

Technical product information

Topic	Flying Spur - Steering shimmy/vibration - 21 inch wheels only - ROW
Market area	Hongkong-Macau (5HK),Russische Föderation (5RU),Australia E04 Bentley rest Asia and Australia (6E04),China 796 VW Import Comp. Ltd (Vico), Beijing (6796),Germany E02 Bentley rest Europe (6E02),Japan E03 Bentley Japan (6E03),Russian Federation 935 Volkswagen Group RUS (6935),United Kingdom E01 Bentley UK (6E01),United States E05 Bentley USA and rest America (6E05)
Brand	Bentley
Transaction No.	2045082/1
Level	EH
Status	Approval
Release date	

New customercode

Object of complaint	Complaint type	Position
Running gear -> Wheels, tyres, tyre pressure monitoring -> Tyres -> Tyre tread	visual appeal / surface -> bump	> not specified <
Running gear -> Steering, power-assisted steering -> Steer	Noise, vibration -> vibrate	
Running gear -> Steering system	functionality	
Running gear -> Steering system	Noise, vibration	
Running gear -> Wheels, tyres, tyre pressure monitoring -> Tyres	component / consumables -> incorrectly built	

New workshopcode

Object of complaint	Complaint type	Position
Running gear -> Wheels, tyres, tyre pressure monitoring -> Tyres	component / consumables -> unbalanced	rear right
Running gear -> Wheels, tyres, tyre pressure monitoring -> Tyres	component / consumables -> unbalanced	front right
Running gear -> Wheels, tyres, tyre pressure monitoring -> Tyres	component / consumables -> unbalanced	rear left
Running gear -> Wheels, tyres, tyre pressure monitoring -> Tyres	component / consumables -> unbalanced	front left
Running gear -> Wheels, tyres, tyre pressure monitoring -> Tyres	component / consumables -> incorrectly built	> not specified <

Vehicle data

Flying Spur

Sales types

Type	MY	Brand	Designation	Engine code	Gearbox code	Final drive code
4W2*	2014	E		*	*	*
4W2*	2015	E		*	*	*
4W2*	2016	E		*	*	*

Documents

Document name
master.xml

Customer statement / workshop findings

This TPI is only applicable to Flying Spur vehicles fitted with 21 Inch wheels, should 20 inch Bentley approved wheels be fitted please raise a DISS query and await further instruction from Product support before commencing with any other work.



Before carrying out any work please check that this TPI is the latest available document by searching in Elsa Pro, you must ensure that the applicable VIN is used when searching for any technical information.

Should a customer complain of steering wheel shimmy/vibration constantly and the condition does not improve when driven please proceed with this TPI. Steering shimmy/vibration is most evident at 90 km/h



Before commencing with this TPI - Refer to the applicable vehicles repair history in Elsa Pro to check that the latest level steering rack wagner valves have not already been fitted or may not be required

Technical background

Due to environmental conditions involving large changes of ambient temperature, condition can occur after a very short stationary period where flat spots are created as the warm tyres cool down. The tread surface of the tyre forming the footprint on the road surface retains the relatively flat form when driven and does not immediately restore to a constant radius. Hence the name of flat spotting which is generally given to this condition.

Flat spotting should not be confused with out of balance, out of round or radial force variation. It is very important that the diagnosis and correction of these different conditions are not confused with each other. Attempting to correct flat spotting by rebalancing the assembly will not correct the problem and worse still, when the flat spots are removed the tyres will be out of balance.

EXPLANATIONS AND DEFINITIONS

Radial force variation (RFV)

The radial force is the force with which a tyre is compressed.

Tyres have softer and stiffer areas along their circumference. In Figure 1, the softer and stiffer areas are illustrated by different size springs.

If this wheel rolls on a level road with constant wheel load (Figure 1, point 1), the centre of the wheel rises and falls by the amount (x) because of the varying spring hardness. The change by the amount (x) can be felt in the vehicle as vibration or shaking of the steering wheel.

The change of the compression force of the tyre is the radial force variation.

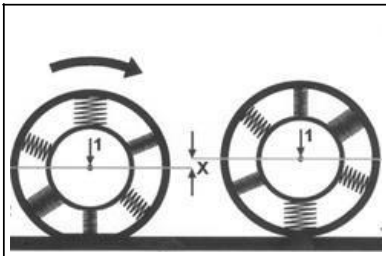


Figure 1

Harmonic vibrations

The wheel force variations during the turn of the wheel can be mathematically divided into individual harmonic vibrations.

For an objective of tyre stiffness, the first harmonic (basic vibration) is used

The basic vibration or first harmonic is the share of the RFV that causes the strongest vibrations

The first harmonic (RFV) must be **85N or less**

NOTE: it is imperative that the first harmonic result is used (Figure 2) please ensure your vibration balancer always shows the first harmonic result, Do not use the Total Indicated Reading (TIR) only the first harmonic result should be used - Refer to the vibration control balancer handbook for further details.

