T/M 10-1443

MAINTENANCE MANUAL

½ TON 4 x 4 CHASSIS

DODGE TRUCKS

built for

UNITED STATES ARMY

Contract Number W398-QM-11592

Model	Type of Vehicle	U. S. A. Registration Numbers
WC-21	Weapon Carrier	W-247219 to W-252141 (Incl.)
WC-25	Radio	W-2071355 to W-2072104 (Incl.)
WC-26	Carry-All	W-2069855 to W-2071354 (Incl.)
WC-27	Ambulance	W-77341 to W-77840 (Incl.)
WC-41	Emergency Repair	W-008608 to W-008684 (Incl.)

Contract Number DAW-398-QM-210

Model	Type of Vehicle
WC-21	Weapon Carrier
WC-23	Command Reconnaissance
WC-24	Command Reconnaissance with Winch
WC-25	Radio
WC-27	Ambulance

CHRYSLER CORPORATION

Dodge Division . Detroit, Michigan

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WAR DEPARTMENT

Washington, February 20, 1942

TM 10-1443, Maintenance Manual, Truck, 1/2-ton 4x4, Dodge (Models WC-21, WC-23, WC-24, WC-25, WC-26 and WC-27) published by the Chrysler Corporation, Dodge Division, is furnished for the information and guidance of all concerned.

(AG 062.11 (4/26/41) PC (C), June 10, 1941.)

By order of the Secretary of War:

G. C. Marshall
Chief of Staff

Official:

E. S. Adams
Major General
The Adjutant General

SGV TD

MAINTENANCE MANUAL
FOR
UNITED STATES ARMY
DODGE 4 x 4 TRUCKS

FOREWORD

TWO objectives have been considered in the preparation of this manual.

1. OPERATION AND CARE OF THE TRUCK: The manual contains practical and useful operating instructions and maintenance suggestions for the guidance of DRIVERS responsible for the operation of Dodge 4 x 4 Army Trucks. This information is written with the aim of promoting uninterrupted truck performance under different driving conditions encountered in Army Maneuvers.

2. REPAIRING THE TRUCK: The manual contains practical and workable mechanical instructions adequately illustrated with "action" pictures and "exploded" views. This information is for the use of the MECHANIC whose responsibility is to keep the truck in operation. The "Service Diagnosis" charts will also help the mechanic to analyze his problems before attempting a solution.

The contents of the manual are arranged in group sequence as indicated in the index in the right-hand margin of this page. Each group is divided into "Subjects" or Service Operations which are numbered consecutively throughout the manual. These subject numbers are used in order to make quick reference to related subjects. For example, in the Front Axle group, Subject 32, on page 18, refers to several other subjects which are related to the procedure of removing and installing a front axle housing.

The last group of the manual entitled "Service Standards" is a tabulated summary of adjustment specifications, dimensions of parts and name and type of units built by other manufacturers.

Special service tools mentioned throughout the manual are obtainable from the Miller Tool & Manufacturing Company, Detroit, Michigan.

The "TM" number assigned to this manual appears on a Maintenance Number Plate attached to the compartment door on the instrument panel. See 2, Fig. 1. The Maintenance Number Plate also contains a number for the Parts List so that both the Maintenance Manual and the Parts List, applicable to the truck being serviced, can be easily identified by referring to the Maintenance Number Plate.

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Dodge Division
DETROIT, MICHIGAN

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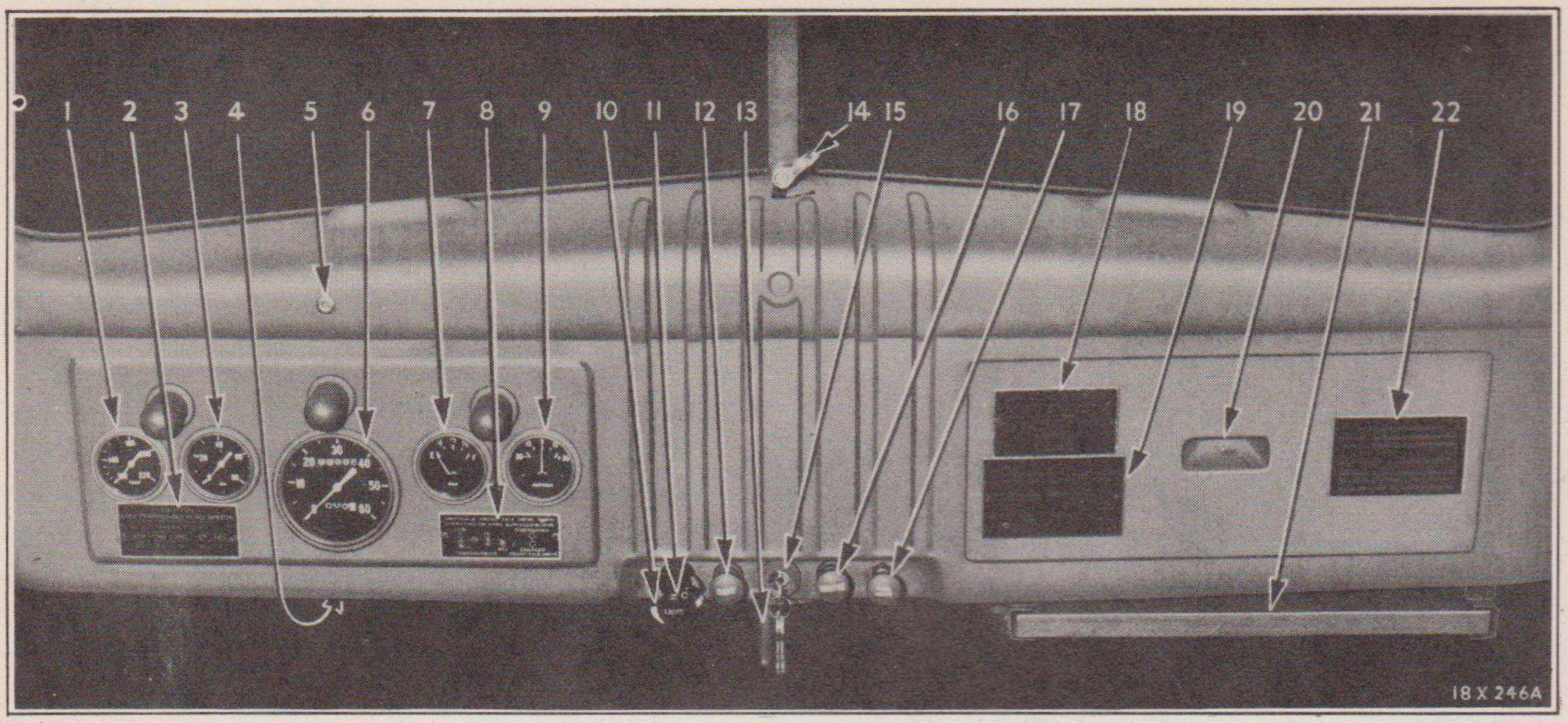


Fig. 1—Instrument Panel

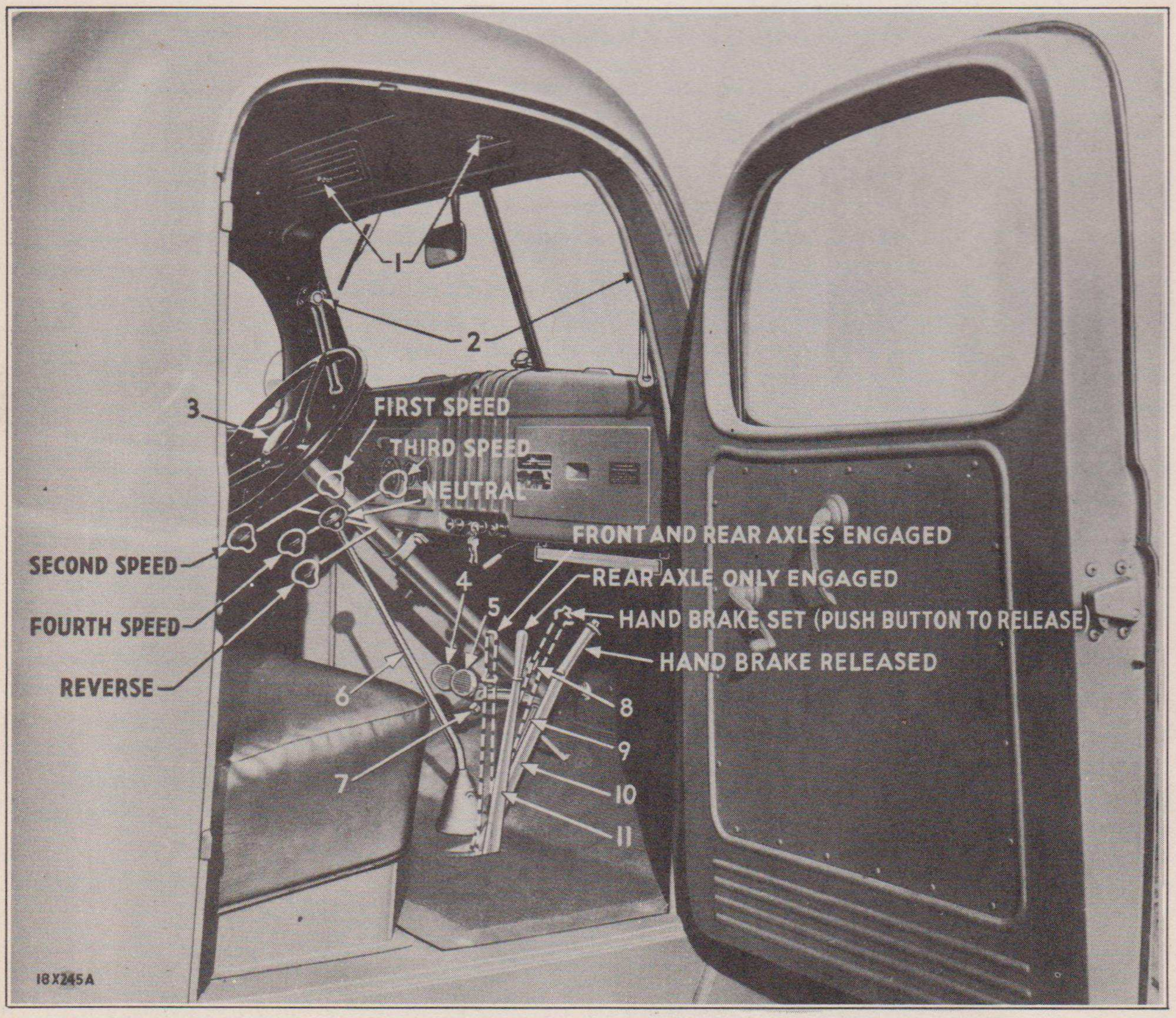


Fig. 2—Front Compartment

OPERATING INSTRUCTIONS

It is important that the driver learn the location of each control lever, pedal and button before driving; then he will find the driving easier than trying to develop such knowledge while driving.

THE CONTROLS

The accompanying illustrations (Figs. 1 and 2) show the location of each control. By knowing the purpose of each control and how to use it, the driver who is unaccustomed to driving a Dodge 4 x 4 Army Truck will find it easier to follow the "Operating Instructions" contained in this section of the Manual.

1—Ignition Lock Switch

The ignition lock switch (15, Fig. 1), can be operated only when the key is inserted and turned to the right (clockwise). In this position the ignition and fuel gauge circuits are connected. The key cannot be removed unless the thumb piece of the key is vertical.

Keys

When the truck is shipped three identical keys are placed in a bag attached to the steering column. These keys will fit all locks used on the vehicle.

2—Choke Control

The choke, (12, Fig. 1), is closed when the control button is pulled "out" to the limit of its travel. Pull the choke control "out" when starting a cold engine and gradually push it in as the engine becomes warm. Always run the engine with the choke button pushed in after the engine has reached normal operating temperature. Excessive use of the choke causes a flooding condition in the engine and excess fuel works its way past the pistons into the crankcase diluting the engine oil. It also increases fuel consumption unnecessarily.

3—Hand Throttle

The hand throttle control button, (16, Fig. 1), is for use when starting the engine. It can also be used when starting the truck on steep hills where both feet are necessary to operate clutch and brake pedals. Pulling the button outward opens the throttle.

4—Accelerator Pedal

The accelerator pedal, (9, Fig. 2), is used to control engine speed with the foot while driving the truck.

5—Starter Pedal Button

This foot button (8, Fig. 2), is for operation of the starting motor which cranks the engine. It is located above the accelerator pedal so that it can be easily reached for starting the engine.

CAUTION: Do not press the starter pedal with the gearshift lever in gear or while the engine is running. See Subject 20.

6—Clutch Pedal

Pressing the clutch pedal (4, Fig. 2), down to the floor board, disengages the clutch so that the transmission gears may be shifted.

7—Transmission Gearshift Lever

This lever (6, Fig. 2), controls the shifting of all gears in the transmission. The diagram in the illustration shows the different positions of the lever for various gear selections in the transmission.

CAUTION: Do not attempt to start the engine unless the gearshift lever is in neutral

Fig. 1—Instrument Panel

1—Heat indicator
2—Maintenance number plate
3—Oil pressure gauge
4—Speedometer trip mileage set stem
5—Headlight bright beam indicator light
6—Speedometer
7—Fuel gauge
8—Transmission shift diagram plate
9—Ammeter
10—Service light lock-out button
11—Service and black-out light switch
12—Carburetor choke control button
13—Cowl ventilator handle
14—Windshield lock handle
15—Ignition lock switch
16—Throttle control button
17—Instrument panel light switch
18—Speed caution plate
19—Serial number plate
20—Compartment door
21—Map board
22—Cooling system drain caution plate

Fig. 2—Front Compartment

1—Windshield wiper control knobs
2—Windshield adjusting arm lock nuts
3—Horn button
4—Clutch pedal
5—Brake pedal
6—Transmission gearshift lever
7—Headlight beam control foot switch
8—Starter pedal button
9—Accelerator pedal
10—Hand brake lever
11—Transfer case control hand lever

To Hook On: Disengage the clutch shifter fork handle at the winch by means of the short hand lever illustrated in Fig. 6 and pull out the cable. (If cable is under a strain depress truck clutch pedal and move power take-off shifter lever to rear position after lifting safety catch on floor board, and use engine power to relieve strain on cable.)

To Pull: Engage clutch shifter fork as illustrated in Fig. 6 and depress truck clutch pedal, shift control lever to forward position (Fig. 5), after lifting safety catch on floor board. Then release truck clutch pedal.

CAUTION: When using winch, operate the engine at a reasonable speed. High engine speeds are liable to damage the winch mechanism or cause other serious trouble.

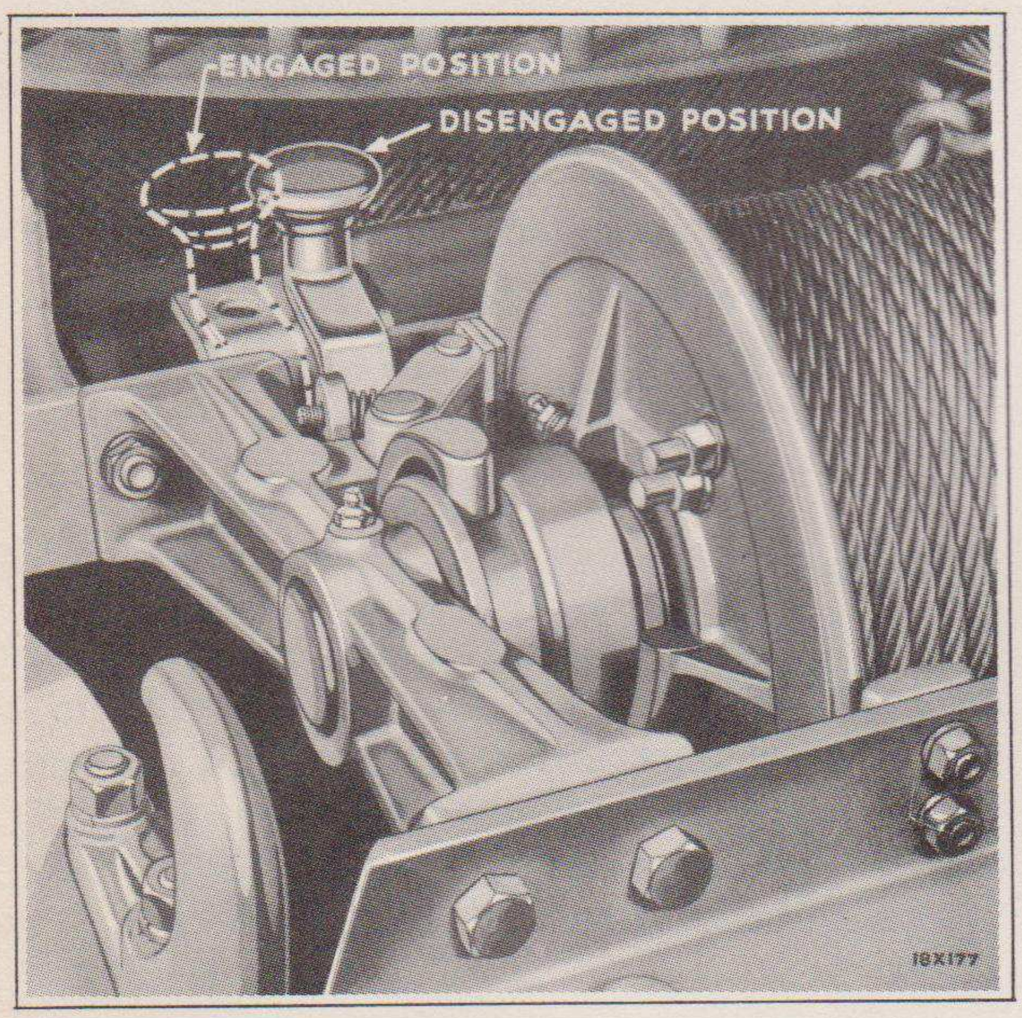


Fig. 6—Winch Clutch Shifter Fork Handle Positions

To Stop: Depress truck clutch pedal and shift control lever into neutral.

To Unwind Cable: Depress truck clutch pedal, lift safety catch on floor board, shift control lever to rear position as illustrated in Fig. 5 and release truck clutch pedal.

OPERATING THE TRUCK

19—Breaking-in Speeds

The life of a truck depends largely upon the care it receives during the first 500 to 1500 miles of operation.

New engines should never be run at speeds equivalent to a truck speed of more than 25 miles per hour in direct drive during the first 500 miles of operation. During the next 1500 miles the speed may be gradually increased to complete the "breaking-in" process. The truck must not be driven at continued full speed nor should it be subjected to heavy load pulls during the first 2000 miles. Maximum power and speed should not be required from the truck until after it has been driven about 2000 miles. This mileage is necessary to make sure of all internal friction of the engine being minimized.

When starting any cold engine (whether new or not), care should be exercised during the warm-up period because lubrication is not as efficient when the engine is cold. Drive slowly until normal operating temperature is reached. The cause of damage to bearings and pistons in new engines as well as in engines operated at subnormal temperatures is due principally to extreme high temperatures of the frictional surfaces.

Avoid premature engine wear by giving the engine a chance to reach its normal operating temperature before subjecting it to heavy loads or maximum speed.

20—Starting the Engine

Before starting the engine, make sure that the transmission gearshift lever is in neutral position.

If the engine is cold proceed as follows:

(a) Disengage the clutch.

(b) Pull out choke button full distance of its travel.

(c) Turn on ignition (turn key to right, clockwise) and step on starter pedal, keeping it engaged until engine starts. After engine starts, gradually push in choke button to give proper operation.

Under extreme cold starting conditions it is advisable, to insure good starting, to pull out the hand throttle control button to give approximately one-third throttle opening.

CAUTION: Do not pump the foot accelerator before or during starting, as this will cause difficult starting.

If the engine is warm proceed as follows:

(a) Disengage the clutch.

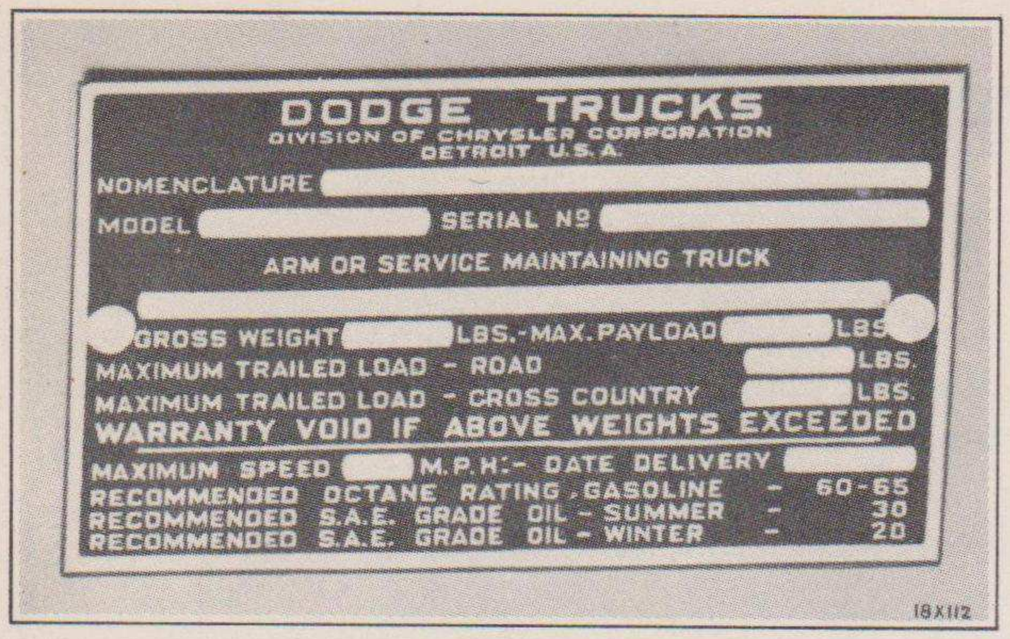


Fig. 3—Chassis Serial Number Plate

Attached to compartment door on instrument panel. Plate also contains other useful truck information.

position. See Subject 21 for further explanation of the gearshift lever.

8—Transfer Case Lever

This lever, (11, Fig. 2), is used to shift gears in the transfer case. When the lever is in the rear position (nearest the seat) the truck is in "four wheel drive." When the lever is in the forward position, the front axle is disengaged and engine power is applied only to the rear axle. See Subject 23.

9—Hand Brake Lever

The hand brake (10, Fig. 2), is used principally for holding the truck while parked. When parking on a grade, turn the front wheels off the straight-ahead position. The hand brake is released when the lever is in the extreme forward position and applied when moved back toward the seat. When pulled back, the lever will lock in position but may be released by pressing down the release button on top of the lever and pushing the lever forward.

10—Brake Pedal

The brake pedal, (5, Fig. 2), is used to slow down or stop the vehicle. See Subject 27.

11—Black-out Light Switch

All service lights and black-out lights are controlled by this switch (11, Fig. 1). When the switch is pulled out to the first position, the black-out lights, consisting of black-out headlights and black-out tail lights, are turned on, and the black-out signal light is operative.

By depressing the lock-out button, (10, Fig. 1), and pulling the switch to the second position, the service lights are turned on. In this position the service headlights and tail lights are turned on, the service stop light is operative and the instrument panel lights may be turned on or off by a separate switch. By pulling the switch to the third position, only the service stop light is operative.

12—Headlight Beam Control Switch

This foot switch, (7, Fig. 2), controls the high and low beams of the service headlights. (The switch operates only when the service headlights are turned on by the hand operated switch on the instrument panel.) Press the button with the foot to raise or lower the headlight beams. The switch locks each time the button is pressed. A red indicator, (5, Fig. 1), on the instrument panel is illuminated only when the high beam is turned on.

13—Black-out Lights

The black-out light lenses contain openings (Fig. 4), which cause the black-out light to appear as two lights when viewed from distances of 75 feet or less, by separating the source of light into two beams. When viewed from distances greater than 75 feet, however, the black-out light appears as one light.

The openings provided in the black-out light lens permit the driver of a vehicle to gauge the distance between him and another vehicle, when the black-out lights are in use. When the black-out light of a vehicle appears as two lights, the driver should proceed with caution, so that an emergency stop can be made, if necessary, in 75 feet or less.

