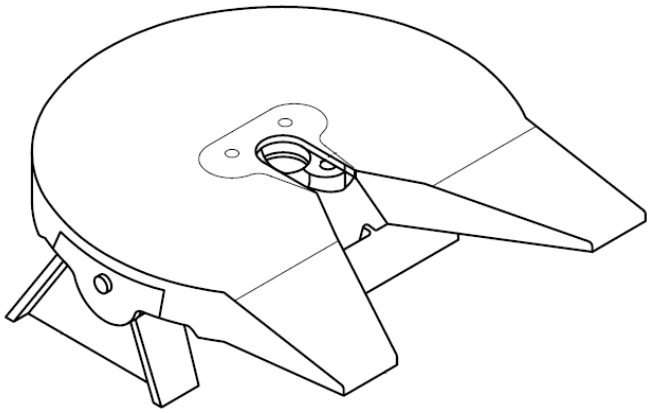
Fifth wheel coupling and uncoupling guidelines

TECHNICAL
ADVISORY
PROCEDURE



AUSTRALIAN TRUCKING ASSOCIATION

INDUSTRY TECHNICAL COUNCIL

Developed by the ATA Industry Technical Council

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About this Technical Advisory Procedure (TAP)
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Operators must comply with the Australian Design Rules (ADRs), the Australian Vehicle Standards Regulations, roadworthiness guidelines and any specific information and instructions provided by manufacturers in relation to the vehicle systems and components.

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The Industry Technical Council (ITC) is a standing committee of the Australian Trucking Association (ATA). The ITC's mission is to improve trucking equipment, its maintenance and maintenance management. The ITC was established in 1995.

As a group, the ITC provides the ATA with robust professional advice on technical matters to help underpin the ATA's evidence-based policymaking. It is concerned with lifting technical and maintenance standards, improving the operational safety of the heavy vehicle sector, and the development of guidelines and standards for technical matters.

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1. INTRODUCTION

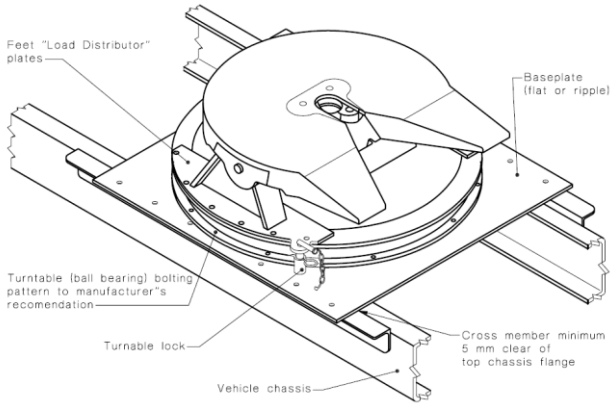
This Technical Advisory Procedure (TAP) has been developed by the ATA Industry Technical Council (ITC) to provide operators with a guideline that provides a consistent, clear and safe procedure for coupling and uncoupling prime movers and semi-trailers using fifth wheel couplings.

All procedures demand consistency and following an uninterrupted routine with an understanding of the importance and relevance of each step. Distractions during this and other procedures should be avoided. It is recommended that only one person undertakes coupling or uncoupling to prevent missing critical steps.

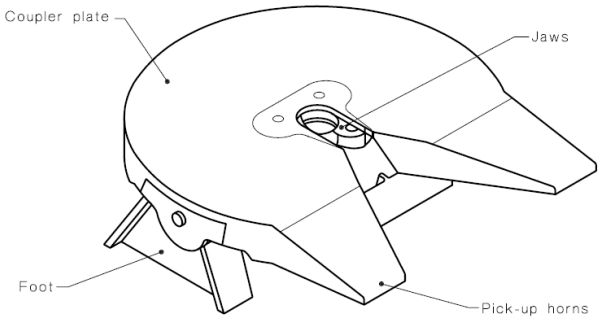
Australia has a diverse fleet with equipment sourced globally. A driver's training should include specific training on all the equipment used across a fleet.

