



FRONT AXLE

Specifications covering IHC F-553-A Front Axle for Truck Models R-1853 to RF-194 inclusive and the Timken FE-900 Front Axle for Truck Models R-190 to RF-210 inclusive are listed in the following chart:-

FRONT AXLE SPECIFICATIONS

FRONT AXLE MODEL	F-553-A	FE-900
Tie Rod Diameter	1-1/8"	1-1/2"
Knuckle Pin Diameter	1-15/16"	1-39/64" (large end)
Knuckle Pin Length	4-21/32"	9-3/4"
Knuckle Pin Thrust Bearing Type	Ball	Roller
Steering Knuckle Spindle Diameter: At Inner Bearing Diameter	2-1/16"	2-3/8"
At Outer Bearing Diameter	1-5/16"	1-3/4"
I-Beam Section	3-3/8x2-1/4"	4x3-9/16"
Alignment Data:		
*A-Center of Steering Arm Ball to level of Spring Pad	4-1/16"	4-3/4"
*B-Spring Centers	31-1/8"	31-1/8"
*E-Camber at Rim (Degrees)	1°	1°
*F-Knuckle Pin Inclination (Degrees)	4°	5-1/2°
*G-Caster (Degrees)	2° to 3°	2° to 3°
*H-Center of Steering Arm Ball to Center Line of I-Beam
*MN-Toe-In (Measured from Thread Centers with Cambers and Caster according to Specifications)	1/16-1/8"	1/16-1/8"

* Key letters refer to illustrations appearing under Axle-Front, Section A, page 3, L-Line.



FRONT AXLE GROUP

Motor truck models and their corresponding front axle models are shown in the following list. Axle model specifications will be found on page 2 of this section.

TRUCK MODEL	AXLE MODEL	TRUCK MODEL	AXLE MODEL
L-110	F-160	L-184	F-580
L-120	F-170	L-185	F-580
LM-120	F-170	LC-180	F-580
L-130	F-170	L-190	F-553
LB-140	F-170	L-193	F-553
L-150	F-280	L-194	F-553
L-153	F-280	L-195	F-553
LM-150	F-270	LC-190	F-553
L-160	F-360	LF-190	F-553
L-163	F-360	L-200	F-653
L-164	F-360	L-204	F-653
L-165	F-360	L-205	F-653
LC-160	F-360	LC-200	F-653
L-170	F-580	L-210	F-751
L-173	F-580	LF-210	F-751
L-174	F-580	L-220
L-175	F-580	L-225
LF-170	F-580	LF-220	F-750
L-180	F-580	L-230	F-750
L-183	F-580	LF-230

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FRONT AXLE SPECIFICATIONS

FRONT AXLE MODEL	F-160	F-170	F-270	F-280	F-360	F-580	F-553	F-653	F-750	F-751
Tie Rod Diameter	3/4"	3/4"	1"	1"	1"	1-1/8"	1-1/8"	1-1/4"	1-1/2"	1-1/2"
Knuckle Pin Diameter	.861	.861	1.110	1.110	1.110	1.234	1.234	1.484	1.359	1.359
Knuckle Pin Diameter O.S.	.876	.876								
Knuckle Pin Diameter O.S.										
Knuckle Pin Length	5-7/16"	5-7/16"	6-1/4"	6-1/4"	6-1/4"	6-3/4"	7-21/32"	7-1/2"	9-5/8"	9-5/8"
Knuckle Pin Thrust Bearing Type	Ball	Ball	Roller	Roller	Roller	Roller	Roller	Roller	Roller	Roller
Steering Knuckle Spindle Diameter:										
At Inner Bearing Diameter	1.3125	1.3125	1.562	1.562	1.562	1.750	2.000	2.125	2.250	2.250
At Outer Bearing Diameter	.8122	.8122	.937	.937	.937	1.000	1.1875	1.375	1.750	1.750
I-Beam Section	2-1/4" x 1-11/16"	2-7/16" x 1-13/16"	2-11/16" x 1-7/8"	2-7/8" x 2"	3" x 2-1/8"	3-1/4" x 2-1/8"	3-3/8" x 2-1/4"	3-13/16" x 2-1/2"	3-3/4" x 2-3/4"	3-3/4" x 2-3/4"
Alignment Data:										
A-Center of Steering Arm Ball To Level of Spring Pad	2-5/8"	2-5/8"	2-5/8"	2-29/32"	2-29/32"	3-1/4"	4-1/16"	4-9/32"	4-27/32"	4-27/32"
B-Spring Centers	28"	28"	28-1/16"	31-7/8"	31-7/8"	31-7/8"	31-1/8"	31-1/8"	31-1/8"	31-1/8"
E-Camber At Rim (Degrees)	2°	2°	1°	1°	1°	1°	1°	1°	1°	1°
F-Knuckle Pin Inclination	4°	4°	4°	4°	4°	4°	4°	4°	4°	4°
G-Caster - Degree	2 to 3°	2 to 3°	2 to 3°	2 to 3°	2 to 3°	2 to 3°	2 to 3°	2 to 3°	2 to 3°	2 to 3°
H-Center of Steering Arm Ball to Center Line of I-Beam	2-17/32"	2-17/32"	2-1/2"	0	0	0	0	0	0	0
MN-Toe-In (Measured From Tread Centers With Camber and Caster According to Specifications)	1/8 to 3/16"	1/8 to 3/16"	1/16 to 1/8"	1/16 to 1/8"	1/16 to 1/8"	1/16 to 1/8"	1/16 to 1/8"	1/16 to 1/8"	1/16 to 1/8"	1/16 to 1/8"





