



Technical Service Information

GM 5L40E / BMW A5S 360/390R

1-2 BIND UP

(SAFETY MODE VALVE STRATEGY)

COMPLAINT: Vehicles equipped with the 5L40E transmission may suddenly exhibit a bind up on the 1-2 shift.

CAUSE: One cause may be that the Safety Mode Valve in the valve body is stuck in an un-stroked position. In first gear, this Safety Mode Valve is held closed by spring tension. This allows line pressure to pass through the valve into the Line Safety Mode circuit which then strokes the 4-5 Shift Valve. The 4-5 Shift Valve then directs 123 oil into the 123 Braking circuit applying the L/R Clutch with regulated line pressure for engine braking in first gear. (Figure 6)

When a 1-2 shift occurs, 1-2 signal oil which becomes memory pilot pressure is suppose to stroke the Line Safety Mode Valve blocking the line pressure feed going to the 4-5 Shift Valve. If the Safety Mode Valve can not stroke, the L/R Clutches remain on and a bind up on a shift into second gear will occur. (Figure 7)

CORRECTION: Clean and free up the Safety Mode Valve. Determine what other problems may have occurred to cause enough debris to stick the valve and repair as necessary.

SAFETY VALVE STRATEGY:

The Safety Mode Valve strategy is to allow for two failsafe gears, 4th and 5th. Should a fault occur while the vehicle is driving, all solenoids will turn Off and the vehicle will failsafe to 5th gear. But with a fault immediately present after an ignition cycle, the vehicle will have 4th gear failsafe.

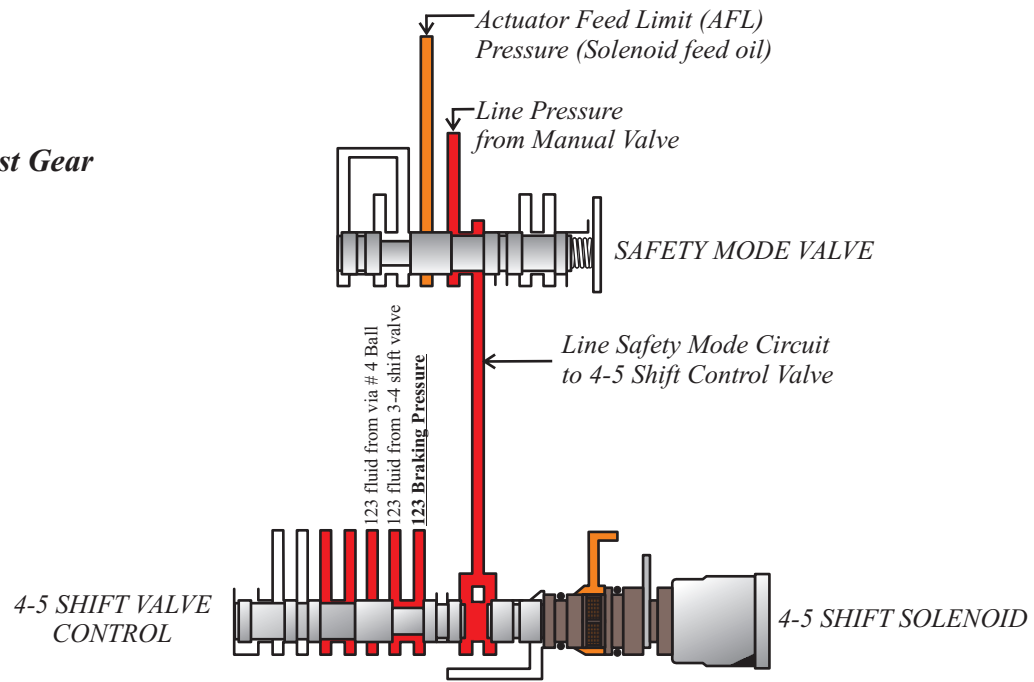
The Safety Mode Valve is stroked by 1-2 signal oil when a shift into second occurs. When this happens, Actuator Feed Limit Pressure (Solenoid feed oil) is allowed to enter the Memory Circuit which keeps the Safety Mode Valve in a stroked position. (See Figures 8 and 9) This also blocks line pressure from going to the 4-5 shift valve though the Line Safety Mode Circuit.

