

DC-5 SPEED AUTOMATIC TRANSMISSION

3650-01

GENERAL

1. SPECIFICATIONS

Item		W5A330 (300)	W5A580 (400)
Input torque		330 Nm	580 Nm
Weight (including ATF)		78 kg	78 kg
Diameter (Torque converter)		270 mm	270 mm
Lockup function		Yes	Yes
Gear ratios	1st	3.951	3.595
	2nd	2.423	2.186
	3rd	1.486	1.405
	4th	1.000	1.000
	5th	0.833	0.831
	Reverse: S mode / W mode	3.147/1.93	3.167/1.926
Driving type		2WD (4WD)	
Fluid specification		Fuchs ATF 3353 or Shell ATF 3353	
Fluid capacity		approx. 8ℓ	
Selector lever position	P.R.N.D	Mechanical	
	D+/D-	Electrical	
Parking lock system		Brake switch (signal) → TGS lever	
Reverse lock system		CAN → TGS lever	
Selected lever indication	P.R.N.D	Lever position	
	4, 3, 2, 1	CAN	
Oil temperature sensor	Resistance: R, D	0.5 ~ 2.5 kΩ	
	Resistance: P, N	20 kΩ	
TCU		EGS 52	
Shift solenoid valve (25°C)	Resistance	3.8 ± 0.2Ω	
	Operating distance	0.2 mm	
	Operating current	1.5 ~ 2 A	
M/P, S/P solenoid valve (23°C)	Resistance	5.0 ± 0.2Ω	
	Operating distance	0.6 mm	
	Operating current	0 ~ 1 A	
Lockup solenoid valve (25°C)	Resistance	2.5 ± 0.2Ω	
	Operating distance	0.2 mm	
	Operating current	1.5 ~ 2.0 A	
	Operating range	3rd to 5th gears	
RPM sensor	Resistance	HALL type	
	Operating voltage	6 V	
Start lockout switch	Switch contact	ON (D position)	
	Switch contact	OFF (P, N position)	

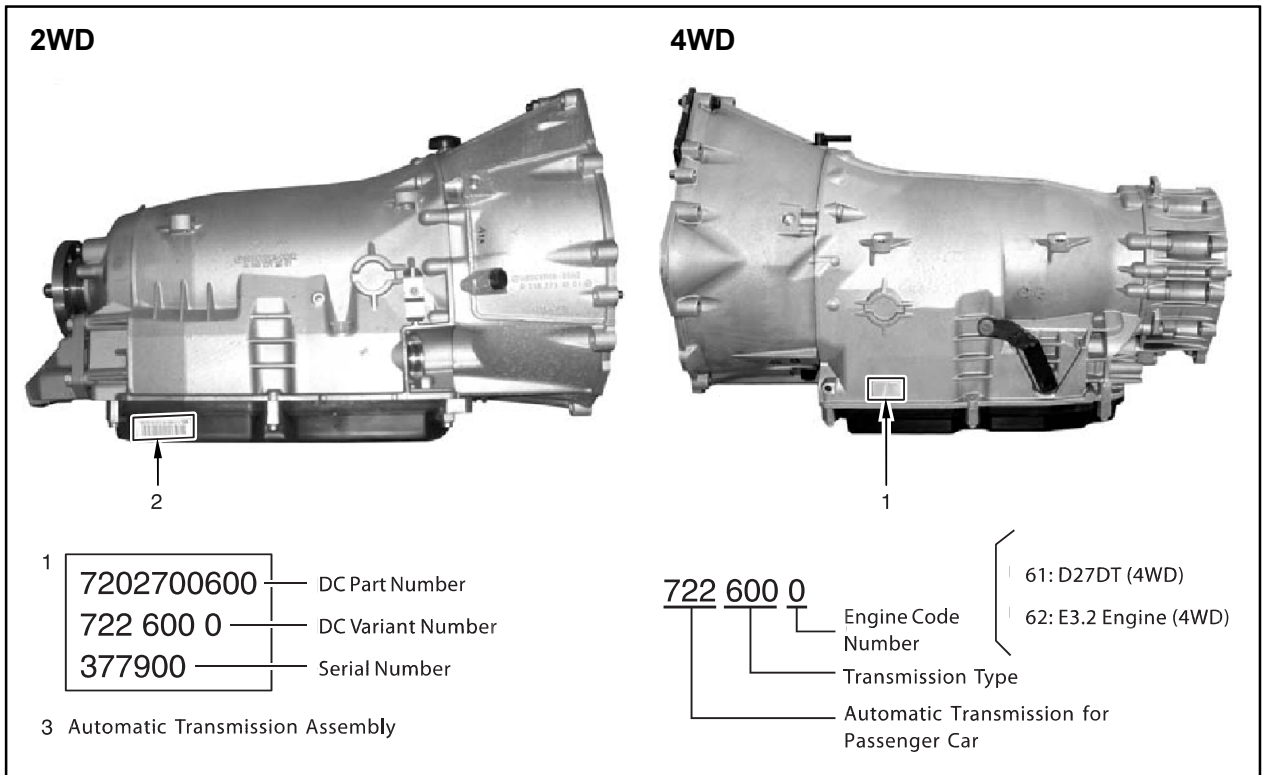
Modification basis	
Application basis	
Affected VIN	

Item		W5A330 (300)	W5A580 (400)
Mode switch		W (Winter)	
		S (Standard)	
One-way clutch		F1, F2	
Planetary gear set	Plain planetary gear: 3 (number of pinion)	3, 4, 3	4, 4, 4
Disc clutch	Disc: C1*, C2, C3*	Single plate type*	
Disc brake	Disc: B1*, B2, B3	Single plate type*	

Modification basis	
Application basis	
Affected VIN	

OVERVIEW AND OPERATION PROCESS

1. OVERVIEW



► DC 5-Speed Automatic Transmission

DCAG 5-speed automatic transmission is an electronically controlled 5-speed transmission with a lockup clutch in the torque converter. The ratios for the gears are realized by three planetary gear sets. The 5th gear is designed with a step-up ratio of 0.83 as an overdrive. The selector lever is controlled by electronically and mechanically. The gears are shifted by the corresponding combination of three hydraulically actuated multiple-disc brakes, three hydraulically actuated multiple-disc clutches and two mechanical one-way clutches. This electronically controlled automatic transmission adjusts the operating pressure to provide proper shifting in relation to engine power. This function improves shifting quality significantly. And, the driver can select "S" (Standard) mode or "W" (Winter) mode according to the driving conditions. This automatic transmission provides two gears even during reverse driving. The internal sensors and controls are connected to TCU by cylindrical 13-pin connector.

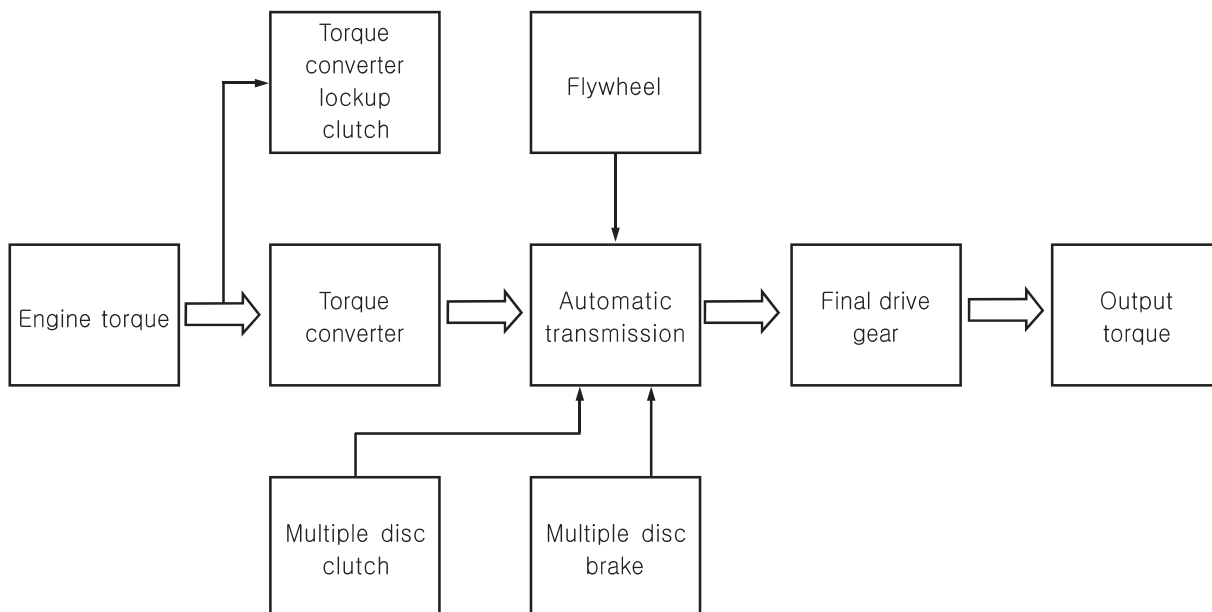
* DCAG 5-speed automatic transmission offers the following advantages:

