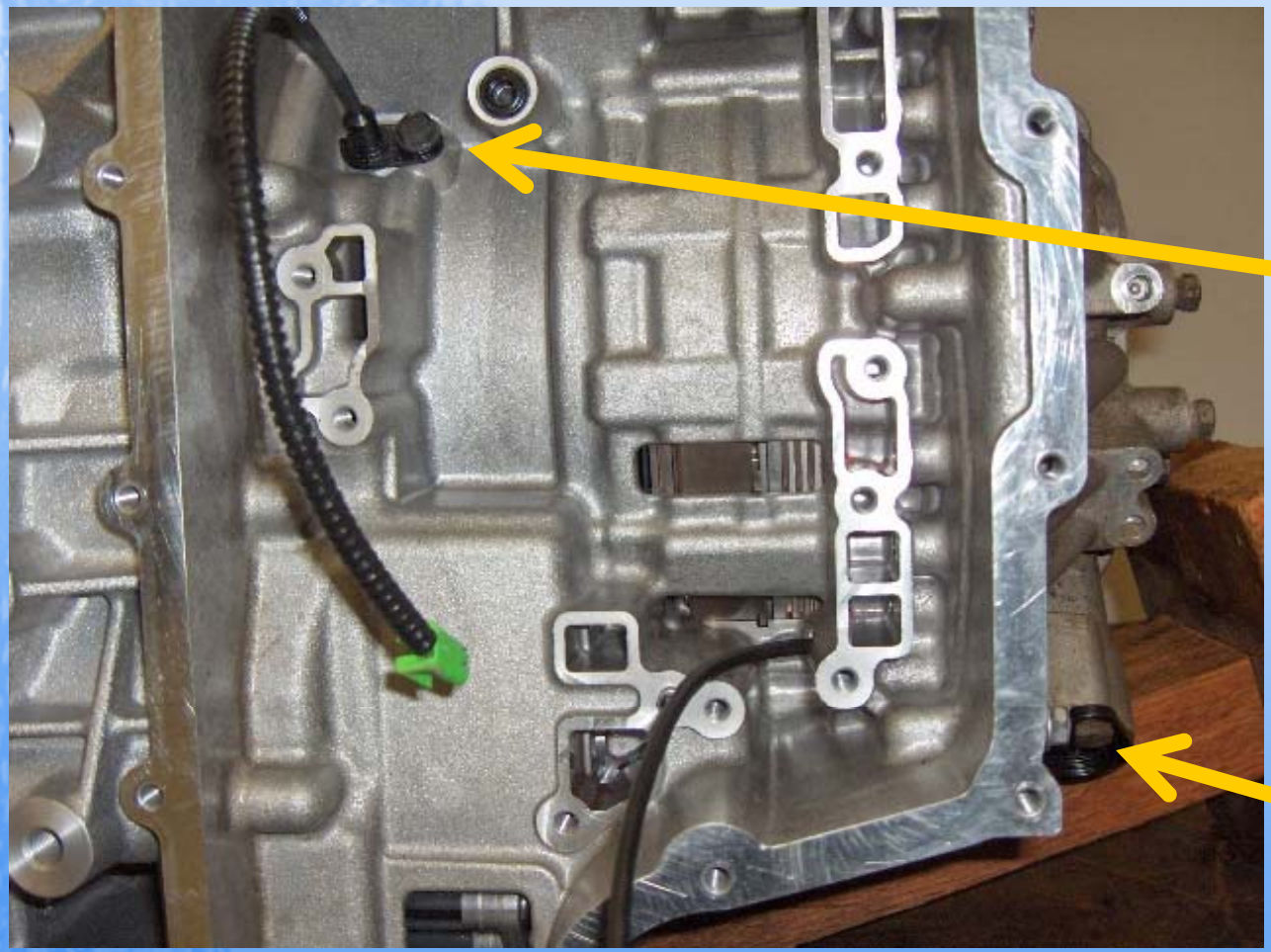
Internal Mode Switch

GROUND
A SIGNAL
B SIGNAL
C SIGNAL
P SIGNAL
P/N SIGNAL

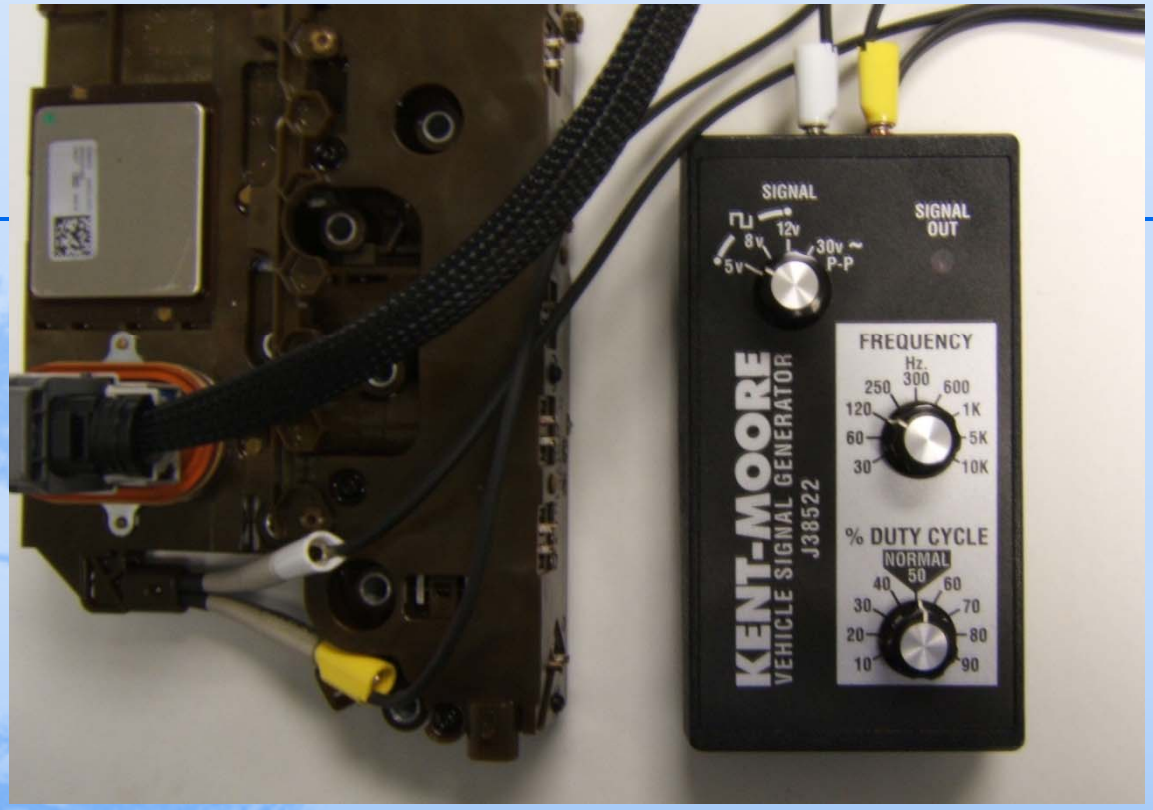
Transmission Internal Mode Switch Logic

High = 8.8 Volts
Low= 0 Volts