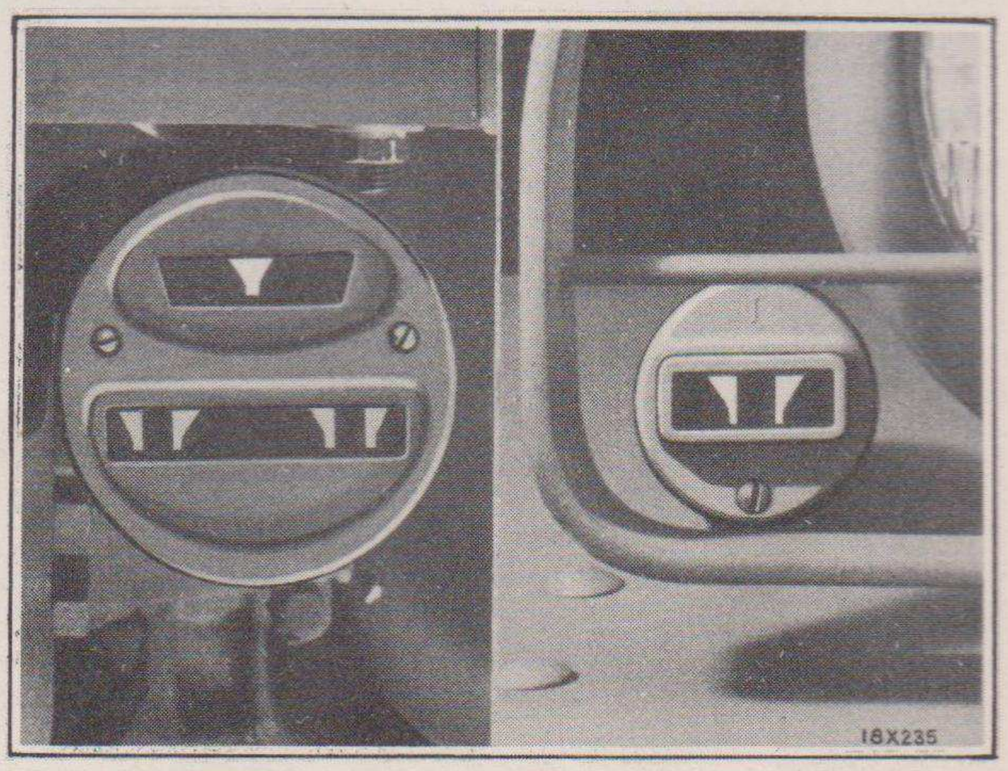


Fig. 4—Black-out Lights

14—Oil Pressure Gauge

The oil pressure gauge (3, Fig. 1), should register about 15 pounds pressure when the engine is running at slow idle speed, but at speeds above 30 miles per hour, the gauge should show from 30 to 40 pounds pressure.

If the gauge registers too low a pressure, especially at speeds above 30 miles per hour, or fluctuates between 0 and 40 pounds (except at slow engine speed) check the engine oil level immediately. If the engine oil is at the proper level and the gauge still registers too low a pressure, or none at all, report the condition at once to the motor officer.

15—Ammeter

The ammeter (9, Fig. 1), registers the amount of electricity flowing into or out of the battery. It indicates the charging condition of the generator and the consumption of electricity in the system. When the electrical units are drawing more electricity than the generator is charging, the pointer on the ammeter will be on the negative (—) side of zero and when charging more than is being consumed, the pointer will be on the positive (+) side of zero. Electricity consumed by the starting motor is not registered by the ammeter. If, when all electrical units are switched off, the ammeter pointer registers on the negative (—) side of zero there is a leakage of electricity somewhere in the system, and the condition should be corrected at once.

While driving the truck, the ammeter hand may gradually approach zero. This indicates that the battery requires less current at that time and the voltage regulator is preventing overcharging. The ammeter should not show more than 10 ampere charge above 30 m.p.h. after the first 30 minutes of continuous driving. If it shows more than 10 amperes, with battery specific gravity of 1.275 or higher, the voltage regulator unit should be checked.

16—Heat Indicator

The heat indicator, (1, Fig. 1), shows the temperature of the water in the engine above 100° F. Never warm the engine quickly by running it fast just after starting. When driving, glance at the heat indicator occasionally to see that it does not register too hot. If it registers 200 degrees or more, the engine is too hot and should be stopped. Usually this is caused by insufficient water in the radiator, broken or loose fan belt. Whatever the cause of overheating may be, have the condition corrected before driving the truck.

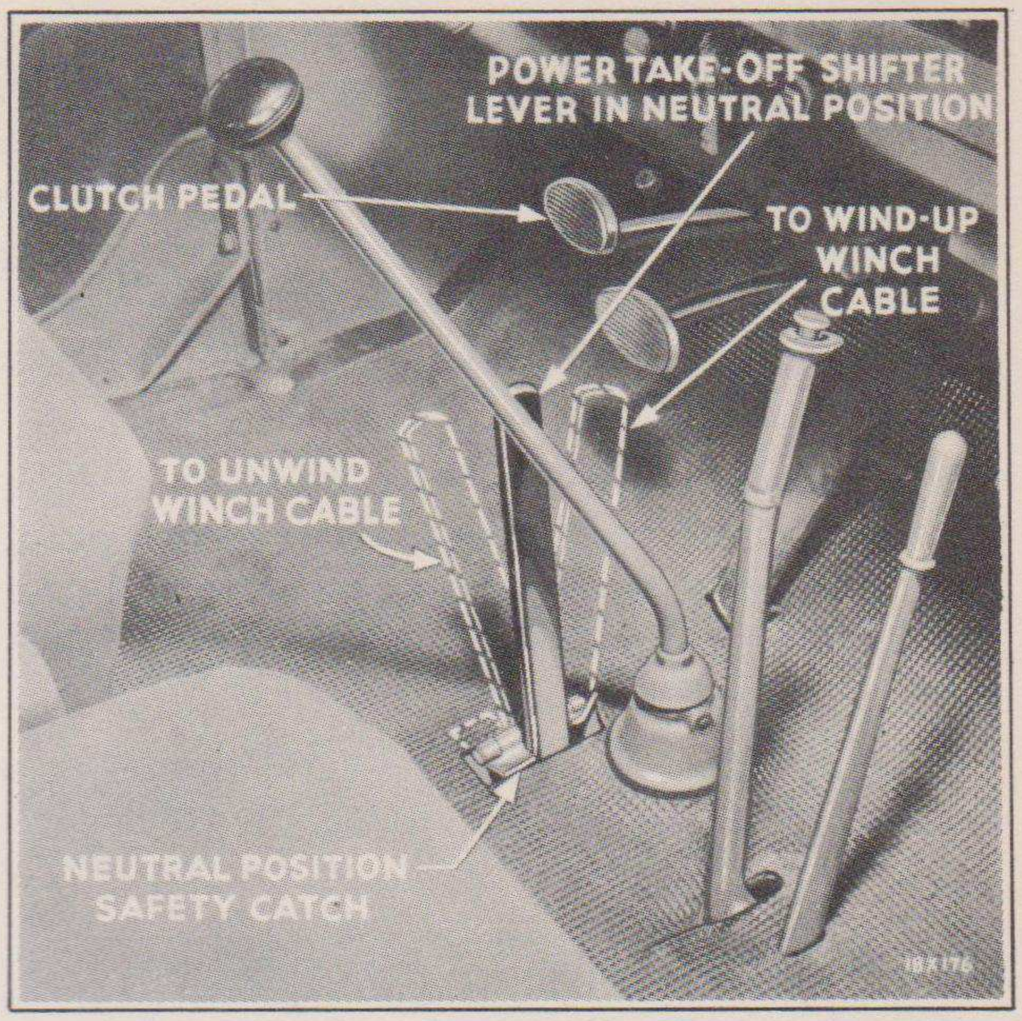


Fig. 5—Power Take-off Shifter Lever in Front Compartment

17—Fuel Gauge

The fuel gauge, (7, Fig. 1), operates when the ignition switch key is turned to the right (clockwise). It is electrically operated and indicates the level of the fuel in the tank. The letter "E" means empty, the letter "F" means full and "½" sign means half full.

18—Winch

The winch on the front of trucks so equipped operates by power from the truck engine. This power is transmitted through the truck transmission into a power take-off control unit, mounted on the side of the transmission. This control unit can be shifted by the lever illustrated in Fig. 5 from neutral position to wind-up or unwind the cable *when the truck clutch pedal is depressed.* Power is transmitted to the winch (from the control unit) through a propeller shaft having two universal joints, one at each end of the shaft.

To Operate Winch

CAUTION: Always place the transmission gearshift lever in neutral and depress the truck clutch pedal before shifting the winch control unit.

(b) Turn on ignition switch and step on starter pedal, keeping it engaged until the engine starts.

Under extreme hot starting conditions it is advisable, to pull out the hand throttle to give approximately one-third throttle opening.

CAUTION: As soon as engine starts, release starting motor pedal to prevent damage to starting motor mechanism.

21—Driving the Truck

The position of the transfer case control lever, (11, Fig. 2), *does not* alter the following recommended procedure of shifting transmission gears when driving the truck. See Subject 23 for instructions covering the engagement and disengagement of front wheel drive by use of the transfer case control lever.

(a) Press the clutch pedal, (4, Fig. 2), down to the floor, then move the transmission gear shifting lever to 1st or 2nd speed forward position, (6, Fig. 2), depending on the condition of the terrain. Next, press the accelerator, (9, Fig. 2), to speed up the engine a little and at the same time gradually relieve pressure on the clutch pedal. This engages the clutch and starts the truck moving. When the clutch is fully engaged (no pressure on the foot pedal), press the accelerator until the vehicle attains the desired road speed.

(b) With the vehicle in motion, press the clutch pedal to the floor and release the accelerator at the same time. Then move the transmission gearshift lever to neutral position and relieve pressure on the clutch pedal to allow the clutch to engage, leaving the gearshift lever in neutral. This synchronizes the engine and transmission speeds. Next, depress the clutch pedal and move the gearshift lever to the next higher speed position, engage the clutch and press the accelerator.

Shifting transmission gears by this method is known as "double-clutching." With a little practice, the average driver can accomplish an easy, smooth and noiseless shift in any transmission gear position.

(c) To shift into reverse, depress the clutch pedal and move the gearshift lever to the position shown at 6, Fig. 2. Then release the clutch pedal, and press the accelerator pedal at the same time until the desired speed is attained.

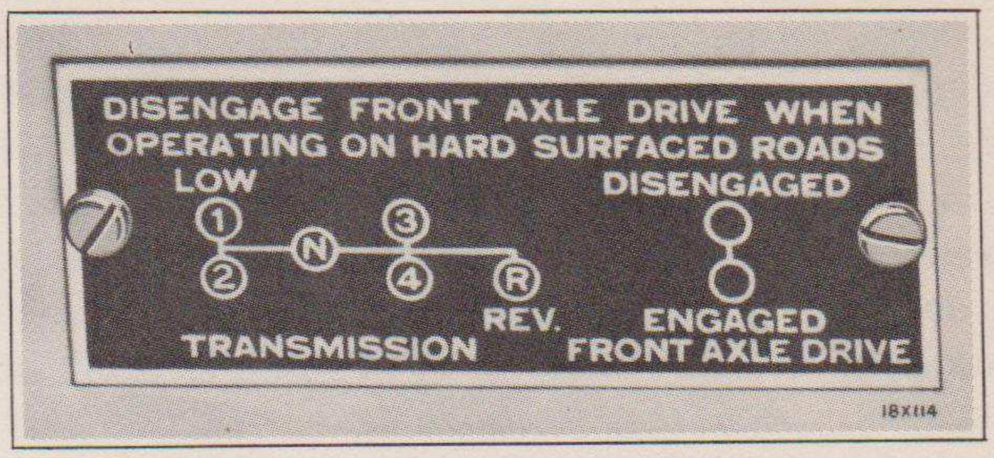


Fig. 7—Transmission and Transfer Case Shift Diagram Plate

Transmission gearshift lever positions are shown on a plate which is attached to the instrument panel. This plate is shown in Fig. 7.

22—Maximum Permissible Road Speeds

Dodge Army trucks are equipped with a governor which limits the maximum permissible road speed of the vehicle. The maximum permissible speed depends on the position of the transmission gearshift lever, as indicated on the plate shown in Fig. 8. This plate is attached to the instrument panel of the vehicle.

CAUTION: Do not permit the truck to exceed maximum road speeds in any gear when driving downhill, because excessive engine speed developed under such conditions is apt to cause damage to engine bearings, pistons, valves, etc.

23—Driving the Truck in Four Wheel Drive (Front Axle Engaged)

The purpose of Four Wheel Drive is to permit maximum traction at all four wheels when driving on icy roads, through snow or mud or over rough unimproved terrain. On smooth, level, hard surfaced roads, and all ordinary conditions, the front axle drive should be *disengaged.*

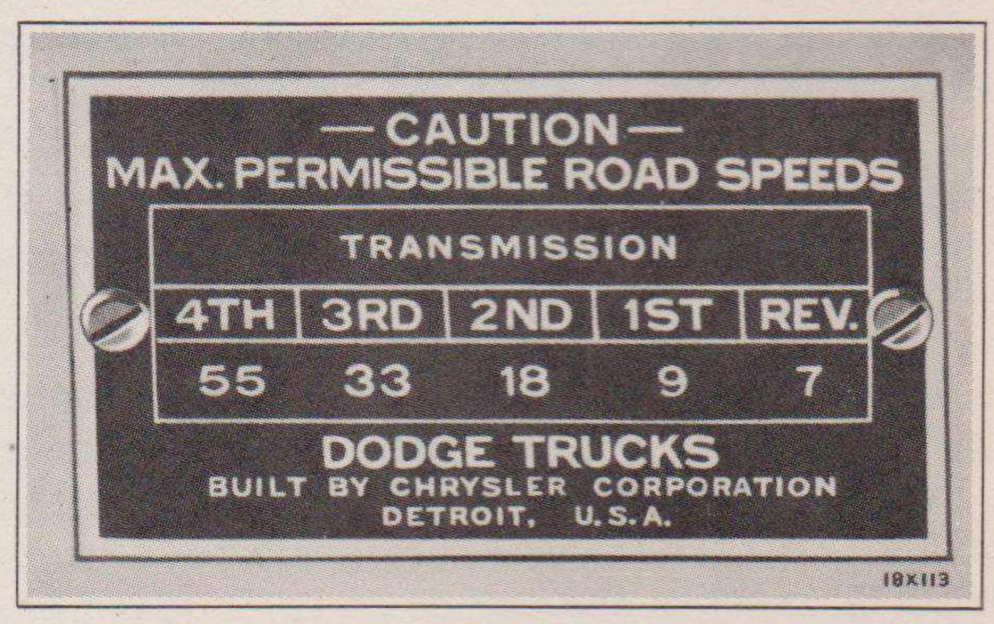


Fig. 8—Maximum Permissible Road Speeds Caution Plate

It is recommended that Four Wheel Drive (front axle engaged) be used below speeds of 25 miles per hour when driving conditions are such that maximum traction is needed at all four wheels. At higher speeds (above 25 miles per hour) the front axle should be disengaged and the driving force applied only to the rear wheels.

The control lever for engaging and disengaging the front axle drive is located in the driver's compartment, (11, Fig. 2). This lever operates the gears in a transfer case at the rear of the transmission. When the lever is moved to the forward position, the front axle is disengaged; when moved to the rearward position, the front axle is engaged for Four Wheel Drive. The positions of the control lever are shown on the plate illustrated in Fig. 7.

When shifting gears in the transfer case to engage or disengage Four Wheel Drive, the vehicle should be moving at a speed not exceeding 25 miles per hour. Shift the control lever in the desired direction with the clutch engaged and with the engine under mild acceleration. If resistance is felt mid-way in the shift, let up on the foot accelerator and complete the shift.

24—Driving Up or Down Steep Grades

When driving down a steep grade, shift into lower transmission gear ratios to cause the truck to drive the engine instead of the engine driving the truck. This will reduce the amount of brake application required. It may be necessary on very steep and long down-grades, to shift the transmission to second speed in order to have the engine hold the truck speed low enough for safety. Continuous or long time application of the brakes is not good practice, because it causes excessive wear of the linings.

When driving upgrade, some drivers have an inclination to try to reach the top without shifting gears. This is not good practice because the engine and drive mechanism is put under great strain unnecessarily and the speed of the truck is reduced.

The governor limits the speed of the engine to its maximum power. Therefore, to negotiate a hill at the highest speed with least load on the engine, shift the transmission gears to the next lower gear when the engine or truck speed begins to decrease by the "double clutch" method. This will permit driving the truck at the maximum possible governed speed up a hill or through soft surface road.

To shift to lower gears with the vehicle in motion, by the "double clutch" method, proceed as follows:

(a) Disengage the clutch and move the gearshift lever to neutral position.

(b) Engage the clutch and accelerate the engine sufficiently to increase the engine speed so that the transmission gears can be meshed in the next lower gear without clashing.

(c) Then disengage the clutch and shift into the next lower gear. Practice will soon reveal how much the engine should be accelerated in step (b) in order to accomplish a smooth, silent shift to lower gears.

25—Sand and Gravel

Drive slowly in loose dry sand or fresh thick gravel, even though the engine will propel the truck at a higher speed, because difficulty may be encountered in steering the truck due to the wheels sliding.

Loose sand or gravel under the tires is dangerous when rolled by the force of the truck. When approaching a sand or loose gravel road, slow down, because after driving on a smooth, hard-surfaced road, the truck will be moving too fast for good steering control on the soft road.

Some types of road have a strip of fresh loose gravel on one side and hard smooth surface on the other side. *Never drive into such a road surface at high speed.* The soft surface material has a tendency to pull the truck farther toward the side on which the soft material is laid.

When starting the trunk in sand or loose gravel, release pressure on the clutch pedal slowly so as not to spin the wheels. Spinning the wheels causes them to work their way down into soft road surfaces and wears the tires unnecessarily.

26—Soft Terrain and Deep Mud

When a truck becomes mired in soft terrain or deep mud good judgment should be used if any attempt is made to drive the vehicle out under

its own power. Any piece of mechanical equipment has its limitations. The axles, propeller shafts, transmission, clutch and engine will withstand a great amount of abuse, yet there is a limit to the amount of abuse to which these units should be subjected.

If the vehicle is pulling through soft mud and the driving wheels start spinning, the engine should not be raced and no attempt should be made to "jump" the vehicle out of the mud. Racing the engine usually results in digging the driving wheels deeper in the mud, and trying to "jump" the vehicle may lead to destruction of some part of the drive line such as the clutch, transmission, propeller shafts, or axles. When the vehicle is hopelessly mired in deep mud, it should be towed out by winch equipment (if so equipped) or by another truck.

27—To Stop the Vehicle

Remove pressure on foot accelerator and apply the brakes by pressing down on the brake pedal (5, Fig. 2). When the truck has been slowed down to engine idling speed, disengage the clutch and move the transmission gearshift lever to neutral position. When the truck has come to a complete stop, release the clutch pedal and apply the hand brake lever (10, Fig. 2).

LUBRICATION

There are numerous moving parts in a truck which should be lubricated with the correct grade of lubricant at specified mileage intervals to avoid rapid wear.

The Lubrication Chart shows the type of lubricant which should be used in the various units of the truck. It is important that the chart be studied carefully by all concerned with the lubrication of motor trucks and that the proper lubricants be provided and used according to the chart.

28—When to Change Engine Oil

During the first 1,000 miles, it is recommended that the engine oil which is in the crankcase, when the truck is delivered, be used. If necessary to add oil during the first 1,000 miles, No. 10-W should be used regardless of the season of the year or regardless of climatic conditions.

After the initial oil change at 1,000 miles, oil changes should then be made, *under normal conditions*, every 1,500 to 2,000 miles during winter and every 2,500 to 3,000 miles during summer. The refill capacity is 5 quarts.

NOTE: When draining the engine oil, jack up the front end of the truck so that the oil pan will slant downward toward the rear. This will insure complete drainage of the used oil.

Winter Driving

During winter, if the truck is driven for short distances of only a few miles at a time, water will condense in the crankcase and form a sludge which may freeze and clog the oil inlet screen. This is especially true if winter temperatures are extremely low for an extended period of time. Under conditions of this kind, the engine does not become sufficiently warm to expel the water through the crankcase ventilation system, and the oil should, therefore, be changed about every 500 miles, and under extreme conditions, less than 500 miles, to eliminate sludge. The engine should be thoroughly warm before it is drained.

As an alternative to this frequent change period during winter, an occasional drive of 30 miles or more at speeds of 30 miles per hour or higher, will do much to eliminate the water through the crankcase ventilation system and the change period may then be extended to 1,000 miles, or the normally recommended 1,500 mile winter change if these longer drives are indulged in frequently.

Dusty Roads and Dust Storms

Driving over dusty roads or through dust storms introduces abrasive material into the engine. Air cleaners which are kept in good condition decrease the amount of dust that may enter the crankcase. However, if the oil becomes contaminated with dust or dirt, it should be drained promptly to prevent harmful engine wear. The frequency of draining depends upon the sever-

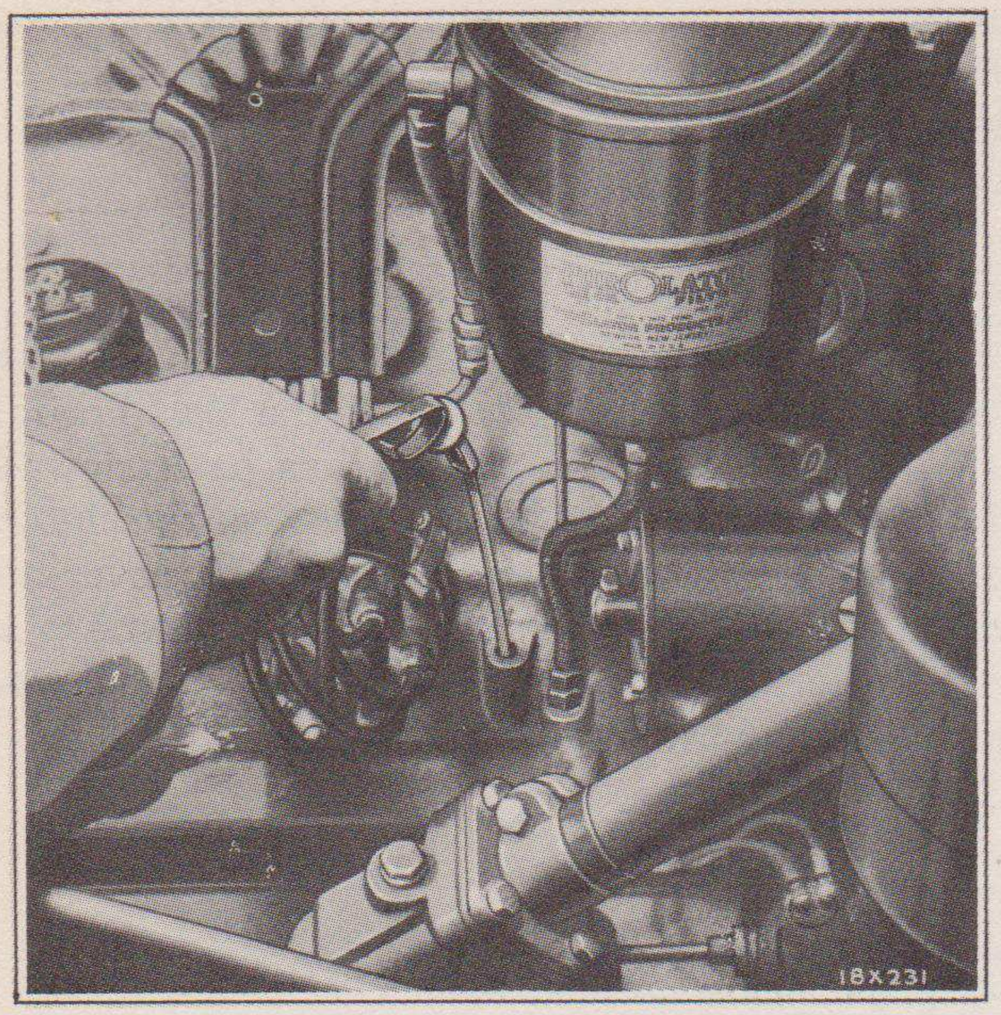


Fig. 9—Engine Oil Level Indicator Location

ity of the dust conditions and no definite draining periods can be recommended.

