

D 101.11: 9-2320-209-35

# TM 9-2320-209-35

## DEPARTMENT OF THE ARMY TECHNICAL MANUAL

CHASSIS, TRUCK: M44, M44A1, M44A2, M45, M45A1, M45A2,  
M45A2G, M45C, M45G, M46, M46A1, M46A1C,  
M46A2C, M46C, M57, M58;  
INSTRUMENT REPAIR SHOP, TRUCK MOUNTED:  
M185, M185A1, M185A2, M185A3;  
TRUCK, CARGO: M34, M35, M35A1, M35A2, M35A2C,  
M36, M36A2, M36C,  
TRUCK, DUMP: M47, M59, M342, M342A2;  
TRUCK, MAINTENANCE: EARTH BORING MACHINE AND  
POLE SETTER, V18A/MTQ: M764  
TRUCK, MAINTENANCE TELEPHONE CONSTRUCTION  
AND MAINTENANCE V17A/MTQ;  
TRUCK, PIPELINE CONSTRUCTION, M756A2;  
TRUCK, TANK: FUEL SERVICING, 1,200-GAL., M49,  
M49A1C, M49A2C, M49C;  
TRUCK, TANK: WATER, 1,000-GAL., M50, M50A1, M50A2;  
TRUCK, TRACTOR: M48, M275, M275A1, M275A2;  
TRUCK, VAN: ELECTRONIC, M567;  
TRUCK, VAN: EXPANSIBLE, M292, M292A1, M292A2, M292A5;  
TRUCK, VAN: SHOP, M109, M109A1, M109A2, M109A3;  
TRUCK, WRECKER: CRANE, M108;  
TRUCK, WRECKER: LIGHT, M60

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## CHAPTER 7

### FRONT AXLE ASSEMBLY

#### Section I. DESCRIPTION AND DATA

##### 59. Description

The front axle is a hypoid double reduction full floating type. It is composed of a main housing, carrier, and two steering knuckles with universal joints and brake and brakedrum assemblies. Power is transmitted from the carrier assembly to the wheels through the shaft and universal joint assemblies. Double reduction is achieved in the carrier assembly by a hypoid pinion on the Through shaft driving a hypoid drive gear which is keyed to the spur drive pinion shaft. The spur drive pinion shaft carries an integral helical-pinion gear which in turn drives the differential drive gear containing the differential unit which drives the axle shafts. The axle housing acts as a supporting unit for all axle components. This housing is expanded into a banjo-type opening for mounting the carrier assembly. Two arms

extend from the carrier opening to the spherical ends which support the steering knuckles and form suitable bases for the steering knuckle boots. The axle shafts mount in suitable bearings in the case and extend from the differential assembly out to the front wheel hubs. A universal joint in each shaft allows sufficient drive line deviation in the shaft to provide steering radius for the front wheels.

##### 60. Data

Make .....	Rockwell-Standard
Model .....	FC-240HX1
Ordnance no. ....	7521734
Type .....	double reduction-full floating
Drive .....	through springs
Gears .....	hypoid and helical
Bearings .....	tapered and straight roller
Adjustment .....	shims
Ratio .....	6.72:1

#### Section II. DISASSEMBLY OF FRONT AXLE INTO SUBASSEMBLIES

##### 61. Hub, Steering Knuckle, Brake Assembly and Axle Shafts

Refer to TM 9-2320-209-20 for removal and installation of the hub, steering knuckle, brake assembly, axle shaft assemblies and drive flanges.

washers. Remove carrier assembly and gasket. Discard gaskets.

##### 62. Carrier Assembly

Procedures for removal and installation of the carrier assembly are shown in figure 61. This operation separates the axle into its two remaining subassemblies; the housing assembly and carrier assembly.

###### a. Removal.

(1) Remove eight nuts and lockwashers. Loosen four nuts located under the through shaft housing.

(2) Install lifting sling and raise carrier housing approximately 1/2 inch and remove remaining four nuts and lock-

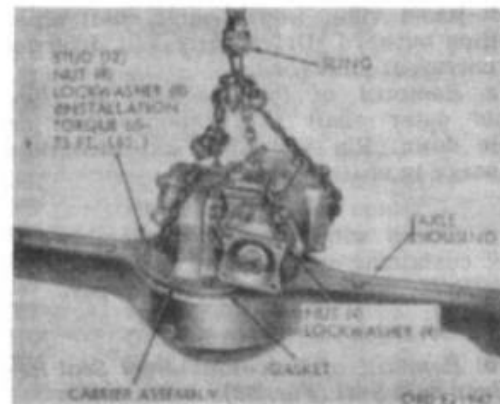


Figure 61. Carrier assembly - removal and installation

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### *b. Installation.*

(1) Install new gasket on carrier mounting studs.

(2) Place carrier on studs and lower until four lockwashers and nuts can be

installed on studs under through shaft housing. Turn down four nuts. Install eight remaining lockwashers and nuts. Torque all twelve nuts to 65-70 ft.-lbs.

## Section III. REPAIR OF FRONT AXLE COMPONENTS

### 63. General

This section contains front axle repair procedures. The repair procedures are given in the following sequence: First, disassembly of the front axle, then cleaning, inspection and repair, and last, assembly. The exploded views (figs. 62 through 64) illustrate the components of the front axle in their locational relationship.

### 64. Disassembly of Front Axle Shaft with Universal Joint

*a. Removal of Outer Shaft Yoke Groove Pin (Fig. 65).* Position axle shaft with universal joint in a soft-jawed vise. Using a suitable punch, drive universal joint groove pin out of universal joint outer shaft yoke.

*b. Dislodge Intermediate Ball Pin (Fig. 66).* Hold drive shaft assembly in a vertical position and bounce end of universal joint outer shaft on a wood block to dislodge intermediate pin from ball. Pin will drop farther into the drilled passage in the universal joint outer shaft and free of the intermediate ball.

*c. Removal of Universal Joint Drive Balls (Fig. 67).* Position inner shaft in soft-jawed vise. Lower outer shaft while pulling outward. Drive balls will drop out of universal joint yoke.

*d. Removal of Intermediate Ball Pin.* Hold outer shaft with intermediate pin hole down. Pin will slide out of drilled passage in shaft.

#### NOTE

Trucks with front axle assembly containing center cross "U" joint. Refer to TM 9-2320-209-20, par. 169.

*e. Removal of Universal Joint Seal Retainer with Seal (Fig. 68).*

(1) Remove the universal joint seal retainer with seal from the axle housing,

using puller 5120-310-4669.

(2) Remove seal from retainer, using remover 5120-708-3258 and handle 5120-708-3241, figure 69.

### 65. Disassembly of Front Axle Carrier

*a. Removal of Differential Carrier Top Cover and Inspection Cover (Fig. 70).*

(1) Remove eight capscrews and lockwashers from top cover and remove cover and gasket. Discard gasket.

(2) Remove four capscrews and lockwashers from inspection cover and remove cover and gasket. Discard gasket.

*b. Removal of Companion Flanges (Fig. 71).* Remove cotter pin from slotted nut (fig. 70) at each end of the through shaft and remove both nuts and washers. Using universal puller 5120-338-6721, remove companion flanges from each end of Through Shaft.

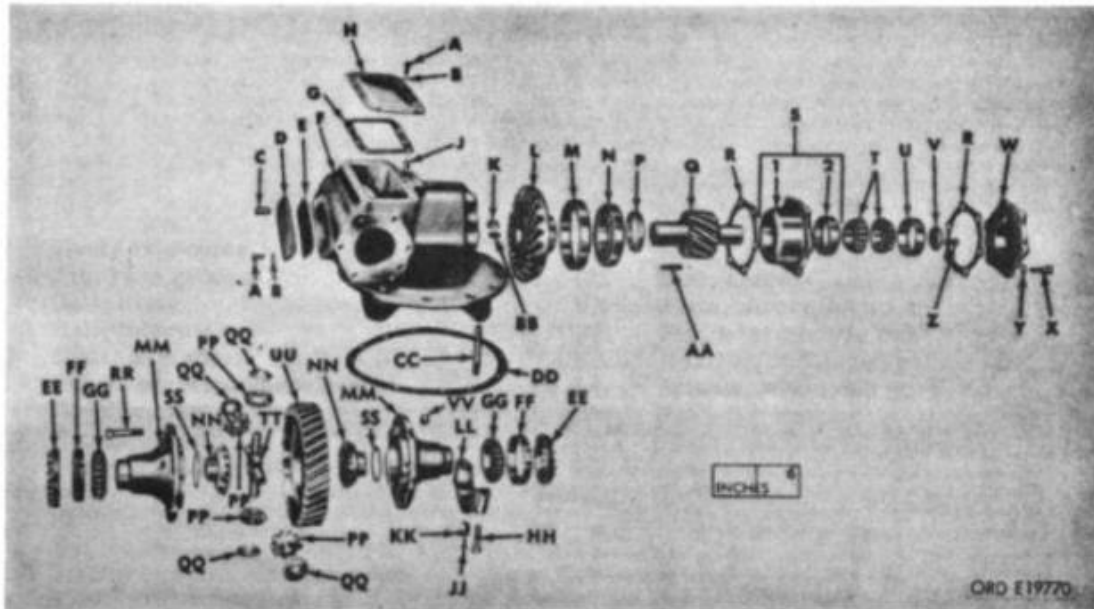
*c. Removal of Differential from Carrier (Fig. 72).*

(1) Punch an index mark on each differential carrier cap and another mark directly opposite on carrier case to ensure proper assembly.

(2) Remove the locking wire from the differential cap bolts. Remove the lock plate capscrew and lock plate from each side of the differential assembly.

(3) Remove the two capscrews securing each carrier cap to the carrier case and carefully remove the carrier caps and adjusting rings. Lift the differential assembly from the carrier case.

*d. Removal of Through Shaft Bearing Covers (Fig. 73).* Remove six capscrews and lockwashers securing each through shaft bearing cover to the carrier case. Remove covers and shims from case. Tie shims to respective cover to facilitate adjustment during assembly.



