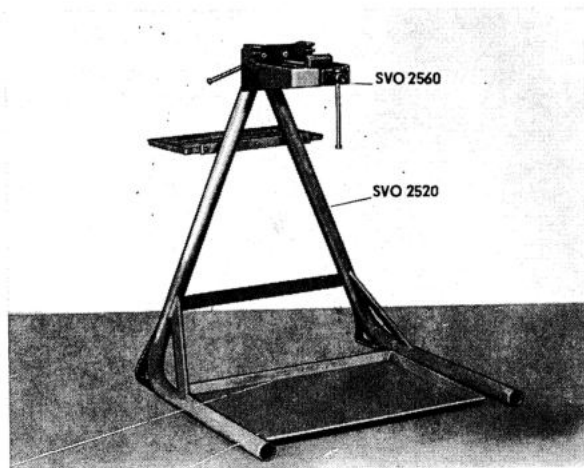




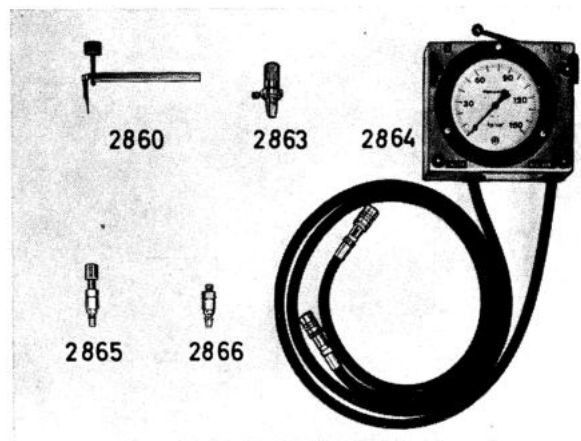
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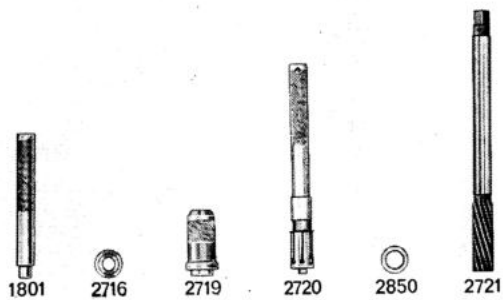
Fig. 6-2. Stand and fixture



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Fig. 6-4. Tools for work on the servo steering

- SVO 2860 Tool, for removing oil seal
- SVO 2863 Tool, for fitting oil seal
- SVO 2864 Testing instrument
- SVO 2865 Connection nipple for SVO 2864
- SVO 2866 Connection nipple for SVO 2864



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Fig. 6-3. Tools for work on the mechanical steering gear

- SVO 1801 Standard handle 18×200
- SVO 2716 Drift, for fitting bush, pitman arm shaft
- SVO 2719 Sleeve, for fitting oil seal, pitman arm shaft
- SVO 2720 Removal tool for pitman arm shaft bush
- SVO 2721 Reamer for pitman arm shaft bush
- SVO 2850 Pilot for reamer 2721

WHEEL ALIGNMENT

WHEEL ANGLES

For the vehicle to have good steering properties and a minimum of tyre wear, the front wheels must have certain pre-determined settings, generally known as the wheel angles. The wheel angles refer to the caster, camber, king pin inclination, toe-out and toe-in.

CASTER

Caster generally refers to the longitudinal inclination (forwards or backwards) of the king pin. As this vehicle does not have a king pin, the caster consists of the angle between a vertical line and a line through the centre of the ball joints (Fig. 6-5).

Caster has the effect of causing the wheels to run straight forwards thereby facilitating the steering.

CAMBER

Camber is the inclination of the wheel itself outwards or inwards. It is positive if the wheel is inclined outwards (see C, Fig. 6-6) and negative if the wheel inclines inwards. Faulty camber causes uneven tyre wear.