IMPORTANT: It is always advisable to drain the crankcase while the engine is at normal operating temperature. Oil will drain more completely when hot, and will, therefore, carry more of the foreign material and dirt with it if drained while the engine is warm.

29—Checking Oil Level

Each time a truck is refueled, the oil level should be checked. See Fig. 9. The oil level indicator is marked at "full" and "half-full". A third marking, between "full" and "half-full," indicates the "running" level. The "full" mark shows the proper level of oil after the engine has *not* been run for a few hours. As soon as the engine is started running, the level will drop somewhat, due to filling of oil passages and the filter.

Oil should not be added until the level is below "running level" as shown in Fig. 10, when one quart may be added. *The level should never be allowed to drop below the "half-full" mark.* The truck should be on a level surface when checking the oil level.

30—Engine Oil Recommendations

The grade of oil to be used in the engine depends on the anticipated minimum atmospheric temperature for the period during which the oil is to be used, as indicated in the following table:

Anticipated Atmospheric Temperature	*Grade to Use*
Not lower than 90°F.	S.A.E. 40
As low as 32°F.	S.A.E. 30
As low as +10°F.	No. 20W
As low as —10°F.	No. 10W
Below —10°F.	No. 10-W plus 10% Kerosene

The interpretation of this table means that S.A.E. 30 is recommended as a general summer oil for trucks having a mileage above 1,000. It may also be used in tropical climates during the winter months where it is known that the lowest temperature will not be lower than 32°F., and where the average temperature will be close to normal summer conditions. For extreme temperatures, exceeding 90°F., S.A.E. 40 engine oil is recommended.

The use of No. 20-W oil should be confined principally to territories during the winter months where mild weather conditions are known to prevail, and where the temperature will not fall below + 10°F. It must not be interpreted that No. 20-W cannot be used above 32°F., should temperatures rise and remain above that temperature. No. 20-W oil is satisfactory for use above 32°F. and a change of oil is, therefore, not necessary until the regular mileage interval.

No. 10-W is recommended as a general winter oil in climates where normal winter conditions prevail, and where temperatures may fall as low as —10°F., but not lower. No. 10-W may also be used above + 10°F. or above 32°F. with

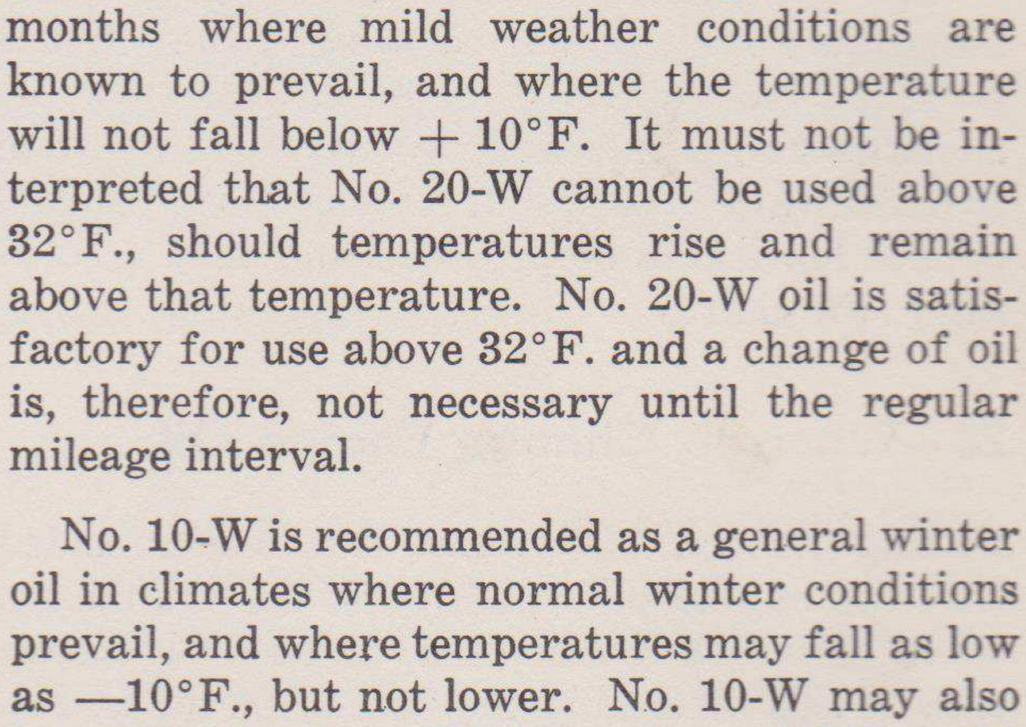


Fig. 10—Engine Oil Level Indicator

safety should temperatures rise above these points during the winter months. A change is, therefore, not necessary until the next mileage period.

For sub-normal winter conditions such as temperatures below — 10°F., it is recommended that No. 10-W be diluted with about 10% of colorless refined kerosene. The kerosene should be mixed thoroughly with the No. 10-W engine oil before being added to the engine.

In addition to the periodical lubrication specified on the Lubrication Chart on the next page, the following units should be inspected, lubricated or serviced according to instructions.

Engine

See Subject 30.

Oil Filter

Replace cartridge every 10,000 miles under average conditions or whenever engine oil becomes excessively dirty. See Subject 187.

Battery

Add distilled water to ⅜" above plates (see directions on top of battery filler plugs) at least once a month or every 1,000 miles. See Subject 116.

Brake Master Cylinder

The level of the brake fluid in the brake master cylinder should not be allowed to go lower than ½ inch below the bottom of the reservoir cover. Check the fluid level each time truck is lubricated.

Shock Absorbers

Maintain fluid at level of filler plug hole located on top side of shock absorber. Check fluid level every 10,000 miles. See Subject 223.

Fuel Filter

A heavy duty fuel filter, mounted on the engine side of the dash removes dirt and abrasive particles before the fuel reaches the carburetor. If the fuel filter becomes clogged with dirt, the fuel flow to the carburetor will be interrupted causing the engine to lose power or stop. To clean the filter see Subject 229.

Winch (If truck so equipped)

Lubricate as follows every 1000 miles or oftener, depending on frequency of use of winch.

Worm Housing: To fill, remove oil level plug at side of housing (next to frame), and filler plug at top. Fill to level of side plug and reinstall both plugs. To drain, remove bottom plug. Use S.A.E. 140 in summer or S.A.E. 90 in winter.

Lubricant Fittings: Use semi-fluid chassis lubricant.

Cable Drum: 2 fittings (1 each side).

Bearing Leg: 1 lubricant fitting.

Propeller Shaft and Universal Joints: 4 lubricant fittings.

Sliding Surface of Jaw Clutch and Linkage: If clutch sticks, clean shaft with kerosene and reoil with light engine oil.

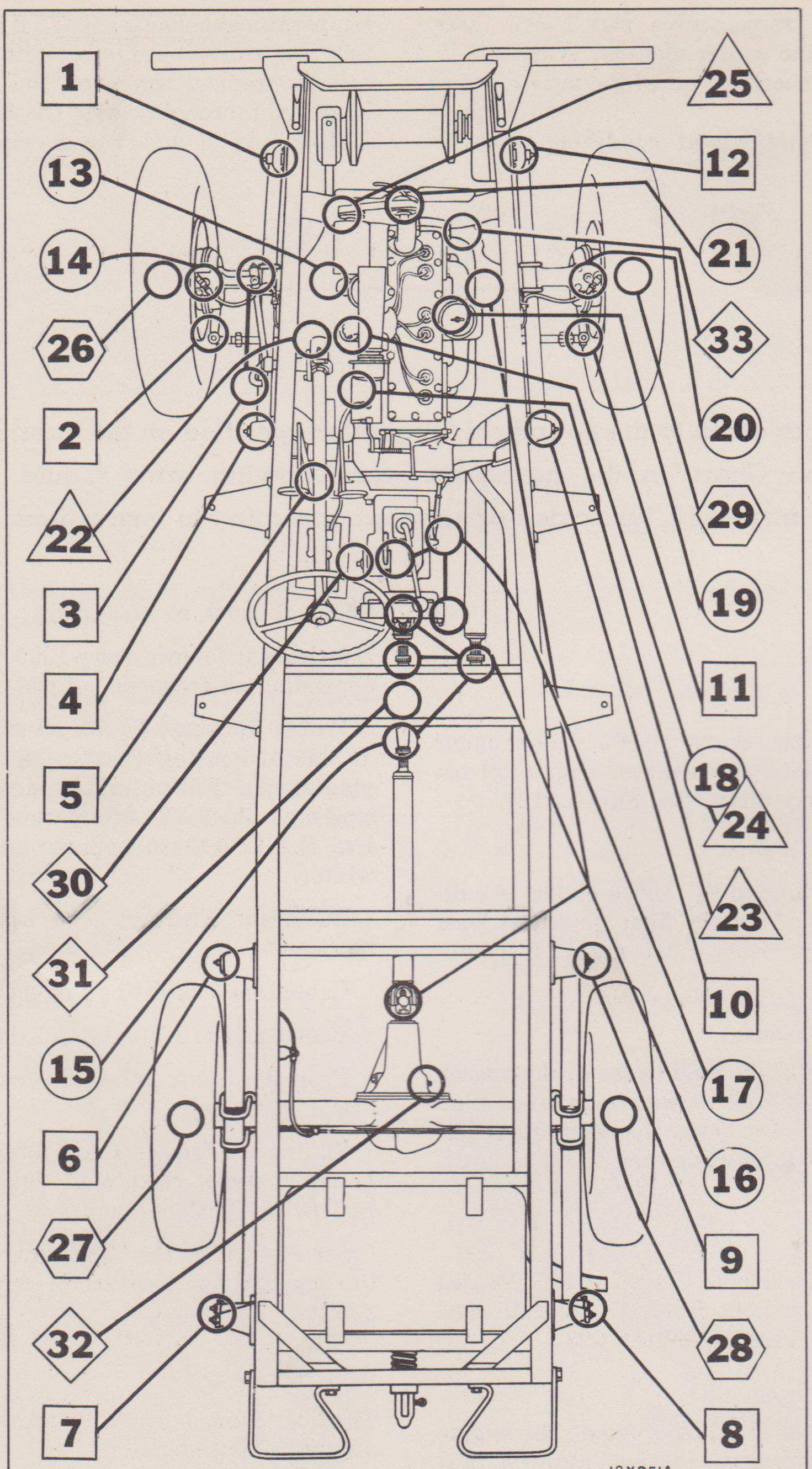
See Fig. 215 in the "Transmission" section of this manual for location of winch lubrication points.

Door Hinges

The door hinges should be lubricated occasionally with light engine oil.

Clutch Release Bearing

The clutch release bearing is lubricated at the time of assembly and requires no further lubrication.



□ 1,000 MILES - ○ 2,000 MILES - △ 6,000 MILES
⬡ 10,000 MILES - ◇ 15,000 MILES

LUBRICATION CHART

IMPORTANT—Trucks operated principally on gravel or dusty roads may need lubrication attention more frequently than is specified on this chart and should be serviced as required. In dusty territories the air cleaners should be cleaned often: once a day may be necessary under extreme conditions.

LUBRICATE AS FOLLOWS EVERY 1,000 MILES

Chart Key No.	Name of Unit	Capacity	How Lubricated	Type of Lubricant
1 and 12	FRONT SPRING SHACKLES	——	4 Lubricant fittings (2 on each side)	Semi-Fluid Chassis Lubricant
2 and 11	TIE ROD BALL JOINTS	——	2 Lubricant fittings (1 on each side)	Semi-Fluid Chassis Lubricant
3	DRAG LINK BALL JOINTS	——	2 Lubricant fittings (1 on each end)	Semi-Fluid Chassis Lubricant
4 and 10	FRONT SPRING REAR BOLTS	——	2 Lubricant fittings (1 on each side)	Semi-Fluid Chassis Lubricant
5	BRAKE PEDAL	——	1 Lubricant fitting	Semi-Fluid Chassis Lubricant
6 and 9	REAR SPRING FRONT BOLTS	——	2 Lubricant fittings (1 on each side)	Semi-Fluid Chassis Lubricant
7 and 8	REAR SPRING SHACKLES	——	4 Lubricant fittings (2 on each side)	Semi-Fluid Chassis Lubricant

LUBRICATE AS FOLLOWS EVERY 2,000 MILES

13	OIL FILLER PIPE CAP	——	Clean in kerosene and oil with engine oil. See Subject 188.	S.A.E. 50 engine oil
14 and 20	FRONT WHEEL UNIVERSAL DRIVE JOINTS AND STEERING KNUCKLE PIVOT BEARINGS	1 lb. each joint	4 Lubricant plugs (2 each side) Remove lower plug and lubricate until lubricant runs out. Reinstall plug. Remove top plug and inject small amount of lubricant then reinstall plug.	0° F. OR BELOW—Use a semi-fluid No. 0 sodium soap grease made from a low pour point steam cylinder oil stock. 0° TO +32°—Use a soft No. 1 sodium soap grease made from steam cylinder oil stock. +32° OR ABOVE—Use a medium No. 2 sodium soap grease made from steam cylinder oil stock.
15	PROPELLER SHAFT SPLINES	——	3 Lubricant fittings (1 on each shaft)	Semi-Fluid Chassis Lubricant
16	PROPELLER SHAFT UNIVERSAL JOINTS	——	6 Lubricant plugs (1 on each universal joint cross) Remove plugs and install lubricant fittings. After lubricating, be sure to reinstall plugs.	S.A.E. 140 Gear Lubricant
17	HAND BRAKE AND TRANSFER CASE SHIFT LINKAGE	——	Oil joints of linkage	Engine Oil
18	DISTRIBUTOR	——	1 oil cup	Light Engine Oil

LUBRICATE AS FOLLOWS EVERY 2,000 MILES—Cont'd

Chart Key No.	Name of Unit	Capacity	How Lubricated	Type of Lubricant
19	CARBURETOR AIR CLEANER	1 Qt.	Remove air cleaner from carburetor, remove filter element, wash in kerosene and dry thoroughly. Empty dirty oil from reservoir, clean and refill to indicated level. Note: If extreme dusty conditions are encountered, clean air cleaner more frequently, or when oil becomes mudded up.	Winter—No. 20-W Engine Oil Summer—S.A.E. 50 Engine Oil
21	WATER PUMP	——	1 Lubricant fitting	Water Pump Grease

LUBRICATE AS FOLLOWS EVERY 6,000 MILES

22	STEERING GEAR	½ Pt.	Remove filler plug, replenish when necessary—do not overfill	S.A.E. 90 Fluid Gear Lubricant
23	STARTING MOTOR	——	1 Oil Cup	Engine Oil
24	DISTRIBUTOR	2 or 3 drops	Remove cap and rotor, apply 2 or 3 drops of engine oil to wick beneath rotor. Caution: See that no oil or grease is on or near breaker points.	Engine Oil
25	GENERATOR	10 drops each cup	2 Oil Cups	Light Engine Oil

LUBRICATE AS FOLLOWS EVERY 10,000 MILES

26 and 29	FRONT WHEEL HUB BEARINGS	8 oz. each wheel	Remove hub and bearings, clean and repack. See Subject 44 for adjustment of front wheel bearings.	Short Fibre Wheel Bearing Grease, Medium
27 and 28	REAR WHEEL HUB BEARINGS	8 oz. each wheel	Remove hub and bearings, clean and repack. See Subject 59 for adjustment of rear wheel bearings	Short Fibre Wheel Bearing Grease, Medium

LUBRICATE AS FOLLOWS EVERY 15,000 MILES

30	TRANSMISSION	6 pts. (7 pts. with power take-off)	Drain, flush with flushing oil and refill. Filler plug—right side of case. Drain plug—bottom of case at rear.	S.A.E. 90 Hypoid Gear Lubricant (Inactive Type)
31	TRANSFER CASE	4 pts.	Drain, flush with flushing oil and refill. Filler plug—rear of case. Drain plug—bottom of case.	S.A.E. 90 Hypoid Gear Lubricant (Inactive Type)
32	REAR AXLE DIFFERENTIAL	4½ pts.	Drain, flush with flushing oil and refill. Filler plug: Right side of carrier Drain plug: Lower rear of housing cover	S.A.E. 90 Extreme Pressure Hypoid Gear Lubricant (Inactive Type)
33	FRONT AXLE DIFFERENTIAL	4½ pts.	Drain, flush with flushing oil and refill. Filler plug: Left side of carrier Drain plug: Lower front of housing cover	S.A.E. 90 Extreme Pressure Hypoid Gear Lubricant (Inactive Type)

FRONT AXLE

The front axle as well as the rear axle is a driving unit for the truck. However, power to the front wheels is controlled by the transfer case shifting lever in the driver's compartment. In other words the front axle drive can be engaged by pulling the shifting lever toward the rear of the truck, or disengaged by pushing the shifting lever forward according to existing driving requirements. The drive to the rear axle cannot be disengaged by the transfer case shifting lever. See operating instructions in Subjects 8 and 23. The power drive from the engine to the front and rear road wheels is through the clutch at the engine, then through the transmission, the transfer case, the propeller shafts and the axle units.

The front axle is built with universal joints at the steering knuckles through which power is delivered to the road wheels from the main drive gear, the pinion and the differential. It is of the full-floating type so that only the torque or driving power load is carried by the axle drive shafts. See Figs. 11 and 12.

The differential and carrier assembly in the front axle is identical with that used in the rear axle. For service procedure on the front assembly, refer to the "Rear Axle and Differential Carrier Assembly" section of this manual.

The following information in this section applies to trucks equipped with either the Bendix-Weiss or the Rzeppa type universal drive assembly in the front wheels except where otherwise noted. Service operations for the Bendix-Weiss universal drive are outlined in Subject 34 while the Rzeppa drive unit is covered in detail in Subject 35. The make of universal drive assembly used can be identified by a metal tag on the front axle housing at the inspection cover.

31—Front Axle Assembly

Removal

(a) Jack up front end of truck and place supports under the frame or the front bumper.

(b) Remove both front wheels. If necessary to remove the wheel hub assemblies, follow the instructions given in Subject 43. In the present procedure, it is not necessary to remove the bearing cups, the inner bearing cone and rollers and the inner oil seal from the wheel hubs.

(c) Disconnect the following—

(1) Brake hose at the brake supports, being careful not to damage or lose the *two gaskets* at each support.

(2) Shock absorber links at the bottom end.

(3) Front universal joint at the differential.

(4) Drag link at the steering arm.

(d) Place a jack or other support under the front axle assembly and remove the front spring clips. Then lower the axle assembly and remove it from under the truck.

Installation

When installing the front axle, make sure the head of each spring center bolt enters the center hole in its respective spring saddle on the axle housing. Also securely tighten the nuts on the spring clips after installing them in position.

In connecting the brake hose, be certain that the contacting surfaces are clean and the two gaskets are in place at the wheel cylinder end of each hose with the gasket having the larger hole next to the head of the retaining screw. It is also necessary after completing the assembly of the front axle, to bleed all brake lines (see Subject 75) in order to remove any air that might have entered the brake system when the front hoses were disconnected from the brake supports.

Lubrication of the front axle must not be overlooked. The differential, the universal joints and the wheel bearings should all be checked and properly lubricated with the right lubricant. Refer to the "Lubrication" section of this manual for lubrication of these units.

The alignment of the front wheels, including king pin angle, camber, caster and toe-in should be checked and replacements or adjustments

(Continued on page 18)

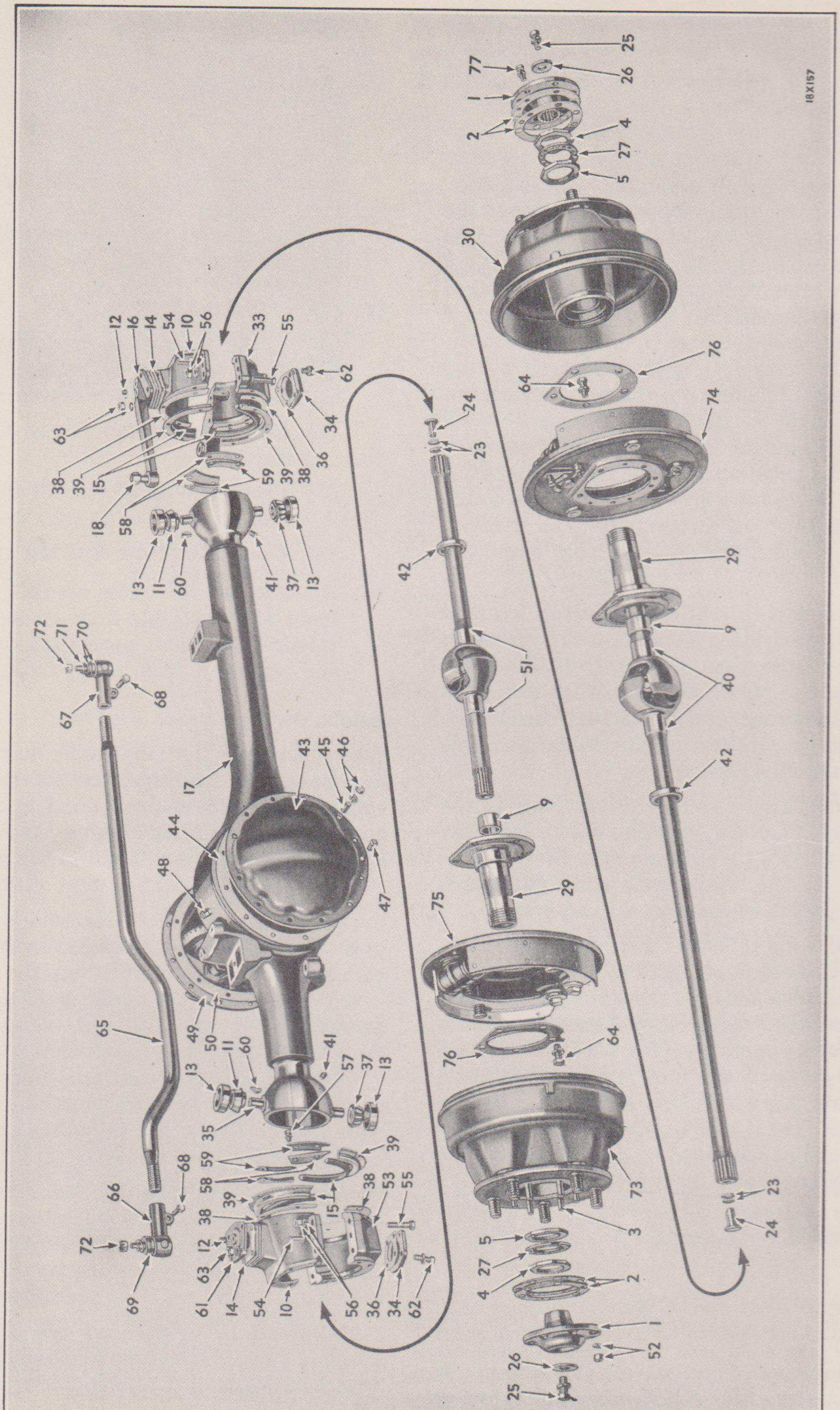


Fig. 11—Front Axle with Bendix-Weiss Universal Drive (disassembled view)

