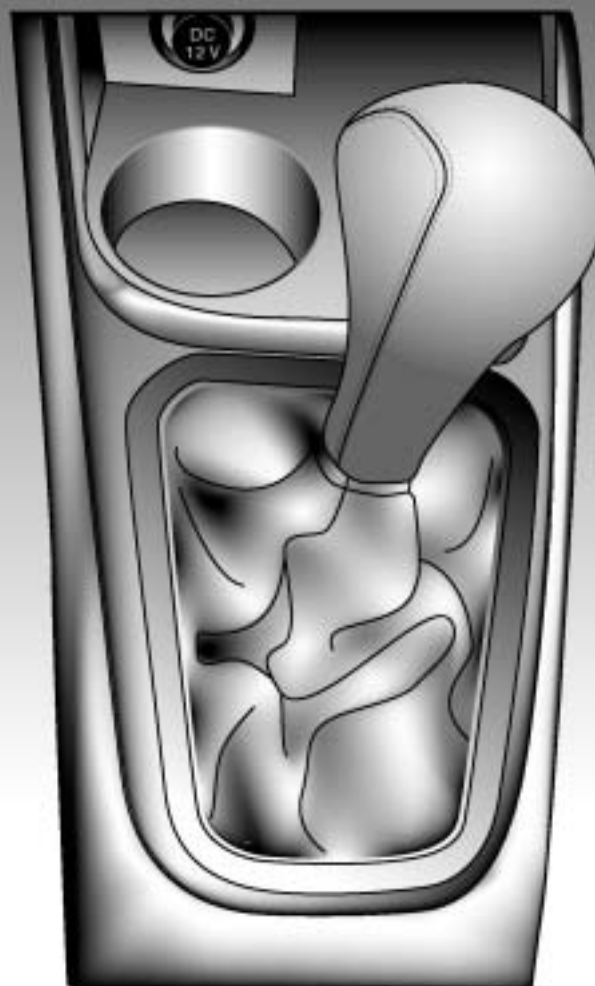


## MANUAL TRANSMISSION SERVICE



CREATED AUGUST, 2004



This book is designed for instructional use only for Nissan North America, Inc. and authorized dealer personnel. For additional information contact:

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**WE ENCOURAGE  
PROFESSIONALISM**



**THROUGH TECHNICIAN  
CERTIFICATION**



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## Corporate Training Office

Technical Training

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- Module 15: RS6F51A or RS6F51H Assembly



## MANUAL TRANSMISSION SERVICE OBJECTIVES

Upon completion of this training program, you will be able to:

Given a vehicle with a manual transmission and hydraulic clutch

- Inspect clutch pedal clevis pin movement and pedal travel.
- Inspect and adjust ASCD switch and/or clutch pedal stop.
- Properly bleed any air from the clutch hydraulic system.

Given a FS5R30A 5-speed manual transmission (Required for Nissan Technicians and Optional for Infiniti Technicians)

- Inspect shift quality on the bench, disassemble the transmission case halves, perform necessary gear and shift linkage inspections, documenting which components require replacement.
- Using puller kit J39856, disassemble shift components and gear assemblies, noting any components which require replacement.
- Reassemble the mainshafts and countershafts into the adapter plate.
- Attach the shift linkage to the gear assembly and reassemble the transmission case halves to the adapter plate.
- Bench shift the transmission, verifying shift into all gears.

Given a FS6R31A 6-speed manual transmission (Required for all technicians)

- Inspect shift quality on the bench, disassemble the transmission case halves, perform necessary gear and shift linkage inspections, documenting which components require replacement.
- Disassemble shift components and gear assemblies, noting any components which require replacement.
- Reassemble the mainshafts and countershafts into the adapter plate.
- Measure and adjust gear endplays if necessary.
- Attach the shift linkage to the gear assembly and reassemble the transmission case halves to the adapter plate.
- Bench shift the transmission verifying shift into all gears.



Given a RS5F51A 5-speed manual transmission (Required for Nissan Technicians and Optional for Infiniti Technicians)

- Disassemble the transmission case halves, perform necessary gear inspections, documenting which components require replacement.
- Disassemble gear assemblies, noting any components which require replacement.
- Perform endplay and preload measurements, selecting correct shims.
- Reassemble gear assemblies and case halves.

Given a RS5F70A 5-speed manual transmission (Optional for Nissan Technicians, required for Infiniti Technicians)

- Inspect shift quality on the bench, disassemble the transmission case halves, perform necessary gear and shift linkage inspections, documenting which components require replacement.
- Remove shift components and gear assemblies from clutch housing.
- Inspect the final drive pinion and side gears.
- Identify shim size and placement.
- Measure final drive side bearing preload and determine shim size. Determine correct final drive turning torque.
- Reassemble gear assemblies, shift components and case halves.
- Bench shift the transmission verifying shift into all gears.