<u>Key</u>	<u>Item</u>	<u>Key</u>	<u>Item</u>
A	Bolt, cover	X	Bolt, cover
B	Lockwasher	Y	Washer, lock
C	Valve, breather	Z	Bolt, bearing lock
D	Cover, end	AA	Key, bevel drive gear
E	Gasket, end cover	BB	Washer, lock
F	Case, differential carrier	CC	Stud, differential carrier case
G	Gasket, top cover	DD	Gasket, differential carrier case
H	Cover, top	EE	Ring, carrier bearing adjusting
J	Screw, lock	FF	Cup, carrier bearing
K	Nut, hex	GG	Cone, carrier bearing
L	Gear, bevel drive	HH	Screw, carrier cap
M	Sleeve, bearing	JJ	Screw, ring lock
N	Bearing, drive gear inner ball	KK	Lock, adjusting ring
P	Spacer, bearing	LL	Cap, carrier
Q	Pinion, drive	MM	Case, differential gear
R	Shim, bearing cage	NN	Gear, differential side gear
S	Cage, assy, w/cups 1 - Cage, housing 2 - Cup, bearing	PP	Pinion, differential spider
T	Cone, taper roller bearing	QQ	Washer, spider pinion thrust
U	Cup, taper roller bearing	RR	Bolt, differential gearcase
V	Bearing, lock	SS	Washer, differential side gear thrust
W	Cover, bearing	TT	Spider, differential
		UU	Gear, differential drive
		VV	Nut, hex

Figure 62. Carrier and differential without through shaft - exploded view



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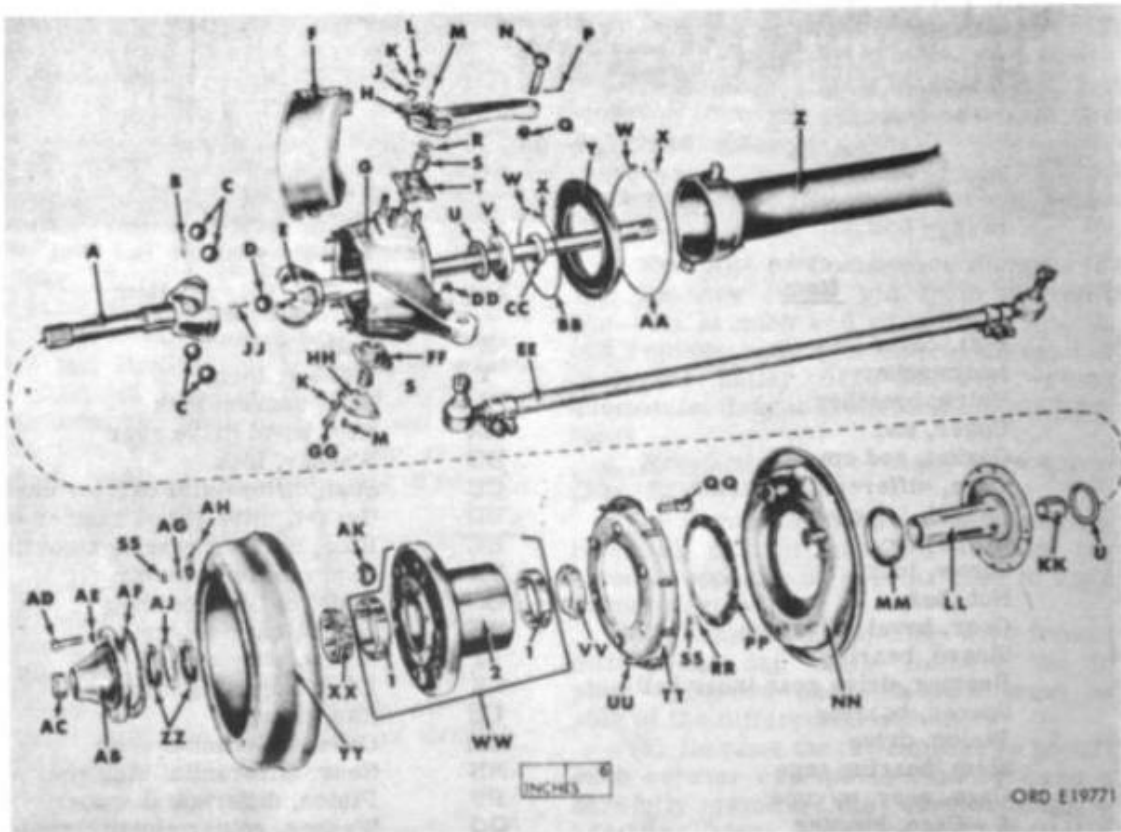


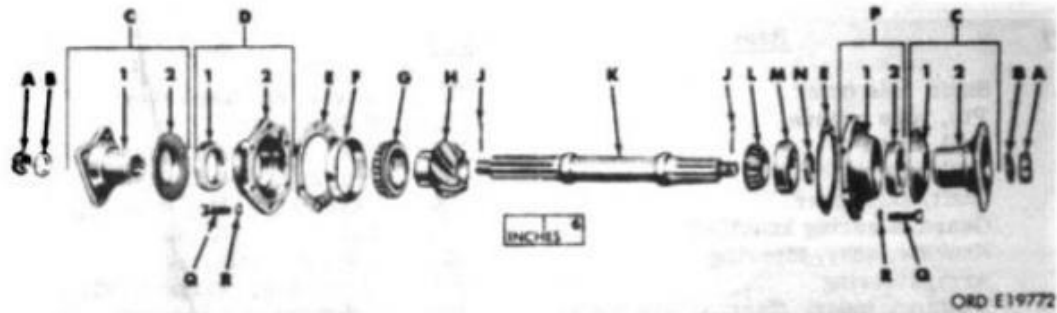
Figure 63. Front axle housing and steering knuckle - exploded view

Find more Rockwell Axle info at [www.RockwellAxles.com](http://www.RockwellAxles.com)

<u>Key</u>	<u>Item</u>	<u>Key</u>	<u>Item</u>
A	Shaft, axle outer	FF	Sleeve, knuckle lower
B	Pin, yoke groove	GG	Bolt, sleeve
C	Ball, drive	HH	Plate, sleeve lower
D	Ball, intermediate	JJ	Pin, intermediate ball
E	Shaft, axle inner	KK	Bearing, bushing-type, spindle
F	Guard, steering knuckle boot	LL	Spindle, wheel hub
G	Knuckle, assy, steering	MM	Seal, hub bearing
H	Arm, steering	NN	Plate, assy, brake backing
J	Bushing, taper, steering knuckle stud hollow	PP	Deflector, oil and dirt
K	Washer, lock	QQ	Bolt, ribbed shoulder
L	Nut, hex	RR	Washer, lock
M	Fitting, lubrication	SS	Nut, hex
N	Stud, ball, steering arm	TT	Adapter, brakedrum
P	Pin, cotter	UU	Bolt, adapter plate
Q	Nut, castellated	VV	Cone, inner bearing
R	Washer, flat	WW	Hub assy w/cups
S	Bearing, bushing-type, knuckle sleeve		1 - Cup, bearing
T	Sleeve, knuckle upper		2 - Hub
U	Washer, flat	XX	Cone, outer bearing
V	Retainer, inner axle seal	YY	Brakedrum, service
W	Nut, boot clamp	ZZ	Nut, bearing adjusting
X	Screw, boot clamp	AB	Flange, front-axle drive
Y	Boot, assy, steering knuckle	AC	Plug, flange
Z	Housing, front axle	AD	Bolt, flange
AA	Clamp, boot outer	AE	Washer, lock
BB	Clamp, boot inner	AF	Gasket, flange
CC	Seal, inner axle	AG	Washer, lock
DD	Screw, turn stop	AH	Cover, inspection
EE	Tie-rod, assy	AJ	Washer, key
		AK	Nut, wheel

*Figure 63. Front axle housing and steering knuckle - exploded view - continued*

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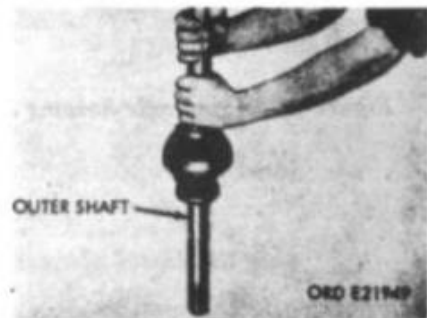
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<u>Key</u>	<u>Item</u>	<u>Key</u>	<u>Item</u>
A	Nut	H	Pinion, bevel
B	Washer	J	Pin, cotter
C	Flange assy, rear companion 1 - Flange 2 - Deflector, dust	K	Shaft, carrier through
D	Retainer assy, rear bearing 1 - Seal, through shaft rear 2 - Retainer, rear bearing	L	Cone, front bearing
E	Shim, bearing cover	M	Cup, front bearing
F	Cup, rear bearing	N	Spacer, front bearing
G	Cone, rear bearing	P	Retainer assy, front bearing w/seal 1 - Retainer 2 - Seal
		Q	Bolt
		R	Washer, lock

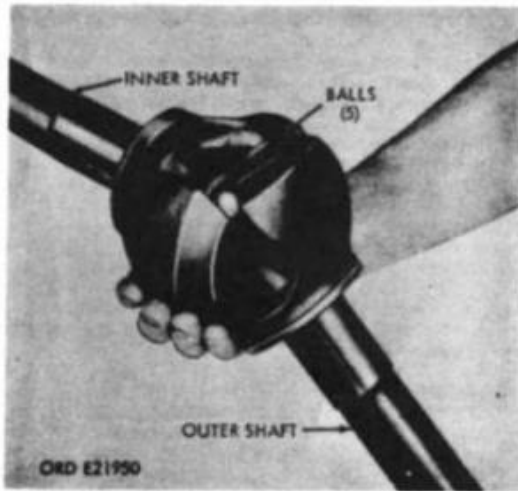
*Figure 64. Carrier through shaft - exploded view*



*Figure 65. Removal of outer shaft yoke groove pin*



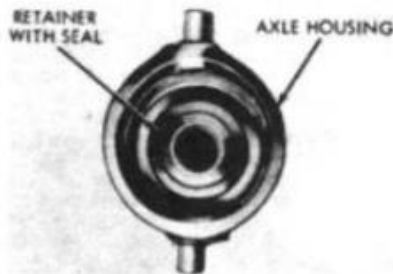
*Figure 66. Dislodging intermediate ball pin*



**Figure 67. Removal of universal joint drive balls**



**Figure 69. Removal of universal joint oil seal from retainer**



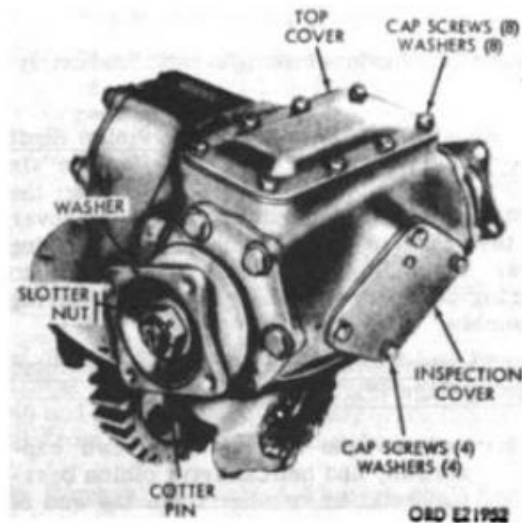
**Figure 68. Removal of universal joint seal retainer with seal**

**e. Removal of Through Shaft (Fig. 74).**

- (1) Tap on end of through shaft with hammer and wood block until front bearing cup is free from carrier case. Remove cup.

**Note.** Drive pinion away from bevel drive gear.

- (2) Remove through shaft with bearing from case. Using suitable driver, drive rear bearing cup from case.



**Figure 70. Removal of differential carrier top cover and inspection cover**



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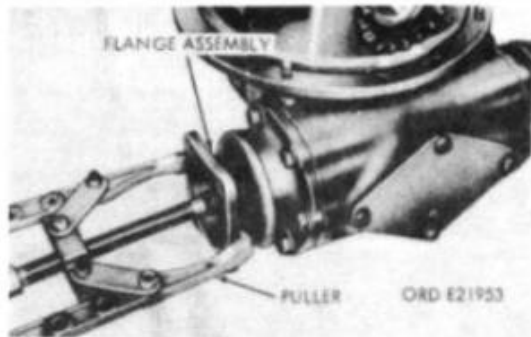


Figure 71. Removal of companion flanges

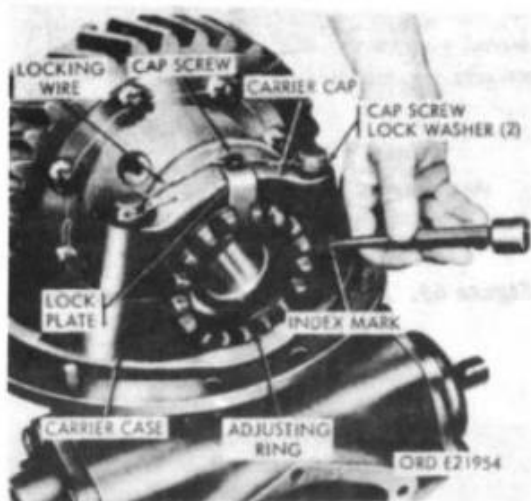


Figure 72. Removal of differential assembly

**f. Removal of Helical Drive Pinion Shaft Outer Bearing Cover (Fig. 75).** Remove six capscrews and lockwashers securing the helical drive pinion shaft outer bearing cover to the carrier case. Remove the bearing cover and shims from case. Tie shims to bearing cover to facilitate adjustment during assembly.

