DFA1101GZ5AD6J-907

SERVICE MANUAL

DONGFENG AUTOMOBILE CO.,LTD
2006.05

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General Principles

GL

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General Principles

This manual mainly states maintenance and service methods of DFA1101GZ5AD6J-907 light commercial truck.

To use vehicles safely and efficiently, you need to read the manual thoroughly and make sure that you are familiar with the items that mark "Note". This is very important.

Due to continuous improvements on our vehicles, maybe there are some instructions in the manual that do not accord with the actual vehicles.

Maintenance method varies with different skill level, methods, tools and available parts that serviceman adopts. Any serviceman should firstly take into consideration no harm personal safety and vehicle safety when working.

As for the maintenance of engine, please refer to service documents offered by DongFeng Cummins Engine Co., Ltd.

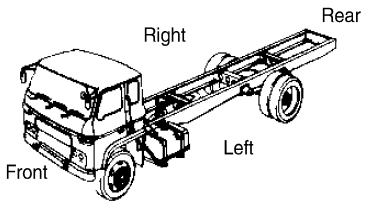
Operational Instruction

You can neglect the structural differences between the part in the manual and the corresponding one of your vehicle, because the manual is just teaching you principles for your operation.

Standard Terms

Vehicle direction

Vehhicle direction referred in the manual is marked as the right picture.



Maintenance standard

The matching clearance or standard performance parameter of components while assembled.

Reparation limit

It means that the component size or component clearance after repairing must satisfy the specified repair limit;

Wear limit

It means that if a component is overworn or exceeds its wear limit, it must be replaced;

Unit

Legal measure units are used in this manual.

Standard Tightening Torque

To assure the safety and reliability of key vehicle parts, this manual makes specific prescriptions to the tightening torque of the bolts and other fasteners on those parts. As for the bolts and other fasteners not mentioned, the structures and the sizes of them have been standardized and they should be fastened with screwing torques prescribed in the following table.

	M6	M8	M10	M12	M14	M16	M18	M20
Ordinary carbon steel	5~8	16~23	29~42	50~70	80~110	130~170	160~200	260~320
High-strength alloy steel	9~12	18~26	34~48	67~95	120~170	165~220	200~250	320~400

Maintenance Rule

Maintenance Schedule

It's necessary for periodical inspection and maintenance of truck to prolong its service life, improve its power performance and fuel economy, so periodical inspection and maintenance should be carefully carried out according to the following items. Then it will achieve the max economic and social benefits.

The following schedule is not only for maintenance items of 80,000km, but also for normal maintenance items after 80,000Km.

△—maintenance mileage at running-in period (1,500~2,500km)

☆—maintenance items at running-in period

★—maintenance items at regular driving period

Note:

Customers should carry out the inspection and maintenance intervals according to the different area condition. Properly shorten the maintenance intervals can ensure the truck to get the reasonable maintenance and move reliability. Never prolong the intervals.

Dong Feng Cummins Diesel Engine

Maintenance Item	Maintenance Mileage Interval(× 1,000km）													
	△	4	8	12	16	20	24	28	32	36	40	44	48	80
Clean engine assembly		★	★	★	★	★	★	★	★	★	★	★	★	
Check acceleration capability and decelerability	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check exhaust status	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check the leakage of eninge lubricant	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check the cleanness and reserves of lubricant		★	★	★	★	★	★	★	★	★	★	★	★	
Check the leakage of fuel	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check the leakage in cooling system	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check the damage of fan belt	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Remove the deposit in fuel prefilter	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check and clean air filter element	☆		★		★		★		★		★		★	
Replace engine lubricant	☆		★		★		★		★		★		★	
Replace oil filter	☆		★		★		★		★		★		★	
Check and adjust valve clearance	☆			★			★			★			★	
Replace fule filter and oil & water seperator				★			★			★			★	
Replace air filter element							★						★	
Check the compression pressure in cylinder													★	
Check the injection pressure of injector													★	
Check injection timing													★	
Check the injection volume of injection pump													★	
Check the working conditions of delivery pump													★	
Check the working conditions of thermostat													★	
Check the working conditions of radiator													★	
Clean the cooling system of engine													★	
Check the working conditions of supercharger, replace while necessary													★	★

Clutch

Maintenance Item	Maintenance Mileage Interval(× 1,000km）													
	△	4	8	12	16	20	24	28	32	36	40	44	48	80
Check the working conditions of clutch	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check the free travel of clutch pedal	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check the leakage of the hydraulic pipeline and clutch pump	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check the air leakage of clutch booster	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check the reserve of braking fluid in oil reservoir	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Replace clutch braking fluid													★	

Propeller Shaft

Maintenance Item	Maintenance Mileage Interval(× 1,000km）													
	△	4	8	12	16	20	24	28	32	36	40	44	48	80
Check the looseness of the linking parts of propeller shaft	☆			★			★			★			★	
Check the looseness of spider bearing	☆												★	
Check the looseness of middle bearing	☆												★	
Check the wearing conditions of spline													★	

Gearbox

Maintenance Item	Maintenance Mileage Interval(× 1,000km）													
	△	4	8	12	16	20	24	28	32	36	40	44	48	80
Clean gearbox and vent plug	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check the oil reserves in gearbox	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check oil leakage of gearbox	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Replace gearbox lubricant	☆						★						★	
Check the looseness of the linking parts of the control mechanism	☆						★						★	
Check the working conditions of the bearings in gearbox													★	
Disassemble and check gearbox														★

Suspension System

Maintenance Item	Maintenance Mileage Interval(× 1,000km）													
	△	4	8	12	16	20	24	28	32	36	40	44	48	80
Check the leakage of shock absorber and fasten the bolts of brackets	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Clean front and rear leaf spring and shock absorber		★	★	★	★	★	★	★	★	★	★	★	★	
Fasten U bolt of leaf spring when fully loaded	☆			★			★			★			★	
Check the damage and looseness of shock absorber				★			★			★			★	
Check the wearing of pin sleeve of rear leaf spring, replace while necessary													★	
Check if shock absorber is out of service														★
Disassemble leaf spring, replace spring pin and pin sleeve														★

Axle and Wheel

Maintenance Item	Maintenance Mileage Interval(× 1,000km)													
	△	4	8	12	16	20	24	28	32	36	40	44	48	80
Clean alxes and wheels		★	★	★	★	★	★	★	★	★	★	★	★	
Check the oil leakage of final drive	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check the fastening conditions of important bolts	☆	★	★	★	★	★	★	★	★					
Check the pressure in tyres	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check the abnormal wearing of wheels		★	★	★	★	★	★	★	★	★	★	★	★	
Check lubricant reserves of final drive, clean vent plug				★			★			★			★	
Clean and adjust hub bearings				★			★			★			★	
Replace the lubricant of final drive	☆						★						★	
Wheel changing				★			★			★			★	
Check the working conditions of final drive and the bearings													★	
Disassemble and check final drive and adjust it														★
Make megnatic examination for axle shaft tube														★

Steering system

Maintenance Item	Maintenance Mileage Interval(× 1,000km)													
	△	4	8	12	16	20	24	28	32	36	40	44	48	80
Check the oil leakage of steering gear	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Clean steering gear		★	★	★	★	★	★	★	★	★	★	★	★	
Check free travel and working conditions of hand wheel	☆			★			★			★			★	
Check the fastening conditions of the ball heads of steering cross rod and tie rod	☆			★			★			★			★	
Check fastening conditions of steering mechanism and its brackets	☆			★			★			★			★	
Check fastening conditions of steering arm and steering knuckle arm	☆			★			★			★			★	
Check and adjust front wheel toe-in	☆			★			★			★			★	
Check front wheel alignment													★	
Check and adjust steering gear													★	
Disassemble and check the connectors of steering cross rod and tie rod														★
Make magnetic examinations for steering knuckle														★
Replace the ball head pins in steering system													★	
Check power steeering oil reserves, add while necessary	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Replace power steering transmission oil							★						★	

Braking System

Maintenance Item	Maintenance Mileage Interval(× 1,000km)													
	△	4	8	12	16	20	24	28	32	36	40	44	48	80
Check the free travel of brake pedal	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check parking brake and its efficiency	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check the air leakage of braking pipeline	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check and adjust the clearance between brake drum and friction disc	☆	★	★	★	★	★	★	★	★	★	★	★	★	★

Braking System

Maintenance Item	Maintenance Mileage Interval(× 1,000km)													
	△	4	8	12	16	20	24	28	32	36	40	44	48	80
Check the fastening conditions of brake back plate	☆			★			★			★			★	
Check the wearing of brake drum and shoe, replace while necessary							★						★	
Check the working conditions of air compressor													★	

Other

Maintenance Item	Maintenance Mileage Interval(× 1,000km)													
	△	4	8	12	16	20	24	28	32	36	40	44	48	80
Check battery liquid reserves, add while necessry	☆	★	★	★	★	★	★	★	★	★	★	★	★	
Check the proportion of battery liquid				★			★			★			★	
Check the looseness of the rivets in chassis frame							★						★	
Check the efficency of locking device of tilting mechanism							★						★	
Check the looseness of linking parts of cabin	☆	★	★	★	★	★	★	★	★	★	★	★	★	★
Check the looseness and damage of cross and side members of cargo body and the linking parts							★						★	

Recommended Fuel and Lubricant

The quality of fuel and lubricant can effect the performances, quality and even life of vehicles. Therefor, to ensure normal operations of vehicles, suitable oil products should be used according to relative prescriptions.

Dong Feng Automobile Co., Ltd. prescribes the most suitable fue and lubricants for its products. The foll-wing are the fuel and lubricants that should be used in our products.

Fuel

Qualified light diesel in accord with GB252-87 Standard should be used. Users can choose specific class of light diesel according to the specific temperature in his region.

Recommended temperature scope:

Class	Recommended Temperature
0# light diesel	above 4 ℃
10# light diesel	above -5 ℃
20# light diesel	between -5 ℃ ~ -14 ℃
35# light diesel	between -14 ℃ ~ -29 ℃
50# light diesel	between -29 ℃ ~ -44 ℃

Engine lubricant

High-quality lubricant meeting following standards must be used for Dong Feng Cummins engines:

Lowest standard： CF-4/SG 15W-40

Recommended Standard：CG-4/SH 15W-40

Ideal standard： CH-4/SJ 15W-40

Note:

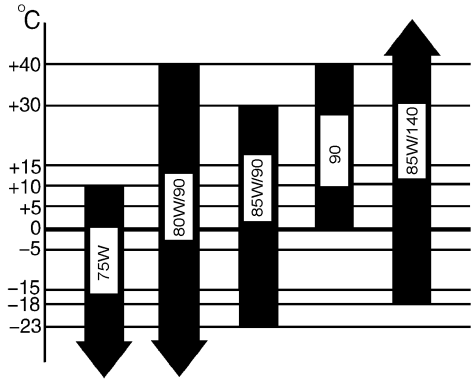
Engine damages for using lubricants below CD15W-40 or CE15W-40 or even lower are not in our warranty scope.

Suitable temperature scope:

For 15W-40: -10 ℃ ~-15 ℃； For 10W: -5 ℃ ~-20 ℃； For 5W-30: below -25 ℃

Lubricant for gears in driving axle

Recommend to use sulfur-phosphor API GL-5 gear lubricant for heavy duty vehicle. Applicable environment temperatures for different classes are as follow:



Gearbox oil

Recommend to use sulfur-phosphor 85W/90 GL-4 gear lubricant for middle duty vehicle.

Lubricating grease

Recommend to use generally-used lithium grease for the lubricating points on hubs and chassis frame.

Shock absorber oil

Recommend to use specially-used shock absorber oil.

Clutch boosting liquid

Recommend to use DOT 4compounded braking liquid. Different classes of braking liquid can not be used together.

Note：

Braking liquid made by different manufacturers can not be used together.

Engine antifreeze liquid (coolant)

Recommend to use long-term antirust & antifreeze liquid. The freeze point of the antifreeze liquid used should be 8 ℃ lower than the minimum local temperature. Different classes of antifreeze liquid can not be used together.

Volume Data

Part	Volume （L）
Fuel tank	102
Engine lubrication system	9
Engine cooling system	14.5
Gearbox	4.2
Rear axle	Add till the oil overflow from the inspection hole
Clutch	Add to the scale of "MAX" of clutch oil reservoir

Volume Data

Part	Volume （L）
Power steering gear	Add between the upper and lower scale of oil tank

Protective Measures while Repairing

To assure safety in repairing, the following protective measures should be taken all the way:

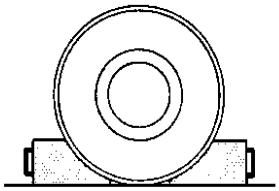
1） Before reparation, you should ensure that the wheels can not turn. The measure to lock wheels is as the sketch map.

2） Ensure that the gearbox is at neutral position.

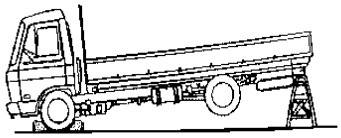
3） Ensure that the ignition switch is at "off" postion.

4） When repairing electric circuit, the negative pole should be disconnected.

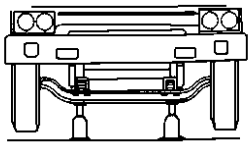
5） The jacks and brackets used should be strong enough for the load acting on them.



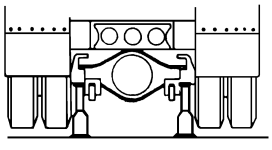
Method of mounting brackets is as the sketch map.



The supporting points of front axle for mounting jacks is as the sketch map.



The supporting points of rear axle for mounting jacks is as the sketch map.



6） When disassemble or assemble the assemblies that have been taken down, you should ensure that they are on a solid worktable to avoid they would drop or turn over.

Cleaning

Because the parts may be covered by dirty oil and mud, cleaning is compulsive.

Applicable cleaning methods include steam cleaning, pressure cleaning, light oil cleaning, acid or alkali cleaning, neutral medium cleaning, trichlorethylene steam cleaning, Magnus solution cleaning, etc. Part damages may be revealed during the cleaning, so great attention should be paid while cleaning.

Metal parts

Light oil: in contrast with other solutions, light oil can't penetrate or dissolve mud. Therefore, except for finished surface, mud should be removed by wire brush or other tools and should be cleaned in this way for two times.

Alkali solution: if the parts are made of alloy, don't use alkali solutions for the cleaning. Instead, alkali solutions are very effective for the cleaning of steel and cast iron.

Note:

If alkali solutions are being used, you should make some correctives such as boric acid solution. Once your eyes or skin touch the alkali solution, you should use the corrective to clean.

Rubber parts

Don't use mineral oil for the cleaning. Use alcohol or clean cloth to remove the mud.

Oil duct

Make a metal wire to get through the oil duct to ensure it is not jammed. Wash the oil duct with cleaning solution with high-pressure nozzle.

Antirust

After removing the oil grease on the parts, clean grease should be applied to prevent the rusting of the parts.

General Inspection

Check parts and components with special gauges or tools. Decide whether a component can continue to serve according to specified maintenance standards. Damaged components should be repaired or replaced as required. If one of a pair of components fitted together is worn so much that the fit clearance exceeds the specified range, replace the pair of components together.

Out of consideration of preventive maintenance, some components should be replaced before them reaching service limit.

Carefully inspect the surface of components by outlook or red check method. Repair or replace the component if its surface has the following abnormal signs: uneven wear, biased wear, scratch, crack, distortion, malfunction or becoming weak (spring), bended, loose, abnormal noise (bearing), distortion, malfunction or becoming weak (spring), bended, loose, abnormal noise (bearing), discolored, seized, eroded, deteriorate (friction lining), etc.

All the rubber pieces, such as O-rings, oil seals and washers cannot be further used after disassembled.

Trouble Analysis

In a vehicle, a part is made up of many components. Some parts like clutch, transmission and rear axle are interactive functioning. Therefore, in order to find and examine trouble exactly, it is necessary to know the structure of each part as well as the functional connection between various parts.

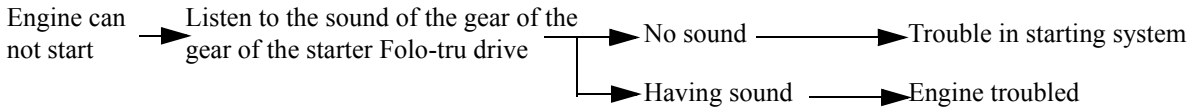
To resolve a problem of the vehicle, you must first know the nature of the trouble. To achieve this, you must get some exact knowledge of the trouble from the customer, including the parts that effect using conditions and the date of the happening of the trouble.

A trouble may be caused by one or many reasons in most cases. Therefore, to examine and repair requires the ability of systematic thinking and resolving problems step by step. For example, when the steering wheel turns unstable, you should first examine the connection mechanism of the pitman arm instead of disassembling the steering gear rashly, then decide whether the trouble belongs to the steering gear or to the connection mechanism.