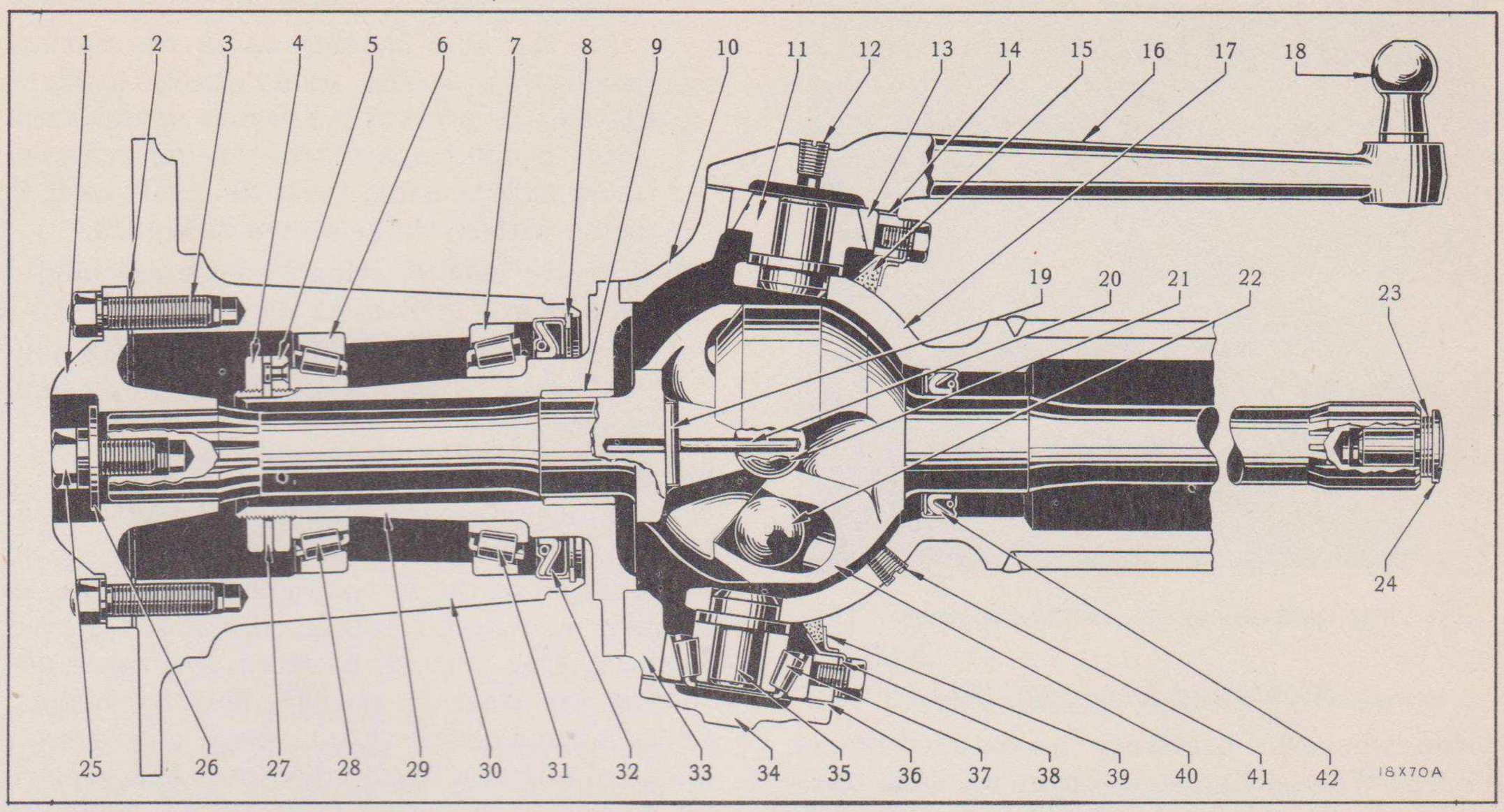


Fig. 12—Front Axle with Bendix-Weiss Universal Drive (assembled view)

Figs. 11 and 12—Front Axle with Bendix-Weiss Universal Drive

1—Front axle drive flange
2—Front axle drive flange shims
3—Front axle drive flange stud
4—Front wheel bearing adjusting nut—outer
5—Front wheel bearing adjusting nut—inner
6—Front wheel bearing cup—outer
7—Front wheel bearing cup—inner
8—Front wheel bearing oil seal retainer snap ring
9—Front axle steering knuckle bushing
10—Front axle steering knuckle flange—upper
11—Front axle steering knuckle flange bearing cone—upper
12—Front axle steering knuckle flange bearing cap grease plug
13—Front axle steering knuckle flange bearing cup
14—Front axle steering knuckle bushing bearing cap shims
15—Front axle steering knuckle flange oil seal
16—Front axle steering arm
17—Front axle housing
18—Front axle steering arm ball
19—Universal drive center ball pin retainer pin
20—Universal drive center ball pin
21—Universal drive center ball
22—Universal drive outer ball
23—Universal drive shaft thrust button shims
24—Universal drive shaft thrust button
25—Front axle drive shaft screw and lockwasher
26—Front axle drive shaft screw plain washer
27—Front wheel bearing adjusting nut lock
28—Front wheel bearing cone and rollers—outer
29—Front axle steering knuckle
30—Front wheel hub and brake drum assembly—left
31—Front wheel bearing cone and rollers—inner
32—Front wheel bearing oil seal
33—Front axle steering knuckle flange—lower left
34—Front axle steering knuckle flange bearing cap—lower
35—Front axle trunnion socket bearing pin
36—Front axle steering knuckle flange bearing cap gasket
37—Front axle steering knuckle flange bearing cone and rollers—lower
38—Front axle steering knuckle flange oil seal gasket
39—Front axle steering knuckle flange oil seal retainer
40—Universal drive assembly—left
41—Front axle trunnion socket grease plug
42—Universal drive shaft oil seal
43—Front axle housing cover
44—Front axle housing cover gasket
45—Front axle housing cover stud
46—Front axle housing cover stud nut and lockwasher
47—Front axle housing drain plug
48—Front axle housing vent
49—Front axle differential and carrier assembly
50—Front axle drive pinion carrier gasket
51—Universal drive assembly—right
52—Front axle drive flange stud nut and lockwasher
53—Front axle steering knuckle flange—lower right
54—Front axle steering knuckle flange dowel
55—Front axle steering knuckle flange bolt
56—Front axle steering knuckle flange bolt nut and lockwasher
57—Front axle steering knuckle flange oil seal screw and lockwasher
58—Front axle steering knuckle flange joint oil seal felt
59—Front axle steering knuckle flange joint oil seal felt retainer
60—Front axle steering knuckle flange bearing cone key
61—Front axle steering knuckle flange bearing cap—upper
62—Front axle steering knuckle flange bearing cap screw and lockwasher
63—Front axle steering knuckle flange bearing cap stud nut and lockwasher
64—Front axle steering knuckle to flange screw and lockwasher
65—Front axle steering knuckle tie rod
66—Front axle steering knuckle tie rod end—right
67—Front axle steering knuckle tie rod end—left
68—Front axle steering knuckle tie rod end clamp bolt
69—Front axle steering knuckle tie rod end dust cover
70—Front axle steering knuckle tie rod end dust cover washers
71—Front axle steering knuckle tie rod end dust cover spring
72—Front axle steering knuckle tie rod end ball nut
73—Front wheel hub and brake drum assembly—right
74—Front wheel brake support assembly—left
75—Front wheel brake support assembly—right
76—Front wheel brake oil slinger
77—Drive flange puller screw and lock nut

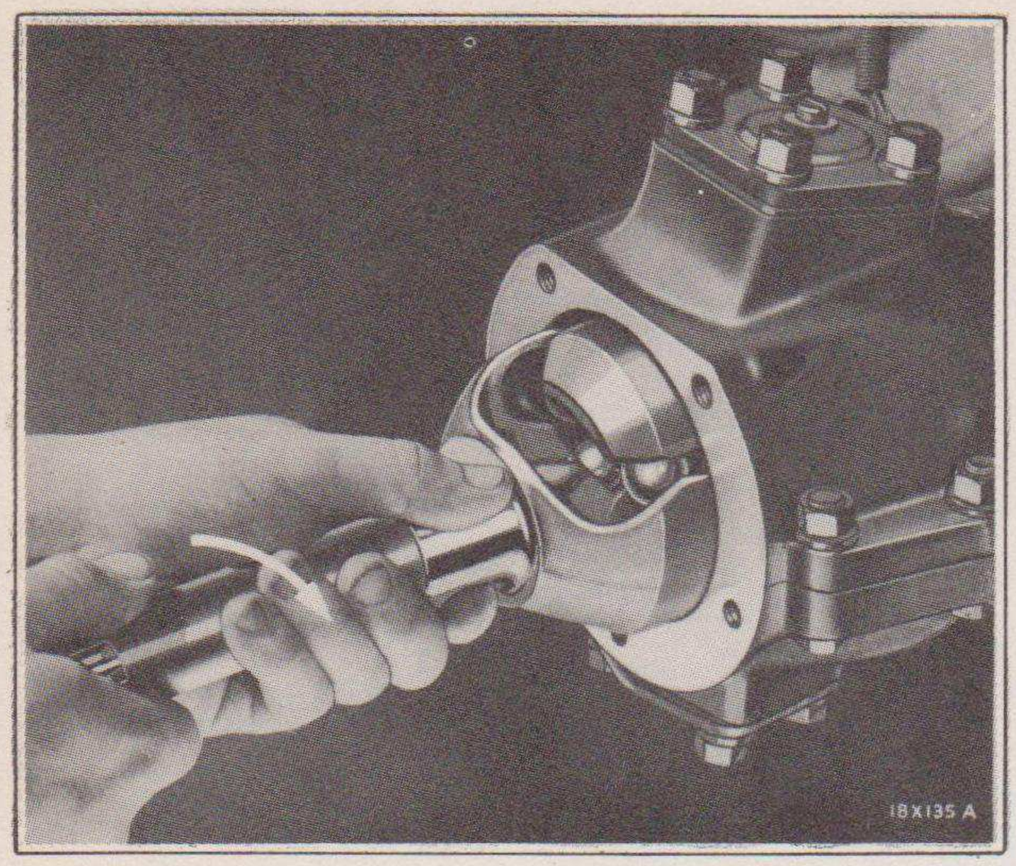


Fig. 13—Removing Universal Drive Assembly

(Continued from page 15)

made whenever necessary as outlined under "Front Wheel Alignment," page 31. The turning angle should also be checked as outlined in Subject 37.

32—Front Axle Housing

Removal

(a) Remove the front axle assembly from the truck as outlined in Subject 31.

(b) Remove both wheel hub assemblies as explained in Subject 43. It is unnecessary in this procedure to remove the bearing cups, the inner bearing cone and rollers and the inner oil seals from the wheel hubs.

(c) Pull out the universal drive assembly at each end of the housing after first making sure each steering knuckle flange is straight with the axle housing or in the normal position with the road wheels straight ahead. To prevent possibility of universal joint coming apart when being removed from axle housing, twist the shaft as it is being withdrawn as shown in Fig. 13.

(d) Remove both steering knuckle assemblies as outlined in Subject 40.

(e) Remove the differential carrier assembly and cover by taking off the retaining nuts and washers.

Installation

When assembling and installing the axle housing, be sure to observe all *cautions* and follow carefully all of the instructions given for these operations in the Subjects 31, 40 and 43 referred to above. This includes bleeding the brakes, adjusting the steering knuckle flange bearings, adjusting end play in the universal drive assemblies and aligning the front wheels. Also replace all gaskets with new ones to avoid lubricant leaks.

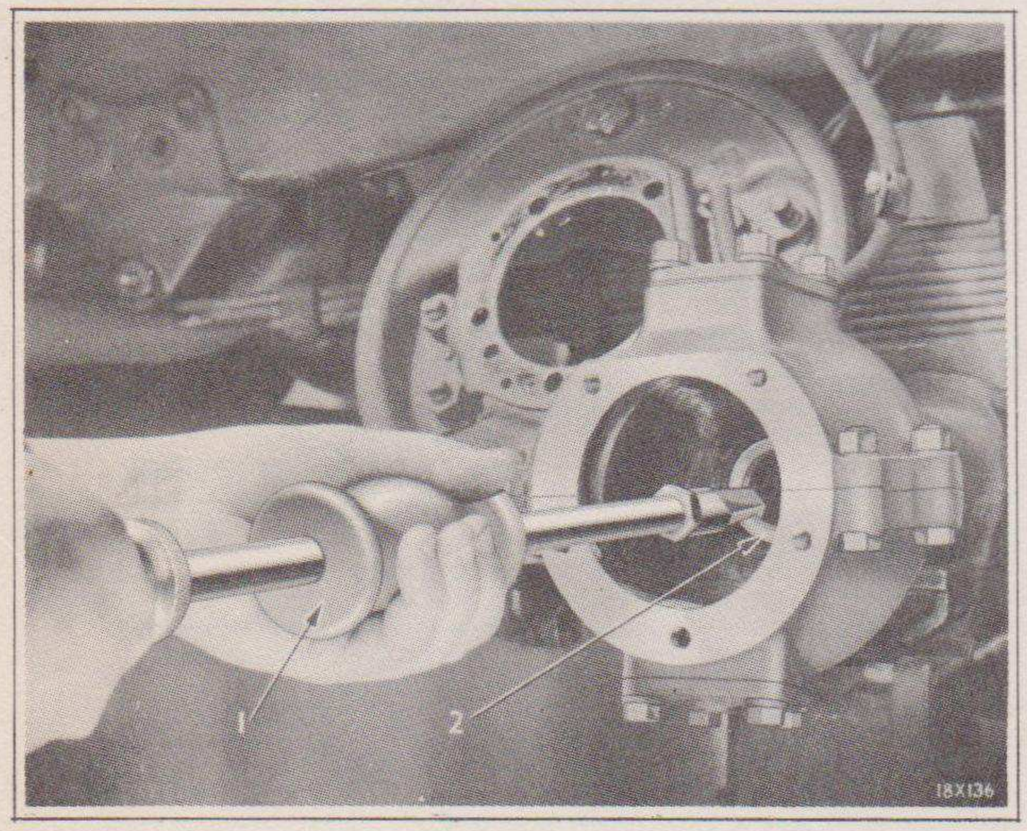


Fig. 14—Removing Universal Drive Shaft Oil Seal
1—Universal drive shaft oil seal 2—Tool C-637

33—Front Axle Universal Drive Assembly

Removal and Installation

(a) Remove front wheel hub assembly as explained in Subject 43. It is not necessary in this particular operation to remove the bearing cups, the inner bearing cone and rollers and the oil seal from the wheel hub.

(b) Disconnect the brake hose hold down spring from the hose clip.

(c) Remove the brake support retaining screws, the lock washers and the oil slinger.

(d) Pull off the brake support assembly and fasten it to the frame or axle housing with a wire or rope to prevent kinking the brake hose. The brake hose should not be disconnected as otherwise it would be necessary to bleed the brake system.

(e) Pull off the steering knuckle.

(f) With the steering knuckle flange straight with the axle housing or in the normal position with the front wheels straight ahead, pull out the universal drive assembly with a twisting motion as shown in Fig. 13.

When removing the Bendix-Weiss drive, check to make sure that the thrust button and shims are in position at the inner end of the shaft. If not, it will be necessary to remove the differential carrier assembly to recover these parts.

With the above parts removed, it is good practice to check the condition of the universal drive shaft oil seal in the outer end of the axle housing. If worn or damaged it should be replaced with a new one. This seal assembly is a drive fit in the housing and special tools must be used for its removal and installation. See Figs. 14 and 15.

It is also important that the adjustment of the steering knuckle flange bearings be checked as outlined in Subject 41, with the universal drive assembly and flange oil seals removed.

IMPORTANT: If the drive assembly is to be replaced by another, be sure to use the same (or same thickness) drive shaft shims and thrust button (when used) as in the shaft removed to establish an approximate adjustment. If the truck is equipped with a Bendix-Weiss universal drive, refer to Subject 36 for adjustment procedure. However, if equipped with a Rzeppa universal drive, no adjustments are required, but the assembly should be installed in the correct operating position as explained in Subject 35.

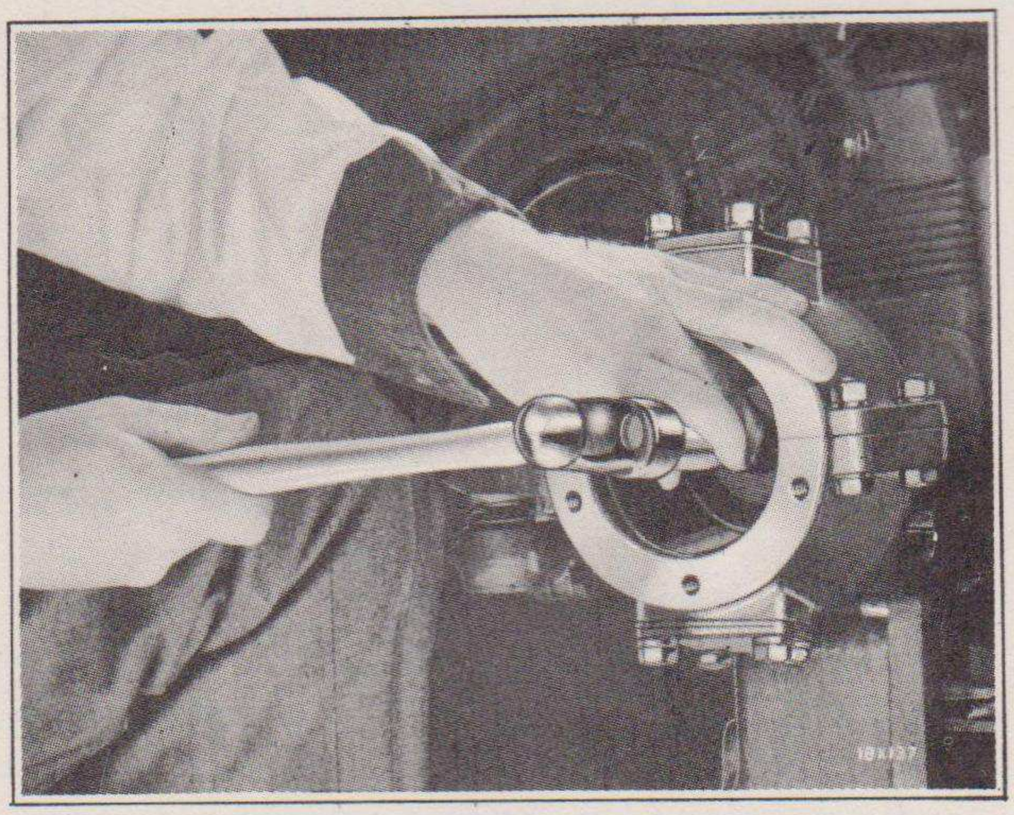


Fig. 15—Installing Universal Drive Shaft Oil Seal (Tool DD-827)

Before installing the front axle universal drive shaft assembly, thoroughly clean and lubricate all parts as the assembly work progresses. Be sure the shims between the hub and the drive flange are in good condition so as to avoid oil leakage.

34—Bendix-Weiss Universal Drive Assembly

Disassembly

(a) After removing the front axle universal drive assembly as outlined in Subject 33, clean the parts thoroughly to facilitate disassembly.

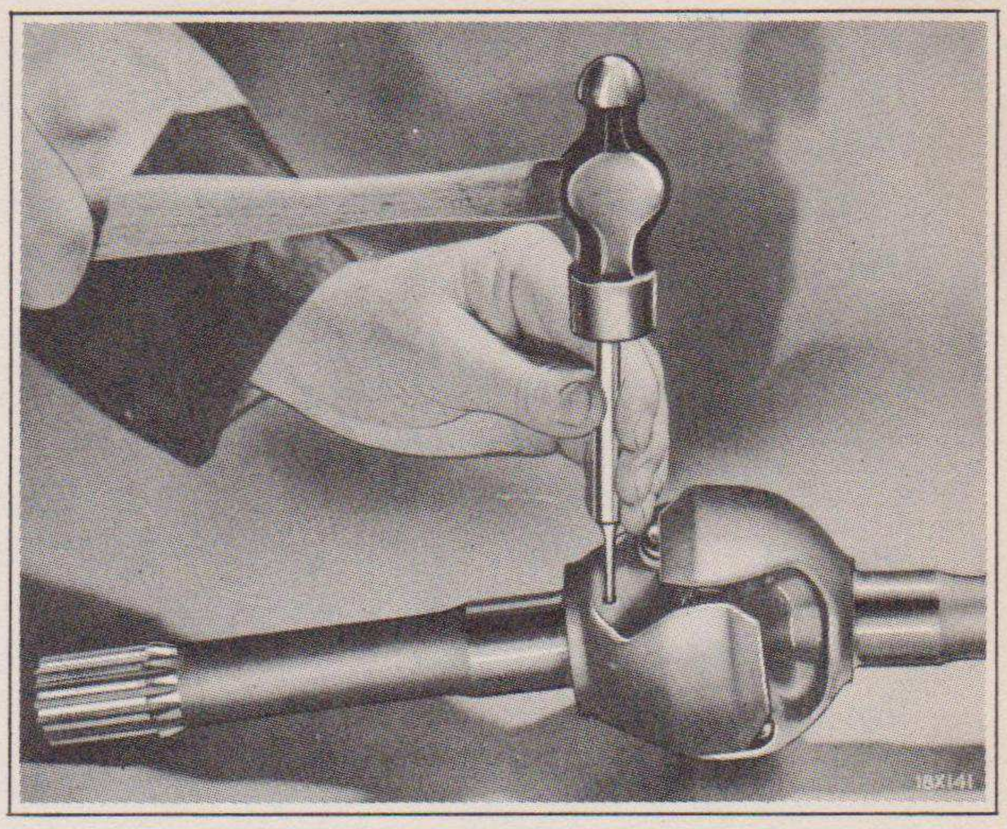


Fig. 16—Removing Universal Drive Center Ball Pin Retainer Pin (Bendix-Weiss)

(b) Drive out the center ball pin retainer pin as shown in Fig. 16.

(c) Bounce the end of the short shaft on a wooden block as shown in Fig. 17 to dislodge the center ball pin, allowing the pin to move farther in the drilled passage in the short shaft. If the lubricant holds the center ball pin in position in the ball, it may be dislodged by means of a pointed instrument inserted in the retainer pin hole.

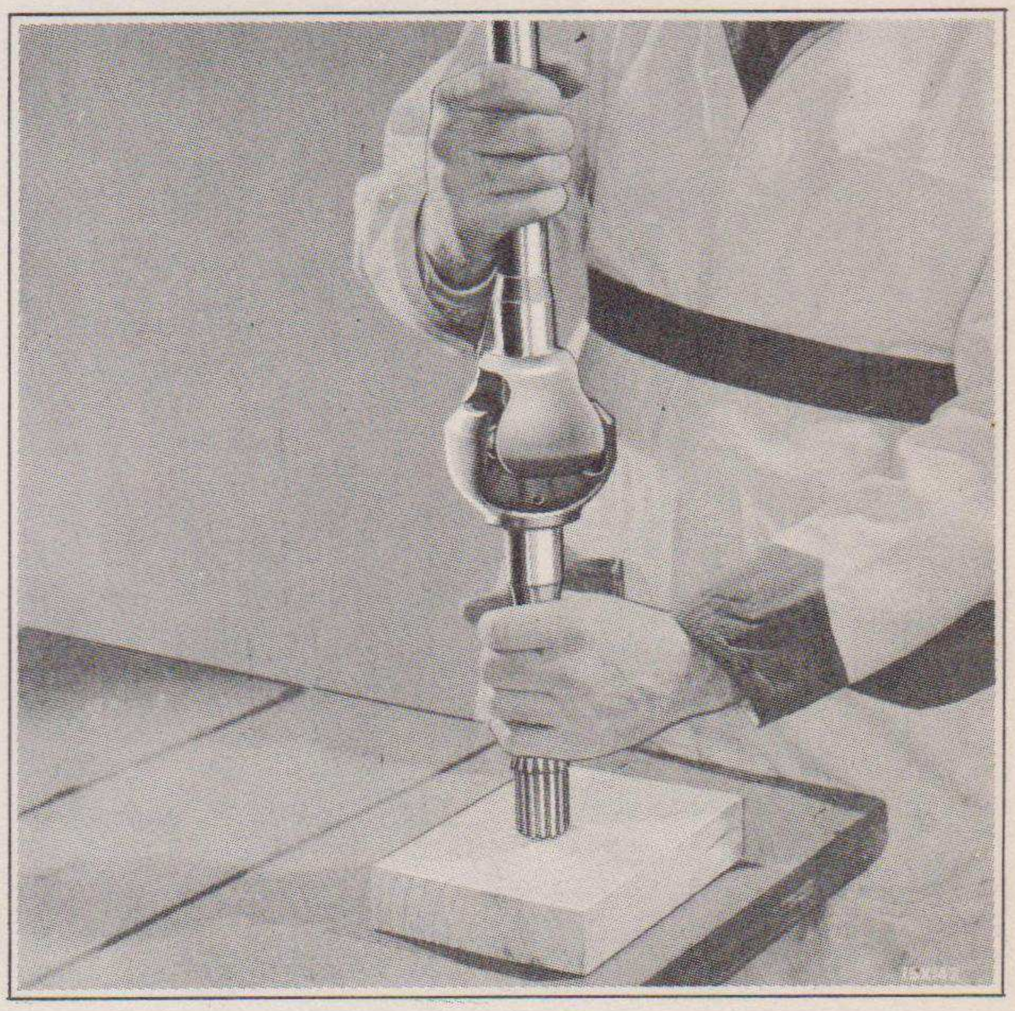


Fig. 17—Dislodging Universal Drive Center Ball Pin (Bendix-Weiss)

(d) With the assembly in a vertical position (long shaft at top), clamp the short shaft in the vise using wooden or soft metal protectors on the jaws of the vise to protect the shaft.

