MEASURING VEHICLE

General

Most wheel alignment devices give only a partial measurement. We recommend, therefore, to use the optical wheel alignment device "Exacta" of Messrs. Müller, Heilbronn, for measuring our vehicles.

With its help one can in a short time detect and correct any errors of wheel alignment.

If the measurements are found to be within tolerance limits, the given complaints are not due to incorrect wheel alignment, but to other causes which are mentioned in the beginning of this section.

Misalignment frequently causes unequal tire wear.

If wheel alignment is correct and if the car is not loaded unevenly or often driven on high crowned roads, then tires of the same manufacture and age should wear evenly. The rear tires wear out faster than the front tires.

In addition to periodic inspections, wheel alignment should be checked if tires show uneven wear, or if poor roadability is experienced; also after removing and installing axles.

Since our service stations feature standard measuring frames and stationary facilities, both types of aligning methods will be described. This description will be of no use to a person who is not familiar with this work, it shall only help to guide the expert.

Attention

Prior to checking the wheel alignment of a car, check and, if necessary, correct the tire pressure and the clearance of the axle components.

Measuring Frame

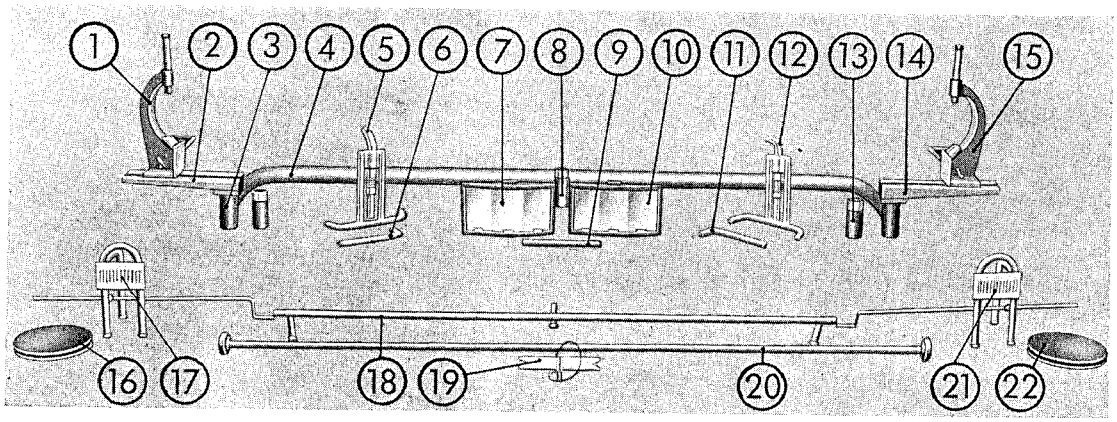


Fig. 5

① Microscope
② Prismatic guide
③ Extension base
④ Rack
⑤ Wheel mirror bracket
⑥ Centre part for 13" rim
⑦ Wheel mirror
⑧ Extension base
⑨ Distance rod
⑩ Wheel mirror
⑪ Centre part for 13" rim
⑫ Wheel mirror bracket
⑬ Extension base
⑭ Prismatic guide
⑮ Microscope
⑯ Wheel support plates
⑰ Scale trestle
⑱ Tripod adjusting rod
⑲ Supporting angle with adjusting wire
⑳ Mirror adjusting bar
㉑ Scale trestle
㉒ Wheel supporting plates

1 Wh

Adjusting Measuring Gauge

1. Attach supporting angle for mirror adjusting bar.
2. Place mirror adjusting bar in position.
3. Adjust measuring distance with distance rod.