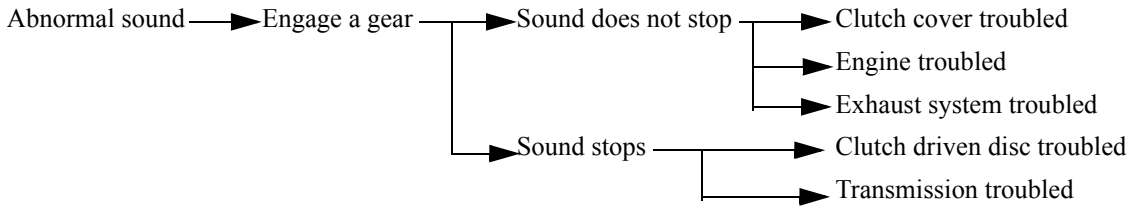
When disassembling the part to find the cause of the trouble, proceed systematically and start from easy problem.

It is a very important way to find out the cause of the trouble according to the manifestation of the trouble such as abnormal noise, vibration and failure. Listed below are some common trouble signs and their reasons. As for the detailed trouble analysis, please refer to chapter of each assembly.

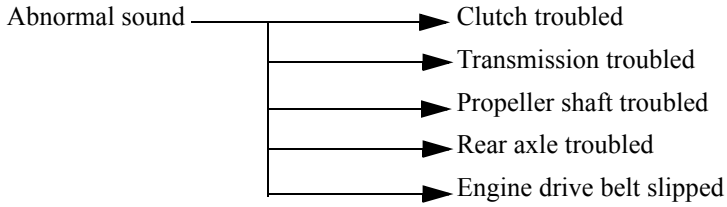
1. During starting of the engine (neutral position)

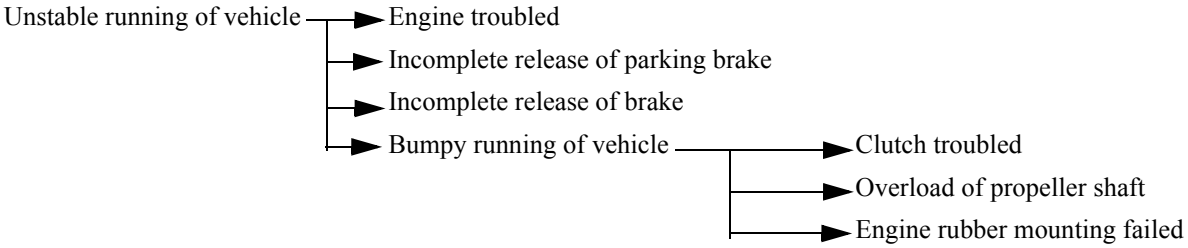


2. After engine started

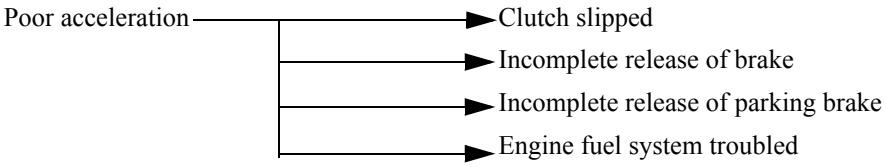


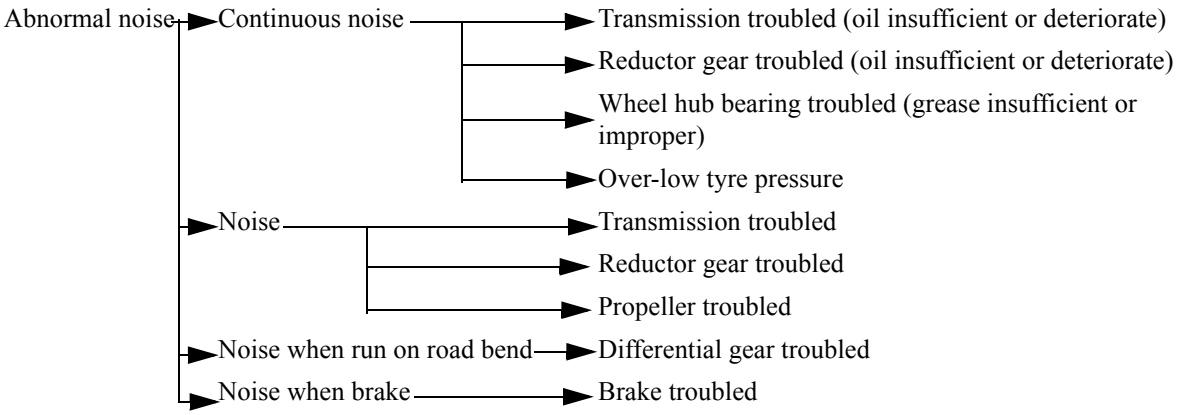
3. During starting of vehicle

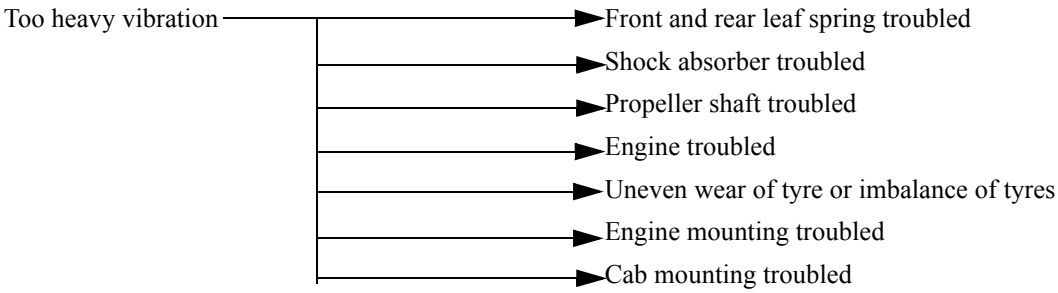


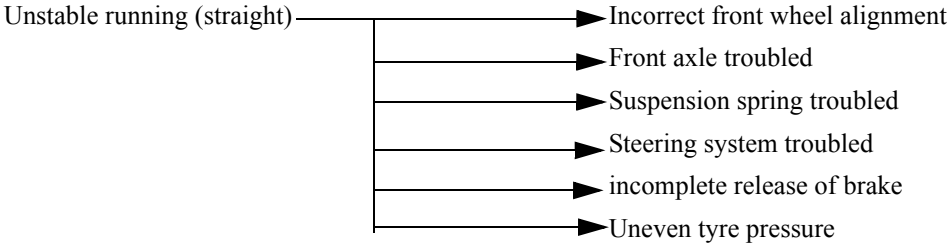


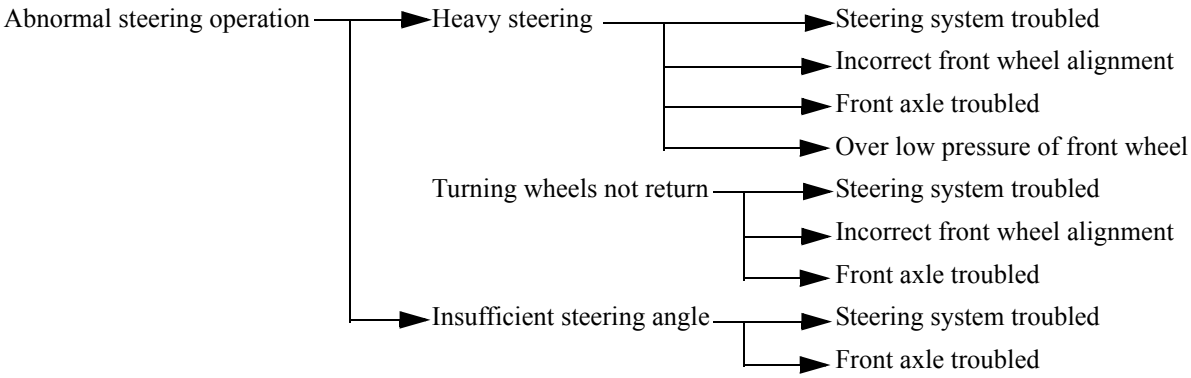
4. During vehicle running

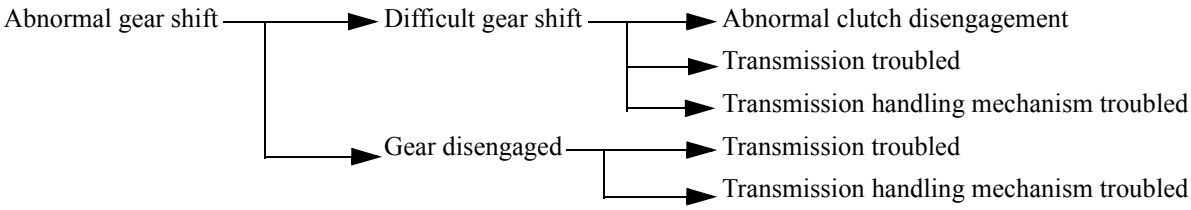


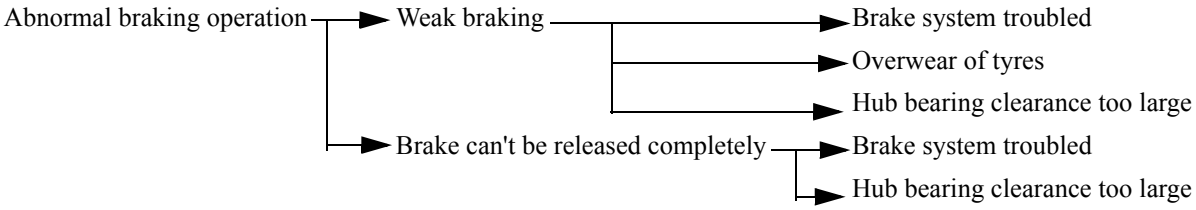







Abnormal steering operation
Heavy steering
Steering system troubled
Incorrect front wheel alignment
Front axle troubled
Over low pressure of front wheel
Turning wheels not return
Steering system troubled
Incorrect front wheel alignment
Front axle troubled
Insufficient steering angle
Steering system troubled
Front axle troubled


Abnormal gear shift
Difficult gear shift
Abnormal clutch disengagement
Transmission troubled
Transmission handling mechanism troubled
Gear disengaged
Transmission troubled
Transmission handling mechanism troubled


Abnormal braking operation
Weak braking
Brake system troubled
Overwear of tyres
Hub bearing clearance too large
Brake can't be released completely
Brake system troubled
Hub bearing clearance too large

Clutch

CL

Table of Contents

Clutch

Main Parameter

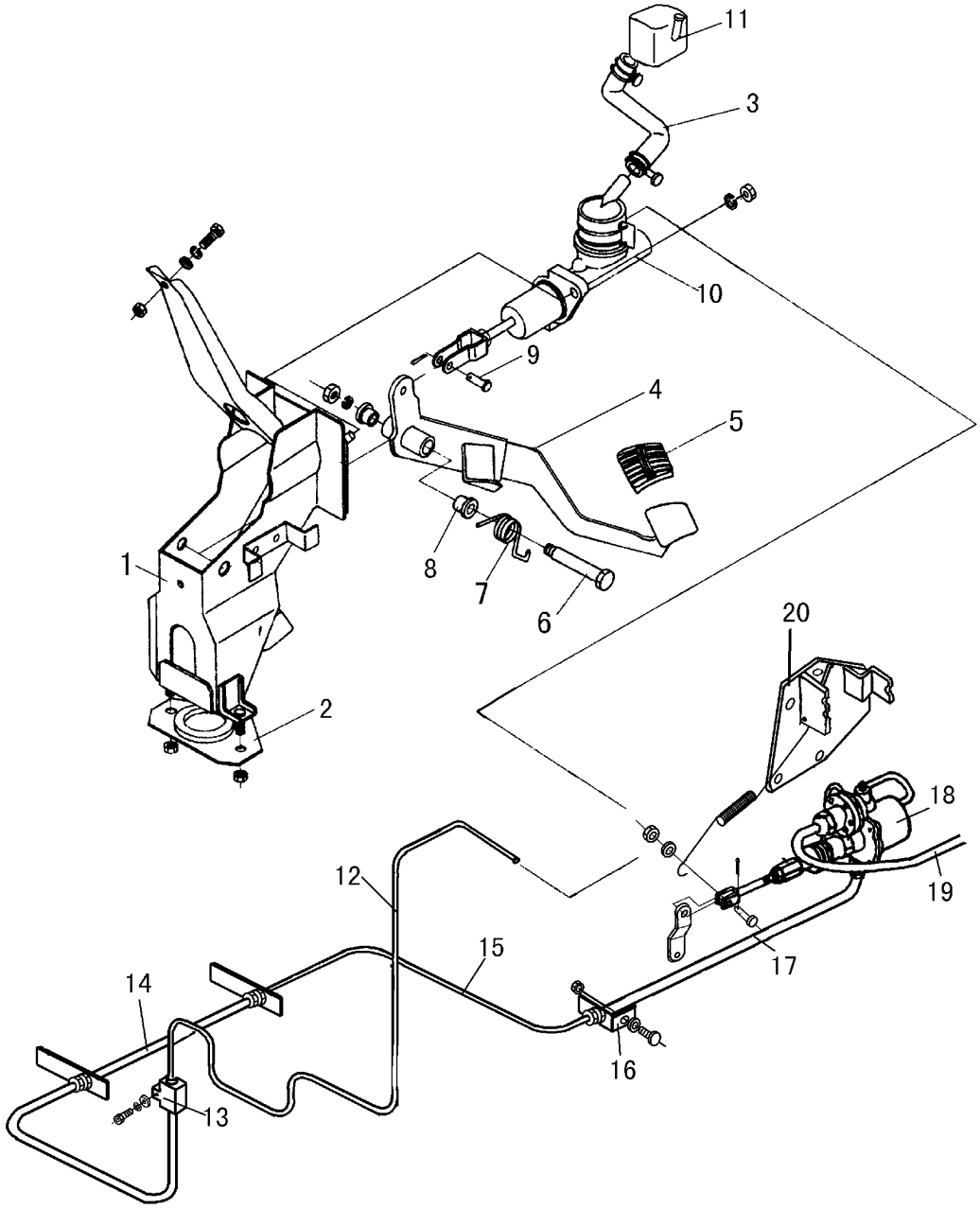
Bolt install hole size	Distributing diameter (mm)	Φ 368.3
	Aperture (mm)	Φ 10.3 (+0.25)
	Number of holes	8 (4 pairs)
Positioning pin hole size	Distributing diameter (mm)	Φ 363.53
	Aperture (mm)	Φ 7.92 (0.03) Φ 9.52 (+0.03)
	Number of holes	2
Angle between positioning hole and installing bolt hole		15°
Friction lining size	D×d	Φ 325× Φ 200
Working pressure force		10250
Release bearing stroke (mm)		10
Pressure plate lift range (mm)		≥ 1.4
Height of release finger (mm)		56±1
Unbalance static of the cover assembly (g.cm)		≤ 50
Unbalance static of the driven disc assembly (g.cm)		≤ 25
Torque (N.m)		Max=770

Note:
The DOT4 compound brake fluid is recommended to the clutch.
Unclean or dirty brake fluid is forbidden to use.
Do not splash the brake fluid down to the paint. (It may erode the paint.)
You must make use of the tools to disassemble and assemble the clutch pipeline system.
Make use of the clean brake fluid to clean the master cylinder, booster and the fluid reservior.
The mining oil such as gasoline, kerosene, etc, it will erode the rubber parts in the hydraulic pressure system.
After clean the clutch pressure plate, dry it with the suction cleaner, not the compression air.

Trouble Analysis

Trouble	Cause	Method
Clutch disengaged incomplete or vehicle started unstably	Clutch pressure plate or driven disc lining distorted or cracked Release lever improper adjusted Air in clutch hydraulic pressure controlling system pipe Too large clutch pedal free travel Clutch master cylinder or booster worked abnormally	Change the pressure plate or driven disc lining Disassemble and repair Exhaust the air in the pipe Readjust accord to the standard Disassemble and repair
Clutch slipped	Clutchdriven disc friction lining or pressure plate worn Oil stain on clutch driven disc or pressure plate Too small clutch pedal free travel Clutch booster push rod has no free stroke. Clutch booster push rod can't return. Clutch pressure plate spring failed Clutch release bearing worn Clutch booster push rod adjusted improperly	Replace driven disc friction lining or pressure plate Clean driven disc friction lining and pressure plate Disassemble and repair Readjust accord to the standard Check master cylinder push rod and booster oil seal Change the pressure platespring Replace the release bearing Disassemble and repair
Abnormal sound of clutch	Clutch release bearing worn or improper lubricated Clutch pressure plate or driven disc distorted Transmission input shaft or driven disc spline worn Clutch pedal shaft bush worn	Replace the release bearing release bearing Change the pressure plate or driven disc Replace input shaft or driven disc Replace the bushing
Clutch pedal can't be stepped down	Clutch out of control Cylinder of clutch hydraulic pressure system blocked Release lever worn	Adjust Adjust Replace
Changes in clutch pedal	Air in hydraulic pressure pipeline Master cylinder oil pipeline blocked	Exhaust air in the pipe Clean or replace
Too large clutch pedal force	Clutch booster troubled Release shaft bushing blocked or improper lubricated Release bearing flange blocked Release lever bush improper lubricated	Disassemble, repair and clean Replace bush or lubricate Correct or replace the bearing flange Lubricate

Clutch Mechanical System



1.Clutch pedal bracket assy
2.Lower fixed plate--pedal bracket
3.Hose assy--oil reservior to master cylinder
4.Clutch pedal welding assy
5.Pedal sleeve
6.Clutch pedal shaft
7.Clutch pedal return spring
8.Bush--pedal assy
9.Pin
10.Clutch master cylinder assy
11.Oil reservior assy
12.Front oil pipe assy
13.Free flowing coupling
14.Front hose assy--clutch
15.Rear oil pipe assy--clutch master cylinder to booster
16.Clutch rear oil pipe bracket
17.Rear hose assy
18. Booster assy
19.Nylon pipe assy (air pipe to four-way protective valve)
20.Bracket set--clutch booster

Adjustment of Clutch Pedal

1.Adjust the height of the clutch pedal by adjusting the pedal setting bolt. The height of clutch pedal is about 160~170mm.