(e) Swing the long shaft to one side as shown in Fig. 18 and at the same time raise it slightly to pull the two sections of the assembly apart and loosen the center ball. Then turn the center ball with the fingers so that the groove in it lines up with the race, to permit the adjacent driving ball to be moved past the center ball.

(f) With the thumb and forefinger, take the driving ball out of the assembly. The remaining three balls and center ball will then drop out, allowing the two sections of the drive assembly to be separated.

(g) As the drive balls are a selective fit, it is necessary that they be replaced in the joint from which they were removed or replaced with balls of the same size, providing the various parts do not indicate excessive wear.

(h) To remove the center ball pin, turn the shaft end for end, allowing the pin to fall out.

Assembly

(a) Make sure all parts are clean and in good condition. If inspection reveals either universal joint yoke to be damaged, the complete drive assembly should be replaced. All of the remaining parts, however, may be replaced when necessary. The center ball pin, the center ball and the four driving balls should be examined and replaced if they are cracked, excessively worn or contain flat spots. Driving balls are available in seven sizes, varying from .003″ under standard size to .003″ over the standard size in steps of .001″. See "Note" page 21. The standard size is 1.000″ in diameter.

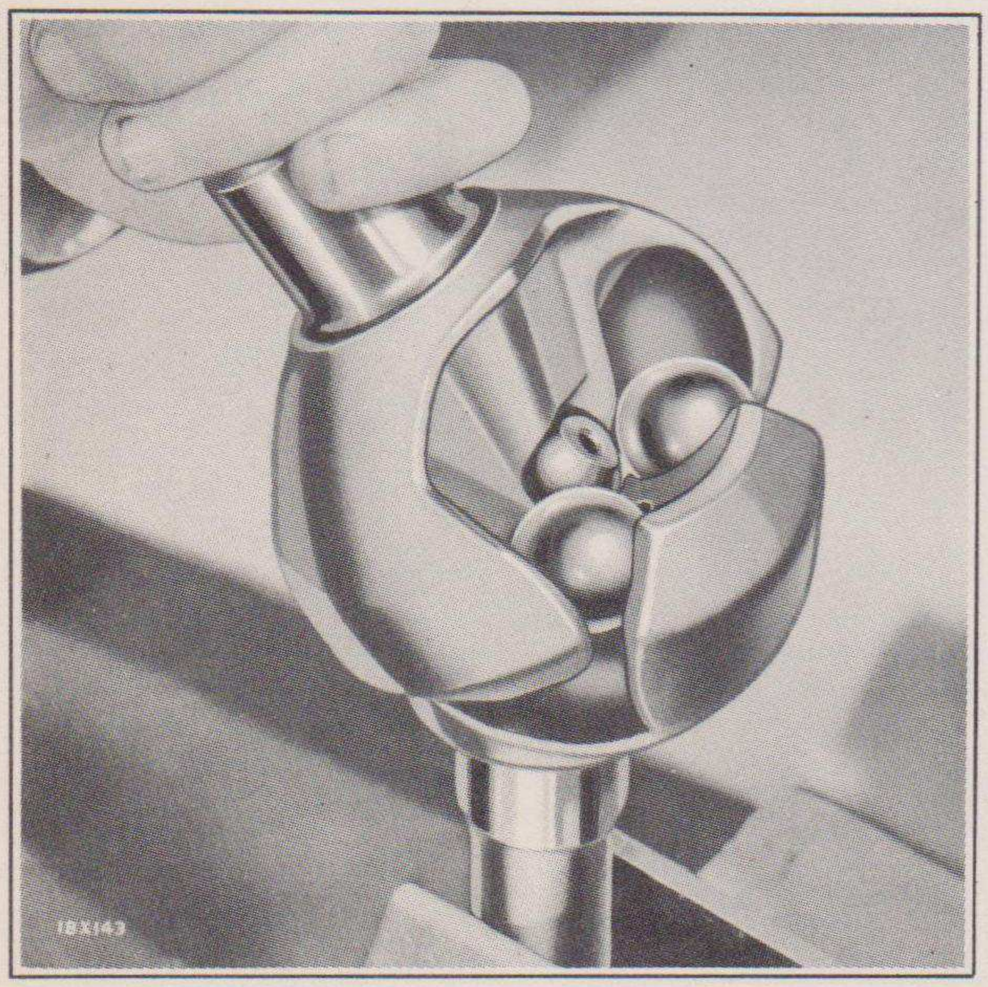


Fig. 18—Removing or Installing Universal Drive Balls (Bendix-Weiss)

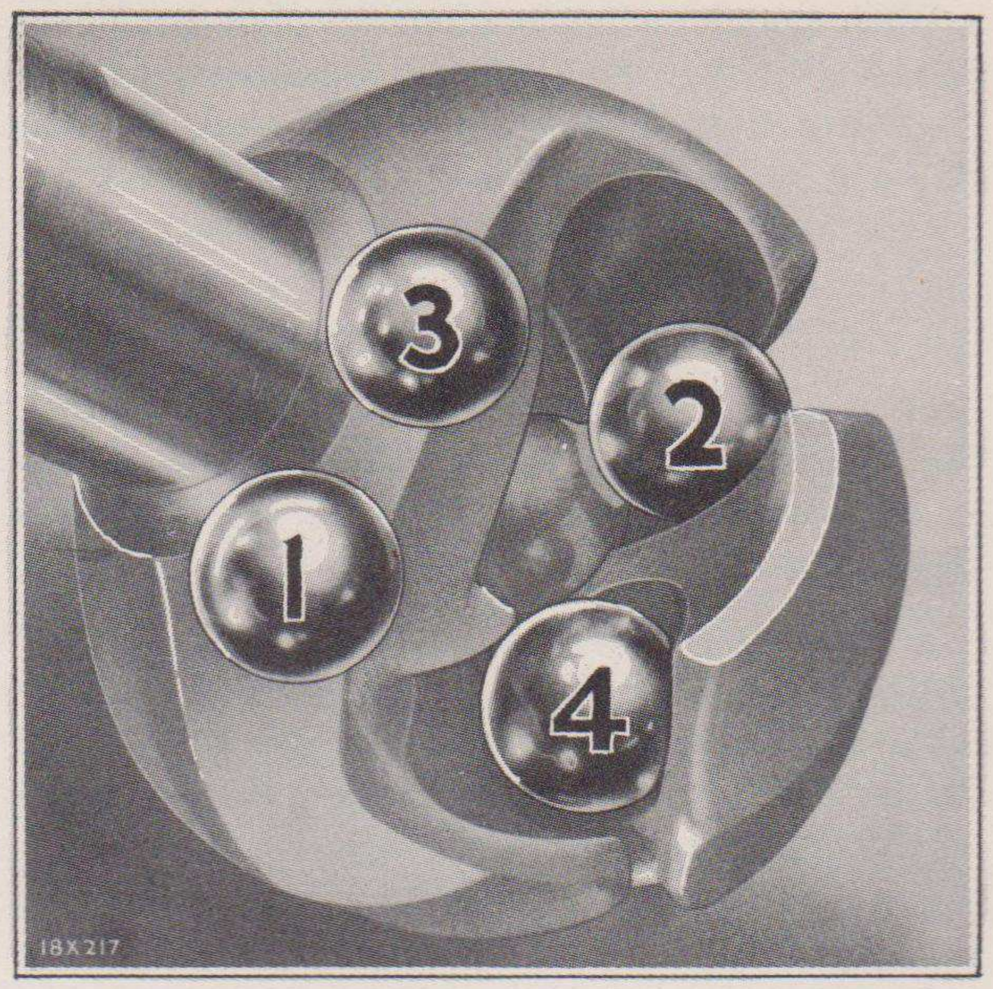


Fig. 19—Universal Drive Ball Installation Diagram (Bendix-Weiss)

Whenever the universal drive is disassembled, the drive balls must be measured with a micrometer in order to determine their correct location. This procedure should also be followed if the two sections of the universal drive assembly should come apart when it is withdrawn from the axle housing.

Selective assembly is not required when replacing the center ball or center ball pin, as these parts are supplied in one size only.

(b) If the drive balls are of different sizes, the two largest balls should be placed diagonally across from each other, as shown at 1 and 2 or 3 and 4, Fig. 19.

(c) Clamp the short shaft in a vise (use protectors on the vise jaws) with the universal joint section at the top and thoroughly clean the center ball pin hole in the inner end of the short shaft to allow the pin to move freely in the hole. Then install the pin 5, Fig. 20.

(d) Install the center ball in the socket on the end of the short shaft with the groove in the ball facing you and then place the long shaft in position on the ball.

(e) Install three of the drive balls. To install the fourth drive ball, turn the center ball to bring the groove toward the adjacent driving ball about to be installed, to permit the driving ball to be pushed into position.

(f) Straighten up the long shaft and remove the universal drive assembly from the vise and turn it end for end, clamping the long shaft in the vise with the short shaft at the top.

(g) Swing the short shaft sideways and lift it slightly to loosen the center ball and then turn the center ball to align the hole in it with the center ball pin in the end of the short shaft, allowing the pin to drop into position in the ball. It may be necessary to turn the center ball slightly to align the hole with the pin.

(h) Install a *new* retainer pin in the joint end of the short shaft. See Fig. 20. Then remove the assembly from the vise and center punch both ends of the retainer pin to hold it in position.

Note: If play develops from wear, in a universal drive assembly where the ball races are in good condition, the difficulty may be remedied through the installation of larger drive balls, as follows:

(a) With the universal drive disassembled, measure the drive balls with a micrometer to determine the size of each ball.

(b) Select one or two new balls .001″ larger than the smallest ball originally used in the assembly. Reassemble the universal drive with the new ball or balls and the two or three largest original balls.

(c) Clamp the long shaft of the assembly in a vise.

(d) Install the drive shaft screw 25, Fig. 12 in the end of the short shaft. Then firmly push the two sections of the drive assembly together. This will apply a tension on the drive balls if the balls are not too small.

(e) To determine the desired preload, attach a pull scale to the drive shaft screw and note how many pounds pull is required to move the short shaft sidewise. If the pounds pull required to move the short shaft is less than 10 to 15 pounds, larger balls must be used, repeating operations (a) and (b).

The desired preload should be measured with the spring scale over a range of 20° to 25° on one side of the straight position of the joint assembly to 20° to 25° on the other side. Normally, the preload will be less at the point where the joint is in a straight position.

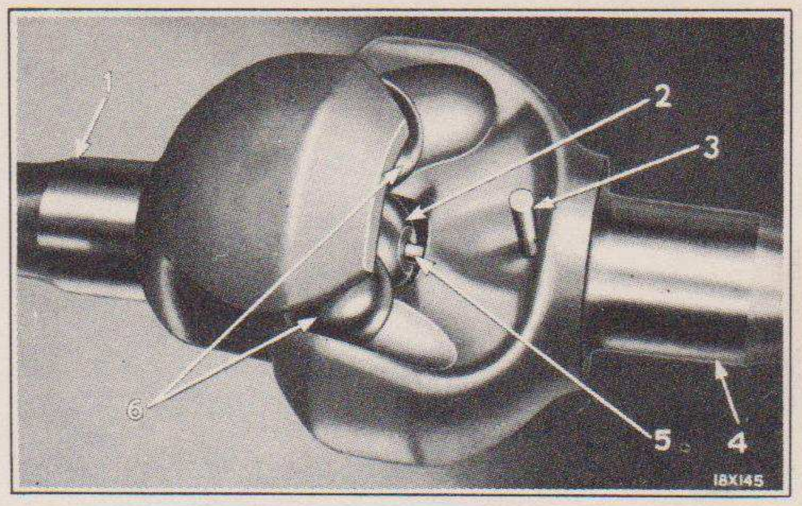


Fig. 20—Installing Universal Drive Center Ball Pin Retainer Pin (Bendix-Weiss)

1—Universal drive shaft (inner splined shaft or driving yoke)
2—Universal drive center ball
3—Universal drive center ball pin retainer pin
4—Universal drive shaft (outer splined shaft or driven yoke)
5—Universal drive center ball pin
6—Universal drive outer balls

Lubricate the drive unit as specified in the "Lubrication" section of this manual. Flex the drive while lubricating it so as to insure lubricant reaching all working surfaces of the balls and ball races.

The front axle universal drive assembly is now ready to be installed in the front axle housing and the wheel hub and various other parts assembled in their normal position.

35—Rzeppa Universal Drive Assembly

The Rzeppa universal drive (see Fig. 21) is of the constant velocity type and is interchangeable with the Bendix-Weiss universal drive previously covered.

There is no thrust button on the inner end of the drive shaft used with the Rzeppa universal drive. However, a total of .052″ in shim stock (2, Fig. 11) is placed between the outer shaft drive flange and the wheel hub, to provide correct operating position of the universal drive assembly. There are two .020″, one .007″ and one .005″ shims used on each side of the truck. If necessary to replace the shims make sure the correct thickness shims are used.

Unlike the Bendix-Weiss universal drive, the alignment of the Rzeppa unit is not

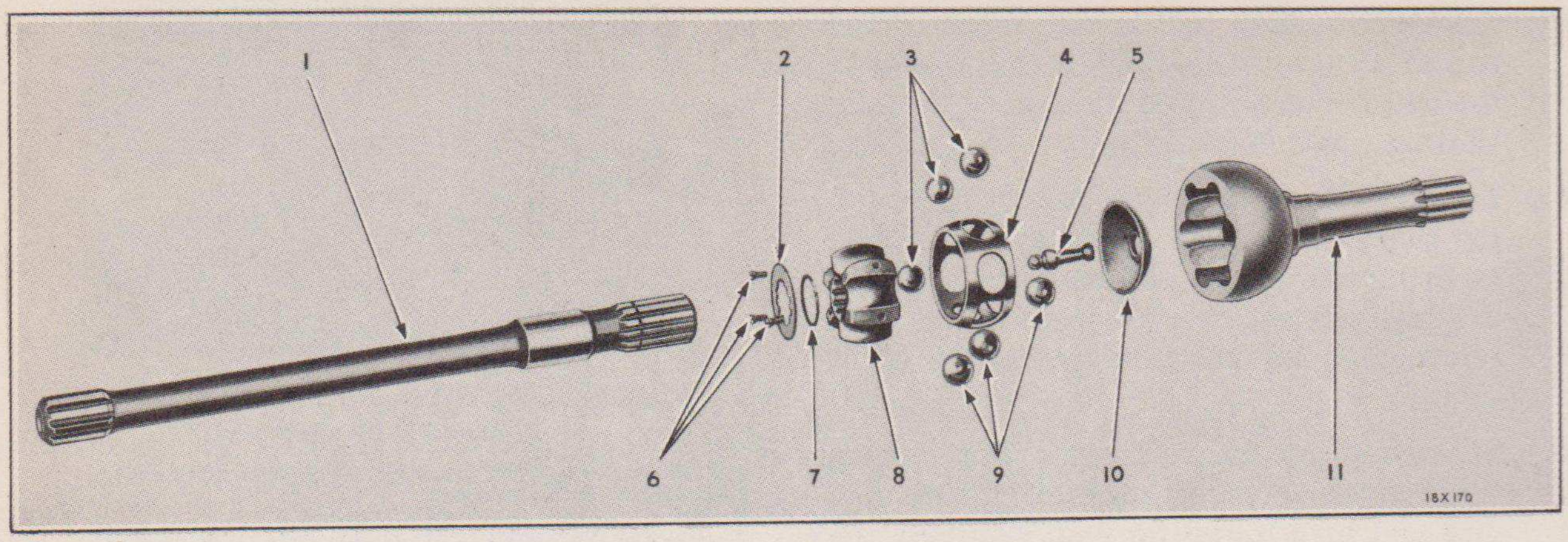


Fig. 21—Rzeppa Universal Drive

1—Shaft (inner splined shaft)
2—Retainer
3—Balls
4—Ball cage
5—Pilot pin
6—Retainer screws
7—Snap ring
8—Ball inner race
9—Balls
10—Pilot
11—Outer race bell (or outer splined shaft)

affected by the replacement of axle parts or by differential adjustments.

Disassembly

(a) After removing the universal drive assembly as outlined in Subject 33, clean the parts thoroughly to facilitate disassembly.

(b) Clamp the short shaft in a vise with the splined end down. Use wooden or soft metal protectors on the jaws of the vise to protect the shaft.

(c) Remove the drive shaft retainer screws.

(d) Pull the drive shaft out of the inner ball race and take off the snap ring and retainer if desired.

(e) Remove the pilot pin (Fig. 22), which is located at the inner end of the outer shaft.

(f) With the first two fingers of either hand, tilt the inner ball race and ball cage assembly as far as possible to bring one of the balls at the top of the raceway, as shown in Fig. 23, and at the same time cock the race and cage assembly slightly to one side to release the ball and allow easy removal of it. Remove the remaining balls in the same manner.

CAUTION: The universal drive should be

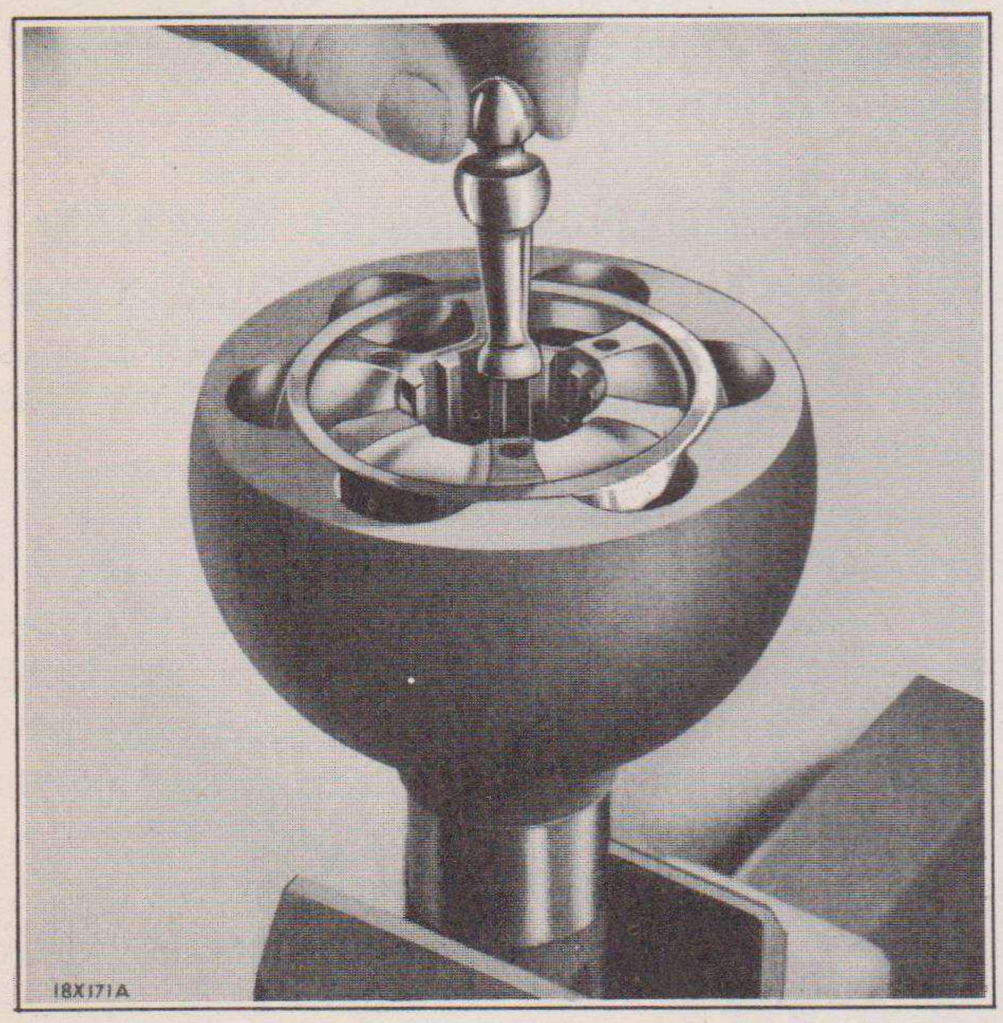


Fig. 22—Removing or Installing Universal Drive Pilot Pin (Rzeppa)

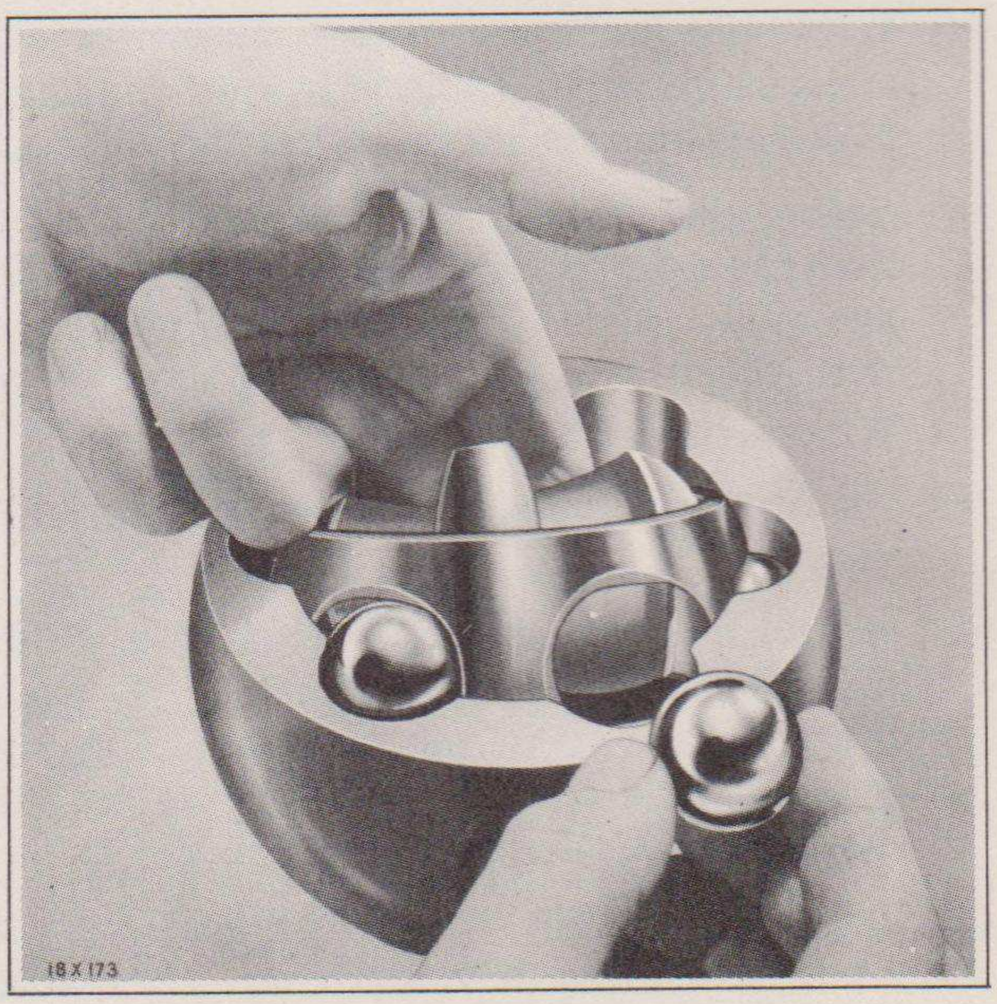


Fig. 23—Removing Universal Drive Ball (Rzeppa)

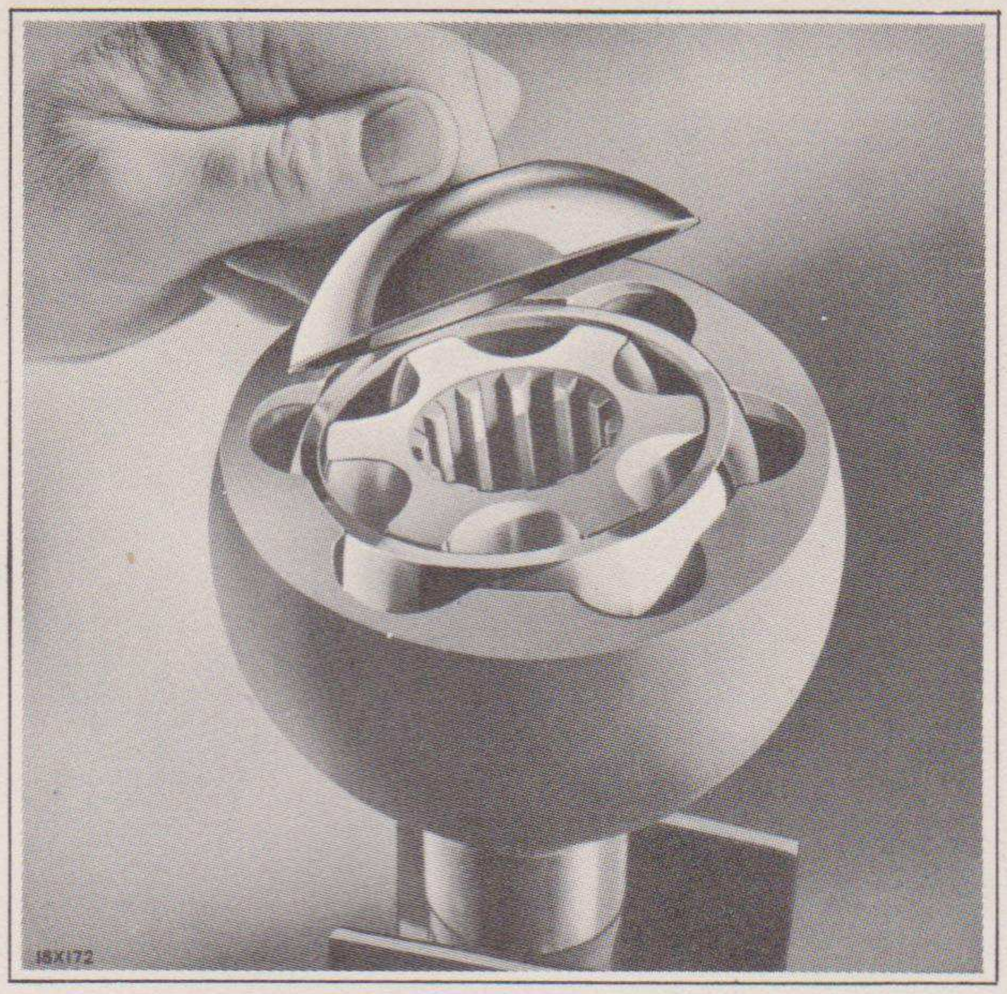


Fig. 24—Removing Universal Drive Pilot (Rzeppa)

disassembled without any binding. Do not force or jam the parts. If binding does occur, move the parts back to their normal position and proceed as before with one of the other balls.

