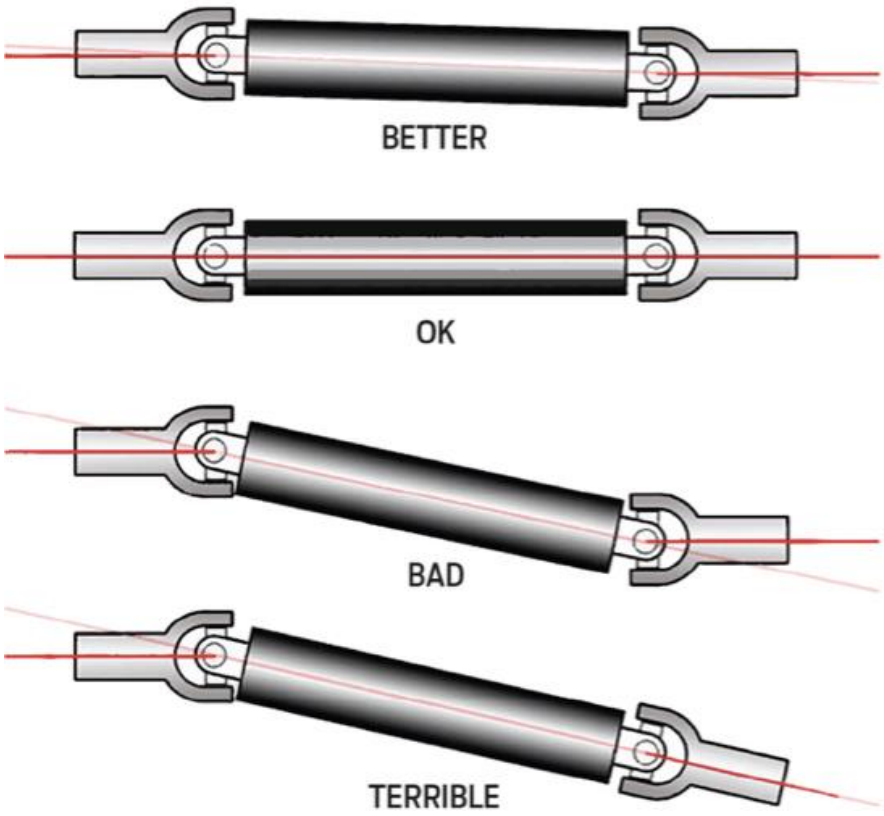
Drifbúnaður.

Drifskapt.

Margt þarf að hafa í huga við að þjónusta drifbúnað

Ýmsar gerðir af drifsköftum.

RULES FOR CONVENTIONAL DRIVESHAFTS



Ideally the yoke-angles should be within 0.5–3° of the shaft. The yoke centerlines should be parallel within 0.5°.

Traditionally a zero joint angle is frowned upon because the caps can't rotate to distribute the grease, but Rehak says this is no longer critical due to improved lubricants and greases.

Yoke angles greater than 3° greatly accelerate U-joint wear.

Yoke angles that are out of parallel will create a vibration.

Reassembling of "U" Bolt Type Universal Joint

Reassembling is merely a reversal of the dismantling operation.

Be sure to hold the bearing in a vertical position to prevent the needles from dropping out of the bearing race.

When assembled, if joints appear to bind tap the lugs lightly with a hammer which will relieve any pressure on the bearings at the end of the journal.

When assembling the bearings into the end yoke the use of a "C" Clamp over the extreme ends of the bearing races to draw the bearings into correct position will greatly facilitate seating them inside of the bearing shoulders on the end yokes. "U" bolt, torque wrench reading, 15-18 ft. lbs.

When inserting the propeller shaft spline into the universal joint be sure that the arrows on the propeller shaft and yoke sleeve are in line. See Fig. 2.

Lubrication

Do not use grease in the needle bearings.

At each 1,000 mile lubrication job, lubricate the Universal Joints, using a hand gun. See Lubrication Chart for oil specifications.

The sliding spline shaft should be lubricated with a good grade of grease or oiled every 1,000 miles, or every time the chassis is lubricated. A hydraulic pressure fitting is provided for this purpose on the side of the sleeve yoke.

FIG. 3—REMOVING UNIVERSAL JOINT BEARING

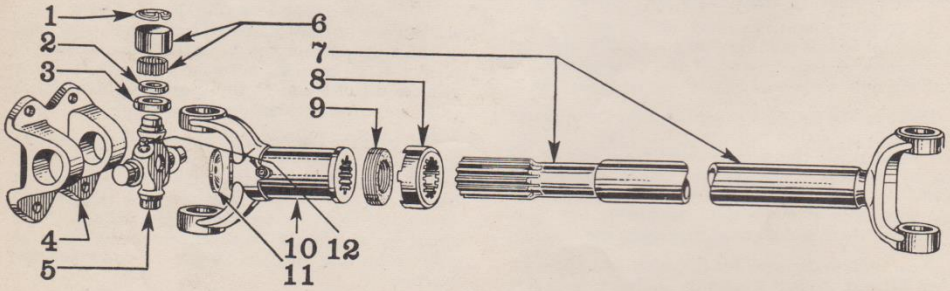


FIG. 4—PROPELLER SHAFT—REAR

No.	Willys Part No.	Ford Part No.	Name
1	A-945	OIY-7096	Universal Joint Bearing Snap Ring
2	A-941	OIT-7078-A	Trunnion Gasket
3	A-940	OIY-7083	Trunnion Gasket Retainer
4	A-950	GP-4866	Universal Joint Flange Yoke
5	A-1426	GPW-7084	Universal Joint Journal Assembly
6	A-1425	GPW-7099	Universal Joint Bearing Race
7	A-1429	GPW-4605	Propeller Shaft Tube Assembly—Rear
8	A-942	GP-7077	Dust Cap
9	A-943	GP-7097	Cork Washer
10	A-935	GP-7092	Universal Joint Sleeve Yoke Assembly
11	A-937		Sleeve Yoke Plug
12	638792	353043-S7	Hydraulic Fitting

Advantage

Dragliðir.

Auto Drive Shaft Parts

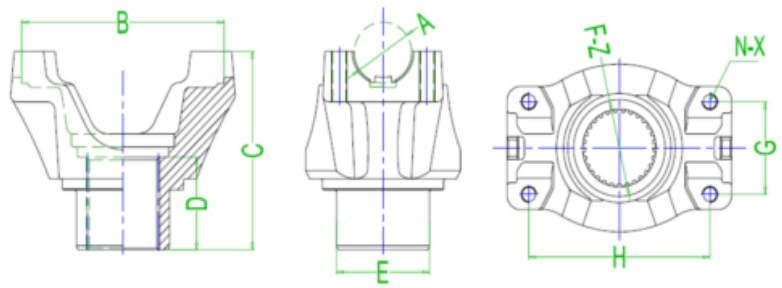
HANGZHOU SPEEDWAY

Endoki 26-317 Drifskaftshlutar

Stutt lýsing:

Ref. Nei.	A	B	C	D	E	G	H	NX	FZ
26-317	27	92	148,7		57,2		84		φ34,5

Endoki 26-317 Drifskaftshlutar



Upprunastaður:	Vörumerki:
Shanghai, Kína (meginland)	FULLT WERK & míkarray
Ábyrgð:	OE NO.:
1 ár	HZ26-317
Gerð bíls:	Stærð:
Plz spurðu mig	OEM staðalstærð, OEM staðalstærð
Vöru Nafn:	Vottun:
End Yoke	ISO9001/TS16949
Annað OEM NO:	Efni:
HZ26-317	45# stál

Hjöruliðs krossar.

Drifliðir.

Coil Spring Suspension

For CV Style Driveshafts on Vehicles with Coil Springs the angle should start out straight (see red line) coming into the pinion yoke like the picture above shows. Failure to set the Angle Correctly will cause a Vibration On or Off the gas, Damage the back of the Slip Yoke, or the Pinion Yoke, voiding the Warranty.

FORD 8.8 SETUP
With Leaf Spring Suspension

The Driveshaft angle should start out at 2 degrees down coming into the 8.8 pinion flange like the Red and Green Lines show. If Angle is not Set Correctly, it will cause the Slip Yoke to come into contact with the flange causing a catastrophic failure, voiding the Warranty and all Responsibility. Also note: If angle is incorrect, you will experience a vibration on or off the gas or at high speeds. If you have any questions, please contact us at 702-568-5680 and we will be more than happy to assist you.

Leaf Spring Suspension

For CV Style Driveshafts on Vehicles with Leaf Springs, the angle should start out around 2 degrees down (see red and green lines) past the centerof the driveshaft coming into the pinion yoke like the picture above shows. Failure to set the Angle Correctly will cause a Vibration On or Off the gas, Damage the back of the Slip Yoke, or the Pinion Yoke, voiding the Warranty.

6.3 Joints

The following are used:
- Universal joints
- Flexible discs
- Ball joints
- Tripod joints
- Double joints

Universal joints (Fig. 1). The link forks are flexibly connected with each other by the joint bolts arranged in the spider. The joint bolts are usually mounted in the link forks in fully encapsulated needle bearings (therefore requiring no maintenance).

In motor vehicles universal joints are used for diffraction angles up to 8°.

Special designs, e.g. for power takeoff units, permit greater diffraction angles.

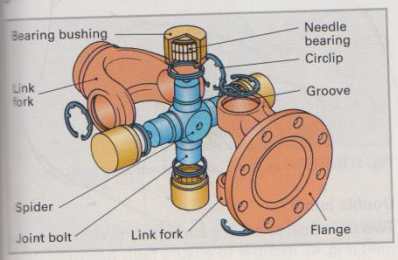
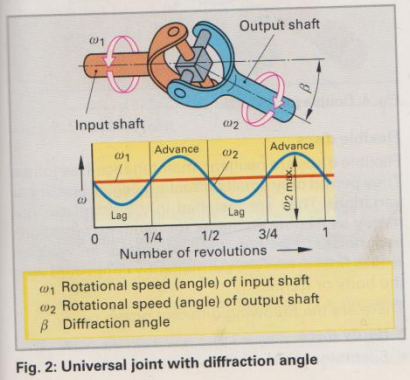


Fig. 1: Universal joint

When an angled universal joint is used, a non-uniform motion is generated at the output end.

If a diffraction angle β exists between the input and output of a universal joint **(Fig. 2)**, the output shaft with the input shaft at uniform rotational speed ω_1 executes a non-uniform motion with sinusoidally alternating rotational speed ω_2.



ω_1 Rotational speed (angle) of input shaft
ω_2 Rotational speed (angle) of output shaft
β Diffraction angle

Fig. 2: Universal joint with diffraction angle

Gimbal error. With 1 revolution of the input shaft, two advances and two lags occur at the output shaft (gimbal error) **(Fig. 2)**.

A propeller or drive shaft with **one universal joint** may only be used when **small diffraction angles β** occur. When larger diffraction angles occur, for instance on vehicles with rigid axles, the propeller or drive shaft must be fitted with **two universal joints (Fig. 3)**.

In this way, the so-called "gimbal error" of joint A is compensated by an equal but opposite "gimbal error" of joint B (ω compensation).

Conditions for compensating the "gimbal error":
- The diffraction angles β_1 of joint A and β_2 of joint B must be equal.
- The link forks of the connecting shaft must lie in the same plane. This must be observed particularly in the assembly of the intermediate shaft (slide).

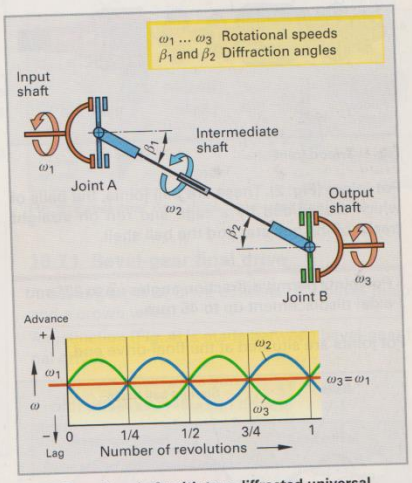


Fig. 3: Propeller shaft with two diffracted universal joints

The distance variations (linear variations) that occur during deflection between the universal joints are compensated by a **slide**.

Universal joints are used for example on propeller shafts between the variable-speed gearbox and the final drive; in commercial vehicles, they are also used on axle shafts.

Constant-velocity joints

Constant-velocity joints (homokinetic joints) transmit the rotary motion uniformly even with larger diffraction angles.

Sliding constant-velocity joints

Tripod joints (Fig. 1). These can be used in the case of independent suspension both on powered front axles (front-wheel drive) and on powered rear axles (rear-wheel drive).

Tripod joints permit diffraction angles up to 26° and axial displacement up to 55 mm.

The tripod star is always turned towards the final-drive end.

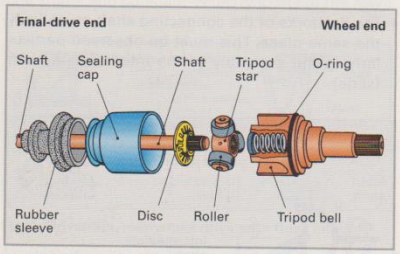


Fig. 1: Tripod joint

Pot joints (Fig. 2). These are ball joints, the balls of which are guided by a cage and run on **straight tracks** of the ball star and the ball shell.

Pot joints permit diffraction angles up to 22° and axial displacement up to 45 mm.

Pot joints are situated at the final-drive end.

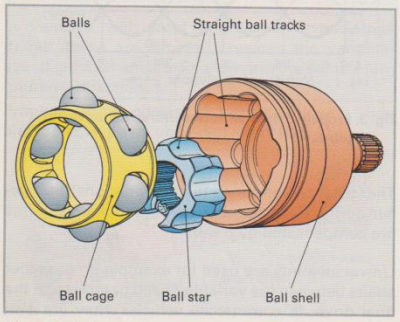


Fig. 2: Pot joint

Fixed constant-velocity joints

Ball joints

These consist of the ball star, ball shell, ball cage and balls **(Fig. 3)**.
The ball shell and ball star have curved tracks, on which the balls run.

Ball joints permit diffraction angles up to 38° in their normal version and up to 47° in their special version. They do not permit any axial displacement.

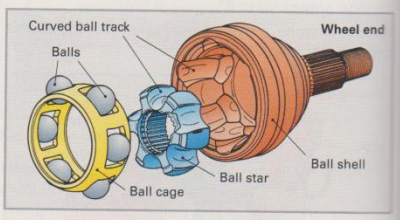


Fig. 3: Ball joint as fixed constant-velocity joint

Double joints

Two universal joints are combined to form a single joint **(Fig. 4)**. In order to ensure fault-free operation, the shaft ends to be connected are centred on the inside of the joint.
They are used in commercial vehicles.

Double joints permit diffraction angles up to 50°. They do not permit any axial displacement.

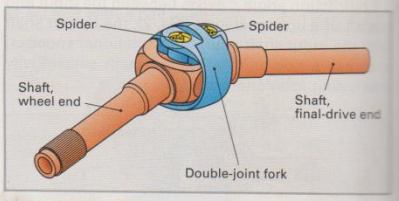


Fig. 4: Double joint

Flexible discs

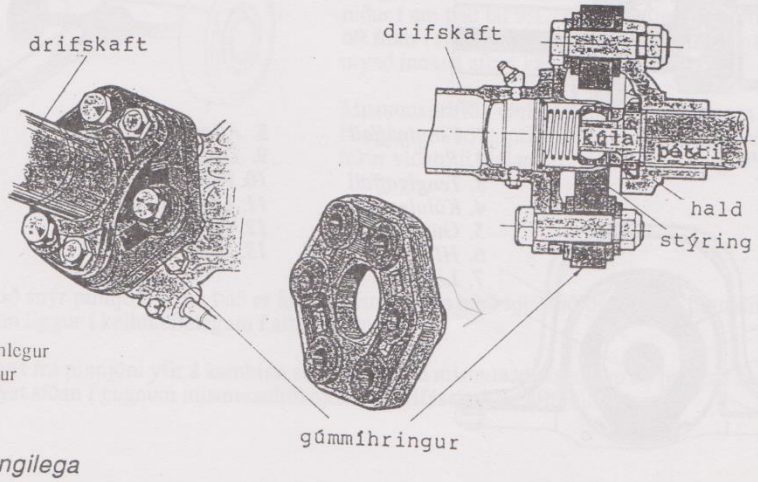
Flexible discs are resilient, maintenance-free joints. They permit only small diffraction angles and linear variations. They are installed in the drivetrain primarily as flexible elements for damping vibrations and noises. Flexible discs are used in vehicles whose final drives are permanently connected with the body or frame.