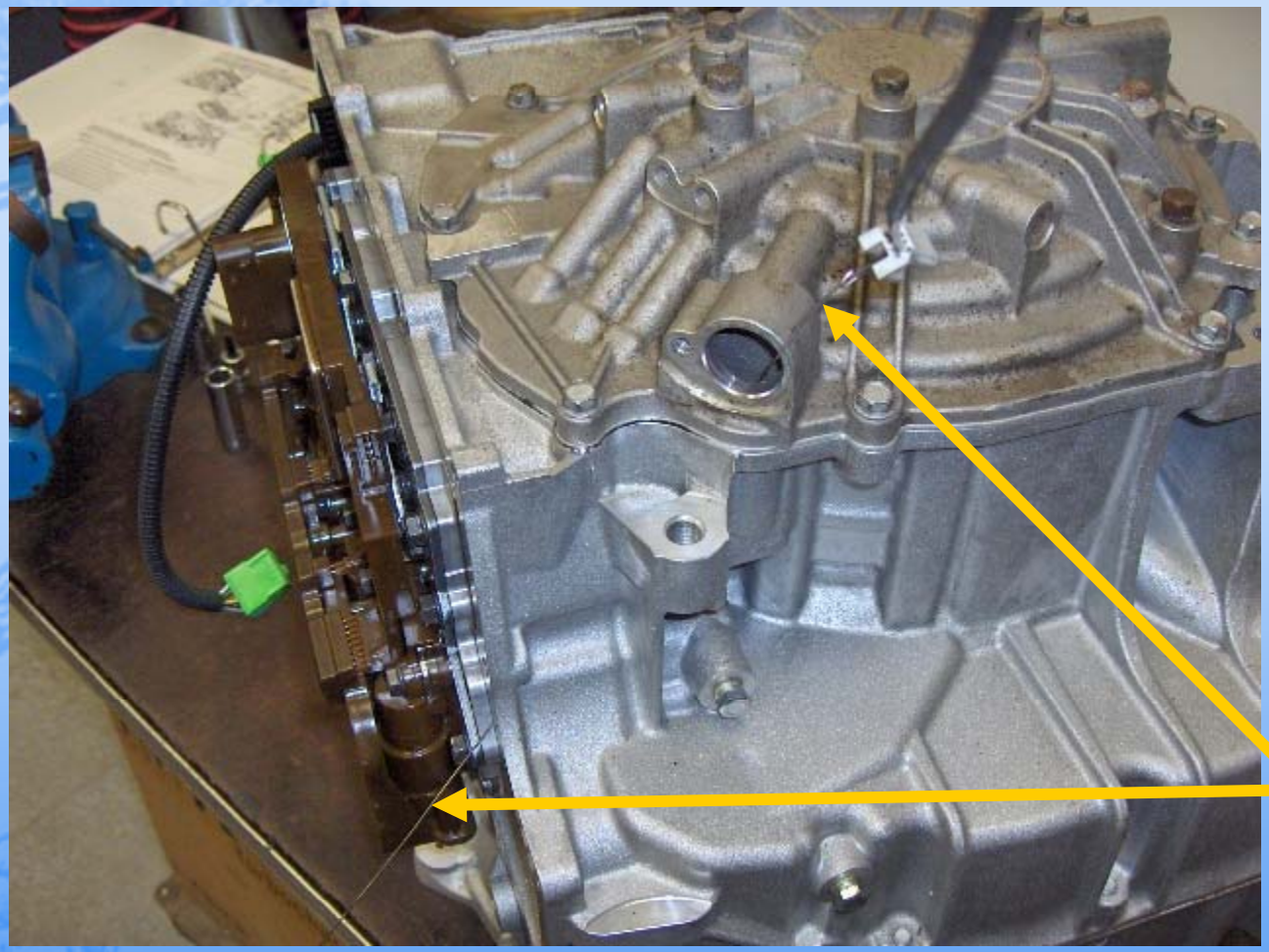
Gear Selector Position	Signal A	Signal B	Signal C	Signal P
Park	**LOW**	**HI**	**HI**	**LOW**
Park/Reverse	**LOW**	**LOW**	**HI**	**LOW**
Reverse	**LOW**	**LOW**	**HI**	**HI**
Reverse/Neutral	**HI**	**LOW**	**HI**	**HI**
Neutral	**HI**	**LOW**	**HI**	**LOW**
Neutral/Drive 6	**HI**	**LOW**	**LOW**	**LOW**
Drive 6	**HI**	**LOW**	**LOW**	**HI**
Drive 6/Drive 4	**LOW**	**LOW**	**LOW**	**HI**
Drive 4	**LOW**	**LOW**	**LOW**	**LOW**


