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2016 WEBINAR	DATES	TRANSMISSION
January	19	6F35N Intro
February	2	AS68RC Intro
February	16	Lineartronic Gen 2 Introduction
March	1	6T40 Internal
March	15	Reprogramming 1
March	29	A5HF1 Introduction
April	12	Reprogramming 2
April	26	Nissan CVT Introduction
May	10	6R140 Internal
May	24	6F35N Internal
June	7	AS68RC Internal
June	21	Lineartronic Gen 1 & 2 Comparison
July	5	6T40 & 6T70 comparison
July	19	Nissan CVT Internal
August	2	722.9 Internal
August	16	JF613 Internal
August	30	Drivability Diagnostics 1
September	13	A5HF1 Internal
September	27	Drivability Diagnostics 2
October	11	Hybrid Diagnostics & Safety
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Drivability Diagnostics 2 Hybrid Diagnostics & Safety



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Nissan CVT Introduction

CVT 7 With Auxiliary Gear Box



Presented by: Mike Souza ATRA Senior Research Technician











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Nissan CVT Introduction I probably title this webinar Jatco CVT Introduction. Because

We should probably title this webinar Jatco CVT Introduction. Because Jatco is the manufacturer for the CVT transmissions found in Nissan vehicles.

They are one of the largest manufacturers of CVT transmission that fit many different car makers. The list of vehicles is extremely long. Long enough to take up 4 pages to list them all.

Here is a list of car makers and model years that the Jatco CVT has been designed for European and Domestic.

2012-2016	Renault	2008-2016
2009-2016	Suzuki	2006-2016
2006-2012	Venucia	2015-2016
2007-2016		
2012-2016		
2006-2016		
2012-2016		
2004-2016		
2000-2016 (earlies	t) REOF06A (latest)	JF015E/CVT7
2009-2016		
2010-2016		
	2012-2016 2009-2016 2006-2012 2007-2016 2012-2016 2012-2016 2006-2016 2004-2016 2000-2016 (earlies 2009-2016 2010-2016	2012-2016 Renault 2009-2016 Suzuki 2006-2012 Venucia 2007-2016 2012-2016 2006-2016 2012-2016 2004-2016 2000-2016 (earliest) REOF06A (latest) 2009-2016 2010-2016









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Here is a list of the different Jatco CVT unit designations that we were able to find. Chevrolet **JF015/16E** Citreon **REOF10A (JF011E) JF015E** F1C1 Dodge **JF011E** Dongfeng REOF10A (JF011E) **JF016E** Infiniti **JF017E** Jeep **REOF10A (JF011E)** Mazda **JF015E** Mitsubishi F1C1 **JF011E**

JF016E SEAL AFTERMARKET PRODUCTS your source for engineered solutions Transmission Kits



Renault **JF017E** Suzuki REOF11A (JF015E) REOF10A (JF011E) **JF016E** Venucia **JF016E**



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Nissan CVT Introduction















Nissan CVT Introduction

The REOF06A was one of the earliest designs used in Nissan vehicles starting in the 2000 model year. The REOF10/09/08/06A are the larger than the JF015E unit.

They are all very similar in design just different in size and some internal components.

We will do a comparison on some of the internal components as well as the different procedures and precautions to disassemble the pulleys in the next Nissan CVT Internal webinar.

The bell housing for some of these REOF11/10/09/08/06A may look the same if they are behind the same size motor. Although there is a tremendous difference in size internally.

The latest model is the JF015E CVT7 (REOF11A) series is for the smaller engine.

I call the CVT7 JF015E the Nissan *CVT Power Glide* because it has a Ravigneaux planet assembly along with two forward clutches a Low Brake, High forward clutch and one Reverse Brake Clutch. It can shift from low to high gear.

While other CVT's have only one forward clutch and one reverse including the CVT8.

For the most part this webinar will mainly cover the JF015E while referring back to the earlier REOF10/09/08/06A models.





















With the bell housings being very similar with differences in internal components, would make it difficult way to identify them.

Bellhousing Comparison







REOF08A



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JF015A













Introduction

This is latest design of CVT by Jatco designated CVT7, JF015E, REOF11A of FICJB depending upon application. There are other versions of this unit such as the JF016E & JF017E for example.

The first thing we noticed is the pulley assemblies (Variator) are located above the area of the case that holds oil. This was designed for less frictional drag and to help prevent aeration of the fluid.











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Quick Comparison

The earlier Jatco CVT designs such as the REOF10/09/08/06A, the pulleys are lower into area of the case that holds oil.