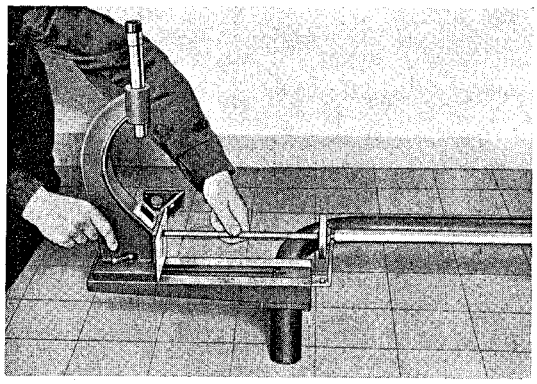


Fig. 6

4. First side:
   Turn mirror adjusting bar, align mirror at the three setscrews until the cross wire on the measuring scale does no longer move.
5. Turn mirror round its axis and observe cross wire (max. deviation: Toe-in 5', camber 10').
6. Align cross wire by turning microscope mirror until the vertical hairline passes through 0 and the horizontal hairline indicates —10'.
7. Proceed in similar way when adjusting second side.
8. If cross wire is not right-angled, loosen setscrews at the elbow sight bracket and correct position of microscope.
9. Set tripod adjusting rod to centre, adjust scale trestles (attach stop angle to measuring scale).

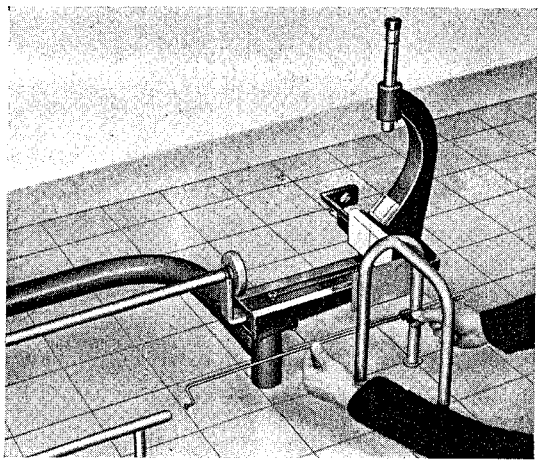


Fig. 7

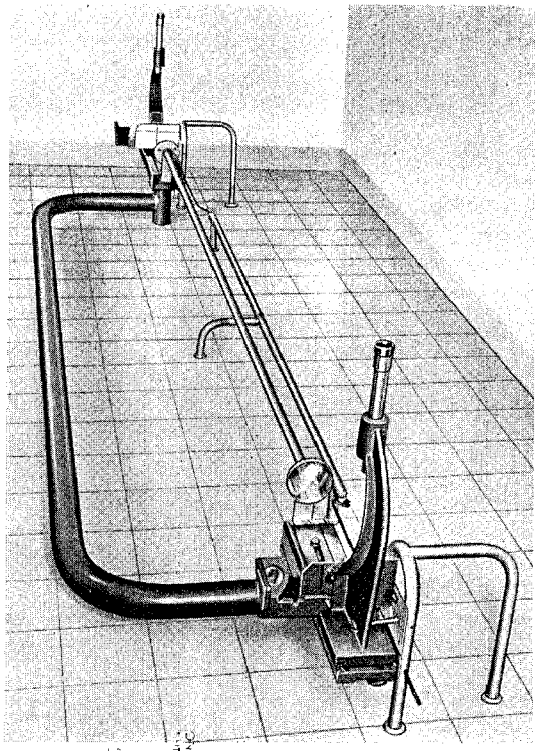


Fig. 8

10. Move tripod adjusting rod at a distance from the rack until both adjusting wires are fully stretched.
11. Place scale trestles left and right in position (with exact alignment).
12. Place elbow sight forward and adjust to zero line on scale trestle. Horizontal line must be somewhat below scanner.

Measuring Front Wheels

2 Wh

1. Secure wheel mirror to front wheels.

2. Position tubular frame so that microscopes are set as close to the centre of the wheel axis as possible.

3. Jack up car until the wheel to be aligned turns freely.

4. Set measuring distance, turn wheel, change position of mirror by means of the three screws, until cross wire does no longer move.

5. Turn mirror round its axis and observe cross wire (max. deviation: Toe-in 5', camber 10').

6. Align second front wheel, proceeding similarly.

7. Lower car, at the same time placing rotating plates underneath both wheels.

8. Rock car and move it to and fro several times.

9. Set measuring distance, attach scale trestles with stop angle to measuring scale and adjust scanners at distance to rim flange.

10. Place scale trestles in position to the rear wheels (attach scanner to the rim flange concerned).

11. Put elbow sight forward and move frame on one side in parallel direction to the longitudinal axis of the vehicle until the same figure appears in the same field of the scale (of the scale trestle) when reading both microscopes.