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

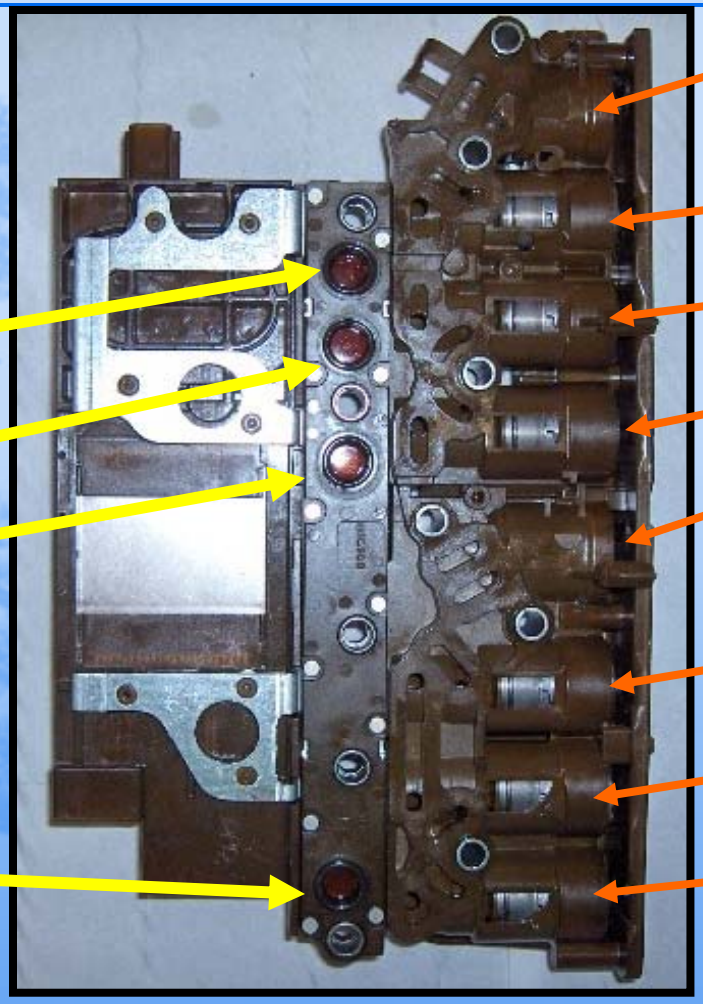
TCM
& Solenoids

TFP Switch 1

TFP Switch 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)

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 2nd and 3rd gear starts and will not allow a downshift to a gear that is inappropriate for current driving conditions.
Do not use 3rd 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

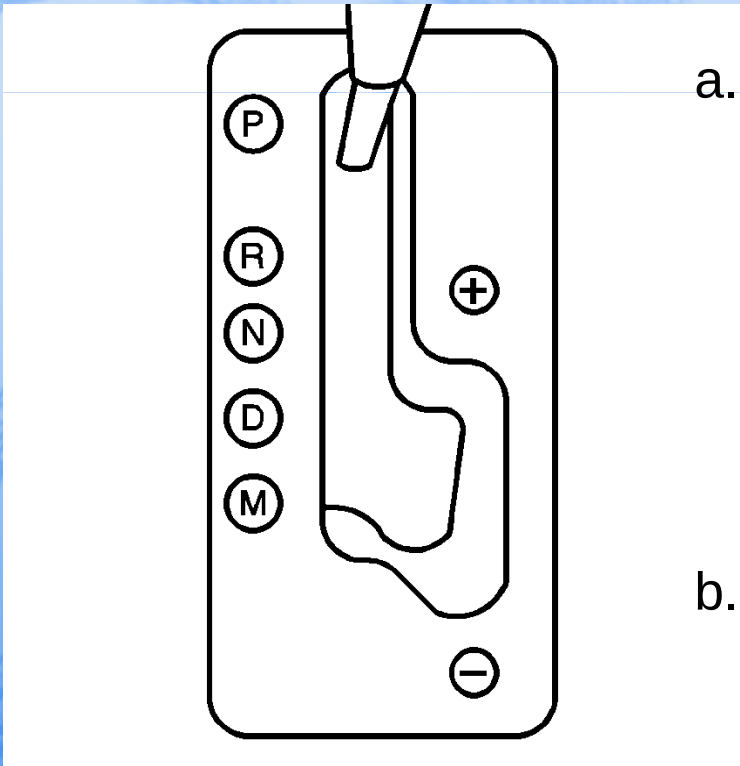
To use this feature, do the following:

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 automaticaly 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