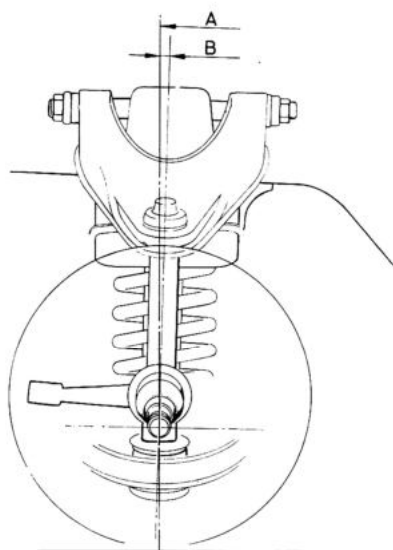


Fig. 6-5. Caster

A = Vertical line
B = Caster

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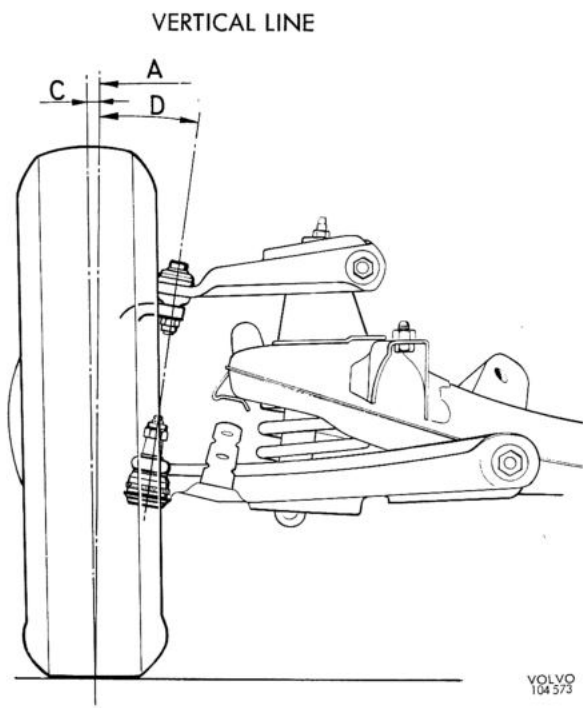


Fig. 6-6. Camber and king pin inclination

A = Vertical line C = Camber D = King pin inclination

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KING PIN INCLINATION

King pin inclination means the inclination of the king pin inwards. Since this car does not have a king pin, the inclination is represented by an angle made between a vertical line and a line through the centre of the ball joints (D, Fig. 6-6).

King pin inclination causes the centre lines of the ball joints and the wheel to approach each other towards the road surface. This makes the wheel easier to turn. The inclination also assists the tendency of the wheel to run straight forwards since the car is lifted very slightly when the wheels are turned.

TOE-OUT

When driving round a bend, the wheels roll at different radii. For them to have the same pivoting centre, and consequently minimum tyre wear, the front wheels must be turned to different extents. This relationship is determined by the shape of the steering rod and steering arms, see Fig. 6-7.

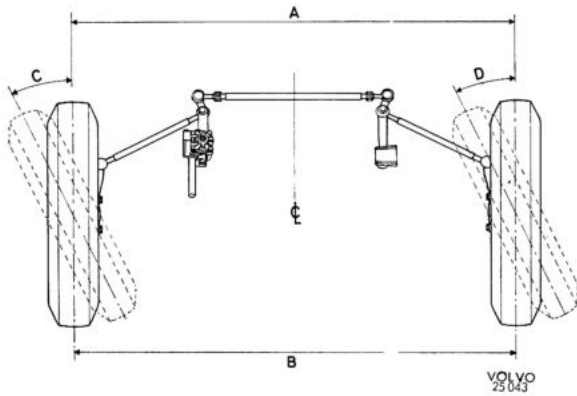


Fig. 6-7. Toe-out and toe-in

TOE-IN

The difference in the distances (A and B, Fig. 6-7) between the wheels measured at hub height at the front and rear of the tyres is known as toe-in. The purpose of toe-in is to reduce tyre wear.

PROCEDURE BEFORE WHEEL ADJUSTING

Wheel angles can be influenced by the factors listed below. Therefore, before measuring and adjusting any faults should be remedied.

1. Check tyre pressure and wear.
2. Play in front wheel bearings.
3. Play in ball joints or wishbone attachments.
4. Broken springs.
5. Abnormal (temporary) equipment or loading.