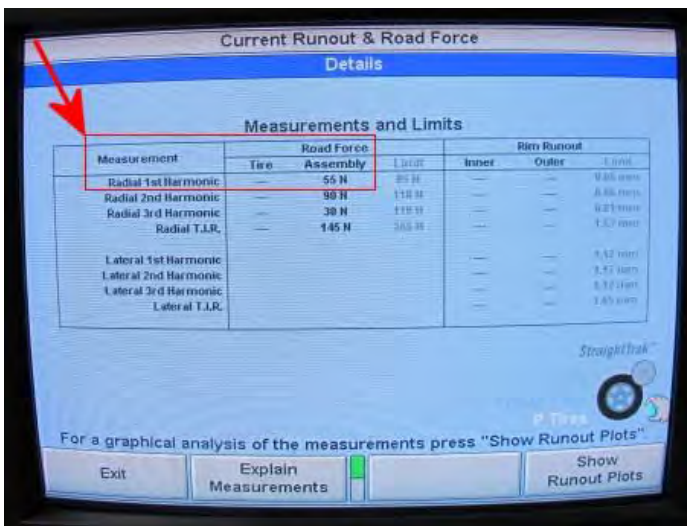


Figure2

During this TPI the Workshop manual is quoted to help in carrying out various tasks, it is recommended that the procedures referenced are checked by the operative as the process within the Workshop manual may have changed since last viewed.

Production change

Measure

1. Check all wheels and tyres for damage/distortion. **NEVER** fit tyres to rims which are damaged/kerbed or distorted, tyres can be damaged/cut during the fitment process if the rims are damaged/kerbed on the outer edge of the rim

- Check the tyres are of correct Bentley approved specification including date code otherwise this TPI does not apply
- Check that Bentley 21 inch approved wheels are fitted
- Check the front and rear suspension for any damage and wear - Refer to Workshop manual
- Check all steering components for damage and wear - Refer to Workshop manual
- Check all wheels for distortion/buckles whilst the car is on the ramp

2. In ambient workshop temperature and ensuring the engine and tyres have cooled down to ambient temperature adjust all tyre pressures to 'Normal' pressure (see tyre pressure label on B-post)

The next part of this process requires the vehicle to be road tested to allow the tyres to warm up sufficiently, on return the vehicle must be raised from the ground within two minutes, please ensure you have a wheel free ramp available on return from road test



Should the vehicle not be raised within a maximum of two minutes after returning from road test the tyres will begin to flat spot resulting in the need to repeat the road test procedure

3. **ROAD TEST** - Conduct an initial road test, the vehicle should be driven until the flat spots come out or the flat spotting condition improves, drive the vehicle for a minimum of 30 km at 120 kp/h (where permitted) to allow the tyres to warm up to running temperature and allow the flat spots to run out, the most sensitive speed for shimmy/vibration is 90 km/h during the road test you should also drive at this speed to validate steering shimmy/vibration to allow the driver to make an accurate assessment.

IMPORTANT Within a maximum of two minutes after returning from the road test, raise the vehicle off the ground

4. Allow the wheel assemblies to cool for 20 minutes before removal

- After 20 minutes has elapsed remove all four wheels
- The wheels should be left to cool down positioned lying flat as shown in Figure 3 ensure the rim of the wheel is protected to prevent damage when lying on the floor **WARNING** Do not allow the wheels to cool down standing upright as shown in Figure 4



Figure3

Figure4

- Using a digital infrared thermometer check the temperature of the tyres

- The RFV process should only be conducted once the tyres are within 10% of ambient workshop temperature this is to allow and confirm the tyres are at the correct temperature

For Example - If the Workshop temperature is 25°C the tyres should be 27.5°C before commencing with the RFV process otherwise do not commence until the tyres have cooled to correct temperature

5. The next part of this process requires the use of the Hunter GSP9712 (VAS 6230) vibration control balancer (or similar)

IMPORTANT: Please ensure your vibration control balancer is calibrated and is in full working order.

