TOYOTA
LAND CRUISER
REPAIR MANUAL
CHASSIS & BODY

FOREWORD

This manual has been prepared to provide complete informations on the maintenance and repair of various parts of the Model **FJ** Toyota Land Cruiser.

It is recommended that this manual be kept within easy reach of the personnel concerned and be referred at all times when necessary repairs arise.

All informations, illustrations, and specifications were the best available at the time of publication.

The company reserves the right to make changes without previous notice at any time.

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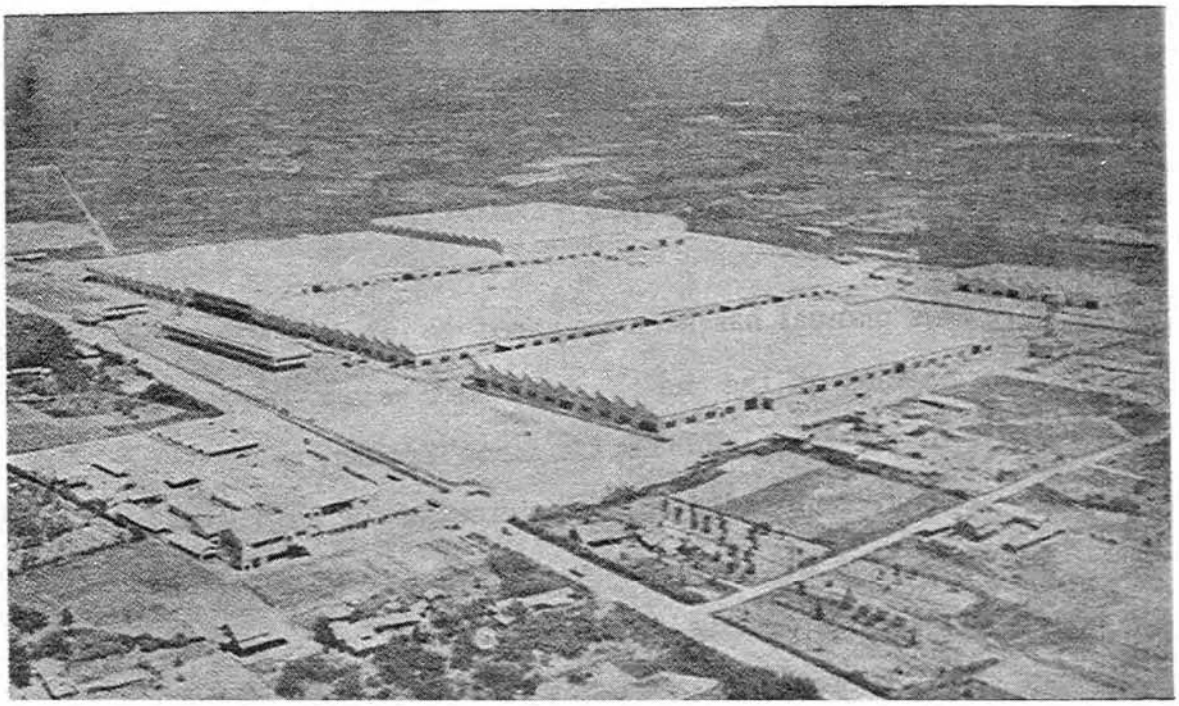


MOTOMACHI PLANT (PASSENGER CAR)

ADMINISTRATION OFFICE, TECHNICAL CENTER & MAIN PLANT (TRUCK)

GROUP INDEX

Group 1

GENERAL

The information in this Group 1 covers a brief outline of specifications of Toyota Land Cruiser FJ40, FJ43, and FJ45 Series, together with their body dimensions. All informations and specifications were in effect at the time of publication.

The FJ45 series were model-changed to FJ55 series in July 1967, for which new repair manual is available separatly. See FJ55 Chassis & Body R/M No. 98040.

FJ40

FJ40-1, FJ40L-1
FJ40, FJ40L
FJ40-B, FJ40L-B
FJ40-C, FJ40L-C
FJ40V, FJ40LV

The Model FJ40 Series Land Cruiser is manufactured in five different types, with left hand drive vehicles available for each type. The model number with letter L indicates left hand drive vehicles.

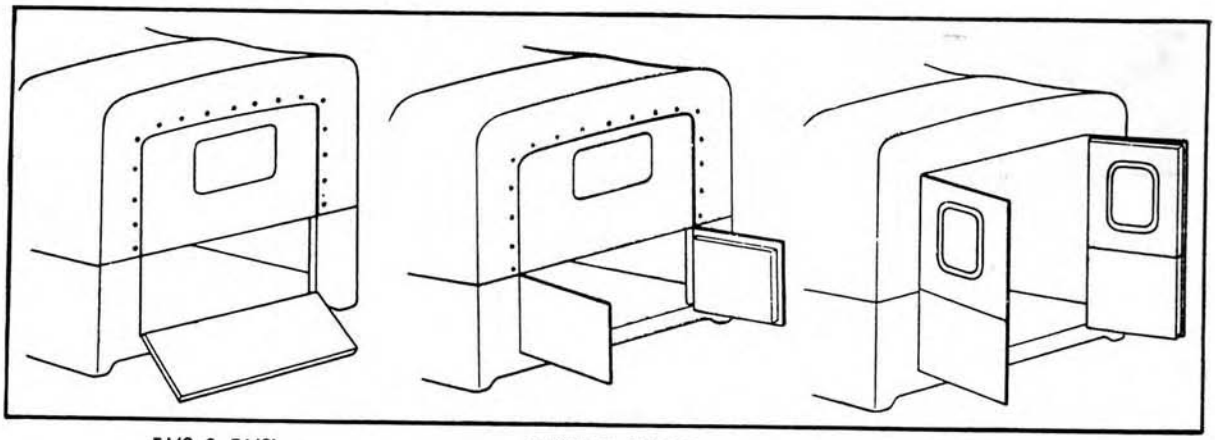
By installing different types of bodies on the chassis of Model FJ40-1 (FJ40L-1), four types of FJ40 Series Land Cruisers are manufactured as a regular production.

Major body dimensions of these types are shown on the following pages. The dimensions of the left hand drive vehicles remains the same as those of the right hand drive vehicles with the exception of the steering wheel symmetrically relocated to the left side.

Major Specifications

	FJ40	FJ40-B	FJ40-C	FJ40V
Type	Canvas Top			Hard Top
Overall Length mm (in.)	3,870 (152.4)			3,870 (152.4)
Overall Width mm (in.)	1,665 (65.6)			1,665 (65.6)
Overall Height mm (in.)	1,950 (76.8)			1,930 (76.0)
Wheelbase mm (in.)	2,285 (90.0)			2,285 (90.0)
Tread, Front mm (in.)	1,404 (55.3)			1,404 (55.3)
Rear mm (in.)	1,400 (55.1)			1,350 (53.1)
Net Vehicle Weight kg (lbs.)	1,480 (3,265)			1,575 (3,470)
Gross Vehicle Weight kg (lbs.)	2,050 (4,500)			2,050 (4,500)
Seating Capacity	3 7			3 7
Maximun Payload kg (lbs.)	400 (900) 0			400 (900) 0
Maximum Speed km/hr (mph)	130 (81)			130 (81)
Grade Ability	45.4°			45.4°
Minimum Turning Radius m (ft)	5.3 (17.5)			5.3 (17.5)
Braking Distance 50km/hr (30 mph) m (ft)	12 (40)			12 (40)
Tire Size, Front	7.10—15, 4P			7.10—15, 4p
Rear	7.10—15, 4P			7.10—15, 4p
Rear Gate	Drop	Swing out	Swing out	Swing out
Rear Curtain	Roll up	Roll up	Swing out canvas door	Folding type steel door
Rear Seat	Parallel Transverse (Optional)	Parallel	Parallel	Parallel

Types of Rear Gate and Rear Curtain

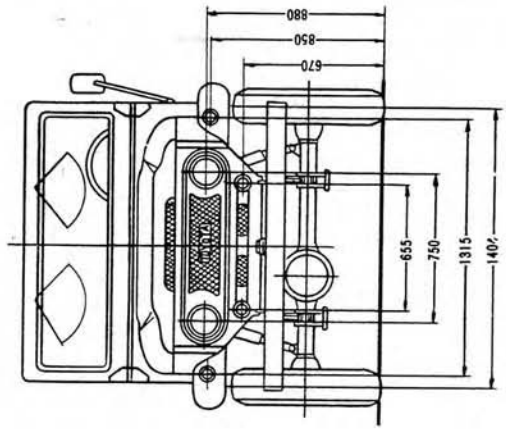


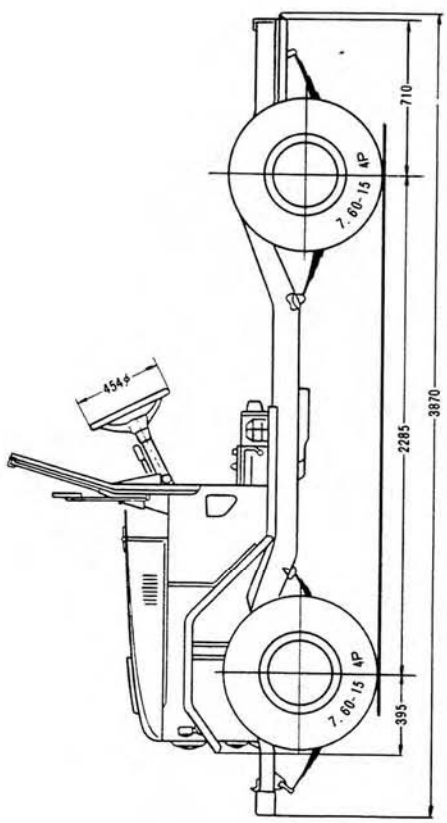
FJ40 & FJ40L

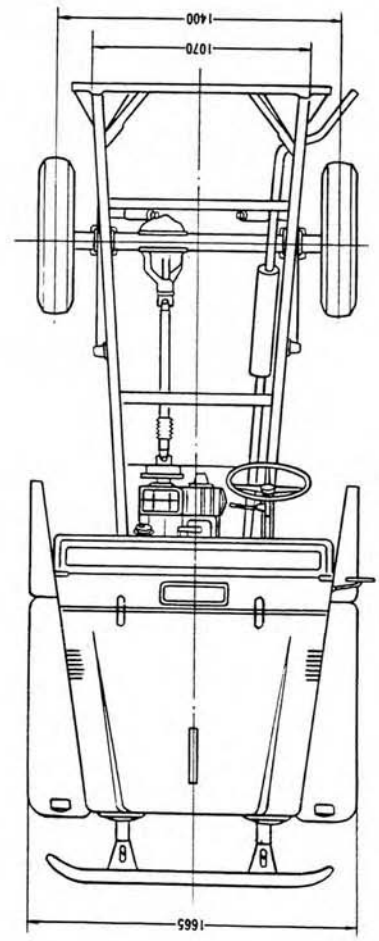
FJ40-B & FJ40L-B

FJ40-C & FJ40L-C

FJ40-1 MAJOR DIMENSIONS (mm)







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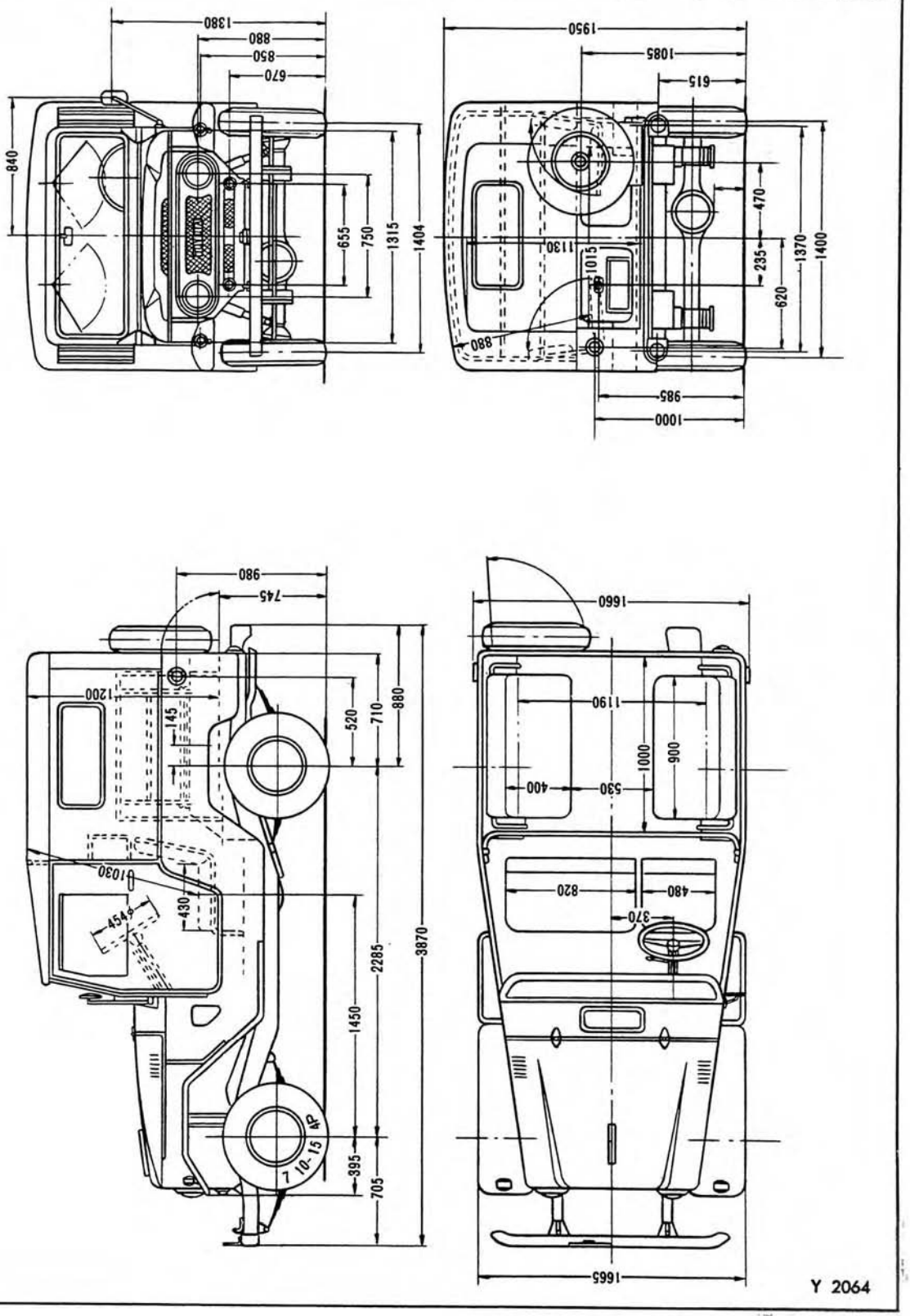
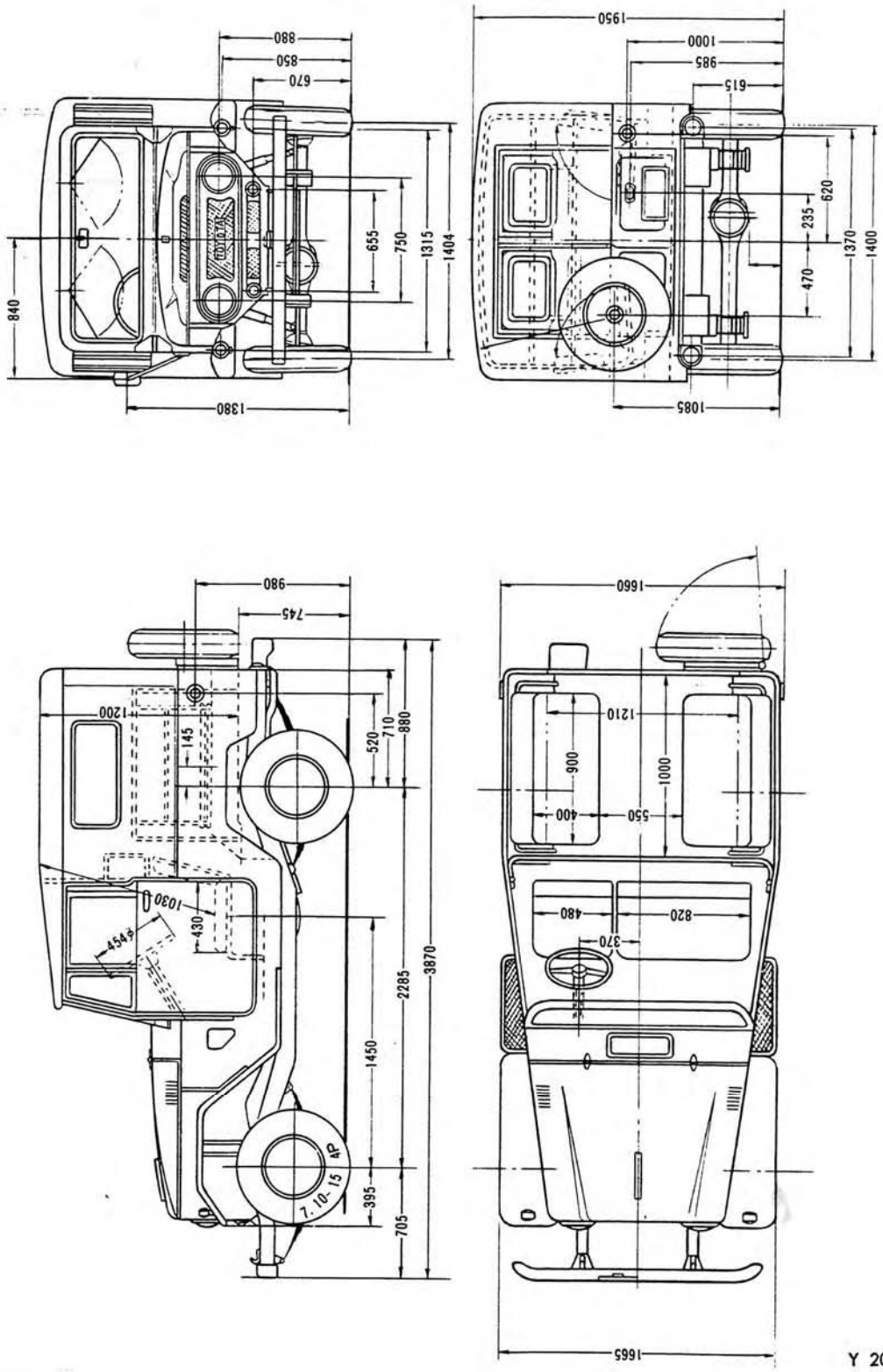
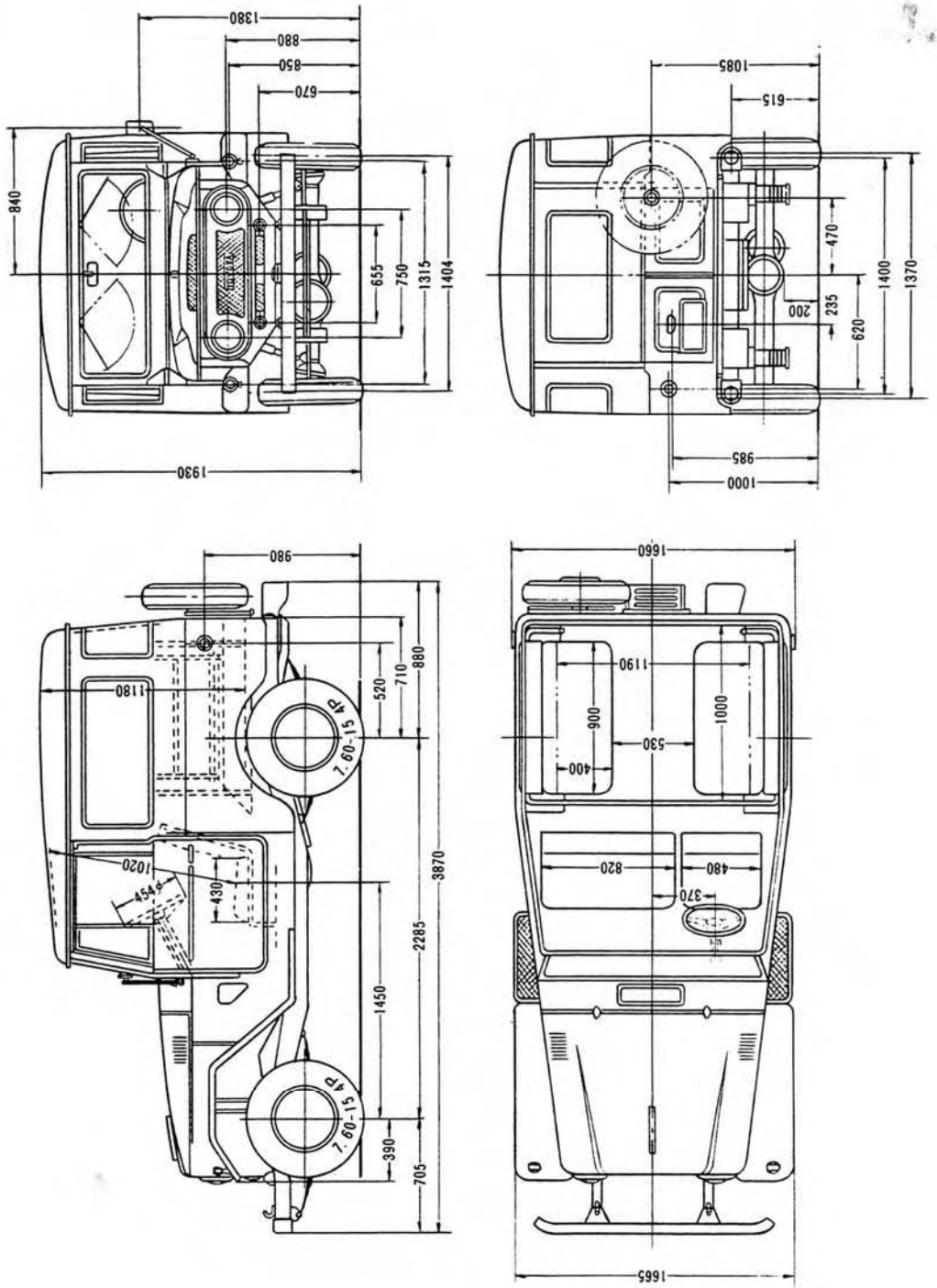
FJ40 (L) MOJOR DIMENSIONS (mm)



FJ40 (L) -C MAJOR DIMENSIONS (mm)



FJ40(L)V MAJOR DIMENSIONS (mm)



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FJ43

FJ43-1 FJ43L-1
FJ43 FJ43L
FJ43-B FJ43L-B
FJ43-C FJ43L-C

The Model FJ43 Series Land Cruiser is manufactured in four different types, with left hand drive vehicles available for each type. The model number with letter L indicates left hand drive vehicles.

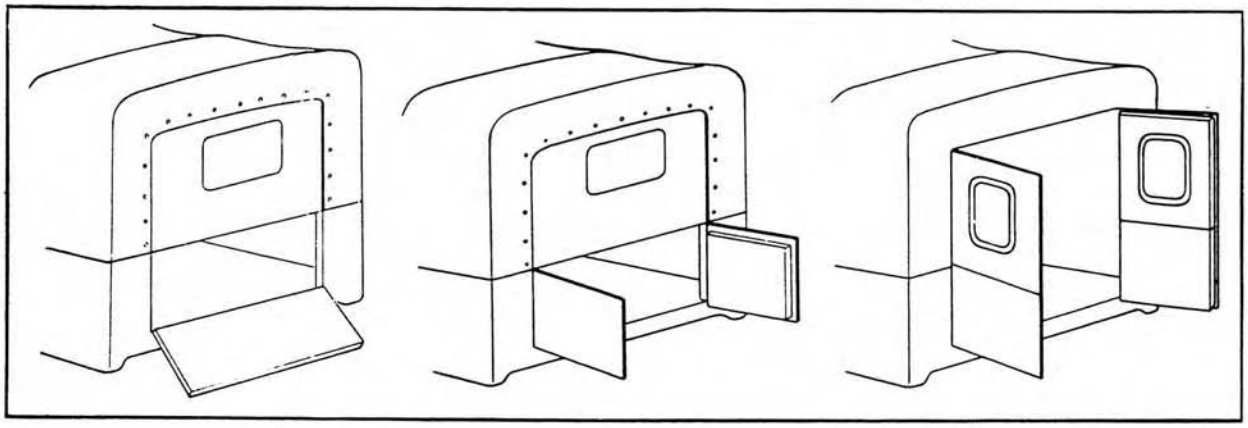
By installing different types of bodies on the chassis of Model FJ43-1 (FJ43L-1), three other types of FJ43 Series Land Cruisers are manufactured as a regular production.

As compared with FJ 40 Series, the wheelbase is longer and the rear leaf spring is strengthened by adding the sub-spring. Major body dimensions of these types are shown on the following pages. The dimensions of the left hand drive vehicles remains the same as those of the right hand drive vehicles with the exception of the steering wheel symmetrically relocated to the left side.

Major Specifications

		FJ43	FJ43-B	FJ43-C
Type		Canvas Top		
Overall Length	mm (in.)	4,230 (166.5)		
Overall Width	mm (in.)	1,665 (65.6)		
Overall Height	mm (in.)	1,970 (77.6)		
Wheelbase	mm (in.)	2,430 (95.7)		
Tread, Front	mm (in.)	1,404 (55.3)		
Rear	mm (in.)	1,400 (55.1)		
Net Vehicle Weight	kg (lbs.)	1,590 (3,510)		
Gross Vehicle Weight	kg (lbs.)	2,300 (5,000)		
Seating Capecity		3		9
Maximum Payload	kg (lbs.)	500 (1,100)		0
Maximum Speed	km/hr (mph)	130 (81)		
Grade Ability		44.5°		
Minimum Turning Radius	m (ft)	5.5 (18)		
Braking Distance 50km/hr (30mph)	m (ft)	15 (50)		
Tire Size, Front		7.60—15, 4p		
Rear		7.60—15, 6p		
Rear Gate		Drop	Swing out	Swing out
Rear Curtain		Roll up	Roll up	Swing out
Rear Seat		Parallel	Parallel	Canvasdoor Parallel

Types of Rear Gate and Rear Curatain

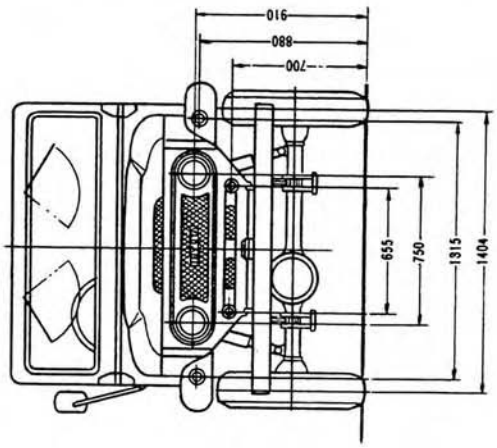


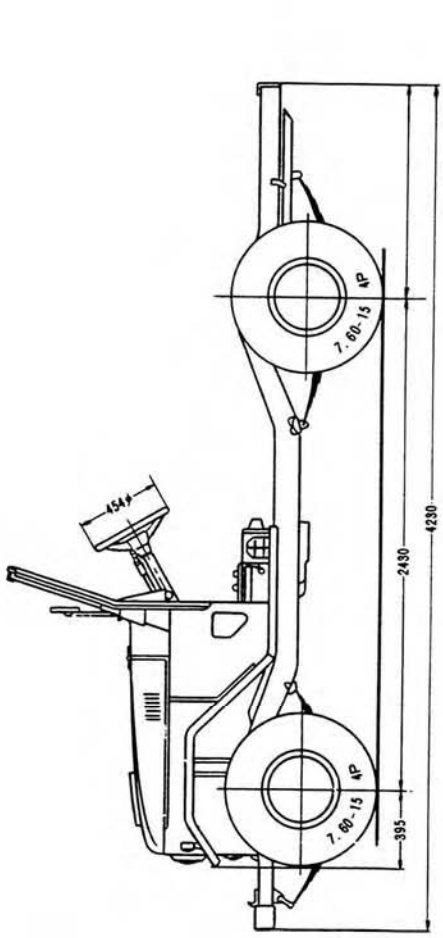
FJ43 & FJ43L

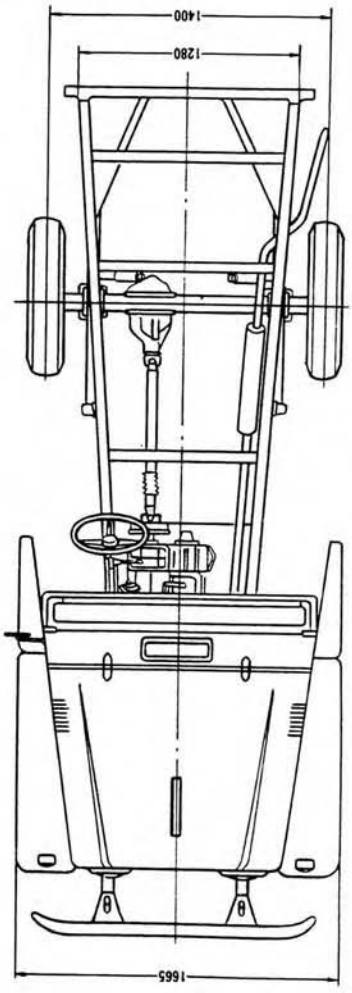
FJ43-B & FJ43L-B

FJ43-C & FJ43L-C

FJ43-1 MAJOR DIMENSIONS (mm)







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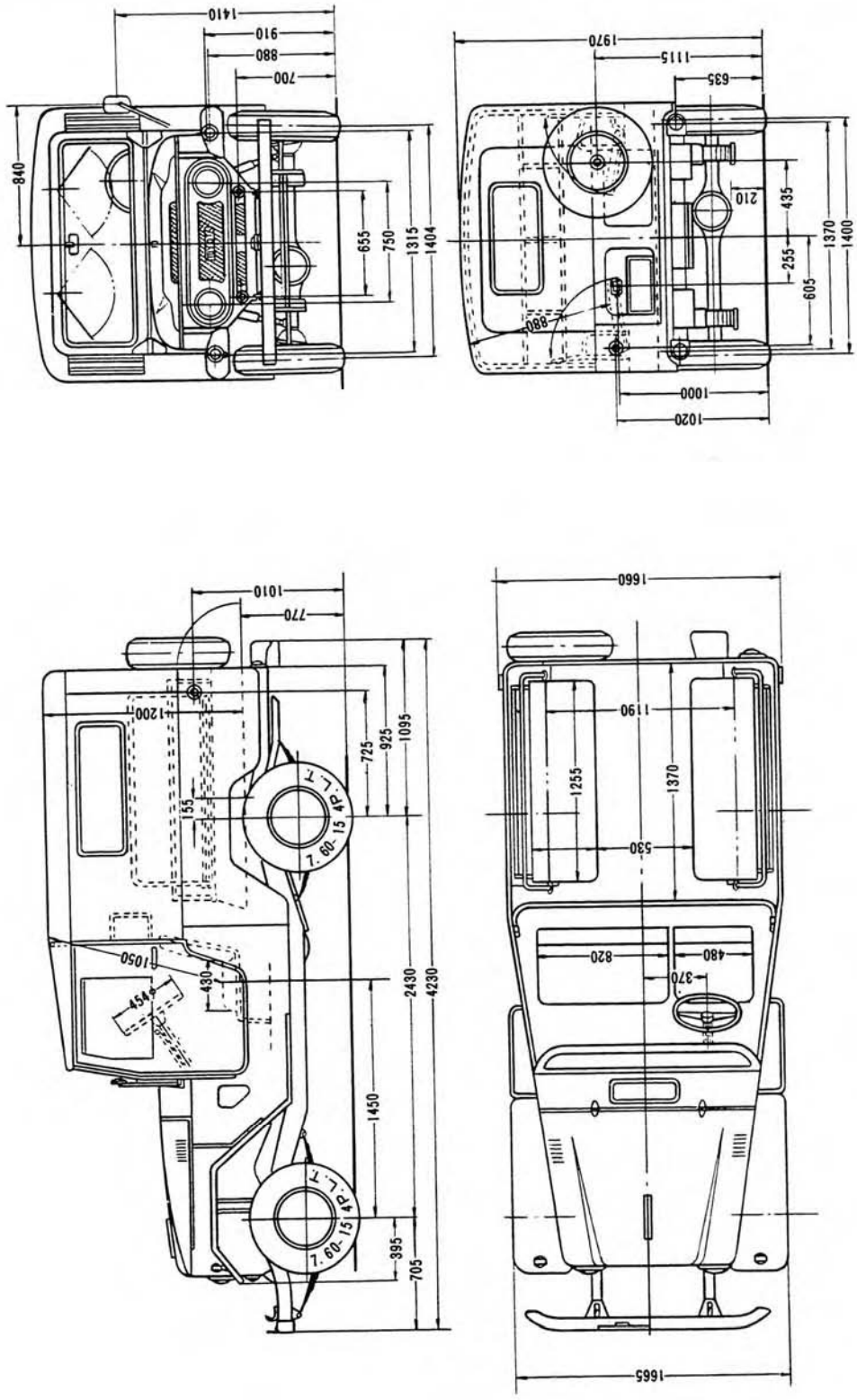
FJ43 (L) MAJOR DIMENSIONS (mm)



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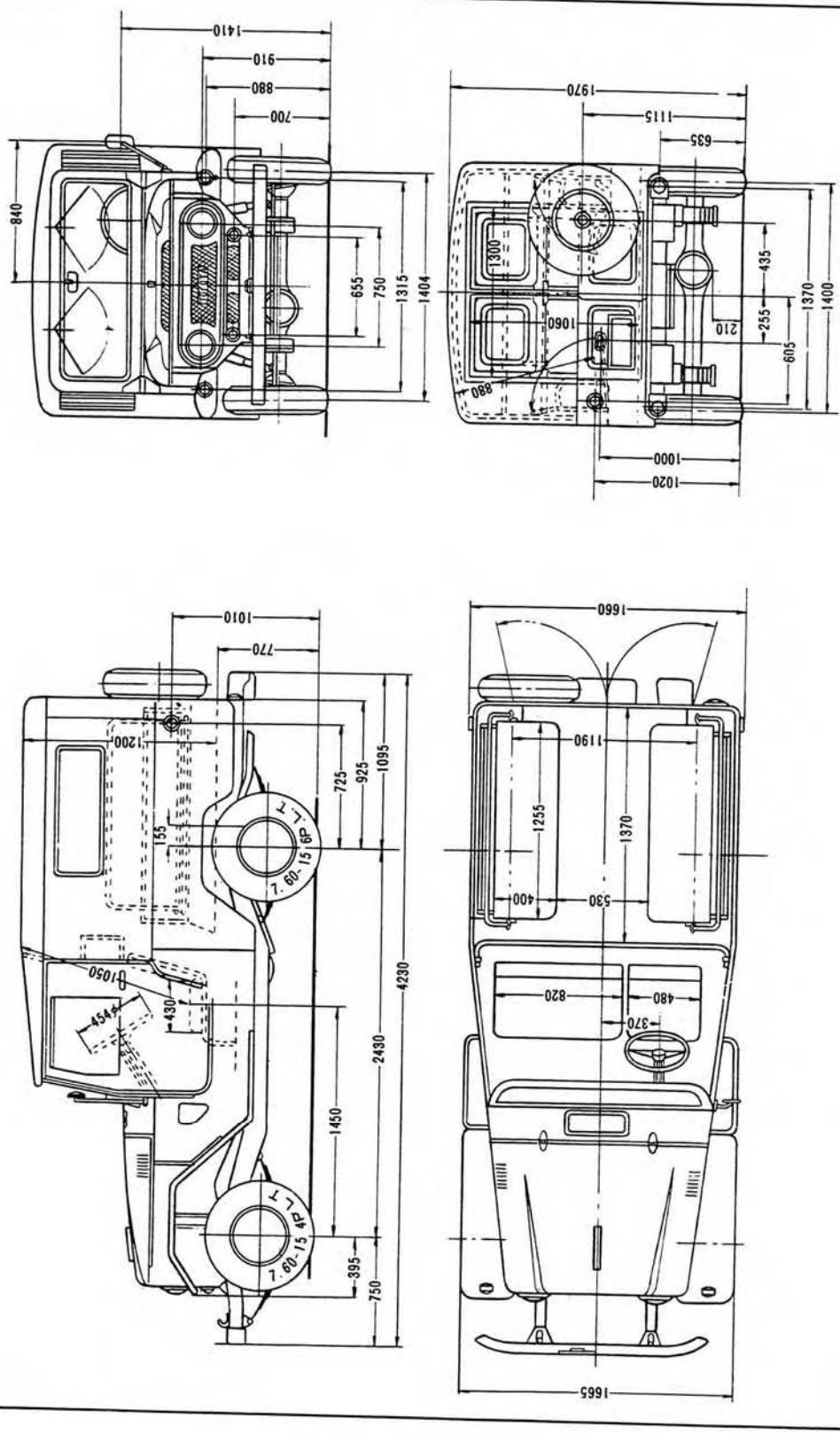
FJ43 (L) -C MAJOR DIMENSIONS (mm)



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FJ45

FJ45-1 FJ45L-1
FJ45-4
FJ45V FJ45LV
FJ45P-B FJ45LP-B

The Model FJ 45 Series Land Cruiser is manufactured in four different types, with left hand drive vehicles available for FJ45-1, FJ45V and FJ45P-B. The model number with letter L indicates left hand drive vehicles. The model FJ45-4 is a chassis with windshield designed to be used for a fire engine.

As compared with FJ40 and FJ43 Series, the wheelbase is longer, and the rear leaf spring is strengthened by adding the sub-spring similarly as FJ43 Series.

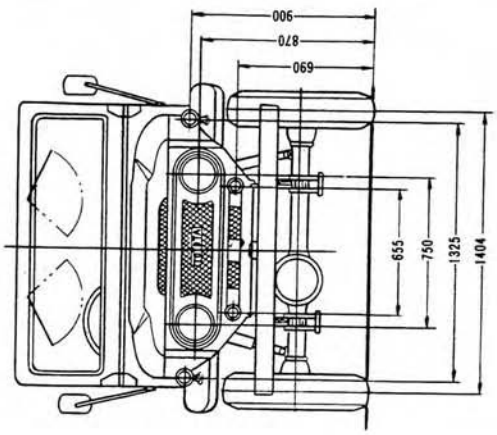
Four door wagon Model FJ45V and Pickup truck Model FJ45P are manufactured as a regular production by installing bodies on the chassis of Model FJ45-1.

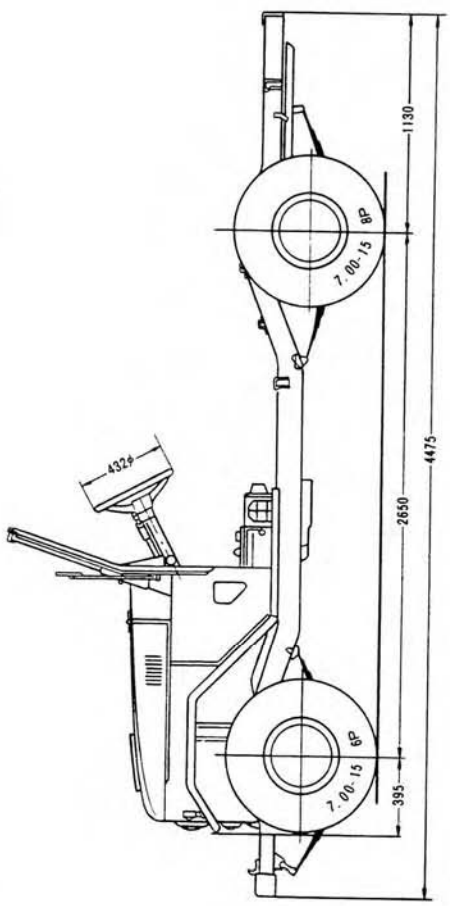
Major dimensions of these types are shown on the following pages. The dimensions of the left hand drive vehicles remains the same as those of the right hand drive vehicles with the exception of the steering wheel symmetrically relocated to the left side.

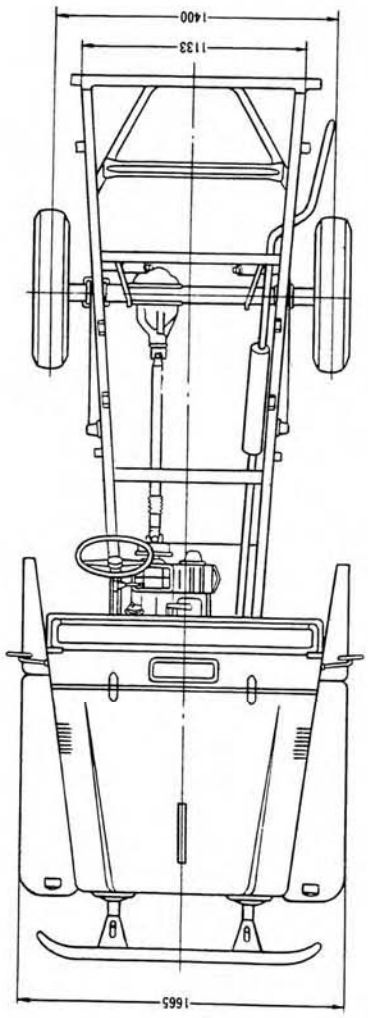
Major Specifications

		FJ45V	FJ45P-B
Type		4 Door Wagon	Pickup Truck
Overall Length	mm (in.)	4,660 (183.4)	4,985 (196.3)
Overall Width	mm (in.)	1,720 (67.7)	1,690 (66.5)
Overall Height	mm (in.)	1,770 (69.7)	1,960 (77.2)
Wheelbase	mm (in.)	2,650 (104.3)	2,950 (116.1)
Tread, Front	mm (in.)	1,404 (55.3)	
Rear	mm (in.)	1,400 (55.1)	
Net Vehicle Weight	kg (lbs.)	1,850 (4,080)	1,720 (3,790)
Gross Vehicle Weight	kg (lbs.)	2,700 (6,000)	2,900 (6,400)
Seating Capacity		3 6	3
Maximum Payload	kg (lbs.)	600 (1,300) 400 (880)	1,000 (2,200)
Maximum Speed	km/hr (mph)	120 (75)	120 (75)
Grade Ability		34°	34°
Minimum Turning Radius	m (ft)	6.2 (20.5)	6.6 (21.5)
Braking Distance 50km/hr (30mph)	m (ft)	15 (50)	18 (59)
Tire Size, Front		7.00—15, 6P	7.00—16 6p
Rear		7.00—15, 8P	7.00—16 8p

FJ45-1 MAJOR DIMENSIONS (mm)







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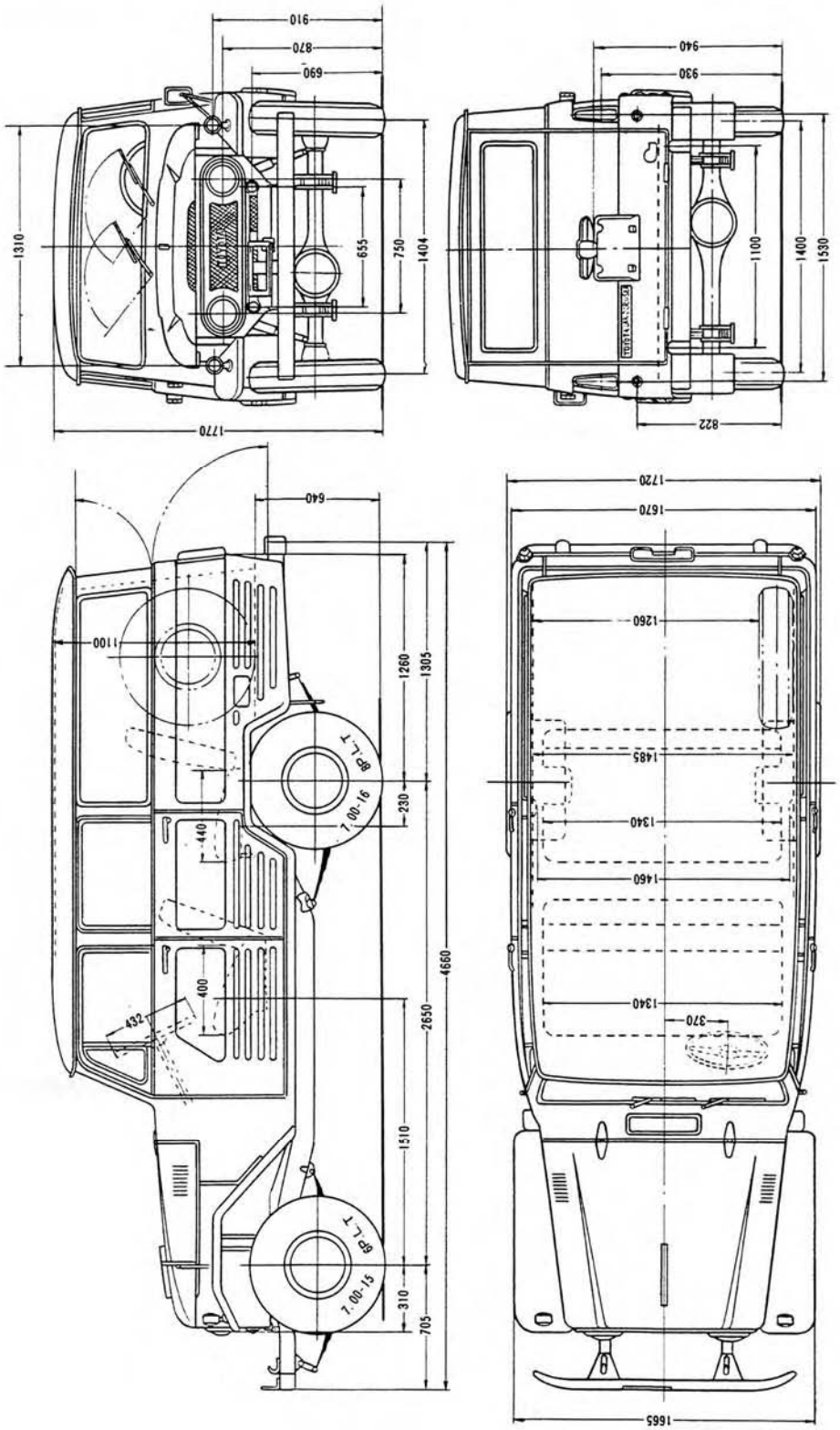
FJ45 (L) V MAJOR DIMENSIONS (mm)



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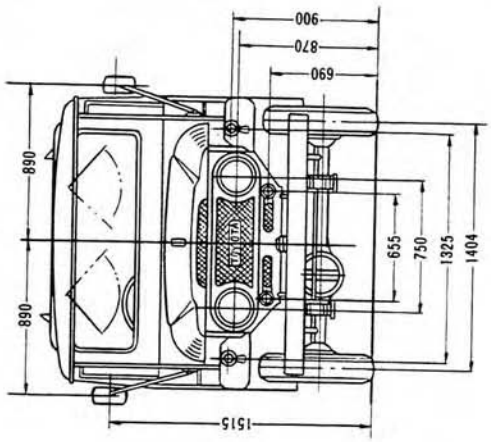
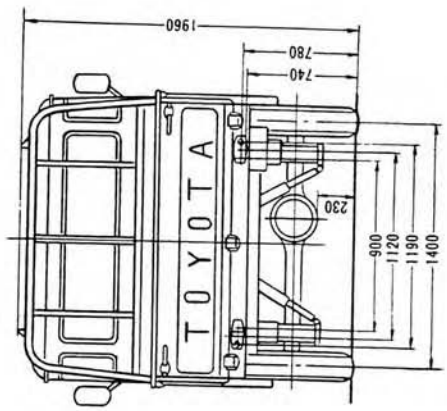
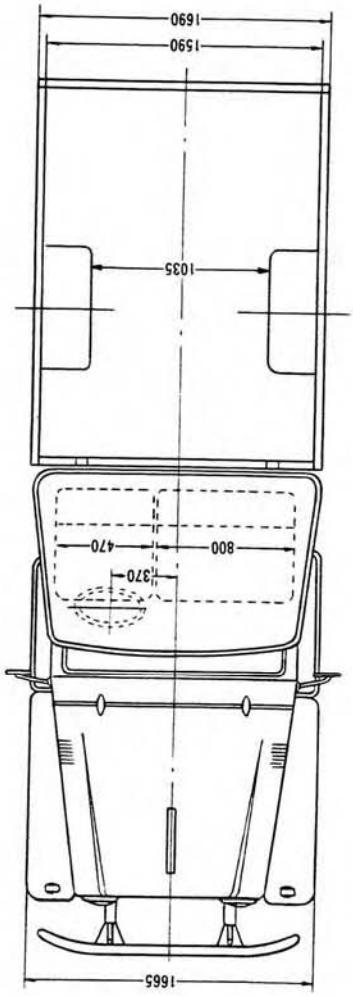
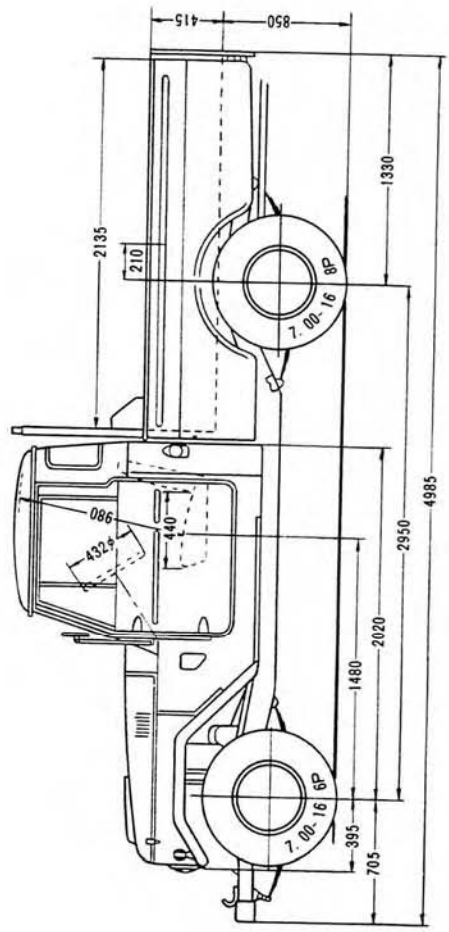
FJ45(L)P-B MAJOR DIMENSIONS (mm)









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Group 2

CLUTCH

PART I TROUBLE SHOOTING

1 Clutch Slips

When the clutch begins to slip, the amount of slip is so small at first that it usually passes unnoticed but the harm already done begins to appear by the following symptoms.

1. The vehicle begins to loose speed.
2. Fuel consumption begins to increase.
3. The engine overheats.
4. When the accelerator pedal is depressed suddenly while running, the engine responds but the vehicle does not pick-up in proportion.
5. No power when climbing hills.

POSSIBLE CAUSES	POSSIBLE REMEDIES
Improper clutch pedal free travel	Adjust clutch pedal
Oil or grease on facing	Replace clutch disc
Worn facing	Replace clutch disc
Weak or broken clutch springs	Replace springs
Warped pressure plate	Replace plate

2 Clutch Drags

The symptom for this trouble is that a disagreeable grating sound is produced and clutch fails to release promptly with resultant difficulty in shifting the transmission gears.

This trouble is most clear when shifting from neutral to low gear.

POSSIBLE CAUSES	POSSIBLE REMEDIES
Improper clutch pedal free travel	Adjust as per instruction
Worn or broken clutch pilot bearing	Replace bearing
Warped clutch disc	Replace clutch disc
Warped pressure plate	Repair plate
Sticking clutch pressure levers	Repair or replace pressure levers
Oil or grease on facing	Replace clutch disc
Engine idling too fast	Adjust idling

3 Clutch Grabs

The symptom for this trouble is the violent and sudden engagement of the clutch.

POSSIBLE CAUSES	POSSIBLE REMEDIES
Oil or grease on facing	Replace clutch disc
Burnt or glazed facing	Replace clutch disc
Sticking clutch pressure levers	Repair or replace pressure levers
Excessive clutch pedal free travel	Adjust as per instructions

4 Clutch Chatters

The clutch chatters especially in low or reverse gear.

POSSIBLE CAUSES	POSSIBLE REMEDIES
Oil or grease on facing	Replace clutch disc
Burnt or glazed facing	Replace clutch disc
Pressure levers improperly adjusted	Adjust pressure lever
Loose engine mounting	Tighten mounting bolts

5 Clutch Squeaks

Squeaking noise is particularly noticed when the pedal is depressed.

POSSIBLE CAUSES	POSSIBLE REMEDIES
Clutch release bearing improperly lubricated	Lubricate
Clutch pilot bearing improperly lubricated	Lubricate

6 Clutch Rattles

The clutch rattles especially at low speed or standing.

POSSIBLE CAUSES	POSSIBLE REMEDIES
Loose hub in clutch disc	Repair or replace clutch disc
Worn release bearing	Replace bearing
Worn pilot bearing	Replace bearing
Other worn clutch parts	Replace defective parts

PART II CLUTCH PEDAL

1 Clutch Pedal Removal and Installation

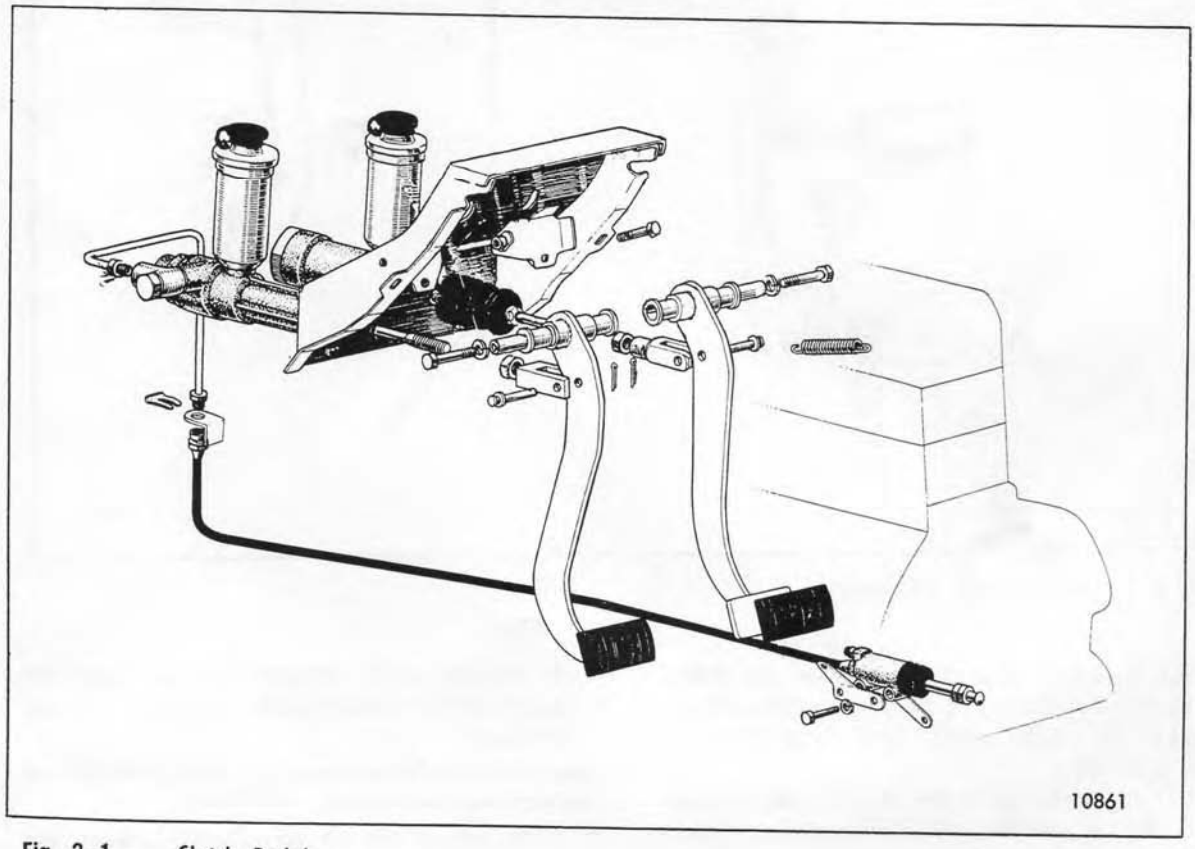


Fig. 2-1. Clutch Pedal

REMOVAL & INSTALLATION

1. Remove the pedal back spring.
2. Remove the cotter pin at the end of the master cylinder push rod pin and remove the rod pin.
3. Unloosen the bolt at the end of the pedal shaft collar. Then the clutch pedal can be removed off the master cylinder piston rod crevice.

For installation, follow "Removal" in reverse order.

2 Clutch Pedal Adjustment

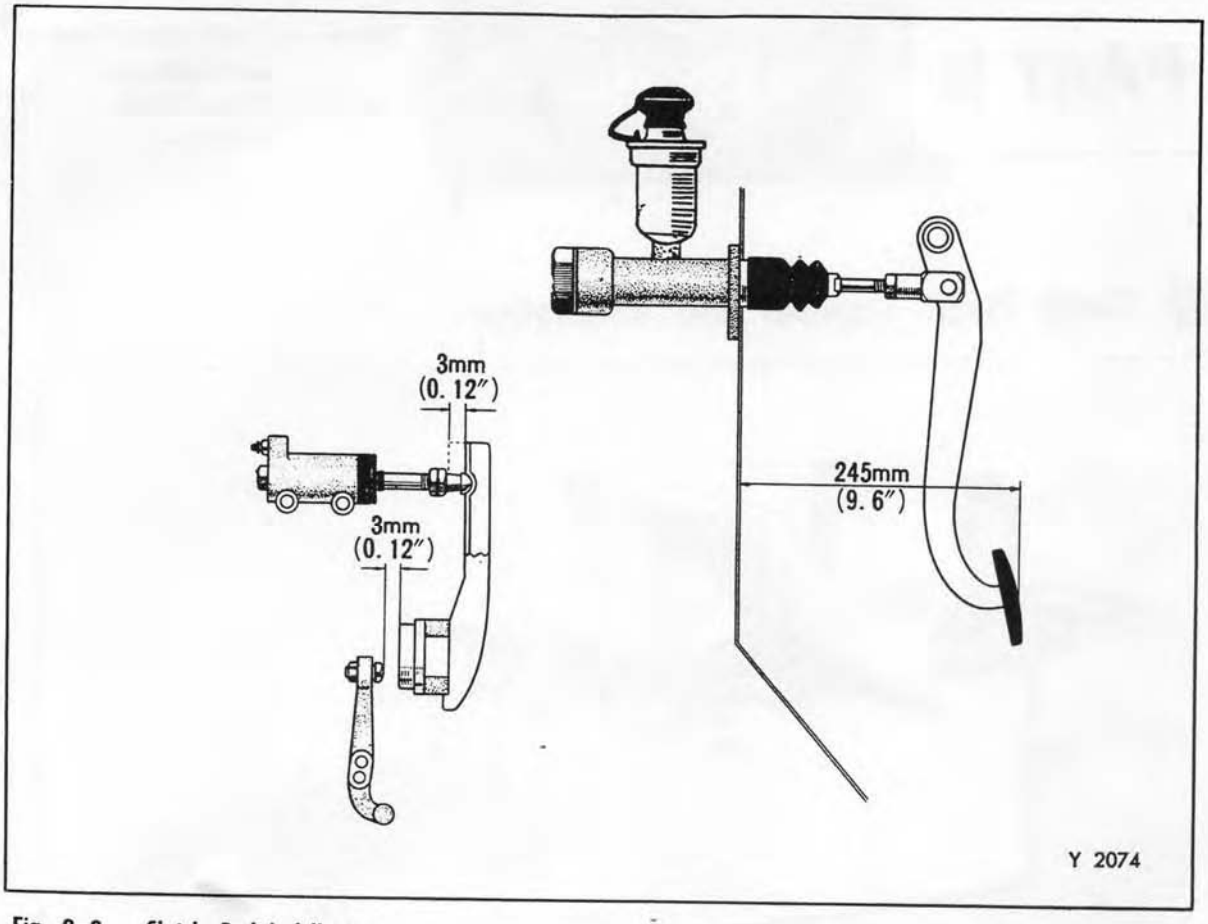


Fig. 2-2. Clutch Pedal Adjustment

Clutch pedal adjustment should be made whenever the clutch dose not disengage or engage properly or clutch parts have been replaced with new ones.

Before proceeding to the clutch pedal adjustment, make sure that the clutch pressure lever height is correctly adjusted to the specification (76.5 mm/3.06 in.) and also that the play of the fork is 3 mm (0.12 in.) at the end of the release fork.

1. Adjust the pedal stopper bolt so that the pedal to toe-board distance will be 245 mm (9.6 in.)

Note : The return spring should be installed and the push rod pin should not be installed at this time.

2. Next, adjust the master cylinder piston rod by the adjusting nut with the piston rod in fully released position so that the push rod pin will be inserted through the piston rod crevice.

PART III SERVICE OPERATIONS

1 Removal and Installation

REMOVAL

1. Remove the transmission and transfer case as explained in Group 3, Part III, Section 1 on page 3-10.
2. Unloosen the clutch fork spring and remove the hole cover set plate and hole cover.
   The clutch fork can then be removed. Also take out the clutch release bearing hub and clutch release bearing.
3. Remove 6 bolts attaching the clutch cover to the flywheel.
   The clutch cover assembly and the clutch disc assembly can then be taken out from under the housing.

INSTALLATION

1. Install the clutch disc and clutch cover assembly to the flywheel using Clutch Guide Tool (09301 55021).
   The clutch disc should be accurately centered when assembling to prevent the possible difficulty in fitting the main drive gear. If the special service tool is not available, use a spare main drive gear for centering.
2. Tighten 6 bolts uniformally and pull out the guide tool.
3. Attach the transmission and transfer case with the clutch release bearing and bearing hub attached to the main drive gear.
4. Install the clutch fork, hole cover and hole cover set plate. Then install the clutch fork back spring.

2 Disassembly

Caution : Prior to disassembly, punch mating marks on the clutch cover and pressure plate. This marking will enable proper alignment during assembly.

1. Place the clutch on an arbor press. Place a flat steel plate over the upper surface of the clutch cover and compress the clutch lightly with a press.
   Remove the three pressure lever bolts using a suitable socket wrench. Release the press slowly until the clutch springs are free, and then remove the cover.

Caution : Do not attempt to remove the bolts without compressing the clutch assembly with a press as pressure of the clutch pressure springs inside the clutch will cause the cover to fly out with great force resulting in extreme danger.

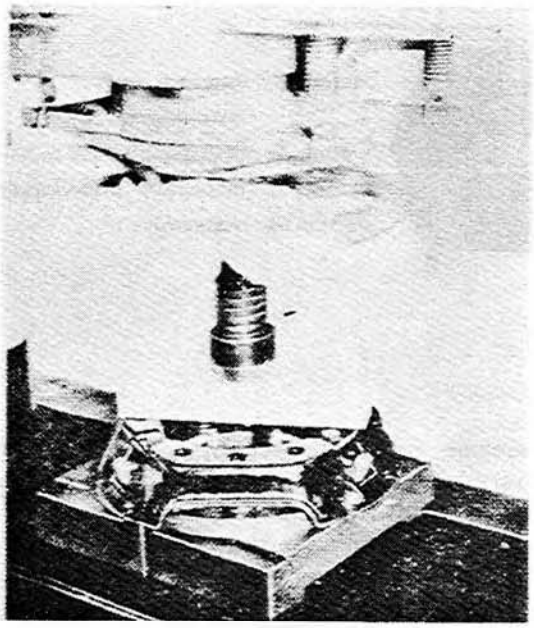


Fig. 2-3. Pressing the Clutch Cover

2. The pressure levers require no disassembling unless inspection of the parts indicates the necessity.
   To disassemble the pressure lever from the pressure plate, remove the cotter pin from the end of the pressure lever pin, then remove the lever pin and needle rollers.

3 Inspection & Repair

CLEANING

Wash all parts, except the release bearing and clutch disc facings, in dry-cleaning solvent, and dry with compressed air.

Caution : The release bearing is permanently packed with lubricant and should not be soaked in cleaning solvent as this may disolve the lubricant.

RELEASE BEARING

Hold the inner race stationary and rotate the outer race. If roughness or noise is present, replace the bearing.

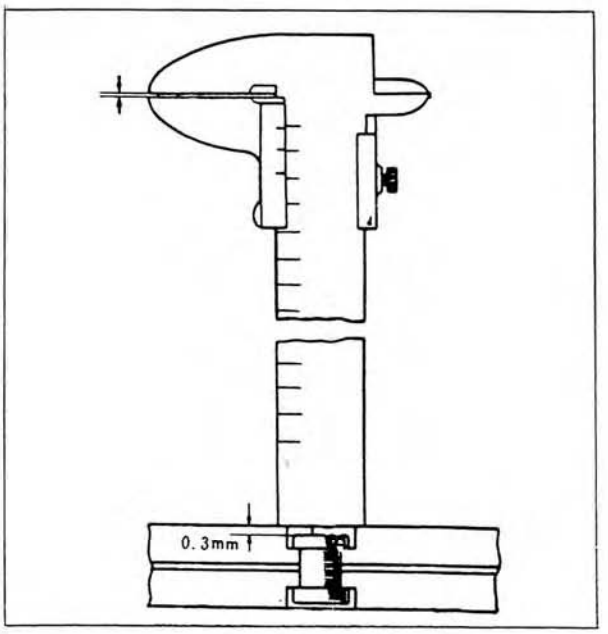


Fig. 2-4. Checking the Depth of Rivet

CLUTCH DISC

1. Inspect the clutch disc for worn and loose facings, loose rivets, worn or damaged torsion rubbers, rusty or burred splines, and

distortion.

If any of these conditions is present, replace the clutch disc.

Note : The depth of the surface of clutch facing to the head of rivet should be more than 0.3 mm (0.012 in.).

2. Try the fit of the disc hub on the transmission main drive gear splines and replace if the clearance of the disc hub and the main drive gear splines shows excessive looseness.
3. Inspect the facing for oily or greasy conditon and also check for possible sources of the grease or oil.

CLUTCH PRESSURE PLATE

Inspect the contact surface of the pressure plate for excessive score marks, burned areas, or ridges.

If any of these conditions exists, replace the pressure plate.

CLUTCH SPRING

1. Inspect the spring for weakened, deformed, or damaged conditions.
2. Measure the free length of the spring, and replace the spring if it is less than 56.7 mm (2.23 in.).
3. Check the spring for squareness by placing the spring upright on a surface plate and use a steel square against the coils of the spring. The spring should not deflect more than 2.5 mm (0.1 in.) out of vertical at their free height of 56.9 mm (2.23 in.).

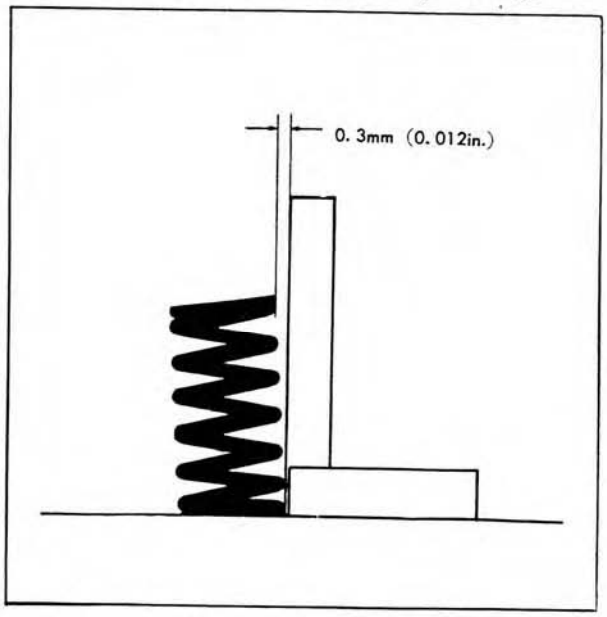


Fig. 2-5. Checking Spring for Squareness

4. Check the spring with a coil spring tester. Replace the spring if the spring tension is less than 44 kg (97 lbs.) when the spring is compressed to 42.9 mm (1.69 in.)

CLUTCH PRESSURE LEVER

1. Check the pressure lever contact surface with the clutch cover and release bearing, and replace the lever if excessively worn.
2. Check for play by moving the lever up and down. If excessive play is indicated, replace all the pressure lever parts as necessary. If the clutch pressure levers are satisfactory, wash all parts with dry-cleaning solvent and dry with compessed air and apply a small amount of lubricating oil to the pressure lever pins and pressure plate pins.
3. Measure and correct the pressure lever height as follows. Assemble the clutch parts to the flywheel and tighten the clutch cover bolts evenly.

   Using the Cluthc Pressure Lever Height Gage 09302-55011, measure the clutch pressure lever height.

   The height should be 76.5 mm (3.06 in.).

   Adjust the lever height with the clutch pressure lever adjusting bolts.

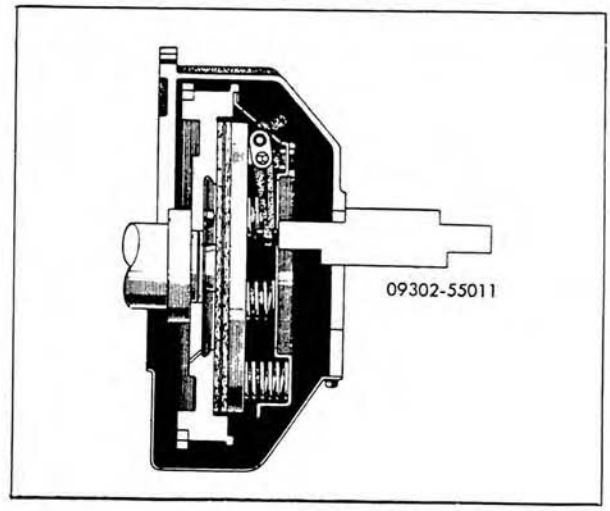


Fig. 2-6. Checking Clutch Pressure Lever Height

CLUTCH PILOT BEARING

The bearing requires attention only when the clutch is removed from the vehicle, at which time it should be inspected for noises and damages and should be replaced if necessary. To remove the bearing, use Clutch Pilot Bearing Puller 09303-55010.

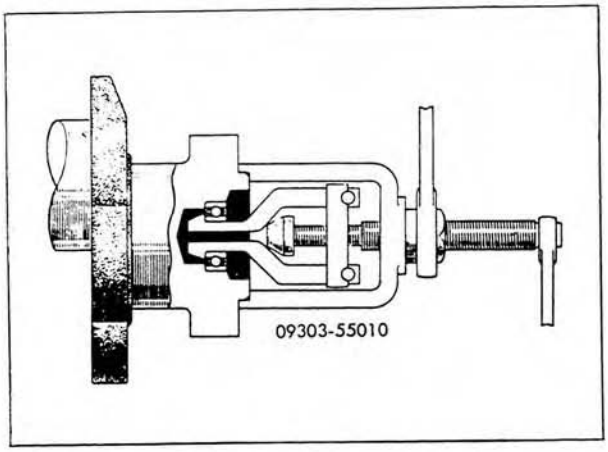


Fig. 2-7. Clutch Pilot Bearing Removal

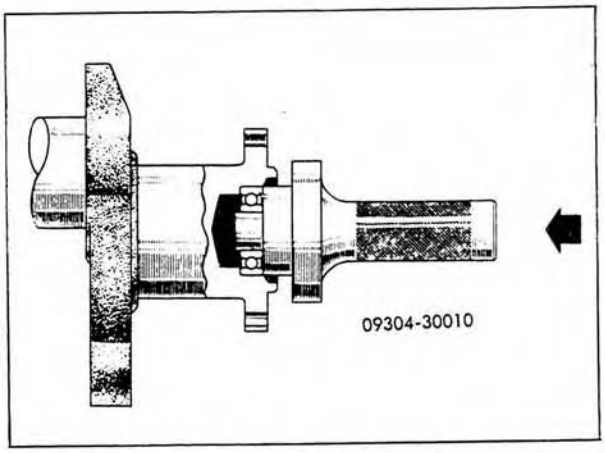


Fig. 2-8. Clutch Pilot Bearing Installation

To install, use Clutch pilot Bearing and Differential Side Bearing Replacer 09304-30010.

4 Assembly

1. If the pressure lever is disassembled for replacement, reassemble as follows.
   Insert 15 clutch pressure plate pin rollers into the pressure lever and insert the pressure lever into the clutch pressure plate fork, then insert the pressure plate pin and cotter pin. Insert the clutch pressure lever roller into the pressure lever, and insert the pressure lever yoke over the pressure lever, then insert the pressure lever pin and cotter pin.
2. Place the pressure plate on an abor press and place the nine clutch springs over respective pins on the pressure plate. Place the clutch cover on the pressure plate so that the mating marks made during disassembly may coincide.
   Place a steel plate on the clutch cover and compress the springs slowly until the clutch cover seats tightly on the pressure plate.
   Install the three bolts securing the clutch cover to the pressure lever pin yoke, and tighten firmly, then release the press.

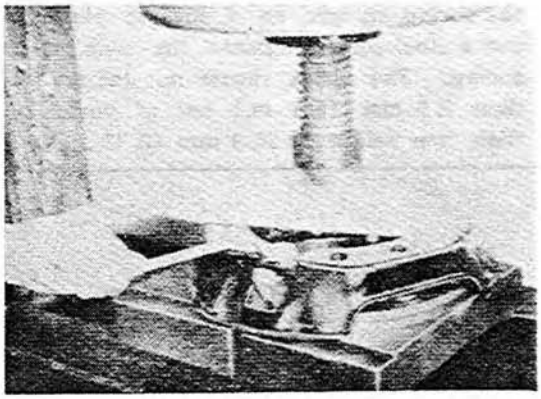


Fig. 2-9. Clutch Cover Installation

PART IV MASTER CYLINDER & RELEASE CYLINDER

1 Master Cylinder Removal & Installation

REMOVAL

1. Plug the air vent of the master cylinder oil tank.
2. Disconnect the clutch release pipe from the master cylinder.
3. Remove the brake pedal return spring.
4. Remove the master cylinder push rod pin.
5. Loosen three attachng bolts securing the master cylinder to the dash board.
6. Remove the master cylinder.

INSTALLATION

1. Attach the master cylinder to the dash board.
2. Connect the master cylinder push rod to the pedal lever by installing the push rod pin and securing it in place with the cotter pin.
3. Install the clutch pedal return spring.
4. Connect the clutch release pipe to the master cylinder.
5. Fill the tank with the brak efluid.
6. Bleed air as outlined in Group 9, Part II, Section 4, Air Bleeding.

2 Master Cylinder Service Operations

DISASSEMBLY

1. Remove the oil tank cap and pour out any remaining fluid.
2. Loosen the oil tank set bolt and remove the oil tank.
3. Remove the master cylinder boot from the cylinder and remove the piston rod.
4. Remove the piston stop ring and piston stop and take out the piston.
5. Remove the master cylinder plug and packing.
6. Remove the return spring and piston cup.
7. Remove the piston packing.

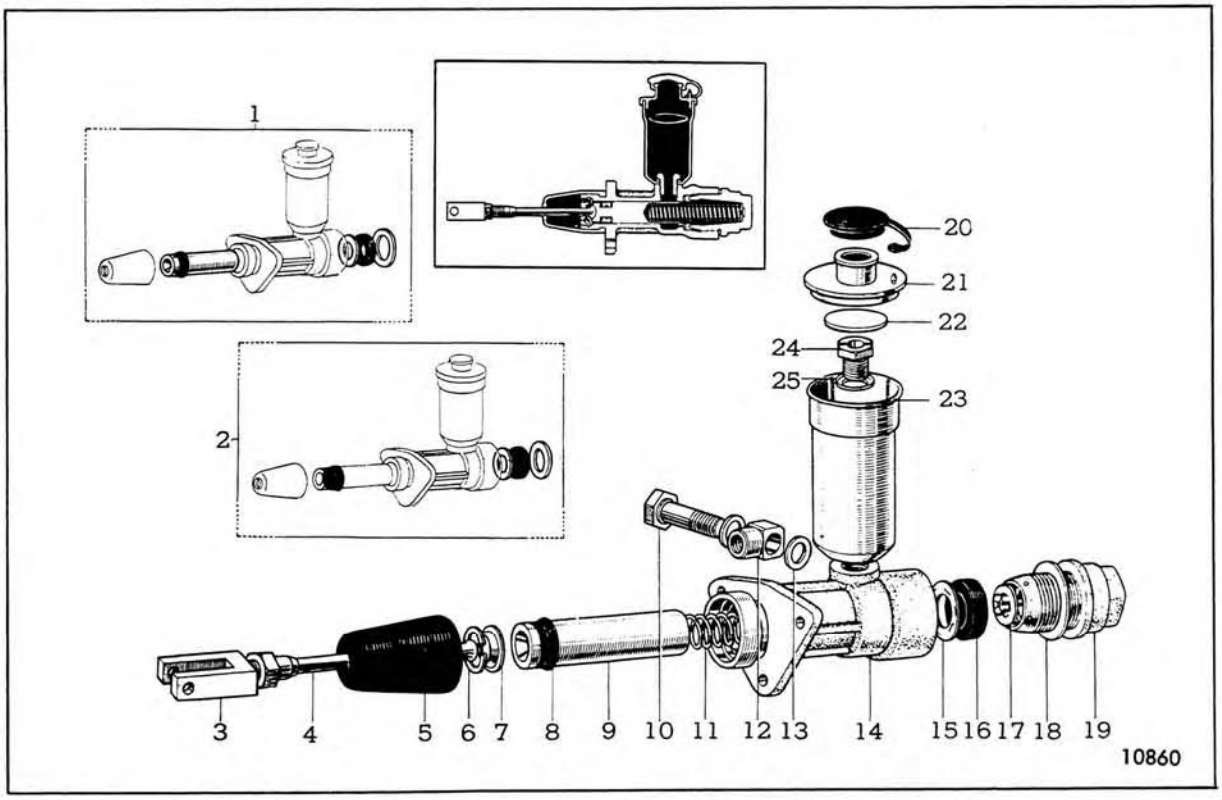


Fig. 2-10. Master Cylinder

INSPECTION AND REPAIR

1. Clean all parts in alcohol and inspect for damage, wear, or other defective condition.

Caution : Clean the piston primary cup and piston secondary cup with alcohol and do not use gasoline or light oil.

2. Check the master cylinder bore for scored or worn conditions and replace if fund damaged.
3. Check the clearance between the master cylinder and the piston. If the clearance exceeds more than 0.15 mm (0.0059 in.), replace the piston.

Note : Clearance between cylinder and piston
Standard Value 0.040—0.125 mm (0.0016—0.0050 in.)
Limit 0.15 mm (0.0059 in.)

4. Check the master cylinder connections to the pipe or oil reservoir, and replace if found damaged.
5. If the piston is excessively scored or worn, replace with the new one.
6. The piston primary and secondary cups that are cracked, damaged, or deformed should be replaced.
7. Check the oil tank for crack, damage, or

deformation. Replace the tank if found defective.

8. Replace the piston return spring if exessively weaked.

Note : Free Length 84.2 mm (3.31 in.)

ASSEMBLY

Note : Each part should be kept clean, and before assembling, apply vegetable oil to cylinder bore piston and piston cup. Use the new packing.

1. Insert the piston secondary cup into the piston.
2. Install the piston primary cup, return spring seat and return spring into the cylinder. Then, install the master cylinder packing and plug.
3. Insert the piston and piston stop into the cylinder and install the piston stop ring.
4. Install the master cylinder piston rod, then attach the boot to the cylinder.
5. Install the oil tank to the cylinder and the oil tank filler cap.

3 Release Cylinder Removal & Installation

REMOVAL

1. Plug the air vent of the master cylinder filler cap.
2. Raise the front end of the vehicle.

Caution : Place stands under the frame to assure safety for the operation.

3. Disconnect the clutch flexible hose from the release cylinder union.
4. Remove the fork back spring.
   Remove the release cylinder by loosening the attaching bolts from the clutch housing.

INSTALLATION

1. Install the release cylinder and spring hanger.
2. Adjust the piston rod adjuster so that the play of the fork will be 3 mm (0.118 in.) at the end of the release fork. Then, install the back spring.
3. Connect the flexible hose to the release cylinder union.
4. Bleed air according to the following procedures.
5. Attach a vinyl tube to the bleeder plug and submerge the free end of the tube in a clean glass container partially filled with brake fluid.
6. Unscrew the plug slowly and depress the clutch pedal. Repeat this operation until air bubbles cease to appear.
7. As soon as the air bubbles stop coming out of the tube, tighten the bleeder plug and disconnect the tube.
8. After making sure that there is no signs of oil leakage, lower the vehicle.

4 Release Cylinder Service Operations

DISASSEMBLY

1. Remove the piston rod along with the boot.
2. Remove the piston and piston cup.

ASSEMBLY

1. Assemble the piston cup to the piston, and install the piston into the cylinder.
2. Assemble the piston rod to the cylinder and install the boot over the cylinder.

Caution : Keep all parts clean and coat the brake oil before assembly.
Use a new union packing.

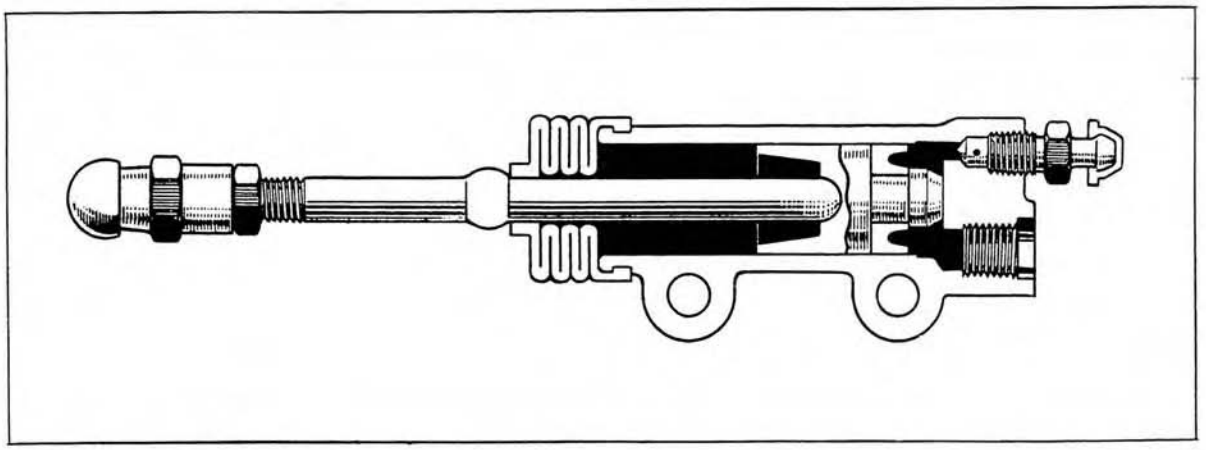


Fig. 2-11. Release Cylinder

INSPECTION AND REPAIR

1. Clean all parts in brake oil or alcohol.
2. Check the inside of the cylinder for scored, worn or damaged conditions, and replace if defective.
3. Measure the outer diameter of the release cylinder piston and replace with new one if the diameter is less than 22.127 mm (0.87 in.).
4. Inspect the piston cup for cracked, damaged, or deformed conditions.

