

THE WORD ON THE STREET

Introducing the Jatco 6-Speed



by Mike Souza
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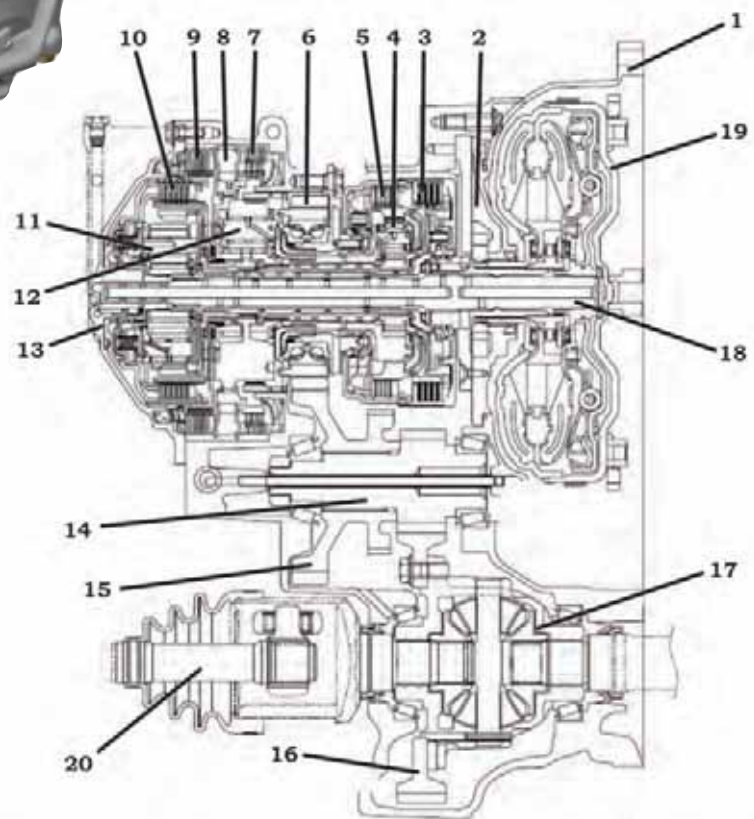
JF613E

The Jatco 6-speed front wheel drive was first produced in 2006. We haven't seen a lot of it yet — in most cars it was still covered under warranty. But after six years, many of those warranties have expired, so it won't be long before the Jatco 6-speed becomes a fixture in transmission shops all across the country.

Jatco's designation for this transmission is JF613E. Nissan, Renault, and Mitsubishi all use this transmission, and each manufacturer gives it a different designation. Nissan and Renault are only using it in Europe; Mitsubishi is the only manufacturer offering it in their U.S. vehicles... for now.

It was first used in the 2006-and-later Nissan Qashqai (try to pronounce that one, I dare you!) behind a 2.0L, 4-cylinder engine. Nissan calls it the RE6F01A.

Renault uses it in their 2007-and-later Laguna with a 2.0L, 4-cylinder and 3.0L and 3.5L V6 engines. They also use it in their 2008-and-up Koleos



- | | |
|---------------------------|-------------------------------|
| 1: Converter Housing | 11: Reduction Planetary Gears |
| 2: Oil Pump (Trochoid) | 12: Rear Planetary Gears |
| 3: 3-5 Reverse clutch | 13: Side Cover |
| 4: Front Planetary Gears | 14: Reduction Pinion Gear |
| 5: Low Clutch | 15: Idler Gear |
| 6: Output Gear | 16: Final Drive Gear |
| 7: Low & Reverse Brake | 17: Differential |
| 8: One Way Clutch (sprag) | 18: Input Shaft |
| 9: 2 -6 Brake Clutch | 19: Torque Converter |
| 10: High Clutch | 20: Axle |

Figure 1

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with a 2.0L, 4-cylinder engine, and the 2010-and-later Scenic and Grand Scenic behind a 2.0L, 4-cylinder. The Renault designation for this transmission is AJO.

Mitsubishi — the only manufacturer offering the Jatco 6-speed in the U.S. market — uses it in their 2007-and-later Outlander equipped with a 2.4L, 4-cylinder or 3.0L V6 engine. The Mitsubishi designation is F6AJA.

You'll find this transmission model listed in some scan tools, although the information available is limited. There's plenty of excellent information available from Mitchell, Alldata, and through factory manuals. And currently there's at least one supplier that's working on a rebuild kit for this unit.