When referring to each unit it's much easier to just use the last 3 digits such as 10A 09A etc.









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Typical Factory Wire Diagram













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8 Low Range Switch Signal To TCM





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Range Sensor

The chart below will show which terminals of the range sensor will have continuity with pin 3.

You can also use a multimeter (grounded at the battery) and check each pin for voltage while moving the shift lever through each detent.

















Speed Sensors

Secondary Speed Sensor



Output Speed Sensor











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Speed Sensors



All three speed sensors are 3 wire Hall Effect. They are powered up through the ignition switch, grounded and the speed signal is sent to the TCM (shown in previous wire diagram).





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Primary Speed Sensor

The Primary Speed Sensors monitors the teeth on the exciter wheel of the Primary Pulley. Be careful not to damage the exciter wheel teeth. The material is very soft and bends easily.

If necessary measure the height of the teeth that are not bent and adjust any bent teeth to the same height. General rule there should be approximately 0.30" clearance to the end of the sensor.

The sensor value is obtained from dividing engine speed by the counter gear ratio.











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Secondary Speed Sensor

The Secondary Speed Sensors monitors the windows found on the exciter wheel of the Secondary Pulley. This material is also very soft and can become distorted as well.

Secondary speed signal in low gear is approximately twice the output revolution. In high gear same as output revolution.

Secondary Pulley











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Output Speed Sensor

The Output Speed Sensors monitors the teeth on the Differential Ring Gear. This signal is used for vehicle speed.

Output speed signal is approximately half of secondary speed in low gear and the same in high gear.











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Speed Sensors

Always check when removing any speed sensors, some may require one or two shims found under one of the speed sensor retainers.

The JF015E model we had there were two shims under the Primary Speed Sensor.







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G Sensor

G-sensors are used by the vehicle dynamic control (VDC) system to help the system determine the pitch angle of the vehicle in acceleration and deceleration as well as side to side pitch angle, referred to as "yaw."

This information, combined with other info, such as that from the ABS system and steering position sensor, is used to help you control your vehicle under conditions that might otherwise cause you to lose control of the vehicle.















The G Sensor in this Nissan vehicle is a primary input to the TCM to control ratio and braking strategy commonly located on the floor under the center console near the parking brake.

The G sensor detects forward/rearward G force and incline applied to the vehicle and converts the signal to voltage signal.

TCM determines the forward/rearward G force and incline angle of the vehicle from the voltage signal.



Flat road (stopped) **Uphill gradient** Downhill gradient

The value changes to the positive side along with uphill gradient (max 40-45%) The value changes to the negative side along with downhill gradient (min 40-45%)



0%





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G Sensor Calibration

Turn ignition switch ON check voltage between TCM connector terminal and ground.









WARNING! Do Not Drop Calibration Will Be Off







Vertical Approx. 1.17V

Horizontal Approx. 2.5V

Vertical Approx. 3.83V









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Case Connector

All Solenoids Are Grounded To The Valve Body



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25 Sensor Ground

22 Low Brake Solenoid

1 ROM (SEL 2)

6 TCC Solenoid

15 ROM (SEL 1)

5 N/A

7 N/A

8 N/A

9 N/A

10 N/A

11 N/A

12 N/A 13 N/A

18 N/A 19 N/A 20 N/A 21 N/A

24 N/A

2 Line Pressure Solenoid

3 Primary Pressure Solenoid 4 Fluid Temperature Signal

14 Secondary Pressure Sensor

17 ROM (SEL 3) / Low Clutch Pressure Switch

23 High & Reverse Brake Clutch Solenoid











16 Sensor Supply (5V) ROM, G Sensor & Secondary Switch











Solenoid Function

There are 5 solenoids and 2 pressure switches found in the Nissan JF015E CVT.

The Line Pressure A normal high (N/H) solenoid valve controls the pressure regulator valve.

The Primary Pressure B normal high (N/H) solenoid valve controls the primary pressure control valve.

The Low Brake normally low (N/L) solenoid valve adjusts the tightening pressure of the low brake.

The High & Reverse Brake Clutch normal high (N/H) solenoid valve adjusts the tightening pressure of the high clutch and reverse brake.

The Torque Converter Clutch normally low (N/L) solenoid valve controls the torque converter clutch control valve.

The Secondary Pressure Switch monitors pressure to the secondary pulley.











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Solenoid & Switch Locations

There is no ratio control motor like that found on the REOF10/09/08/06A Units. The pulleys on the JF015E are controlled by the Line Pressure A and Secondary Pressure solenoids.