12. Check measuring distance and correct distance and position of tubular frame, if required.

13. Remove elbow sight, attach tension spring to the wheels (load approx. 20 kg).

14. Set left front wheel to zero, read camber and enter this figure in measuring chart.

15. Read toe-in of right wheel, set wheel to zero, read camber and enter result.

16. Turn wheel towards left until left wheel is exactly on 20° (correct measuring distance). Read camber of left wheel and enter result (observe clinometer).

17. Read difference angle through right microscope and enter result (correct measuring distance).

18. Set right cross wire to zero (toe-in), read camber and enter result (observe clinometer).

19. Turn wheels towards right until the right wheel is exactly on 20°, read camber of right wheel, read difference angle left, set to zero (toe-in), read camber and enter result (observe measuring distance and clinometer).

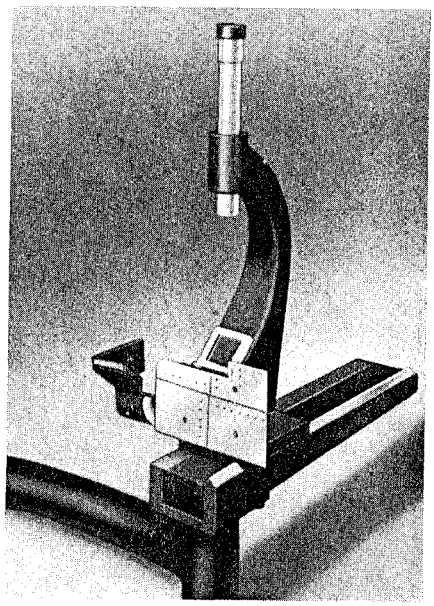


Fig. 9

3 Wh

Measuring Rear Wheels

1. Attach wheel mirror.
2. Position tubular frame so that microscopes are approximately set to centre of wheel axis.
3. Jack up car until the wheel to be aligned can turn freely.
4. Set measuring distance, turn wheel, modify position of mirror by means of the three screws until cross wire does no loger move.
5. Align second rear wheel, proceeding similarly.
6. Lower car, rock and move it to and fro several times.
7. Adjust measuring distance, attach scale trestles with stop angle to measuring scale and set scanners at distance to rim flange.
8. Put scale trestles to front wheels turned in straight-ahead position.
9. Put elbow sight forward and move tubular frame on one side in parallel direction to the longitudinal axis of the car until the same figure appears in the same field of the scale (of the scale trestle) when looking through both microscopes.
10. Check measuring distance and correct distance and position of tubular frame, if necessary.
11. Remove elbow sight, read camber and wheel alignment on both sides, enter results.