1. Improved shifting quality
2. More gears
3. Extended working life and reliability
4. Reduced fuel consumption

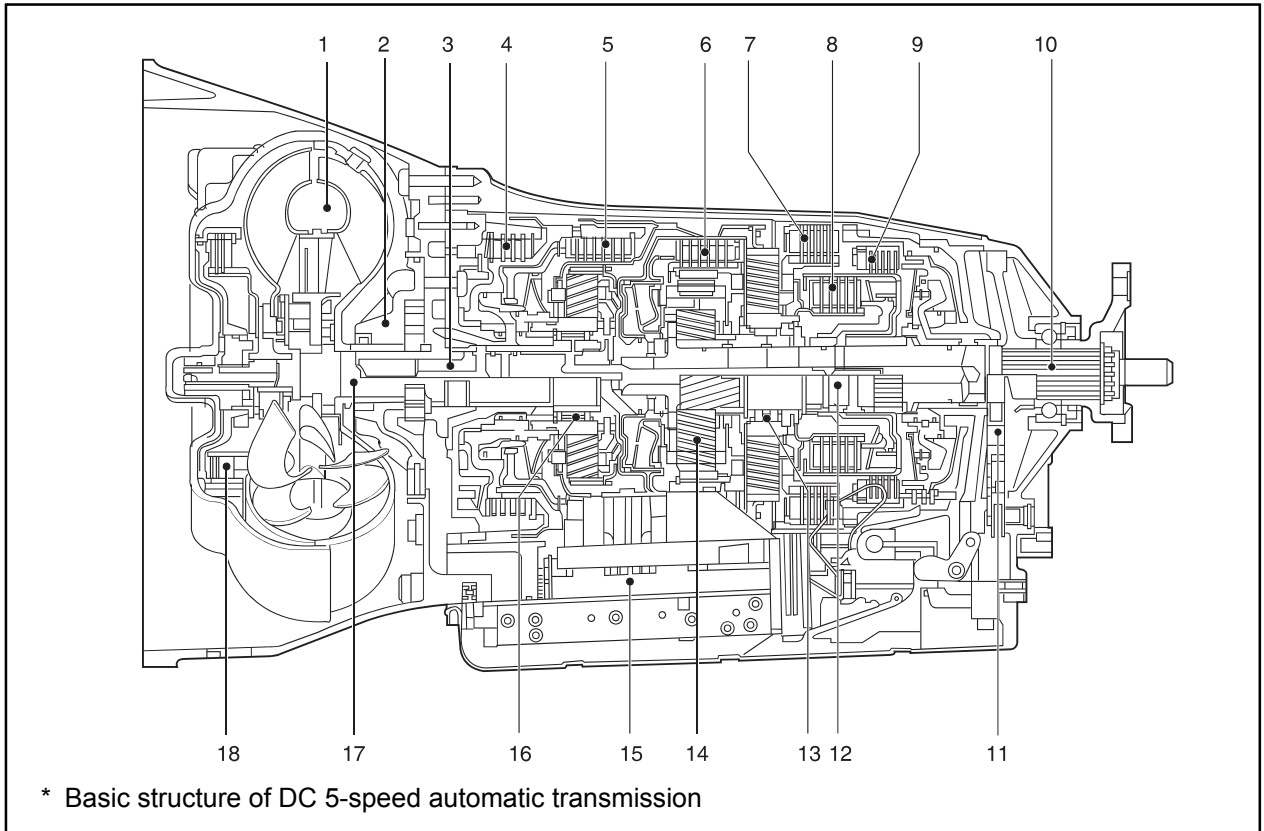
Modification basis	
Application basis	
Affected VIN	

2. CHARACTERISTICS

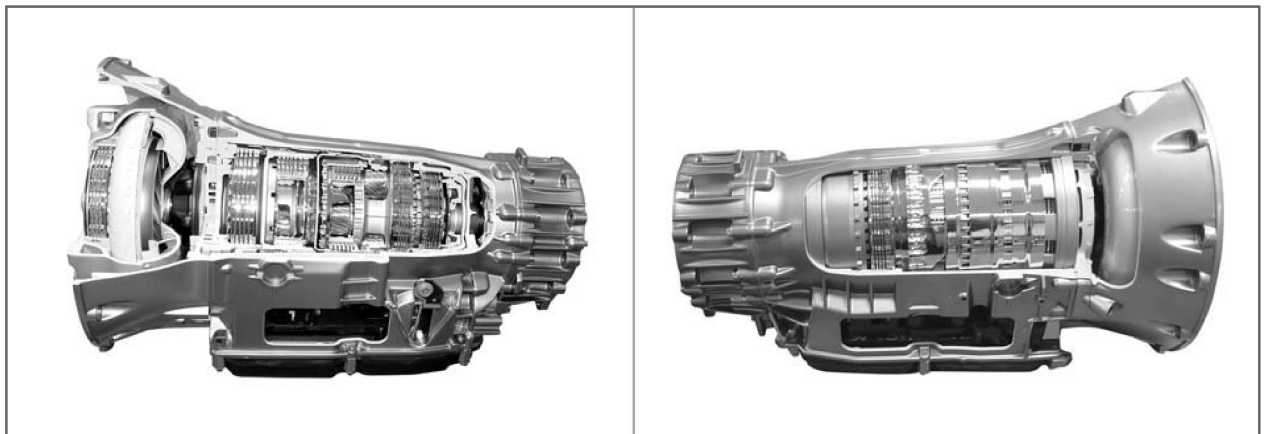
Characteristic	Function and Description	Effect
Slope recognition (down hill, up hill)	Recognize it according to engine RPM and accelerator pedal position	Delay up shift
Engine torque limitation	During 1st gear driving or reverse driving with full throttle condition	Prevent automatic transmission from overheating
Engine torque decrease	Delay of ignition timing to reduce torque at all shifting moments	Improve shift quality
Engine rpm limitation	Limit engine rpm until the gears are fully engaged when shifting from "P" or "N" to "D"	Prevent shift shock
ESP Operation	When the ESP is controlling the engine torque, shifting is not available and vehicle starts off with 2nd gear.	Cannot use kick-down function and shift at maximum rpm
ABS Operation	Not any effect to brake control	
Fast-off function	Does not up shift when accelerator pedal is abruptly released	To get an engine brake effect during cornering
Altitude recognition	As altitude increases (atmospheric pressure reduces) engine torque decreases. Up shift while additionally depressing the accelerator pedal (adjusting shift diagram)	Improves driving performance and increases torque
Oil temperature	If transmission oil temperature is too low, the shifting point gets delayed in full throttle and kick down	Improves driving performance
Hydraulic pressure is produced in emergency driving mode	When starting the engine with cycling the ignition switch ("OFF" and "ON") due to transmission trouble, the selector lever should be placed in "P" position. If starting the engine with selector lever "N" position, the lever should be moved into "P" position. Because, the hydraulic pressure can be produced in selector lever "P" position.	The hydraulic pressure flows with direct operation mode via "R" and "D" valve to operate "R" and "forward 2nd" gear.
Adaptation	Function to optimize the shifting quality.	To exclude play and wear