Once the Safety Mode Valve is stroked it remains stroked throughout 2nd, 3rd, 4th and 5th gear. (See Figures 10 and 11) When a shift into 5th occurs, the 4-5 solenoid turns off and 4-5 oil enters the Overdrive Clutch Feed 2 circuit applying the Overdrive Clutch. The Coast Clutch is exhausted. (Figure 11) And this is exactly what takes place when the vehicle failsafes to 5th while driving. (Figure 12)

But once the vehicle stops and the ignition is cycled, the Safety Mode Valve is forced closed by spring pressure. Line pressure passes through the valve and into the Line Safety Mode Circuit where it strokes the 4-5 Shift Control Valve. With all solenoids Off, this blocks 4-5 oil from entering the Overdrive Clutch Feed 2 circuit placing the vehicle into a 4th gear failsafe. (See Figure 13)

NOTE: This bulletin explains that if the Safety Mode Valve should stick in an un-stroked position a bind up in 2nd will occur. But if this valve should get stuck in a stroked position, a loss of engine braking in first gear may be noticed. If the vehicle failsafes, it will have 5th gear even after an ignition cycle.

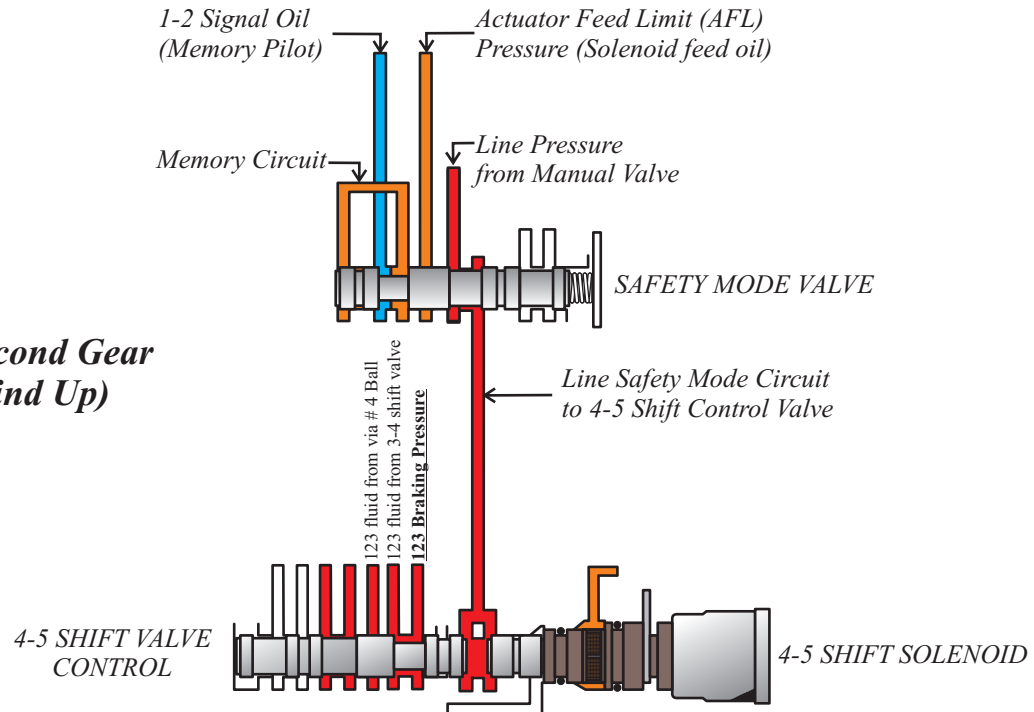
First Gear



In 1st gear, the Safety Mode Valve directs line pressure into the Line Safety Mode Circuit where it strokes the 4-5 Shift Valve. The 4-5 Shift Valve then directs 123 Fluid into the 123 Braking Circuit where it applies the L/R Clutches for engine braking in 1st gear.