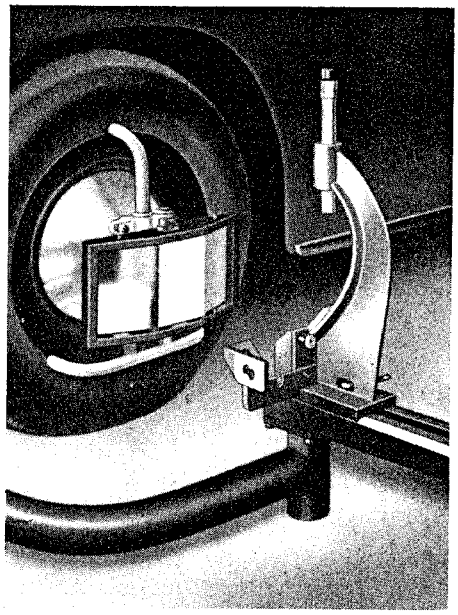


Fig. 10

Stationary Measuring Gauge

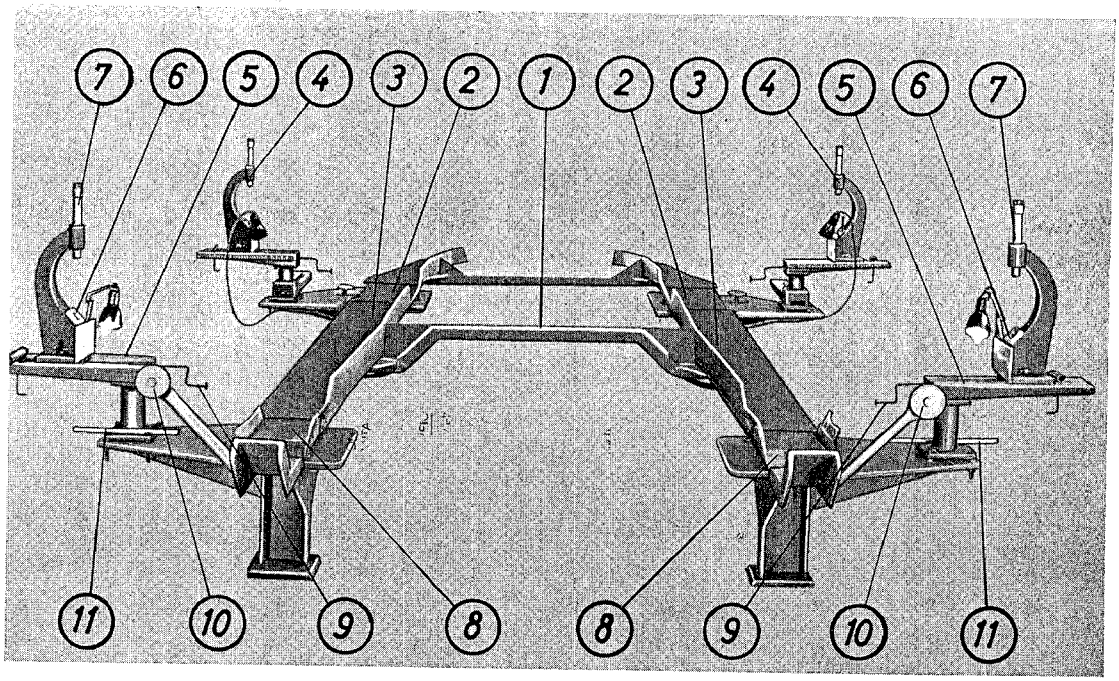


Fig. 11

① Transverse strut
② Rear plate
③ Platform
④ Sliding rear microscope
⑤ Prismatic guide
⑥ Microscope mirror
⑦ Microscope
⑧ Front wheel base
⑨ Scanner
⑩ Reel for weight
⑪ Distance rod

Adjusting Measuring Gauge

4 Wh

1. Check prismatic guide for parallelism and distance.
2. Attach supporting angle for mirror adjusting rod.
3. Place mirror adjusting rod into position.
4. First microscope:
   Set measuring distance, turn mirror adjusting rod, align mirror by means of the three setscrews until the cross wire on the measuring scale does no longer move.

5. Turn wheel mirror round its axis and observe cross wire (max. deviation: Toe-in 5', camber 10').

6. Align cross wire by turning setscrews of the microscope mirror until the vertical hairline points to 0 and the horizontal hairline indicates —10'.

7. Adjust remaining microscopes by proceeding in a similar manner.

Attention:

Take care with adjustable prismatic guides to maintain equal distance on both sides to the fixed prismatic guide.