3. STRUCTURE

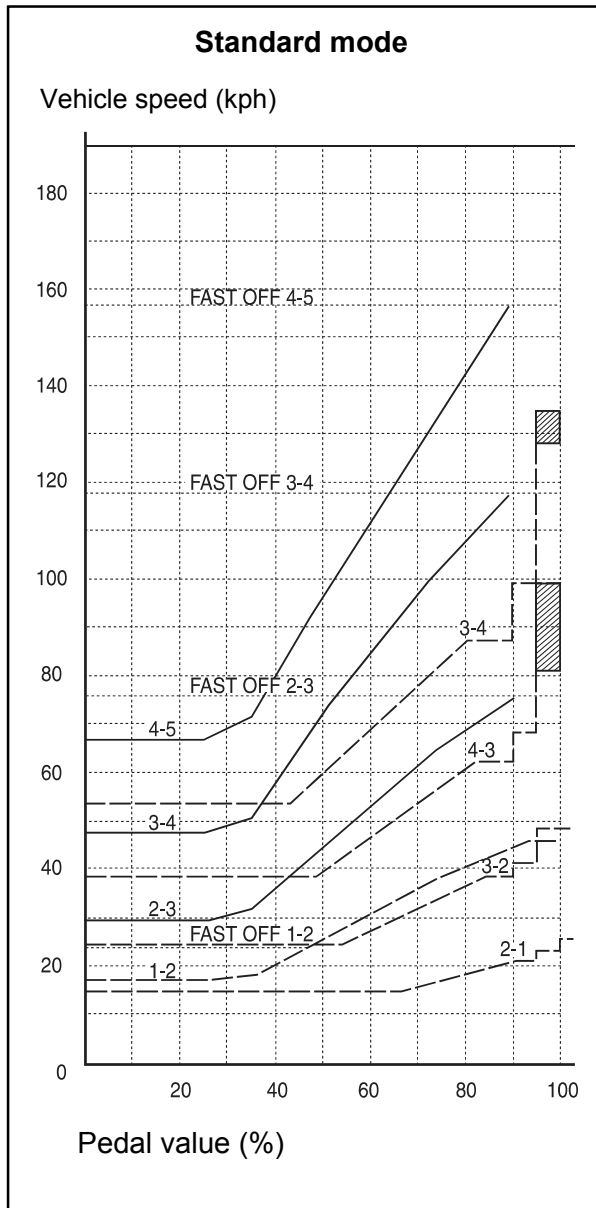


- | | | |
|---------------------|------------------------|--|
| 1. Torque converter | 7. Disc brake B3 | 13. Freewheel F2 |
| 2. Oil pump | 8. Disc clutch C3 | 14. Center planetary gear set |
| 3. Input shaft | 9. Disc brake b2 | 15. Electric control unit (valve body) |
| 4. Disc brake B1 | 10. Output shaft | 16. Freewheel F1 |
| 5. Disc clutch C1 | 11. Parking lock gear | 17. Stator shaft |
| 6. Disc clutch C2 | 12. Intermediate shaft | 18. Converter lockup clutch |



Modification basis	
Application basis	
Affected VIN	

4. PERFORMANCE CURVE AND GENERAL CHARACTERISTICS



CAUTION

1. Based on DI Engine + A/T equipped vehicle specifications

Gear ratio

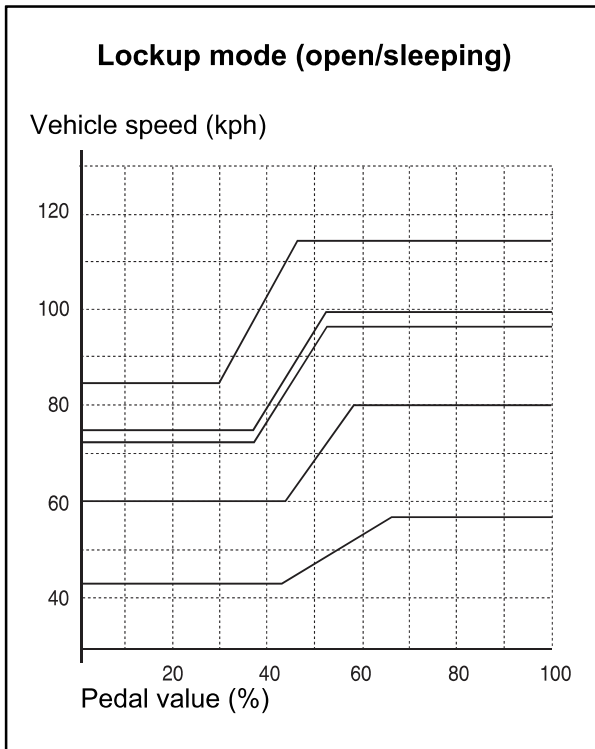
1st gear: 3.595 Rev. 1st gear: 3.167
 2nd gear: 2.185 Rev. 2nd gear: 1.926
 3rd gear: 1.405
 4th gear: 1.000
 5th gear: 0.831
 Axle ratio: 3.31

2. WINTER Mode: Standard Mode

3. Allowable shifting point:

Upshift
 Downshift
 Lockup (sleeping)
 Unlock (open)
 FAST OFF
 Dynamic shift range

Modification basis	
Application basis	
Affected VIN	



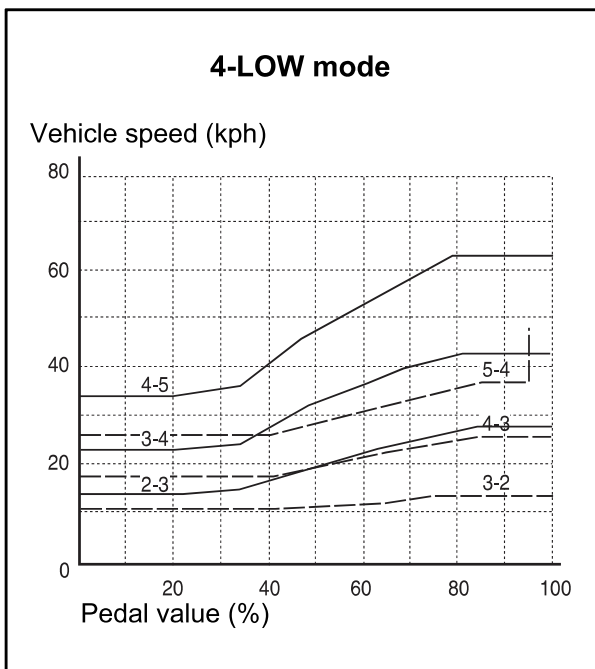
CAUTION

4. FAST OFF

- When abruptly releasing the accelerator pedal, the transmission remains at 4th gear other than 4 → 4 shift (when slowly releasing the accelerator pedal, the transmission is shifted to 5th gear).

5. Dynamic shift range

- When operating the accelerator pedal, the 4 → 3 shift is completed by kick-down signal after completion of 4 → 4 shift.
- When promptly operating the accelerator pedal, the 4 → 3 shift is done in shaded area.