Figure 6

Second Gear (Bind Up)

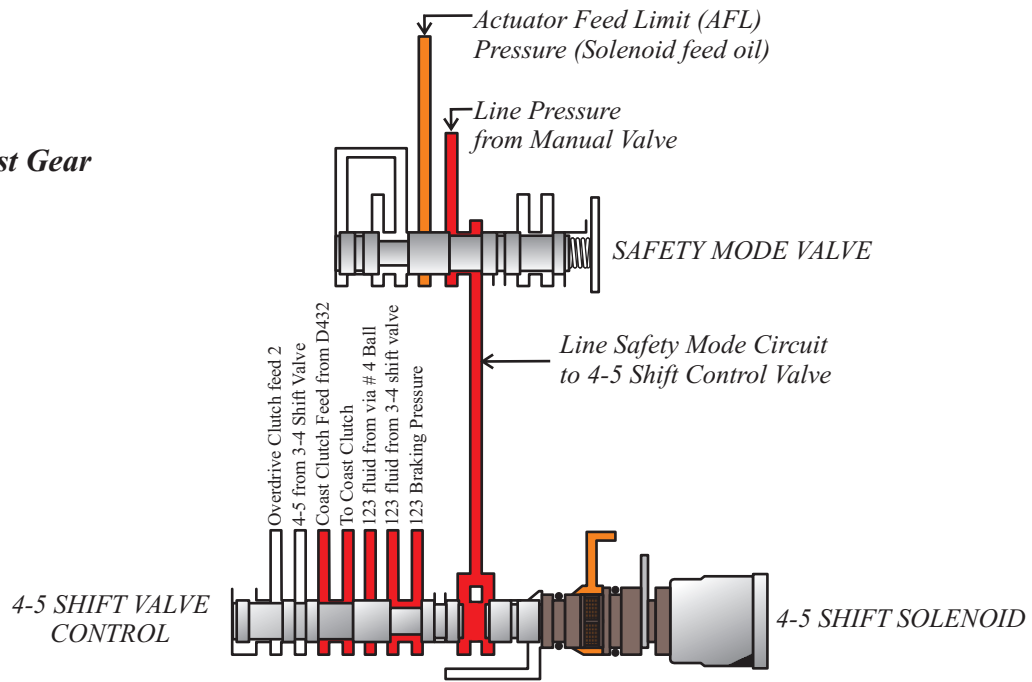


If the Safety Mode Valve cannot stroke on a 1-2 up shift, the L/R clutch stays applied causing the bind up into 2nd.