PART V SPECIFICATIONS

Clutch Type		Dry, single plate with torsion rubber dampers
Clutch Pedal Free Play		25 mm (1 in.)
Clutch Pedal Height		245 mm (9.6 in.)
Clutch Facing	Outer Diameter	275 mm (10.8 in.)
	Inner Diameter	175 mm (6.9 in.)
	Thickness	3.4~3.6 mm (0.134~0.142 in.)
	Wear Limit	more than 0.3 mm (0.012 in.) from rivet head
Clutch Spring	Nos. of Spring	9
	Free Height	56.7 mm (2.23 in.)
	Installed Height	42.9 mm (1.69 in.)
	Installed Load	52~55 kg (114.6~121.3 lbs.)
	Limit	44 kg (97 lbs.)
	Squareness	not more than 2.5 mm (0.098 in.) at free height
Release Cylinder	Cylinder Bore	19.05~19.102 mm (0.75~0.752 in.)
	Piston Outer Diameter	18.995~19.02 mm (0.748~0.749 in.)
	Clearance between Cylinder and Piston	0.03~0.107 mm (0.001~0.004 in.)
	Limit	0.15 mm (0.006 in.)
	Release Fork Play	3 mm (0.12 in.)
Master Cylinder	Cylinder Bore	19.05~19.102 mm (0.75~0.752 in.)
	Piston Outer Diameter	18.977~19.01 mm (0.747~0.748 in.)
	Clearance between Cylinder and Piston	0.04~0.125 mm (0.0016~0.0049 in.)
	Limit	0.15 mm (0.006 in.)
	Return Spring Free Length	84.2 mm (3.31 in.)

Torque Limits

Description	m-kg	ft-lbs
Clutch Pressure Lever Pin Yoke Bolt	3.5~4.1	25~30
CLutch Cover × Flywheel	2.0~2.6	15~19

Group 3

TRANSMISSION & TRANSFER CASE

PART I GENERAL INFORMATION

Transmission and Transfer Case

A standard 3-speed forward and 1-speed reverse transmission is used as standard equipment on the FJ40 Series Toyota Land Cruisers. This three speeds transmission provides smooth synchromesh operations in second and top speeds.

The transmission is supplied in two types. One has the remote control type gear shift mechanism and the other has the direct control type gear shift lever mounted on the transmission case. Both types use the same transmission component parts except for the gear shift forks and gear shift shaft.

The transfer case is located behind the transmission and it can be shifted in high and low speed as auxiliary unit of the transmission. The front drive mechanism is mounted at the front of the transfer case and the front drive can be operated merely by pulling the front drive shift button on the instrument panel.

The speedometer drive gear and the speedometer driven gear are installed at the rear end of the transfer case.

In case the gears are required to be replaced, care should be exercised since the combination of the drive gear and driven gear differs in conjunction with the tire sizes and differential reduction gear ratios.

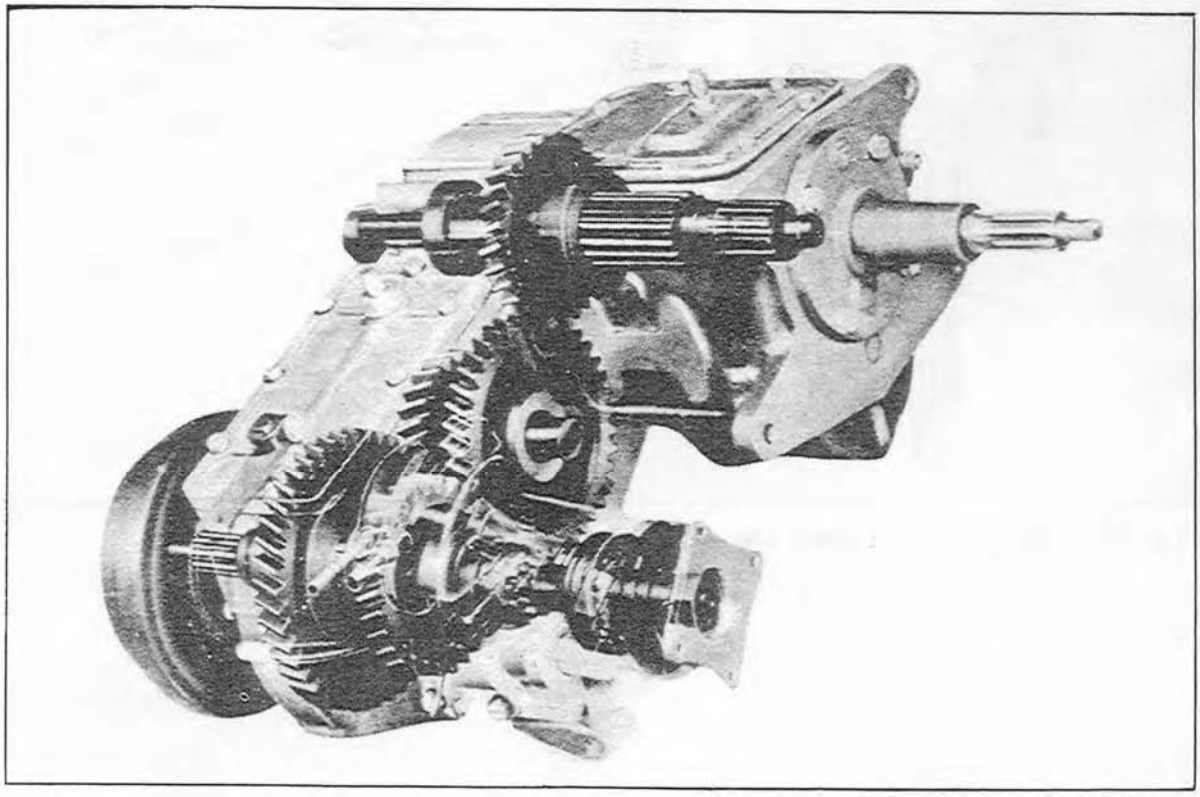


Fig. 3-1. Transmission and Transfer Case

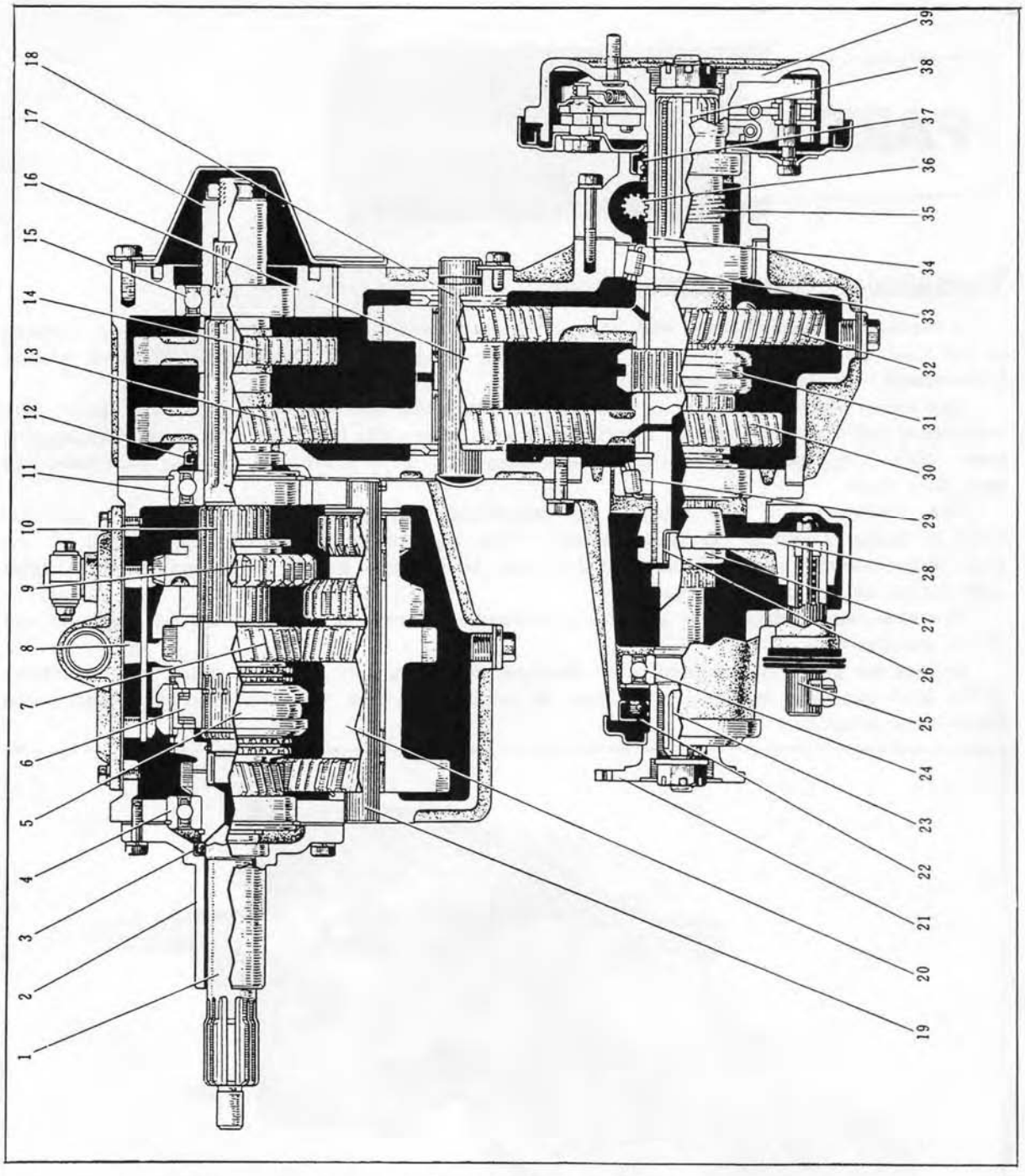


Fig. 3-2. Transmission & Transfer Case Cross Section

1. Main Drive Gear
2. Transmission Front Bearing Lock
3. Oil Seal
4. Transmission Front Bearing
5. Clutch Hub Sleeve
6. High Speed Clutch Hub
7. Second Speed Gear
8. Gear Shift Sliding Lever
9. Low & Reverse Sliding Gear
10. Spline Shaft
11. Transmission Rear Bearing
12. Oil Seal
13. Transfer Drive Gear
14. Power Take-off Driving Gear
15. Transfer Rear Bearing
16. Transfer Idle Gear
17. Spline Shaft End Space
18. Transfer Idle Gear Shaft
19. Counter Gear Shaft
20. Counter Gear
21. Transfer Joint Retainer
22. Oil Seal
23. Front Driving Shaft
24. Transfer Front Driving Shaft Bearing
25. Front Drive Fork Shaft
26. Needle Bearing
27. Front Drive Clutch Hub
28. Front Drive Fork
29. Tapered Roller Bearing
30. Transfer High Speed Gear
31. High & Low Clutch Hub
32. Transfer Low Speed Gear
33. Tapered Roller Bearing
34. Speedometer Spacer
35. Speedometer Drive Gear
36. Speedometer Driven Gear
37. Oil Seal
38. Transfer Drive Shaft
39. Center Brake Drum

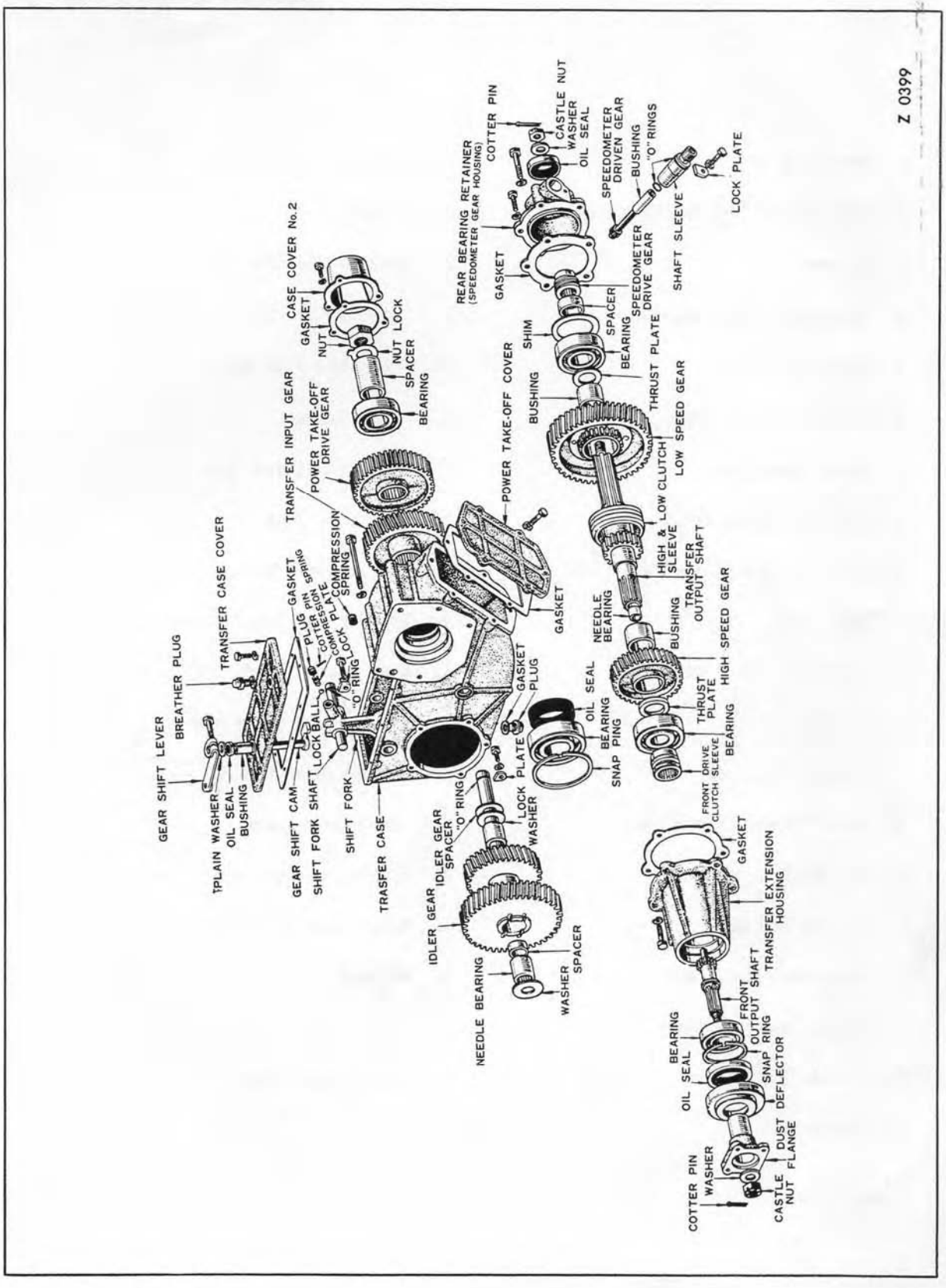


Fig. 3-3. Transmission

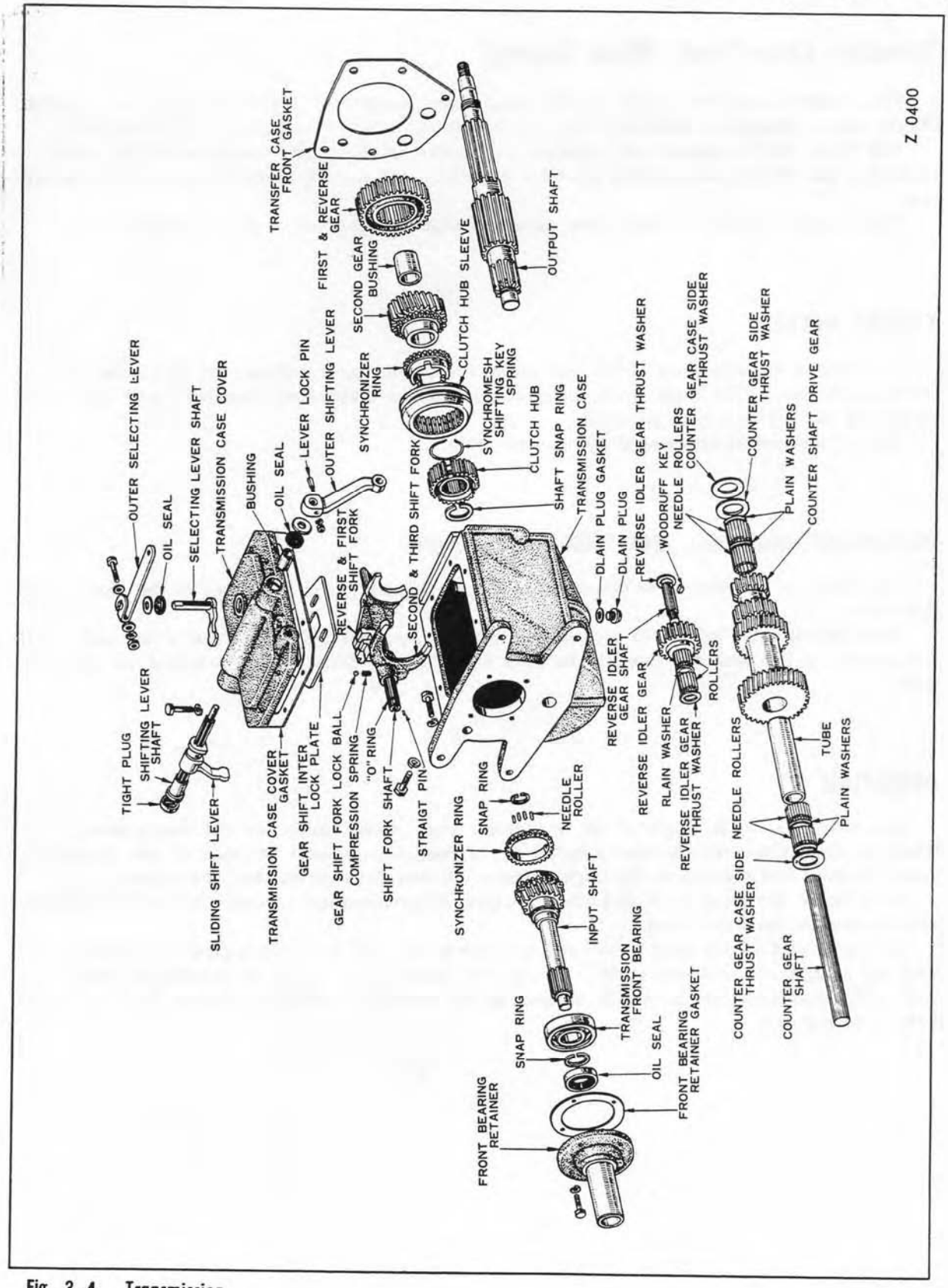


Fig. 3-4. Transmission

Transfer Case Front Drive Control

The transfer case front drive control mechanism consists of the front drive shift button, change valve, diaphragm chambers, front drive indicator lamp, vacum pipes, and shift fork.

The front drive is operated by utilizing the vacuum in the engine intake manifold, which is induced to the diaphragm chamber provided on the front drive extension housing of the transfer case.

The construction of this front drive control mechanism is shown on the next page.

CHANGE VALVE

The change valve consists of the four ports, two in the upper portion and the other two in the lower portion. The lower ports communicate with the diaphragm chambers, and the upper ports with the engine intake manifold.

The air strainer is attached to the change valve.

DIAPHRAGM CHAMBERS AND FRONT DRIVE FORK

The push rod is attached to the center of the diaphragm and is connected to the front drive shift lever.

Two chambers are subject to vacuum and atmospheric pressure. The front drive fork shaft is connected to the push rod through the lever and the front drive fork is attached on the fork shaft.

OPERATION

The change valve is operated by the front drive shift button on the instrument panel. When the front drive shift button is pulled out, atmospheric pressure actuates on the diaphragm upper chamber and vacuum in the engine intake manifold actuates on the lower chamber.

As a result, the front drive fork slides the front drive clutch hub to mesh with the front driving shaft to engage the front drive.

At the same time the front drive indicator lamp switch ball sits on the groove provided on the push rod to light the indicator lamp. In case the front drive button is pushed in, the front drive mechanism functions in reverse manner as the operations described above and the front drive is disengaged.

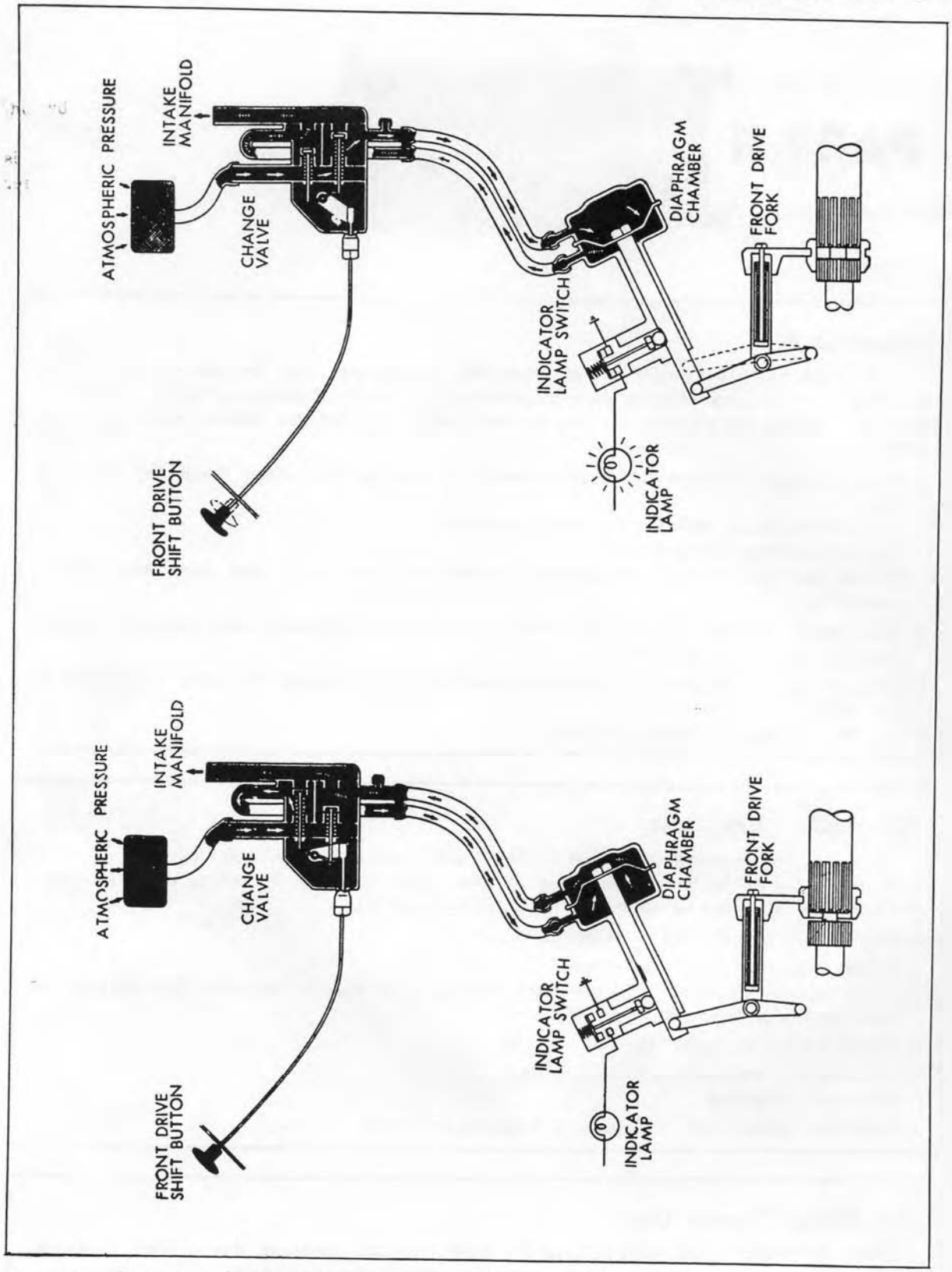


Fig. 3-5. Front Drive Control Mechanism

PART II TROUBLE SHOOTING

Transmission Noise

The noise which seemingly comes from the transmission may be caused by another assembly such as axles, transfer case, propeller shafts, universal joints, or clutch. Therefore prior to replacing the transmission due to noise, make sure that the trouble does not exist elsewhere.

1. When the noise develops in the transmission or transfer case, first check the lubricant level.
   Lack of lubrication will produce groaning sound.
   Add the lubricant as necessary.
   If the lubricant level is satisfactory, remove the case cover and check the interior carefully.
2. Worn gears and bearings will also produce a high groaning sound while running. Replace the worn gears and bearings.
3. Damaged gears will produce a groaning sound but it will change to a knocking sound at low speed.
   Replace the gears if found damaged.

Hard Shifting (Transmission)

If a clashing unpleasant sound is produced and gears are exceedingly difficult to shift, it is usually caused by lack of oil inside the case or by the clutch not disengaging properly. Hard shifting may also be caused by worn synchronizer rings.

1. Check the lubricant level. Replenish if necessary.
2. Adjust the clutch pedal free travel.
   If the adjustment cannot eliminate hard shifting, it is due to improper shift linkage or transmission interior parts binding.
3. Check, adjust, or repair the shift linkage.
4. Examine the transmission interior parts.
   Replace if defective.
5. Check the spline shaft. Replace if distorted or burred.

Hard Shifting (Transfer Case)

1. Check the transfer case shift linkage for bind or stuck condition due to rust, corrosion, dirt, or lack of lubrication. Inspect, clean, and lubricate the linkage.
2. Hard shifting may not be due to any trouble in the transfer case, but due to improper driving practices.

Check if the normal driving and shifting procedures are followed.

3. Examine the transfer gears and clutch hub. Replace if defective.

Transmission Slips Out of Gear

The following are the major causes of transmission slipping out of gears.

1. The gear shift fork is bent causing gears not to mesh fully and resulting in shallow meshing.
   Replace the bent gear shift fork.
2. Splines are worn resulting in looseness between the sliding gear and spline shaft.
   Replace the worn spline shaft.
3. Badly worn or damaged gears. Replace the defective gears.
4. Worn synchronizer rings. Replace the worn rings.
5. Bearings are badly worn causing excessive play in axial direction of the spline shaft.
   Replace the worn bearings.
6. Excessive end play of the counter gear shaft.
   Adjust the end play.
7. Gear shift fork rock ball spring weakened.
   Replace the spring.
8. Improper adjustment of the shift linkage.
   Adjust the linkage.

Transfer Case Slips Out of Gear

1. The transfer case will slip out of gear if the gears do not fully engage due to improperly adjusted control linkage.
   Adjust the control linkage.
2. A weak or broken fork shaft lock ball spring will cause the transfer case to slip out of gear.
   Replace the spring.

Front Drive Do Not Engage

1. Change valve is not working properly.
   Check the change valve and the vacuum connecting hoses.
   Replace the change valve assembly if defective.
2. The diaphragm is broken or swollen.
   Replace the diaphragm.
3. The change valve shift wire is not sliding properly.
   Replace the shift wire.
4. The diaphragm push rod is stuck.
   Clean and lubricate, or replace with new one.
5. The shift lever linkage is loose.
   Tighten the linkage.

PART III TRANSMISSION & TRANSFER CASE

1 Removal and Installation

1. Jack up the vehicle and place on the stands.
2. Remove the transmission under cover.
3. Drain lubricant out of the transmission and transfer case.
4. On models FJ 40L, 40LV, and 43L, remove the assistant driver seat.
   On models FJ 40, 40V, and 43, remove the driver seat and assistant driver seat.
   On models FJ 45V and 45LV, remove the front seat.
5. On the vehicles except for models FJ 45V and 45LV, remove the gasoline tank.
   tank.
6. Remove the transmission cover.
7. Disconnect the parking brake flexible wire at the end of the parking brake lever.
8. Disconnect the speedometer cable.
9. Disconnect the diaphragm connect hoses at the diaphragm chamber by loosening the vacuum hose clamps.
10. On the remote control type transmission, disconnect the two intermediate rods by removing the intermediate rod pins and cotter pins at the end of the transmission.
11. Disconnect the control lower rod at the transfer gear shift lever by loosening the cotter pin and shift lever upper pin.
12. Disconnect the front drive indicator switch wires.
13. Jack up the transmission and remove the front universal joint yoke and rear universal joint yoke.
14. Remove the clutch housing under cover.
15. Remove the transmission set bolts.
16. Remove the transmission with the transfer case and parking brake assembly attached.

For Installation, follow "Removal" in reverse order.

Note:

1. Tighten the transmission set bolts to 7.5~7.9 m-kg (52 ~57 ft-lbs.)
2. After installation, check the operations of the transmission remote control mechanism and the clutch.

2 Disassembly

This section describes the detailed disassembling procedures of the transmission and transfer case into completely disassembled condition.

1. On vehicles with direct control type transmission gear shift mechanism, remove the gear shift lever using Transmission Gear Shift Lever Remover 09305 55010.

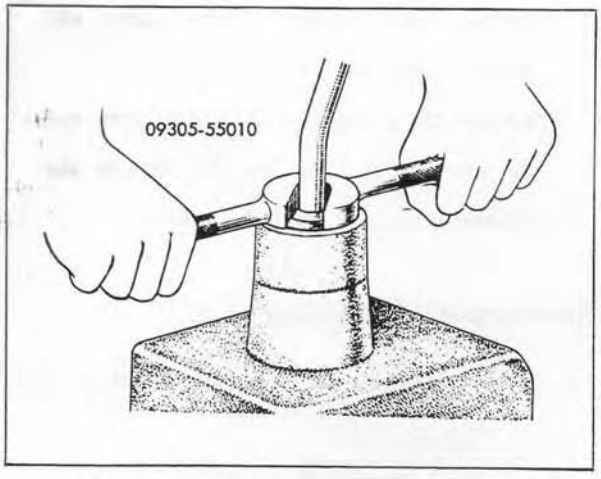


Fig. 3-6. Gear Shift Lever Removal

Removal of Transfer from Transmission

1. Remove the six hex-head cap bolts and spring washers that secure the spline shaft cap to the transfer case. (Fig. 3-7)

   Remove the spline shaft cap and packing from the case.

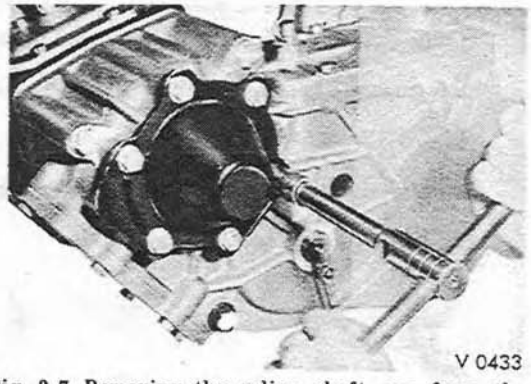


Fig. 3-7. Removing the spline shaft cap from the transfer case.

2. Remove the six hex-head cap bolts and wave washers that secure the power take-off cover to the transfer case. (Fig. 3 8)

   Remove the power take-off cover and packing from the case.

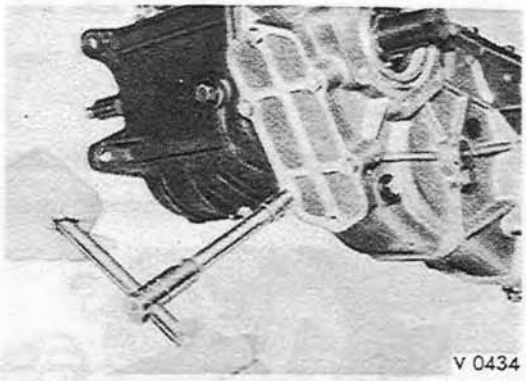


Fig. 3-8. Removing the power take-off cover from the transfer case.

3. Use a brass bar or wooden blocks, and fix the transfer drive gear or the power take-off driving gear to prevent rotating of the spline shaft.

   Then, bend back the locking edge of the lock wāsher at the end of the spline shaft. Remove the lock nut and lock washer that secure the two driving gears on the shaft between the front and rear bearings. (Fig.3-9)

   Remove the spline shaft end spacer from the shaft.

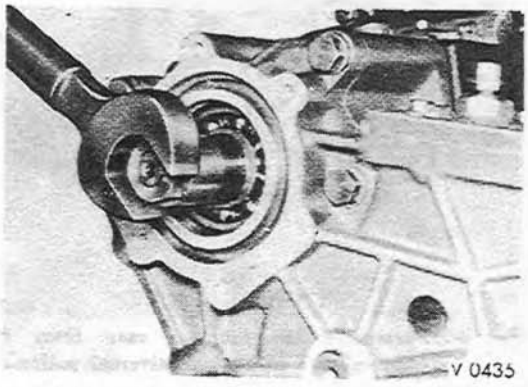


Fig. 3-9. Removing the nut from the spline shaft.

4. Remove the five hex-head cap bolts and spring washers that secure the transfer case to the transmission case.

   Two of bolts are short which should be removed from the inside of the transfer case.

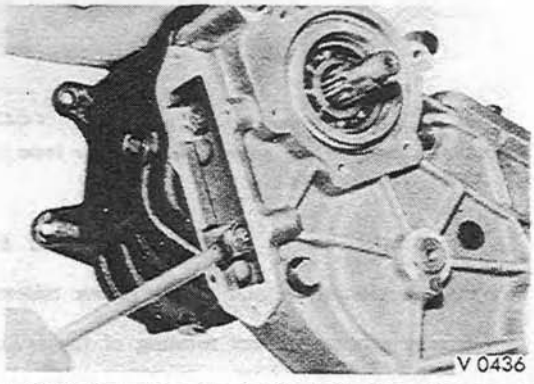


Fig. 3-10. Removing the inside bolt from the power take-off cover hole.

5. Install a universal puller in the three tapped holes (10 mm, 1.25 p) in the transfer case, and remove the transfer assembly and the transfer case packing from the transmission case. (Fig. 3-11)

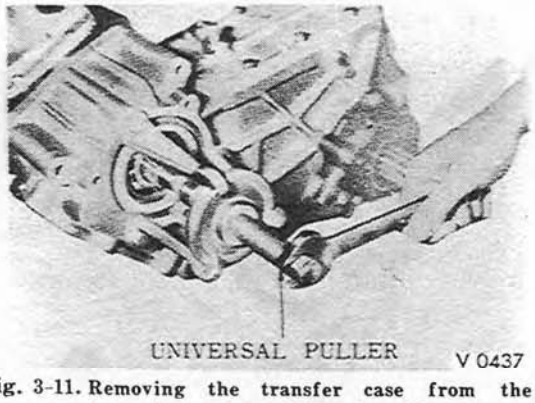


Fig. 3-11. Removing the transfer case from the transmission case with universal puller.

Prior to removal, note the direction of installation of the power take-off driving gear and the position of the two power take-off driving gear spacers. These parts will remain in the transfer case.

Remove the power take-off driving gear and the two spacers, and carefully remove the transfer drive gear from the case.

Transmission Disassembly

6. Remove the gear shift selecting lever. (Fig. 3-12)

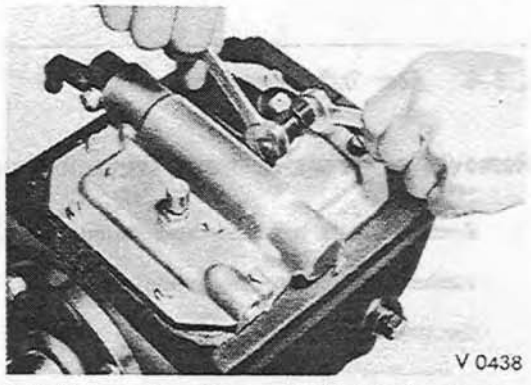


Fig. 3-12. Removing the gear shift selecting lever.

Remove the eight hex-head cap screws, spring washers and plate washers that secure the transmission case cover to the case. (Fig. 3-13)

Remove the transmission case cover assembly and packing from the case.

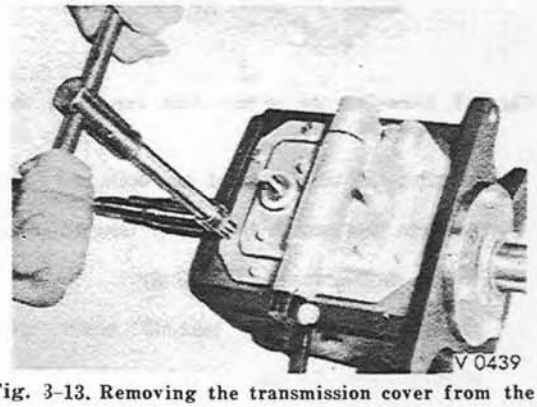


Fig. 3-13. Removing the transmission cover from the case.

7. Remove the four hex-head cap bolts and spring washers that secure the transmission front bearing lock to the case. (Fig. 3-14)
   Remove the transmission front bearing lock and packing from the case.

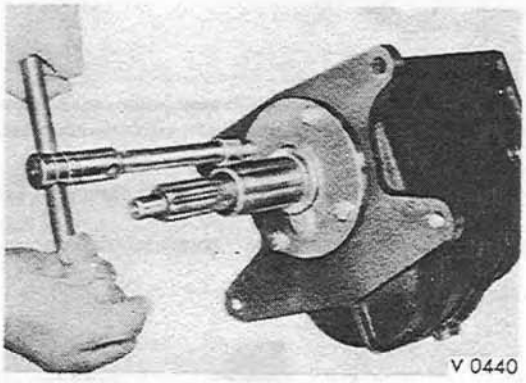


Fig. 3-14. Removing the front bearing lock from the transmission case.

8. Remove the knock pin that secures the gear shift fork shaft to the case. (Fig. 3-15)

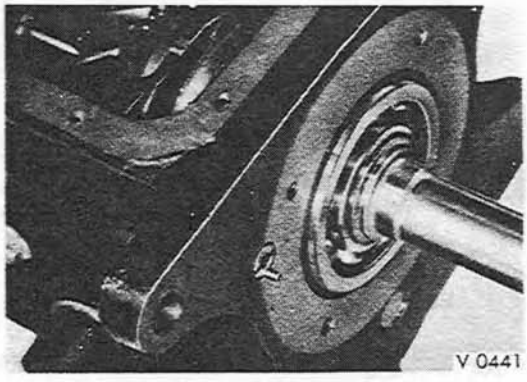


Fig. 3-15. Gear shift fork shaft knock pin.

   Use a brass rod of approximately 12 mm diameter, and remove the fork shaft from the rear toward the front from the case. (Fig. 3-16)
   At this time, be careful not to lose the two gear shift fork lock balls and springs.

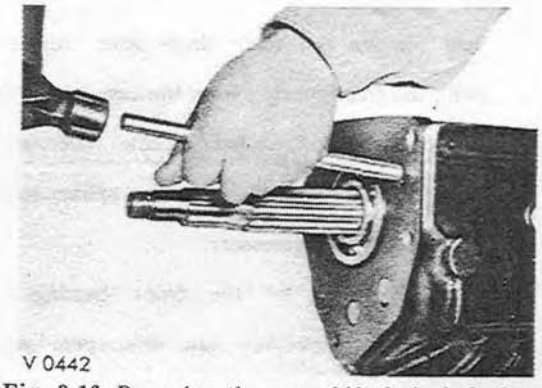


Fig. 3-16. Removing the gear shift fork shaft from the transmission case.

9. Remove the low speed gear shift fork complete and the high speed gear shift fork from the case.
   Remove the two gear shift fork lock ball and spring from each fork.
10. Use a brass rod of approximately 19 mm diameter, and remove the counter gear shaft from the case. (Fig. 3-17)

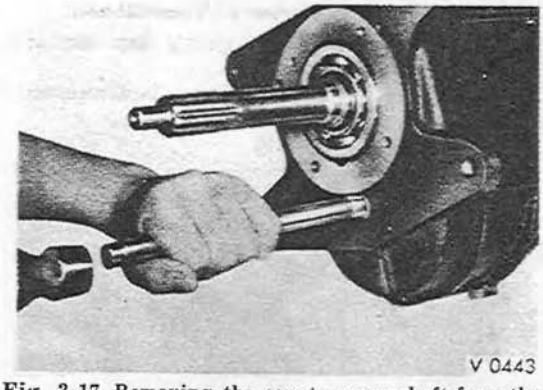


Fig. 3-17. Removing the counter gear shaft from the transmission case.

   The shaft must be removed toward the back as it is locked with the woodruff key at the rear end.
   After removing the shaft, the counter gear assembly remains in the case.

11. Use a special tool, puller set (09910-00010), and remove the main drive gear together with the front bearing from the case. (Fig. 3-18)
Remove the spline shaft needle roller snap ring only if replacement of the spline shaft needle roller is necessary.
If replacement of the front bearing is necessary, remove the main drive gear snap ring only, and then remove the bearing using a universal puller.

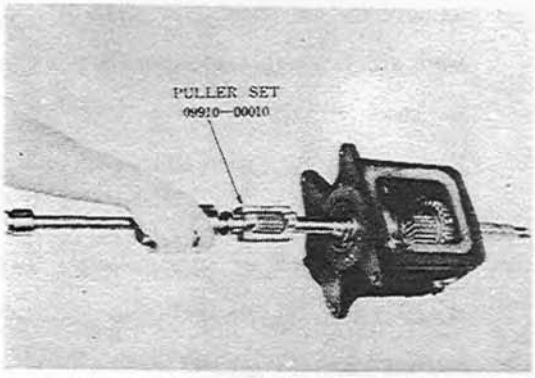


Fig. 3-18. Removing the front bearing from the transmission case with special-tool.

12. Use a brass rod, and gently tap the spline shaft until the rear bearing is driven out of the case. (Fig. 3 19)

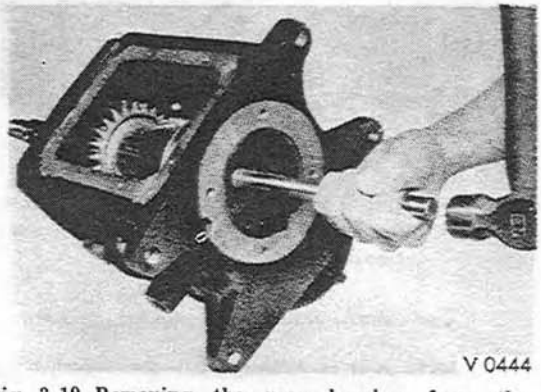


Fig. 3-19. Removing the rear bearing from the transmission case.

Use a universal puller (09950-00010), and remove the bearing from the shaft. (Fig. 3 20)

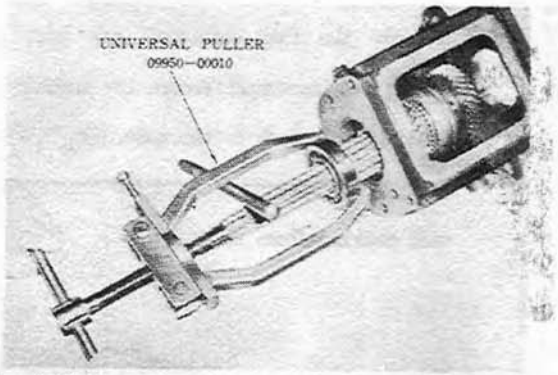


Fig. 3-20. Removing the transmission rear bearing form the spline shaft with universal puller.

13. Remove the spline shaft with the cluth group of parts through the transmission case cover hole. (Fig. 3 21)

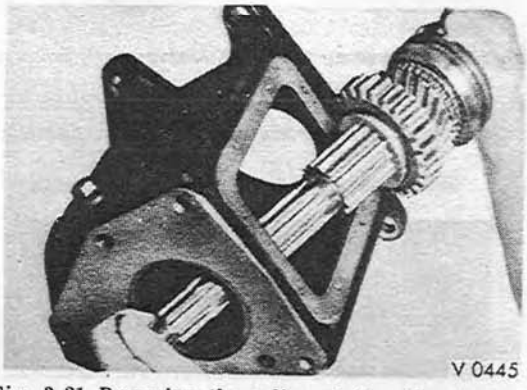


Fig. 3-21. Removing the spline shaft with attached parts through the transmission case cover hole.

Remove the snap ring at the front end of the shaft if removal of the parts is necessary.

14. Remove the counter gear together with the internal parts, and the three thrust washers from the case.
At this time, note the position of the gear side thrust washer.

15. Use a brass rod of approximately 16 mm diameter, and drive out the reverse idler gear shaft from the case. (Fig. 3-22)

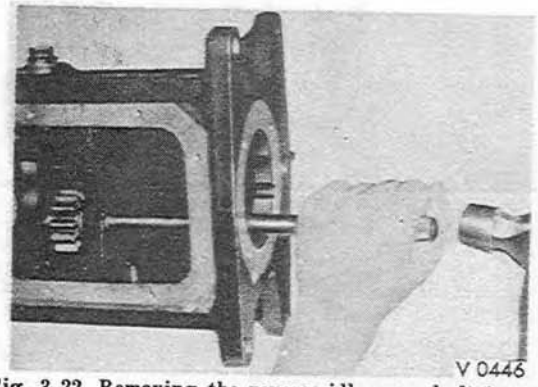


Fig. 3-22. Removing the reverse idle gear shaft from the transmission case.

The shaft must be removed toward the back as it is locked with the woodruff key at the rear end.

Then, remove the reverse idler gear and the two thrust washers from the case.

Transfer Disassembly

16. Remove the cotter pin, hexagon nut and washer that secure the center brake drum to the transfer drive shaft. (Fig. 3-23)

    Remove the brake drum from the shaft.

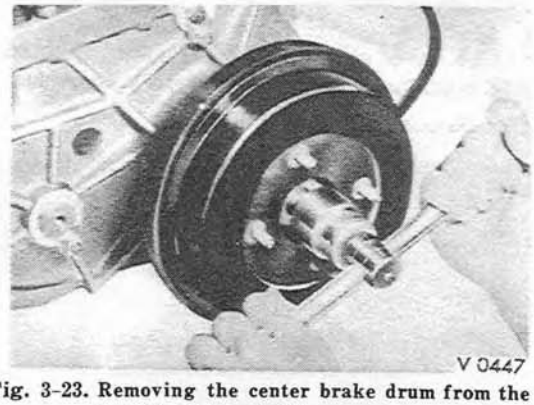


Fig. 3-23. Removing the center brake drum from the transfer drive shaft.

17. Remove the four hex-head cap bolts and spring washers that secure the brake plate complete to the speedometer housing. (Fig. 3-24)

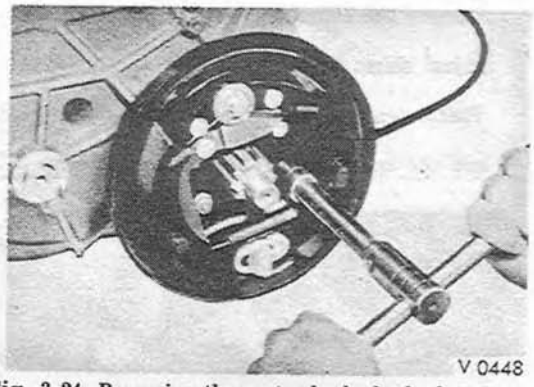


Fig. 3-24. Removing the center brake back plate from the speedometer housing.

Remove the brake plate from the housing.

18. Remove the speedometer shaft sleeve stopper. Then, remove the speedometer shaft sleeve set together with the speedometer driven gear complete from the housing. (Fig. 3-25)

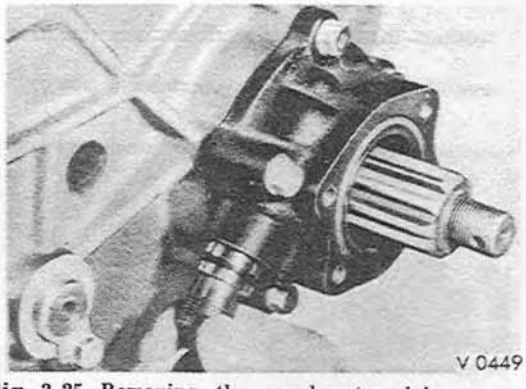


Fig. 3-25. Removing the speedometer driven gear from the speedometer housing.

19. Remove the five hex-head cap bolts and spring washers that secure the speedometer housing to the transfer case. (Fig. 3-26)

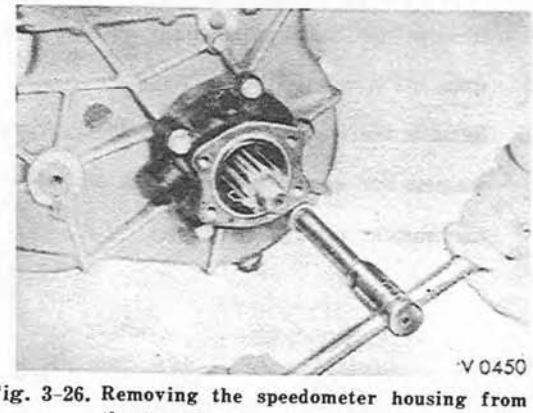


Fig. 3-26. Removing the speedometer housing from the transfer case.

Remove the housing, packing and drive shaft adjust shims from the case.

Then, remove the speedometer drive gear and the spacer from the drive shaft. (Fig. 3-27)

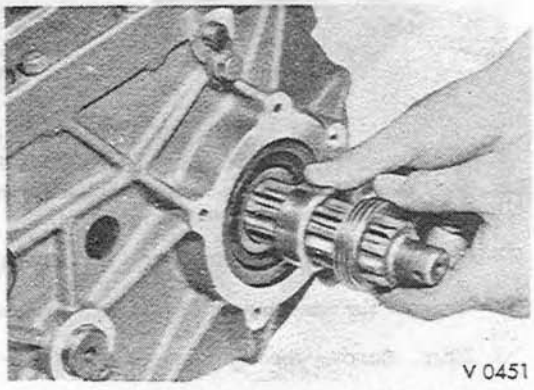


Fig. 3-27. Removing the speedometer drive gear and the spacer from the transfer drive shaft.

20. Remove the four hex-head cap bolts and wave washers that secure the diaphragm chamber assembly to the front drive extension housing.

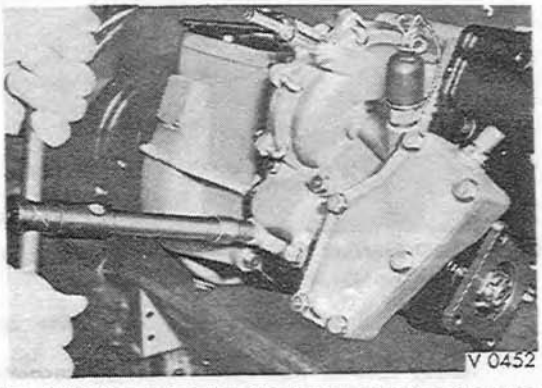


Fig. 3-28. Removing the diaphragm chamber from the transfer front drive extension housing.

Remove the chamber assembly and packing from the housing.

21. Remove the five hex-head cap bolts and wave washers that secure the extension housing to the transfer case. (Fig. 3-29)

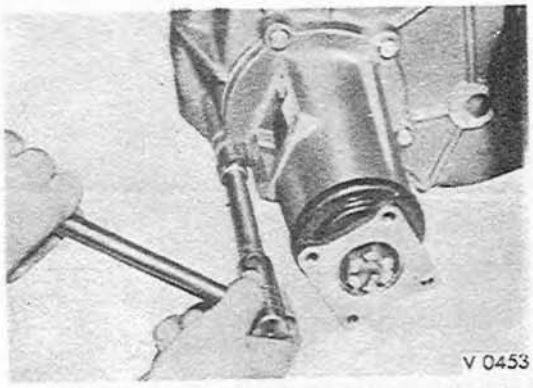


Fig. 3-29. Removing the front drive extension housing from the transfer case.

Remove the housing and packing with the internal parts from the case. It may be necessary to tap the housing with a brass bar.

Remove the front drive clutch hub from the drive shaft. Note the direction of installation of the hub.

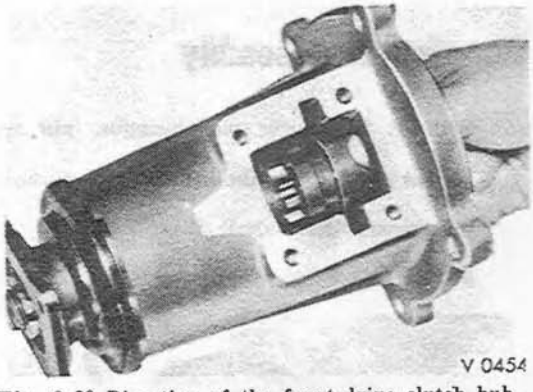


Fig. 3-30. Direction of the front drive clutch hub.

22. Remove the gear shift lever.

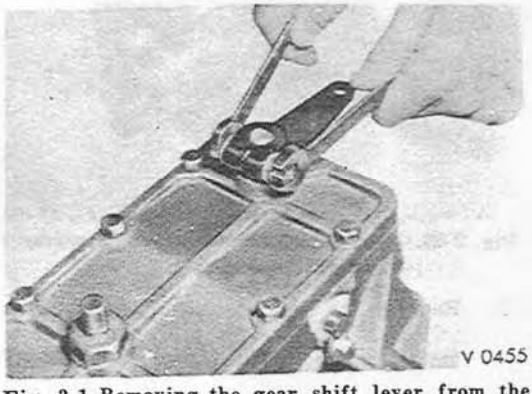


Fig. 3-1. Removing the gear shift lever from the transfer case cover.

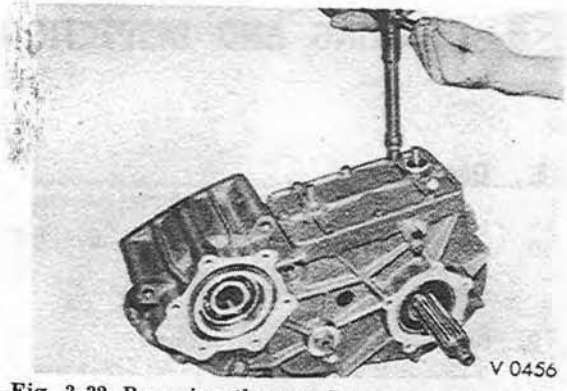


Fig. 3-32. Removing the transfer case cover from the case.

Ther, remove the eight hex-head cap bolts and wave washers that secure the transfer case cover to the case. (Fig. 3-32)

Remove the case cover and packing from the case.

23. Remove the cotter pin and gear shift fork plug.

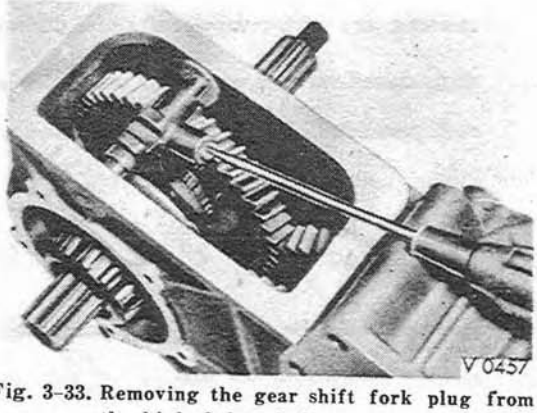


Fig. 3-33. Removing the gear shift fork plug from the high & low fork.

Remove the gear shift fork lock ball and spring from the fork.

Remove the fork shaft lock.

Use a brass rod of approximatelv 12 mm diameter, and remove the high & low fork shaft toward the back from the case.

Then, remove the high & low fork from the case.

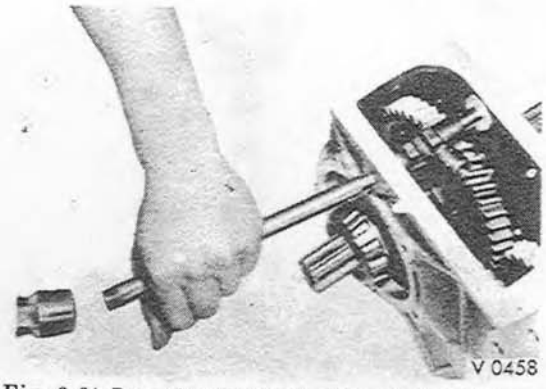


Fig. 3-34. Removing the high & low fork shaft from the transfer case.

24. Use a special tool, transfer low speed gear holding tool (09313-60010), between the low speed gear and the front inside of the case to prevent the gear from moving forward, and also install a special tool, transfer drive shaft remover (09332-60010), onto the threaded end of the drive shaft, and then remove the shaft by tapping with a hammer from the case.

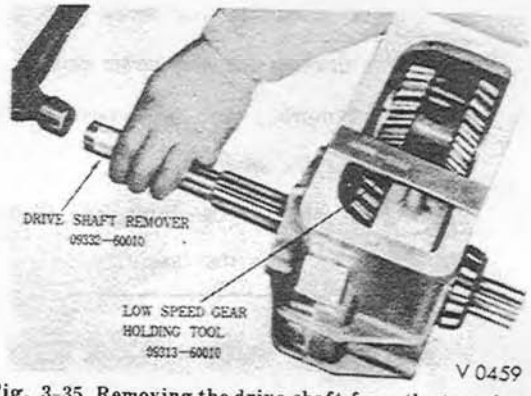


Fig. 3-35. Removing the drive shaft from the transfer case with special tool.

25. Remove the low speed gear complete through the transfer case cover hole.

Remove the cone of the rear tapered roller bearing and the thrust plate from the case.

Carefully remove the cup of the bearing with a brass rod from the case.

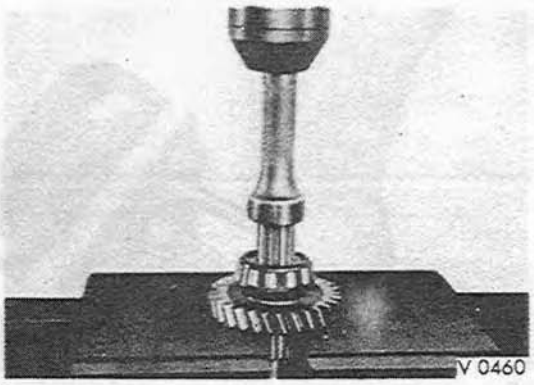


Fig. 3-36. Removing the cone of tapered roller bearing from the transfer drive shaft.

Press the cone of the front tapered roller bearing. the thrust plate and the high speed gear from the drive shaft only if replacement of parts is necessary. (Fig. 3 36)

26. Remove the idle gear shaft lock.

Use a special tool, transfer idle gear shaft remover (09319 60010), and remove the idle gear shaft from the case. (Fig. 3-37)

Then, remove the idle gear together with the internal parts, the two thrust plate and the spacer through the case cover hole.

Prior to removal, note the position of installation of the spacer.

Remove the plug at the front side of the idle gear shaft from the case.

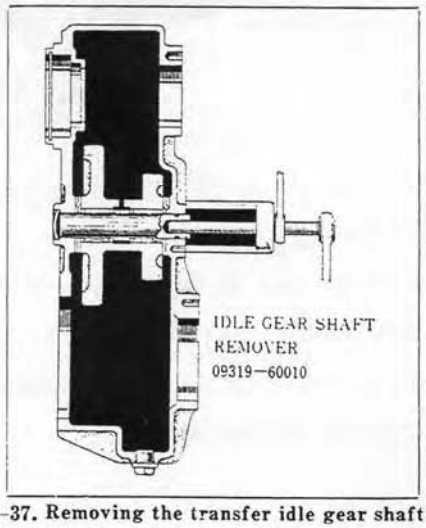


Fig. 3-37. Removing the transfer idle gear shaft from the case with special tool.

3 CLEANING AND INSPECTION

1. General

A. Oil Seals. Replace all oil seals and "O" rings.

B. Packings. Replace all packings.

C. Lock Washer. Replace a lock washer.

D. Cotter Pins. Replace all cotter pins.

2. Cleaning

A. **Ball and Roller Bearings.** Use standard maintenance procedures to clean all ball and roller bearings.

B. **All Other Parts.** Thoroughly clean all other parts with a suitable cleaning agent. After cleaning, dry with compressed air. Lubricate all machined surfaces with clean oil. Examine each part after cleaning to make certain all foreign matter has been removed.

3. Inspection

A. **Ball and Roller Bearings.** Use standard maintenance procedures to inspect all ball and roller bearings.

B. **Castings.** Inspect all castings for cracks. Inspect all bearing bores and mounting faces for wear, grooves, scratches, etc.

Remove burrs and scratches with a crocus cloth. Chase demaged threads with a used tap of the correct size.

Replace all castings that cannot be repaired.

C. **Splined Parts.** Inspect all splined parts for worn, twisted, chipped, or burred splines. If possible, remove these defects with an oil stone. Replace a splined part that cannot be repaired.

D. **Gear Teeth.** Inspect all gear teeth for cleanliness and damage.

Clean thoroughly and repair minor damage with a crocus cloth.

Replace a gear that cannot be repaired.

E. **Synchronizer Rings.** Inspect the synchronizer ring for broken, cracked, or otherwise damaged lugs. Engage a ring onto the main drive gear or second speed gear, and measure the clearance as shown in the figure. (Fig. 3-38)

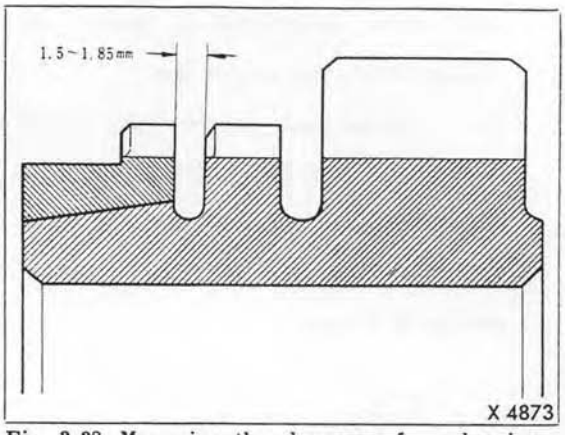


Fig. 3-38. Measuring the clearance of synchronizer ring.

Replace a ring if the clearance is excessively small.

Standard Gap is 1.5~1.85 mm (0.059~0.073 in.).

4 ASSEMBLYT

This section describes the detailed assembling order of the transmission and transfer from the completely disassembled condition, and also the accompanying cautions and methods of various adjustments to be performed while assembling.

Transmission Assembly

1. Apply grease in the bore of the reverse idle gear, and install the fifty six needle rollers and the needle roller washer.

Put in place the reverse idle gear and the two thrust washers, and gently drive the reverse idle gear shaft in the case from the back. Then, lock the shaft with woodruff key at the rear end. (Fig. 3-39)

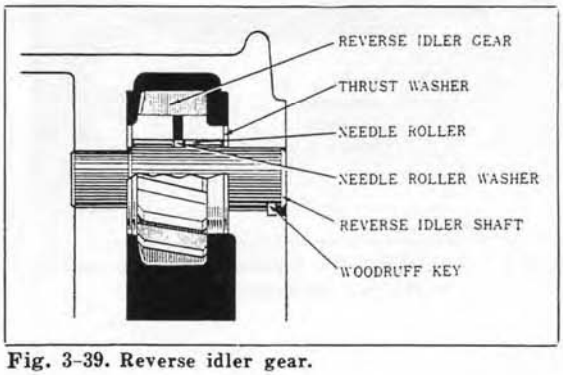


Fig. 3-39. Reverse idler gear.

2. Install the ninety six needle rollers, the four needle roller washers and the spacer pipe into the bore of the counter gear.

   Use a special tool, counter gear needle roller guide shaft (09311 60010), and place the counter gear, the two case side thrust washers and the gear side thrust washer in position in the case.

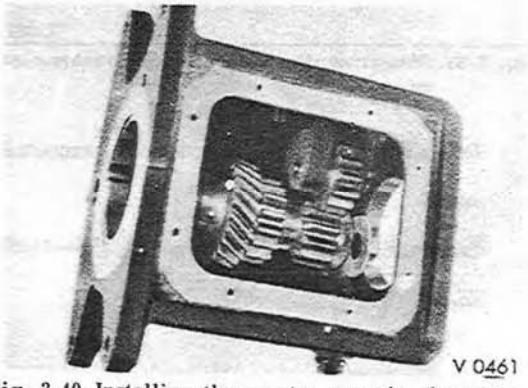


Fig. 3 40. Installing the counter gear in the transmission case.

3. Use a special tool, bearing replacer (09316-60010) with adapter E and D, and install the main drive gear with the front bearing into the case.

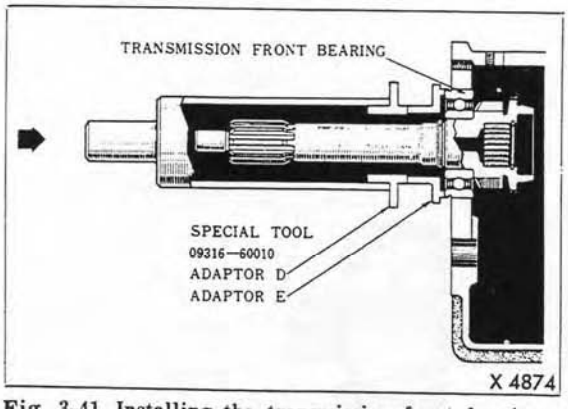


Fig. 3-41. Installing the transmission front bearing in the case with special tool.

Note :

A. Use a special tool, adapter B of bearing replacer (09316-60010), and press the front bearing on the main drive gear.

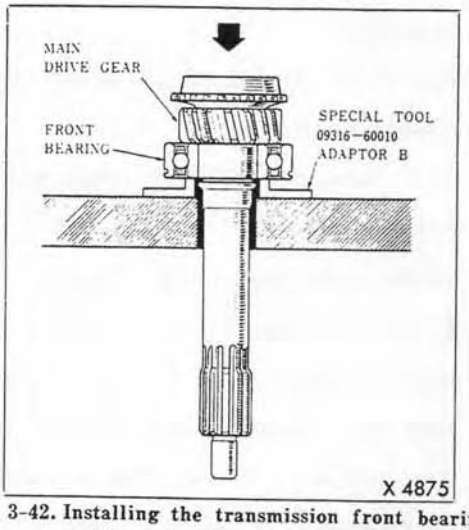


Fig. 3-42. Installing the transmission front bearing on the main drive gear with special tool.

B. Install the main drive gear snap ring, and if the bearing is found loose in the axial direction, use a proper snap ring from following Table.

Snap Rings

Part No.	mm	inch
90520-33010	2.17~2.57	0.085~0.101
90520-33011	2.30~2.42	0.090~0.095

4. Install the counter gear shaft driving out guide shaft into the case from the back. (Fig. 3-43)

   Use a feeler gauge, and measure the distance between the gear side washer and the counter gear. (Fig. 3-44)

   Select a proper washer from following Table to obtain the clearance of 0.15~0.40 mm (0.006~0.016 in.).

Then, lock the shaft with woodruff key at the rear end.

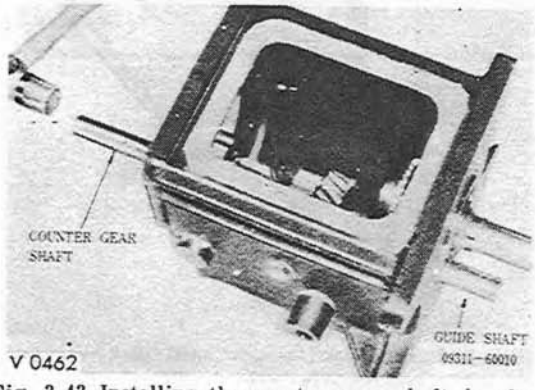


Fig. 3-43. Installing the counter gear shaft in the transmission case.

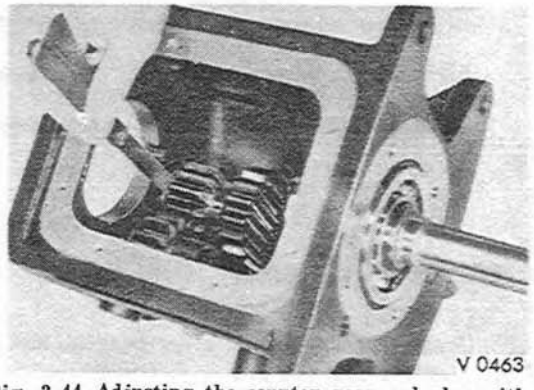


Fig. 3-44. Adjusting the counter gear end play with feeler gauge.

Counter Gear Gear Side Thrust Washers

Part No.	mm	inch
33441-61010	1.45~1.50	0.057~0.059
33442-61010	1.50~1.55	0.059~0.061
33443-61010	1.55~1.60	0.061~0.063

5. Installing the clutch group of parts on the spline shaft, put in place the shaft through the case cover hole. (Fig. 3-45)

Note :

Prior to installation, use a feeler gauge, and measure the clearance in the axial direction of the second speed gear. (Fig. 3-46)

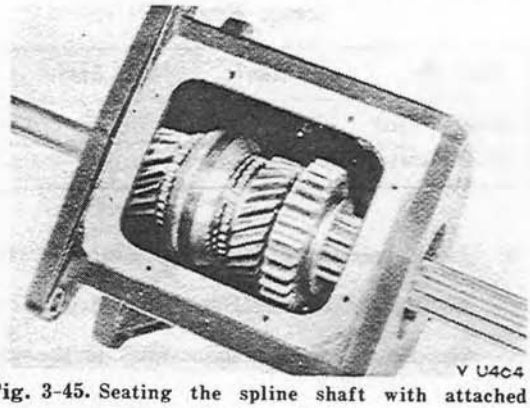


Fig. 3-45. Seating the spline shaft with attached parts in the transmission case.

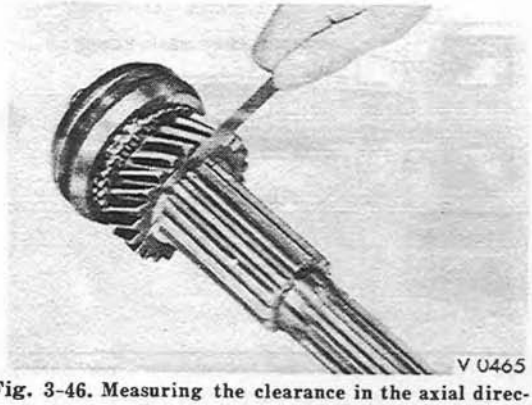


Fig. 3-46. Measuring the clearance in the axial direction of the second speed gear with feeler gauge.

Select a proper snap ring from following Table to obtain the clearance of 0.1~0.3 mm (0.004~0.012 in.).

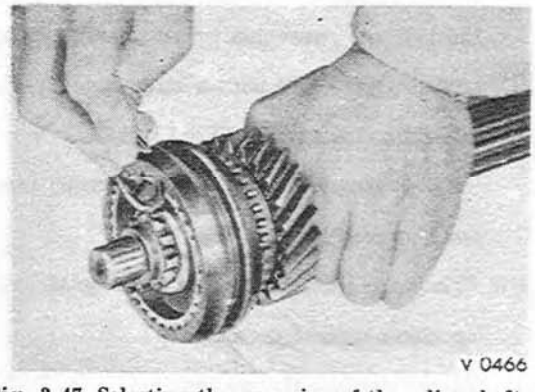


Fig. 3-47. Selecting the snap ring of the spline shaft.

Snap Rings

Part No.	mm	inch
90520-33010	2.17~2.57	0.085~0.101
90520-33011	2.30~2.42	0.090~0.095

6. Use a special tool, bearing replacer (09316-60010) with adapter B and D, and install the rear bearing on the spline shaft in the case.

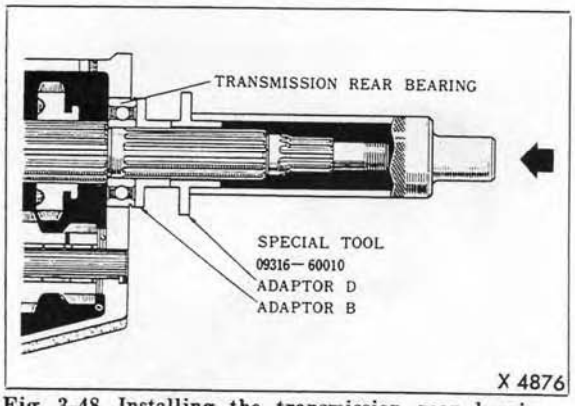


Fig. 3-48. Installing the transmission rear bearing on the spline shaft with special tool.

7. Put in place the high speed gear shift fork and the low speed gear shift fork.
   Insert the gear shift fork lock ball and spring in each fork hole.
   Install the gear shift fork shaft pushing down on the ball with a screw driver in the case from the front. (Fig. 3-49)
   Do not damage the "O" ring at the front end of the shaft.
8. Place the front bearing lock and packing in position against the case.
   Do not damage the oil seal.
   Tighten the four hex-head cap bolts and spring washers to 1.5 m-kg (11 ft-lbs) torque.

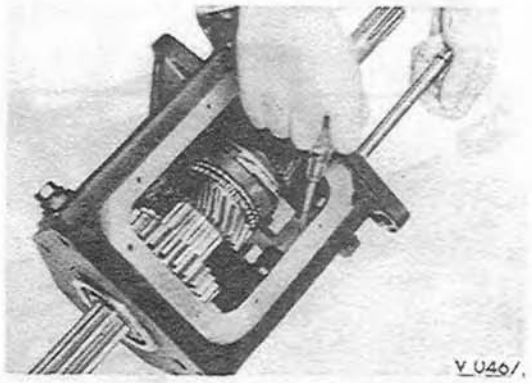


Fig. 3-49. Installing the gear shift fork shaft in the transmission case.

9. Place the transmission case cover and packing in position against the case, and tighten the eight hex-head cap screws, plate washers and spring washers to 1.5 m-kg (11 ft-lbs.) torque.

Transfer Assembly

10. Install the two needle roller bearings and the spacer in the bore of the transfer idle gear. Place the idle gear and the two thrust plates and the spacer in position in the case. Install the idel gear shaft in the case from the back.

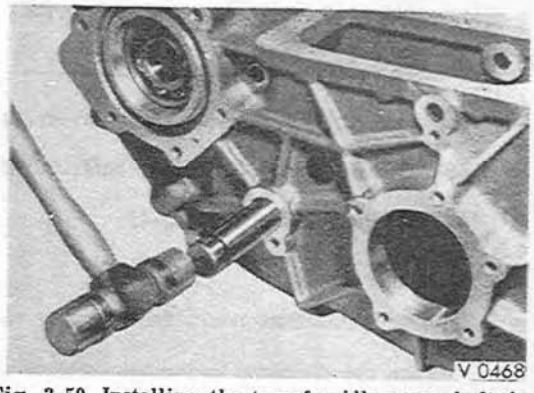


Fig. 3-50. Installing the transfer idle gear shaft in the case.

Do not damage the "O" ring at the end of the shaft.

After installation, measure the idle gear end play in the axial direction, and select a proper washer to obtain the clearance of 0.15 ~0.40 mm (0.06~0.016 in) from following Table. (Fig. 46)

Idle Gear Spacers

Part No.	mm	inch
36261-60010	1.20~1.30	0.0472~0.0512
36262-60010	1.30~1.40	0.0512~0.0551
36263-60010	1.40~1.50	0.0551~0.0591
36264-60010	1.50~1.60	0.0591~0.0630
36265-60010	1.60~1.70	0.0630~0.0669
36266-60010	1.70~1.80	0.0669~0.0709

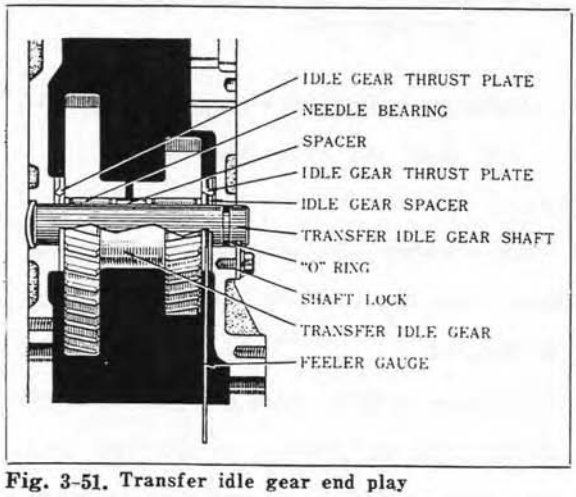


Fig. 3-51. Transfer idle gear end play

Then, secure the shaft lock with the hex-head cap bolt and spring washer, and install the plug to the case.

11. Install the transfer high speed gear complete on the drive shaft.

Use a special tool, bearing replacer (09316-60010) with adapter F, and press the cone of the front tapered roller bearing and the thrust plate on the drive shaft. (Fig. 3-52)

Place the high & low clutch hub, the transfer low speed gear and the drive shaft in position into the case.

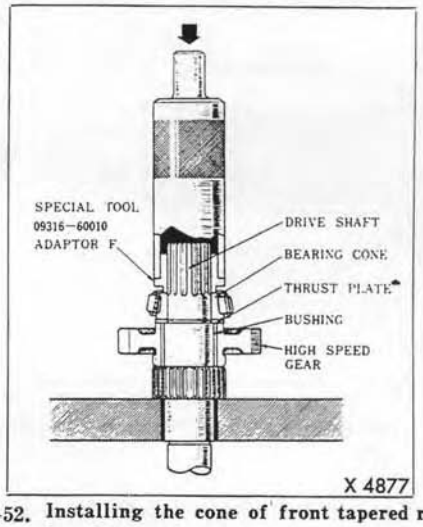


Fig. 3-52. Installing the cone of front tapered roller bearing on the transfer drive shaft with special tool.

Use a special tool, bearing replacer (09316-60010) with adapter F, and press the cone of the rear tapered roller bearing and the thrust plate onto the drive shaft. (Fig. 48)

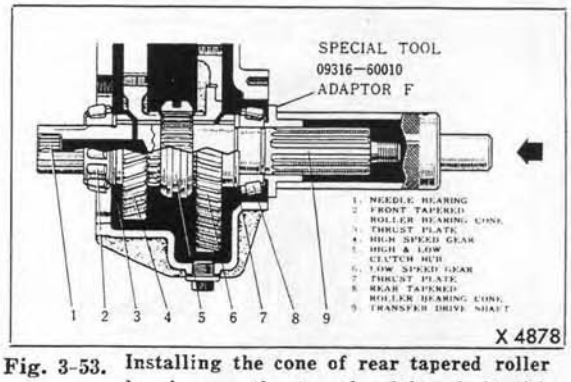


Fig. 3-53. Installing the cone of rear tapered roller bearing on the transfer drive shaft with special tool.

12. Use a special tool, bearing replacer (09316-60010) with adapter E, and install the cup of the rear tapered roller bearing in the case. (Fig. 3-52)

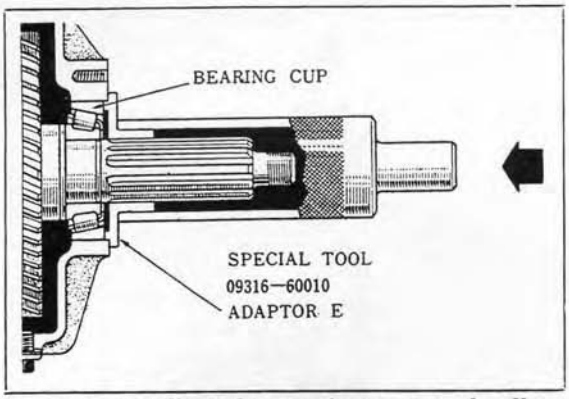


Fig. 3-54. Installing the cup of rear tapered roller bearing in the transfer case with special tool.

13. Install the front drive clutch hub on the drive shaft.

    Place the front drive extension housing, in which the front drive shaft group of parts are assembled, and packing in position against the case. Tighten the five hex-head cap bolts and wave washers to 1.5 m-kg (11 ft-lbs.).

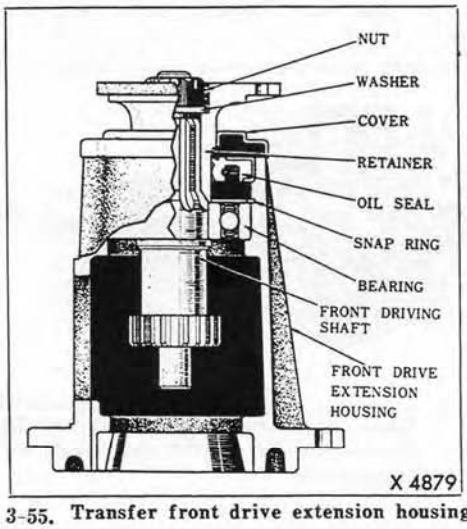


Fig. 3-55. Transfer front drive extension housing.

Note :

In case of installing the front drive shaft bearing, use a special tool, adapter A of bearing replacer (09316-60010), and press the bearing onto the shaft.

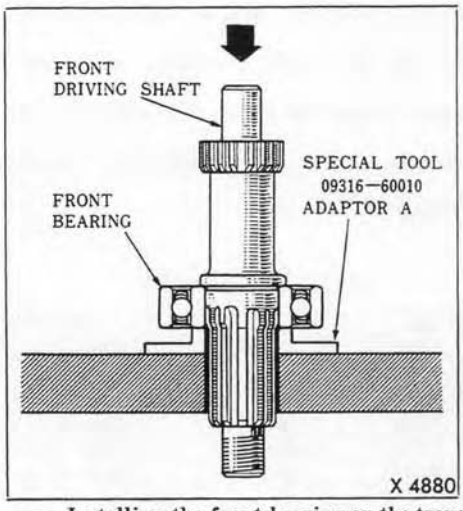


Fig. 3-56. Installing the front bearing on the transfer front drive shaft.

14. Install the speedometer spacer and the speedometer drive gear on the drive shaft.

Note :

When replacing the speedometer drive and driven gear; the following precautions should be observed.

Two kinds of drive gears and four kinds of driven gears are avilable, but the drive gear with mark 6×18 will only mesh with the driven gear 6×18. The drive gear with mark 6×17 will mesh with the other three gears. For this reason, four speedometer gear ratios are obtainable.

The speedometer gear ratio can be determined in accordance with tire size and differential reduction gear ratio, the combination of which are as shown on the following Table.

Speedometer Drive Gears

Part No.	Mark	Nos. of Teeth
33481-60020	6×18	6
33481-60030	6×17	6

Speedometer Driven Gears

Part No.	Mark	Nos. of Teeth
33403-60010	6×18	18
33403-60020	6×17	17
33403-60030	6×16	16

Four Kinds of Speedometer Gear Ratios

Speedometer Gear Ratio	Drive Gear	Driven Gear
2.67=16/6	33481-60030	33403-60030
2.83=17/6	33481-60030	33403-60020
3.00=18/6	33481-60020	33403 60010

Determination of Speedometer Gear Ratios

Tire Size	Differential Reduction Gear Ratio	Speedometer Gear Ratio
7.10—15	3.70=37/10 4.11=37/ 9	2.67=16/6 3.00=18/6
7.60—15	3.70=37/10 4.11=37/ 9	2.67=16/6 2.83=17/6
7.00—15	4.11=37/ 9	2.83=17/6
7.00—16	4.11=37/ 9	2.83=17/6

15. Place the speedometer housing and packing, and the drive shaft adjust shim in position against the case.

    Tighten the five hex-head cap bolts and spring washers to 1.5 m-kg (11 ft-lbs.) torque. Then, temporarily install the center brake drum onto the drive shaft, and measure the bearing preload by hooking the scale at the brake drum set bolt with the high & low clutch hub in neutral position and the front drive disengaged.

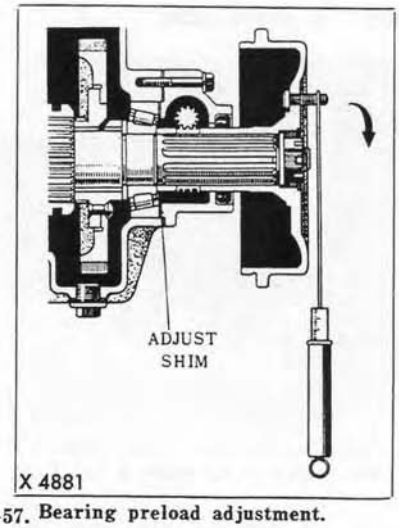


Fig. 3-57. Bearing preload adjustment.