Internal Components

The component identification is shown in figure 1. The geartrain is based on the *Lepelletier* planetary system. There are three driving elements:

- Low Clutch — applied in 1st, 2nd, 3rd, and 4th gears. The Low Clutch transfers input torque from the 3-5 Reverse Clutch drum to the front internal gear (driven).
- 3-5 Reverse Clutch — applied in 3rd, 5th, and reverse. This clutch transfers the reduction internal gear input torque to the front sun gear (driven).
- High Clutch — applied in 4th, 5th, and 6th gears. The High Clutch transfers torque from the input shaft to the rear planet assembly (driven).

The three holding elements:

- Low/Reverse Brake Clutch — applied in 4th, 5th, and 6th gears. It transfers the input shaft torque to the rear planet assembly (holding).
- 2-6 Brake Clutch — applied in 2nd and 6th gears. The 2-6 Brake holds the rear sun gear stationary.
- One-Way Clutch — locked in 1st gear during acceleration. The One-Way Clutch holds the rear planet assembly stationary.

The component function and apply chart are shown in figure 2. Failsafe is usually 3rd gear in drive, depending on the failure. The Transmission Control

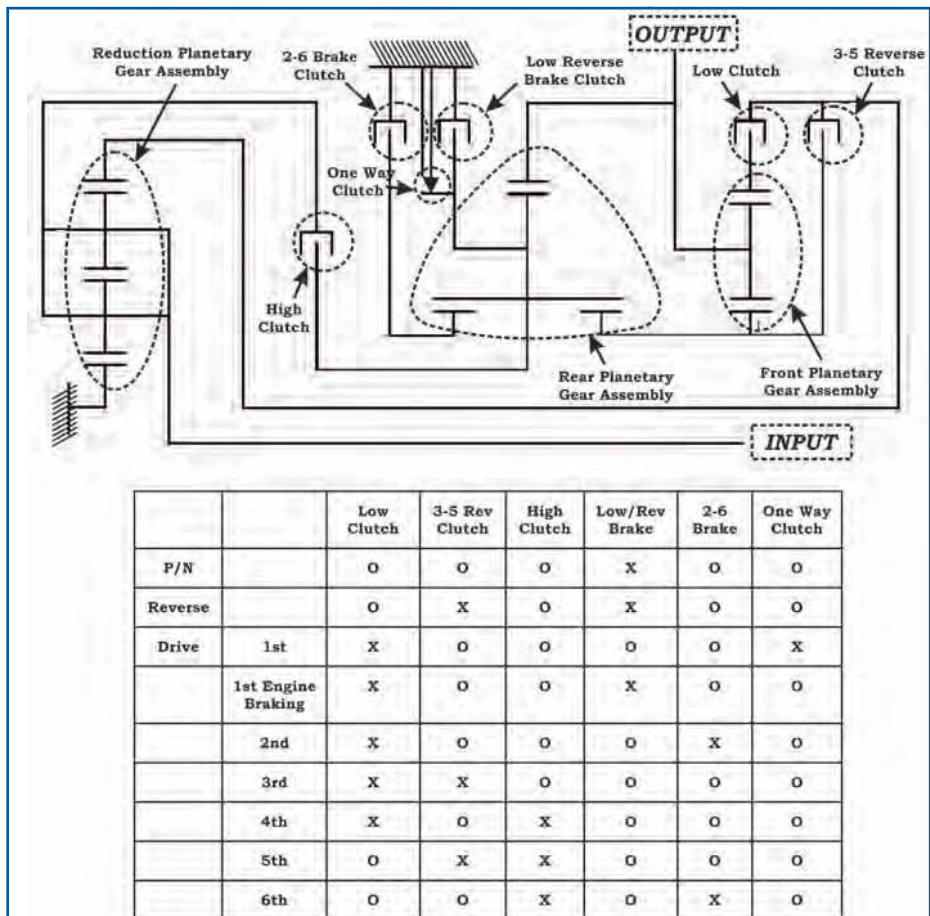


Figure 2

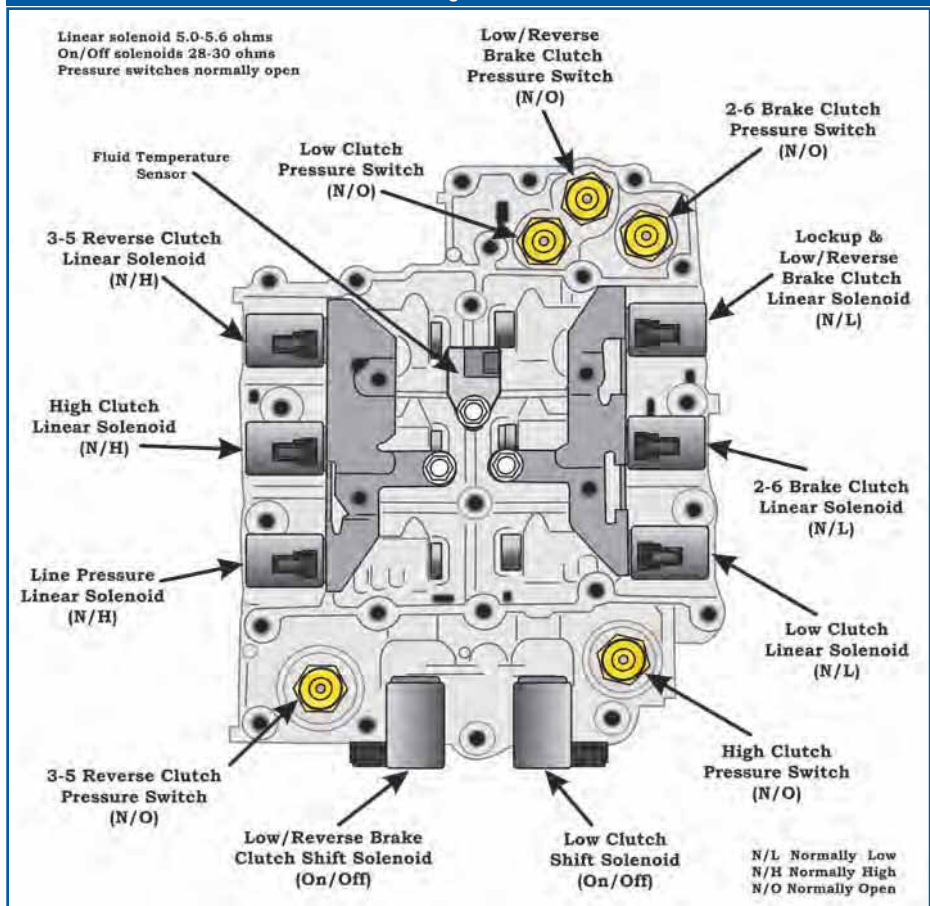


Figure 3



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Module (TCM) will try to hold the current gear command when the failure that caused failsafe occurs. After coming to a stop the TCM will command 3rd gear.

Eight Solenoids

The Jatco JF613E is controlled by eight solenoids. All eight are feed controlled; that is, they're normally grounded through the valve body and the TCM provides them with power to energize them (figure 3).

