



Technical Service Information

AW55-50SN/AF23/33-5 GEAR RATIOS

The AW55-50SN found in some Volvos and the AF23/33-5 found in the Saturn Vue and the Ion Sedan is a rather unique transmission due to the fact that the first gear ratio is lower than the reverse ratio with fifth gear being 1 to 1 as seen in the chart in Figure 1. The final drive is a high 2.440 ratio which creates higher rpm and less torque.

The AW55-50SN/AF23/33-5 transmission contains three (3) planetary sets, seven (7) multiple disc clutches, one (1) band and two (2) sprag type clutches which are represented in Figures 2 and 3.

The assembled driving and holding components along with the final drive shown in figure 4 are labeled Gear Set 24, which consists of the complete front carrier assembly.

The center and rear planets which is referred to as the front differential drive gear carrier assembly is labeled Gear Set 259. The 1-2 reverse carrier gear assembly is labeled Gear Set 18.

By looking at the arrangement of these components and comparing what element is on by using the clutch application chart in Figure 5 and comparing this information by using the chart in Figure 6, a determination can be made as to which planetary is in low reduction, a lesser reduction, locked in a 1:1 gear ratio or when a gear set is overdriven.

Looking at the chart in Figure 6, what is seen is that in first gear all three planetary sets are in reduction. When a shift into second occurs, only planetary gear set 24 ratios to a lesser reduction. The other two remain the same. So if there was a noise that changed pitch on the 1-2 upshift, it would be planetary gear set 24 that would be suspect.

When a 2-3 shift occurs, only gear set 18 ratios to a lesser reduction. If there was a noise that changed pitch on the 2-3 upshift, it would be the planetary gear set 18 that would be suspect.

When the 3-4 upshift occurs, both planetary gear sets 18 and 259 are locked. Planetary gear set 24 is still in a reduction ratio.

It is when the 4-5 upshift is made that this gear set locks 1:1 putting the transmission into direct drive. This means if a noise changed pitch on the 1-2 upshift and disappeared on the 4-5 upshift, planetary gear set 24 is suspect.