Given a RS6F51A/H 6-speed manual transmission (Required for Nissan Technicians and Optional for Infiniti Technicians)

- Inspect shift quality on the bench, disassemble the transmission case halves, perform necessary gear and shift linkage inspections, documenting which components require replacement.
- Disassemble shift components and gear assemblies, noting any components which require replacement.
- Reassemble the mainshafts and countershafts into the adapter plate.
- Measure and adjust gear endplays if necessary.
- Attach the shift linkage to the gear assembly and reassemble the transmission case halves to the adapter plate.
- Bench shift the transmission verifying shift into all gears.

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## MANUAL TRANSMISSION SERVICE

### Introduction

Internal combustion engines develop very little torque or power at low rpm. This is especially obvious when you try to start out in direct drive, 4th gear in a 4-speed or 5th gear in a 6-speed manual transmission -- the engine stalls because it is not producing enough torque to move the load.

Manual transmissions have long been used as a method for varying the relationship between the speed of the engine and the speed of the wheels. Varying gear ratios inside the transmission allow the correct amount of engine power to reach the drive wheels at different engine speeds. This enables engines to operate within their power band.

A transmission has a gearbox containing a set of gears, which act as torque multipliers to increase the twisting force on the driveshaft, creating a "mechanical advantage", which gets the vehicle moving.

From the basic 4 and 5-speed manual transmission used in early Nissan and Infiniti vehicles, to the state-of-the-art, high-tech six speed transmission used today, the principles of a manual gearbox are the same. The driver manually shifts from gear to gear, changing the mechanical advantage to meet the vehicles needs.



Nissan and Infiniti vehicles use the constant-mesh type manual transmission. This means the mainshaft gears are in constant mesh with the counter gears. This is possible because the gears on the mainshaft are not splined/locked to the shaft. They are free to rotate on the shaft. With a constant-mesh gearbox, the main drive gear, counter gear and all mainshaft gears are always turning, even when the transmission is in neutral.





## Transmission Designation

Each transmission has its own unique designation. A front wheel drive designation always begins with **RS** and a rear wheel drive designation always begins with **FS**. Each designation goes as follows:

### Front Wheel Drive RS6F51A or H

**RS** = Remote Shift

**6** = 6 Forward gears

**F** = Front drive

**51** = Model designation

**A** = Standard final drive

**H** = Helical type limited slip final drive

### Rear Wheel Drive FS6R31A

**FS** = Fixed Shift

**6** = 6 Forward gears

**R** = Rear drive

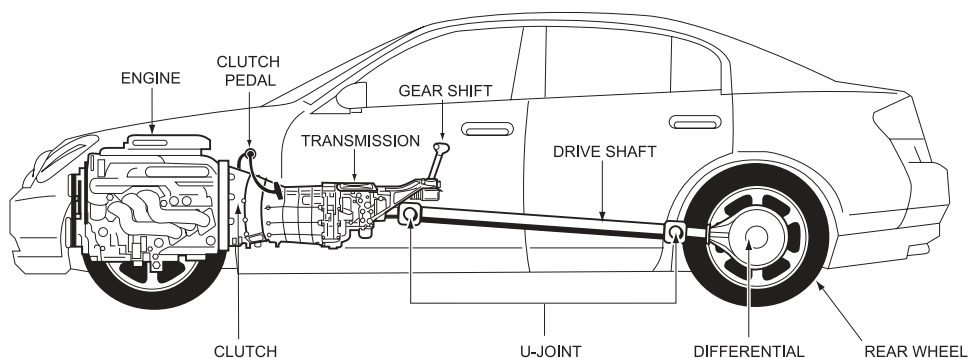
**31** = Model designation

**A** = Version

**Note:** The letter V on some front drive transmissions indicates a viscous coupling, limited slip final drive.

## Unit Operation

Engines have a maximum rpm value. The transmission allows the gear ratio between the engine and the drive wheels to change as the car speeds up and slows down. The driver shifts gears so the engine stays below the rpm band of its best performance.

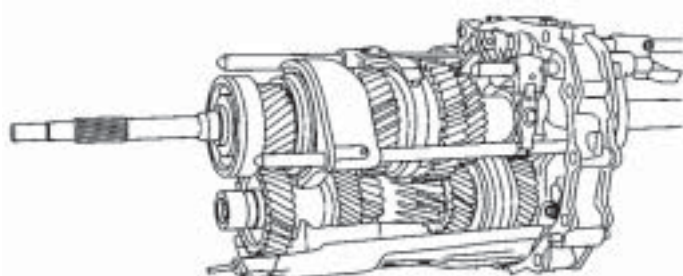




## Input Shaft, Counter Shaft and Output Shaft

The input shaft is in constant mesh with the clutch disc. In other words, the clutch disc drives the input shaft. When the clutch is engaged, the input shaft continually turns whether the car is moving or not. The input shaft in turn drives the counter shaft. Whenever the input shaft turns, the counter shaft rotates as well. When a gear is selected, the counter shaft then turns the output shaft, which is connected to the drive shaft or drive axle.

The output shaft only turns when the vehicle is moving.



## Shift Lever

Using the gearshift, the driver selects the desired gear for the driving condition.

The gearshift or shift lever connects the transmission using either a shift rod or shift cables. The shift rod or cables move the internal shift rods.

