Vehicle Certification Agency

VCA, 1 Eastgate Office Centre,
Eastgate Road, Bristol, BS5 6XX, United Kingdom
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Report Number: VST409391 Issue: 0

Test Report: Special Requirements for Vehicles Equipped with Vehicle Stability Function

Legislation

Directive 2007/46/EC as amended by Regulation (EU) No 2015/166
UNECE Regulation 13.11 to Supplements 10 - 14

Test Details

Location of Test:	HORIBA MIRA Limited. Watling Street Nuneaton Warwickshire CV10 0TU
Date of Test:	27 November 2017
VCA Representative(s):	K. Heath / C. Strickland
Manufacturer's Representative(s):	Chris Maynard
Reason for Test Report:	Test Report only to cover vehicles with mass in running order > 1,735 kg

Manufacturer Details

Name and Address:	Driverite Ltd., Unit 626 Kilshane Avenue, North West Business Park, Ballycoolin, Dublin 15, IRELAND
Type:	AN1P (EU,N) - GUN125 or AN1P – TSAM – S2 UK
Commercial Description:	Toyota Hilux
Category:	N1G

Conclusion

The above mentioned vehicle was tested in accordance with the above mentioned legislation and was found to comply in all respects.

Signature:	
Name:	K. Heath
Position:	Type Approval Engineer
Date:	14 December 2017

List of Annexes

Annex	No of Pages	Subject
I	1	Dimensions of Double Lane Change Track
II	8	DR.02.014004_R1 Fitting Instructions

Worst Case Rationale

Test of a standard vehicle, fitted with manually adjusted fixed air pressure air bags to the rear suspension to assist the standard vehicle leaf springs.

Max axle masses are as per base vehicle:

Front: 1420kg
Rear: 1920kg
Gross Vehicle Weight: 3210kg

Vehicle is fitted with the standard suspension, dampers, springs etc, and standard road tyres.

Braking is covered by the base vehicle approval: Base vehicle whole vehicle approval number:
Stage 1: e11*2007/46*2587*04*06
Stage 2: e11*2007/46*3854*02*02

Manual gear box tested to cover Automatic

Tested Laden and Unladen.

Tested on 18” wheels to covers smaller 17” and 16” options.

Laden air bag pressure – 1.6 Bar (1.8 Bar shown on DriveRite supplied gauge)
Unladen air pressure 0.5 Bar (0.5 Bar shown on DriveRite supplied gauge)

VIN: AHTBB3CDX01731406

Drive Rite Air suspension kit – Part number DR.02.014004_R1

Note: Include information on variants and versions this report covers, as applicable

Description of Modifications to the Vehicle that have Affected the ESC System:	Addition of supplementary air bags to the rear suspension

Covered Part Kits	Combined with Optional Control Kit
DR.02.014004_R1	Not Applicable

Manufacturer’s Documentation

Manufacturer’s documentation is complete and reflects the agreed specification for the vehicle tested, and covers all variants and versions agreed in the worst case rationale.	Yes

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Facility and Equipment Checks

Calibration certificates checked and valid, recorded in the following table: Yes

Equipment	Serial / Certificate No.	Calibration due*
Race Logic data kit	00904	09/03/2018
Tyre pressure	00038	24 June 2018
Weigh Bridge	E09502-0071	June 2017

Specify calibrated date + (interval) or calibration due date.

Test Requirements

Test Vehicle

General

0.1.	Make:	Toyota
	Type/Commercial name:	Hilux Invincible
0.2.	Approval number:	Stage 1: e11*2007/46*2587*04*06 Stage 2: e11*2007/46*3854*02*02
	Variant/Version:	Double Cab
0.3.	Vehicle Identification Number:	AHTBB3CDX01731406
0.4.	Category:	N1G

General Construction Characteristics of the Vehicle

1.3.	Number of axles and wheels:	2 axle 4 wheel
1.3.3.	Powered axles and position:	4 WD / 2 WD (Rear Wheels) Tested in 2WD mode
2.1.1.	Wheelbase:	3085mm
2.4.2.1.	Length:	5330mm
2.4.2.2.	Width:	1855mm
2.4.2.4.	Height:	1815mm
2.4.2.9.	Position of centre of gravity:	As per base vehicle

