

GROUP 60

WHEEL ALIGNMENT

In order for the vehicle to have good steering properties and minimum tyre wear, the front wheels must have certain, pre-determined settings which are generally known as wheel alignment. This includes caster, camber, king pin inclination, toe-out and toe-in.

CASTER

This refers to the longitudinal inclination of the king pin (forwards or backwards) (A, Fig. 1). This means easy steering since the wheels have a tendency to maintain the straight-forward position.

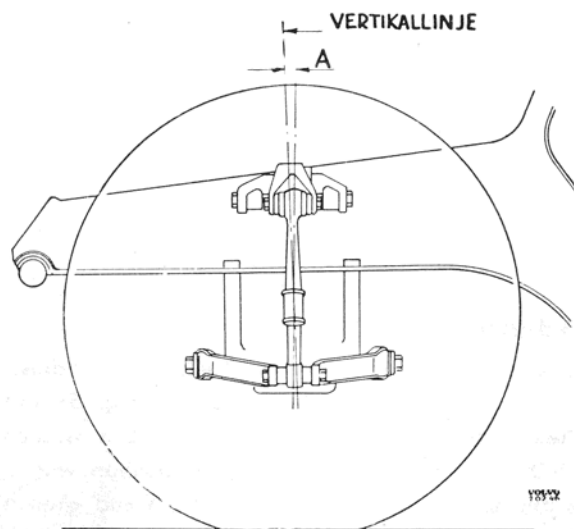


Fig. 1. Caster
Vertikallinje = Vertical line

CAMBER

This refers to the inwards or outward inclination of the wheel. Camber is reckoned to be positive if the wheel is inclined outwards and negative if it is inclined inwards. Positive camber is shown at C in Fig. 2. Faulty camber means uneven tyre wear.

KING PIN INCLINATION

This refers to the inward inclination of the king pin (B, Fig. 2). King pin inclination means that the centre lines of the king pin and the wheel approach each other towards ground level. The wheel is thus easier to turn. The king pin inclination also influences the tendency of the wheels to run straight ahead since the vehicle is lifted slightly when the steering wheel is turned.

TOE-OUT

When driving round a curve, the wheels have varying radii of rotation. In order to have the same turning centre with resulting minimum tyre wear, the front wheels must be turned to a varying extent. This relationship, the toe-out, is determined by the construction of the steering rods and steering arms. See Fig. 3.

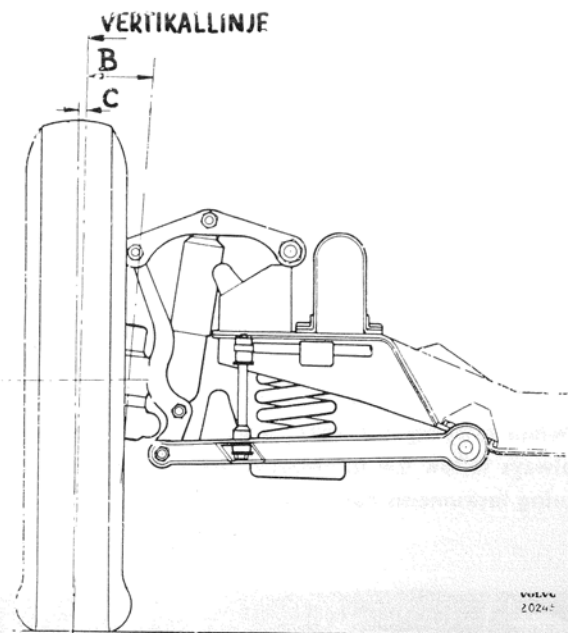


Fig. 2. Camber and king pin inclination
Vertikallinje = Vertical line

TOE-IN

The difference in the distances (E and G, Fig. 3) between the wheels measured at hub height at the rear and front of the tyres is called toe-in. The purpose of toe-in is to reduce tyre wear.

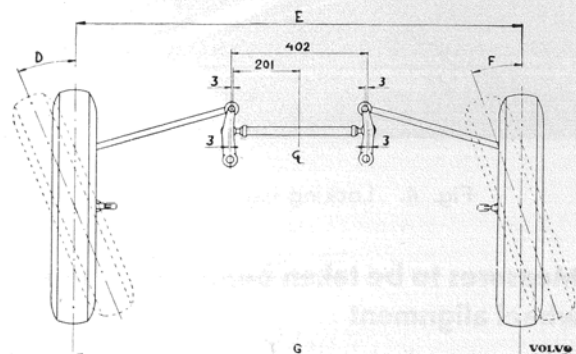


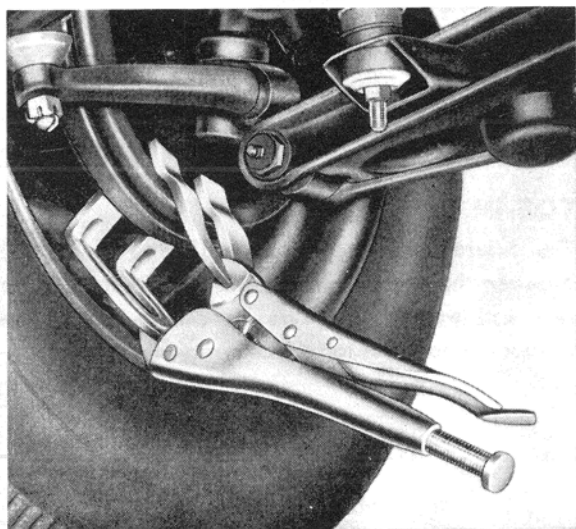
Fig. 3. Toe-out

MEASURING AND ADJUSTING WHEEL ALIGNMENT

Wheel alignment is measured by means of special instruments of which many different types are available. For this reason, no general instructions concerning the procedures to be adopted are given, with the exception of toe-out and toe-in. The principle of measurement is that camber is measured directly when the wheels are in the straight-forward position. Caster and king pin inclination cannot be measured directly. Instead, measurements of the angular difference are carried out on the instrument when the wheels are turned from 20° outwards to 20° inwards.