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Figure 7

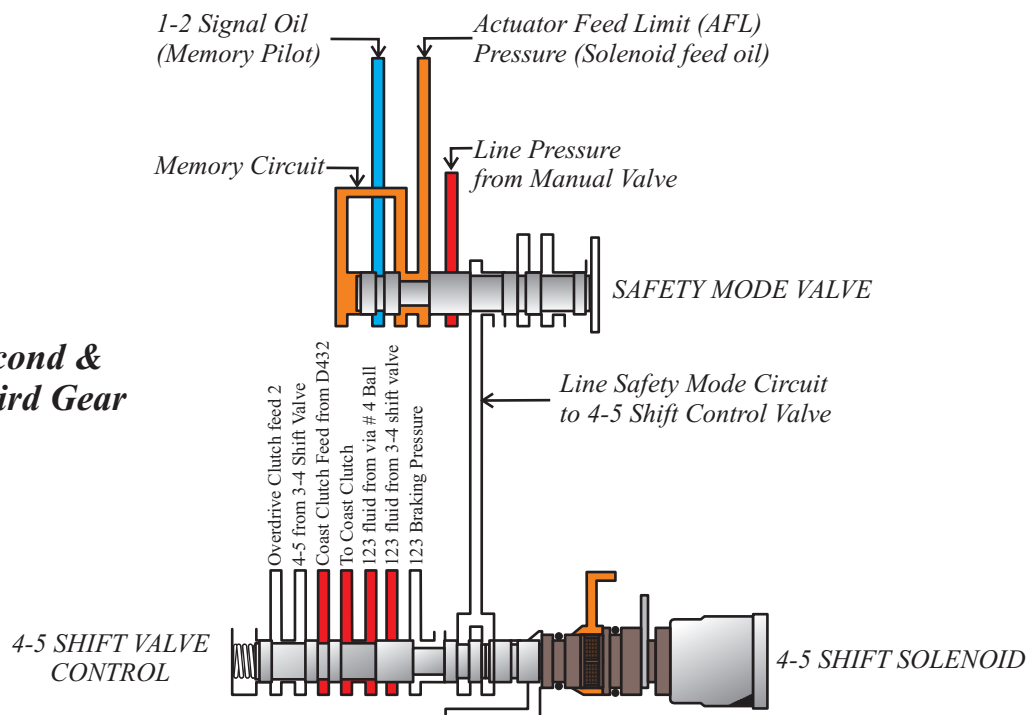
First Gear



The Safety Mode Valve allows for 5th gear failsafe and 4th gear failsafe. If a fault occurs during driving conditions 5th gear failsafe will occur. After the ignition is cycled, 4th gear will be the failsafe gear.

Figure 8

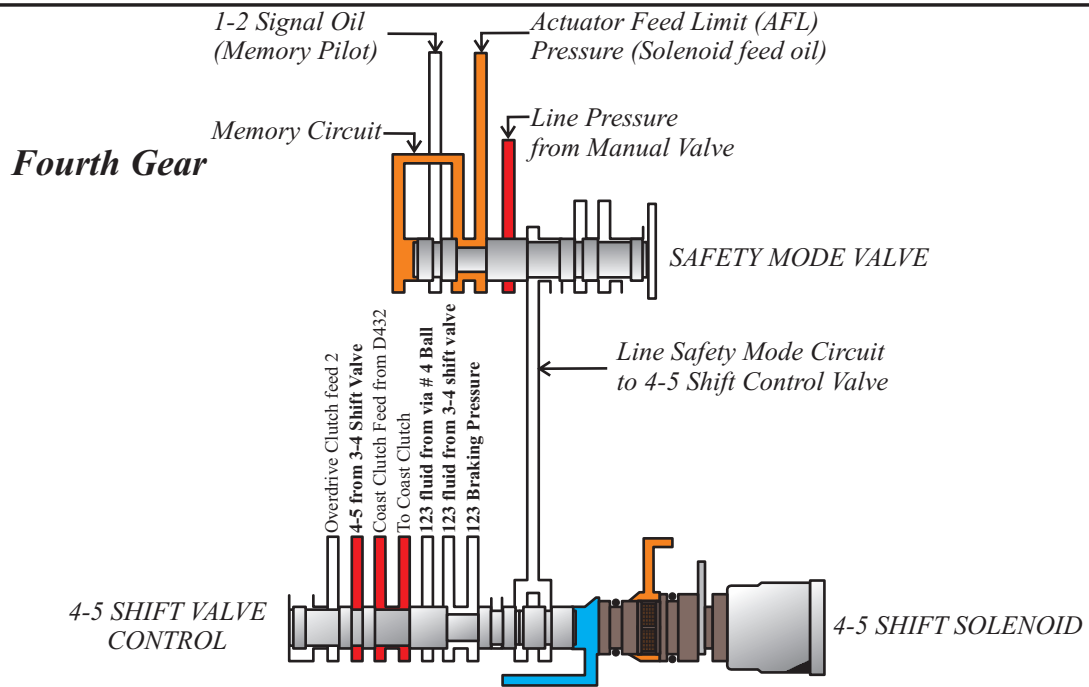
Second & Third Gear



When a shift into second occurs, 1-2 signal oil (memory pilot) is sent to stroke the Safety Mode Valve. When the valve is stroked, actuator feed limit fluid is used to hold the valve in a stroked position. Should all the solenoids turn off due to a fault, this valve is held in a stroked position which will allow for 5th gear failsafe. When the ignition is cycled, the valve will un-stroke making 4th gear the failsafe gear.