Power Plant

3.2.1.1.	Working principle:	Compression Ignition
3.2.1.2.	Number and arrangement of cylinders:	4 Cylinder in line
3.2.1.3.	Engine capacity:	2393 cc
3.2.1.8.	Maximum net power:	110kW @ 3400 rpm

Transmission

4.5.1.	Type of gearbox:	Manual
4.6.	Gear ratios:	6 speed as per base vehicle.
4.7.	Maximum vehicle speed:	170 km/h

Suspension

6.2. Type and design of the suspension of each axle, or group of axles, or wheel:

Axle 1:	Double wishbone with coil spring suspension,
Axle 2:	Leaf spring rear suspension with supplementary air bags, fixed air pressure.

Tyres and Wheels

6.6.1. Tyre/wheel combination(s):
Note: For tyres, indicate size designation, minimum load capacity index and minimum speed category; for wheels, indicate rim size(s) and off-set(s).

6.6.1.1.1.

Axle 1			
Tyre size and index	Rim size	Wheel offset	Wheels formation
265/60 R18 110H	18”	30	Single wheel

6.6.1.1.2.

Axle 2			
Tyre size and index	Rim size	Wheel offset	Wheels formation
265/60 R18 110H	18”	30	Single wheel

6.6.3.

Tyre Pressures	
Axle 1	Axle 2
29 psi	36 psi

Brakes

8.1. Type and characteristics of the brakes:

Front / Rear split system with front discs and rear drum brakes, with ABS / EBD

Bodywork

9.1. Type of bodywork: Standard Pickup

Test Requirements — Complies Yes / NA

R13H, 5.2.24.1. As an alternative to the requirement of paragraph 5.2.24 of UNECE Regulation 13H, vehicles of categories M_1 and N_1 with a mass in running order more than 1,735 kg may be equipped with vehicle stability function, which includes roll-over control and directional control, and meets the technical requirements of Annex 21 to Regulation 13. — Yes

Tested load condition:

- Unladen*
- Laden*

**Strikethrough, as appropriate.*

Masses of Tested Vehicle		
	Unladen (kg)	Laden (kg)
Axle 1	1350	1290
Axle 2	1110	1920
GVM	2460	3210

Modification details:

Addition of supplementary air bags to the rear suspension

Test Results - Laden

Double Lane Change

		ESC - Active	ESC – Disabled	Gear
ISO 3888-1:1999 Test 1				
Section 1	Entry speed (kmh):	82.2	74.2	4
Section 5	Exit speed (kmh):	70.2	74.4	4

		ESC - Active	ESC – Disabled	Gear
ISO 3888-1:1999 Test 2				
Section 1	Entry speed (kmh):	82.1	76.3	4
Section 5	Exit speed (kmh):	70.8	74.9	4

Steady State Circular Test – Constant Radius Steering

	80	m

ESC – Active

Limit speed:	79	km/h
Gear:	4	
Peak lateral acceleration:	0.78	g
Three second average:	0.61	g

Remarks:

Vehicle ESC system intervened to reduce the vehicle speed whenever the lateral G forces got too high or the vehicle became unstable due to body roll / under steer

Test Results – Un-Laden

Double Lane Change

		ESC - Active	ESC – Disabled	Gear
ISO 3888-1:1999 Test 1				
Section 1	Entry speed (kmh):	82.2	84.9	4
Section 5	Exit speed (kmh):	78.3	84.2	4

		ESC - Active	ESC – Disabled	Gear
ISO 3888-1:1999 Test 2				
Section 1	Entry speed (kmh):	86.6	81.8	4
Section 5	Exit speed (kmh):	88.4	81.7	4

Steady State Circular Test – Constant Radius Steering

Radius of corner:	80	m

ESC – Active

Limit speed:	80	km/h
Gear:	4	
Peak lateral acceleration:	0.87	g
Three second average:	0.68	g

Remarks:

Vehicle ESC system intervened to reduce the vehicle speed whenever the lateral G forces got too high or the vehicle became unstable due to body roll / under steer