(g) Rotate the race and cage unit to bring the pilot at the top and remove the pilot as shown in Fig. 24.

(h) Rotate the race and cage unit back part way, as shown in Fig. 25, to bring the two elongated slots on opposite sides of the ball cage parallel with two opposite ribs in the outer race bell, which are between the ball raceways. Then lift the race and cage unit straight up and out of the drive unit.

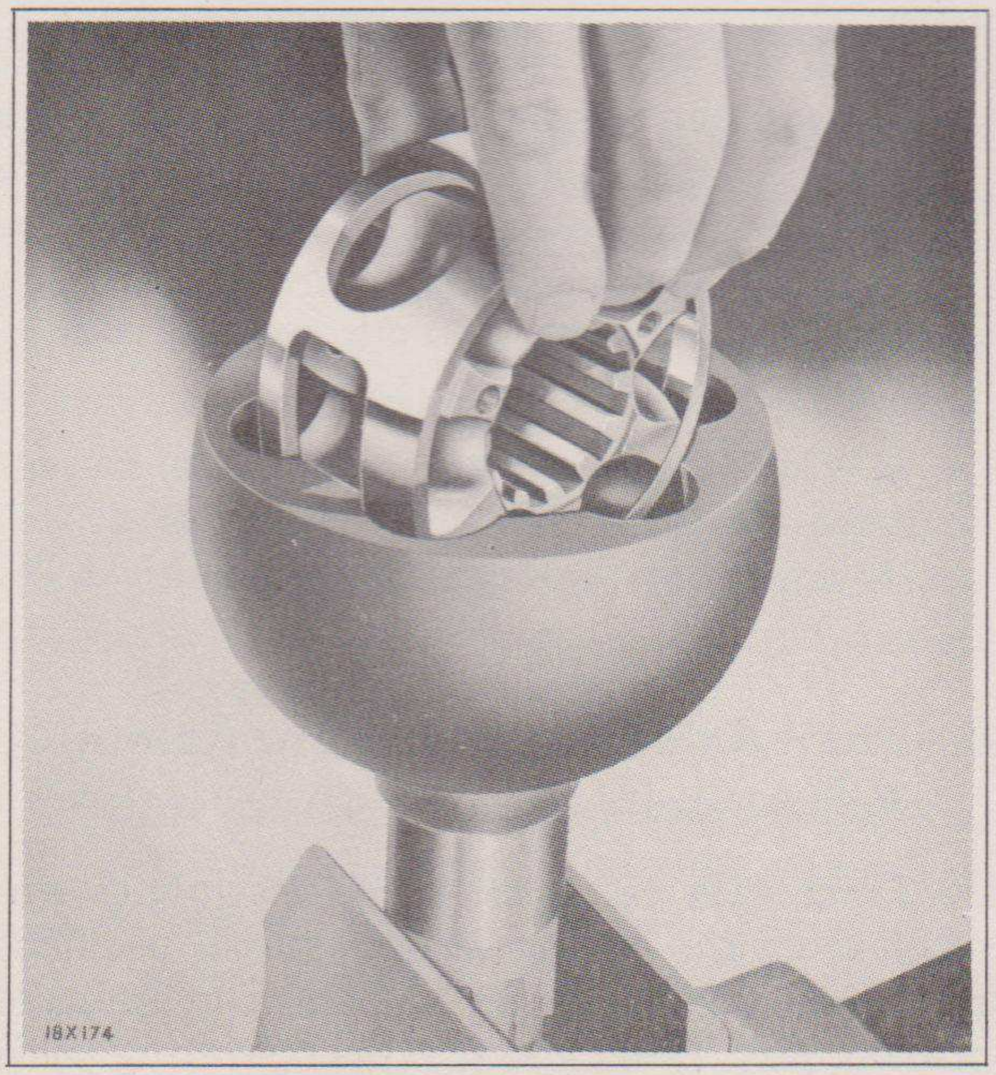


Fig. 25—Removing Universal Drive Inner Race and Ball Cage (Rzeppa)

(i) Rotate the inner ball race within the ball cage to bring any two opposite ribs on the race in line with the two elongated slots in the cage. Then move the race slightly in one of the slots in the cage and turn the race out of the cage as shown in Fig. 26.

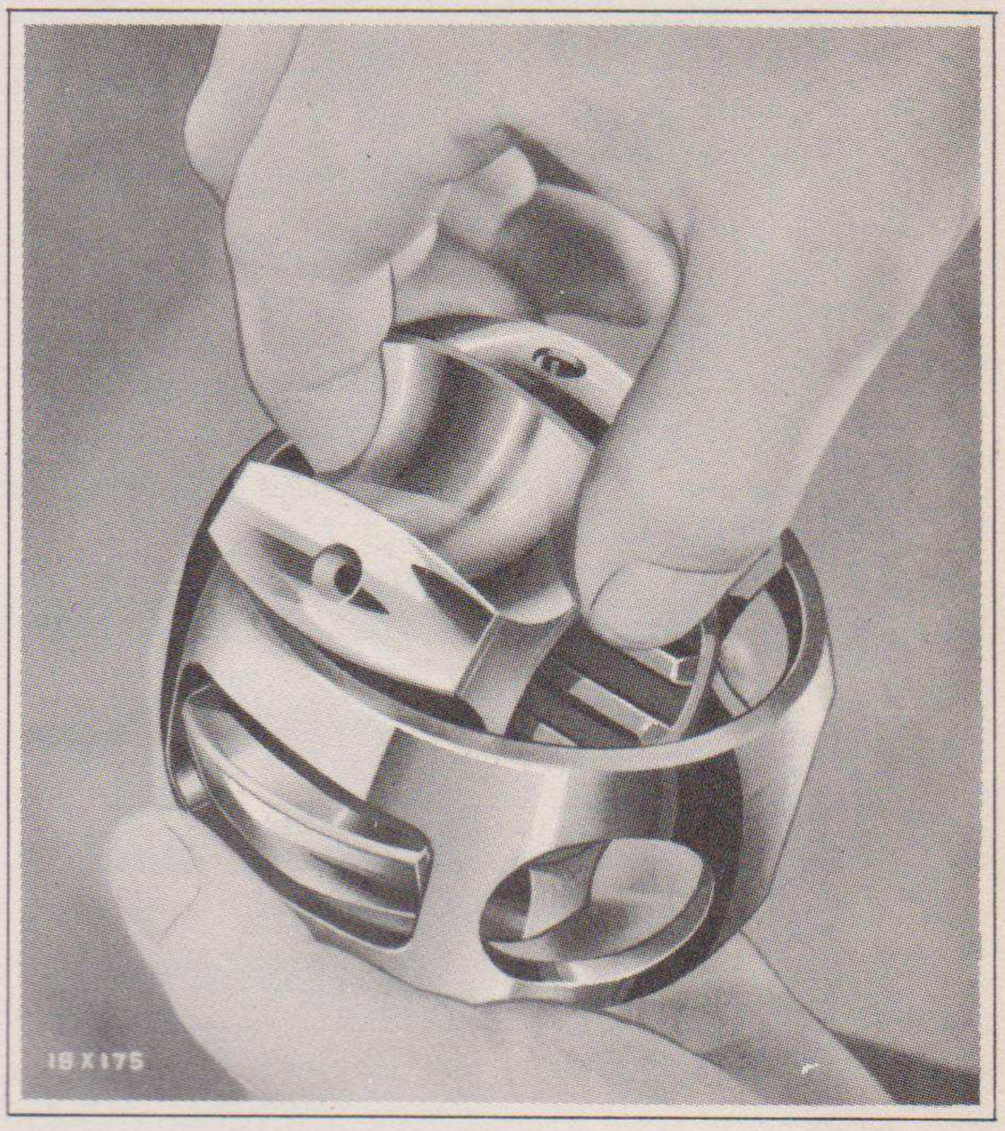


Fig. 26—Removing Universal Drive Inner Race from Ball Cage (Rzeppa)

Assembly

(a) Make sure all parts are clean and in good condition. Inspect the balls for cracks or flattened spots and the raceways for scores. Lightly lubricate all parts as they are being assembled.

(b) Clamp the drive unit (short shaft) in a vise with the splined end down. (Use protectors on the vise jaws.)

(c) Assemble the inner ball race in the ball cage by lining up any two opposite ribs on the race with the two elongated slots in the cage and rotating the race in position in the cage. Then rotate the race to line up the two sides of both units.

(d) Install both the race and cage in the drive unit by rotating this assembly sufficiently to allow the two elongated slots in the cage to slide down over any two opposite ribs between the raceways in the drive unit.

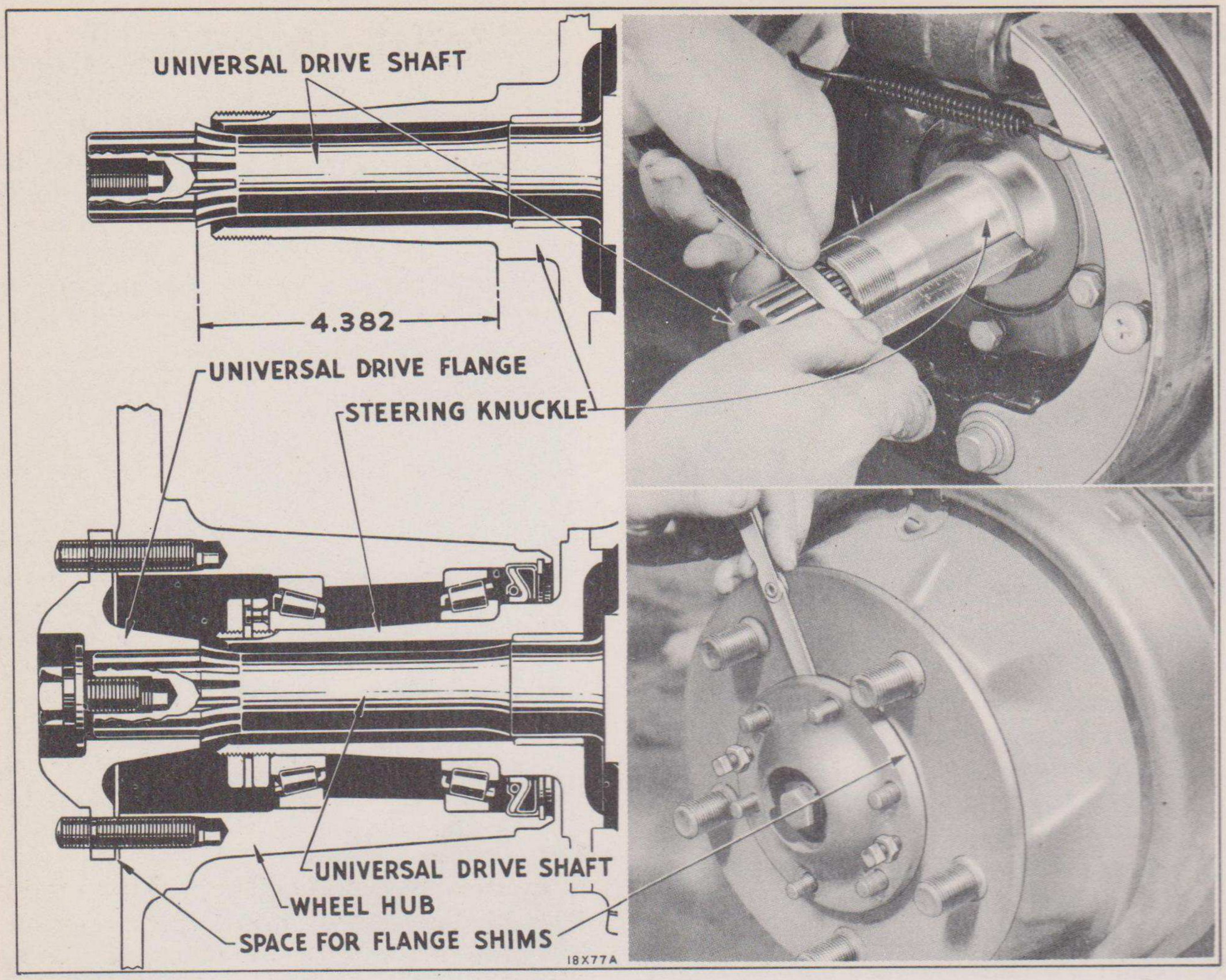


Fig. 27—Front Axle Shaft End-Play Adjustment (Bendix-Weiss only)

(e) Rotate the race and cage unit to bring the bottom of the race at the top and install the pilot, after which rotate the assembly to its normal position with the pilot at the bottom and the screw holes in the race at the top as shown in Fig. 22.

(f) With the first two fingers of either hand, tilt the race and cage assembly to bring one of the ball sockets in the cage in line with one of the raceways in the drive unit and toward the top sufficiently to allow the ball to drop into place. The inner race and cage unit should also be cocked slightly to permit easy installation of the ball.

(g) Tilt the race and cage assembly to the other five positions in turn to install the remaining balls.

(h) Install the pilot pin (Fig. 22), making sure the flatened ball is inserted down.

(i) With the snap ring and retainer in position on the drive shaft, install the drive shaft making sure the snap ring is down into the inner race counterbore. Then install the shaft retainer screws and lock with prick punch on both ends of screwdriver slot.

When installing the Rzeppa universal drive assembly in the truck refer to instructions at the beginning of Subject 35.

36—Front Axle Universal Drive Assembly Adjustments (Bendix-Weiss only)

The front axle universal drive assemblies are designed so the universal joints will oscillate around the same axis as the steering knuckle trunnion pins (king pins). This operating position is adjustable only with the Bendix-Weiss universal drive installation. Consequently, the

alignment of this type drive is affected by replacement of the universal drive assembly, steering knuckle, axle housing, differential parts or sidewise adjustment of the drive gear.

Whenever any of these parts are replaced, the operating position of the universal drive should be checked and corrected, if necessary, before driving the truck. Whenever the differential drive gear or bearings are adjusted sidewise, both axle shaft assemblies should be pulled out of the housing far enough to permit making the differential adjustment. Then, when the differential adjustment is completed, each universal drive assembly should be adjusted for correct location.

To check the universal drive location, the wheel hub assemblies must be off the steering knuckles. If these assemblies are already in position, they can be removed as explained in Subject 44, but without removing the bearing cups, the inner bearing cone and rollers and the inner oil seal from the wheel hub.

With an accurate steel rule or depth gauge, measure the distance from the steering knuckle flange inner bearing shoulder to the flat shoulders of the splines at the outer end of the axle shaft as shown in Fig. 27. This measurement should be 4.382″ or a full 4⅜″.

Adjustment for Location (Bendix-Weiss only)

Adjustment for correct operating position of the Bendix-Weiss universal drive assembly is made by removing or installing shims between the inner end of the axle shaft and the thrust button. See Fig. 28. To make this adjustment proceed as follows:

(a) Remove the steering knuckle and brake support. It is unnecessary to disconnect the brake hose to remove the brake support.

(b) Pull out the universal drive assembly as shown in Fig. 13, after first making sure that the steering knuckle flange is straight with the axle housing or in the normal position with the front wheel straight ahead.

(c) Place shims between the inner end of the shaft and the thrust button. The total thickness of these shims to start checking should be about $\frac{3}{16}$″. (If replacing a shaft assembly, use shims taken from the shaft being replaced.) Make certain that the thrust button is pushed in as far as it will go and that the shims are not loose.

(d) Install the universal drive assembly, making certain that it is in as far as it will go.

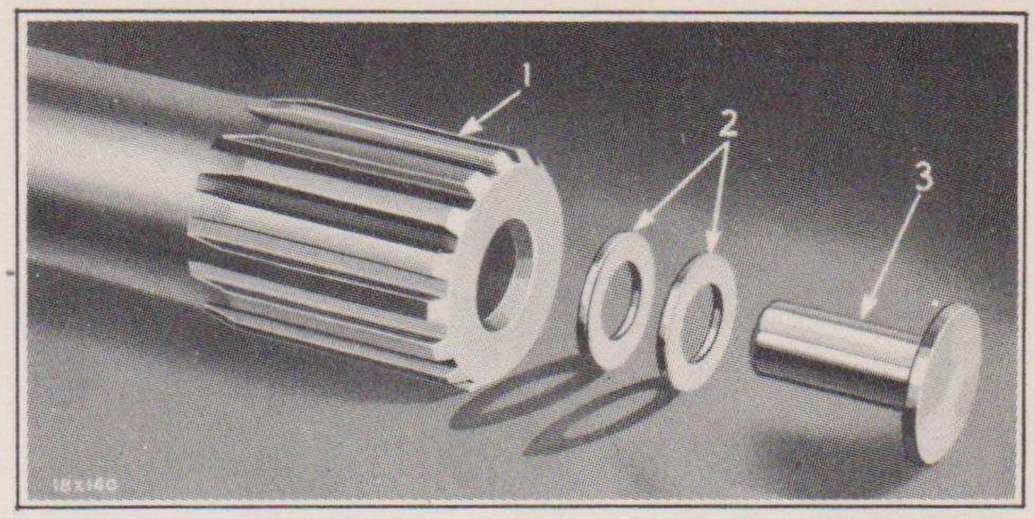


Fig. 28—Universal Drive Shaft Thrust Button (Bendix-Weiss)
1—Universal drive inner splined shaft
2—Universal drive shaft thrust button shims
3—Universal drive shaft thrust button

(e) Assemble the brake support and steering knuckle to the axle housing.

(f) With the drive assembly pushed all the way in, measure the distance from the steering knuckle flange inner bearing shoulder to the flat shoulders of the splines at the outer end of the drive shaft. See Fig. 27. If the measurement is not 4.382″ or a full 4⅜″, it can be corrected by removing or installing the necessary amount of shims between the inner end of the drive shaft and the thrust button.

Adjustment for End Play (Bendix-Weiss only)

The Bendix-Weiss universal drive assemblies are adjustable for end play by means of shims between the wheel hub and the drive shaft flange. This adjustment is made in the following manner:

(a) Install the wheel hub and drive shaft flange, leaving off the flange retaining nuts and washers and the shims between the hub and the flange.

(b) Install the drive shaft screw so as to firmly seat the flange against the shoulders of the drive shaft splines. Also make certain that the hub is properly tightened against the bearings.

(c) Force the drive shaft flange in toward the hub as far as possible to eliminate the end play in the universal drive assembly by butting the inner end of the drive shaft against the differential pinion shaft. This can be accomplished by driving lightly on the flange with a lead mallet.

(d) With the flange and drive assembly forced inward as far as it will go, measure with a feeler gauge, the space between the drive shaft flange and the wheel hub as shown in Fig. 27.

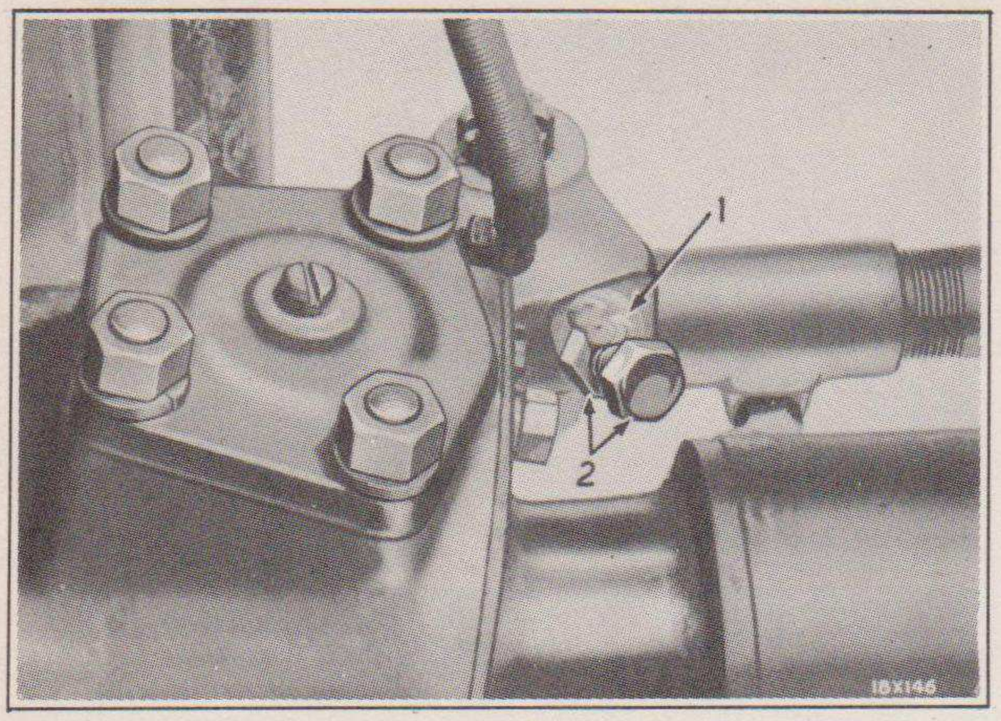


Fig. 29—Steering Knuckle Stop Screw
1—Weld 2—Steering knuckle stop screw and nut

(e) Remove the drive shaft flange.

(f) Add .020″ to the total dimension just determined with the feeler gauge and install that amount of shims between the drive shaft flange and the hub. This will establish the required .020″ end play or float in the assembly, which is necessary to prevent binding in the universal drive assembly.

37—Steering Knuckle Stop Screws

The steering knuckle stop screws are adjusted at the factory to allow each front wheel a turning angle of 28° (—0° to +1°) when on an inside turn. These stop screws are then arc welded in position, as shown in Fig. 29, and the adjustment cannot be altered. The turning angle of the front wheels can be checked with a turn-table or by means of chalk marks on the floor representing the straight ahead and turned positions of the wheels.

