



**Technical Service
BULLETIN**

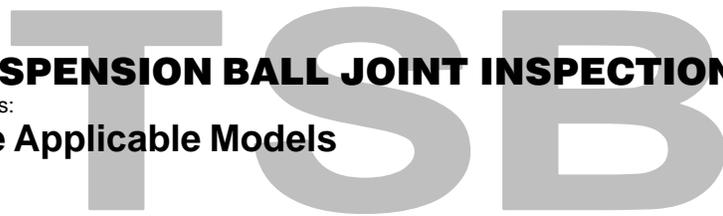
December 4, 2002

Title:

SUSPENSION BALL JOINT INSPECTION

Models:

See Applicable Models



PG027-02

PRODUCT GENERAL INFORMATION

Introduction This bulletin describes the inspection method and free play specification figures for suspension ball joints. The on-vehicle inspection methods have been standardized.

Applicable Vehicles

- **1989 – 1992** model year **Cressida** vehicles.
- **1989 – 1998** model year **Supra** vehicles.
- **2001 – 2003** model year **Highlander** vehicles.
- **1995 – 2003** model year **Avalon** vehicles.
- **1989 – 2003** model year **Camry / Camry Solara** vehicles.
- **1985 – 2003** model year **MR2** vehicles.
- **1990 – 2003** model year **Celica** vehicles.
- **2001 – 2003** model year **Prius** vehicles.
- **1988 – 2003** model year **Corolla / Corolla Matrix** vehicles.
- **2000 – 2003** model year **ECHO** vehicles.
- **1991– 1999** model year **Tercel** vehicles.
- **1991 – 1999** model year **Paseo** vehicles.
- **1990 – 1997** model year **Previa** vehicles.
- **1998 – 2003** model year **Sienna** vehicles.
- **1996 – 2003** model year **RAV4 / RAV4 EV** vehicles.
- **1999 – 2003** model year **Land Cruiser** vehicles.
- **2001 – 2003** model year **Sequoia** vehicles.
- **1989 – 2003** model year **4Runner** vehicles.
- **2000 – 2003** model year **Tundra** vehicles.
- **1995 – 2003** model year **Tacoma** vehicles.
- **1989 – 1995** model year **Truck** vehicles.
- **1993 – 1998** model year **T-100** vehicles.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFF	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–



Inspection Information

MODEL	LOCATION	LOWER BALL JOINT OR SUSPENSION BALL JOINT			UPPER BALL JOINT		
		INSP. METHOD	MAX. PLAY	TURNING TORQUE	INSP. METHOD	MAX. PLAY	TURNING TORQUE
Cressida (MX8#) 1989 – 1992	Front	1–(C)	No Play Felt	40 in.•lbf (4.5 N•m) or Less	N/A	N/A	N/A
	Rear	3	No Play Felt	31 in.•lbf (3.5 N•m) or Less	2–(A)	No Play Felt	31 in.•lbf (3.5 N•m) or Less
Supra (MA70) 1989 – 1994	Front	1–(A)	0.4 mm	4 in.•lbf (0.5 Nm) or Less	2–(A)	No Play Felt	31 in.•lbf (3.5 N•m) or Less
	Rear	3	No Play Felt	31 in.•lbf (3.5 N•m) or Less			
Supra (JZA80) 1994 – 1998	Front	1–(A)	0.4 mm	27 in.•lbf (3.0 N•m) or Less	2–(A)	No Play Felt	31 in.•lbf (3.5 N•m) or Less
	Rear	1–(A)	No Play Felt	31 in.•lbf (3.5 N•m) or Less			
Highlander (ACU2#, MCU2#) 2001 – 2003	Front	1–(C)	No Play Felt	31 in.•lbf (3.5 N•m) or Less	N/A	N/A	N/A
Avalon (MCX10, 20) 1995 – 2003	Front	1–(C)	No Play Felt	31 in.•lbf (3.5 N•m) or Less	N/A	N/A	N/A
Camry, Camry Solara (SV2#, VZV21, VCV10, MCV10, 20, 30 ACV 20, 30 SVX 10, 20) 1989 – 2003	Front	1–(C)	No Play Felt	31 in.•lbf (3.5 N•m) or Less	N/A	N/A	N/A