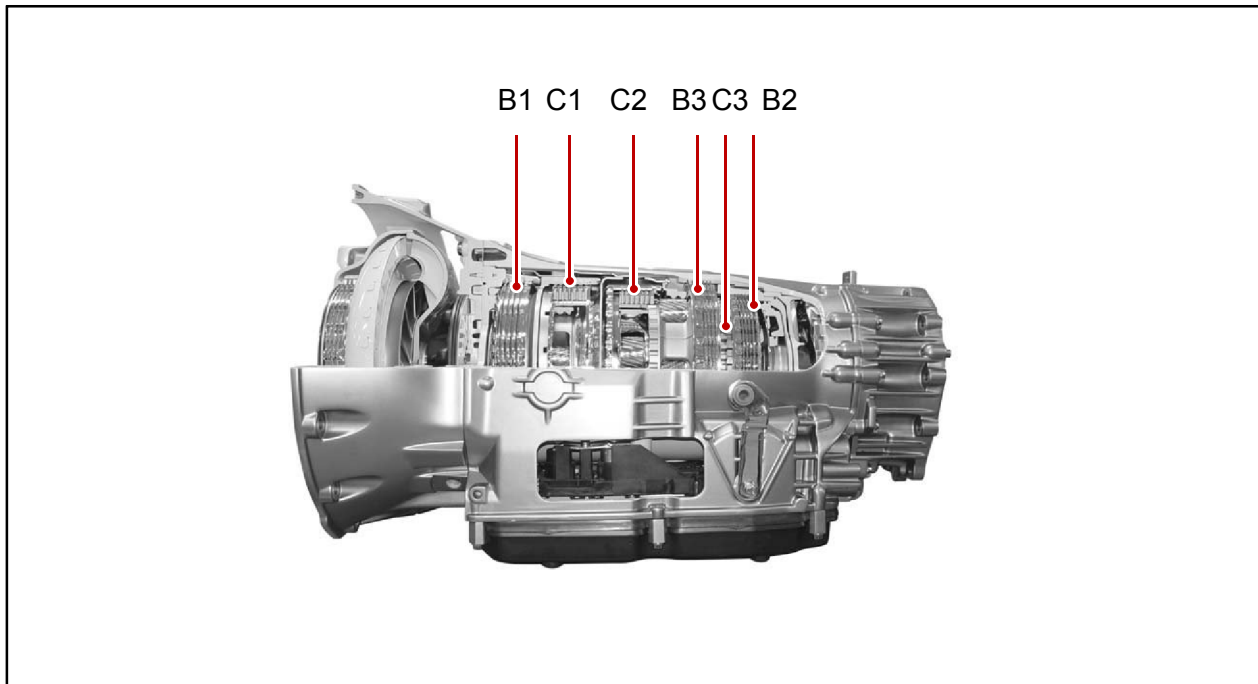


Modification basis	
Application basis	
Affected VIN	

DC 5-SPEED
TGS LEVER
MANUAL TRANSMISSION
CLUTCH
PART TIME
TORQUE ON
ALL WHEEL
IWE
AXLE
IOP/IRDA AXLE
PROPELLER
STEERING
SUSPENSION
IRS SUSPENSION
ELECTRONIC
BRAKE SYSTEM
ANTI-BRAKE

5. POWER FLOW

► Sectional View



► Shifting elements

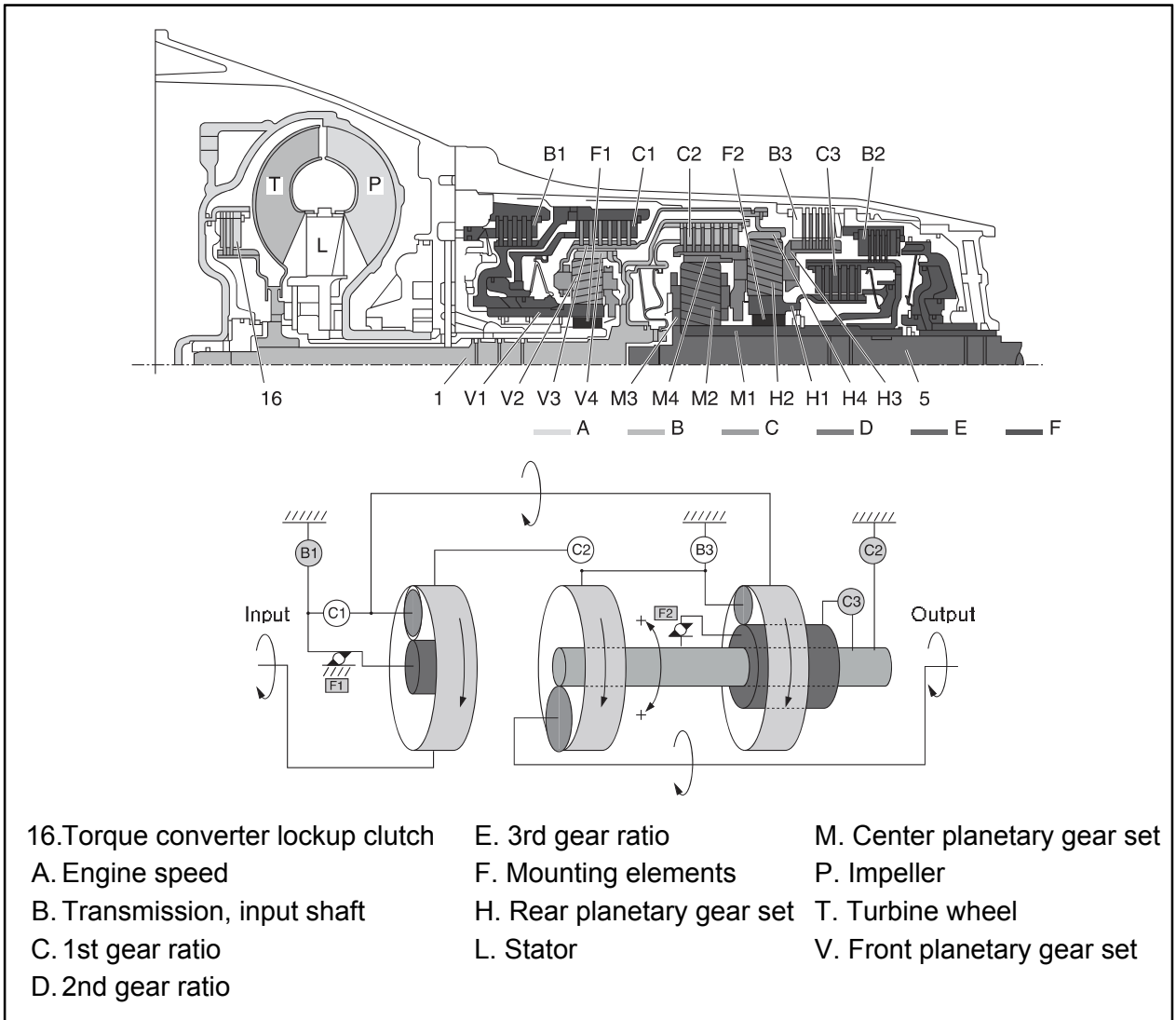
Gear	C1	C2	C3	B1	B2	B3	F1	F2
1			● ³⁾	● ³⁾	●		●	●
2	●		● ³⁾		●			●
3	●	●			●			
4	●	●	●					
5		●	●	● ³⁾			●	
P/N ¹⁾			●	●				
P/N ²⁾	●		●					
R ¹⁾			●	● ³⁾		●	●	
R ²⁾	●		●			●		

1) Selector program switch: "S" mode

2) Selector program switch: "W" mode

3) Overrun

► 1st Gear (3.932)



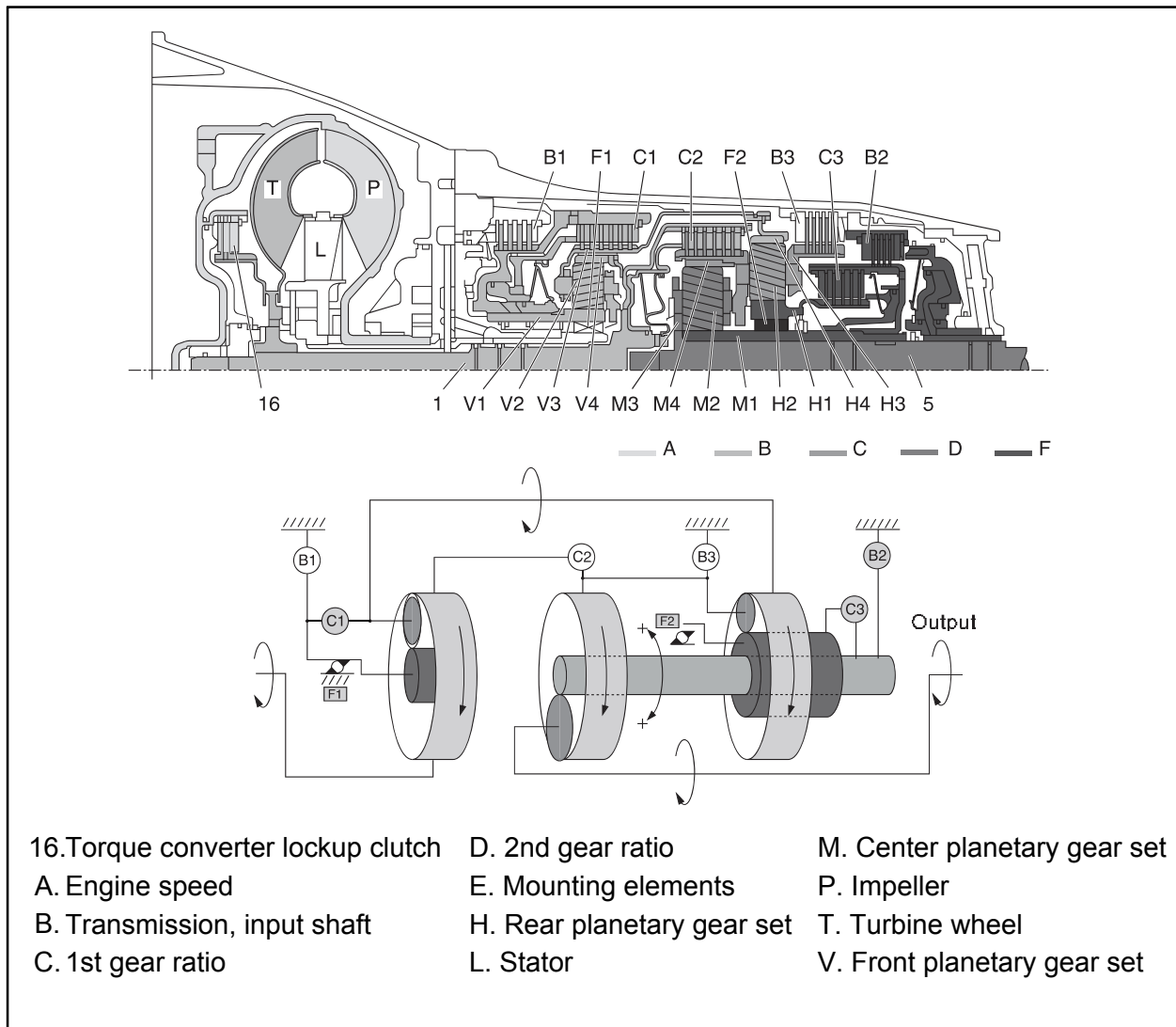
- * Input shaft: Clockwise rotation
- * Front sun gear: Locked by F1 and B1, Planetary gear carrier: Rotation with reduced speed
- * Rear ring gear: Counterclockwise rotation
- * Rear sun gear: Locked by F2 and B2, Planetary gear carrier: Clockwise rotation with reduced speed
- * Center ring gear: Clockwise rotation
- * Center sun gear: Locked by B2, Rotation with reduced speed
- * Output shaft: Clockwise rotation