Vehicle Assessment – Special Purpose Vehicles

2007/46, Ann XI, Footnote A_1	Vehicle is at a second or subsequent stage of approval, where the base vehicle has an approved ESC system, the functioning of which may have been affected by modifications made.	Yes
2007/46, Ann XI, Footnote A_1	Manufacturer can either: - ~~Disable the ESC system~~* - Demonstrate that the vehicle has not been rendered unsafe or unstable by the modifications* **Strikethrough, as appropriate.*	Yes
2007/46, Ann XI, Footnote A_1	If the ESC system has been disabled, give details on how this has been achieved (to be confirmed by the second or subsequent stage manufacturer, if applicable): Not Applicable *Note: Include confirmation that other mandatory functions of the brake system have not been affected.*	

Vehicle Test

Note: If the system has not been disabled, the following test is carried out:

VCA/R13H, Ann 9, 4.2.	Surface is dry, level and has good surface friction characteristics without irregularities and undulations, such as dips and large cracks.	Yes
VCA/R13H, Ann 9, 4.3.3.	Tyres are inflated to the vehicle manufacturer's recommended cold inflation pressure(s), e.g. as specified on the vehicle's placard or the tyre inflation pressure label.	Yes
VCA/R13H, Ann 9, 4.3.4.	Outriggers may be used for testing if deemed necessary for test driver's safety. If used, they are in accordance with the relevant requirements of UNECE Regulation 13H.	N/A
VCA/R13H, Ann 9, 5.4.	Brakes are conditioned according to the UNECE Regulation 13H procedure or the test officer is satisfied that the friction surfaces are suitably bedded-in.	Yes
VCA/R13H, Ann 9, 5.5.	Tyres are conditioned according to the UNECE Regulation 13H procedure, or the test officer is satisfied that any mould sheen has been removed and they are up to operating temperature.	Yes
2007/46, Ann XI, Footnote A_1	Double lane change manoeuvres (equivalent to those prescribed in UNECE Regulation 13H) performed in each direction at progressively increasing speeds up to 80 km/h.	Yes
2007/46, Ann XI, Footnote A_1	Steering input has sufficient severity to cause intervention by the ESC system.	Yes
2007/46, Ann XI, Footnote A_1	ESC interventions are well-controlled and act to improve stability of the vehicle.	Yes

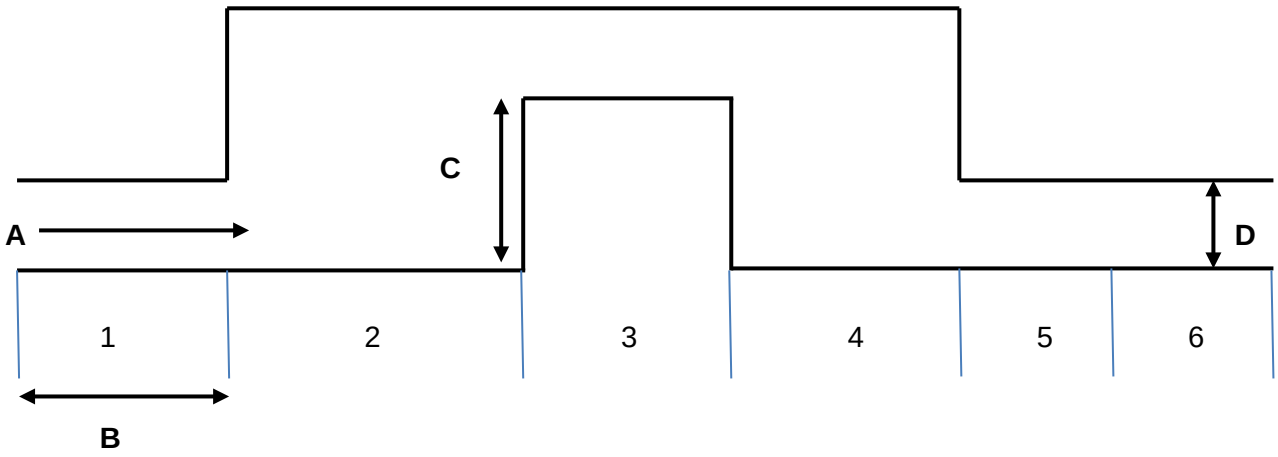
Note: If the results of the above test are inconclusive, further testing (e.g. full R13H tests) may be requested.