2.Adjust the free stroke of the clutch pedal.

Release bearing

Check the release bearing for any crack or wear. The release bearing must be smooth and turn without noise. Replace it if necessary.

Check the release sleeve and release fork for wear, damage or erode, and replace if necessary.

Bearing lubricating

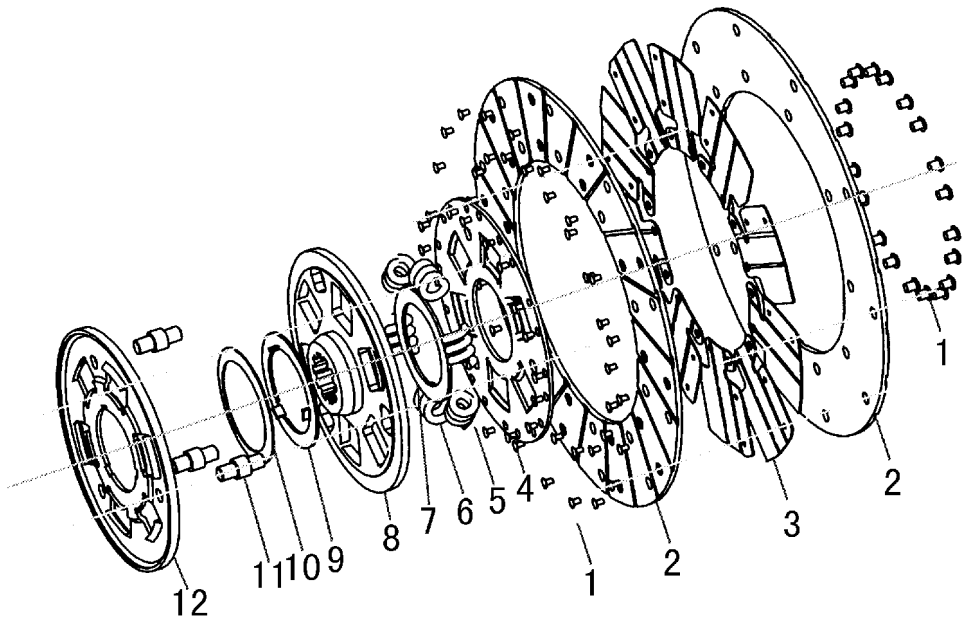
Make use of the recommended lubricant for the connecting surface and the attrition surface of bearing and fork.

Note:

Overmuch lubricant may cause clutch driven disc damaged.

Clutch driven disc and pressure plate

Clutch driven disc

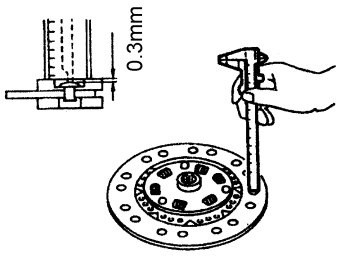


1.Friction lining rivet
2.Friction lining
3.Wave spacer
4.Front damping disc
5.Wave spacer rivet
6.Damping spring
7.Damping spacer
8.Disc hub
9.Damping impact spacer
10.Damping spring spacer
11.Limiting pin
12.Rear damping disc

Check

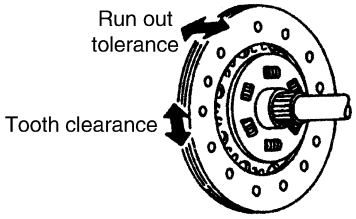
Check the degree of wear of the driven disc surface.

Wear limit:(from friction surface to the rivet head) 0.3mm.



Check the spline tooth clearance and the run out tolerance of driven disc.

Check the driven disc for ablation, color changed, or contaminated by oil or grease. Replace if necessary.



Installation

Smear some grease on the connecting surface and the spring.

Overmuch grease may damage the surface of the driven disc.

Clutch pressure plate

Check and adjust

Check the height and plainness of the diaphragm.

When checking the height of the diaphragm, set a clearance gauge(T=0.2mm) on the distance bushing.

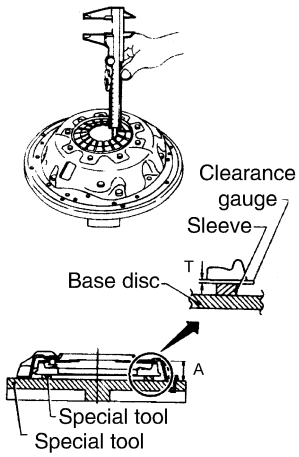
Height of the diaphragm: 41~43mm (base disc to the top of the diaphragm)

If the height is not in the range of the specific range, you need to replace the pressure plate.

Shake the pressure plate gently, listening and check the wear or damage of the diaphragm supporting ring. Or you can knock the rivet head gently to find if there is cracks. Replace the pressure plate if necessary.

Check the surface of the pressure plate for any ablation or dirt, make use of the corundum paper to get rid of them if necessary.

Check the connecting side of the pressure plate and the driven disc for any distorsion or damage, and replace them if necessary.



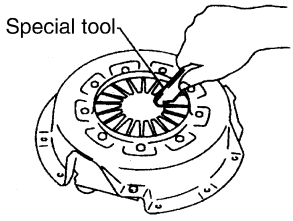
Adjust the plainness of the diaphragm by tools.

Plainness: <0.7mm

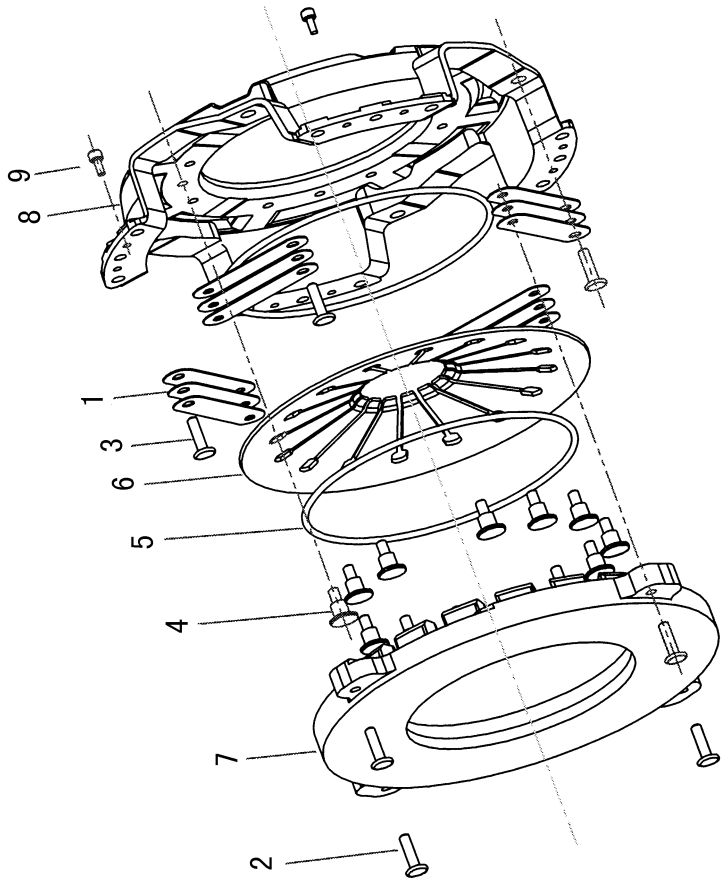
When install the clutch pressure plate and driven disc, insert the special tool into the clutch driven disc spline(used to align and orient).

Screw down the fixing bolt of the clutch cover.

Screw down the bolt in an acrossed sequence, following two steps.



Clutch Cover and Flywheel

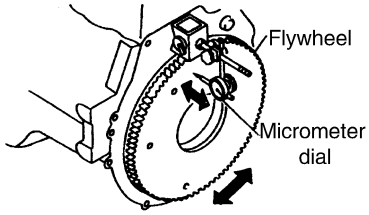


1.Driving blade
2.Rivet--pressure plate
3.Rivet--cover
4.Rivet--supporting ring
5.Supporting ring
6.Diaphragm spring
7.Pressure plate
8.Clutch cover
9.Balancing rivet

Flywheel check

Check the working face of the flywheel for ablation or color changed, make use of the corundum paper to get rid of them if necessary.

Check the plainness of the flywheel surface: <0.1mm



Usage and Maintenance

The diaphragm clutch which has two positioning holes and been connected by 8 M10 bolts, is made up by cover assy and driven disc assy.

The drive blade is used to transmit the engine torque between the pressure plate and clutch cover. Two ends of the drive blade are riveted to the clutch cover and the pressure plate. When disengaged, the drive blade may have the axial deformation, and there is no friction between clutch cover and pressure plate. Therefore, the clutch will has a higher drive efficiency, lower noise, and stable engage.

The working pressure force is caused by the diaphragm. The original height of the clutch release finger is 56±1mm. During the usage, it will be heigher because of wearing. The wear limit of the two pieces of the friction lining is 2×1.8mm. During the wearing time, the distance between the toppest point of the release finger and the release bearing end has to be adjusted to 3~4mm, and the largest release stroke of the release finger is 10mm.

The outside diameter of the driven disc friction lining is Φ 325mm. Its material may adopt to asbestos or non-asbestos according to the need of the customer. The original thickness of the driven disc working surface is 9.7±0.3mm. The assembly is equipped with big and small shock-absorber spring and damping spacer which is good to absorb the impact and vibration from the chassis.

The involute spline is used to connect the driven disc and transmission.

The working surface of the driven disc can't be stained with oil soil during the assembling and storage.

When the friction lining is in trouble, such as the rivet loose or come out or cracked, the driven disc must be replaced immediately.

During the assembling and instorage, the working surface of the clutch cover assembly must haven't any scuffing and rust. If the release finger is broken or the pressure plate reached to its wear limit and the diaphragm is broken, you must replace the assembly immediately.

Transmission

MT

Table of Contents

Maintenance Standard

Maintenance Standard

Item			Nominal Dimension（mm）	Sevice Standard（mm）	Repair Limit（mm）	Wear Limit（mm）	Remark
Transmission top cover	Clearance between gear shift lever and select lever	Gear shift lever	—	0.1~0.4	—	0.8	
		Gear select lever	—				
	Radial clearance between gear shift lever and its spline		—	0.05~0.11	—	0.5	
	Clearance between gear shift lever and guide block	Gear shift lever	—	0.1~0.4	—	1.0	
		Each guide block	—				
Transmission upper cover	Clearance between gear shift fork and slide sleeve		—	0.10~0.29	—	1.0	
	Gear shift fork shaft self-locked spring	Free length	—	34.0~36.0	—	—	
		Pressure force	—	140~190 N	—	110N	When press to 25mm
Transmission body	Backlash between mainshaft and countershaft		—	0.15~0.25	—	0.5	
	Axial clearance of the 2nd gear		—	0.3~0.5	—	0.7	
	Axial clearance of the reverse gear		—	0.3~0.6	—	1.0	
	Radial clearance between mainshaft spline hub and mainshaft		—	0.2~0.3	—	0.5	
	Radial clearance between slide sleeve and coupling gear		—	0.45~0.55	—	1.0	
	Axial clearance of ball bearing		—	—	—	0.5	
Synchronizer	Lockpin type	Pretravel of synchronizer conical ring and conical disc	—	0~0.5	—	2.0	
	Slide block type	Clearance between baulk ring and synchronizer conical ring	—	1.5~2.5	—	0	
		Radial clearance between baulk ring and fixed tooth seat	—	5.3~5.7	—	—	
		Axial clearance between fixed seat and synchronizer closing ring	—	＞0.5	—	—	
		Axial clearance between fixed seat and synchronizer backing block	—	0.05~0.35	—	—	
		Free length of the backing block spring	15	—	—	—	
		Packing force of the backing block spring	—	6~10N	—	4N	When press to 12.5mm

Tightening Torque

Item		Tightening Torque （N.m）
Clutch housing connecting bolt		142~186
fasten nut of propeller shaft connecting flange		333~549
Transmission upper cover fixed bolt and nut		32~42
Transmission cover fasten bolt		20~26
Reversing lamp switch and neutral position switch		20
Power take-off housing connecting bolt	Standard	47~63
Countershaft rear bearing cover fixed bolt		59~79
Fixed bolt of mainshaft rear bearing seat	M12	59~79
	M14	93~124
Fixed bolt of drive gear shaft bearing cover		33~44
Reverse gear shaft locking plate bolt		20~26
Mainshaft front locking nut		300
Oil drain screw plug and filler port screw plug		120~140
Gear shift guide bolt		40
Countershaft rear locking nut		300

Transmission Dismount

Before disassemble the assembly, switch the ignition key to OFF, and wedge up the front and rear wheel to ensure the safety.

1.Screw off the drain plug screw, drain off the lubricant oil from the underpart of the transmission;

2.Disassemble the driving shaft assembly and central support bearing;

3.Remove the speedometer flexible shaft;

4.Disassemble transmission control system

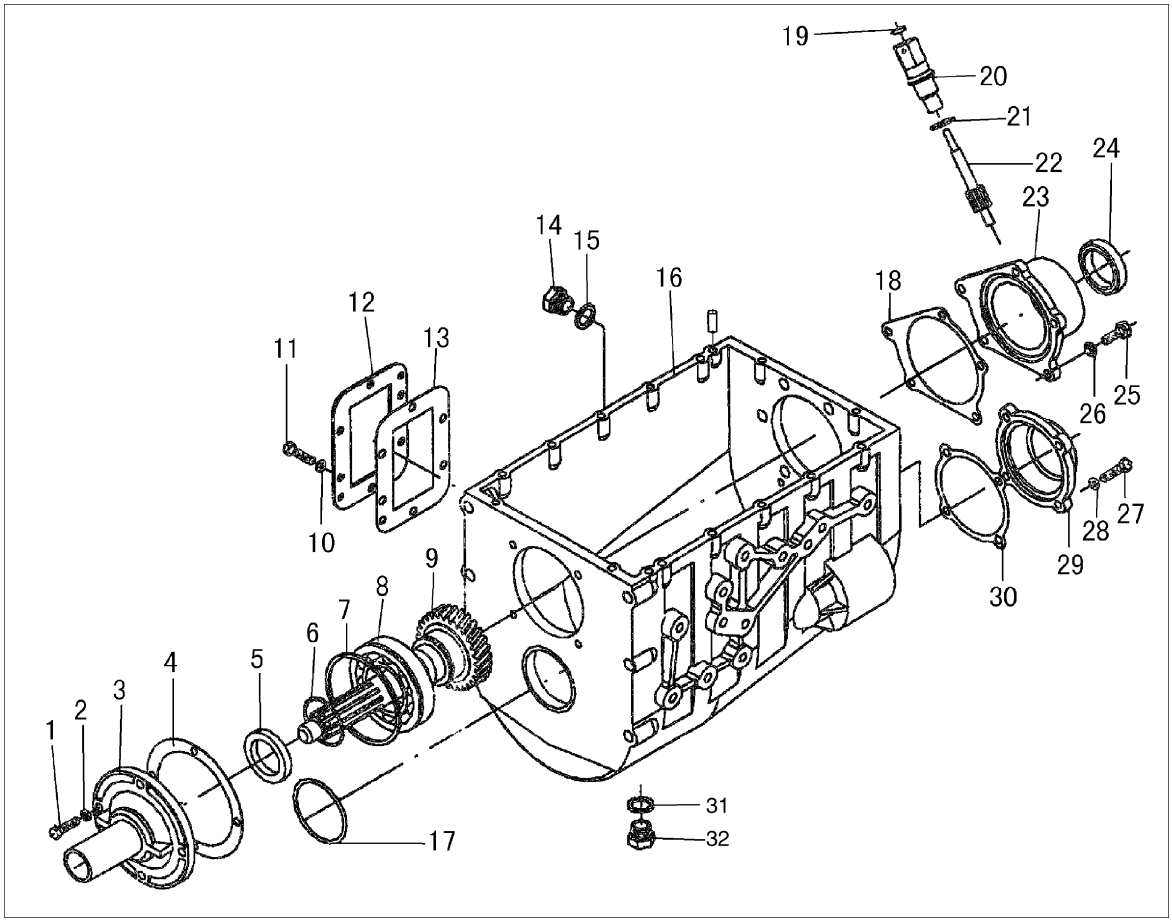
5.Remove the return spring and dowel pin of the clutch slave cylinder then safely put the clutch slave cylinder assembly onto the frame;

6.Remove wire and tube.

7.Disassemble the transmission with transmission jack and steel wire.

