

# AIR SUSPENSION CODE OF PRACTICE CHECKLIST

This Wall Chart Checklist is to be used in conjunction with the **Air Suspension Code of Practice "Guidelines for Maintaining and Servicing Air Suspension for Heavy Vehicles"** book.

## SERVICE EQUIPMENT AND REPAIR KITS

Most suppliers list specific tools for adjustment and repair tasks. In many cases service repair kits include a range of small hand tools and measurement templates to ensure correct assembly of components.

### Certified Torque Tools

Quality equipment is identified with a traceable certification mark or serial number. Such certified and tested equipment provides service workshops with peace of mind as to the accuracy of achieving recommended torque settings and adjustments. Depending on frequency of use, regular "re-calibration" may be required.

### Torque Multipliers

Consideration should be given to selecting the most suitable torque wrench for each particular task. In many cases the required range of torque can only be found on hand torque wrenches that may not be workable in the available space.

A range of small hand torque multipliers are available with multiplication factors ranging from 5:1 up to 25:1.

### Hand Torque Wrench Examples

#### - Automotive and Industrial

Typical torque range, in sizes: 70-350nm, 150-600nm, 500-1000nm.



### Essential Adjustment Tools

#### CHECKLIST:

- ✓ Torque wrench (certified) and OEM recommended torque tables for the suspension model
- ✓ Hand held non-contact infrared thermometer for shock absorbers
- ✓ Chassis support jacks
- ✓ Tape measure, ride height calibration measure, or ride height spacers
- ✓ Bush pressing tools if available from supplier
- ✓ Use only approved lubricant for fitting rubber bushes into eye
- ✓ Use wall chart and parts manuals to ensure OEM replacement numbers are correct
- ✗ Do not re-use worn or damaged components
- ✗ Do not jack the spring down
- ✗ Do not use impact tools in place of proper torque tools.

## SHOCK ABSORBER REPLACEMENT

Check shock absorbers at each regular vehicle service inspection. Visual checks should cover leaks, broken mounts, extruded or worn bushings. A cold shock absorber is no longer a functioning shock absorber.



#### CHECKLIST:

- Daily visual inspection, for oil leaks and loose fittings
- ✓ Keep suspension clean and free of road dirt build-up
  - ✓ Check bush eyes and catch straps for wear
  - ✓ Arrange regular "heat-tests" of shock absorbers, compare with others shocks?
  - ✓ Ensure ride height settings are correct, that absorbers do not "over-extend"
  - ✓ Record your fleet history for a preventive maintenance change-over distance
- REPLACING:** Set vehicle at correct ride height
- ✓ Remove upper and lower mounting bolts and the absorber
  - ✓ Replace with the OEM recommended shock absorber or one meeting appropriate standards
  - ✓ Ensure torque adjustments are made to manufacturers recommendations
  - ✓ Replace both sides on an axle when replacing
  - ✗ Do not mix a new shock absorber on the same axle as the old worn one
  - ✗ Do not "over-tighten" any fasteners/nuts.

## AIR SYSTEM VALVES

A range of valves ensure the system meets the OEM's design performance.

### Height Control Valve – for a 1 or 2 HCV system

The main differences are whether they are on a powered unit or a trailing unit.

Proper ride height is especially important for driven axles, as driveline angles are directly affected by incorrect angles, including small variations. For vehicles with dual height control valves, each OEM procedure should be followed.

There is only one correct ride height for each vehicle. Refer to your manufacturers' suspension drawing.

