

SPRINGS, SHOCK ABSORBERS

SERVICE STANDARDS

Model Designation	1-08AD 1-08AF 1-08AS	2-26AD 2-26AF 2-26AS	2-33AD 2-33AF 2-33AS	3-59AD 3-59AF 3-59AS	6-71AD 6-71AF 6-71AS	8-65AD 8-65AF 8-65AS	8-71AD 8-71AF 8-71AS	8-71AD-D 8-71AF-D 8-71AS-D
Front Spring								
Length	42" 1 3/4"	42" 1 3/4"	42" 1 3/4"	45" 2"	45" 2 1/2"	45" 2 1/2"	45" 2 1/2"	45" 2 1/2"
Width	1 3/4"	1 3/4"	1 3/4"	2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"
Number of Leaves	9	9	9	10	8	8	8	8
Rear Spring								
Length	52 1/8" 1 3/4"	52" 1 3/4"	52" 1 3/4"	54" 2 1/2"	54" 2 1/2"	54" 2 1/2"	54" 2 1/2"	54" 2 1/2"
Width	1 3/4"	1 3/4"	1 3/4"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"
Number of Leaves	10 (11†)	12 (14†)	12 (14†) 5*	10 4	15 6	15 6	15 6	15 6
Shock Absorbers (Type)								
Front	Hyd. Telescopic Double Acting	Hyd. Telescopic Double Acting	Hyd. Telescopic Double Acting	—	—	—	—	—
Rear	Hyd. Telescopic Double Acting	—	—	—	—	—	—	—

* Except with express body.
† Optional Equipment.

TIGHTENING REFERENCE

Part Name.	Torque (Foot Pounds)
Rear Spring Clip Nut	62 to 69
Rear Spring Front Bolt	150 to 175
Shock Absorber Stud Nuts	45 to 50

FRAME

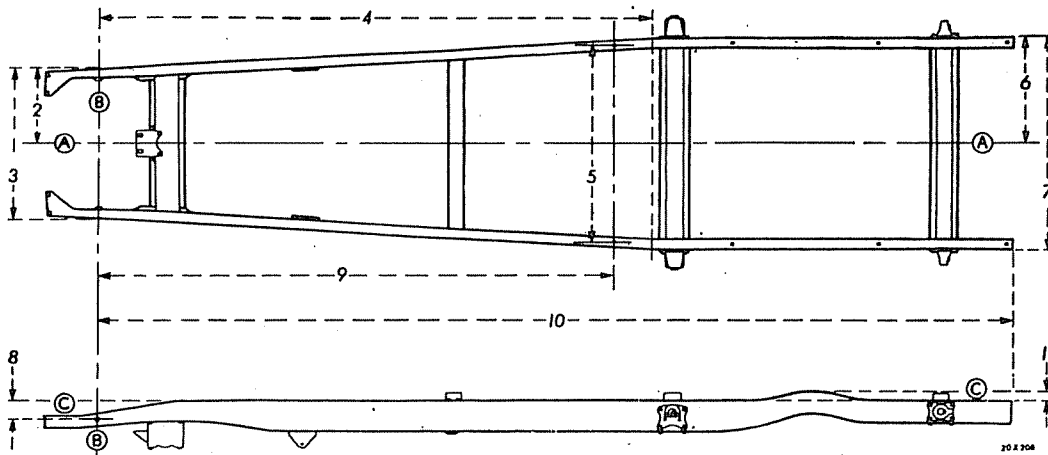


Fig. 1.— Frame Alignment (Dimensions given in inches) 108 inch Wheel Base shown above.

Model Designation and Wheel Base Refer to Figure 1.	1-08AD 1-08AF } 108" 1-08AS } W.B.	2-26AD 2-26AF } 126" 2-26AS } W.B.	2-33AD 2-33AF } 133" 2-33AS } W.B.
A. Centre line of frame			
B. Centre of front spring front eye.			
C. Top of frame			
2. Centre line to side of frame	$15\frac{17}{64}$	$15\frac{5}{16}$	$15\frac{5}{16}$
3. Across flat sides at front of frame	$30\frac{1}{2}$	$30\frac{5}{8}$	$30\frac{5}{8}$
4. Centre of front spring eye to bend	$96\frac{3}{4}$	$96\frac{3}{4}$	$96\frac{3}{4}$
5. Centre to centre of first body bolt holes	38	38	38
6. Centre line to side of frame	$20\frac{1}{64}$	$20\frac{1}{16}$	$20\frac{1}{16}$
7. Across flats at rear of frame	$40\frac{1}{32}$	$40\frac{1}{8}$	$48\frac{1}{8}$
8. Centre of front spring front eye to top of frame	$7\frac{3}{32}$	$7\frac{1}{16}$	$7\frac{1}{16}$
9. Centre of front spring front eye to centre of first body bolt hole	$93\frac{2}{32}$	$93\frac{2}{32}$	$93\frac{2}{32}$
10. Centre of front spring front eye to rear end of frame	$165\frac{1}{32}$	$191\frac{1}{32}$	$198\frac{1}{32}$
11. Top of frame to top of rise	$1\frac{45}{64}$	$1\frac{45}{64}$	$1\frac{45}{64}$

3-59AD } 3-59AF } 3-59AS }	159" W.B.	6-71AD } 6-71AF } 6-71AS }	171½" W.B.	8-65AD } 8-65AF } 8-65AS }	165" W.B.	8-71AD } 8-71AF } 8-71AS }	171½" W.B.	8-71AF-D } 8-71AD-D } 8-71AS-D }	171½" W.B.
Refer to table		Refer to table		Refer to table		Refer to table		Refer to table	
2. 14 $\frac{2}{8}$		2. 14 $\frac{7}{8}$		2. 14 $\frac{7}{8}$		2. 14 $\frac{7}{8}$		2. 14 $\frac{7}{8}$	
3. 29 $\frac{1}{16}$		3. 29 $\frac{1}{4}$		3. 29 $\frac{1}{4}$		3. 29 $\frac{1}{4}$		3. 29 $\frac{1}{4}$	
4. 59 $\frac{55}{64}$		4. 59 $\frac{55}{64}$		4. 59 $\frac{55}{64}$		4. 59 $\frac{55}{64}$		4. 59 $\frac{55}{64}$	
5. Not applicable		5. Not applicable		5. Not applicable		5. Not applicable		5. Not applicable	
6. 18 $\frac{3}{8}$		6. 18 $\frac{1}{16}$		6. 18 $\frac{1}{16}$		6. 18 $\frac{1}{16}$		6. 18 $\frac{1}{16}$	
7. 37 $\frac{9}{16}$		7. 37 $\frac{5}{8}$		7. 37 $\frac{5}{8}$		7. 37 $\frac{5}{8}$		7. 37 $\frac{5}{8}$	
8. 10 $\frac{5}{8}$		8. 10 $\frac{1}{16}$		8. 10 $\frac{1}{16}$		8. 10 $\frac{1}{16}$		8. 10 $\frac{1}{16}$	
9. Not applicable		9. Not applicable		9. Not applicable		9. Not applicable		9. Not applicable	
10. 235 $\frac{33}{64}$		10. 253 $\frac{15}{64}$		10. 246 $\frac{57}{64}$		10. 253 $\frac{15}{64}$		10. 253 $\frac{15}{64}$	
11. Not applicable		11. Not applicable		11. Not applicable		11. Not applicable		11. Not applicable	

FRAME ALIGNMENT.