**g. Removal of Helical Drive Pinion Outer Bearing Cage (Fig. 76).**

- (1) Remove the locking wire, two capscrews, and helical drive pinion bearing retainer shaft from the end of the pinion shaft.
- (2) Install two puller screws, 5120-836-6689, into the bearing cage assembly.

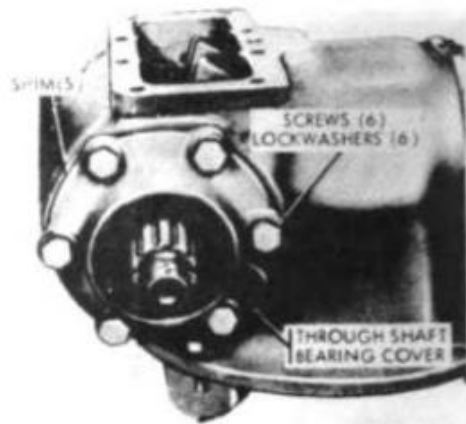


Figure 73. Removal of through shaft bearing cover

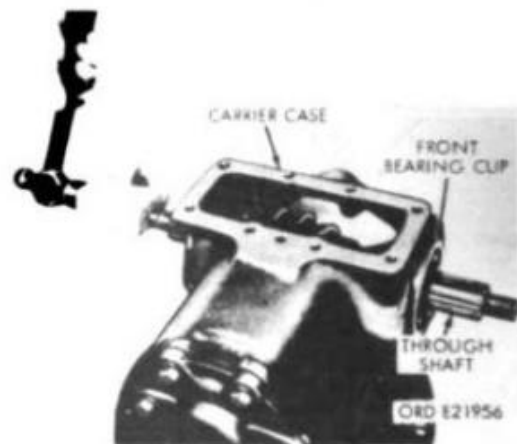


Figure 74. Removal of through shaft

Turn screws alternately and evenly until bearing cage is free of carrier case. Tie shims to bearing cage to facilitate adjustment during assembly.

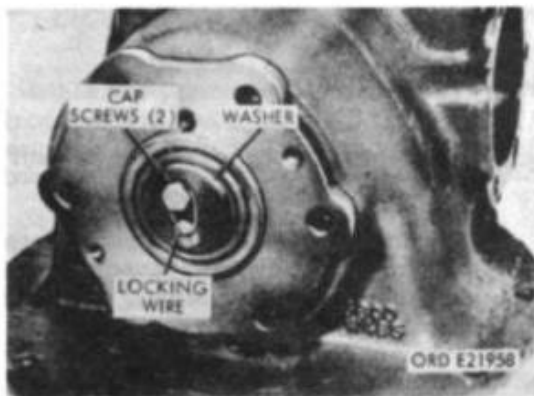
**h. Removal of Helical Drive Pinion Shaft, Bevel Drive Gear, and Bearing Assembly.**

- (1) Place two pieces of channel steel across the bed of a ram press (fig. 77).
- (2) Rest the carrier assembly on the two pieces of channel steel with the bevel

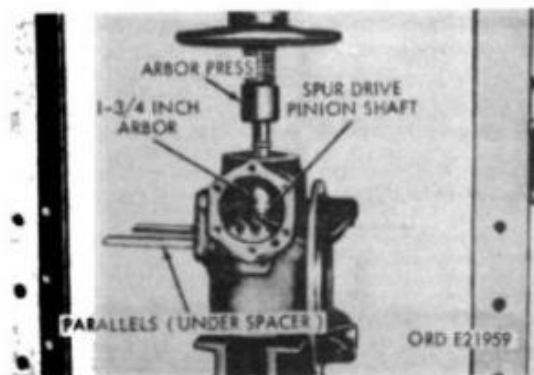
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**Figure 75.** Removal of helical drive pinion shaft outer bearing cover



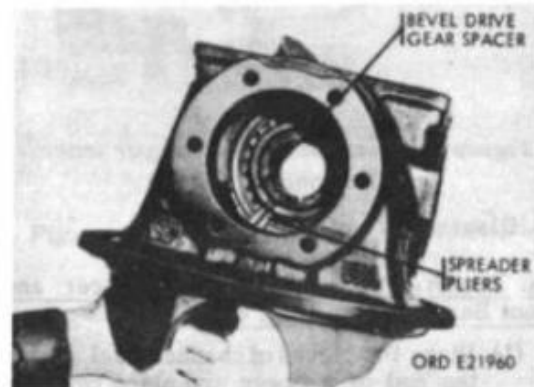
**Figure 76.** Removal of helical drive pinion outer bearing cage



**Figure 77.** Removal of helical drive pinion shaft

drive gear teeth facing upward (fig. 77).

- (3) Position two iron parallel bars beneath the bevel drive gear spacer (fig. 77) and press the helical drive pinion shaft from the carrier case. Remove key from shaft keyway.
- (4) Using spreader pliers, open the bevel drive gear spacer (fig. 78) and remove the bevel drive gear with bearing.



**Figure 78.** Removal of bevel drive gear and bearing assembly

**1. Removal of Bevel Gear Inner Bearing Sleeve (Fig. 79).**

- (1) Remove the setscrew securing the sleeve to the carrier case.
- (2) Place the two halves of remover and replacer 5120-108-3246 into the bevel gear bearing sleeve.
- (3) Install screw 5120-708-3216 to remover and replacer 5120-708-3246 and drive bevel gear bearing sleeve from carrier case.

**66. Disassembly of Carrier Through Shaft End Bearing Covers**

**a. Removal of Carrier Through Shaft Front Oil Seal (Fig. 80).** Using remover 5120-708-3249 and handle 5120-708-3241, drive front oil seal from front through shaft bearing cover.

**b. Removal of Carrier Through Shaft Rear Oil Seal (Fig. 81).** Using remover 5120-708-3250 and handle 5120-708-3241, drive rear oil seal from rear through shaft bearing cover.

- (2) Install an adapter assembly around the through shaft directly beneath pinion gear (fig. 83). Place through shaft between the two iron spacers and press pinion gear and rear bearing cone from the shaft.

c. Removal of Rear Bearing Cone from Pinion Gear (Fig. 84).

- (1) Set up press the same as in a(1) above.
- (2) Install an adapter puller around the pinion gear and place the rear bearing cone and pinion gear between the two iron spacers on the press bed and press rear bearing from the pinion gear assembly.

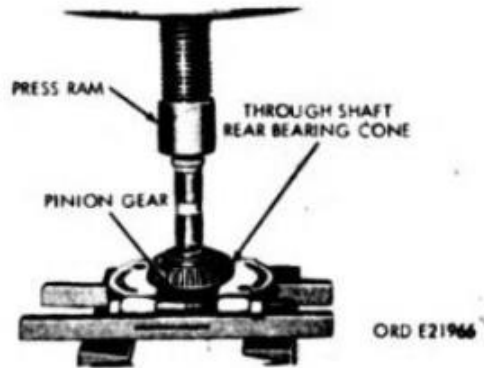


Figure 84. Removal of rear bearing cone from pinion gear

**68. Disassembly of Helical Drive Pinion Bearing Cage (Fig. 85)**

Place the pinion bearing cage between two iron spacers, using handle 5120-708-3241 and remover 5120-708-3251 the inner and outer bearing cups and inner and outer bearings.

**69. Disassembly of Bevel Drive Gear (Fig. 86)**

Install puller 5120-708-325 to bevel drive gear inner bearing as shown in figure 86. Remove the bearing from bevel drive gear.

**70. Disassembly of Differential**

a. Removal of Locking Wire and Slotted Nuts.

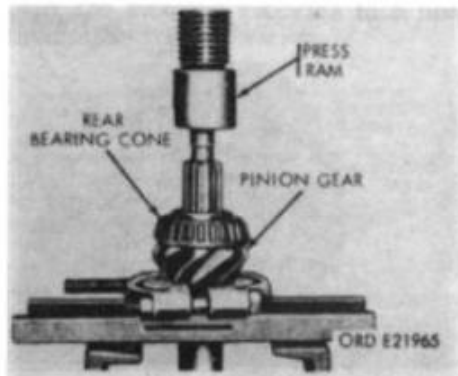


Figure 83. Removal of through shaft pinion gear and rear bearing cone

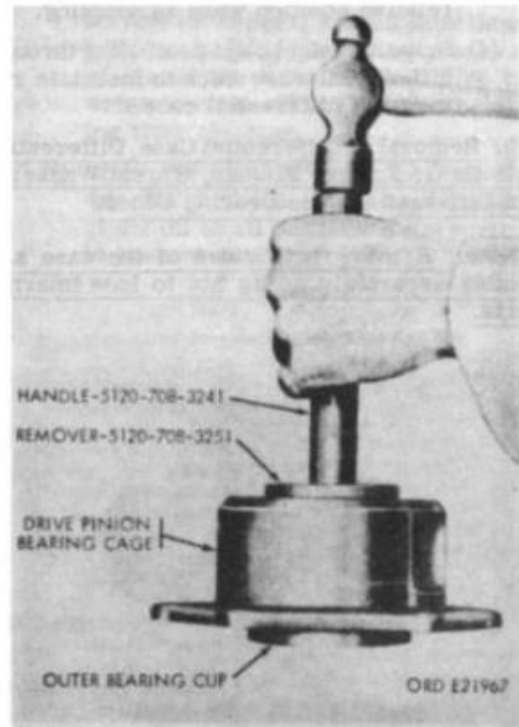


Figure 85. Removal of inner and outer bearings and bearing cups

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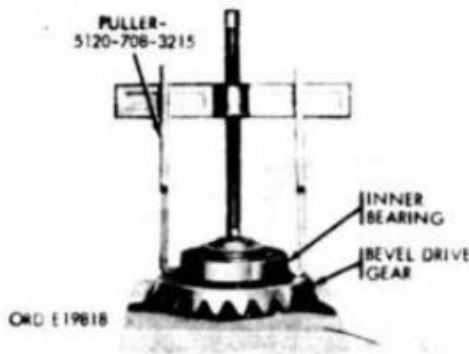


Figure 86. Removal of inner bearing from bevel drive gear

- (1) Place differential assembly in a vise and cut and remove the locking wire from holes in bolts (fig. 87).
- (2) Remove the eight slotted nuts from the eight bolts protruding through the differential case (fig. 87).
- (3) Using a punch, put an index mark on each half of the differential case and each side of the gear to assure original relative position when assembling.
- (4) Drive the eight bolts protruding through differential case back to facilitate removal of differential case.

**b. Removal of Differential Case, Differential Side Gear, Spider, Pinions, Thrust Washers, and Differential Case Bearing Cones.**

**Note.** Remove both sides of the case assembly separately so as not to lose internal parts.



Figure 87. Removal of differential slotted nuts and bolts

- (1) Remove the right and left sides of the differential case. Lift the differential side gear and thrust washer from each side as shown in figure 88.
- (2) Remove the spider, pinions, and spider pinion thrust washers from differential drive gear assembly (fig. 89).
- (3) Place two pieces of channel steel across the bed of a press. Place two iron spacers across the two pieces of channel steel. Place each side one at a time between the two iron spacers with differential bearing cone facing upward and press the bearing from the case (fig. 90).