2. DEFINITIONS

FIFTH WHEEL ASSEMBLY: A fifth wheel coupling including any turntable (ballrace), mounting plate, sliding assembly, load cell and other equipment mounted between the towing vehicle chassis and the trailer skid plate, but not including any attachment angles or other sections used for the same purpose.
NOTE: This includes any mechanism which allows the adjustment of the longitudinal location of the fifth wheel.



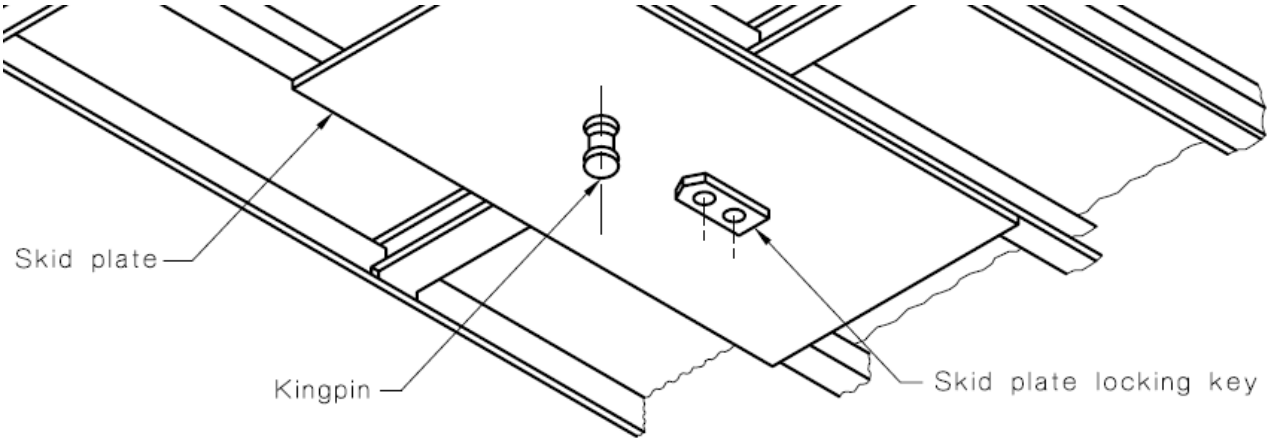
FIFTH WHEEL COUPLING: A device fitted to a towing vehicle to permit the quick coupling and uncoupling of a semi-trailer, provide articulation for the combination and provide stability and support to the semi-trailer. Where a fifth wheel is specially designed to have a turntable base as an integral part, the term “fifth wheel assembly” includes that turntable base. It does not include the skid plate and kingpin, which are parts of the semi-trailer.



NOTE: Frequently, a fifth wheel is incorrectly referred to as a turntable.

KINGPIN: A pin (including retention plate and bolts, where applicable) attached to the skid plate of a semi-trailer and used for connecting the semi-trailer to the fifth wheel of a towing vehicle. The kingpin transfers the lateral towing and braking forces between the towing vehicle and the towed trailer.

SKID PLATE: The plate structure on the semi-trailer which houses the kingpin, and which mounts on to the fifth wheel coupling coupler plate to form the connection between the towing vehicle and the semi-trailer. The skid plate transfers vertical force (weight) from the trailer to the towing vehicle through the fifth wheel assembly.



SKID PLATE LOCKING KEY: A steel block attached to the underside of the skid plate. It is located rearward of the king pin to key into the throat of the coupler plate of a turntable based fifth wheel, to prevent relative rotation of these two components. A skid plate locking key is sometimes referred to as a "block.''

TURNTABLE: A bearing built to carry vertical and horizontal loads, but that does not allow quick separation of its upper and lower rotating elements (typically, a ball-race or greasy plate) and is used to connect and allow articulation between—

(a) a prime mover and a semi-trailer
(b) the front axle group or axle of a dog trailer and the body of the trailer
(c) a fifth wheel coupling and the vehicle to which it is mounted.

Note: A ball-race type turntable may also be referred to as a slewing ring by the manufacturer.