There are the following different types:

- Hardy discs
- Silentbloc joints

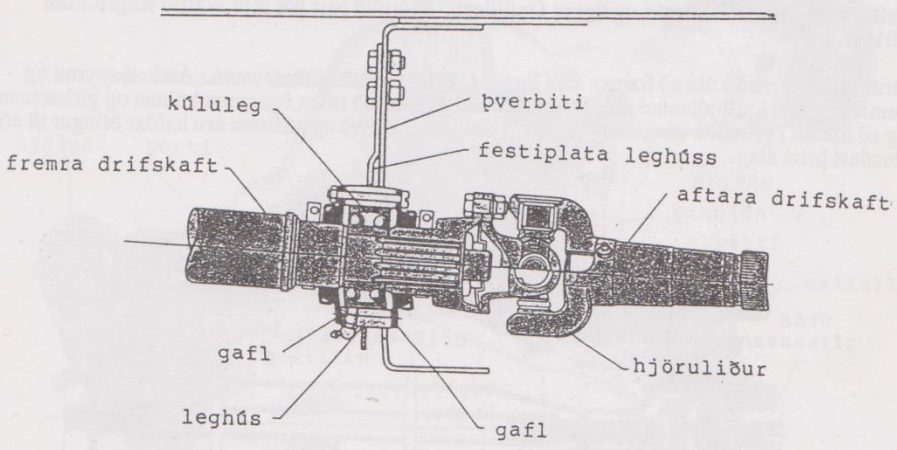
Sveigjanlegur hjöruliður

Snúningsvægið flyst í gegnum gúmmíhringinn. Til að koma í veg fyrir titring er ásnum stýrt af kúlu milli gormlestaðra kúluskála.



Upphengilega

Upphengilegunni er alltaf komið svo fyrir að það geti færst ofurlítið til á lengdina og er það nauðsynlegt vegna þess að hreyfillinn og gírkassinn eru ávallt með sveigjanlegum festingum.



Upphengilega sem getur færst fram og aftur milli gafflanna á leguhúsinu.


ecobusparts.com


DENNY'S


UBC

Drifskafts kló.

Jóki.

Drifskafts upphengja.

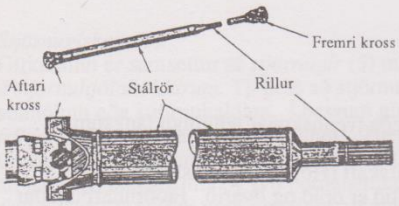
Festingar.

Ástand skafsins.

Skipt drifskaft er algengt

Drifskaftinu er oft skipt í hluta til að draga úr hættu á titringi og sveigju. Á þessari mynd er drifskaftið tvískipt með hjörulið. Við liðamótin eru sköftin tvö í legum.

Drifskaftið er gert úr stálröri. Til endanna eru soðnar á festingar fyrir hjöruliðina.



Drifskaftið er smíðað úr stálröri

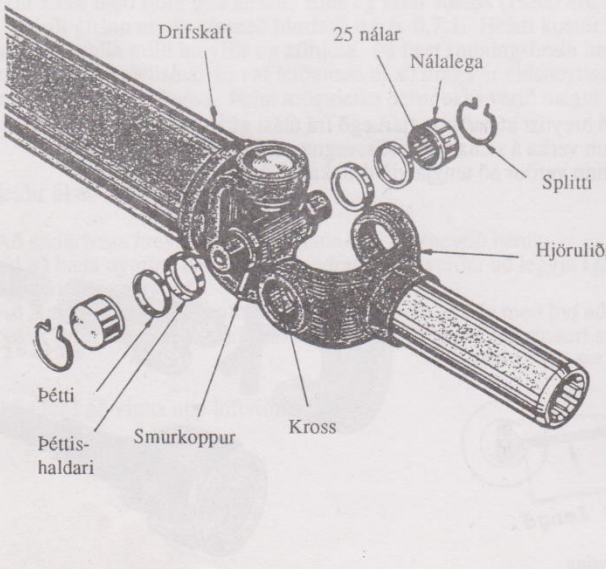
Drifskaftið er vandlega jafnvægisstillt svo að ekki komi fram titringur þegar það snýst. Jafnvægisstillingin er fólgin í því að sjóða járnlóð á skaftið. Stundum fer drifskaftið að titra eftir að undirvagninn hefur verið ryðvarinn. Þá hefur farið ryðvarnarefni á skaftið og spillt jafnvæginu.

Hjöruliðir

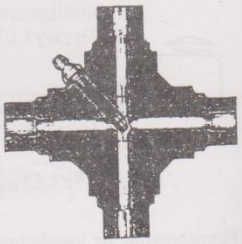
Gerður er greinarmunur á vélvirkum og sveigjanlegum hjöruliðum.
Báðar þessar gerðir eru til í mörgum útgáfum.

Vélvirkur hjöruliður

Snúningsvægið flyst frá tengigafflinum í gegnum krossinn til drifskaftsins. Krossinn liggur í nálalegum sem eru varðar fyrir óhreinindum með þéttum. Nálalegurnar eru smurðar í gegnum rásir í krossinum eða þá að þær eru smurðar við samsetningu í eitt skipti fyrir öll og þurfa því ekkert viðhald.

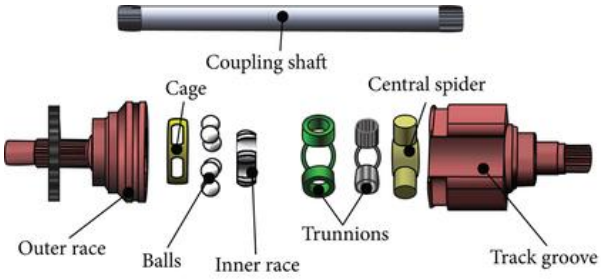


Hjöruliður



Hjöruliðskross

Drif öxlar.



(a) The components of a drive shaft

(b) Photo of a drive shaft

16.6 Propeller shafts, drive shafts, joints

Functions

- Transmit torques
- Facilitate angular variations
- Permit linear variations (axial displacement)
- Damp torsional vibrations

The torque converted by the variable-speed gearbox is transmitted to the final drive and the drive wheels.

Example of rear-wheel drive with front engine:

The power flow progresses in the drivetrain **(Fig. 1)** from the variable-speed gearbox via the propeller shaft (cardan shaft) to the final drive and on via the axle shafts and constant-velocity joints to the drive wheels.

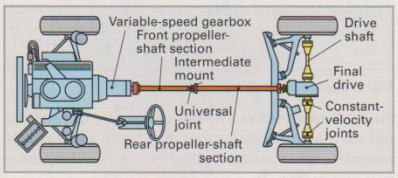


Fig. 1: Drivetrain, rear-wheel drive with front engine

Example of front-wheel drive with front engine and rear-wheel drive with rear engine:

The power flow progresses in the drivetrain from the variable-speed gearbox via the final drive, constant-velocity joints and drive shafts to the drive wheels.

No cardan shaft is required here.

The variable-speed gearbox and the final drive are accommodated in a single housing.

16.6.1 Propeller shafts

In vehicles with front engines and rear-wheel drives, these are situated between the variable-speed gearbox and the final drive in the vehicle longitudinal direction.

Propeller shafts consist of a shaft tube with slide and joints, e.g. two universal joints **(Fig. 2)**.

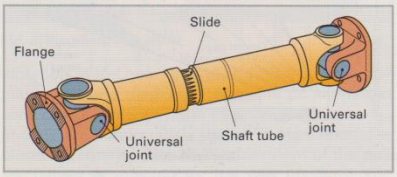


Fig. 2: Propeller shaft with two universal joints

If in vehicles with independent suspension a large distance has to be covered between the variable-speed gearbox and the final drive, a two-piece propeller shaft is used which is supported by an intermediate mount **(Fig. 3)**.

Universal joints are deployed to facilitate an axis offset between the variable-speed gearbox and the final drive. The flexible discs serve to damp vibrations.

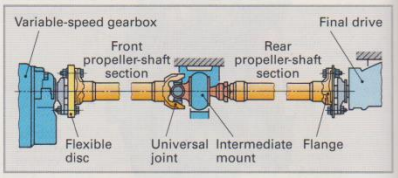


Fig. 3: Two-piece propeller shaft

Intermediate mount (Fig. 3). The split propeller shaft is resiliently supported here.

The intermediate mount is secured by means of a bearing pedestal to the vehicle floor. It contains a ball bearing which is embedded in rubber.

The separation of the propeller shaft results in low-vibration, quiet running and eliminates droning noises.

16.6.2 Drive shafts (axle shafts)

These are arranged in the drivetrain between the final drive and the drive wheels.

The drive shafts can be equipped at the final-drive end, for example, with a tripod joint and at the wheel end with a ball joint.

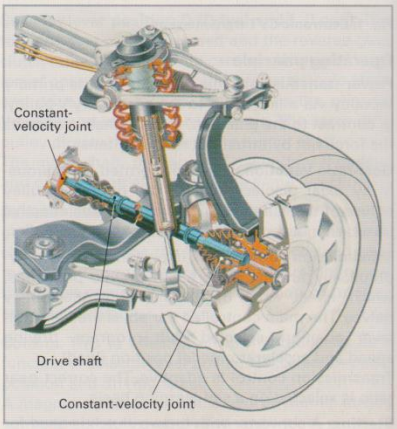


Fig. 4: Drive shaft in a front-wheel drive

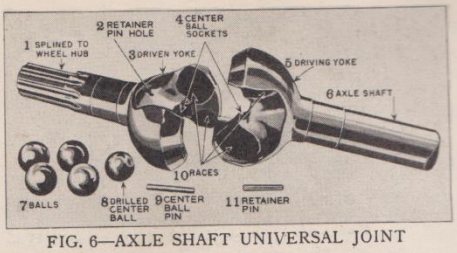


FIG. 6—AXLE SHAFT UNIVERSAL JOINT

Reassembly—(Bendix Joint)

1. Place the differential half of the axle shaft in a bench vise, with the ground portion of the shaft above the vise jaws.
2. Install the center ball (one with hole drilled in it) in its socket in the shaft, hole and groove facing you.
3. Drop the center ball pin into the drilled passage in the wheel half of the shaft.
4. Place the wheel half of the shaft on the center ball. Then slip three balls into the raceways.
5. Turn the center ball until the groove in it lines up with the raceway for the remaining ball as shown in Fig. 7. Slip the ball into the raceway and straighten up the wheel end of the shaft.
6. Turn the center ball until the center ball pin drops into the hole drilled in the ball.
7. Install the retainer pin (lock pin) and prick punch both ends to securely lock in place.

Disassembly (Rzeppa Joint)

After the shaft has been removed, the universal joint may be disassembled as follows, Fig. 4, Pg. 115:

1. Remove the three screws holding the front axle shaft to the joint and pull the shaft out of the splined inner race. To remove the axle shaft retainer, remove the retainer ring on the axle shaft.
2. Clean the universal joint in a suitable cleaning solution and lift out the axle centering pin.
3. Push down on various points of the inner race and cage until the balls can be taken out with the help of a small screw driver. Be careful not to damage parts.
4. After all the balls have been removed the inner race and cage can be turned over so the pilot cup is up, then remove the pilot cup.
5. There are two large elongated holes in the cage as well as four small holes. Turn the cage so two bosses in the spindle shaft will drop into the elongated holes and lift out cage.
6. To remove the inner race turn it so one of the bosses will drop into an elongated hole in the cage, shift the race to one side, and lift out opposite side.

FIG. 7—ASSEMBLING UNIVERSAL JOINT BALLS

Reassembly (Rzeppa Joint)

1. Reassembly of the joint is the reverse of dismantling. Care should be exercised not to damage parts and see that they are clean of all dirt and grit.

To Reassemble Axle Shaft and Universal Joint Assembly to Housing

1. Clean all parts so that they are free from dust and foreign matter.
2. Enter universal joint and axle shaft assembly in the housing, taking care not to injure the outer and inner oil seals. Enter spline end of axle into the differential and push in until the shoulder on the universal joint stops against the axle.
3. Install wheel bearing spindle.

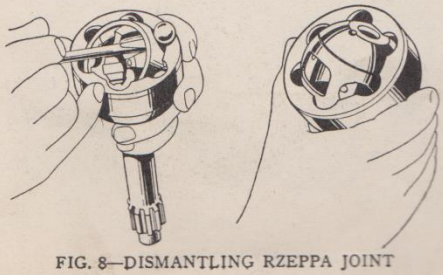


FIG. 8—DISMANTLING RZEPPA JOINT

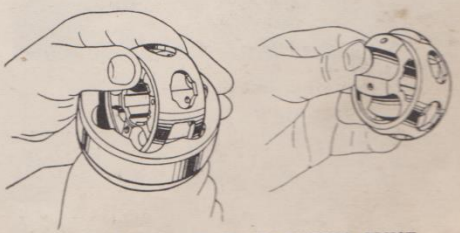


FIG. 9—REMOVING CAGE—RZEPPA JOINT

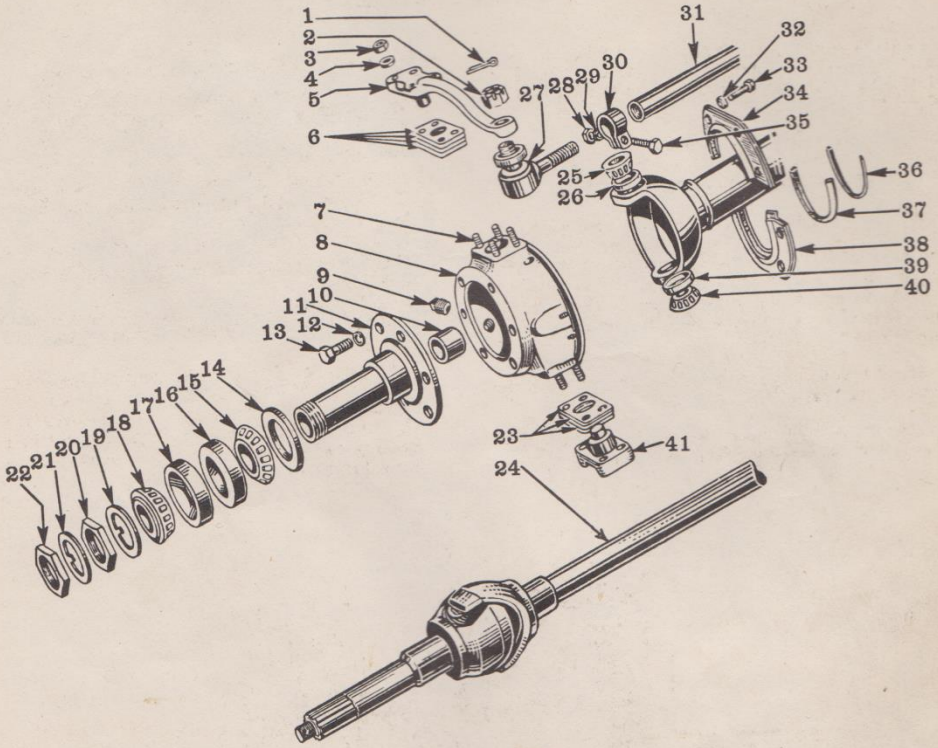


FIG. 2—FRONT AXLE, STEERING KNUCKLE AND WHEEL BEARINGS

(Bendix Universal Joint)