Correct frame alignment is of great importance in the operation of the vehicle. Improper frame alignment is usually the result of an accident which in turn causes misalignment, placing undue strain on various parts of the entire vehicle, affecting wheel alignment and causing annoying squeaks and rattles.

Figure 1 shows various dimensions to be used as a guide in checking frame alignment. These dimensions are the true length between the two points as measured with a steel tape.

Figure 2 shows a few of the various diagonal

measurements that may be taken to check the squareness of the frame.

Diagonal measuring will quickly determine which section of the frame is bent and where force should be applied to restore correct alignment.

To properly check a frame for alignment diagonal measuring should be performed with the greatest of accuracy and care. When the body is removed, the frame may be easily checked for alignment by measuring diagonals shown in Figure 2 with trammels or steel tape and checking dimensions given in Figure 1. Measurements may be taken without removing the body from the chassis,

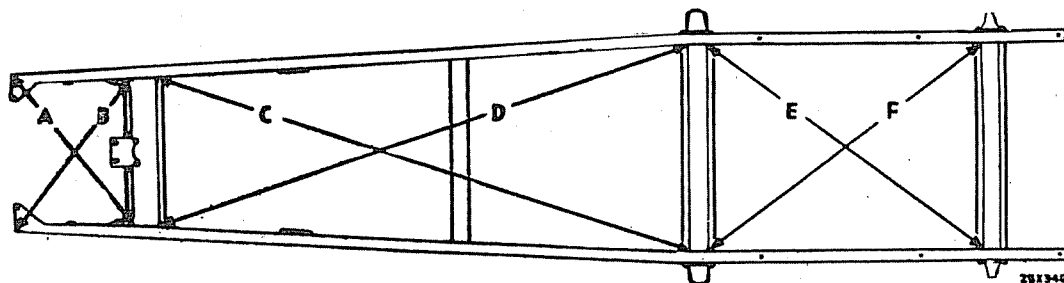


Fig. 2—Frame Diagonal Alignment.

however, by using a plumb-bob and chalk line as follows:

1. Place the truck on a level floor with all tyres properly inflated.
2. Suspend a plumb-bob from various corresponding points on the frame, such as indicated by the diagonal lines in Figure 2. The plumb-bob should be suspended slightly above the floor. When the plumb-bob comes to rest, mark the floor directly underneath it. The marks made on the floor will represent various points of the frame to be checked diagonally.
3. Move the truck away so that the distance between the marks on the floor can be measured.
4. Measure the distance between the points connected by line "A" Figure 2. This distance should agree within $\frac{1}{4}$ inch with the distance between the points connected by line "B".
5. The distance between points connected by line "C" should agree within $\frac{1}{4}$ inch with the distance between points connected by line "D".

The diagonals shown in Figure 2 represent only a few that may be checked. Many other diagonals may be measured in the same way.

Care should be taken to see that any two diagonals compared represent exactly corresponding points on each side of the frame.

Correct frame alignment can usually be restored by straightening the frame parts which have been bent, although badly distorted frame parts, due to a serious accident, can in most cases be replaced more economically than by attempting repairs.

When assembling the body to the frame, the body should be properly aligned so that it and the frame will fit together without the necessity of forcing the body bolts in place.

SPRINGS

1. REMOVAL AND INSTALLATION OF SPRINGS.

- (1) Place jacks under frames and axle.
- (2) Remove nuts, lock washers and U bolts.
- (3) Remove spring shackle bushing or bolt.
- (4) Remove spring bolt with tool DD-431. On Models 3-59A, 6-71A, 8-65A, 8-71A and 8-71A-D, there is a hole opposite the bolts, and bolts can be driven out using a soft drift.

To instal, reverse the above operations. When installing springs or spring bushings, it is important that shackles be adjusted as specified under "Adjustments".

If the truck is equipped with shock absorbers, be sure to disconnect them before removing springs.

2. ADJUSTMENTS.

(a) FRONT SPRING SHACKLES—

1-08A, 2-26A, 2-33A.

When the shackle bushing is screwed into place, the shackle should clear the spring by $\frac{3}{4}$ inch and should also clear the frame spring hanger by $\frac{3}{4}$ inch. Refer to A and B, Figure 3.

The only adjustment required on other models is to draw the nut or the spring shackle bolt up until there is no free play between the shackle and the shackle pins.

(b) REAR SPRINGS—1-08A, 2-26A, 2-33A.

When the shackle bushing is screwed into place, the shackle should clear the spring by $\frac{7}{8}$ inch and should also clear the frame spring hanger by $\frac{7}{8}$ inch. Refer to A and B, Figure 3.

The only adjustment required on other models is to draw the nut or the spring shackle bolt up until there is no free play between the shackle and the shackle pins.

3. MAINTENANCE.

Always keep the U-bolts tightened securely.

Spring breakages at or near the centre of the springs may occur if U-bolts are loose.

When U-bolts are loose, the entire stress is on the centre of the spring leaves. The nuts on the U-bolts should be tightened at least three times during the first month, and about once every month for the succeeding six months of initial operation, and periodically thereafter.

4. WEIGHT DISTRIBUTION AND LOADING.

Pay load distribution is an important phase of vehicle operation. The load should be distributed

as evenly as possible over the floor of the vehicle. In other words, the weight centreline should fall slightly ahead of the rear axle.

Improper loading often results in excessive wear, spring failure, or a sufficient change in caster angle to cause erratic steering under extreme conditions.

Proper front tyre contact on the road is necessary for stability and safety. However, this tyre contact cannot be maintained when the load is shifted too far toward the rear of the vehicle. Excessive loading of the rear tyres results in shortened tyre life.

Proper weight distribution should be taken into consideration when making inspections and adjustment to correct erratic steering and excessive tyre wear.

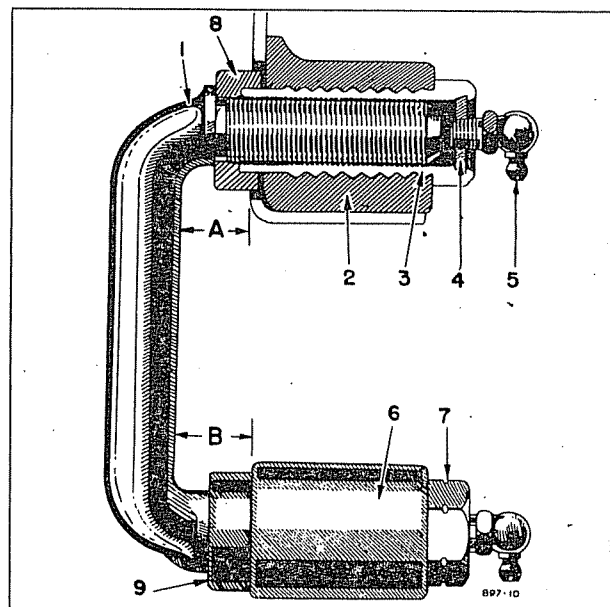


Fig. 3—Spring Shackle 1-08A, 2-26A, 2-33A.