FRONT AXLES

F-160, F-170

Steering Knuckle Pins and Bearings
(See Figs. 1 and 2)

Steering knuckle thrust bearings, located between knuckles and lower faces of I-beam, support the entire front end load. The end play must be kept within proper limits to prevent excessive wear. The use of spacing washers to correct this condition is described in subsequent paragraphs. A tapered draw key with nut and lockwasher hold knuckle pin rigidly in end of I-beam.

The draw keys should be inspected occasionally to assure their being tight. If one becomes loosened, knuckle pin hole as well as draw key hole will become worn and necessitate replacing or machining of I-beam.

Steering knuckle pins and bushings are available in sets to facilitate replacement service.

Oversize steering knuckle pins are available for use if the I-beam hole has been worn. Installation of oversize pins necessitate reaming hole in the I-beam and bushings to the new diameter.

Bronze bushings are used in steering knuckle at upper and lower knuckle pin holes. Seals at top and bottom consist of expansion plugs pressed into steering knuckle.

Removal of expansion plugs can be readily accomplished by drilling a 1/4" hole through one of the plugs. Remove knuckle pin draw key. Insert a punch in hole in expansion plug and drive pin against opposite plug, forcing it from its recess. Reverse direction of pin travel and force out drilled expansion plug.

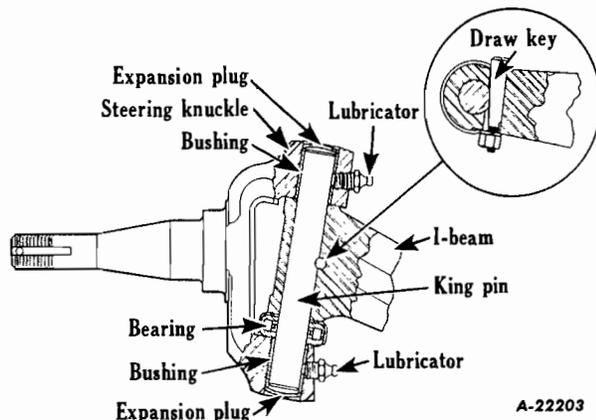


Fig. 1

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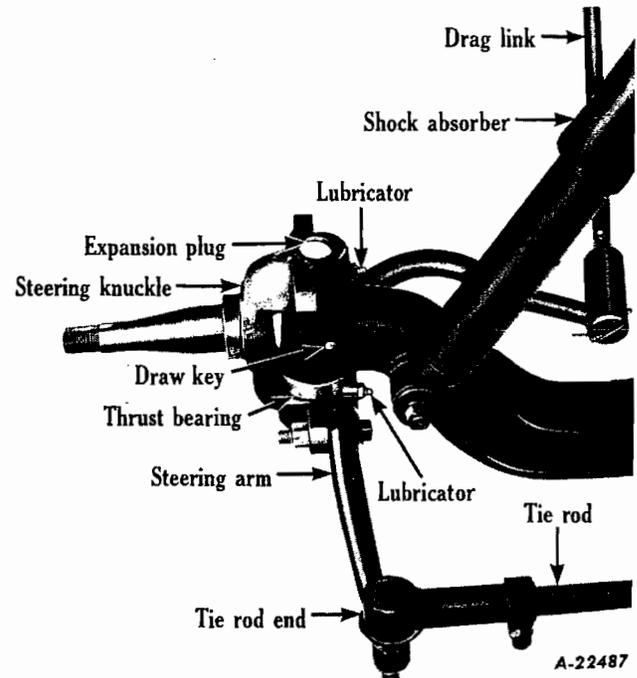


Fig. 2

Refitting Steering Knuckle Pin Bushings

After ascertaining that steering knuckle bushings require replacement, the following procedure will be found efficient and helpful:

For service stations doing a large volume of steering knuckle bushing service work, there is a special set of installing arbors and burnishing tools available. Reamers are not necessary with this equipment.