Gear	C1	C2	C3	B1	B2	B3	F1	F2	Lockup clutch
1			● ³⁾	● ³⁾	●		●	●	

3) Overrun

Modification basis	
Application basis	
Affected VIN	

► 2nd Gear (2.408)



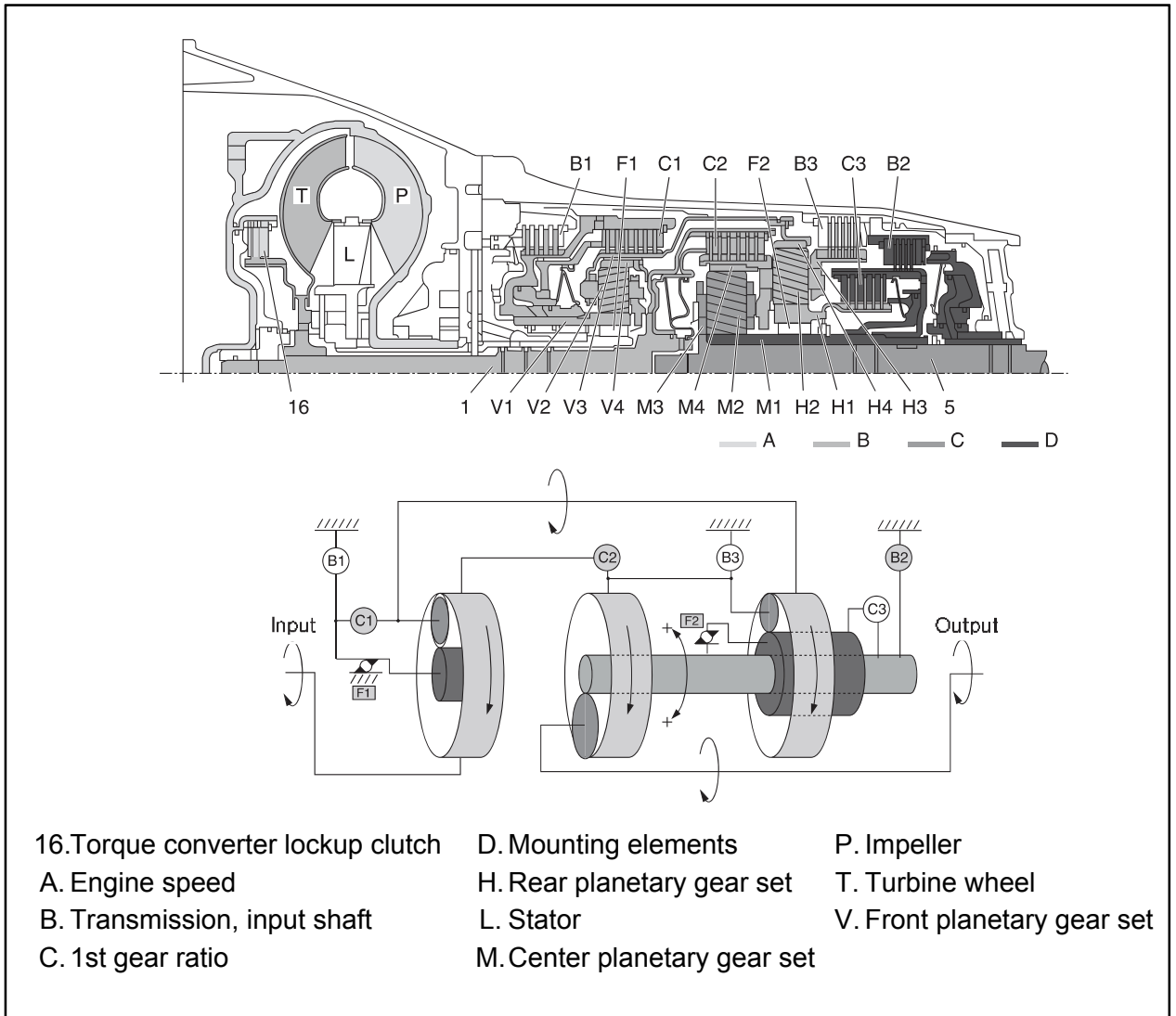
- * Input shaft: Clockwise rotation
- * Sun gear and planetary gear carrier: Clockwise rotation by C1 activation
- * Rear ring gear: Clockwise rotation
- * Rear sun gear: Locked by F2 and B2, Planetary gear carrier: Rotation with reduced speed
- * Center ring gear: Clockwise rotation
- * Sun gear: Locked by B2, Planetary gear carrier: Rotation with reduced speed
- * Output shaft: Clockwise rotation

Gear	C1	C2	C3	B1	B2	B3	F1	F2
2	●		● ³⁾		●			●

3) Overrun

Modification basis	
Application basis	
Affected VIN	

► 3rd Gear (1.486)