**71. Disassembly of Front Axle Steering Arm (Fig. 91)**

- a. Remove the steering arm assembly (TM 9-2320-209-20).



Figure 88. Removal of differential case, side gear, and thrust washers

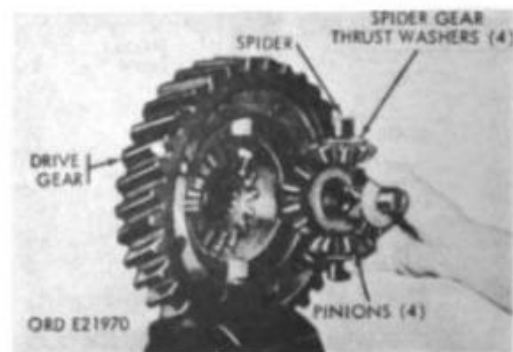
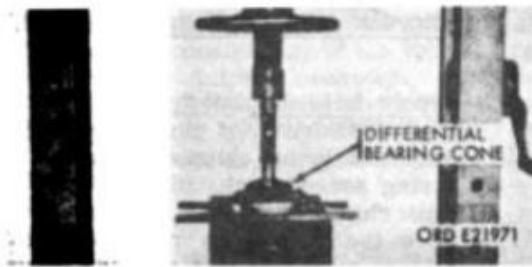


Figure 89. Removal of spider, pinions, and spider pinion thrust washers



*Figure 90. Removal of bearing cones from differential case*

- b. Remove cotter pin from the ball stud.
- c. Press or drive ball stud from steering arm.

**72. Disassembly of Wheel Hub Spindle (Fig. 92)**

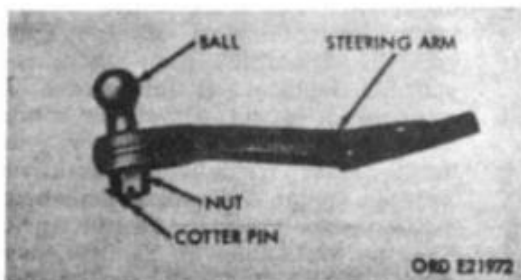
Use a suitable tool or an arbor press to remove old bearing.

**73. Disassembly of Front Axle Drive Flange (Fig. 93)**

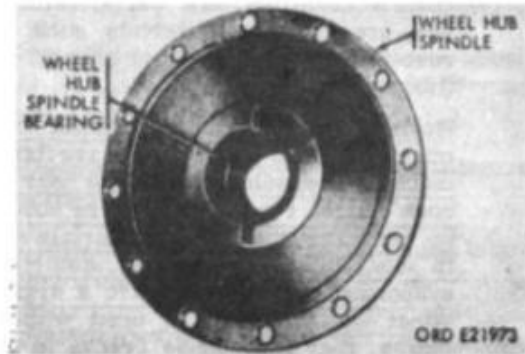
- a. Remove drive flange (TM 9-2320-209-20).
- b. Press or drive out plug at top of drive flange.

**74. Disassembly of Steering Knuckle Sleeve**

- a. Remove the steering knuckle upper and lower sleeves. (Refer to TM 9-2320-209-20.)
- b. Place the steering knuckles in a press and press out old bushing sleeve.



*Figure 91. Disassembly of front axle steering arm*

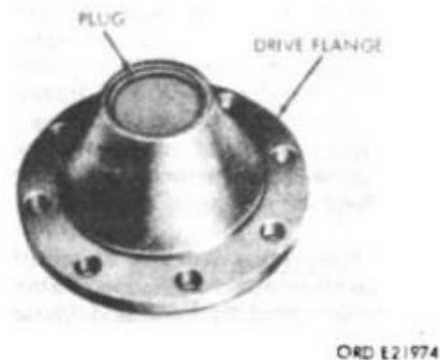


*Figure 92. Disassembly of wheel hub spindle*

**75. Cleaning, Inspection and Repair**

**a. Cleaning.**

- (1) Use dry-cleaning solvent or mineral spirits paint thinner to clean or wash grease or oil from all parts of axle. See TM 9-214 for cleaning and preservation of bearings.
- (2) A solution of one part grease-cleaning compound to four parts of dry-cleaning solvent or mineral spirits paint thinner may be used for dissolving grease and oil from the axle housing. Use cold water to rinse off any solution remaining after cleaning.
- (3) After the parts are cleaned, rinse and dry them thoroughly. Apply a light grade oil to all polished metal surfaces to prevent rusting.



*Figure 93. Disassembly of front axle drive flange*



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- (4) Before installing new parts, remove any preservative materials such as rust-preventive compound or protective grease.

Warning: Dry-cleaning solvent and mineral spirits paint thinner are flammable and should not be used near an open flame. Fire extinguishers should be provided when these materials are in use. In addition, these materials evaporate quickly and have a drying effect on the skin. If used without gloves, they may cause cracks in the skin and, in some cases, a mild irritation or inflammation. Use only in well-ventilated places. The use of diesel fuel oil, gasoline, or benzine (benzol) for cleaning is strictly prohibited.

**b. Inspection and Repair.**

- (1) Axle housing. Check axle housing for twisted or distorted condition. Replace housing if twisted or distorted. Inspect housing outer ends and steering socket pins for excessive wear or damage. Replace housing if outer ends are excessively worn or damaged. Check filler and drain plug hole threads for damage. Replace plugs and housing if damaged threads cannot be repaired. Replace broken or damaged studs. Smooth machined surfaces that are nicked or burred with a fine stone. Replace oil seals if worn or damaged.
- (2) Universal joint assemblies. Inspect drive shaft splines for damage. Check drive shafts for twisted or bent condition. Examine ball races in yokes for excessive wear. If either the inner or outer drive shaft is damaged or excessively worn, a complete new universal joint drive shaft assembly must be installed. Check universal joint drive balls for cracks, chips, or rough spots. Use a micrometer and check drive balls for out-of-round condition. Replace damaged drive balls.
- (3) Differential carrier. Check differential carrier for cracks or distortion. Inspect stud threads and capscrew hole threads for damage. Replace studs if broken or damaged. Clean up damaged threads of carrier with a tap. Replace carrier if differential adjusting ring threads are damaged beyond repair.

Note. Carrier and caps cannot be replaced as separate items.

- (4) Hypoid drive and pinion gears. Examine the hypoid drive and pinion gears carefully for being chipped, cracked, or having scored teeth. Gears with broken, chipped, cracked or excessively worn teeth must be replaced. Small defects such as nicks, scores, or burs may be corrected with a fine stone.

Note. The hypoid drive and pinion gears are matched gears. If necessary to replace either gear, both gears must be replaced.

Replace a hypoid pinion gear front outer or inner bearing cone if any of the rollers are missing, pitted, corroded, or discolored, due to overheating. Replace hypoid pinion gear front inner or outer bearing cups that are cracked, chipped, pitted or discolored, due to overheating. Replace a hypoid pinion front bearing cage cover if damaged. Replace the oil seals if worn or damaged.

- (5) Helical pinion gear and related parts. Replace a helical pinion gear if the teeth are broken, chipped, or visibly worn. Small nicks may be polished with a fine stone. Replace a helical pinion gear if the threaded holes in end of shaft are stripped or damaged beyond repair. Replace the outer bearing cone or cups if worn or damaged. Replace the outer bearing cage if cracked or damaged. Replace the inner bearing or bearing sleeve if worn or damaged.
- (6) Differential assembly. Replace a helical drive gear that is chipped, broken, or visibly worn. Replace all four spider gear thrust washers if any are worn or scored. Replace both differential side gear thrust washers if either is worn or scored. Position the spider gears on the spider. If any looseness is noted between spider and gears, replace the spider gear bearings and/or spider. Position the spider in the differential case. If any radial movement is noted, replace spider and/or case, whichever is at fault. Replace a differential case if scored. Replace both differential side

gears if either gear is visibly worn, broken or chipped. Replace differential bearing cones if any of the rollers are missing, pitted, corroded, or discolored, due to overheating. Replace a differential bearing adjusting ring if the threads are stripped, or if the rings are broken or damaged.

- (7) Front wheel spindle assembly. Inspect front wheel spindle threads for damage. Inspect wheel spindle bearing (bushing-type) for excessive wear, rough spots, or damage. Replace if found defective.
- (8) Steering knuckles. Inspect steering knuckles carefully for cracks or distortion. Inspect studs for damaged threads. Replace studs if damaged or broken. Replace steering knuckle if evidence of cracks or distortion is found.
- (9) Steering arm. Inspect steering arm for a distorted or damaged condition. Inspect steering arm ball stud for damage or excessive wear. Install new stud if necessary.
- (10) Steering knuckle boot. Inspect steering knuckle boot for wear, cracks, or tears. Replace if any damage is noted.
- (11) Steering knuckle sleeves. Inspect steering knuckle upper and lower sleeve bearings (bushing-type) for excessive wear, rough spots, or damage. Replace if damage is evident.

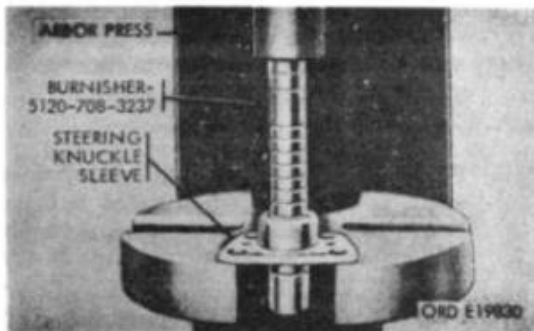


Figure 94. Burnishing steering knuckle sleeve

## 76. Assembly of Steering Knuckle Sleeve

a. Place steering knuckle sleeve in arbor press and press in new bushing-type bearing sleeve.

b. Burnish bearing sleeve as shown in figure 94, using burnisher 5120-708-3237.

c. Install steering knuckle upper and lower sleeves (refer to TM 9-2320-209-20).

## 77. Assembly of Front Axle Drive Flange

a. Press or drive new front axle drive flange plug into drive flange. Use tool of sufficient diameter to cover flat of plug so as not to distort plug.

b. Install drive flange on wheel hub (TM 9-2320-209-20).

## 78. Assembly of Wheel Hub Spindle

Place wheel hub spindle in arbor press and install new bushing to bottom of chamfer (fig. 92) and ream or burnish to 1.7025-1.7045.

## 79. Assembly of Front Axle Steering Arm

Press or drive ball stud into steering arm. Install nut and new cotter pin (fig. 91) on ball stud.

Note. Use brass drift or hardwood block when driving ball stud into steering arm.

## 80. Assembly of Differential

The differential assembly may be assembled by reversing the disassembly procedures. (Refer to paragraph 70.)

## 81. Assembly of Bevel Drive Gear

Place the bevel drive gear and inner bearing in a press and press the bearing on bevel drive gear.

## 82. Assembly of Helical Drive Pinion Bearing Cage

a. Place the drive pinion bearing cage flange down on a solid block. Set inner bearing cup over opening in top of bearing cage with small taper pointing upward. Using replacer 5120-708-3252 and handle 5120-708-3241, drive inner bearing cup even with the top of bearing cage.

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b. Turn drive pinion bearing cage over so flange is facing upward. Insert inner bearing into inner bearing cup and position outer bearing in cage in opposite direction of the inner bearing so the two bearings are back-to-back. Place the outer bearing cup over opening in bearing cage. Using replacer 5120-708-3252 and handle 5120-708-3241, drive bearing cup even with the bottom of bearing cage (fig. 95).

### 83. Assembly of Carrier Through Shaft

To assemble the carrier through shaft assembly, reverse the disassembly procedures. (Refer to par. 67.)