1. Remove hub caps and grease caps.
2. Remove spindle nut cotter keys and spindle nuts.
3. Remove wheels, inner bearings, and grease retainers from spindles.
4. Remove dirt shield screws and shields.
5. Remove bolts holding brake backing plate assemblies to steering knuckles. Lay assemblies back over ends of axle I-beams.
6. Remove tapered draw keys holding knuckle pins.
7. Remove expansion plugs from top and bottom of steering knuckles.
8. Drive out knuckle pins.



9. Remove steering knuckles, thrust bearings, and any spacer shims present.
10. Clean all parts thoroughly in kerosene or Stoddard Solvent.
11. Remove old bushings, using an arbor or drift.
12. Install new bushings, with the grease holes lined up with the lubricating holes in the steering knuckles. Use an arbor press or vise for forcing the new bushings into place, piloting with a proper size arbor.
13. Line-ream new bushings. Use either special burnishing equipment or a reamer equipped to pilot in one bushing while reaming the other or a reamer long enough to ream both bushings at the same time.
14. Install steering knuckles, thrust bearings, spacer shims as required, and knuckle pins.
15. Install knuckle pin draw key and tighten securely. NOTE: Draw key nut and lock-washer should be located on front side of axle.
16. Insert expansion plugs in top and bottom of steering knuckles. Expand into recess by striking with a hammer.
17. Place brake backing plates in position and install bolts. Tighten bolts securely.
18. Install dirt shields and holding screws.
19. Clean and repack front wheel bearings.
20. Install new grease seals.
21. Install wheels and spindle nuts. Rotate wheel by hand while tightening nut until drag or bind is felt. Back off nut to first castellation and install new cotter key.
22. Install grease caps and hub caps.
23. Lubricate steering knuckle bushings.
24. Check and correct toe-in of wheels.

Steering Knuckle Stop Screws

Adjustable stop screws in steering knuckle limit movement of front wheels when turning and prevent tires from rubbing against nearest point on chassis and to prevent steering gear from bottoming. These screws should be adjusted so there will be ample clearance between front tires and nearest point on chassis when wheels are turned to extreme right or left under any conditions. NOTE: This should be checked when tire size is changed.

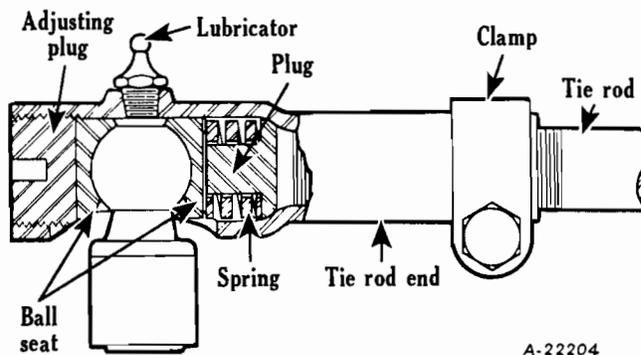


Fig. 3 - Details of tie rod end.

Tie Rod (Fig. 3)

Tie rod is of three-piece construction, consisting of two rod end assemblies. Rod is threaded into ends and locked with clamp bolts. Right and left-hand threads are provided to facilitate toe-in adjustment. The rod ends are self-adjusting and require no attention in service other than periodic lubrication and occasional inspection to see that ball studs are tight in steering knuckle arms.

Proper adjustment can be effected by:

1. Remove cotter key.
2. Tighten adjusting plug until it "bottoms" or is snug.
3. Loosen adjusting plug to the nearest cotter keyhole (not over 1/4 turn).
4. Install new cotter key.

NOTE: Always check and correct toe-in of front wheels after any adjustment of tie-rod ends.

Front Wheel Alignment

Front wheels must be kept in proper alignment in order to assure ease of steering and satisfactory tire life. Important factors of front wheel alignment are: Toe-in, camber and axle caster.

These points should be checked occasionally to guard against excessive tire wear.

Wheel Toe-In (Fig. 4)

Front-wheel toe-in is the setting of front wheels so that they are closer together at the front of the axle than at the rear.

Incorrect toe-in of front wheels will result in rapid tire wear. Excessive toe-in will produce a scuffing or "feather-edge" at the inside edge of the tire tread. Toe-out will produce a like wear but at the outside of the tire tread.