- 1—Shackle
- 2—Frame rear spring rear hanger
- 3—Rear spring shackle bushing—upper
- 4—Shackle bushing—plug
- 5—Shackle bushing lubricant nipple
- 6—Rear spring
- 7—Rear spring shackle bushing—lower
- 8—Dust seal
- 9—Dust seal
- A—Clearance between shackle and frame
- B—Clearance between shackle and spring.

SERVICE DIAGNOSIS

Conditions — Possible Causes — Remedies

1. SPRINGS SAG OR BOTTOM.

Possible Causes.

- a. Severe operation or overloading.
- b. Inoperative shock absorbers.
- c. Broken leaves.

Remedies.

- a. Drive with care under severe road conditions and avoid over-loading truck. If condition is severe, replace springs.
- b. Check shock absorber operation and replace if necessary. Also check rubber insulators and replace if condition warrants.
- c. Rebuild or replace spring.

2. SPRING NOISE.

Possible Causes.

- a. Loose U-bolts.
- b. Loose rebound clips.
- c. Loose or worn shackle bushings.
- d. Lack of lubrication (spring slap).

Remedies.

- a. Tighten U-bolts. Check spring for broken leaves and rebuild or replace as necessary.

- b. Tighten the rebound clips by disassembling spring and rivetting clip. If truck is equipped with the clamp type, tighten the bolt.
- c. Instal new shackle bushings and tighten.
- d. Lubricate rear springs. Spring slap occurs when springs move sideways.

3. SPRING BREAKAGE.

Possible Causes.

- a. Overload.
- b. Loose U-bolts.
- c. Inoperative shock absorbers.
- d. Normal fatigue.

Remedies.

- a. Replace broken spring and avoid overloading truck.
- b. Replace broken spring. (This type of breakage will occur at or near the bolt hole.) Tighten U-bolt nuts.
- c. Replace broken spring. Test shock absorbers and replace as required.
- d. Breakage from normal fatigue generally occurs between the front eye of the spring and the centre bolt. If this occurs, replace spring and tighten U-bolts.

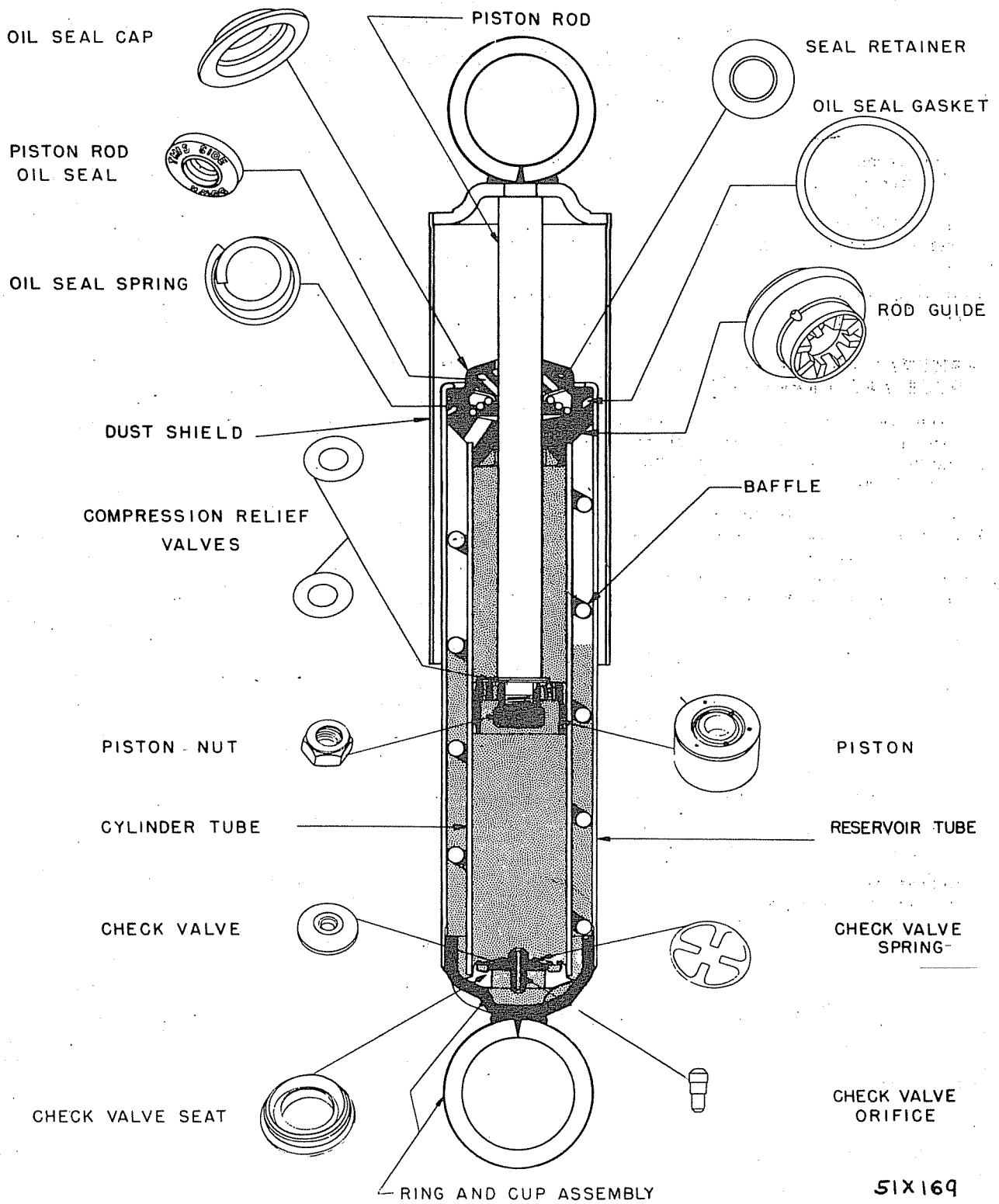


Fig. 4—Oriflow Shock Absorber.

SHOCK ABSORBERS

Models 1-08A, Front and Rear,
Model 2-26A, 2-33A, Front Only.

The above models are fitted with shock absorbers of two different types. On the above models with low serial numbers, the shock absorbers will have the name "MONROE" stamped on the cover, and later serial numbers will have "ORIFLOW" stamped on the cover.

Both types of shock absorbers are not serviceable and should be replaced when failure occurs.

1. REMOVAL AND INSTALLATION OF SHOCK ABSORBERS (BOTH TYPES).

To remove a shock absorber, remove the nuts from the pins which pass through the eye at the top and bottom of the shock absorber. Then, slide the unit off the pins.

When installing a shock absorber, be sure the rubber bushings are placed between the pins and the eyes of the shock absorbers, with the flat washers at the outer ends of the bushings. Never use grease or oil on the rubber bushings.

a. INSTALLATION.

To ensure immediate operation of the shock absorber when installed on the truck, pump the air out of the cylinder tube by operating the shock absorber as follows:—

- (1) Hold the shock absorber in its upright position and extend it to its maximum length.
- (2) Turn the shock absorber upside down and collapse it to its shortest possible length.
- (3) Repeat steps (1) and (2) three times to ensure the removal of all air.

CAUTION.