No.	Willys Part No.	Ford Part No.	Name
1	5152	72025-S	Tie Rod Stud Nut Cotter Pin
2	10558	351059-S7	Tie Rod Stud Nut
3	630598		Steering Arm Nut
4	5010	34807-S	Steering Arm Nut Lockwasher
5	A-1712	GPW-3113	Upper Steering Arm—Left Hand (Ford GPW-3112; Willys A-1710 Right Hand)
6	A-830	GP-3117-A	King Pin Adjusting Shims
7	A-1714	357703-S	Steering Arm Stud—Upper (A-5504 Dowel Stud—Upper Outside Front and Inside Rear)
8	A-811	GP-3148-A	Steering Knuckle Right Hand (Ford GPW-3149-A; Willys A-812 Left Hand)
9	5140	353064-S	Steering Knuckle Filler Plug
10	A-853	GP-3205	Wheel Bearing Spindle Bushing
11	A-851	GP-3105	Wheel Bearing Spindle Assembly
12	5010	34807-S	Brake Disc Screw Lockwasher
13	A-877	355552-S	Brake Disc Screw
14	A-864	GP-1177	Hub Oil Seal Assembly
15	52942	GP-1201	Wheel Bearing Cone and Rollers
16	52943	GP-1202	Wheel Bearing Cup
17	52943	GP-1202	Wheel Bearing Cup
18	52942	GP-1201	Wheel Bearing Cone and Rollers
19	A-865	GP-1218	Wheel Bearing Lockwasher
20	A-866	GP-4252	Wheel Bearing Nut
21	A-867	GP-1124	Wheel Bearing Nut Lockwasher
22	A-866	GP-4252	Wheel Bearing Nut
23	A-830	GP-3117-A	King Pin Adjusting Shims
24	A-809	GPW-3206-A	Axle Shaft and Universal Joint Assembly (Bendix type) — Right Hand (Ford GPW-3207-A; Willys A-810 Left Hand)
25	52940	GP-3161	King Pin Bearing Cone and Rollers
26	52941	GP-3162	King Pin Bearing Cup
27	A-847	GP-3290	Tie Rod Socket Assembly Left Hand (Ford GP-3289; Willys A-838 Right Hand)
28	636575	34083-S2	Tie Rod Socket Clamp Nut
29	5010	34807-S	Tie Rod Socket Clamp Nut Lockwasher
30	A-1706	51-3287	Tie Rod Socket Clamp
31	A-1705	GPW-3281	Tie Rod Tube Right Hand (Ford GPW-3282; Willys A-1709 Left Hand)
32	52510	34941-S	Knuckle Oil Seal Screw Lockwasher
33	A-872	355483-S	Knuckle Oil Seal Screw
34	A-813		Steering Knuckle Oil Seal Assembly—Half
35	A-1707	24916-S2	Tie Rod Socket Clamp Screw
36	A-818	GP-3139	Steering Knuckle Oil Seal Felt Pressure Strip
37	A-819	GP-3135	Steering Knuckle Oil Seal Felt—Half
38	A-813		Steering Knuckle Oil Seal Assembly—Half
39	52941	GP-3162	King Pin Bearing Cup
40	52940	GP-3161	King Pin Bearing Cone and Rollers
41	A-828	GP-3140	Lower King Pin Bearing Cap

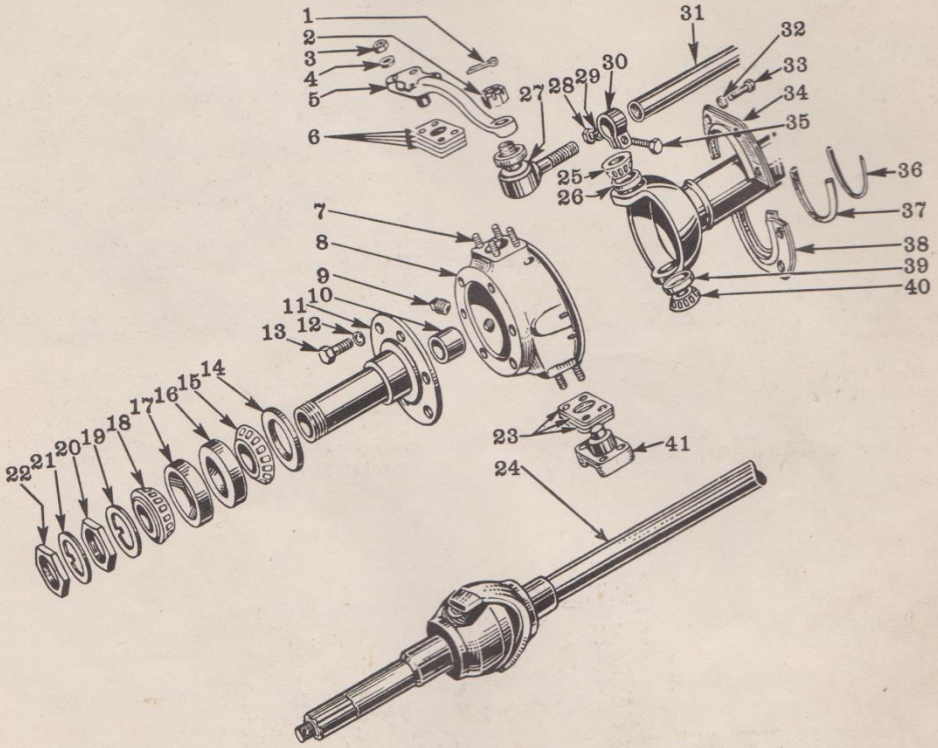


FIG. 2—FRONT AXLE, STEERING KNUCKLE AND WHEEL BEARINGS

(Bendix Universal Joint)

No.	Willys Part No.	Ford Part No.	Name
1	5152	72025-S	Tie Rod Stud Nut Cotter Pin
2	10558	351059-S7	Tie Rod Stud Nut
3	630598		Steering Arm Nut
4	5010	34807-S	Steering Arm Nut Lockwasher
5	A-1712	GPW-3113	Upper Steering Arm—Left Hand (Ford GPW-3112; Willys A-1710 Right Hand)
6	A-830	GP-3117-A	King Pin Adjusting Shims
7	A-1714	357703-S	Steering Arm Stud—Upper (A-5504 Dowel Stud—Upper Outside Front and Inside Rear)
8	A-811	GP-3148-A	Steering Knuckle Right Hand (Ford GPW-3149-A; Willys A-812 Left Hand)
9	5140	353064-S	Steering Knuckle Filler Plug
10	A-853	GP-3205	Wheel Bearing Spindle Bushing
11	A-851	GP-3105	Wheel Bearing Spindle Assembly
12	5010	34807-S	Brake Disc Screw Lockwasher
13	A-877	355552-S	Brake Disc Screw
14	A-864	GP-1177	Hub Oil Seal Assembly
15	52942	GP-1201	Wheel Bearing Cone and Rollers
16	52943	GP-1202	Wheel Bearing Cup
17	52943	GP-1202	Wheel Bearing Cup
18	52942	GP-1201	Wheel Bearing Cone and Rollers
19	A-865	GP-1218	Wheel Bearing Lockwasher
20	A-866	GP-4252	Wheel Bearing Nut
21	A-867	GP-1124	Wheel Bearing Nut Lockwasher
22	A-866	GP-4252	Wheel Bearing Nut
23	A-830	GP-3117-A	King Pin Adjusting Shims
24	A-809	GPW-3206-A	Axle Shaft and Universal Joint Assembly (Bendix type) — Right Hand (Ford GPW-3207-A; Willys A-810 Left Hand)
25	52940	GP-3161	King Pin Bearing Cone and Rollers
26	52941	GP-3162	King Pin Bearing Cup
27	A-847	GP-3290	Tie Rod Socket Assembly Left Hand (Ford GP-3289; Willys A-838 Right Hand)
28	636575	34083-S2	Tie Rod Socket Clamp Nut
29	5010	34807-S	Tie Rod Socket Clamp Nut Lockwasher
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31	A-1705	GPW-3281	Tie Rod Tube Right Hand (Ford GPW-3282; Willys A-1709 Left Hand)
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36	A-818	GP-3139	Steering Knuckle Oil Seal Felt Pressure Strip
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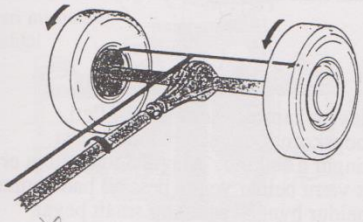
38	A-813		Steering Knuckle Oil Seal Assembly—Half
39	52941	GP-3162	King Pin Bearing Cup
40	52940	GP-3161	King Pin Bearing Cone and Rollers
41	A-828	GP-3140	Lower King Pin Bearing Cap

Drif og stillingar.

Afturásinn

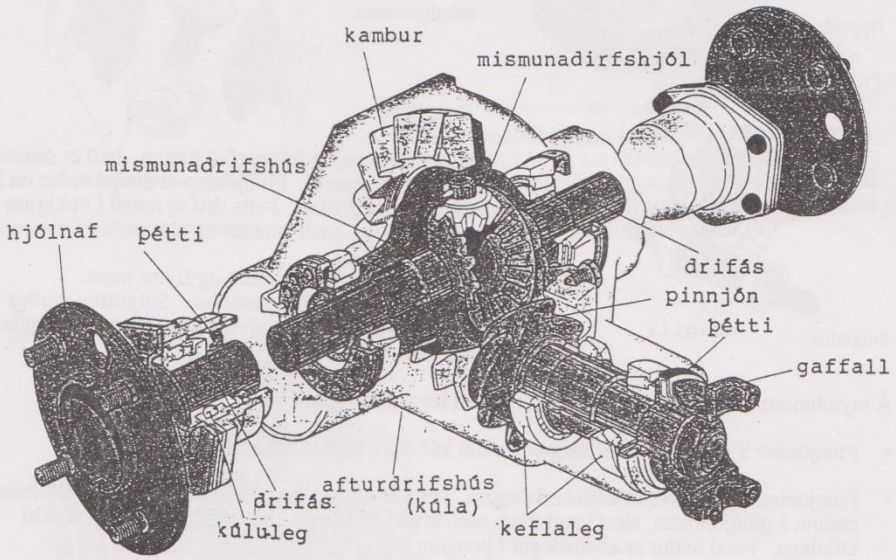


Í afturásnum (vinkilásnum, aflhjóladrifinu) gírast snúningur drifskaftsins niður og snúningsvægið flyst hornrétt yfir á drifásana og aflhjólin. Gírhlutfallið er í kringum 4:1 í fólksbílum og lægra í vörubílum, allt niður í um það bil 9:1. Gírun í afturásum vörubíla fer oft fram í tveimur þrepum með tvöföldum gír, sjá mynd innaná aftari kápu.

Mismunadrifið í vinkilásnum snýr hjólunum mishratt í beygjum. Það skiptir líka snúningsvæginu sem það tekur við milli hjólanna.

Drifskaftið snýr pinnjóninum. Það er fest við pinnjóninn með hjörulið og gaffli á pinnjóninum. Pinnjóninn liggur í keilukeflalegum í afturgírshúsinu.

Átakið flyst frá pinnjóni yfir á kambinn sem er fastur á mismunadrifshúsinu en það er í keflalegum. Átakið flyst síðan í gegnum mismunadrifshjólin til drifásanna og aflhjólanna.



Hardy discs (Fig. 1)

Several steel bushings (e.g. 6) are wrapped in textile cords so that one coil pack passes round two adjacent bushings. The textile cords and steel bushings are vulcanised in rubber.

Hardy discs are used in the drivetrain as flexible intermediate links, for example, on two-piece propeller shafts.

Hardy discs permit diffraction angles up to 5° and axial displacement up to 1.5 mm.

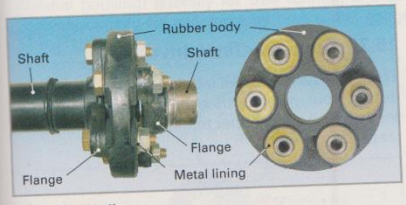


Fig. 1: Hardy disc

Silentbloc joints (Fig. 2). Several silentblocs (e.g. 6), consisting of rubber bodies with sleeve inserts, are combined in a metal jacket and bolted on both sides to three-arm flanges. Depending on the propeller-shaft connection, the centre section can be floating or centred.

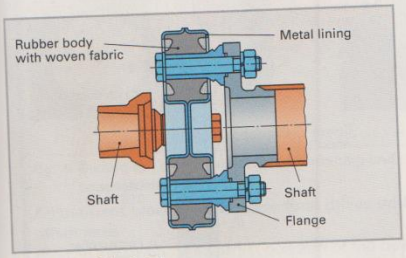


Fig. 2: Silentbloc joint

REVIEW QUESTIONS

1. What are the functions of propeller shafts?
2. Into which categories are joints subdivided?
3. Which constant-velocity joints are used in vehicle manufacturing?
4. What is the function of the slide of a propeller shaft?
5. What are the functions of flexible discs?

16.7 Final drive

Functions

- **Transmits and multiplies torque.** The torque converted by the variable-speed gearbox must be multiplied in the final drive so that sufficient torques are available at the drive wheels for all driving states.
- **Gears down engine revolutions.** The engine revolutions converted by the gearbox are geared down by the constant gear ratio of the final drive.
- **Diverts the power flow, if necessary.** If the engine is installed in the vehicle longitudinal axis, the power flow must be diverted through 90° by a bevel-gear final drive because the drive shafts are always arranged transversally to the vehicle longitudinal axis **(Fig. 3)**.

  In vehicles with engines installed transversally to the vehicle longitudinal axis, the direction of the power flow does not have to be diverted. Spur-gear final drives are used here.

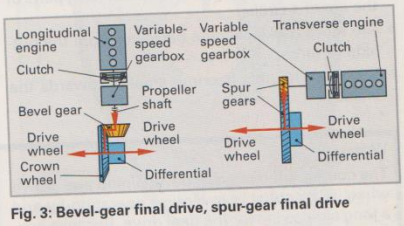


Fig. 3: Bevel-gear final drive, spur-gear final drive

16.7.1 Bevel-gear final drive

A bevel-gear final drive consists of a bevel pinion and a crown wheel.

A distinction **(Fig. 4)** is made between bevel-gear final drives

- with **non-offset axes** and
- with **offset axes** (hypoid drive).

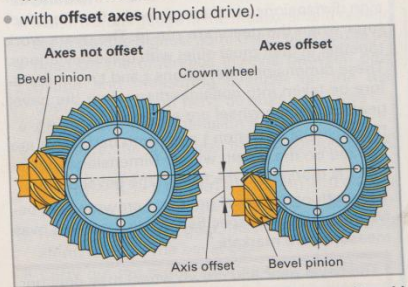


Fig. 4: Final drive with offset and non-offset axes (hypoid drive)

Skemmdir á drifi.

DIAGNOSIS AND PROBLEM ANALYSIS

Analysis of Gear Noise

Gear Howl and Whine

When you disassemble the axle to diagnose and correct gear noise, it is assumed that you have first checked the tires, exhaust, trim items and roof racks as possible causes.

The noises described earlier under "Road Test" usually have specific causes that you can diagnose by observation as you disassemble the unit (Fig. 1). The initial clues are, of course, the type of noise you heard on the road test and the driving conditions. We will describe the possible causes of each of the types and how the correction can be made.

Chuckle

Chuckle that occurs on the *coast* driving phase is usually caused by excessive clearance due to differential gear wear or by a damaged tooth on the coast side of the pinion or ring gear.

Damaged Gear Tooth. Any damage to a gear tooth on the coast side (Fig. 1) can cause a noise identical to chuckle. Even a very small tooth nick or ridge on the edge of a tooth is enough to cause the noise.

You can often correct this condition and remove the noise simply by cleaning up the gear tooth nick or ridge with a small grinding wheel. (Fig. 1 shows examples of tooth damage that can be corrected by grinding.)

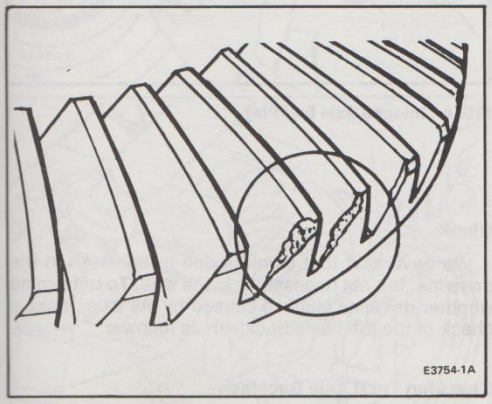


FIG. 1 Damaged Gear

Inspect the Gear Set

To check the gear set, remove as much lubricant as possible from the gears with clean solvent. Wipe the gears dry or blow them dry with compressed air. Look for scored or damaged teeth (Fig. 2). Also, look for cracks or other damage.

If either gear is scored or damaged badly, the gear set must be replaced. Also, if there is metal broken loose, the carrier and housing must be cleaned to remove particles that could cause damage later. And, of course, and other damaged parts in the axle must be replaced.

If the cleaned-up or damaged area is larger than 1/8-inch, it is advisable to replace the gear set.