Remarks

The report is only valid for vehicle specification as listed in the test report, any variation on this specification including but not limited to any of the following:
Tyres, Tyre pressures, Air bag type, Airbag pressure, Rear damper specification, Centre of Gravity location (Moving either higher or further rearward) is not covered by this report.
The report is only valid for standard unmodified vehicles (apart from the addition of supplementary air bags) using standard road tyres.

Note: VCA apply measurement uncertainty to calibrated items but not test results.

Annex I – Dimensions of Double Lane Change Track



A: Direction of travel
B: Length
C: Lane offset
D: Width

Vehicle width:		1855 m	
Section	**Length B (m)**	**Lane Offset C (m)**	**Width D (m)**
1	15	-	2040.75
2	30	-	-
3	25	3.5	2226.25
4	25	-	
5	15	-	2411.75
6	15	-	2411.75

DRIVE RITE

AIR SUSPENSION SYSTEMS

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DR.02.014004

Toyota Hilux
GUN125R, GUN126R, GGN125R

INSTALLATION INSTRUCTIONS

Table of Contents

Introduction

The purpose of this publication is to assist with the installation of the Drive-Rite Semi-Air air suspension kit.

It is important to read and understand the entire installation guide before beginning installation or performing any maintenance, service or repair. The information here includes a hardware list and step-by-step installation information.

Drive-Rite reserves the right to make changes and improvements to its products and publications at any time. Contact Drive-Rite at +353 1 8612 632 or visit us online at www.driveriteair.com for the latest version of this manual.

IMPORTANT SAFETY NOTICE

The installation of this kit does not alter the Gross Vehicle Weight Rating (GVWR) or payload of the vehicle. Check your vehicle's owner's manual and do not exceed the maximum load listed for your vehicle.

Gross Vehicle Weight Rating = the maximum allowable weight of the fully loaded vehicle (including passengers and cargo). This number — along with other weight limits, as well as tire, rim size and inflation pressure data — is shown on the vehicle's Safety Compliance Certification Label.

Payload: The combined, maximum allowable weight of cargo and passengers that the truck is designed to carry. Payload is GVWR minus the Base Curb Weight.

Precautions

Never exceed the maximum and minimum recommended pressure limits:

- Minimum Pressure 1 Bar (14.5 p.s.i)
- Maximum Pressure 7 Bar (100 p.s.i)

While it is possible to inflate the system in static mode to 7 Bar (100 p.s.i.), it should not be necessary to exceed operating pressure in the region of 3.5 Bar (50 p.s.i.) at vehicle full GVW. This kit should not be used to carry any greater load than manufacturers stated GVW.

To avoid damage to airsprings – When the kit has been installed, please ensure there is adequate clearance (25mm) around the airspring so the airspring does not come in contact with any other parts.

NEVER DRIVE WITH DEFLATED AIRSPRINGS

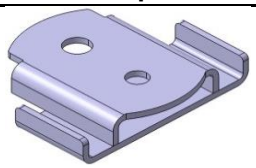
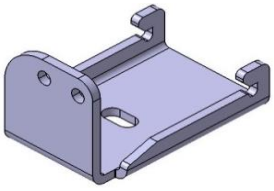
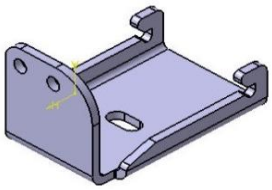
Special Instructions for Air Connections

- To cut the tubing correctly an appropriate cutter must be used (not scissors)

- When inserting the tubing into the connection, it must be pushed in approximately 14mm until a 'click' is heard.
- To remove the tube, you must push the flange in on the connection and at the same time pull the tube. (No tool is necessary.)
- **ATTENTION,** when a tube is removed it is important to trim 14mm from the end before reconnection.
- It is advisable that LOCTITE or similar sealant be used on the threaded fittings.