Select the proper adjust shims to obtain the bearing preload of 4.7~5.9 kg (10.3~13.0 lbs.) from following Table.

Drive Shaft Adjust Shims

Part No.	mm	inch
90564-64017	0.10	0.0039
90564-64023	0.15	0.0059
90564 64024	0.20	0.0079
90564-64025	0.25	0.0098

16. Place the center brake back plate complete in position against the speedometer housing, and tighten the four hex-head cap bolts and spring washers to 1.5 m-kg (11 ft-lbs.) torque. Apply a thin film of oil to the sleeve of the brake drum not to damage the oil seal, and install the drum onto the drive shaft. Tighten the nut and washer to 17 m-kg

(120 ft-lbs.) torque, and lock the shaft and the nut with the cotter pin.

17. For installation of the speedometer group of parts, the fork shaft group of parts and the transfer case cover complete, follow " Disassembly " in reverse order.

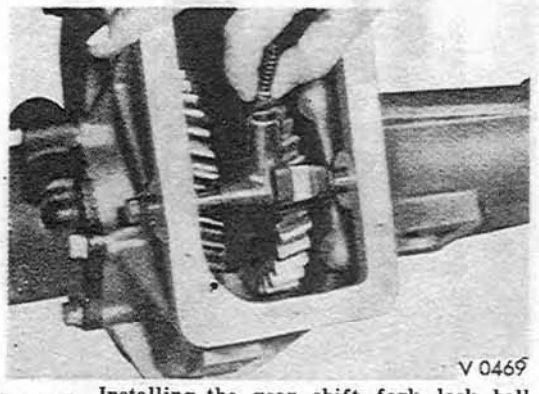


Fig. 3-58. Installing the gear shift fork lock ball and spring in the high & low fork.

Tighten the hex-head cap bolts and wave washers to 1.5 m-kg (11 ft-lbs.) torque.

18. Place the diaghragm chamber assembly and packing in position against the extension housing to align the front drive fork with the groove on the clutch hub.

Tighten the four hex-head cap bolts and wave washers to 1.5 m-kg (11 ft lbs.) torque.

Installation of Transfer to Transmission

19. Install a special tool, transfer guide shaft (09323 60010), onto the threaded end of the spline shaft.

Place the transfer drive gear, the two spacers and the power take-off driving gear on the guide shaft in position in the case through the power take-off cover hole.

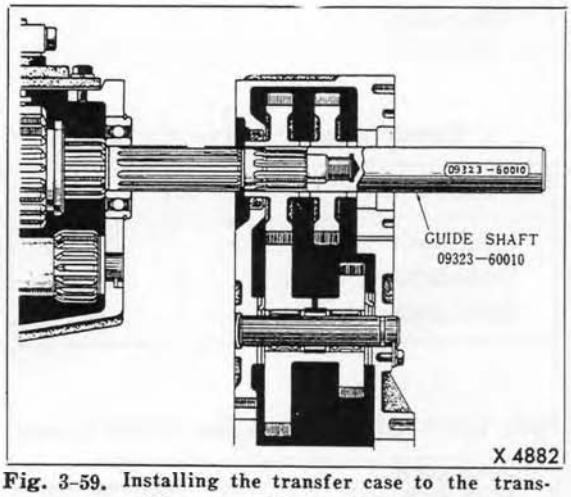


Fig. 3-59. Installing the transfer case to the transmision case with special tool.

Prior to installation, apply a thin film of oil to the sleeve of the drive gear, and be careful not to damage the oil seal.

Install the spline shaft into the transfer case.

At this time, do not forget to install the transfer case packing between the transmission case and the transfer case.

20. Secure the transfer case to the transmission case with the five hex-head cap bolts and spring washers.

Tow of the bolts are short and are secured at the inside of the case.

Tighten the bolts to 3.5~4.1 m-kg (25~30 ft-lbs.) torque.

21. Use a special tool, bearing replacer (09316 60010) with adapter A, and carefully tap the rear bearing onto the spline shaft.

Do not use great force to install the bearing

as damage to the front bearing will occur. (Fig. 3-60)

Then, install the end spacer onto the shaft.

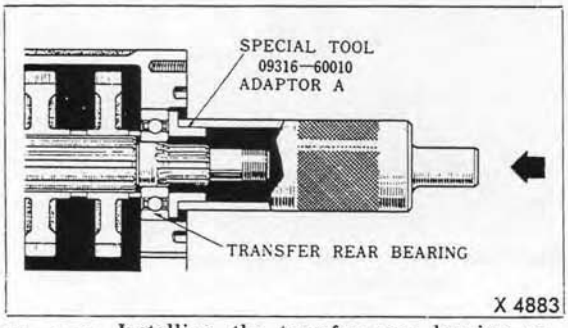


Fig. 3-60. Installing the transfer rear bearing on the spline shaft with special tool

22. Secure the front and rear bearings to the shaft with the lock nut and lock washer. Tighten the nut to 14 m-kg (100 ft-lbs.) torque.
23. Place the power take-off cover and the spline shaft cap and each packing in position against the transfer case.
    Tighten the hex-head cap bolts and wave washers to 1.5 m-kg (11 ft-lbs.) torque.

5 INSTALLATION

1. Follow "Removal" in reverse order.
2. Tighten the four transmission set bolts to 7.5~7.9 m-kg (52~57 ft-lbs.) torque.
3. After installation, check the operations of the transmission remote control mechanism and the clutch.

6 SPECIAL TOOLS

Figures 3 59 through 3 63 in this section identify the special tools by tool number. These tools are intended primarily to make overhaul procedure seasier.

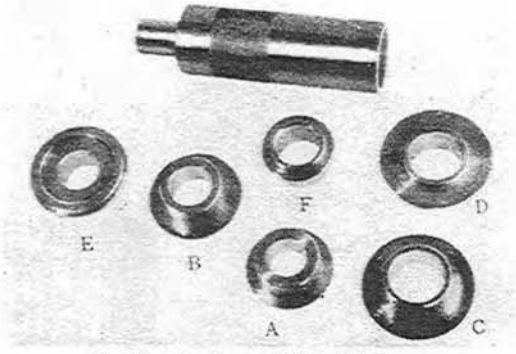


Fig. 3-61. Bearing replacer 09316-60010.

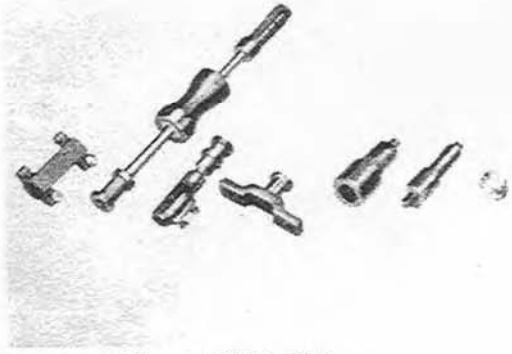


Fig. 3-62. Puller set 09910-00010.

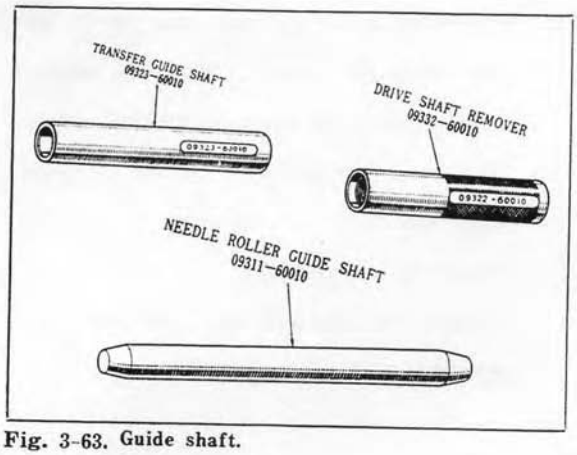


Fig. 3-63. Guide shaft.

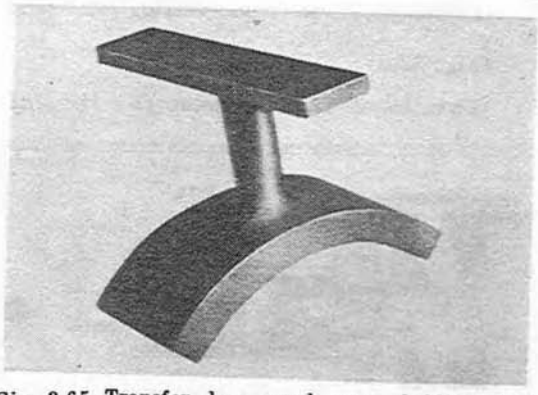


Fig. 3-65. Transfer low speed gear holding tool 09313-60010.

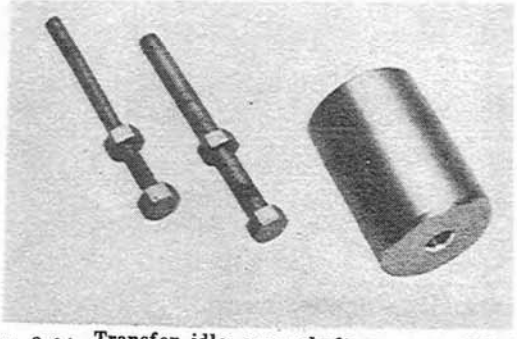


Fig. 3-64. Transfer idle gear shaft remover 0931-9 60010.

PART IV TRANSFER CASE FRONT DRIVE CONTROL

1 Change Valve and Connections

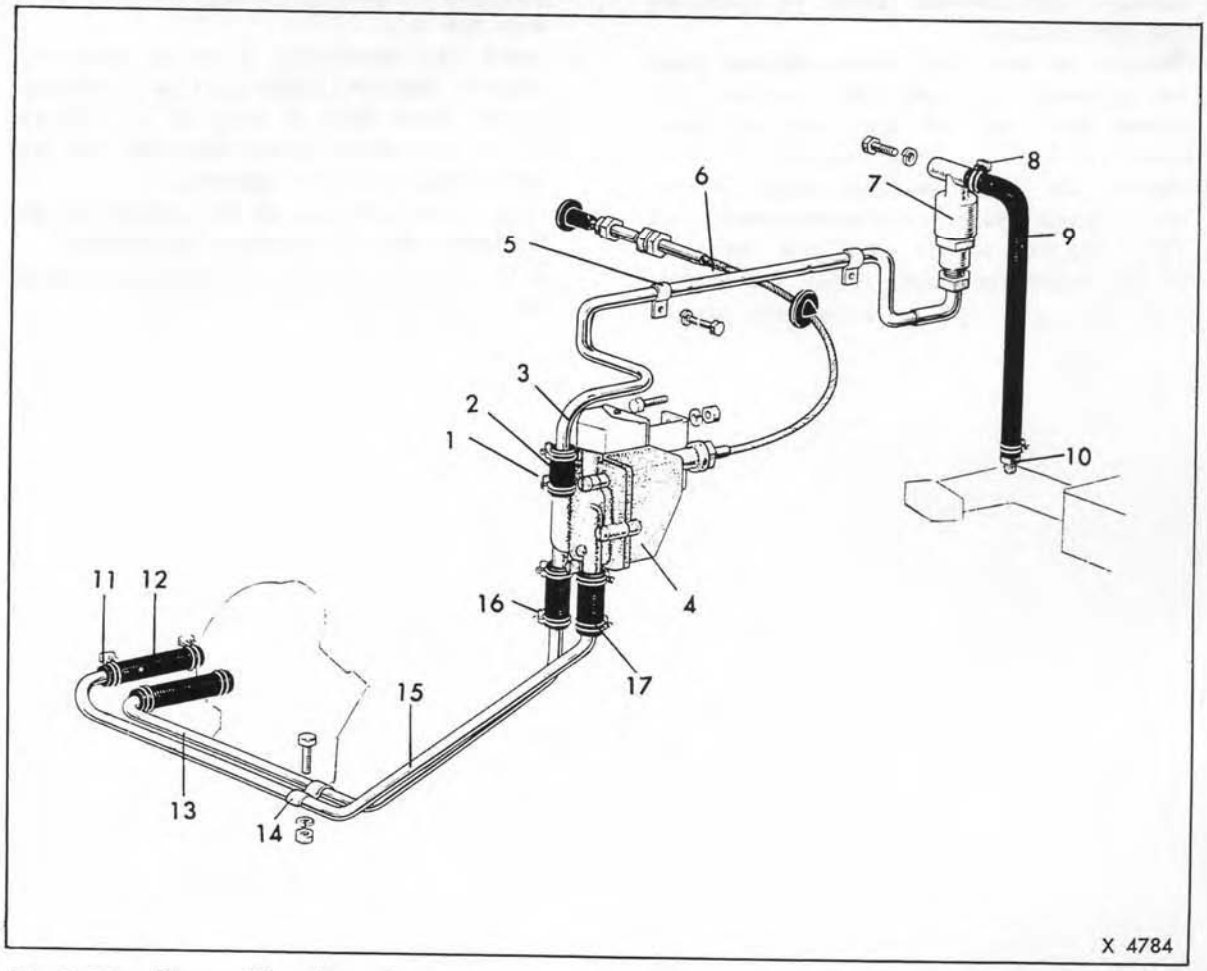


Fig. 3-66. Change Valve Connections

1. CLAMP
2. CHANGE VALVE CONNECT HOSE
3. CHANGE VALVE PIPE
4. CHANGE VALVE
5. PIPE CLAMP
6. CHANGE VALVE SHIFT WIRE
7. CHECK VALVE
8. CLAMP
9. CHANGE VALVE CONNECT HOSE
10. VACUUM OUTLET PIPE UNION
11. CLAMP
12. DIAPHRAGM CONNECT HOSE
13. FRONT DRIVE VACUUM PIPE No. 2
14. CLAMP
15. FRONT DRIVE VACUUM PIPE No. 1
16. CLAMP
17. VACUUM PIPE CONNECT HOSE

REMOVAL

1. Disconnect the change valve connect hose at the vacuum outlet pipe union on the intake manifold by loosening the vacuum hose clamp. Also disconnect the hose at the end of the change valve pipe.
2. Disconnect the two vacuum pipe connect hoses beneath the change valve assembly. Also disconnect the diaphragm connect hoses at the ends of the diaphragm chambers.
3. Remove the change valve pipe with the change valve connect hoses by removing the pipe clamps.
   Remove the two front drive vacuum pipes by removing the gear shift vacuum pipe clamp, loosening the bolt and nut from under the cowl mounting bracket.
4. Remove the front drive shift button, spacer and grommet at the instrument panel, and loosen the nuts at the front and the back of the instrument panel. Then the change valve shift wire can be pulled out toward the engine compartment through the rubber grommet.
5. Remove the bolts attaching the change valve to the cowl flange inside the engine compartment, and remove the change valve assembly with the wire attached.

For installation, follow "Removal" in reverse order.

INSPECTION & REPAIR

1. Check the change valve shift wire for proper operation. If it sticks and will not move smoothly by pulling the shift button, replace with new one.
2. Check the connecting hoses at each end whether they are tightly fixed by the clamps.
3. In case front drive is hard to be shifted, check the change valve operation by disassembling the valve assembly.
   Inspect the operation of the valves for air tightness, worn or damaged conditions.
   If the valve is found to be defective, replace the valve assembly with new one.

2 Diaphragm Chambers and Front Drive Fork

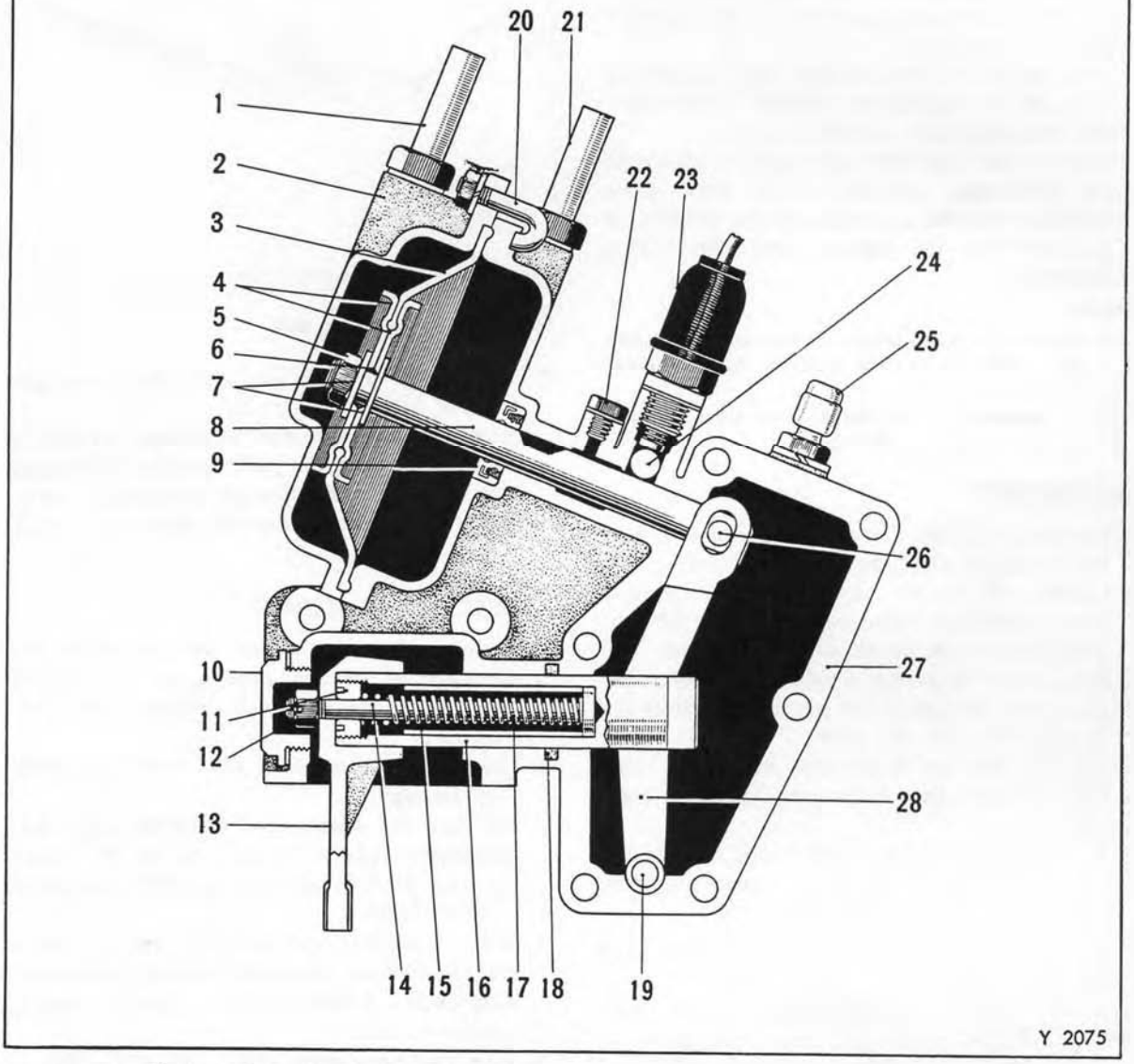


Fig. 3-67. Section of Diaphragm Chamber

1. Suction Tube
2. Diaphragm Cylinder Body Cover
3. Diaphragm
4. Diaphragm Plate
5. Nut
6. "O" ring
7. Plain Washer
8. Diaphragm Push Rod
9. Oil Seal
10. Straight Screw Plug
11. Stopper
12. Nut
13. Transfer Front Drive Shift Fork
14. Push Rod Bolt
15. Spacer
16. Transfer Front Drive Shift Shaft
17. Compression Spring
18. Dust Seal
19. Pin
20. Diaphragm Cylinder Set Bolt
21. Suction Tube
22. Straight screw plug
23. Transfer indicator switch
24. Ball
25. Breather plug
26. Pin
27. Diaphragm cylinder body
28. Front drive shift link lever

REMOVAL & INSTALLATION

1. To remove the diaphragm cylinder body and transfer front drive fork.
   First remove the transmission under cover, and then disconnect the front drive indicater switch connections.
   Also disconnect the vacuum pipe connecting hoses at the diaphragm cylinder body cover and the diaphragm cylinder body.
   Remove the four bolts and washers attaching the diaphragm cylinder to the front drive extension housing and take out the diaphragm cylinder with the transfer front drive fork attached.

Caution :

1) At removal and installation, take care to shift the front drive "OFF" position. For installation, follow "Remove" in reverse order.
2) At installation, be sure that the front drive shift lever and the fork are in "OFF" position.

DISASSEMBLY

1. Remove the front drive indicator switch and ball from the diaphragm cylinder body.
2. Loosen and remove the diaphragm cylinder cover attaching bolts, then remove the diaphragm cylinder cover with the gasket.
3. Remove the front drive shift link lever upper pin cotter pin and lower pin, then remove the front drive shift link lever.
4. Remove the six diaphragm attaching bolts, then remove the diaphragm cylinder body cover.
5. Remove the expantion plug, then remove the front drive shift link lever upper pin from the transfer front drive shift shaft.
6. Pull out the diaphragm with the shift shaft from the diaphragm cylinder body.
7. Loosen and remove the straight screw plug.
8. Remove the cotter pin from the push rod shaft end, then loosen and remove the push rod nut from the push rnd end.
9. Remove the transfer front drive shift fork from the transfer front drive shift shaft.
10. Pull out the transfer front drive shift shaft from the diaphragm cylinder body.
11. Loosen and remove the shift shaft stopper using a suitable tool and take out the bolt spring and spacer.

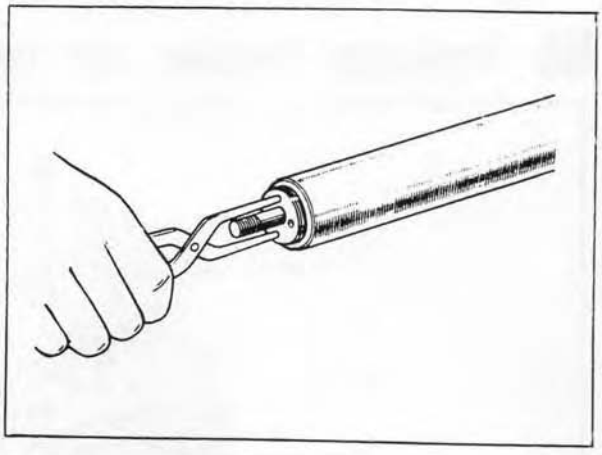


Fig. 3-68. Removing Bolt

12. Remove the suction pin from the diaphragm cylinder body.
13. Loosen and remove the diaphragm attaching nut, then remove the plain washer, diaphragm plate, "O" ring, diaphragm, diaphragm plate, and plain washer from the diaphragm push rod.

INSPECTION & REPAIR

1. Inspect the diaphragm for air tightness, damaged or swollen conditions. If any of these conditions exists, replace the diaphragm.
2. Check the operation of the front drive shift fork linkage.
3. In case the diaphragm chambers are disassembled, apply a few amount of grease into the oil hole provided on the diaphragm cylinder body.
4. When installing the fork and diaphragm to the front drive extension housing, use a new diaphragm cylinder body gasket coating gasket cement.
5. Check the dust seals, and "O" rings. When the diaphagm chambers have been disassembled, replace the "O" ring with new one.
   with new one.
6. Check the oil seal and replace if excessively worn.

ASSEMBLY

1. Assemble the plain washer, diaphragm plate, diaphragm, "O" ring, diaphragm plate, and plain washer to the diaphragm push rod end, then install and tighten the diaphragm nut.
2. If the oil seal removed from the diaphragm cylinder body, install the oil seal.
   Then insert the diaphragm push rod with diaphragm into the diaphragm cylinder body. Take care to keep the push rod position correctly so that the slot on the push rod will face the switch side and the rod may not move around.

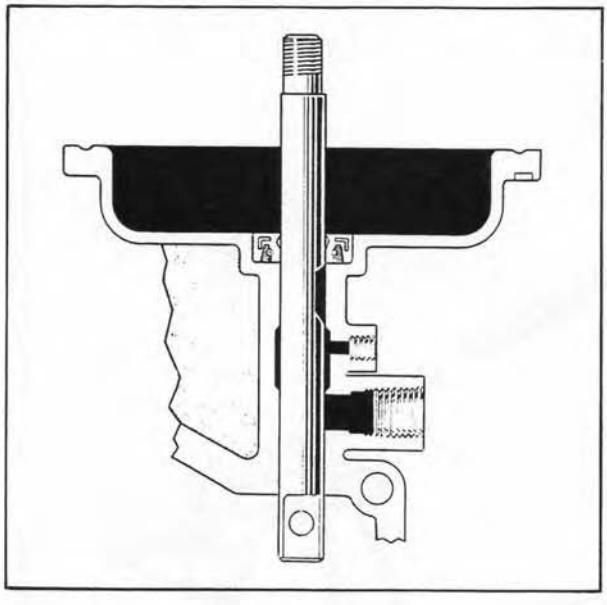


Fig. 3-69. Push Rod Installation

3. Install the diaphragm cylinder body cover and fix it with six bolts, washers and nuts.
4. Install the suction pipes to the diaphragm cylinder body and cover with gaskets.
5. To assemble the front drive shift shaft, first attach the coil spring to the long bolt and insert them into the spacer.
   Then install the spacer with them into the shift shaft and install and tighten the shaft stopper using a suitable tool.
6. Insert the shift shaft assembly into the chamber and place the front drive shift fork in position. Then ponch the shaft stopper prevent loosing.
7. Install the shift fork to the shift shaft end and fix with a nut and a cotter pin to the extent that the fork lightly contacts the shaft end.
   Then install and tighten the straight screw plug with the gasket.
8. Apply grease to the oil hole provided in the diaphragm cylinder body and install the oil hole plug.
9. Attach the transfer front drive shift lever with pins to the diaphragm push rod and diaphragm cylinder body.
   Then install the cotter pin and plain washer to the diaphragm push rod side pin.
   Take care to apply grease enough to the pins.
10. Install the diaphragm cylinder cover to the diaphragm cylinder body by installing and tightening bolts with wave washers securely.
11. Drop the ball for the indicator switch and install the switch to the diaphragm cylinder body.
12. Install the expantion plug with a new plug to the diaphragm cylinder body.

PART V TRANSMISSION & TRANSFER CASE GEAR SHIFT LINKAGE

1 Transmission Gear Shift & Linkage

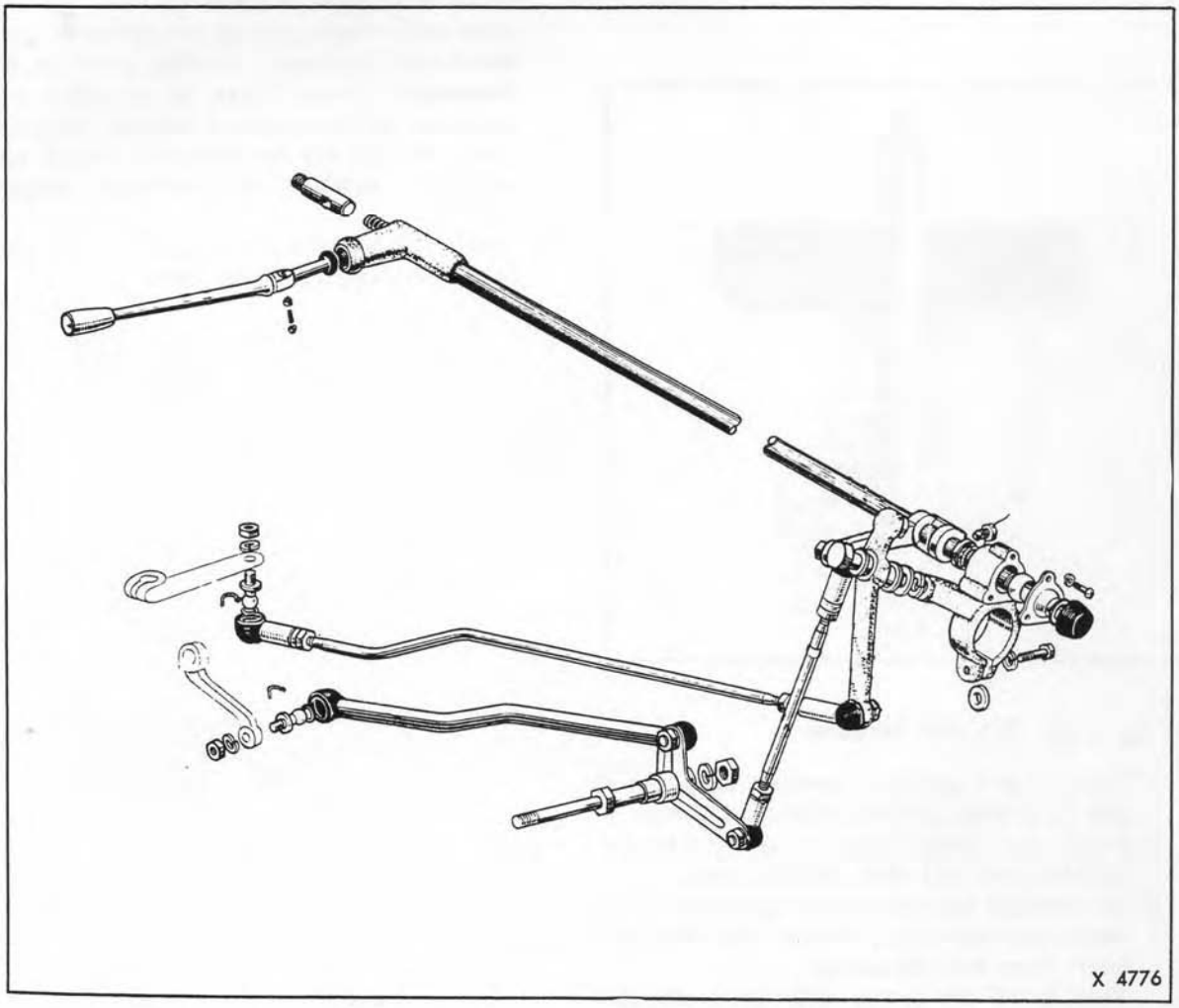


Fig. 3-68. Control Shaft and Linkage

REMOVAL & DISASSEMBLY

1. Remove the steering wheel using Steering Wheel Puller 09609-20010.
   See Group 6, Steering.
2. Disconnect the gear shifting lever by pressing the lever pins.
3. Remove the turn-signal switch from the mast jacket. Disconnect the horn wiring. The shaft spring can be taken out.
4. Remove the mast jacket lower clamp and also remove the mast jacket hole cover rubber set plate and hole cover rubber.
5. Disconnect the gear shifting rod No. 1 and gear selecting rod at the end of the control shift lever and control select lever.
6. Remove the control shaft lower bracket.
7. Unloosen the bolts holding the steering gear box bracket cap.

Note : On the left hand drive vehicles, it is recommended to remove or raise the oil cleaner to facilitate removal of the control shaft.

8. Pull the control shaft with the control select and shift levers attached out through the engine compartment.
9. Disconnect the control select and shift levers and control shaft lower bracket from the control shaft.
10. Removal procedure of the shift linkage down from the control select shift levers is self explanatory.

INSPECTION & ADJUSTMENT

Clean all parts thoroughly in cleaning solvent and inspect for wear or other damages. Repair or replace the defective parts.

ASSEMBLY & INSTALLATION

1. Assemble the shift linkage down from the control select and shift levers.
2. Install the turn signal switch on the mast jacket with the control shaft upper bracket shaft.
   Make sure that the hole provided on the shaft be positioned correctly.
3. Assemble the control select and shift levers and the control shaft lower bracket to the control shaft.
4. Place the control shaft with the control levers attached in correct position on the mast jacket.
   Connect the control shaft with the control shaft upper bracket shaft on the turn signal switch after installing into the control shaft.
5. Assemble the control lever to the lever housing.
6. Tighten the control shaft lower bracket clamp.
7. Tighten the bolts holding the steering gear box bracket clamp.
8. Keeping the levers in the neutral position, connect the gear shifting rod No. 1 and gear selecting rod.
9. Install the mast jacket lower clamp and also install the mast jacket hole cover rubber set plate and hole cover rubber.
10. Install the steering wheel.
11. Connect the horn wiring connector.
12. Operate the control lever and check if the gear shifting is performed properly.

2 Transfer Case Gear Shift Linkage

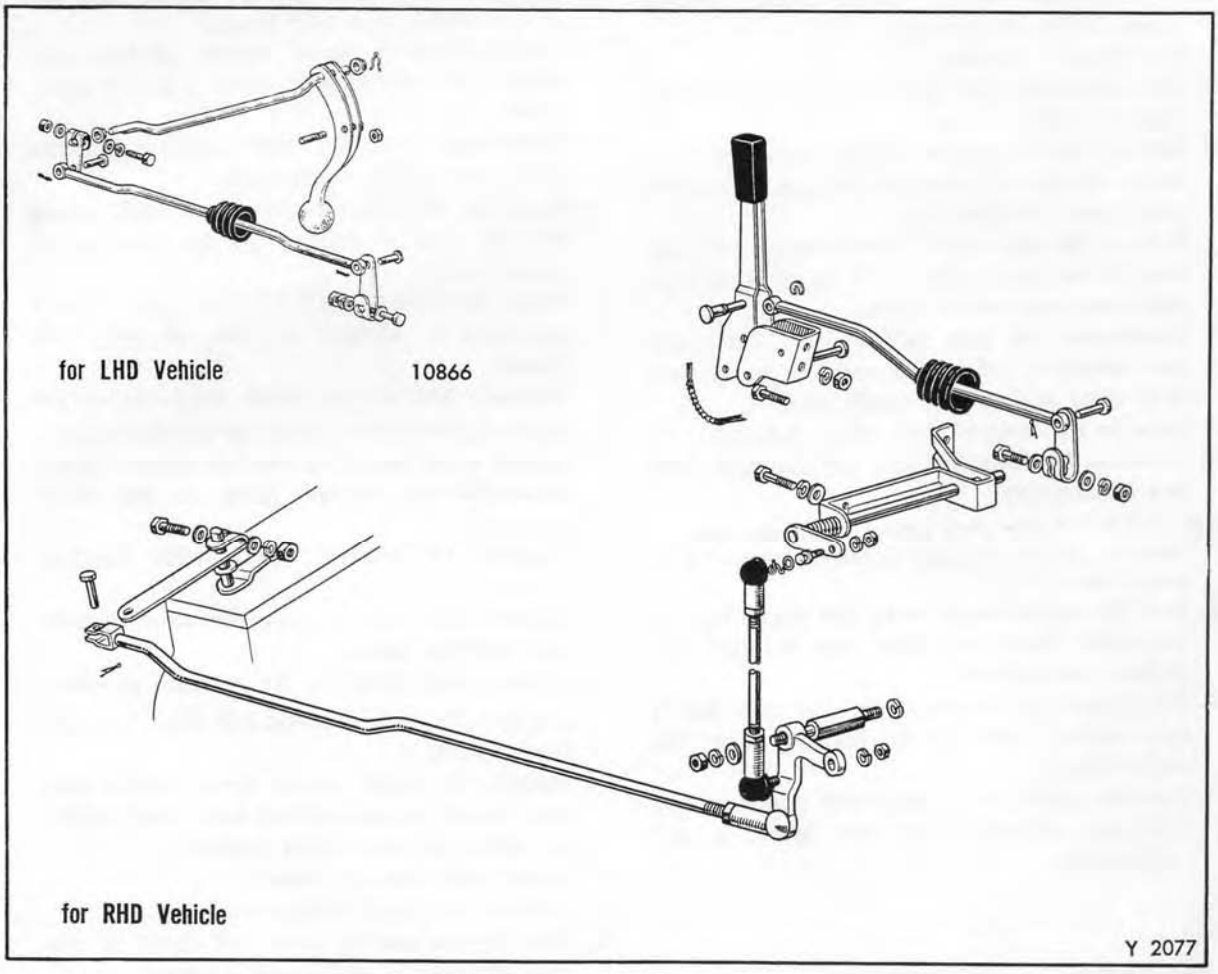
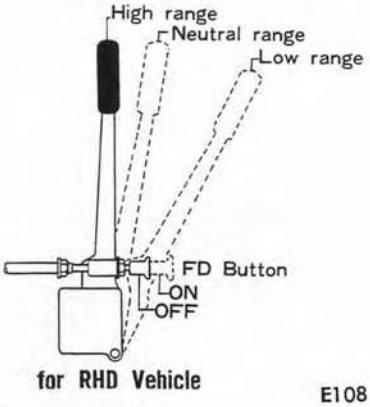


Fig. 3-70. Transfer Case Gear Shift Linkage

3 Transfer Gear Shift & Front Drive Shift Operation



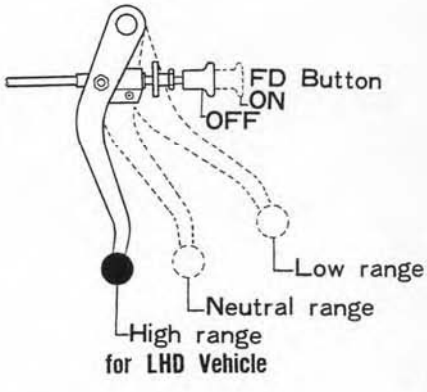


Fig. 3-71. Operation

PART VI SPECIFICATIONS

Transmission Gear Ratio

Low	2.76
Second	1.70
Top	1.00
Reverse	3.67

Transfer Case Gear Ratio

High Speed	1.00
Low Speed	2.31

Speedometer Gear Ratios

Gear Ratio	Nos. of Teeth	Part Number	
	Driven Gear/Drive Gear	Drive Gear	Driven Gear
2.67	16/6	33481-60030	33403-60030
2.83	17/6	33481-60030	33403-60020
3.00	18/6	33481-60020	33403-60010

Tire Size	Differential Reduction Gear Ratio	Speedometer Gear Ratio
7.10—15	3.70	2.67
	4.11	3.00
7.60—15	3.70	2.67
	4.11	2.83
7.00—15	3.70	2.67
	4.11	2.83
7.00—16	4.11	2.83

Play of Second Speed Gear in Axial Direction		0.1—0.3 mm (0.004—0.012 in.)
Input Shaft Gear Snap Ring Thickness	90520-33010	$2.3^{+0.27}_{-0.13}$ 2.17~2.57 (0.085~0.101 in.)
Output Shaft Snap Ring Thickness	90520-33011	$2.3^{+0.12}_{-0}$ 2.30~2.42 (0.090~0.095 in.)
Counter Gear End Play		0.15—0.40 mm (0.006—0.016 in.)
Counter Gear Side Thrust Washer Thickness	33441-61010	1.45—1.50 mm (0.057—0.059 in.)
	33442-61010	1.50—1.55 mm (0.059—0.061 in.)
	33443-61010	1.55—1.60 mm (0.061—0.063 in.)
Transfer Idle Gear End Play in Axial Direction		0.15—0.40 mm (0.006—0.016 in.)
Transfer Idle Gear Spacer Thickness	36261-60010	1.20—1.30 mm (0.0472—0.0512 in.)
	36262-60010	1.30—1.40 mm (0.0512—0.0551 in.)
	36263-60010	1.40—1.50 mm (0.0551—0.0591 in.)
	36264-60010	1.50—1.60 mm (0.0591—0.0630 in.)
	36265-60010	1.60—1.70 mm (0.0630—0.0669 in.)
	36266-60010	1.70—1.80 mm (0.0669—0.0709 in.)
Rear Drive Gear Retainer Bearing Preload (Scale reading at the parking brake drum set bolt)		4.7—5.9 kg (10.3—13.0 lbs.)
Drive Shaft Adjusting Shim Thickness	90564-64017	0.10 mm (0.0039 in.)
	90564-64023	0.15 mm (0.0059 in.)
	90564-64024	0.20 mm (0.0079 in.)
	90564-64025	0.25 mm (0.0098 in.)

Torque Limits

Description	m-kg	ft-lbs
Transmission Set Bolt	7.5—7.9	52—57
Gear Shift Cam Retainer Set Bolt	1.5	11
Transfer Case × Transmission		
Two Long Bolts	3.5—3.8	20—28
Three Attaching Bolts	3.5—4.1	25—30
Power Take-off Cover Bolt	1.5	11
Front Bearing Lock Set Bolt	1.5	11
Front Drive Extension Housing × Transfer Case	1.5	11
Speedometer Housing × Transfer Case	1.5	11
Transfer Case Cover Set Bolt	1.5	11

Group 4

REAR AXLE & DRIVE LINE

PART I TROUBLE SHOOTING

An unusual noise is usually the first indication of improper functioning of the axle driving parts. Although some mechanical failures of the rear axle are relatively easy to locate, noises in the rear axle are a little more difficult to diagnose and repair. When noise is experienced in the rear axle assembly, it is advisable to make a thorough test and search for the location of the noise. Noises which seem to come from the rear axle may be caused by some other units such as engine, transmission, transfer case, tire, or other parts of the vehicle. These noises originating from other places cannot be corrected by adjustment or replacement of parts of the rear axle assembly.

Even an experienced mechanic sometimes fails to make a correct diagnosis, so that the following methods of locating troubles should be carefully observed when necessary repairs arise in the rear axle.

Caution: To make the rear axle noise diagnosis, the vehicle should be road-tested on a smooth level road. Before road-testing the vehicle, make sure that the tire inflation and the rear axle lubricant level are normal.

Rear Axle Noises

The rear axle noises can be classified into two types, that is, Gear Noise and Bearing Noise.

To quickly differentiate these two types of noise is the first step of rear axle trouble diagnosis.

Gear Noise can be recognized since it produces a cycling pitch and tends to peak in a narrow speed range, while Bearing Noise will tend to remain constant in pitch and produce a rough whine.

1. Rear Wheel Bearing Noise is usually caused by rough bearings, and vibration or growl continues while transmission in neutral, or at low speed. It usually stops when the brakes are gently applied. Jack up the vehicle and rotate the wheel by hand and listen at hub to rough or damaged bearing.

2. Differential Side Gears and Pinions seldom causes noise except when turning curves as they are used only when the rear wheels travel at different speeds. Test on a straight road and also test while turning on a curve.

3. Drive Pinion Bearing Noise will occur if the bearing is rough or damaged, and will produce a whine starting at relatively low speed.

4. Typical rear axle noises originate from the faulty Ring Gear and Drive Pinion. The drive pinion bearing or wheel bearing noises sometimes mingle at different driving conditions.

To detect the alleged rear axle noise, the vehicle should be road-tested at varying speeds under proper road conditions.

a. Drive Noise is most clear on constant acceleration through the speed range, and the probable causes are tight ring gear and pinion adjustment, or rough drive pinion bearings.

b. Coast Noise is most evident when the vehicle is allowed to coast through the speed range with the throttle closed. The probable causes are loose ring gear and pinion adjustment, rough pinion bearings, or excessive end play in the pinion.

c. When the rear axle is noisy on both Drive and Coast, the probable causes will be rough drive pinion bearings, loose or damaged side bearings, damaged axle shaft bearing, worn universal joint, worn or damaged ring gear and drive pinion gear teeth, or incorrect ring gear and drive pinion adjustment.

Excessive Backlash in Axle Driving Parts

This condition may be caused by loose axle shaft, worn axle shaft splines, loose bolt nuts, worn differential gears or case, loose ring gear and pinion adjustment, or loose universal joints, etc. Check these points and adjust or replace if excessively worn or damaged.

Excessive Drive Line Noise or Vibration

Excessive noise or vibration may be caused by lack of lubrication in the universal joints.

Also if the propeller shafts are not assembled with the universal joints in the same plane, vibration will result.

Worn universal joints, bent propeller shaft, or worn universal joint needle roller cup will also cause noise and vibration.

Confusing Noises

Road noise, tire noise, front wheel bearing noise, or engine and transmission noise are often mistaken for Rear Axle Noises.

These noises should be correctly diagnosed and repaired before proceeding to the rear axle repair.

Road Noise

Some road surfaces such as brick, or rough surfaced concrete causes the noise which may be mistaken for tire or rear axle noise.

Drive on different types of roads, and smooth road will quickly show whether the road surface is the cause of the noise.

Tire Noise

Tire noise may easily be mistake. for rear axle noise even though the noisy tires may be found on the front wheels.

Check the tire inflation as the low pressure tire may cause more noise. Inflate the tires a little more than specified for test purposes.

Front Wheel Bearing Noise

Loose or rough front wheel bearings will cause noises which may be mistaken for rear axle noise. Front wheel bearing noise will not change on Pull and Coast. To check the front wheel bearing noise, jack up the front wheel and rotate to listen to unusual loose bearing noises.

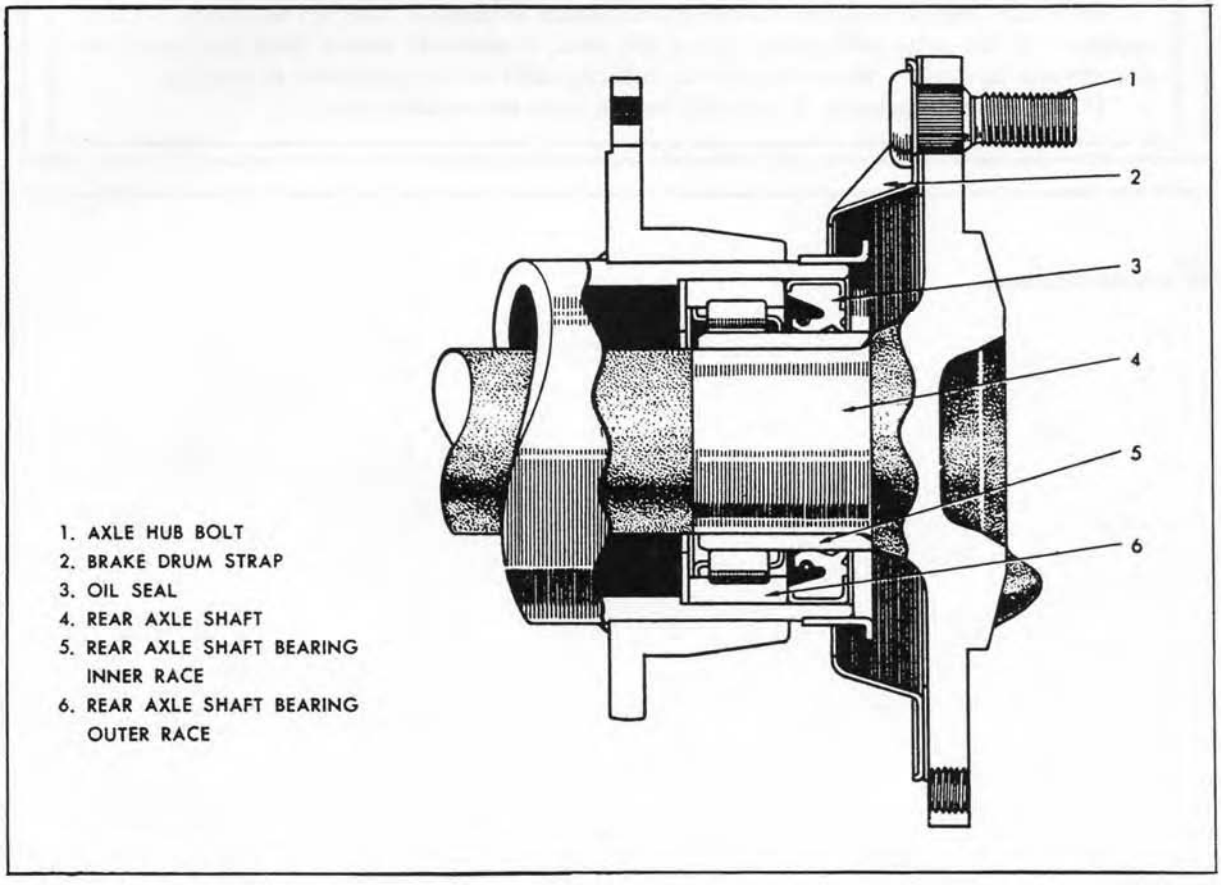
Engine and Transmission Noise

With the vehicle stopped and the transmission in neutral, run the engine at various speeds. If the noise still exists during this test, it probably comes from the engine or the exhaust system. While driving the vehicle, shift the transmission in neutral.

If the noise disappears, it probably comes from the transmission.

Memorandum

PART II REAR AXLE SHAFT, AXLE SHAFT BEARING, & OIL SEAL



1. AXLE HUB BOLT
2. BRAKE DRUM STRAP
3. OIL SEAL
4. REAR AXLE SHAFT
5. REAR AXLE SHAFT BEARING INNER RACE
6. REAR AXLE SHAFT BEARING OUTER RACE

Fig. 4-1. Axle Shaft, Bearing & Oil Seal

The rear axle equipped on the Toyota Land Cruiser is of the Semi-floating type and the drive used is of the Hotchkiss type in which the drive is effected through the chassis. The rear axle consists of the right and left parts with the differential gears in the middle. The inner end of each axle connects onto the differential side gear with splines and locked with rear axle shaft lock ("C" washer) to prevent the axle from coming out.

1 Removal

1. Jack up the rear axle housing and support the rear end of the vehicle on a stand.
2. Drain differential gear oil.
3. Remove the wheels.
4. Remove the brake drum.
5. Remove the rear axle housing cover.
6. Remove the differential pinion shaft pin.
7. Remove the differential pinion shaft and

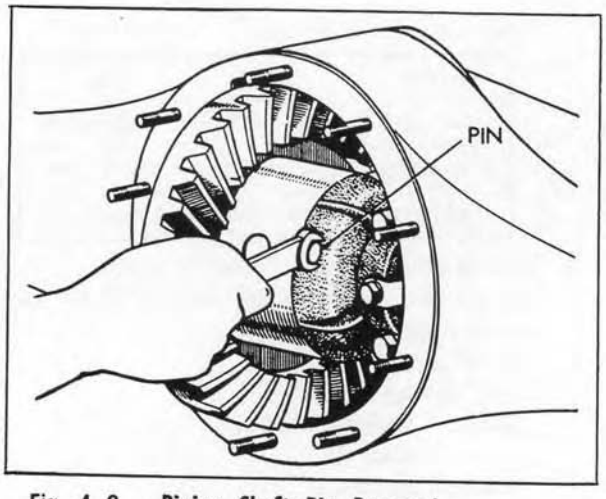


Fig. 4-2. Pinion Shaft Pin Removal

the pinion spacer.

8. Remove the shaft lock from the rear axle shaft.
9. Pull out the rear axle shaft.
10. Remove the rear axle shaft bearing outer race and oil seal using Rear Wheel Bearing Puller (09514-35010)
11. Take out the axle hub bolts and remove the brake drum strap.
12. When removing the bearing inner race, tap off with a cold chisel. To install, tap the inner race with a light hammer.

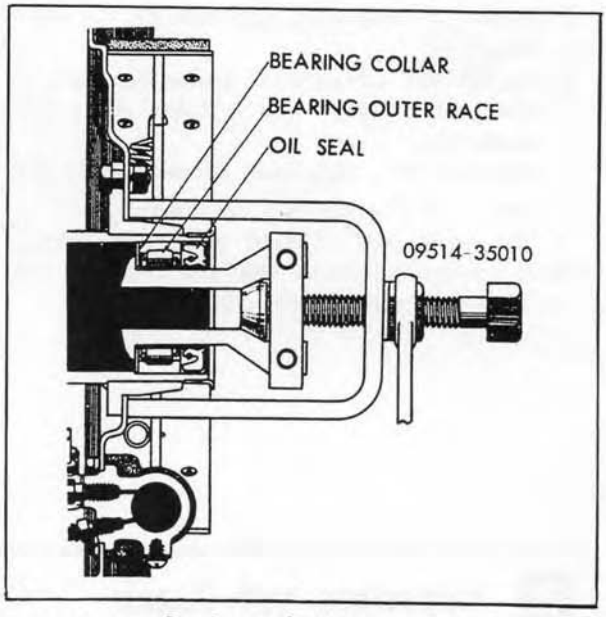


Fig. 4-3. Bearing and Oil Seal Removal

2 Installation

1. Attach the brake drum strap on the axle shaft flange and insert the hub bolts.
2. Install the rear axle shaft bearing outer race using Rear Wheel Bearing Replacer (09515-35010), and then install the oil seal.

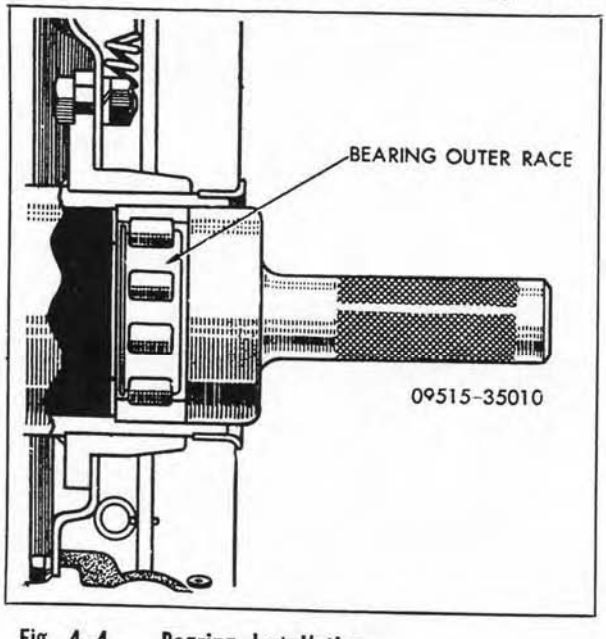


Fig. 4-4. Bearing Installation

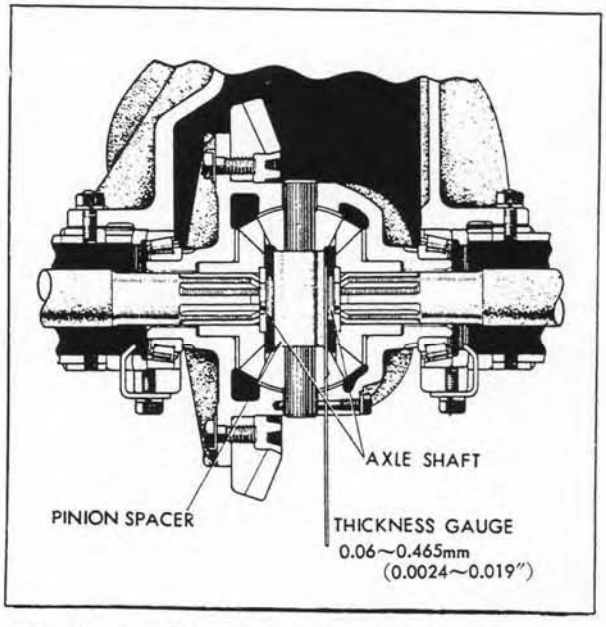


Fig. 4-5. Clearance between Shaft and Spacer

3. Install the rear axle shaft and fit the shaft lock.
4. Install the differential pinion spacer and the pinion shaft, and tighten the pinion shaft pin.
5. Measure the clearance between the axle shaft and the pinion shaft spacer.

By using one of three differential pinion shaft spacers, adjust so that the clearance will be 0.06~0.465 mm (0.0024~0.019 in.).

Thickness of the Spacers

Part No.	mm	inch
41344-35010	29.775~29.800	1.172~1.173
41345-35010	30.175~30.200	1.188~1.189
41346-35010	30.575~30.600	1.204~1.205

6. Attach the rear axle housing cover.
7. Install the brake drum, then tighten the brake drum set screw.
8. Install the wheel
9. Refill the gear oil.
   Kind Hypoid Gear Oil SAE 90
   Amount 25 liters
10. Lower the vehicle.

3 Inspection and Repair

1. Inspect the rear axle shaft for bent, cracked or damaged condition, and replace if found defective.
2. Check each bearing for worn, damaged, or noisy condition.
3. Replace the oil seals if found damaged.

Memorandum

PART III DIFFERENTIAL CARRIER

The differential carrier is installed within the banjo type housing. The drive ring gear and drive pinion are the hypoid type with the pinion being 1.5 mm off-set from the ring gear. Two kinds of diffrential reduction gear ratios of 3.70, 4.11 are available for Toyota Land Cruiser. They are interchageable with each other.

1 Removal & Installation

1. Jack up the rear axle housing and support the rear end of the vehicle on a stand.
2. Drain the gear oil.
3. Remove the wheel.
4. Remove the brake drum.
5. Pull out the rear axle shaft slightly. (See Rear Axle Shaft Removal)
6. Disconnect the differential joint yoke retainer and the joint yoke retainer and the joint yoke.
7. Remove the differential carrier from the housing.

For installation follow "Removal" in reverse order.

Note : Replace all packings with new ones.

2 Service Operations

DISASSEMBLY

1. Attach the differential carrier on a repair stand.
2. Using Joint Yoke Holding Tool (09330-30010), remove the joint yoke retainer set nut and remove the retainer.
3. Using Oil Retainer Puller (09308-30010), remove the carrier oil seal.
4. Put the mating mark on both carrier cap and carrier.
5. Remove the adjusting nut lock.
6. Remove the carrier cap and the adjusting nut and then remove the differential case.
7. Remove the drive pinion.

BEARINGS

Check the bearing cups and rollers for

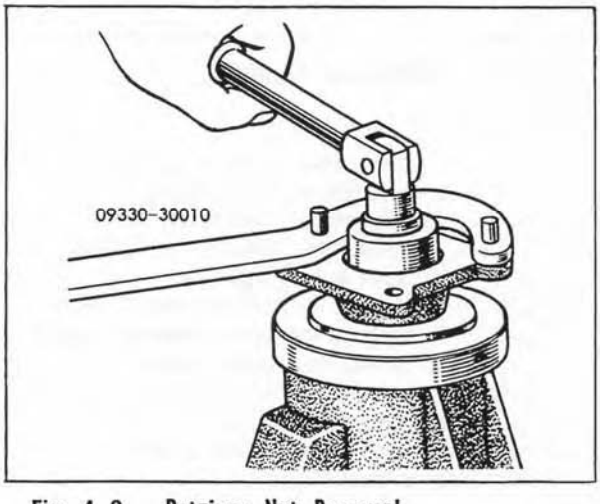


Fig. 4-6. Retainer Nut Removal

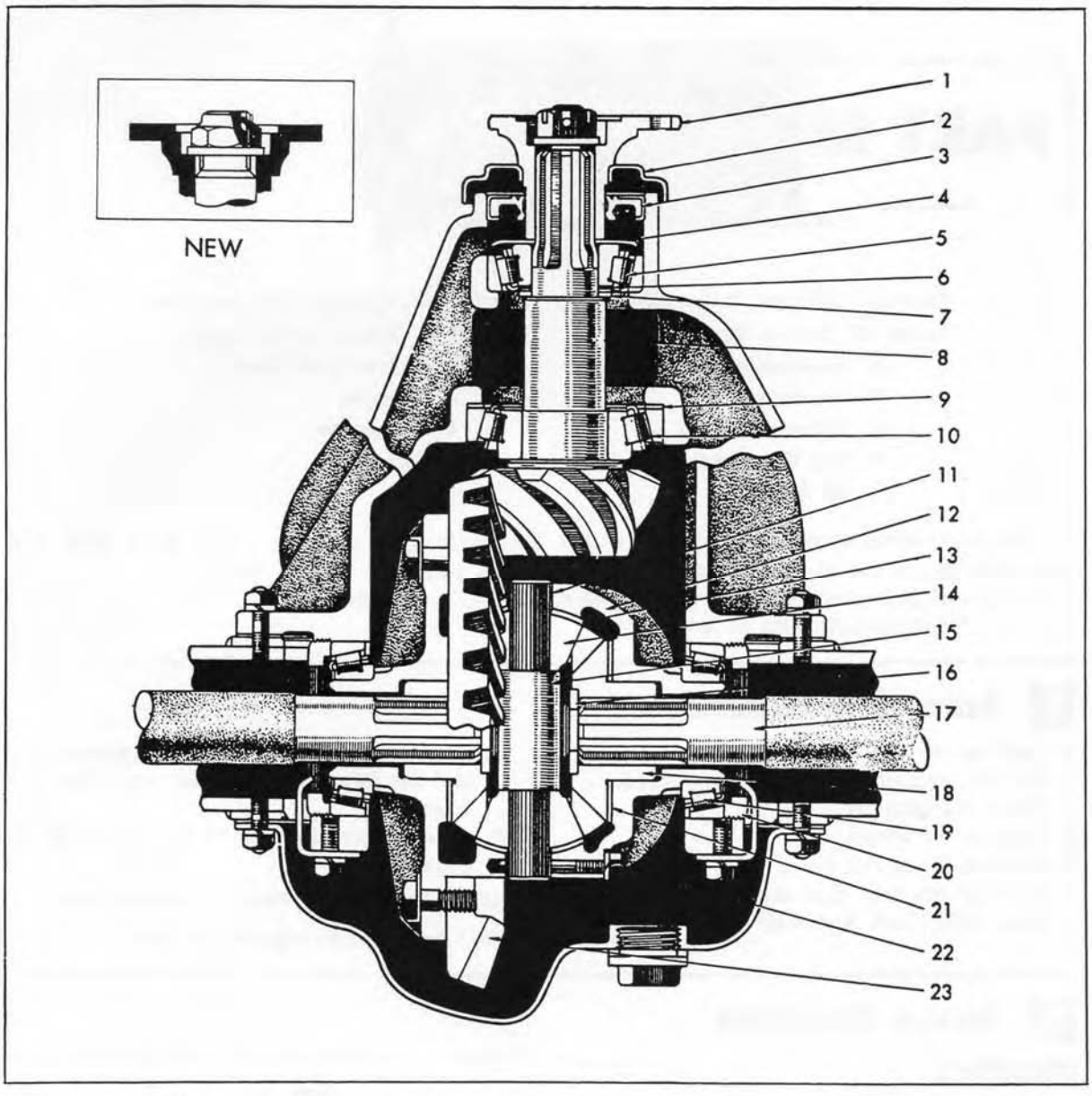


Fig. 4-7. Differential Carrier

1. DIFFERENTIAL JOINT YOKE RETAINER
2. DIFFERENTIAL DUST COVER
3. DIFFERENTIAL CARRIER OIL SEAL
4. DIFFERENTIAL CARRIER OIL SLINGER
5. TAPER ROLLER BEARING
6. DRIVE PINION SPACER ADJUST SHIM
7. DRIVE PINION FRONT BEARING SPACER
8. DIFFERENTIAL DRIVE PINION
9. DRIVE PINION ADJUST SHIM
10. TAPER ROLLER BEARING
11. DIFFERENTIAL PINION SHAFT
12. DIFFERENTIAL CASE
13. DIFFERENTIAL PINION THRUST WASHER
14. DIFFERENTIAL PINION
15. DIFFERENTIAL PINION SPACER
16. REAR AXLE SHAFT LOCK
17. REAR AXLE SHAFT
18. DIFFERENTIAL SIDE GEAR
19. TAPER ROLLER BEARING
20. DIFFERENTIAL ADJUSTING NUT
21. SIDE GEAR THRUST WASHER
22. DIFFERENTIAL PINION SHAFT PIN
23. DIFFERENTIAL RING GEAR

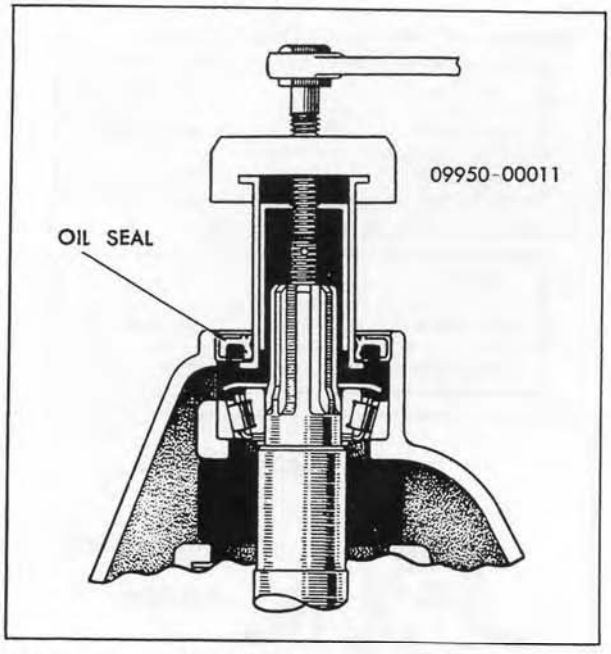


Fig. 4-8. **Oil Seal Removal**

scored, excessively worn, or other defective conditions, and replace if necessary.

1. To remove the rear bearing cone from drive pinion, use Universal Puller (09950-00011).

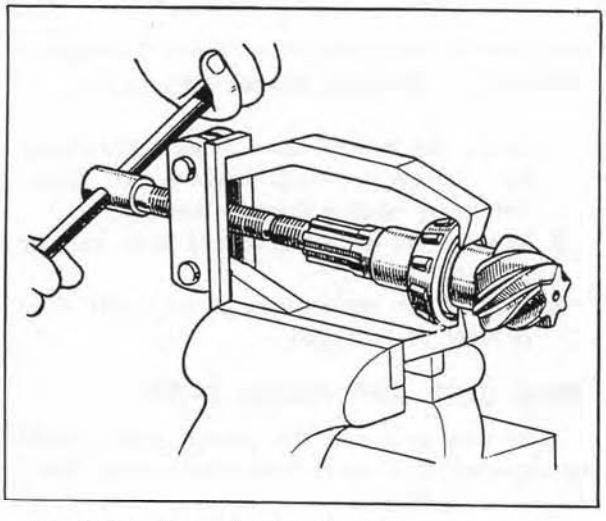


Fig. 4-9. **Rear Bearing Cone Removal**

2. To install, press fit on the drive pinion using Drive Pinion Rear Bearing Cone Replacer (09506-30010).
3. To remove the side bearing cone, use Universal Puller (09950 00091). To install, use Side Bearing Cone Replacer (09505 20010).

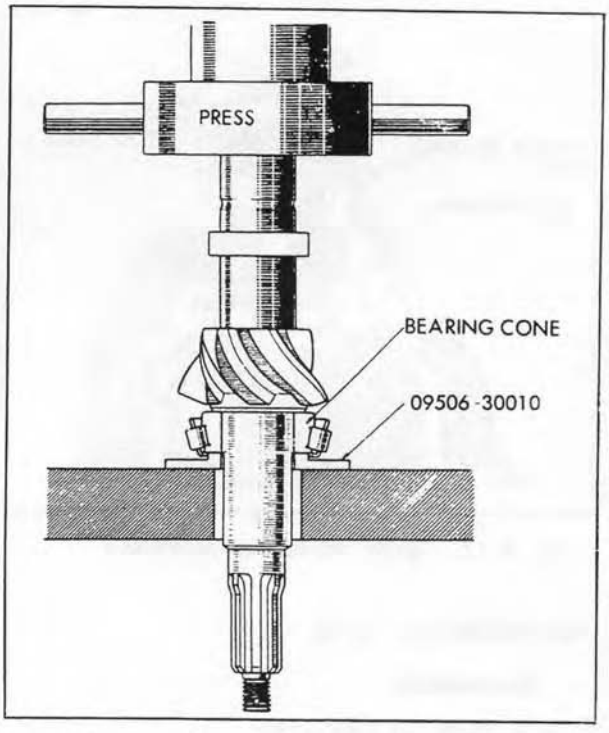


Fig. 4-10. **Rear Bearing Cone Installation**

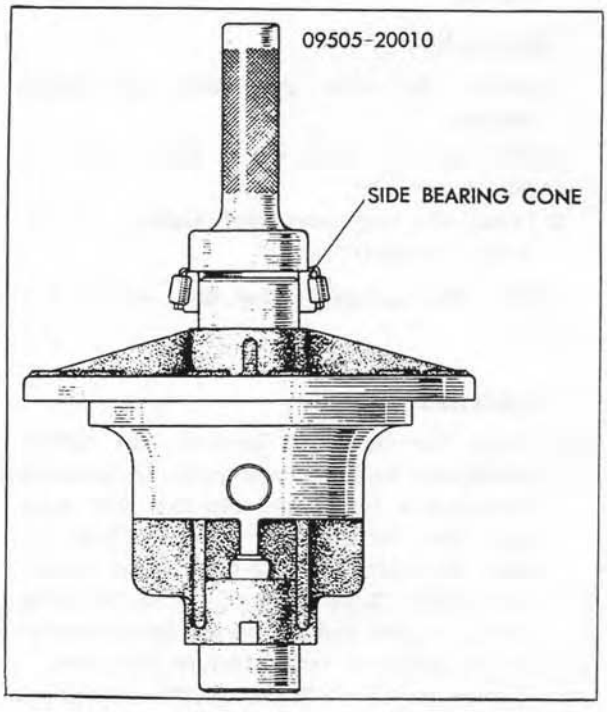


Fig. 4-11. **Side Bearing Cone Installation**

4. To install the differential drive pinion bearing cup, use Differential Drive Pinion Front and Rear Bearing Cup Replacer (09507 30010).

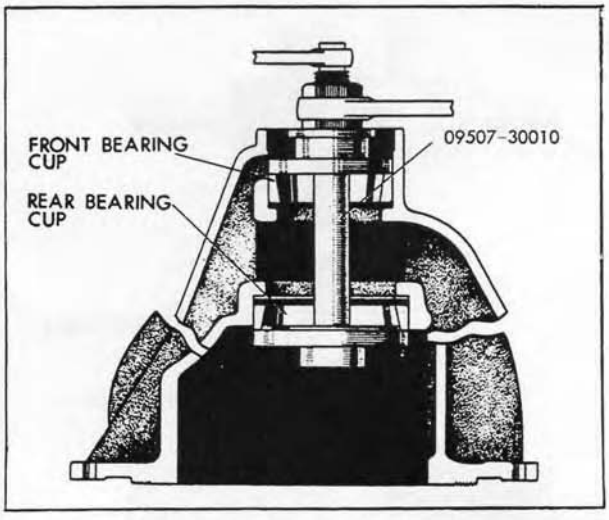


Fig. 4-12. **Drive Pinion Cup Installation**

DIFFERENTIAL CASE

Disassembly

1. Remove the ring gear.
2. Take out the side gear and the thrust washer.

Assembly

1. Install the side gear and the thrust washer.

Caution : Install the thrust washer with the oil slot facing the gear side.

2. Install the ring gear and tighten to 10~12 m-kg 74~89 ft-lbs)

Caution : After tightening the bolt, latch with the bolt lock.

Inspection

1. Check the clearance between the differential case and the side gear. If excessive clearance is found between the side gear and the differential case, adjust by selecting adequate side gear thrust washer and pinion thrust washer. The side gear thrust washer and the pinion thrust washer are available in two different thickness.
   Clearance 0.15~0.35 mm (0.0059~0.0138 in)

Thickness of Side Gear Thrust Washer

Part No.	mm	inch
41361-35010	1.53~1.67	0.060~0.066
41362-35010	1.7 ~1.9	0.067~0.075

Thickness of Pinion Thrust Washer

Part No.	mm	inch
41351-35010	1.5~1.7	0.059~0.067
41352-39020	1.7~1.9	0.067~0.075

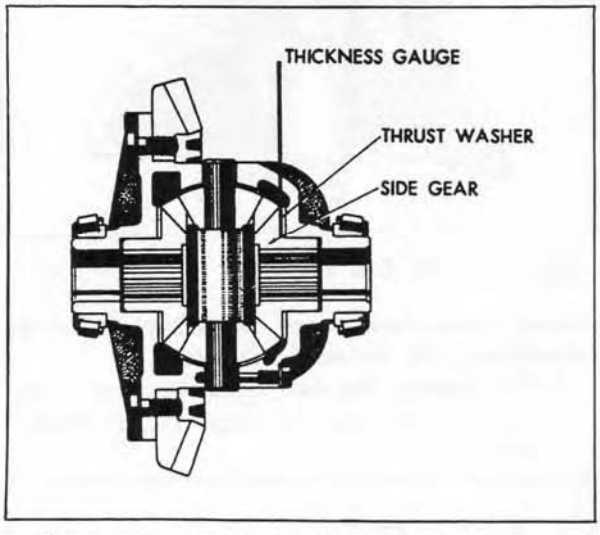


Fig. 4-13. **Clearance between Case and Gear**

2. Check the differential side gear and pinion for damage at tooth surface. If found defective, replace them as one set.
3. Replace the thrust washer if it is worn or damaged.
4. Replace the differential pinion shaft if it is worn or damaged.

RING GEAR AND PINION GEAR

The ring gear and the pinion gear should be replaced as a set if found excessively worn, scored, or damaged.

OIL SEAL

Inspect the oil seal and replace if found worn, damaged, or defective.

3 Assembly and Adjustment

Caution : Use the Drive Pinion Adjusting Gauge 09530-35010 for Drive Pinion Adjusting Shim selection, Drive Pinion Bearing Spacer Adjusting Shim selection and Drive Pinion Bearing Spacer Adjusting Shim selec-

tion (Drive Pinion Bearing Preload Adjustment).

Drive Pinion Adjusting Shim Selection

1. Install the rear bearing cone on the Base Rod of the Adjusting Gauge.
2. Install the Base Rod in the differential carrier and install the front bearing cone and Push Collar.

Caution : Before installing them, remove the drive pinion adjusting shim, front bearing spacer and spacer adjusting shim.

3. Install Adjusting Gauge Screw and tighten to (8.4~15 ft-lbs).
4. Place the Master Gauge in the bearing bores and assemble the caps and tighten cap bolts with a torque wrench to 11 m-kg (80 ft-lbs)
5. Measure the clearance between the master gauge and the base rod and select several adjusting shims of proper thickness from the four kinds of shims so that they can fit tight between the master gauge and the base rod.

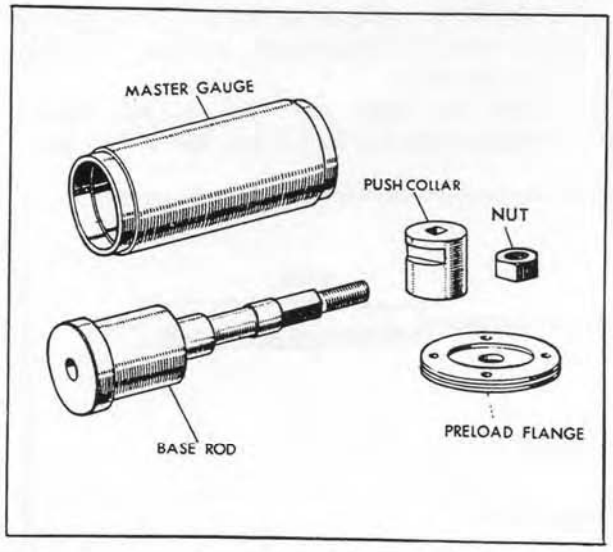


Fig. 4-14. Drive Pinion Adjusting Gauge

Four Kinds of Drive Pinion Adjusting Shims Thickness

Part No.	mm	inch
90564-70101	0.250	0.0098
90564-70102	0.300	0.0118
90564-70103	0.350	0.0138
90564-70104	0.450	0.0177

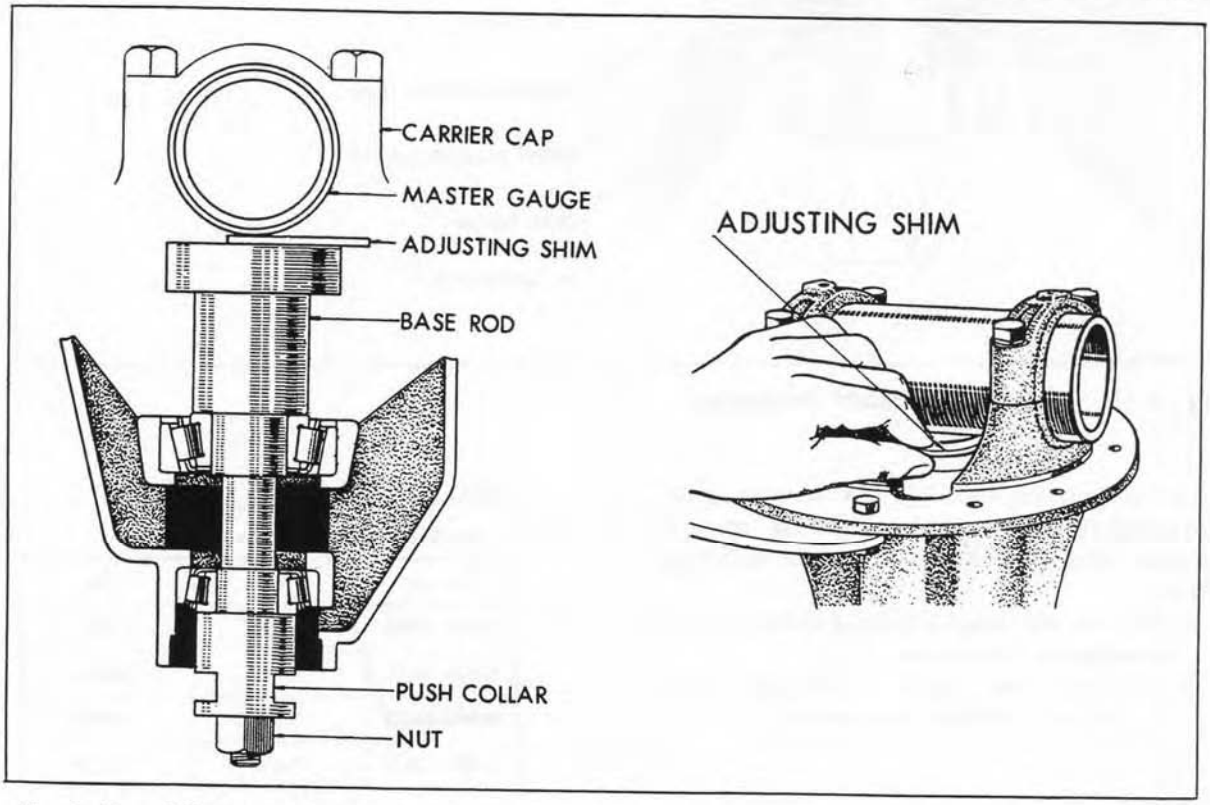


Fig. 4-15. Adjusting Shims Selection

Drive Pinion Bearing Preload Adjustment

6. After selecting the drive pinion adjusting shims, remove the rear bearing cup and install those shims, and then install the rear bearing cup again.
7. Press fit the rear bearing cone on the drive pinion using Drive Pinion Rear Bearing Cone Replacer (09506-30010).
8. Install the drive pinion on the differential carrier.
9. Install the front bearing cone, dust cover and joint yoke retainer and tighten the retainer nut to 22 m-kg (160 ft-lbs) torque using Joint Yoke Holding Tool (09330-30010). Calk the companion flange attaching nut.
10. Install the preload flange on the joint yoke retainer.
11. Check the preload by tying a cord around the preload Flange and hooking the scale to the cord.
    Pull the scale and the reading should range from 3.8 to 5.2 kg (8.4 to 11.5 lbs).

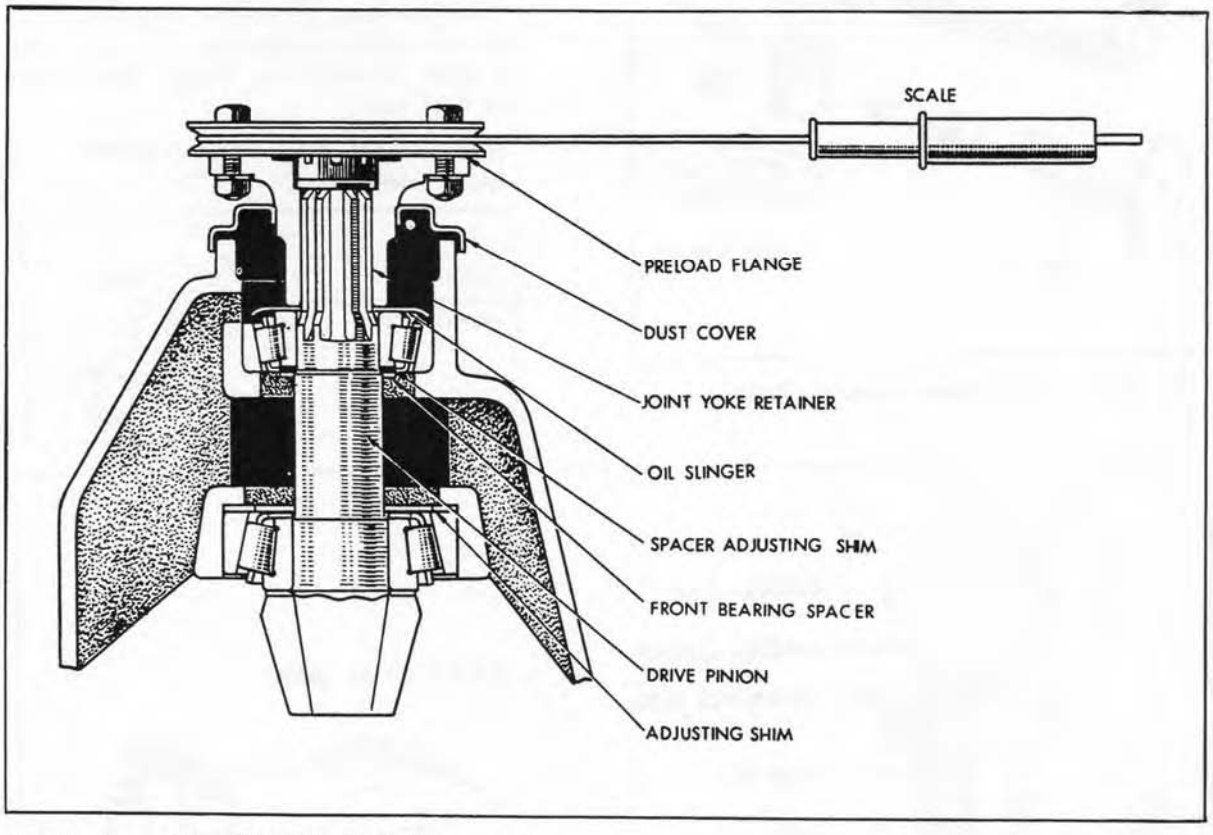


Fig. 4-16. Drive Pinion Preload Measurement

To obtain this reading, the several spacer adjusting shims of proper thickness must be selected from four kinds of spacer adjusting shims.

a. Increase the spacer adjusting shim thickness to decrease the preload.
b. Decrease the spacer adjusting shim thickness to increase the preload.

Thickness of Four Kinds of Spacer Adjusting Shims

Part No.	mm	inch
90564-30033	0.030	0.0012
90564-30034	0.100	0.0049
90564-30035	0.250	0.0098
90564-30063	0.450	0.0176

Caution : Do not install the carrier oil seal when checking the preload.

Side Bearing Preload Adjustment

12. Attach the differential side bearing cups to the bearing cones, then install the differential case on the differential carrier and attach the adjusting nuts.
13. Install the carrier caps so that the markings match with those on the carrier case. Then tighten cap bolts lightly after checking that the screw of the adjusting nut is properly fitted in the screws of the carrier and the caps.
14. Adjust preload of the side bearing using Adjusting Nut Wrench (09504-30010). Unscrew the right side adjusting nut fully and screw in the left side adjusting nut until the ring gear play in the axial direction is eliminated, and finally tighten the cap bolts. Then, screw in the right side adjusting nut until the nut contacts the bearing lightly, and then screw in the nut 1.5 to 2 notches, and tighten cap bolts.