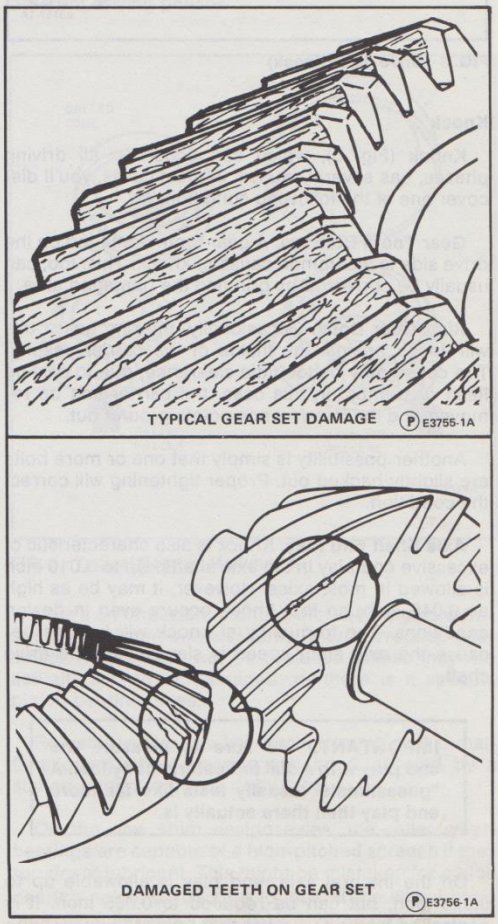


FIG. 2 Inspecting Gear Set

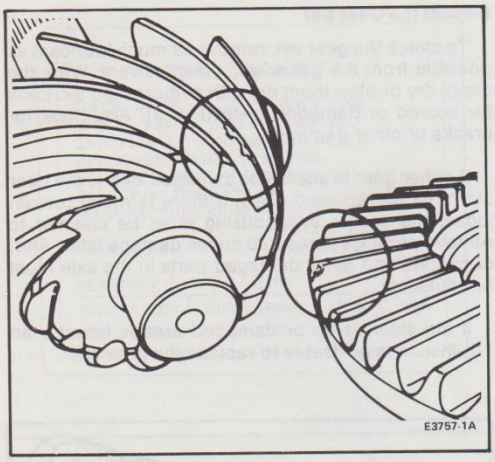


FIG. 3 Drive Side (Knock)

Knock

Knock (Fig. 3), which can occur on all driving phases, has several causes. In most cases, you'll discover one of the following conditions:

Gear Tooth Damage. A gear tooth damaged on the drive side is a common cause of knock. This, too, can usually be corrected by grinding the damaged area.

Ring Gear Bolts. Occasionally, the ring gear bolts will knock against the inside of the carrier casting. The cause may be too little clearance, due to casting flash or bumps. In this case, the carrier can be removed and the interference points ground out.

Another possibility is simply that one or more bolts are slightly backed out. Proper tightening will correct the condition.

Axle Shaft End Play. Knock is also characteristic of excessive end play in the axle shafts. Up to 0.010 inch is allowed in most axles. However, it may be as high as 0.045 inch; so that knock occurs even in design conditions. The frequency of knock will be less because the axle shaft speed is slower than the drive shaft.

IMPORTANT: Be sure to measure the end play with a dial indicator; not by feel. A "guesstimate" usually feels like far more end play than there actually is.

On the integral axle, end play is allowable up to 0.025 inch; but can be reduced to 0.005 inch. It is controlled by the C-washer that holds the shaft in the pocket of the side gear (Fig. 4).

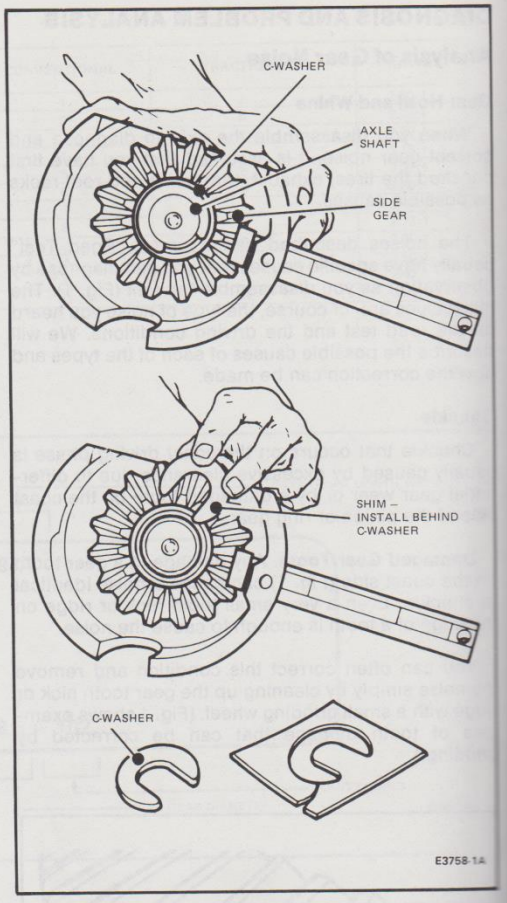


FIG. 4 Integral Axle End Play

Clunk

We have said that clunk is due to backlash in the driveline, but not necessarily in the axle. To determine whether driveline clunk is caused by the axle, make a check of the total axle backlash as follows:

Checking Total Axle Backlash

1. Raise the vehicle on a frame or twin-post hoist so that the rear wheels are free.

2. Clamp a bar between the axle companion flange and a part of the frame or body so that the flange cannot move.

3. Lock the left rear wheel to keep it from turning.

4. Turn the right wheel slowly until you "feel" it in a drive condition. Hold a chalk marker on the side of the tire 12 inches from the center of the wheel (Fig. 5).

5. Turn the wheel the other way until you again feel the drive condition.

6. Measure the length of the chalk mark; which is the total axle backlash. *It should be one inch or less.*

If the backlash is within this limit, the clunk will not be eliminated by disassembling the axle.

Check for these conditions if the backlash is excessive:

1. Elongation of the differential pinion shaft holes in the differential case.

2. Missing differential or side gear washer.

3. Galling of the differential pinion shaft and bore.

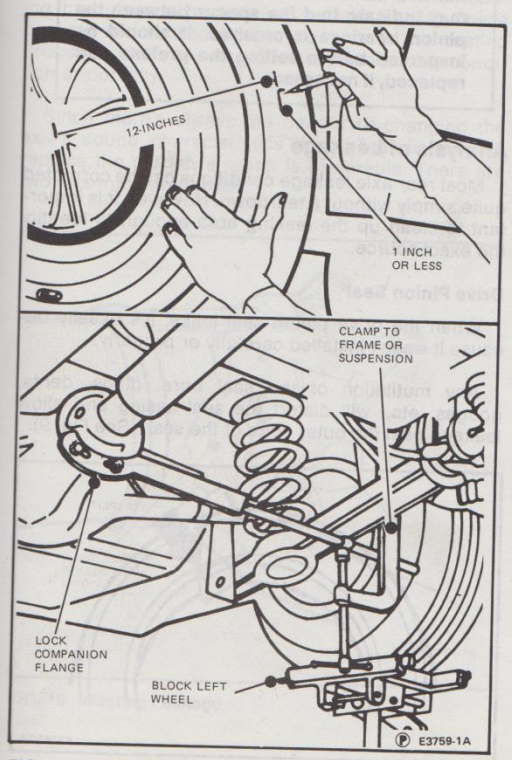


FIG. 5 Checking Total Axle Backlash

Check Axle Shaft Spline Fit. If none of the above conditions show up, there may be a loose fit of the axle shafts to the side gear splines. You should continue as follows *until the correction is made*.

4. Install new side gears and recheck the backlash.

5. Install two new axle shafts.

6. Replace the axle assembly.

Bearing Noise

Bearing malfunctions normally will be obvious at disassembly (Fig. 6). As we've noted earlier, pinion bearings make a high-pitched, whistling noise; usually at all speeds. However, if there is only one pinion bearing that is malfunctioning, the noise may vary in different driving phases.

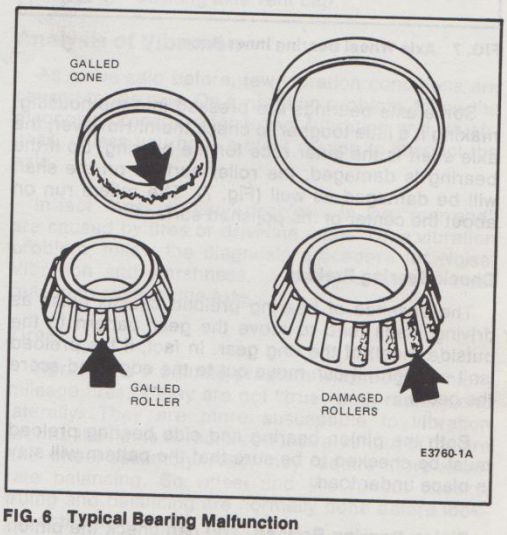


FIG. 6 Typical Bearing Malfunction

Here's an important point: *pinion bearings are frequently replaced unnecessarily when correcting gear noise.* They should not be replaced unless they are actually scored or damaged; or there is a specific pinion bearing noise.

Remember that the low-pitched rumble of a malfunctioning wheel bearing can be duplicated by a station wagon roof rack or by tires.

On the new shim design axles, the roller wheel bearings are capable of a high-pitched screech if they run dry of lubricant. This might be mistaken for pinion bearing noise, so be sure to look at the wheel bearings carefully before tearing down the axle.

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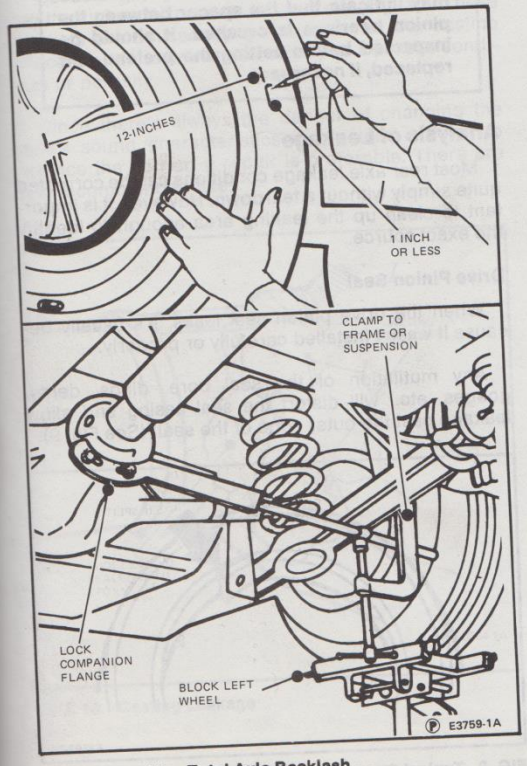

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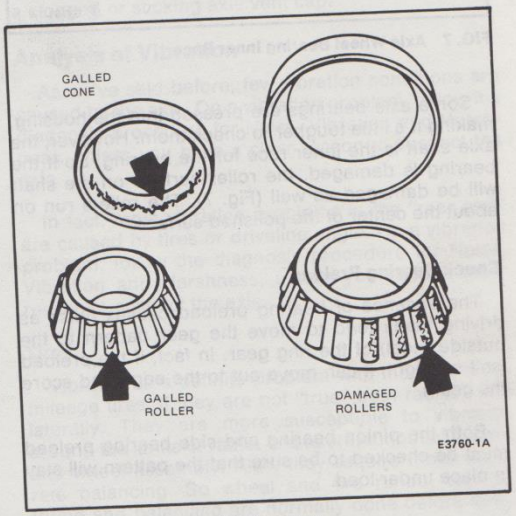

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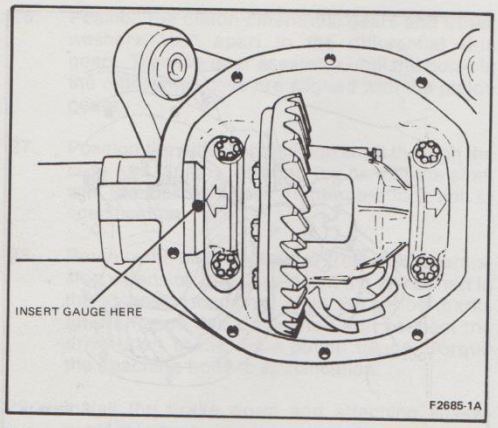


FIG. 14 Inserting Feeler Gauge

10. Using a feeler gauge tool, select the thickest feeler blade that will enter between the gauge disc and the carrier bore ring gear side (LH), (Fig 16). The feeler gauge fit should be a slight drag-type feel. Record the feeler gauge reading.

11. Add .200 in. to the feeler gauge recorded reading. See example below. The left shim thickness is the total reading minus .008 in., then subtract the total of the .200 in. plus the feeler gauge reading in Step 11 from Step 4 and add .016 in. to obtain the thickness for the pinion gear side (RH) shim.

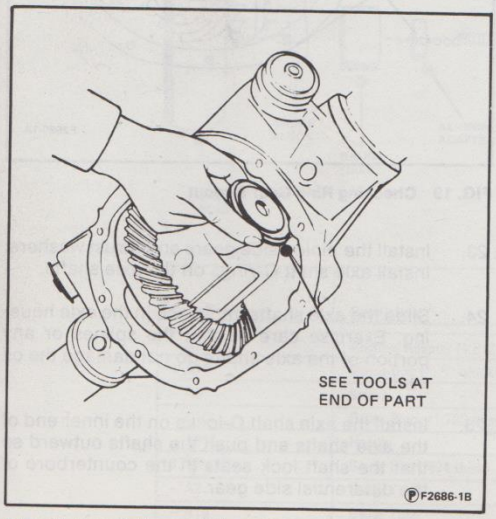


FIG. 15 Installation of Differential Bearing Preload Disc

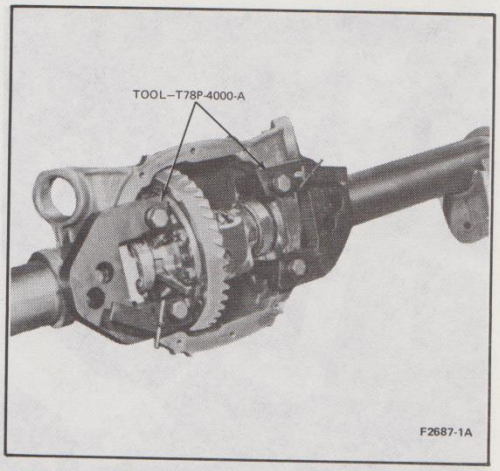


FIG. 16 Installation of Differential Carrier Spreader Adapters

EXAMPLE—

Step 4—Feeler Gauge Reading	0.40 in.
Add	.500 in.
Total Clearance	.540 in.

EXAMPLE—

Step 11—Feeler Gauge Reading	.086 in.
Plus	.200 in.
Total	.286 in.
Ring Gear Side Shim LH	.286 in.
Subtract	.008 in.
Correct Shim Size Ring Gear Side (LH) (Fig. 21 and 22)	.278 in.

Total Clearance	.540 in.
	Obtained in Step 4
Subtract Ring Gear Side LH	.286 in.
	Obtained in Step 11
	.254
Add	.016 in.
CORRECT SHIM SIZE PINION GEAR SIDE (RH) (Fig. 21 and 22)	.270 in.

12. Remove the adjuster rod tool T78P-4136-A, or equivalent, from the housing assembly.

13. Remove the bearing caps—two (2).

14. Remove the .200 in. gauge disc spacer tool and the bearing preload spacer disc.

15. Install the carrier spreader adapters T78/-4000-A, or equivalent, and spreader tool T78P-4000-E, or equivalent, as shown in figures 16 and 17.

16. Install a dial indicator (Tool 4201-C, or equivalent) to determine the housing spread as shown in Fig. 17.

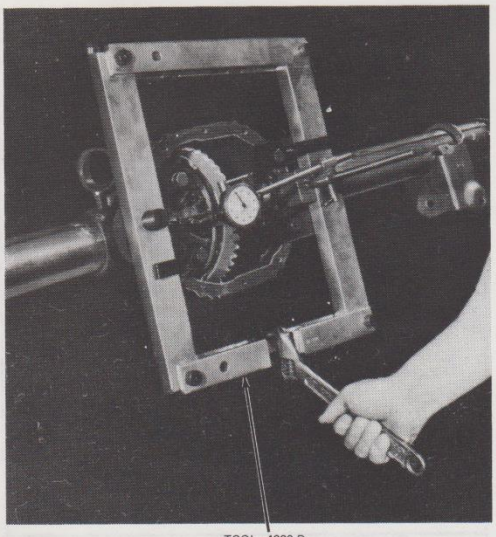


FIG. 17 Spreading the Differential Carrier

17. Spread the housing to a value of .016 in. Do not exceed this dimension at the tip of the case opening. Remove the dial indicator.

18. Install the shim on the ring gear side (LH) as determined in Step 11 and push the differential case and bearing cup as far left as possible.