**Inspection
Information**
(Continued)

MODEL	LOCATION	LOWER BALL JOINT OR SUSPENSION BALL JOINT			UPPER BALL JOINT		
		INSP. METHOD	MAX. PLAY	TURNING TORQUE	INSP. METHOD	MAX. PLAY	TURNING TORQUE
MR2 (AW1#) 1985 – 1989	Front	1-(C)	No Play Felt	27 in.•lbf (3.0 N•m) or Less	N/A	N/A	N/A
	Rear	1-(C)* ¹ 3* ²	No Play Felt	27 in.•lbf (3.0 N•m) or Less* ¹ 31 in.•lbf (3.5 N•m) or Less* ²			
MR2 (SW2#) 1990 – 1996	Front	1-(C)	No Play Felt	22 in.•lbf (2.5 N•m) or Less	N/A	N/A	N/A
	Rear			27 in.•lbf (3.0 N•m) or Less			
MR2 (ZZW30) 2000 – 2003	Front	1-(C)	No Play Felt	22 in.•lbf (2.5 N•m) or Less	N/A	N/A	N/A
	Rear	3		9 in.•lbf (1.0 N•m) or Less			
Celica (AT180, ST18#) 1990 – 1993	Front	1-(C)	No Play Felt	35 in.•lbf (4.0 N•m) or Less	N/A	N/A	N/A
Celica (AT200, ST20#, ZZT23#) 1994 – 2003	Front	1-(C)	No Play Felt	44 in.•lbf (5.0 N•m) or Less	N/A	N/A	N/A
Prius (NHW11) 2001 – 2003	Front	1-(C)	No Play Felt	44 in.•lbf (5.0 N•m) or Less	N/A	N/A	N/A
Corolla (AE9#, 10#) 1988 – 2003	Front	1-(C)	No Play Felt	27 in.•lbf (3.0 N•m) or Less	N/A	N/A	N/A
Corolla/ Corolla Matrix (AE10#, ZZE11#, 13#) 1988 – 2003	Front	1-(C)	No Play Felt	44 in.•lbf (5.0 N•m) or Less	N/A	N/A	N/A
ECHO (NCP1#) 2000 – 2003	Front	1-(C)	No Play Felt	31 in.•lbf (3.5 N•m) or Less	N/A	N/A	N/A
Tercel, Paseo (EL4#, 5#) 1991 – 1999	Front	1-(C)	No Play Felt	27 in.•lbf (3.0 N•m) or Less	N/A	N/A	N/A

Inspection Information
(Continued)

MODEL	LOCATION	LOWER BALL JOINT OR SUSPENSION BALL JOINT			UPPER BALL JOINT		
		INSP. METHOD	MAX. PLAY	TURNING TORQUE	INSP. METHOD	MAX. PLAY	TURNING TORQUE
Previa (TCR1#, 2#) 1990 – 1997	Front	1-(C)	No Play Felt	35 in.•lbf (4.0 N•m) or Less	N/A	N/A	N/A
Sienna (MCL10) 1998 – 2003	Front	1-(C)	No Play Felt	31 in.•lbf (3.5 N•m) or Less	N/A	N/A	N/A
RAV4/ RAV4 EV (SXA1#, BEA11) 1996 – 2000	Front	1-(C)	No Play Felt	40 in.•lbf (4.5 N•m) or Less	N/A	N/A	N/A
	Rear	3	No Play Felt	31 in.•lbf (3.5 N•m) or Less			
RAV4 (ACA2#) 2001 – 2003	Front	1-(C)	No Play Felt	44 in.•lbf (5.0 N•m) or Less	N/A	N/A	N/A
Land Cruiser 100 (UZJ100) 1999 – 2003	Front	1-(A)	No Play Felt	27 in.•lbf (3.0 N•m) or Less	2-(A)	No Play Felt	40 in.•lbf (4.5 N•m) or Less
Sequoia (UCK35, 45) 2001 – 2003	Front	1-(A)	0.5 mm	22 in.•lbf (2.5 N•m) or Less	2-(A)	No Play Felt	40 in.•lbf (4.5 N•m) or Less
4Runner (VZN120, 13#, RN13#, 12#) 1989 – 1995	Front	1-(C)	2.3 mm	53 in.•lbf (6.0 N•m) or Less	2-(B)	No Play Felt	Turns Smoothly
4Runner (RZN18#, VZN18#) 1996 – 2003	Front	1-(A)	0.5 mm	22 in.•lbf (2.5 N•m) or Less	2-(A)	No Play Felt	40 in.•lbf (4.5 N•m) or Less
Tundra (VCK30, 40, UCK30, 40) 2000 – 2003	Front	1-(A)	0.5 mm	22 in.•lbf (2.5 N•m) or Less	2-(A)	No Play Felt	40 in.•lbf (4.5 N•m) or Less