Contion : Before determining the preload, tighten the adjusting nuts of both sides until slight pressure is applied on the side bearings and then screw back the nuts to install the side bearing cups in correct positions inside the boss.

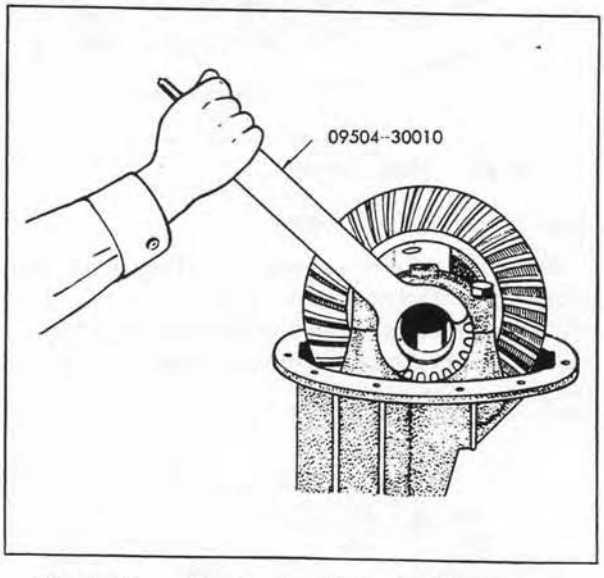


Fig. 4-17. Side Bearing Preload Adjustment

Backlash Adjustment

15. Check the backlash between the ring gear and the drive pinion gear using Adjusting Nut Wrench (09504-30010).

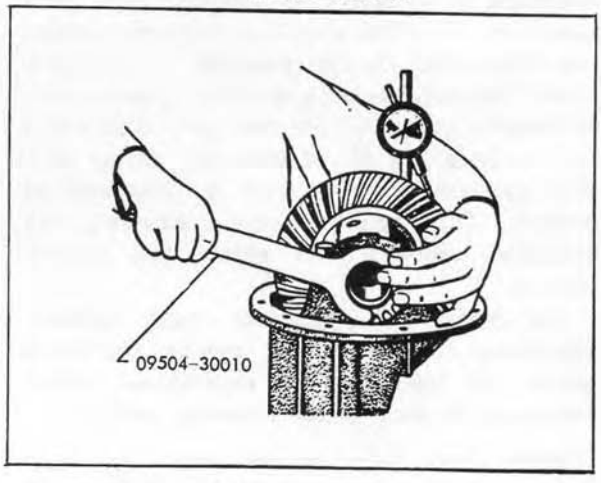


Fig. 4-18. Backlash Adjustment

Place the dial gauge perpendicular to the gear teeth and read the backlash on the ring gear. Adjust so that the reading will range from 0.15 to 0.20 mm (0.006 to 0.008 in.) by moving the adjusting nuts of both sides the same notches toward the same direction.

Caution : The preload already determined in paragraph 12, 13 and 14 should not be changed. Adjust the nut in position where the adjusting nut lock will contact the notch while keeping the value above specified.

16. Tighten the carrier cap bolts to 11 m-kg (80 ft-lbs).
17. Check the tooth contact pattern between the ring gear and the drive pinion. (Refer Part III, Section 4).
18. After checking tooth contact pattern, install the adjusting nut lock.
19. Remove the joint yoke retainer nut, retainer, and dust cover.
20. Install the differential carrier oil seal.
21. Install the joint yoke retainer and the dust cover, and tighten the set nut to 22 m-kg (160 ft-lbs) using Joint Yoke Holding Tool (09330-30010).
22. Lock the retainer set nut with a cotter pin.

4 Tooth Contact Pattern

Proper ring gear and drive pinion adjustment is important to obtain quiet and trouble-free

operation of the rear axle assembly.

The tooth contact must be tested and corrected as necessary to prevent noisy gear operation. This test should be performed before the differential carrier assembly is installed. Clean the ring gear and drive pinion teeth thoroughly and paint the ring gear with a thin and uniform coat of red lead and oil of suitable consistency to produce a clear contact pattern. Turn the drive pinion clockwise giving sufficient resistance to obtain the contact pattern.

To remedy the incorrect tooth pattern, adjustment can be made by moving the drive pinion and following the instructions which correspond to each of the incorrect patterns.

Caution : When moving the drive pinion, increase or decrease the same amount of the drive pinion spacer adjusting shims as the drive pinion adjusting shims, in order to keep the prescribed preload.

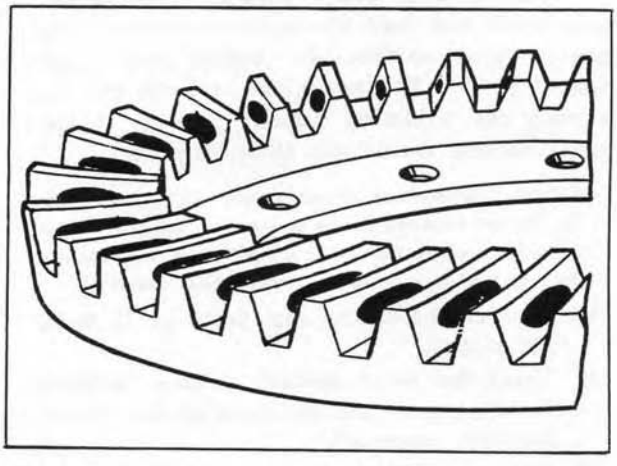


Fig. 4-19. Correct Tooth Contact

Correct Tooth Contact

The pinion gear tooth contact pattern is evenly shown on the ring gear teeth.

Toe Contact & Flank Contact

Move the pinion away from the ring gear by reducing thickness of the drive pinion adjusting shims and the spacer adjusting shims. Adjust backlash by moving the ring gear toward the pinion.

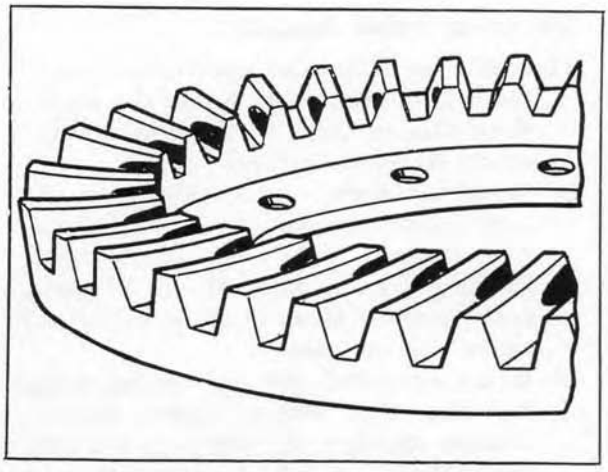


Fig. 4-20. Toe Contact

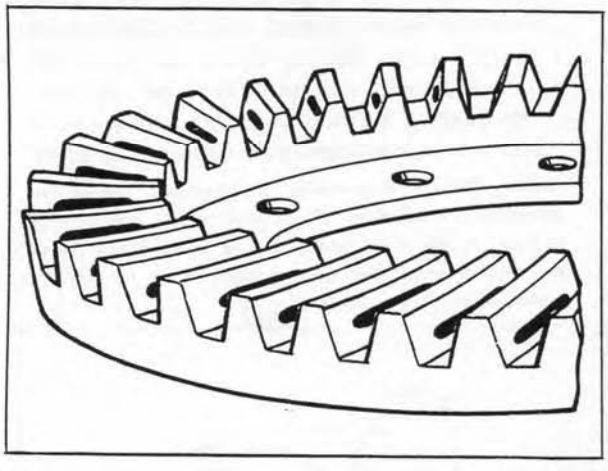


Fig. 4-21. Flank Contact

Heel Contact & Face Contact

Move the pinion toward the ring gear by increasing thickness of the drive pinion adjusting shims and the spacer adjusting shims. Adjust the backlash by moving the ring gear away from the pinion.

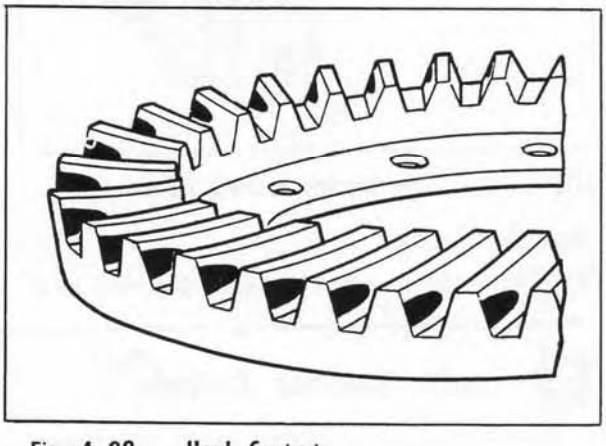


Fig. 4-22. Heel Contact

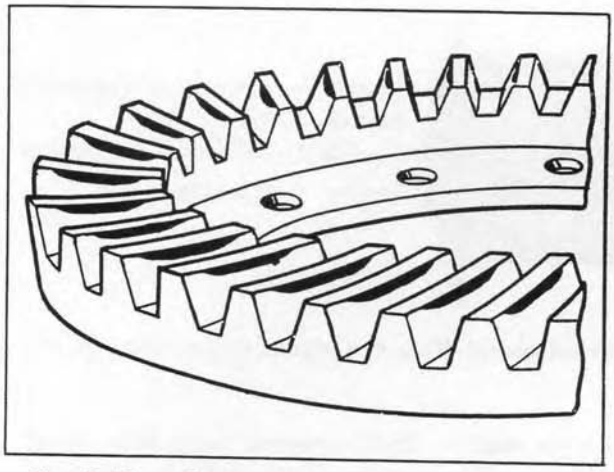


Fig. 4-23. Face Contact

Note : The tooth contact shown above does not occur separately in the actual operation, but in most cases Heel and Face contacts, or Toe and Flank contacts appear overlapping with each other.

Caution : Check backlash each time the gears are adjusted for tooth contact as the movement of the gears will affect the amount of backlash.

Backlash 0.15~0.20 mm (0.006~0.008 in.)

5 Rear Axle Assembly

REMOVAL

1. Jack up the rear axle housing.
2. Drain the gear oil.
3. Support the rear end of the body on a stand.
4. Remove the wheel
5. Disconnect the differential joint yoke retainer and the joint yoke. Then, in case of Models FJ 43, 43L, 45 & 45L, the stabilizer link should be removed from the differential housing.
6. Disconnect the rear oil brake flexible hose.
7. Remove the shock absorber, and disconnect rear spring at the spring shackle. (See Suspension)

Caution : Attach a plug at the end of the hose to prevent the fluid from flowing out.

8. Remove the rear spring U bolt.
9. Remove the rear axle assembly.
10. Remove the rear axle shafts, differential carrier, rear brake assemblies, and flange plates from the rear axle housing. (For removal of these units, refer Part II, Part III and Group 6)

INSTALLATION

For Installation, follow "Removal" in reverse order. After installation, proceed as follows.

1. Refill the gear oil.
   Kind Hypoid Gear Oil SAE 90
   Amount 2.5 liters
2. Perform air bleeding and brake adjustment. Refer Group 7, Part II on page 7-5.
3. Lower the vehicle.

INSPECTION

Inspect the housing for crack, distorsion, or bent condition.

PART IV DRIVE LINE

A total of two propeller shafts are used to transmit power from the transmission through the transfer case to the two driving axles.

1. Universal joints.

Universal Joints are at both ends of each propeller shaft. Each universal joint consists of two yokes, a spider and four needle bearing assemblies. The bearings are held in place by snap rings.

2. Propeller Shafts.

All shafts are tubular type. Each shaft has a yoke welded to one end and opposite end has splined shaft welded to tube.

1 Removal & Installation

1. Disconnect the propeller shaft from the differential joint yoke retainer.
2. Pull out the propeller shaft.
3. Remove the universal joints at the parking brake drum and also at joint yoke retainer on the front drive extension housing.

For installation, follow "Removal" in reverse order.

Caution : Before installation, coat grease around the propeller shaft splines.

2 Disassembly

1. Mark the mating marks on the joint yoke and the propeller shaft.
2. Remove the universal joint snap rings.
3. Press out the needle roller cups.
4. Remove the needle rollers and the needle roller dust seal.
5. On other joints, repeat the same procedure.

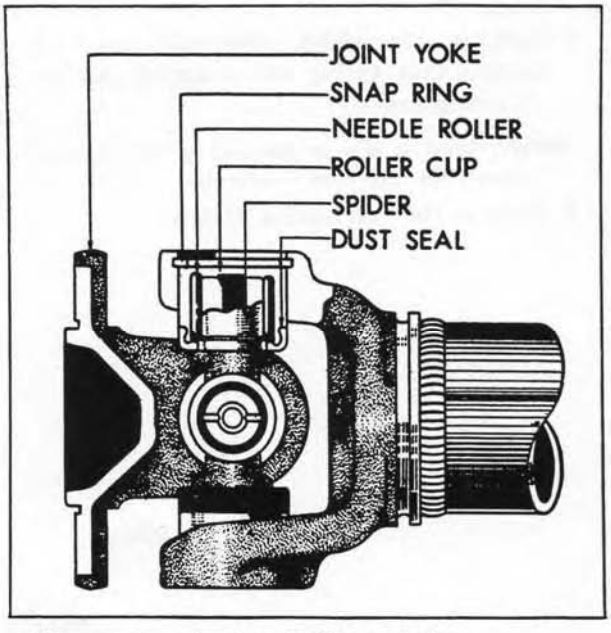


Fig. 4-24. Section of Universal Joint

3 Inspection and Repair

Clean all parts thoroughly and inspect.

Caution : By blowing with compressed air, make sure that the grease passage in the spider is not clogged.

Joint Yoke

Inspect the yoke for cracks, wear, or bent conditions.

Small burrs can usually be removed with a hone.

Carefully inspect the splined parts for damaged or excessively worn condition. Replace the yoke if found defective.

Spider

Inspect the bearing surface of the spider for excessive wear, rust, or damaged conditions. Replace if found defective.

Needle Roller

Replace if damaged, excessively worn or rusted.

Needle Roller Seat and Propeller Shaft Dust Cover

Inspect the seat and the cover for damaged or cracked conditions.

4 Assembly

1. Coat 24 needle rollers with bearing grease and place them in the needle roller cup.
2. Install the needle roller dust seal on the cup.
3. Place the spider in the yoke and press in the needle roller cups.

   Caution : Line up the marks marked when disassembled.
4. Install the joint snap rings.

Memorandum

PART V SPECIFICATIONS

Rear Axle

Housing Type	Banjo
Axle Shaft Type	Semi-floating
Differential Gear Type	Hypoid
Method of Drive	Hotchkiss Type

Differential

Reduction Gear Ratio		3.70	4.11
Nos. of Teeth	Drive Pinion	10	11
	Ring Gear	37	
	Side Gear	16	
	Diff. Pinion	10	
Off-set		1.5 mm	
Oil		Hypoid Gear Oil	
Oil Capacity		2.5 liters (0.66 U.S. gal.)	
Clearance between Axle Shaft and Pinion Spacer		0.06~0.465 mm (0.024~0.019 in.)	
Differential Pinion Spacer Thickness	41344-35010	29.8 mm (1.19 in.)	
	41345-35010	30.2 mm (1.21 in.)	
	41346-35010	30.6 mm (1.23 in.)	
Clearance between Differential Case and Side Gear		0.15~0.35 mm (0.006~0.014 in.)	
Side Gear Thrust Washer Thickness	41361-35010	1.53~1.67 mm (0.060~0.066 in.)	
	41362-35010	1.7~1.9 mm (0.067~0.075 in.)	
Pinion Thrust Washer Thickness	41351-35010	1.5~1.7 mm (0.059~0.067 in.)	
	41352-35010	1.7~1.9 mm (0.067~0.075 in.)	
Drive Pinion Preload **Note :** The figure shows scale reading by using 09530-35010 without oil seal.		3.8~5.2 kg (8.4~11.5 lbs.)	
Ring Gear and Drive Pinion Backlash		0.15~0.20 mm (0.006~0.008 in.)	
Side Bearing Preload		1~2 notches	

Drive Pinion Adjusting Shim Thickness	90564-70101	0.250 mm (0.0098 in.)
	90564-70102	0.300 mm (0.0118 in.)
	90564-70103	0.350 mm (0.0138 in.)
	90564-70104	0.450 mm (0.0177 in.)
Spacer Adjusting Shim Thickness	90564-30033	0.030 mm (0.0012 in.)
	90564-30034	0.100 mm (0.0049 in.)
	90564-30035	0.250 mm (0.0098 in.)
	90564-30063	0.450 mm (0.0177 in.)

Propeller Shaft & Universal Joint

Propeller Shaft Outer Diameter, Froet & Rear		65 mm (2.56 in.)
Propeller Shaft Inner Diameter, Front & Rear		61.8 mm (2.40 in.)
Propeller Shaft Lnngth, Front		525 mm (20.67 in.)
Propeller Shaft Length, Rear	FJ40	490 mm (19.29 in.)
	FJ43	635 mm (25.40 in.)
	FJ45	855 mm (33.66 in.)
	FJ45P-B	1160 mm (45.67 in.)
Universal Joint Spider	Outer Diameter	16.7 mm (0.66 in.)
	Play in Axial Direction	Less than 0.05 mm (0.0002 in.)
Needle Roller	Number	24×4
	Outer Diameter	2.5 mm(0.1 in.)

Torque Limits

Description	m-kg	ft-lbs
Ring Gear Set Bolt	10~12	74~89
Differential Carrier Cap Bolt	11	80
Joint Yohe Retainer Nut	22	160
Differential × Axle Housing Set Nut	4~5.5	30~41
Differential Pinion Shaft Pin	1.5~2.2	11~16
Differential Adjusting Nut Lock Lock Bolt	1.0~1.6	7.3~12
Hub Nut	9~12	66~88
Axle Housing Cover × Axle Housing	1.0~1.6	7.3~12
Filler Plug	7~9	51~66

Group 5

FRONT AXLE

PART 1 TROUBLE SHOOTING

The trouble shooting of the front axle covered in this part includes only these symptoms caused by the front wheel misalignment and the defective front axle parts.

The trouble shooting of the differential is excluded since the troubles are almost common to those of the rear axle differential. Refer Group 4, Part 1. A trouble symptom which seems to come from the front axle may be caused by deficiency of other units such as steering system, suspension system, wheels and tires, etc. Therefore cross reference to the trouble shooting of other systems should be made to correctly diagnose the true cause of the trouble.

Front Wheel Shimmy

POSSIBLE CAUSES	POSSIBLE REMEDIES
Loose or broken wheel beairngs	Tighten or replace wheel bearings
Improper wheel alignment	Correct alignment
Wheels out of balance	Balance wheels
Loose tie-rod ends	Repair or replace tie-rod ends
Improper tire pressure	Inflate to correct pressure
Broken steering knuckle bearing	Replace knuckle bearing
Improper steering knuckle bearing preload	Adjust and correct preload

Abnormal Noise

POSSIBLE CAUSES	POSSIBLE REMEDIES
Defective wheel bearings	Replace wheel bearings
Scored drums	Refinish drum and replace linings
Lack of lubrication	Lubricate

Abnormal or Irregular Tire Wear

POSSIBLE CAUSES	POSSIBLE REMEDIES
Improper tire pressure	Inflate to correct pressure
Improper wheel alignment	Correct alignment
Improper wheel bearing adjustment	Adjust wheel bearing
Wheels out of balance	Balance Wheels
Unequal brake adjustment	Readjust brakes
Bent spindle	Replace spindle
Bent axle housing	Repair or replace axle housing

Hard Steering

POSSIBLE CAUSES	POSSIBLE REMEDIES
Low air pressure in tires	Inflate to correct pressure
Lack of lubrication	Lubricate
Improper wheel alignment	Correct alignment
Bent spindle	Replace spindle
Defective wheel bearings	Replace wheel bearings
Worn knuckle bearings	Replace knuckle bearings

Road Wander

POSSIBLE CAUSES	POSSIBLE REMEDIES
Improper tire pressure	Inflate to correct pressure
Lack of lubrication	Lubricate
Improper wheel alignment	Correct alignment
Worn tie-rod ends and tie-rod	Replace tie-rod ends or tie-rod
Tight steering gear	Adjust steering gear
Broken steering knuckle bearing	Replace knuckle bearing
Improper steering knuckle bearing preload	Adjust preload

PART II FRONT WHEEL ALIGNMENT ADJUSTMENT

Front wheel alignment should be correctly maintained in order to insure easy steering and reduce tire wear to a minimum. The most important factors of the front wheel alignment are Caster, Camber and Toe-in. These factors should be checked at regular intervals, particularly when the axle has been subject to heavy impacts. Before checking and adjusting the front wheel alignment, the following preliminary checks should be made.

1. Check all tires for inflation and wear. The tires should have about the same wear and be inflated to specified pressure.
2. Check the wheel bearings for looseness, wear, or damage.
3. Check the ball joints and mountings for looseness, wear, and damage.
4. Check the steering gear mountings and all steering linkage connections for looseness. Tighten all mountings to the specified torque. Worn or bent linkage should be replaced.
5. Check the shock absorber action and replace if necessary.
6. Bounce the vehicle at the front and the rear ends several times to allow the frame to come to its normal level.

There are several types of front wheel alignment gauges, all of which outline the proper procedures for checking the factors of front wheel alignment. The instructions furnished by each manufacturer for the operation of his particular gauge should be followed.

1 Caster

Caster is the inclination of the centerline through the upper and lower knuckle bearings toward the rear of the vehicle. The purpose of providing the caster is to obtain steering stability which will keep the front wheels in a straight ahead position and to assist in bringing the wheels out of a turn on a curve. Using the front wheel alignment tester, measure the caster. The value should be 1 degree.

Caster is established by design and will be changed only by the shifting of the front axle on the springs or by the distortion of the chassis frame or springs. There is no adjust ment for caster.

2 Camber

Camber is the angle at which the wheel is declined outwards at the top. Unequal camber may result in unstable steering, wandering, road shock, shimmy or unequal tire wear. Using the front wheel alignment tester, measure the camber. The value should be 1 degree.

There is no adjustment for camber, however, loose wheel bearings, bent steering knuckle, or bent axle housing will affect camber.

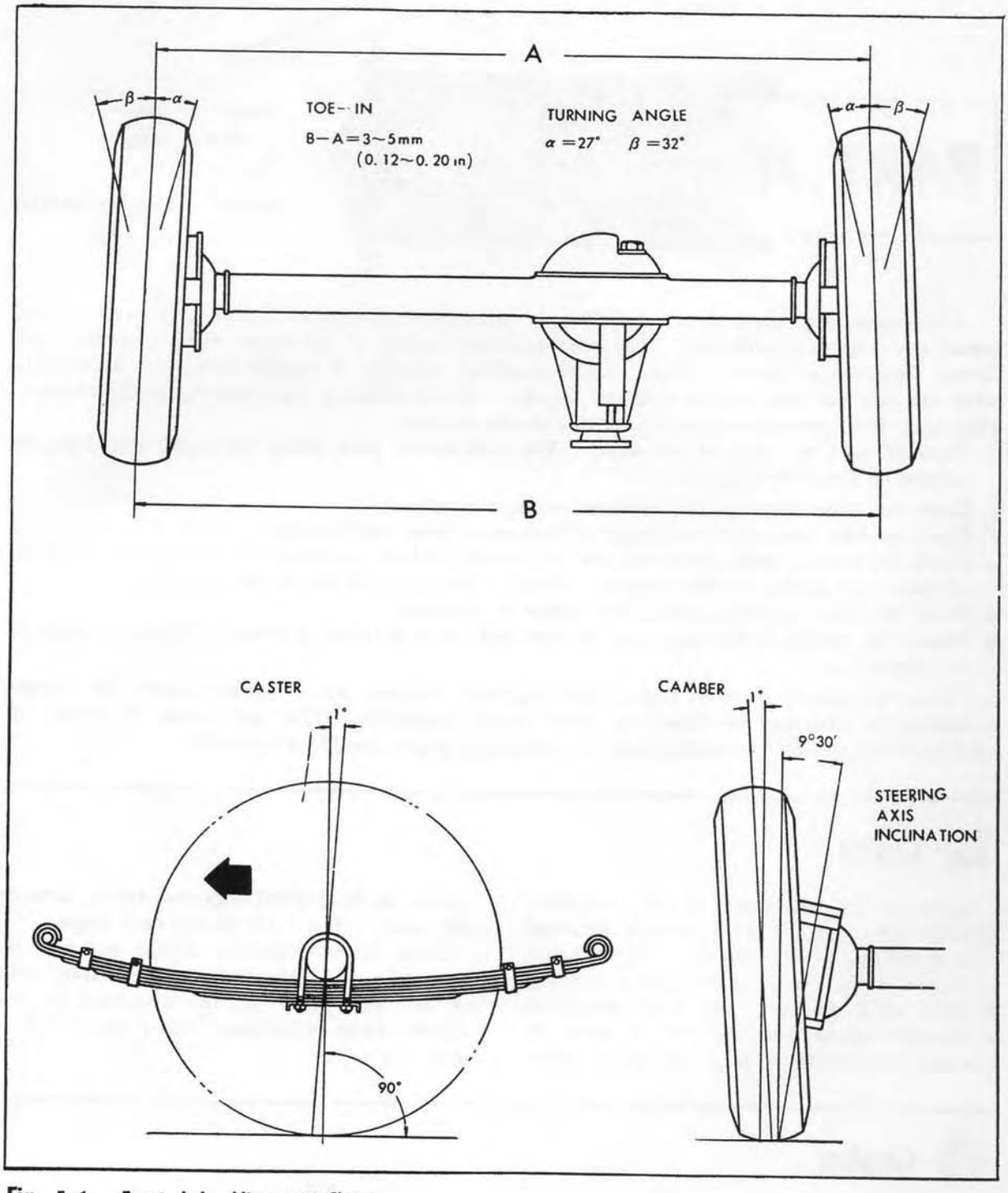


Fig. 5-1. Front Axle Alignment Chart

3 Toe-in

Toe-in is the amount that the wheels are closer together in front than at the rear. The purpose of toe-in is to prevent the front wheels from spreading out due to the effect of camber. As camber and toe-in are closely related with each other, both should be checked at the same time. Improper toe-in may cause uneven and excessive tire wear. Using the toe-in gauge, measure the toe-in. The value should be from 3 to 5 mm (0.12″ to 0.2″). To adjust the toe-in, vary the length of the tie-rod as necesssary, by loosening the tie-rod adjusting tube clamp and rotating the tie-rod.

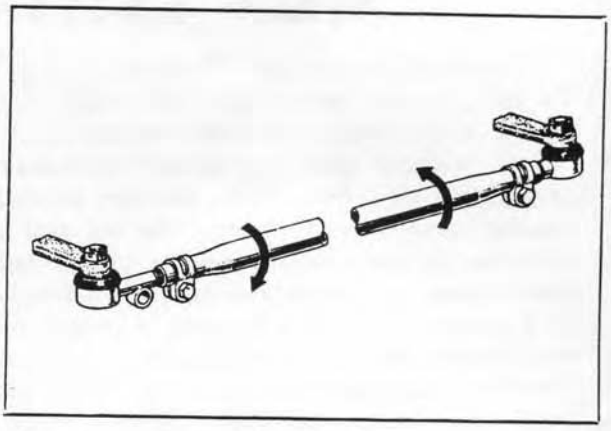


Fig. 5-2. Toe-in Adjustment

4 Turning Angle

The turning angle is the maximum angle through which the wheels may be turned from the straight-ahead position. The turning angle for the inside wheel when turning is shown as dimension "β" in Figure 7-1, and the turning angle for the outside wheel is shown as dimension "α". Adjust the turning angle with the steering knuckle stop screws located on the steering knuckle by following the next steps.

1. Place the front wheel on the turning angle instrument.
2. Loosen the lock nut of the steering knuckle stop screws, and then turn the wheels to the extreme left.
3. Adjust the stop screw until "β" is correct for the left wheel. Adjust the turning angle by loosening the steering knuckle stop screw if the turning angle is too wide, and tightening if too small.
4. With the wheels in position giving correct reading for angle "β" on the left wheel, check angle "α" for the right wheel. If this angle is incorrect, the tie-rod or other linkage may be bent, loose or twisted.
5. Adjust angle "β" for the right wheel by turning the wheel to the extreme right and repeating operations given for the left wheel. Tighten the lock nut when "β" and "α" are correctly adjusted.

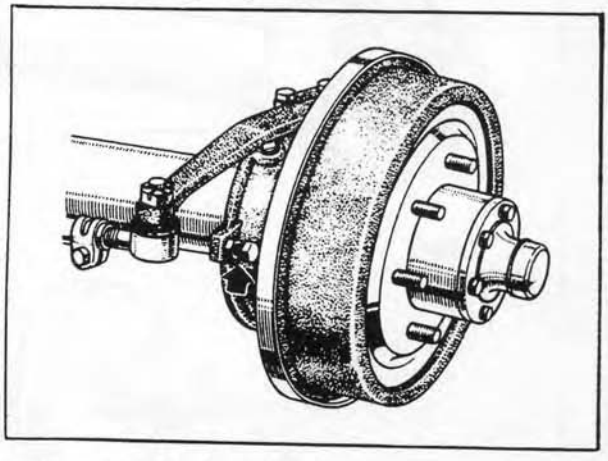


Fig. 5-3. Adjusting Turning Angle

5 Steering Knuckle Centering

Steering Knuckle Centering Gauge — 09634-60012

The special service tool, Steering Knuckle Centering Gauge (09634 - 60012), which will be used for all FJ series, consists of a rod gauge, two rod gauge attachments, a centering gauge adopter, a plug, a rod gauge lever and a retaing nut. The purpose of using this special service tool (S-ST) is to obtain true horisontal and vereical alignments of the front axle with respect to the ball joint through the front diving shaft, ball joint through the front axle shaft, and the steering knuckle arm bearing (upper bearing) through the ball joint and the steering knuckle bearing (lower bearing). Effecting the adjustments using the SST, premature wear of the fhe frot axle shaft bushing and drive shaft bushing and abnormal vibrations produced while making a sharp turn on a curve can be reduced to a great extent. A pull-scale, a vernier caliper and some lead should be prepared in addition to the Steering Knuckle Centering Gauge. Before proceeding to the adjustments, remove all grease from the front axle and wash disassembled parts in cleaning solvent. Dry and inspect each part for wear, bent, scores and other damages. Inspect the front axle shaft bushing and the front driving shaft bushing for wear or damage. Replace the part found defective. Assemble the steering knuckle spindle on the steering knuckle with a gasket between them.

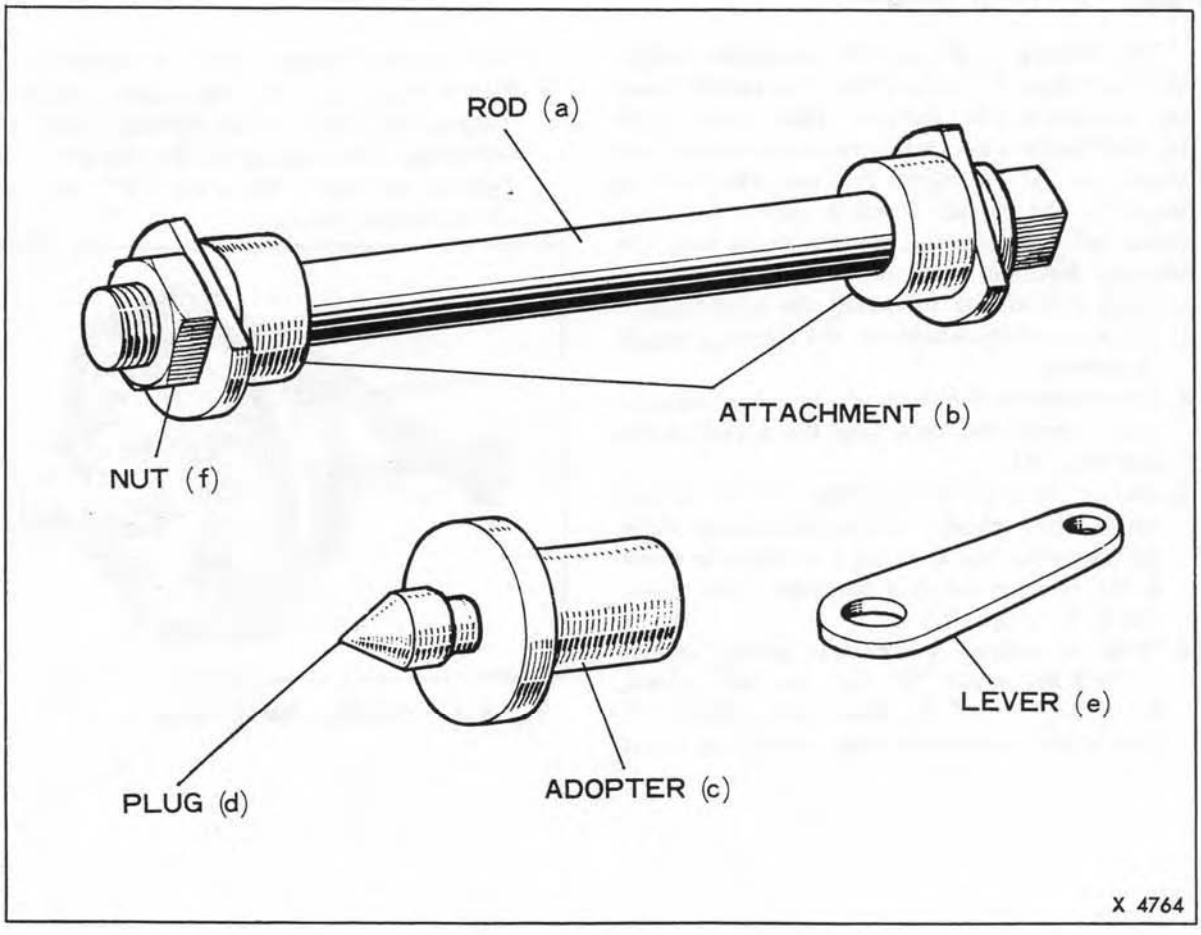


Fig. 5-4 Component of Steering Knuckle Centering Gauge

Adjustment

(I) Steering knuckle bearing preload

1. Install the centering gauge adopter (c) and the plug (d) in the front axle shaft bushing.
2. Install one at the attachments (b) and a knuckle bearing on the rod gauge (a), then assemble the rod gauge the axle housing end from the bottom as shown in Fig. 5-5.

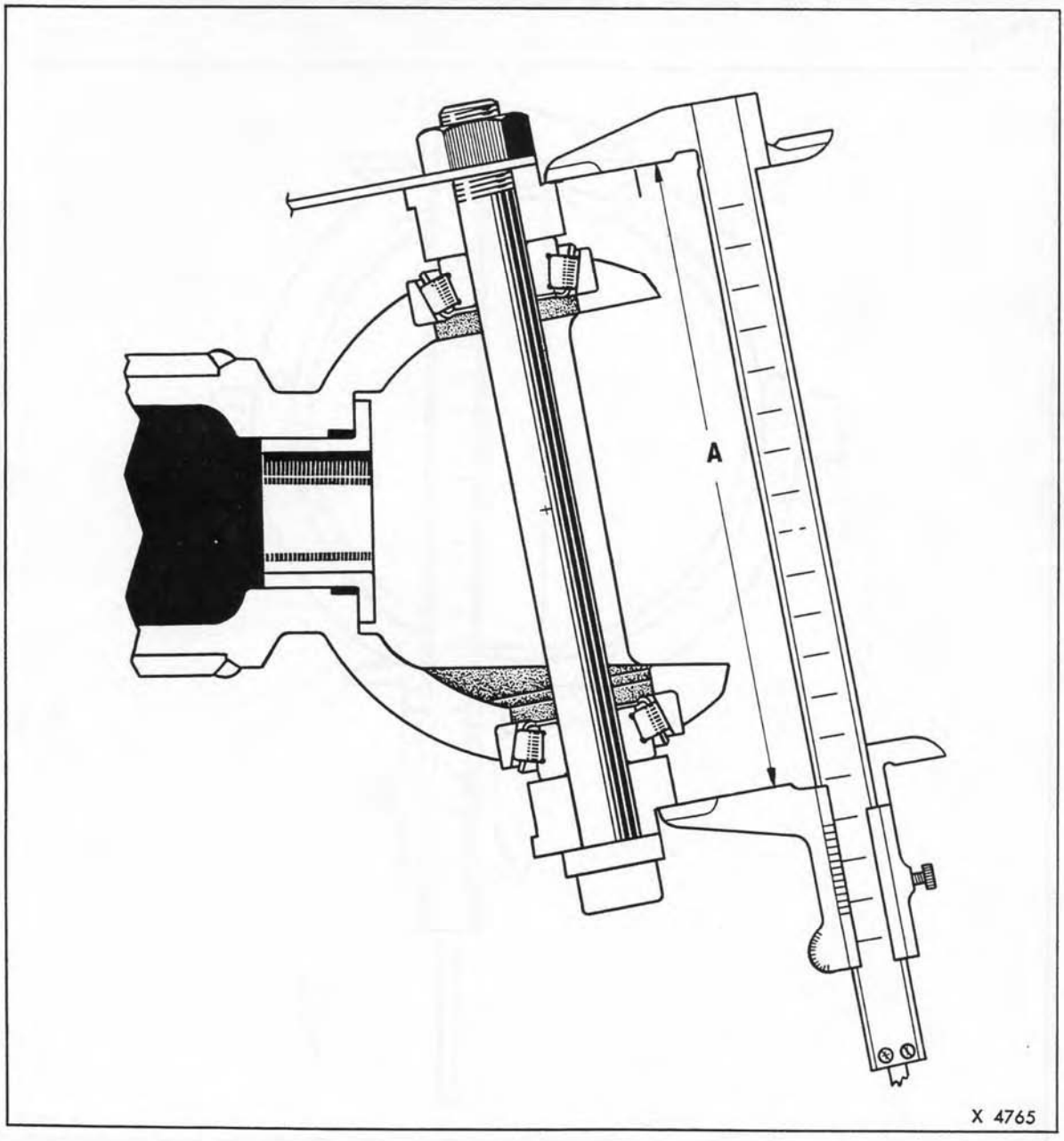


Fig. 5-5 Measuring between Rod Gauge Attachments

3. Install upper bearing, the other attachment and rod gauge lever (e) on the rod gauge. Install and tighten the retaining nut (f) on the gauge rod, but do not tighten excessively.
   Attach a pull-scale to the end of the lever, and while exerting a steady pull on the pull-scale at right angle to the lever, note the reading on the pull-scale. If the reading is not within the specification of 2.0~2.5 kg (44~55 lbs), loosen or tighten the nut until the specified preload is obtained.
4. After having obtained the specified preload, measure and record the distance (A) between the gauge rod attachments shown in Fig. 5-5.
5. Measure and record the height (B) of the steering knuckle using a vernier caliper as shown in Fig. 5-6.

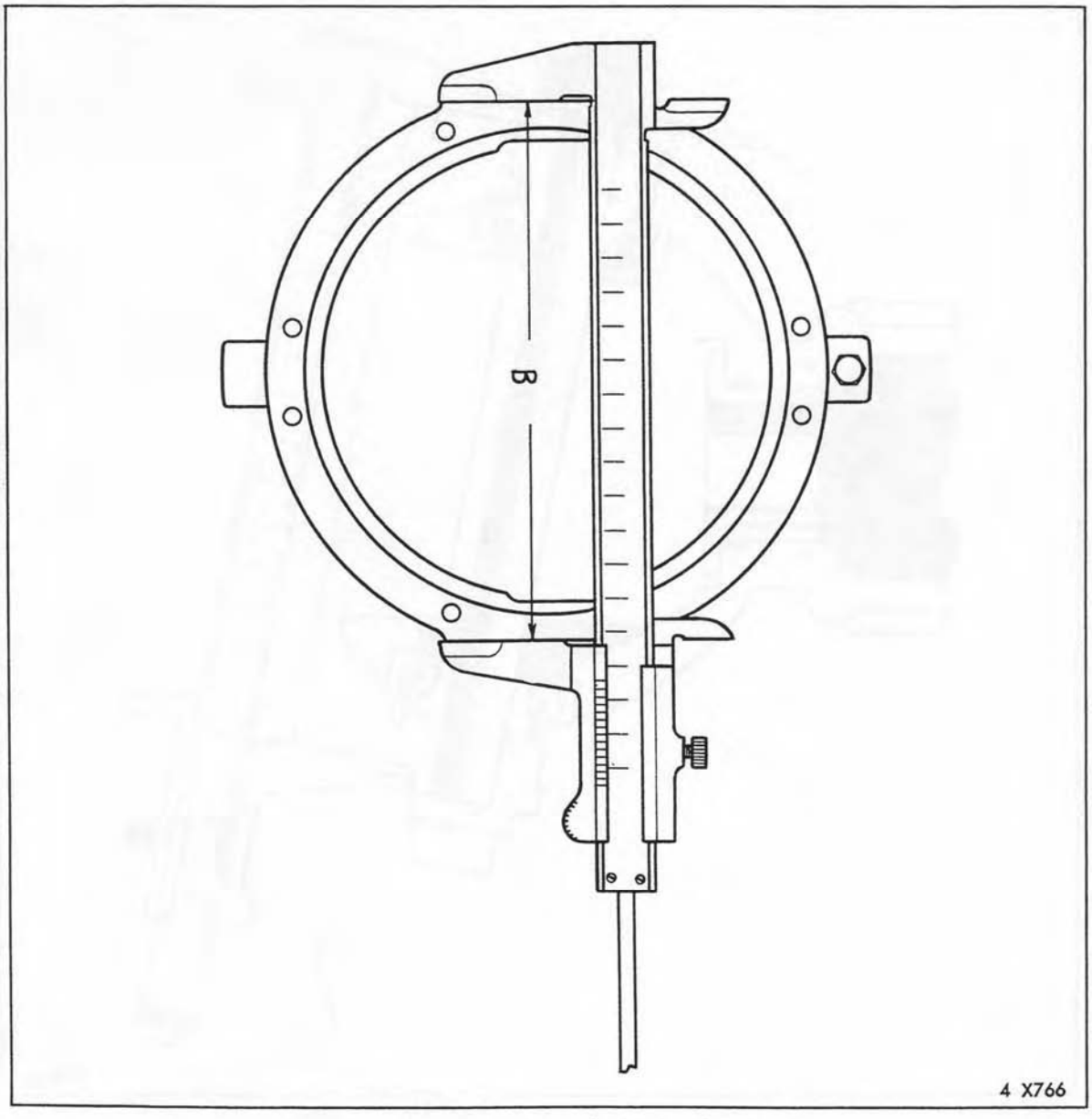


Fig. 5-6 Measuring Height of Steering Knuckle

6. Difference between (A) and (B) is the total shim thickness that are required to maintain the correct bearing preload.

Total shim thickness (C) = A − B

(II) Upper and lower shim thickness

1. Apply thin coat of red lead to the middle part of the rod gauge so that a line can be produced when the rod gauge is revolved with respect to the plug . Now revolve the rod gauge in the housing while pressing the plug against the rod gauge and adopter against the bushing to pro puce a clear line around the gauge as shown in Fig. 5-7.

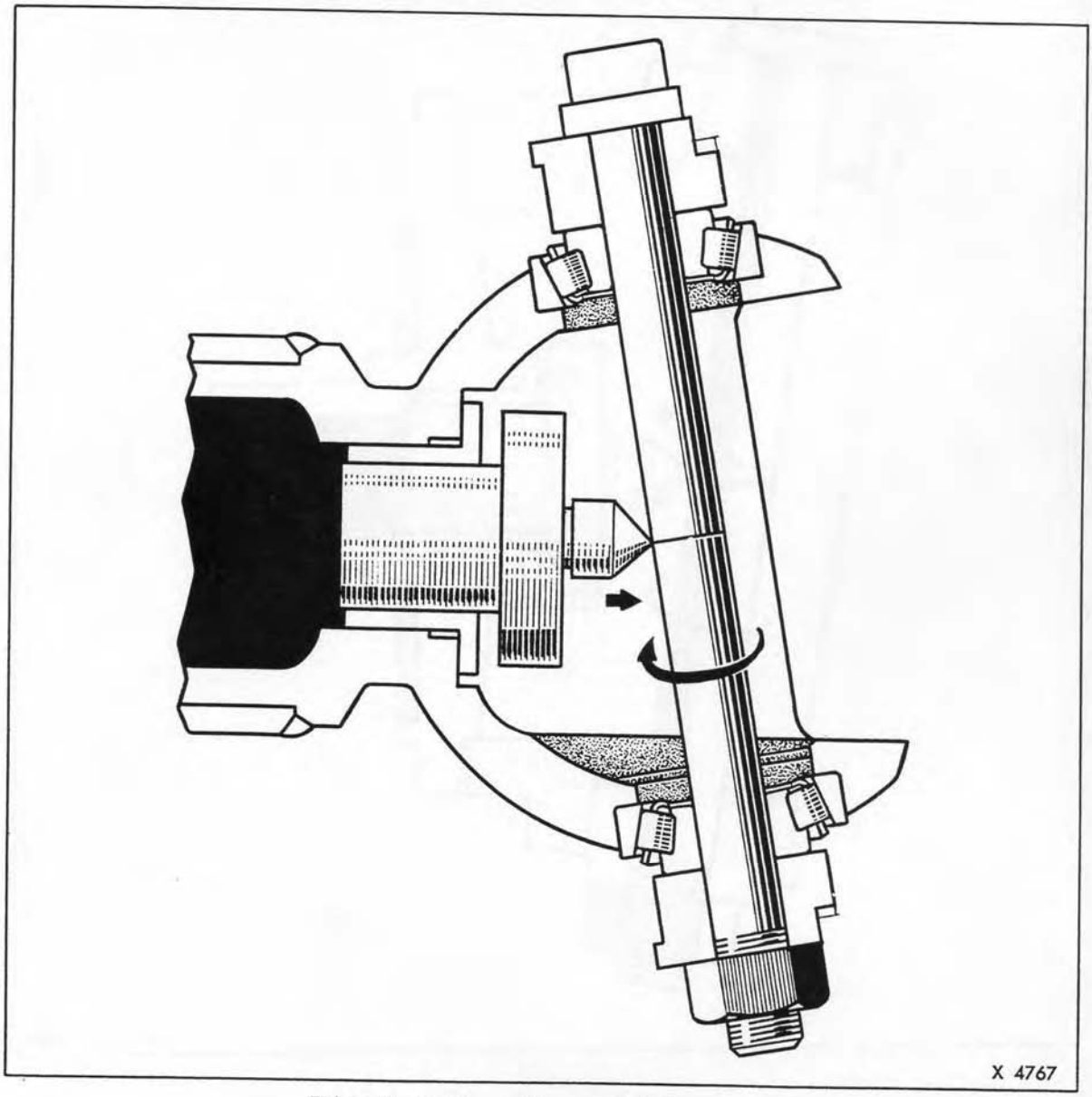


Fig. 5-7 Scribing a Line on Rod Gauge

2. Remove the rod gauge together with the lower attachment from the bottom of the axle housing, taking care not to remove the line scribed on the rod gauge. Pull out the adopter with plug from the bushing, and install the adopter assembly in the drive shaft bushing in the spindle In stall the rod gauge and the attachments in the same manner as done in section (I).
3. Mark another line on the rod gauge by revolving the rod gauge in the steering knuckle as shown in Fig. 5-8.

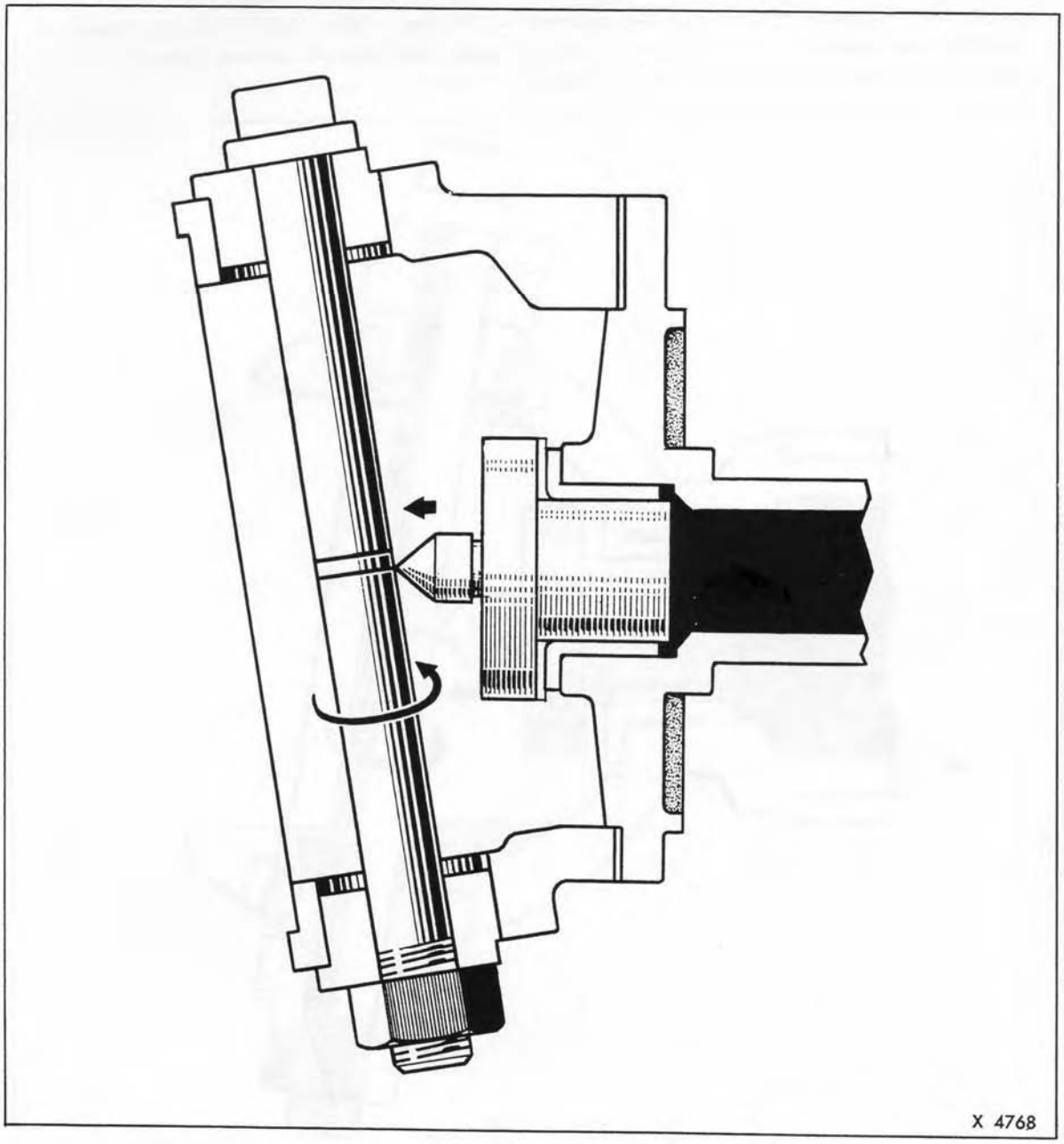


Fig. 5-8 Scribing a Line on Rod Gauge

4. Measure between the two lines and record (D), Subtract 3mm from the value (D) just obtained. The difference (E) will be the shim thickness required for the lower bearing.

Lower bearing shim thickness (E) = D − 3mm

5. Upper bearing shim thickness (F) will be determined by subtracting the (E) from the total shim thickness (C).

Upper bearing shim thickness (F) = C − E

(III) Spacer thickness

In the previous section, paragraph (1) and (2), check the clearance (G) between the plug and the rod gauge using a feeler gauge. This clearance is the thrust clearance between the bushing and the axle shaft or the drive shaft. Select and fit the spacer which will give the least clearance.

thrust clearance − oil clearance = spacer thickness

(0.5 ~ 1.0 mm)

Three kinds of spacers are available as the special service part.

Part Name	Part No.
Spacer, front axle shaft, thk = 1.0 mm	04002 − 20160
Spacer, front axle shaft, thk = 1.5 mm	04002 − 20460
Spacer, front axle shaft, thk = 2.0 mm	04002 − 20560

(VI) Final check

1. After the front axle has been assembled, check to see if the drive shaft is free of binding in the knuckle spindle by turning the steering knuckle from one extreme end to the other.
2. Road test the vehicle. Make right turns and left turns, operating the steering wheel all the way. Drive slowly so that detection of noise, if remained, may de easier.

PART III STEERING KNUCKLE & AXLE SHAFT

1 Removal

1. Remove the wheel cap.
2. Remove the bolts attaching the front drive shaft flange and remove the front drive shaft flange.
3. Straighten the front wheel adjusting nut lock washer.
4. Loosen the adjusting nuts using Front Wheel Adjusting Nut Wrench with Handle (09607-60010).

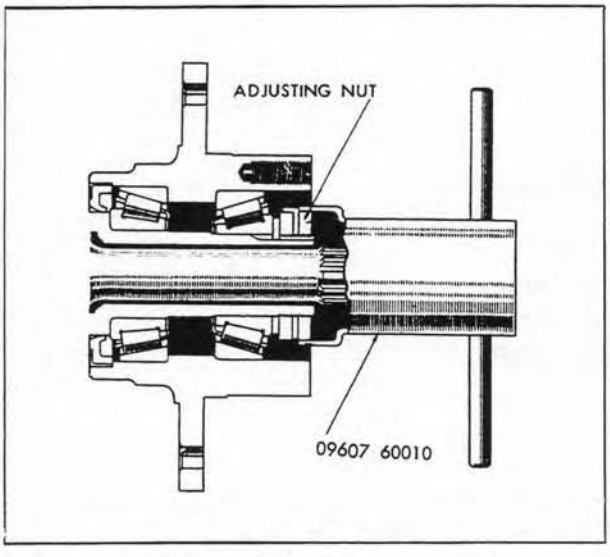


Fig. 5-9. Adjusting Nut Removal

5. Loosen the hub nuts and raise the front of the vehicle.
6. Remove the wheel and the adjusting nuts.
7. Remove the brake drum with the axle hub, outer bearing, and inner bearing cup attached.
   Remove the inner and outer bearing cups from the axle hub.
8. Disconnect the front brake flexible hose.
9. Remove bolts attaching the spindle and flange plate to the knuckle, and take out the flange plate and brake assembly together with the steering knuckle spindle.
   Care should be exercised since the driving shaft and ball joint will also come off at the same time.
   Using Bearing Puller (09612-65010), remove the driving shaft bushing.

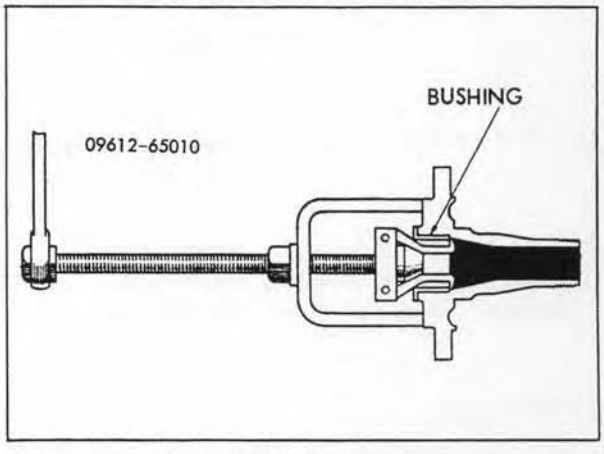


Fig. 5-10. Driving Shaft Bushing Removal

10. Disconnect the steering knuckle arm from the tie-rod end and remove the knuckle arm and the knuckle shaft using Steering Knuckle Bearing Remover (09606 60001).

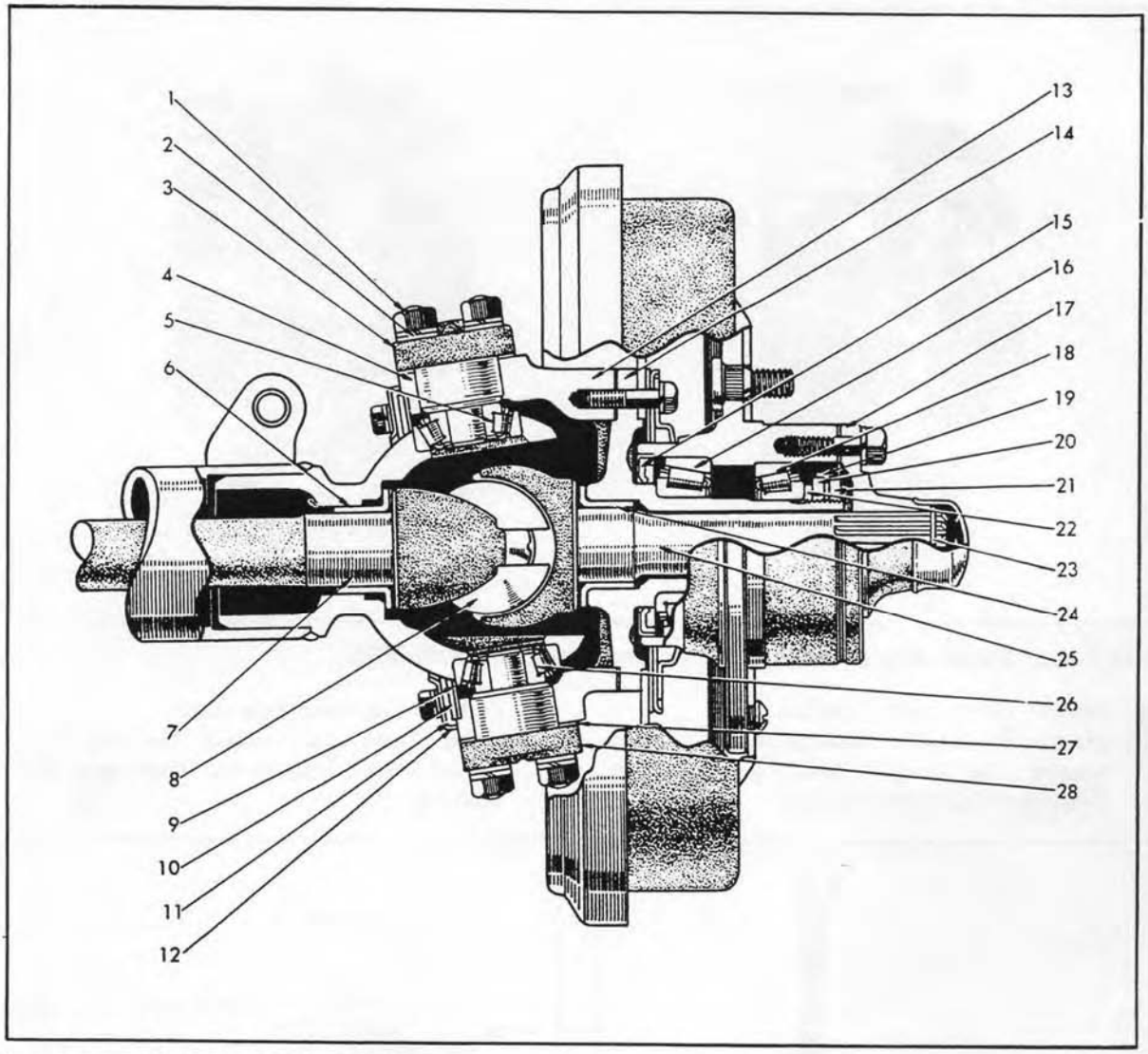


Fig. 5–11. Steering Knuckle & Axle Shaft

1. NUT
2. STEERING KNUCKLE ARM SET DOWEL
3. STEERING KNUCKLE ARM
4. STEERING KNUCKLE ADJUST SHIM
5. TAPER ROLLER BEARING
6. FRONT AXLE SHAFT BUSHING
7. FRONT AXLE SHAFT
8. FRONT DRIVE BALL JOINT
9. OIL SEAL INNER RING
10. OIL INNER SEAL
11. OIL OUTER SEAL
12. OIL SEAL COVER
13. STEERING KNUCKLE
14. STEERING KNUCKLE SPINDLE
15. OIL SEAL
16. TAPER ROLLER BEARING
17. FRONT DRIVING SHAFT FLANGE
18. TAPER ROLLER BEARING
19. LOCK WASHER
20. FRONT WHEEL ADJUSTING NUT
21. FRONT WHEEL ADJUSTING NUT
22. WASHER
23. SNAP RING
24. DRIVE SHAFT BUSHING
25. FRONT DRIVING SHAFT
26. TAPER ROLLER BEARING
27. STEERING KNUCKLE ADJUST SHIM
28. STEERING KNUCKLE BEARING CAP

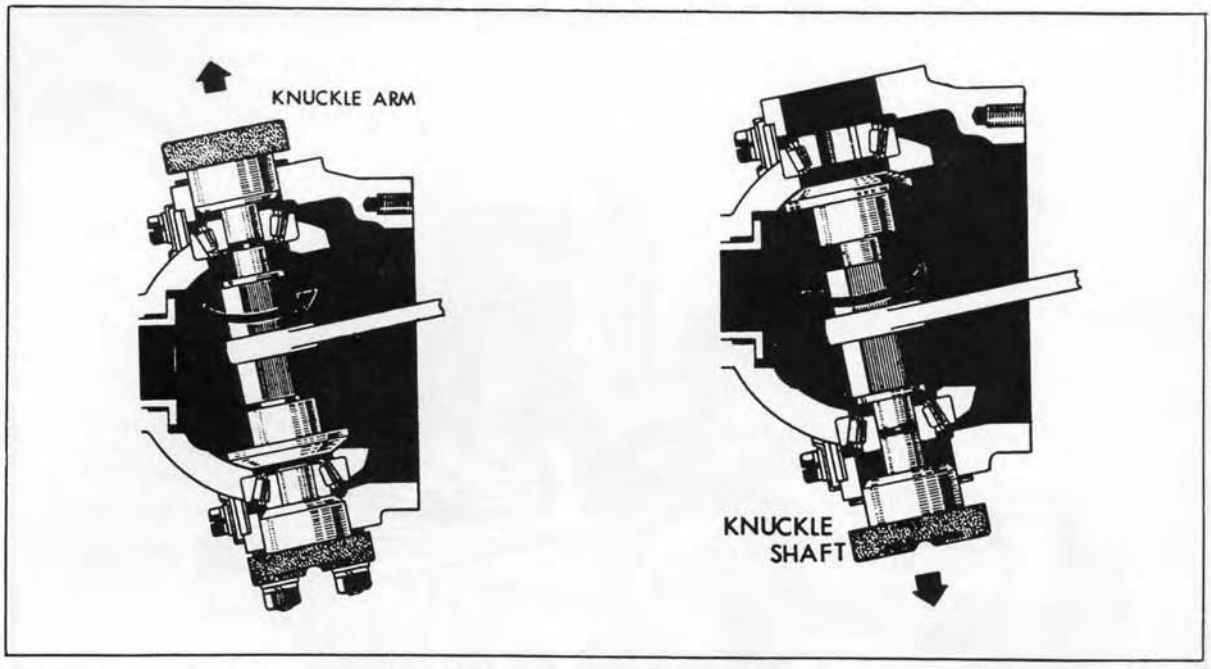


Fig.5-12. **Knuckle Arm & Knuckle Shaft Removal** (Using SST 09606-60010)

11. Remove the steering knuckle.
12. Remove the knuckle bearing cone and then remove the knuckle bearing cup using Bearing Puller (09612-65010).
13. Pull out the front axle shaft.
14. Using Front Axle Shaft Bushing Puller (09619 60010), remove the front axle shaft bushing.

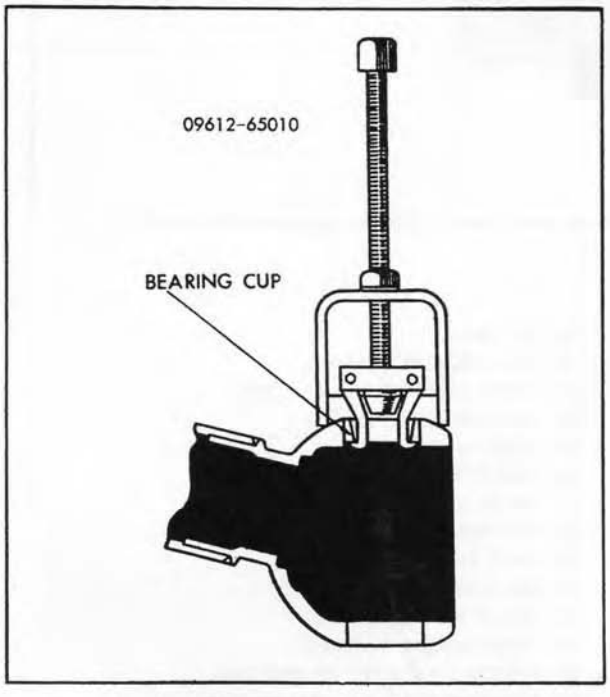


Fig. 5-13. **Knuckle Bearing Cup Removal**

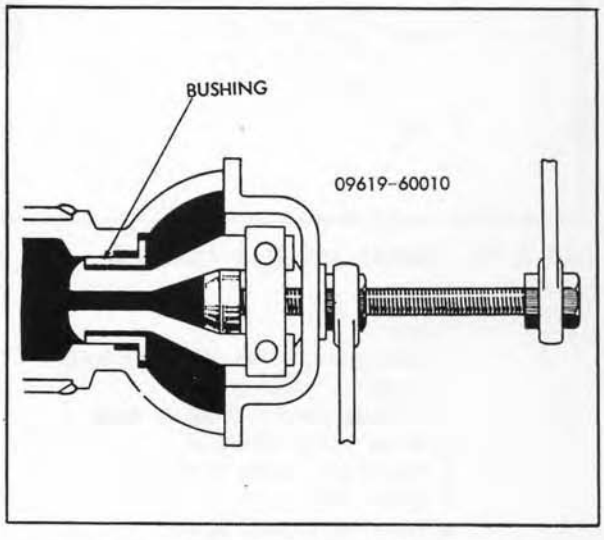


Fig. 5-14. **Front Axle Shaft Bushing Removal**

2 Inspection and Repair

1. Clean all parts thoroughly with cleaning solvent and dry with compressed air.
2. Inspect the following parts and replace with new parts if defective

Drive Shaft Flange

Inspect holes in drive shaft flange for worn condition. Examine spline for chips, nicks, or excessive wear. Install a new drive shaft flange if any of these conditions exists.

Steering Knuckle Spindle

Inspect the threads on the steering knuckle outer end. Inspect carefully the inner and outer bearing surfaces for damages with special attention for presence of cracks. Cracked, twisted or bent knuckle spindle should be replaced.

Steering Knuckle

Inspect the steering knuckle for cracks. Replace the steering knuckle if found damaged or bent.

Steering Knuckle Oil Seal

Inspect the steering knuckle oil seal for wear or damage.

Wheel Bearings

Inspect for wear, damage, or abnormal noise.

Ball Joint

Inspect the ball joint for wear, crack, or other damages.

Front Axle Shaft

Inspect the splines on the axle shaft inner end for chips, nicks, or excessive wear. If any of these conditions exists, install a new axle shaft.

Front Driving Shaft

Inspect for wear, damage, or bent conditions.

Axle Shaft Bushing & Drive Shaft Bushing

Inspect for excessive wear or damage.

3 Installation

1. Carefully distinguishing right and left front axle bushings, then install the front axle bushing using Front Axle and Drive Shaft Bushing Replacer (09618-60010). Right side bushing part number is 90999-70028, and left side bushing part number is 90999-70029.

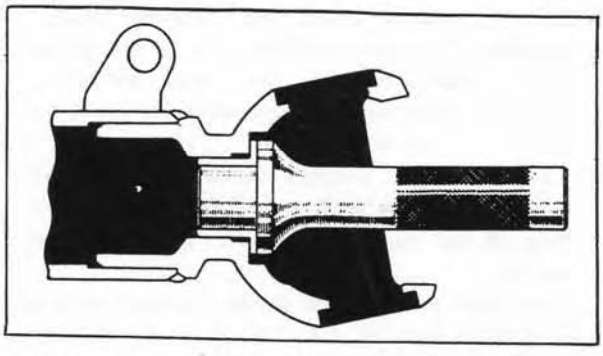
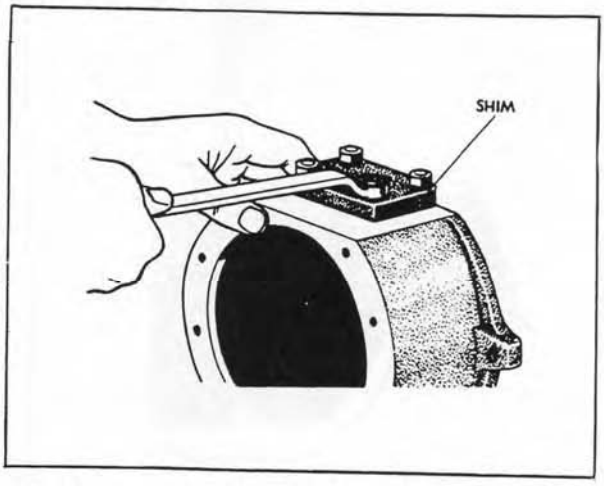


Fig. 5-15. Front Axle Shaft Bushing Installation

2. Assemble the knuckle shaft on the steering knuckle inserting proper number of shims between them.



.Fig. 5-16. Knuckle Shaft Assembly

3. Install the knuckle bearing cone on the steering knuckle shaft using Steering Knuckle Bearing Remover (09606 60010).

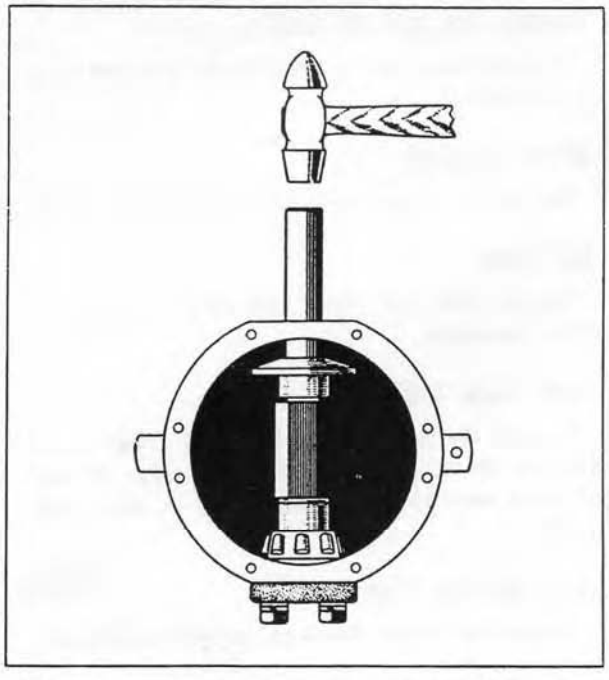


Fig. 5-17. Knuckle Bearing Cone Installation

4. Install the steering knuckle bearing cup in the ball joint case using Steering Knuckle Bearing Replacer (09605-60010).

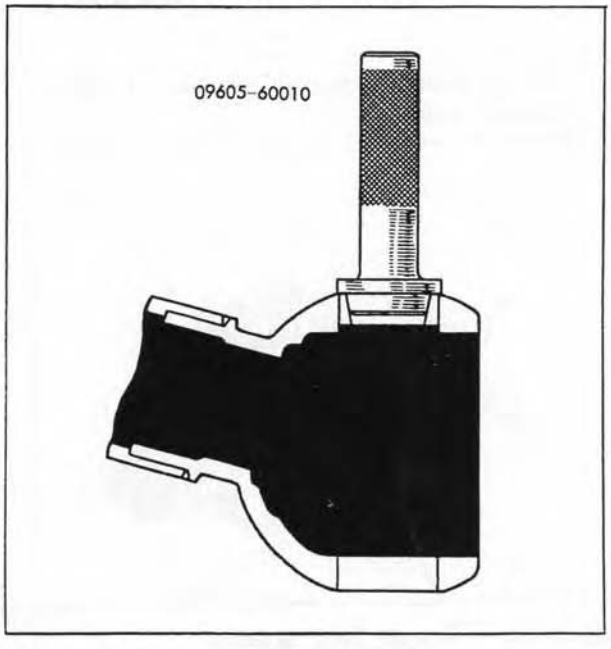


Fig. 5-18. Bearing Cup Installation

5. Insert the upper steering knuckle bearing cone in the bearing cup installed on the front axle housing, then install the steering knuckle to the ball joint case.

Caution : Steering knuckle oil seal set should be installed on the ball joint case before installing the steering knuckle.

6. Assemble the steering knuckle arm inserting the same number of shims as installed at the lower part, and tighten the nuts after installing the screw set cones.
   Using Steering Knuckle Bearing Remover (09606 60010), hold the bearing cone upward, and alternately repeat tightening the nuts and inserting the bearing.

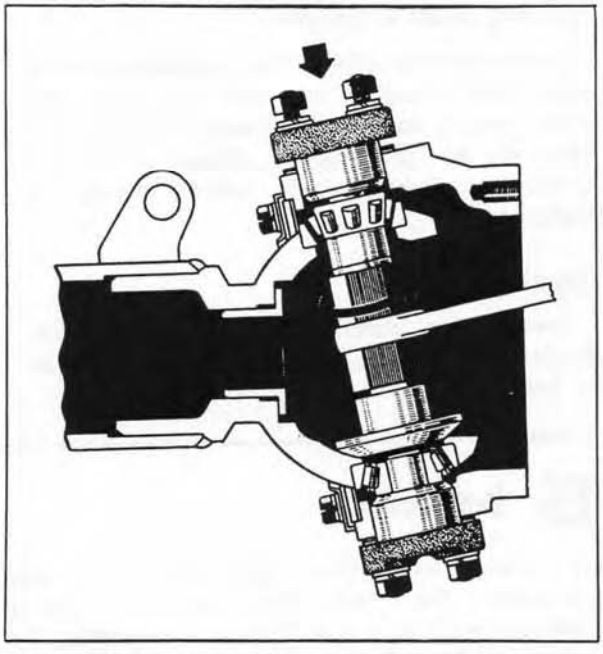


Fig. 5-19. Knuckle Arm & Knuckle Bearing Installation

7. After having installed the bearing, shims, knuckle shaft and knuckle arm to the steering knuckle, tighten the nuts attaching knuckle shaft and knuckle arm to the knuckle to 40~60 ft-lbs.
8. Then check the preload on bearing as shown in the figure. Attach a pull scale to the end hole of the steering knuckle arm at right angle.
   Then give a little push to the arm and obtain a steady pull of 1.8~2.3 kg (4~5-lbs). with the arm in motion, keeping the pullscale at right angle to the arm.
   if the preload is not satisfactory, make an adjustment with the following shim or shims.

Steering Knuckle Adjusting Shim Thickness

Part No.	mm	inch
43233-60010	0.2	0.0079
43234-60010	0.5	0.0195

Caution :

1. Preload Checking should be done without the driving shaft, knuckle spindle, etc.
2. Install the same number of shims on both steering knuckle arm and steering knuckle shaft.

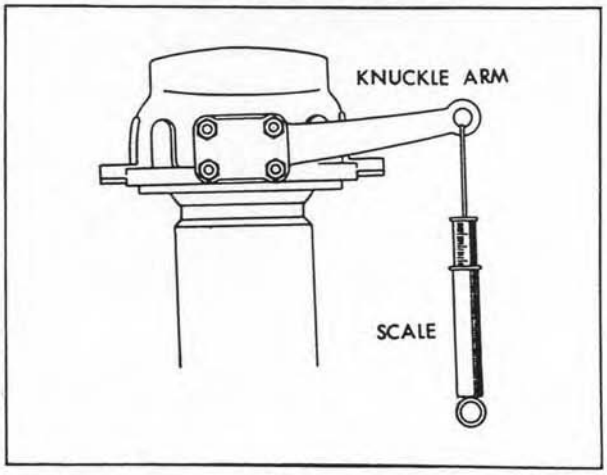


Fig. 5-20. Checking Bearing Preload

9. Attach the steering knuckle oil seal set to the steering knuckle.
10. Install the front axle shaft and ball joint. When assembling, coat sufficient grease around the ball joint and pack enough grease in the ball joint case.
11. Install the driving shaft bushing to the steering knuckle spindle, using Front Axle and Driving Shaft Bushing Replacer (09618 -60010).

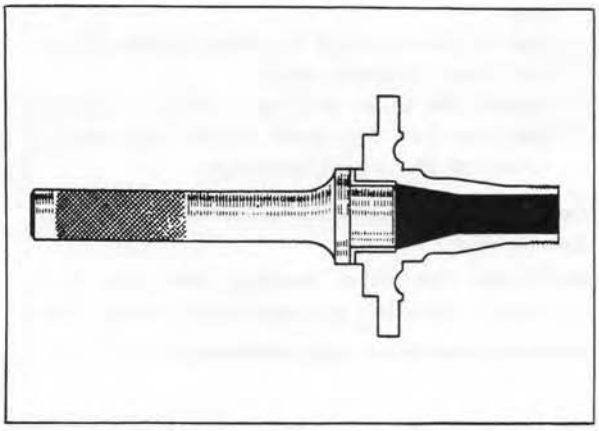


Fig. 5-21. Driving Shaft Bushing Installation

12. Install Knuckle Spindle Guide Pin (09604 -60010) on the steering knuckle, then after inserting the driving shaft into the steering knuckle, place the shaft and spindle at the guide pins as shown in the figure. Replace old packing with new one.

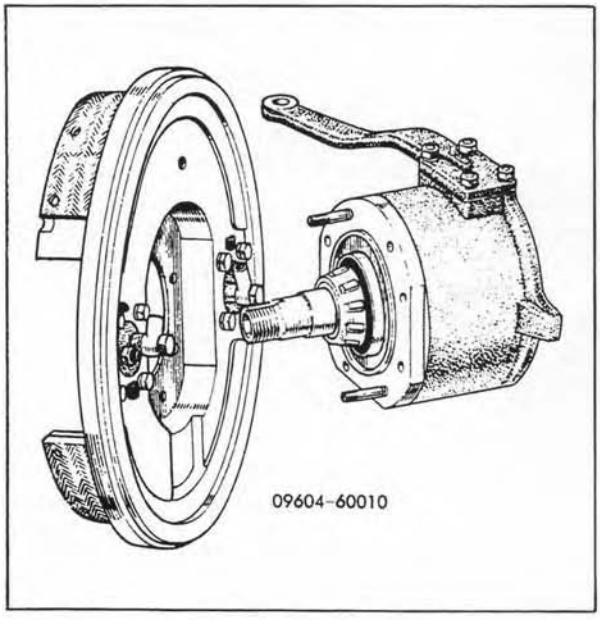


Fig. 5-22. Knuckle Spindle Guide Pin

13. Then attach the brake flange plate to these guide pins and tighten the bolts. Use new oil retainer packing when assembling. After removing the guide pins, install the remaining bolts and tighten.
    Lock the bolts by threading the wire through the holes provided in the bolt heads.
14. Connect tie-rod end and steering knuckle

arm.
Install the steering knuckle spindle oil seal and inner bearing cone.

15. Install the inner and outer bearing cups to the axle hub and pack grease between the space of the wheel bearings.

Caution : Apply enough grease around the inner and outer bearing cones.

16. Install the outer bearing cone and front wheel adjusting nuts and lock washer in the following order, viz. adjusting nut: lock washer: adjusting nut.
Use Front Wheel Adjusting Nut Wrench with Handle (09607-60010).

Caution : Install the axle hub with brake drum attached.

17. Install the front driving shaft flange setting the knock pin in the correct position and using a new packing.
18. Install the flange cap and then install the wheel.

Memorandum

PART IV FRONT AXLE HOUSING

1 Removal

1. Place the vehicle on a level surface and apply parking brake to prevent the vehicle from rolling. Place the dolly jack under the differential housing and raise the front end of the vehicle high enough to permit withdrawing the axle assembly. Place blocks under frame, and lower the dolly jack until the entire front end weight rests on the blocks. Leave the dolly jack raised high enough to support the axle assembly.
2. Remove the wheels and tires.
3. Disconnect the flexible brake hose from each wheel cylinder.
4. Disconnect the tie-rod end at each steering knuckle arm, and also disconnect the steering relay rod at the steering center arm. Remove the tie-rod and steering relay rod.
5. Disconnect the propeller shaft at the differential.
6. Remove the steering knuckles, axle shafts, driving shafts, ball joints and other related parts.
7. Remove four nuts from the U bolts and remove the bolts.
8. Unloosen the lower portion of the shock absorber from the front shock absorber lower bracket.
9. Lower the dolly jack until the axle assembly clears the under side of the chassis and then withdraw from under the vehicle.

2 Inspection and Repair

The procedures for inspection and repair of the differential assembly are the same as those for the rear axle differential and they are described in Group 3, Part III.

1. Inspect the axle housing for bent or cracked conditions. Repair or replace the axle housing if found defective.
2. Inspect the ball joint case for crack, distorsion or other damaged conditions.

3 Installation

1. Place the axle assembly on a dolly jack and move into position under the vehicle. Raise the axle assembly into position against springs.
2. Install the U bolts and tighten U bolt nuts.
3. Connect the front shock absorber lower bracket.
4. Connect the propeller shaft.
5. Install the axle shafts, ball joints, driving shafts, knuckle bearings, steering arms, steering knuckles and other related parts as described in Part III.
6. Install the tie-rod and the steering relay rod.
7. Connect the flexible brake hose at each wheel cylinder.
8. Install the wheels and tires.
9. Raise the front of the vehicle with the dolly jack and remove the blocks from under the vehicle.
   Lower the dolly jack and withdraw from under the vehicle.
10. Check all connections for tightness.
11. Bleed the front wheel brakes.
12. Check lubrication of the complete axle assembly and propeller shaft universal joint.

PART V SPECIFICATIONS

Front Wheel Alignment

Caster		1°
Camber		1°
Toe-in		3~5 mm (0.12~0.2 in.)
King Pin Angle		9°30
Turning Angle	Inner	32°
	Outer	27°

Front AXle

For specifications of the front axle differential, refer Gronp 3, Part V, Rear Axle & Drive Line Specifications.

Type		Fullf loating
Steering Knuckie Adjusting Shim Thickness	43233-60010	0.2 mm (0.0079 in.)
	43234-60010	0.5 mm (0.0195 in.)
Knuckle Bearing Preload (Scale reading at the steering knuckle arm.)		1.8~2.3 kg (4~5 lbs)

Group 6

STEERING

PART I TROUBLE SHOOTING

Steering troubles, like many other automotive ills, are seldom due to any one defect. They are almost always a combination of several minor defects which add up to more serious troubles.

For example, a slightly bent steering knuckle arm on one side, a fraction of a degree incorrect camber on the other side, a slightly under-inflated tire on one front wheel and a weak front spring on the other side, a defective rear shock absorber on one side and an unbalanced rear wheel on the other side might all add up to trouble. Any other combination of defects could be cited.

The point is that one of these difficulties would not cause serious trouble, but in combination they become serious.

The serviceman therefore must possess the knowledge and mental ability to visualize or see the entire picture at one time.

1 Hard Steering

Jack up the front end of the vehicle to lift the front wheels off the ground, and rotate the steering wheel.

a. If this enables easy steering, the probable cause is in the ball joint or steering knuckle and its related parts.

b. If the steering wheel is still hard to turn, disconnect the steering pitman arm from the drag link.
If this enables easy steering, the trouble is in the mechanism down from the drag link, but if the steering wheel is still hard to turn, the trouble is in the mechanism above the sector shaft.