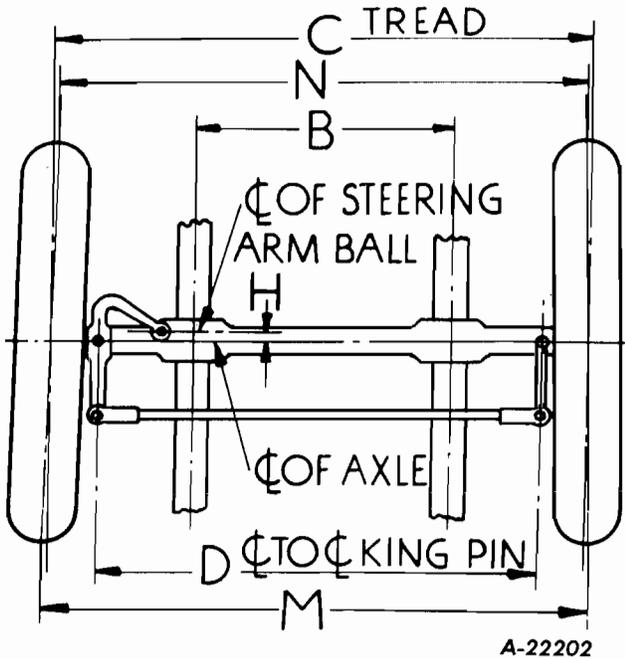


Fig. 4

Follow instructions of Tool Equipment Manufacturer for checking and correction of toe-in.

NOTE: Always recheck toe-in after any change in caster or camber angles, or after any alteration in tie-rod end adjustment.

Wheel Camber (Fig. 5)

Front-wheel camber is the inclination of the wheel from a vertical plane.

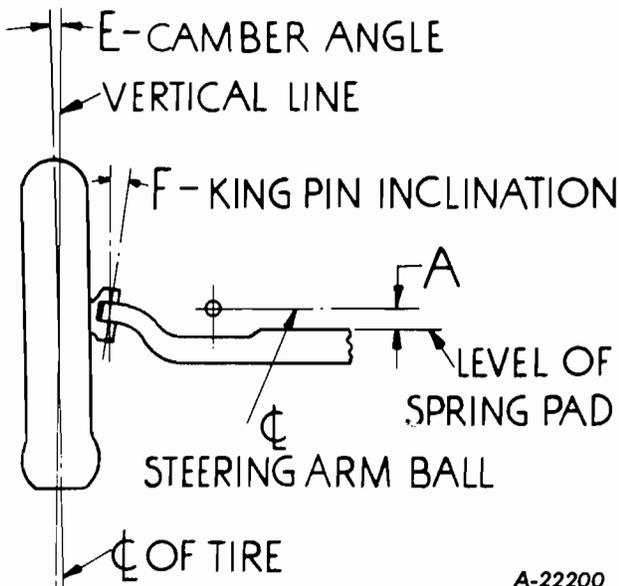


Fig. 5

"Positive" camber is an outward tilt or inclination of the wheel at the top.

"Negative" or "reverse" camber is an inward tilt of the wheel at the top.

Axle Caster (Fig. 6)

Caster is the amount of backward tilt at the top of the steering knuckle pin. When the top of the knuckle pin is tilted to the rear, the caster is positive. When the top of the knuckle pin is tilted to the front, the caster is negative.

The purpose of caster is to provide stability of steering.

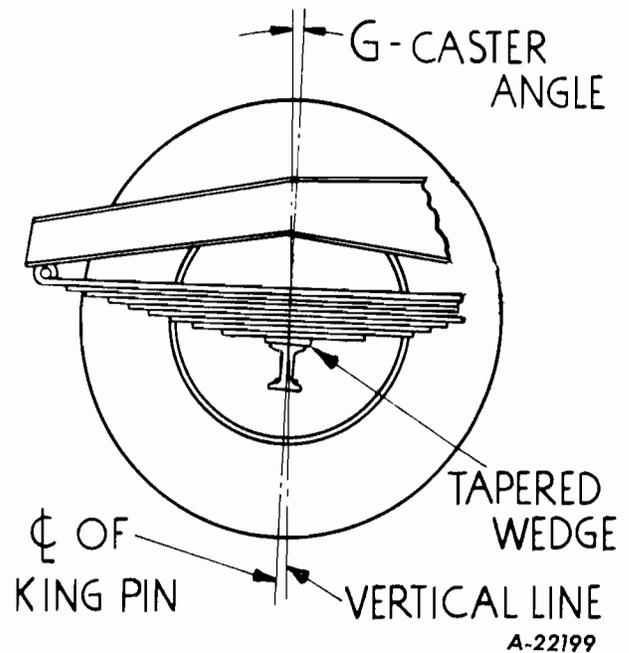


Fig. 6

Tapered wedge plates are available for use in altering the caster angle. They are to be installed between the springs and axle spring seats.

Installation with the thick end toward the rear will produce increased caster. If installed with thick end toward the front, will decrease caster.

Knuckle Pin Inclination (Fig. 5)

The angle which the kingpin makes with the vertical is known as kingpin inclination.

FRONT AXLES

F-270, F-280, F-360, F-580, F-553, F-653, F-750, F-751

Steering Knuckle Pins and Bearings (See Figs. 1 and 2)

Steering knuckle thrust bearings, located between knuckles and lower faces of I-beam, support the entire front end load. The end play must be kept within proper limits to prevent excessive wear. The use of spacing washers to correct this condition is described in subsequent paragraphs. A tapered draw key with nut and lockwasher hold knuckle pin rigidly in end of I-beam.