Do not expand the shock absorber when it is in its upside down position. If this is done, the cylinder tube will refill with air and the above operation will have to be repeated.

b. SERVICING.

The "Oriflow" and "Monroe" type shock absorbers

cannot be refilled or disassembled. If replacement is necessary, install a new unit.

2. TESTING SHOCK ABSORBERS.

a. "Oriflow" Type.

"Oriflow" shock absorbers cannot be bench tested.

Only a road test can determine whether this type of shock absorber is performing satisfactorily. Test drive car over extremely rough road to check resistance under high shock absorber piston speed. Then drive car over smooth road to test control under lower piston speed. If both rough and smooth road conditions give you a smooth ride, shock absorbers are acting as they should. If you "hit bottom" or experience excessive bounce and poor road control, shock absorbers need to be replaced.

b. "Monroe" Type.

To check the shock absorber after it has been removed from the car, clamp flat side of lower eye in a vice with the shock absorber in an upright position.

Operate the shock absorber a few full strokes to remove the air from pressure cylinder.

Pump shock absorber up and down, resistance to movement should be felt through the full length of the stroke with no evidence of backlash when direction of movement is reversed near mid stroke. If outside cylinder cannot be moved up, or down, the shock absorber is offering too much resistance. If barrel slides up and down without any resistance at all, or if the shock absorber is leaking fluid, the unit should be replaced.

3. REPLACING "MONROE" TYPE SHOCK ABSORBER WITH "ORIFLOW" SHOCK ABSORBER.

When a defective "Monroe" shock absorber is replaced with an "Oriflow" unit, it is recommended that the shock absorber on the opposite side of the vehicle also be replaced, regardless of condition, for maximum riding comfort and safety balanced road control.

STEERING SERVICE STANDARDS

Model Designation. →	1-08AD 1-08AF 1-08AS	2-26AD 2-26AF 2-26AS	2-33AD 2-33AF 2-33AS	3-59AD 3-59AF 3-59AS	6-71AD 6-71AF 6-71AS	8-65AD 8-65AF 8-65AS	8-71AD 8-71AF 8-71AS	8-71AD-D 8-71AF-D 8-71AS-D
Type	Worm & Roller	Worm & Roller	Worm & Roller	Cam & Lever	Cam & Roller	Cam & Roller	Cam & Roller	Cam & Roller
Ratio	18.2 to 1	18.2 to 1	18.2 to 1	16 to 1	18 to 1	18 to 1	18 to 1	18 to 1
Turning Circle (feet)								
Right	36 $\frac{1}{4}$	42 $\frac{1}{2}$	42 $\frac{1}{2}$	56	58	57	58	58
Left	36 $\frac{1}{4}$	42 $\frac{1}{2}$	42 $\frac{1}{2}$	56	58	57	58	58
Wheel Base (inches)	108	126	133	159	171 $\frac{1}{2}$	165	171 $\frac{1}{2}$	171 $\frac{1}{2}$

TIGHTENING REFERENCE

Part Name.	Torque (foot pounds)
Steering gear to frame bolt	45 to 50
Steering wheel nut	35 to 40
Pitman arm nut	100 to 125

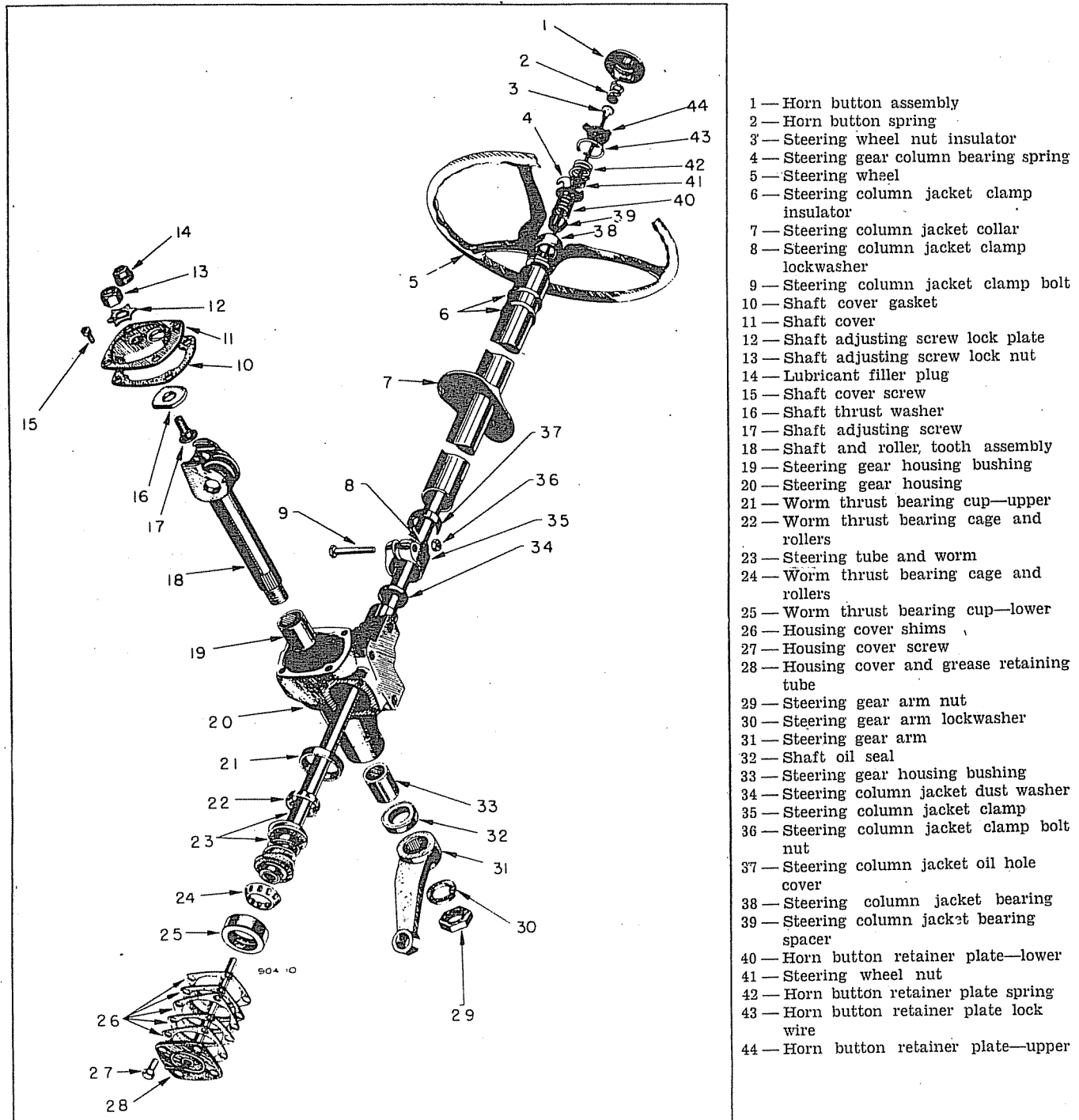


Fig. 1—Typical Steering Gear (Disassembled) Worm and Roller Type.

Model 1-08A, 2-26A, and 2-33A.