1. When hardness is in the mechanism above the sector shaft.

POSSIBLE CAUSES	POSSIBLE REMEDIES
Improper steering gear adjustment	Adjust according to instructions
Damaged steering gear	Replace steering gear
Bent steering main shaft or mast jacket	Repair or replace main shaft or mast jacket
Damaged or deformed insulator bushing	Replace insulator bushing
Improper lubricant inside the steering gear box	Lubricate gear box

2. When hardness is in the mechanism down from the drag link

POSSIBLE CAUSES	POSSIBLE REMEDIES
Drag link too tight	Adjust drag link
Lack of lubrication	Lubricate tie-rod ends and knuckle joints
Damaged steering knuckle bearing	Replace steering knuckle bearing

Deformed front axle or broken spring	Repair or replace front axle or spring
Incorrect camber due to defective front wheel bearing	Replace wheel bearing and correct wheel alignment

2 Excessive Play in Steering

POSSIBLE CAUSES	POSSIBLE REMEDIES
Worn steering gear parts	Replace defective parts
Loose drag links	Tighten drag links
Loose or worn tie-rod ends	Tighten or replace tie-rod ends

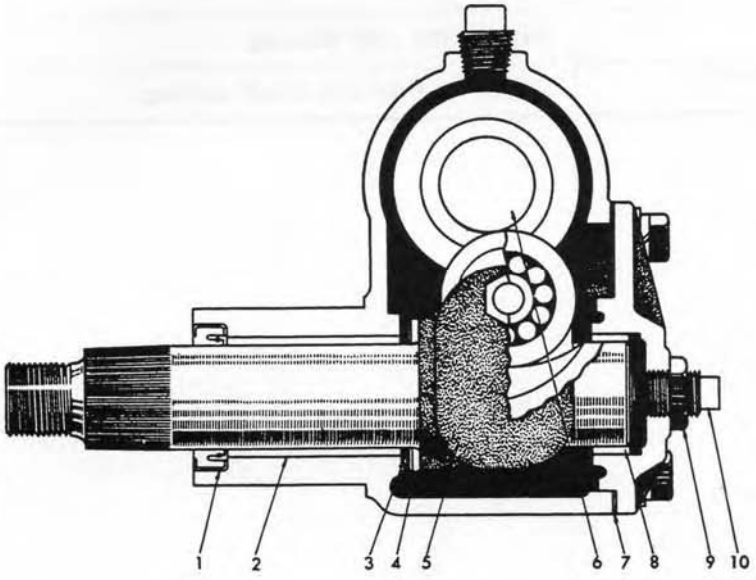
3 Shimmy

POSSIBLE CAUSES	POSSIBLE REMEDIES
Worn steering gear	Replace steering gear
Ball joints on both ends of drag link have excessive play	Adjust
Excessively worn tie-rod ends	Replace tie-rod ends
Worn front wheel bearings	Replace front wheel bearing
Worn steering knuckle bearing	Replace steering knuckle bearing
Steering knuckle bearing preload defective	Adjust
Play between steering worm and sector roller too great	Adjust play
Unbalanced front wheels	Balance wheels
Loose connection between steering gear box and frame	Tighten
Loose connection between steering knuckle and knuckle arm	Tighten
Loose tie-rod end	Tighten
Loose front axle U bolt	Tighten
Excessively worn front spring shackle bolt or its bushing	Replace shackle bolt or bushing
Loose wheel bearing	Tighten
Tires excessively worn	Replace tires
Loose hub nuts	Tighten

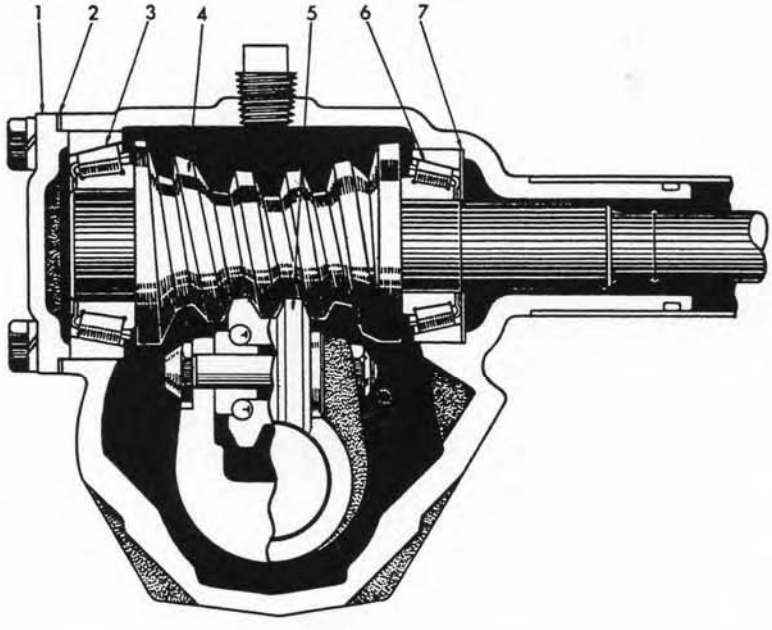
4 Steering Wheel Turns to One Side

POSSIBLE CAUSES	POSSIBLE REMEDIES
Broken or sagging front spring	Replace spring
Improper front wheel alignment	Correct alignment
Tire inflation not uniform	Inflate to correct pressure
Frame deformed	Repair frame
Rear axle housing deformed	Repair rear axle housing
Wheel bearings tight or insufficiently lubricated	Adjust or lubricate wheel bearing

PART II STEERING GEAR



1. STEERING SECTOR OIL RETAINER
2. SECTOR SHAFT BUSHING
3. STEERING SECTOR ADJUSTING SHIM
4. STEERING SECTOR ADJUSTING PLATE
5. SECTOR SHAFT
6. WORM GEAR
7. PACKING
8. BUSHING
9. NUT
10. STEERING SECTOR THRUST SCREW



1. STEERING WORM BEARING CAP
2. PACKING
3. STEERING WORM REAR BEARING
4. WORM GEAR
5. SECTOR ROLLER
6. STEERING WORM FRONT BEARING
7. STEERING WORM FRONT BEARING ADJUSTING SHIM

Fig. 6-1. Steering Gear

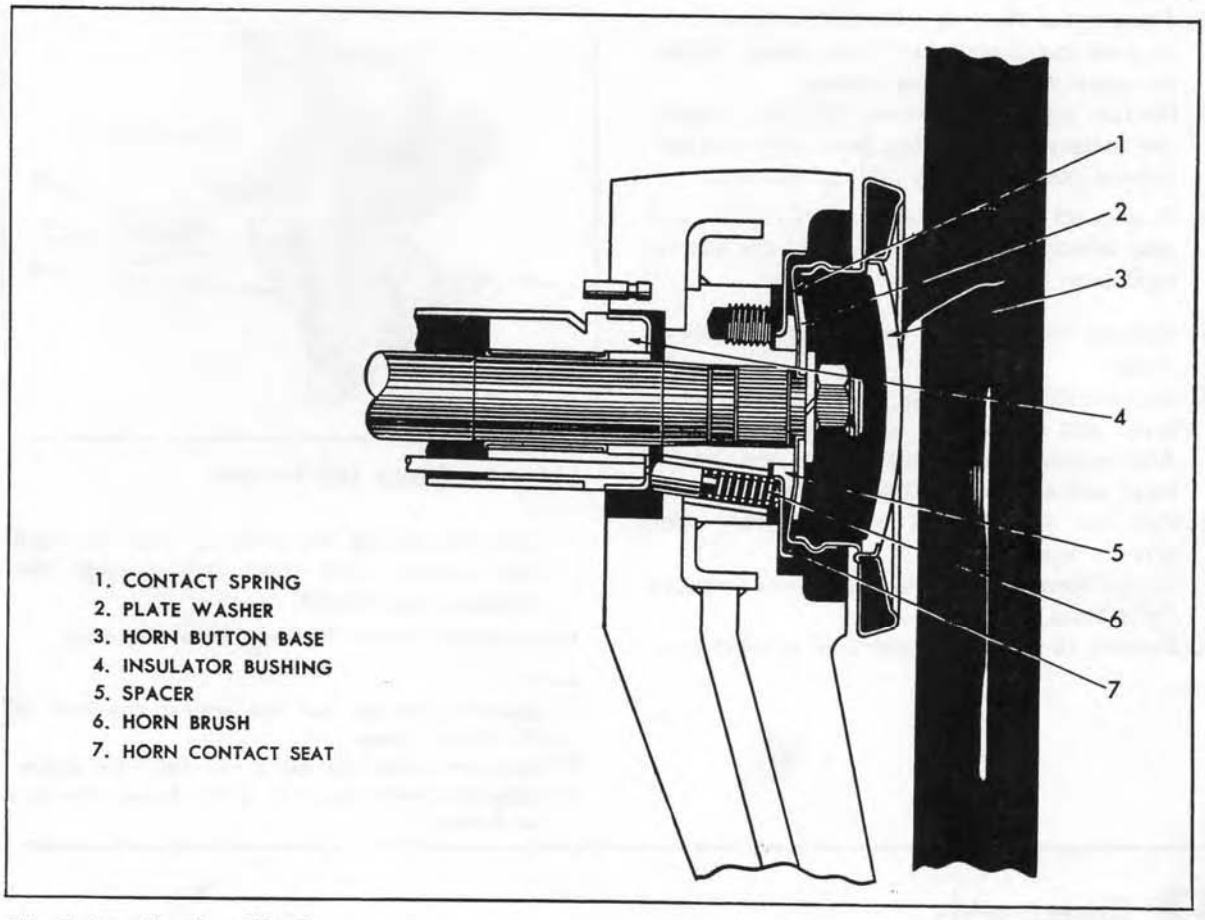


Fig. 6-2. Steering Wheel

1 Removal & Installation

1. Remove the horn button, contact spring, and other related parts from the steering wheel.
2. Remove the steering wheel from the main shaft using Steering Wheel Puller 09609-20010.

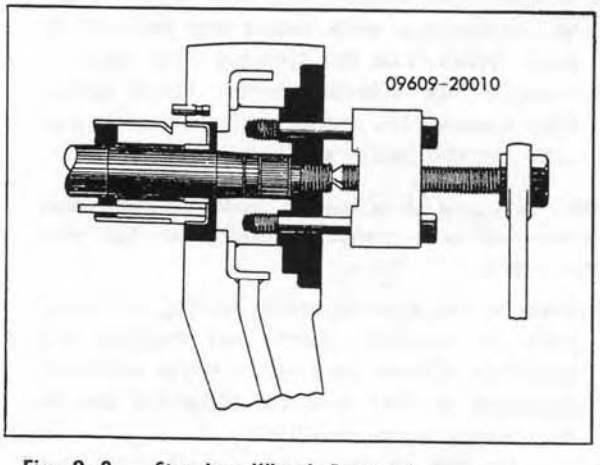


Fig. 6-3. Steering Wheel Removal

3. Disconnect the horn button wire connection at the side of the mast jacket.
4. Remove the mast jacket lower clamp.

5. Remove the turn signal switch assembly.
6. Remove the mast jacket hole cover rubber set plate and hole cover rubber.
7. On the right hand drive vehicle, remove the battery. On the left hand drive vehicle, remove the carburetor and oil cleaner.
8. Disconnect the gear shifting rod No. 1 and gear selecting rod at the ends of the control shift lever and control select lever.
9. Remove the control shaft lower bracket clamp.
10. Remove the control shift lever, control select lever, and the control shaft lower bracket. Also remove the control shaft low speed lever and control shaft lower bracket.
11. Pull out the control shaft toward the driver's seat.
12. Using Pitman Arm Puller, 09610-55010 remove the pitman arm.
13. Remove the steering gear box bracket cap, and then lifting the steering gear box and mast jacket, take them out through the engine compartment.

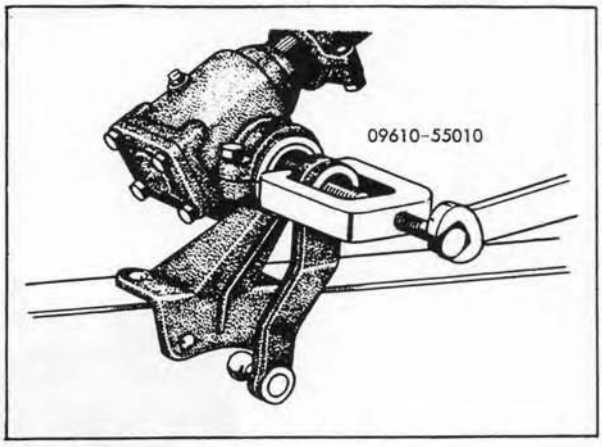


Fig. 6-4. Pitman Arm Removal

For Installation, follow "Removal" in reverse order.

Note :

1. Tighten the steering gear box bracket cap bolts to 75~90 ft-lbs torque.
2. Tighten the pitman arm nut to 120~140 ft-lbs torque.
3. Tighten the steering wheel nut to 4.5~7 m-kg (30~50 ft-lbs) torque.

2 Disassembly

1. Remove the steering gear box oil plug and drain out the gear oil.
2. Hold the steering assembly in a vise and unloosen the bolt holding the lower clamp on the steering mast jacket and pull out the mast jacket from the steering main shaft.
3. Unscrew the steering sector thrust screw, then remove the sector shaft end cover and take out the sector shaft assembly.

Note : Take care not to lose the sector adjusting shims as they must be reinstalled to obtain proper lash when reassembling.

4. Remove the steering worm bearing cap along with the steering worm rear bearing cap packings. Check the number of the adjusting packings, so that preload adjusting can be done easily upon installation.
5. Tap the end of the steering main shaft with a wooden hammer and remove the steering main shaft worm gear assembly together with the steering worm rear taper roller bearing and front taper roller bearing cone.

Caution : Take care as the rear bearing cup drops out when removing.

6. Using Bearing Puller 09612-65010, remove the steering worm front bearing cup together with the front bearing adjusting shims.

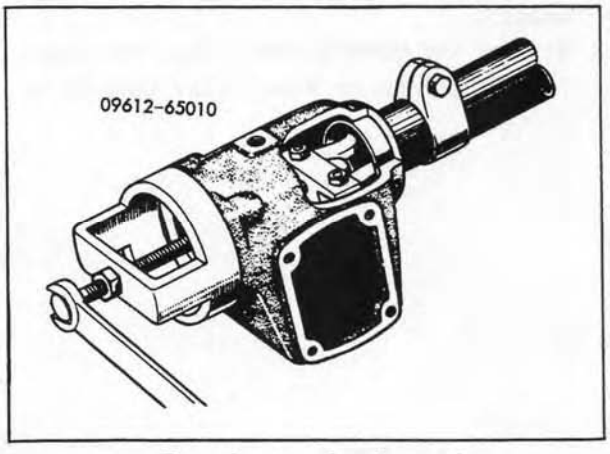


Fig. 6-5. Front Bearing Cup Removal

7. To remove the steering worm front and rear bearing cones at both ends of the worm gear, use the Steering Worm Bearing Cone Remover 09613-30010.
8. To remove the worm gear from the main shaft, use a press and force out the gear.
9. The removal of the sector shaft bushing and oil retainer in the gear box may be deferred until a thorough inspection of the parts can be made.
   If preliminary inspection shows damage, drive the bushing and the oil retainer out of the gear box using a suitable bushing remover and replacer.

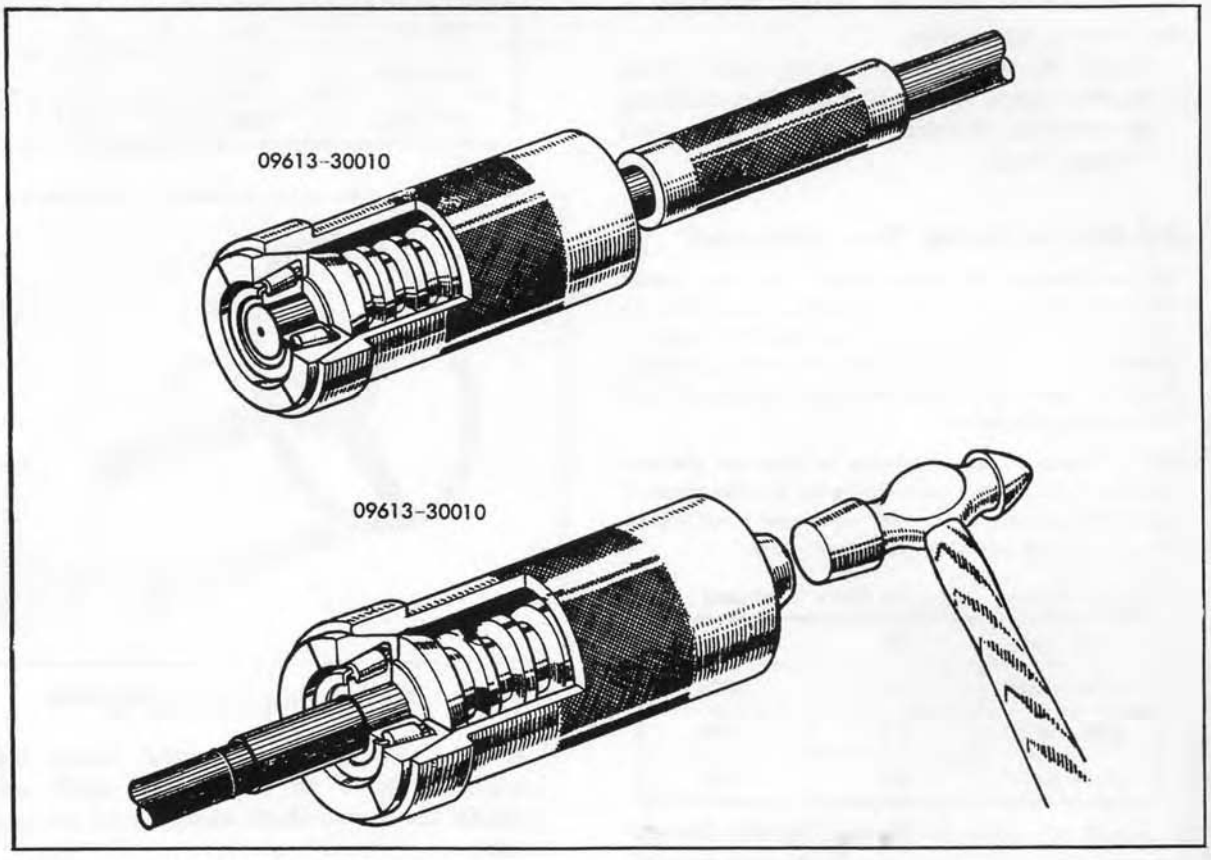


Fig. 6-6. Bearing Cone Removal

3 Inspection

1. Wash all parts in cleaning solvent and dry completely.
2. Inspect the steering main shaft and worm for worn or rough grooves and bent conditions.
   Replace the steering main shaft and worm if found defective.
3. Inspect the sector shaft assembly for damaged serrations, worn or twisted shaft, worn sector roller and roller balls.
   If any of these parts is found defective, they should be replaced as a sector shaft assembly.
4. Inspect the worm bearings for excessively worn, damaged, or noisy conditions.
   Replace the defective bearings with the new ones.
5. Inspect the sector shaft bushing for wear.
   If the clearance between the bushing and the shaft exceeds 0.2 mm (0.08 in.), replace the bushing.
6. Replace the gear box if inspection reveals cracks or other damages.
7. Replace the oil retainer or "O" ring if found damaged.
8. Inspect the gear box for cracks.

Caution : No attempt should be made to weld, machine, or repair any component parts of the steering gear assembly. Parts which are worn or cracked should be replaced with new parts.

4 Assembly & Adjustment

Described below are the assembly and adjustment procedures of the steering gear mechanism. The instructions on adjustment are covered under each assembling order although the adjustment may not always be done at that time of assembling.

1. Install the steering worm front taper roller bearing cup in the steering gear box inserting the selective fit front bearing adjusting shim between them.

End Play in Steering Worm Adjustment

The centerlines of the steering worm and sector roller are in proper alignment if the steering wheel has the same amount of play when turned in eigher direction. If there is a difference of play in either direction, adjust by increasing or decreasing the number of front bearing adjusting shims.

Note : If there is any difference in play or stiffness between right and left when turning the steering wheel, it means that the center line of the worm gear is not aligned with the pivoting center of the sector shaft.

Front Bearing Adjusting Shim Thickness

Part No.	mm	inch
90564-40037	0.5	0.020
90564-40038	0.2	0.008
90564-40039	0.1	0.004

2. Install the main shaft assembly with bearing cones attached. Then install the rear bearing cup.
3. Install the selective fit rear bearing cap packings and attach the worm bearing cap.

Worm Bearing Preload Adjustment

Adjust preload of worm bearing using cap packings. Place one packing and tighten the cap to specified 1.5~2.2 m-kg (10~16 ft-lb) torque. Attach the steering wheel temporarily. Apply the pull scale to a spoke at a rim of wheel and exert a steady pull while keeping the scale at 90 degrees to the spoke as shown in the figure. The pull required to keep wheel turning slowly should be approximately 0.4 kg (0.88 lbs). If preload is excessive, increase thickness of packing. If preload is not enough, decrease thickness of packing.

Steering Worm Rear Bearing Cap Packing Thickness

Part No.	mm	inch
45322-60010	0.5	0.020
45322-55010	0.31	0.012

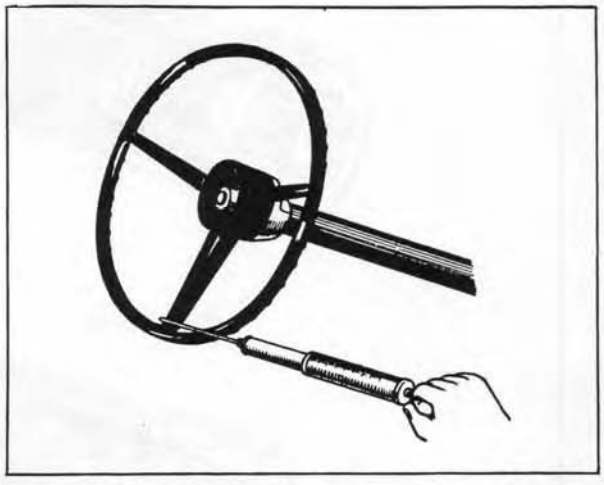


Fig. 6-7. Worm Bearing Preload Adjustment

4. Attach the sector adjusting shims and adjusting plate to the sector shaft and install the sector shaft assembly to the gear box.

Steering Wheel Play Adjustment

The steering wheel play can be adjusted by increasing or decreasing the number of sector adjusting shims.

Decreasing the shims will move the roller closer o the worm to make the mesh tighter, while increasing the shims will make the mesh looser. To adjust, install the steering wheel on end of the main shaft and while holding the sector roller shaft with hand, turn the steering wheel in both directions. The point on the steering wheel where the roller shaft is felt to begin turning is made as the starting point and make adjustments by increasing or decreasing the number of shims until there is about 1 inch play in the steering wheel.

Note : The standard number of steering sector adjusting shims are as follows.

Thickness 0.3 mm (0.012 in.) 6 pcs.
0.5 mm (0.020 in.) 5 pcs.
Total is 11 pieces.

5. Install the sector shaft end cover. Tighten the bolts to 1.5~2.2 m-kg (10~16 ft-lb) torque.

Sector Roller Shaft Axial Play Adjustment

Adjust the sector roller shaft axial play by turning the sector thrust adjusting screw. Loosen the lock nut and tighten the screw until the steering shaft feels heavy to turn. Then loosen the screw 1/4 to 1/2 turn and tighten the lock nut. the lock nut to 5~8 m-kg (37~60 ft-lb).

6. Install the mast jacket "O" ring and install the mast jacket onto the gear box and then tighten with the mast jacket lower clamp.

Memorandum

PART III STEERING LINKAGE

The service operations of the steering linkage can be devided into three major operations, that is, operations on Drag Link, Steering Center Arm and its connections, and Tie-rod.

Since the steering linkage is one of the most important functional parts in the operation of the vehicle, utmost care should be exercised in assembling as well as inspection.

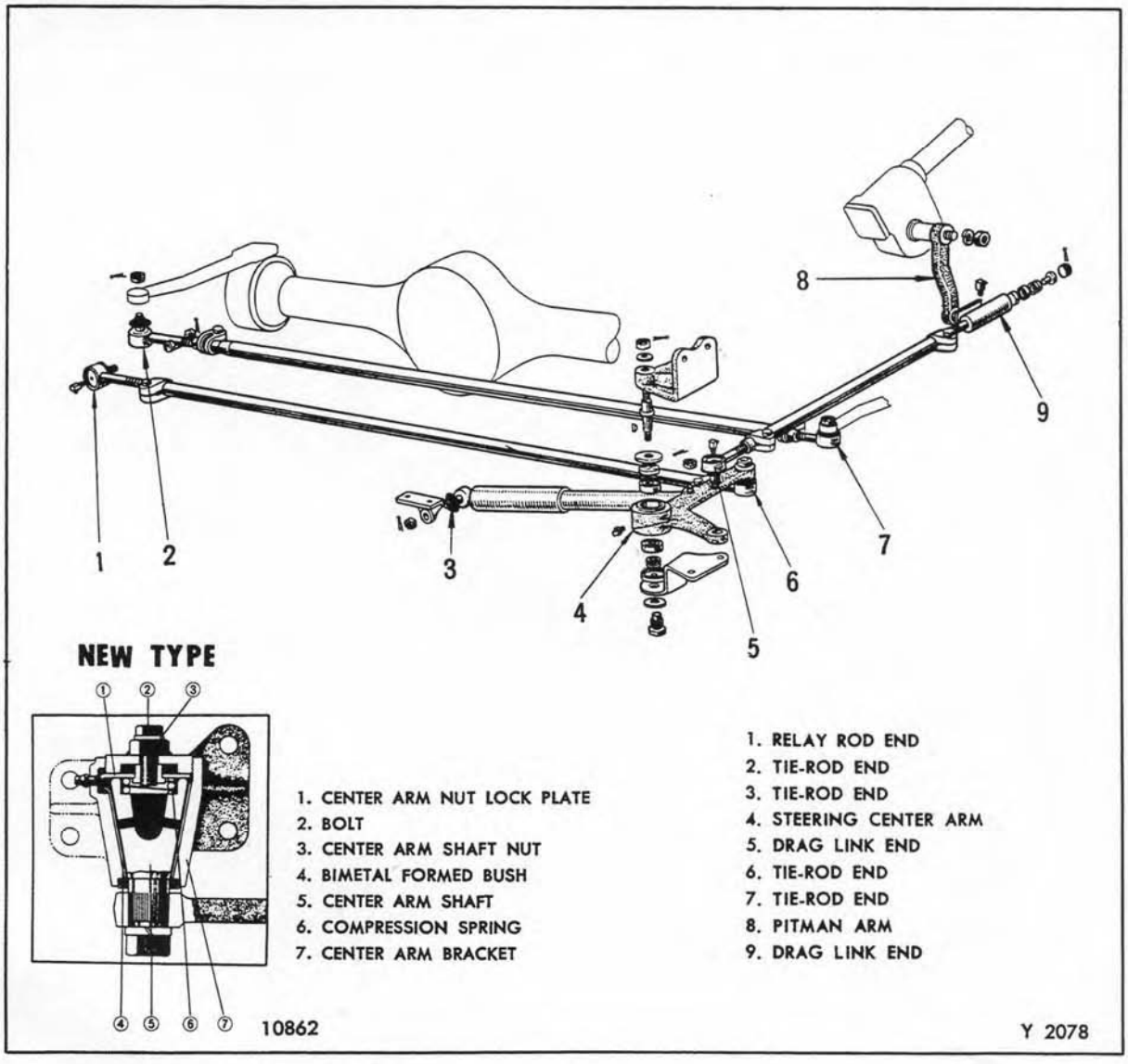


Fig. 6-8. **Steering Linkage (L.H.)**

1 Drag Link

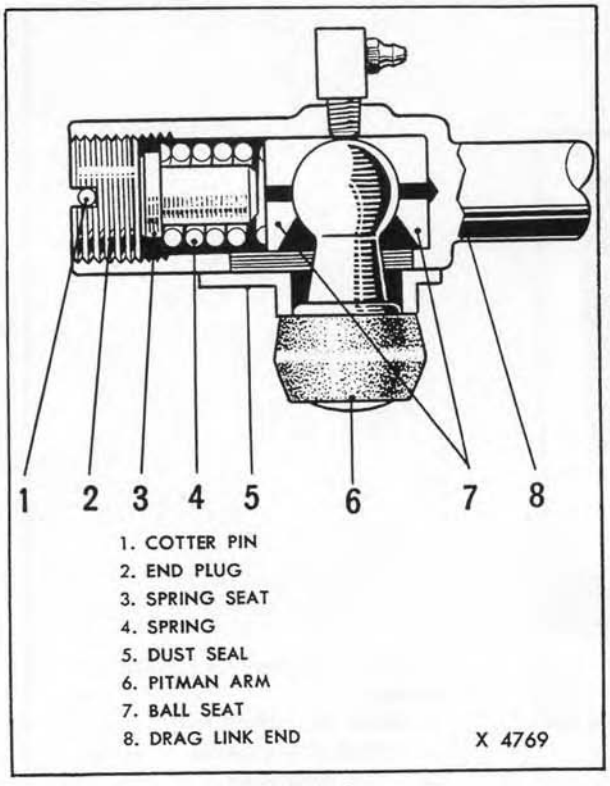


Fig. 6-9. Drag Link End

DISASSEMBLY

1. Pitman Arm End. Remove the cotter pin and drag link end plug. Then, disconnect the drag link assembly from the pitman arm knob, and remove the spring seat, spring, ball seats, and dust cover.
2. Center Arm End. To disconnect the drag link end from the center arm end, remove the cotter pin and nut retaining the tie-rod end knob. Then disconnect using Tie-rod End Puller 09611-20011. Refer Section 3, Tie-rod Ends.

INSPECTION

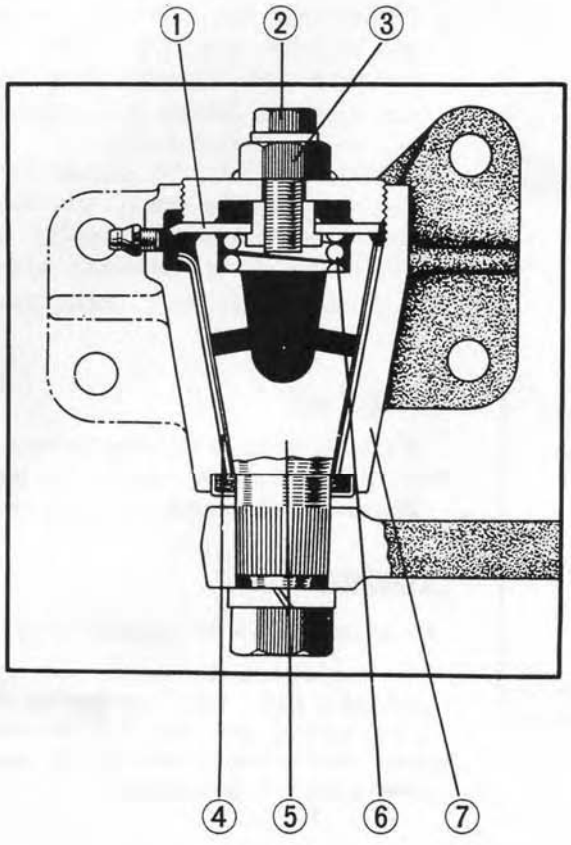
Wash all parts in cleaning solvent and check them for wear and the spring for lost tension. Discard all parts that are worn excessively.

ASSEMBLY

For Assembly, follow "Disassembly" in reverse order.

Note : Coat ample grease on the ball, ball seat and other sliding parts. Tighten the drag link end plug fully at first and then screw back 1/2 turn and install the cotter pin after making sure that the knob will move smoothly and with no looseness.

2 Steering Center Arm



1. CENTER ARM NUT LOCK PLATE
2. BOLT
3. CENTER ARM SHAFT NUT
4. BIMETAL FORMED BUSH
5. CENTER ARM SHAFT
6. COMPRESSION SPRING
7. CENTER ARM BRACKET

10862

Fig. 6-10. Steering Center Arm

REMOVAL

1. Disconnect the end of the steering shimmy damper from the shimmy damper bracket on the front cross-member frame.
2. Loosen and remove the steering center arm securing nut, then using the Ball Joint Puller 09628-62010, remove the steering center arm with the simmy damper.
3. Remove the engine under cover, then remove the center arm bracket from the frame.

DISASSEMBLY

1. Remove the steering shimmy damper from the steering center arm, and also remove the steering relay rod from the tie-rod using the Tie-rod End Puller 09611-20011.
2. Steering center arm shaft disassembly
   a. Secure the center arm bracket in a vise, remove the bolt on the center arm shaft nut, then loosen and remove the center arm shaft nut.
   b. Carefully press the end of the center arm shaft with the lock plate and the spring out of the center arm bracket.
   c. Remove the bushing from the center arm bracket.

INSPECTION

Wash all parts thoroughly in cleaning solvent. Check all parts for wear and damages, and replace with new ones if found defective. Check the center arm shaft and bushing for wear. Also check the center arm shaft spring tension.

ASSEMBLY

For assembly, follow "Disassembly" in a reverse order.

Note : Coat grease on the bushing and center arm shaft. Tighten the center arm shaft nut firmly, then loosen the nut 1/4 of a turn.

3 Tie-rod Ends

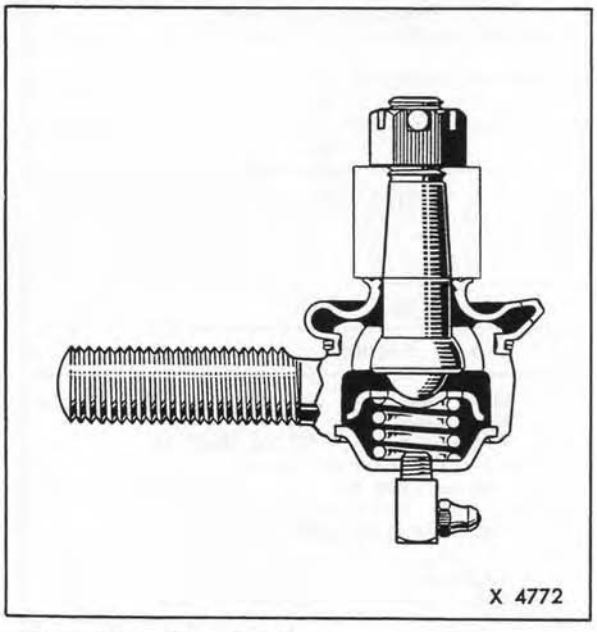


Fig. 6-11. Tie-rod End

REMOVAL

The tie-rod ends are provided with knobs to form the ball joints as shown in the figure. This type of connections are used at the following portions with minor differences depending on the parts.

Note : The tie-rod ends with parts as illustrated in the figure cannot be disassembled.

1. Connection between the drag link and center arm.
2. Connection between the center arm and steering relay rod.
3. Connection between the steering relay rod and tie-rod.
4. Connection between the tie-rod ends and knuckle arms.

To disconnect these connections, first remove the cotter pin and nut at the end of the knob and then disconnect using Tie-rod End Puller 09611-20011.

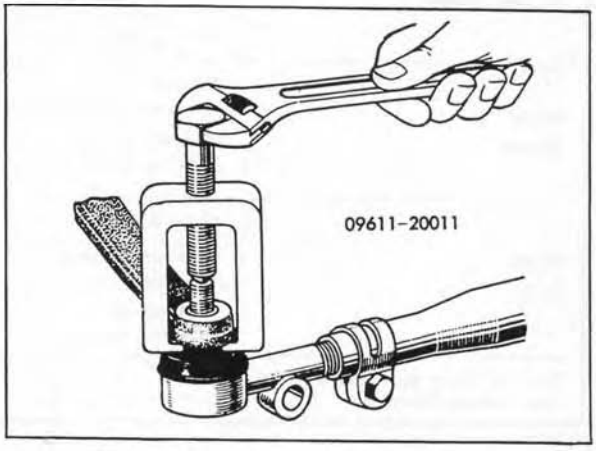


Fig. 6-12. Using Tie-rod End Puller

After this operation, the tie-rod ends can be removed from tie-rod relay rod, or drag link by loosening the tie-rod adjusting tube clamps and screwing back the tie-rod ends.

INSPECTION

Inspect the tie-rod end knob for wear or damage.

Replace the tie-rod end if found defective.

Also check the tie-rod for bent or other damaged conditions.

PART IV SPECIFICATIONS

Gear Type		Worm and Sector Roller
Gear Ratio		21 : 1
Steering Angle	Inner	22°
	Outer	27°
Minimum Turning Circle		10.6 m (35 ft) for FJ40(V)(L), 11.0 m (36 ft) for FJ43(L) 12.4 m (41 ft) for FJ45(L)V, 13.2 m (43 ft) for FJ45(L)P-B.
Steering Wheel	Diameter	432 mm (17.3 in.)
	Free Play	25~50 mm (1~2 in.)
Worm Bearing	Preload	0.4 kg (0.88 lbs)
	Thickness of Adjusting Shims	90564-40037 0.5 mm (0.020 in.) 90564-40038 0.2 mm (0.008 in.) 90564-40039 0.1 mm (0.004 in.)
Sector Shaft	Outer Diameter	32 mm (1.26 in.)
	Clearance between the Bushing	0.009~0.06 mm (0.0004~0.002 in.)
	Thickness of Adjusting Shims	45338-55010 0.3 mm (0.012 in.) 90564-33062 0.5 mm (0.020 in.)
Steering Worm Rear Bearing Cap Packing Thickness		45322-60010 0.5 mm (0.020 in.) 45322-55010 0.31 mm (0.012 in.)

Torque Limits

Description	m-kg	ft-lbs
Steering Wheel × Main Shaft	4.5~7	30~50
Steering Gear Box Bracket Cap Bolt	10~12	75~90
Steering Worm Bearing Cap Bolt	2.0~3.5	15~25
Sector Shaft End Cover Bolt	1.5~2.2	10~16
Gear Housing End Cover Bolt	1.5~2.2	10~16
Sector Shaft × Pitman Arm	16.5~19.5	120~140
Sector Thrust Adjusting Screw Lock Nut	5~8	37~60
Steering Sector Roller Shaf Nut	3~4.5	22~33

Group 7

BRAKES

The front brake is two leading shoe type. When braking at forward, two brake shoes actuate as leading shoe, and when braking in reverse, two brake shoes actuate as trailing shoe.

The rear brake is dual two leading shoe type. When braking at forward and in reverse, the two brake shoes actuates as leading shoe.

The parking brake operated by a cable is internal expanding type and mounted at the back of the transfer case. The parking brake lever is of the pistol grip type.

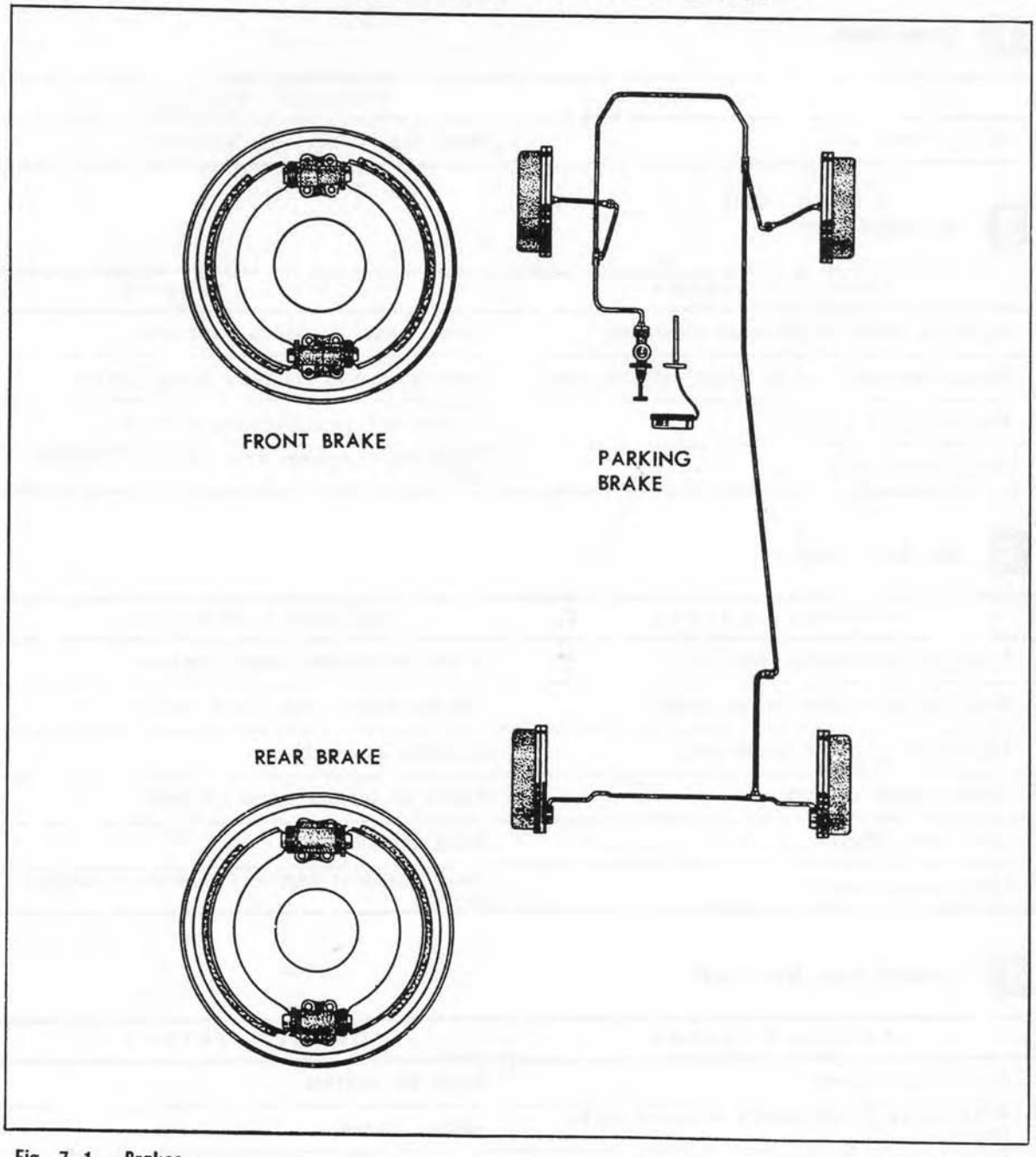


Fig. 7-1. Brakes

PART I TROUBLE SHOOTING

1 Spongy Pedal

POSSIBLE CAUSES	POSSIBLE REMEDIES
Air in brake lines	Bleed the system more accurately

2 All Brakes Drag

POSSIBLE CAUSES	POSSIBLE REMEDIES
Improper pedal to toe-board clearance	Adjust pedal toe-board clearnace
Brake shoe distorted or improperly adjusted	Replace shoe or correctly adjust brake
Faulty master cylinder	Inspect and adjust master cylinder
Dirty brake fluid	Flush entire system and replace all rubber parts

3 One Brake Drags

POSSIBLE CAUSES	POSSIBLE REMEDIES
Loose or worn wheel bearings	Adjust or replace wheel bearings
Weak or broke shoe return spring	Replace brake shoe return spring
Improperly adjusted brake shoe	Correctly adjust brakes
Faulty wheel cylinder	Adjust or replace wheel cylinder
Dirty brake fluid	Bleed the system
Dirty brake fluid	Flush entire system and replace all rubber parts

4 Excessive Pedal Free Travel

POSSIBLE CAUSES	POSSIBLE REMEDIES
Air in brake lines	Bleed the system
Worn lining or improperly adjusted brake shoe	Adjust brakes
Fluid leaks or fluid level in master cylinder is too low	Repair or fill master cylinder and bleed the system

5 Excessive Effort Required on Pedal

POSSIBLE CAUSES	POSSIBLE REMEDIES
Clogged brake lines	Check and correct brake lines
Worn lining or improperly adjusted brake shoe	Adjust brakes
Grease or water on linings	Clean or replace linings

6 Unbalanced Braking

POSSIBLE CAUSES	POSSIBLE REMEDIES
Oil leaking at one wheel cylinder	Repair or replace wheel cylinder or clean brake shoe linings
Tires improperly inflated	Inflate tires to correct pressure
Scored brake drums	Grind and correct or replace brake drums
Dirty brake fluid	Flush entire system and replace all rubber parts

7 Pedal Goes to Floor Under Slight Pressure

POSSIBLE CAUSES	POSSIBLE REMEDIES
Fluid leaks through connections or hoses	Tighten connections or replace damaged hoses
Fluid leaks at wheel cylinders	Check or replace wheel cylinders Clean and dry brake shoe linings
Insufficient fluid in master cylinder or defective master cylinder	Fill master cylinder or replace if found defective

8 Vehicle Pulls to One Side

POSSIBLE CAUSES	POSSIBLE REMEDIES
Tires improperly inflated	Inflate tires to correct pressure
Clogged brake lines	Check and correct brake lines
Loose or worn wheel bearings	Adjust or replace wheel bearings
Brake shoe distorted or improperly adjusted	Replace shoe or correctly adjust brake
Weak or broken brake shoe return spring	Replace brake shoe return spring
Brake drum out of round	Grind and correct, or replace brake drum
Worn or glazed linings	Replace linings
Grease or water on linings	Clean or replace linings
Faulty wheel cylinder	Adjust or replace wheel cylinder

9 Brakes Chatter

POSSIBLE CAUSES	POSSIBLE REMEDIES
Brake drum out of round	Grind and correct or replace brake drum
Worn or glazed lining	Replace lining
Grease or water on linings	Clean or replace linings
Loose lining	Repair or replace

10 Brakes Fails to Apply

POSSIBLE CAUSES	POSSIBLE REMEDIES
Fluid leaks or insufficient fluid in master cylinder	Check all lines, connections and wheel cylinders for leakage and fill master cylinder
Air in brake lines	Bleed the system accurately
Faulty master cylinder	Inspect and adjust, or replace
Dirty brake fluid	Flush entire system and replace all rubber parts
Worn or glazed lining	Replace
Grease or water on linings	Clean or replace linings

PART II BRAKE ADJUSTMENT

1 Brake Pedal Adjustment

PEDAL STOPPER

By adjusting the location of stop switch attached on the pedal bracket, adjust so that the distance will be 245 mm (9.65 in.) between the toe-board and the pedal at fully released position.

MASTER CYLINDER PISTON ROD

1. By loosening the piston rod lock nut and turning the piston rod, adjust the piston rod so that the pedal will fully contact the stop switch and the piston will return fully when the pedal is released.
2. If the distance from toe-board to the brake pedal is less than 25 mm (1 in.) when depressed, the brake lining should be checked for wear.

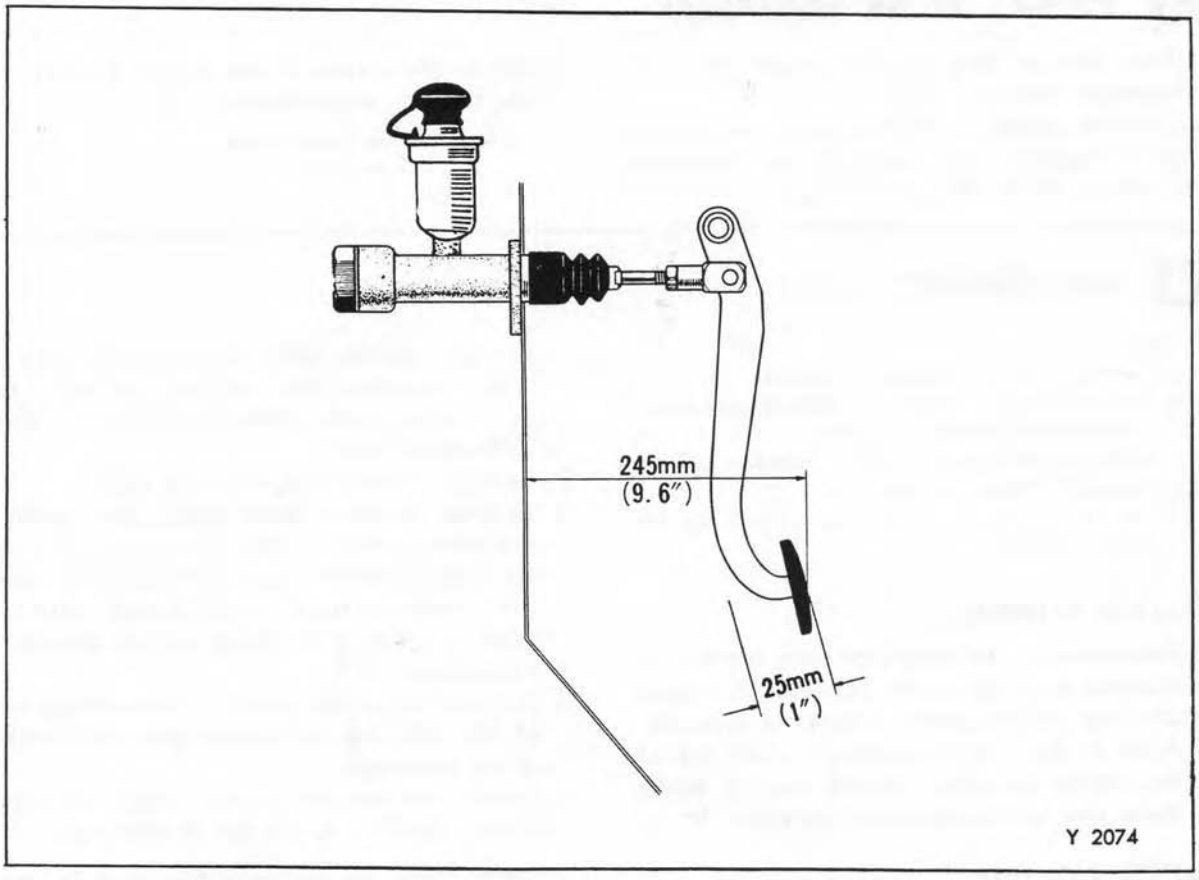


Fig. 7-2. Brake Pedal Adjustmet

2 Brake Shoe Adjustment

1. Raise the front of the vehicle.
2. Remove the rubber plug from the brake adjusting hole in the flange plate. Using the brake adjusting tool, turn adjuster screw to expand brake shoe. The brake pedal must be depressed several times while turning the adjusting screw in order to make the brake lining contact the drum all around its surface and to lock the wheel completely. Moving the outer end of the tool away from the center of the flange plate toward the tire will expand the shoe.
3. Back off the brake adjusting screw 5 notches. If the shoe still drags lightly on the drum, back off adjusting screw 1 or 2 additional notches. Check if the wheel rotates freely.
4. Perform the same operations on each brake shoe.
5. After all brake shoes have been adjusted, check the operation of the brakes.

Caution : Do not adjust two shoes at the same time.

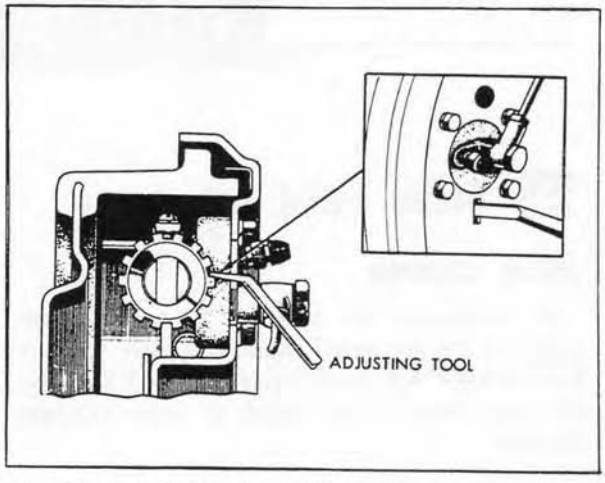


Fig. 7-3. Brake Shoe Adjustment

3 Parking Brake Adjustment

1. Place the parking brake plunger at fully released position.
2. Turn the shaft of the adjusting cam fully counterclockwise to obtain proper clearance between the drum and the shoe.
3. Adjust the travel of the brake plunger by the flexible wire adjusting nut.

Travel of the Brake plunger
6 ~ 9 notches

4 Air Bleeding

Caution :

a. Check all lines for damage or leakage.
b. Keep the master cylinder tank filled with new brake fluid during the bleeding operation.
c. Attach a drain tube at each bleeder plug to receive the fluid in a container.
d. Take care so that the fluid may not corrode the painted surface.

MASTER CYLINDER

1. Remove oil brake main pipe from the master cylinder, and depress the pedal several times until air in the master cylinder is expelled.
2. After air has been completely bled out of the master cylinder, connect the oil brake main pipe while depressing the pedal slowly.

WHEEL CYLINDER

1, Remove the rubber cap from the wheel cylinder bleeder plug and attach a drain tube. Submerge the free end of the tube in a clean glass container partially filled with brake fluid.
2. Unscrew bleeder plug one full turn.
3. Depress the brake pedal fully, then release the pedal slowly. Repeat the operation until air bubbles cease to appear. Frequently check the amount of fluid in the master cylinder tank as air may be drawn into the hydraulic system again.
4. As soon as the air bubbles stop coming out of the tube, tighten bleeder plug with brake pedal depressed.
5. Check the master cylinder tank for fluid level. Refill it to 3/4 full if necessary.

Caution : Never use the brake fluid which has been drained.

PART III BRAKE DRUM & BRAKE SHOE

1 Brake Drum Removal and Installation

1. Remove the wheel cap.
2. Loosen the hub nuts and raise the front (for front brake drum) or rear (for rear brake drum) of the vehicle, then remove the wheel.
3. Remove the brake drum set screw and remove the brake drum.

For installation, follow "Removal" in reverse order.

2 Brake Drum Refinishing

If the brake drum is excessively worn or scored, correct the brake drum by grinding on a lathe.

The refinished inner diameter should not exceed 293 mm (11.54 in.).

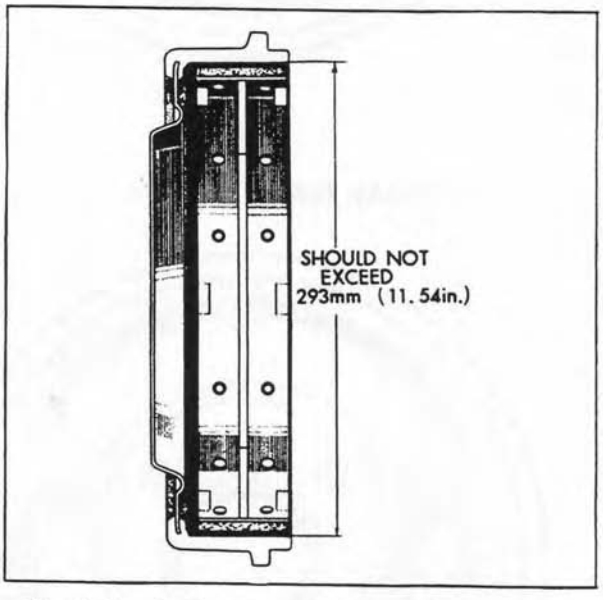


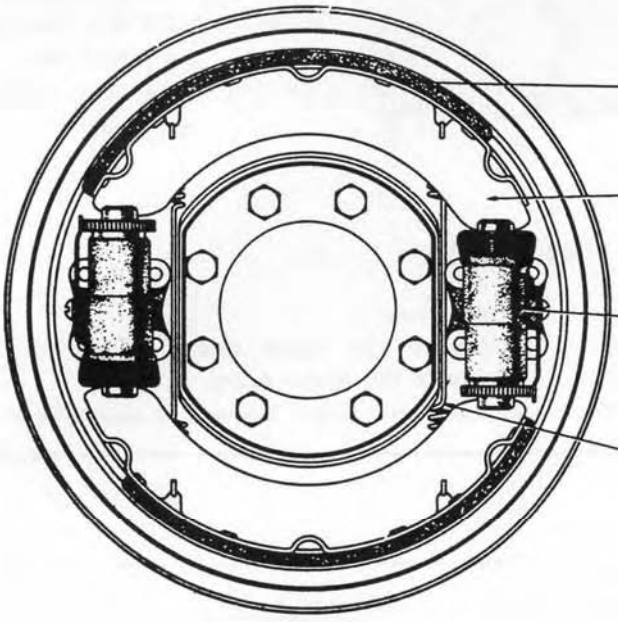
Fig. 7-4. Brake Drum, Lining and Shoe

3 Brake Shoe Removal and Installation

1. Remove the brake drum.
2. Remove two brake shoe return springs.
3. Remove upper and lower brake shoes.

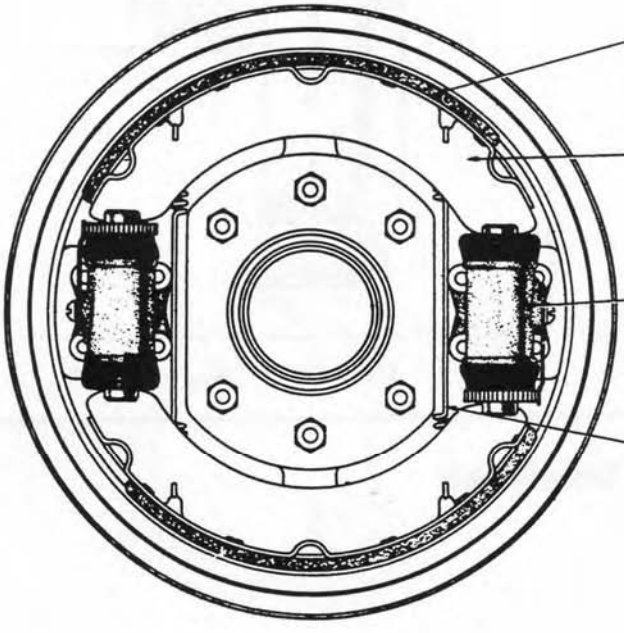
For installation, follow "Removal" in reverse order.

FRONT BRAKE (L.H.)



1 BRAKE LINING
2 BRAKE SHOE
3 FRONT WHEEL CYLINDER
4 BRAKE SHOE BACK SPRING

REAR BRAKE (L.H.)



1 BRAKE LINING
2 BRAKE SHOE
3 REAR WHEEL CYLINDER
4 BRAKE SHOE BACK SPRING

Fig. 7-5. Brake Mechanism

4 Brake Shoe Inspection and Repair

BRAKE SHOE RELINING

1. Inspect lining to drum contact. If the inspection indicates poor contact, recondition the lining.
2. Brake linings that are worn down to 4 mm (0.16 in.) should be replaced. Worn linings can score the brake drum.

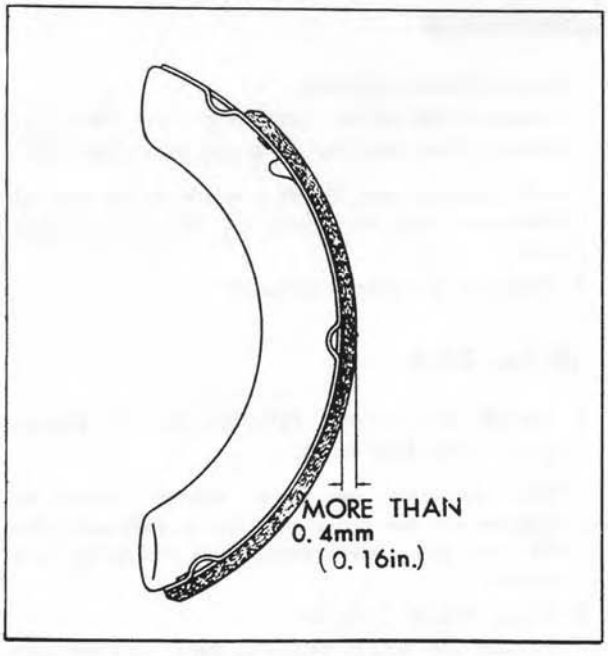


Fig. 7-6. **Brake Lining Inspection**

Note : It is unnecessary to clean the lining un ess oil or grease is adhering on it.

SHOE RETURN SPRING

Worn or damaged shoe return spring should be replaced.

Standard Free Length (From hook neck to neck) 189.5 mm (7.46 in.)

PART IV WHEEL CYLINDER & MASTER CYLINDER

1 Wheel Cylinder Removal and Installation

REMOVAL

1. Remove brake return spring and the brake shoe following the steps previously outlined in Part Ⅲ.
2. Front Wheel Cylinder
   Remove the flexible hose from the wheel cylinder, and disconnect the wheel cylinder pipe.

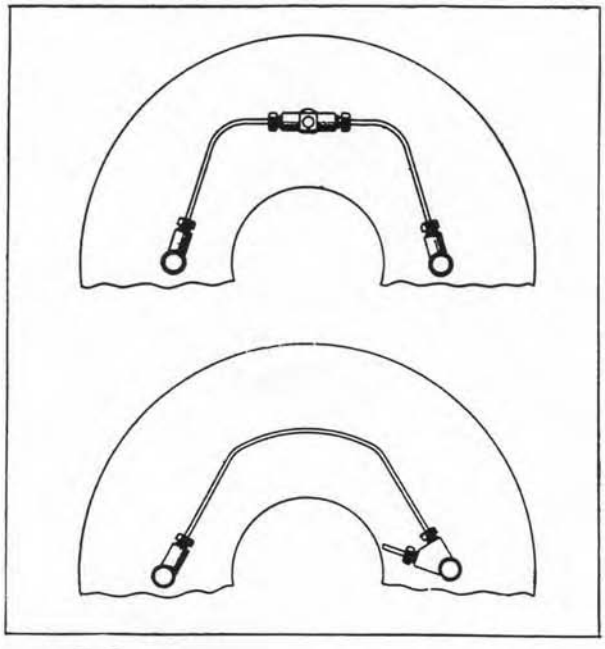


Fig. 7-7. Flange Plate Rear View

   Rear Wheel Cylinder
   Remove the brake pipe rear and the rear wheel cylinder pipe from the wheel cylinder.

   Note : Attach a plug cap or a waste at the end of the hose or pipe to prevent the fluid from flowing out.
3. Remove the wheel cylinder.

INSTALLTION

1. Install the wheel cylinder on the flange plate with four bolts.

   Note : The front side wheel cylinder should be installed with the piston side facing downward, and the rear side wheel cylinder with the piston side upward.
2. Front Wheel Cylinder
   Attach the wheel cylinder pipe and connect the flexible hose.
   Rear Wheel Cylinder
   Attach the wheel cylinder pipe and brake pipe rear.

2 Wheel Cylinder Service Operations

DISASSEMBLY

1. Wash all dirty materials adhering to the outside.
2. Remove the adjuster lock spring.
3. Pull out the adjuster.
4. Remove the wheel cylinder cover.
5. Remove the piston, cup, spring seat and piston spacer (only rear).
6. Remove the bleeder plug.

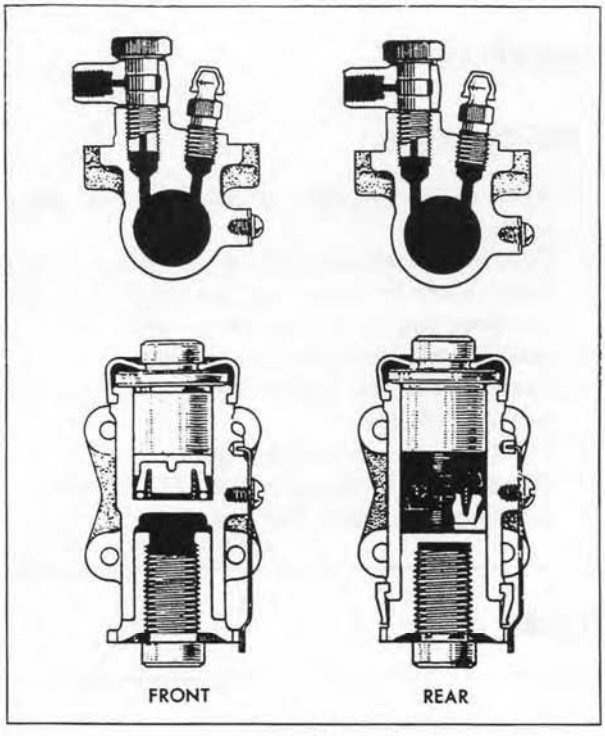


Fig. 7-8. Wheel Cylinders

INSPECTION

1. Wash all parts in clean alcohol.
2. Inspect the cylinder bore for excessive wear, rust, or damage. If any one of these condition is present, the cylinder should be replaced.
3. Check the clearance between the cylinder and the piston. The clearance should range from 0.040 mm to 0.125 mm (0.0016~0.0049 in.). If the clearance is more than 0.15 mm (0.006 in.), the cylinder should be replaced.

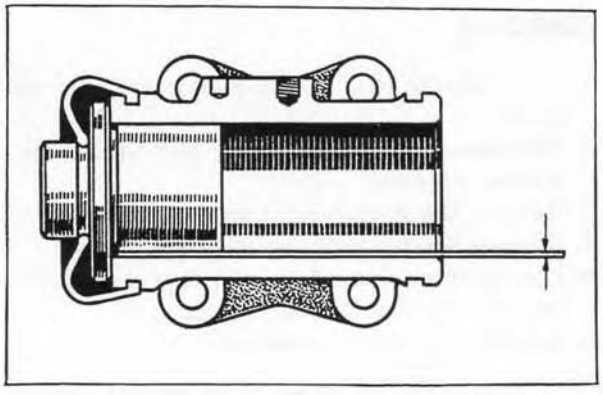


Fig. 7-9. Checking the Clearance

4. Check the piston cup for damage, crack, or corrosion. Replace the cup if necessary.
5. Check the wheel cylinder spring. Weak or damaged spring should be replaced.

Free length	43 mm (1.69 in.)

ASSEMBLY

For assembly, follow "Removal" in reverse order.

1. Apply a coating of brake fluid to all internal parts before assembling.
2. The Adjuster and Adjuster Screw have a distinction between right and left, and they should be installed on the flange plate as follows.
   Left-hand Thread·····Right side
   Right-hand Thread ·····Left side

3 Flange Plate

REMOVAL & INSTALLATION

1. To remove the front flange plate, refer Group 6, Part II, Section 1.
2. To remove the rear brake flange plate, observe the following instruction.
   a. Remove the brake shoes and the wheel cylinder as outlined before.
   b. Pull out the rear axle shaft as outlined in Group 6, Part II, Section 1.
   c. Then remove six bolts that secure the plate to the rear axle brake flange plate and remove the flange plate.

For installation, follow removal in reverse order.

4 Master Cylinder Removal and Installation

REMOVAL

1. Plug the air vent of the master cylinder oil tank.
2. Disconnect oil brake main pipe from the master cylinder.
3. Remove the brake pedal return spring.
4. Remove master cylinder push rod pin.
5. Loosen three attaching bolts that secure the master cylinder to dash board.
6. Remove the master cylinder.

No:e : For removal and installation of the brake pedal, refer to Group 2, Part II, Section 1.

INSTALLATION

1. Attach the master cylinder to the dash board.
2. Connect the master cylinder push rod to the pedal lever by installing the push rod pin and securing it in place with cotter pin.
3. Install brake pedal return spring.
4. Connect the oil brake main pipe to the master cylinder.
5. Fill the tank with brake fluid.
6. Bleed air as outlined in Part II, Section 4.
7. Adjust brake pedal free travel.

5 Master Cylinder Service Operations

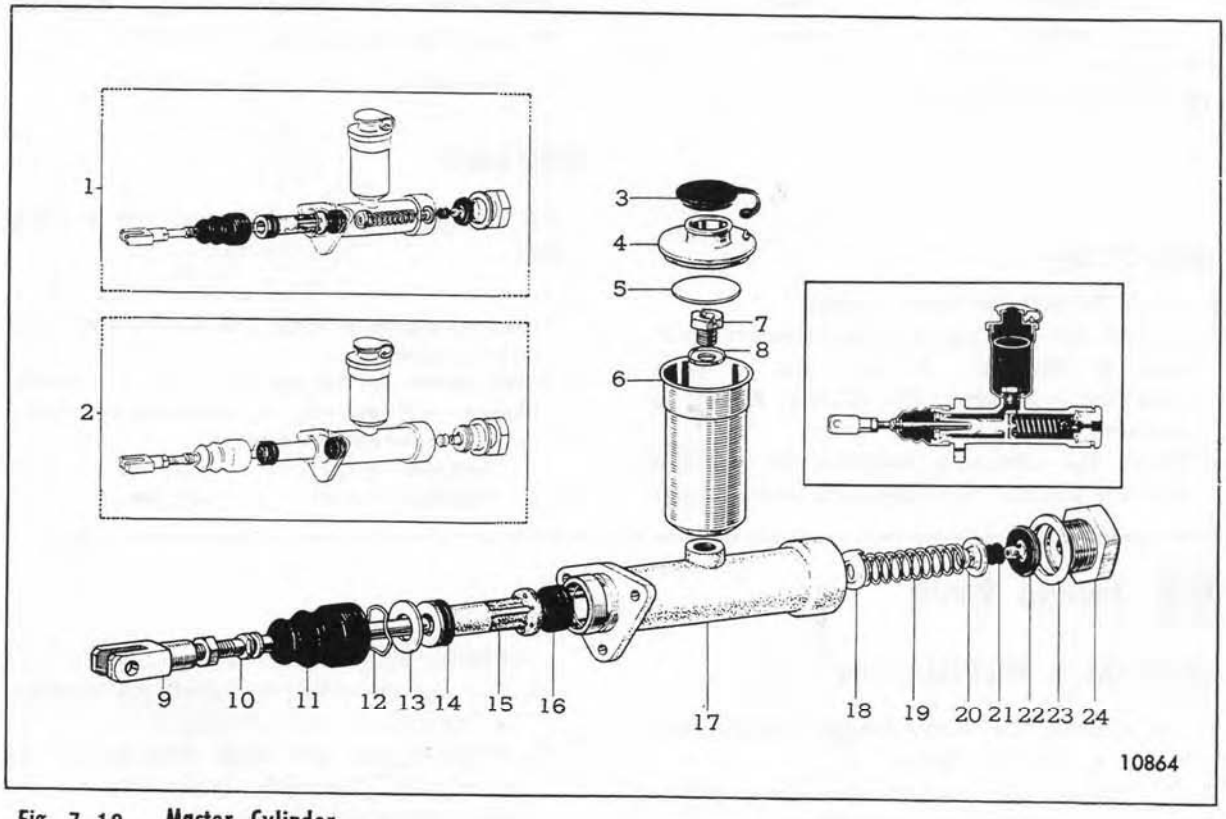


Fig. 7-10. Master Cylinder

DISASSEMBLY

1. Remove the oil tank cap and pour out any remaining fluid.
2. Loosen the oil tank set bolt and remove the oil tank.
3. Remove the master cylinder boot from the cylinder and remove the piston rod.
4. Remove the piston stop ring and piston stop to take out the piston.
5. Remove the master cylinder plug, packing, and outlet seat packing.

6. Remove the return spring, seat, outlet valve, and piston cup.
7. Remove the piston packing.

INSPECTION & REPAIR

1. Clean all parts in alcohol and inspect for damage, wear, or other defective condition.

   Caution : Clean the piston cup and piston packing with alcohol and do not use gasoline or light oil.

2. Check the master cylinder bore for scored or worn conditions and replace if found damaged.
3. Check the master cylinder connections to the pipe or oil reservoir, and replace if found defective.
4. Check the clearance between the master cylinder and the piston. If the clearance exceeds more than 0.15 mm (0.006 in.), replace the piston.

Note : Clearance between cylinder and piston

Standard Value	0.040 mm~0.125 mm (0.0016~0.0049 in.)
Limit	0.15 mm (0.006 In.)

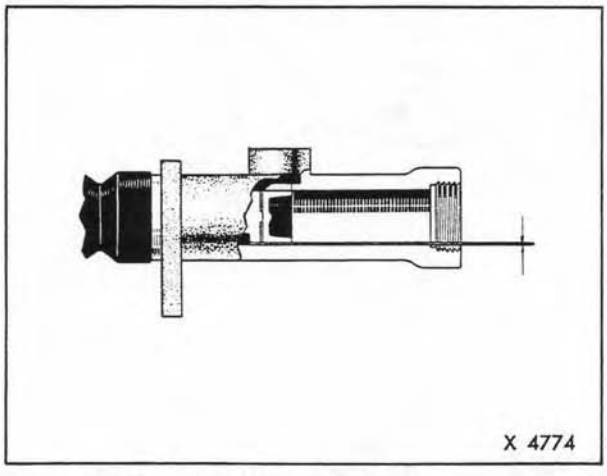


Fig. 7-11. Checking the Clearance

5. If the piston is excessively scored or worn, replace with the new one.
6. The piston cup and piston packing that are cracked, damaged, or deformed should be replaced.
7. Check the oil tank for crack, damage, or deformation. Replace the tank if found defective.
8. Replace the return spring if excessively weakened

Note : Free Length 94 mm (3.70 in.)

ASSEMBLY

Note : Each part should be kept clean, and before assembling apply vegetable oil to cylinder bore piston and piston cup. Use the new packing and new gasket.

1. Insert the piston packing into the piston.
2. Assemble the outle seat packing, master cylinder packing and plug.
3. Insert the outlet valve, return spring, spring seat and piston cup into the cylinder.
4. Insert the piston and piston stop into the cylinder and install the stop ring.
5. Install the master cylinder piston rod then attach the boot to the cylinder.
6. Install the oil tank to the cylinder. Install the oil tank cap.

PART V BRAKE PIPE & CLAMP

In making up hydraulic brake pipes, it is important that the proper flaring tool be used to flare the ends of the tubing for the compression couplings. Unless the tubing is properly flared, the connections will leak and the brakes will become ineffective.

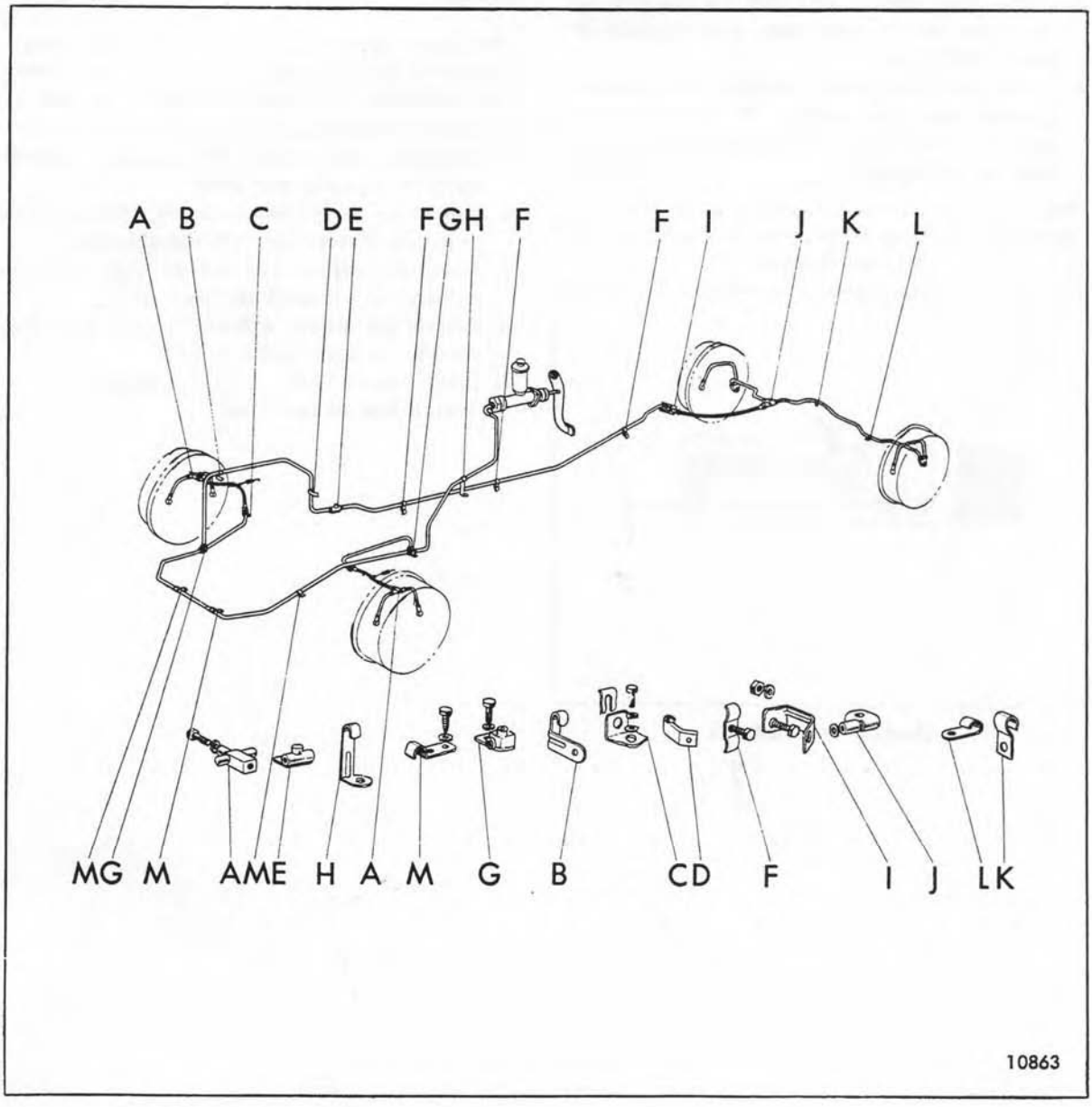


Fig. 7-12. Brake Pipe and Clamp

PART VI PARKING BRAKE

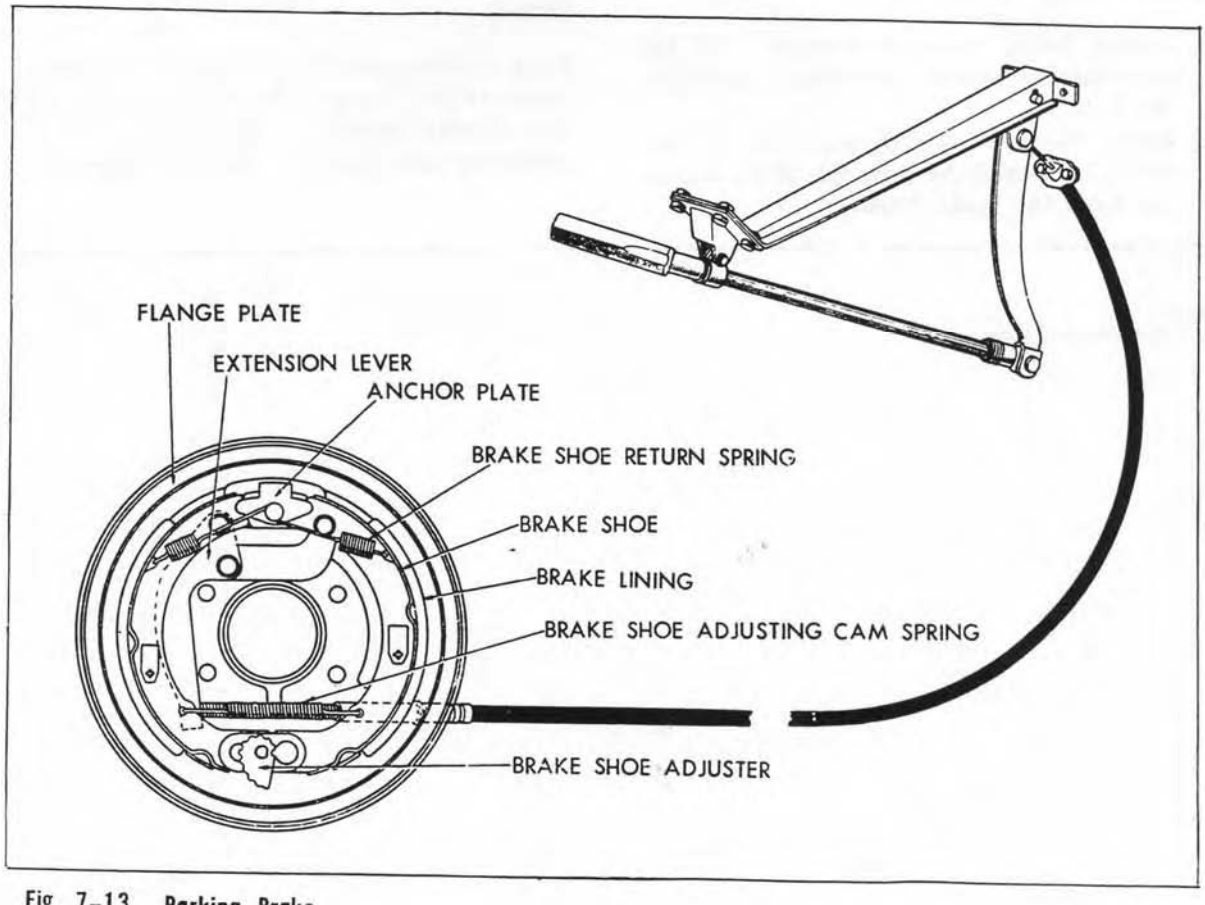


Fig. 7-13. **Parking Brake**

1 Disassembly and Assembly

1. Disconnect the propeller shaft from the brake drum.
2. Remove the cotter pin and nut, then remove the brake drum.
3. Unloosen the flexible wire adjusting nut.
4. Remove the brake shoe clip and clip pin.
5. Remove the brake shoe return spring.
6. Remove the brake shoe adjusting cam spring.
7. Remove the anchor pin with the anchor plate block.
8. Remove the brake shoes and remove the flexible wire from the extension lever.
9. Remove the extension lever pin and disassemble to the brake shoes, extension lever, and extension lever strut.
10. Remove the flexible wire lock washer and remove the wire from the back plate.

For assembly, follow "Disassembly" in reverse order.

Caution : When assembling, place the adjusting cam in the lowest position.

2 Inspection and Repair

Wash all parts with cleaning solvent.

Note : It is unnecessary to clean the lining unless oil or grease is adhering on it.

Brake Lining

a. Inspect lining to drum contact. If the inspection indicates poor contact, recondition the lining.
b. Brake linings that are worn to 1.5 mm (0.059 in.) should be replaced. Worn linings can score the brake drum.

Brake Drum

If the brake drum is excessively worn or scored, replace with new one.

Spring

Worn or damaged spring should be replaced.

Standard Free Length (From hook neck to neck)

Shoe Return Spring	69.5 mm (2.74 in.)
Adjusting Cam Spring	72.7 mm (2.86 in.)

Memorandum

PART VII SPECIFICATIONS

Pedal

Height (from toe-board)	190 mm (7.48 in.)
From toe-board to pedal when depressed	more than 25 mm (1.0 in)

Master Cylinder

Cylinder Bore	25.4~25.452 mm (0.997~0.99 in.)
Piston Outer Diameter	25.327~25.360 mm (0.997~0.998 in)
Clearance between Piston and cylinder	0.040~0.125 mm (0.0002~0.0049 in.)
Limit	0.15 mm (0.0059 in.)
Return Spring Free Length	94 mm (3.7 in.)

Front Brake

Wheel Cylinder	Cylinder Bore	28.500~28.552 mm (1.122~1.124 in.)
	Piston Outer Diameter	28.427~28.460 mm (1.119~1.120 in.)
	Clearance between Piston and Cylinder	0.04~0.125 mm (0.0015~0.049 in.)
	Limit	0.15 mm (0.059 in.)
	Return Spring Free Length	43 mm (1.69 in.)
Drum Inner Diameter		290 mm (11.4 in.)
Limit		293 mm (11.5 in.)
Lining Thickness		6.5 mm (0.26 in.)
Limit		4.0 mm (0.16 in.)
Shoe Return Spring Free Length (from hook neck to neck)		189.5 mm (7.46 in.)