Six of the solenoids are linear; three are normally high and three are normally low. The other two solenoids are basic on-off solenoids.

Normally High Linear Solenoids:

- Reverse Clutch Solenoid
- High Clutch Solenoid
- Line Pressure Solenoid

Normally Low Linear Solenoids:

- Lockup and Low/Reverse Brake Clutch Solenoid
- 2-6 Brake Clutch Solenoid
- Low Clutch Solenoid

On-Off Solenoids:

- Low Clutch Shift Solenoid
- Low/Reverse Brake Clutch Shift Solenoid

Look for the solenoid application chart in figure 4.

The six linear solenoids have a resistance of about 5.0 to 5.6 ohms at 68°F/20°C. They're controlled by a variable duty cycle signal that cycled at a fixed frequency of 300 Hz.

The two on-off solenoids should have a resistance of about 28-30 ohms at 68°F/20°C. They're controlled by full

system voltage.

When the normally high solenoids are off, pilot pressure moves the control valve against the return spring, allowing line pressure to apply the clutch. When they're energized, pilot pressure exhausts from the control valve. The control valve return spring moves the valve back, which blocks line pressure and releases the clutch. The longer the

Solenoid	Line Pressure	L/U - L/R Brake	L/R Brake	Low Clutch	Low Clutch	2-6 Brake	3-5/R Clutch	High Clutch
Type	N/H Linear	N/L Linear	On/Off Shift (N/C)	On/Off Shift (N/C)	N/L Linear	N/L Linear	N/H Linear	N/H Linear
Gear								
P/N	Duty	Off	On	Off	Off	Off	Duty	Duty
Reverse	Duty	Duty	On	Off	Off	Off	Off	Duty
Man 1st	Duty	Duty	On	Off	Duty	Off	Duty	Duty
Drive 1st	Duty	Off	On	Off	Duty	Off	Duty	Duty
Drive 2nd	Duty	Off	Off	Off	Duty	Duty	Duty	Duty
Drive 3rd	Duty	Off	Off	Off	Duty	Off	Off	Duty
Drive 4th	Duty	Duty	Off	Off	Duty	Off	Duty	Off
Drive 5th	Duty	Duty	Off	On	Off	Off	Off	Off
Drive 6th	Duty	Duty	Off	On	Off	Duty	Duty	Off