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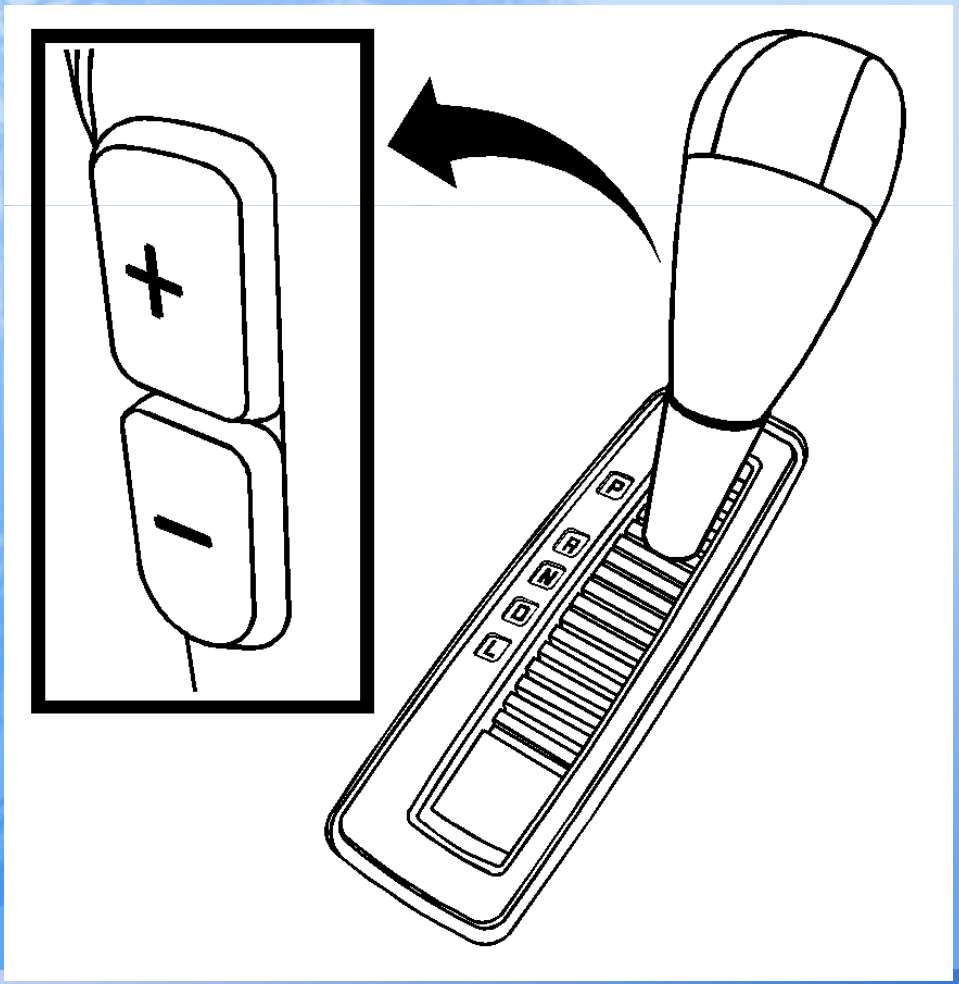
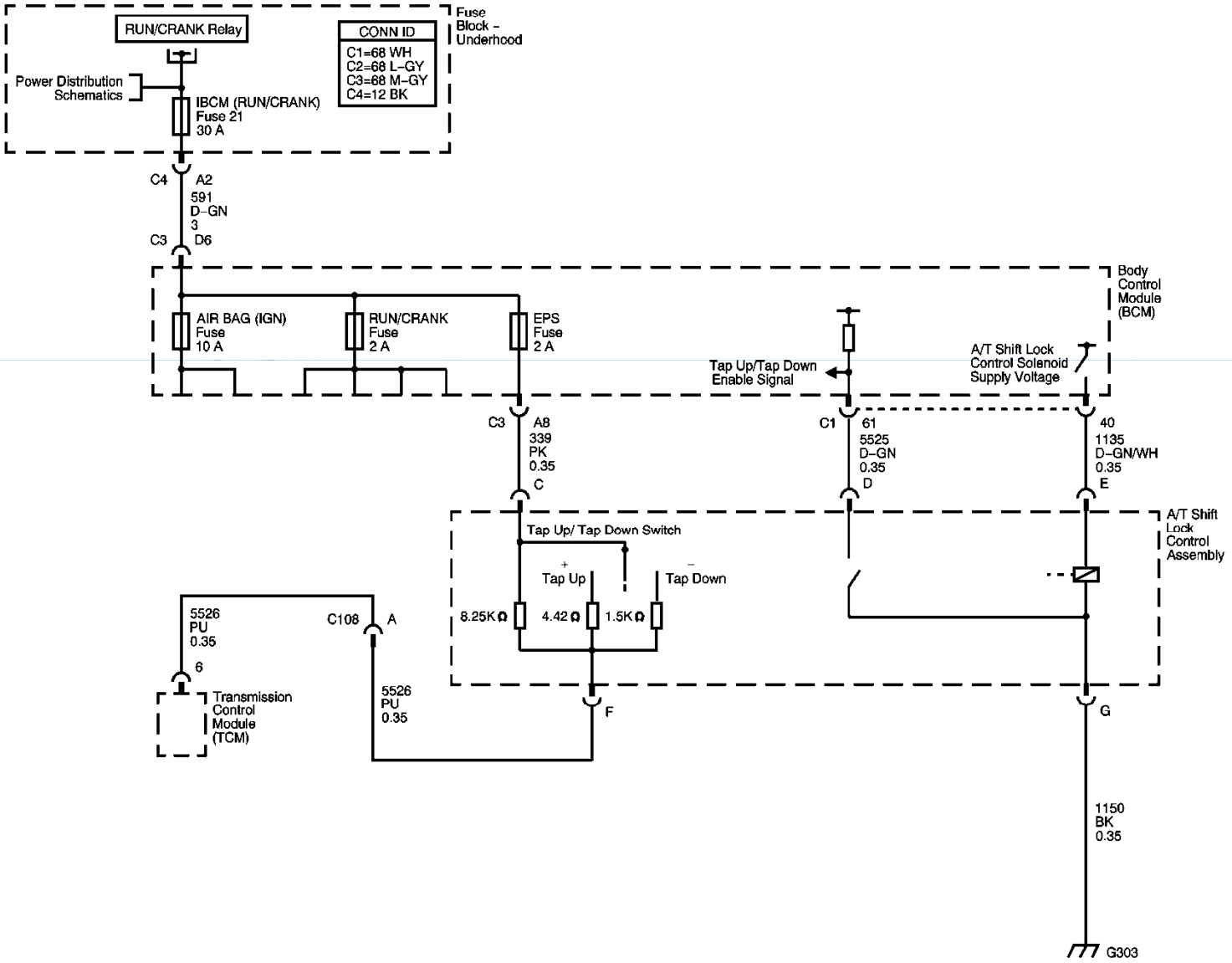