Rear Brakes

		FJ40 (L)	FJ43(L), FJ45(L)
Wheel Cylinder	Inner Diameter	25.400~25.452 mm (0.999~1.002 in.)	28.500~28.552 mm (1.122~1.124 in.)
	Piston O. D.	25.327~25.360 mm (0.997~0.998 in.)	28.427~28.460 mm (1.119~1.121 in.)
	Clearance between Piston and Cylinder	0.040~0.125 mm (0.0002~0.0049 in.)	
	Limit	0.15 mm (0.059 in)	
	Return Spring Free Length	43 mm (1.69 in.)	

Drum Inner Diameter	290 mm (11.4 in.)
Limit	293 mm (11.5 in.)
Lining Thickness	6.5 mm (0.26 in.)
Limit	4.0 mm (0.16 in.)
Shoe Return Spring Free Length (from hook neck to neck)	189.5 mm (7.46 in.)

Hand Brake

	FJ40(L), FJ43(L), FJ45(L)
Lever Travel	6~9 notches
Drum Inner Diameter	160 mm (6.30 in.)
Lining Thickness	4 mm (0.16 in.)
Limit	1.5 mm (0.059 in.)
Shoe Return Spring Free Length (from hook neck to neck)	69.5 mm (2.74 in.)
Adjusting Cam Spring Free Length (from hook neck to neck)	72.7 mm (2.86 in.)

Group 8

WHEELS, TIRES & SUSPENSION

PART I TROUBLE SHOOTING

The troubles which seem to come from Suspension, Wheels and Tires may be caused by deficiency of other units such as Front Axle, Steering System, etc.

Therefore, cross reference to the trouble shooting of other systems should be made to correctly diagnose the true cause of the trouble.

1 Abnormal or Irregular Tire Wear

POSSIBLE CAUSES	POSSIBLE REMEDIES
Improper tire pressure	Inflate to correct pressure
Improper wheel alignment	Correct alignment
Improper wheel bearing adjustment	Adjust wheel bearing
Wheels out of balance	Balance wheels
Unequal brake adjustment	Readjust brakes
Bent spindle	Replace spindle
Bent axle housing	Repair or replace
Excessive speed on paved high way with front axle engaged	Keep speed within limit

2 Hard Steering

POSSIBLE CAUSES	POSSIBLE REMEDIES
Lack of lubrication	Lubricate as per instruction
Improper wheel alignment	Correct alignment
Improper tire pressure	Inflate to correct pressure
Sagging front or rear spring	Replace spring
Bent spindle	Replace spindle
Faulty wheel bearing	Replace wheel bearing
Improper steering gear adjustment	Readjust the steering gear

3 Hard or Rough Ride

POSSIBLE CAUSES	POSSIBLE REMEDIES
Improper tire pressure	Inflate to correct pressure
Wheels out of balance	Balance wheels
Sagging or broken spring	Replace spring
Overloaded spring or tire	Reduce load
Loose or worn shock absorber	Replace shock absorber
Shock absorber fluid leaking	Replace shock absorber
Improperly lubricated shackle and spring	Lubricate shackle and spring

4 Sag at One Wheel

POSSIBLE CAUSES	POSSIBLE REMEDIES
Sagging or broken spring	Replace spring
Improper tire pressure	Inflate to correct pressure
Overloaded spring or tire	Reduce load
Tire size not uniform	Install correct size tire

5 Vehicle Pulls to One Side

POSSIBLE CAUSES	POSSIBLE REMEDIES
Improper tire pressure	Inflate to correct pressure
Improper wheel alignment	Correct alignment
Loose or worn wheel bearings	Adjust or replace
Sagging or broken spring	Replace spring
Bent spindle	Replace spindle
Bent knuckle arm	Replace knuckle arm
Faulty brake system	Refer Group 9, Part I.
Bent axle housing	Replace axle housing

6 Noisy Operations

POSSIBLE CAUSES	POSSIBLE REMEDIES
Spring or Spring Shackles Noisy	
Broken spring leaves	Replace spring
Loose spring clamp, U bolts, hanger & shackle pin	Tighten or replace faulty spring clamp, U bolts, hanger & shackle pin
Worn spring eye bushing	Replace bushing
Lack of lubrication in shackle	Lubricate shackle
Shock Absorber Noisy	
Loose attaching nuts	Tighten nuts
Shock absorber broken	Replace shock absorber
Insufficient fluid	Replace shock absorber
Worn shock absorber pivot pin bushing	Replace bushing
Wheel Noise	
Loose or worn hub bolts or nuts	Tighten or replace hub bolts or nuts
Loose or damaged wheel bearing	Tighten or replace wheel bearing

7 Front Wheel Shimmy

POSSIBLE CAUSES	POSSIBLE REMEDIES
Improper tire pressure	Inflate to correct pressure
Loose or broken wheel bearings	Tighten or replace wheel bearing
Wheels out of balance	Balance wheels
Loose tie-rod ends	Repair or replace tie-rod ends
Loose steering gear	Adjust steering gear
Loose hub nuts	Tighten hub nuts
Improper wheel alignment	Correct alignment
Defective front brakes	Repair or replace brakes as necessary

PART II WHEELS & TIRES

1 Wheel Balance

When the vehicle is running at low speed on straight level road, there are cases where the steering wheel may shake, or the wheels and tires wobble without affecting the steering wheel.

Also there are cases where the wheels may bounce seriously at higher speed and will not hold the road, although they may not tend to bounce at slow speed.

These symptoms become more apparent when the wheel and tire assemblies are out of balance.

To obtain maximum steering ease and driving stability, wheels must be Statically and Dynamically balanced in case unbalance becomes noticeable.

The entire tire, tube, wheel, rim and brake drum assembly should be balanced as a unit. Actually the entire assembly should be checked for balance every time the tire is removed and replaced on the rim, or the wheel removed and replaced on the hub.

This is seldom done but the balance should be checked at least twice per year as the tires wear unevenly and may thus get out of balance.

When balancing the wheels and tires, it is advisable to closely follow the instructions covering the operations of the wheel balancer being used in order to attain correct balancing.

STATIC BALANCE

To obtain static balance of the wheel and tire assembly, install the balance weights on the rim of the wheel so that the assembly will rest at any position as desired.

When no special wheel balancer is available, the static balance can be obtained as follows.

1. Remove the wheel bearings, wash them thoroughly to remove grease, and remove grease from the hub.
2. Install the wheel bearings loose enough to allow the wheel to turn freely.
3. Spin the wheel slowly. The wheel will stop with the heavy side at the bottom.
   Make a chalk mark at the bottom.
4. Repeat this stop by spinning the wheel in the opposite direction and make a chalk mark at the bottom where the wheel stops.
5. The heavy part of the tire will be midway between the two chalk marks.
   It is possible that the wheel comes to rest at the same spot, in which case it means that the marks were made in the heaviest part of the wheel.
6. Install the two balance weights of the same size on the rim directly opposite to the heavy part.
7. Move both weights apart equal distance from where they have been installed, and repeat several times until the wheel is balanced.
8. Lubricate the wheel bearings and hub, and install the wheel and tire assembly.

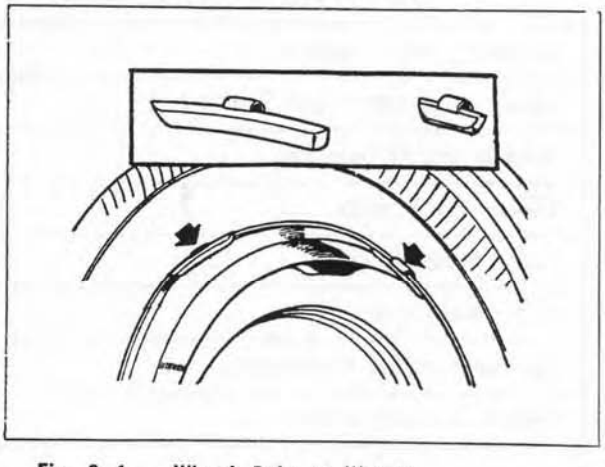


Fig. 8-1.. Wheel Balance Weights

DYNAMIC BALANCE

The wheel assembly balanced statically by the method previously outlined does not always mean that it is balanced dynamically. The dynamic balance means that the wheel assembly will revolve smoothly around the axis of rotation at any speed without wobbling.

Dynamic unbalance in front wheels will cause them wobble as well as bounce. Rear wheels are not free to wobble but should be kept in static balance to avoid bouncing, which will sometimes interfere with steering action by creating vibration.

Assume a wheel balanced statically with balance weights installed on the inner and outer sides of the rim as shown in the figure.

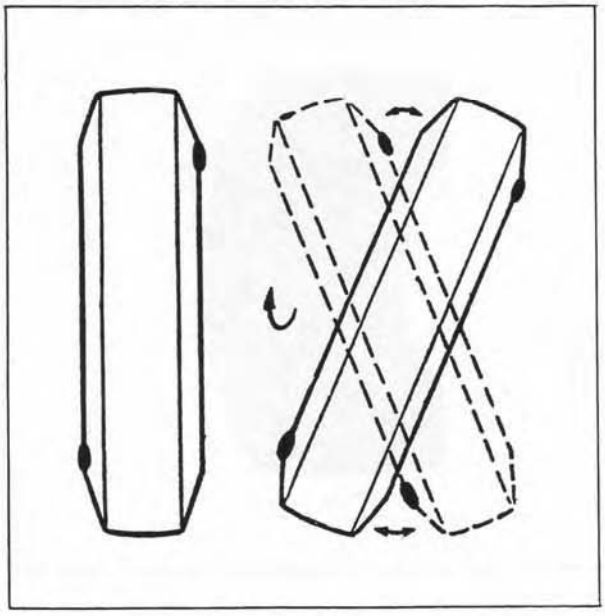


Fig. 8-2. Wheel Wobbling

When the wheel is spinned, the wheel wobbles owing to the centrifugal force of the heavy portions.

Since the wheel is rigidly installed to the steering knuckle, the vibrations produced by wheel wobbling will be transmitted through the steering mechanism to the steering wheel.

To eliminate such a trouble, the wheel assembly should be balanced dynamically in addition to static balance.

The quickest and best methods of testing and correcting dynamic unbalance are by the use of dynamic wheel balancers which are available commercially.

The necessary operational instructions are included in these balancers.

The following information, however, will help in the correction of dynamic balance.

When a wheel that is statically unbalanced is dynamically in balance, the dynamic balance can be retained while correcting the static balance by installing the corrective weights so that half of the weight required is placed on the inner edge of the rim and the other half on the outer edge of the rim.

Dynamic unbalance can be corrected without destroying static balance by installing weights so half of weight required for dynamic balance is placed on the rim opposite the heavy point, while the other half is placed 180 degrees away and on the opposite side of the rim.

2 Wheels and Tires

For the models FJ40 and FJ43 series, three kinds of tire size, viz. 7.10-15 4p, 7.60-15 4p, and 7.60-15 6p are available.

For the model FJ45 series, the light truck tire 7.00-15 6p and 7.00-15 8p L/T are available.

TREAD PATTERN

Each tire has three types of tread pattern as briefly described below.

S Type The tire of this type is fitted for those vehicles driven normally on ordinary hard and soft roads.

M Type This tire having grip pattern is fitted for those vehicles driven normally on bad roads or in the mountains.

L Type This tire that is line pattern is fitted for those vehicles driven normally at high speed on paved smooth roads.

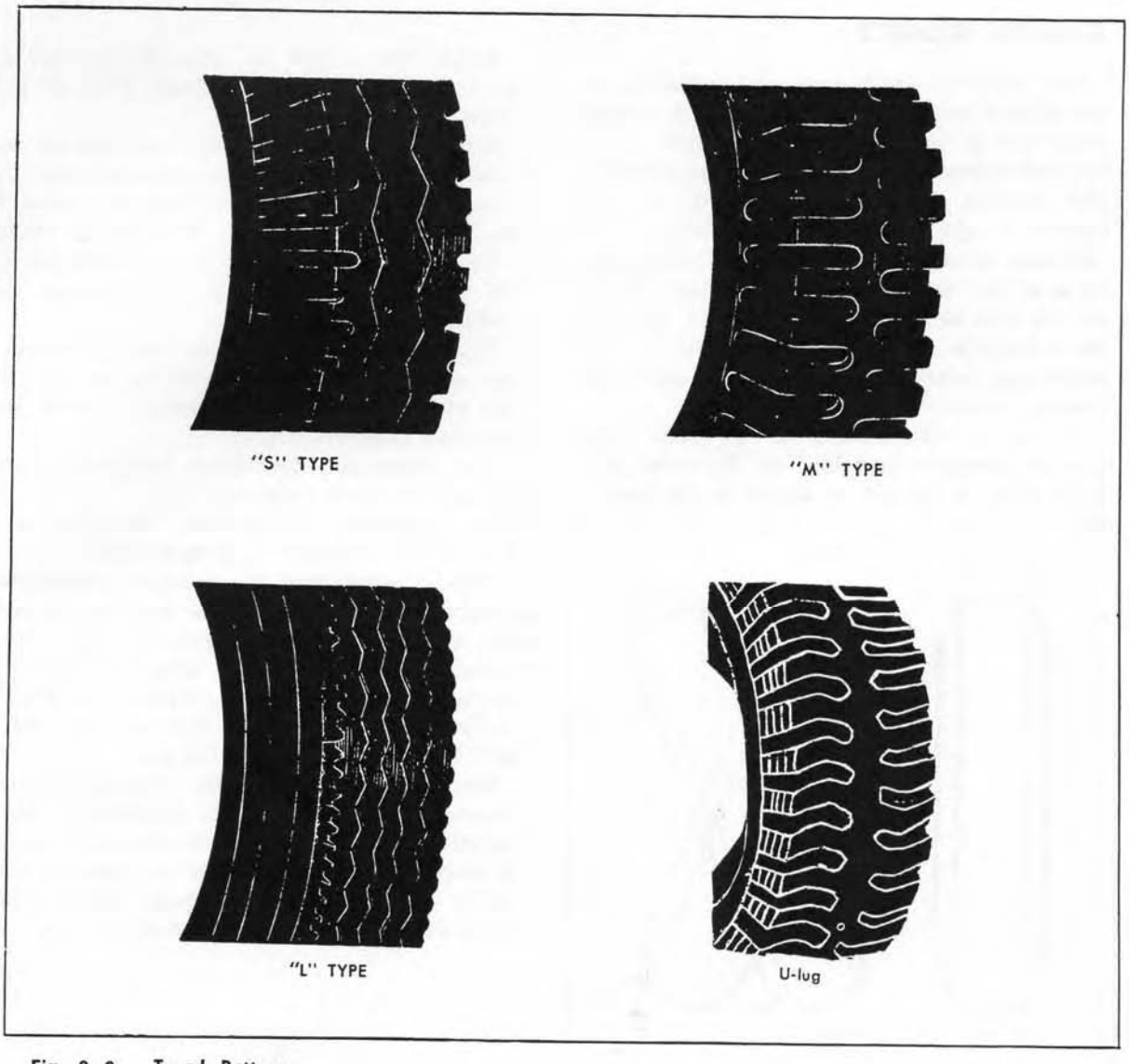


Fig. 8-3. Tread Pattern

Note : There are slight differenses in the tire tread patterns according to the tire manufacturers.

TIRE AND TUBE REPAIR

When a puncture occurs in the tire, it is necessary that the wheel be removed from the vehicle, and the tire and tube disassembled from the wheel rim to detect the cause of the puncture and to perform necessary repairs to the tire or tube.

After the tire and tube have been removed from the rim, remove all rust on the wheel rim thoroughly, and repair any deformation or damages on the wheel rim.

Also remove any dirt or rust on the tire bead and flap.

When installing the tire and tube to the rim, observe the following precautions.

Insert the center of the tire flap in the middle between the beads. The inner surface of the tire should be well dried and splinkled with pumice or mica powder.

The tube should be carefully inserted to prevent wrinkling and the valve correctly positioned so that unnecessary force will not fall on the valve.

The tube should never be inserted while it is still wet.

INSTRUCTIONS ON TIRE MAINTENANCE

1. The following instructions should be stri observed while driving the vehicle.
   a. Avoid overloading.
   b. Avoid sudden starting and quick stopping except when absolutely necessary.
   c. Avoid overspeeding and slow down when making sharp turns.
   d. Avoid rough roads, but when necessary, travel at slow speed.
   e. When a puncture occurs in the tire, stop the vehicle immediately. Never keep on running.
2. The following inspection and servicing should be made before and after running the vehicle.
   a. Check the tire inflation.
      The recommended inflations are as follows.
   b. Check for air leaks in the tire.
   c. Check and tighten loose hub nuts.
   d. Clean dirts and oil adhering to the tires and rims, remove any nail, glass, stones and other foreign materials sticking into the treads.
   e. Check for damages in the tires and rim.
   f. Check front wheel alignment.

TIRE ROTATION PLAN

To minimize tire wear and trouble, it is recommended that the tires be interchanged utilizing the spare tire with other four tires.

It is recommended that the wheels be rotated at least every 6,000 miles (9,000 km) as shown in the following recommended plan for tire rotation.

If the front tires differ from the rear tires, the tire rotation should be done among the rear tires and the spare tire.

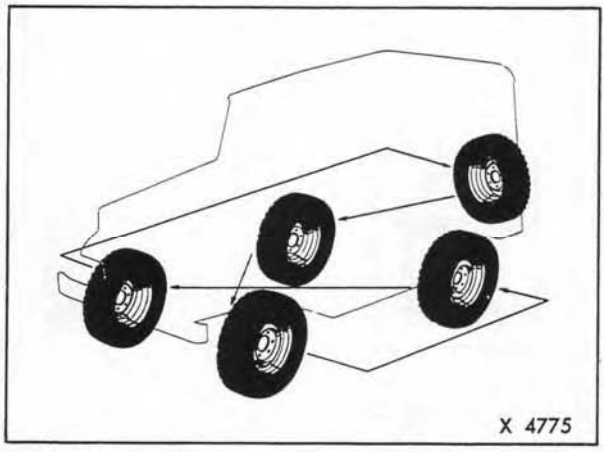


Fig. 8-4. Tire Rotation

Note : Never fail to readjust the tire pressures after rotation.

Tire Inflation

Model		Tire Size	Unladen		Laden		
			kg/cm²	lbs/in²	kg/cm²	lbs/in²	
FJ40(L) FJ40(L)V	STD	Front 7.10—15 4p	1.3	18	1.3	18	G.V.W. 2,050 kg (4,500 lb)
		Rear 7.10—15 4p	1.3	18	1.8	25	
	OPT	Front & Rear 7.60—15 4p	1.1	15	1.8	25	
		7.60—15 6p	1.1	15	1.2	17	
		7.00—16 6p	1.7	24	1.7	24	
FJ43(L)	STD	Front 7.60—15 4p	1.1	15	1.2	17	G.V.W. 2,300 kg (5,000 lb)
		Rear 7.60—15 6p	1.1	15	2.1	30	
	OPT	Front & Rear 7.60—15 6p	1.1	15	1.2	17	
		7.00—16 6p	1.7	24	1.7	24	
FJ45(L)V	STD	Front 7.00—15 6p	1.75	25	2.0	28	G.V.W. 2,700 kg (6,000 lb)
		Rear 7.00—15 8p	2.5	35	4.25	60	
	OPT	Front & Rear 7.60—15 6p	1.5	21	2.1	30	Six passengers, with 200 kg (440 lb) load G.V.W. 2,500 kg (5,500 lb)
		7.00—16 6p	1.7	24	2.0	28	
		7.00—16 8p	2.5	35	3.25	45.5	
FJ45(L)P-B	STD	Front 7.00—16 6p	2.0	28	2.25	32	G.V.W. 2,900 kg (6,380 lb)
		Rear 7.00—16 8p	2.0	28	4.25	62	

PART III FRONT SUSPENSION

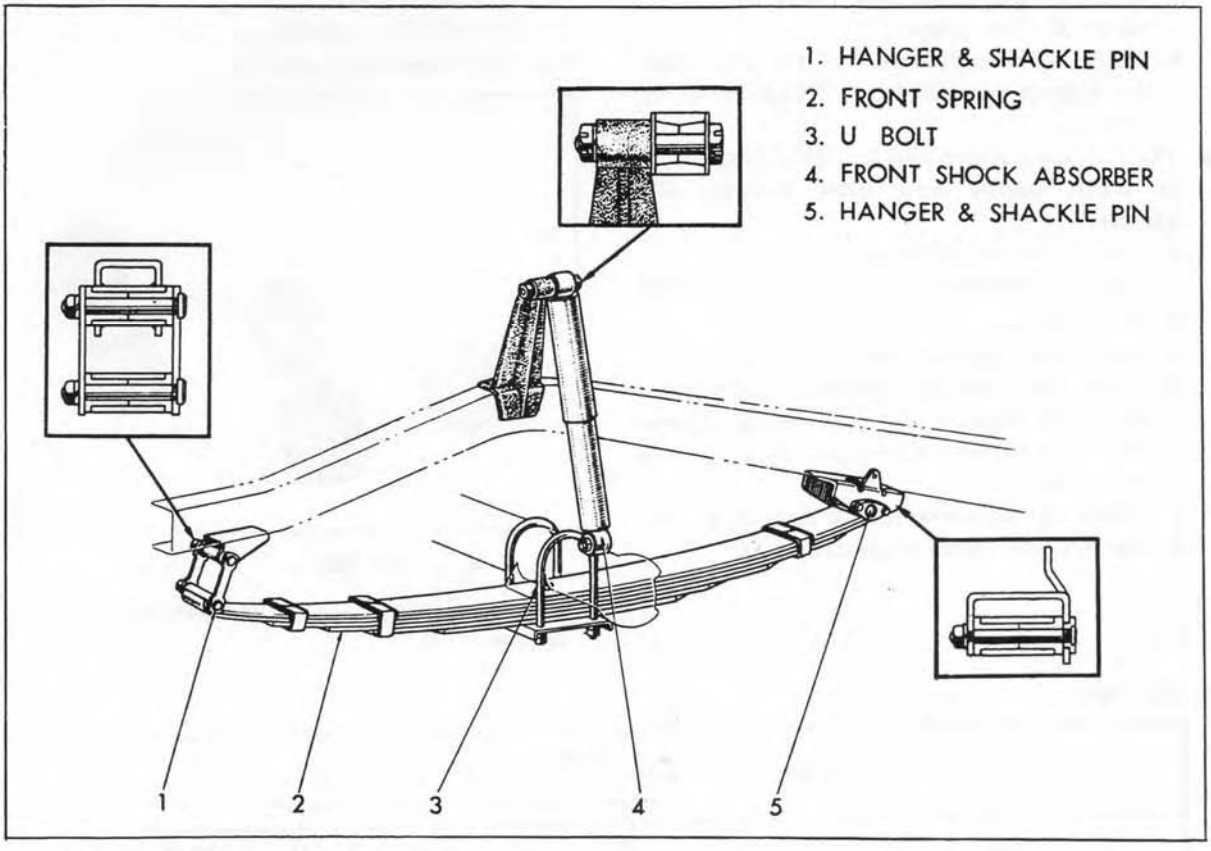


Fig. 8-5. Front Suspension

1 Front Shock Absorber

REMOVAL & INSTALLATION

1. Jack up the vehicle at the front axle and place stands under the frame.
2. Disconnect at the lower eye connection by removing the cotter pin, nut, washers, and pivot pin bushings.
3. Disconnect the absorber at the upper bracket by removing the cotter pin, nuts, washers, pivot pin, and pivot pin bushings.

For installation, follow "Removal" in reverse order.

INSPECTION & REPAIR

1. Inspect for fluid leakage or other damages.
2. Touch the shock absorber body with hand immediately after the vehicle has been driven. If the body feels warm, the shock absorber can be assumed to be functioning satisfactorily.
3. If the shock absorber body shows no appre ciable rise in temperature, remove the shock absorber assembly from the vehicle and hold

it in a vise. Move the absorber arm up and down. If little or no resistance is shown on the downward stroke, the shock absorber is defective. The shock absorbers used are of the single acting type, so that if in good working condition, the shock absorber arm should present a continuous resistance on the downward stroke and no resistance on the upward stroke.

If found defective, replace with the new assembly.

4. Replace the pivot pin bushing and cushion rubber if found damaged or excessively worn.

2 Front Spring

REMOVAL & INSTALLATION

1. Jack up the vehicle at the front axle and place stands under the frame and front axle.
2. Unscrew U bolt nuts and remove the U bolts and U bolt seat.
3. Unscrew the spring shackle nuts and remove the hanger & shackle pin with the shackle plate.
4. Remove the bolts attaching the spring support pin end and remove the end by removing the nut. Then the spring assembly can be removed.

For installation, follow "Removal" in reverse order.

INSPECTION

Clean all parts throughly with solvent. Remove all rust and corrosion from spring leaves with the wire brush or buffer.

Spring Leaves

Inspect the spring assembly for broken, cracked or excessively weak leaves. The spring leaves can be replaced individually if one of the leaves is broken or damaged.

If more than three leaves in a spring assembly are broken, the entire new assembly must be installed. When installing, make sure that all rusts have been removed from the leaf surfaces, and lubricate both sides with grease.

Hanger & Shackle Pin

Pins broken or having the damaged screw should be replaced.

Spring Eye Bushing

Excessively worn or damaged bushings should be replaced.

U Bolt

Bolt broken or having the damaged threads should be replaced.

Spring Clamp

The spring clamps should be drawn up tight enough to hold leaves in alignment without restricting free movement of the leaves.

1. Disconnect the front end of the spring by removing the nut and hanger pin support end from the rear spring front hanger.
2. Disconnect the rear end of the spring by removing the nuts, washers, spring shackle and rear spring shackle plate.

   Then the spring assembly can be removed.
3. By removing the bolts and nuts of the rear spring No.2 clamps, the rear spring assembly can be disassembled into the main spring and sub-spring.

For installation, follow "Removal" in reverse order.
For inspection, refer to the Front Spring Inspection.

PART IV REAR SUSPENSION

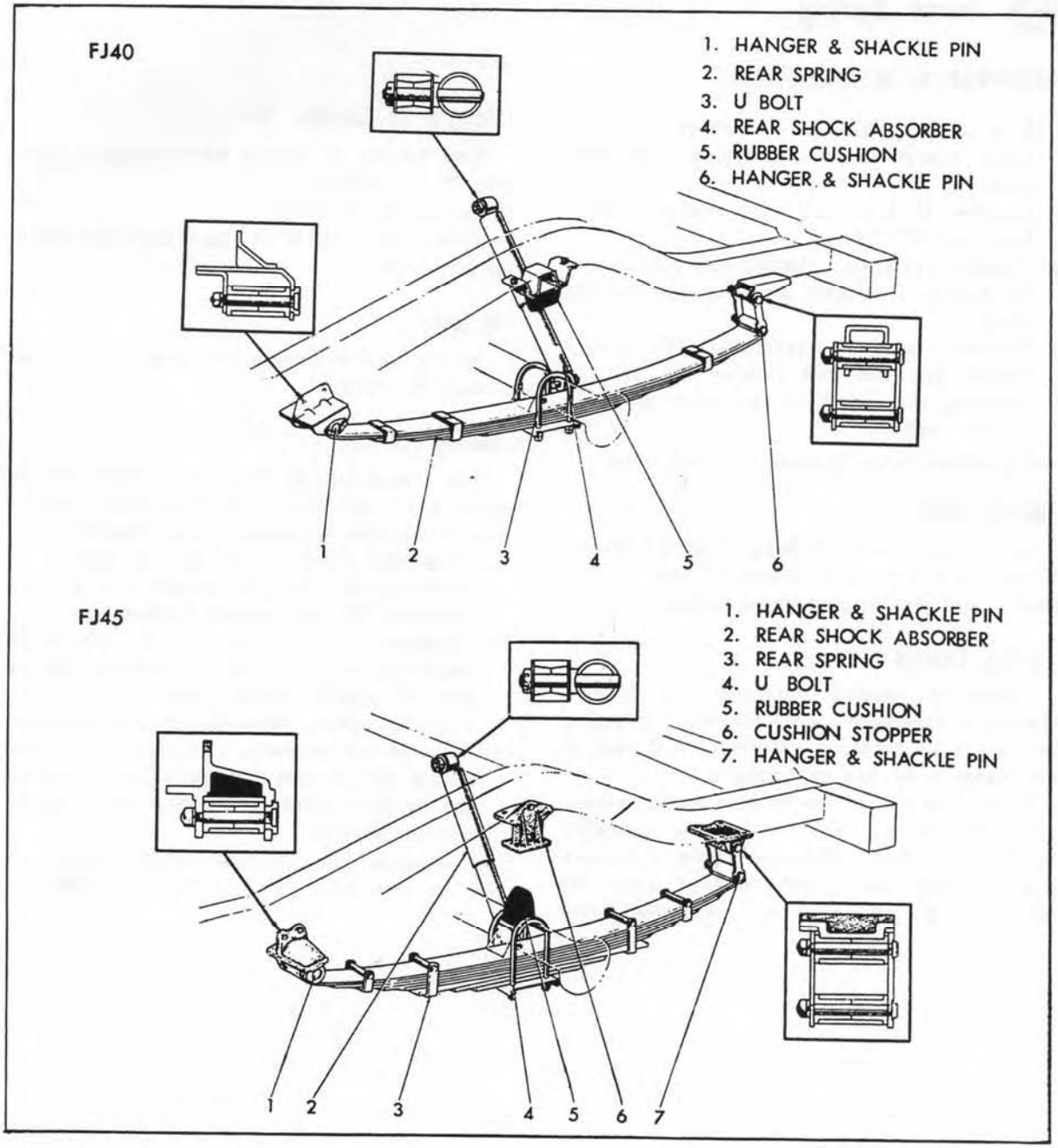


Fig. 8-6. Rear Suspension

1 Rear Shock Absorber

REMOVAL & INSTALLATION

1. Jack up the vehicle at the rear axle and place the stands under the frame.
2. Disconnect the absorber at the lower eye connection by removing the cotter pin, nuts washer, and pivot pin busings.
3. Disconnect the absorber at the upper pivot pin by removing the cotter pin, nuts, washers, and pivot pin bushings.

For installation, follow "Removal" in reverse order.
For inspection, refer to the Front Shock Absorber Inspection.

2 Rear Spring

REMOVAL & INSTALLATION

Models FJ40 & 40L

1. Jack up the vehicle at the rear axle and place stands under the frame and rear axle.
2. Unscrew the U bolt nuts and remove the U bolts and U bolt seat.
3. unscrew the bolts retaining the spring support pin end to the rear spring support pin end to the rear spring front hanger and disconnect the front end of the rear spring hanger removing the nut and washer.
4. Disconnect the rear end of the rear spring by removing the nuts, spring shackle and rear spring shackle plate. Then the spring assembly can be removed.

Models FJ43, 43L, 45 & 45L

1. Jack up the vehicle at the rear axle and place stands under the frame and rear axle.
2. Disconnect the absorber at the lower eye connection, then unscrew U bolt nuts and remove the U bolts and U bolt seat.

3 Stabilizer

REMOVAL & INSTALLATION

Models FJ43, 43L, 45 & 45L

1. Unscrew the bolts and nuts holding the stabilizer to the stabilizer support brackets.
2. Remove the stabilizer from the link by removing the cotter pins, nuts, link pins, link pieces, and bushings.
3. Disconnect the link complete by removing the cotter pins, nuts, link pins, link pieces, and bushings at the rear stabilizer link brackets located on the axle housing.

For installation, follow "Removal" in reverse orders.

INSPECTION

1. Inspect the stablizer for bent or damaged conditions.
2. Inspect the link compilete for bent condition. Check both ends of the link for damaged threads. Replace if found defective.

PART V SPECIFICATIONS

Wheels & Tires

Model		Tire Size	Unladen		Laden		
			kg/cm²	lbs/in²	kg/cm²	lbs/in²	
FJ40(L) FJ40(L)V	STD	Front 7.10—15 4p Rear 7.10—15 4p	1.3 1.3	18 18	1.3 1.8	18 25	G.V.W. 2,050 kg (4,500 lb)
	OPT	Front & Rear 7.60—15 4p 7.60—15 6p 7.00—16 6p	1.1 1.1 1.7	15 15 24	1.8 1.2 1.7	25 17 24	
FJ43(L)	STD	Front 7.60—15 4p Rear 7.60—15 6p	1.1 1.1	15 15	1.2 2.1	17 30	G.V.W. 2,300 kg (5,000 lb)
	OPT	Front & Rear 7.60—15 6p 7.00—16 6p	1.1 1.7	15 24	1.2 1.7	17 24	
FJ45(L)V	STD	Front 7.00—15 6p Rear 7.00—15 8p	1.75 2.5	25 35	2.0 4.25	28 60	G.V.W. 2,700 kg (6,000 lb)
	OPT	Front & Rear 7.60—15 6p 7.00—16 6p 7.00—16 8p	1.5 1.7 2.5	21 24 35	2.1 2.0 3.25	30 28 45.5	Six passengers, with 200 kg (440 lb) load G.V.W. 2,500 kg (5,500 lb)
FJ45(L)P-B	STD	Front 7.00—16 6p Rear 7.00—16 8p	2.0 2.0	28 28	2.25 4.25	32 62	G.V.W. 2,900 kg (6,380 lb)

Suspension

REAR SUSPENSION FJ40(L)		
Rear Leaf Spring		
Type		Semi-elliptic Leaf Spring
Size	Width × Thickness × Number	70 mm × 6 mm × 6 (2.76 in. × 0.24 in. × 6)
Span		1,100 mm (43.31 in.)
Camber		164 mm (7.87 in.)
Spring Constant		4.7 kg/mm (263 lbs/in.)
Installing Load		435 kg (959 lbs)
Off-set		50 mm (1.97 in.)
Rear Shock Absorber		
Type		Hydraulic, Tubular Type Double Acting
Damping Force (0.3 m/sec)	Rebound	97 kg (213 lb)
	Compression	29 kg (63.8 lb)
Maximum Length		508 mm (20.00 in.)
Minimum Length		308 mm (12.13 in.)
Stroke		200 mm (7.87 in.)

REAR SUSPENSION FJ43(L)		
Rear Leaf Spring		
Type		Semi-elliptic Leaf Spring
Size Width × Thickness × Number	Main	70 mm × 7 mm × 6 (2.76 in × 0.28 in × 6)
	Sub	70 mm × 11 mm × 3 (2.76 in × 0.43 in × 3)
Span		1,300 mm (51.2 in)
Camber		168 mm (6.61 in)
Spring Constant	Main	5.7 kg/mm (319 lbs/in)
	Sub	12.1 kg/mm (678 lbs/in)
Installing Load		750 kg (1,653 lbs)
Off-set		0
Rear Shock Absorber (FJ43 and 45 series)		
Type		Hydraulic Tubular Type Double Acting
Damping Force (0.3 m/sec)	Rebound	110 kg (242 lbs)
	Comprression	36 kg (29.2 lbs)
Maximum Length		568 mm (22.36 in)
Minimum Length		338 mm (13.41 in)
Stroke		230 mm (9.06 in)

REAR SUSPENSION FJ45 series		
Rear Leaf Spring		
Type		Semi-elliptic Leaf Spring
Size Width × Thickness × Number	Main	70 mm × 7 mm × 6 (2.76 in × 0.28 in × 6)
	Sub	70 mm × 11 mm × 3 (2.76 in × 0.43 in × 3)
Span		1,314 mm (51.7 in)
Camber		203 mm (7.99 in)
Spring Constant	Main	5.2 kg/mm (281.8 lbs/in)
	Sub	11.1 kg/mm (501.7 lbs/in)
Installing Load		750 kg (1,653 lbs)
Off-set		0
Rear Leaf Spring FJ45LP-B for only USA		
Type		Semi-elliptic Leaf Spring
Size Width × Thickness × Number		70 mm × 7 mm × 7(2.76 in × 0.28 in × 7)
Span		1,300 mm (51.2 in)
Camber		170 mm (6.7 in)
Spring Constant		5.17 kg/mm (280 lbs/mm)
Installing Load		595 kg (1,309 lbs)
Off-set		0

Torque Limits

Description	m-kg	ft-lbs
Front Spring U Bolt	6.9~9.7	50~70
Rear Spring U Bolt	6.9~9.7	50~70
Hanger and Shackle Pin	2.8~4.5	20~30
Wheel Hub Bolt	9.7~12.4	70~90

Group 9

ELECTRICAL

PART I TROUBLE SHOOTING

The following are a series of inspection of chassis electrical system which may assist the servicemen in locating and correcting the troubles of various component parts of system.

It is recommended that the servicemen do not neglect the use of any type of testing equipments such as voltmeter, ammeter, low voltage circuit tester, test lamps, and other necessary testers that are available.

The greater the number of symptoms of troubles that can be evaluated, the easier will be the isolation of the defect.

1 Battery and Lighting System

When checking the batteries and lighting system, note the circuit continuity. The most common causes of light failure are faulty lamps, grounded or shorted cables, or discharged battery.

Battery Discharged

POSSIBLE CAUSES	POSSIBLE REMEDIES
Operation of electrical units without generator operating (engine not running)	When possible, avoid the use of electrical equipment with the engine stopped
Battery terminals loose or corroded	Clean and tighten terminals
Regulator inoperative	Repair or replace regulator
Generator inoperative	Repair or replace generator
Battery inoperative	Charge or change battery

All Lights Fail

Battery discharged	Refer above
Cables grounded or shorted	Check continuity of cables and repair as required
Light switch inoperative	Replace faulty switch

One Light Fails

Lamp unit inoperative	Replace faulty lamp unit
Lamp assembly not properly grounded	Tighten and clean all connecting screws or bolts
Damaged wiring	Check continuity of wiring and repair or replace wiring

Insufficient Light

Partially discharged battery	Charge battery
Loose connections	Check and tighten all connections
Dirty lenses	Clean lenses

Frequent Lamp Unit Failure

Regulator inoperative	Repair or replace regulator
Loose connections	Check and tighten all connections

2 Horns

Horns will Not Blow

POSSIBLE CAUSES	POSSIBLE REMEDIES
Loose connections	Tighten connections
Horn button inoperative	Repair or replace horn button
Faulty horn	Replace horn
Battery discharged	Charge or replace battery

Horn Sounds Continuously

Relay sticking	Replace relay
Horn button sticking	Adjust horn button contact

3 Gauges and Switches

Ammeter Inoperative or Reads Incorrectly

POSSIBLE CAUSES	POSSIBLE REMEDIES
Generating system inoperative	Refer Trouble Shooting of the generating system
Ammeter disconnected	Make sure connections are tight
Ammeter inoperative	Replace ammeter
Ammeter reads backward	Check the polarity of the battery, and also check ammeter connections if they are not reversed
Damaged wiring	Repair or replace wiring

Fuel Gauge Fails to Register Correct Fuel Level

Fuel gauge inoperative	Replace fuel gauge
Fuel gauge unit inoperative	Replace fuel gauge unit
Damaged wiring	Repair or replace wiring

Engine Water Heat Gauge Does Not Register Correctly

Cooling system inoperative	Refer Trouble Shooting of the cooling system
Water heat gauge inoperative	Replace water heat gauge
Water heat gauge unit inoperative	Replace water heat gauge unit
Damaged wiring	Repair or replace wiring

Engine Oil Pressure Gauge Fails to Register

Insufficient oil or improper oil viscosity	Add oil or change oil
Damaged tubing	Replace tubing
Oil pressure gauge inoperative	Replace oil pressure gauge
Oil pressure gauge unit inoperative	Replace oil pressure gauge unit
Engine lubricating system defective	Refer Trouble Shooting of the engine & exhaust system on page 2-7

Ignition Switch Fails to Operate

Damaged wiring	Repair or replace wiring
Ignition switch inoperative	Replace ignition switch

Light Switch Fails to Operate

Damaged wiring	Repair or replace wiring
Light switch inoperative	Replace light switch

Dimmer-Switch Fails to Operate

Damaged wiring	Repair or replace wiring
Dimmer switch inoperative	Replace dimmer switch

Turn Signal Lamp Fails to Operate

Burnt out lamp bulb	Replace lamp bulb
Damaged wiring	Repair or replace wiring
Turn signal switch inoperative	Replace turn signal switch

PART II BATTERY

1 Removal and Installation

REMOVAL

1. Disconnect the ground cable and the starter cable at their respective terminals.
2. Remove two wing nuts holding the battery and then remove the battery.

INSTALLATION

Follow "Removal" in reverse order.

Caution : After terminals have been tightened, coat the terminals with grease.
Do not hammer the terminals.

2 Inspection

Battery Specifications

Manufacturer	Furukawa	GS	Kobe
Type	ARSJ 4-12	RS 4-12	MG 4-12
Voltage	12	12	12
Capacity (20 hr rate) (amp/hr)	50	50	50
Electrolyte (liter) (qt.)	3.4 3.5	3.0 3.1	3.3 3.4
Specific Gravity	1.260	1.260	1.260

Liquid Level

Check liquid level in each cell under fully charged condition. If the liquid level is found to be low, distilled water should be added to each cell until the liquid level rises to the bottom of the vent well (up to □ in the vent well.)

Specific Gravity

Check the specific gravity of the battery with a hydrometer. If the specific gravity readings are below 1,200 and variation between cells is more than 0.025, the battery should be recharged before further use.

Specific Gravity at 20°C (68°F),
fully charged condition·····1.260
Variation between cells·····less than 0.010

Specific Gravity and State of Charge

(68°F) Specific Gravity	State of Charge
1.260	Full Charge
1.230	75% charge
1.200	50% charge
1.170	25% charge
1.110	Discharged

Electrolyte Temperature and Specific Gravity upon Completion of Charge

Temperature°C (F°)	Specific Gravity
-10 (14)	1.281
-5 (23)	1.278
0 (32)	1.274
5 (41)	1.271
10 (50)	1.267
15 (59)	1.264
20 (68)	1.260
25 (77)	1.257
30 (86)	1.253
35 (95)	1.249

Voltage

1. Check voltage of each cell using a voltmeter.

Note :

1. The state of charge cannot be determined by testing voltage.
   Standard cell voltage·····2.1 V
2. If voltage variation between cells is more than 0.15 V, the battery must be recharged.

2. Check voltage of each cell using a cell tester.

1.4~1.8V	Good
0.4~1.4V	Charging necessary
Less than 0.4V	Unserviceable

3 Maintenance

Caution :

1. Clean each terminal with a wire brush and check liquid level in each cell. If liquid level is found low, add distilled water up to square mark.
2. Remove all vent plugs before starting the charge.
3. Caution must be taken so that electrolyte temperature may not rise more than 45°C (113°F)

CONSTANT CURRENT CHARGING

1. Connect the battery charger to the positive and negative terminals of the battery.
   Current·····3~4 amperes
2. Check specific gravity of each cell at the end of charging. If the specific gravity is more than 1.265, add distilled water so that specific gravity is 1.260 at 68°F. If specific gravity is less than 1.255, add diluted sulfuric acid (specific gravity of 1.400 at 68°F) to the battery to adjust, and this work should be done at shop specializing in battery repairs.

Caution :

1. Use distilled water only for supplying battery cells.
2. Do not approach any fire to the battery while it is gassing up.

Note : Completion of charging is followed by the following.

1. Gassing becomes vigorous.
2. Each cell voltage retains maximum voltage of 2.5~2.7 for more than one hour.

3. Charge the battery for a few minutes after adjusting specified gravity and liquid level in each cell.

CONSTANT VOLTAGE CHARGING

1. Connect the charger to the battery.
   Voltage·····14.0~14.8 V
2. Adjust specific gravity and level in cells after charging as done in "Constant Current Charging".

Note : During charging is in process, voltage drops gradually. When vgltage approaches to zero, the charging is completed. The gassing is hardly taking place at this time.

Caution : To charge a number of batteries in this method, connect them in series

QUICK CHARGING

1. Quick charging does not require removal of the battery from the vehicle. Connect the quick charger to the battery.
2. Current is determined by the state of discharge of the battery and time necessary to charge. Reference should be made to the table for charging.

Time & Current Relation in Quick Charge

State of Discharge	Time (hours)	Current (amperes)
Complete Discharge	0.5	36
	1	25
	2	18
	3	14
	4	10
	5	9
75% Discharge	0.5	27
	1	20
	2	14
	3	10
	4	8
50% Discharge	0.5	18
	1	14
	2	9

PART III LIGHTING SYSTEM

1 Headlamps

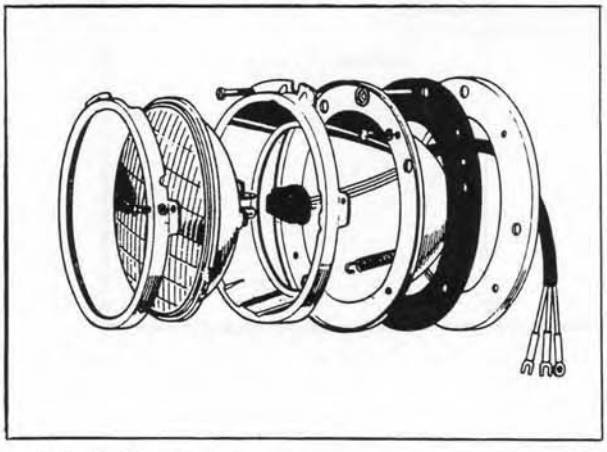


Fig. 9-1. Headlamp

REMOVAL & INSTALLATION

1. To remove the headlamps, first remove the radiator grille.
2. Remove the headlamp sealed beam retaining ring by unscrewing three attaching screws.
3. The sealed beam unit can be taken out. Disconnect the headlamp from the socket & cord complete.
4. Unloosen the headlamp adjusting bolts and remove the headlamp sealed beam seating ring.
5. Remove the screws retaining the headlamp body, and then remove the headlamp packing and headlamp housing ring.
6. To install, follow the removal procedure in reverse order.

AIMING

Headlamp can be adjusted quickly and accurately with a headlamp tester. If this equipment is not available, nowever, the adjustment can be made as follows.

1. Place the vehicle on a level floor so that the headlamps are 33 feet (10 m) from a smooth vertical surface, such as a door or wall, preferably of a light color.
   The centerline of the vehicle should be at right angles to the vertical surface.
2. Measure the height of the headlamp center from the floor, then draw a horizontal line on the vertical surface at this point. Locate the point on this line at which projected centerline of the vehicle intersects. Measure the distance between the headlamp centers and divide this distance equally on both sides of the center mark.
   Draw a vertical line through each of these points. The points at which these two vertical lines intersect the horizontal line represent the centers of the right and left headlamps.

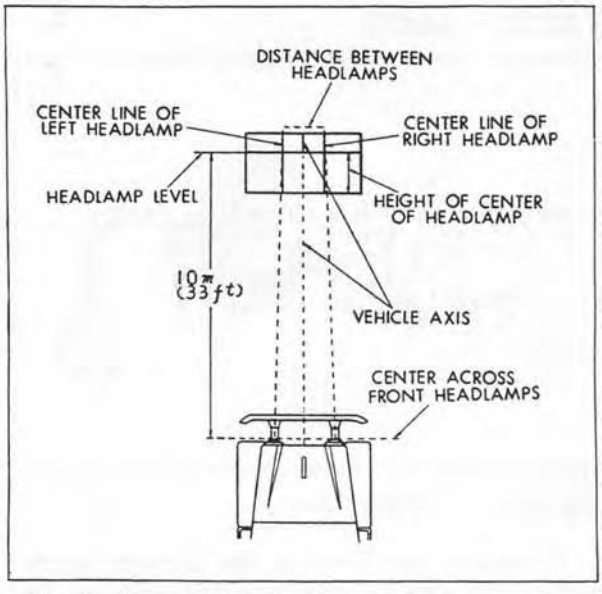


Fig. 9-2. Headlamp Adjusting Chart

3. Turn on the headlamps and select the high beam with the dimmer switch.

4. Cover one headlamp while adjusting the other. The adjustment can be made with a vertical adjuting bolt and a lateral adjusting bolt located at the headlamp sealed beam seating ring.
Aim the headlamp so that the beam pattern registers with horizontal and vertical lines in manner shown in the figure.

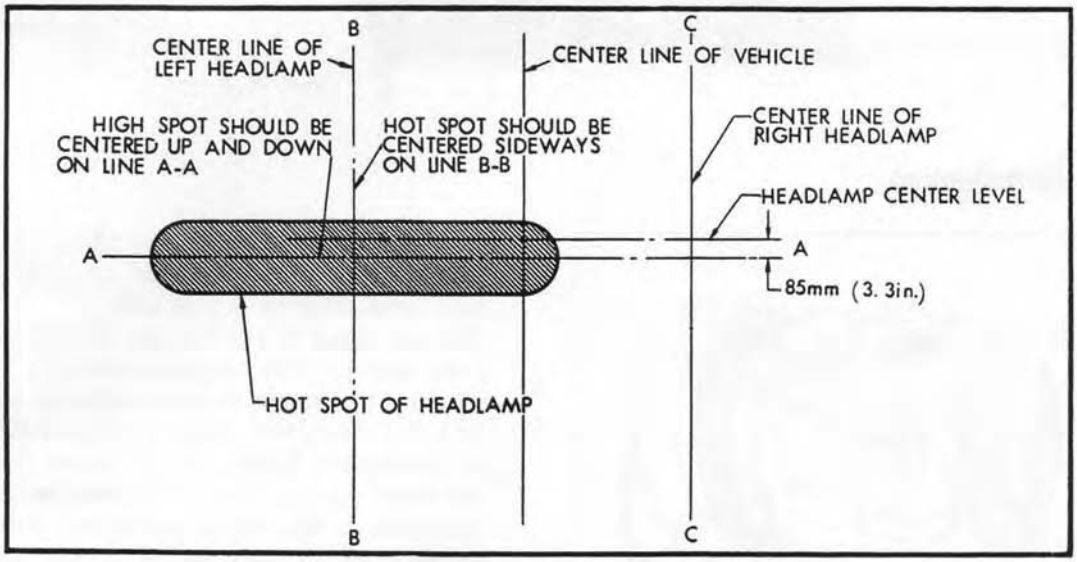


Fig. 9-3. Headlamp Aiming Pattern

2 Lamp Bulb Replacement

PARKING LAMPS

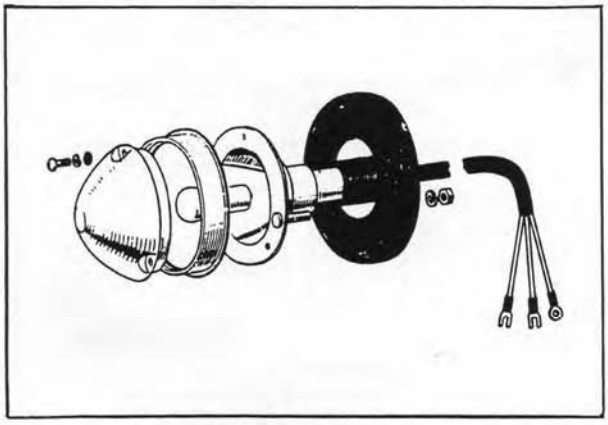


Fig. 9-4. Parking Lamp

To replace the bulb in the parking lamp, remove the parking lamp lens by removing the three attaching screws. To remove the bulb, push in the bulb and turn it counterclockwise. To install the new bulb, push in the bulb and turn it clockwise.

FOG LAMPS

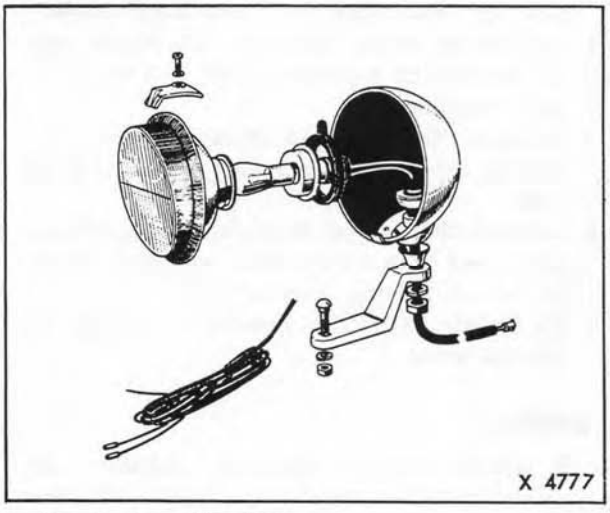


Fig. 9-5. Fog Lamp

To replace the fog lamp bulb, remove the fog lamp reflector stopper screw and the fog lamp reflector, and then remove the bulb.

FRONT TURN SIGNAL LAMPS

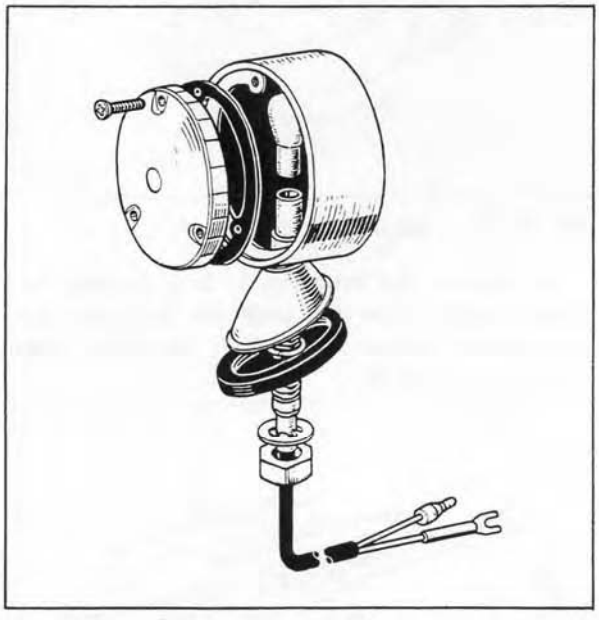


Fig. 9-6. Front Turn Signal Lamp (FJ40, 43 & 45)

To replace the front turn signal lamp bulb, remove the three attaching screws, and then remove the turn signal lamp lens. Push down the bulb and remove.

COMBINATION REAR LAMPS

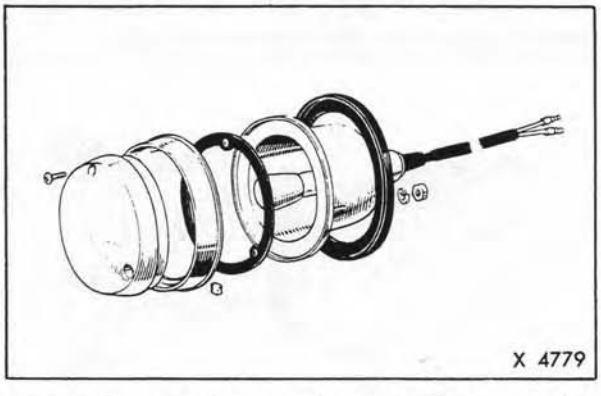


Fig. 9-7. Combination Rear Lamp (FJ 40 & 43)

To replace the bulb in the combination rear lamp, remove the combination rear lamp lens by removing the three attaching screws. To remove the bulb, push in the bulb and turn it counterclockwise. To install the new bulb, push in the bulb and turn it clockwise.

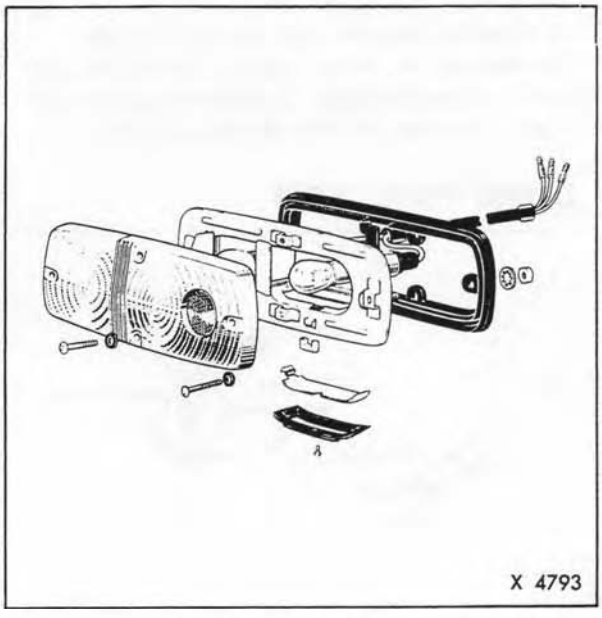


Fig. 9-8. Combination Rear Lamp (FJ 45P-B)

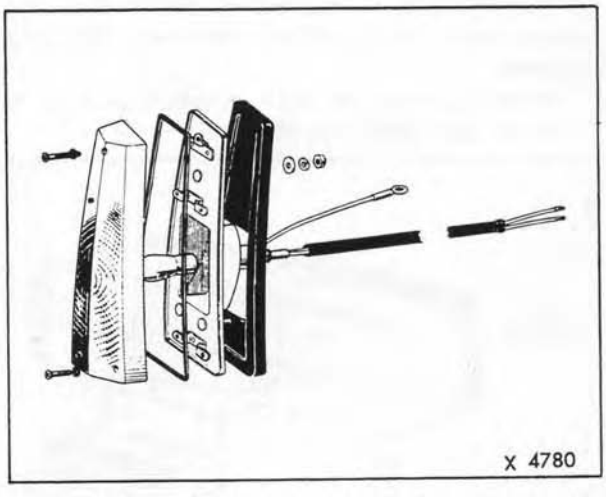


Fig. 9-9 Combination Rear Lamp (FJ 45(L)V)

To replace bulb, remove the five attaching screws, and then remove the lens. Push in the bulb and turn it counterclockwise. To install the new bulb, push in the bulb and turn it clockwise.

To replace the bulb, loosen and remove the four attaching screws and remove the lens.

To remove the bulbs, push in the bulbs and turn it counterclockwise. Replace the bulbs and reinstall the lens and the attaching screws.

LICENSE PLATE LAMPS

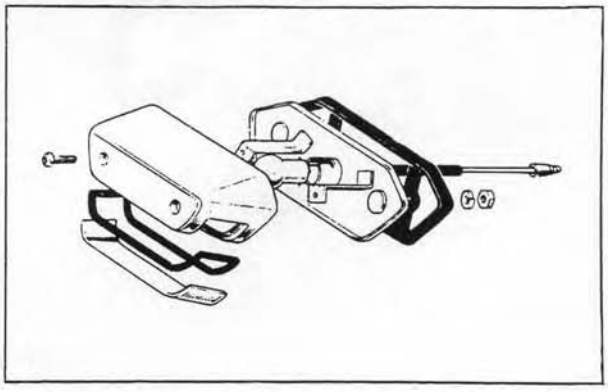


Fig. 9-10. License Plate Lamp (FJ 40 & 43)

To replace the bulb, remove the license plate lamp cover by loosening the two attaching screws.

Push and turn the bulb counterclockwise to remove, and clockwise to install.

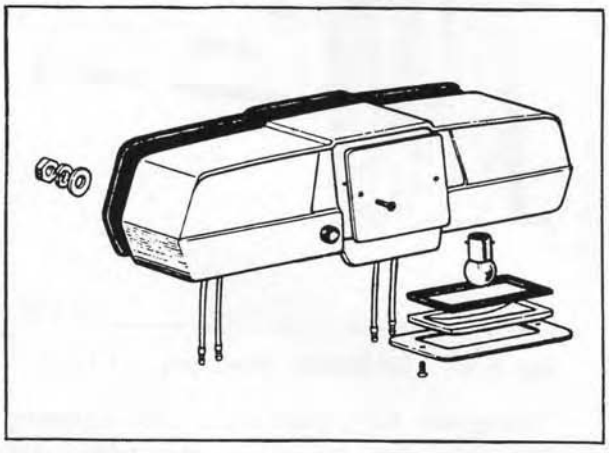


Fig. 9--11. License Lamp (FJ 45V)

To replace the bulb, remove the lens by loosening the two attaching screws.

Push and turn the bulb counterclockwise to remove, and clockwise to install.

INTERIOR LAMPS

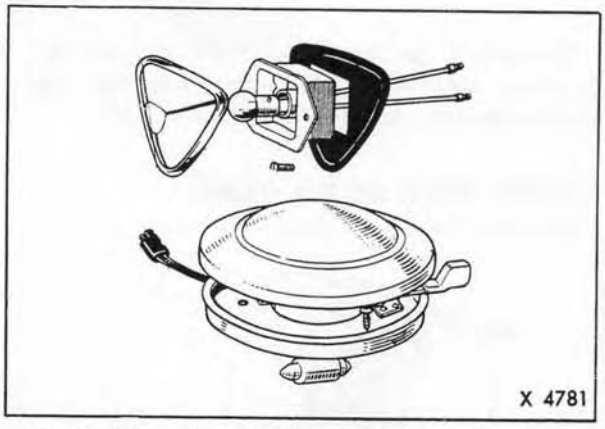


Fig. 9-12 . Interior Lamp (FJ 45V)

To replace the lamp bulb, first remove the interior lamp glass and push the bulb and turn it counterclockwise. To install the bulb, push and turn clockwise.

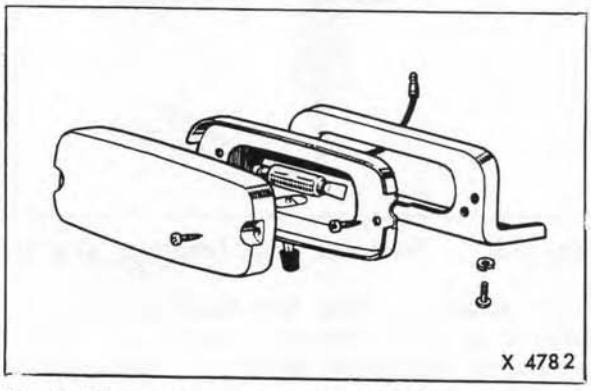


Fig. 9-13. Interior Lamp (FJ40(L)V)

To replace the lamp bulb, first remove the interior lamp glass and remove the bulb.

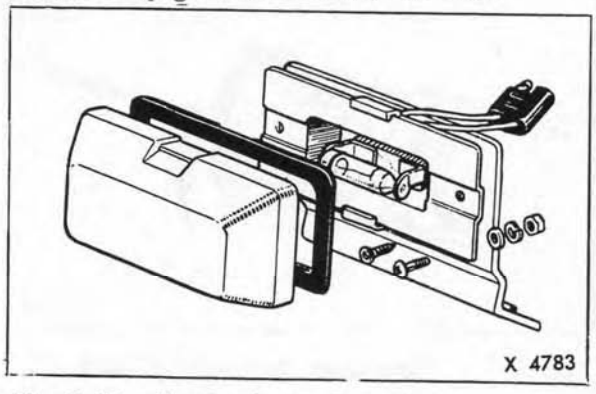


Fig. 9-14. Interior Lamp (FJ45(L)P-B)

To remove the piller lamp bulb, first remove the lamp glass and remove the bulb.

SIDE TURN SIGNAL LAMPS

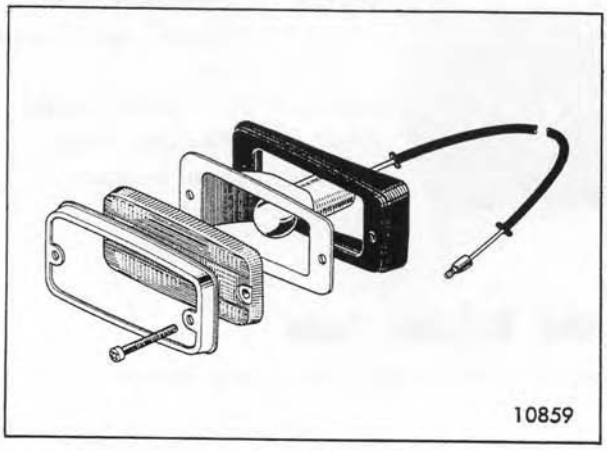


Fig. 9-6-1. Side Turn Signal Lamps (Except USA)

To replace the lamp bulb, first remove the interior lamp glass and remove the bulb.

3 Fuses

The fuse box assembly is mounted at the cowl under the instrument panel.

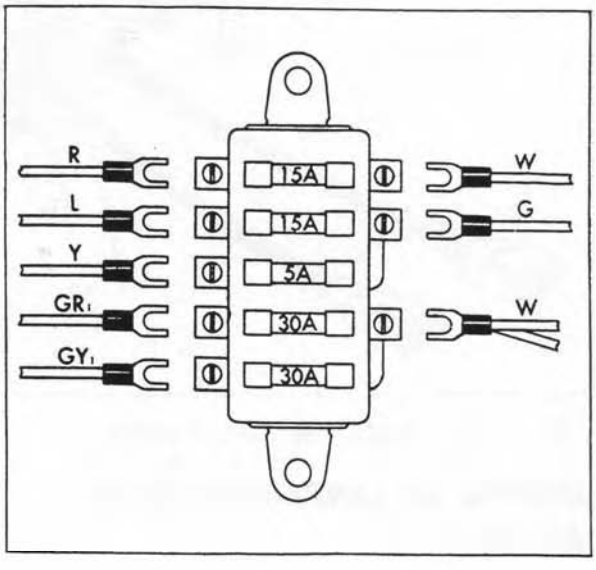


Fig. 9-15. Fuses

PART IV GAUGES & CONTROLS

1 Combination Meter Assembly and Related Parts

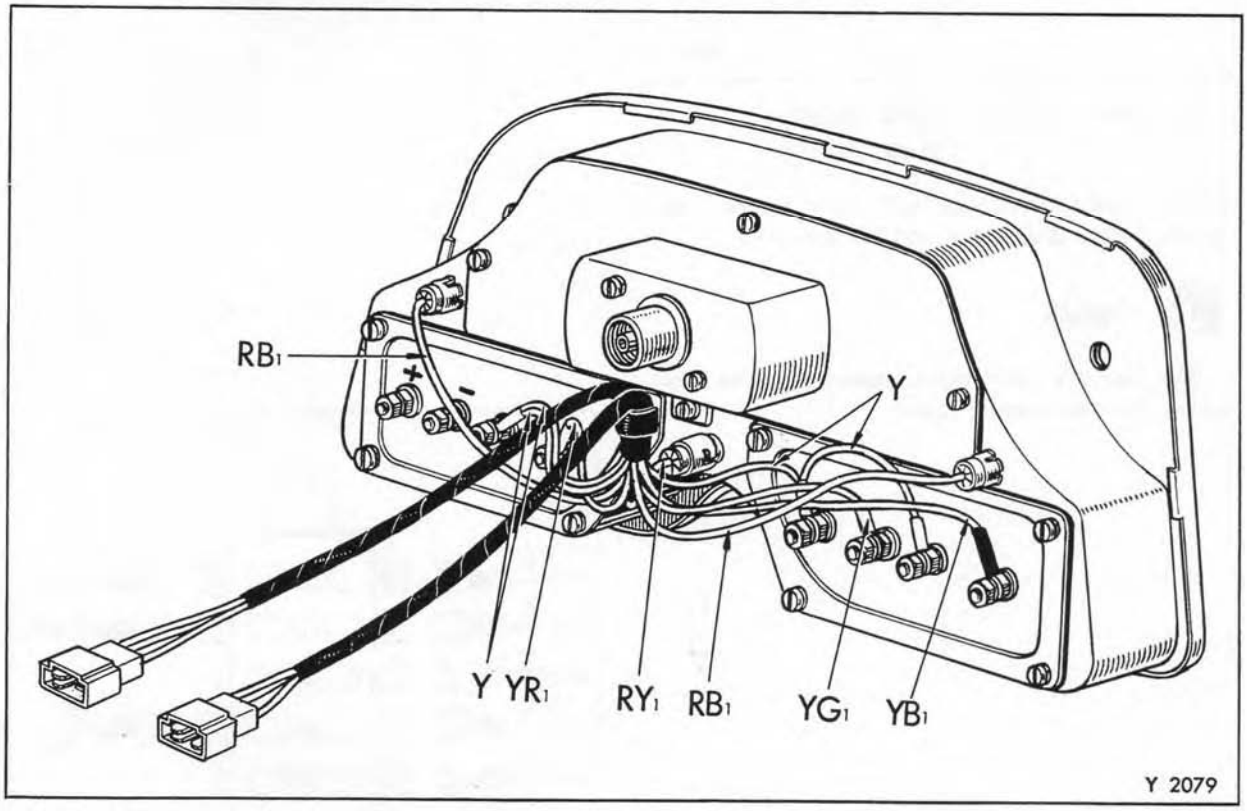


Fig. 9-16. Combination Meter Assembly

REMOVAL OF COMBINATION METER ASSEMBLY

1. Disconnect the speedometer cable from the speedometer.
2. Remove the combination meter retaining screws (2).
3. Pull out the assembly from the instrument panel and disconnect the light bulbs and wirings from the meter assembly. Then remove the assembly from the instrument panel.
4. Remove the back plate retaining screws to expose each gauge cluster.

ASSEMBLY & INSTALLATION OF THE METER ASSEMBLY

Follow "Removal and Disassembly" in reverse order.

SPEEDOMETER

The speedometer is connected to the transfer drive shaft by means of a cable and a drive gear located inside the transfer case.

Speedometer Replacement

1. Remove 4 back plate retaining screws, then remove the speedometer from the combination meter housing.
2. Position the speedometer assembly in the combination meter housing and install the retaining screws.

FUEL GAUGE & FUEL GAUGE UNIT

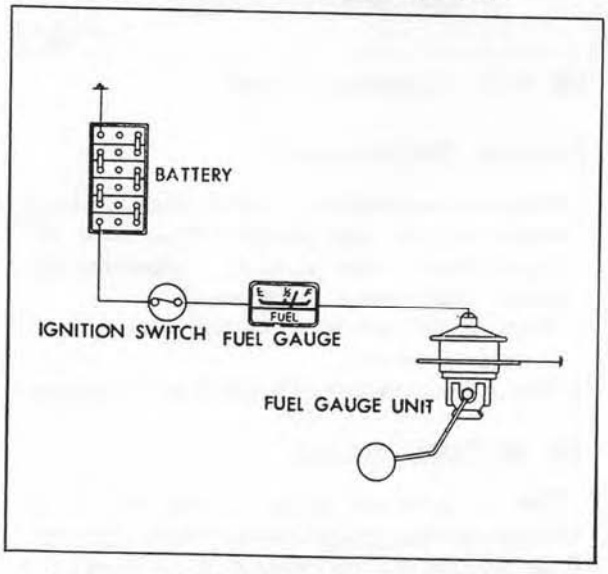


Fig. 9-17. Fuel Gauge & Fuel Gauge Unit

Fuel Gauge Replacement

1. Remove four retaining screws from the back plate and pull the fuel gauge away from the combination meter housing. Disconnect the wires and remove the fuel gauge.
2. Position the fuel gauge to the housing and connect the wires.
3. Install the fuel gauge with the retaining screws.

Fuel Gauge Unit Replacement

1. Disconnect the wire at the fuel gauge unit, then remove the unit retaining screws from the unit and tank.
2. Remove the unit and packing carefully.
3. Clean the fuel gauge unit mounting surface at the fuel tank.
4. Position the packing and unit to the fuel tank and secure them in place with retaining screws.
5. Connect the wire to the fuel gauge unit.

TEMPERATURE GAUGE

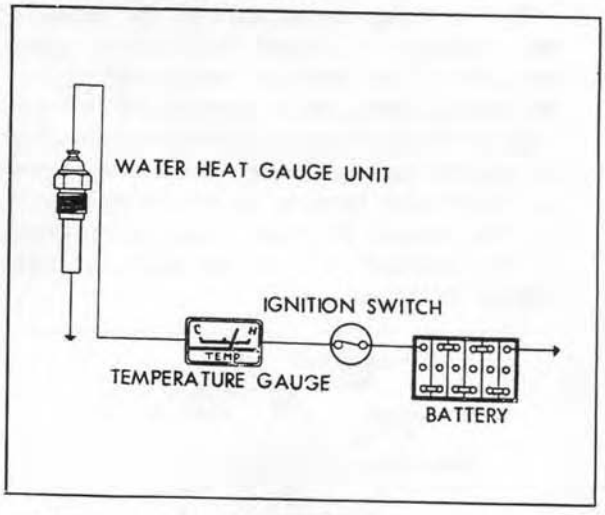


Fig. 9-18. Temperature Gauge

The temerature gauge consists of a temperature gauge mounted on the instrument panel and a heat indicator mounted in the cylinder head.

Temperature Gauge Replacement

1. Remove the retaining screws from the back plate and pull the gauge out of the housing.
2. Disconnect the wires and remove the temperature gauge.
3. Position the temperature gauge to the housing and connect the wires, then secure the back plate with retaining screws.

Water Heat Indicator Replacement

1. Disconnect the wire from the temperature gauge at the heat indicator, and relieve any pressure in the cooling system by loosening the radiator cap.
2. Prepare the new heat indicator and apply a small amount of sealer to the threads.
3. Remove the heat indicator from the cylinder head and immediately install the new heat indicator. Then connect the wire to the heat indicator.

AMMETER

The operating components of the ammeter are illustrated in figure 9-19. This gauge composes of the indicator needle installed on the moving plate, and is operated by the compound force of the magnetic force energized by the current passing through the electromagnet, and the magnet force of the permanent magnet. For this reason, the needle will always defect to the stronger side of the magnetic force induced in the magnet.

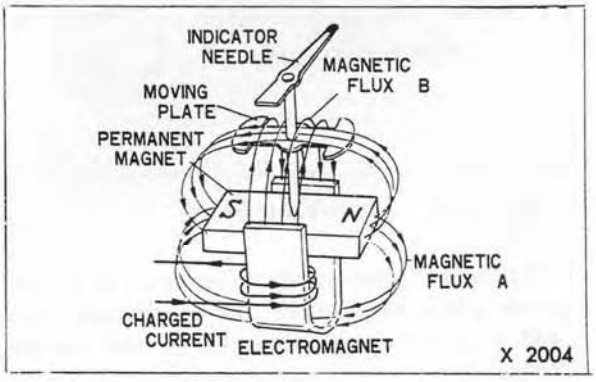


Fig. 9-19. Operation

At state condition, the indicator needle registers the zero point by only the force of the permanent magnet.

When charging becomes large, the current at the electromagnet becomes large, and the needle will defect to the positive side of the ammeter.

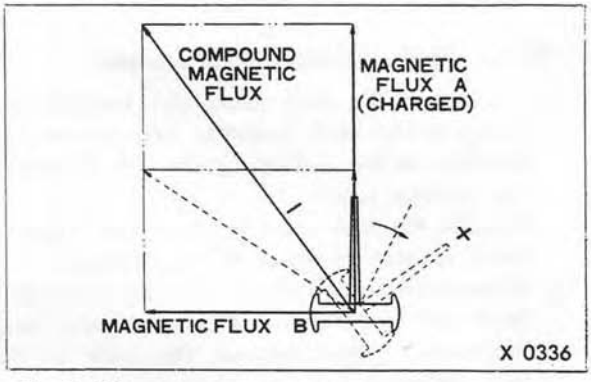


Fig. 9-20. Charging Condition

At discharged condition, the current flows to the opposite side causing the needle to defect to the negative side of the ammeter.

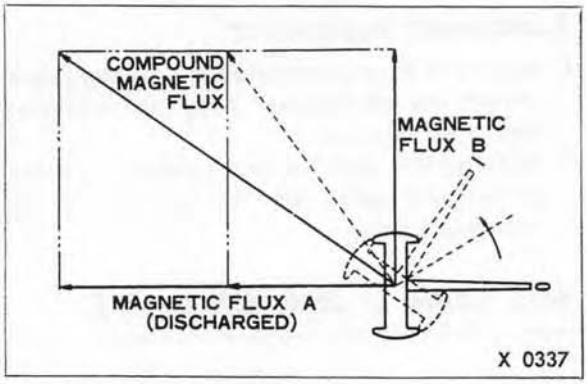


Fig. 9-21. Discharging Condition

Ammeter Replacement

1. Remove four retaining screws from the back plate and pull the ammeter away from the combination meter housing. Disconnect the wirers and remove the ammeter.
2. Position the ammeter to the housing and connect the wires.
3. Install the ammeter with the retaining screws.

OIL PRESSURE GAUGE

The oil pressure gauge consists of the oil pressure sending gauge, and the receiving gauge: Both gauges are constructed by utilizing the same bi-metal, and the same heating coils are wound on the bi-metal.

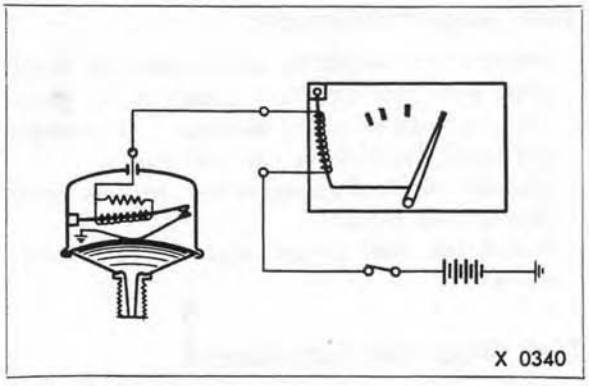


Fig. 9-22. Operation

The receiving gauge bi-metal is connected to the indicator needle. The sending gauge contact point operates in relative with the oil pressure, and is bent by the increase of the oil pressure.

When the ignition switch is turned to ON, the current from the battery flows through the receiving gauge heating coil to the sending gauge heating coil, and to the contact point, and is grounded.

By this current, both heating coils are energized, and this actuated heat is applied onto the bi-metal. When the bending of the bi-metal by heat becomes larger than that by the coil pressure at the sending gauge, the point opens, and the current will not flow. For this reason, the heating coil is cooled, and the bi-metal is straightened, and the point closes again. As the bi-metals of the sending gauge, and receiving gauge are the same, the operation of the sending gauge is transmitted all the same to the receiving gauge, and the above repetition registers the oil pressure. The graduation of the gauge dial is from 0, 2, 4 and 6 kg\cm² (0, 28.4, 56.8 and 85.2 psi).

Oil Pressure Gauge Replacement

1. Remove the retaining screws from the back plate and pull the gauge out of the housing.
2. Disconnect the wires and remove the oil pressure gauge.
3. Position the oil pressure gauge to the housing and connect the wires, then secure the back plate with the retaining screws.

Oil Pressure Sender Gauge Replacement

The oil pressure sender gauge is installed at the left of the cylinder block and is connected to the oil pressure receiver gauge which in turn is connected to the ignition switch.

1. Disconnect the wire at the sender gauge, then remove the sender gauge from the engine.
2. Apply sealer to the threads of the new sender gauge, and install the sender gauge to the engine.
3. Connect the wire to the oil pressure sender gauge, and check the operation of the sender gauge.

2 Turn Signal Control

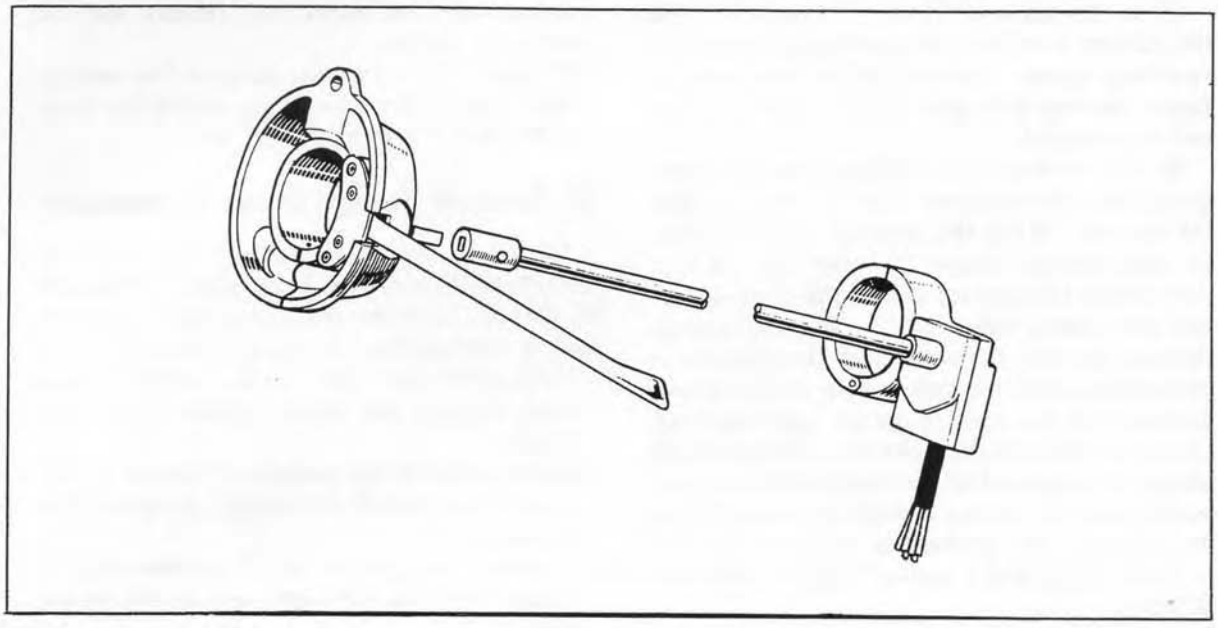


Fig. 9-23. Turn Signal Control

TURN SIGNAL SWITCH

The turn signal switch assembly is mounted on the steering post. The upper half of the switch is located right below the steering wheel and a rod extends from it to the lower half of the switch clamped on to the lower part of the steering post.

Removal

1. Remove the plate from the instrument panel, then remove the screw from the lower switch clamp. Open the clamp and remove the lower switch and intermediate rod.
2. Remove the control lever pin from the control shaft and lever.
3. Pull the control lever out of the control shaft half away.
4. Remove the horn button from the steering wheel, then remove the steering wheel retaining nut.
5. Remove the contact spring, spacer, plate and horn brush from the wheel Then remove the steering wheel using Steering Wheel Puller (09609 20010).
6. Remove the screw from the upper switch clamp,then pull out the upper half of the switch from the steering post with the upper bracket shaft.
7. Remove the upper bracket shaft from the switch by turning it counter-clockwise.

Installation

Follow "Removal" in reverse order.

TURN SIGNAL INDICATOR LAMPS

The turn signal indicator lamps are installed on each side of the speedometer. To remove the lamps for replacement, pull out the cord and socket from the combination meter housing. Pushing the light bulb, turn it counter-clockwise to remove.

FLASHER UNIT

The flasher unit is installed on the dashboard adjacent to the fuse box.

Replacement

1. Disconnect wires from the flasher unit, then remove the clamp screw. Open the clamp wide enough to remove the flasher unit.
2. Install a good flasher unit in the clamp and secure it in place by a screw. Connect the wire to the flasher unit and check the operation of the flasher unit.