Figure 4

3-5 Reverse Clutch, High Clutch and Line Pressure

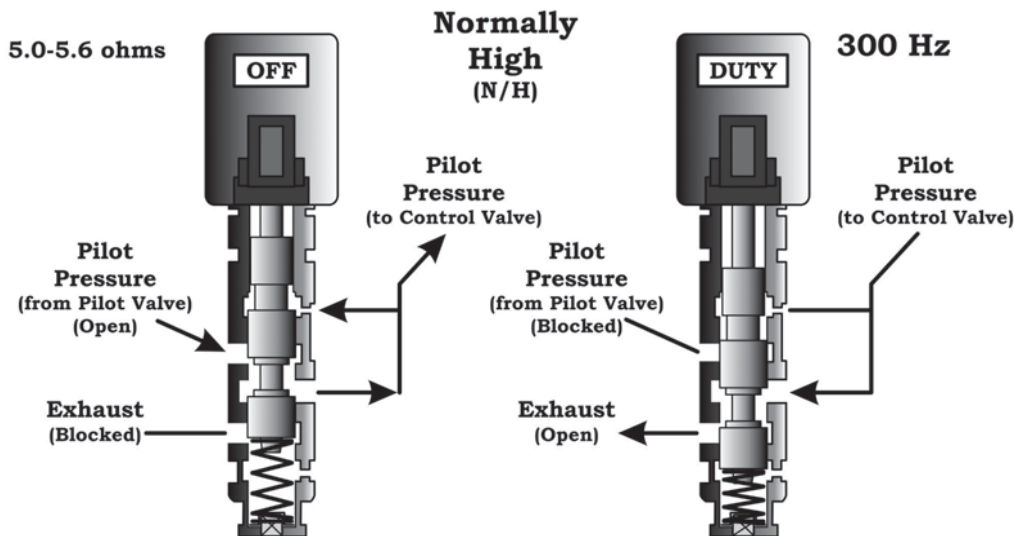


Figure 5

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duty cycle on-time, the lower the pressure (figure 5).

When the normally low solenoids are off, pilot pressure is blocked at the solenoid valve. When they're energized, pilot pressure moves the control valve against the return spring, allowing line pressure to apply the clutch. The longer the duty cycle on-time, the higher the pressure (figure 6).

The two on-off solenoids are energized by supplying system voltage. This blocks pilot pressure at the sole-

noid, shutting off pressure to the control valve (figure 7).

There are also five normally open pressure switches (figure 3):

- Low Clutch
- Low/Reverse Brake Clutch
- 2-6 Brake Clutch
- 3-5 Reverse Clutch
- High Clutch

Well that's about all for this article. Look for more information on the not-so-new Jatco JF613E in future articles and seminars.



The TCM uses the signals from these switches to monitor the apply pressure of the designated clutch.