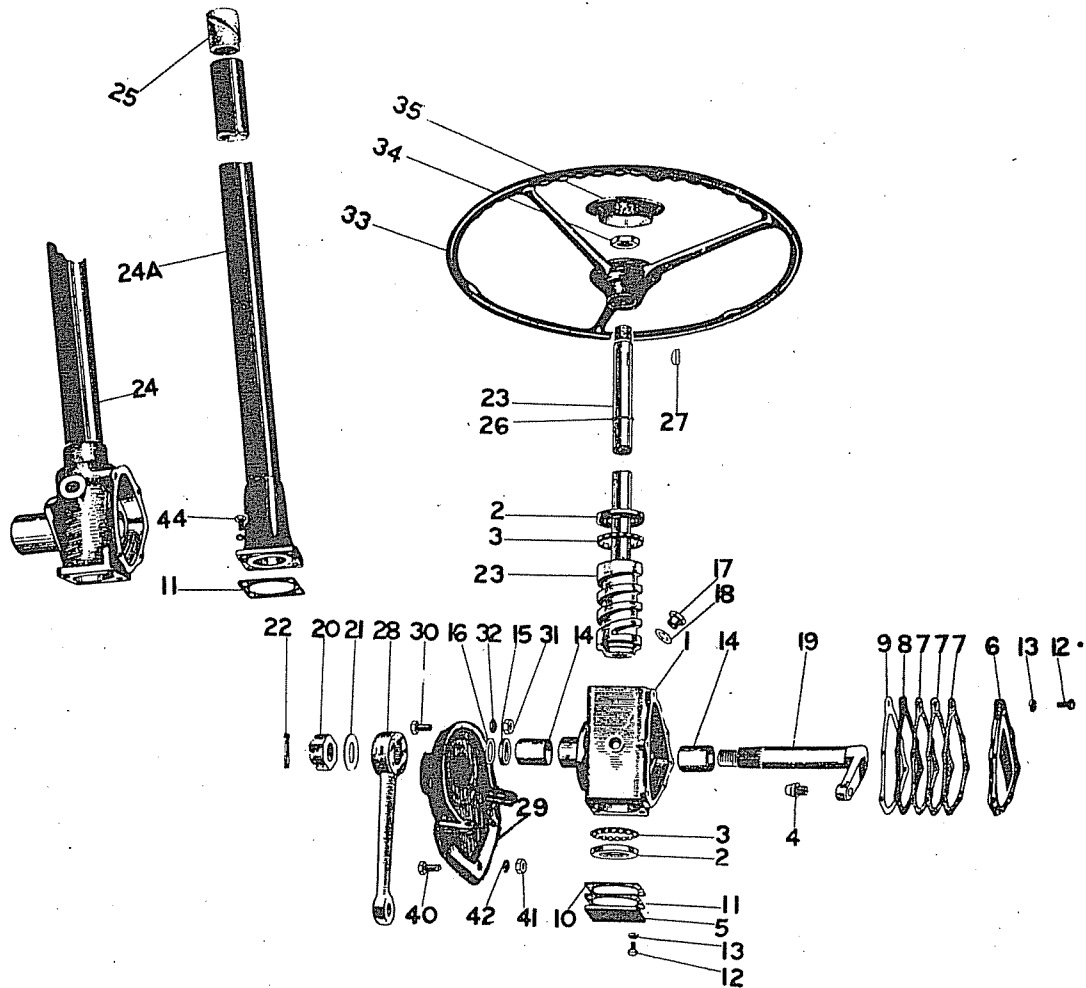


Fig. 2.—Typical Steering Gear Cam and Lever Type. Models 3-59A.

- | | |
|--|--|
| 1. Steering gear housing. | 21. Rocker shaft nut washer. |
| 2. Steering bearing cup, upper and lower. | 22. Rocker shaft nut cotter pin. |
| 3. Steering bearing cage, upper and lower. | 23. Cam and shaft. |
| 4. Rocker shaft peg. | 24. Outer tube. |
| 5. Steering box bottom cover. | 24A. Outer tube steering and socket assem. |
| 6. Steering box side cover. | 25. Steering inner felt bush. |
| 7. Side cover shims. | 26. Steering inner felt bush retainer. |
| 8. Side cover shim. | 27. Steering inner shaft key. |
| 9. Side cover gasket. | 28. Steering drop arm. |
| 10. Steering box shim, top and bottom. | 29. Steering box bracket. |
| 11. Gasket top and bottom cover. | 30. Steering box to bracket bolt. |
| 12. Bottom and side cover screw. | 31. Steering box to bracket nut. |
| 13. Steering box screw washer. | 32. Steering box to bracket washer. |
| 14. Steering box bush. | 33. Steering wheel. |
| 15. Steering box cork washer. | 34. Steering wheel nut. |
| 16. Steering box cork disc. | 35. Horn cover. |
| 17. Steering box oil plug. | 40. Bracket to frame bolt. |
| 18. Steering box oil plug washer. | 41. Bracket to frame nut. |
| 19. Rocker shaft. | 44. Top cover bolt. |
| 20. Rocker shaft nut. | |

NOTE.— Models 6-71A, 8-65A, 8-71A and 8-71A-D are fitted with cam and roller type steering similar to the above illustration. The only variation is that the peg (4) is fitted in a roller bearing.

STEERING

NOTE: The steering knuckles and arms are heat treated to obtain inherent characteristics required for these parts. If these parts become bent they should be replaced. Heating these parts for straightening, or correcting any irregularity will make them unfit for use because this additional heating destroys the result of initial heat treatment.

REMOVAL AND DISASSEMBLY

1. REMOVAL AND INSTALLATION OF STEERING GEAR—ALL MODELS.

- (1) Disconnect the horn wire at connector between bottom of steering gear and horn, on models 3-59A, 6-71A, 8-65A, 8-71A and 8-71A-D. Disconnect horn wire at R.H. side of splash shield.
- (2) Press firmly on the horn button and rotate it to the right as far as it will go. Relieve pressure and horn button will pop out.
- (3) Remove horn contact button and plate.
- (4) Remove steering wheel nut.
- (5) Pull steering wheel off steering tube using special puller.
- (6) Remove steering column "U" bolt clamp. On some models, also remove instrument panel cover plate and dash panel cover plate.
- (7) Remove steering gear arm (Pitman arm) from steering arm shaft with special puller C-143.
- (8) Remove floor board.
- (9) Remove bolts holding steering gear housing to frame and remove steering gear assembly out of truck.

Instal by reversing the above procedure.

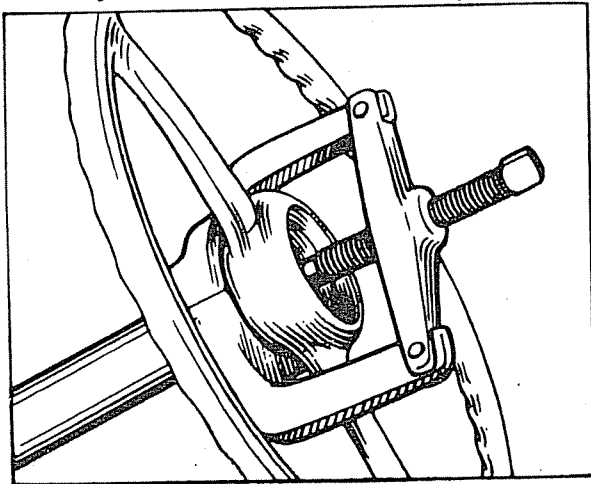


Fig. 3—Removing Steering Wheel, Tool C-232.