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Solenoid & Switch Locations















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Ratio Control Motor (Stepper Motor) found on REOF10/09/08/06A Units.

The stepper motor changes the step by turning 4 coils ON/OFF according to the signal from TCM.

As a result, the flow of line pressure to primary pulley is changed and pulley ratio is controlled.





















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ROM "Read Only Memory"

The Transmission Control Module (TCM) receives the calibrated data from the "Read Only Memory" (ROM) assembly inside the transmission and stores this information in the EEPROM "Electrically Erasable Programmable Read-Only Memory" EEPROM in the TCM.

The TCM compares the stored data in the EEPROM to the transmitted data from the ROM in the transmission.

If the calibration data does not match the DTC P167A Calibration Miss-match will set and the MIL will illuminate after one failure.

ROM "Read Only Memory"







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Fluid Temperature Sensor (All)

The CVT fluid temperature sensor detects CVT fluid temperature in oil pan.

The fluid temperature sensor uses a thermistor, and changes the signal voltage by converting changes in the CVT fluid temperature to a resistance value.

TCM evaluates the CVT fluid temperature from the signal voltage value.















Fluid Temperature Sensor JF015E

At first glance this sensor looks like the fluid temperature sensor, but when you look at the wire diagram there are two wires going to the temp sensor and this sensor only has one wire.



Fluid Temperature Sensor ???



Only one wire going to the sensor







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Fluid Temperature Sensor JF015E

A closer look here reveals the actual location of the fluid temperature sensor. So what is the other sensor or switch for? The secondary pressure switch was identified in the wire diagram with 3 wires on the other side of the valve body.

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Fluid Temperature Sensor JF015E

When the sensor was removed we could not see the small hole at the bottom of it until some oil was wiped away. The hole measures only .030" in diameter.

This has to be a pressure switch. It is not listed in any factory manual or shown in any wire diagram that we could find.

The wire for this pressure switch is spliced into one of the wires going to the ROM. It is some type of pressure signal to the ROM and TCM with no factory information available.

When we tested the switch it was discovered that it is normally open and closes with pressure.

Tracing the oil circuit we discover that it went to the High Clutch. So this is the High Clutch Pressure Switch.



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Hole Diameter 0.030" (Normally Open)

High Clutch Pressure Switch

MAX









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High Clutch Pressure Switch JF015E

The High Clutch Pressure Switch is spliced into the ROM SEL 3 circuit going to pin 17 not shown in any factory manual or wire diagram.



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Fluid Temperature Sensor REOF10/08/06A

This is the location of the Fluid Temperature Sensor found on the other Nissan CVT units with two wires. The third black wire is a shared ground









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Fluid Temperature / Internal Range Sensor REOF09A/B "Only"

The Range Sensor is internal on the REOF09A/B CVT "only" along with the Fluid Temperature sensor attached.

As you can see in the photos below the retainer legs for the ROM extend over the Range Sensor/Fluid Temperature Sensor assembly.

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Pressure Sensors

There is only one Secondary Pressure Sensor found in the JF015E (located on the valve body) that monitors pressure applied to the secondary pulley.

When pressure is applied to the ceramic device in the secondary pressure sensor, the ceramic device is deformed, resulting in voltage change.

TCM evaluates the secondary pressure from its voltage change. Voltage is increased along with pressure increase. Approximately 0.88-0.92 volts in neutral at idle.

The REOF06A also has only one fluid pressure sensor that monitors Line pressure.























Pressure Sensors

The REOF10/09/08/06A have two fluid pressure sensors, one Secondary and Primary pressure sensor to monitor primary and secondary pulley pressure.

In REOF10/06A both pressure sensors may be found located on the valve body while the REOF09/08A will have one located on the valve body and one in the case.

The F1C1 found in the Mitsubishi will have only one switch on the valve body like the JF015E

REOF09/08A

REOF09/08A







REOF10/06A









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Idle Neutral Control

Idle Neutral Control Start Condition:

Idle neutral control is started when all of the following conditions are fulfilled. However, during idle neutral control, idle neutral control is stopped when any of the following conditions are not met or idle neutral control continues 30 seconds.

- Driving environment: Flat road or road with mild gradient
- Selector lever position: "D" position
- Vehicle speed: 0 km/h (0 MPH)
- Accelerator pedal position: 0.0/8
- Brake pedal: Depressed
- Engine speed: Idle speed
- Turn signal lamp/hazard signal lamp: Not activated

NOTE: Stops or prohibits the idle neutral control when the TCM and ECM detect that the vehicle is in one of the following conditions.