3 Windshield Wiper

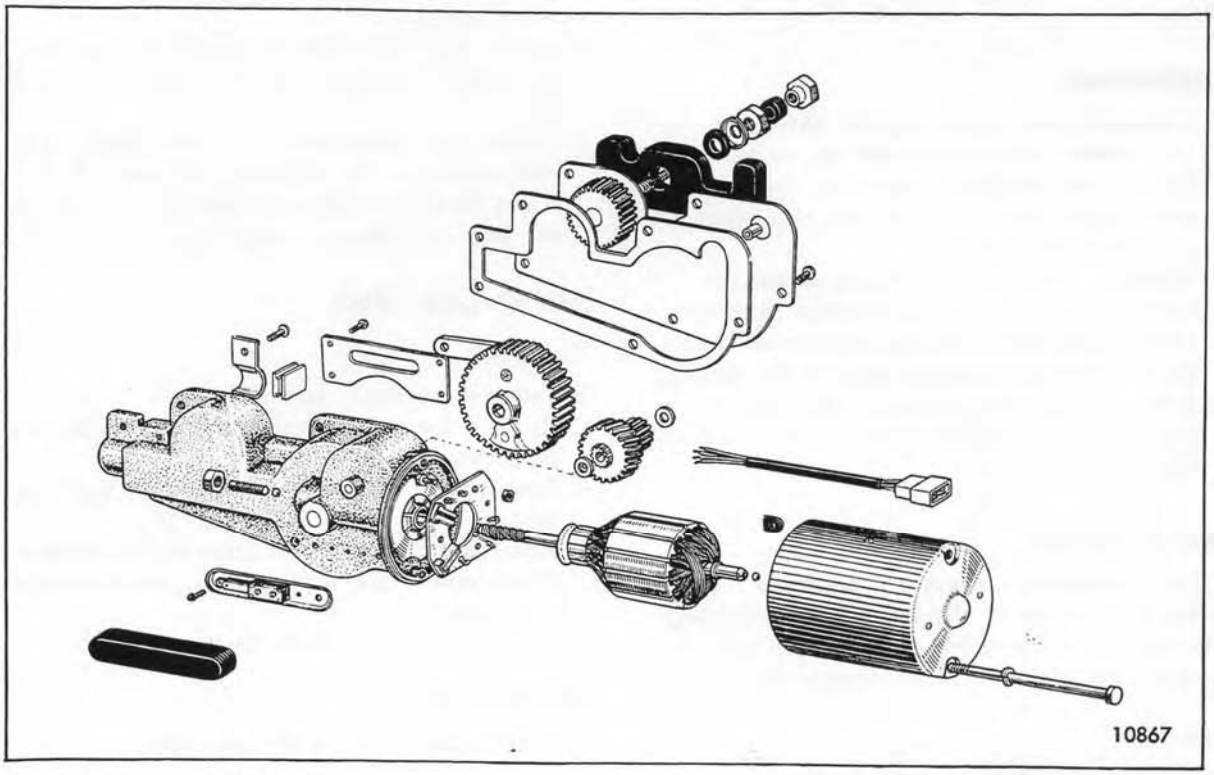


Fig.9-24. Windshield Wiper

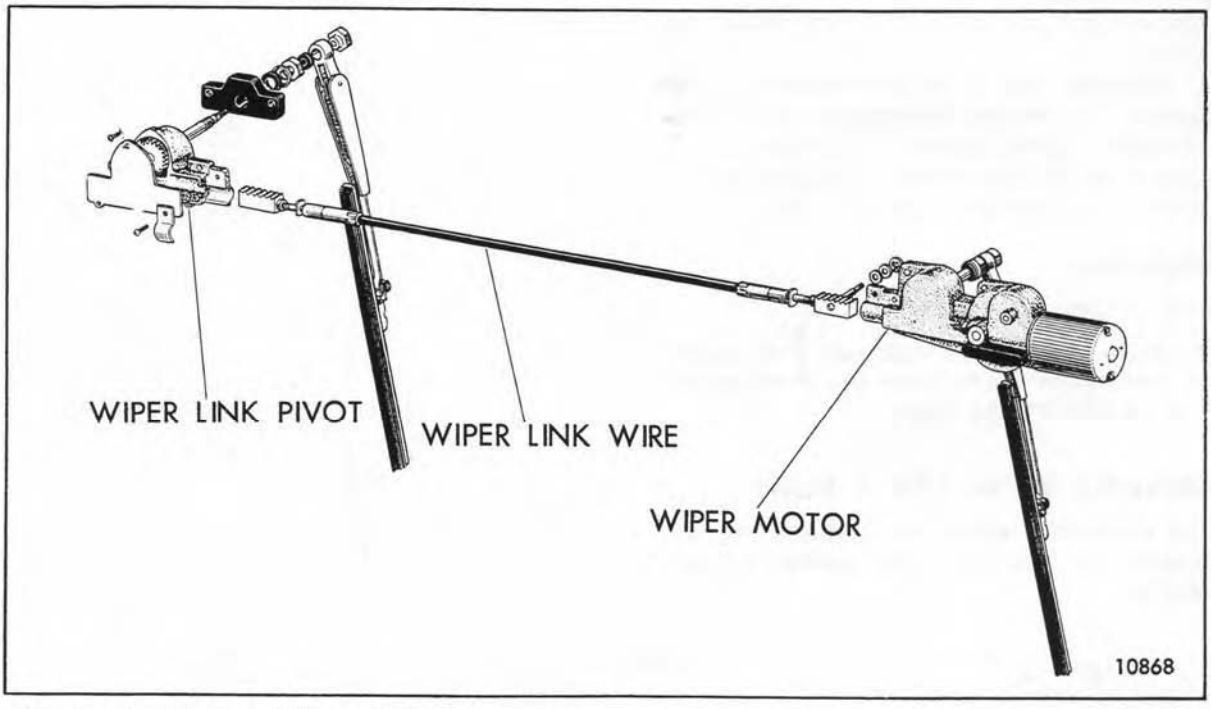


Fig. 9-25. Windshield Wiper System

WIPER SWITCH

The wiper switch is located approximately at the center of the instrument panel near the choke button.

Replacement

1. Loosen the lock screw of the switch button and remove the button from the switch.
2. Remove the retaining ring from the switch, then remove the switch toward the back of the instrument panel.
3. Disconnect wires at the switch terminals.
4. Connect the wires to the switch terminals. Position the switch in the instrument panel and install the retaining ring on the switch.
5. After securing the switch in the instrument panel, install the switch button and tighten the lock screw.

WIPER MOTOR

The electrically operated windsield wiper motor is mounted at the top of the windsield. The motion of the wiper motor is controlled by a switch installed on the instrument panel.

Removal

1. Remove the wiper arm and brade.
2. Remove the pivot housing end plate from the pivot housing.
3. Remove the wiper motor with the wiper link wire.
4. If necessary, take of the wire from the wiper motor. Remove the wiper motor drive shaft assembly. Them remove the wiper motor gear plate and wire clamp. And, remove the wire from wiper motor gear housing.

Installation

Follow "Removal" in reverse order.

Note : Pull the wiper switch and check wiper blade position. If the wiper does not wipe the desired area loosen the lock bolt nut and adjust the wiper blade.

WINDSHIELD WIPER ARM & BLADE

The windshield wipers are mounted at the bottom of the left and right sections of the windshield.

Replacement

1. Remove the wiper blade from the wiper arm, and remove the wiper arm lock nut. Remove the wiper arm.
2. Install the wiper arm to the shaft and lock the arm in place with the lock bolt and nut.
3. Install the wiper blade on the wiper arm and check the wiper blade position. If the wiper does not operate in desired area, loosen the lock bolt nut and adjust the wiper blade.

WIPER LINK WIRE

Removal

1. Remove the wiper arm and brade.
2. Remove the pivot housing end plate from the pivot housing.
3. Remove the wiper motor with the wiper link wire.
4. Remove the wiper motor drive shaft assembly. Then remove the wiper motor gear plate and wire clamp.
5. Take off the wire from the wiper motor.

Installation

Follow "Removal" in reverse order.

4 Other Switches

LIGHTING SWITCH

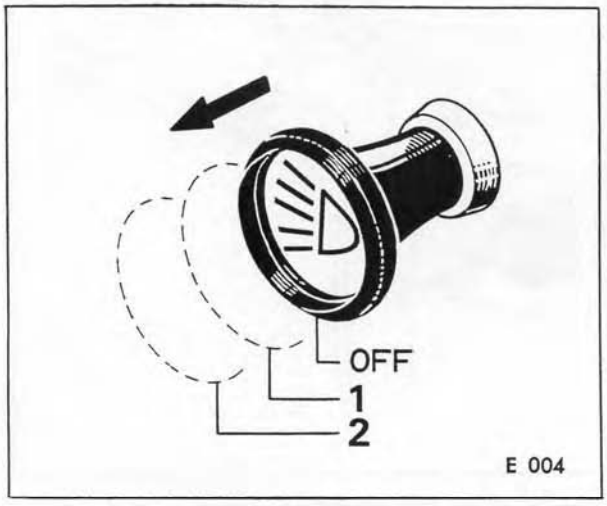


Fig. 9-26. Lighting Switch

The Land Cruiser has a rotary type lighting switch on the instrument panel. The switch has three positions and controls all the vehicle lights and trailer socket.

Replacement

1. Remove the screw from the switch knob, then remove the knob.
2. Remove the switch retaining ring by turning it counter-clockwise.
3. Remove the switch from the back of the instrument panel, and disconnect all wires at switch terminals.
4. Connect all wires to the respective terminals of the new switch.
5. Install the switch in the instrument panel, and secure it in place with the retaining ring.
6. Install the switch knob and lock it firmly in position with a screw.

IGNITION & STARTER SWITCH

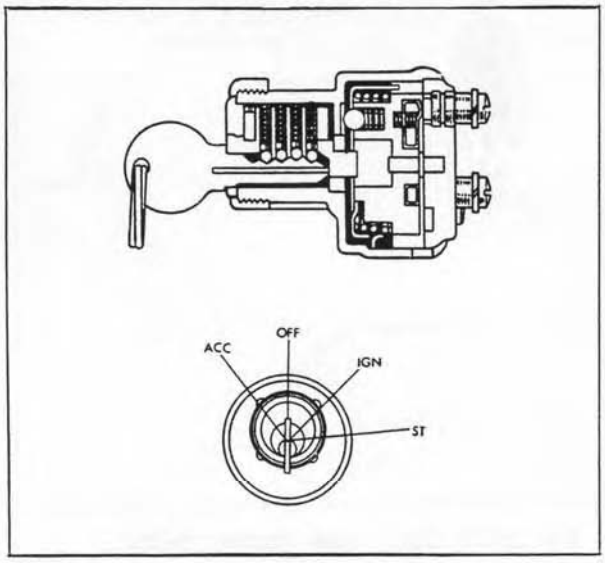


Fig. 9-27. Ignition & Starter Switch

Replacement

1. Disconnect wires from the switch terminals.
2. Remove the switch retaining ring, and push the switch toward the back of the instrument panel to remove it.
3. Position the new switch in the instrument panel, and install the retaining ring on the switch.
4. Tighten the retaining switch using a pair of pliers. It is a good idea to protect the retaining ring with a rag before applying the pliers.

FRONT DRIVE INDICATOR SWITCH

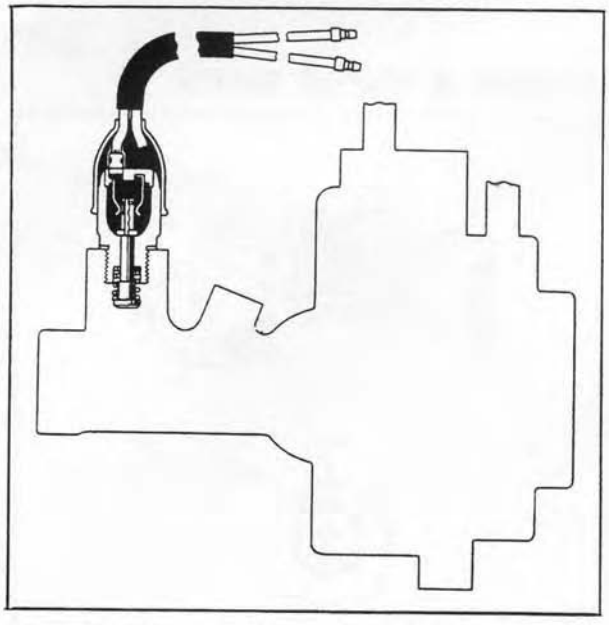


Fig. 9-28. Front Drive Indicator Switch

The switch is installed on the diaphragm cylinder body, and when the front drive shift button is operated (pulled out), the push rod moves forward. Then the indicator switch ball seats in the slot of push rod, thus completing the circuit to the indicator.

Replacement

Disconnect the wires at the socket, then unscrew the entire assembly counter-clockwise. Replace the switch and/or the ball. Install the ball in the diaphragm cylinder body, then install the switch assembly in the diaphragm.

STOP SWITCH

The stop switch is installed on the pedal bracket underneath the instrument panel and is always in contact with the brake pedal except when the brake pedal is depressed.

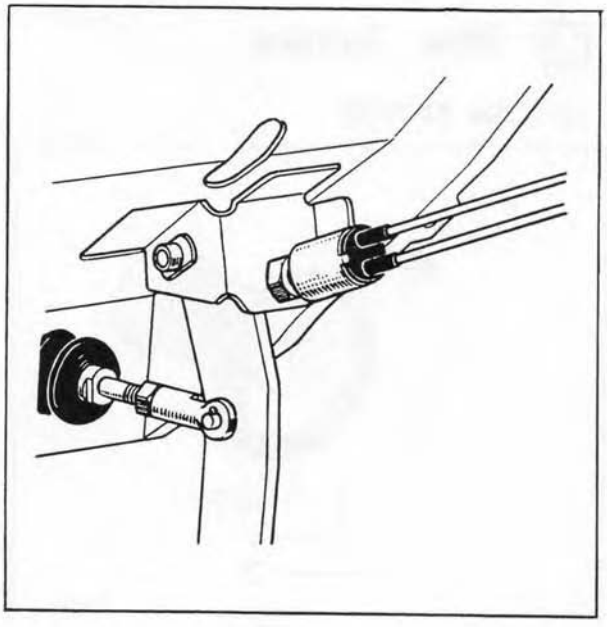


Fig. 9-29. Stop Switch

Replacement

1. Screw back the lock nut, then remove the stop switch by turning it counter-clockwise.
2. Disconnect the wires at snap terminals.
3. Connect the wires of new switch, and install the switch in the pedal bracket.
4. Check the operation of the stop switch by depressing the brake pedal. If its operation is not satisfactory, screw in or screw back the switch until the switch operates properly. Lock the switch securely with the nut.

DIMMER SWITCH

The dimmer switch is installed on the toe-board to the right of the clutch pedal. High and low beam changeovers are made by this foot-operated dimmer switch.

Replacement

1. Remove two bolts attaching the switch to the toe board.
2. Remove the switch from the back of the toe-board.
3. Disconnect the wires at the switch terminals.
4. Connect the wires to the terminals of the dimmer switch.
5. Positon the switch in the toe-board from the its back and secure it in place with two bolts.

5 Horns

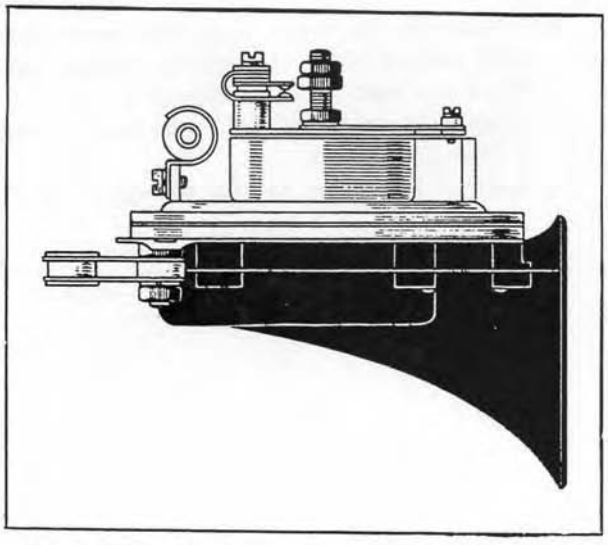


Fig. 9-30. Horn

A pair of horns is mounted on the tire aprons in the engine compartment, and is controlled by means of a relay. The horn button closes the relay contacts, completing the circuit to the horns. A high pitch toned horn is mounted on the right tire apron, and a low pitch toned horn is installed on the left side tire apron.

CURRENT DRAW TEST

Connect a voltmeter and ammeter to the horn and to a voltage supply. The current draw for the horns is 7 amperes at 13 volts.

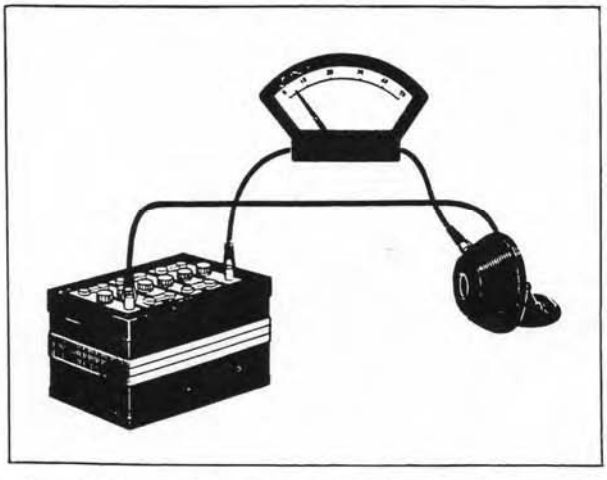


Fig. 9-31. Current Draw Test

ADJUSTMENT

The adjustments necessary for the horns are current draw and air gap adjustmets.

Current Draw Adjustment

Loosen the center bolt nut then turn the nut counter-clockwise to increase the current and the other way to decrease the current. Make sure to lock the nut securely after the adjustment is finished.

Air Gap Adjustment

Denso-made

The air gap is defined as the clearance between the moving plate coil case. To adjust the gap, loosen the plate lock nut that is located under the nut and turn the moving plate clockwise to make the gap smaller. When the gap is excessive, the horns will not operate under the low voltage. If the gap is small, it makes the plate and the case come in contact at high voltage and disturbs the horns' tone. Furthermore, it causes a damage to the diaphragm. For these reasons, the gap should be adjusted so that the horns operate at 10 volts, and the plate and case do not come in contact at 15 volts. The specified clearance is 0.6mm (0.024 in.).

Maruko-made

To adjust the gap, loosen the nut which retains the horn cone to the horn base, then adjust the gap to the specified clearance.

HORN RELAY

The horn relay is installed at the right side of the cowl and it protects the horn button switch from burning and prevents voltage drop in the horn circuit. The main trouble in the horn relay is burned contact points. They should be dressed down with a fine file or sandpaper until the points contact evenly. If the horn relay does not operate when the horn button is depressed, the trouble is due to a break in wire or coil.

Specifications for Adjustment

Voltage for points to close	6~8 volts
Coil resistance	
Air gap	0.4 mm (0.016 in.)
Point gap	0.8 mm (0.032 in.)

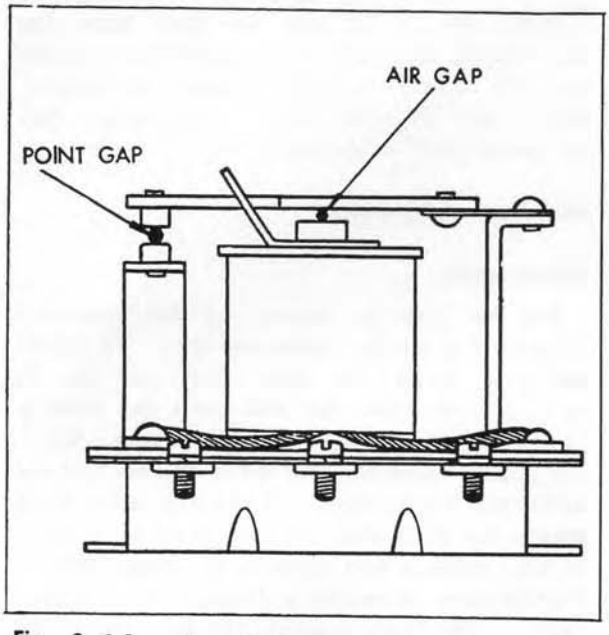


Fig. 9-32. Horn Relay

Replacement

1. Disconnect the wires from the horn relay, then remove bolts and spring washers attaching the horn relay to the cowl.
2. Install the relay to the cowl with spring washers and bolts.
3. Connect the wires to the terminals of the horn relay.

Memorandum

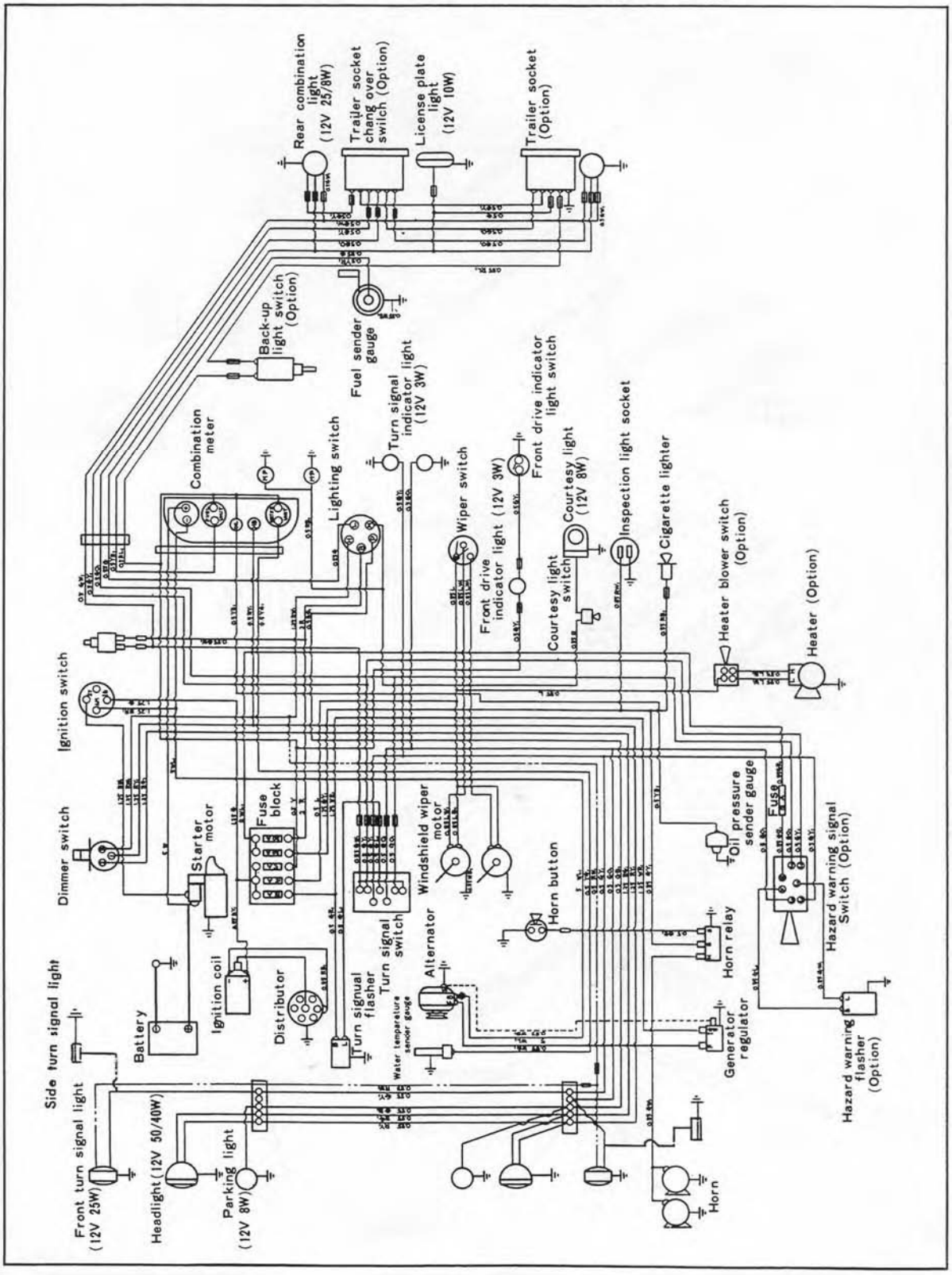
PART IX WIRING DIAGRAM & WIRE HARNESS

Color Code

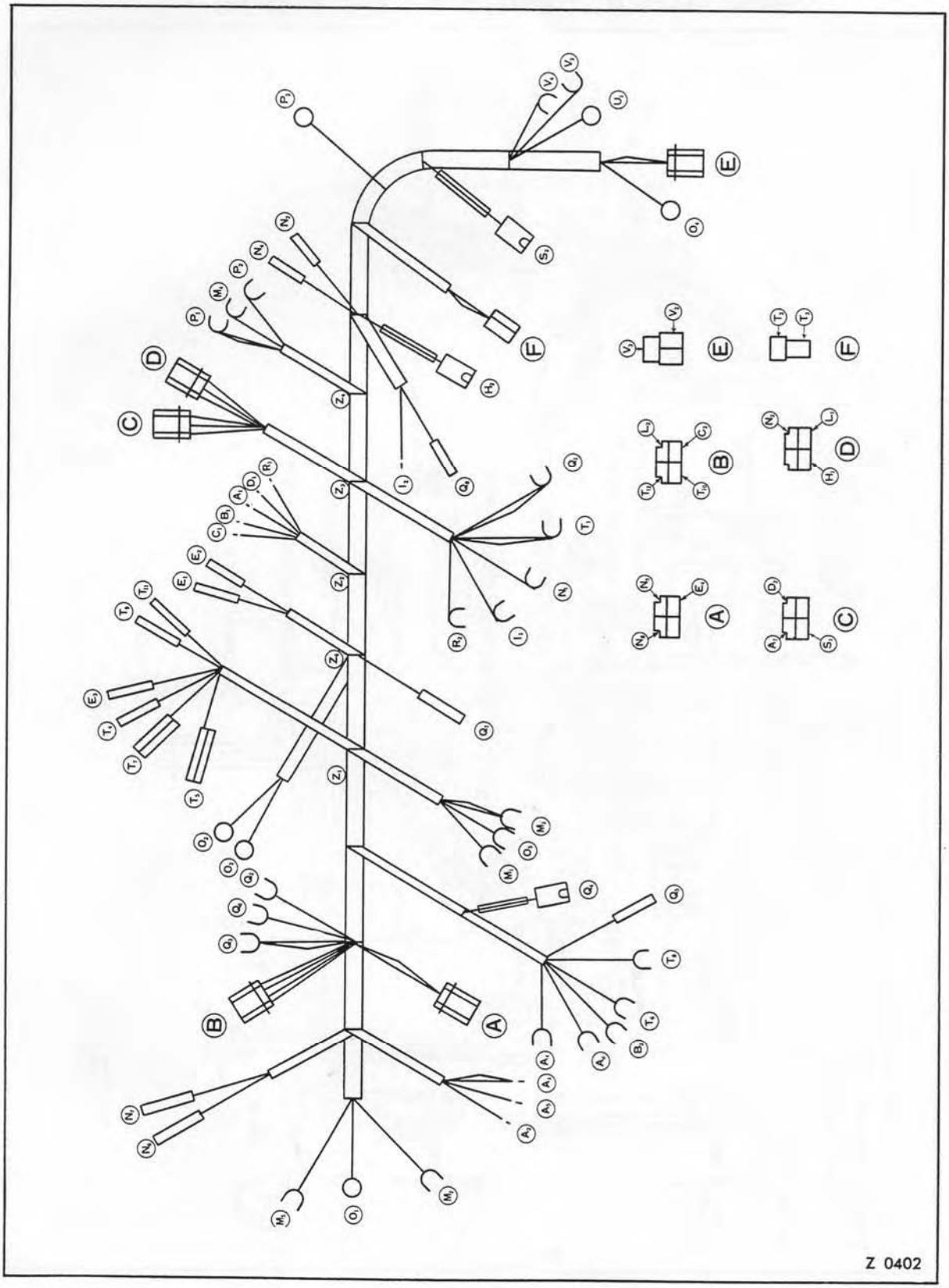
Sign	Color	Sign	Color
BR1	Black and Red	RB1	Red and Black
BW1	Black and White	RG1	Red and Green
BY1	Black and Yellow	RL1	Red and Blue
G	Green	RW1	Red and White
GB1	Green and Black	RY1	Red and Yellow
GL1	Green and Blue	W	White
GO1	Green and Orange	WB1	White and Black
GR1	Green and Red	WG1	White and Green
GW1	Green and White	WL1	White and Blue
GY1	Green and Yellow	WR1	White and Red
L	Blue	Y	Yellow
LB1	Blue and Black	YB1	Yellow and Black
LR1	Blue and Red	YG1	Yellow and Green
LW1	Blue and White	YR1	Yellow and Red
R	Red		

The first alphabet indicates the basic color of the wire, and the second alphabet indicates the spiral line color.

WIRING DIAGRAM (FJ40(L), 45(L), 45(L)V, 43(L))



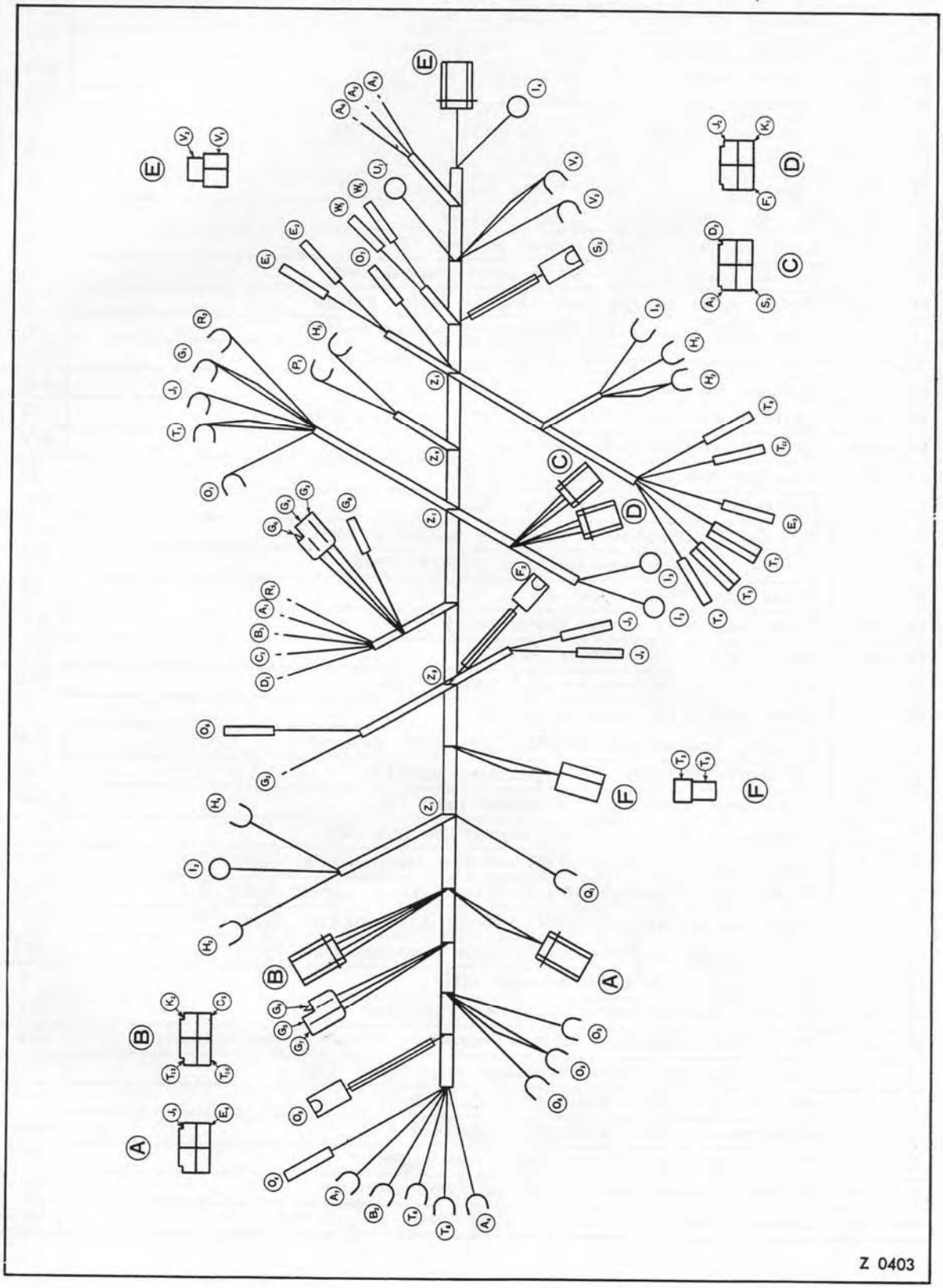
COWL WIRING HARNESS (FJ40, 40V & 43)



COWL WIRING HARNESS (FJ40, 40V & 43)

Keys	Connections	Color
$A_1 \sim A_2$	Lighting switch (H)~Dimmer switch (B)	RW_1
$A_3 \sim A_4$	Dimmer switch (I)~Headlight high beam (R)	RY_1
$A_3 \sim A_7$	Dimmer switch (I)~High beam indicator light	RY_1
$A_5 \sim A_6$	Dimmer switch (2)~Headlight low beam (R)	RG_1
$B_1 \sim B_2$	Lighting switch (P)~Parking light (R)	GB_1
$C_1 \sim C_2$	Lighting switch (L)~Tail light connected	G
$D_1 \sim D_2$	Lighting switch (M)~Meter pilot light	RB_1
$R_1 \sim R_2$	Lighting switch (B)~Fuse box load side	R
$Z_2 \sim E_1$	$R_1 \sim R_2$ connected~Stop switch	GW_1
$E_2 \sim E_3$	Stop switch~Turn signal switch (S)	GW_1
$Z_1 \sim E_4$	$E_2 \sim E_4$ connected~Stop light connected	GW_1
$H_1 \sim H_2$	Water heat gauge unit~Water heat gauge	YG_1
$I_1 \sim I_2$	Fuse box load side~Windshied wiper switch	L
$L_1 \sim L_2$	Fuel seder gauge~Fuel gauge connected	YR_1
$M_1 \sim M_2$	Ignition switch (ST)~Starter magnet	BW_1
$M_3 \sim M_4$	Ignition switch (IG)~Fuse box battery side	G
$M_3 \sim M_5$	Ignition switch (IG)~Ignition coil	BY_1
$O_1 \sim O_2$	Starter motor~Ammeter (+)	W
$O_3 \sim O_4$	Ammeter (—)~Alternator (B)	WL_1
$Z_4 \sim P_1$	$O_3 \sim O_4$ connected~Fuse box battery side	WL_1
$Z_6 \sim O_5$	$O_3 \sim O_4$ connected~Ignition switch (AM)	BR_1
$P_1 \sim P_2$	Fuse box~Fuse box	W
$Q_1 \sim Q_2$	Fuse box load side~Horn relay (B)	GY_1
$G_3 \sim Q_4$	Horn relay (H)~Horn (R)	GW_1
$G_3 \sim Q_5$	Horn relay (H)~Horn (L) connected	GW_1
$Q_6 \sim Q_7$	Horn velay (S)~Horn button	GR_1
$Z_3 \sim P_3$	$Q_1 \sim Q_2$ connected~Inspection light socket	RW_1
$S_1 \sim S_2$	Oil warning light~Oil pressure switch	YB_1
$T_1 \sim T_2$	Fuse box load side~Flasher unit (B)	GR_1
$T_3 \sim T_4$	Flasher unit (L)~Turn signal switch (B)	GL_1
$T_5 \sim T_6$	Turn signal switch (FR)~Front turn signal light (R)	GY_1
$T_7 \sim T_8$	Turn signal switch (FL)~Front turn signal light (L)	GO_1
$T_9 \sim T_{10}$	Turn signal switch (RR)~Rear combination light (R)	GY_1
$T_{11} \sim T_{12}$	Turn signal switch (RL)~Rear combination light (L)	GO_1
$N_1 \sim N_2$	Fuse box load side~Meter (B)	Y
$Z_3 \sim N_3$	$N_1 \sim N_2$ connected~Transfer indicator light	GY_1
$N_4 \sim N_5$	Transfer indicator light~Transfer indicator light switch	GY_1
$T_1 \sim U_1$	Fuse box load side~Voltage regulator (IG)	WR_1
$V_1 \sim V_2$	Alternator (F)~Voltage regulator (F)	WG_1
$V_3 \sim V_4$	Alternator (E)~Voltage regulator (E)	WB_1
$Q_1 \sim Q_8$	Fuse box load side~Cigarette Lighter	RB_1
$Z_3 \sim N_6$	$N_1 \sim N_2$ connected~Back-up light switch	RL_1
$N_7 \sim N_8$	Back-up light switch~Trailer back connected	RL_1

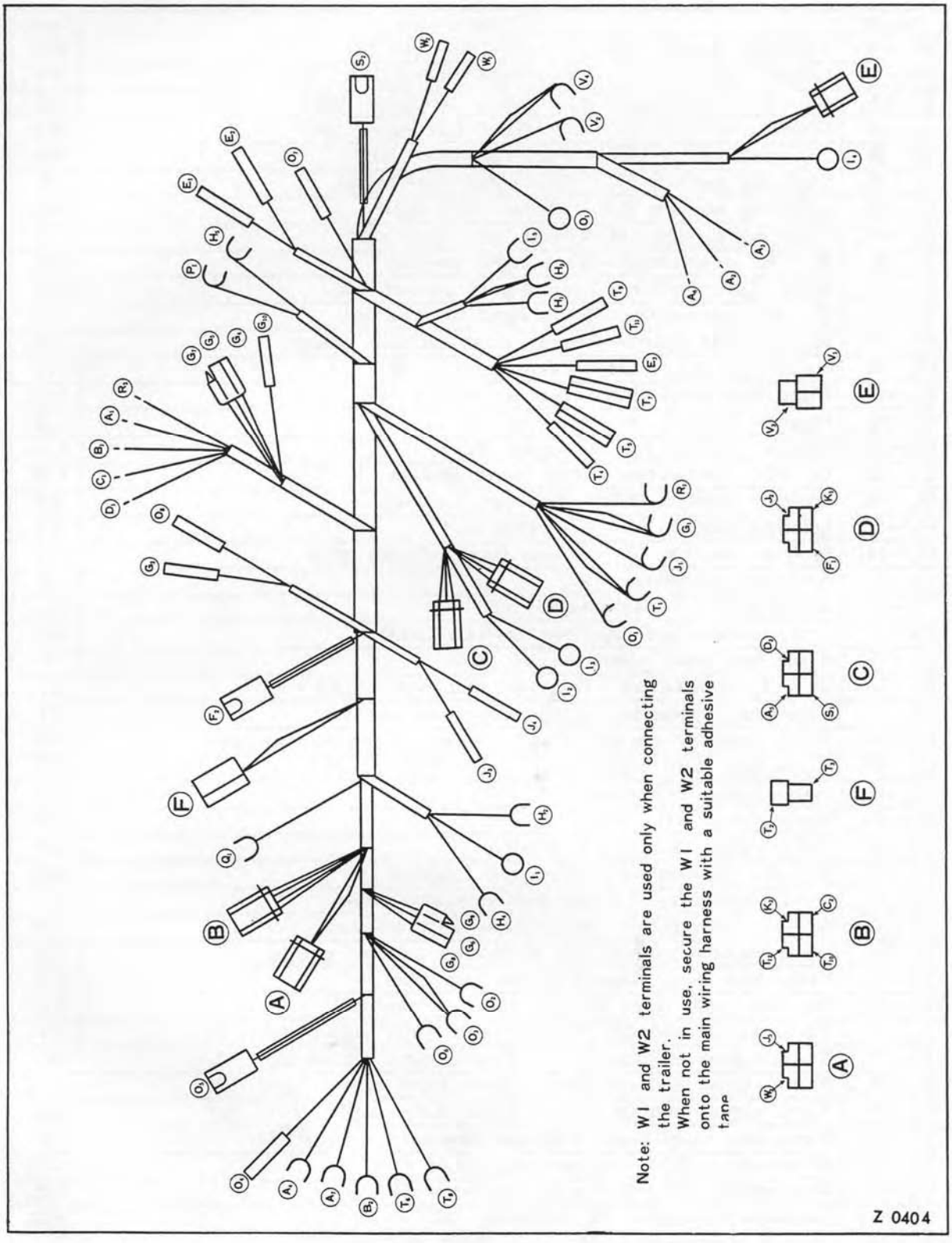
COWL WIRING HARNESS (FJ40L, 40LV, 43L & 45LP-B)



COWL WIRING HARNESS (FJ40L, 40LV, 43L & 45LP-B)

Keys	Connections	Color
$A_1 \sim A_2$	Lighting switch (H) ~ Dimmer switch (B)	RW_1
$A_3 \sim A_4$	Dimmer switch (1) ~ Headlight high beam (R)	RY_1
$Z_1 \sim A_5$	$A_3 \sim A_4$ connected ~ High beam indicator light	RY_1
$A_6 \sim A_7$	Dimmer switch (2) ~ Headlight low beam (R)	RG_1
$B_1 \sim B_2$	Lighting switch (P) ~ Parking light (R)	GB_1
$C_1 \sim C_2$	Lighting switch (T) ~ Tail light connected	G
$D_1 \sim D_2$	Lighting switch (M) ~ Meter pilot light	RB_1
$R_1 \sim R_2$	Lighting switch (B) ~ Fuse box load side	R
$Z_1 \sim E_1$	$R_1 \sim R_2$ connected ~ Stop light switch	GW_1
$E_2 \sim E_3$	Stop light switch ~ Turn signal switch (S)	GW_1
$Z_{II} \sim E_4$	$E_2 \sim E_3$ connected ~ Stop light connected	GW_1
$F_1 \sim F_2$	Water heat gauge ~ Water heat sender gauge	YG_1
$G_1 \sim G_2$	Fuse box load side ~ Wiper switch (B)	L
$G_1 \sim G_3$	Fuse box load side ~ Heater switch (B)	LR_1
$G_4 \sim G_5$	Heater switch (H) ~ Heater (H)	LB_1
$G_6 \sim G_7$	Heater switch (L) ~ Heater (L)	LW_1
$Z_1 \sim G_8$	$G_1 \sim G_3$ connected ~ Rear seat heater	LR_1
$H_1 \sim H_2$	Ignition switch (ST) ~ Starter magnet	BW_1
$H_3 \sim H_4$	Ignition switch (IG) ~ Ignition coil	BY_1
$H_3 \sim H_5$	Ignition switch (IG) ~ Fuse box battery side	G
$I_1 \sim I_2$	Starter ~ Ammeter (+)	W
$I_3 \sim I_4$	Ammeter (—) ~ Alternator (B)	WL_1
$Z_{II} \sim I_5$	$I_3 \sim I_4$ connected ~ Ignition switch (AM)	BR_1
$J_1 \sim J_2$	Fuse box load side ~ Meter (B)	Y
$Z_1 \sim J_3$	$J_1 \sim J_2$ connected ~ Transfer indicator light	GY_1
$J_4 \sim J_5$	Transfer indecator light ~ Indicator switch	GY_1
$K_1 \sim K_2$	Fuel receiver gauge ~ Fuel sender gauge connected	YR_1
$O_1 \sim O_2$	Fuse box load side ~ Horn velay (B)	GY_1
$O_3 \sim O_4$	Horn relay (H) ~ Horn	GW_1
$O_3 \sim O_5$	Horn relay (H) ~ Horn	GW_1
$O_6 \sim O_7$	Horn relay (S) ~ Horn button	GR_1
$Z_{III} \sim O_8$	$O_1 \sim O_2$ connected ~ Cigarette Lighter	RB_1
$Z_{IV} \sim P_1$	$I_3 \sim I_4$ connected ~ Fuse box battery side	WL_1
$V_V \sim Q_1$	$O_1 \sim O_2$ connected ~ Inspection light socket	RW_1
$S_1 \sim S_2$	Oil pressure gauge ~ Oil prescure sender gauge	YB_1
$T_1 \sim T_2$	Fuse box load side ~ Flasher unit (B)	GR_1
$T_3 \sim T_4$	Flasher unit (L) ~ Turn signal switch (B)	GL_1
$T_5 \sim T_6$	Turn signal switch (FR) ~ Front turn signal light (R)	GY_1
$T_7 \sim T_8$	Turn signal switch (FL) ~ Front turn signal light (L)	GO_1
$T_9 \sim T_{10}$	Turn signal switch (RR) ~ Rear turn signal light (R)	GY_1
$T_{11} \sim T_{12}$	Turn signal switch (RL) ~ Rear turn signal light (L)	GO_1
$T_1 \sim U_1$	Fuse box load side ~ Voltage regulator (IG)	WR_1
$V_1 \sim V_2$	Alternator (F) ~ Voltage regulator (F)	WG_1
$V_3 \sim V_4$	Alternator (E) ~ Voltage regulator (E)	WB_1
$V_4 \sim G_9$	Voltage regulator (E) ~ Heater (E)	WB_1
$Z_1 \sim W_1$	$J_1 \sim J_2$ connected ~ Back-up light switch	RL_1
$W_2 \sim W_3$	Back-up light switch ~ Back-up light connected	RL_1

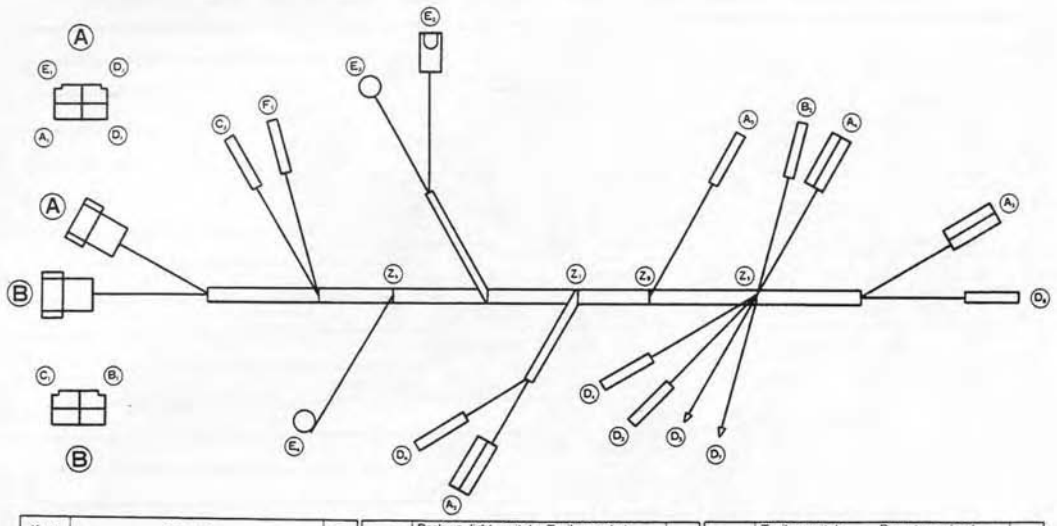
FRONT END WIRE HARNESS (FJ40, 40L, 43, 43L, 45 & 45LV)



FRONT END WIRE HARNESS (FJ40, 40L, 43, 43L, 45 & 45LV)

Keys	Connections	Coller
$A_1 \sim A_2$	Lighting switch (H) ~ Dimmer switch (B)	RW_1
$A_3 \sim A_4$	Dimmer switch (I) ~ Headlight high beam (Right)	RY_1
$A_3 \sim A_5$	Dimmer switch (I) ~ High beam indicator light	RY_1
$A_6 \sim A_7$	Dimmer switch (2) ~ Head light low beam (Right)	RG_1
$B_1 \sim B_2$	Lighting switch (P) ~ Parking light (Right)	GB_1
$C_1 \sim C_2$	Lighting switch (T) ~ Tail light connction	G
$D_1 \sim D_2$	Lighting switch (M) ~ Meter pilot light	RB_1
$R_1 \sim R_2$	Fuse box load side ~ Lighting switch (B)	R
$Z_3 \sim E_1$	$R_1 \sim R_2$ connected ~ Stop light switch	GW_1
$E_2 \sim E_3$	Stop light switch ~ Turn signal light switch	GW_1
$F_1 \sim F_2$	Heat gauge ~ Heat gauge unit	YG_1
$G_1 \sim G_2$	Fuse box load side ~ Wiper Witch (B)	L
$H_1 \sim H_2$	Ignition switch (ST) ~ Starter magnet	BW_1
$H_3 \sim H_4$	Ignition switch (IG) ~ Ignition coil	BY_1
$H_3 \sim H_5$	Ignition switch (IG) ~ Fuse box battery side	G
$I_1 \sim I_2$	Starter ~ Ammeter (+)	W
$I_3 \sim I_4$	Ammeter (—) ~ Alternator (B)	WL_1
$Z_5 \sim P_1$	$I_3 \sim I_4$ connected ~ Fuse box battery side	WL_1
$Z_2 \sim O_8$	$O_1 \sim O_2$ connected ~ Cigarette Lighter	RB_1
$Z_4 \sim I_5$	$I_3 \sim I_4$ connected ~ Ignition switch (AM)	BR_1
$O_1 \sim O_2$	Fuse box load side ~ Horn relay (B)	GY_1
$O_3 \sim O_4$	Horn relay (H) ~ Horn	GW_1
$O_3 \sim O_5$	Horn relay (H) ~ Horn	GW_1
$O_6 \sim O_7$	Horn relay (S) ~ Horn button	GR_1
$Z_1 \sim Q_1$	$O_1 \sim O_2$ connected ~ Inspection light socket	RW_1
$S_1 \sim S_2$	Oil pressure gauge ~ Oil pressure gauge unit	YB_1
$T_1 \sim T_2$	Fuse box load side ~ Flasher unit (B)	GR_1
$T_3 \sim T_4$	Flasher unit (L) ~ Turn signal switch (B)	GL_1
$T_5 \sim T_6$	Tum signal switch (FR) ~ Front turn sighal light (Right)	GY_1
$T_7 \sim T_8$	Turn signal switch (FL) ~ Front turn signal light (Left)	GO_1
$T_9 \sim T_{10}$	Turn signal switch (RR) ~ Rear combination light (Right)	GY_1
$T_{11} \sim T_{12}$	Turn signal switch (RL) ~ Rear combination light (Left)	GO_1
$K_1 \sim K_2$	Fuel gauge (TANK) ~ Gauge unit connection	YR_1
$J_1 \sim J_2$	Fuse box load side ~ Meter (B)	Y
$Z_3 \sim J_3$	$J_1 \sim J_2$ connected ~ Transfer indicator light	GY_1
$J_4 \sim J_5$	Transfer indicator light ~ Indicator switch	GY_1
$T_1 \sim V_1$	Fuse box load side ~ Voltage regnlator (IG)	WR_1
$V_1 \sim V_2$	Alternator (F) ~ Voltage regulator (F)	WG_1
$V_3 \sim V_4$	Alternator (E) ~ Voltage regulator (E)	WB_1
$G_1 \sim G_4$	Fuse box load side ~ Heater switch (B)	LR_1
$G_5 \sim G_6$	Heater switch (H) ~ Heater (H)	LB_1
$G_7 \sim G_8$	Heater switch (L) ~ Heater (L)	LW_1
$V_4 \sim G_9$	Voltage regulator (E) ~ Heater (E)	WB_1
$Z_3 \sim G_{10}$	$G_1 \sim G_4$ connected ~ Rear seat heater (B)	LR_1
$Z_3 \sim W_1$	$J_1 \sim J_2$ connected ~ Back-up light switch	RL_1
$W_2 \sim W_3$	Back-up light switch ~ Back-up light connected	RL_1

CHASSIS WIRE HARNESS (FJ40, 40L, 40V, & 40LV)



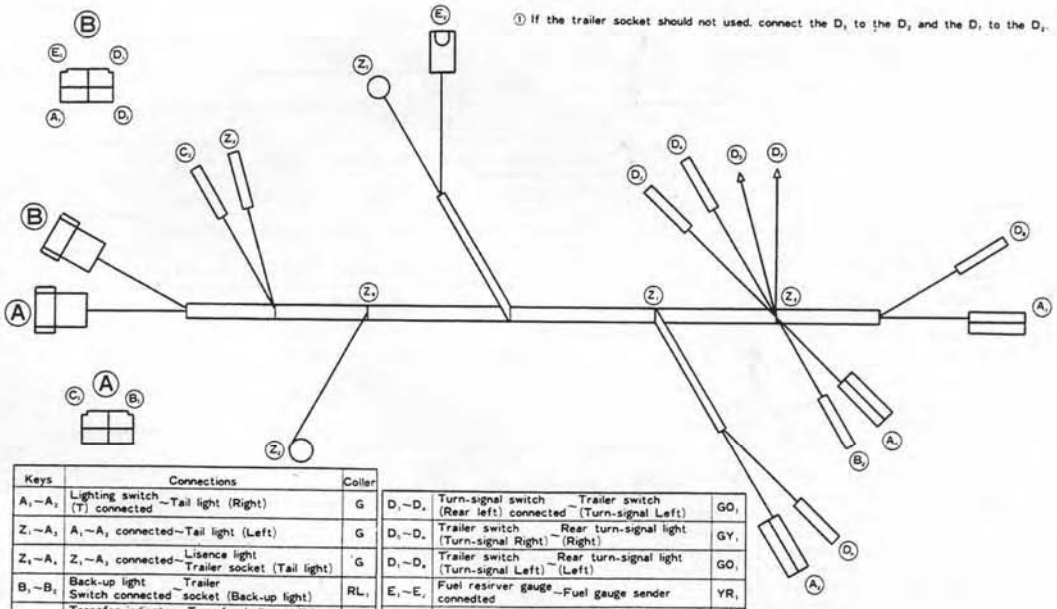
Keys	Connections	Collor
A_1~A_2	Lighting switch (T) connected~Tail light (Right)	G
Z_1~A_1	A_1~A_2 connected~Tail light (Left)	G
Z_4~A_4	Z_1~A_4 connected~License light / Trailer socket	G
Z_4~A_3	Z_1~A_3 connected~License light	G

B_1~B_2	Back-up light switch connected~Trailer socket (Back light)	RL_1
C_1~C_2	Transfer indicator light connected~Transfer indicator light switch	GY_1
D_1~D_3	Turn-signal switch (Rear right)~Trailer switch (Turn-signal Right)	GY_1
D_2~D_4	Turn-signal switch (Rear left)~Trailer switch (Turn-signal Left)	GO_1
D_3~D_5	Trailer switch (Turn-signal Right)~Rear turn-signal light ((Right)	GY_1

D_4~D_6	Trailer switch (Turn-signal Left)~Rear turn-signal light (Left)	GO_1
E_1~E_2	Fuel gauge resirver connected~Fuel guge sender	YR_1
E_3~E_4	Fuel gauge sender ground~Body ground	WB_1
Z_4~F_1	E_2~E_4 connected~Transfer indicator light switch	WB_1

Y 2081

CHASSIS WIRE HARNESS (FJ45V & 45LV)



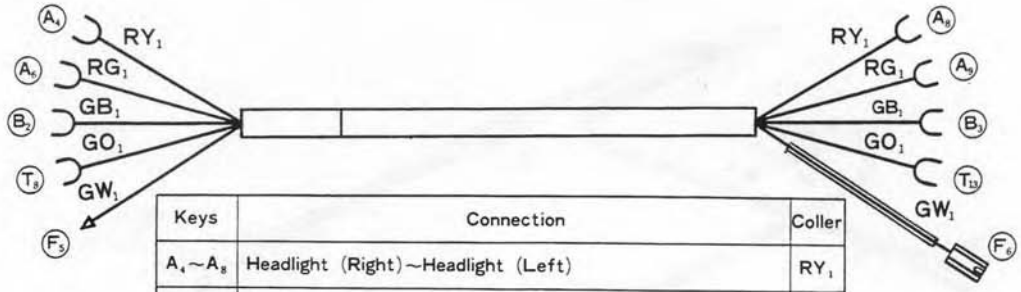
① If the trailer socket should not used. connect the D_1 to the D_3 and the D_2 to the D_4.

Keys	Connections	Collor
A_1~A_2	Lighting switch (T) connected~Tail light (Right)	G
Z_1~A_1	A_1~A_2 connected~Tail light (Left)	G
Z_4~A_4	Z_1~A_4 connected~Lisence light / Trailer socket (Tail light)	G
B_1~B_2	Back-up light Switch connected~Trailer socket (Back-up light)	RL_1
C_1~C_2	Transfer indicator light connected~Transfer indicator light switch	GY_1
D_1~D_3	Turn-signal switch (Rear right) connected~Trailer switch (Turn-signal Right)	GY_1

D_2~D_4	Turn-signal switch (Rear left) connected~Trailer switch (Turn-signal Left)	GO_1
D_3~D_5	Trailer switch (Turn-signal Right)~Rear turn-signal light (Right)	GY_1
D_4~D_6	Trailer switch (Turn-signal Left)~Rear turn-signal light (Left)	GO_1
E_1~E_2	Fuel resirver gauge connedted~Fuel gauge sender	YR_1
Z_1~Z_2	Fuel gauge sender ground~Body ground	WB_1
Z_4~Z_3	Z_1~Z_3 connected~Transfer indicator light switch	WB_1

Y 2082

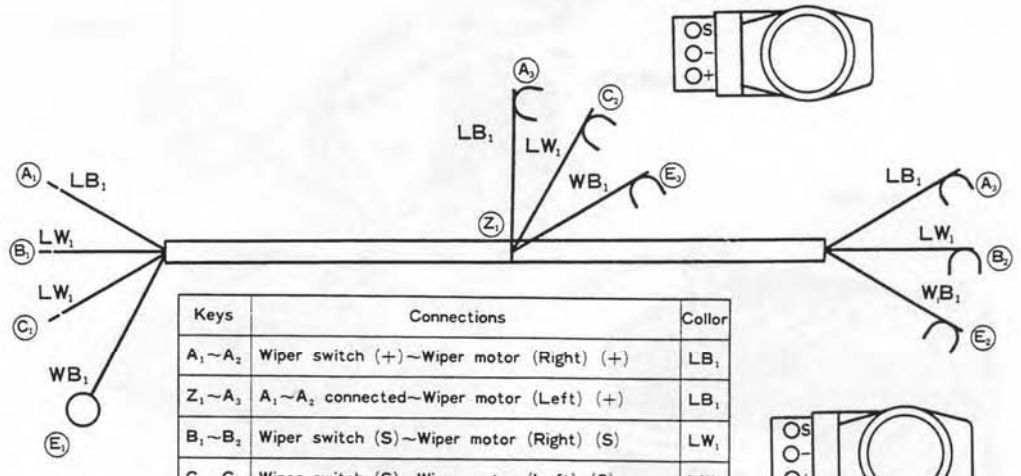
WIPER MOTOR (FJ40, 40L, 43L, 45, 45LV)



Keys	Connection	Coller
$A_4 \sim A_8$	Headlight (Right) ~ Headlight (Left)	RY_1
$A_6 \sim A_9$	Headlight low beam (Right) ~ Headlight low beam (Left)	RG_1
$B_2 \sim B_3$	Parking light (Right) ~ Parking light (Left)	GB_1
$T_8 \sim T_{13}$	Turn-signal connected ~ Front turn-signal light (Left)	GO_1
$F_5 \sim F_6$	Horn (Left) connected ~ Horn (Left)	GW_1

X 4785

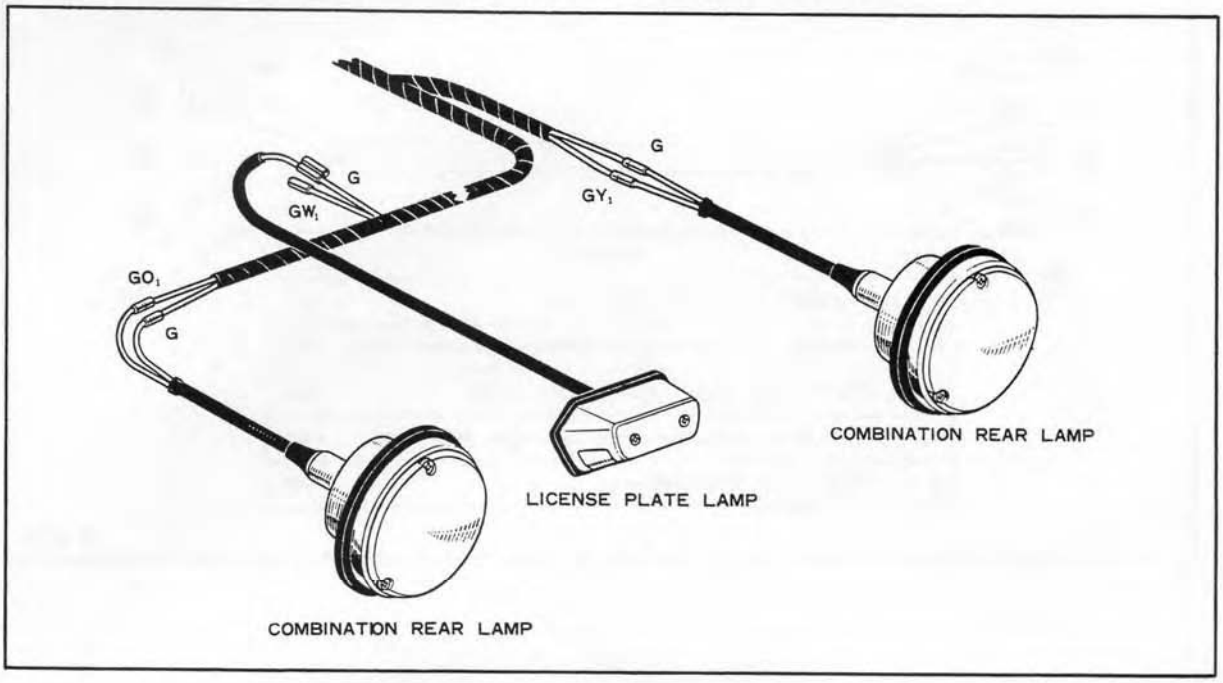
WIPER SIDE WIRE HARNESS (FJ40, 40L, 43 & 43L)



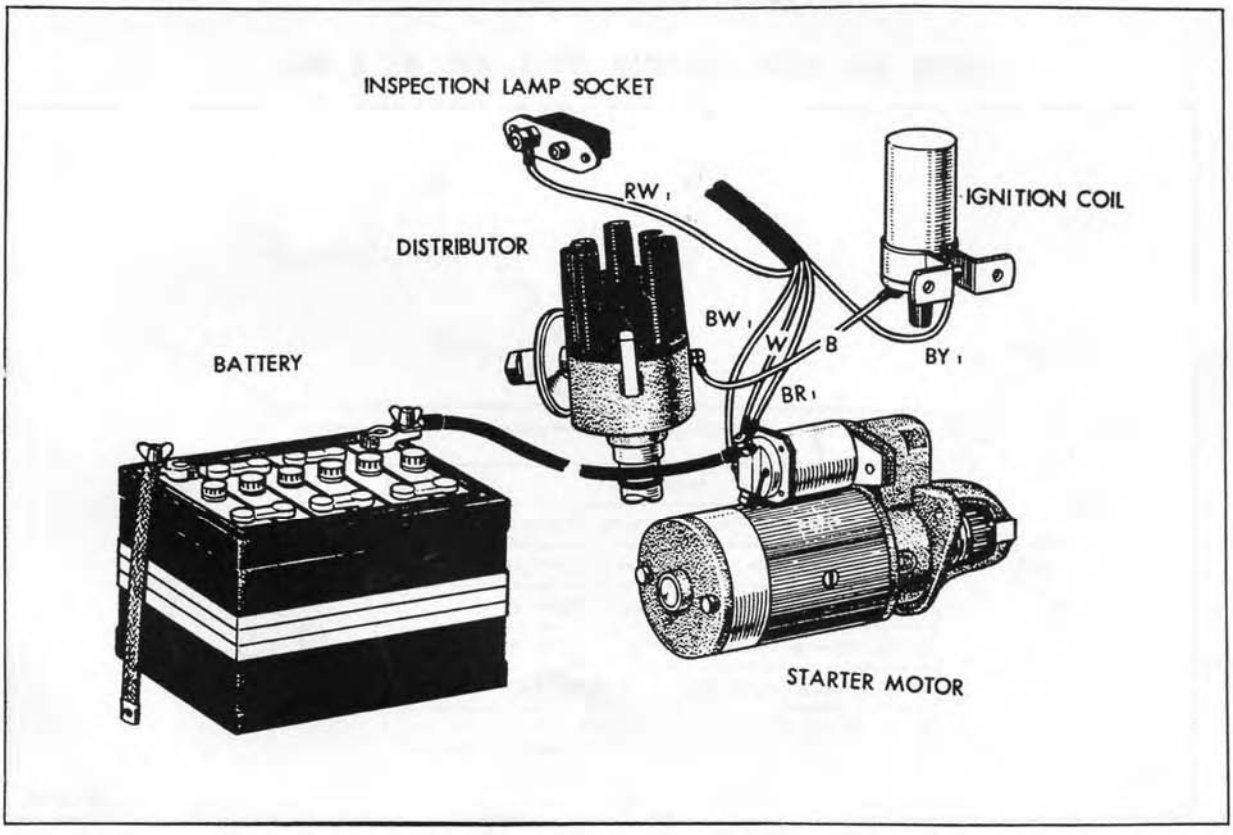
Keys	Connections	Collor
$A_1 \sim A_2$	Wiper switch (+) ~ Wiper motor (Right) (+)	LB_1
$Z_1 \sim A_3$	$A_1 \sim A_2$ connected ~ Wiper motor (Left) (+)	LB_1
$B_1 \sim B_2$	Wiper switch (S) ~ Wiper motor (Right) (S)	LW_1
$C_1 \sim C_2$	Wiper switch (S) ~ Wiper motor (Left) (S)	LW_1
$E_1 \sim E_2$	Body grounded ~ Wiper motor (Right) (−)	WB_1
$Z_1 \sim E_3$	$E_1 \sim E_2$ connected ~ Wiper motor (Left) (−)	WB_1

X 4786

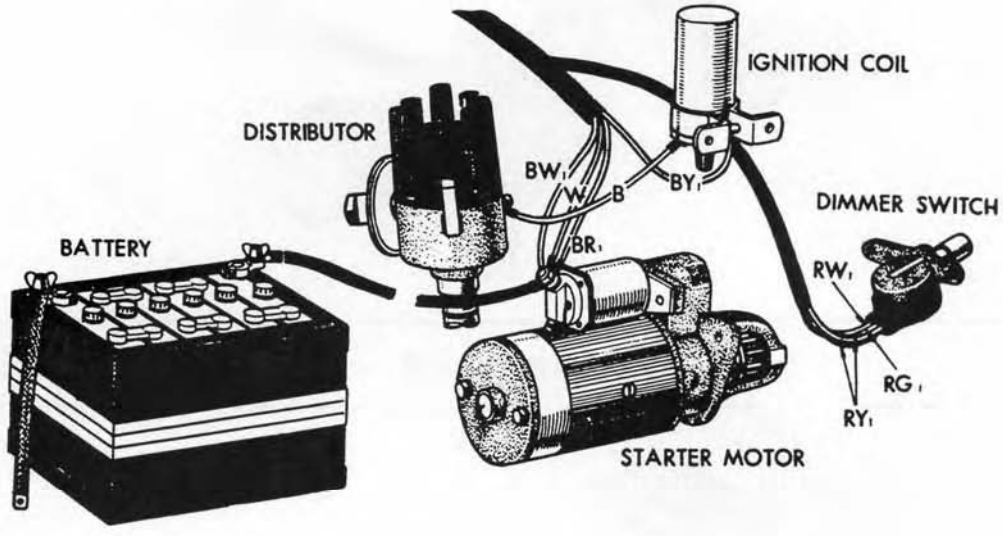
LICENSE LAMP & COMBINATION REAR LAMP



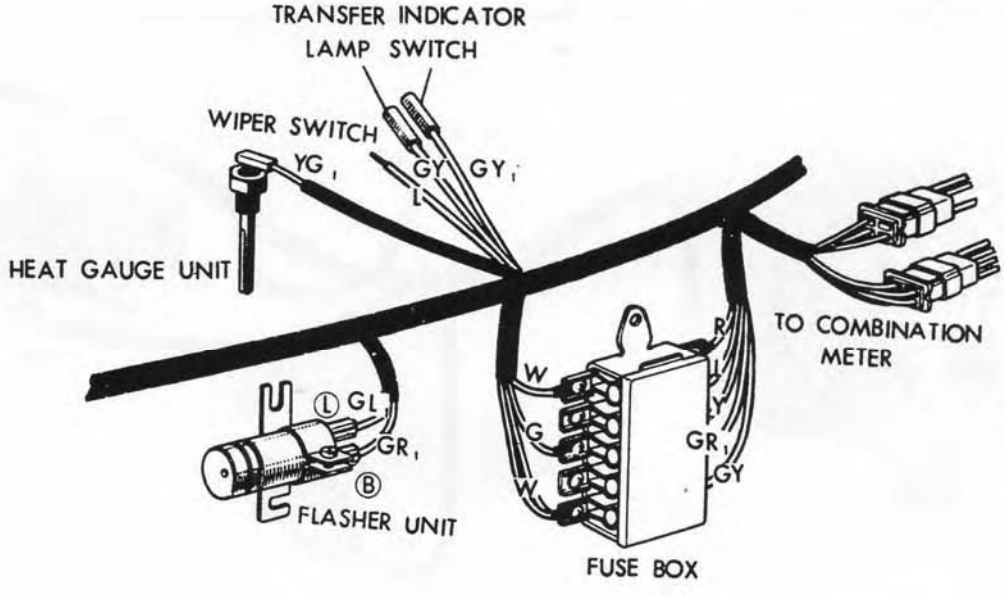
BATTERY, STARTER & DISTRIBUTOR (L.H.)



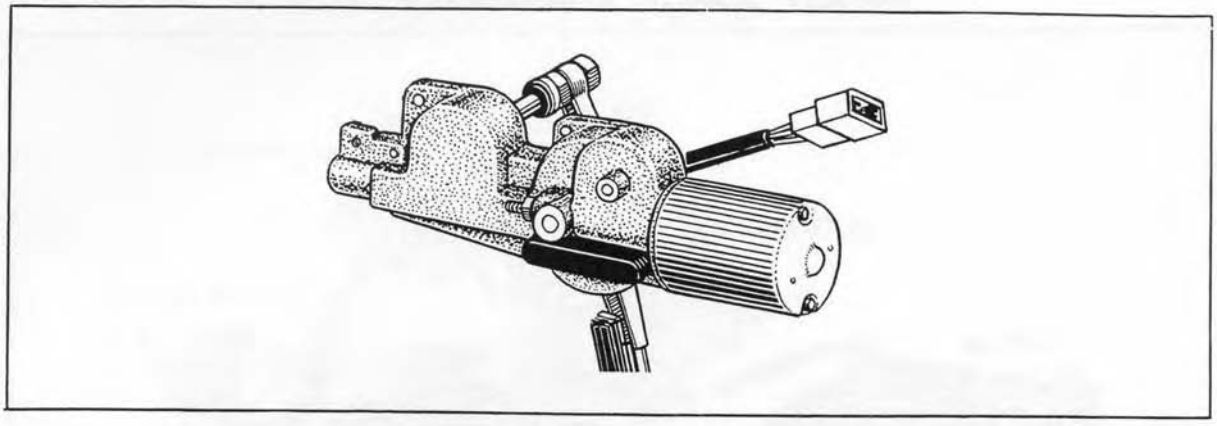
BATTERY, STARTER, & DISTRIBUTOR (R.H.)



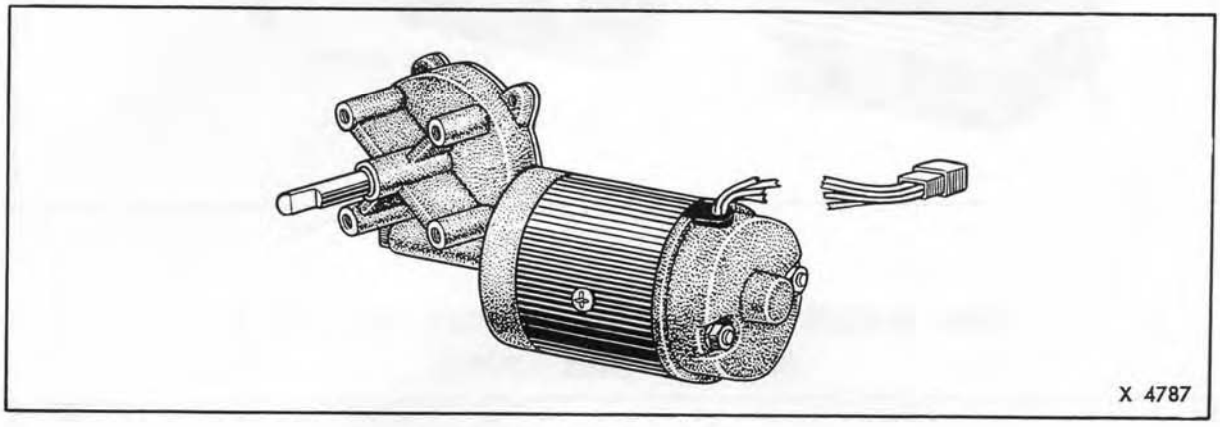
FUSE, FLASHER UNIT, HEAT GAUSE UNIT, & TRANSFER INDICATOR LAMP SWITCH



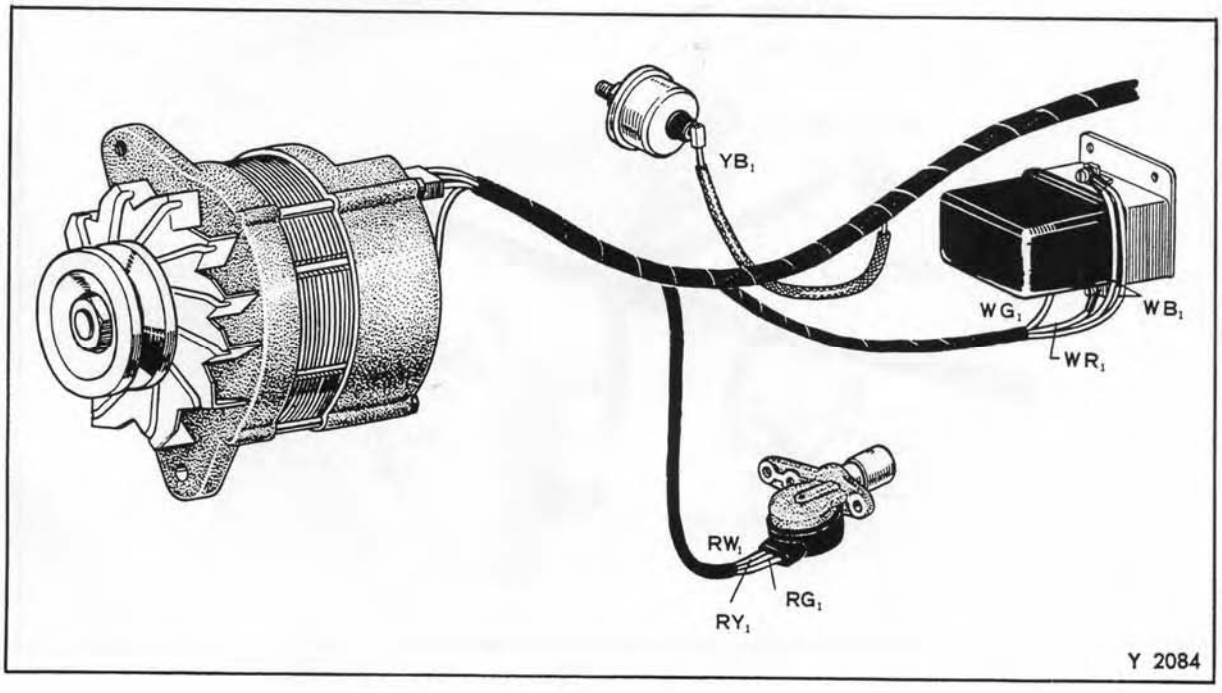
WIPER MOTOR (FJ40, 40L)



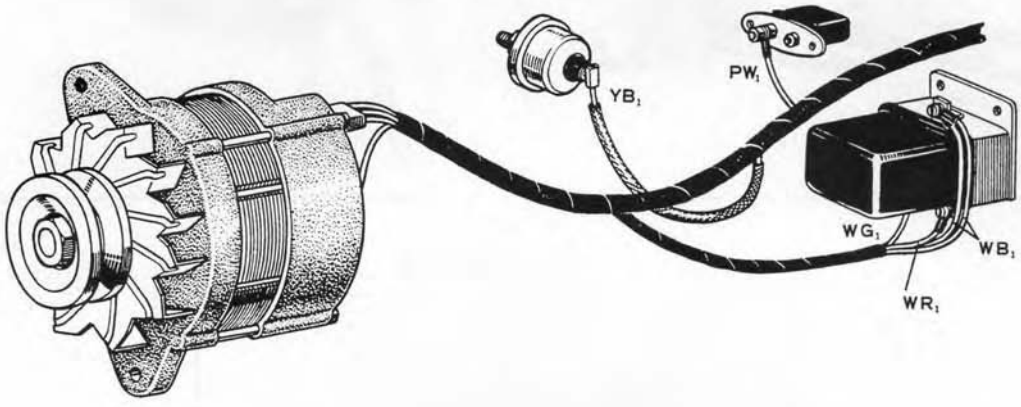
WIPER MOTOR



GENERATOR & REGULATOR (L.H)

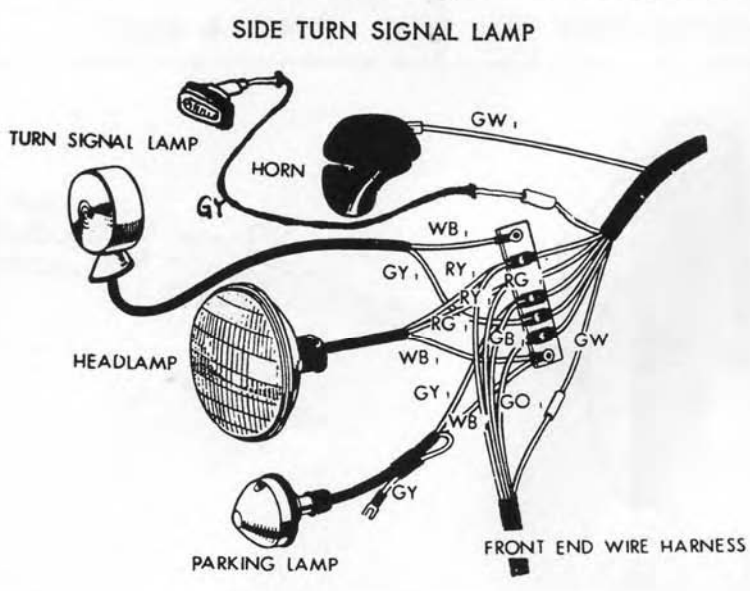


GENERATOR & REGULATOR (R.H.)

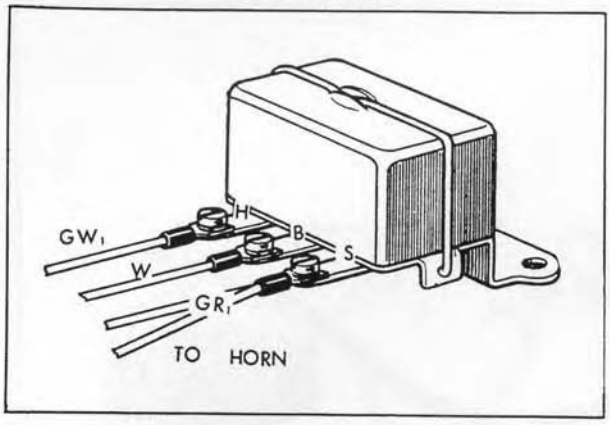


Y 2085

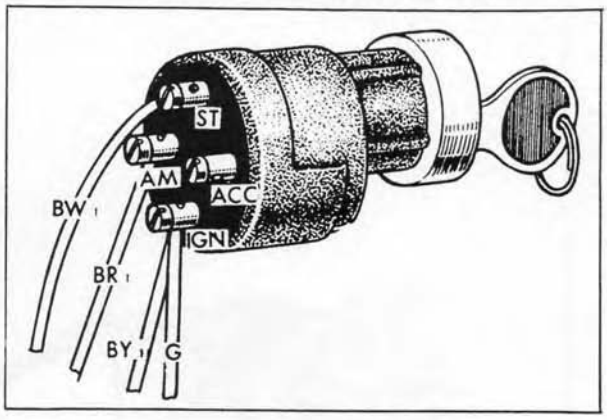
HEADLAMP, TURN SIGNAL LAMP, & HORN



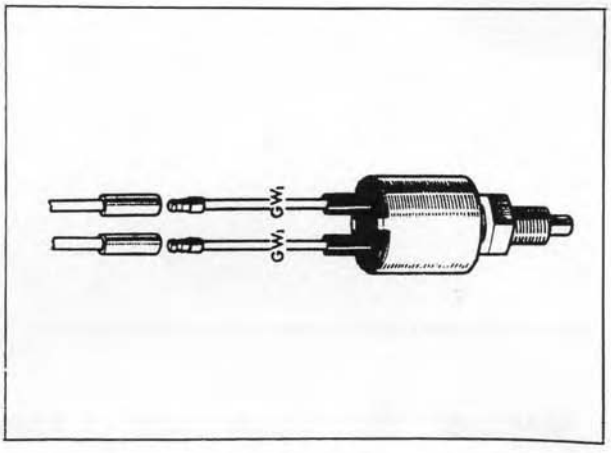
HORN RELAY



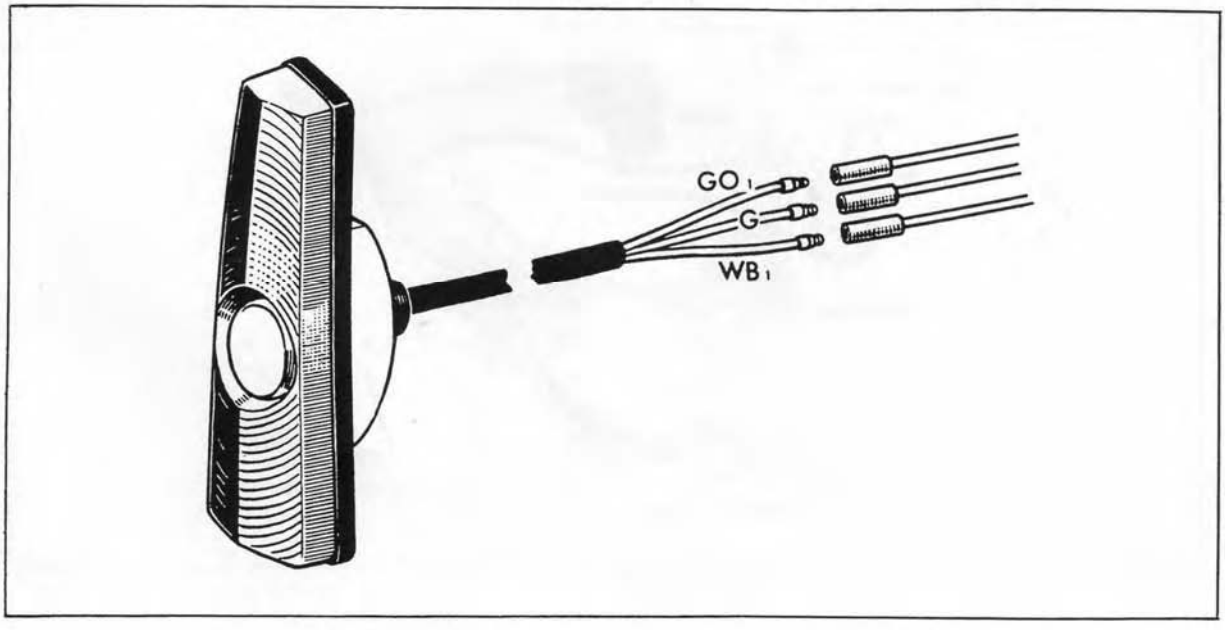
IGNITION & STARTER SWITCH



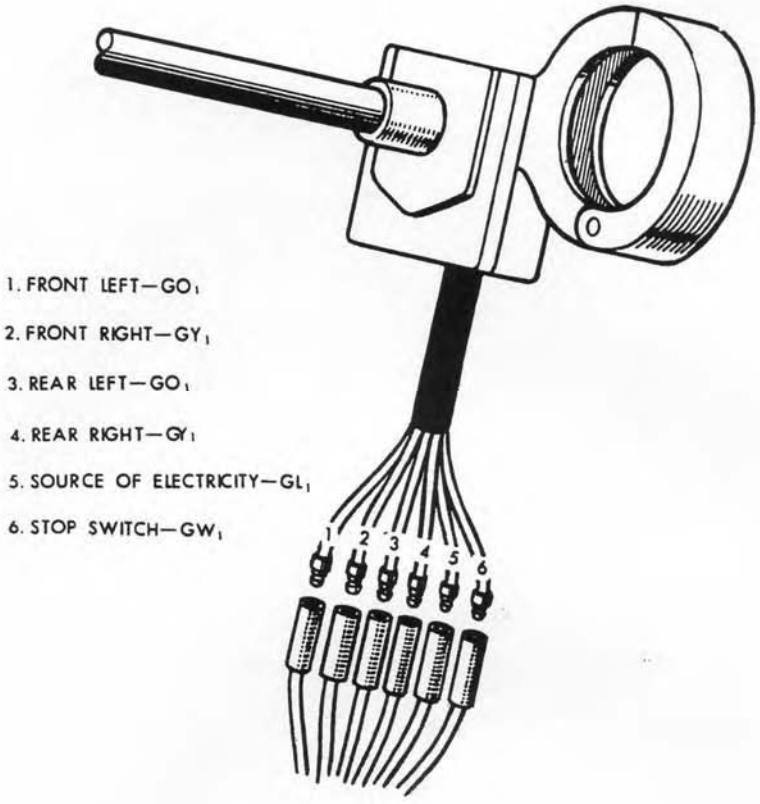
STOP SWITCH



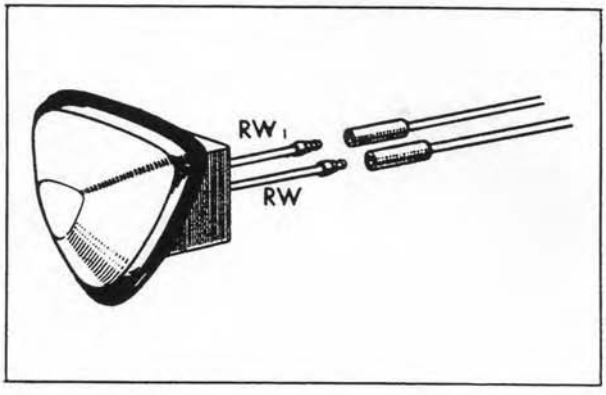
COMBINATION REAR LAMP (FJ45V & 45LV)



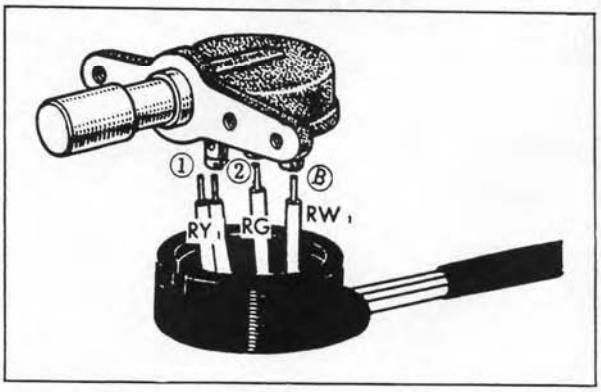
TURN SIGNAL SWITCH



INTERIOR LAMP (FJ45V & 45LV)



DIMMER SWITCH



Group 10

BODY & FRAME

PART I CANVAS TOP

Fig. 10-1. Model FJ40 Canvas Top Type

1 Front Door

The front door can be easily removed by pulling out the hing pins from the door hinges.