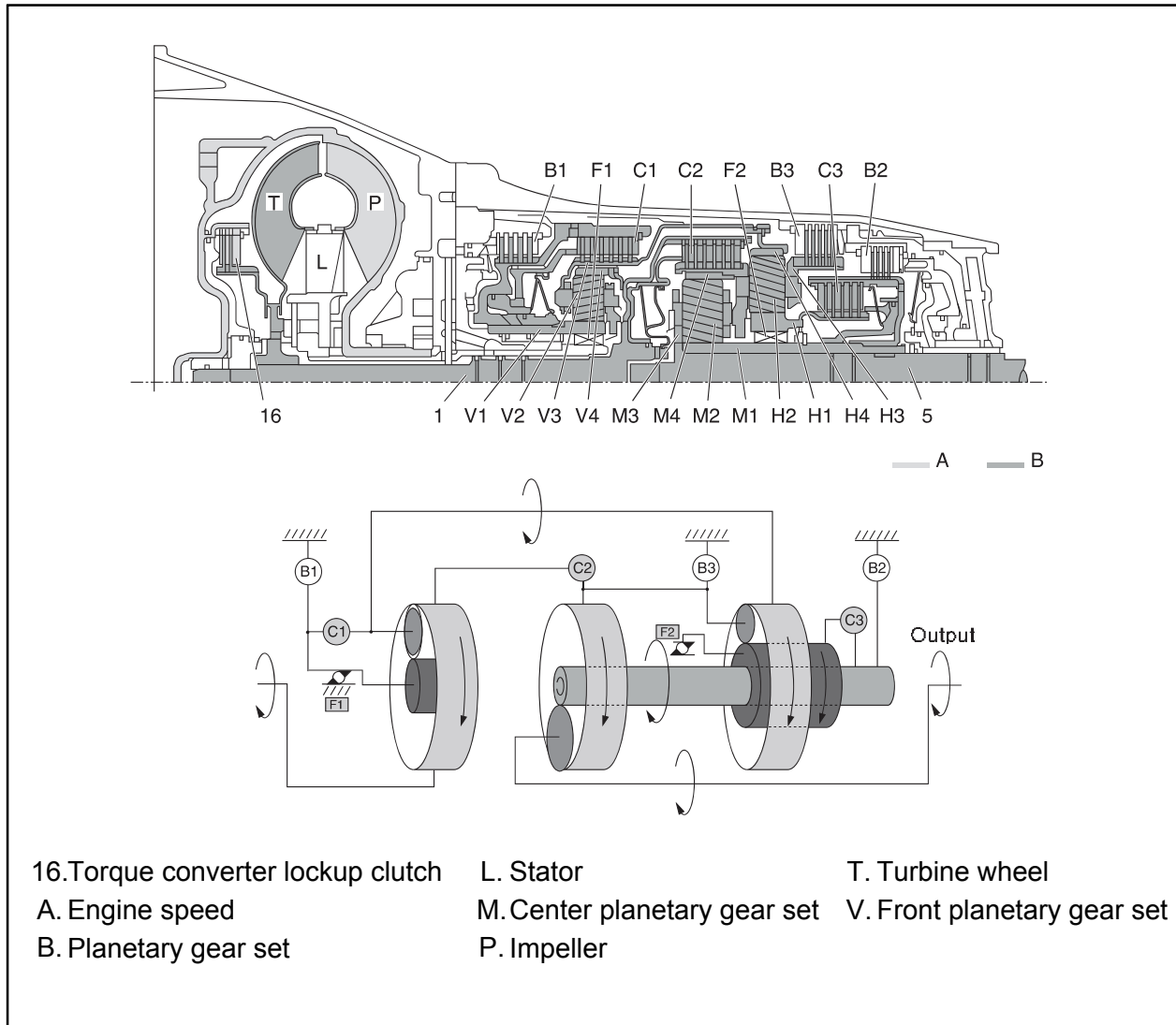


- * Input shaft: Clockwise rotation
- * Front ring gear: Clockwise rotation
- * Center ring gear: Clockwise rotation by clutch 2 activation (direct connection)
- * Center sun gear: Locked by B2, Planetary gear carrier: Clockwise rotation with reduced speed
- * Output shaft: Clockwise rotation

Gear	C1	C2	C3	B1	B2	B3	F1	F2
3	●	●			●			

Modification basis	
Application basis	
Affected VIN	

► 4th Gear (1.000)

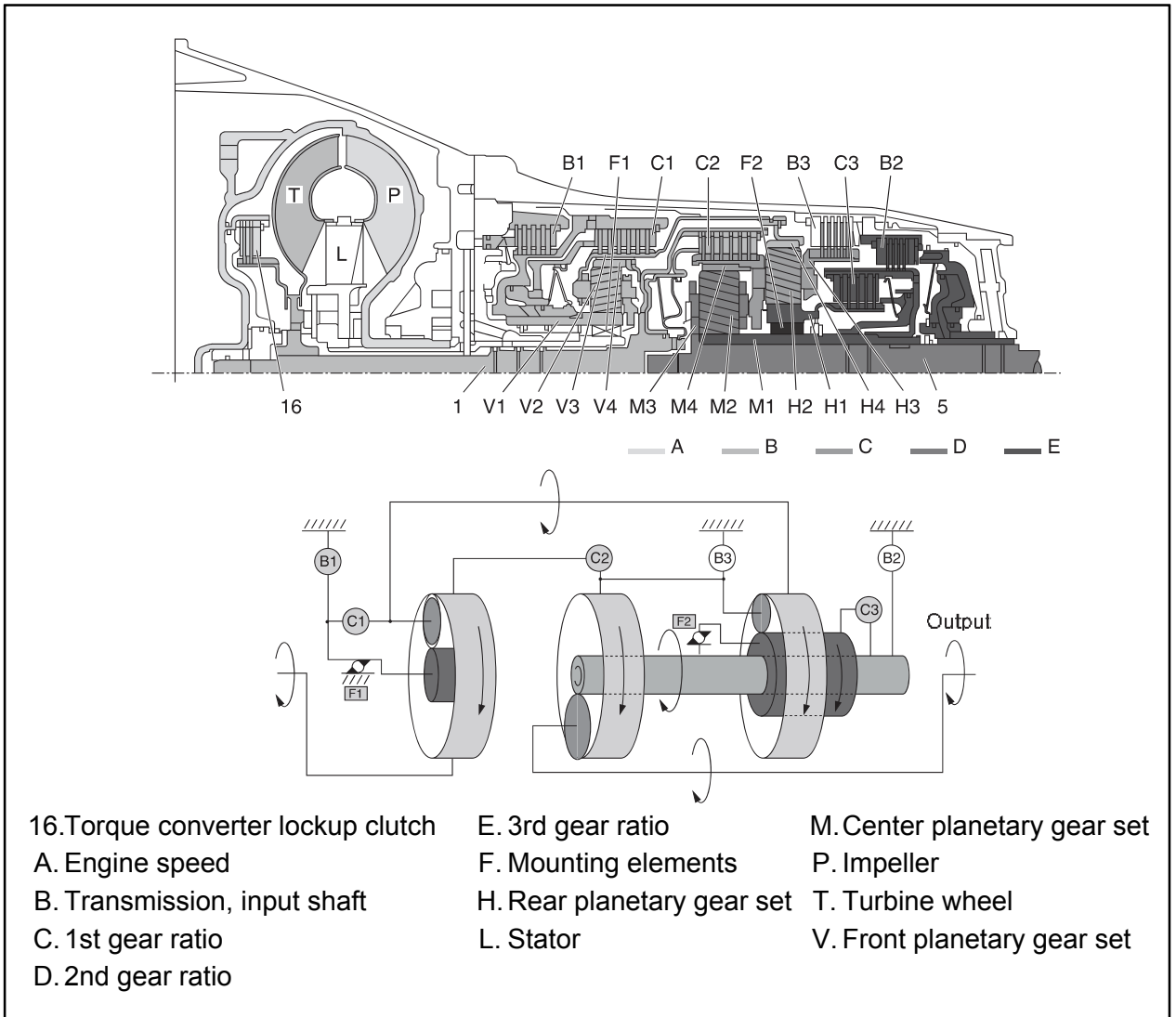


- * Input shaft: Clockwise rotation
- * Front ring gear: Clockwise rotation
- * Center ring gear and rear planetary gear carrier: Clockwise rotation
- * Front sun gear and planetary gear carrier: Clockwise rotation (direct connection)
- * Rear ring gear: Clockwise rotation
- * Rear sun gear: Rotation by ring gear and planetary gear carrier (direct connection)
- * Center ring gear: Clockwise rotation by C3 activation
- * Planetary gear carrier: Clockwise rotation by center sun gear and ring gear (direct connection)
- * Output shaft: Clockwise rotation

Gear	C1	C2	C3	B1	B2	B3	F1	F2
4	●	●	●					

Modification basis	
Application basis	
Affected VIN	

► 5th Gear (0.830)