Further definitions and abbreviations as referenced are in the ATA-ITC technical dictionary.

3. TECHNICAL CONSIDERATIONS

Trailers parked on air

Some trucks operating with ADR35/05 alternative approval (UN ECE R13) may have the trailer parking brake applied using service air. Whilst this is allowed (ADR 35/05) it is not considered good practice nor is it typical practice in Australia – prior versions of ADR 35*(ADR 35/00; 01; 02; 03; 04:)* mandated that the trailer parking be on spring brakes via the supply air circuit (no air – parking brakes applied!).

Simple check

Apply prime mover parking brake, exit prime mover (using safe procedure) and disconnect the SUPPLY (Red) Line. If there is air flow in the Supply Line, the combination trailers are being "parked" on Service Air.

US style park brake controls

Trailer Hand Control (brake) - will provide graduated control of the trailer brakes.

Red octagonal button - trailer air supply.

Yellow diamond button - will apply the combination's park brakes by pulling button. To release the park brakes and recharge the trailer air system, both buttons need to be pushed in.

Figure 1: Typical North American controls

European style park brake control

Trailer Hand Control (brake) – will provide graduated control of the trailer brakes. The feature is optional, and its fitment is illegal in some European countries.

Park brake – applies the combination's park brakes by lifting and locking level into place. Some recent European models use a simple electrical push button to apply the combination's park brakes. All ADR35 compliant units, the park brake must be released to charge the trailer air system.

Figure 2: Typical European trailer controls

Note: *There are prime movers available supplied to market in Australia, that may not be fitted with Trailer Hand Control (brake). This would potentially prevent the operator undertaking a tug test of an assembled combination. These can be retro fitted and then approved under Vehicle Standards Bulletin #6 (VSB 6) by an Authorised Vehicle Examiner (AVE). The ADR compliance of the unit must be maintained.*

Notes:

1. **Sliding Fifth Wheel Couplings** - Sliders allow the position of the fifth wheel coupling to be moved on the prime mover and/or (towing) semi-trailer. This allows the axle load and load distribution to be optimised. For further details and instructions for mounting and use contact the slider manufacturer.

2. **Pneumatic Release fifth wheel couplings** – Pneumatic (air) release fifth wheel couplings allow for the remote release of the coupling in special

applications, such as a roll back trailer. For further details and instructions for mounting and use contact the fifth wheel manufacturer.

3. **Compensated fifth wheels** - Compensated fifth wheel are sometimes used for very rigid trailers (eg: tankers). For further details and instructions for mounting and use contact the fifth wheel manufacturer.

4. **Ballraces & Turntables** – Ballraces should preferably be used only when free to rotate (ie: with semi-trailers fitted with a skid plate locking key). However, when used with a with a semi-trailer that is not fitted with a skid plate locking key, the ballrace must be “pinned” locked. Whilst Australian Standard AS4968.2:2003 specifies a single locking pin, **The TAP working group and suppliers recommend the fitting and use of two (2) locking pins**.
For further details and instructions for mounting and use contact the fifth wheel manufacturer.

4. SAFETY CONSIDERATIONS

- ⇒ Firstly, take reasonable care for his or her own health and safety
- ⇒ Secondly, take reasonable care that his or her acts or omissions do not adversely affect the health and safety of other persons
- ⇒ Comply, so far as the worker is reasonable able, with any reasonable instruction that is given by the ‘person conducting the business or undertaking’ (PCBU) to allow the PCBU to comply with the WHS Act and the Work Health and Safety Regulations (WHS Regulations)
- ⇒ Co-operate with any reasonable policy or procedure of the PCBU relating to health or safety at the workplace that has been notified to workers.
- ⇒ Always wear personal protective equipment
- ⇒ Never take risks when it comes to safety
- ⇒ Always follow the latest approved procedures
- ⇒ Report unsafe conditions
- ⇒ Report all injuries or near misses immediately
- ⇒ Be aware of your surroundings
- ⇒ Be aware of new safety procedures
- ⇒ Obey all relevant safety signs, stickers and tags
- ⇒ Never take shortcuts on safety procedures
- ⇒ If interrupted during a procedure go back to a known and confirmed step in the process
- ⇒ If in doubt, contact your supervisor or manager for instruction, guidance or training
- ⇒ Keep things in perspective. Hazards may be limitless, focus on the most likely risks as first value