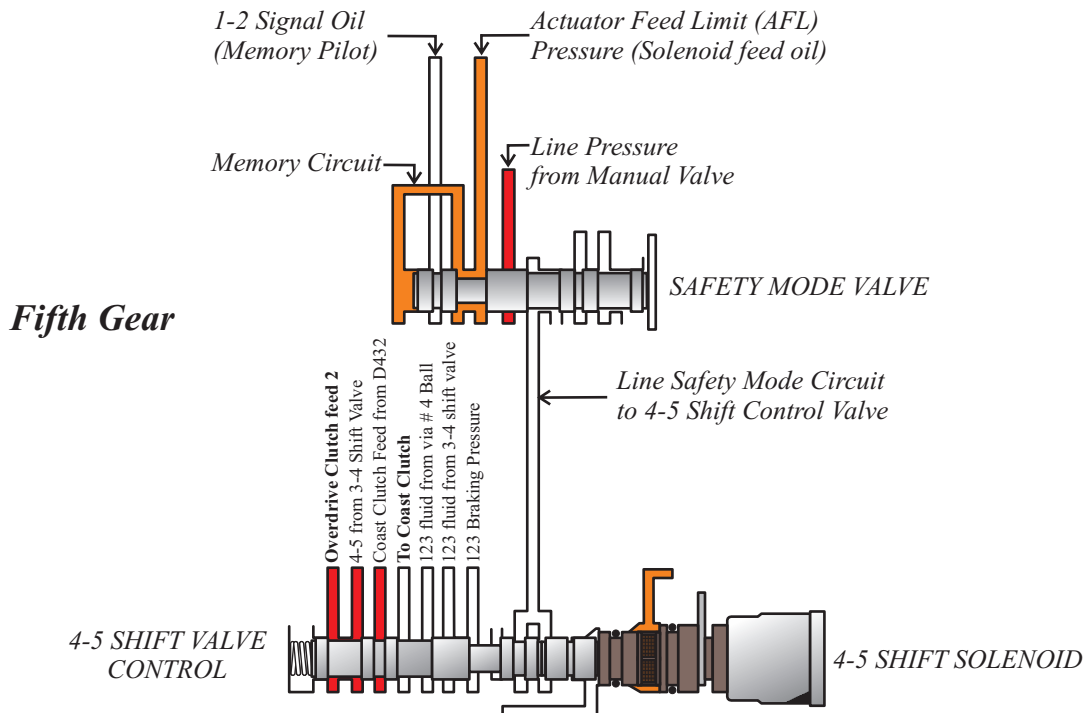
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Figure 9



When a shift into 4th is made, the 1-2 Shift Solenoid turns Off causing the 1-2 signal oil to be exhausted. This causes the 3-4 shift valve to un-stroke simultaneously exhausting 123 fluid and supplying 4-5 oil pressure at the 4-5 Shift Control Valve. The 4-5 Shift solenoid turns on stroking the 4-5 Shift Control Valve blocking 4-5 oil from entering the Overdrive Clutch Feed 2 circuit. The Safety Mode Valve remains stroked by AFL fluid called the Memory Circuit.