The draw keys should be inspected occasionally to assure their being tight. If one becomes loosened, knuckle pin hole as well as drawkey hole will become worn and necessitate replacing of I-beam.

Steering knuckle pins and bushings are available in sets to facilitate replacement service.

Bronze bushings are used in steering knuckle at upper and lower knuckle pin holes. Seals at top and bottom consist of gasket and plate, held in position by flat head screws and lockwashers.

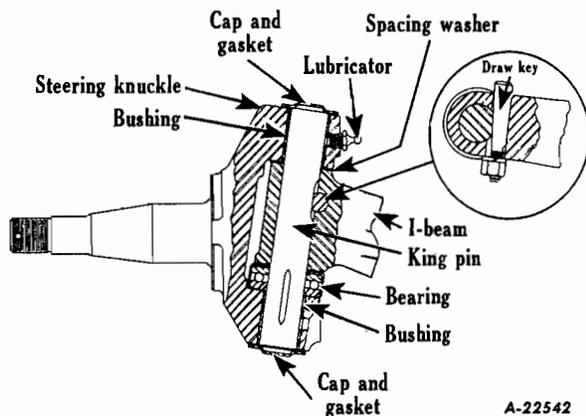


Fig. 1

Refitting Steering Knuckle Pin Bushings

For service stations doing a large volume of steering knuckle bushing service work, there is a special set of installing arbors and bur-nishing tools available. Reamers are not nec-essary with this equipment.

After ascertaining that steering knuckle bushings require replacement, the following procedure will be found efficient and helpful:

1. Remove hub caps and grease caps.

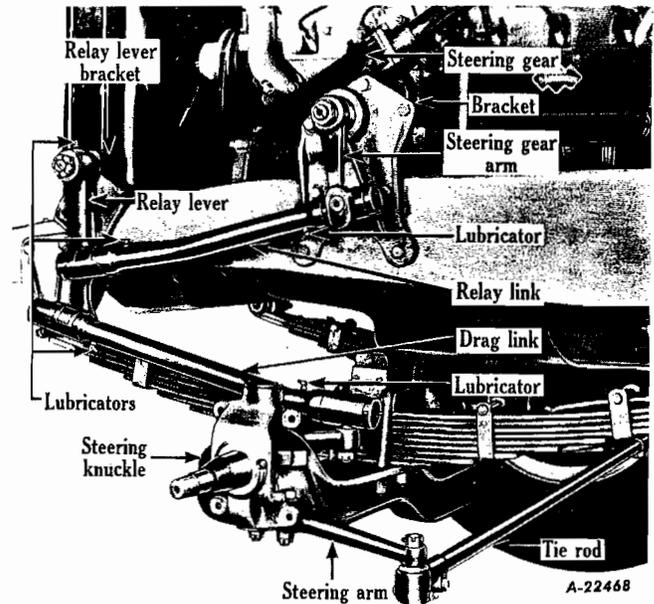


Fig. 2 - Showing details of relay lever, relay link and drag link.

2. Remove spindle nut cotter keys and spindle nuts.
3. Remove wheels, inner bearings, and grease retainers from spindles.
4. Remove dirt shield screws and shields.
5. Remove bolts holding brake backing plate assemblies to steering knuckles.
6. Remove tapered draw keys holding knuckle pins.
7. Remove caps from top and bottom of steer-ing knuckles.
8. Drive out knuckle pins.
9. Remove steering knuckles, thrust bearings, and spacer shims.
10. Clean all parts thoroughly in kerosene or Stoddard Solvent.
11. Remove old bushings, using an arbor or drift.
12. Install new bushings, with the grease holes lined up with the lubricating holes in the steering knuckles. Use an arbor press or vise for forcing the new bushings into place, piloting with a proper size arbor.



13. Line-ream new bushings. Use either a reamer equipped to pilot in one bushing while reaming the other or a reamer long enough to ream both bushings at the same time.
14. Install steering knuckles, thrust bearings, spacer shims as required, and knuckle pins.
15. Install knuckle pin draw key and tighten securely.
16. Replace caps on top and bottom of steering knuckles.
17. Place brake backing plates in position and install bolts. Tighten bolts securely.
18. Install dirt shields and holding screws.
19. Clean and repack front wheel bearings.

20. Install new grease seals.
21. Install wheels, and spindle nuts. Rotate wheel by hand while tightening nut until drag or bind is felt. Back off nut to first castellation and install new cotter key.
22. Install grease caps and hub caps.
23. Lubricate steering knuckle bushings.
24. Check and correct toe-in of wheels.