2. DISASSEMBLY OF STEERING GEAR. 1-08A, 2-26A, 2-33A.

- (1) Drain lubricant out of housing.
- (2) Fasten the steering gear in a bench vice with the steering column jacket horizontal.
- (3) Remove the cross shaft adjusting screw lock nut and cover cap screws.
- (4) Remove the cross shaft and shaft cover from the housing.
- (5) Pull the cross shaft bearing oil seal out of the housing. (Leave in place if not necessary to remove).
- (6) Remove cover and grease tube assembly with shims, from the bottom of the steering gear housing.
- (7) Loosen the column jacket clamp and pull the jacket off the steering gear housing.
- (8) Pull the steering tube and worm assembly out of the bottom end of the housing.
- (9) Remove the cross shaft bushing by means of a puller.
- (10) Remove tube and worm upper bearing cup with a soft drift, if necessary to replace this part.

To instal steering gear, reverse the foregoing operations, ensuring the following operations are carried out:

- (1) Thoroughly clean the inside of the steering gear housing as well as the steering gear worm cross shaft and bushings. Do not coat any parts with lubricant until adjustments and assembly have been completed.
- (2) If bushings have been removed, press new bushings into place.
- (3) Instal cross shaft oil seal.

Make adjustments properly, as outlined under Steering Gear Adjustments. Then instal lubricant in steering gear housing.

3. STEERING GEAR ADJUSTMENT— MODELS 1-08A, 2-26A, 2-33A.

Adjustments are provided for end play of the worm shaft bearings, cross shaft and mesh of the roller tooth or sector with the steering worm.

Adjustments may be made while the steering gear is assembled in the truck, or by a slightly different

procedure during the process of assembling after having been disassembled for complete overhauling.

a. Steering Gear Worm Bearing.

Procedure for adjusting worm bearing when the gear is assembled in the truck is as follows:

- (1) Rotate the steering wheel to the extreme right or left, then turn back $\frac{1}{4}$ turn to relieve side thrust on the worm bearings.
- (2) Press a finger at the point between the bottom of the steering wheel hub and the shell.
- (3) Have a helper shake the front wheels hard sideways, but not enough to turn the steering wheel. Any end play in the worm bearings can then be felt at the steering wheel hub.
- (4) If any excessive end play exists, remove the engine splash pan and disconnect the horn wire at the connector between the steering gear and horn.
- (5) Remove the cap screws which hold the grease retainer cover and tube at the bottom of the steering gear housing.
- (6) Remove shims between this cover and the steering gear housing of sufficient thickness to eliminate end play in the worm but not enough to cause binding when the cover is bolted tightly in place.
- (7) Turn the steering from extreme right to left. If any stiffness exists, too many shims have been removed or the steering gear is misaligned on the truck.

b. Roller Tooth or Sector and Worm.

End play of the cross shaft and mesh of the roller tooth or sector with the steering worm may be adjusted as follows:

- (1) Disconnect the drag link from the pitman arm.
- (2) Turn the steering wheel to the mid position. To do this, turn the wheel to extreme right or left. Then turn back to the opposite extreme, counting the number of turns required to make the turn from one extreme to the other. Then, turn the steering wheel back one half that number of turns. The steering wheel will then be in mid position.
- (3) With the steering wheel in mid position, move the pitman arm back and forth to determine whether or not there is any backlash. There should be no backlash, but if there is more than $\frac{3}{32}$ inch free movement at the end of the pitman arm, the mesh of the roller tooth and worm should be adjusted.
- (4) Remove the cross shaft adjustment screw lock nut (2), Figure 4.
- (5) Slide off the lock plate far enough to clear the lock bars on the cross shaft cover.

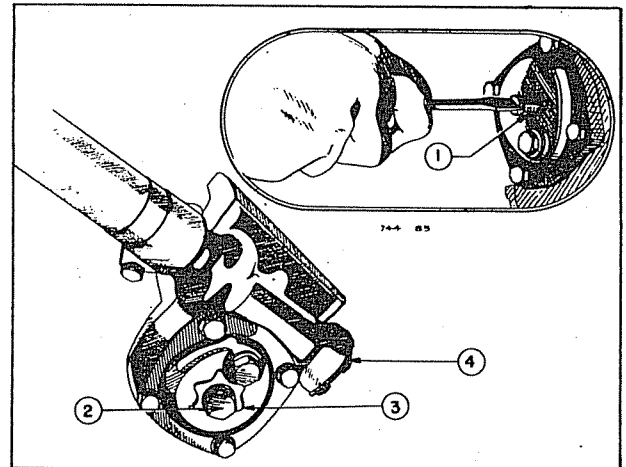


Fig. 4—Steering Gear Adjustments.

- 1 — Adjusting screw and thrust washer
- 2 — Adjusting screw lock nut
- 3 — Adjusting screw lock plate
- 4 — Bearing adjusting shims

- (6) Tighten the cross shaft adjustment screw (1) Figure 4, just enough to eliminate the free play between the cross shaft and the worm. **It must not bind.**
- (7) Slide the lock plate into position against the cross shaft cover and lock it.
- (8) Re-install and tighten the cross shaft adjustment screw lock nut.
- (9) Check the steering operation again for binding and backlash. Correct any inaccuracies in adjustment.
- (10) Re-install the drag link.

c. Testing Adjustment of Steering Gear.

If adjustment of the steering gear is made while the steering gear is being assembled out of the truck, measure with scales the amount of torque required to rotate the steering wheel, especially if new parts have been installed. This measurement is performed by hooking the scales on the rim of the steering wheel at a spoke and pulling the wheel around with the scales.

The amount of torque required to rotate the steering wheel (when the roller tooth or sector shaft is assembled in the housing) should be between 1 to $2\frac{1}{4}$ pounds pull required on the rim of the steering wheel to rotate it through mid-position. If this adjustment is made with the roller tooth or sector shaft removed, measure the actual bearing pre-load with an inch-pound torque wrench and bring it to within 5 to 10 inch pounds.

4. DISASSEMBLY OF STEERING GEAR— 3-59A, 6-71A, 8-65A, 8-71A, and 8-71A-D.

- (1) Remove steering box bracket screw from housing. Remove bracket. Inspect bushes for wear.
- (2) Remove screws which hold gear side cover to housing. Remove side cover shims and gasket.
- (3) Slide the lever shaft from the housing.
- (4) Remove steering box bottom cover screws. Remove cover, shims, gasket and bearings.
- (5) Remove four retaining screws which hold the steering outer tube to the steering gear housing.
- (6) Remove outer tube, cam and shaft, lever shaft, bearings and shims.

When assembling, reverse the foregoing operations.

5. ADJUSTMENTS—3-59A, 6-71A, 8-75A, 8-71A and 8-71A-D.

a. Cam Bearing End Play.

- (1) Turn the steering wheel one turn to the left from the straight-ahead position. Secure in this position by tying one spoke to the right door hinge pillar and holding the wheel against it as a brace.
- (2) Grip the steering column with the other hand just below the steering wheel hub with side fingers just touching the lower end of the

steering wheel hub. This will enable any end play in the cam bearings to be felt by up and down movement of the steering wheel hub.