### Ride Height Adjustment

#### CHECKLIST:

- ✓ Use the vehicle on a level surface, release brakes and chock wheels
- ✓ Disconnect HCV linkage arms, exhaust all air from bags, then re-inflate
- ✓ Measure trailers with correct height prime mover or correct height skid plate stand in place
- ✓ Always use axle centre (the one with the HCV) to measure to ground and to chassis underside, use the manufacturer's template or measuring tool
- ✓ Exhaust all air by rotating control arm to the "down" position
- ✓ Recheck the adjustment by repeating, ie; exhausting air and refilling air bags, use duplex air pressure gauge on dual HCV vehicles (loaded)
- ✓ Adjustments are made by lengthening the various types of vertical linkage
- ✓ Ensure driveline angles are maintained on powered vehicles as per the manufacturer's recommended settings
- ✓ Ensure ride height settings are "correct", that absorbers do not "over-extend"
- ✗ Do not grease the ride height valve
- ✗ Do not change the manufacturers recommended ride height

### Pressure Protection Valve

Pressure protection valve pressure is set at about 480kPa or 70 PSI. If operating pressures on a prime mover fell below 420kPa then the trailer spring brakes would apply automatically. ADR 38/02 requires 420kPa, brakes must be fully applied when system reduces to 155kPa. The low pressure warning light should come on at 450kPa (per ADR 35/01).

### Air Line Filter Valve

This is a secondary line filter to ensure clean air supply and protect the operation of the height control valve plus any air suspension system accessories.

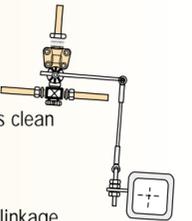
### Drain Valve

Drain valves are fitted to all air tanks and allow regular drainage of condensation.

### Air System Valves

#### CHECKLIST:

- ✓ Ensure tank drain valves are regularly used to clear all condensation
- ✓ Understand how height control valves must be set
- ✓ Clean dirt particles and foreign debris by keeping all line and tank filters clean
- ✓ Visually check that adjustment fasteners remain in correct set positions
- ✓ Ensure air line clip supports are in place on the suspension
- ✓ Check suspicious air line leaks with soapy water
- ✓ Adjust settings by lengthening or shortening the various types of vertical linkage
- ✓ Ensure ride height linkage angles are greater than 15° (up) and less than 90° (ride height) and less than 170° at maximum downward travel
- ✗ Do not grease valves
- ✗ Do not use pipe compound or Teflon tape, it may clog valves.



## SUSPENSION

### Track Settings and Alignment

Observe the manufacturer's recommended settings, especially the toe-in, toe-out and camber.

### Alignment and Torque



#### CHECKLIST:

- Use the vehicle un-laden and on a level surface, release brakes
- ✓ Consider axle extensions to assist in getting accurate visual alignment
  - ✓ Always use a torque wrench as per the manufacturer's recommended settings
  - ✓ Recheck all fasteners for correct torque after 1500 kms
  - ✓ Ensure all disc or spring washers have the CONCAVE side to the hanger
  - ✓ Re-torque U-bolts diagonally and check after first day of work after major services
  - ✗ Do not reassemble worn and or mis-matched parts
  - ✗ Do not change the manufacturer's recommended torque settings.

## SUSPENSION BUSHES

An important, but often overlooked detail when inspecting and servicing suspension bushes is to be sure of the OEM model and part numbers.

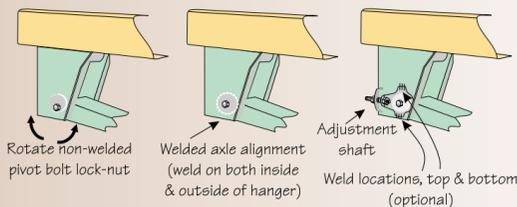
### Pivot Connections

Fabricated trailing arms are typically fitted with a range of bushes that each have special fitting procedures. The manufacturer's procedures should be followed to ensure the optimum suspension performance.

On completion, ride height adjustment must be re-checked as well as axle alignment between each axle.