GEAR	GEAR RATIO
FIRST	4.68
SECOND	2.94
THIRD	1.92
FOURTH	1.30
FIFTH	1.00
REVERSE	3.18
FINAL DRIVE	2.440

Figure 1

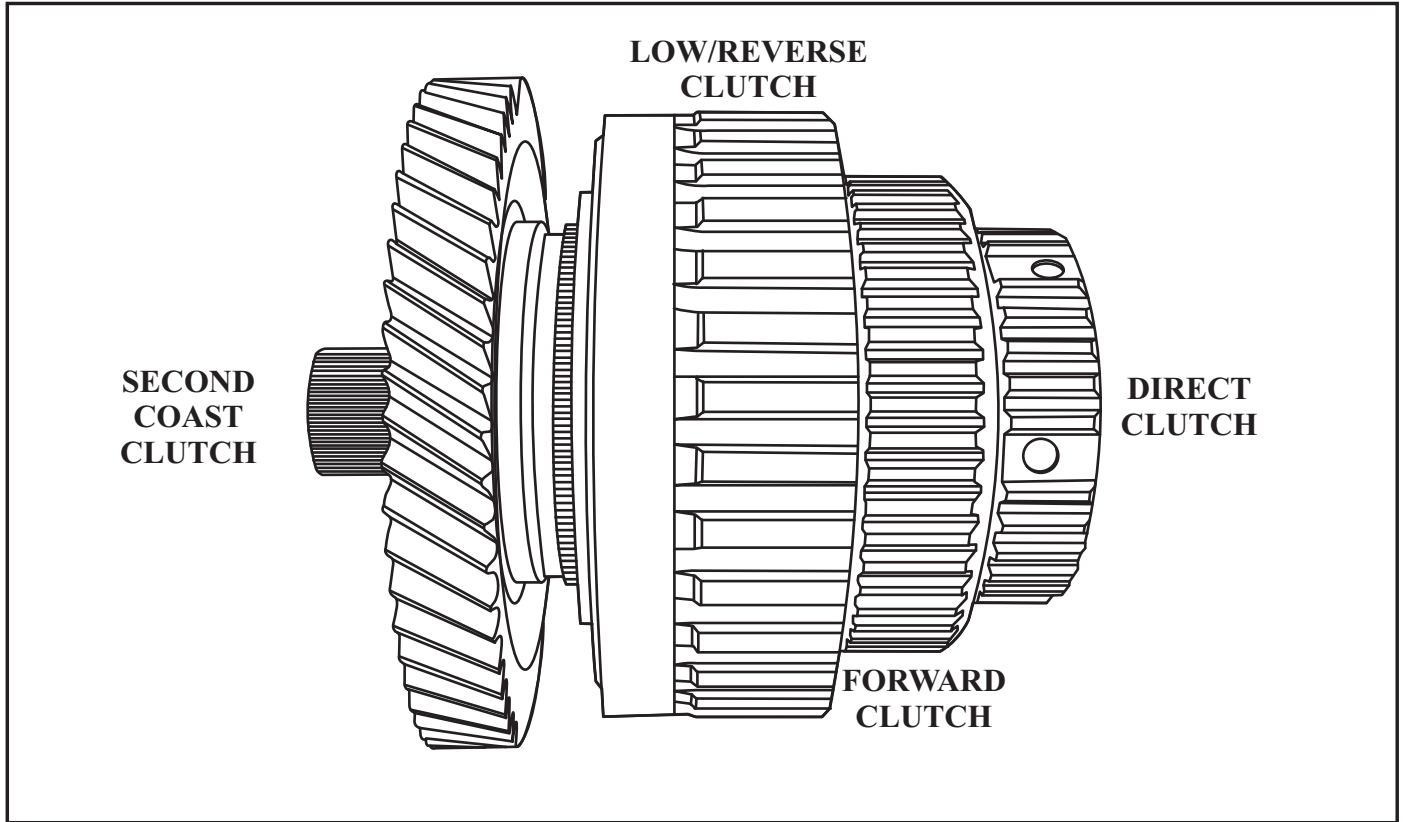
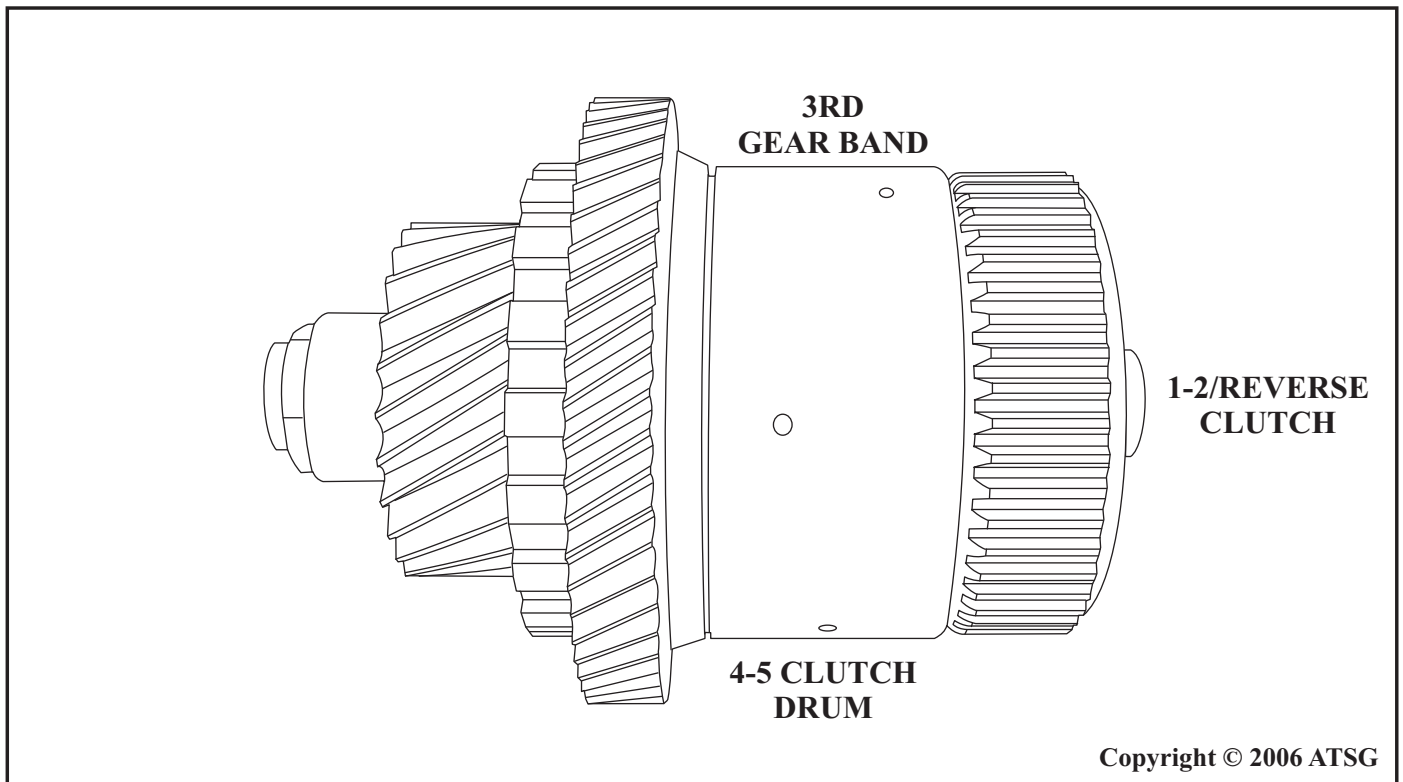