Allows you to choose the top-gear limit of the vehicle's transmission and the vehicle's speed while driving down hill or towing trailer.

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.


RUN/CRANK Relay
CONN ID
C1=68 WH
C2=68 L-GY
C3=68 M-GY
C4=12 BK
Fuse Block – Underhood
Power Distribution Schematics
IBCM (RUN/CRANK) Fuse 21 30 A
C4
A2
591
D-GN
3
C3
D6
Body Control Module (BCM)
AIR BAG (IGN) Fuse 10 A
RUN/CRANK Fuse 2 A
EPS Fuse 2 A
Tap Up/Tap Down Enable Signal
A/T Shift Lock Control Solenoid Supply Voltage
C3
A8
339
PK
0.35
C
C1
61
5525
D-GN
0.35
D
40
1135
D-GN/WH
0.35
E
A/T Shift Lock Control Assembly
Tap Up/ Tap Down Switch
+
Tap Up
–
Tap Down
8.25KΩ
4.42Ω
1.5KΩ
5526
PU
0.35
6
Transmission Control Module (TCM)
C108
A
5526
PU
0.35
F
G
1150
BK
0.35
G303

Operation

Range Reference Chart

RANGE	GEAR	1-2-3-4 CLUTCH	3-5 REV CLUTCH	4-5-6 CLUTCH	2-6 CLUTCH	LOW & REV CLUTCH	LOW ONE -WAY CLUTCH
PARK	P					ON	
REV	R		ON			ON	
NEU	N					ON	
D	1ST BRAKING	ON				ON	HOLDING
	1ST	ON					HOLDING
	2ND	ON			ON		
	3RD	ON	ON				
	4TH	ON		ON			
	5TH		ON	ON			
	6TH			ON	ON		

Solenoid Application Chart

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

RANGE	GEAR	SHIFT SOL 1	SHIFT SOL 2	1234 CL PC SOL 5 NL	26 CL PC SOL 4 NL	35 REV CL PC SOL 2 NH	LOW REV 456 CL PC SOL 3 NH
PARK	P	ON	ON	OFF	OFF	OFF	ON
REV	R	ON	OFF	OFF	OFF	ON	ON
NEU	N	ON	ON	OFF	OFF	OFF	ON
D	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

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 weather 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