Transmission Disassembly

Transmission housing and drive gear shaft

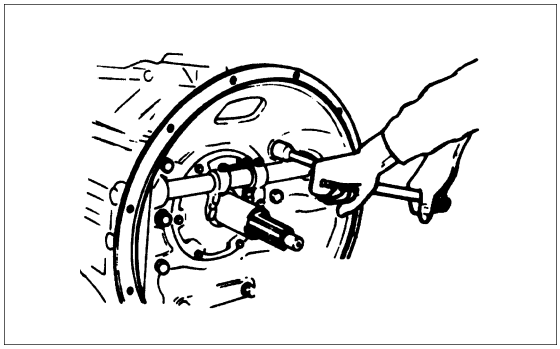


1.Small hex guide bolt
2.Spring washer
3.Bearing cover--drive gear shaft
4.Bearing cover spacer--drive gear shaft
5.Oil seal --transmission drive gear shaft
6.Snap ring for shaft
7.Staved steel ring for shaft
8.Rear bearing--transmission drive gear shaft
9.Transmission drive gear shaft
10.Spring washer
11.Hex bolt
12.Cover board--power take-off hole
13.Cover board spacer--power take-off hole
14.Oil screw plug assy
15.Sealing washer
16.Transmission housing
17.O-ring--transmission counter-shaft
18.Rear bearing seat spacer--mainshaft
19.Speedometer oil seal assy
20.Speedometer flexible joint
21.Sealing washer
22.Speedometer driven gear
23.Rear bearing seat--mainshaft
24.Skeleton oil seal assy
25.Small hex guide bolt
26.Spring washer
27.Bolt--for bearing cover
28.Spring washer
29.Countershaft rear bearing cover
30.Spacer--countershaft rear bearing cover
31.Sealing washer
32.Oil screw plug assy

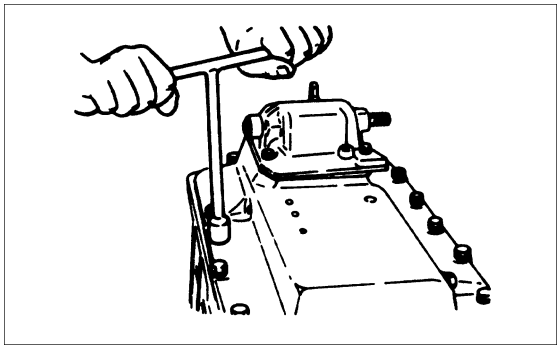
Set the transmission on the working table carefully. If there is not a working table, make use of a simple table to support the transmission housing first, and then carefully do the disassembly.

Disassembly of transmission accessories

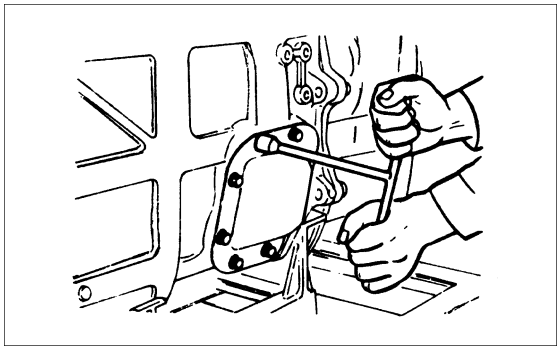
1.Remove the clutch housing assembly;



2.Remove the transmission upper cover assembly and spacer;

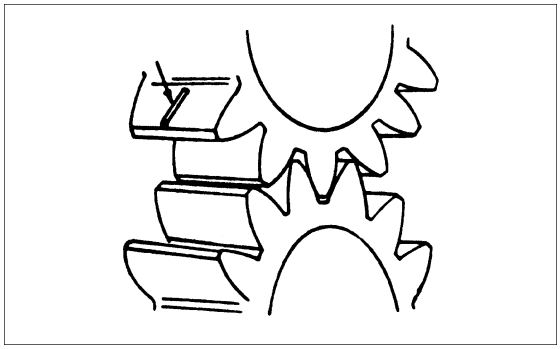


3.Dismantle the power take-off cover and spacer;

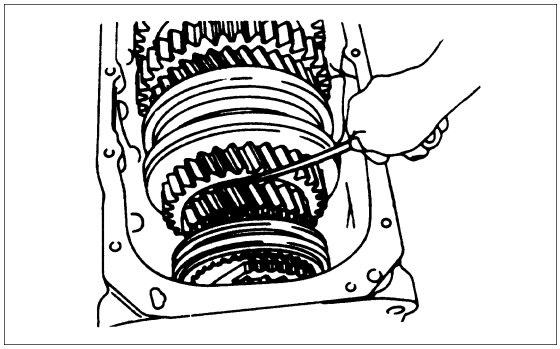


4.Measure the backlash of every pair of gear and take the records;

Note: Take three points of every pair of gear to measure.



5.Measure the axial clearance of every gear and take the records.



Check point

1.Clearance between 6th speed gear and 6th speed gear thrust ring;

2.Clearance between 4th speed gear and 6th speed gear thrust ring;

3.Clearance between 3rd speed gear and 3rd and 4th speed gear fixed seat;

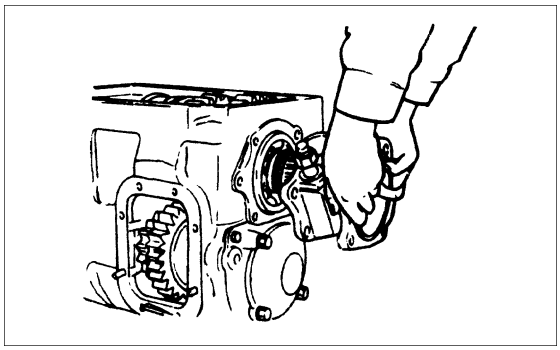
4.Clearance between reverse gear and reverse gear fixed seat;

5.Clearance between 2nd speed gear and 3rd speed gear thrust ring;

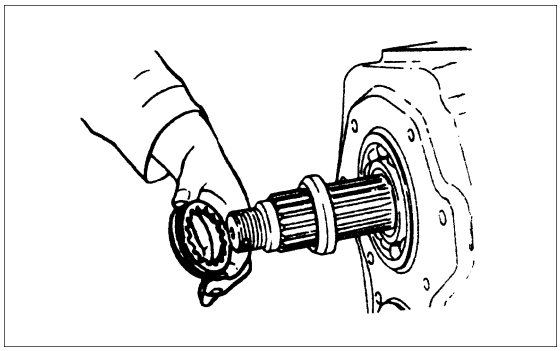
6.Clearance between 1st speed gear and reverse gear seat.

Transmission body

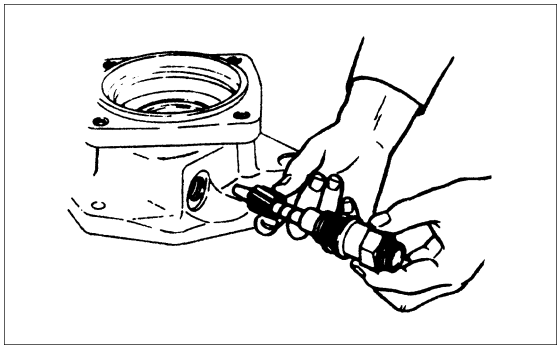
1.Remove the rear bearing cover of the mainshaft;



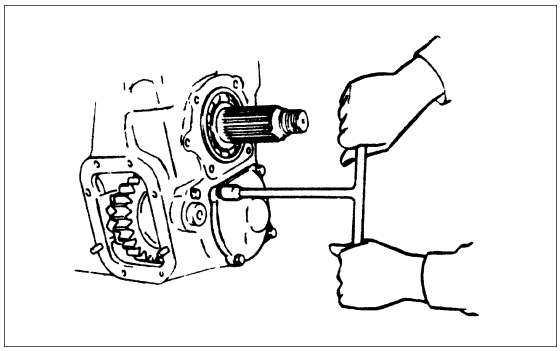
2.Remove the speedometer drive gear and spacer;



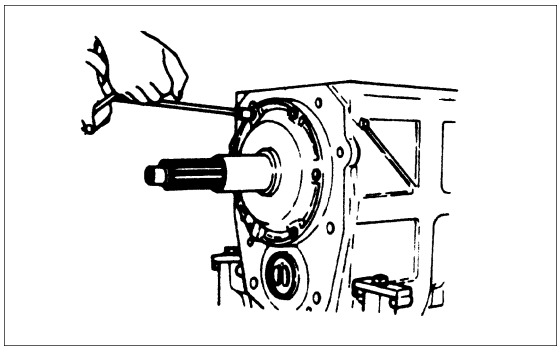
3.Remove the driven gear, flexible joint and bushing of the speedometer;



4.Remove the countershaft rear bearing cover and gasket;

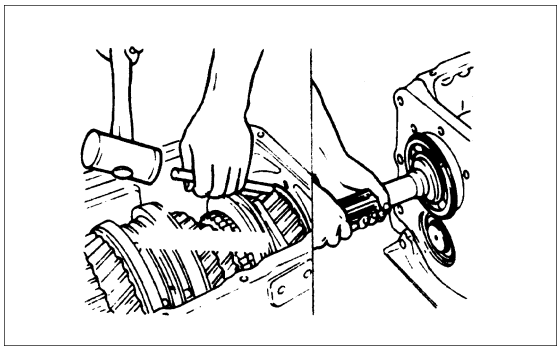


5.Remove the drive gear shaft bearing cover and gasket;

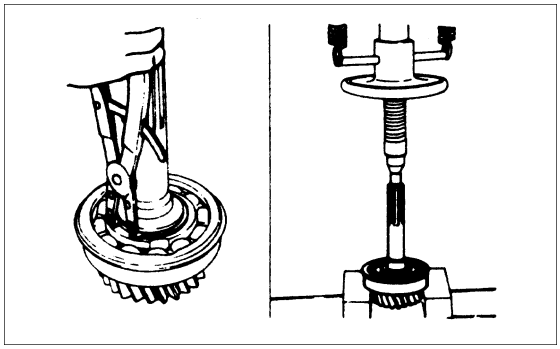


6.Remove the oil seal from the bearing cover (if necessary);

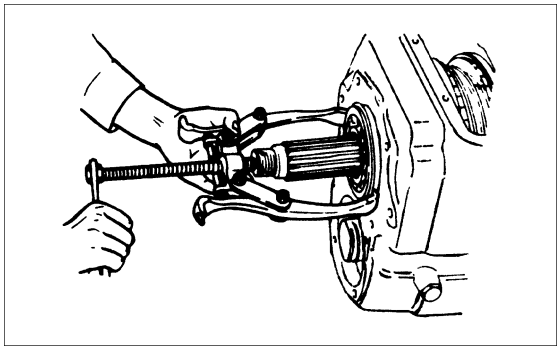
7.Take out the drive gear shaft assembly;



8.Remove the elastic collar and remove the ball bearing (only if it is necessary to replace the bearing);



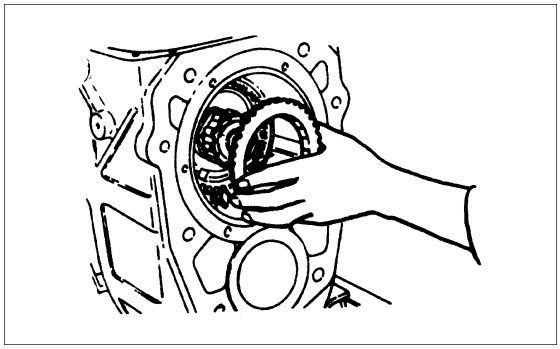
9.Remove the mainshaft rear ball bearing elastic ring, set the extractor in the slot of the elastic ring, then take down the bearing;



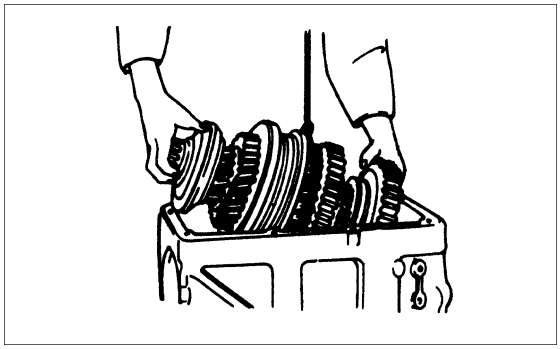
10.Take down the synchronizer baulk ring of the 5th and 6th speed gear;

Note:

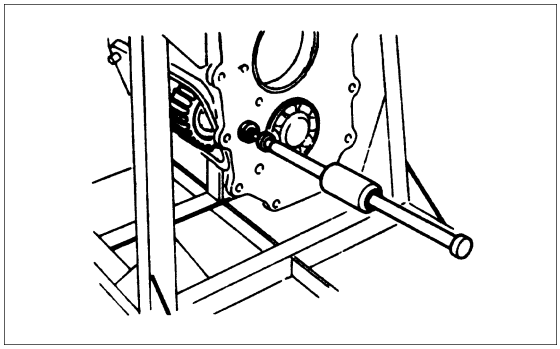
Make marks on the baulk ring in order to distinguish.



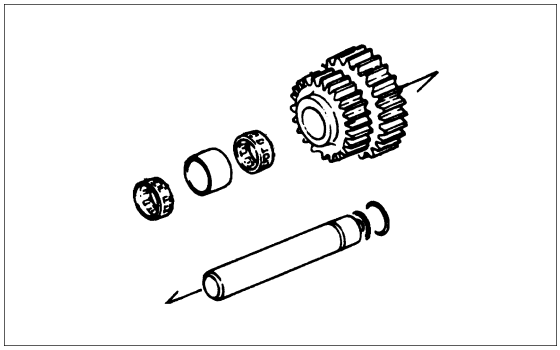
11.Make use of a crane or hoist to lift the mainshaft out from the transmission housing and make the front end of the mainshaft uptilted;



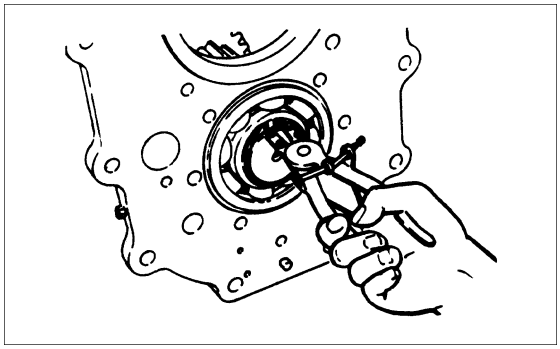
12.Make use of the extractor to pull the reverse gear shaft;



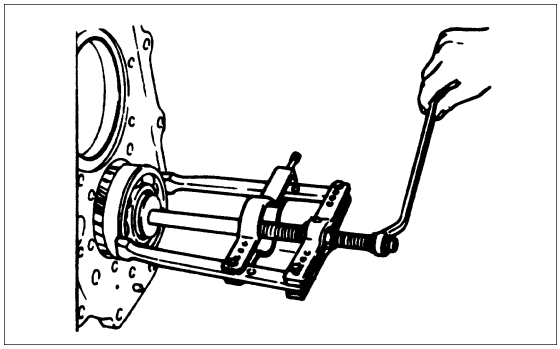
13.Disassemble the reverse gear assembly;



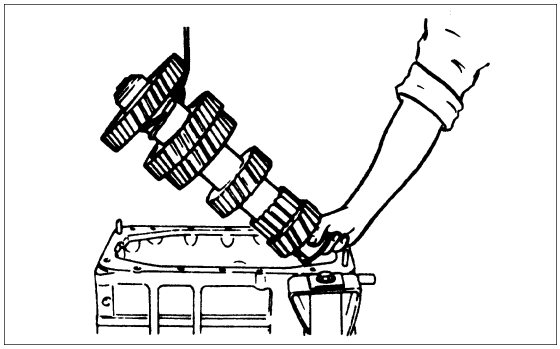
14.Remove the countershaft rear locking nut;



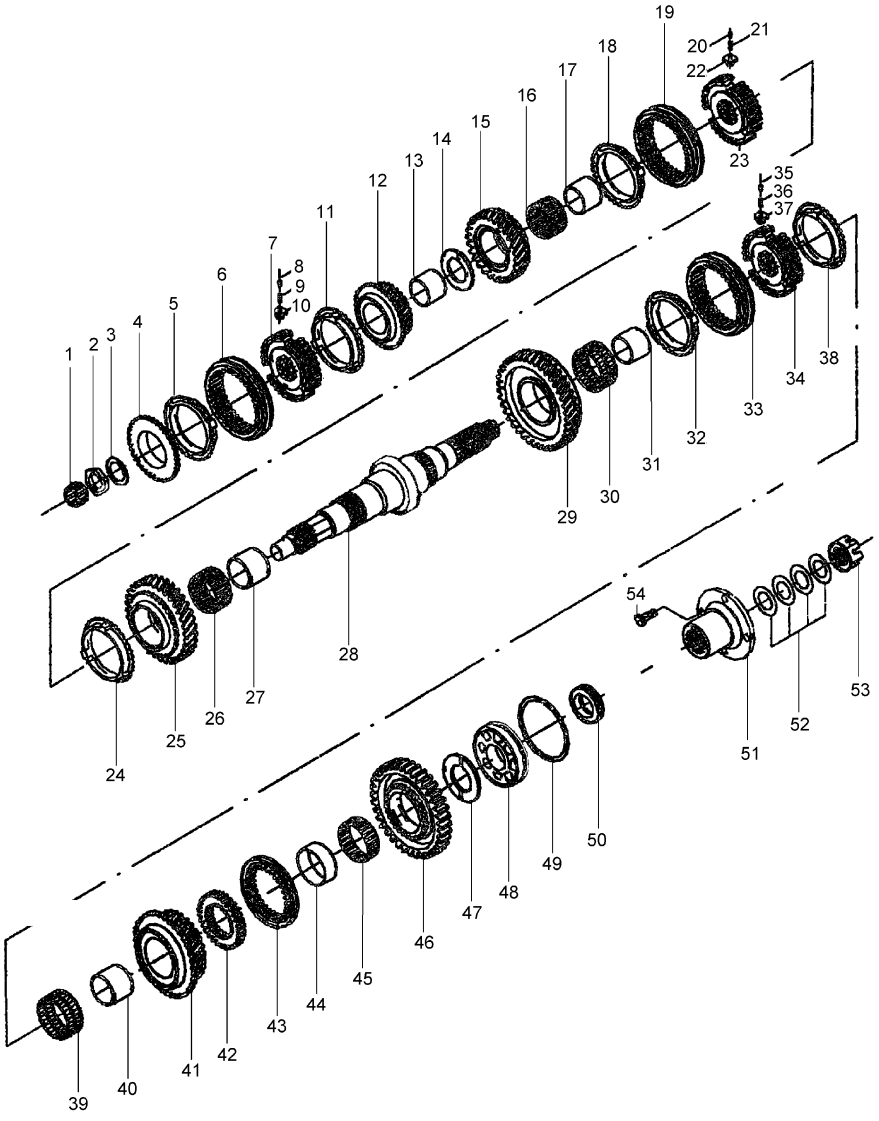
15.Remove the elastic ring of the countershaft rear ball bearing, then set the extractor in the retainer ring slot, and pull the bearing out;



16.Lift the countershaft out by using crane or hoist.