- Engine coolant temperature and CVT fluid temperature are the specified temperature or more, or the specified temperature or less.
 - When a transaxle malfunction occurs.
- When the vehicle detects DTC and is in the failsafe mode.

Idle Neutral Control Resume Condition:

When the idle neutral control finishes, if the vehicle is driven at more than the specified speed and the idle neutral control start conditions are satisfied, the idle neutral control starts again. If the vehicle has a malfunction, the idle neutral control does not start.





















Clutch Apply Chart

Unlike most CVT's the CVT7 starts out in and low gear after coming to a stop. Upshift timing to high gear is control by the TCM when correct road conditions are met.

Nissan CVT Power Glide

x: Engaged or applied.									
Selector lever position	Parking mechanism	Counter gear set	Low brake	High clutch	Reverse brake	Primary pulley	Secondary pulley	Steel belt	Reduction gear set
Р	х	Х				х	x	х	
R		Х			х	х	х	X	х
Ν		Х				х	х	Х	
D		х	x (1GR)	x (2GR)		х	х	х	х
L		Х	x (1GR)	x (2GR)		х	х	х	х









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Nissan CVT Power Glide











With shifter in the Low position the CVT will remain in the lowest ratio for most amount of time or until the conditions are met that the TCM will upshift to overdrive to prevent engine over revving. Mainly used for engine braking.

In the Normal drive position the shift to 2nd or High gear (overdrive 7.4:1) will occur at approximately 31 mph (50 km/h) or more. The CVT8 behind the larger higher horsepower engine is a single speed which has a total ratio of 7.0:1.

In the Sport mode the shift will remain at a lower ratio by driver control or until the conditions are met that the TCM will upshift to overdrive to prevent engine over revving.

D Range Normal

D Range Sport

Low Range





To get to the clutch and planetary assemblies that make up the Auxiliary Gearbox you must first remove the front case/bellhousing.











Differential









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Then remove the pinion/park gear and differential.











Pinion/Park Gear









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Now remove the Cover/Reverse Brake Clutch Housing Support.





















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Auxiliary Gearbox (Stepped Transmission)

Now remove the Reverse Brake Clutch Housing, Piston and Return Spring.



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Now remove the Reverse Brake Clutch assembly and High Clutch Drum.



Reverse Brake Clutch













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Then remove the Ravigneaux planetary assembly.



Ravigneaux Planetary











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That only leaves the Low Brake Clutch Hub/Sun Gear along with the Low Brake Clutch.











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CVT Oil Pump JF015E / REOF10A

The JF015E (REOF11A) and the REOF10A (JF011E) have an off axis chain driven pump. It is not unusual for the chain to seem loose there are no factory specifications for the chain movement.

JF015E



REOF10A











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CVT Oil Pump JF015E / REOF10A

The JF015E (REOF11A) and the REOF10A (JF011E) have an off axis chain driven vane type pump.



















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CVT Oil Pump REOF09/08/06A



The REOF09/08/06A have a converter driven pump.











REOF06A











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CVT Oil Pump REOF09/08/06A



Lockup can be commanded to apply as low as 11 mph.



Control Valve











Lockup can apply as

low as 11mph



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Valve Body Information

There are only 7 values found in the JF015E value body and 1 value in the pump assembly. They are as follows;

1. Control Valve (Flow) (located in the pump assembly): Controls oil pressure from the oil pump to the pressure suitable for the line pressure control system, shift control system, lockup control system and lubrication system.

2. Pressure Regulator Valve: Adjusts the discharge pressure from the oil pump to the optimum pressure (Line Pressure) corresponding to the driving condition.

3. Torque Converter Regulator Valve: Adjusts the feed pressure to the torque converter to the optimum pressure corresponding to the driving condition.

4. Pilot (Solenoid Modulating) Valve: Adjusts line pressure and produces a constant pressure (pilot pressure) necessary for activating each solenoid valve (also controls flow to secondary pulley).

5. Manual Valve: Distributes the clutch and brake operation pressures (pilot pressure) corresponding to each shift position.

6. High clutch/Reverse Brake Switching Valve: Switches the circuit for the high clutch and the reverse brake.

7. Torque Converter Clutch Control Valve: It is operated with the torque converter clutch solenoid valve and it adjusts the tightening pressure and non-tightening pressure of the torque converter clutch piston of the torque converter.