Kit Contents

HARDWARE LIST

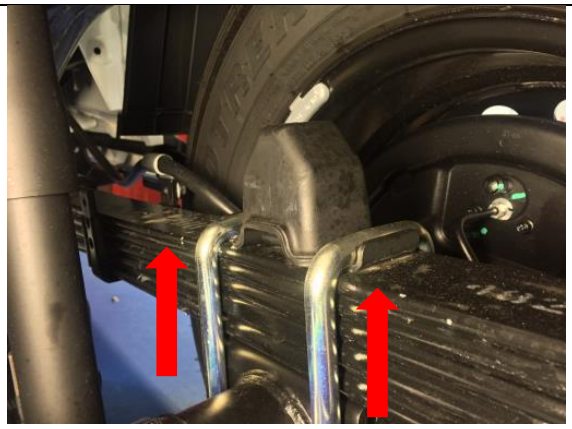
Name	Qty	Picture/Description	Part No.
Lower Bracket	2		DRV-7590
Upper Left Bracket	1		DRV-7589
Upper Right Bracket	1		DRV-7591
M10 Spring Washer	4		
M10 x 15 Hex Head Bolt	4		
Cable Ties	15		
Air Spring	2		7936
3/8 X 3/4 Flange Bolt	2		0114
5/8 Washer	2		3896
5/8 UNF Half Nyloc Nut	2		3332
6mm Tubing	5		1364-1MR
1/8 - 6mm Straight	**2**		**3628**
6mm Tee Piece	**1**		**3666**
6mm Inflation Valve	**2**		**3660**
6mm Compression Joiner	**2**		**0190**
Dust Cap	**2**		**9064**

Step by Step Installation

Step 1: Remove the Bump Stop

Loosen the rear axle u-bolts enough to remove the bump stop from the leaf pack.

NOTE- The u-bolts are re used to fit the lower bracket.

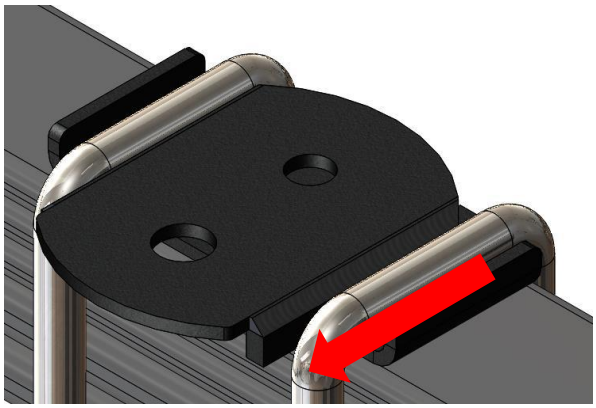


Step 2: Fit Lower Bracket to Vehicle

Place the u-bolts over the lower bracket.

Ensure that the lower bracket is orientated correctly. The larger hole in the bracket should be facing inboard of the vehicle.

Tighten as per manufacturers recommended torque settings.



Large Hole Inboard

Step 3: Upper Bracket to Air Spring

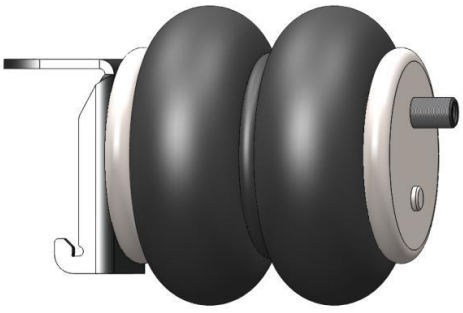
Fasten the upper bracket to the airbag using the supplied 3/8" x ¾" flange bolt.

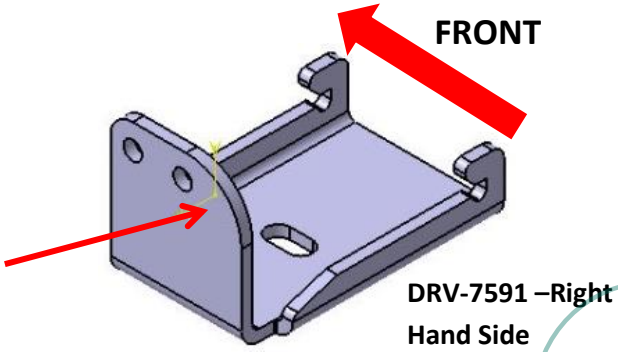
LHS bracket is DRV-7589 and RHS bracket is DRV-7591, as shown.

Orientate the bracket as shown, with the upturned flange on the upper bracket to the same side as the long combo stud on the bottom of the bag.

On the upturned flange on the upper bracket, the corner with the small curve will face towards the front of the vehicle.

The edge with the large curve will face to the rear of the vehicle.