19. Install the shim on the pinion gear side (RH) as determined in Step 11. Use a plastic hammer and tap the shim in until it is seated.

20. Release the spreader and remove it from the housing.

21. Install the bearing caps and torque them to specification (70-85 ft-lbs.), making sure that the punch marks are aligned.

NOTE: Cap arrows to be pointed out-board.

22. Determine backlash readings at several teeth around the ring gear. (Specification .008-.012). However, the variance of the readings must not exceed .004 (Fig 18). Also, determine back face runout (Spec .003) (Fig. 19).

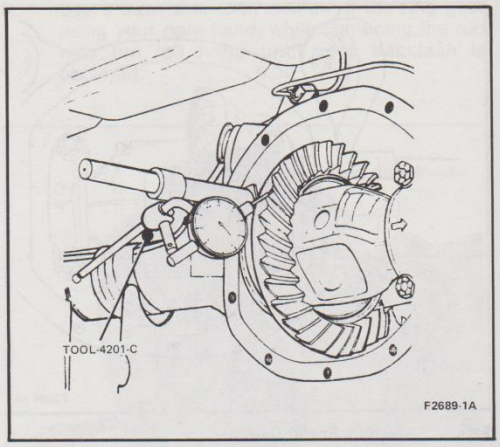


FIG. 18 Checking Ring and Pinion Gear Backlash

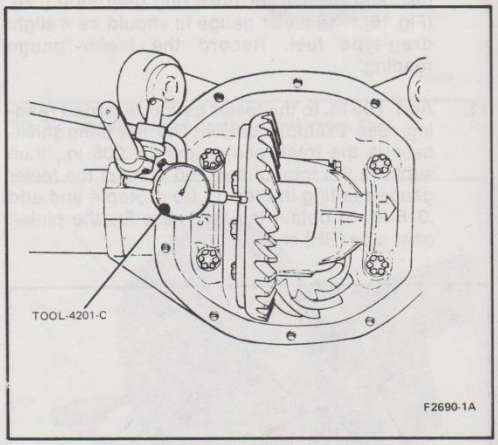


FIG. 19 Checking Ring Gear Runout

23. Install the pinion side gears and thrust washers. Install axle shaft O-rings on the axle shafts.

24. Slide the axle shafts into place in the axle housing. Exercise care so that the splines or any portion of the axle shafts do not damage the oil seals.

25. Install the axle shaft C-locks on the inner end of the axle shafts and push the shafts outward so that the shaft lock seats in the counterbore of the differential side gear.

T76P-4020-A11

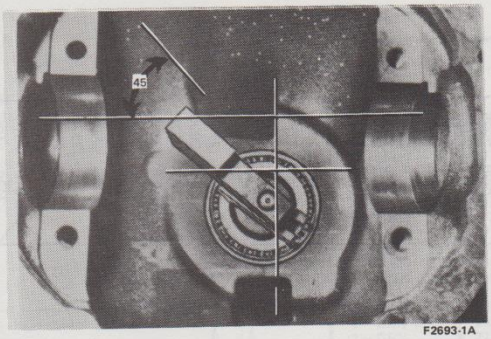


FIG. 23 Installation of Pinion Depth Gauge Block in 7.5 Axle

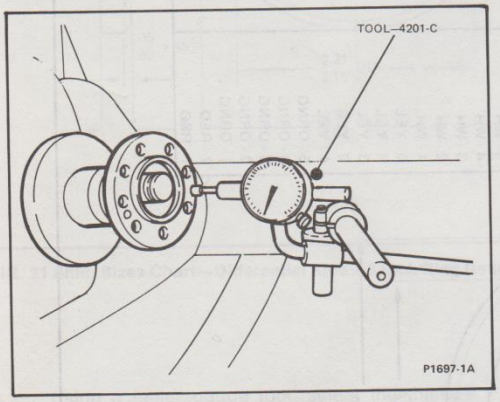


FIG. 24 Checking Companion Flange Lateral Runout

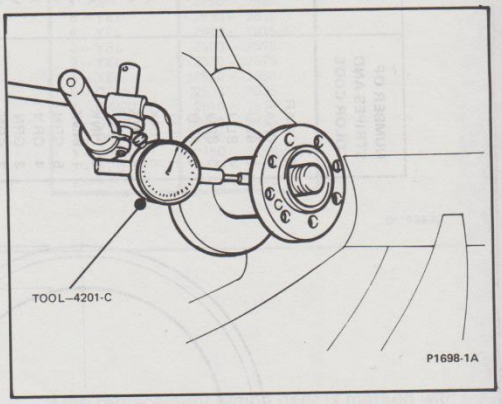


FIG. 25 Checking Companion Flange Radial Runout Typical

Companion Flange Runout Check

1. Raise the vehicle on a hoist that supports the rear axle (twin-post hoist).
2. Remove the driveshaft assembly (Refer to the applicable Part in this Group of the Manual).
3. Check the companion flange for damage.
4. To check radial runout, set up dial indicator as shown in Fig. 25
5. Rotate the companion flange with the dial indicator in place. If the runout exceeds specifications, remove the flange and reinstall it 180 degrees from original position.
6. If the runout is still excessive, remove and reinstall the flange an additional 90 degrees and re-check the runout.
7. To check lateral (face) runout, set up the dial indicator as shown in Fig. 24. Repeat Steps 5 and 6.
8. If the runout is still excessive, replace the companion flange and check the runout. If necessary, rotate the new flange on the pinion shaft until and acceptable runout is obtained.

   If excessive runout is still evident after replacement of the companion flange, it will be necessary to replace the ring and pinion gear, and repeat the above checks until runout is within specifications.
9. Install the driveshaft assembly (Refer to the applicable Part in this Group of the Manual).

FINAL RESULTS

Properly designed, manufactured, and maintained RICHMOND GEAR gears, correctly assembled by you in a clean rigid gear box, and operated with the proper lubricant, should result in safe and satisfactory performance. Be sure you select the proper application for your gear set.

Any questions concerning these installation instructions must be forwarded to us for clarification at the following address:

RICHMOND GEAR
P.O. Box 238, Old Norris Road
Liberty, South Carolina 29657
TechLine: 864-843-9275
Email: tech@richmondgear.com

WARRANTY

Warranty is limited to material and/or workmanship defect at time of shipment from the factory, and in no event shall seller have any liability for consequential damages of any kind resulting from a breach of this warranty. This warranty will be void on all products that show evidence of misapplication, improper installation, abuse, lack of proper maintenance, negligence, or alteration from original design. This warranty is in lieu of any other warranties, either express or implied, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OF FITNESS FOR ANY PARTICULAR PURPOSE.

ADDITIONAL INFORMATION

Buyer shall be solely responsible for determining the adequacy of the product for any and all uses to which buyer shall apply the product. The application by buyer shall not be subject to any implied warranty of fitness for that particular purpose. The manufacturer makes no warranty or representations, expressed or implied, by operation of law or otherwise as to the merchantability or fitness for a particular purpose of the goods sold hereunder. Buyer acknowledges that it alone has determined that the goods purchased hereunder will suitably meet the requirements of their intended use. In no event will the manufacturer be liable for consequential, incidental or other damages.

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with selection, installation, operation, lubrication, and maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purpose, the matter should be referred to RICHMOND GEAR.

BREAK IN

A new ring and pinion installation, especially a high numeric ratio with new bearings, can cause an excessive heat buildup in the rear end and cause softening of the gear teeth and bearings if a break in is not performed.

Street vehicles should be driven at normal street driving speed for approximately 10 miles, then stop and let cool for 30 minutes. Do this 2 to 3 times. Towing vehicles need approximately 200 to 300 miles of normal street driving before being used for towing.

On circle track race cars make approximately 6 to 8 laps at slow speed, then let cool for 30 minutes. Make 6 to 8 more laps at slow speed, then 2 to 3 laps at full speed, then let cool again for 30 minutes.

NOTE: If after the above break in is performed, overheating of the rear end is suspected, repeat the final portion of the break in procedures.

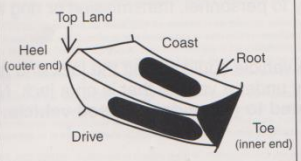
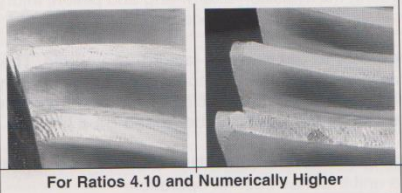
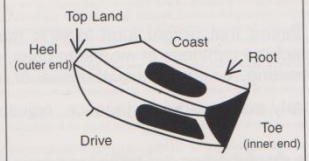
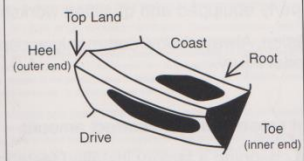
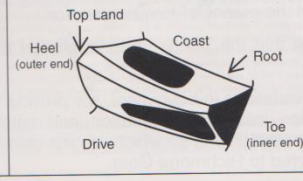
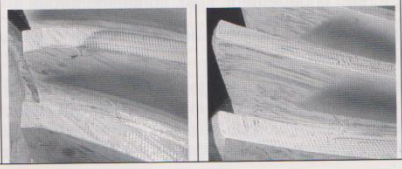
HELPFUL HINTS & ADDITIONS TO RICHMOND GEAR INSTALLATION INSTRUCTIONS

After completely reading instructions, go back to step #4. The following group of shim thickness are only if you do not have access to a pinion depth gauge or the old shim from the old pinion to start with. G.M.- .035, Ford 8-9" - .020, Ford 8.8 - 7.5 - .030, All Dana's- .035, 8-3/4 x 1-3/4 pin, - .090, 8-3/4 x 1-7/8 pin, - .020, Mopar- 9-1/4 - .020.

Pinion depth shims are located underneath the rear pinion bearing cone that is pressed on pinion with exception of the Dana Models. Dana pinion depth shims are underneath the rear pinion bearing cup in the housing. Dana carrier bearing preload shims are between carrier and bearing cone. All others are on the outside of bearing cup unless spanners are used as in the Ford 8 and 9 inch, both 8-3/4 and Mopar 9-1/4. Ford 8 and 9 inch pinion depth is regulated by shims between pinion support and chuck or center section.

Step #5 - If crush collar is used to set bearing preload, do not use until you have established pinion depth and backlash and you are satisfied with the pattern you get. You can simulate pinion bearing preload by tightening pinion nut until the right preload is achieved with only motor oil on the pinion bearings. The crush collar and pinion seal should be last to install.

TOOTH CONTACT CHART

	Ring Gear Tooth Contact	Coast Side	Drive Side	Condition	Remedy
A		For Ratios 3.90 and Numerically Lower 		IDEAL PATTERN	V/A
B		For Ratios 4.10 and Numerically Higher 		IDEAL PATTERN	N/A
C		All Series - Pattern Too High 		HIGH TOOTH CONTACT heavy on the top of the drive gear tooth profile	Move the Drive PINION DEEP-ER into MESH.
D		All Series - Pattern Too Low 		LOW TOOTH CONTACT heavy on the root of the drive gear tooth profile	Move the Drive PINION OUT of MESH.

TORQUE SPECIFICATIONS

RING GEAR BOLTS
GRADE 8

3/8" x all lengths	45-50 ft lb
7/16" x all lengths	60-65 ft lb
1/2" x all lengths	100-110 ft lb

CARRIER CAP BOLTS

7/16" (5/8" head)	60-65 ft lb
1/2" (3/4" head)	80-85 ft lb

Step #7-G.M. rear cover style housings use shims on the outside, between bearing cup and housing, adjusting backlash and carrier bearing preload. If starting with a bare housing, or you are installing a spool or different carrier, before you mount the ring gear, establish equal shim pack on each side of carrier and enough to create a drag when you slide it in and out of the housing by hand. Keep in mind you should keep the thickest shim next to the bearing cup.

With a little loctite on the threads of the ring gear bolt, mount gear to carrier or spool. After adjusting shim pack to get proper backlash and once you have established your pattern, remove carrier and pinion. Now is the time to install crush collar and pinion seal. NOTE: Always use loctite on the pinion nut. If you do not have a rear end housing spreader, you will have to work at installing the carrier once you add more shim to preload the carrier bearings. As a rule of thumb all carrier bearings will require .010 preload. After adding .005 to each side of the shim pack, coat surfaces of the shims with axle bearing grease to hold them in the housing, make sure the cups stay straight. Using a plastic or brass hammer, gently pound on bearing cups side to side until carrier has seated in housing. Again, it is important that you keep the cups straight during this operation. A spreader is almost necessary for all Dana Model rear ends. Torque caps to proper torque value.

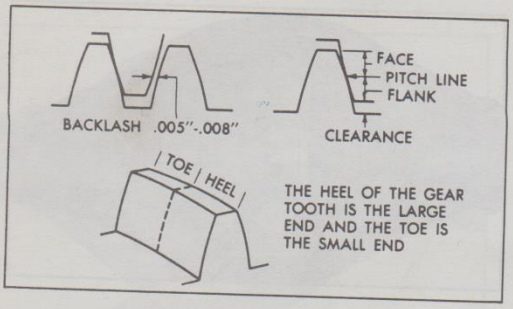


Fig. 23—Gear Tooth Nomenclature

5. Inspect the contact pattern produced by the above procedure. Figure 23 shows the terminology used in analyzing contact patterns.

The large end of the tooth is called the "heel" and the small end of the "toe". Also, the top of the tooth, which is the part above the pitch line, is called the "face," while the part below the pitch line is called the "flank". The space between the adjacent meshing teeth is referred to as "backlash".

Figure 24 shows correct and incorrect contact patterns.

Contact pattern "A" provides the ideal bearing for quietness and long life. If the pattern shows a toe contact "B," it indicates not enough backlash. To correct, move the ring gear away from the pinion by increasing right shim thickness while decreasing left shim thickness an equal amount.

If the pattern shows a heel contact "C," it indicates too much backlash. To correct, move the ring gear toward the pinion by increasing left shim thickness while decreasing right shim thickness an equal amount.

NOTE: Make adjustment increasing and decreasing shim thickness by 0.002" at a time, check contact with red lead mixture and continue adjustment until tooth contact appears as in "A". Backlash must remain within limits.

If the pattern shows a high face contact "D," it indicates that the pinion is too far out, that is, too far toward the front of the car.

To correct a pattern such as "D," it will be necessary to install a thicker pinion shim as described under "Pinion and/or Bearing Replacement". A .001" thicker shim is recommended as a starting point. Continued changes may be necessary to obtain the correct setting.

If the pattern shows a flank contact "E," it indicates that the pinion is in too far. To correct replace the pinion shim with a .001" thinner shim and recheck contact pattern.

In making pinion adjustments, be sure backlash is correct before testing contact pattern. Moving the pinion in reduces backlash and moving it out increases backlash.

After satisfactory contact pattern is produced as in "A," clean ring and pinion gear teeth and pour a liberal quantity of rear axle lubricant on gears and bearings - turn gears to work lubricant into all surfaces.

6. Install axle shafts, drums and wheel assemblies; fill rear axle with proper lubricant to a level even with bottom of filler hole and road test vehicle.

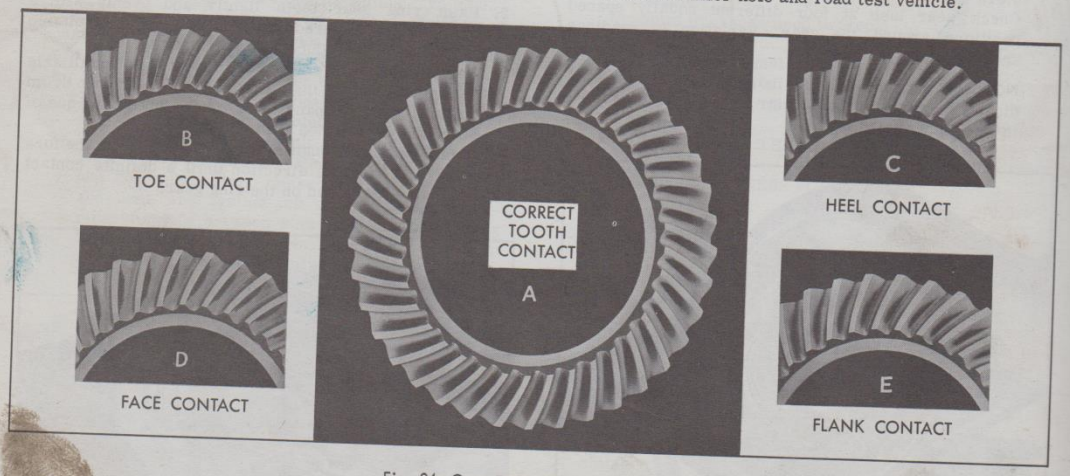


Fig. 24—Gear Tooth Contact Patterns

In order to assist in determining whether the gears are properly adjusted, paint the bevel gear with red lead or similar substance and turn the bevel gear so the pinion will make an impression on the teeth. Correct procedure to follow in the event of an unsatisfactory tooth contact is shown in Fig. 17.