To determine the turning angle with chalk marks, first set the front wheels in a straight ahead position. Then draw a straight forward line on the floor just in front of the wheels to represent this position of the wheels. Next turn the wheels to the extreme right and mark the floor to show this position of both wheels, after which turn the wheels to the extreme left and again mark the floor to show this third position of the wheels. All of these wheel positions are clearly illustrated with lines representing the chalk marks in Fig. 30.

When the front wheels are turned to the extreme left, the left wheel is on the inside of the turn and should have turned through an angle "A" of 28° (—0° to +1°). With the wheels turned to the extreme right, the right wheel is on the inside of the turn and it, too, should have turned an angle "B" of 28° (—0° to +1°) from the straight ahead position.

If the turning angle of the front wheels is found to be more or less than the amount specified, it is an indication that some part is bent or otherwise damaged and should be replaced. The above described turning angle must not be confused with the turning angle of either wheel when on the outside of the turn, as this turning angle is less and is not to be considered in checking the adjustment of the stop screws.

If the turning angle is greater than that specified, it will be possible to cramp the front wheels to a more acute angle than that for which the universal drives are designed, thereby bringing about excessive strain and possible destruction of the front axle drive assembly.

38—To Remove Broken End of Front Axle Drive Shaft

(a) Perform all of the operations listed in Subject 33.

(b) If the break is less than about 4″ from the inner end of the shaft, it will be necessary to remove the differential carrier assembly as outlined in Subject 60, to remove the short section of the shaft. If the break is more than 4″ from the inner end, the inner section of the shaft can be snared out through the housing with a wire loop, after removing the inner oil seal.

When removing a Bendix-Weiss drive in this manner, check to make sure that the thrust button and shims are in position at the inner end of the shaft. If not, it will be necessary to re-

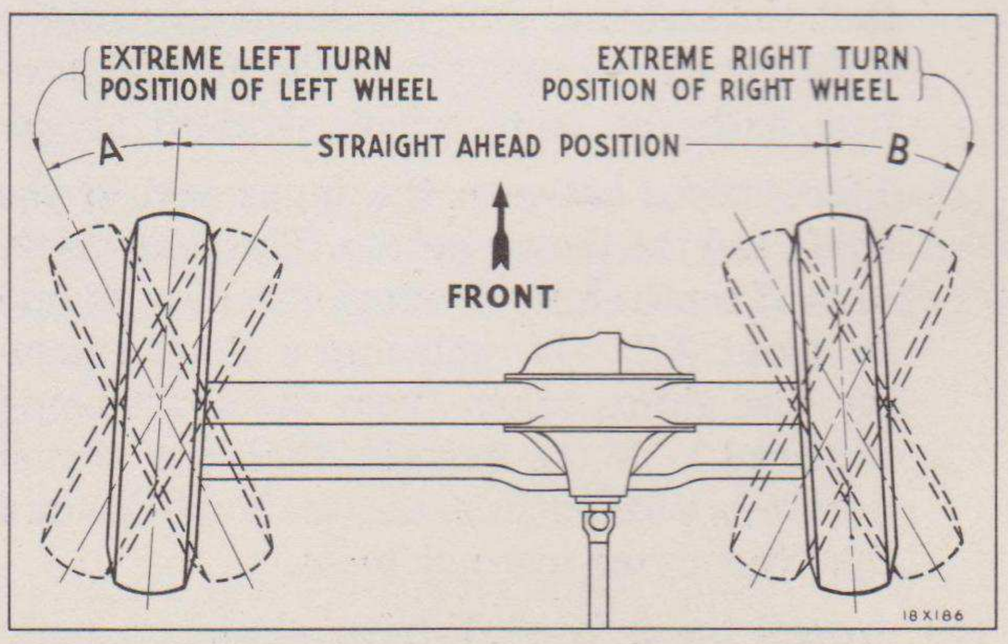


Fig. 30—Turning Angle

move the differential carrier assembly to recover these parts.

When installing the new universal drive assembly, check the various adjustments as covered in Subject 36 and make sure that the necessary lubricant is added.

39—Differential Carrier Assembly

(See "Differential Carrier Assembly" on page 43)

40—Steering Knuckle Flange Bearings

Each steering knuckle is supported by two bearings mounted on pins at the top and bottom of the ball end of the axle housing. While these pins are welded in position, they can be replaced with new ones which are available from the Chrysler Corporation Parts Division. The top bushing is keyed to the trunnion socket bearing pin, while a tapered roller bearing is used at the bottom pin.

Removal

(a) Remove the front wheel and hub assembly as outlined in Subject 43. In the present operation, however, it is not necessary to remove the bearing cups, the inner bearing cone and rollers and the inner oil seal from the wheel hub.

(b) Disconnect the tie-rod end from the steering knuckle lower flange. See Subject 45.

(c) Pull out the universal drive assembly as outlined in Subject 33, after first making sure the steering knuckle flange is straight with the axle housing or in the normal position with the front wheel straight ahead.

(d) Drive out the dowel pin at each side of the steering knuckle flange.

(e) Remove the four bolts (2 each side) holding the upper and lower halves of the flange together, and dismount the flange parts.

(f) Pull the top and bottom bearing cones off the trunnion socket bearing pins on the ball end of the axle housing with a bearing puller. See Fig. 31.

(g) Press the cups out of the flange or drive them out with a brass drift.

Installation

When reinstalling the steering knuckle assembly, first place the upper and lower halves of the knuckle flange in position on the ball end of the axle housing and install the two dowel pins. Then complete the assembly operations and check the adjustment of the knuckle bearings as covered in Subject 41.

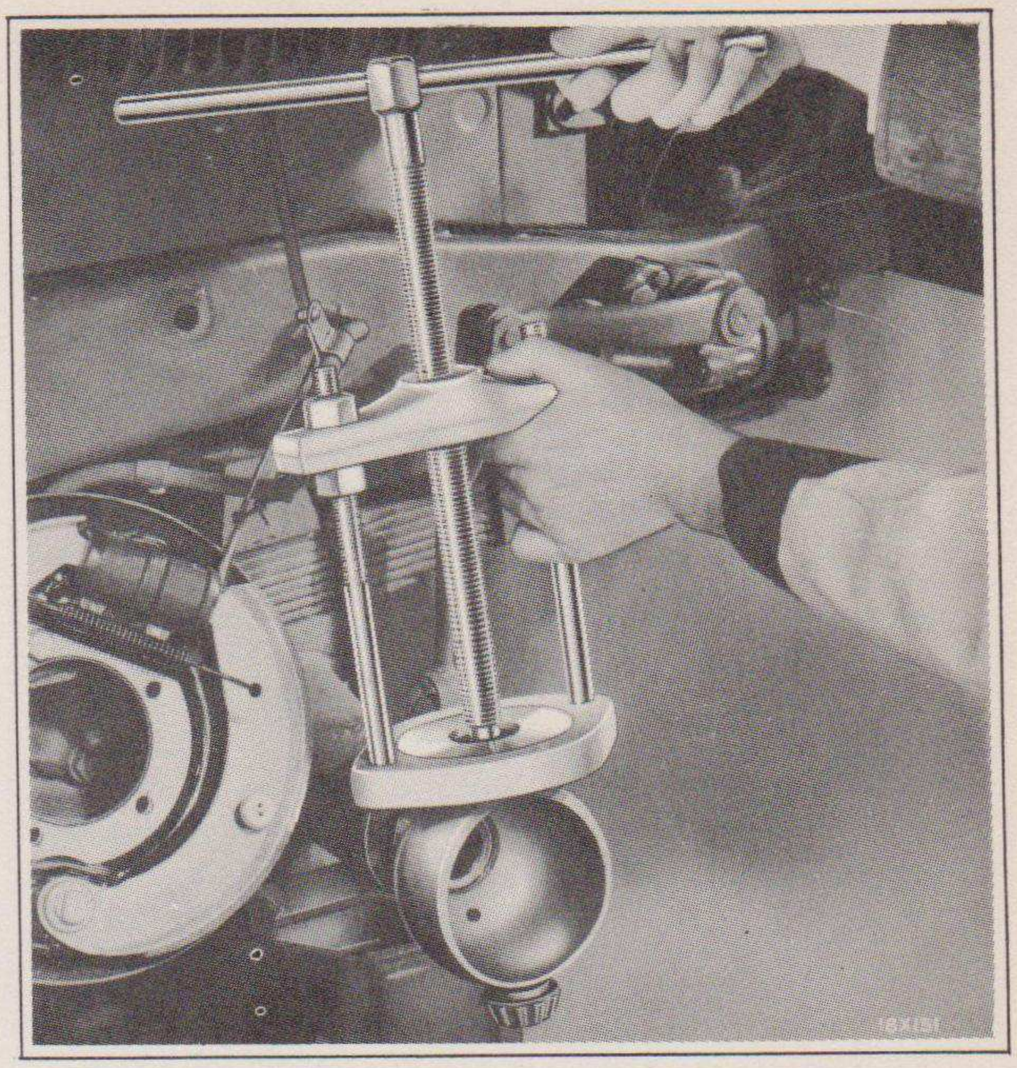


Fig. 31—Removing Steering Knuckle Flange Bearings (Tool C-293-U)

Replacing Front Axle Trunnion Socket Bearing Pins

In the event a trunnion socket bearing pin breaks away from the axle housing, replace it with a new one as follows:

(a) Remove the steering knuckle flange as outlined under the sub-heading "Removal" in Subject 40 and take out the broken pin. Dress up the pin hole in the ball end of the axle housing if necessary.

(b) Install the new pin in position on the end of the housing and then reinstall the steering knuckle flange and flange bearings to keep the pin in position.

(c) Tack-weld the pin at the inner end of the axle housing.

(d) Remove the steering knuckle flange and flange bearings.

(e) Finish welding the pin to the housing and dress the inside of the housing ball with a portable grinder.

(f) Install the steering knuckle flange and wheel assembly as covered under the heading "Installation" in Subject 40.

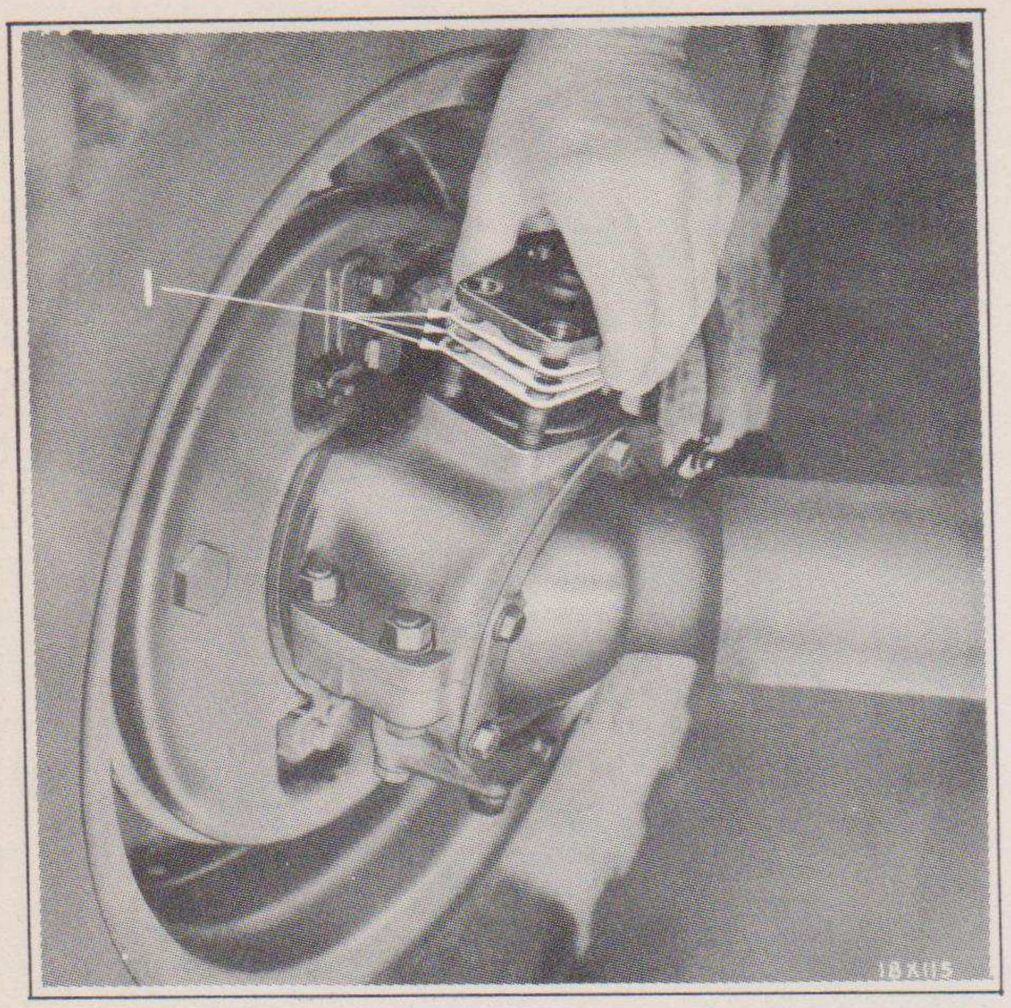


Fig. 32—Steering Knuckle Flange Bearing Adjusting Shims

41—Adjustment of Steering Knuckle Flange Bearings

(a) After jacking up the front wheel, remove the wheel and disconnect the tie-rod as outlined in Subject 45.

(b) Remove the retaining cap screws and lock washers at the top bearing. If working on the left wheel, also disconnect the drag link from the steering knuckle flange.

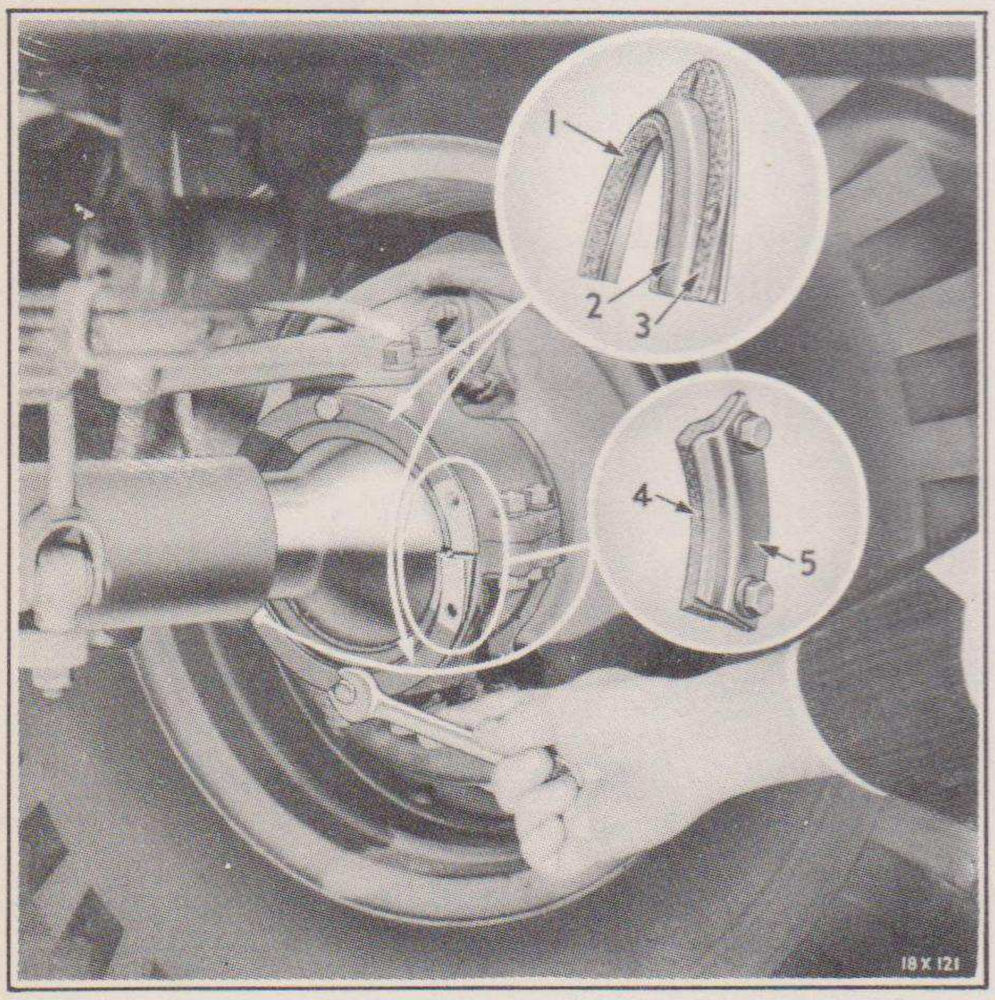


Fig. 33—Removing Steering Knuckle Flange Oil Seals

1—Steering knuckle flange oil seal
2—Steering knuckle flange oil seal retainer
3—Steering knuckle flange oil seal retainer gasket
4—Steering knuckle flange joint oil seal
5—Steering knuckle flange joint oil seal retainer

(c) Adjustment of the steering knuckle flange bearings is made by means of the shims between the top bearing cap and the steering knuckle flange. See Fig. 32. Remove shims to tighten or add shims to loosen the bearings. The bearings should be adjusted first so there is no end (up and down) play in the steering knuckle assembly but with sufficient freedom to oscillate freely by hand. Make sure that bearing caps and bearings are seated by tapping with a soft hammer or mallet. Then remove the bearing cap and reduce the total thickness of the shim pile .005". After this is done, there should be a perceptible drag felt when oscillating the knuckle by hand but it should not bind.

(d) Install the tie-rod and wheel.

42—Replacing Steering Knuckle Flange Oil Seal

(a) Remove the cap screws attaching the oil seal retainer to the steering knuckle flange.

(b) Remove the two retainer joint oil seal retainers together with the upper and lower halves of the oil seal retainer. See Fig. 33.

Before installing the oil seal assembly, carefully examine the ball on the outer end of the front axle housing for roughness and scratches that would damage the seal. If such imperfections are found to exist, smooth them down with fine emery cloth.

When installing the oil seals, make sure the ends of the felts line up with the ends of the retainers. It is also good practice to replace the retainer gaskets to prevent lubricant leakage.

If a truck is to remain standing outdoors for an extended period of time, a coating of grease should be applied to the exposed portion of the ball ends of the axle housing surrounding the universal joints, to prevent rusting. These surfaces are machined and cannot be painted or rustproofed because they move against oil seals when the front wheels are turned for steering the truck. Rusty surfaces would rapidly destroy the oil seals and allow lubricant to be lost from the universal joints. These surfaces are lubricated automatically when the truck is in operation.

43—Front Wheel Hub Bearings

Removal

(a) After jacking up the wheel, remove the nuts

which hold the wheel to the hub, using special wrench No. DD-812.

(b) Lift off the wheel and tire assembly.

(c) Remove the nuts (and lock washers) which hold the axle drive flange to the hub.

(d) Remove the front axle drive shaft screw.

(e) Pull out the hub drive flange by loosening the lock nuts on the two pusher screws in the flange and turning the screws in as shown in Fig. 34.

Care must be used to preserve the number and condition of the shims.

(f) Unscrew the wheel bearing outer adjusting nut, using special tool DD-824, as shown in Fig. 35, and remove the inner adjusting nut lock.

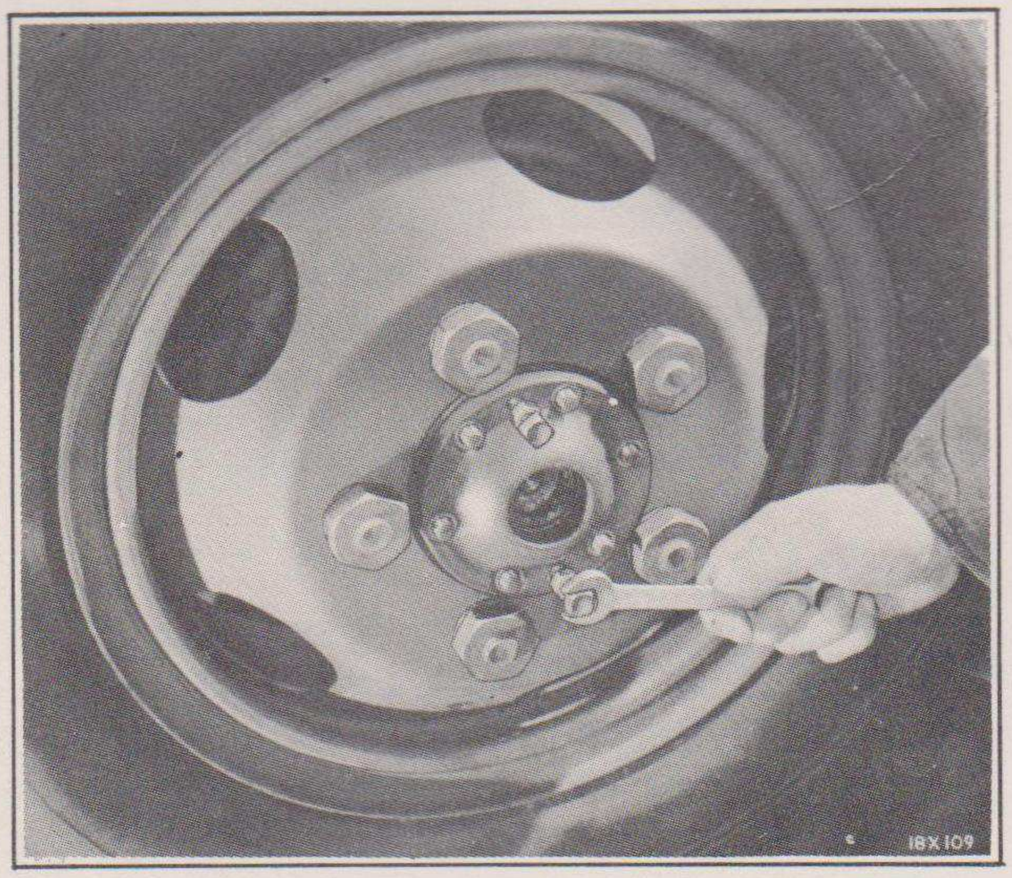


Fig. 34—Removing Drive Flange with Puller Screws

(g) Unscrew and remove the bearing inner adjusting nut.

(h) Pull off the hub and brake drum assembly, using special tool DD-423, as shown in Fig. 36, and then remove the outer bearing cone and rollers.

(i) Remove the oil seal retainer snap ring.

(j) Using a drift, drive out the inner bearing cone and rollers and the oil seal. Inspect the oil seal for wear and possible damage.

(k) Drive out the inner and outer bearing cups, removing the inner cup from the inner end of the hub and the outer cup from the outer end of the hub.