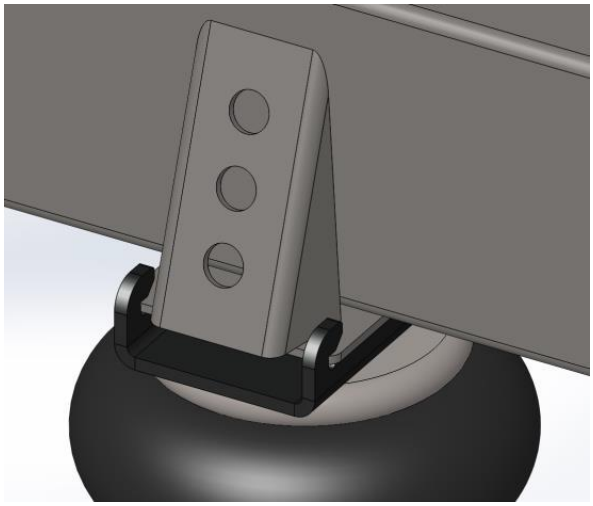


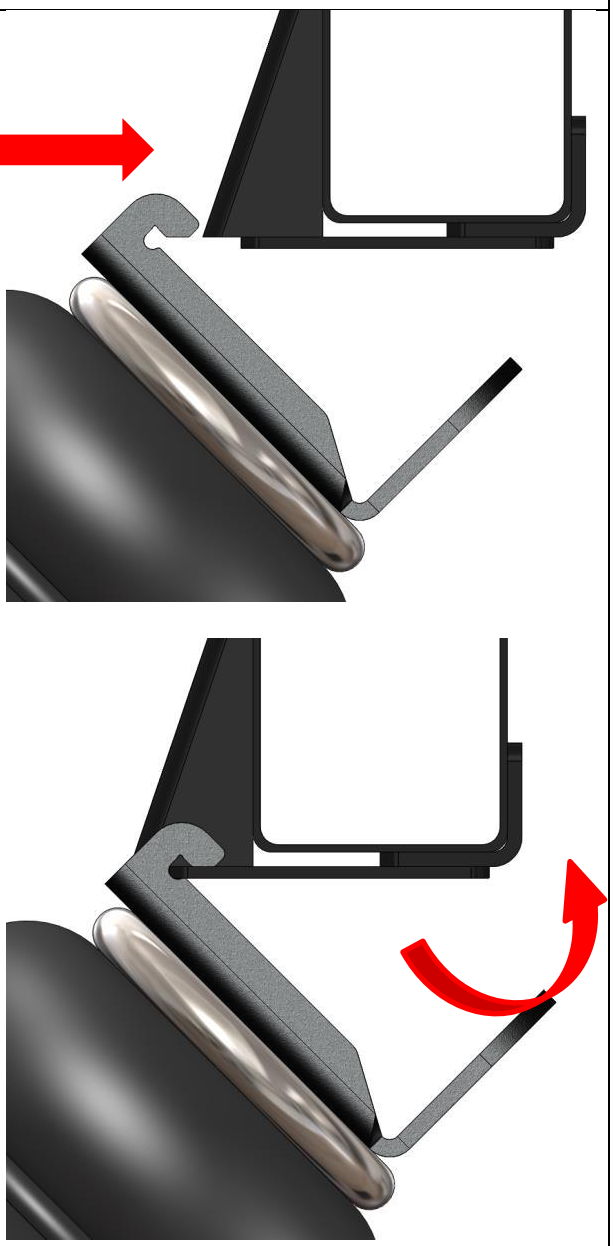
DRV-7591 –Right Hand Side

Step 4: Fit Airspring to Lower Brackets

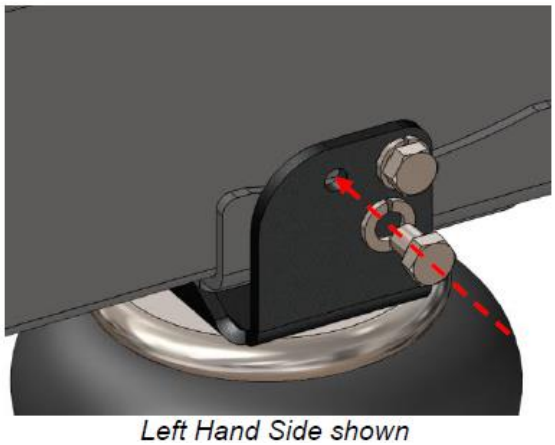
To fit the airbag assembly to the vehicle the upper bracket needs to be 'hooked' onto the outboard side of the bump stop striker plate on the vehicle.