### 84. Assembly of Through Shaft Front and Rear Bearing Covers

a. Place the bearing cover on a solid block. Place the oil seal over the opening in the cover.

b. Using replacer 5120-708-3256 with handle 5120-708-3241, drive the seal even with top of bearing cover (fig. 96).



Figure 96. Installing front and rear bearing cover oil seals

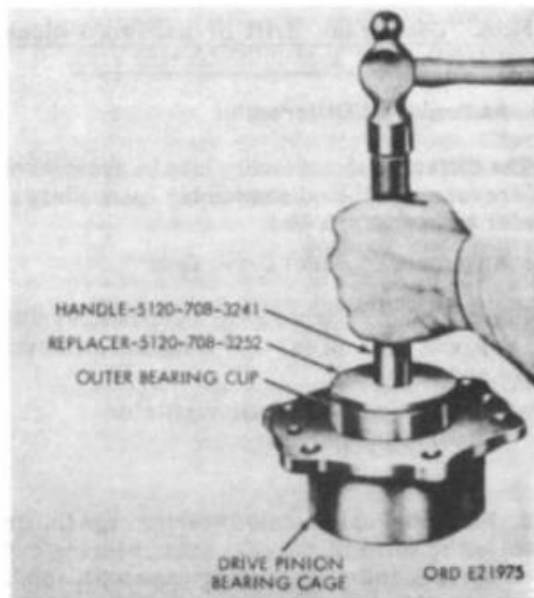


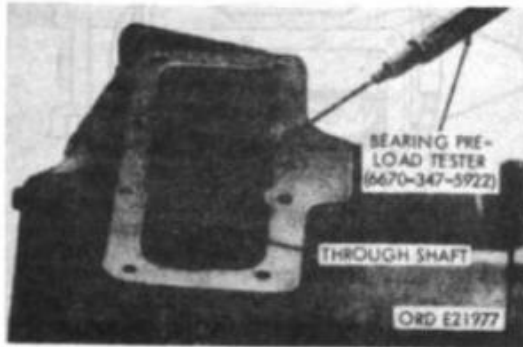
Figure 95. Installation of outer bearing cup

### 85. Assembly of Front Axle Carrier

a. Installation of Bevel Gear Inner Bearing Sleeve (Fig. 79). Aline notch in bevel gear inner bearing sleeve with setscrew hole in carrier and drive into place, using remover and replacer 5120-708-3246 and screw 5120-708-3216. Install bearing sleeve setscrew.

b. Bevel Pinion Bearing Preload Test (Fig. 97).

- (1) Install through shaft assembly temporarily to conduct bearing preload test. Refer to f below for installation procedures.
- (2) Wrap cable of preload tester 6670-347-5922 around through shaft.
- (3) Pull and note reading on scale while shaft is rotating. If original bearing cones and cups are used, reading should be between 4 to 8 inch-pounds. If new bearing cones and cups are used, reading should be between 12 to 18 inch-pounds. An equal amount of shims must be added under through-shaft bearing covers to decrease preload or removed to increase preload.

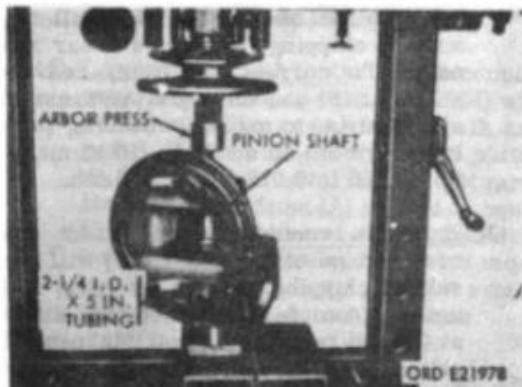


*Figure 97. Bevel pinion bearing preload test*

- (4) Remove through-shaft assembly, keeping shims intact to prevent change in preload setting. Refer to paragraph 65d and e for removal procedures.

**c. Installation of Helical Drive Pinion, Bevel Drive Gear and Bearing Assembly.**

- (1) Install bevel drive gear with bearing into bearing sleeve and install bearing sleeve, and install bearing spacer (fig. 78).
- (2) Place carrier assembly into press with outer bearing cage side down (fig. 98) and insert pinion shaft with helical drive pinion into carrier. Install key in shaft keyway and align with keyway in bevel gear. Press shaft until gear seats against spacer.



*Figure 98. Installation of helical drive pinion shaft and bevel drive gear*

**d. Installation of Helical Drive Pinion Outer Bearing Cage and Shims.**

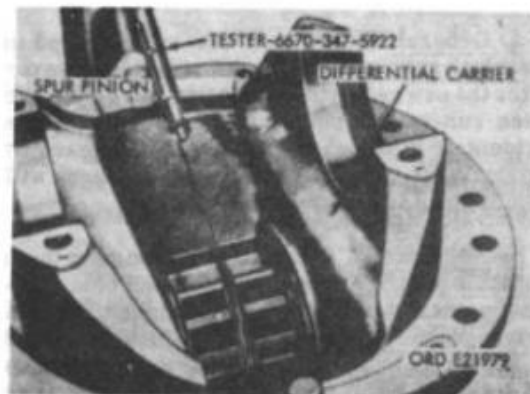
- (1) Aline oil passage holes in shims and bearing cage with hole in case and press or drive cage (with bearings) in place.
- (2) Install bevel drive gear outer bearing retainer washer and secure with two capscrews (fig. 76) and locking wire.
- (3) Aline bearing cover oil passage with oil passage in bearing cage and secure with six capscrews and lockwashers.

**e. Helical Drive Pinion Bearing Preload Test (Fig. 99).**

- (1) Wrap cable of bearing preload tester 6670-347-5922 around helical drive pinion.
- (2) Pull tester and note reading on scale. If original drive pinion outer bearing cups and cones are used, preload should read between 4 to 8 inch-pounds. If new bearing cones and cups are used, preload should read between 12 to 18 inch-pounds. If preload is not within these limits, add or remove shims as required.

**f. Installation of Through Shaft.**

- (1) Install rear bearing cup in carrier, using suitable driver and hammer.
- (2) Install through shaft with bevel pinion and bearings in carrier (fig. 74) and install front bearing cup, using suitable tool.



*Figure 99. Helical drive pinion bearing preload test*

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- (3) Install shims as determined in bevel pinion preload test (b above).
- (4) Install through shaft bearing covers (fig. 73) and secure with six screws and lockwashers on each cover.
- (5) Adjust bevel drive gear and bevel pinion tooth contact (par. 86).

**g. Installation of Differential to Carrier.**  
This item may be installed by reversing the installation procedures. (Refer to par. 65c.)

**h. Installation of Through Shaft Companion Flanges.**

- (1) Tap the companion flanges on the through-shaft splines.
- (2) Place a washer and nut over the threaded ends of through shaft. Torque to 300 pound-feet.
- (3) Install cotter pins through holes in each end of the through shaft.

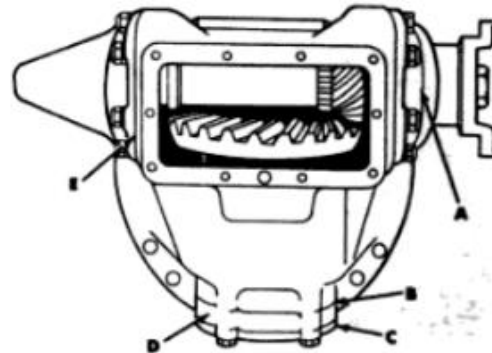
**i. Installation of Differential Carrier Top Cover and Inspection Cover (Fig. 70).**

- (1) Position inspection cover and new gasket on differential carrier and secure with four capscrews and lockwashers. Torque capscrews to 15-20 pound-feet.
- (2) Position top cover and new gasket on carrier and secure with eight capscrews 51-58 pound-feet.

**86. Adjustment of Bevel Drive Gear and Bevel Pinion Tooth Contact**

**a. General.** Gears that are not installed in matched sets generally are noisy. However after the new gear and the mating old gear have been run-in the noise usually becomes less evident or disappears entirely. When gears fit properly at time of rebuild, no damage will result from incidental gear noises.

**b. Adjustment.** Paint bevel pinion gear teeth with red lead, white lead or Prussian blue. Rotate gears and compare contact marks on bevel drive gear, following the procedures outlined in (1) through (5) below. Several adjustments of both the bevel pinion and bevel drive gear may be necessary before correct contact and backlash are established.



ORD E21980

Key	Item
A	Bevel pinion front bearing cage cover shims
B	Helical pinion outer bearing shims
C	Helical pinion outer bearing cage cover
D	Helical pinion outer bearing cage
E	Bevel pinion rear bearing cover shims

*Figure 100. Bevel drive gear and bevel pinion tooth contact adjustment*

**Note.** The key letters noted in parentheses refer to figure 100, except where otherwise indicated.

- (1) **Correct tooth contact.** Gear contact centered on bevel gear must show approximately 80% contact (fig. 101) which indicates correct tooth contact.
- (2) **Short heel contact.** Gear contact too heavy on heel of tooth (fig. 102) will result in chipping, excessive wear and noise. To correct condition, remove shims at (E) and add equal thickness of shims at (A) to maintain bearing preload. Remove shims from (B) to maintain 0.006 to 0.012-inch backlash.
- (3) **Short toe contact.** Gear contact too heavy on toe of tooth (fig. 103) will result in chipping, excessive wear, and noise. To correct condition add shims at (E) and remove an equal thickness of shims at (A) to move bevel gear away from pinion and maintain bearing preload. Add sufficient shims at (B) to maintain backlash of 0.006-to-0.012 inch.



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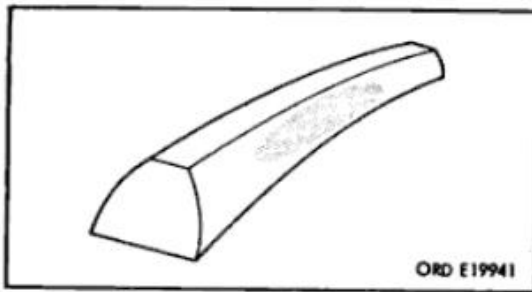


Figure 101. Correct tooth contact

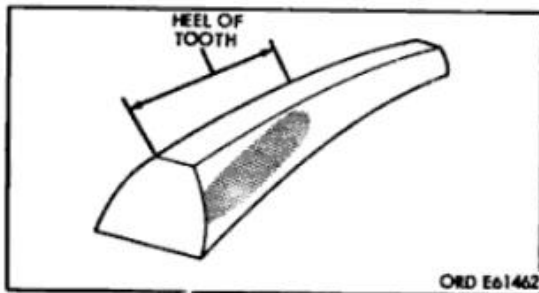


Figure 102. Short heel contact

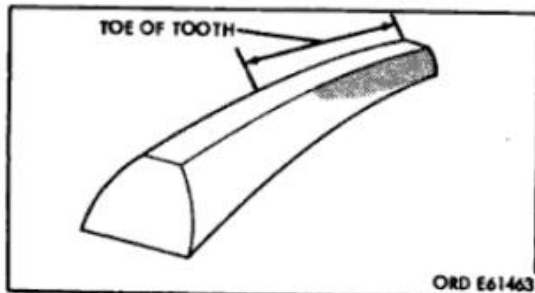


Figure 103. Short toe contact

(4) **Low narrow tooth contact.** Gear contact centered too low on tooth (fig. 104) will result in galling, grooving of teeth and noise. To correct condition add shims at (B) to move bevel pinion outward. Remove shims from (A) and add an equal thickness of shims at (E) to maintain correct bearing preload and also move bevel gear toward bevel pinion to establish 0.006 to 0.012-inch backlash.