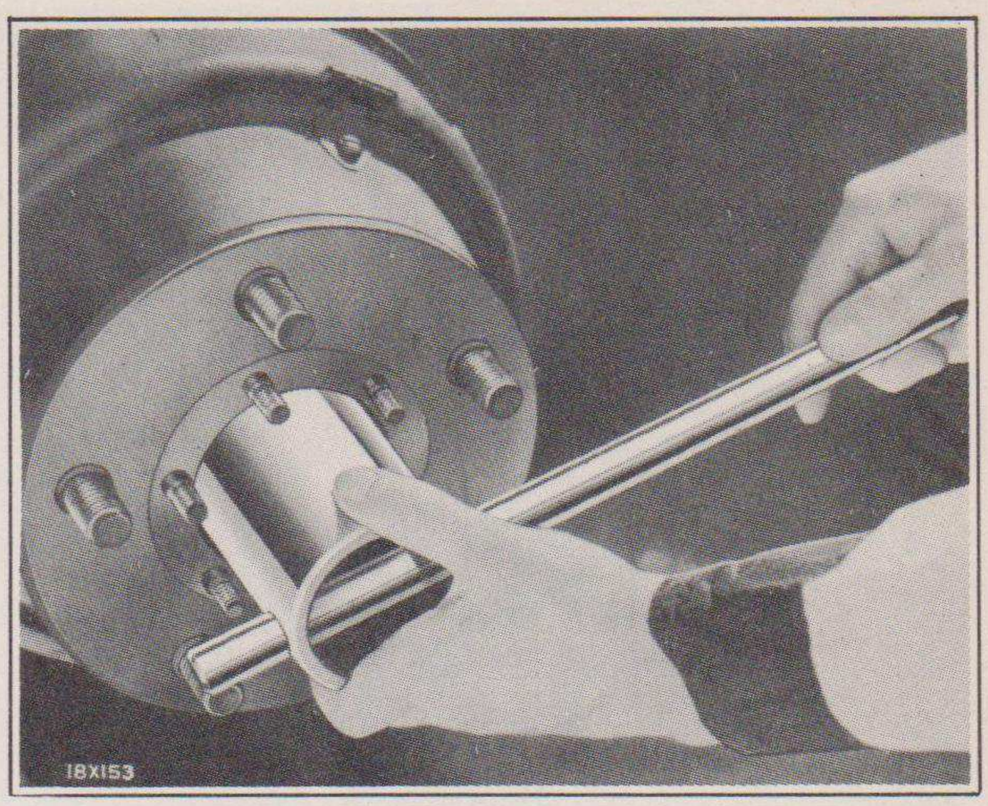


Fig. 35—Removing Front Wheel Bearing Adjusting Nuts or Adjusting Bearings (Tool DD-824)

Installation

Before assembling the bearings in the front wheel hub, make sure all old lubricant is removed and the various parts are clean and in good condition. Then install the inner and outer bearing cups, driving them in place with a drift. Make sure the cups are correctly installed with the thick edge toward the center of the wheel hub. Next coat the inner bearing cone and rollers with short fibre wheel bearing grease (medium) and assemble them in the inner cup, after which install the oil seal with special tool DD-808. See Fig. 37. Then install the oil seal retainer snap ring. Place a quantity of wheel bearing lubricant in the hub between the bear-

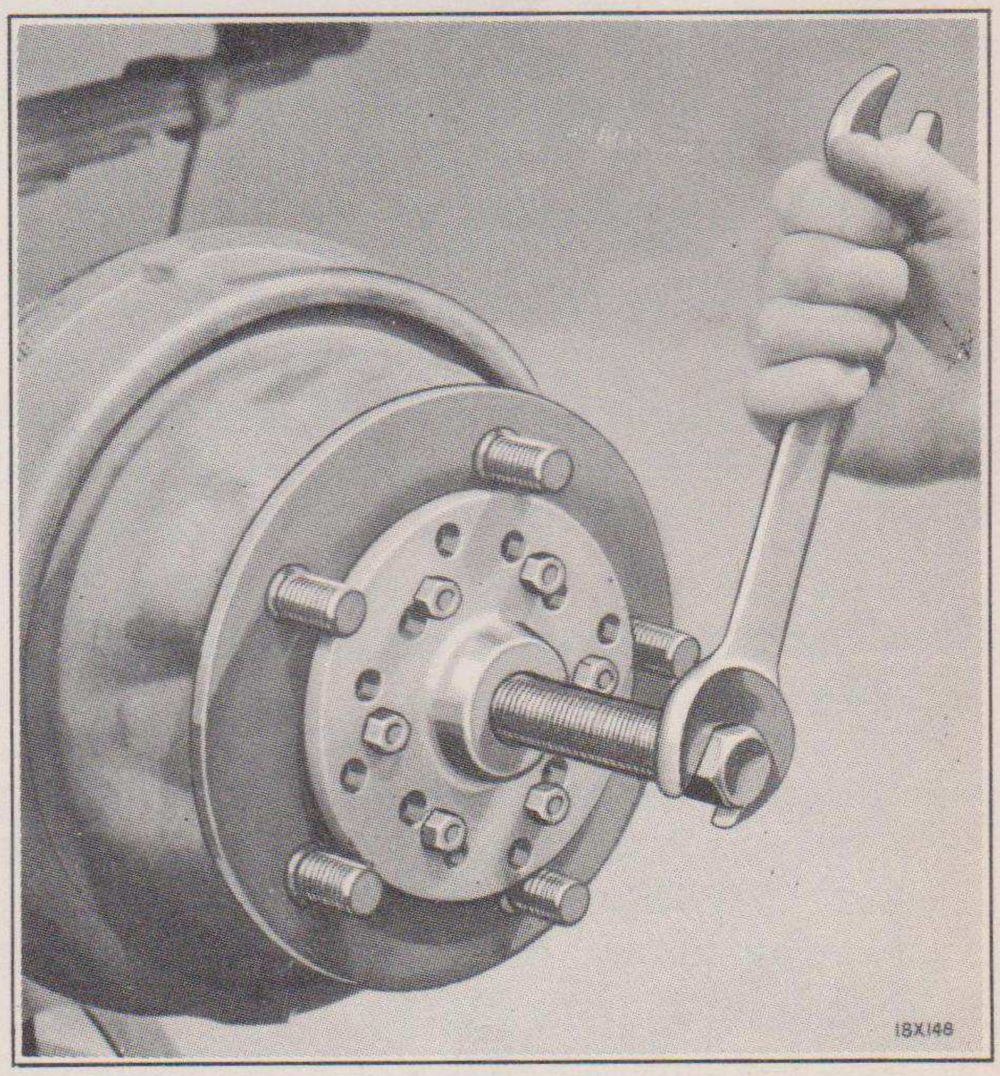


Fig. 36—Removing Wheel Hub with Puller (Tool DD-423)

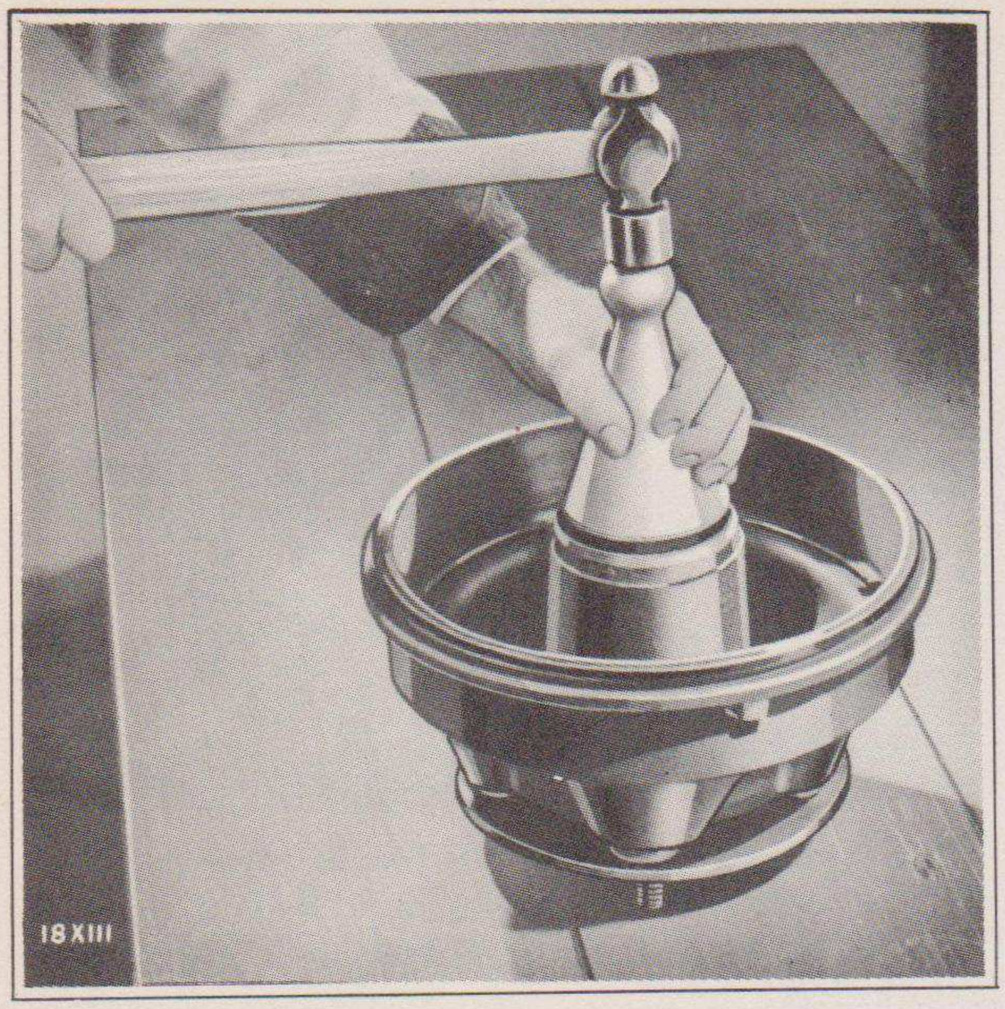


Fig. 37—Installing Wheel Bearing Oil Seal (Tool DD-808)

ing cones (do not fill the space over half full).

Before installing the hub, inspect the surface of the steering knuckle where it contacts the inner oil seal to make certain that it is smooth. Roughness will cause rapid wear of the seal and oil leakage. Use care when sliding the hub onto the steering knuckle to keep it straight with the knuckle so as not to damage the oil seal.

With the hub in position, install the outer bearing cone and rollers and the bearing inner adjusting nut. Before installing the outer bearing cone and rollers, thoroughly coat them with short fibre wheel bearing grease (medium). Then install the wheel and adjust the hub bearings as outlined in Subject 44, after which reinstall the remaining parts.

When installing the hub drive flange, be sure to put in the same number and thickness of shims as originally used and make certain that the puller screws do not bottom against the hub and are securely locked in place.

44—Adjustment of Front Wheel Hub Bearings

(a) Remove the axle drive flange, the bearing outer adjusting nut and the adjusting nut lock. See Subject 43. Then turn the hub bearing inner adjusting nut with special tool DD-824 (see Fig. 35) until the bearings are tight so that the wheel cannot be shaken by hand, but can be rotated without binding. This is sometimes difficult to detect when adjusting front wheel bearings because of the weight of the wheel, especially when dual wheel equipment is used. The recommended method is to turn the adjusting nut tight and back it off about 1/6 of a turn.

(b) Install the adjusting nut lock, making certain that the dowel pin in the inner adjusting nut enters a hole in the lock. It may be necessary to turn the lock over and even to turn the inner adjusting nut slightly in one direction or another in order to permit the dowel pin to enter one of the holes. The bearing adjustment must not be changed to any extent.

(c) Install outer adjusting nut and tighten it securely.

(d) Test the bearing adjustment again after tightening the outer adjusting nut, as the inner adjusting nut may have been tightened when tightening the outer nut. If so, remove the outer adjusting nut and the nut lock and repeat the foregoing operations. *Do not attempt to free up the bearing by loosening the outer adjusting nut only.*

(e) Install the axle driving flange.

45—Steering Tie-Rod

Removal and Disassembly

(a) Remove the retaining nut at the top end of each tie-rod end stud, which holds the tie-rod end to the steering knuckle flange arm.

(b) Remove the tie-rod end studs from the steering knuckle flanges by forcing them

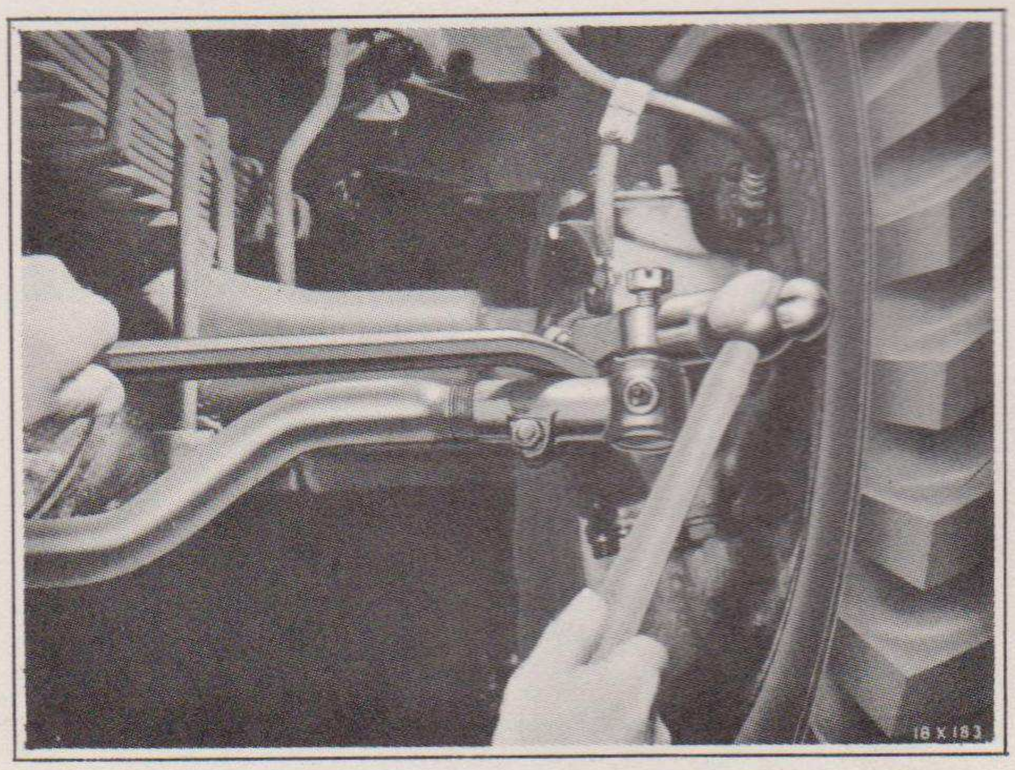


Fig. 38—Removing Steering Tie Rod Ends from the Steering Knuckle Flange

out with a pry-bar inserted above the tie-rod and below the steering knuckle flange arm as shown in Fig. 38. While applying this pressure, give the end of the steering knuckle flange arm a smart rap with a hammer. When removing the studs from the flanges, be careful not to lose the spring, the composition washer and the two metal washers on each stud.

(c) Remove the clamp bolt on each tie-rod end assembly and screw the ends off the tie-rod. The tie-rod end assemblies cannot be disassembled. Therefore, in case of damage or worn parts, new ends must be used.

Assembly and Installation

Install the tie-rod ends on the tie-rod, leaving about ¾" of threads exposed at each end of the tie-rod for adjustment purposes. The right end of the tie-rod is threaded with a coarse thread and the left end with a fine thread, making it possible to obtain a close toe-in adjustment.

When installing the tie-rod assembly on the steering knuckle flanges, make sure the tie-rod ends are clean and the springs and washers are correctly arranged on the studs between the tie-rod ends and the flange arms. The composition washer should be placed between the two metal washers with the spring mounted above the washer assembly. The small end of the spring should be at the top next to the flange arm.

For adjustment of the tie-rod, refer to Subject 49.

FRONT WHEEL ALIGNMENT

Correct front wheel alignment produces easy, positive steering with a minimum of scuffing action between the tires and the road.

All the factors of front wheel alignment are inter-related but each angle has a specific purpose. Should any one angle get out of position, the harmonious relationship of all of them is destroyed. Each angle depends upon the proper setting of the others if the front wheels are to lead properly.

In making corrections to front wheel alignment, or when installing new front axle parts, the angles in both front wheels (See Fig. 39) should be checked as follows:

(a) King pin inclination.
(b) Camber.
(c) Caster.
(d) Toe-in and toe-out.

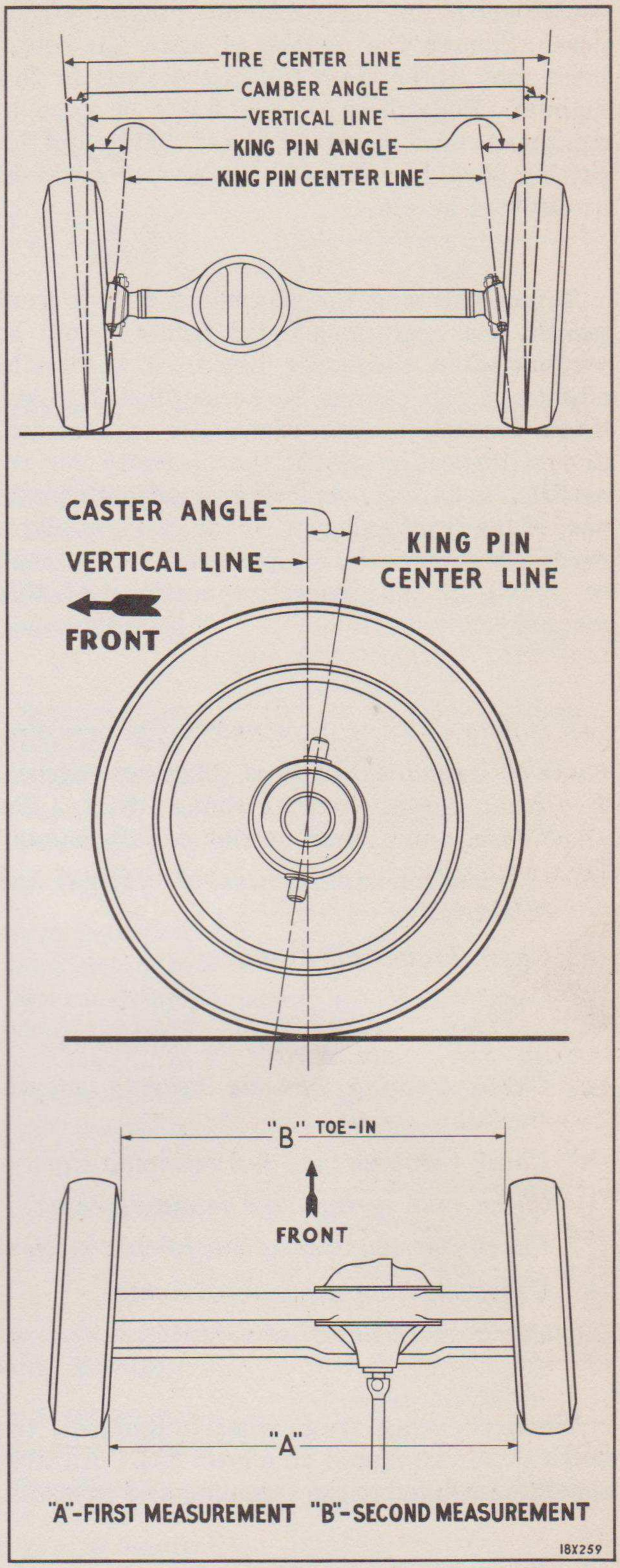


Fig. 39—Front Wheel Alignment Angles

The instructions in this manual for checking front wheel alignment are based on the use of Bendix-Feragen equipment.

There are many other types of checking equipment in use that accomplish the same purpose, although the method of using the equipment may differ from the instructions in this manual. Regardless of the make or type of equipment used, however, the checking and adjusting should be done in the proper sequence as outlined herein.

Before checking the alignment of the front wheels, the operations listed below should be performed in the order listed. A successful alignment job cannot be accomplished unless these inspection operations are performed. Should inspection reveal the necessity for removing, installing, replacing or adjusting any part of the front axle or steering, prior to aligning the front wheels, complete instructions will be found in the respective sections of this manual.

(a) *Inflate all tires to recommended pressure.*

(b) *Check condition of tires* (blow-out patches, thin treads, vulcanizing, etc.). See "Wheels and Tires" section of this manual.

(c) *Check wheel and tire run-out* (wobble) and eccentricity.

(d) *Check brakes for dragging.*

(e) *Check wheels for proper balance.*

(f) *Check front wheel bearing adjustment.*

(g) *Check steering knuckle bearing adjustment.*

(h) *Check front springs and retaining clips.*

(i) *Check rear springs and retaining clips.*

(j) *Check steering connections for lost motion.*

(k) *Check steering gear adjustments.*

(l) *Check shock absorber control.*

When checking front wheel alignment, the truck should be placed on a level floor. All tires should be inflated to the recommended pressure.

46—King Pin Inclination

King pin inclination is the amount the steering knuckle pivot pins incline away from the vertical, toward the center of the truck as viewed from the front of the truck (Fig. 39). Inclined pivot pins are closer together at the top than at the bottom.

The correct king pin angle is 8 degrees. When the king pin inclination is incorrect, it is an indication of a bent front axle housing, and the necessary corrections should be made to bring the king pin angle within limits before making any further wheel alignment checks.

Checking King Pin Inclination

The truck should be placed on a level floor with the front wheels resting on locking turntables. It is important that the front axle be perfectly level. Be certain that the wheels are in the *center* of the turntables. The turntables should be locked until the operation is started.

When checking the king pin angle, use the 40 degree scale on the gauge if the wheels are turned 20 degrees each side of the straight-ahead position, or the 50 degree scale if the wheels are turned 25 degrees. See inset in Fig. 42 showing close-up view of scale on gauge.

IMPORTANT: Keep the foot brakes applied so that the wheels cannot turn while all of the following operations are being performed.

(a) Assemble the gauge to the wheel as shown in Fig. 40, with the quadrant parallel with

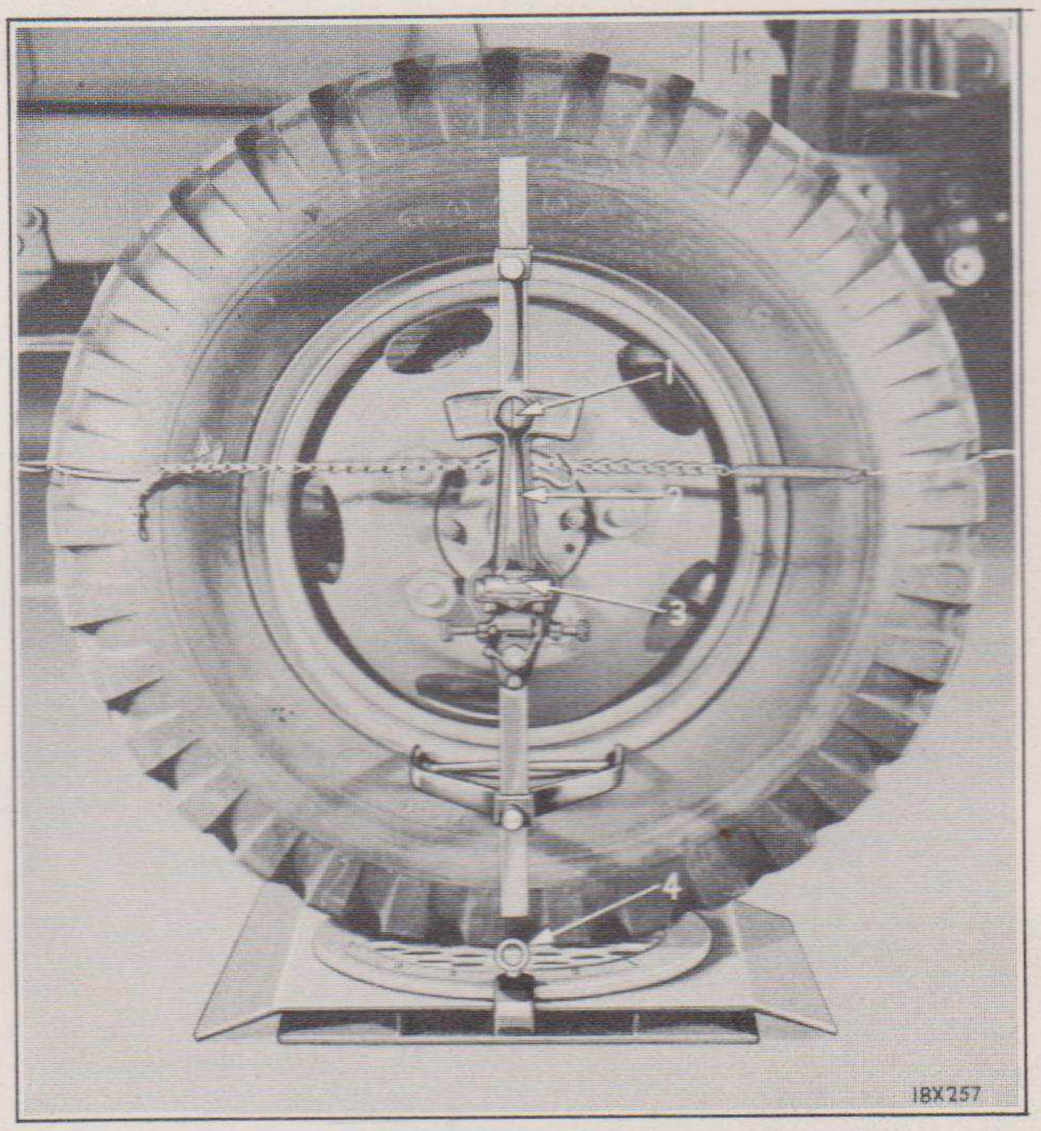


Fig. 40—Checking King Pin Angle—Gauge on Right Wheel (Tool DD-428) (Turntables—Tool DD-435)

NOTE: If tire ring is bent or damaged, place gauge arms against wheel felloe.

1—Hair line on zero
2—Pointer on scratch mark
3—Bubble level
4—Turntable lock pin