Steering Knuckle Stop Screws

Adjustable stop screws in steering knuckles limit movement of front wheels when turning and prevent tires from rubbing against nearest point on chassis and prevent steering gear from bottoming. These screws should be adjusted so there will be ample clearance between front tires and nearest point on chassis when wheels

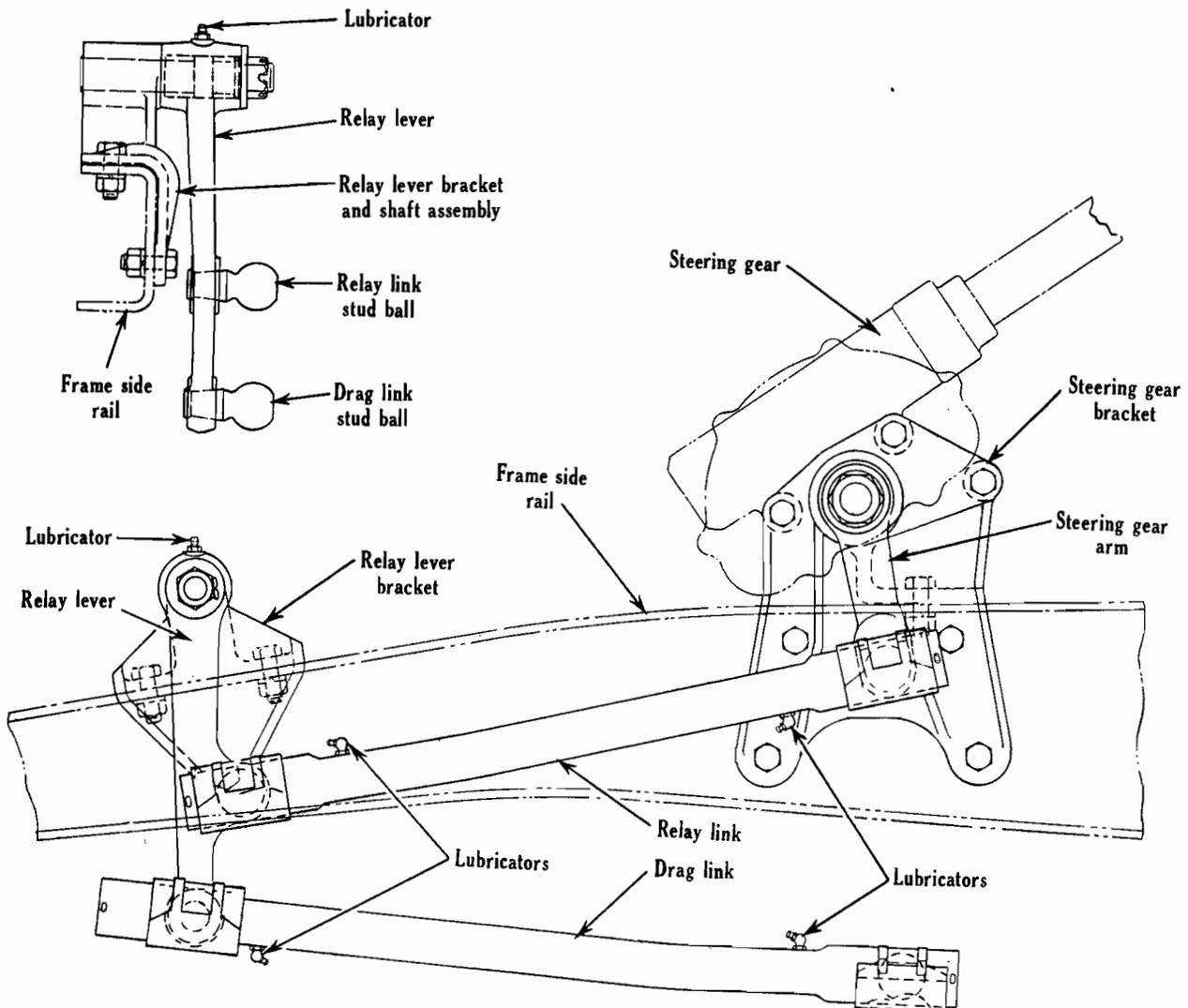


Fig. 3 - Front axle linkage and steering gear for L-190 Series and up.



are turned to extreme right or left under any conditions. NOTE: This should always be checked when tire size is changed.

Linkage for Models L-190 and Up (Figs. 2 and 3)

Figs. 2 and 3 illustrate front axle linkage with the steering gear for models L-190 series and up. In order to maintain the proper degree of angle on steering column for best riding and driving comfort, the relay lever assembly is used.

Tie Rod (Figs. 4 and 5)

Tie rod is of three-piece construction, consisting of two rod end assemblies and tube. Rod is threaded into ends and locked with clamp bolts. Right and left-hand threads are provided to facilitate toe-in adjustment. The rod ends are self-adjusting and require no attention in service other than periodic lubrication and occasional inspection to see that ball studs are tight in steering knuckle arms.