Most types of modern measuring tools for wheel alignment require that the wheels are locked by means of a pedal jack or similar device. This is not sufficient on vehicles equipped with Duo-Servo type brakes since the brake shoes in this system have a certain amount of reciprocating movement. On such vehicles, therefore, the brake drum should be locked mechanically to the brake backing plate when measuring. This can be done by applying welding pliers between the drum and brake backing plate on each front wheel (see Fig. 4), when it is not necessary to use a pedal jack.

When carrying out wheel alignment measurements, always follow the instructions given with the measuring instruments concerned.



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Fig. 4. Locking the brake drum

Measures to be taken before adjusting wheel alignment

Before any adjustments are made, the following points must be checked and any faults corrected.

1. Check the tyre pressure on all wheels.
2. Check that the front wheel tyres are equally worn. If not, change around with a rear wheel or the spare wheel.
3. Check that the wheel warp and out-of-roundness do not exceed 2.5 mm (3/32"), and that the radial throw does not exceed 2.5 mm (3/32").
4. Check the front wheel bearings, king pin and bushes as well as the shock absorbers.
5. Check that the control arms are not damaged and that they are firmly attached to the front axle member. Check that the control arm bushes do not have excessive play.
6. Check that the springs are in good order and are not fatigued.
7. Check the play and adjustment of the steering mechanism. With the steering mechanism in the central position, the wheels should point straight forward.
8. Check the steering rods, steering arms and idler arm.
9. Check that the vehicle has normal equipment (oil, water, petrol and tools), but is otherwise unloaded.

Adjusting caster

Caster should be $-3/4^\circ$ - $+1/4^\circ$. This is adjusted by loosening the clamp bolt (1, Fig. 5) and then turning the eccentric bush (2). Use wrench SVO 1411 if the bush is early production with a width across flats of 28.5 mm (1 1/8") and wrench SVO 2201 if the bush is late production with width across flats of 34.3 mm (1 11/32"). One complete turn alters the angle by $1/2^\circ$.

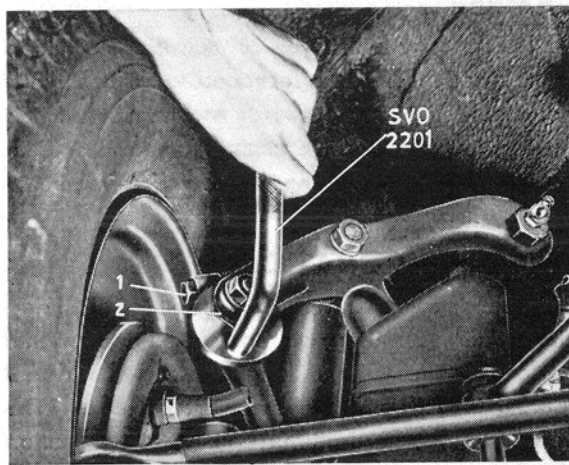


Fig. 5. Adjusting caster and camber

1. Clamping screw
2. Eccentric bush

Note that if the wheel has the correct camber, one complete turn must be given, otherwise the camber will be altered. Tighten the clamp bolt before checking the caster.

Checking camber

After the caster has been checked, adjust the camber. This should be -14° - $+1/2^{\circ}$. It is adjusted by loosening the clamp bolt and turning the eccentric with wrench SVO 1411 or SVO 2201, see Fig. 5. Altering the camber also means a slight alteration of the caster, but this is negligible.

Adjusting toe-in

The toe-in should be 0—3 mm (0—0.12 ins.). This is adjusted by slackening the clamping bolts or locknuts respectively and turning the tie-rod in the required direction. By turning in the normal direction of rotation of the wheels, the distance between the tyres at the front is reduced, that is to say, the toe-in increases. Thus a $1/4$ turn of the tie-rod represents a toe-in of about 3 mm (0.12"). When the correct toe-in has been obtained, the clamping bolts are tightened to a torque of 1.1—

1.4 kgm (8—10 lb.ft.). In the case of the late production tie-rods, the locknuts can be tightened to a torque of 7.5—9 kgm (55—65 lb.ft.).

Checking king pin inclination

As a precautionary measure, the king pin inclination should also be checked. This should be 5° when the camber is 0° .

Checking toe-out

1. Place the front wheels on turntables and ensure that they are pointing straight forward. When the vehicle is placed on them, the turntables should be set to zero and locked.
2. Turn one of the wheels 20° inwards and read off the turning angle of the other wheel. This should be $22 \pm 1^{\circ}$.
3. Turn the wheel in the other direction and read off the angle of turn on the other wheel in the same way.
3. There is no possibility of adjusting the toe-out. If it should be faulty, check the steering arms and steering rods and replace any damaged parts.