(5) **High narrow tooth contact.** Gear contact centered too high on tooth (fig. 105) will result in galling, rolling over top edge

of gears, and noise. To correct conditions remove shims at (B) to move bevel pinion inward. Add shims at (A) and remove equal thickness of shims from (E) to maintain bearing preload and also move bevel gear away from bevel pinion to maintain 0.006 to 0.012-inch backlash

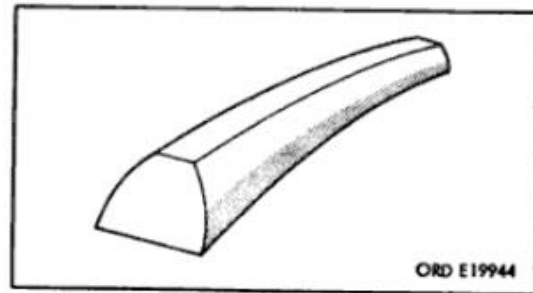


Figure 104. Low narrow tooth contact

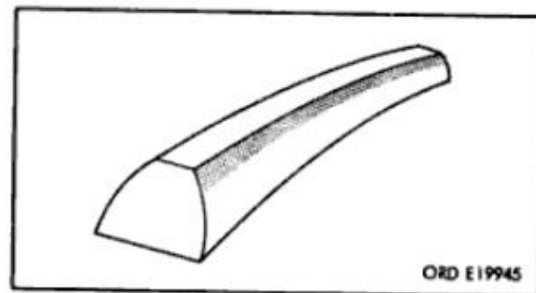


Figure 105. High narrow tooth contact

### 87. Assembly of Front Axle Shaft with Universal Joint

#### a. Installation of Universal Joint Seal and Retainer.

- (1) Install new seal into seal retainer with remover and replacer 5120-708-3258 and handle 5120-708-3241 (fig. 69).

Note. Position seal with edge of lip facing up (against replacer). This will place lip facing inward when retainer is installed in axle housing.

- (2) Press or drive retainer with seal assembled (fig. 68) in place against shoulder in axle housing.

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b. Installation of Intermediate Pin and Ball (Fig. 106). Insert pin into drilled passage in outer shaft. Hold outer shaft in vertical position and position intermediate ball in socket of outer shaft.

c. Installation of Drive Balls and Yoke Pin.

- (1) Position outer shaft with intermediate ball against inner shaft (fig. 107) and insert two drive balls.
- (2) Rotate shaft assembly and lower outer shaft as far as possible without lower drive or intermediate balls falling out. Insert remaining two drive balls.
- (3) Stand axle up vertically with inner shaft on bottom (fig. 108) and aline intermediate ball hole with pin.

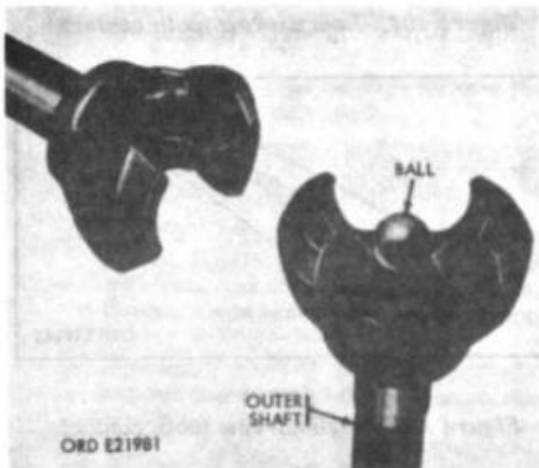


Figure 106. Installation of intermediate pin and ball

- (4) Keep outer shaft in the raised position and install groove pin (fig. 108) into outer shaft yoke.

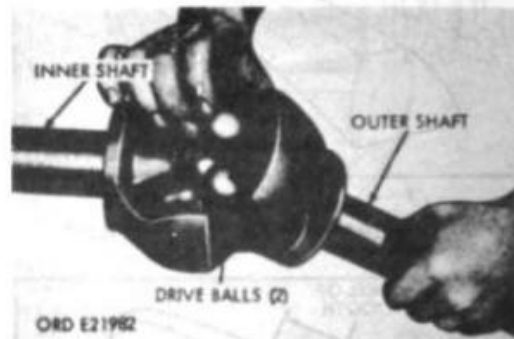


Figure 107. Installation of universal joint drive balls

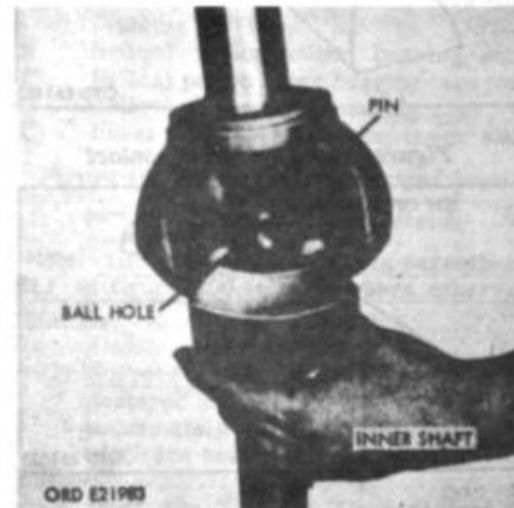


Figure 108. Installation of yoke pin

#### Section IV. REPAIR AND REBUILD STANDARDS

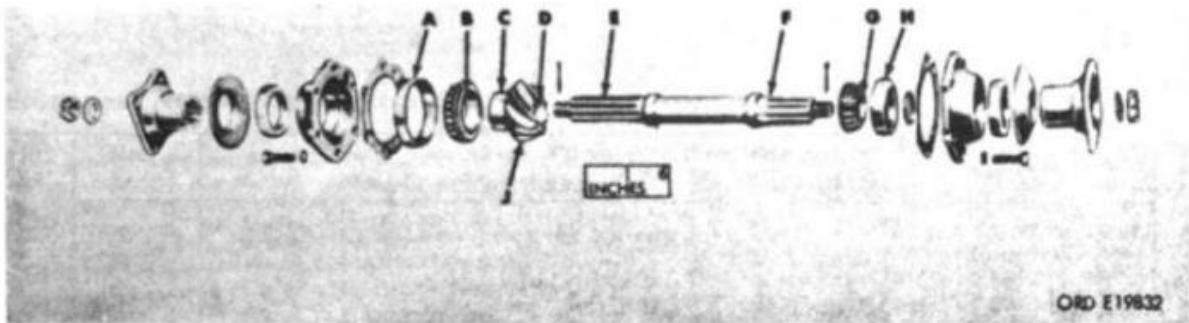
##### 88. General

The repair and rebuild standards included herein give the minimum, maximum, and key clearances of new or rebuilt parts. They also give wear limits which indicate that point to which a part or parts may be worn before replacement, in order to receive maximum service with minimum replacement. Normally, all parts which have not been worn beyond the dimensions shown in the "Wear limits" column or damaged from corrosion will be approved for service. An asterisk (\*) in the "Wear limits" column indicates that the part or parts should

be replaced when worn beyond the limits given in the "Size and fit of new parts" column. In the "Size and fit of new parts" column, the letter "L" indicates a loose fit (clearance) and the letter "T" indicates a tight fit (interference). A double asterisk (\*\*) in wear limits column indicates part may be used by selective fitting as long as the resulting fit is within the tolerance specified.

##### 89. Front Axle Assembly - Repair and Rebuild Standards

Refer to figures 109, 110 and 111.



## Carrier through Shaft

Fig. No.	Ref. Ltr.	Point of measurement	Size and fit of new parts	Wear Limits	
				Field	Depot
100	A	Outside dia bearing cup	3.2500	(*)	(*)
	A-Y	Fit of bearing cup in carrier case	0.0000L-0.0010L	.0015L	(*)
	B	Inside dia of bearing cone	2.5000-2.5005	(*)	(*)
	O	Dia of pinion journal	2.5010-2.5015	(*)	(*)
	B-C	Fit of bearing on pinion	.0010T-.0015T	(*)	(*)
	D-E	Fit of pinion on shaft	Press Fit	(*)	(*)
	F	Dia of through shaft	1.6885-1.6890	(*)	(*)
	G	Inside dia of bearing cone	1.6875	(*)	(*)
	F-G	Fit of bearing on shaft	.0010T-.0015T	(*)	(*)
	H	Outside dia of bearing cup	4.3307	(*)	(*)
	H-Z	Fit of bearing cup in carrier case	0.0000L-0.0010L	.0015L	(*)
J	Bevel gear pinion to bevel ring gear (backlash)	.006L-.012L	(*)	(*)	

Note. See Federal Supply Catalog C3110-II-A.

Figure 109. Repair and rebuild standard points of measurement for axle carrier through shaft.



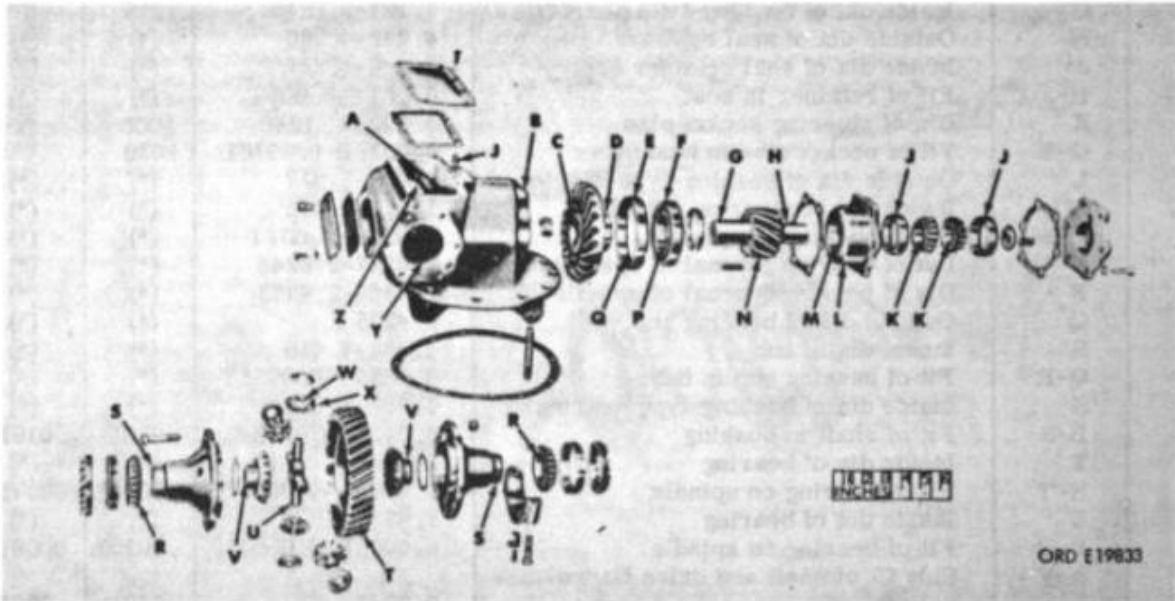
## Housing and Steering Knuckle Assembly