- (3) Have a helper shake the front wheels hard sideways. If any end play at all is found at the steering wheel hub, the cam bearing needs to be adjusted.

b. Adjustment of Cam Ball Thrust Bearings.

- (1) Loosen the side cover screws to free the stud in the cam groove.
- (2) Remove the steering outer tube to the steering box to permit the removal of shim "B" (Figure 5).
- (3) Clip and remove one or more of the thin shims as required.
- (4) Re-assemble tube and housing and tighten into place.
- (5) Test adjustment and if necessary remove or add shims "B" (Figure 5) to the top or lower bearings to centralise stud in the cam groove until adjustment is correct. The bearings should be tightened until a barely perceptible drag is felt when the steering wheel is turned.

6. INSPECTION OF BACKLASH OF TAPERED STUD IN CAM GROOVE.

- (1) Make certain drag link is disconnected and steering gear properly aligned.

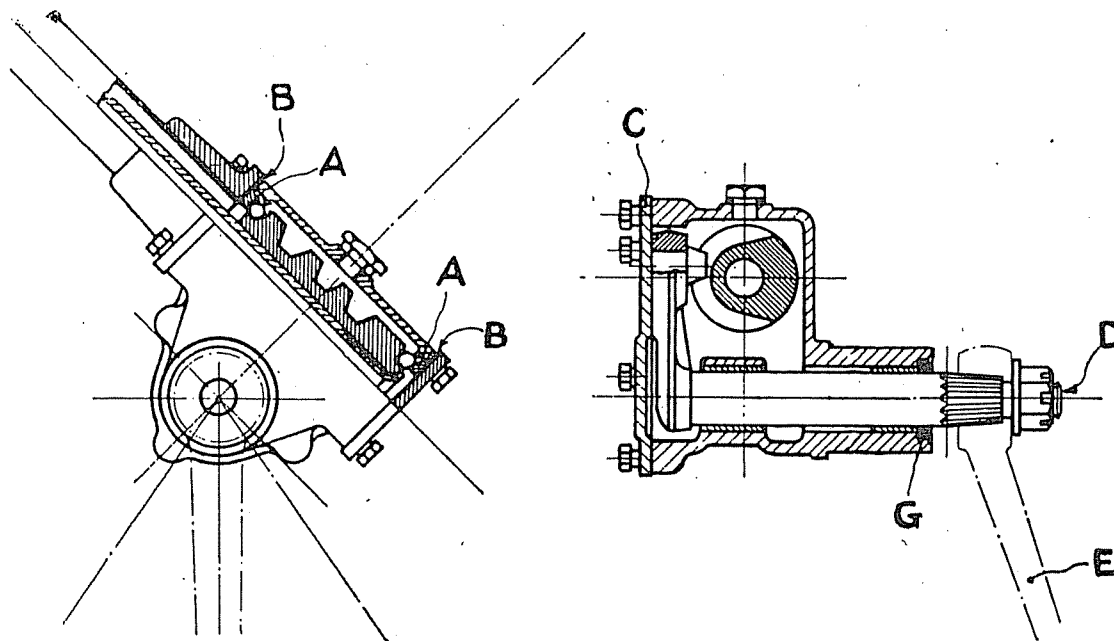


Fig. 5.—Section of Steering Gear.

- (2) Turn the steering to mid-position. This is achieved by turning the wheel to the extreme right or left, then turning it to the opposite extreme, counting the number of turns required. Then, turn it back one half of the number of turns, centering the steering wheel spokes in their proper location.
- (3) With the gear in its mid-position, shake the pitman arm to determine lost motion. If this motion exceeds $\frac{3}{8}$ inch at the end of the pitman arm, lever shaft adjustment should be made.

a. ADJUSTMENT FOR BACKLASH OF TAPERED STUD IN CAM GROOVE

The lever shaft should be adjusted until a very slight drag is felt through the mid-position when turning the steering wheel slowly from one extreme to the other. Adjust by following the procedure outlined below:

- (1) Remove screws which hold steering box side cover plate. Remove cover and shims "C" (Figure 5).
- (2) The shims are in varying thickness so that a fine adjustment can be made.
- (3) Add or remove shims of the required thickness to eliminate backlash.

Care must be taken to ensure the correct shims are fitted as possibly the steering will become too tight in the central position and this must be avoided.

Secure the gear at all points which were loosened to make adjustments. Also check tightness of mounting screws. With all supporting brackets clamped tight, turn steering to check for stiffness.

CAUTION

Do not tighten steering to dampen out steering troubles. Adjust steering gear only to remove play in the unit.

7. STEERING (PITMAN ARM) ALL MODELS.

The pitman arm is secured to the lever with a nut and on some models a cotter pin. To remove and assemble the pitman arm, proceed as follows:

- (1) Remove cotter pin (if fitted) and nut.
- (2) Remove pitman arm from splines using a suitable puller (C-143 or C-410).

CAUTION

Do not attempt to hammer the drop arm off the shaft as the re-action of the hammer blow will

possibly cause damage to the steering gear housing and bearings.

When assembling the pitman arm, make sure it is fitted to the correct spline in order to obtain a full right and left hand lock. To do this, jack up the front of the vehicle with both front wheels in the straight-ahead position. Then, turn the steering wheel so that the cam and roller or lever are in the central position. Connect the pitman arm to the drag link, then assemble the pitman arm to the lever shaft. Test the steering to ensure that there is a full lock on both sides, and securely tighten the nut and fit new cotter pin. Make sure the drag link lock nuts are securely tightened.

8. REMOVAL AND INSTALLATION OF DRAG LINK—MODELS 1-08A, 2-26A, 2-33A, fitted with cross type steering.

- (1) Remove cotter pins and nuts from drag link ends.
- (2) Remove drag link.

Instal the drag link by reversing the above operation, paying particular attention to the following:

- (a) Set the front wheels in the straight-ahead position.
- (b) Centre the steering gear in the centre position or high spot with the pitman arm in the vertical position.
- (c) Instal drag link.
- (d) The drag link is not adjustable for length and should fit into place with only a slight movement of the pitman arm from the recommended position. If it does not, it indicates damaged parts, either the drag link or the pitman arm.

9. REMOVAL AND INSTALLATION OF DRAG LINK—ALL MODELS FITTED WITH FORE AND AFT STEERING.

The drag link is adjusted by means of drag link ends, these being fitted at one end to the pitman, and at the other to the steering knuckle arm. To remove an adjustable drag link end, proceed as follows:

- (1) Slacken off the lock nut. CAUTION: One lock nut has a right hand thread and the other a left hand thread.
- (2) Remove the ball pin. To do this remove the cotter pin and nut and give the end of the ball pin a sharp tap with a hammer to free it from the taper.
- (3) Unscrew the ends from the drag link.

When re-assembling, adjust so that a full right and left lock is obtained, and be sure that the drag link lock nuts are securely tightened.

10. STEERING WHEEL.

The steering wheel is located on the steering shaft by means of serration on Models 1-08A, 2-26A

and 2-33A, and with a key on Models 3-59A, 6-71A, 8-65A, 8-71A and 8-71A-D.

The centre spoke should be in the upward position with the other two spokes pointed downward at an angle. In this position maximum visibility of the speedometer and other instruments is obtained.