Figure 10

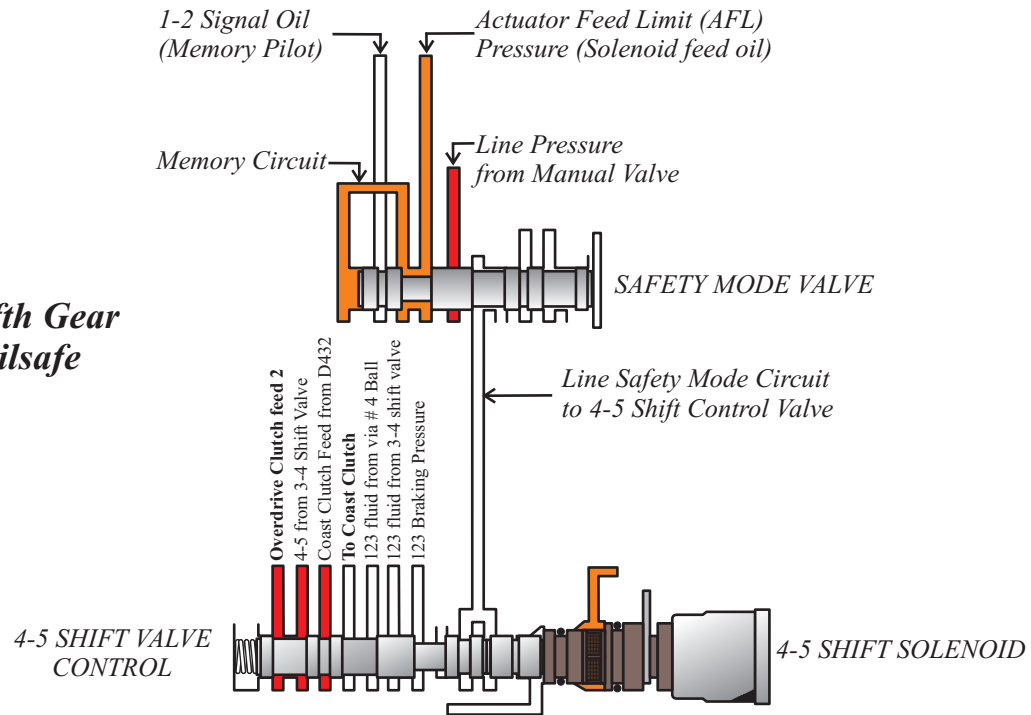


When a shift into 5th occurs, the 4-5 solenoid turns off and 4-5 oil enters the Overdrive Clutch Feed 2 circuit applying the Overdrive Clutch. The Coast Clutch is exhausted and the Safety Mode Valve remains stroked.

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Figure 11

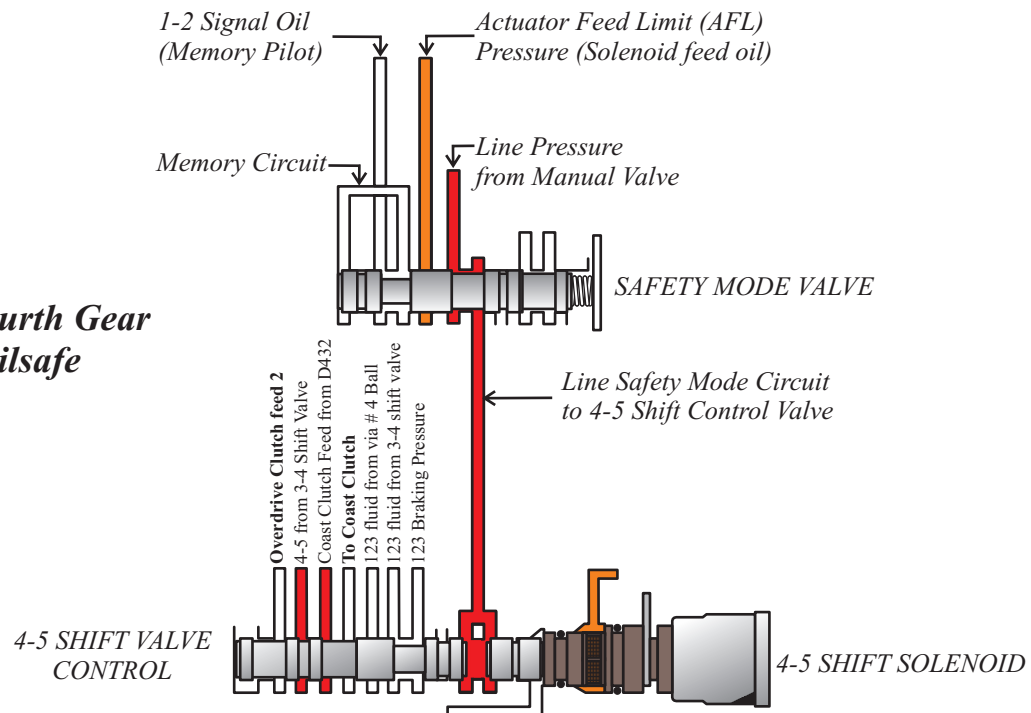
Fifth Gear Failsafe



When a fault is detected while the vehicle is being driven, all solenoids turn off and 5th gear is the failsafe gear.

Figure 12

Fourth Gear Failsafe



After an ignition cycle of a failsafed vehicle, the Safety Mode Valve un-strokes where the valve sends line pressure to stroke the 4-5 Shift Control Valve. This blocks 4-5 oil from entering the Overdrive Clutch Feed 2 circuit and now the vehicle will have a 4th gear failsafe.

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Figure 13