Other factors which can influence the steering during driving without being revealed when measuring the wheel angles are:

1. Wheel out-of-true more than 2.5 mm (0.1").
2. Poor shock absorbers.
3. Faulty steering box adjustment.
4. Play in intermediate arm jounalling or steering rod parts.

MEASURING THE WHEEL ANGLES

The wheel angles are measured with special measuring instruments of which there are many different types. No general description can, therefore, be given

as to how measuring should be carried out except in the case of the steering geometry. The measuring principle is that camber is measured directly with the wheels pointing straight forwards. Caster and kin pin inclination cannot be measured directly. Instead, the angular alteration which occurs when the wheel is turned from 20° outwards to 20° inwards is measured on the instrument.

Most types of modern wheel alignment measuring instruments require that the wheels are locked with, for example, the help of a pedal jack.

When measuring the wheel angles, follow the instructions applicable to the measuring instruments concerned.

CHECKING THE KING PIN INCLINATION

The king pin inclination, which on this vehicle is represented by the inclination of the centre line of the ball joints, should be 7.5° at a camber of 0°. This cannot be adjusted and is difficult to measure exactly due to the tension and resilience in the parts, so that the angle read off on the instruments will not be exact king pin inclination but can serve as a guide.

CHECKING THE TOE-OUT

1. Place the vehicle front wheels on turntables and make sure that the wheels point straight forwards. Before the car is placed on them, the turntables must be set to zero and locked.
2. Turn the wheels to the left until the right wheel has turned 20° inwards. The scale on the left turntable should then read $22.5 \pm 1^\circ$.
3. Check the position of the right wheel in the same manner by turning the wheels to the right until the left wheel has turned 20° inwards, when the right turntable scale should give the same reading as previously indicated on the left. Both measurements should thus lie within the above-mentioned tolerances, otherwise it means that the steering gear or front end is distorted.
4. There are no adjusting possibilities, but if the toe-out is incorrect, the steering arms and steering rods should be checked. Replace any parts that are damaged.

ADJUSTING THE WHEEL ANGLES

N.B. The front wheel angles are always adjusted in the following order:

1. Caster
2. Camber
3. Toe-in

To save time and labour, caster and camber should be adjusted at the same time, see under "Adjusting the camber".

CASTER

The caster for each wheel should be within a tolerance range of 0° to $+1^{\circ}$, that is, min. 0° and max. 1° positive. The difference between both sides should, however, not exceed $1/2^{\circ}$.

To adjust, slacken the special bolts at the upper wish-bone shaft with tool SVO 2713 (Fig. 6-6). Use one end of the tool for the front bolt and the other for the rear bolt. After the bolts have been slackened several turns, the requisite number of shims can be either removed or added, whichever is the case. Positive caster is obtained by either **adding** shims to the **rear** bolt or **removing** shims at the **front** bolt.

The diagram in Fig. 8 shows the shim thicknesses required for a certain alteration in angle. Shims are stocked in thicknesses of 0.15—0.5—1.0—3.0 and 6.0 mm (0.006—0.020—0.039—0.12 and 0.24"). The caster is altered to the same extent by either

1. removing a shim at one of the bolts,
2. adding a shim to the other bolt,
3. moving over half of the required shim thickness from one bolt to the other.

For proper caster, adjustment should be according to alternative 3.

After adjustment has been carried out, tighten the bolts to a torque of 5.5—7.0 kpm (40—50 lb.ft.).

CAMBER

The camber for each wheel should be within a tolerance range of 0° to $+1/2^{\circ}$, that is, it should be min. 0° and max. $1/2^{\circ}$ positive.