Figure 2



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Figure 3

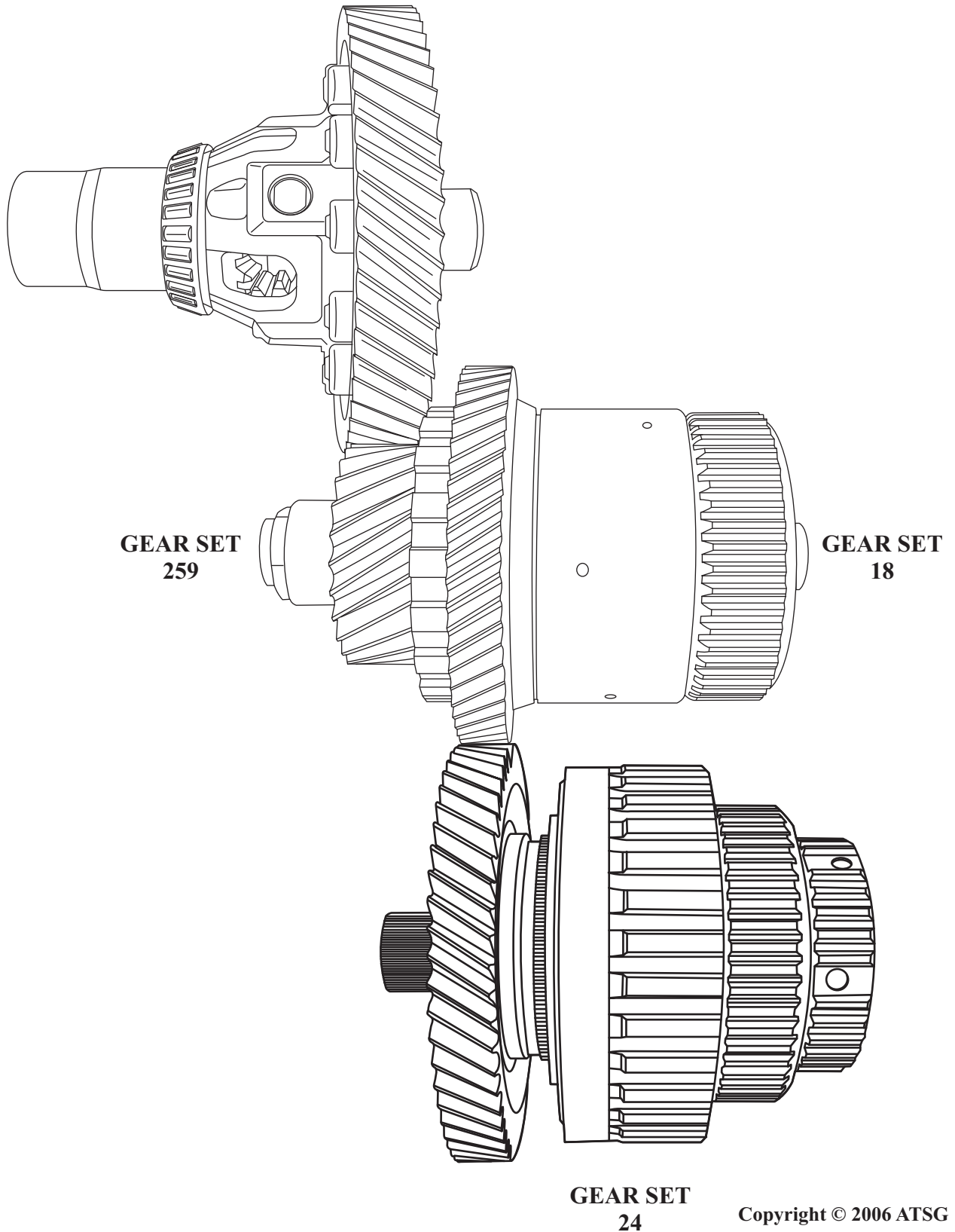
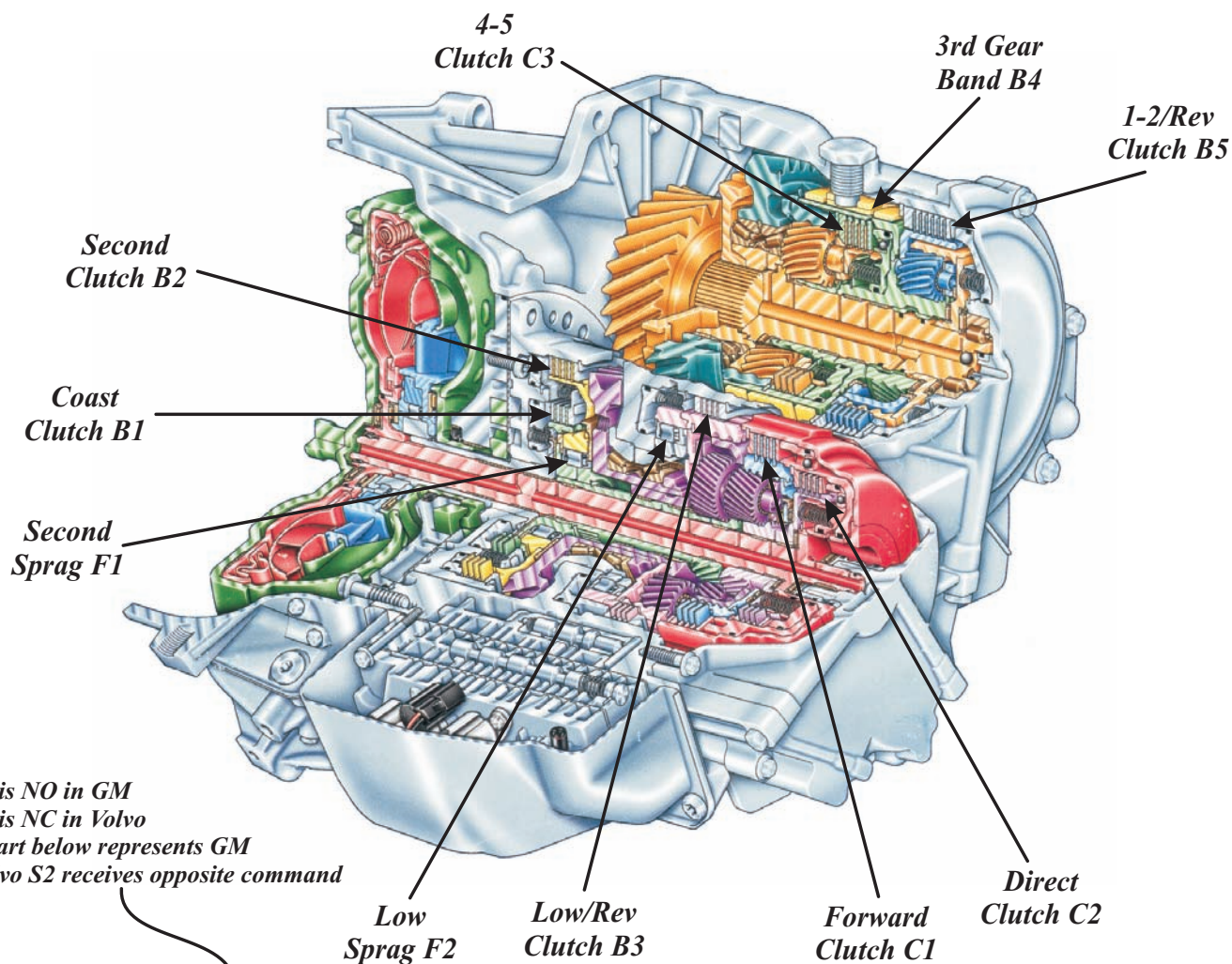