Remember:

- Avoid distractions - Ensure full attention is maintained when undertaking work tasks.
- If distraction has occurred – retrace / revisit process until you can confirm what step has been completed correctly, re-continue process from this point. Coupling and/or uncoupling process is be completed by one person – to avoid missing critical step(s).
- Always conduct a pre-start check.
- If any damage found - report immediately to your supervisor / manager.
- Reverse in a straight line as this will make coupling easier.
- Always apply park brake prior to exiting vehicle.
- Perform task on a flat / even level surface that will support the trailer(s) and load (when applicable).
- Ensure stable footing is always maintained during coupling / uncoupling task/s.
- Prior to coupling – ensure fifth wheel and trailer are set in respect of height, tilt and alignment. If an air suspension is used – ensure that you follow this Technical Advisory Procedure.
- Always drive smoothly/slowly when coupling/uncoupling
- Always visually check that the locking jaw is securely locked
- Always perform tug test twice
- Always ensure the fifth wheel handle is locked after coupling
- Connecting trailer airline order – blue signal before red supply line.
- Disconnecting trailer airline order – red supply before the blue signal line.

DO NOT:

- Park / uncouple trailers on unstable / uneven or changeable surfaces.
- Obstruct other traffic - vehicle and/or pedestrian.
- Place fingers or hand in or near the fifth wheel jaws.
- Leave gap between trailer skid plate and fifth wheel.
- Release the fifth wheel coupling with services connected.
- Attempt to lift or lower a trailer with landing legs in high gear.
- Pull or tug sharply on electrical plugs or airline/s.
- Pass or allow others to pass under trailer/s.
- Allow other person/s to access area whilst performing coupling / uncoupling task.
- Attempt to drive away until air pressure is at correct operational level.
- Park a trailer where it could roll away.
- Uncouple a trailer where later coupling task may be difficult.

5. FIFTH WHEEL COUPLING PROCEDURE FOR:

PRIME MOVERS AND SEMI-TRAILERS; SEMI-TRAILERS AND SEMI-TRAILERS; CONVERTER DOLLIES AND SEMI-TRAILERS.

Step 1: General Preparation

1. Prior to starting/moving the towing vehicle/s, ensure that trailer airline isolation taps (where fitted) are closed; and, that the airlines and electrical & TEBS services (and hydraulic services if fitted) are in good condition; not fouled, nor likely to foul, not crossed and are “positioned” clear for trailer coupling.

2. Check fifth wheel is positioned and is “set” for coupling engagement.

Step 2: Trailer check

1. If the trailer has a Skid Plate Locking Key (block) (refer to figure 3) fitted to the trailer’s skid plate (approximately 100mm behind the kingpin – towards the rear of the trailer), ensure that the attachment is secure, and that the fifth wheel for coupling is mounted on a turntable (ballrace) base.

Figure 3: Trailer skid plate locking key (block)

2. If the trailer has a Skid Plate Locking Key (block) that is removable (bolted), it may be removed for coupling to a fixed base fifth wheel.
3. Ensure that the skid plate is clean and free of snarls and scoring.

Step 3: Prime Mover (or towing vehicle)

1. If the trailer has a Skid Plate Locking Key (block) fitted and the prime mover is not fitted with a turntable (ball race) mounted fifth wheel assembly, the Skid Plate Locking Key (block) **must be removed** from the trailer before connecting to the towing vehicle, or an alternative towing vehicle of appropriate specification will be required.

2. If the trailer is not fitted with a Skid Plate Locking Key (block) and the fifth wheel is turntable (ball-race) mounted base, the turntable (ball-race) will need to be locked in position using two (2) locking pins.

3. If the towing vehicle fifth wheel is fitted with a low friction (greaseless) top plate inserts (See Figure 4), ensure that the trailer skid plate is clean.