As the brackets are handed, ensure that the correct side is used. **LHS assembly with the DRV-7589** and **RHS assembly with DRV-7591**, determined in the previous Step.





Once the bracket is hooked onto the vehicle and it is fully wrapped around the bump stop striker plate, finger tighten the supplied 3/8" x ½" hex bolts and spring washers into place.



Left Hand Side shown

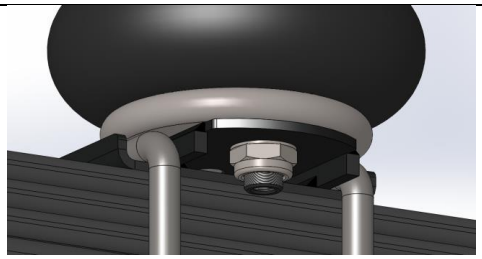
NOTE: Before fully tightening, ensure that the Upper bracket seats completely against the bump stop striker.

If required, the complete kit can be installed, fill the airbag to 20 psi to seat the upper bracket correctly and then fully tighten the 3/8" x ½" hex bolts and spring washers into place.

Ensuring that the hex bolts sit into the groove in the striker plate and **not** push into the striker plate itself.

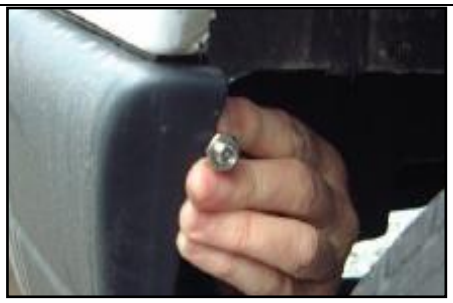
↘ Step 5: Airspring to Lower Bracket

Fit the airbag to the lower bracket by feeding the long 'combo stud' into the inboard hole on the bracket.
Ensure that the small stud is located in the lower bracket hole.
Secure the airbag in place with the 5/8" nut and washer supplied.
Once the lower bracket is secured to the airbag, tighten the 3/8" x ¾" Flange Bolt on the top of the airbag to fully secure it to the upper bracket.
A 9/16" (M14) spanner will be needed to reach the flange bolt.



Step 7: Routing the Air Tubing

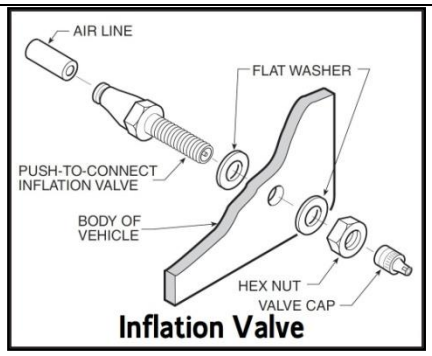
Cut a long length of tubing in order to connect the valve to the nearest air spring. Do the same for the opposite side. Choose whether you want separate inflation valves for each side or one valve common to both sides using the T shaped connector. Use the nylon ties provided to tie the tubing up into a safe position.



When cutting the air tube, it is vital that the tube is not cut at an angle. This could cause an air leak. It is recommended that a tube cutter or a sharp blade be used.

Drill an 8mm (5/16”) hole and mount the inflation valve as shown in the diagram, pushing the valve through the hole from behind and attaching with 2 washers and a nut.

Cut the air tube to length, making sure the end is cut squarely, and push the end as far as possible into the back of the inflation valve.



IMPORTANT:

- Attach all tubing securely to the underneath of the vehicle using nylon ties.
- Do not attach to brake lines.
- Protect the tube with the sleeves provided where there are any sharp edges or sources of heat.
- Ensure all fittings are fastened to recommended torque.

Examination:

After assembly, inflate air springs and check all mounting bolts are tight. Screw all connections tight again. It must be ensured that the mounting brackets cannot move. If the plates touch the brake hose at the air springs, then these must be moved by suitable means.