Figure 4

COMPONENT APPLICATION AND SOLENOID CHART



RANGE	GEAR	RATIO	SOL S1	SOL S2	SOL S3	SOL S4	SOL S5	SECOND CLUTCH (B2)	COAST CLUTCH (B1)	SECOND SPRAG (F1)	LOW SPRAG (F2)	LO/REV CLUTCH (B3)	FWD CLUTCH (C1)	DIRECT CLUTCH (C2)	4-5 CLUTCH (C3)	3RD BAND (B4)	1-2/REV CLUTCH (B5)
PARK	P		OFF	OFF	OFF	OFF	OFF										APPLIED
REVERSE	R	3.18	Off*	OFF	On*	OFF	On*					APPLIED		APPLIED			APPLIED
NEUTRAL	N		OFF	OFF	OFF	OFF	OFF										APPLIED
DRIVE	1	4.68	ON	OFF	ON	OFF	OFF				HOLD		APPLIED				APPLIED
	2	2.94	OFF	ON	ON	OFF	OFF	APPLIED	APPLIED	HOLD			APPLIED				APPLIED
	3	1.92	OFF	ON	ON	ON	OFF	APPLIED	APPLIED	HOLD			APPLIED			APPLIED	
	4	1.30	OFF	ON	OFF	ON	OFF	APPLIED	APPLIED	HOLD			APPLIED		APPLIED		
	5	1.00	OFF	OFF	OFF	ON	OFF	APPLIED					APPLIED	APPLIED	APPLIED		
	LIMP	1.00	OFF	OFF	OFF	OFF	OFF	APPLIED					APPLIED	APPLIED	APPLIED		
INTERM	1	4.68	ON	OFF	ON	OFF	OFF				HOLD		APPLIED				APPLIED
	2	2.94	OFF	ON	ON	OFF	OFF	APPLIED	APPLIED	HOLD			APPLIED				APPLIED
	3	1.92	OFF	ON	ON	ON	OFF	APPLIED	APPLIED	HOLD			APPLIED			APPLIED	
LOW	1 E/B	4.68	ON	OFF	ON	OFF	ON				HOLD	APPLIED	APPLIED				APPLIED
	2	2.94	OFF	ON	ON	OFF	OFF	APPLIED	APPLIED	HOLD			APPLIED				APPLIED

* If vehicle speed is above 7km/h (4 mph), the TCM commands the shift solenoids to inhibit reverse

Figure 5

Diagnostic Details

Mechanical

There are 3 planetary gear sets used in the AW55-50SN. They are:

1. The Front Carrier Sun Gear Assembly (24)
2. The Front Differential Drive Gear Carrier Assembly (259)
3. The 1-2 Reverse Carrier Gear Assembly (18)

Planetary Gear Set	First Gear	→ Second Gear	Notes
24	Reduction	→ Changes to a lesser Reduction	1-2 up shift: Second clutch and second coast clutch apply on 1-2 up shift. Gear set 24 changes ratio. Gear set 259 and 18 remain the same.
259	Reduction	No Change	
18	Reduction	No Change	
Planetary Gear Set	Second Gear	→ Third Gear	Notes
24	Reduction (L)	No Change	2-3 up shift: 1-2/Rev clutch releases and 3rd gear band applies. Only gear set 18 changes ratio. Gear set 24 and 259 remain the same.
259	Reduction	No Change	
18	Reduction	→ Changes to a lesser Reduction	
Planetary Gear Set	Third Gear	→ Fourth Gear	Notes
24	Reduction (L)	No Change	3-4 up shift: 3rd gear band releases and the 4-5 clutches apply. Gear set 24 remains the same while both gear set 18 and 259 each go to a locked 1:1 ratio.
259	Reduction	→ Change to 1:1	
18	Reduction (L)	→ Change to 1:1	
Planetary Gear Set	Fourth Gear	→ Fifth Gear	Notes
24	Reduction (L)	→ Change to 1:1	4-5 up shift: Second coast clutch releases and the direct clutch applies. Gear set 24 goes to a locked 1:1 ratio. With gear set 18 and 259 already locked at 1:1, the gear box is in direct drive.
259	1:1	No Change 1:1	
18	1:1	No Change 1:1	

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Figure 6