Fig. No.	Ref. Ltr.	Point of measurement	Size and fit of new parts	Wear Limits	
				Field	Depot
110	A	Side fit of shaft and side gear splines	0.004L	.010L	.006L
	B	Dia of outer shaft journal	1.667-1.670	.005	.0015
	C	Dia of universal outer balls	‡	(*)	(*)
	D	Dia of journal on shaft	1.665-1.675	.003	.0015
	E	Outside dia of bushing-type bearing	1.253-1.255	(*)	(*)
	F	Inside dia of steering knuckle sleeves	1.248-1.250	(*)	(*)
	E-F	Fit of bushing in sleeve	0.003T-0.007T	(*)	(*)
	G	Inside dia of bushing-type bearing	1.121-1.234&	.015	.005
	H	Outside dia of seal retainer	4.248-4.250	(*)	(*)
	J	Inside dia of seal retainer seat	4.245-4.247	(*)	(*)
	H-J	Fit of retainer in seat	0.001T-0.005T	(*)	(*)
	K	Dia of steering socket pins	1.1235-1.1240	.005	.005
	G-K	Fit of socket pins in bushings	0.0025L-0.0010L	.030	.010
	L	Outside dia of bushing-type bearing	1.813-1.817	(*)	(*)
	M	Inside dia of steering spindle	1.810-1.812	(*)	(*)
	L-M	Fit of bushing in spindle	0.001T-0.007T	(*)	(*)
	N	Dia of bearing journal of spindle	2.6247-2.6248	(*)	(*)
	P	Dia of bearing journal of spindle	2.4368-2.4373	(*)	(*)
	Q	Outside dia of bearing cup	4.4375	(*)	(*)
	R	Inside dia of hub	4.434-4.436	(*)	(*)
Q-R	Fit of bearing cup in hub	0.0015T-0.0035T	(*)	(*)	
S	Inside dia of bushing-type bearing	1.682-1.684	(*)	(*)	
B-S	Fit of shaft in bushing	0.012L-0.017L#	.025L	.019L	
T	Inside dia of bearing	2.6250	(*)	(*)	
N-T	Fit of bearing on spindle	0.0002L-0.0003L	.0015L	.0007L	
U	Inside dia of bearing	2.4375	(*)	(*)	
P-U	Fit of bearing on spindle	0.0002L-0.0007L	.0015L	.0009L	
A-V	Side fit of shaft and drive flange splines	0.004L	.010L	.006L	

#Ream bushing to size.  
 &Line reamed. Burnish to 1.125-1.125 in place.  
 ‡Ball sizes. .001, .002, .003, undersize .001, .002, .003 oversize  
 Note. See SM 9-1, Series 3110, for conversion of inches and fractions to millimeters.



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*Figure 111. Repair and rebuild standard points of measurement for axle carrier and differential*

## Carrier Assembly

Fig. No.	Ref. Ltr.	Point of measurement	Size and fit of new parts	Wear Limits	
				Field	Depot
111	A	Bore in housing	5.684-5.686	(*)	(*)
	B	Dia of bore in housing	4.7242-4.7252	(*)	(*)
	C	Dia of shaft hole in bevel gear	1.999-2.000	(*)	(*)
	D	Outside dia of gear shoulder	2.9617-2.9628	.002	.000
	E	Outside dia of bearing sleeve	5.6865-5.6875	(*)	(*)
	A-E	Fit of sleeve in housing bore	0.0015T-0.0036T	(*)	(*)
	F	Outside dia of bearing	5-1181	(*)	(*)
	G	Dia of drive pinion shaft	2.002-2.003	(*)	(*)
	C-G	Fit of gear on pinion shaft	0.002T-0.004T	(*)	(*)
	H	Dia of drive pinion shaft	1.6265-1.6266	(*)	(*)
	J	Outside dia of bearing cup	3.3750	(*)	(*)
	K	Inside dia of bearing cone	1.6250	(*)	(*)
	H-K	Fit of bearing on shaft	0.0005T-0.0015T	(*)	(*)
	L	Dia of cage and cup assembly	4.7222-4.7232	(*)	(*)
	B	Fit of cage in housing	0.0010L-0.0030L	(*)	(*)
	M	Inside dia of cage	3.376-3.377	(*)	(*)
	J-M	Fit of bearing cup in cage	0.001L-0.002L	(*)	(*)
	N-T	Backlash of drive pinion to ring gear	0.008L-0.012L	.020	.016
	P	Inside dia of bevel gear bearing	2.9628	(*)	(*)
	D-P	Fit of bearing on bevel gear	0.0000L-0.0011L#	(*)	(*)
	D-P	Fit of bearing on gear	0.0009T-0.0020&	(*)	(*)
	Q	Inside dia of bearing sleeve	5.1216-5.1226	(*)	(*)
	F-Q	Fit of bearing in sleeve	0.0035L-0.0045L	(*)	(*)
	R	Dia of differential case journal	2.5000	(*)	(*)
	S	Dia of differential case journal	2.5035-2.5050	(*)	(*)
	R-S	Fit of bearing on case	0.0035T-0.0050T	(*)	(*)
	U	Dia of spider	0.871-0.873	(*)	(*)
	V	Fit of side gear on axle shaft spline	0.004L-.009L	.018	.010
	W	Inside dia of differential pinion	0.877-0.879	(*)	(*)
	U-W	Fit of pinion on spider	0.004L-O.008L	.015	.009
X	Backlash of pinion to side gear	0.004-0.006	.015	.006	
Y	Dia of case bore	3.250-3.251	(*)	(*)	
Z	Dia of case bore	4.3307-4.3317	(*)	(*)	

&Fit after pressing gear on shaft at (G)

#Fit before pressing gear on shaft at (G)

Note. See Federal Supply Catalog C3110-IL-A, for conversion of inches and fractions to millimeters.

C5, TM 9-2320-209-35

## Section VII. REAR AND FORWARD REAR AXLES ASSEMBLIES REMOVAL AND INSTALLATION

### 106. Description (fig. 129)

The rear and forward rear axles are exactly alike but differ from the front axle in the shape of the housing, axle shaft, and hub and drum assemblies. The center portion of the housings is the same as the front axle and is equipped with the identical type of carrier. The outer end of the rear axle housings carries riveted brake backing plate assemblies. The axle shafts are straight and include the hub drive caps which are integral with the shaft. The hubs and drums are bolted assemblies. The hub and drum are assembled for mounting dual wheels. Re-

versal of the hub and wheel studs in their assembled position with the brake drum will convert the axles for use with single wheels. Single wheel axles of the same model may be disassembled and wheel hubs and drums reversed for use with dual wheels. The procedure for interchanging the two types of axles by reversal of hub and drum parts is explained in SB 9-174. Replacement axle assemblies include the spring guides and the upper and lower torque rod brackets. Rebuilt units should include these items to avoid confusion in parts depots.

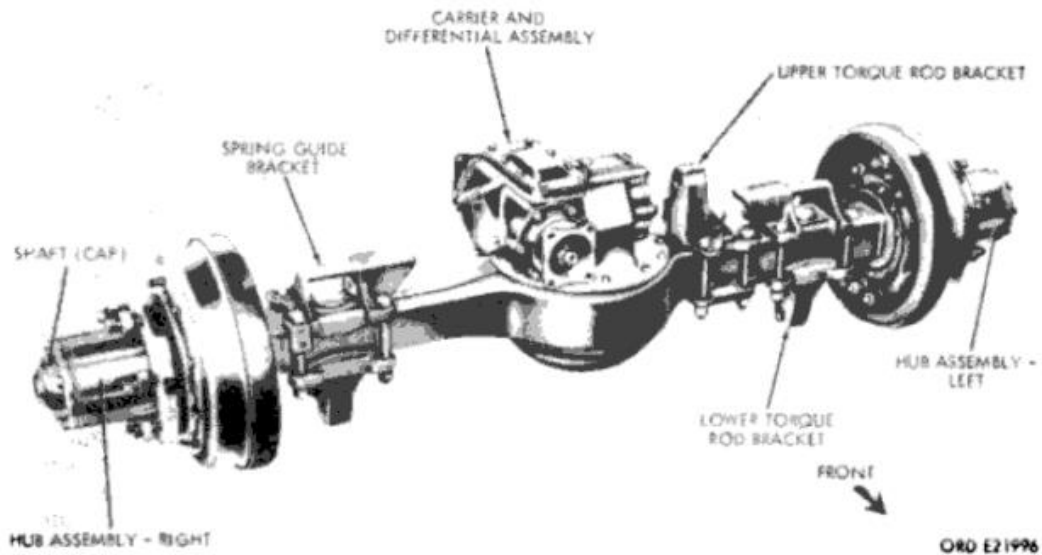


Figure 129. Rear axle assembly - (rear and forward rear)

107. Data

Ordinance no. . . . . 7368511  
 Make . . . . . Rockwell-Standard  
 Model . . . . . C240FHX3  
 Type . . . . . full floating  
 Drive . . . . . thru torque rods  
 Ratio . . . . . 6.72:1  
 Carrier and differential . . same as front axle

108. Replacement of Rear and Forward Axle Assemblies

Procedure for replacement of the rear and forward rear axles as individual units is the same as for replacement in the assembly line sequence. Refer to paragraph 83.

**Section VIII. DISASSEMBLY AND ASSEMBLY OF REAR AND FORWARD REAR AXLE ASSEMBLIES**

109. General

Refer to figure 130 for identification and location of axle components, except carrier and differential.

110. Hub and Drum Assembly and Brake Components - Removal and Installation

Refer to TM 9-2320-209-20

111. Torque Rod and Spring-guide Brackets Removal and Installation

Refer to paragraphs 96 and 97.

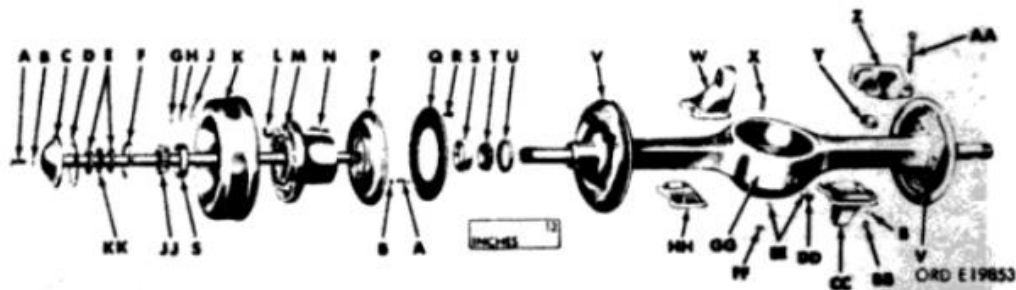
112. Carrier and Differential Assembly - Removal and Installation

Refer to paragraph 62.

113. Cleaning, Inspection, and Repair

Refer to paragraph 75 for cleaning, inspection, and repair procedures for the rear axle.

TM 9-2320-209-35



<u>Key</u>	<u>Item</u>	<u>Key</u>	<u>Item</u>	<u>Key</u>	<u>Item</u>
A	Bolt	N	Stud	Z	Bracket
B	Washer	P	Adapter	AA	Screw
C	Shaft	Q	Slinger B	BB	Nut
D	Gasket	R	Bolt	CC	Bracket
E	Nut	S	Cup	DD	Plug
F	Seal	T	Cone	EE	Gasket
G	Nut	U	Seal	FF	Plug
H	Washer	V	Plate, assy	GG	Housing
J	Cover	W	Bracket	HH	Plate
K	Drum	X	Stud	JJ	Cone
L	Nut	Y	Plate	KK	Lock
M	Hub				

Figure 130. Rear axle assembly - less carrier - exploded view

### Section IX. REPAIR OF REAR AXLE HUB AND DRUM ASSEMBLIES

#### 114. Disassembly

##### a. Removal of Hub and Oil Slinger Assembly (Fig. 131).

- (1) Remove ten nuts and lockwashers and inspection cover securing drum to hub assembly.
- (2) Place hub and drum assembly on bench with brakedrum on flat surface. Using a hardwood block and hammer, drive hub downward. This will separate oil slinger and brakedrum from hub and adapter assembly.