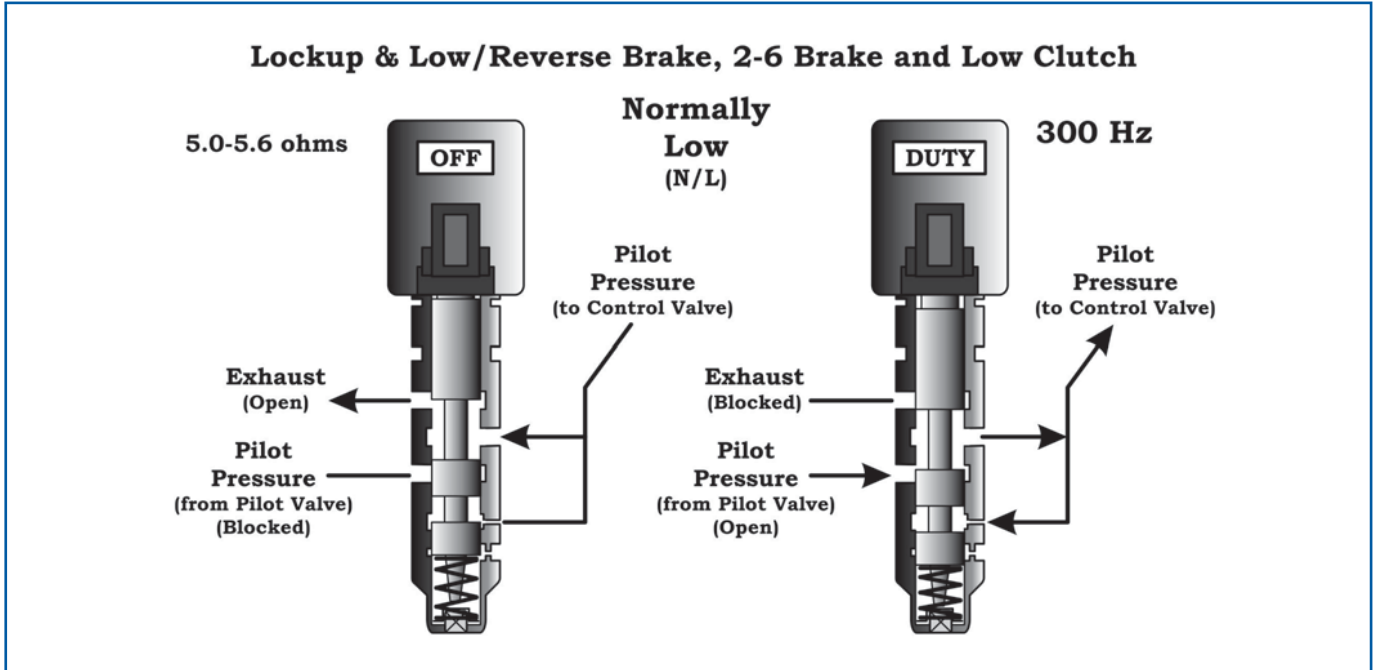


Figure 6

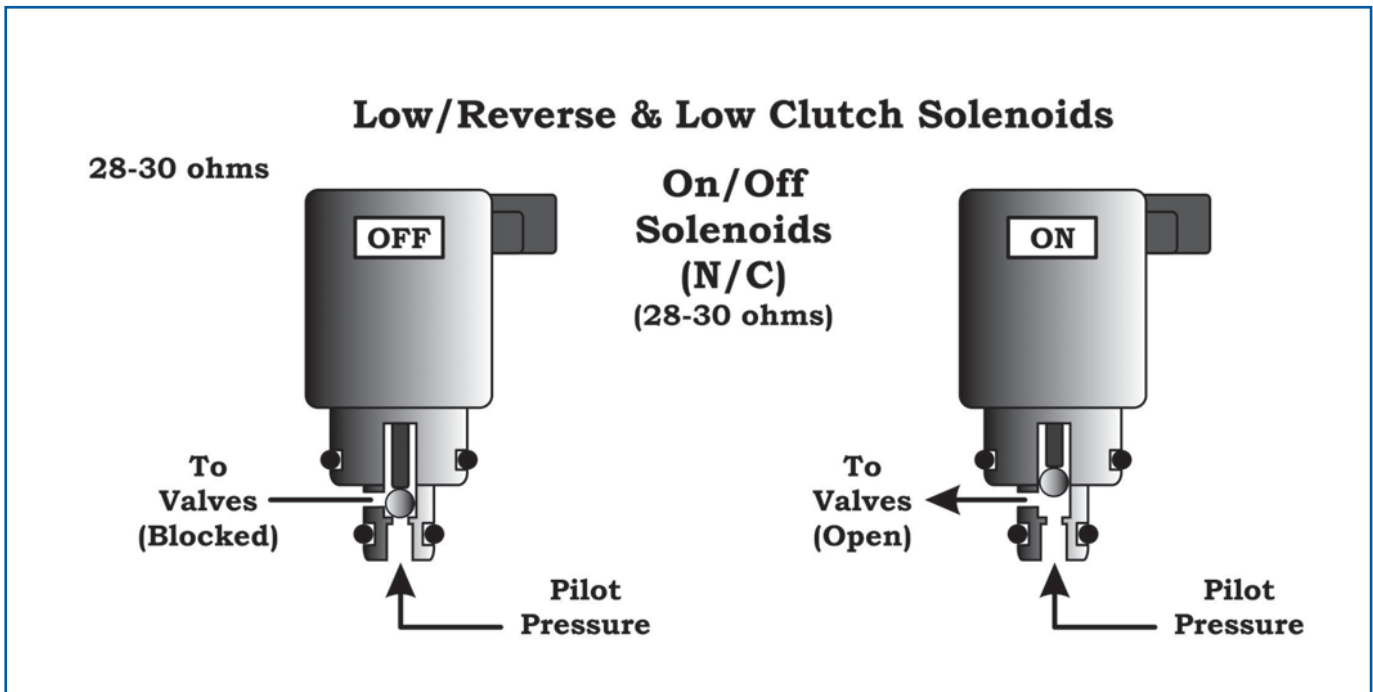


Figure 7

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