To adjust, slacken the special bolts at the upper wish-bone shaft several turns with tool SVO 2713 (Fig. 6-6). Use one end of the tool for the front bolt and the

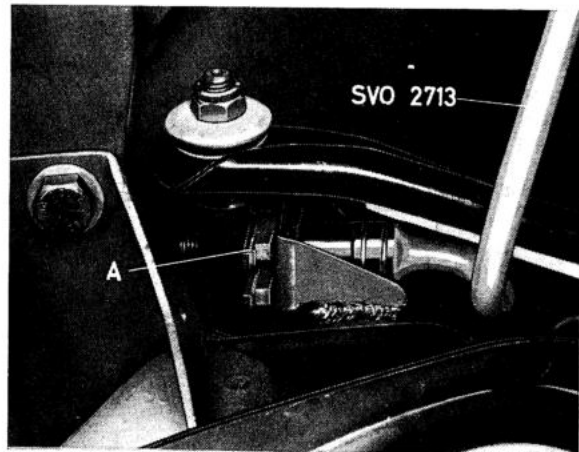


Fig. 6-8. Adjusting the caster and camber

A=Shims

other for the rear bolt. Then either increase or reduce the number of shims equally for both bolts. More **positive** camber is obtained by **removing** shims, and **negative** camber by **increasing** the number of shims. The shim thickness required for a certain alteration in angle is shown in the diagram in Fig. 8. Shims are stocked in thicknesses of 0.15—0.5—1.0—3.0 and 6.0 mm (0.006—0.020—0.039—0.12 and 0.24"). The camber is altered by removing or adding an equal number of shims at both the bolts.

After adjustment has been carried out, tighten the bolts to a torque of 5.5—7.0 kpm (40—50 lb.ft.).

To save time and labour adjust the caster and camber at the same time by removing or adding shims for the camber and altering the number of shims for the caster. If, for example, the camber is increased 0.6° and the caster $1/4^{\circ}$, first remove 2.5 mm (0.1") in shims at both the bolts and move 0.3 mm (0.012") in shims from the front to the rear bolt.

ADJUSTING THE TOE-IN

The toe-in should be 0—4 mm (0—0.16"). Incorrect toe-in is adjusted by slackening the locknuts on the tie rod, after which the rod is turned in the required direction. The distance between the tyres at the front is reduced, that is to say, toe-in is increased by turning the tie-rod in the normal direction of rotation of the wheels. Tighten the locknut after adjustment to a torque of 7.5—9.0 kpm (55—65 lb.ft.).