Figure 4: No lube fifth wheel top plate.

Low friction top plate inserts on a fixed base fifth wheel.

Note: *These low friction inserts should not be retrofitted to grease type fifth wheels.*

4. If the fifth wheel is turntable (ball-race) based and in the locked position or the fifth wheel does not include low friction inserts, then ensure that the fifth wheel top plate has suitable grease applied across the entire contact face to ensure lubrication (see Figure 5) and prevent snarling between the fifth wheel top plate and the trailer skid plate which may adversely affect vehicle steering and stability.

Figure 5: Fifth wheel top plate

5. Enter prime mover and reverse the towing vehicle into position, ensuring it is aligned in front of the trailer, stopping the prime mover **before** the fifth wheel contacts the trailer skid plate.

6. Apply the prime mover/combination parking brake.

Step 4: Trailer coupling

1. Reverse towing vehicle (slowly) under semi-trailer – Stop! when the skid plate is above the fifth wheel top plate (approximately 500mm short of kingpin engagement) Lower the trailer until the skid plate is in full contact with the fifth wheel top plate and the trailer landing legs are clear of the ground (approx. 25-50 mm).

   Alternatively, (if fitted) raise the prime movers air suspension ensuring that fifth wheel is in contact with the skid plate, and the land legs are clear of the ground. This allows the trailer to accommodate any minor misalignment without damaging the landing legs.

2. Reverse prime mover/towing vehicle (slowly) under the trailer keeping the prime mover/towing vehicle aligned until fifth wheel engages with the Kingpin.

3. Complete Tug Test – minimum once or per company policy/procedures.

Step 5: Coupling Lock Checks

1. Ensure the combination parking brakes are “applied”.

2. Exit prime mover and check “visually” that:
   - There is no gap between the fifth wheel and the skid plate;
   - The fifth wheel jaw/s are locked;
   - The secondary lock has engaged; and,
   - Connect release handle safety chain (it fitted)

3. Fully retract landing legs and stow handle

Connecting the towing vehicle and towed vehicle service lines.

1. Ensure the prime mover’s park brake is engaged prior to exiting prime mover cabin.

2. Connect trailer air hoses (BLUE control before RED supply), electrical lighting cable, ABS/TEBS cables and hydraulics and other ancillaries (if fitted). Turn air isolation taps, if fitted, to the “on” position to ensure air supply to the trailer/s. Ensure coupling secondary locks are in in position. Figures 6 and 7 refer to PBR bayonet type air couplings.

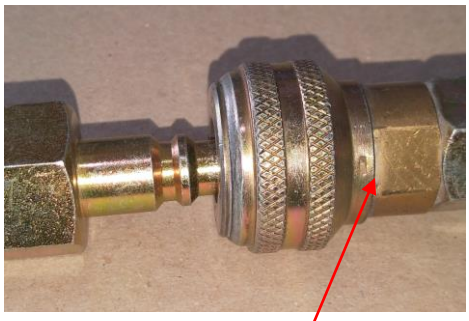


Figure 6: Secondary lock dis-engaged

Figure 7: Secondary lock engaged.

Some ADR 35/05 prime movers may park trailers on the service brakes and the commonly used airline isolation taps may be used in sequence to

identify and manage worst case scenario. However, the use of self-sealers in the supply line also has issues.

For consideration:

- *If isolation taps are fitted – open supply (RED) isolation tap before coupling: If air flow is present, **do not couple** to trailer (as this may release the trailer spring brakes.*
- *If there is not a tap and a self- sealer is fitted to the supply coupling, if there is any indication of air supply **do not couple** (as this may release the trailer spring brakes).*
- *Note: if supply line is coupled and is charged, closing the isolation tap will not allow air to vent and hence the parking brakes will not be re-applied the coupling MUST BE DISCONNECTED to allow air to vent.*

3. With the engine running build-up pressure in the trailer air system. This must be done with the driver seated and his foot on the foot brake and park brake must be released.