Self calibration (excluding service contract calibration is highly recommended every 3 days to ensure correct and accurate measurements) – please refer to manufacturer's instructions relating to self calibration

Please refer to the instruction manual of your particular vibration control balancer for all relevant information



- **If your vibration control balancer has a Smart weight function Do Not use this function when balancing Bentley wheel assemblies please only use traditional balancing technology**
- **Ensure Smart weight is not selected please refer to the manufacturers operating instructions**

Does the vehicle have accessory tyre valve caps fitted as shown in Figure 5? If Yes please ensure the force match and balance process is always conducted with the accessory valve caps fitted

If No and the wheels are fitted with plastic valve caps these should still be fitted during the force match and balance process

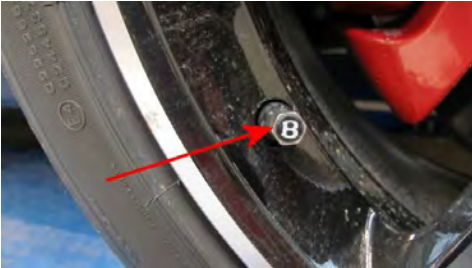


Figure 5

IMPORTANT: Apply a thin smear of silicon based grease for example Dow Corning high vacuum grease to the external threads of the valve stem prior to fitting the accessory valve cap. Grease should be applied any time the cap is removed and the grease is not evident

If during the RFV process you are prompted to measure the rim run out due to an out of specification assembly please adhere to all points below
Please refer to workshop manual Rep. Gr 44 Tyres – checking condition and replacement – Radial Force Variation – Best fit practice to ensure the following are confirmed and rectified

- The wheel rim run out measurement is as per specification
- The wheel rim run out process is strictly adhered to as per the manufacturers vibration control balancer operating instructions
- It is recommended to measure the bare rim for accurate run out readings

Referring to Figure 6 (Point A) - After force matching and balancing the assembly must not exceed 85N (first harmonic)

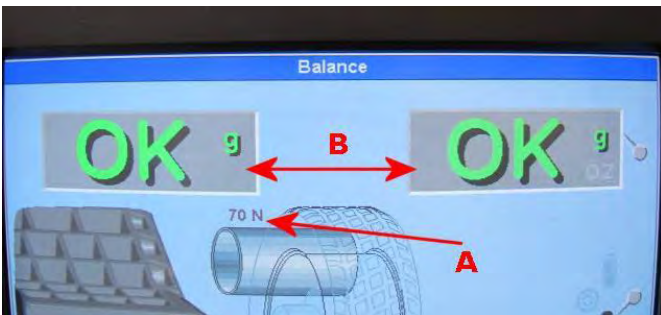


Figure 6

Ensure after balancing the screen shows as (Point B) do not fit an assembly which does not show OK – OK for the inner and outer balance weight adjustment

- For Hunter GSP 9712 (or similar) use the White faced adaptor cone with identification code 154 F+ shown in Figure 7, **NOTE:** If your workshop does not have this particular adaptor please contact your local Hunter representative

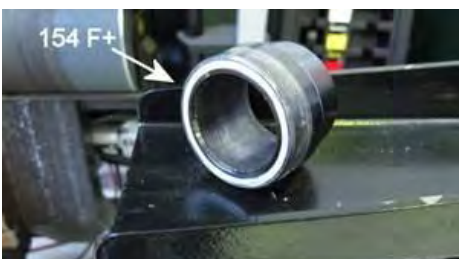


Figure 7

6. The cone must be fitted on the spindle as shown in Figure 8 ensuring the white face of the cone is facing towards the end of the spindle

IMPORTANT NOTE: Should the initial first harmonic reading be above 85N this does not necessarily mean the assembly cannot be adjusted to the specified tolerance, please ensure that the force matching process is adhered to as instructed within the workshop manual Rep.Gr 44 – Tyres – checking condition and replacement.

All four tyres must not exceed 85N after force matching and balancing, should this not be achievable replace the applicable tyres - Refer to Workshop Manual Rep.Gr 44



Figure8

IMPORTANT: When conducting the wheel and tyre force matching process or the tyres require replacing, a specific tyre fitting lubricant should be used. The lubricant is Rema Tip Top Anti Gliss Lube with the Bentley Part Number of RH 14530. On drying the Anti Gliss has adhesive properties that increases friction between the tyre and wheel rim to prevent slippage. Please Refer to Workshop Manual Rep.Gr 44 Tyres - Checking Condition and Replacement - Radial force variation - Best fit practice.

- Using a clean brush apply to the entire circumference of the upper and lower tyre beads
- Anti Gliss must also be applied to the entire circumference of the upper hump of the wheel rim (Figure 9 shows the upper hump and where the Anti Gliss should be applied)



Figure9

- Every time the bead is broken any remnants of "Anti-Gliss" MUST be cleaned off the wheel rim and the tyre bead



- **Ensure that all original balance weights and balance weight adhesive is completely removed from the wheel rim**



Failure to remove weight adhesive could result in the application of the new weights in the same place resulting in poor contact between the weight and rim, the weight can become detached from the rim which will affect the balance of the assembly



It is recommended to wear eye protection

- To seat the tyre beads to the wheel rim inflate to a **min** of 3.5 Bar **max** of 4.2 Bar with the valve core removed (Figure 10), the removal of the valve core allows the assembly to be inflated quicker than with the core fitted, which helps to seat the tyre bead to the rim evenly