##### b. Removal of Adapter from Wheel Hub (Fig. 132). Remove eight capscrews and lockwashers securing adapter to wheel hub and remove adapter.

##### c. Remove Inner and Outer Bearing Cups. Remove inner and outer bearing cups (fig.

133), using remover and replacer tool 5120-473-7372 and screw 5120-708-3216. Refer to figure 126 for removal procedures.

##### d. Removal of Wheel Hub Studs (Fig. 134). Position wheel hub in arbor press and remove defective wheel hub studs as required.

##### e. Removal of Oil Slinger Bolts (Fig. 135). Remove ten bolts from oil slinger as required.

#### 115. Assembly

Assemble the hub and drum assembly in reverse order of disassembly (par. 114).

Note. When installing brakedrum, be sure the inspection hole is located between the wheel studs (fig. 131). Tighten the ten nuts to 30-38 pound-feet torque.



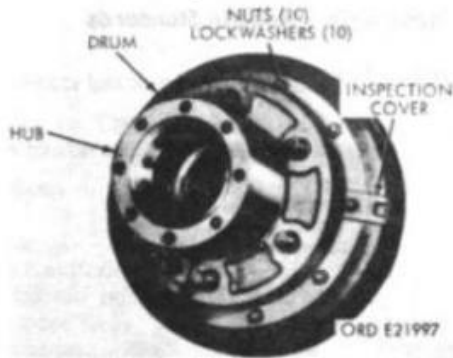


Figure 131. Separating hub and oil slinger from drum



Figure 133. Inner and outer wheel hub bearing cups

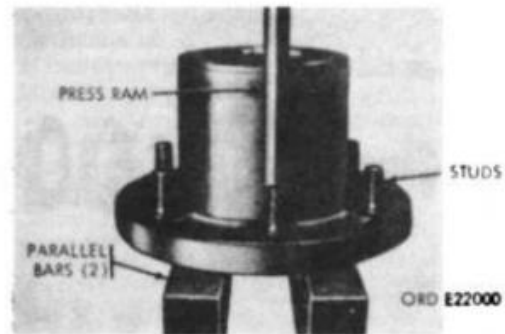


Figure 134. Removal of wheel hub studs

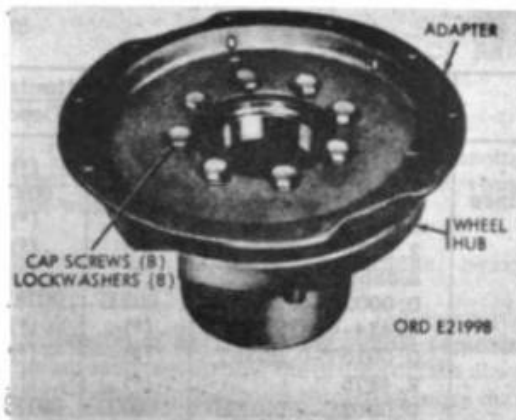


Figure 132. Removing adapter from wheel hub

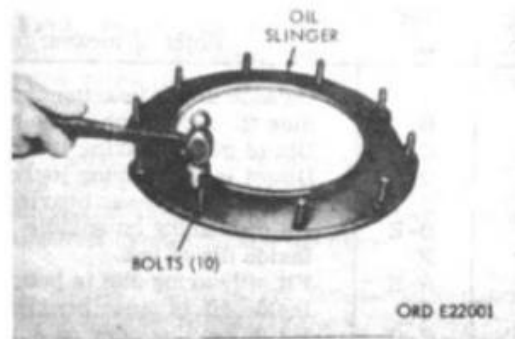


Figure 135. Removal of oil slinger bolts

### Section X. REPAIR AND REBUILD STANDARDS

#### 116. General

The repair and rebuild standards included herein give the minimum, maximum, and key clearances of new or rebuilt parts. They also give wear limits which indicate that point to

which a part or parts may be worn before replacement, in order to receive maximum service with minimum replacement. Normally, all parts which have not been worn beyond the dimensions shown in the "Wear limits" column or damaged from corrosion will be

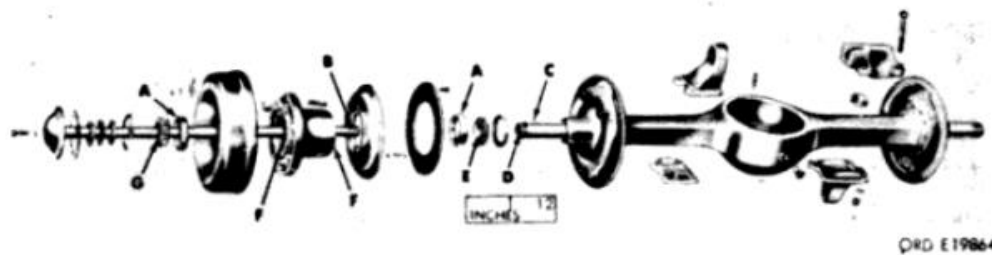
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approved for service. An asterisk (\*) in the "Wear limits" column indicates that the part or parts should be replaced when worn beyond the limits given in the "Size and fit of new parts" column. In the "Size and fit of new parts" column, the letter "L" indicates a loose fit (clearance) and the letter "T" indicates a tight fit (interference). A double

asterisk (\*\*) in wear limits column indicates part may be used by selective fitting as long as the resulting fit is within the tolerance specified.

117. Rear Axle - Rebuild Standards

Refer to figure 136.



ORD E19864

Rear Axle Hub and Drum Assembly

Fig. No.	Ref. Ltr.	Point of measurement	Size and fit of new parts	Wear limits	
				Field	Depot
	A	Outside dia of bearing cup	4.4375	(*)	(*)
	B	Side fit of shaft and side gear splines	0.004L	.015L	.008L
	C	Dia of outer bearing journal	2.4363-2.4373	(*)	(*)
	D	Dia of inner bearing journal	2.6238-2.6248	(*)	(*)
	E	Inside dia of inner bearing cone	2.6250	(*)	(*)
	D-E	Fit of bearing on spindle	0.0002L-0.0012L	.003L	.0018L
	F	Inside dia of hub	4.434-4.436	(*)	(*)
	A-F	Fit of bearing cup in hub	0.0015T-0.0035T	(*)	(*)
	G	Inside dia of outer bearing cone	2.4375	(*)	(*)
	C-G	Fit of bearing cone on spindle	0.0002L-0.0012L	.003L	.0018L

**Note.** See SM 9-1, Series 3110, for conversion of inches and fractions to millimeters.

Figure 136. Repair and rebuild standard points of measurement for rear axle assembly

## CHAPTER 9

## BRAKE SYSTEM, WHEELS AND TIRES

## Section I. DESCRIPTION AND DATA

## 118. Description and Operation

Refer to TM 9-2320-209-20 for description of the brake system, wheels and tires.

## 119. Data

System . . . . . air-hydraulic  
Master cylinder:  
Ordnance no. . . . . 7539267  
Manufacturer . . . . . Wagner-Lockheed  
Model no. . . . . FB3527A

Dia cylinder bore . . . . . 1-3/4 in.  
Wheel cylinder:  
Ordnance no. . . . . 7348976  
Manufacturer . . . . . Wagner-Lockheed  
Model no. . . . . FD4419  
Type . . . . . straight bore  
Dia cylinder bore . . . . . 1-3/8 in.  
Air-hydraulic cylinder:  
Ordnance no. . . . . 8345003  
Manufacturer . . . . . Midland Steel Prod.  
Model no. . . . . N4105H

## Section II. REPLACEMENT OF BRAKE COMPONENTS

## 120. Components - Replacement

Refer to TM 9-2320-209-20 for replacement procedures for all brake system components.

## Section III. REPAIR OF BRAKEDRUMS, SHOES, AND LINKAGE

## 121. Service and Parking Brakedrums

a. Cleaning. Wash drums in dry-cleaning solvent or mineral spirits paint thinner; rinse in hot water and dry thoroughly.

b. Inspection. Inspect for cracks, heavy scoring, uneven wear or warping.

c. Repair. If heavy scoring can be removed satisfactorily by turning the drum surface down without reducing the drum thickness more than 25%, turn the drum down in the drum-turning lathe. If a drum is cracked, too heavily scored, warped or shows uneven wear indicating out of round, replace the drum.

## 122. Service and Parking Brakeshoes

a. Cleaning. If brakeshoe lining is not to be replaced, clean the shoe and lining with a wire brush. Do not use dry-cleaning solvent or mineral spirits paint thinner or allow cleaning fluids or oil and grease to come in contact

relined, remove the old lining and wash the shoes in dry-cleaning solvent or mineral spirits paint thinner. Rinse in hot water and dry thoroughly.

b. Inspection. Check shoes for cracks in faces or web, warping, flat areas on faces, or enlarged or ragged rivet holes. If any of these conditions exist, discard the shoe.

c. Repair. Repairs are limited to removal of burs and minor scoring.

d. Assembly (Relining). To replace the worn or damaged brakeshoe lining (refer to fig. 137): Grind off the rivet heads on the back of the shoe and punch out the old rivets and pry off the old lining. Clean, inspect, and repair the shoe as in a, b, and c, above. Rivet the specified lining to the shoe.

Note. Use same procedure for relining all brakeshoes.

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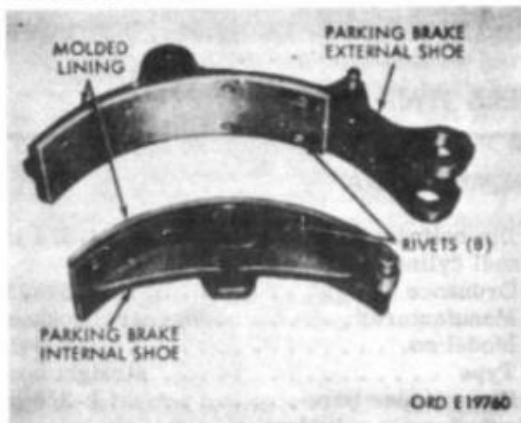


Figure 137. Relining brakeshoes

#### 123. Parking Brake Control Cable Repair

Replace parking brake control cable when damaged or worn. (Refer to TM 9-2320-209-20.)

#### 124. Parking Brake Hand Lever

Repair of the parking brake-control lever is normally not economically advisable since wear or damage affects enough of its parts to make complete replacement preferable. However, where either the pawl or sector is the only part worn or damaged, it may be replaced by removing the three bolts and safety nuts holding the assembly together and reassembling with the new part or parts.

### Section IV. REPAIR OF THE MASTER CYLINDER, WHEEL CYLINDERS, AND AIR-HYDRAULIC UNIT

Note. For removal of these items, see TM 9-2320-209-20.

#### 125. Master Cylinder and Wheel Cylinders

Refer to TM 9-1827C for repair procedures for the master hydraulic cylinder and wheel hydraulic cylinders.

#### 126. Air-Hydraulic Unit

Refer to TM 9-8601 for repair procedures for the air-hydraulic unit.

### Section V. REPAIR OF WHEEL AND TIRE

Note. For disassembly and assembly of wheel and tire, refer to TM 9-2320-209-20.

#### 127. Cleaning

Remove grease from wheel assemblies with grease-cleaning compound. Dry with compressed air.

#### 128. Inspection and Repair

a. Wheel Assemblies. Carefully inspect wheels for distortion and replace if damaged.

Check condition of paint and repaint wheel if paint is chipped, cracked, or reveals bare metal. Inspect mounting stud holes for excessive wear due to loose mounting and replace wheel if wear is excessive. Check side ring for distortion and replace if distortion is found. Inspect threads on wheel stud nuts and replace if threads are stripped.

b. Tire Repair. Refer to TM 9-1871 for procedures and methods used for repairing and rebuilding tires.