After the differential has been assembled and adjusted, the pinion shaft oil seal should be installed. Remove universal joint flange and with oil seal replacing tool, Fig. 18 install oil seal. Fig. 19 gives dimensions of oil seal replacing tool. Install universal flange and tighten nut solidly in place, then install cotter pin.

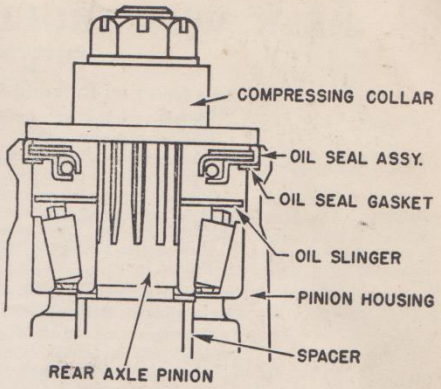


FIG. 18—INSTALLING PINION OIL SEAL

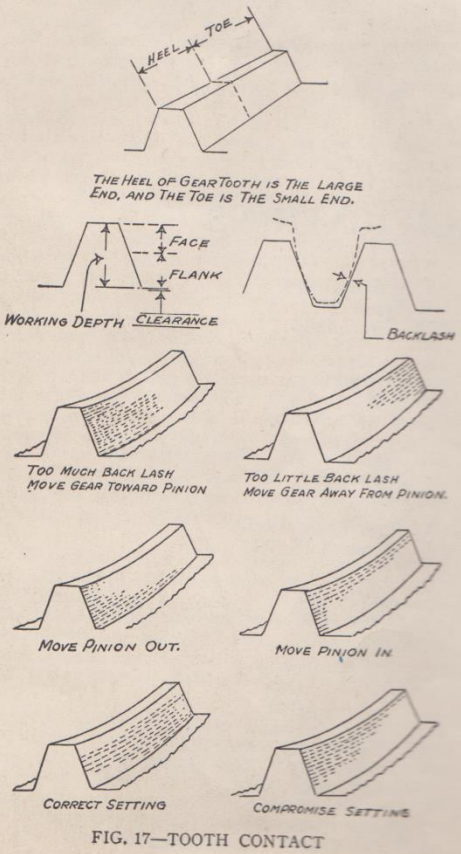


FIG. 17—TOOTH CONTACT

Install axle shafts as instructed under "Axle Shaft" and replace housing cover with new gasket. Fill differential housing with proper amount of hypoid lubricant. See Lubrication Chart, Page 12.

Install axle under vehicle in reverse order of removal, after which bleed the rear brake cylinders to remove any air from the lines, first making certain that there is an ample supply of fluid in the brake master cylinder reservoir. See Section "Brakes" for further instructions.

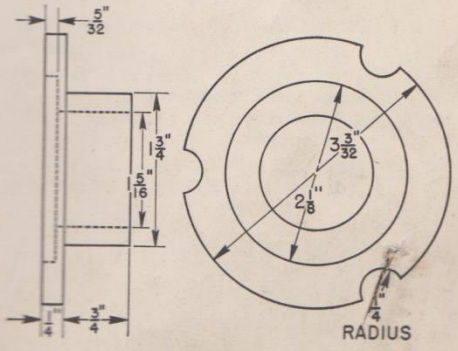


FIG. 19—OIL SEAL COMPRESSING COLLAR

REAR AXLE TROUBLES AND REMEDIES

SYMPTOMS	PROBABLE REMEDY
Axle Noisy on Pull and Coast	
Excessive back lash bevel gear and pinion	Adjust
End play pinion shaft	Adjust
Worn pinion shaft bearing	Replace
Pinion set too deep in ring gear	Adjust
Pinion and bevel gear too tight	Adjust
Axle Noisy on Pull	
Pinion and bevel gear improperly adjusted	Adjust
Pinion bearings rough	Replace
Pinion bearings loose	Adjust
Axle Noisy on Coast	
Excessive lash in bevel gear and pinion	Adjust
End play in pinion shaft	Adjust
Improper tooth contact	Adjust
Rough bearings	Replace
Backlash	
Worn differential pinion gear washers	Replace
Excessive lash in bevel gear and pinion	Adjust
Worn universal joints	Replace

Emergency

Should difficulty be experienced with differential or propeller shaft the vehicle may be driven in by removing the rear axle shafts and propeller shaft.

Place front wheel drive lever in rear (engaged) position. This will allow front wheel drive to propel the vehicle.

REAR AXLE SPECIFICATIONS

Rear Axle		
Type	Full floating	
Make	Spicer	
Drive	Thru springs	
Differential		
Type	Hypoid	
Ratio	4.88:1	
Bearings	Timken Roller	
Differential Pinion Gears	2	
Oil capacity	See Lubrication Chart, Page 12	
Adjustment	Shims .003", .005", .010", .030"	
Pinion Shaft		
Bearings	Two Timken Roller	
Adjustment	Shims .003", .005", .010"	
Bevel and Pinion Gear		
Back Lash	.005"—.007"	
Adjustment	Shims .003", .005", .010", .030"	
Bearings		
Make—Differential Side	Timken	
Cone and roller	24780	
Cup	24721	
Make—Pinion Shaft	Timken	
Cone and roller	Front 02872	Rear 31593
Cup	Front 02820	Rear 31520
Shims	.003", .005", .010", .030"	
Make—Wheel Hub	Timken	
Cone and Roller	Inner 18590	Outer 18590
Cup	Inner 18520	Outer 18520

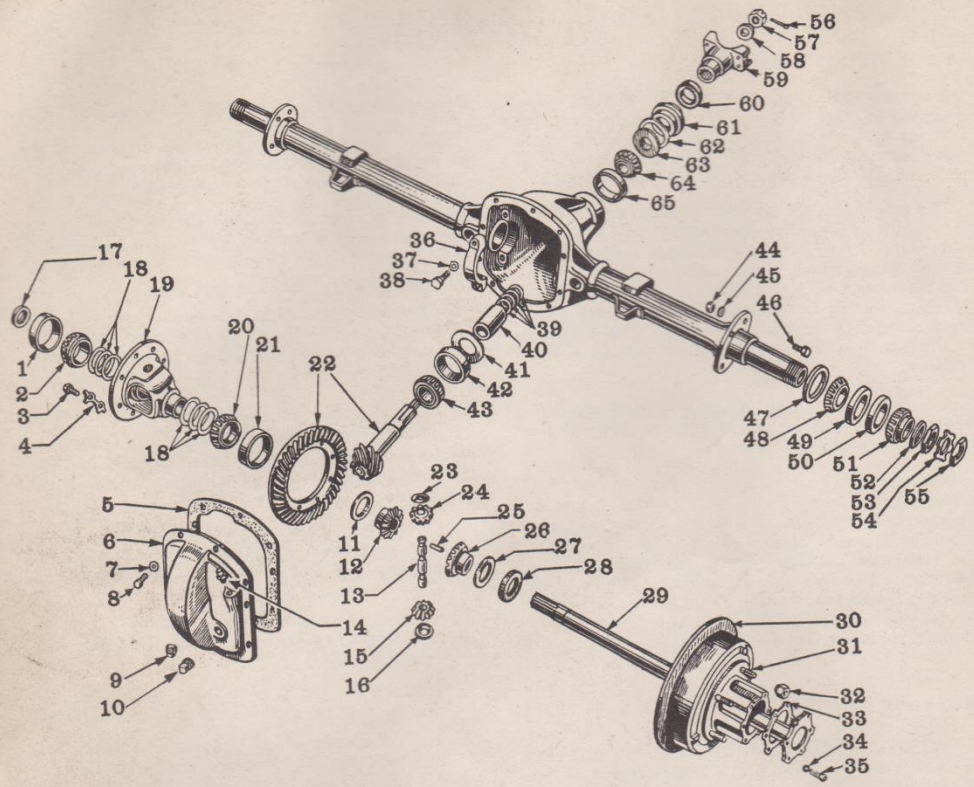
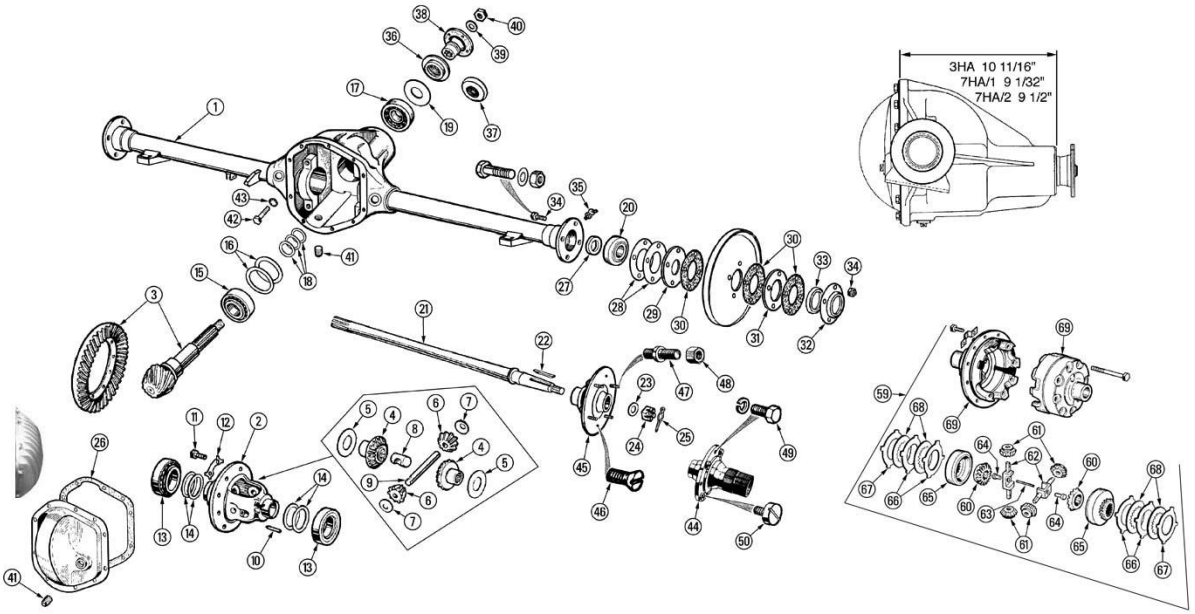


FIG. 1—REAR AXLE ASSEMBLY

No.	Willys Part No.	Ford Part No.	Name
1	52881	GP-4222	Differential Bearing Cup
2	52880	GP-4221	Differential Bearing Cone and Rollers
3	A-871	355511-S	Hypoid Bevel Drive Gear Screw
4	A-792	GP-4281	Drive Gear Screw Lock Strap
5	A-782	GP-4035	Gear Carrier Cover Gasket
6	A-781	GP-4016	Gear Carrier Cover
7	52510	34941-S	Gear Cover Screw Lockwasher
8	51523	20346-S2	Gear Cover Screw
9	636577	358048-S	Axle Housing Drain Plug
10	636538	353051-S	Gear Cover Filler Plug
11	A-795	GPW-4228	Differential Bevel Side Gear Thrust Washer
12	A-794	GP-4236	Differential Bevel Side Gear
13	A-798	GP-4211	Differential Bevel Pinion Mate Shaft
14	A-870	GP-4022	Differential Vent Plug
15	A-796	GP-4215	Differential Bevel Pinion Mate
16	A-797	GP-4230	Differential Bevel Pinion Mate Thrust Washer
17	A-779	GP-3034	Oil Seal—Carrier End
18	A-784	GP-4229-A	Differential Adjusting Shims
19	A-793	GP-4206	Differential Case
20	52880	GP-4221	Differential Bearing Cone and Rollers
21	52881	GP-4222	Differential Bearing Cup
22	A-789	GPW-4209	Hypoid Bevel Drive Gear and Pinion Set
23	A-797	GP-4230	Differential Bevel Pinion Mate Thrust Washer
24	A-796	GP-4215	Differential Bevel Pinion Mate
25	636360	GP-4241	Differential Bevel Pinion Mate Shaft Lock Pin
26	A-794	GP-4236	Differential Bevel Side Gear
27	A-795	GP-4228	Differential Bevel Side Gear Thrust Washer
28	A-779	GP-3034	Oil Seal Carrier End
29	A-901	GPW-4234	Rear Axle Shaft—Right (Ford GP-4235; Willys A-902—Left)
30	A-472	GP-1111	Brake Drum
31	A-474	GP-1107	Wheel Hub Bolt—R.H. Thread (Ford GP-1108; Willys A-473 L.H. Thread)
32	A-476	GP-1012	Wheel Hub Bolt Nut—R.H. Thread (Ford GP-1013; Willys A-475 L.H. Thread)
33	A-904	GP-4032	Axle Shaft Gasket
34	5010	34837-S	Rear Axle Drive Shaft Screw Lockwasher
35	A-760	GP-1110	Rear Axle Drive Shaft Screw
36	A-764	GP-4224	Differential Bearing Cap
37	636528	34922-S	Differential Bearing Cap Screw Lockwasher
38	636527	355699-S	Differential Bearing Cap Screw
39	A-833	GP-4659-A	Pinion Bearing Adjusting Shim (Front
40	A-799	GP-4068	Drive Pinion Bearing Spacer
41	A-800	GP-4660-A	Pinion Bearing Adjusting Shim (Rear)
42	52877	86H-4616	Drive Pinion Bearing Cup—(Rear)
43	52876	86H-4621	Drive Pinion Bearing Cone and Rollers —(Rear)
44	636575	34083-S2	Brake Disc Screw Nut
45	5010	34837-S	Brake Disc Screw Lockwasher
46	A-903	355578-S	Brake Disc Screw
47	A-864	GP-1177	Hub Oil Seal Assembly
48	52942	GP-1201	Hub Bearing Cone and Rollers
49	52943	GP-1202	Hub Bearing Cup
50	52943	GP-1202	Hub Bearing Cup
51	52942	GP-1201	Hub Bearing Cone and Rollers
52	A-865	GP-1218	Outer Wheel Bearing Washer
53	A-866	GP-4252	Outer Wheel Bearing Nut
54	A-867	GP-1124	Outer Wheel Bearing Lockwasher
55	A-866	GP-4252	Outer Wheel Bearing Nut
56	636571	357202-S	Drive Pinion Nut Cotter Pin
57	636569	356126-S	Drive Pinion Nut
58	636570	355534-S	Drive Pinion Nut Washer
59	A-1445	GP-4842	Universal Joint End Yoke Assembly
60	636568	GP-4666	Universal Joint End Yoke Dust Shield
61	639265	GP-4676	Pinion Leather Oil Seal
62	636565	GP-4661	Pinion Leather Oil Seal Gasket
63	636566	GP-4619	Drive Pinion Oil Slinger
64	52878	GP-4630	Drive Pinion Bearing Cone and Rollers (Front)
65	52879	GP-4628	Drive Pinion Bearing Cup (Front)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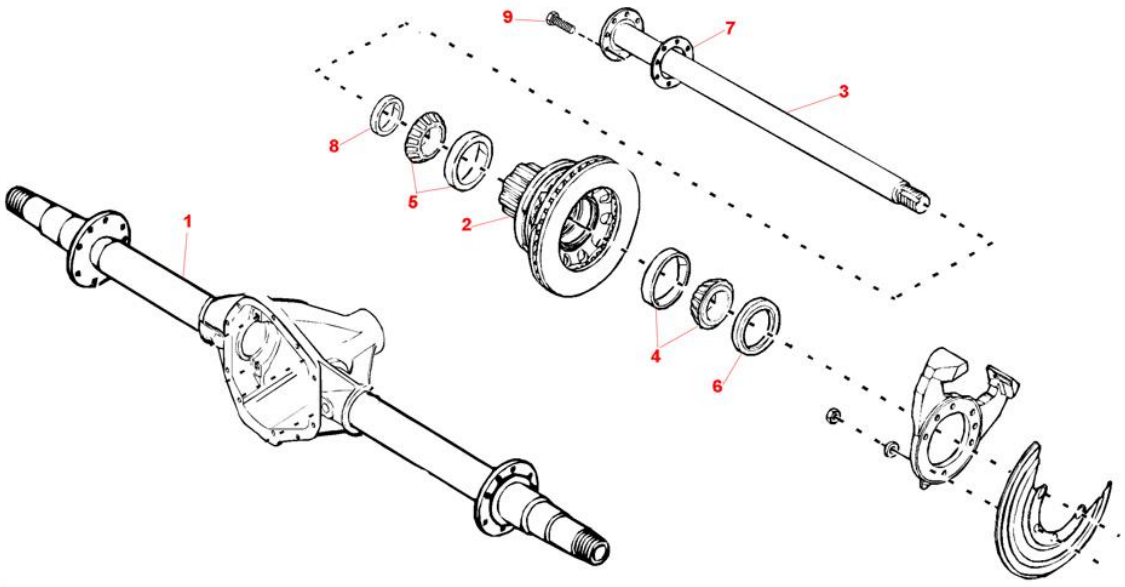
7HA/2 9 1/2"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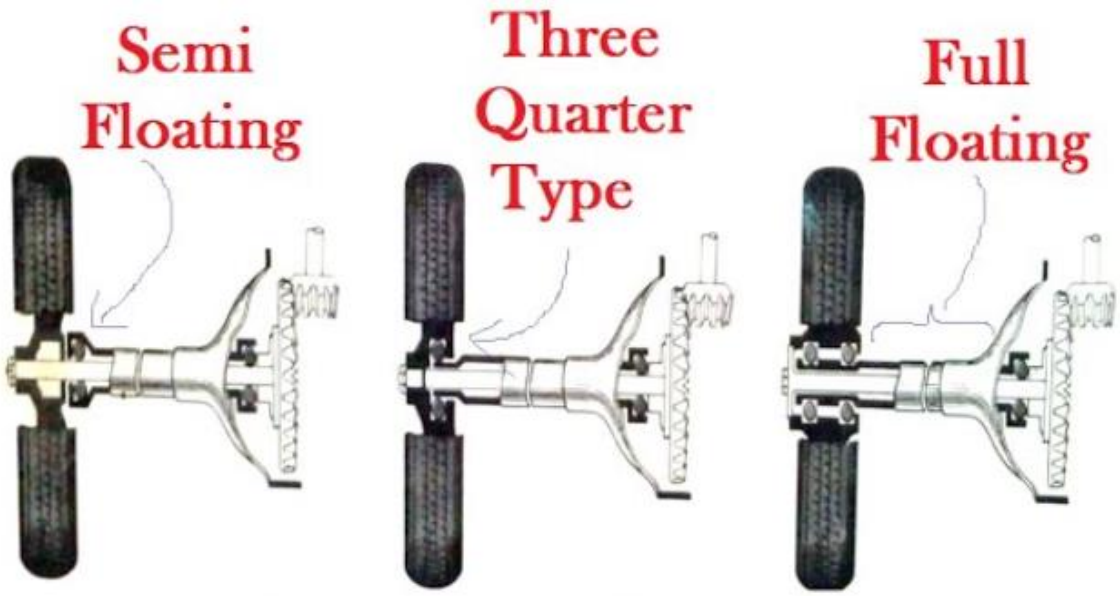