CAUTION

Tighten steering wheel nut securely.

SERVICE DIAGNOSIS

Conditions — Possible Causes — Remedies

11. CAUSES OF BACKLASH.

- (a) Excessive end play of steering gear worm.
- (b) Improper mesh of worm and sector.
- (c) End play in steering gear arm shaft, or worm bearing on steering gear arm shaft.

Sometimes backlash is caused by lost motion in parts other than the steering gear. To quickly determine if the backlash is in the steering gear, disconnect the drag link from the steering gear arm and rock the arm forward and backward. Excessive steering gear backlash will be indicated by excessive free travel of the arm.

12. STEERING GEAR COLUMN.

A slight bind in the steering gear is sometimes caused by the cab shifting. If this condition occurs, the cab bolts should be properly adjusted. The steering gear should be loosened at the frame and brackets, allowing the steering column to seek its free position. Then, tighten the steering gear frame bolts and tighten the dash bracket.

13. HARD STEERING.

Possible Causes

- (a) Insufficient lubricant.
- (b) Front tyres underinflated.
- (c) Tight steering assembly.
- (d) Bent steering linkage.
- (e) Worn steering gear.
- (f) Worn king pins.

- (g) Bent steering knuckle.
- (h) Sagging or broken front spring.
- (i) Bent or twisted frame.
- (j) Steering column misaligned.

Remedies

- (a) Fill housing with correct lubricant if lubricant level is below filler plug hole. Refer to Lubrication Section for proper lubricant and amount.
- (b) Inflate tyres to recommended pressure. Refer to Service Standards, Wheels and Tyres Section.
- (c) Adjust steering gear.
- (d) Check for bent tie rods, steering knuckle arms, or steering knuckles. Replace bent or damaged parts as required.

CAUTION: Never attempt to straighten these parts by heating.

- (e) Remove and disassemble steering gear and replace parts as necessary.
- (f) Service king pins and bushings. Replace parts as required.
- (g) Remove bent steering knuckle and replace parts as needed.
- (h) Remove damaged front spring and instal new parts as required.
- (i) Check frame dimensions. Refer to Service Standards, Frame Section, Straighten as necessary.
- (j) Check steering housing alignment. Correct as necessary.

14. LOOSE STEERING.**Possible Causes.**

- (a) Worn tie rod ends.
- (b) Steering gear mounting loose.
- (c) Worn sector shaft bushings or bearings.
- (d) Improper steering adjustment.
- (e) Worn king pins or bushings.
- (f) Loose or worn front wheel bearings.
- (g) Bent steering cross shaft.

Remedies

- (a) Check tie rod ends and replace those that show wear.
- (b) Tighten mounting bolts to the proper torque.
- (c) Replace bushings (if truck is so equipped) as required.
- (d) Re-adjust steering gear.
- (e) Replace worn king pins and bushings.
- (f) Check front wheel bearings for looseness and then inspect for damage. Replace parts as needed.
- (g) Replace bent cross shaft.

15. LOW SPEED SHIMMY.**Possible Causes.**

- (a) Too much caster.
- (b) Worn king pins and bushings.
- (c) Loose steering gear.
- (d) Loose wheel bearings.
- (e) Weak or broken springs.
- (f) Worn tie rod ends.

Remedies

- (a) Re-adjust caster, refer to Service Standards, Front Axle Section for caster specifications.
- (b) Replace worn king pins and bushings.
- (c) Adjust steering gear.
- (d) Inspect wheel bearings for possible damage. Then, replace parts as necessary and re-adjust.
- (e) Check height of front and rear springs. Replace weak or broken springs.
- (f) Replace worn tie rod ends. Make sure tie rod ends are threaded proper distance on short and long rod.

16. HIGH SPEED SHIMMY.**Possible Causes**

- (a) Eccentric wheels or tyres.
- (b) Wheels out-of-balance.
- (c) Weak or broken springs.
- (d) Wheel or tyre wobble.
- (e) Front tyres underinflated.
- (f) Unequal inflation of tyres.
- (g) Whipping propeller shaft.
- (h) Loose engine mounting.
- (i) Worn rear wheel bearings.
- (j) Worn universal joint.
- (k) Faulty shock absorbers.

Remedies

- (a) Check wheels and tyres for out-of-round and correct as necessary.
- (b) Balance wheels as necessary.
- (c) Check height of front and rear springs. Replace weak or broken springs.
- (d) Straighten wheel, or replace wheel and tyre assembly as required.
- (e) Inflate tyres to the proper pressure—all around. Refer to Service Standards, Wheels and Tyres Section.
- (f) Inflate tyres to proper pressure—all around. Refer to Service Standards, Wheels and Tyres Section.
- (g) Check propeller shaft and correct as necessary.
- (h) Tighten engine mounting bolts.
- (i) Replace worn rear wheel bearings. Reset axle shaft end play.
- (j) Check universal joint for excessive wear. Replace worn parts as required. Refer to Propeller Shaft and Universal Joints Section.
- (k) Replace worn or inoperative shock absorbers.

17. WANDER OR WEAVE.**Possible Causes.**

- (a) Wrong caster adjustment.
- (b) Incorrect toe-in adjustment.
- (c) Worn king pins and bushings.
- (d) Worn front wheel bearings.
- (e) Tighten steering assembly.
- (f) Loose spring shackles.

- (g) Weak or broken springs.
- (h) Bent or broken frame.
- (i) Loose rear axle "U" bolts.
- (j) Unequally inflated tyres.
- (k) Unequal tyre wear.
- (l) Overloading.

Remedies

- (a) Re-adjust caster, Refer to Service Standards, Front Axle Section for caster specifications.
- (b) Re-adjust toe-in. Refer to Service Standards, Front Axle Section.
- (c) Replace worn king pins and bushings.
- (d) Replace parts as necessary.
- (e) Adjust steering.
- (f) Adjust and secure shackles.
- (g) Check height of front and rear springs. Replace weak or broken springs.
- (h) Check frame alignment. Align, Repair or replace frame as necessary.
- (i) Tighten "U" bolts to required torque.
- (j) Inflate tyres to recommended pressure all round. Refer to Service Standards, Wheels and Tyres Section.
- (k) Refer to Service Diagnosis, Wheels and Tyres Section for Possible Causes and Remedies of

excessive, or unequal tyre wear. Correct as indicated in Remedies.

- (l) Avoid overloading truck.

18. TRUCK LEADS TO ONE SIDE.

Possible Causes

- (a) Incorrect camber.
- (b) Tyres unequally inflated.
- (c) Dragging brake.
- (d) Steering off high spot.
- (e) Tight king pin bushing.
- (f) Tight or dry wheel bearings.

Remedies

- (a) Re-adjust camber, Refer to Service Standards, Front Axle Section for camber adjustment specifications.
- (b) Inflate tyres to recommended pressure all round. Refer to Service Standards, Wheels and Tyres Section.
- (c) Refer to Service Diagnosis, Brakes Section, for Possible Causes and Remedies of Dragging Brake. Correct as indicated in remedy.
- (d) Adjust steering.
- (e) Free up king pin bushings, Replace if necessary.
- (f) Inspect wheel bearings for possible damage. Replace if necessary and adjust.