8. Primary Pressure Control Valve: It is operated with the primary pressure solenoid valve and adjusts the feed pressure to the primary pulley.











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Valve Body Information











There is no Low Brake Clutch valve the Low Brake Clutch is fed off of the Manual Valve. Open end of filter (2) faces up.



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Valve Body Information

The only accumulator is in the valve body for the Low Brake Clutch.











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Steel Belt (Push Belt)

The Steel Belt is composed of multiple steel plates (A) and two steel rings (B) several stacked to a certain amount.

The feature of this steel belt transmits power with compression of the steel plates in contrast with transmission of power in pulling with a rubber belt.

Friction force is required with the pulley slope to transmit power from the steel plate. The force is generated with the following mechanism: Oil pressure applies to the secondary pulley to nip the plate. The plate is pushed and extended outward. The pulling force is generated on the steel ring. The plate of the primary pulley is nipped between the pulley.

Friction force is generated between the steel belt and the pulley.

Therefore, responsibilities are divided by the steel plate that transmits the power with compression and the steel ring that maintains necessary friction force.

In this way, the tension of the steel ring is distributed on the entire surface and stress variation is limited.







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Steel Belt (Push Belt)













The most common failure is a broken Steel Ring. The belt shown below is badly worn and scoring marks can be seen on the Pulley Sheathe.

The arrow on the belt is installed in the direction of the engine rotation.













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CVT Oil Warmer

The CVT Oil Warmer is located on the front part (faces towards the radiator) of transaxle assembly.

While engine and CVT are cold, engine coolant temperature rises more quickly than CVT fluid temperature.

The CVT oil warmer is provided with two circuits for CVT and engine coolant respectively so that warmed engine coolant warms CVT quickly.

This helps shorten CVT warming up time, improving fuel economy.

A cooling effect is obtained when CVT fluid temperature is high.

CVT Oil Warmer











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Heater Thermostat

The heater thermostat is installed in the cooler line going to the oil warmer assembly.

The heater thermostat starts opening before the completion of an engine warmup and fully opens at the completion of the engine warmup.

This allows the transaxle to be warmed up when CVT fluid temperature is lower than coolant temperature under low temperature conditions





Bolted here & connected to this line





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5.0mm (0.197")





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There is an external lube filter (from cooler) that can be serviced on the outside of the transmission.

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CVT Service Information



Toledo

DR

To drain a majority of the fluid quickly; remove the 17mm drain plug and fluid level overfill tube with a 5mm Allen socket.



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CVT Service Information

This is not a fill level plug, it is an extra drain plug.

As can see the bottom of the hole with the plug removed is lower than the top of the fluid level overfill tube.

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CVT Service Information

It is recommended to use only genuine Nissan CVT Fluid NS-3 using any other fluid may damage the transmission.

Check fluid level with drain plug (only) removed the selector in park and fluid temperature between 95-113° F (35-45° C).

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Today's

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SAP	#	Description	Pcs.	Brand
	222	ATE Azam, Gee low and retere 24 dath 2004lip	3	0E
Chryelar	221	411E Azam, Gwir kw and inverse 24 dath 2004b	3	OE
	4851	458FE 1999On	2	0E
cirysier	4859	5458FE 2004Up	5	OE/AM
	4856	62TE 2007-sp	6	Hi-Per/OE
	4860	689FE 20074b	5	OE/AM
	323880	4F27E 2000Alp	7	OE/AM
	788	58110W 2005Up	8	0E
	45188	5859N 1999K02	3	Hi-Per/OE
	4863	6F35_20094b	5	0E
	4867	6Pi0 6Pi5 650 20084b (Brendin 1)	5	0E
Ford	463188	政制 1994%	5	0E
	4850	AX4N 4F50N 19999Up	5	0E
	4850	<u>単名 単相 1999年</u>	5	hi-Per/OE
	765A	DHE 19940p	3	0E
	7658	DHE ALCOLD	3	0E
	32388	HH48L 199950p	7	OE/AM
F1/044	32388	1985 200507	9	AM/THPs
Ford/GM	4661	8150 8155 600 605 200/4p	5	Ut
	/98	1000/2000 Altern 2006/jp	4	Ut
	/32	4000 1997-40p	3	UE
	34088	4030 4022: 177/-0p	3	Ut
	310	1910 17730	/	UE Dur
General	1001	Date 2009	7	DFT BT
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- Reengineered HirPer Blue pistons
- Aftermarket alternatives

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- Better bonding characteristics
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Hi-Per Blue Reengineered High Performance Pistons