Inspection Information
(Continued)

MODEL	LOCATION	LOWER BALL JOINT OR SUSPENSION BALL JOINT			UPPER BALL JOINT		
		INSP. METHOD	MAX. PLAY	TURNING TORQUE	INSP. METHOD	MAX. PLAY	TURNING TORQUE
Tacoma*3 (RZN140, 150, VZN150) 1995 – 2003	Front	1–(A)	0.5 mm	40 in.·lbf (4.5 N·m) or Less	2–(A)	No Play Felt	40 in.·lbf (4.5 N·m) or Less
Tacoma*4 (RZN140, 150, VZN150) 1995 – 2003	Front	1–(A)	0.5 mm	31 in.·lbf (3.5 N·m) or Less	2–(A)	No Play Felt	40 in.·lbf (4.5 N·m) or Less
Tacoma (RZN161, 171, 19#, VZN160, 170, 195) 1995 – 2003	Front	1–(A)	0.5 mm	22 in.·lbf (2.5 N·m) or Less	2–(A)	No Play Felt	40 in.·lbf (4.5 N·m) or Less
Truck*5 (RN8#, 90 VZN85, 9#) 1989 – 1995	Front	1–(B)	2.3 mm	44 in.·lbf (5.0 N·m) or Less	2–(A)	2.3 mm	35 in.·lbf (4.0 N·m) or Less
Truck*6 (RN8#, 90 VZN85, 9#) 1989 – 1995	Front	1–(B)	0.5 mm	44 in.·lbf (5.0 N·m) or Less	2–(A)	2.3 mm	35 in.·lbf (4.0 N·m) or Less
Truck (RN10#, 11# VZN10#, 110) 1989 – 1995	Front	1–(C)	2.3 mm	53 in.·lbf (6.0 N·m) or Less	2–(B)	2.3 mm	Turns Smoothly
T-100 (RCK10, VCK1#) 1993 – 1998	Front	1–(A)	0.5 mm	62 in.·lbf (7.0 N·m) or Less	2–(A)	1.9 mm	35 in.·lbf (4.0 N·m) or Less
T-100 (VCK2#) 1993 – 1998	Front	1–(C)	2.3 mm	53 in.·lbf (6.0 N·m) or Less	2–(B)	No Play Felt (from 1995 MY)	Turns Smoothly

*1 Lower Ball Joint

*2 Suspension Arm Ball Joint

*3 With Serial Number Prior to Z718190

*4 With Serial Number After and including Z718190

*5 With Serial Number Prior to those listed in *6

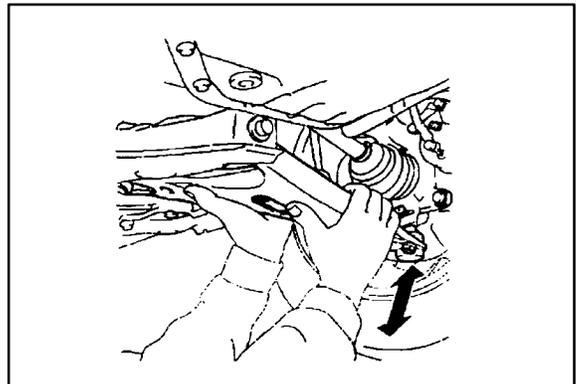
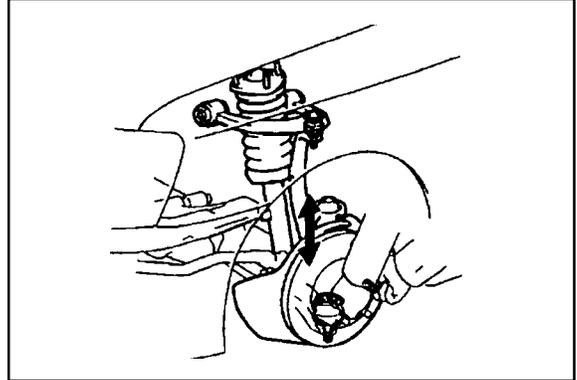
*6 RN80-0087125, RN80-5130170, RN85-0004477, RN85-5046258, RN85-9010725, RN90-0014600, RN90-5047105, RN90-9002376, VZN85-0003605, VZN85-5004547, VZN90-5025989, VZN95-0025290, VZN90-0006119

**On–Vehicle
Inspection****NOTE:**

- Be sure to check the table for the applicable inspection type based on the vehicle model.
- Refer to the table for the standard free play values.