   - Most ADR35 compliant prime movers do not supply air to the trailer supply circuit until the prime mover park brake system has been released. For American style prime movers this means that both the yellow and red dash buttons must be pushed in, allowing air to be supplied, for European style prime movers the singular park brake lever must be released.

   - The driver must remain seated with his foot on the (foot) service brake to ensure a rollaway situation does not occur as both the prime mover and trailer build up air which releases the park brakes.

4. When the prime mover air pressure indications have returned to the normal operating range and the trailer air suspension is at normal ride height, engage first gear, release the foot brake, gently release the clutch and check if the vehicle moves indicating that the trailer park brakes have released.

Note: *The braking air system has priority, when the trailer brakes have released auxiliary systems such as air suspensions may not be fully/adequately charged. An air depleted laden trailer can take up to seven (7) minutes to fully charge.*

If the brakes have not released, the driver may need to re-engage the park brake and leave the cabin to ensure that the trailer airlines are connected properly and that the ball valves, if fitted, are in the correct position or allow additional time for the trailer air systems to be charge. Repeat steps 3 & 4.

5. Using the Trailer Hand Control brake (if fitted) to perform a tug test to confirm that the trailers service brakes are working.

Note: *Large pressure drops during a static brake check may indicate that there may be a problem with the air system.* ***Always have this checked****.*

Step 6: Final Check

1. Apply the parking brakes, switch off the engine, and turn on the hazard warning lights, side and taillights.

2. Perform an inspection by walking around the prime mover and trailer/s listening for air leaks and checking all trailer lights are operational. *A potential issue with this process being: when the parking brake is applied, the supply line and the spring brakes are typically NOT charged. Hence scope to identify air leaks in the parking brake circuit is substantially reduced.*

3. Allow time for air suspension ride systems to fill before moving off as substantial damage may occur if the combination is not in the full ride position.

   Even with full air tanks on the prime mover, it will take several minutes for air suspension to fully charge to its working ride height. Up to 15 minutes for a B-double; more for larger combinations. The air system prioritises: 1) brake system; 2) suspension and ancillaries.

4. Ensure all ABS/TEBS warning light(s) are off (warning light may not cycle until vehicle moves at speed up to 15km/h). It is common for ABS/TEBS warning lights to stay engaged until the vehicle exceeds about 15 km/h for first time.

   If the ABS/TEBS light remains on, then the system has an active fault that requires attention.

5. Before moving off, where possible and in accordance with Company Policy/Procedure, complete a final tug test.

6. VISUAL INSPECTION OF FIFTH WHEEL COUPLING

The visual inspection should not be just about the jaw locking around the kingpin but rather:

- The skid plate is in contact with the fifth wheel top plate
- The fifth wheel locking bar or locking indicator is in position; and,
- The fifth wheel secondary lock has engaged.

Companies may require visual checks and for an appropriately trained driver, awareness and confirmation by a visual check is relevant.

7. FIFTH WHEEL UNCOUPLING PROCEDURE

Uncoupling is typically the reverse of the coupling procedure.

Step 1: Secure the vehicle

1. Before uncoupling:
   - Ensure that the towed vehicle is on a surface firm enough to support the trailer landing gear and its load.
   - The landing legs may have a high ground loading and extra care should be taken that they are adequately supported when parked; and, another potential issue with a partly loaded A trailer is that the Centre of Gravity may be forward of the landing legs.
   - Make sure the prime mover and semi-trailer are in a straight line and on level ground.

2. Then:
   - Apply the parking brakes.
   - When uncoupling on soft ground, place suitable (strong timber) supports under the landing gear.

Step 2: Trailer Check

1. Empty trailer: Lower the landing legs ensuring firm and even contact with the ground.

2. Loaded trailer: Lower the landing legs ensuring firm and even contact with the ground followed by approximately 20 to 40 turns of the handle in low gear so that the legs support the trailers' weight, so that it doesn't sag onto

the prime mover upon disconnecting.

3. Secure the landing gear handle.

Step 3: Uncoupling the Trailer

1. Release the fifth wheel. If the release handle cannot be moved, the jaws may be under load and procedure Step 3.4 may need to be applied.