### Track Corrections – Fabricated Trailing Arms

1. Raise and support the vehicle chassis with suitable strength jack stands
2. Release air from all air springs
3. Slacken hanger arm bush lock nuts, or remove weld spots carefully and clean surfaces. Consider the careful use of a grinder in place of the gas welder.
4. Slide adjustment shaft towards the adjustment direction, using light hammer blows or if adjustment comprises of an adjustment nut and bolt, then turn in the alignment direction.
5. Check that all track settings are in correct alignment
6. Tighten all locking nuts up to specified torque at each bush, or if the means of adjustment requires spot welding, then place the tack welds as per OEM procedure.
7. Remove all jack supports and re-inflate air springs.



### Spring Eye Bush

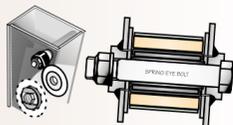
It consists of a steel encased rubber spring eye bush and positively locates the axle to the hanger bracket. The two most common types are the "huck" locking nut and the welded type.

### Spring Eye Bush Checks and Adjustments

#### CHECKLIST: Insert a pinch-bar between the spring top and rear hanger plate to check wear

- ✓ Clean all surfaces carefully after grinding old tack welds
- ✓ Follow the OEM recommended torque settings eg; M30 thread 1000 Nm
- ✓ Tighten to correct torque settings AFTER correct ride height is set
- ✓ Use a porta-power hydraulic press to press out old bushes, with axle in place
- ✓ Wear plates should be replaced in the hangers when bushes are replaced
- ✓ Use a "never-sieze" lubricant
- ✓ Always follow the OEM adjustment procedures
- ✓ Re-check adjustments after 2000 kms

- ✗ Do not push the springs apart
- ✗ Too much welding heat can burn Teflon wear plates/washers



## AIR SYSTEM COMPONENT SERVICING

### Air Line Inspections

Listen for possible air line leaks from any line pipes. Check that pipes have not become kinked or pinched in any way. Ensure all air lines remain properly clamped to the vehicle chassis and do not sag down so as to be able to get caught.

### Air Line Leaks

If a suspected leak proves hard to find, hand brush or spray soapy water over the lines and watch for air bubbles.

Carry out regular visual inspections to ensure all tank fittings and mountings are tight and in place. Vent moisture from drain plug on a regular basis.

Clean and or replace air tank filters.

### Air Spring Inspections

Check all air spring (bag) connections to ensure torque settings are correct. Ensure there is no build up of small stones or other debris between the piston and the air spring. Check that the springs have no wear marks from rubbing on other components that may be out of alignment.

If constant wear is occurring, check that the air springs are not too large for the application. Rolling lobe pistons should be inspected for cracks and corrosion. If cracks or corrosion is found, replace the piston. Slight corrosion may be cleaned up, so long as a smooth rolling surface is restored. Check for leaks with soapy water.

### On-Road Air Spring Damage

The only type of air spring that is suitable for limited (very slow speed) travel without air, on smooth roads, are those that have the inbuilt rubber "bump-stop" on top of the piston.

Isolate the damaged air spring by removing the air line and folding it back on itself, clamp tight with vice grips or a hose clamp. If not set up in series, then add a bridging "T" piece or bung jammer, to isolate the damaged air spring.

### Fitting an Air-Spring

Follow the OEM parts catalogue.

Fitting of a new air spring should be carried out when the vehicle is empty. Support the vehicle frame with strong jack stands approximately 50mm above ride height. If jacks are not available then raise the suspension on the other air springs.

### Air Spring Replacement

#### CHECKLIST: Exhaust all air from the suspension system (even if the spring is deflated).

- ✓ Disconnect the lower link of automatic height control valves
- ✓ Turn the hand control valve handle to deflate manual systems
- ✓ Disconnect the air supply line from the air spring
- ✓ Install the new air bag assembly, torque as per the OEM torque chart
- ✓ Reconnect air supply lines and link connections
- ✓ Inflate suspension in excess of 275-350kPa and check for leaks (max is approx 690kPa)

- ✗ Do not attempt to replace a spring with a vehicle loaded
- ✗ Do not use a non-conforming or non-approved air spring