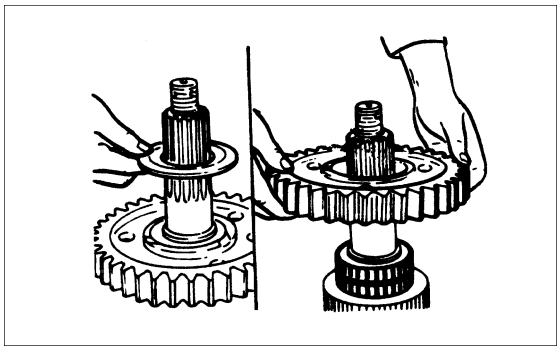


Transmission mainshaft



1.Front roller bearing--mainshaft
2.Lock nut
3.Lock nut lock shim
4.Direct gear synchronizer conical ring
5.5th, 6th gear baulk ring
6.5th, 6th gear sliding sleeve
7.5th, 6th gear fixed gear seat
8.5th, 6th gear synchronizer lock-pin
9.Lockpin
10.Synchronizer push rod
11.5th, 6th gear baulk ring
12.5th gear assy
13.6th gear bearing seat ring
14.6th gear thrust ring
15.4th gear assy
16.Needle bearing
17.4th gear bearing seat ring
18.4th gear baulk ring
19.3rd, 4th gear sliding sleeve
20.3rd, 4th gear synchronizer lockpin
21.Lockpin
22.Synchronizer push block
23.3rd, 4th gear fixed gear seat
24.3rd gear baulk ring
25.3rd gear
26.Needle bearing
27.3rd gear bearing seat ring
28.Transmission mainshaft
29.2nd gear assy
30.Needle bearing
31.2nd gear bearing seat ring
32.1st, 2nd gear baulk ring
33.1st, 2nd gear synchronizer gear sleeve
34.1st, 2nd gear synchronizer gear seat
35.3rd, 4th gear synchronizer lockpin
36.Lockpin spring
37.Synchronizer push block
38.1st, 2nd gear baulk ring
39.Needle bearing
40.2nd gear bearing seat ring
41.1st gear--mainshaft
42.Reverse gear seat
43.Reverse gear slide sleeve
44.Reverse gear bearing seat ring
45.Needle bearing
46.Driven gear--reverse gear
47.Reverse gear thrust spacer
48.Rear roller bearing--mainshaft
49.Staved steel ring for shaft
50.Drive gear--speedometer
51.Mainshaft flange
52.Disc spring
53.Hex slotted nut

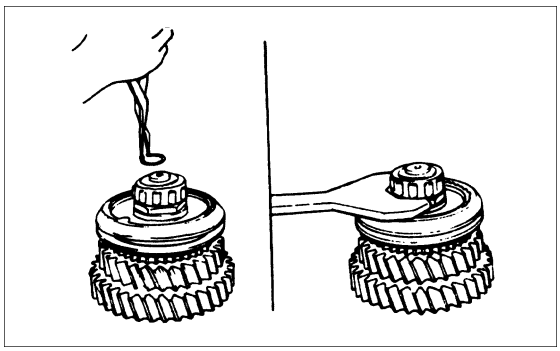
1.Take down the following parts in sequence: the thrust washer, reverse gear, needle bearing and bearing base ring, reverse gear seat, reverse gear sleeve;



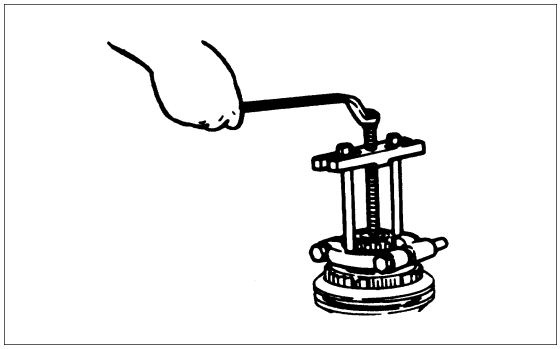
2. Set the front end of the mainshaft up and place it on the working table, remove the elastic ring and square the locking spacer, then loose the locking nut by a spanner;

Note:

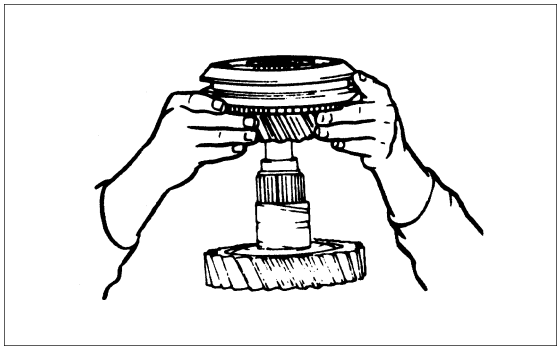
Make sure the nut is totally loose.



3.Pull out the bearing by the extractor, then remove the locking nut, locking spacer and the spacer sleeve in sequence;



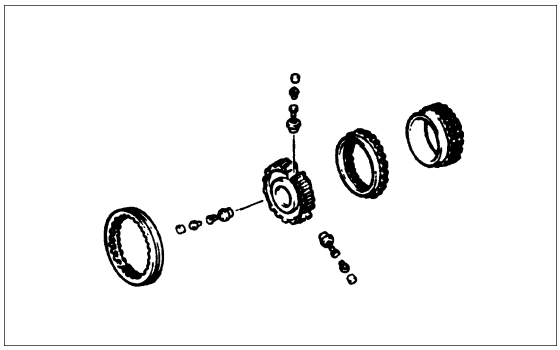
4.Take down the 5th and 6th speed gear synchronizer assembly and the 6th gear;



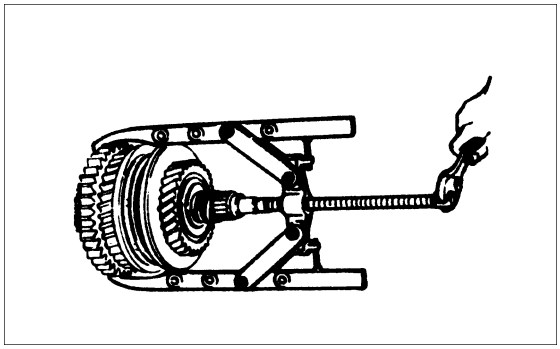
5.Dismantle the 5th and 6th speed gear synchronizer assembly;

Note:

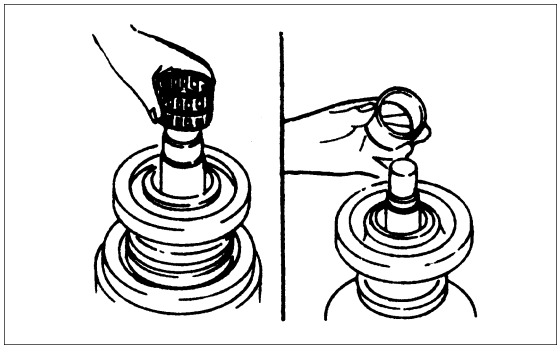
Be careful when dismantle the slide gear sleeve, take care of the fixed gear seat, lockpin and spring of the slide sleeve, and other parts. Do not miss any of them.



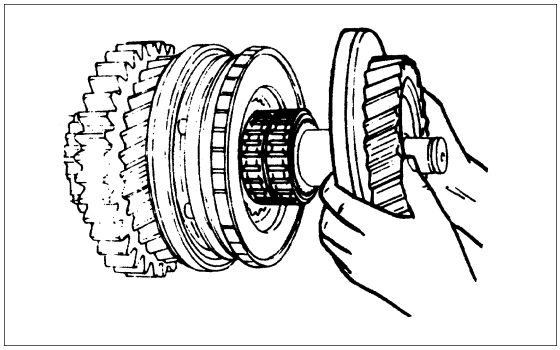
6.Pull the reverse gear with an extractor to loose the shaft bush and every gear needle bearing seat ring;



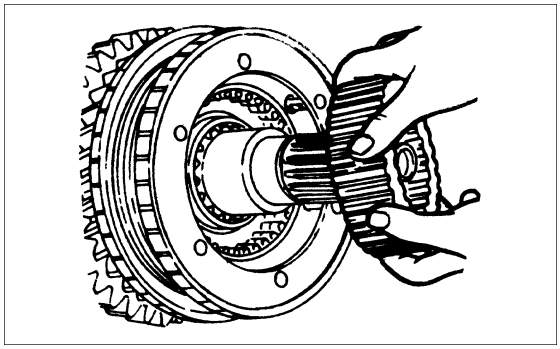
7.Take down 6th speed gear needle bearing and the bearing seat ring;



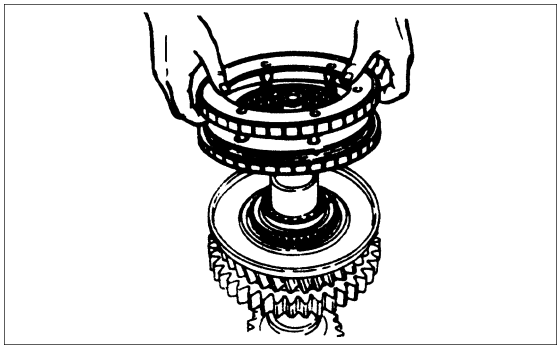
8.Remove the thrust spacer, 4th gear, needle bearing and 4th speed gear bearing seat ring;



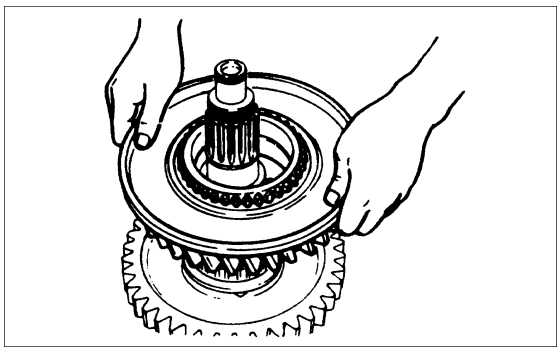
9.Take down 3rd and 4th speed gear fixed gear seat;



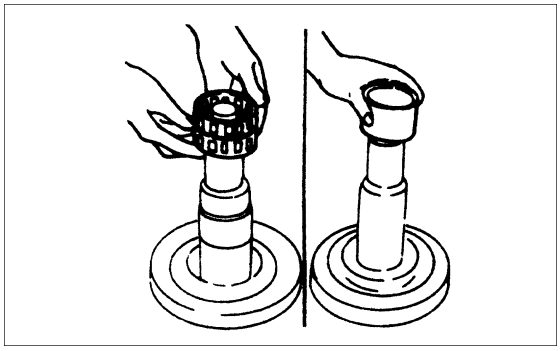
10.Take down 3rd and 4th speed gear synchronizer;



11.Take down 3rd and 4th speed gear;



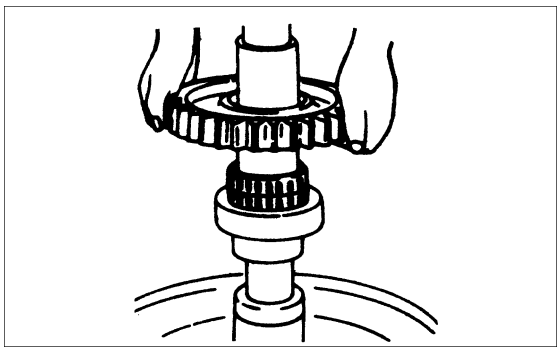
12.Remove the needle bearing, spacer sleeve;



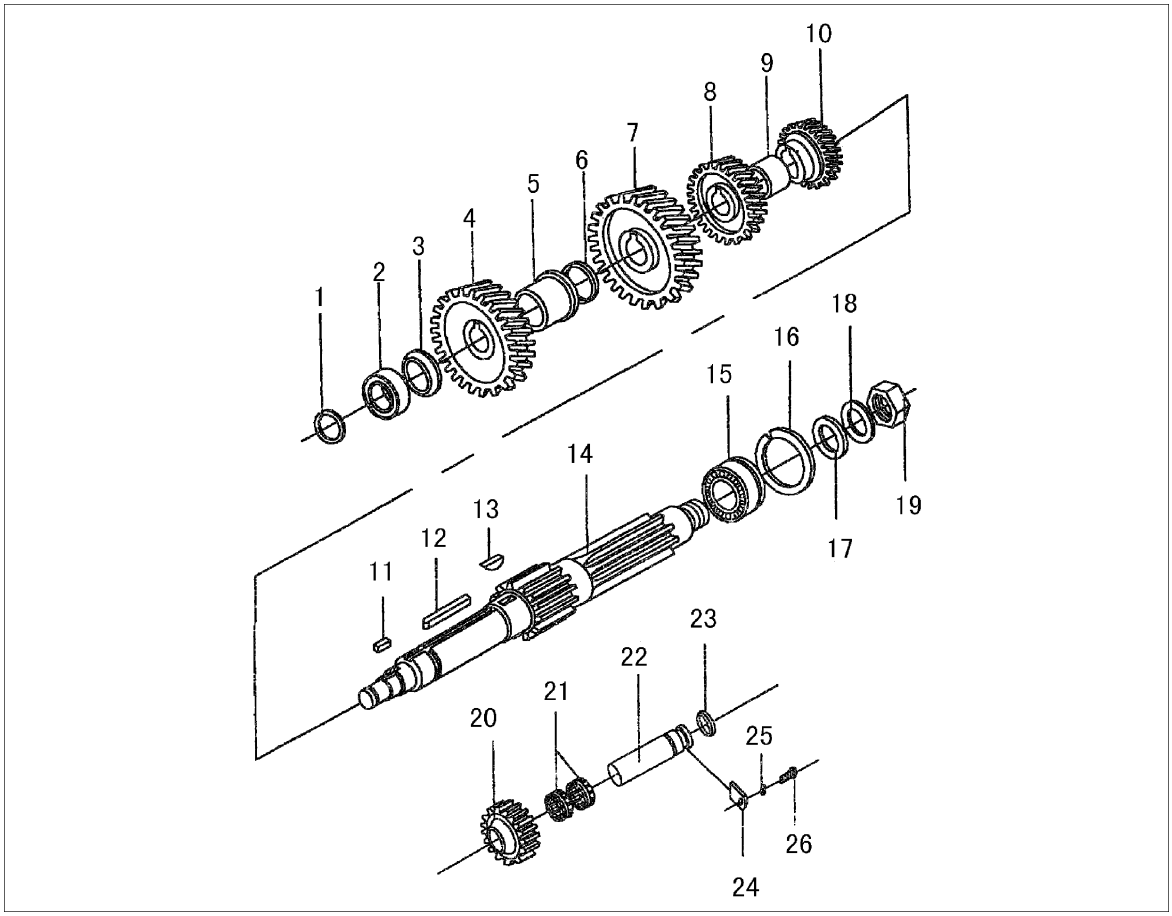
13.Take down 2nd speed gear and needle bearing;

14.Take down the 1st and 2nd speed gear synchronizer assembly;

15.Remove the 1st speed gear and needle bearing.