2. Disconnect all air hoses (red supply before the blue signal line) and electrical cables from the trailer (Note: with the air hoses disconnected, the trailers park brakes are now applied). Close ball taps on air lines if fitted to the prime mover.

3. Stow hoses and cables properly on the prime mover making sure that the connectors are kept free of dust and water, and that they cannot get caught on the tail shaft.

4. (Only required if the release handle cannot be moved at 3.1) Relieve the pressure off the fifth wheel jaws by releasing the prime movers park brake, select reverse gear and while applying light pressure to the drive line in reverse re-apply the prime movers park brakes, repeat procedure 3.1. If this fails – release prime mover park and select low forward, repeat procedure 3.1.

Note: *there is common opinion that if a fifth wheel handle cannot be pulled that by lowering or raising the vehicles suspension or the trailer will facilitate release of the handle. Whilst this may work for trailing arm type air suspensions, generally it is false. To assist in the uncoupling operation, it may be necessary to "unload" the fifth wheel coupling by moving the towing vehicle slightly forwards or rearwards, and the trailer skid plate should be at the point of initial contact or just clear of the towing vehicle fifth wheel top plate.*

5. Prime mover fitted with air suspension: Release the prime mover parking brake and slowly drive forward in a straight line until the fifth wheel is clear of the trailer kingpin, stop and lower or 'dump' the prime movers air suspension.
    - After the prime mover's air suspension is lowered, slowly move forward until the prime mover (or towing vehicle) is clear of the towed trailer.
    - Raise the prime mover's suspension.

6. Prime mover fitted with mechanical suspension: Release the prime mover parking brake and slowly drive forward in a straight line until the fifth wheel is clear of the trailer skid plate, caution as the front of a loaded trailer may drop significantly.

8. MULTI TRAILER COMBINATIONS VEHICLE COUPLING

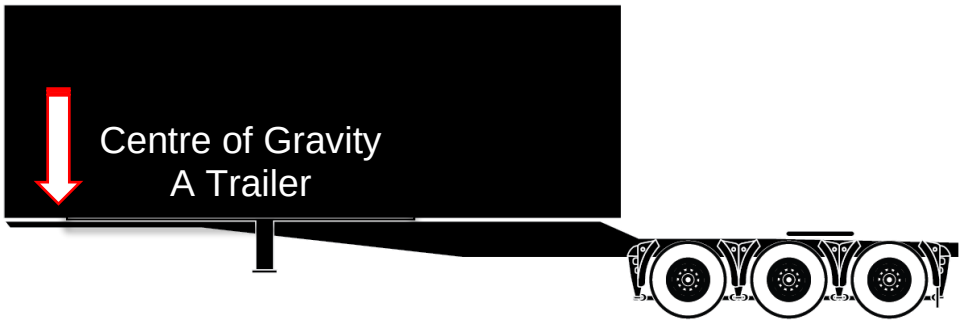
Coupling:

Figure 8: Multi-combination vehicle B-Double (B1233). Refer TAP Truck Configurations.

Coupling an A Trailer to a B Trailer to form a B-double or a converter dolly to a semi-trailer to form a dog trailer, follow the procedure in section 4. Replacing the reference to prime mover with the A Trailer or converter dolly. All steps otherwise should be followed.

Note with multi trailer combinations, performing a tug test may be an issue. Do not fit the airlines around the coupling to be checked. Without air supply, the trailer's parking brakes will not release, and the towing trailer can undertake a coupling tug test.

A Trailer parking:



Landing legs

Figure 9: A trailer parking issue

Depending on the design of the A trailer and its loading, the centre of gravity for the trailer could be forward of the landing legs (as shown above in figure 16), this is especially so for short leading (10 or 12 pallet) trailers, resulting in it rotating on the landing legs and raising the wheels off the ground.

The landing legs of Leading B-double Trailers may have a high ground loading and extra care should be taken that they are adequately supported when parked; and, another potential issue with a partly loaded A trailer is that the Centre of Gravity may be forward of the landing legs.