Figure 10

Once satisfied that the tyre beads are seated correctly refit the valve core and readjust to the RFV measuring pressure of 3.0 Bar – Refer to workshop manual Rep.Gr 44 and also observe the following key points

-Referring to Figure 11 The assembly high spot is identified with a brown dash the first harmonic result (RFV) is shown in this example as 45N



Figure 11

-Rotate the assembly on the spindle until the high spot is at 12 o'clock and the brown dash turns to Green (Figure 12)



Figure 12

-Mark the RFV high point with a paint pen or similar (Figure 13) this will be required when refitting the wheels



Figure 13

In the event that any parts are required to be replaced using the latest specification they should be fitted at this point prior to refitting the wheels

12. Refit the road wheels refer to Workshop manual Rep.Gr 44 Tyres – Checking Condition and Replacement – Radial force variation – Best fit practice

.- Carry out a full front and rear geometry check and adjust as required - Refer to workshop manual - Rep.Gr 44 Wheels, tyres. axle align

IMPORTANT: The geometry check and adjust process is crucial to the whole process please ensure the process is fully adhered to including 'S' Point adjustment (Raised toe adjustment)

Vehicle model	'S' Point toe constant	Toe-in
Flying Spur	5' ± 2'	10' ± 2' positive (per side)

13. Adjust the tyre pressures to 'Normal' pressure (see tyre pressure label on B-post)

IMPORTANT: In the event that brand new tyres have been fitted you must carry out procedures 14 to 16

- If the original tyres were used it is only a requirement to carry out procedure 16

- The second road test on fitment of new tyres is only applicable when conducting this TPI and should not be conducted if a customer requires new tyres for a non steering shimmy/vibration complaint

14. **NEW TYRES ONLY** Conduct a second road test to evenly seat the beads to the rim, drive the vehicle for a minimum of 30 Km at 120 kp/h (where permitted) this process is essential to allow the tyres to warm up to running temperature

15. **NEW TYRES ONLY** On return from the second road test repeat Section 1 procedures 1 to 6 to confirm the RFV and balance is within specification
- When refitting the wheels - Refer to Workshop manual Rep.Gr 44 Tyres – Checking Condition and Replacement – Radial force variation – Best fit practice

16. **NEW AND ORIGINAL TYRES** Reassess the vehicle, the vehicle should be driven for a minimum of 20 Km at 90 kp/h (where permitted) 90 kp/h is the most sensitive speed for steering shimmy/vibration validation

NOTE: It is recommended the tyre pressures are adjusted to 'Normal' pressure (see tyre pressure label on B-post) on return to the customer

The customer should be made aware that should they require to drive at higher speeds than recommended for Normal pressure the pressure should be adjusted accordingly

Warranty accounting instructions

Time to carry out the initial flat spot recovery process and force match and balance all four assemblies

Warranty Type	910 or 110
Labour operation code	44 40 94 00
Damage Service Number	44 40
Damage code	00 13
Time	Shop Time

Time to check and adjust the front and rear vehicle geometry without ACC

Warranty Type	910 or 110
Labour operation code	44 95 03 00
Damage Service Number	44 95
Damage Code	00 13
Time	80 Time units

Time to check and adjust the front and rear vehicle geometry with ACC

Warranty Type	910 or 110
Labour operation code	44 95 03 10
Damage Service Number	44 95
Damage Code	00 13
Time	150 Time units

Road Test

Warranty Type	910 or 110
Labour operation code	01 21 00 00
Damage Service Number	01 21
Damage Code	00 13
Time	50 Time units

Parts information

Description	Part Number	Quantity
Anti Gliss	RH 14530	1 x 500 Gram tin can be used for multiple applications

— All regions applicable to this TPI must be source tyres locally Rep.Gr please ensure the new tyres are of correct specification as detailed within the Workshop Manual Rep.Gr 44 – Tyres - Checking, Condition and Replacement

Customer information

Bentley branded Tyre Cradles are available as an approved accessory – Part number JNV018 927

The tyre cradles have been designed and manufactured specifically for Bentley providing simple and effective tyre protection.

Tyre flat spotting can be caused by medium to long term storage or from parking after a long drive, especially where the tyre experiences large changes in temperature.

To prevent flat spotting, tyres need to be cooled in a controlled manner to enable the tyre to restore to a constant radius.

Made from a unique polymer that moulds to the shape of the tyre the new Bentley Tyre Cradles maintain the tyre shape whilst cooling and in storage.

The tyre cradles are easy to use, simply drive the car onto them in the desired parking area.

NOTE: It is recommended the tyre pressures are adjusted to 'Normal' pressure (see tyre pressure label on B-post) on return to the customer

The customer should be made aware that should they require to drive at higher speeds than recommended for Normal pressure the pressure should be adjusted accordingly