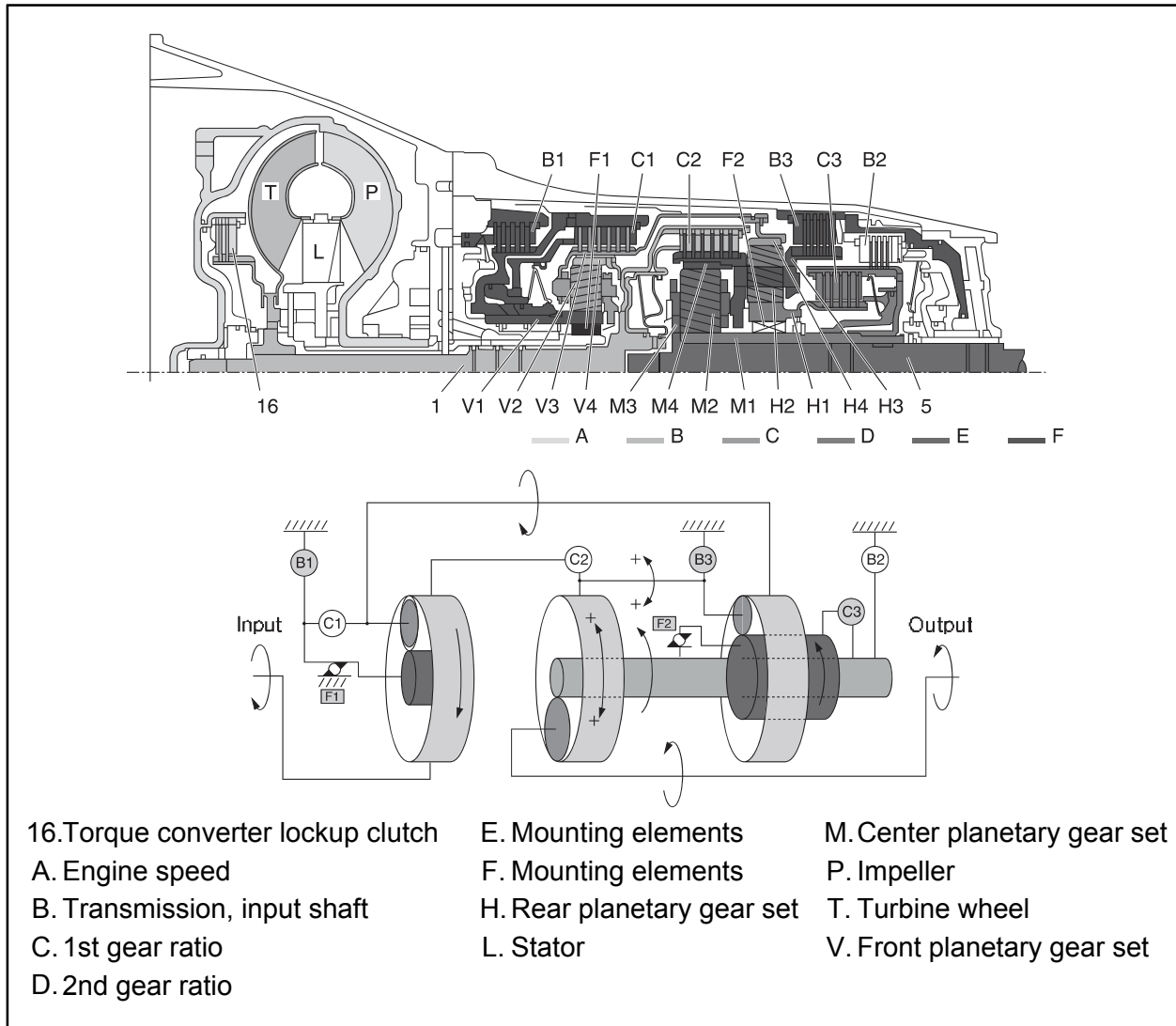


- * Input shaft: Clockwise rotation
- * Front sun gear: Locked, Planetary gear carrier: Rotation with reduced speed
- * Rear planetary gear carrier: Clockwise rotation with reduced speed
- * Center ring gear and rear planetary gear carrier: Clockwise rotation by clutch C2 activation
- * Rear sun gear: Clockwise rotation because rear planetary gear carrier rotates faster than rear ring gear (increased speed)
- * Center sun gear: Clockwise rotation with increased speed by C3 activation
- * Center planetary gear carrier: Clockwise rotation (increased speed)
- * Output shaft: Clockwise rotation (increased speed)

Gear	C1	C2	C3	B1	B2	B3	F1	F2
5		●	●	● ³⁾			●	

Modification basis	
Application basis	
Affected VIN	

► Reverse 1st Gear (3.160, "S" Mode)

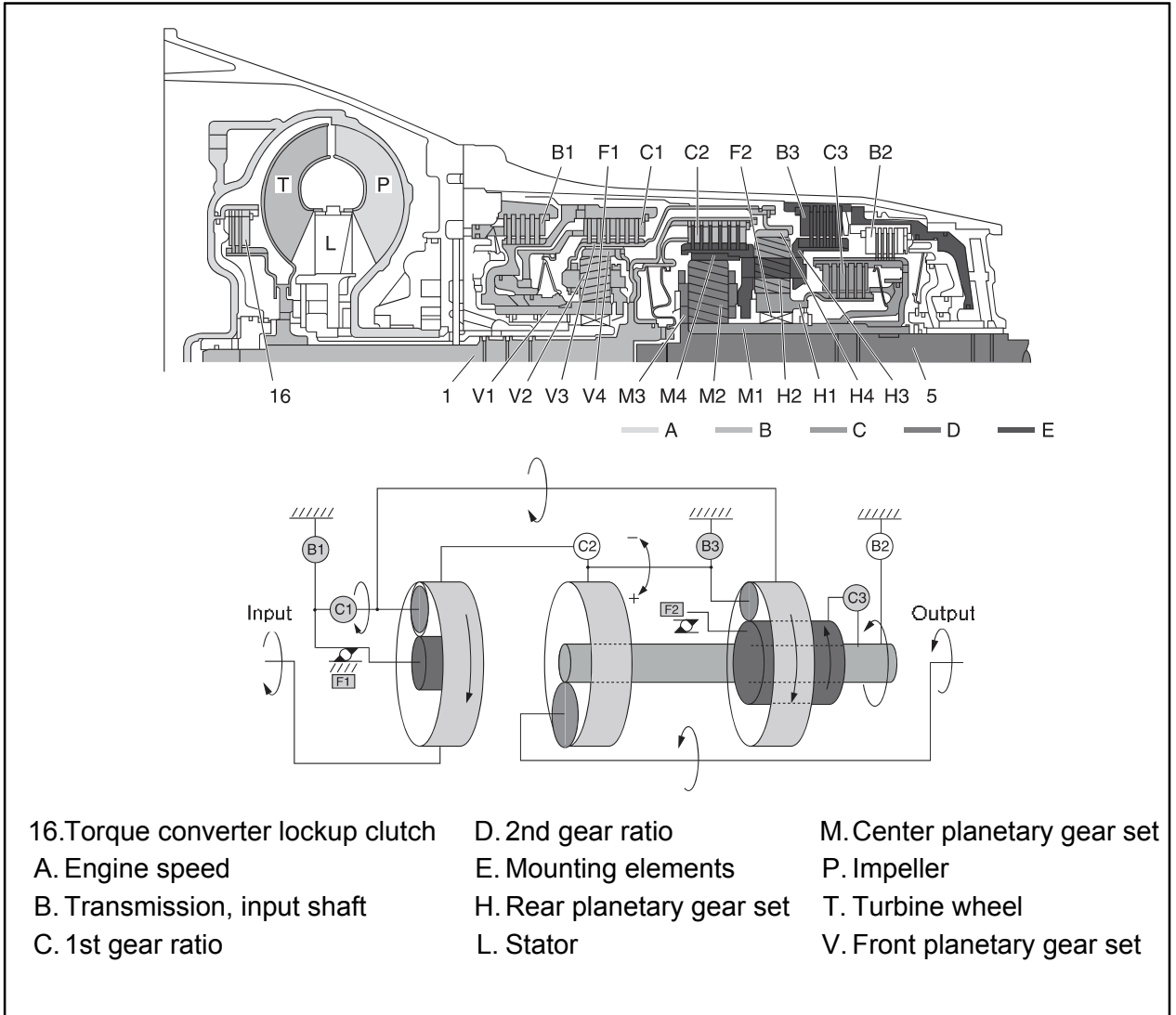


- * Input shaft: Clockwise rotation
- * Front ring gear: Clockwise rotation
- * Front sun gear: Locked by one-way clutch F1
- * Front planetary gear carrier: Clockwise rotation (reduced speed)
- * Rear planetary gear ring gear: Clockwise rotation
- * Rear planetary gear carrier: Locked by B3
- * Rear sun gear and center sun gear: Counterclockwise rotation (increased speed)
- * Center ring gear: Locked by B3
- * Center planetary gear carrier: Counterclockwise rotation (reduced speed)
- * Output shaft: Counterclockwise rotation

Gear	C1	C2	C3	B1	B2	B3	F1	F2
R (S)			●	● ³⁾		●	●	

Modification basis	
Application basis	
Affected VIN	

► Reverse 2nd Gear (1.930, "W" Mode)