1. Inspect Lower Ball Joint Free Play

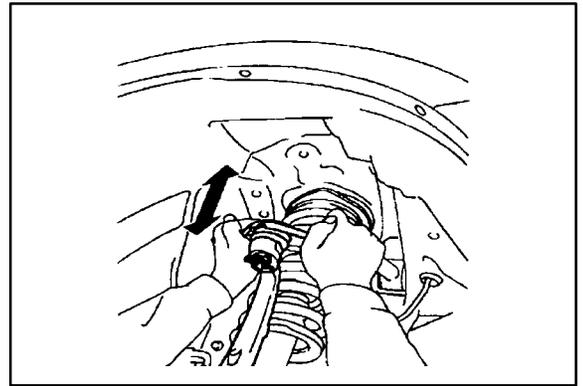
- A. Move the hub up and down by hand (most models with wishbone suspension):
 - a. Remove the tire.
 - b. Install the 2 lug nuts.
 - c. Inspect the free play while moving the lug nuts up and down at a force of 67 lbf (294 N, 30 kgf).
- B. Move the lower arm using a lever (some models with double wishbone type suspension):
 - a. Lift up the vehicle.
 - b. Place the tip of the lever to the wheel and inspect the free play while moving the lower arm up and down.
- C. Move the lower arm by hand (all models with strut type suspension and some models with wishbone type suspension):
 - a. Lift up the vehicle.
 - b. Inspect the free play while moving the lower arm up and down at a force of 67 lbf (294 N, 30 kgf).



On-Vehicle Inspection
(Continued)

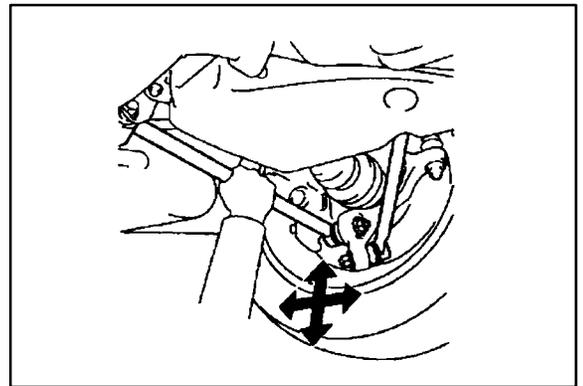
2. Inspect Upper Ball Joint Free Play

- A. Move the upper arm by hand (models with the LOWER control arm linked by a torsion bar, and all models using a coil spring).
 - a. Remove the front tire.
 - b. Inspect the free play while moving the upper arm up and down at a force of 67 lbf (294 N, 30 kgf).
- B. Move the tire with a lever (models with the UPPER control arm linked by a torsion bar).
 - a. Lift up the vehicle.
 - b. Place the lever under the tire, and inspect the free play while lifting the tire using a wooden stick, etc., as a fulcrum.



3. Inspect the Suspension Arm Ball Joint Free Play

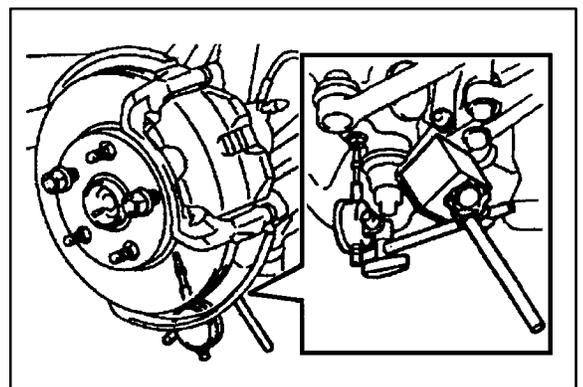
- A. Lift up the vehicle.
- B. Inspect the free play while moving the control arm by hand.



(Reference)

**Free Play Inspection Method
(Gauge Installation)**

- Position the dial gauge between the arm (upper or lower) and the knuckle, and measure free play.
(This illustration shows how to measure free play for vehicles with double wishbone type suspension with coil spring.)



4. Inspect Ball Joint Dust Cover

Check for cracks and grease leaks on the dust cover (boots).

**Turning
Torque
Inspection****Inspect Ball Joint Turning Torque**

Move the stud back and forth 5 times, and then turn the stud continuously at 3–5 seconds per turn, and measure the turning torque at the 5th turn.

HINT:

Refer to the table for standard values for the turning torque.