DOOR GLASS

To replace the door glass, remove the door bumper rubbers at the bottom ends of the door glass channels.

Then remove the door window set channel.

DOOR HANDLE

To install the door handle, first hook up the door lock spring to the door inside handle and side channel.

Position the door outside handle in place through the hole provided on the door and connect the door inside handle firmly in position by the nuts.

Using proper number of door handle adjusting washers, adjust the operation of the door handle if it latches properly wthout looseness.

The relative positions of the door handles and other parts are as shown on the next parts page.

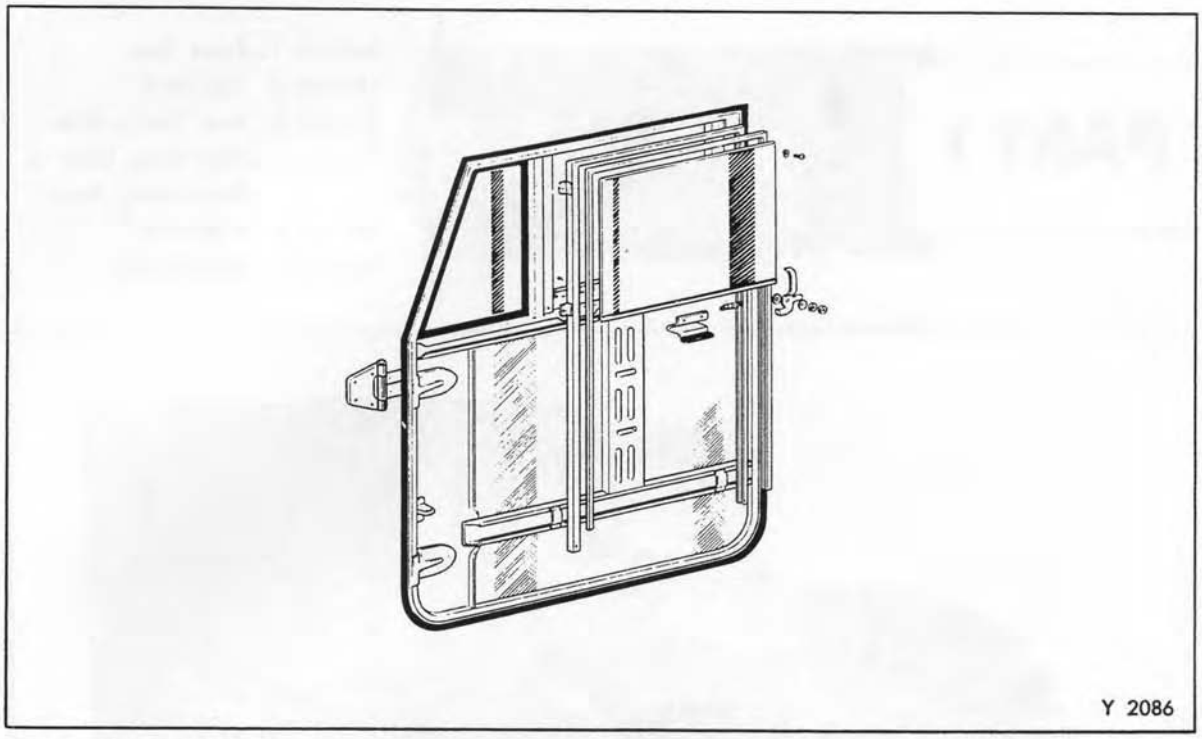


Fig. 10-2. Front Door

2 Top Bow

Two types of top bows, A type and B type, are available. In case the top bow is to be replaced, remove the canvas top and side curtain assemblies.

The top bow can be removed by loosening the attaching bolts and nuts as shown in the following figures.

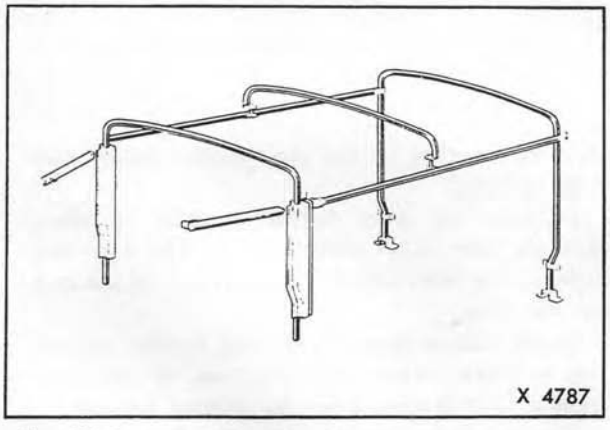


Fig. 10-3. A Type Top Bow

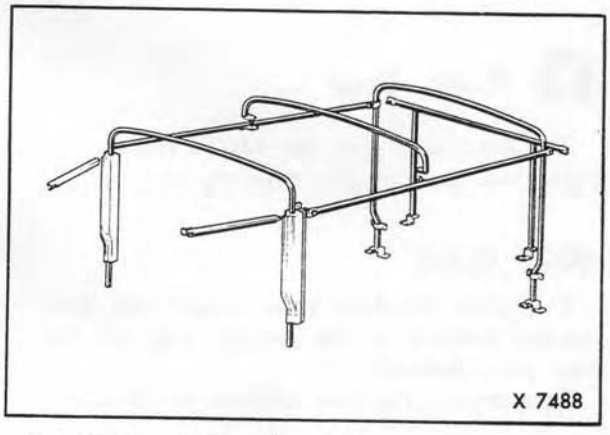


Fig. 10-4. B Type Top Bow

3 Rear Swing Gate

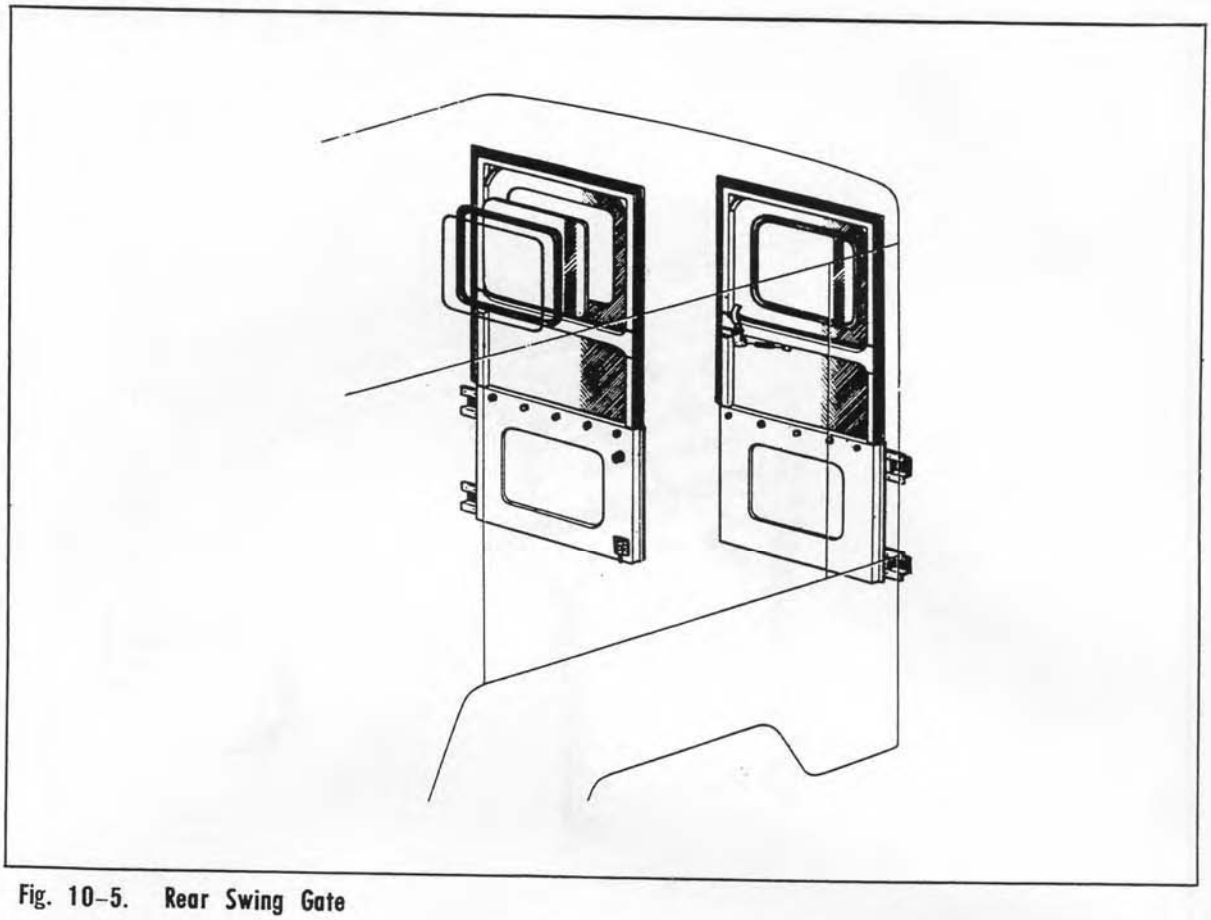


Fig. 10-5. Rear Swing Gate

4 Rear Drop Gate & Rear Swing Door

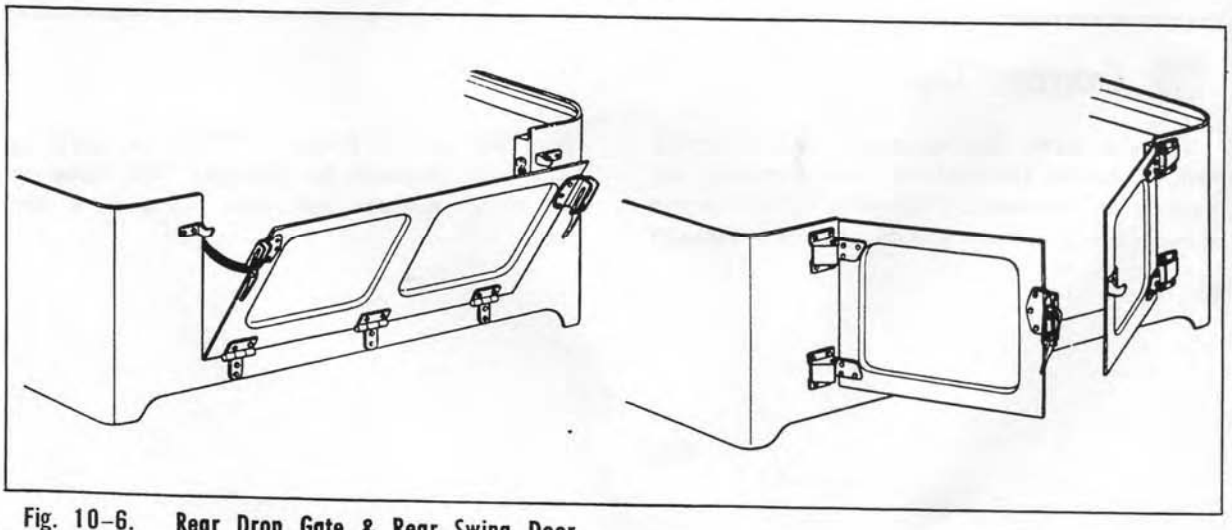


Fig. 10-6. Rear Drop Gate & Rear Swing Door

5 Ventilator

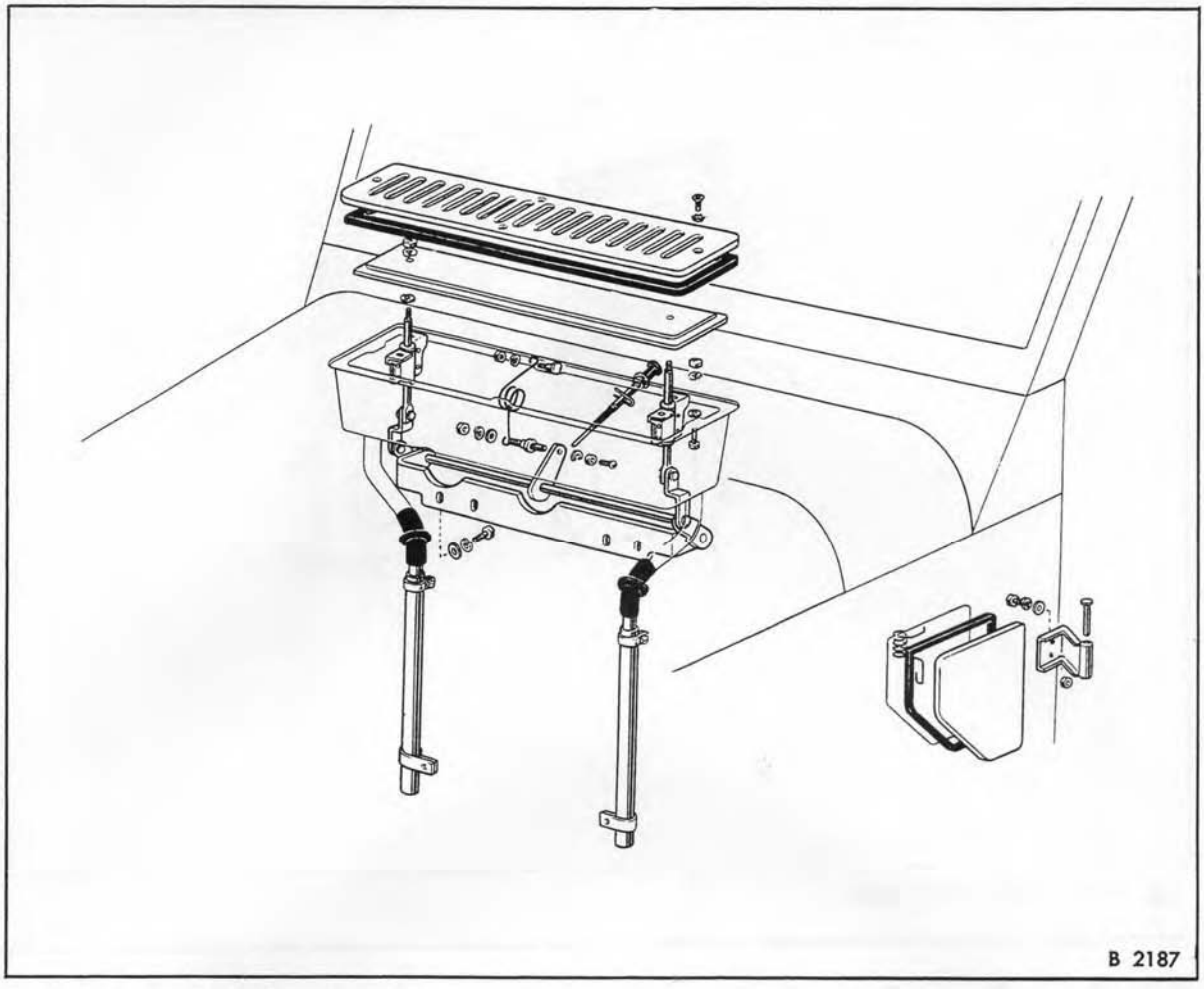


Fig. 10-7. Front Window Ventilator

6 Canvans Top

The top cover, side curtains, and rear curtain can be easily replaced by disconnecting the backles and fasteners. When installing the top cover, slide the front end of the cover through the front window frame. When the curtains have been removed for storage, fold them in an orderly manner and store them in a dry place.

PART II HARD TOP

Fig. 10-8. Hard Top Model FJ40V

1 Front Door

VENTILATOR WINDOW GLASS REPLACEMENT

To replace the window glass, remove out the ventilating window handle set pin from the ventilating window handle.

Loosen and remove the ventilating window lock handle shaft nut, and remove the ventilating window lock handle shaft from the ventilating window glass frame.

Remove the ventilating window glass from the glass frame.

To install the window glass, reverse the above procedures.

DOOR LOCK REPLACEMENT

1. Remove the nuts and spring lock washer at the front door inside handle. Then, pull out the door outside handle.
2. Remove the door lock base plate by removing the four attaching screws. The door lock key and its related parts can be easily disassembled.
3. To install, reverse the above procedures.

WINDOW GLASS AND WINDOW GLASS REGULATOR

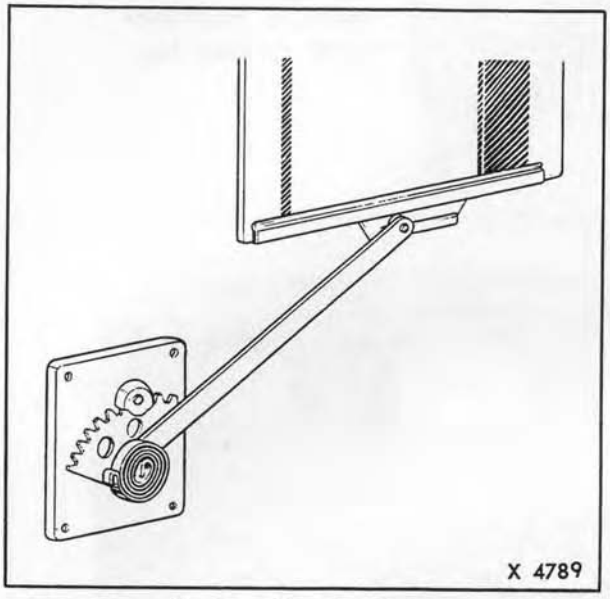


Fig. 10-9. Window Glass Regulator

Removal

1. Remove the weatherstrip from the window frame.
2. Remove the door window frame with the window glass out of the door by removing the window frame retaining bolts.
3. Remove the door glass from the door window frame.
4. Remove the door glass channel from the window glass.
5. Remove the door window regulator handle by removing the four attaching screws.
6. Remove the window regulator out of the door.

Installation

1. Position the window regulator into the door, then install the window regulator handle by installing and tightening the four screws.
2. Attach the door glass channel insert to the glass and put the glass to the door glass channel. Then carefully aligning the roller guide on the glass channel to the roller at the end of the regulator bar, install the glass and frame into the door.
3. Install the door frame attaching bolts. Then check the operation of the window regulator.
4. Install the weatherstrip onto the window frame using a weatherstrip cement.

2 Hard Top

The hard top roof and side panels can be removed depending upon the usage of the vehicle.

To remove the roof assembly, remove the attaching screws. After removing the roof assembly, remove the side panels by loosening the attaching screws and lifting the front end of the panel.

The fiberglas reinforced plastic is used on the Hard Top and the method of the plastic body repair procedures is entirely different from the conventional pressed steel body repairs.

PART III

STATION WAGON & PICK-UP

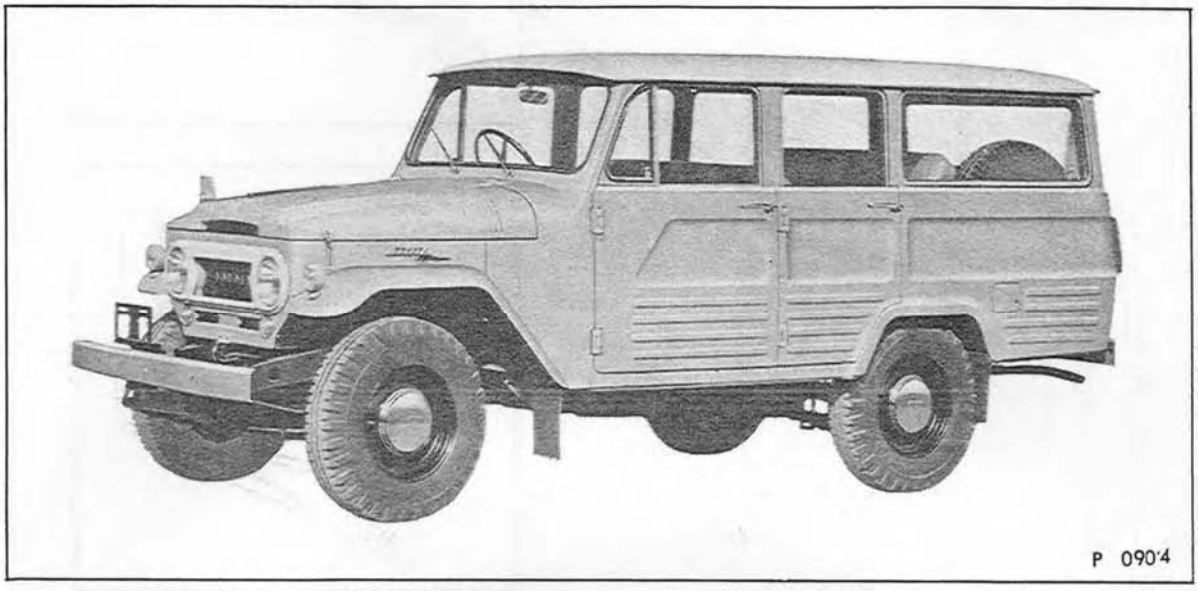


Fig. 10–10. Station Wagon Model FJ45V

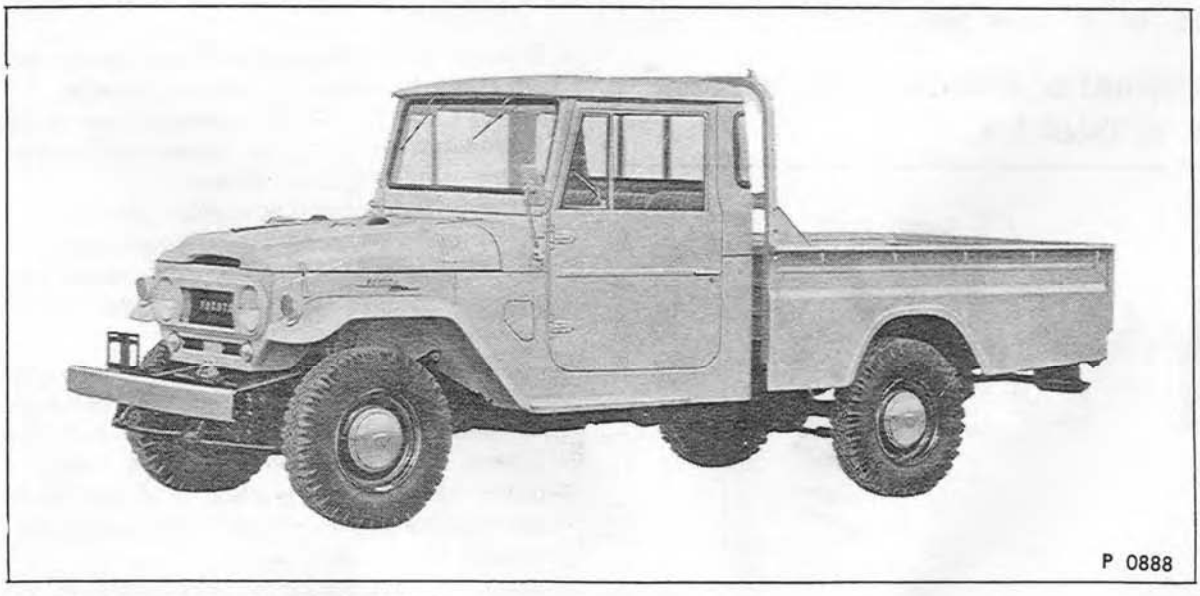


Fig. 10–11. Pick-up Model FJ45(L)P-B

1 Front Door (FJ45V & 45V)

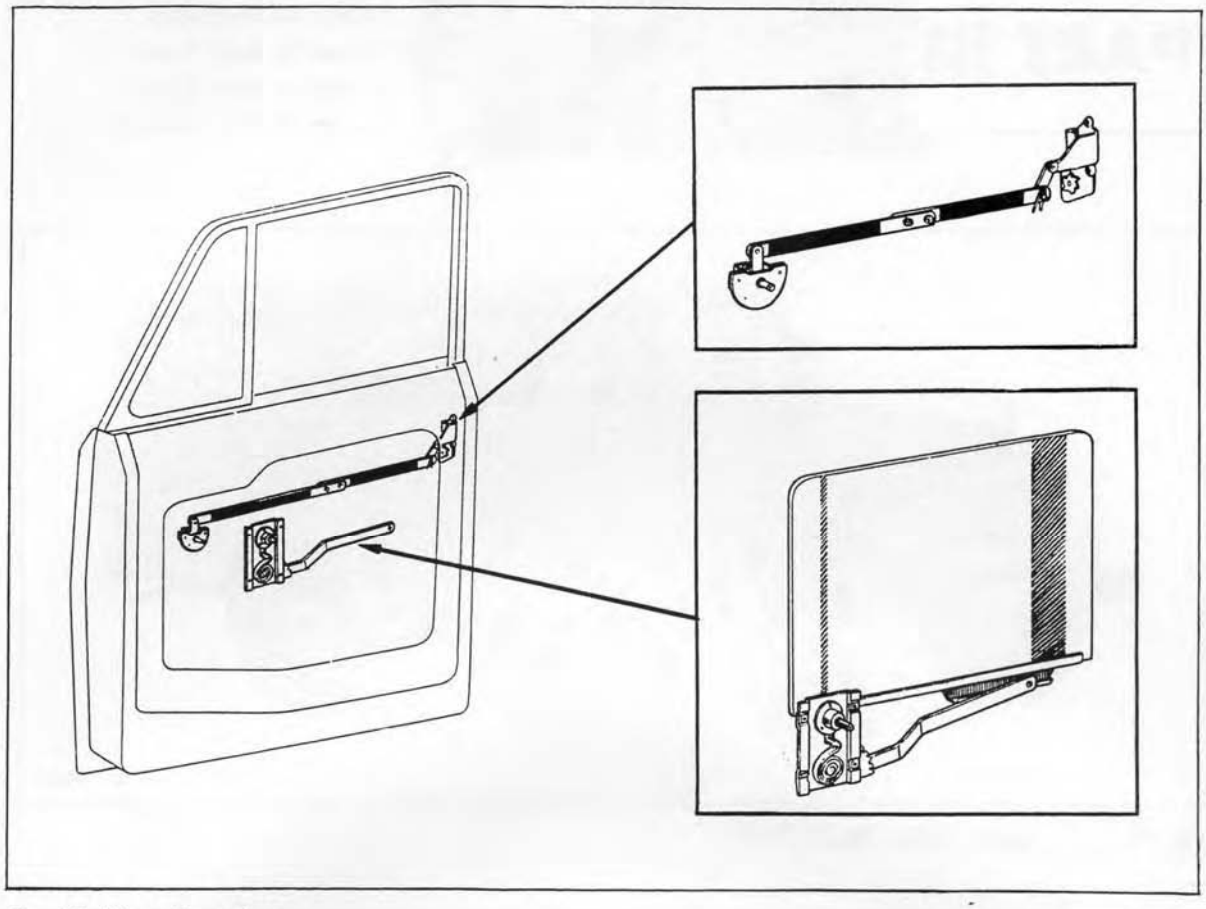


Fig. 10-12. Front Door

VENTILATOR WINDOW GLASS REMOVAL & INSTALLATION

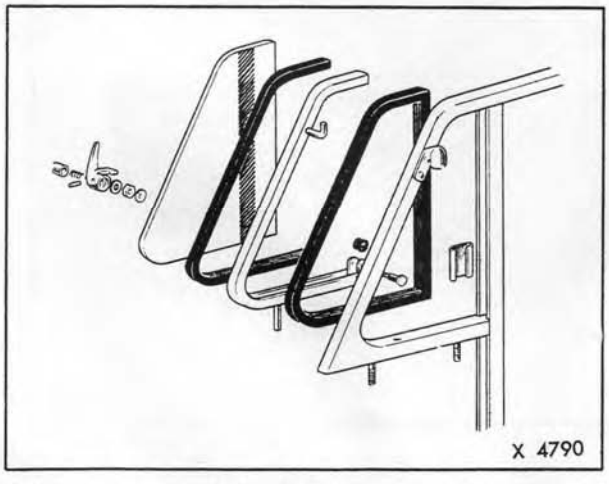


Fig. 10-13. Ventilator Window (FJ45V)

1. Remove the ventilating window handle set pin from the ventilating window handle.
2. Remove the ventilating window glass with ventilating window glass rubber and ventilating window frame attached.
3. Remove the ventilating window glass.
4. To install, first clean off old sealer from the ventilating window frame and ventilating window glass rubber, and install the rubber round the frame.
5. Coating glass adhesive in the ventilating window glass rubber attache the rubber to the glass and then install the glass into the frame. Then clean off the excess sealer.
6. Install the ventilating window handle shaft and relative parts, and install the ventilating window handle shaft set pin.
7. Install the ventilating window assembly to the front door glass channel.

DOOR WINDOW GLASS, WINDOW REGULATOR & DOOR LOCK

Removal

1. Remove the window regulator handle and the door inside handle using the Door Inside Handle Pin Remover.

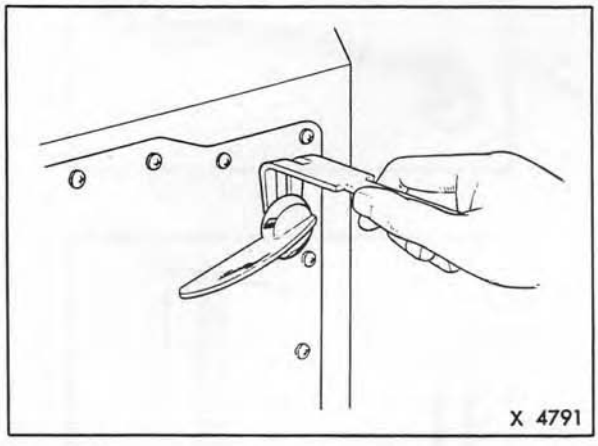


Fig. 10-14. Door Inside Handle Removal

2. Remove the door trim board.
3. Remove the vinyl sheet pasted on the inside of the door.
4. Remove the door glass channel by removing the channel set bolts and nuts.

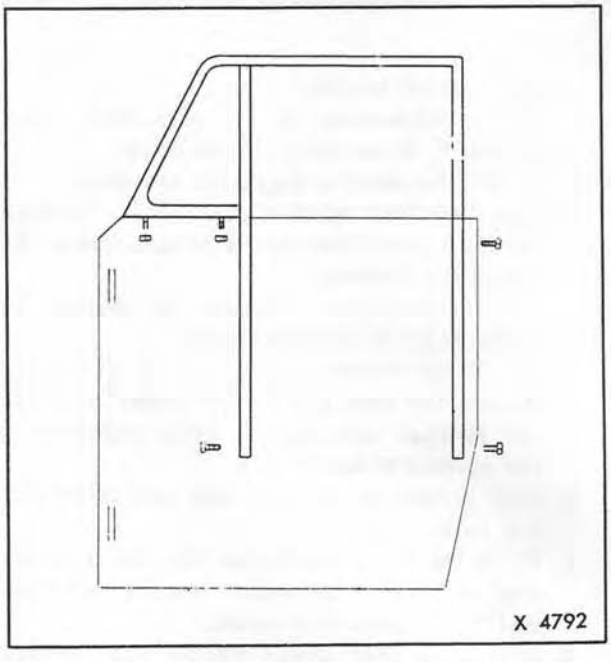


Fig. 10-15. Door Glass Channel Set Bolts and Nuts

5. Remove the door window regulator by removing the attaching bolts and sliding off the door glass skirt holder.
6. Remove the door glass skirt holder and door glass cleaner rubber and take out the door glass by pulling upwasd.
7. Disconnect the door lock remote control assembly from the door lock and remove the door lock.
8. Remove the door lock remote control assembly.
9. Remove the door lock outside handle.

Installation

1. Install the door lock and door lock remote control assembly, and also install the door lock outside handle. Adjust the door lock so that the ratchet will turn freely in the unlocked position.
   Install the door inside handle temporarily and adjust the door lock remote control assembly.
   The adjustment can also be made by the adjusting nut of the door lock outside handle to make the ratchet turn freely.
2. Install the door window regulator assembly.
3. Insert the door window glass down through the opening of the door and then insert the door glass channel.
4. Fix the door glass channel in position by tightening the attaching bolts and nuts in five locations.
5. Install the rubber channel to the glass and connect the door glass skirt holder with the end roller of the window glass regulator in the horizontal position.
6. Coat grease on the door lock and other sliding parts.
7. Paste the vinyl sheet over the inside of the door to prevent the water leaking and then install the door trim board.
8. Install the door inside handle and window regulator handle. Do not forget to install the door inside handle pins.

2 Rear Door (FJ45(L)V)

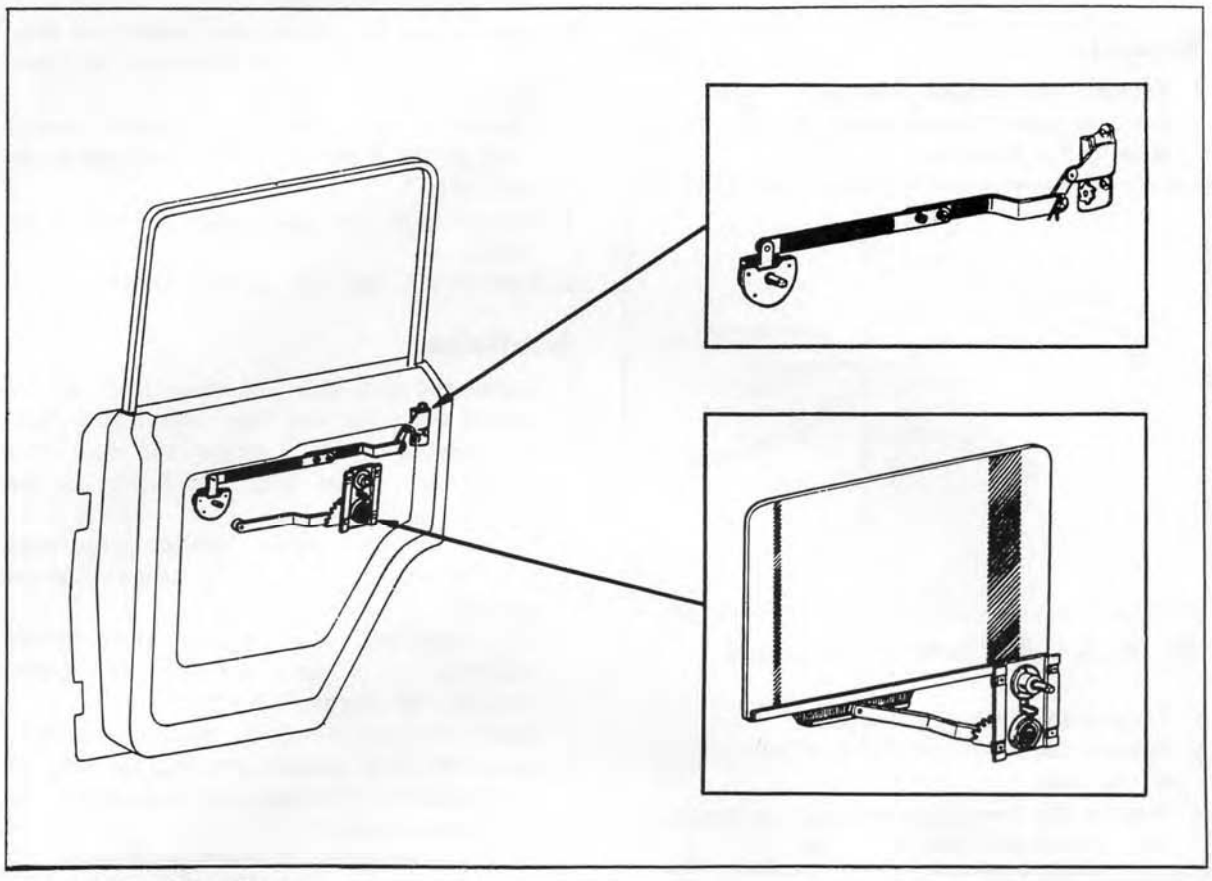


Fig. 10-16. Rear Door

DISASSEMBLY

1. Remove the window regulator handle and the door inside handle using the Door Inside Handle Pin Remover.
2. Remove the door trim board.
3. Remove the door glass channel by removing the channel set bolts.
4. Disconnect and remove the door window regulator off the door glass skirt holder.
5. Remove the door glass skirt holder and door glass cleaner rubber and take out the door glass by pulling upward.
6. Remove the door lock and door lock remote control assembly.
7. Remove the door lock outside handle.

ASSEMBLY

1. Install the door lock and door lock remote control assembly, and also install the door lock outside handle.
   For the adjustment of the door lock, refer Section 1, Front Door, Installation.
2. Install the window regulator assembly.
3. Insert the door window glass down through the opening of the door, and then insert the door glass channel.
4. Fix the door glass channel in position by tightening the attaching bolts.
5. Install the rubber channel to the glass and connect the door glass skirt holder with the end roller of the window glass regulator in the horizontal position.
6. Coat grease on the door lock and other sliding parts.
7. Paste the vinyl sheet over the inside of the door to prevent the water leaking and then install the door trim board.
8. Install the door inside handle and window regulator handle. Do not forget to install the door inside handle pins.

3 Back Door (FJ45(L)V)

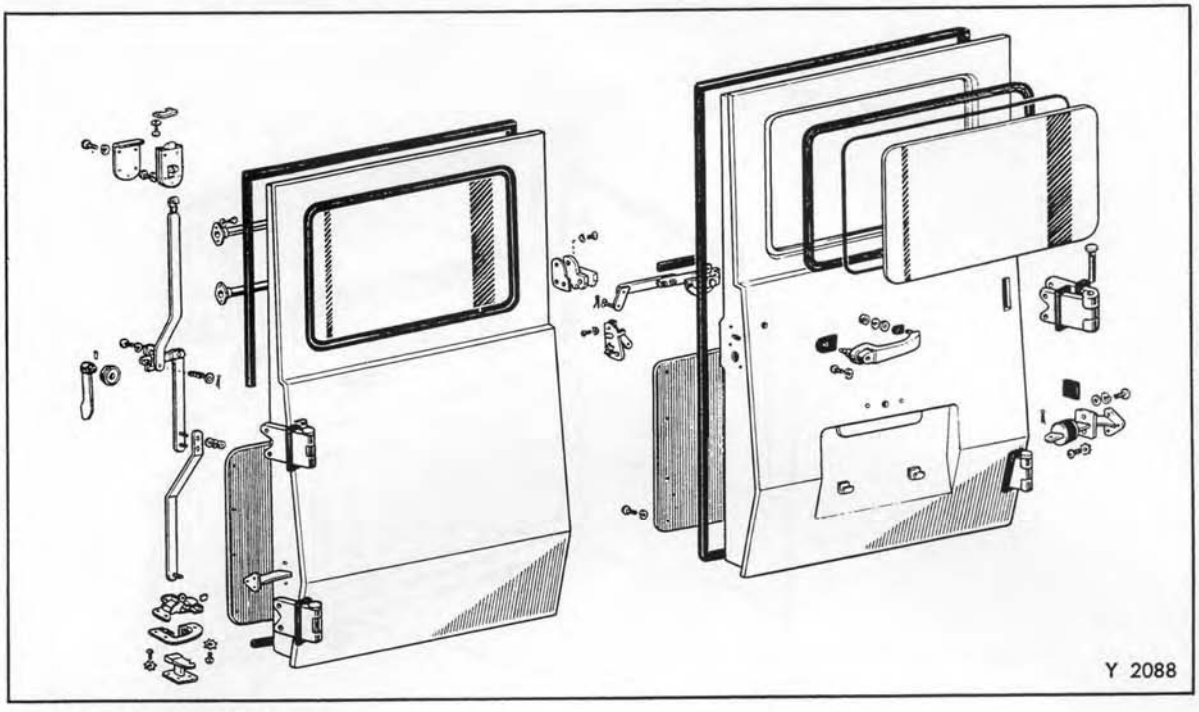


Fig. 10-17. Back Door

DOOR LOCK

1. To remove the door lock, remove the back door inner trim board and disconnect the door lock and door lock remote control assembly.
2. Remove the door lock and door lock remote control assembly.
3. Remove the door lock outside handle.
4 To install, reverse the above procedures.
5. Adjust the door lock remote control connect plate.

4 Rear Gate (FJ45(L)V)

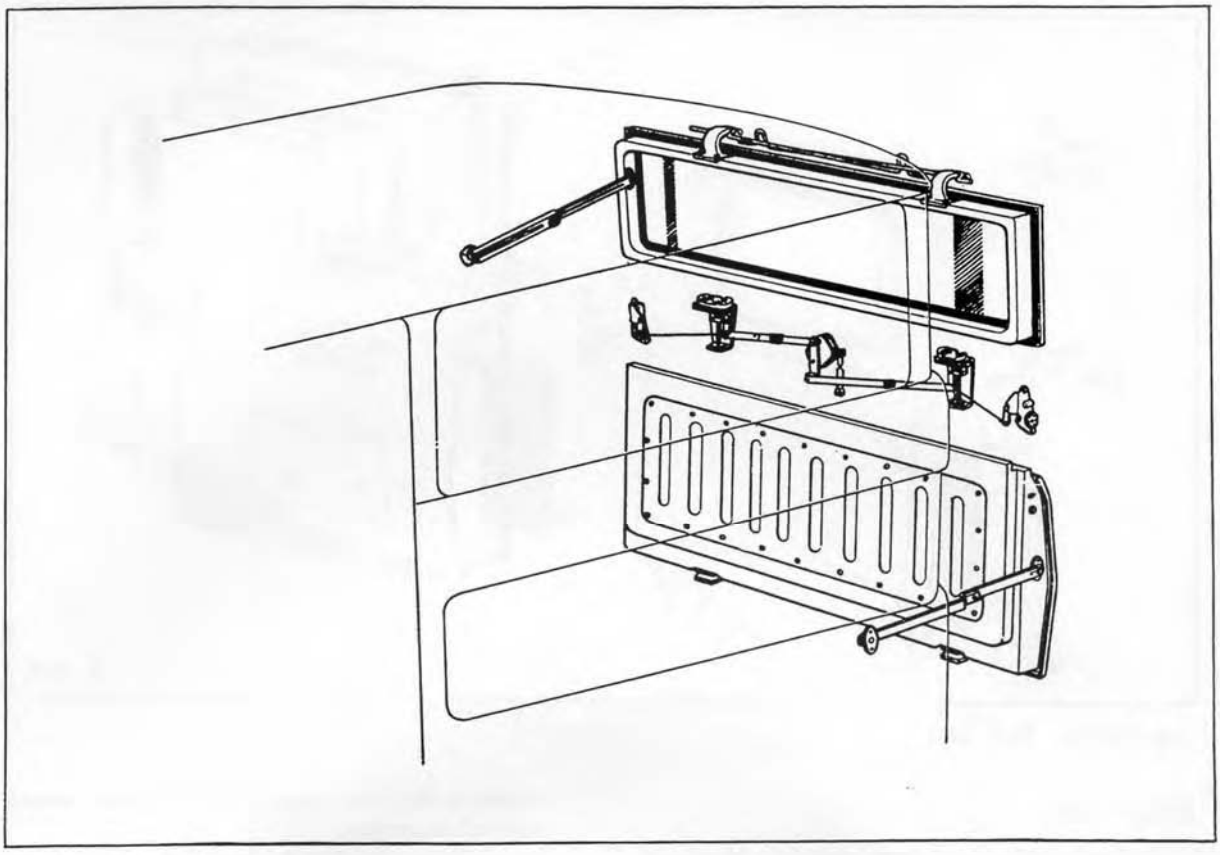


Fig. 10-18. Rear Gate

The rear gate of model FJ45 opens downward and upward as it consists of the tail gate and lift gate. The license and tail gate handle on the tail gate operates in two stages. Pulling the handle halfway unlocks the lift gate to open automatically by the lift gate spring. And pulling the handle fully furthermore unlocks the tail gate lock.

The lift gate is attached with the tail gate stay and when the lift gate is opened fully and lowered slightly, the lift gate is automatically held in open position.

TAIL GATE LOCK REMOTE CONTROL LINKAGE

Removal

1. Open the tail gate and remove the tail gate inner pannel cover.
2. Disconnect the remote control wires and levers.
3. Remove the lift gate locks, remote control lever, and lock assembly. Also remove the tail gate handle.

Installation and Adjustment

1. Install the tail gate handle.
2. Install the right and left lock assemblies.
3. Install the remote control levers and lift gate locks.
4. Install the remote control wires and remote control rod.
5. Adjust the operation of the lift gate lock catch by the elongated hole of the remote control rod as shown in the figure on the next page.

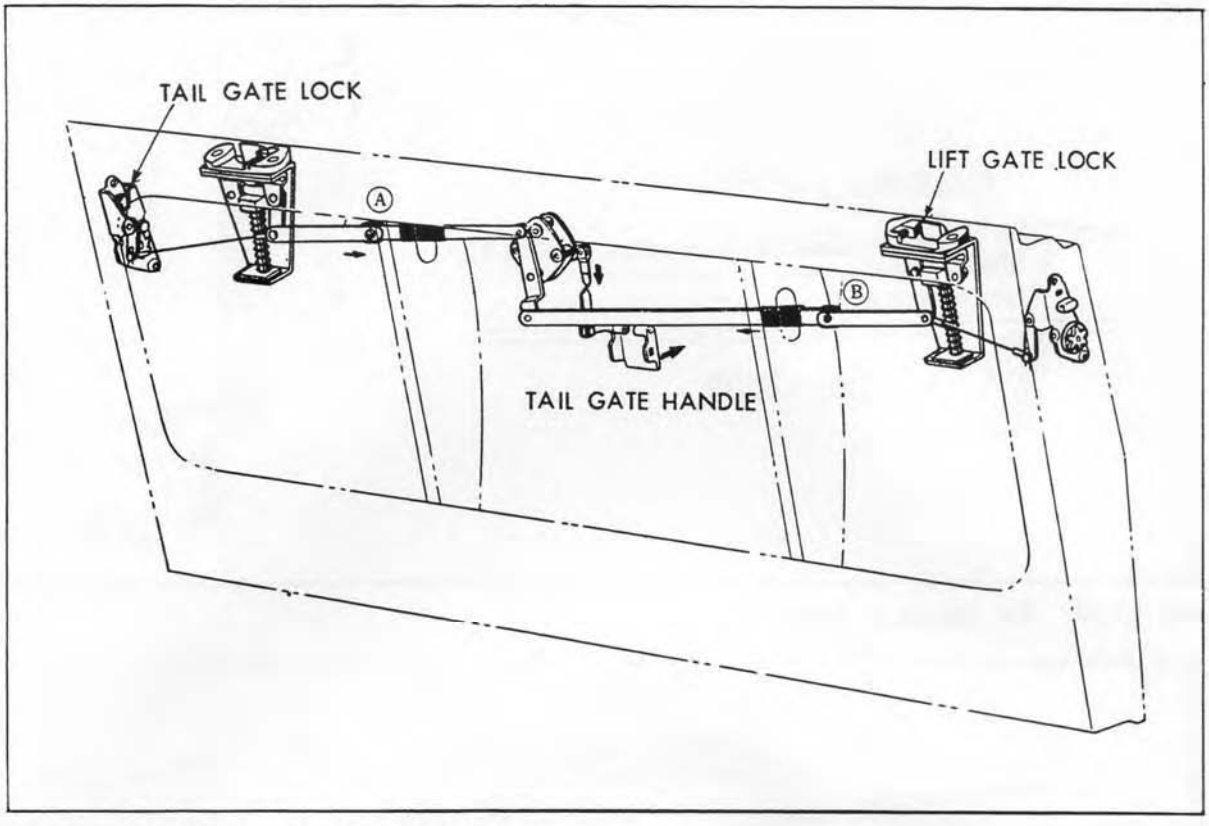


Fig. 10-19. Tail Gate Remote Control Linkage

6. Lifting the tail gate lock handle fully operates the remote control connecting wire to unlock the lock assembly. The wire cannot be adjusted. The ratchet of the lock assembly should turn freely in the unlocked position.
7. The looseness of the tail gate handle can be adjusted by the elongated hole of the rod.

ADJUSTMENT OF TAIL GATE HINGE

The tail gate is mounted to the rear body with two hinges. The attaching bolt holes are elongated to enable fore and aft or lateral adjustment of the tail gate.

The fore and aft adjustment can also be made by moving the tail gate check.

ADJUSTMENT OF LIFT GATE HINGE

1. Removal and installation of the lift gate hinge cover should be done with the lift gate in open position.
   The lift gate spring cannot be adjusted.
2. The adjustment of the lift gate hinge pin and up-and-down adjustment of the lift gate can be made by moving the bracket after loosening the hinge attachinng bolt "A" in the figure on the next page.
3. Fore and aft or lateral adjustment of the lift gate can be made by loosening four hinge to lift gate attaching bolts, "B" in the figure on the next page.

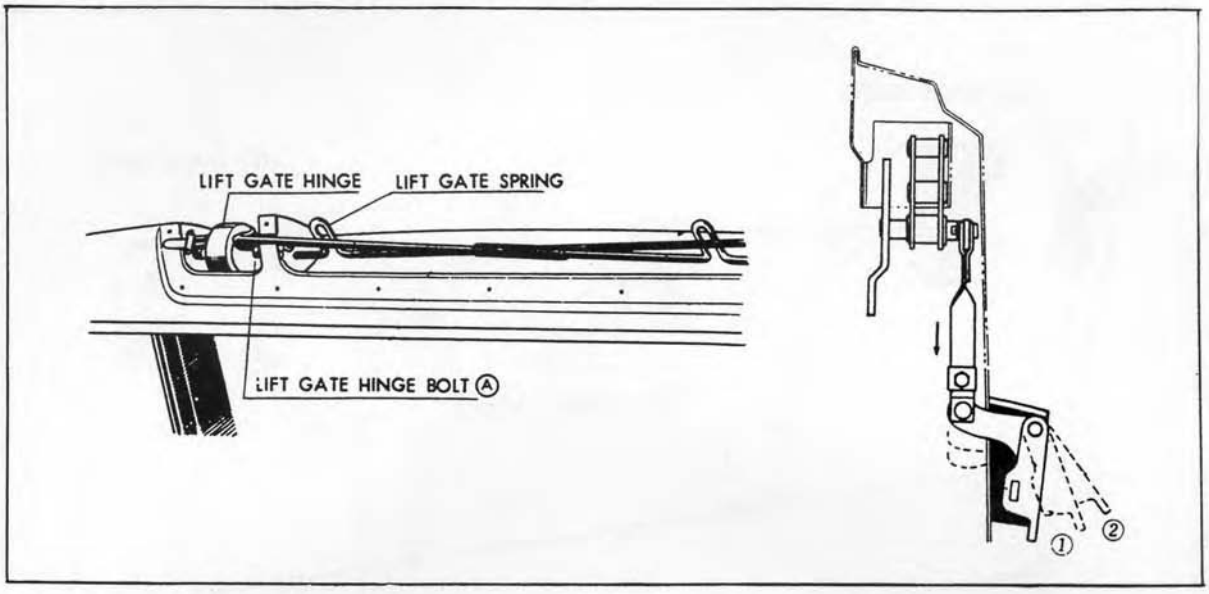


Fig. 10-20. **Lift Gate Hinge Adjustment**

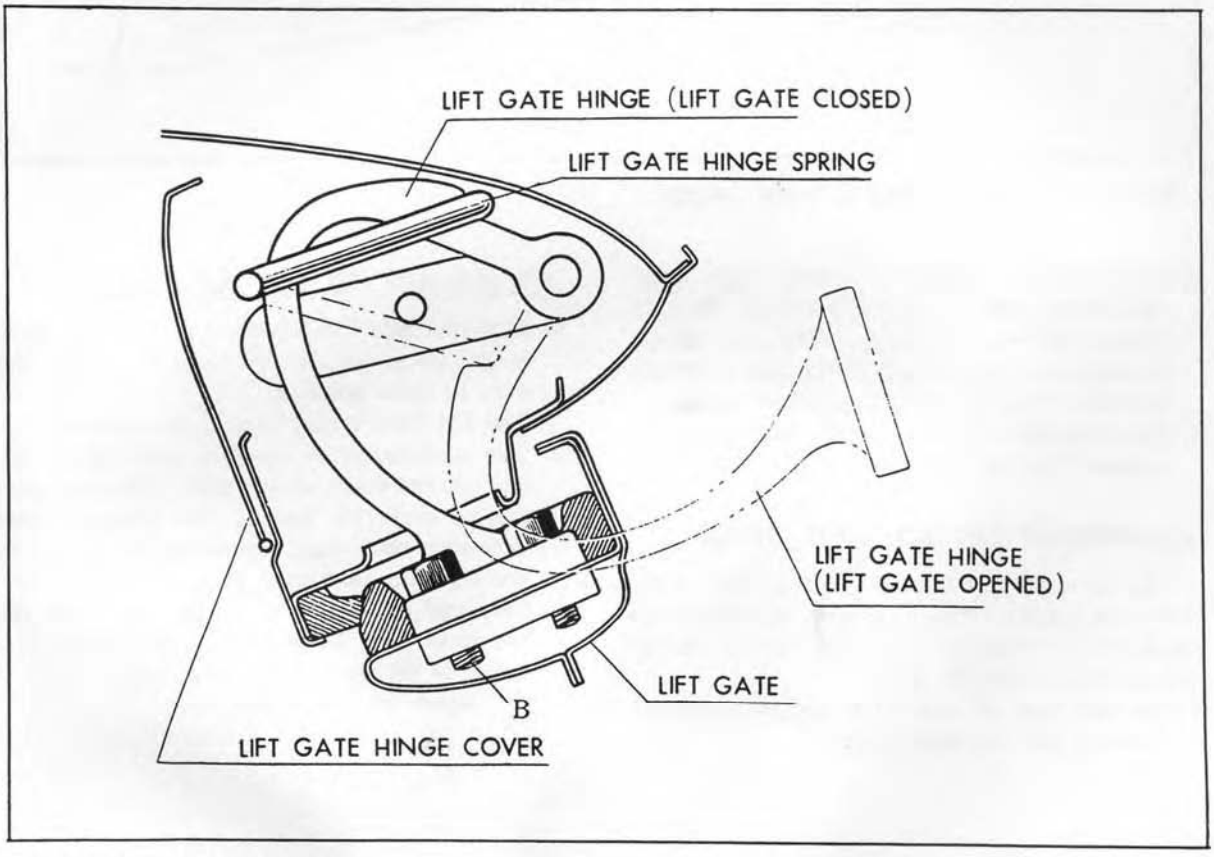


Fig. 10-21. **Lift Gate Hinge**

4. Fore and aft or lateral adjustment of the loose lift gate can be made by moving the lift gate hold check.

5 Seat Adjuster

To remove the seat adjuster, remove the seat with the seat adjuster attached. Then remove the adjuster.

To install the adjuster, attach the seat adjuster to the seat and then fix the seat in position.

Memorandum

PART IV WINDSHIELD & BODY SIDE GLASS

1 Model FJ40

FRONT WINDSHIELD GLASS INSTALLATION

1. Clean out old sealer in glass cavity of windshield channel and around the base of the rubber channel.
2. Install the rubber channel to the glass and insert a strong cord in the rubber channel around the windshield.
3. Position and center the windshield assembly in the windshield opening from the outside.
4. When the glass and channel are properly positioned in the windshield opening, pull the ends of the cord to the inside to seat lip of the rubber over the flange of the windshield cavity.

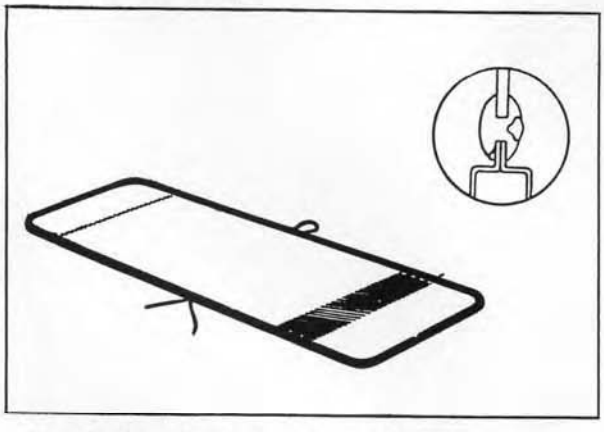


Fig. 10-22. Windshield Glass Installation

5. Install the outer weatherstrip using a suitable tool.
6. Using a pressure type applicator, seal the inner and outer lips of the rubber channel to the glass with an approved weatherstrip adhesive.
7. Clean off the excess sealer.

SIDE WINDOW GLASS INSTALLATION (FJ40V)

1. Insert a strong cord around the base of the rubber channel and install the rubber channel to the glass.
2. Place the glass in positon and pull the cord to the inside to seat the lip of the rubber in place.
3. Seal the inner and outer lips of the rubber channel with an approved weatherstrip adhesive.
4. Install the inner weatherstrip from the the outside using a suitable tool.

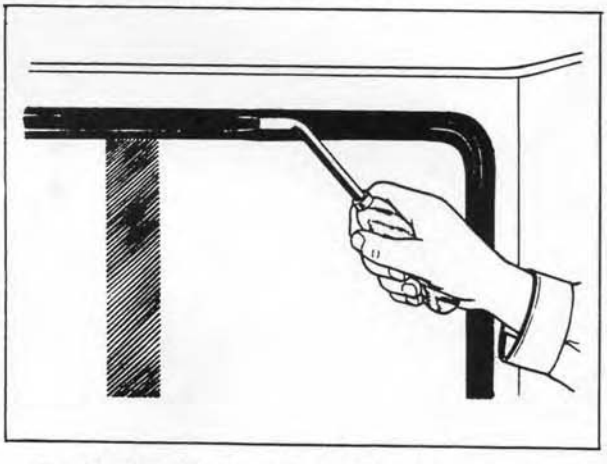


Fig. 10-23. Inner Weatherstrip Installation

REAR UPPER DOOR GLASS INSTALLATION (FJ40V)

1. Insert a strong cord around the base of the rubber channel and install the rubber channel to the glass.
2. Place the glass in position and pull the cord to the inside to seat the lip of the rubber in place.

3. Seal the inner and outer lips of the rubber channel with an approved weatherstrip adhesive.
4. Install the inner weatherstrip from the outside using a suitable tool.

3 Model FJ45

FRONT WINDSHIELD GLASS INSTALLATION

Refer Model FJ43 Front Windshield Glass Installation.

SIDE WINDOW GLASS INSTALLATION (FJ45V)

1. Insert a strong cord around the weatherstrip and install the weatherstrip around the window glass.
2 Place the glass in position from the inside of the body and pull the cord from the outside to overlap the lip of rubber over the flange of the window opening.
3. Install the side window rubber inner strip from the inside of the body.

LIFT GATE WINDOW GLASS INSTALLATION FJ45V)

1. Install the rubber channel to the glass and then insert a strong cord in the rubber channel around the window glass.
2. Install the glass from the outside and pull the cord to the inside.
3. Seal the rubber channel and clean off the excess sealer.

Memorandum

PART V FRAME

1 Frame Alignment

Since the frame constitutes the foundation of the entire vehicle, proper functioning of the vehicle and its components is greatly dependent upon correct frame alignment.

If the vehicle has been in a collision, or if there is any reason to suspect a sprung, swayed, or otherwise misaligned frame, the frame should be inspected and correction made as required.

The most convenient way to check the frame alignment, particularly on the vehicle equipped with a body, is by marking on the floor all points from which measurements are to be taken.

This can be done by tacking or cementing pieces of paper securely to the floor under each point of measurement.

Lower the plumb bob from the points necessary for alignment and mark the spots where the plumb bob touches the floor.

Then remove the vehicle and check alignment of the marked points with reference to the centerline.

The difference of the diagonal distances should be within 6 mm (0.23 in.).

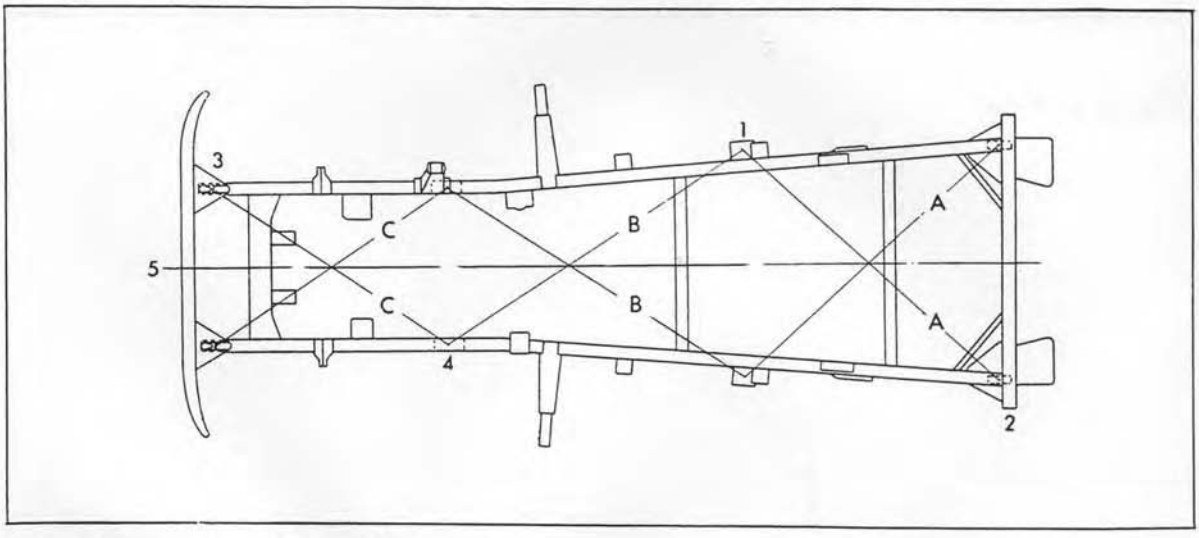


Fig. 10-24. Measuring Frame Alignment

1. Rear spring front hanger
2. Rear spring hanger
3. Front spring front hanger
4. Front spring rear hanger
5. Chassis centerline

2 Frame Dimensions (mm)

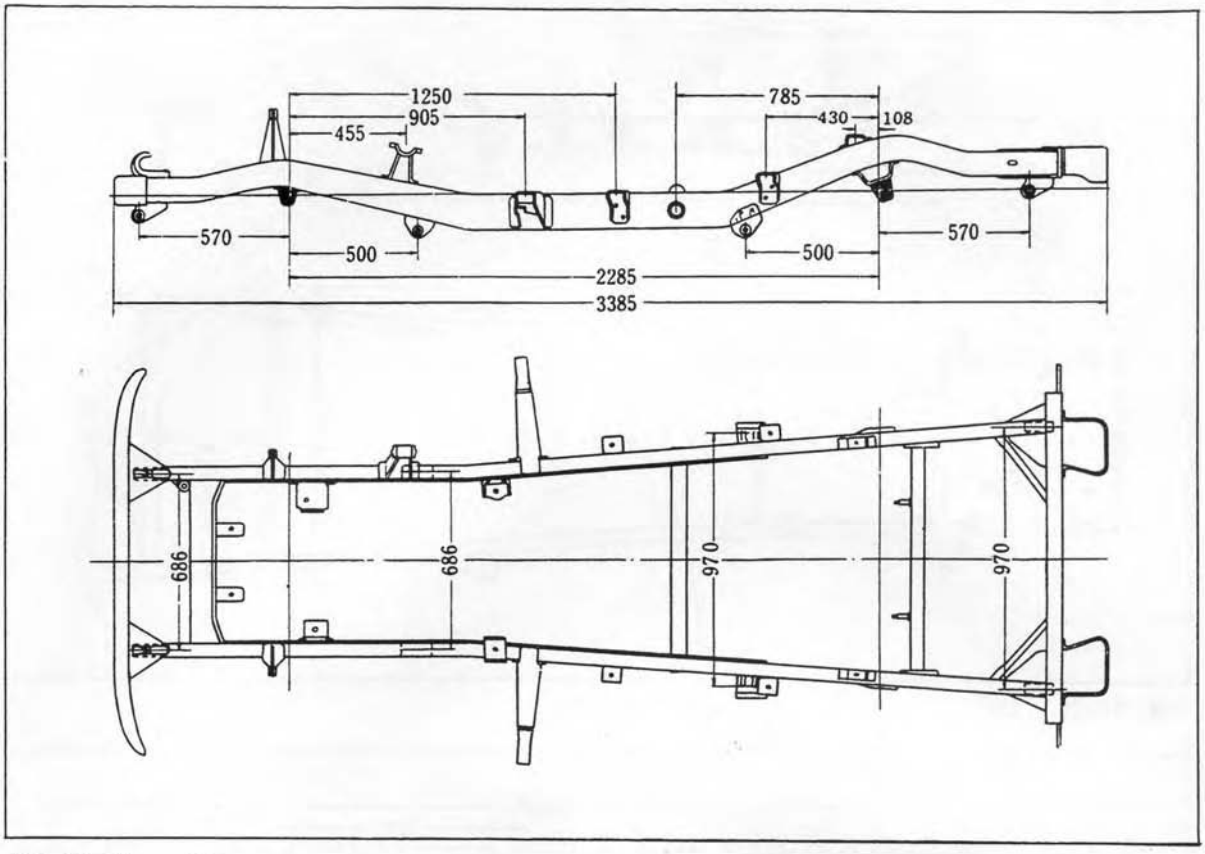


Fig. 10-25. FJ40

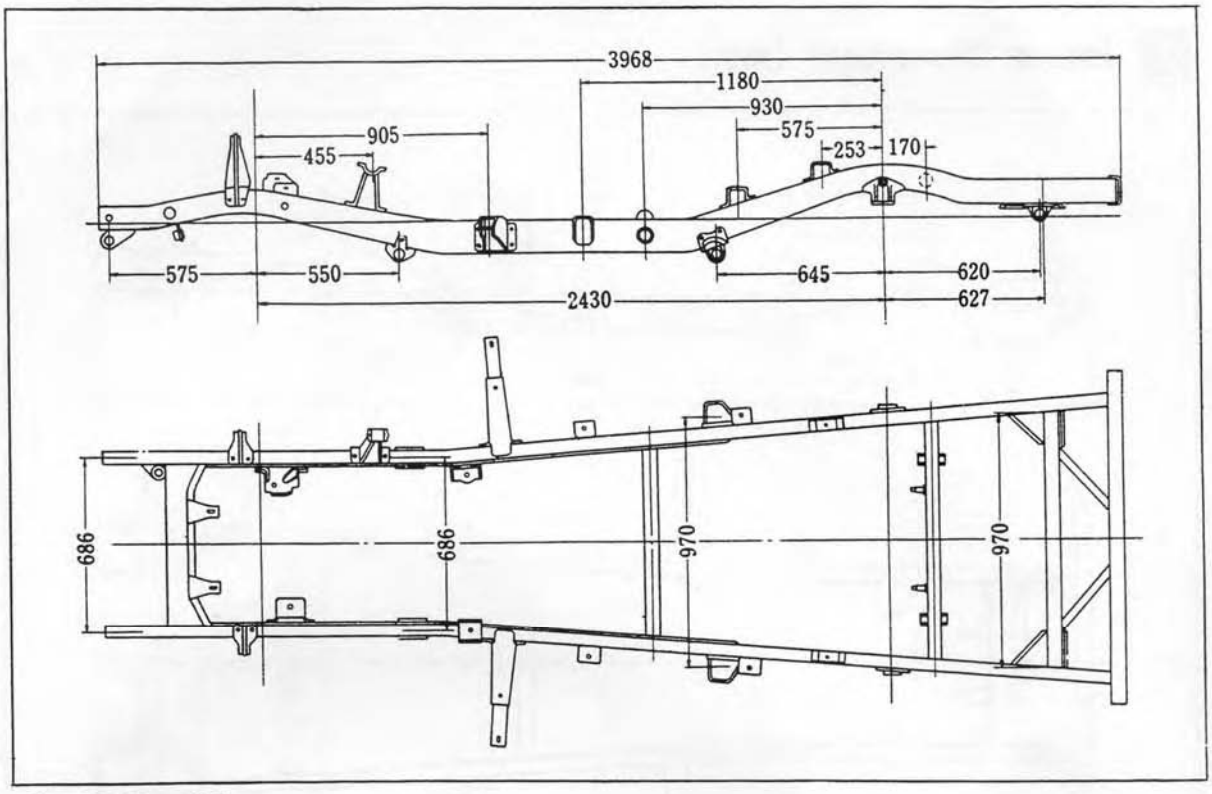


Fig. 10-26. FJ43

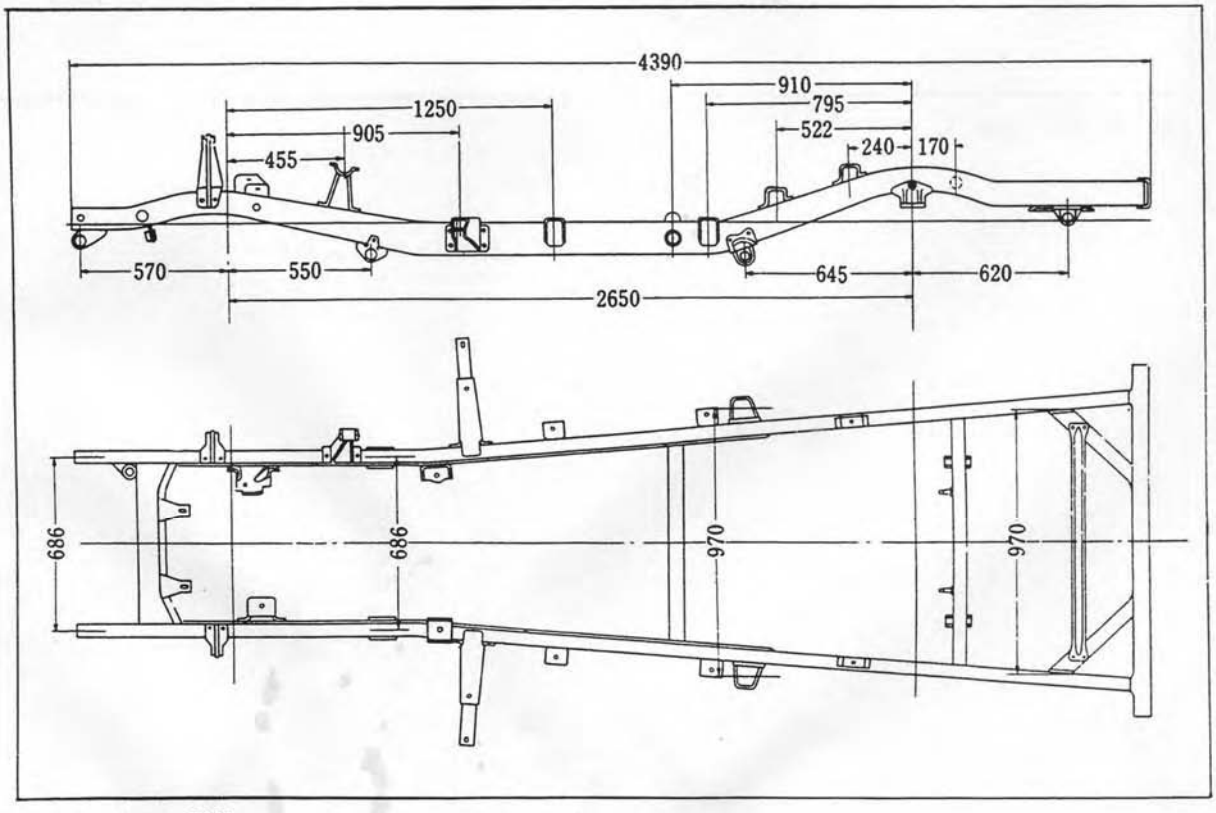


Fig. 10-27. FJ45

3 Frame Repair

FRAME STRAIGHTENING

The use of heat is not recommended when straightening the frames. However, in extreme cases of bent frame, it is necessary that heat be applied to prevent internal stresses from being set up in the metal. In such cases, extreme care must be exercised not to allow the metal to be heated more than dull red.

The frame members which show strain or cracks after straightening must be reinforced or replaced.

FRAME REINFORCEMENT

No established rules can be made on the necessity, length, or kinds of reinforcements to install on the frames which have been bent or broken. Reinforcements can be made with channel, angle, or flat stock. Because of the difficulties encountered when inserting the channel reinforcements into the frame side rails, the use of the angle reinforcements is recom mended.

Whenever possible, the reinforcement should extend the entire length of the side rail or at least beyond the cab crossmember. This procedure may be impractical in some instance because of the positon of attached units and existing crossmembers, therefore it is necessary that the mechanic use his best judgement in the case involved. The reinforcement stock thickness should not exceed that of side rail to be reinforced, and the material of the reinforcement stock should be of the same tensile strength as that of the side rail.

CROSSMEMBERS & BRACKETS

All crossmembers, brackets, or gussets that are damaged or broken must be replaced. Cut off and drive out ail rivets from the part to be replaced. Install the new part, using the hot rivets to secure in place.

RIVETING

Specific rules for the spacing of the rivets used in frame reinforcement cannot be given, as such spacing depends entirely upon the number and size of the rivets used in attaching the reinforcements, brackets, crossmembers, etc., to that portion of the frame that is being repaired.

The mechanic must use his best judgement as to the number and spacing of the rivets necessary for the repair.

The diameter of the rivets depends upon the spacing and number of rivets used. Generally rivets are 50 to 100 percent as thick as the parts to be riveted. Countersunk rivets should protrude twice the diameter of the rivet.

WELDING

The electric arc-welding method is recommended for all frame welding. Heat generated during welding is localized and burning of material is minimized whenever this method is used. Additional advantages are that finished weld can be ground, filed, and drilled as necessary. Welding rod must be substantially of the same material as used in the frame.

Whenever inspection indicates the necessity of repairing a cracked frame, certain precautions must be observed. Namely, the crack must be ground out as shown in the figure 12-29, and the reinforcement patch of the same or less thickness of the frame be shaped to fit exterior or the interior of the frame as shown in the figure.

Do not weld on fillets of the frame, or edges of the frame side rail flanges. Welding at these points tends to weaken the frame and encourage development of new cracks.

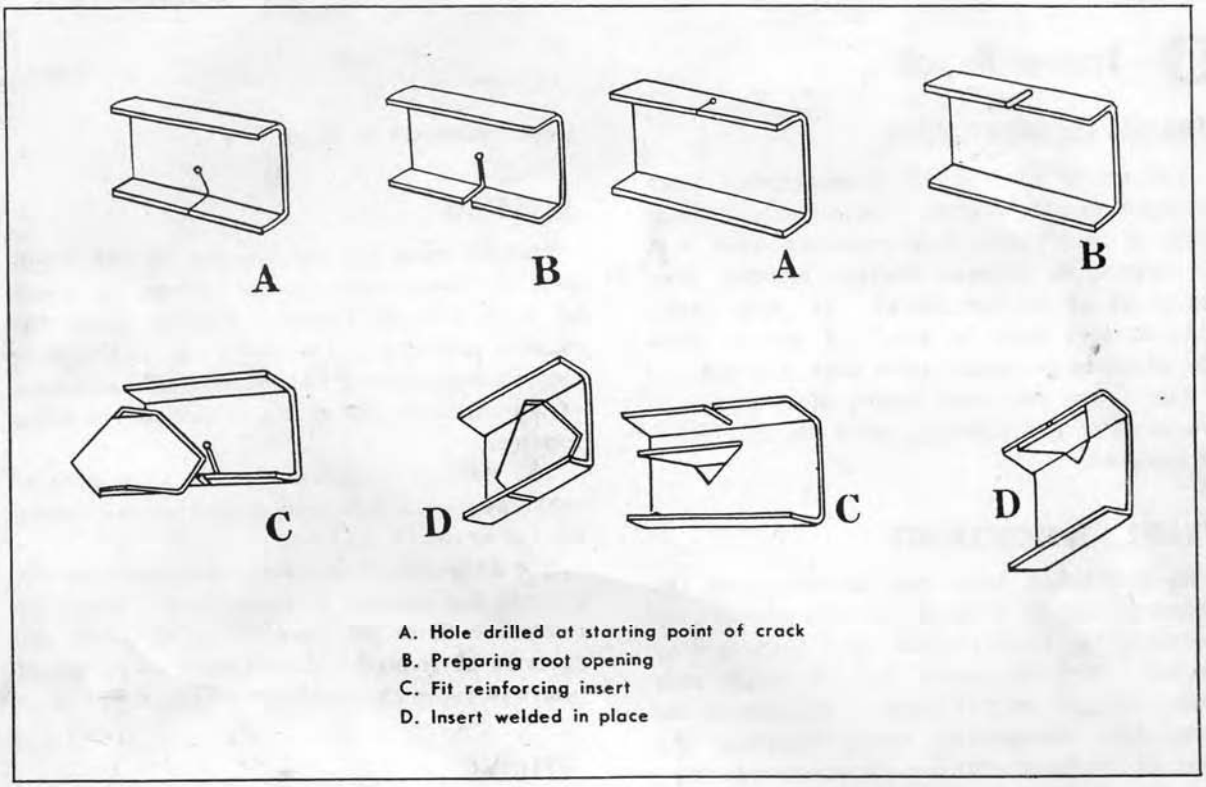


Fig. 10-28. **Method of Preparing Crack in Frame for Welding**

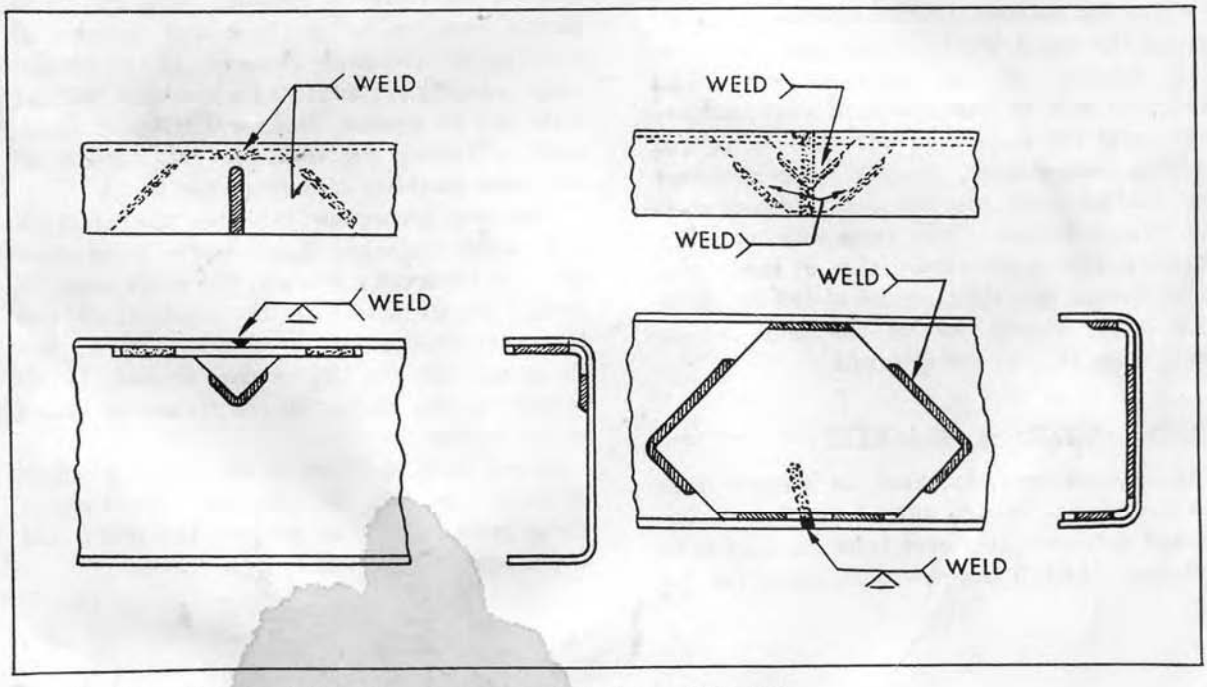


Fig. 10-29. **Method of Attaching Reinforcement in Frame Side Rails**