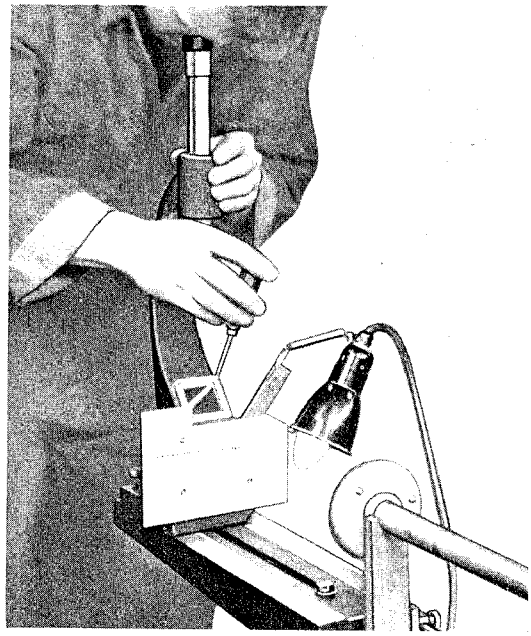


Fig. 12

5 Wh

Measuring Vehicle

1. Set front wheel bases and rear plates to initial position and arrest.

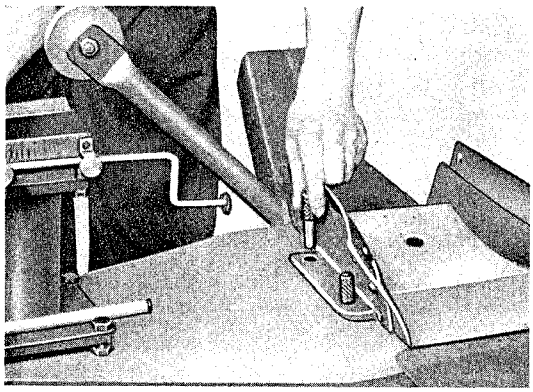


Fig. 13

2. Position vehicle so that front wheels left and right are placed at equal distance to the microscopes.

3. Remove wheel hub cap and attach wheel mirror.

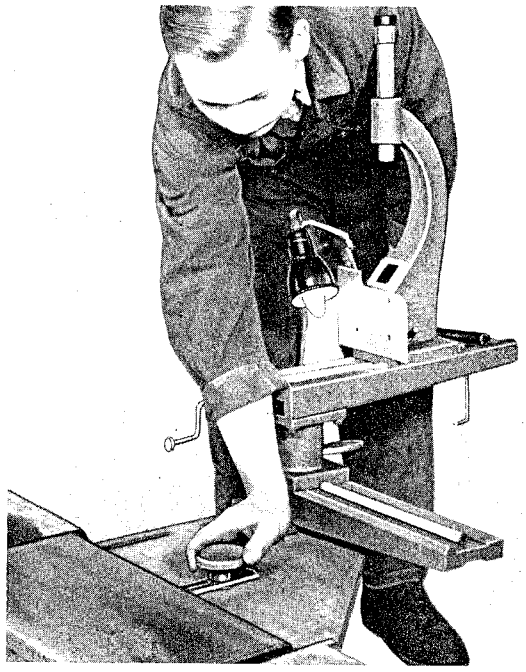


Fig. 14

4. Loosen pin at wheel bases and screws at rear plates, attach tension spring or weights resp. to the front wheels.

5. Move car at the rear to the side until indicators of scanners give the same figure left and right.

6. Adjust measuring distance at the rear wheels with distance rod and read camber and toe-in for each wheel. Enter result into measuring chart.

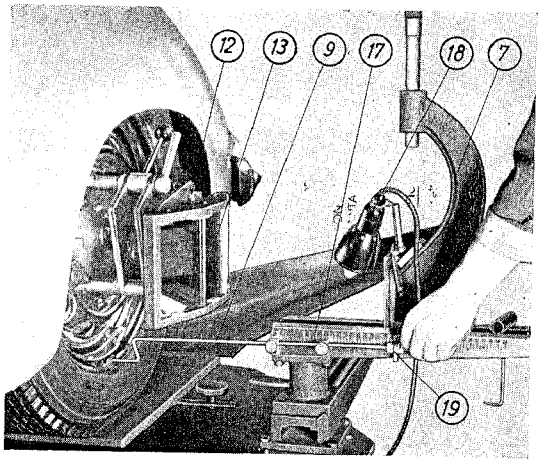


Fig. 15

▲

⑦ Microscope ▶
⑨ Scanner
⑩ Reel for weight
⑪ Distance rod
⑫ Clinometer
⑬ Wheel mirror
⑭ Excentric lever
⑮ Weight
⑯ Yoke
⑰ Scale for scanner
⑱ Scale light
⑲ Indicator for scanner

7. Adjust measuring distance at left front wheel, align wheel to zero, read camber. Enter result.

8. Read toe-in of right front wheel. Enter result. Align wheel to zero, read camber and enter result.

9. Turn wheels to left until left wheel is exactly on 20° (Correct measuring distance). Read camber of left wheel and enter result (Observe clinometer).

10. Read difference angle on right microscope. Enter result (Correct measuring distance).

11. Turn right wheel until vertical line passes through zero, read camber and enter result (Observe clinometer).

12. Turn wheels to right until right wheel is exactly on 20° and read camber right, read difference angle left, set vertical line to zero (20°), read camber and enter all data obtained.