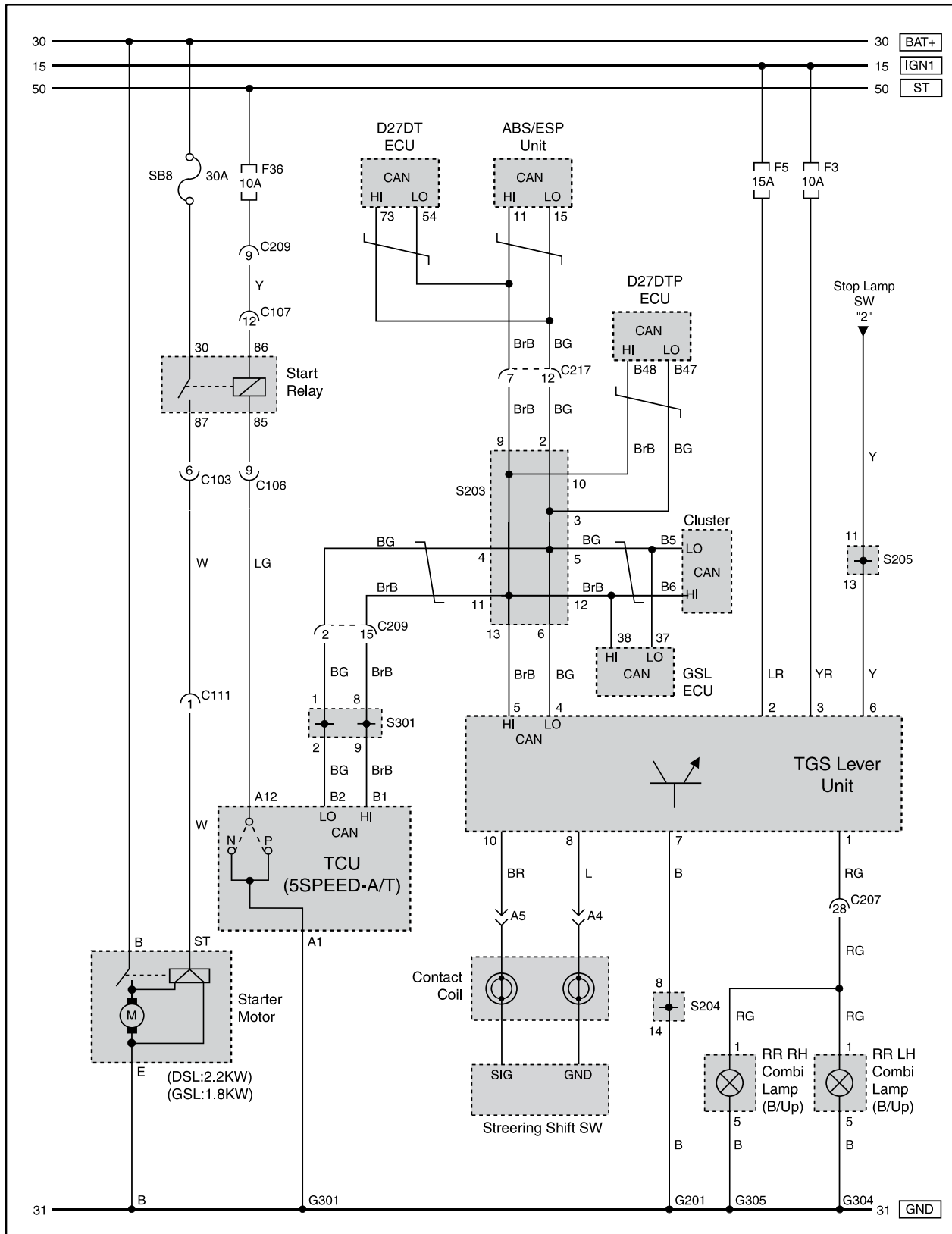
- * Input shaft: Clockwise rotation
- * Front ring gear: Clockwise rotation
- * Front planetary gear carrier: Clockwise rotation by clutch C1 activation (direct connection)
- * Rear ring gear: Clockwise rotation
- * Rear planetary gear carrier and center ring gear: Locked by brake B3
- * Rear sun gear and center sun gear: Counterclockwise rotation (increased speed)
- * Center planetary gear carrier: Counterclockwise rotation (reduced speed)
- * Output shaft: Counterclockwise rotation

Gear	C1	C2	C3	B1	B2	B3	F1	F2
R (W)	●		●			●		

Modification basis	
Application basis	
Affected VIN	

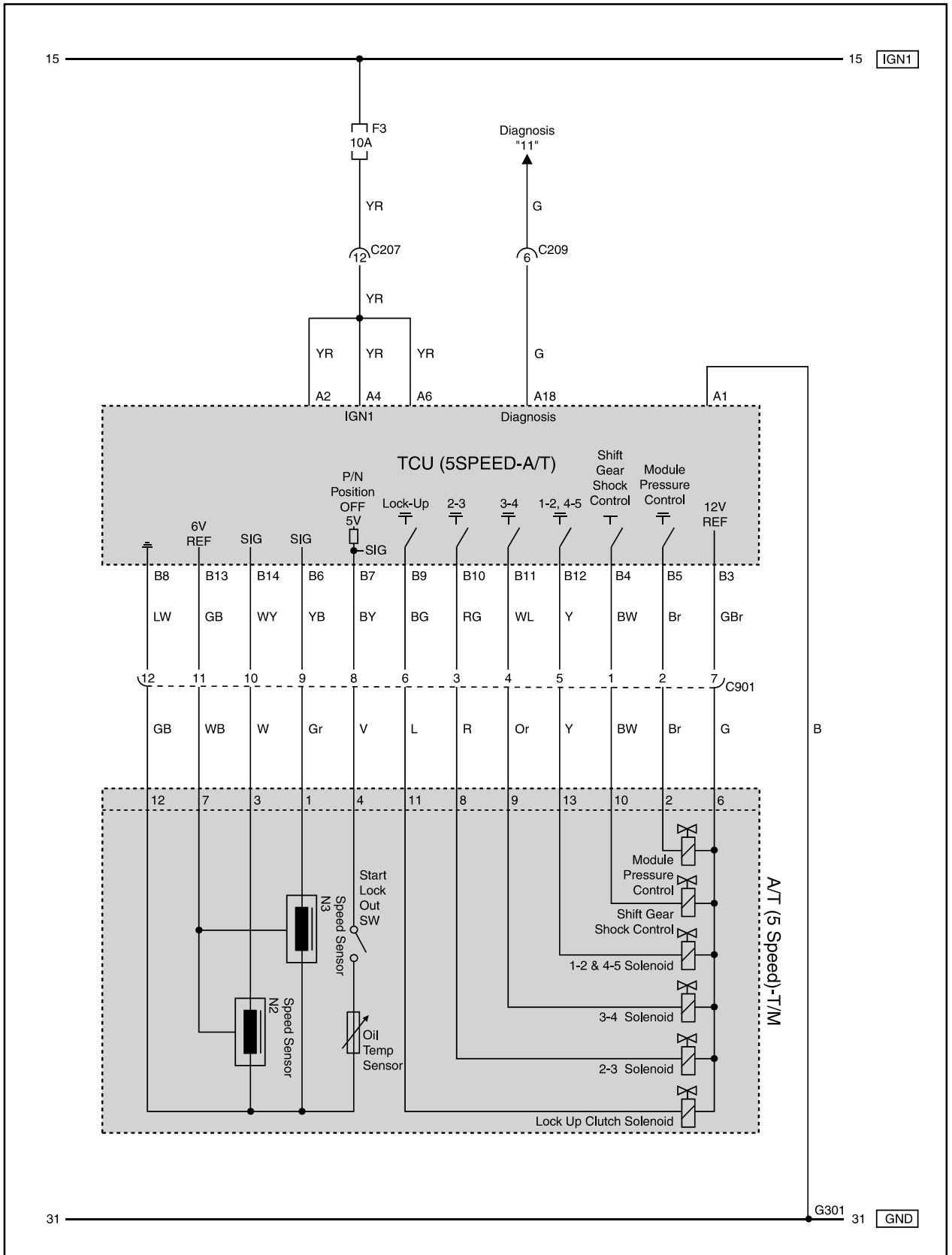
6. CIRCUIT DIAGRAM

1) Starter, Selector Lever, CAN Communication



Modification basis	
Application basis	
Affected VIN	

2) Solenoid, Oil Temperature Sensor, RPM Sensor (N2, N3)



Modification basis	
Application basis	
Affected VIN	