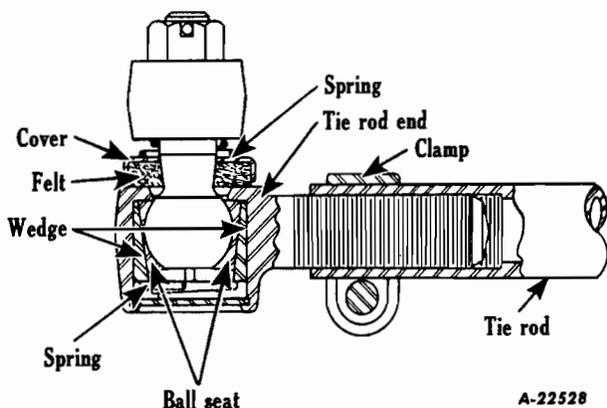


Fig. 4 - Tie rod assembly - Models F-270, F-280, F-360.

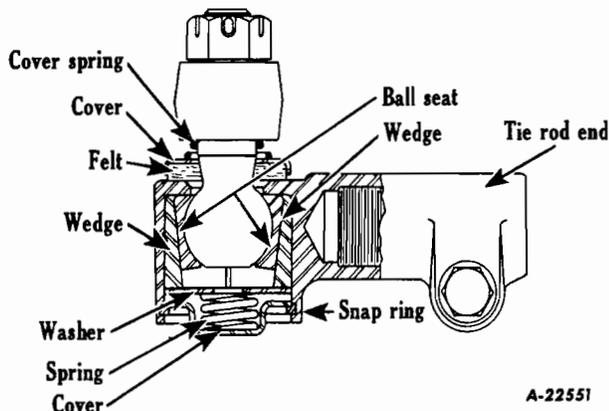


Fig. 5 - Tie rod assembly - Models F-553, F-580, F-653, F-750, F-751.

Front Wheel Alignment

Front wheels must be kept in proper alignment in order to assure ease of steering and

satisfactory tire life. Important factors of front wheel alignment are: Toe-in, camber and axle caster.

These points should be checked occasionally to guard against excessive tire wear.

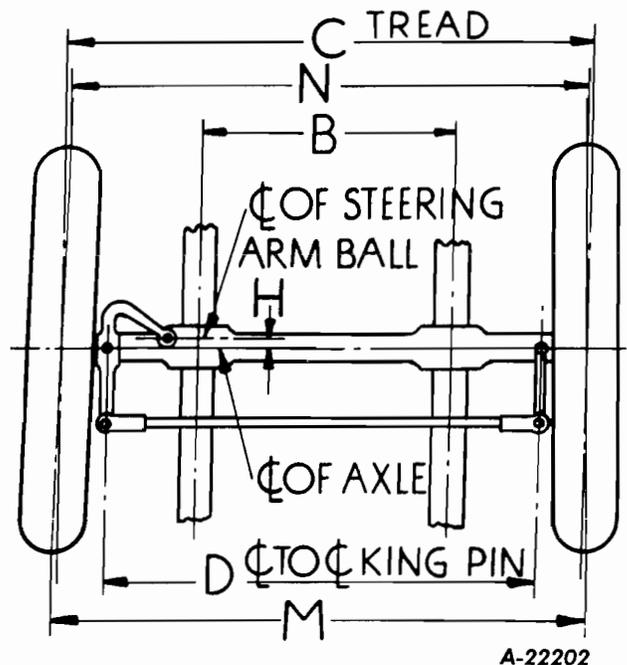


Fig. 6

Wheel Toe-In (Fig. 6)

Front-wheel toe-in is the setting of front wheels so that they are closer together at the front of the axle than at the rear.

Incorrect toe-in of front wheels will result in rapid tire wear. Excessive toe-in will produce a scuffing or "feather-edge" at the inside edge of the tire tread. Toe-out will produce a like wear but at the outside of the tire tread.

Follow instructions of Tool Equipment Manufacturer for checking and correction of toe-in.

NOTE: Always recheck toe-in after any change in caster or camber angles, or after any alteration in tie-rod end adjustment.

Wheel Camber (Fig. 7)

Front-wheel camber is the inclination of the wheel from a vertical plane.

"Positive" camber is an outward tilt or inclination of the wheel at the top.



"Negative" or "reverse" camber is an inward tilt of the wheel at the top.

Axle Caster (Fig. 8)

Caster is the amount of backward tilt at the top of the steering knuckle kingpin. When the top of the knuckle pin is tilted to the rear, the caster is positive. When the top of the knuckle pin is tilted to the front, the caster is negative.

The purpose of caster is to provide stability of steering.

Tapered wedge plates are available for use in altering the caster angle. They are to be installed between the springs and axle spring seats.

Installation of the tapered wedge with the thick end toward the rear will produce increased caster. If installed with thick end toward the front, decreased caster will result.