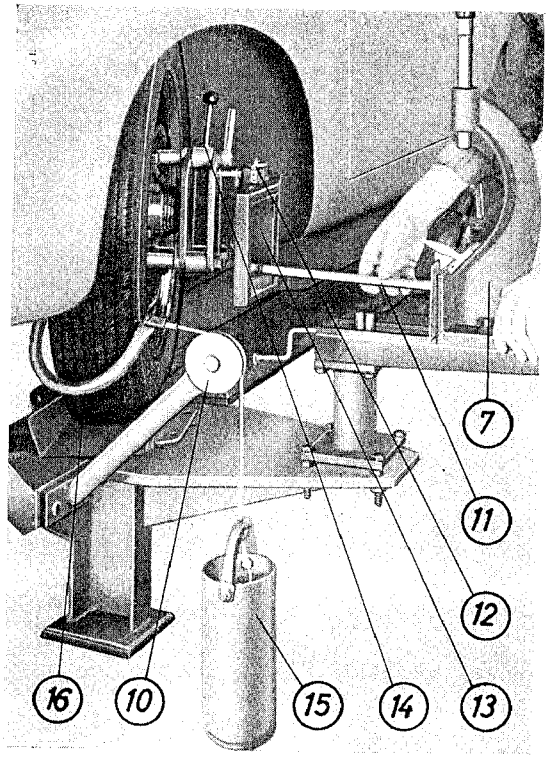


Fig. 16

Measuring Toe-In Variation of Front Wheel During Spring Action

6 Wh

1. Set vertical line to zero on left wheel (with vehicle unloaded), read toe-in right and enter result.

2. Press front part of car downward until stop, set left wheel exactly to zero, read toe-in right and enter result.

7 Wh

Alignment of Toe-In

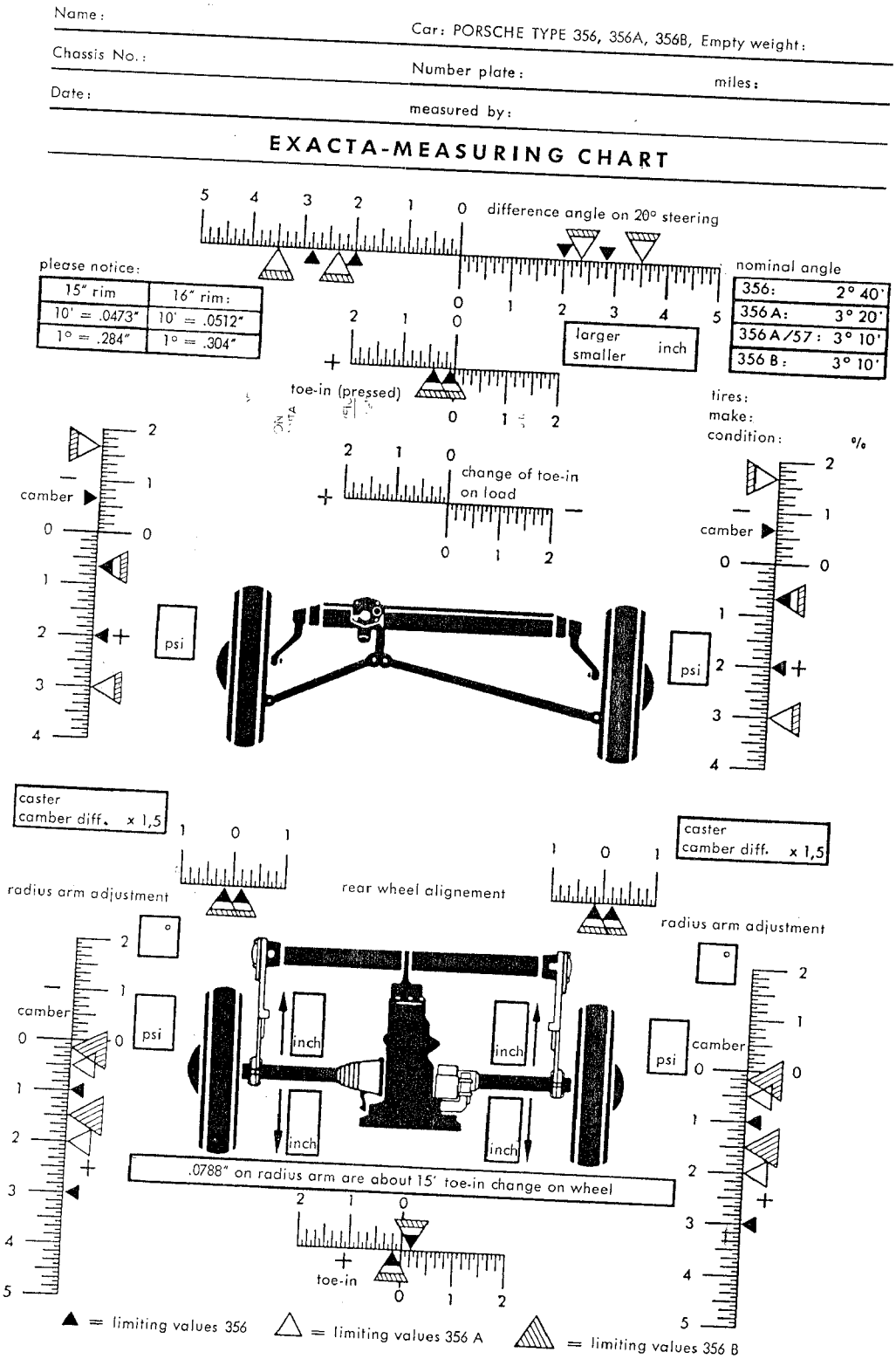
1. Align vehicle.
2. Adjust steering to pressure point (Mark).
3. Adjust short tie-rod so that left wheel shows + 10' toe-in (pressed).
4. Adjust long tie-rod so that right wheel shows + 10' toe-in (pressed).
5. Check difference angle.