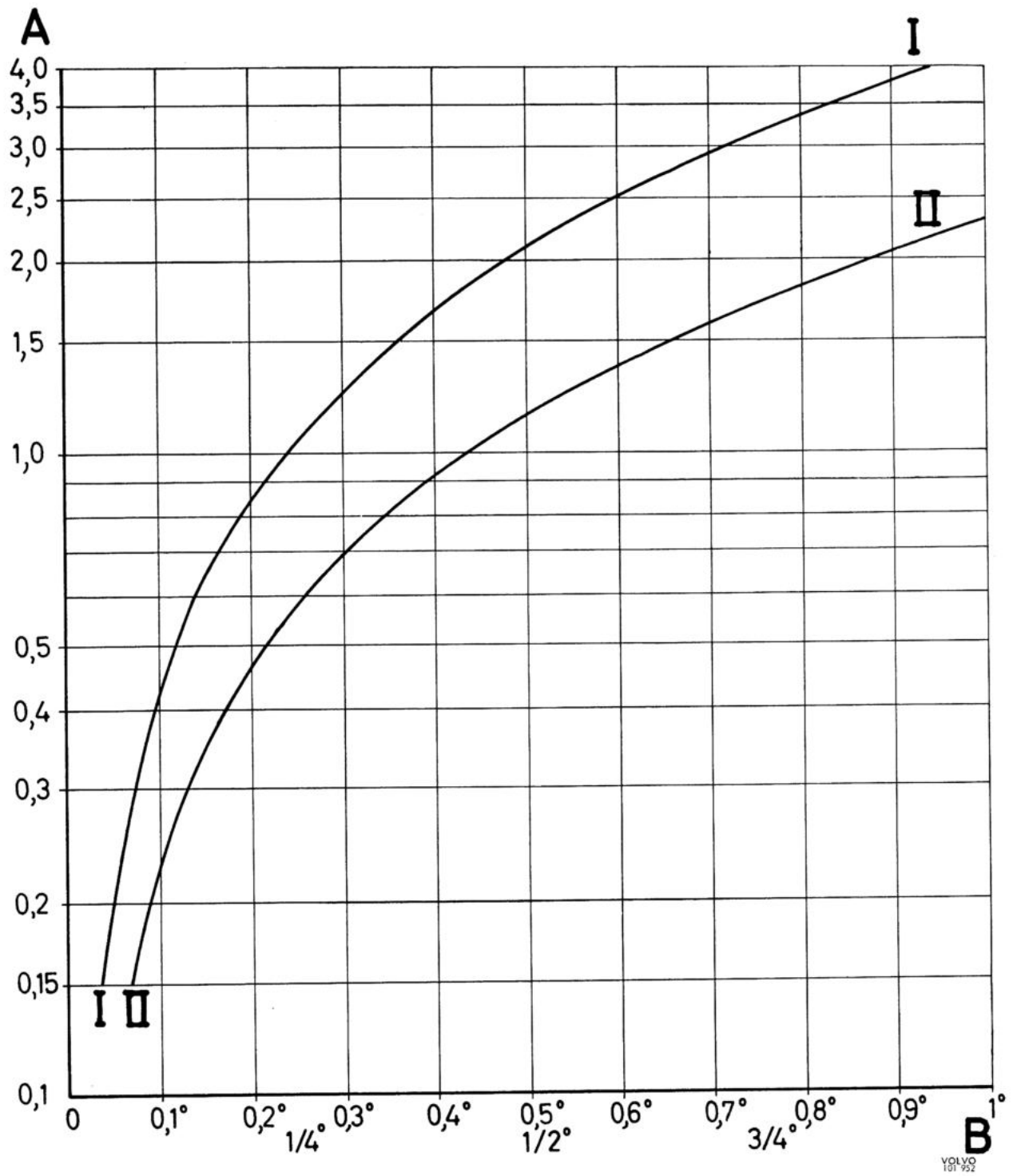


Fig. 6-9. Diagram for alteration of caster and camber

I = Camber
 II = Caster
 A = Shims (mm)
 B = Alteration of angle

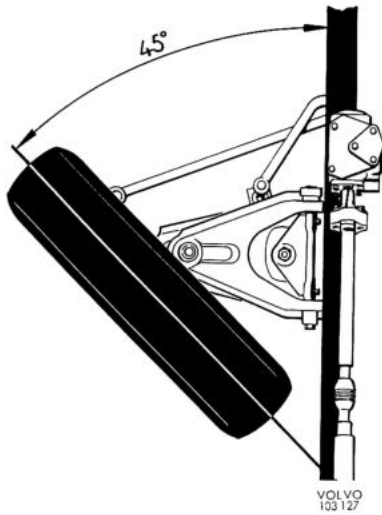


Fig. 6-10. Adjusting the max. wheel lock

ADJUSTING THE STEERING LIMITS

Wheel turning is limited by stop bolts, at the pitman arm (Fig. 6-11) and at the relay arm.

Adjusting is done as follows:

1. Turn the left wheel for a left-hand turn as far as it goes. Check that the lock angle of the wheels is 45° . If it is not, then adjust to this value with the stop bolt (A, Fig. 6-11) at the pitman arm.

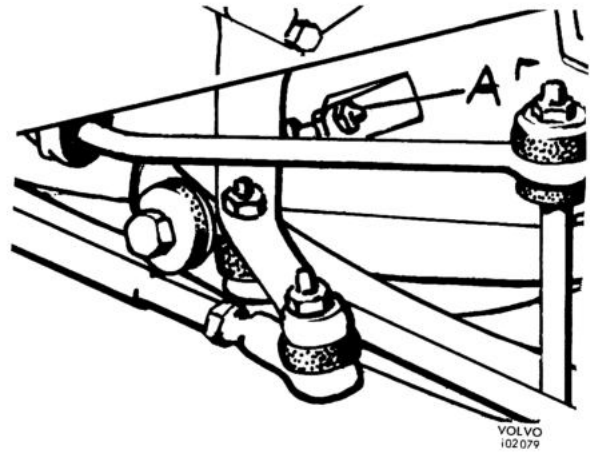


Fig. 6-11. Adjusting screw, max. wheel lock

2. Repeat this procedure with the right wheel and the stop screw on the relay arm.

N.B. Check that the break hoses are clear at full wheel lock.