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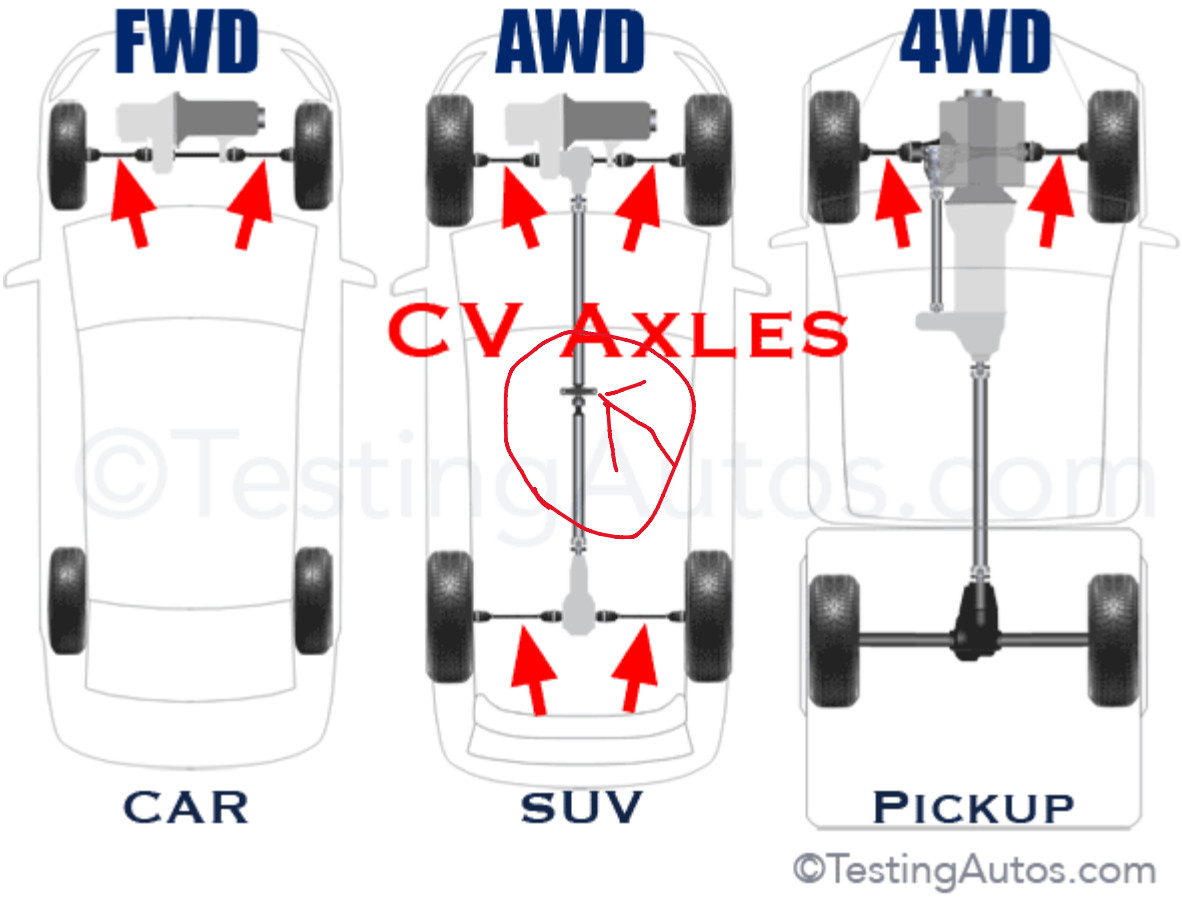
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AWD
4WD
CV AXLES
CAR
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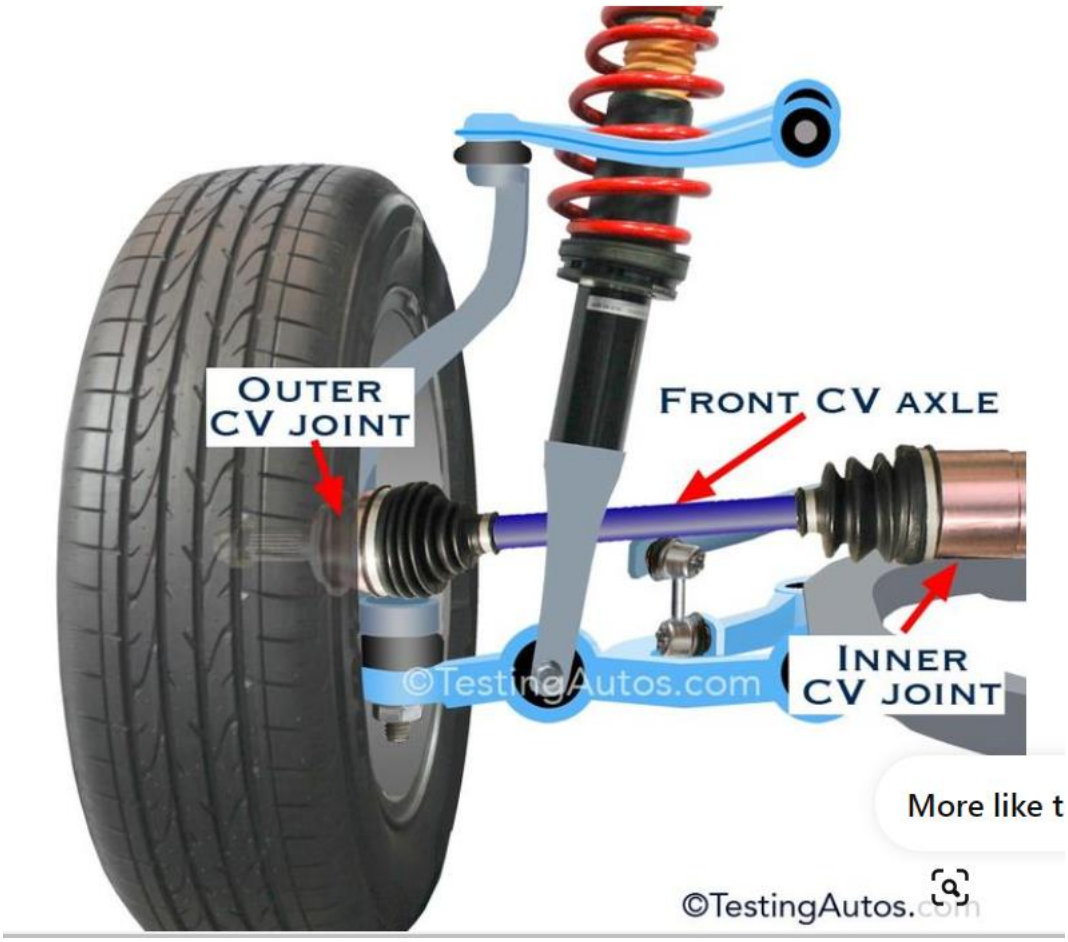
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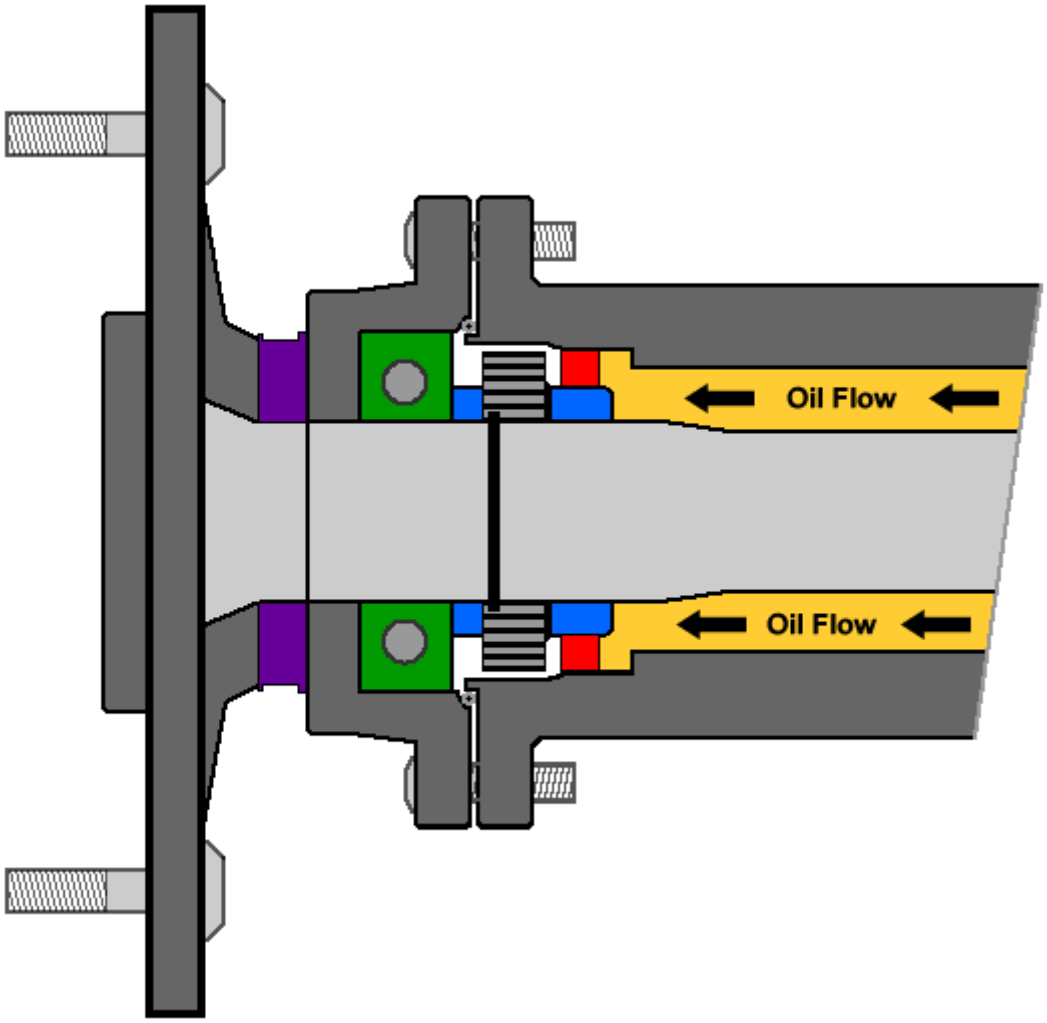
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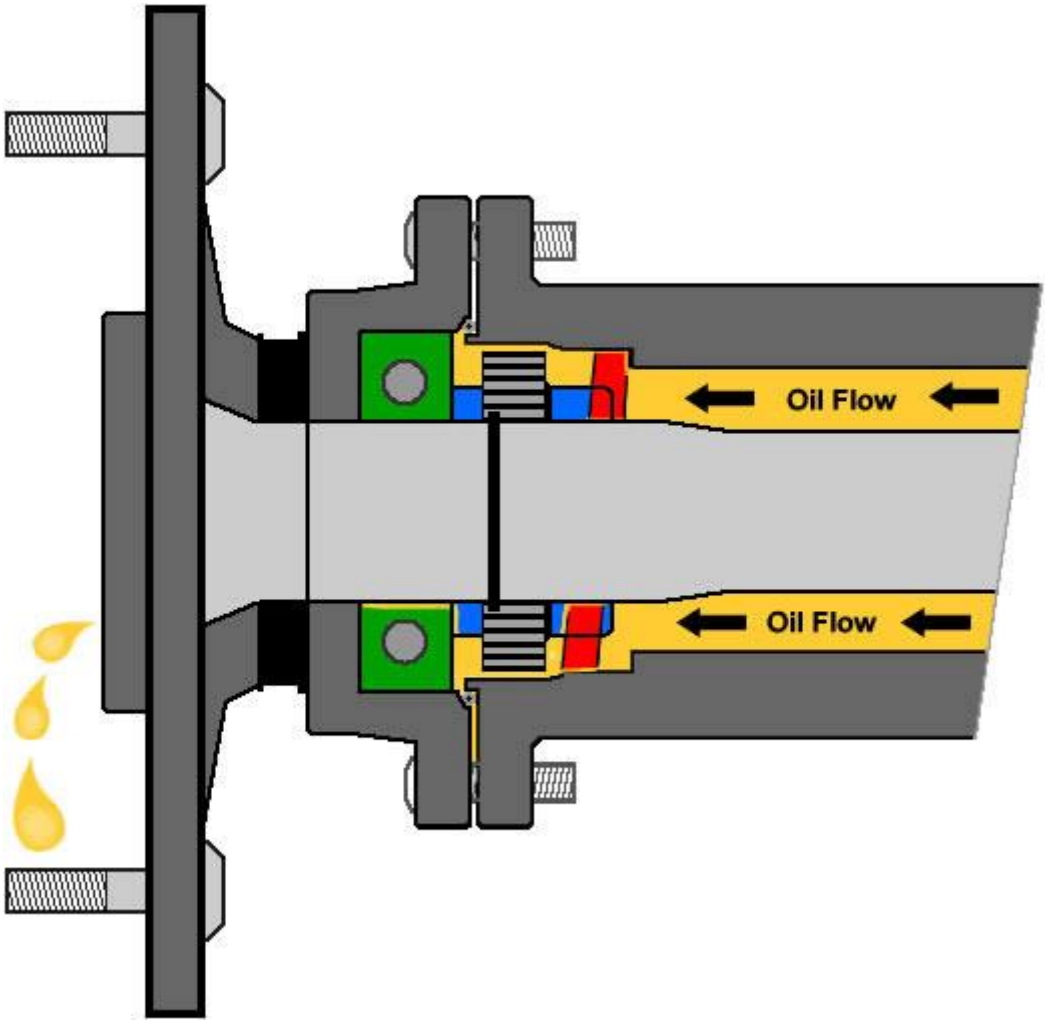
Oil Flow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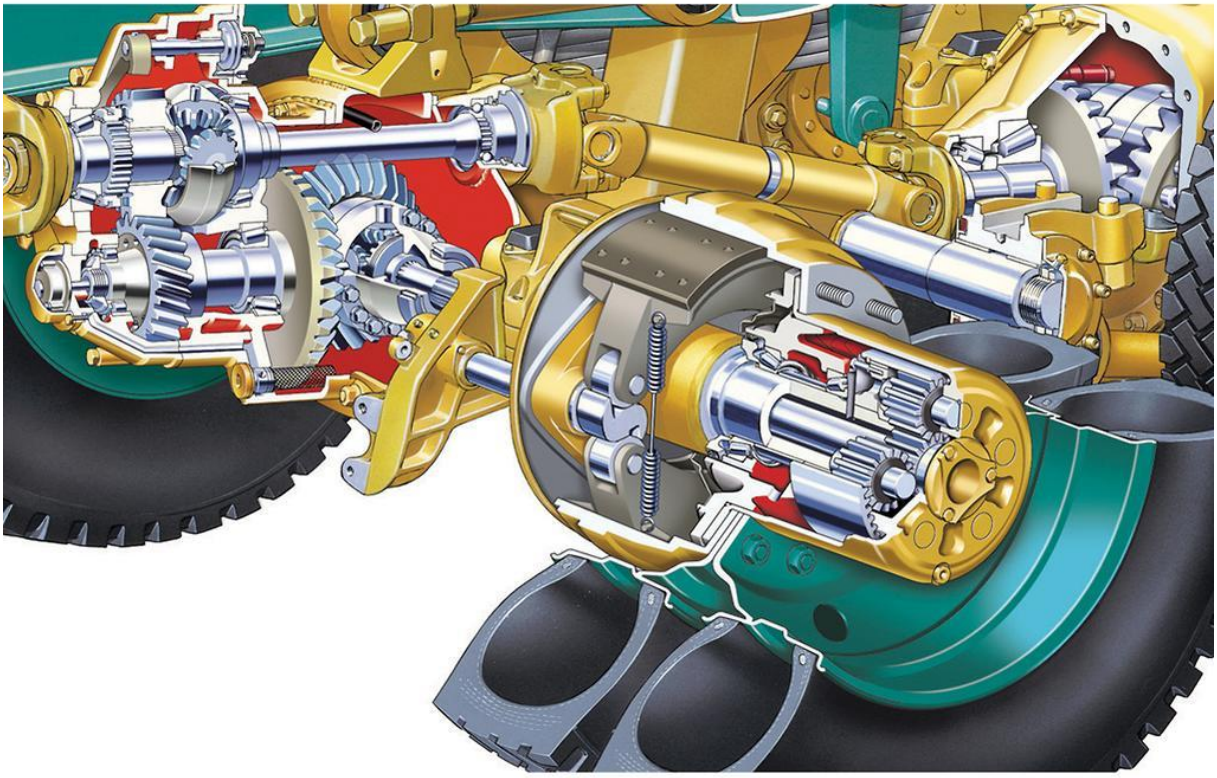
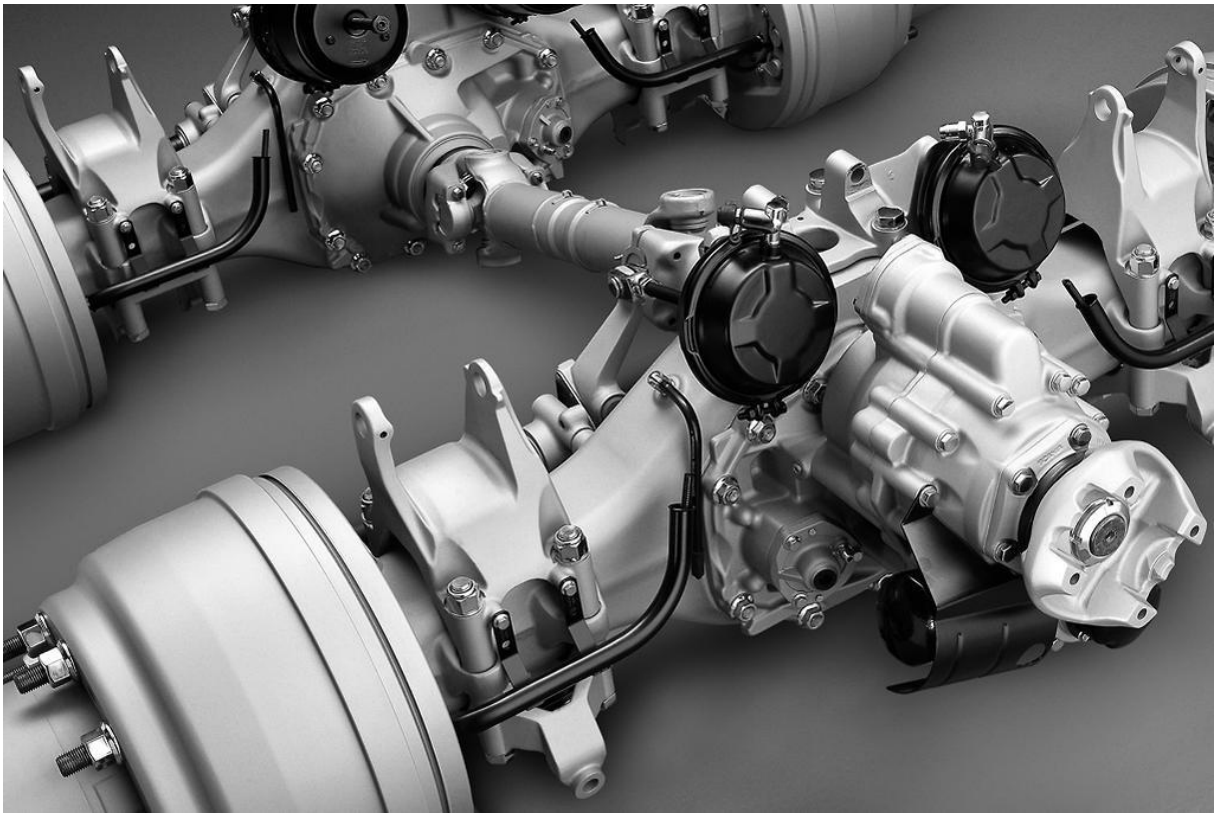