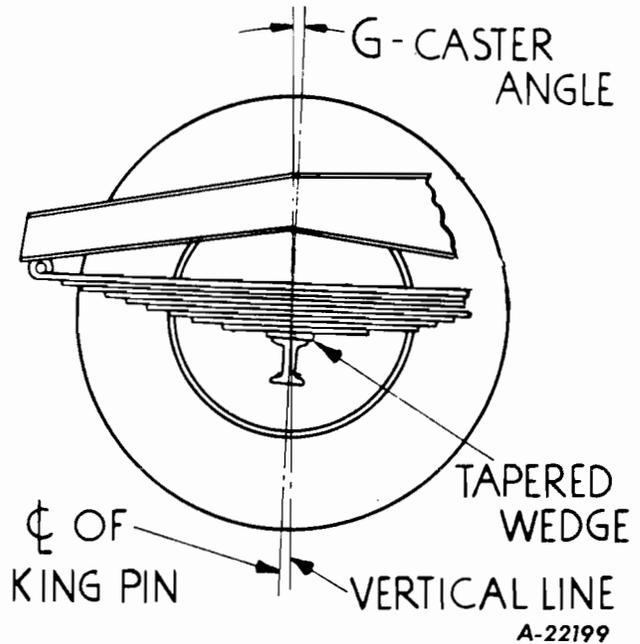


Fig. 8

Knuckle Pin Inclination (Fig. 7)

The angle which the kingpin makes with the vertical is known as kingpin inclination.

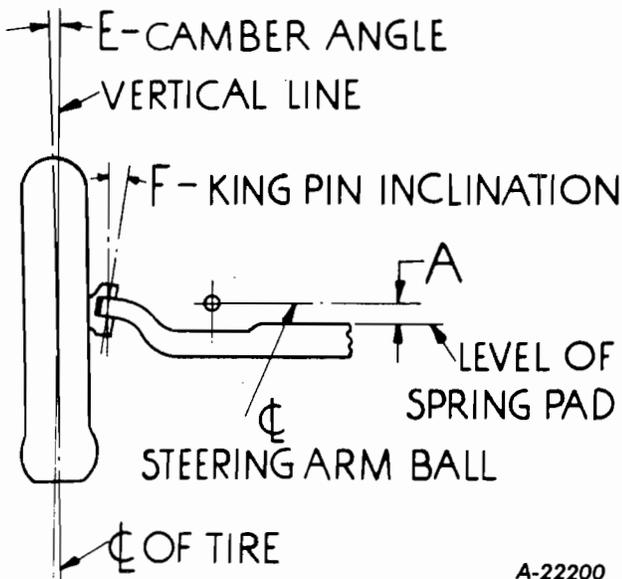


Fig. 7



SUGGESTED WHEEL ALIGNMENT TROUBLE SHOOTING CHART

Remember that all alignment angles are so closely related that any change of one will automatically change the others. Because of this fact, it will probably be found that there is more than one cause for the complaint. The following

list is not all-encompassing but is representative of the more common causes of difficulty encountered in wheel and axle alignment and should prove of value in locating and correcting complaints on steering or tire wear.

<u>COMPLAINT</u>	<u>POSSIBLE CAUSE</u>
(1) Shimmy (Generally exists at speeds below 30 miles per hour.)	(a) Tire pressure incorrect. (b) Tires of unequal size or weight. (c) Wheel bearings loose. (d) Steering arms loose. (e) Steering gear loose. (f) Too much caster. (g) Drag link ends loose. (h) Drag link springs weak or broken. (i) Spring shackles loose. (j) Kingpins and bushings worn. (k) Tie-rod ends loose.
(2) High-Speed Wheel Tramp (Generally exists at speeds above 35 miles per hour.)	(a) Tire and wheel assemblies out of balance. (b) Shock absorbers ineffective.
(3) Wander or Weave	(a) Tire pressure incorrect. (b) Tires of unequal size. (c) Bent spindle. (d) Wheel bearings loose. (e) Kingpins and bushings worn. (f) Kingpins bent. (g) Kingpins tight. (h) Pitman arm loose. (i) Steering gear assembly too tight or too loose. (j) Too little caster. (k) Too much or too little camber. (l) Too much or too little toe-in. (m) Drag link ends tight. (n) Drag link springs weak or broken. (o) Tie-rod ends too tight or too loose. (p) Front axle bent. (q) Front axle shifted. (r) Springs broken. (s) Rear axle shifted. (t) Rear axle housing bent. (u) Frame diamond-shaped.
(4) Hard Steering	(a) Tire pressure low. (b) Wheel spindle bent. (c) Kingpin assembly poor fit. (d) Steering assembly too tight. (e) Tie-rod ends tight. (f) Caster excessive.
(5) Uneven Tire Wear	(a) Tire pressure low. (b) Excessive camber. (c) Wheels out of balance. (d) Tires overloaded. (e) Eccentric wheels or rims. (f) Caster incorrect. (g) Toe-in incorrect.