Attention! Misalignment of the difference angle cannot be corrected by adjusting the tie-rods. Errors which do not exceed the tolerance limits as specified in the measuring chart have to be put up with. If difference angle errors are severe, this will be caused by deformations on the steering arm at the stub axle, tie rods, stub axles or frame.

SAMPLE MEASURING CHART

General

In order to ensure a reliable analysis of the records obtained, the measuring chart specifies tolerance limits which should not be exceeded. Thus it will be possible to ascertain at a glance where modifications are required. The new measuring chart will in addition include columns where corrections should be entered.



Alignment Data

(For Porsche Type 356 B, unloaded, weight empty)

	1600/1600 S	1600 S–90	
Tire Dimensions	5,60–15 Sport (165–15 upon request)	165–15	5.90–15 Super Sport (upon special request only)
Tire Pressure, (Approx. data) front:	normal driving (country roads) (1,3 atü) 18,46 psi	normal driving (country roads) (1,6 atü) 22,8 psi	normal driving (country roads) (1,2 atü) 17,3 psi
	high-speed (Highway) (1,5 atü) 21,3 psi	high-speed (Highway) (1,8 atü) 25,6 psi	high-speed (Highway) (1,4 atü) 19,9 psi
rear:	normal driving (country roads) (1,6 atü) 22,8 psi	normal driving (country roads) (1,8 atü) 25,6 psi	normal driving (country roads) (1,5 atü) 21,3 psi
	high-speed (Highway) (1,8 atü) 25,6 psi	high-speed (Highway) (2,0 atü) 28,4 psi	high-speed (Highway) (1,7 atü) 24,2 psi

Difference angle, each side 3° 10' ± 20'

(Based on an angle of 20° for wheel on the inside of the curve).
The amount of toe-in must be added to the measured angle to arrive at the nominal difference angle value.

Toe-in of Front Wheels (pressed)

.0394" to .118", 1 to 3 mm (5' to 25') for each wheel pressed approx. + 10'

Camber of Front Wheels

(in straight-ahead position)
Values should be equal for both sides

0° 40' ± 30'

Caster

Values should be equal on both sides

5° ± 30'

Camber of Rear Wheels

Values must be equal for both sides

+ 10' to + 1° 30'

Toe-in of Rear Wheels

.00 to .059" (0 to 1,5 mm) (0° ± 10')