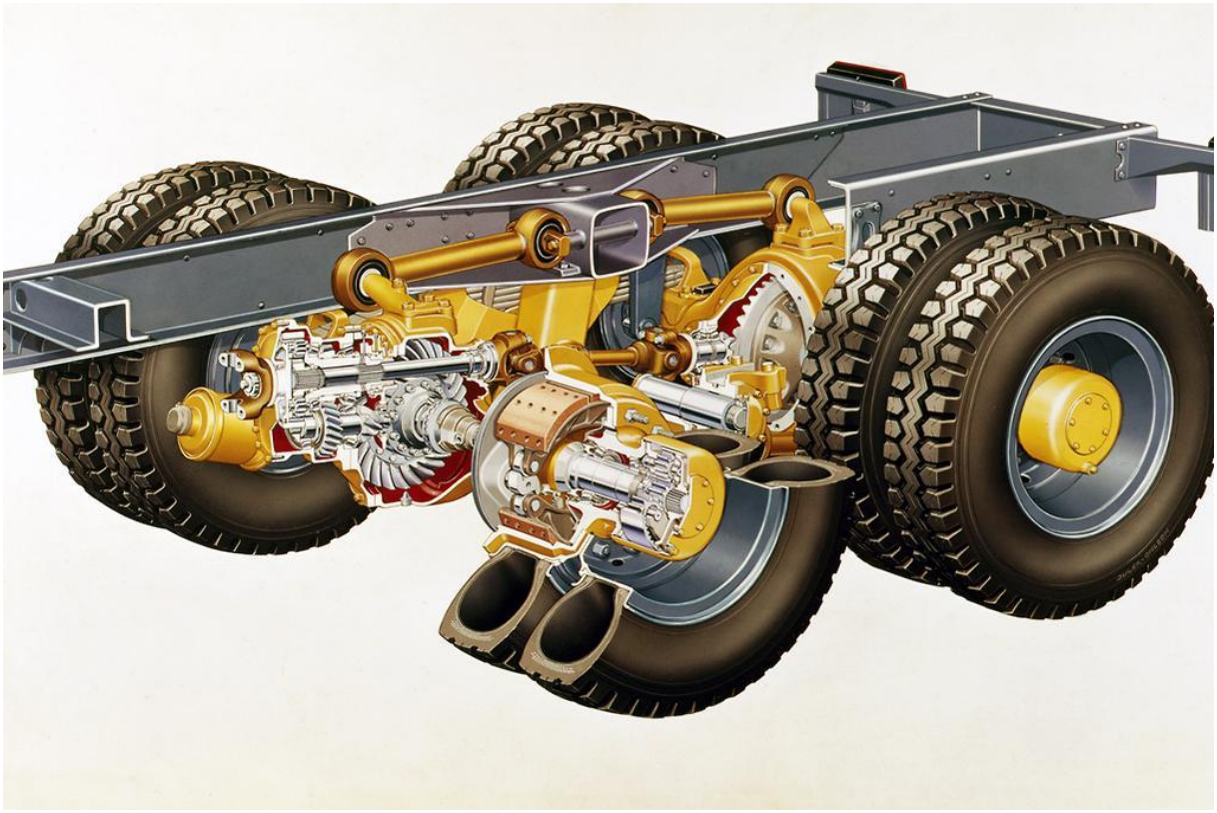
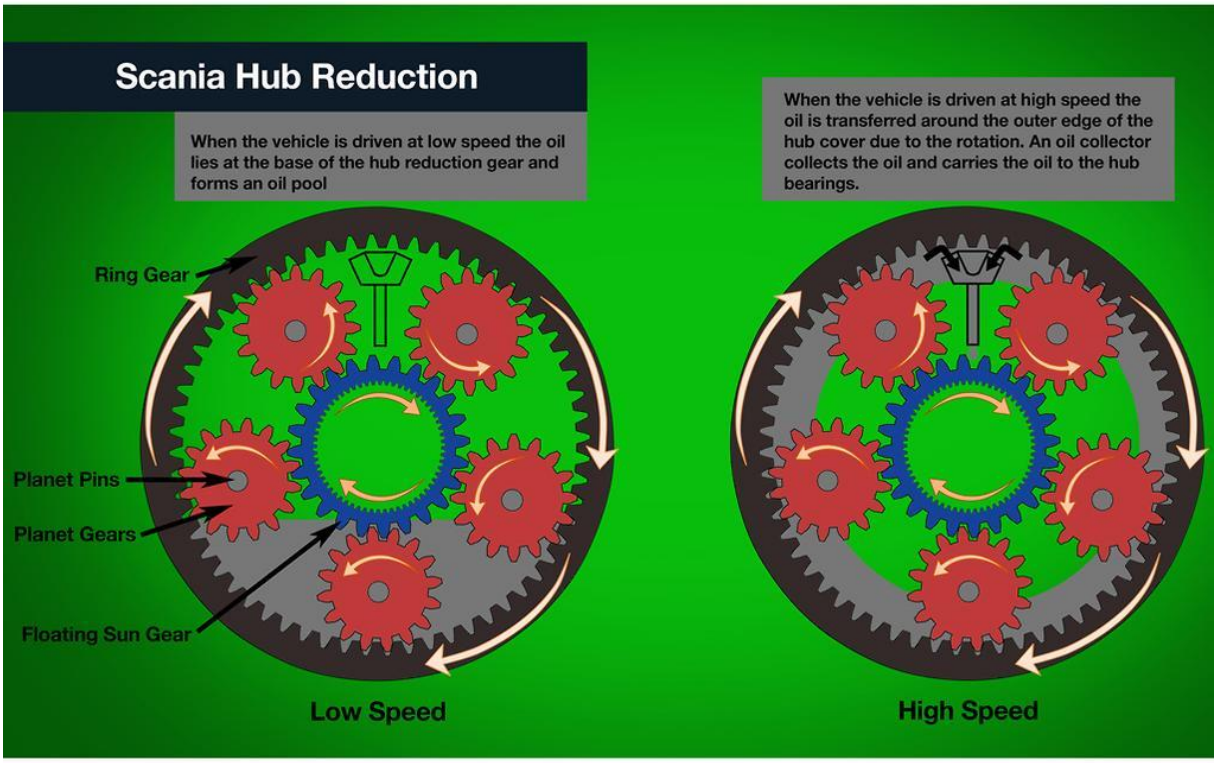
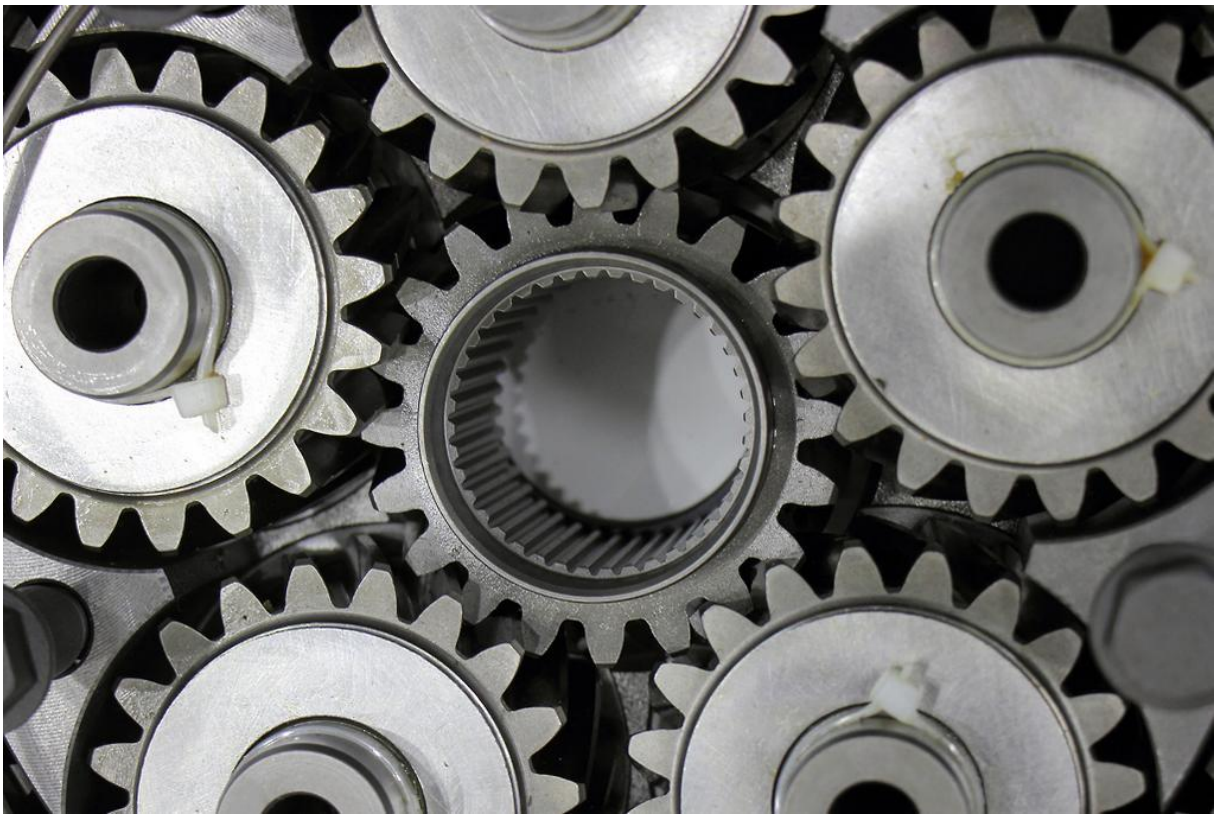







Scania Hub Reduction
When the vehicle is driven at low speed the oil lies at the base of the hub reduction gear and forms an oil pool
When the vehicle is driven at high speed the oil is transferred around the outer edge of the hub cover due to the rotation. An oil collector collects the oil and carries the oil to the hub bearings.
Ring Gear
Planet Pins
Planet Gears
Floating Sun Gear
Low Speed
High Speed




SCANIA
ROAD
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