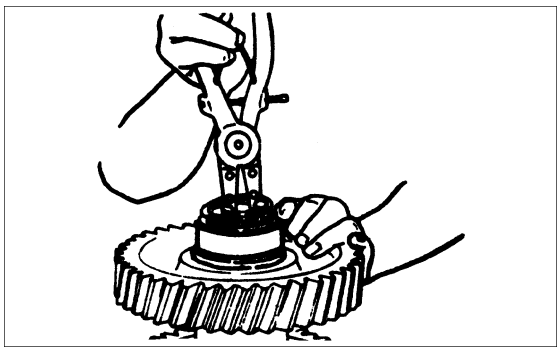
Transmission countershaft, reverse gear shaft



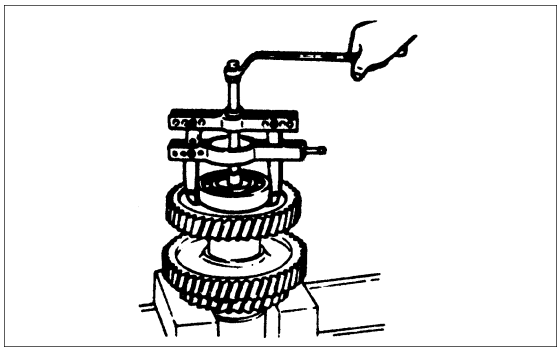
1.Snap ring for shaft	10.Countershaft 3rd gear	19.Lock nut
2.Countershaft front roller bearing	11.Key	20.Reverse gear
3.Constant mesh gear thrust shim	12.Key	21.Reverse gear needle bearing
4.Countershaft constant mesh gear	13.Woodruff key	22.Reverse gear shaft
5.Countershaft 6th gear sleeve	14.Transmission countershaft	23.O-ring
6.Countershaft 4th gear lock ring	15.Countershaft rear roller bearing	24.Reverse shaft lock spacer
7.Countershaft 5th gear	16.Steel ring for shaft	25.Spring washer
8.Countershaft 4th gear	17.Lock nut washer	26.Hex bolt
9.Sleeve	18.Lock nut lock spacer	

Usually, the countershaft need not to be disassembled, unless the gear worn or damaged and it is necessary to replace, then you need to do the disassembly.

1.Take down the elastic ring and spacer sleeve;



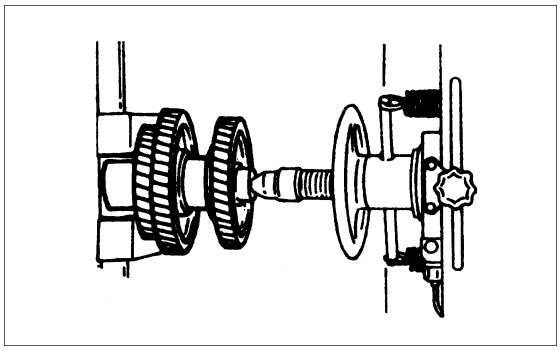
2.Remove the roller bearing;



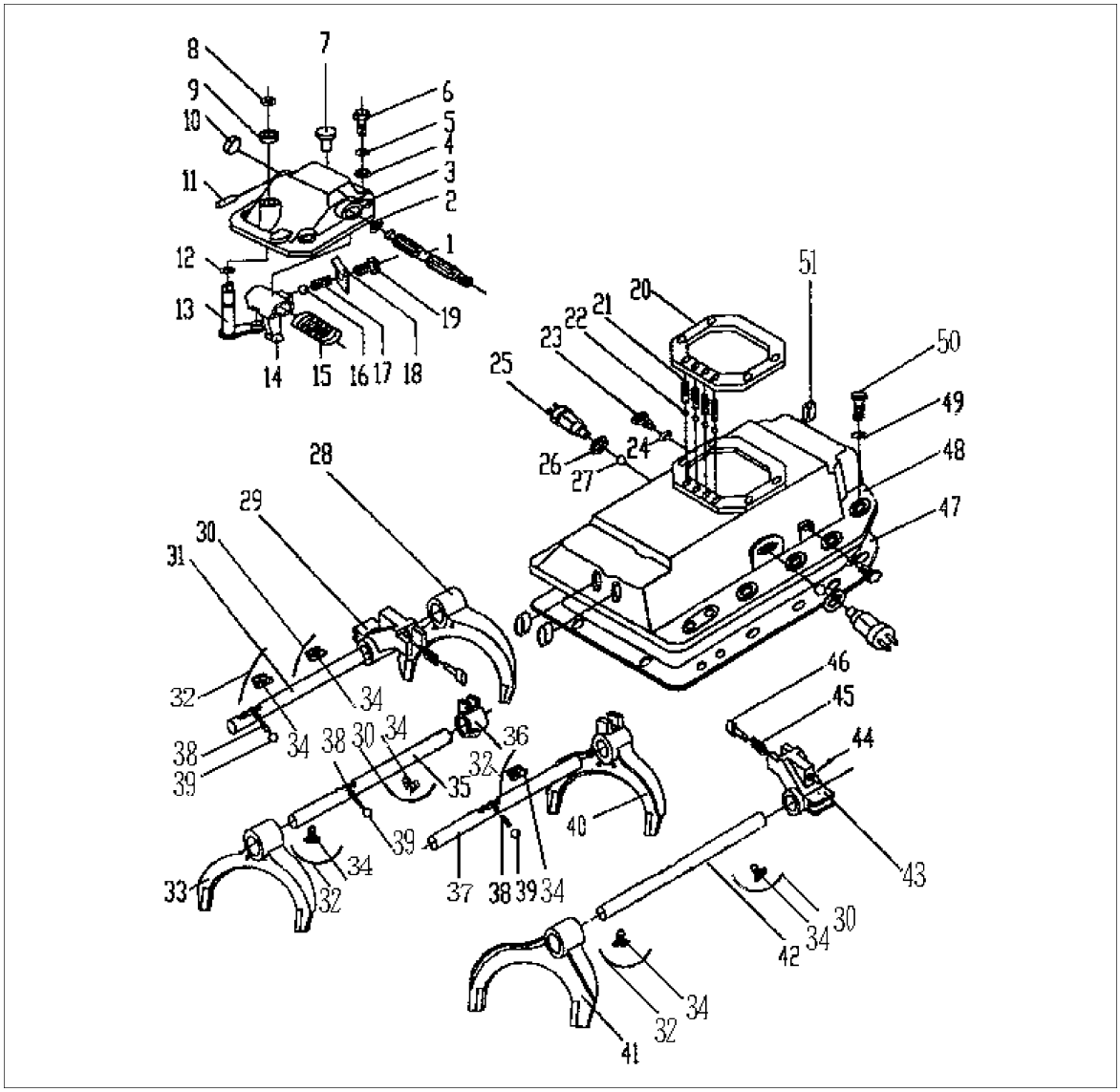
3.Make use of the oil pressure machine to press out the gear which fixed by keys, and remove the spacer sleeve at the same.

Note:

When pressing the countershaft, don't let it fall down.



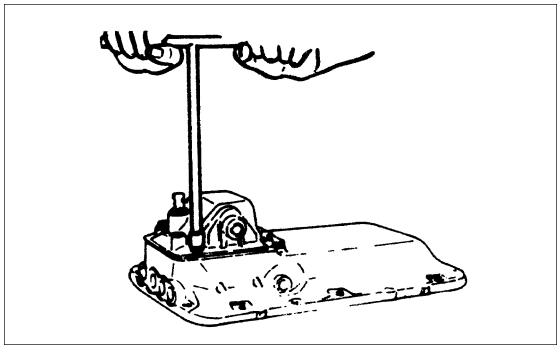
Transmission cover



1.Controlling shaft
2.Oil seal
3.Top cover
4.Plain washer
5.Spring washer
6.Hex bolt
7.Vent plug assy
8.Snap ring for shaft
9.Washer
10.Cup spacer
11.Pin
12.O-ring
13.Gear select rocker arm assy
14.Gear shift lever
15.Balancing spring -- gear select
16.Steel ball
17.Damping spring--reverse gear
18.Lock shim--spring seat
19.Damping spring seat--reverse gear
20.Top cover spacer
21.Lock transmission fork shaft spring
22.Steel ball
23.Limiting stop pilot bolt
24.Spring washer
25.Switch assy
26.Spacer
27.Steel ball
28.Reverse shift fork
29.Reverse gear guide block
30.Steel wire rope
31.Reverse gear fork shaft
32.Steel wire rope
33.1st, 2nd gear fork
34.Gear fork catch bolt
35.1st, 2nd gear fork shaft
36.1st, 2nd gear guide block
37.3rd, 4th gear fork shaft
38.Interlock pin
39.Steel ball
40.3rd, 4th gear fork
41.5th, 6th gear fork
42.5th, 6th gear fork shaft
43.5th, 6th gear guide block
44.Cotter pin
45.Safety stop pin spring
46.Safety stop pin spring
47.Spacer--transmission upper cover
48.Transmission upper cover
49.Spring washer
50.Hex bolt
51.Cup spacer

Gear shift shaft and fork could be moved in any sequence. But however, the interlocked pin and steel ball are related to the transmission top cover. Therefore, if the interlocked pin is not set on the neutral position, you can't pull down the gear shift fork shaft.

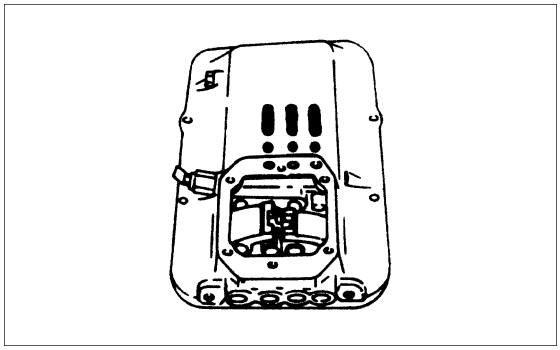
1.Take down the top cover assembly and gasket;



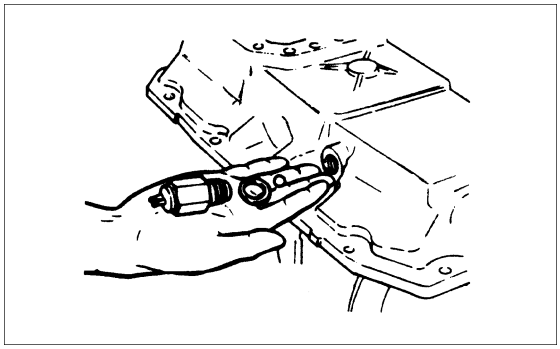
2.Take out the self-locked spring and steel ball;

Note:

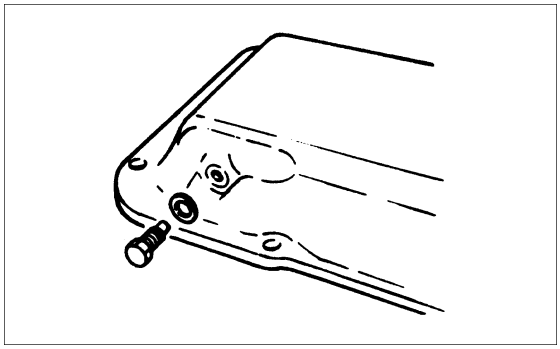
Look out the self-locked spring and steel ball, don't miss any of them.



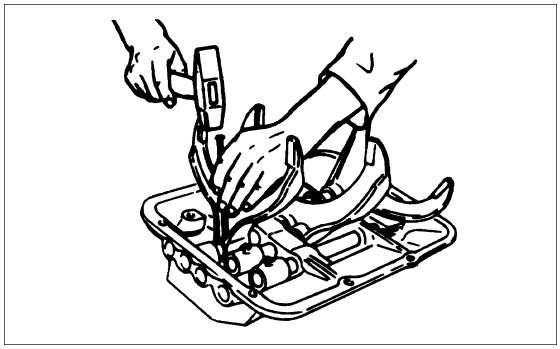
3.Take down the reverse lamp switch and neutral switch, steel ball;



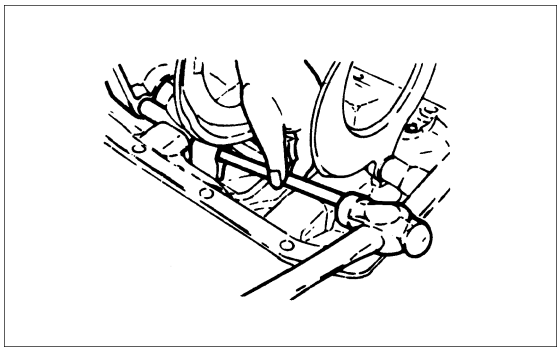
4.Take down the guide bolt of the limit block;



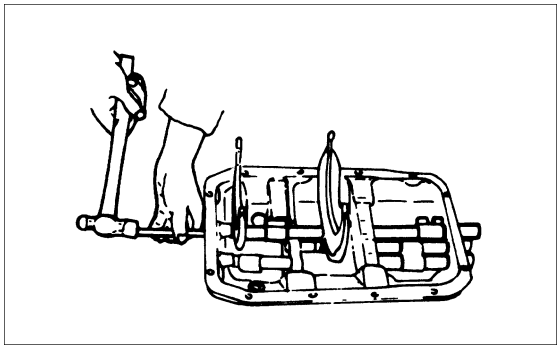
5.Make use of tools to take out the gear shift fork of the reverse gear, 5th and 6th speed gear, and the spring pin of every guide block;



6.Knock down the 5th and 6th speed or reverse gear shift shaft, and then take down the interlocked pin, reverse gear or 5th and 6th speed gear shift fork and steel ball;

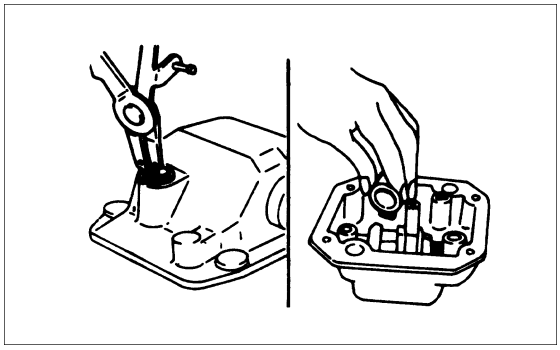


7.Knock out the 1st and 2nd gear shift fork spring pin, and then the 1st and 2nd gear shift fork and 3rd and 4th speed gear guide block shaft.

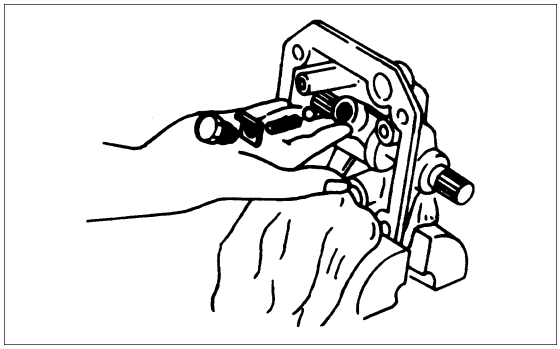


Transmission top cover

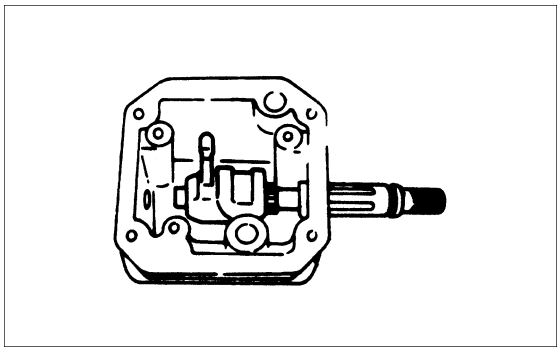
1.Take down the elastic ring, and then remove the select rocker arm and O-ring;



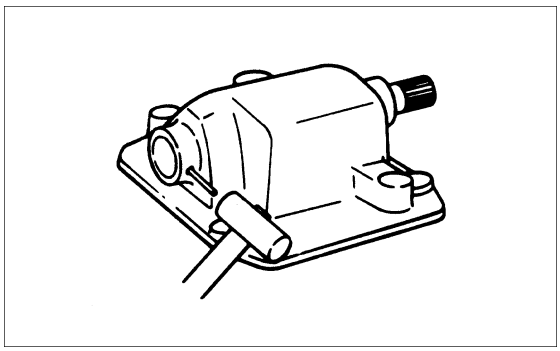
2.Loose the screw and remove the locking spacer, then take out the spring and steel ball from the gear shift lever;



3.Make marks on the same place of the gear shift lever and gear shift shaft spline;



4.Knock out the straight pin by a hammer and then pull the gear shift shaft.



Cleaning

Cleaning is compulsive because parts and components are often covered up with dirty oil and slurry. Applicable washing methods include vapor wash, Light oil wash, acid wash or alkaline wash, neutral agent wash, trichloroethylene wash, Magnus solution wash, etc. Some damages may be exposed during washing, so keep an eye on the parts and components during washing.

Metal parts

Light oil

Unlike other solutions, light oil is not able to osmose into and solute slurry. So except for the finish surface, clear the slurry with metal brush or other tools, and then wash twice as specified above.

Alkaline solution

Don't wash with alkaline solution if the part or component is of alloyed metal, alkaline solution is an ideal washing agent for steel or cast iron.

Note:

If wash with alkaline solution, prepare some neutralizing agent such as boric acid solution. In case alkaline solution splash into eyes or onto skin, wash it off with neutralizing solution.

Rubber parts

Don't wash with mineral oil. Get rid of slurry or filth with alcohol or clean cloth.

Oil channel

Let a wire go through the oil passage to unclog the passage, then wash the passage by injecting washing solution into it with pressurized nozzle.

Anticorrosion

After getting rid of the dirty oil on the component, apply a layer of clean grease to prevent corrosion.

Check

Check parts and components with special gauges or tools. Decide whether a component can continue to serve according to specified maintenance standards. Damaged components should be repaired or replaced as required.

If one of a pair of components fitted together is so worn that the fit clearance exceeds the specified range, replace the pair of components together.

Out of consideration of preventive maintenance, some components should be replaced before reaching service limit.

Carefully inspect the surface of components by eye looking or red check method. Repair or replace the component if its surface has the following abnormal signs:

uneven wear,

biased wear,

scratch,

crack,

distortion,

malfunction or becoming weak (spring),

bent,

loose,

abnormal noise (bearing),

discolored,

eroded,

deteriorate (friction lining), etc.

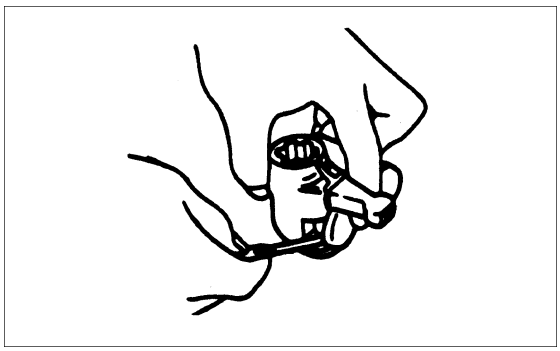
All the rubber pieces, such as O-rings, oil seals, washers, cannot be further used after disassembled.

Transmission top cover

1.Measure the clearance between gear shift lever and gear select rocker arm;

Repair standard: 0.1~0.4mm

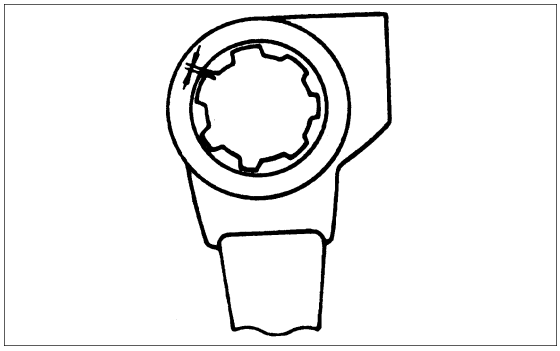
Wear limit: 0.8mm



2.Measure the clearance between gear shift shaft and gear shift lever spline;

Repair standard: 0.05~0.11mm

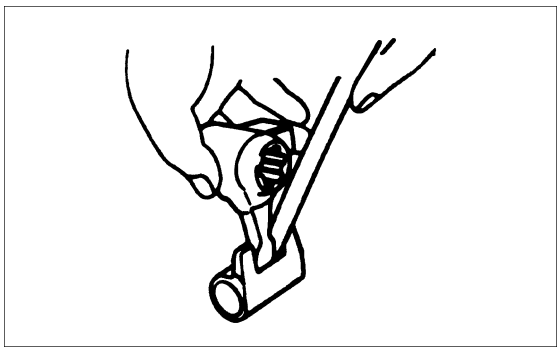
Wear limit: 0.5mm



3.Measure the clearance between gear shift lever and every guide block.

Repair standard: 0.1~0.4mm

Wear limit: 1.0mm



Transmission upper cover

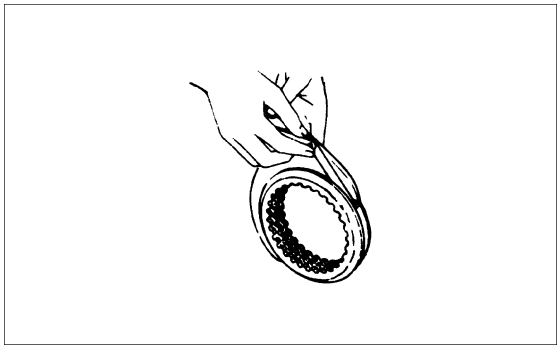
1.Measure the clearance between gear shift fork and gear slide sleeve slot;

Note:

Measure the gear slide sleeve slot, it has to be above than 3 points or 5 points.

Repair standard: 0.10~0.18mm

Wear limit: 1.0mm



2.Measure the free length and stiffness of the gear shift fork shaft self-locked spring.

Free length: 35mm

When press to 25mm:

Repair standard: 140~190N

Repair limit: 110N

Gear

1.If the measured backlash is over the wear limit value, check gear impression and working condition of the bearing;

Repair standard: 0.15~0.25mm

Wear limit: 0.5mm

2.Measure the clearance between fixed gear seat and gear slide sleeve engaged tooth (including mainshaft);

Repair standard: 0.2~0.3mm

Wear limit: 0.5mm

3.Measure the radial clearance between slide sleeve and the upper engaged tooth of the gear.

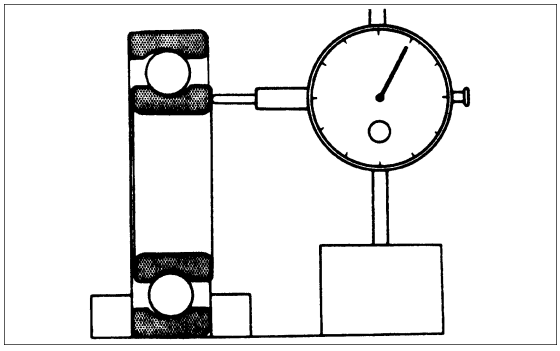
Repair standard: 0.45~0.55mm

Wear limit: 1.0mm

Ball bearing

Measure the axial clearance of the ball bearing.

Wear limit: 0.5mm



Synchronizer

Lockpin type

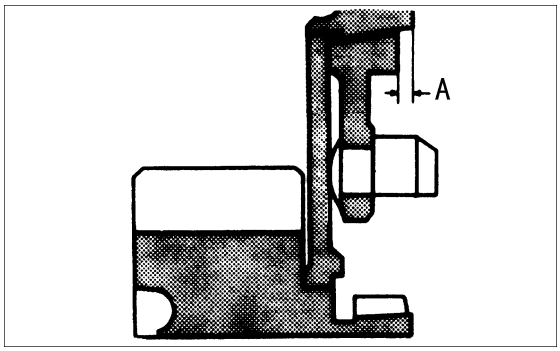
Check the pretravel between synchronizer conical ring and cone disc. (A)

Note:

Measure the average value between two points by 180° .

Repair standard: 0~0.5mm

Wear limit: 2.0mm

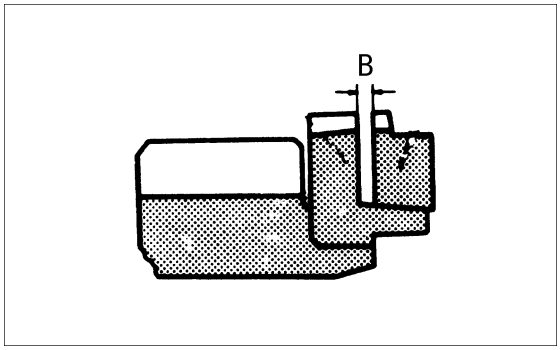


Slide block type

1.Measure clearance between baulk ring and synchronizer conical ring;

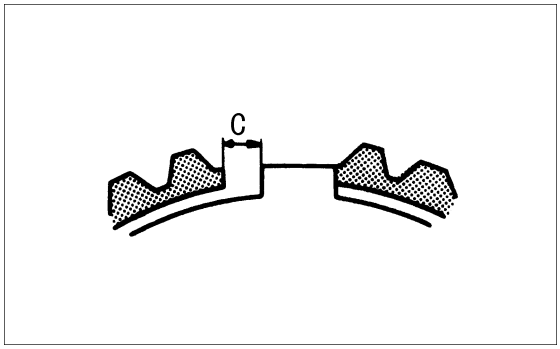
Repair standard: 1.5~2.5mm

Wear limit: 0mm



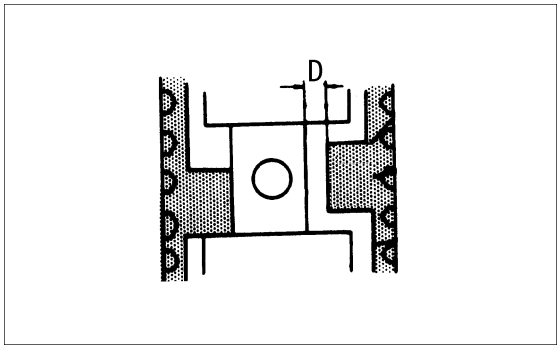
2.Measure clearance between baulk ring and gear fixed seat (C);

Repair standard: 5.3~5.7mm



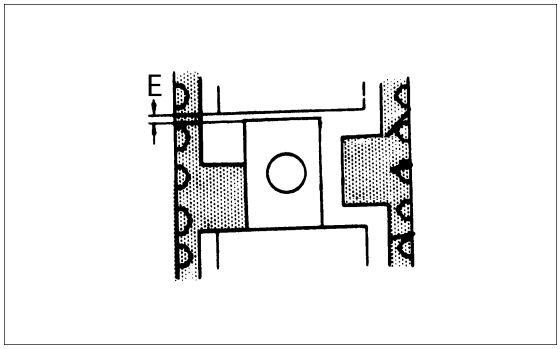
3.Measure axial clearance between baulk ring and backing block (D);

Repair standard: ＞ 0.5mm



4.Measure radial clearance between fixed gear seat and synchronizer backing block (E);

Repair standard: 0.05~0.35mm



5.Measure the free length and stiffness of the synchronizer spring.

Free length: 15mm

When press to 12.5mm:

Stiffness repair standard: 0.6~1.0kg

Wear limit: 0.4kg

Reassembly

When assembling the parts, please make sure that the installing direction of the gear thrust washer needle bearing and spacer sleeve.

All the surface of the turning part should be smeared with clean gear oil.

According to the requirement, all the self-locked nut, oil seal and O-ring should be replaced.

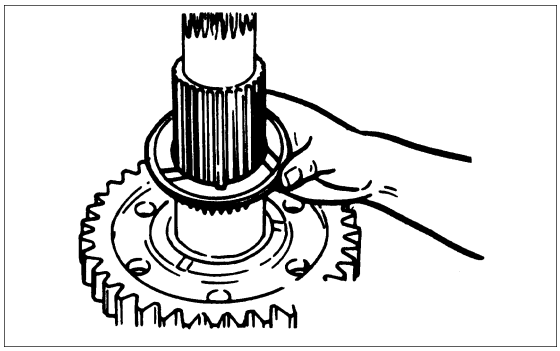
Mainshaft

1.Install the needle bearing and 2nd speed gear;

Note:

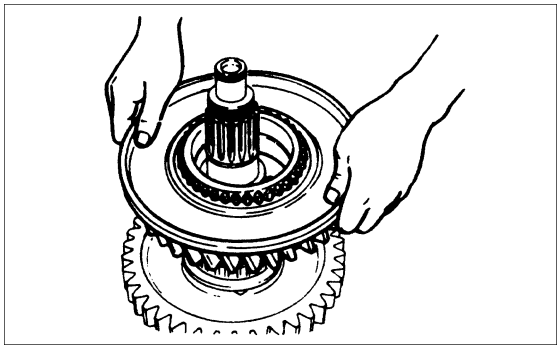
Install the 2nd speed gear in the correct direction.

2.Install the thrust spacer, and let the gap align to the dowel;

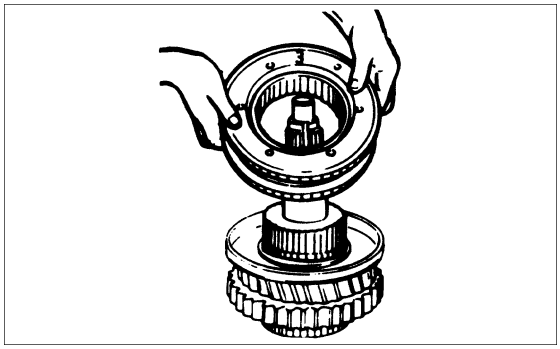


3.Assemble the 3rd speed gear needle bearing;

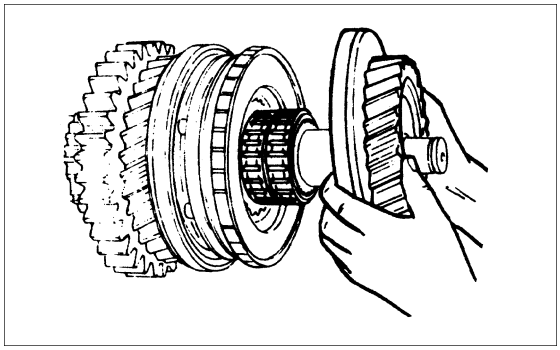
4.Assemble the 3rd speed gear;



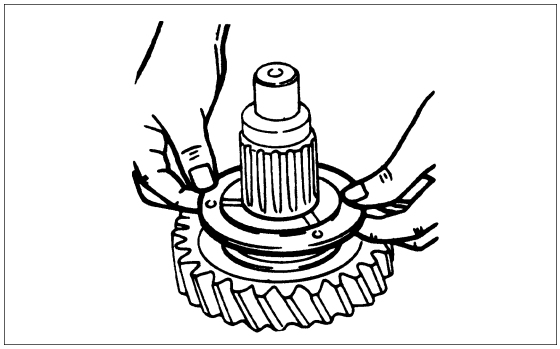
5.Assemble the 3rd and 4th speed fixed gear seat and synchronizer assembly;



6.Press the needle bearing seat ring of the 4th speed gear, then install the needle bearing and 4th speed gear;

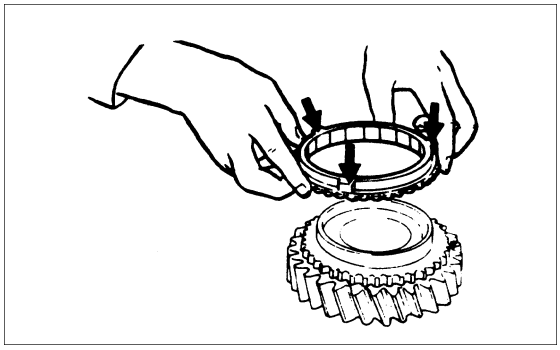


7.Install the thrust spacer;

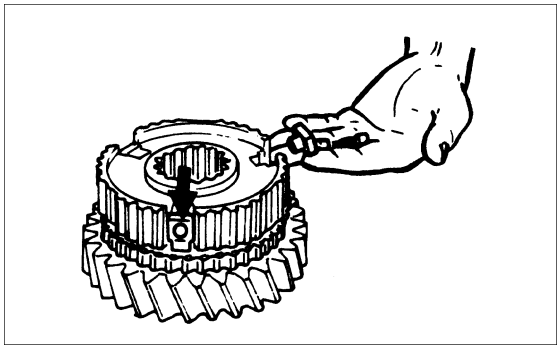


8.Install the 6th speed gear needle bearing seat ring and needle bearing;

9.Install the 5th and 6th speed fixed gear seat;



10.Install the synchronizer backing block, spring seat, spring and lockpin in sequence;



11.Install the synchronizer lockpin assembly into the slot of the fixed gear seat;

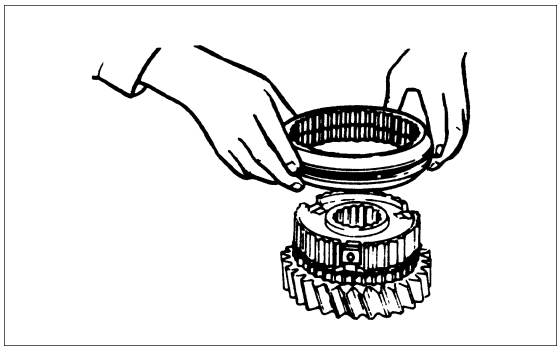
Note:

Be sure to make the wide face of the synchronizer accord to the turning direction of the fixed gear seat.

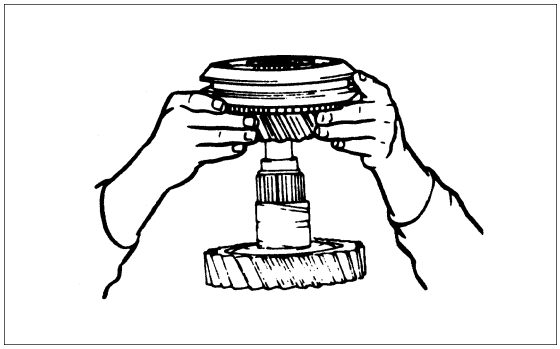
12.Install the 5th and 6th speed gear slide sleeve;

Note:

The height of the synchronizer lockpin lower than the lockpin assembly is not allowed.



13.Install the 5th and 6th speed gear synchronizer;

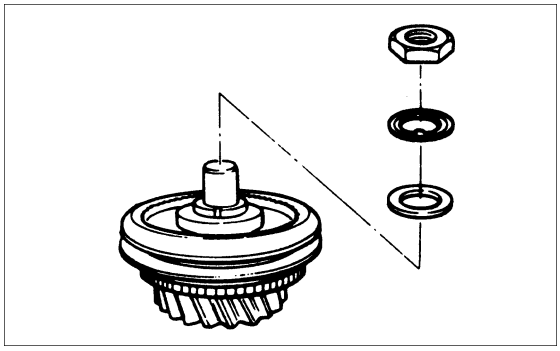


14.Install the spacer sleeve and lock shim, then tighten the locking nut with a special spanner;

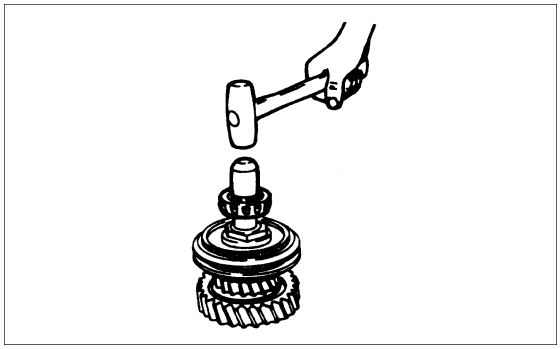
Tightening torque: 300N.m

Note:

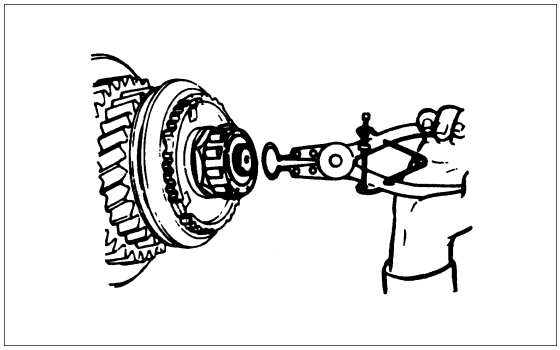
Bend the relative edge of the locking shim and nut.



15.Install the mainshaft front bearing;

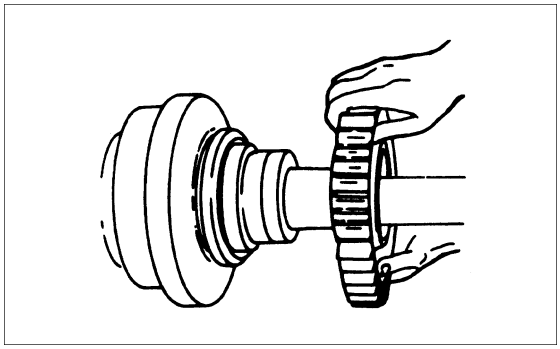


16.Set the elastic ring in the slot of the mainshaft end to block off the bearing;



17.Set the front end of the mainshaft downward, and install the 1st and 2nd speed synchronizer assembly, needle bearing, 1st speed gear, reverse gear seat and reverse gear sleeve;

18.Press in the reverse gear bearing seat ring, and install the needle bearing and reverse gear and thrust spacer;



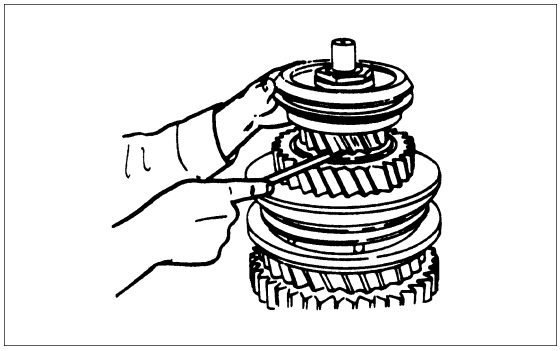
19.Measure clearance between every gear of mainshaft ;

Repair standard: 0.3~0.5mm

Wear limit: 0.7mm

Note:

Make use of the transmission housing and mainshaft assembly to measure the end clearance of the 1st speed gear.



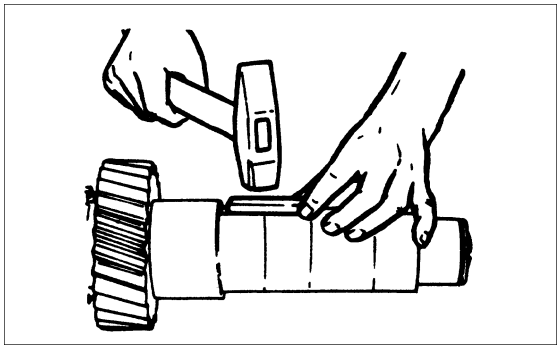
Countershaft

1.Install the 3rd speed gear woodruff key;

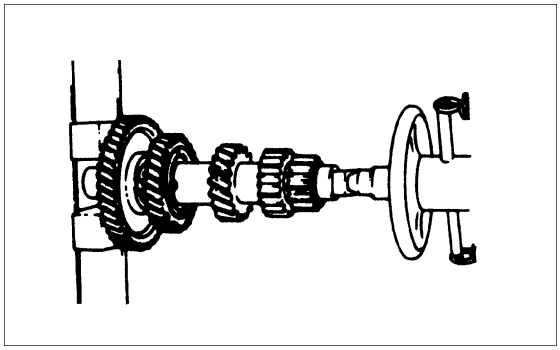
2.Install the 3rd speed gear;

3.Install the spacer sleeve;

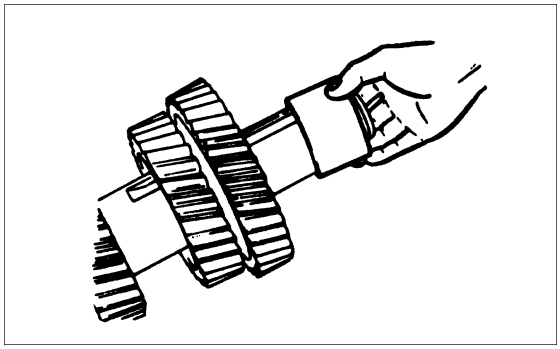
4.Install the flat key of 4th and 5th speed gear;



5.Install the 4th and 6 the speed gear of the countershaft;



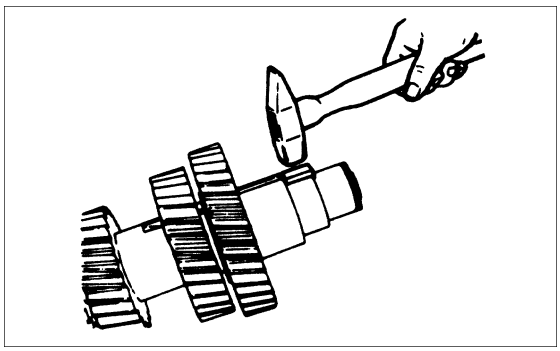
6.Install the spacer sleeve;



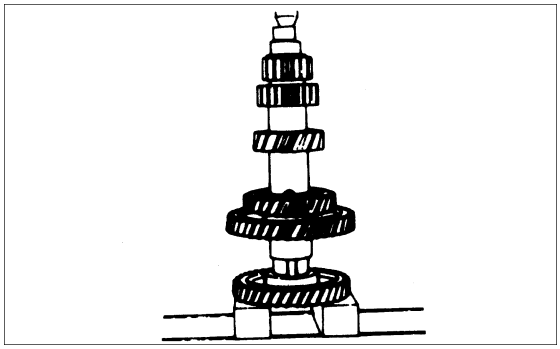
7.Install the constant engaged gear flat key of the countershaft;

Note:

When installing the key, pay attention that the face with a bigger chamfer should be set on the gear.

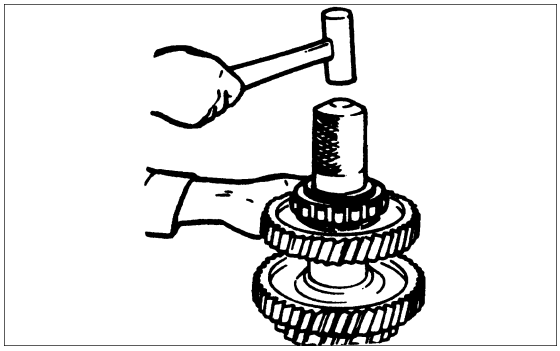


8.Install the constant engaged gear of the countershaft;

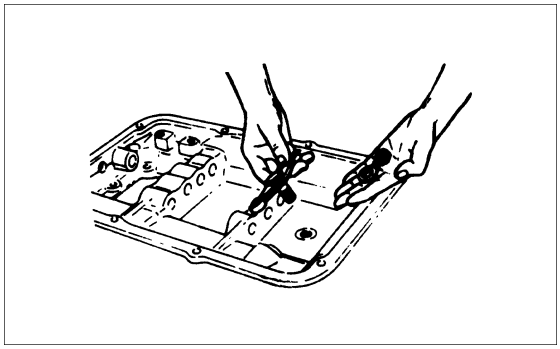


9.Use a thickness gauge to measure, and make sure the clearance between spacer sleeve and gear is smaller than 0.05mm;

10.Install the roller bearing;

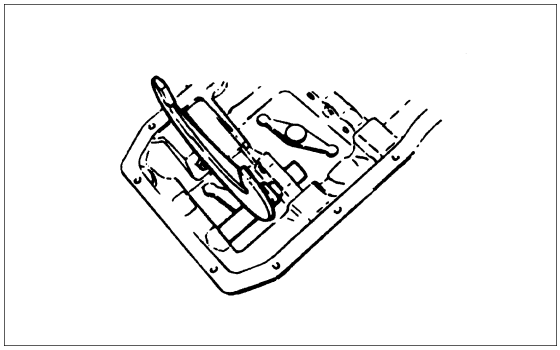


11.Install the elastic ring to the countershaft;

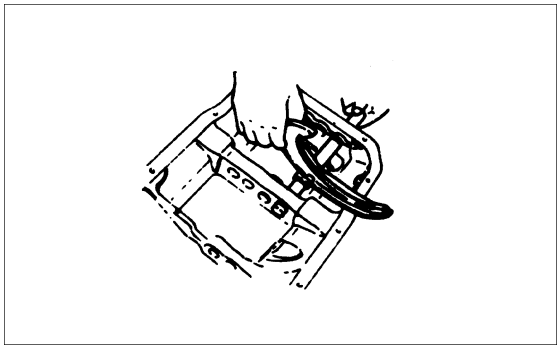


Transmission upper cover

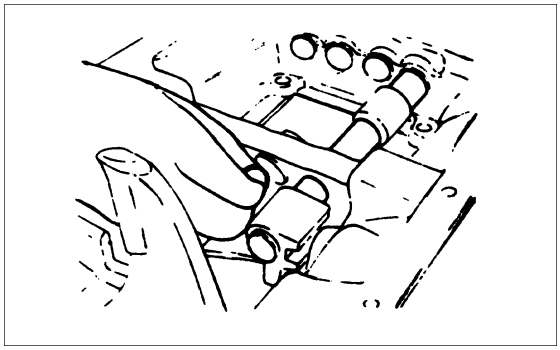
1.Press to install the gear shift fork shaft by the upper cover hole, and then install the 3rd, 4th and reverse gear shift fork. Remember to assemble the spring pin into the spring pin hole of the gear shift fork;



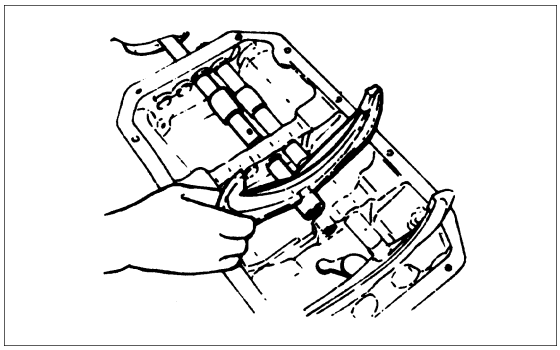
2.Install the interlocked pin on the 5th and 6th speed gear shift fork shaft, and then press to install the 5th and 6th speed shift fork shaft by the upper cover hole, then assemble the gear shift fork and guide block;



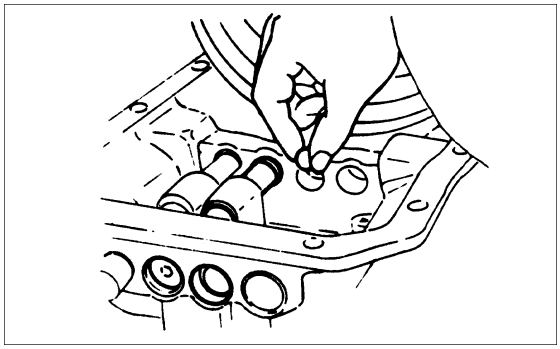
3.Install the interlock steel ball;



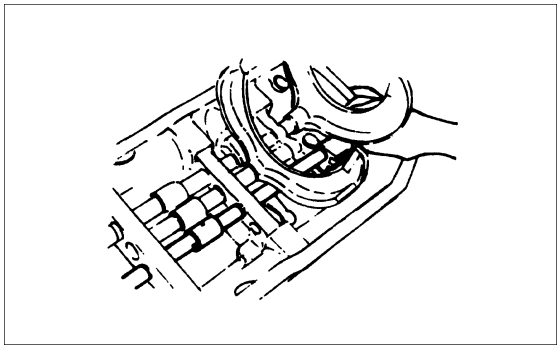
4.Install the interlocked pin to the 1st and 2nd speed gear shift fork shaft, press to assemble the 1st and 2nd gear shift shaft by the transmission upper cover hole, and then install the 1st and 2nd guide block and transmission fork;



5.Install the steel ball;

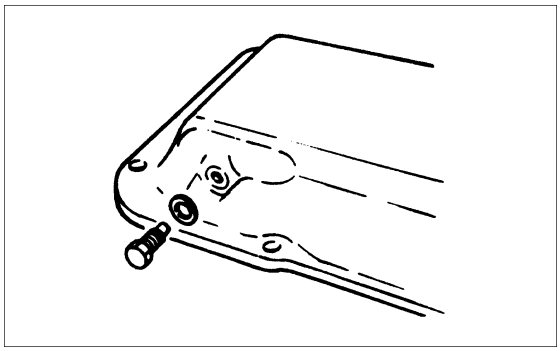


6.After install the interlocked pin to the reverse gear fork shaft, press to assemble the reverse gear fork shaft through the hole of the transmission upper cover, then install the reverse gear guide block and gear shift fork;

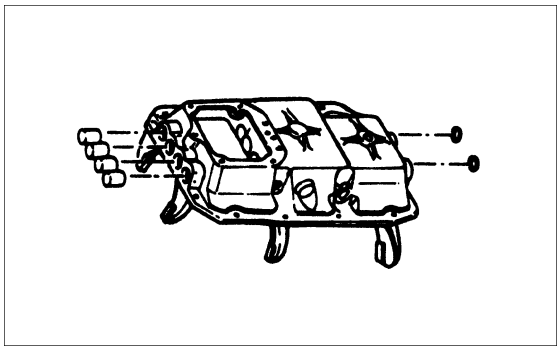


7.Install the guide bolt;

Tightening torque: 40N.m



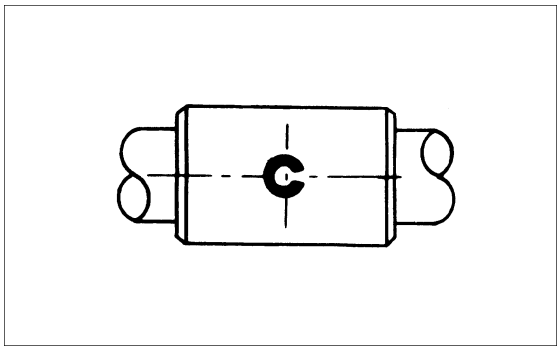
8.Assemble the plug and spacer on the two ends;



9.Install the spring pin on every shaft;

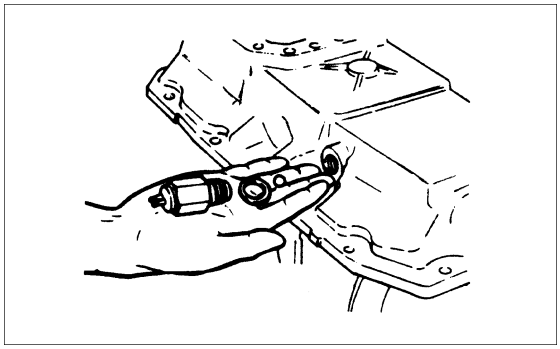
Note:

When installing the spring pin to the gear shift fork shaft and the guide block shaft, the gap of the spring pin has to align with the direction of the shaft.



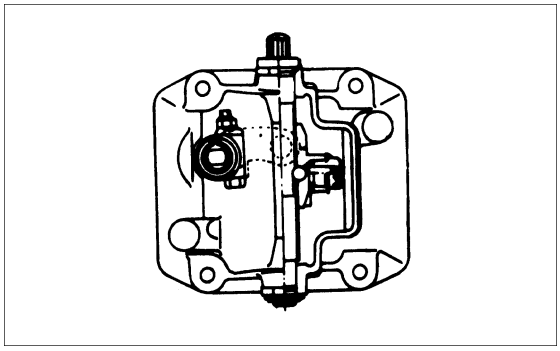
10.Install the reverse lamp switch and neutral switch.

Tightening torque: 20N.m

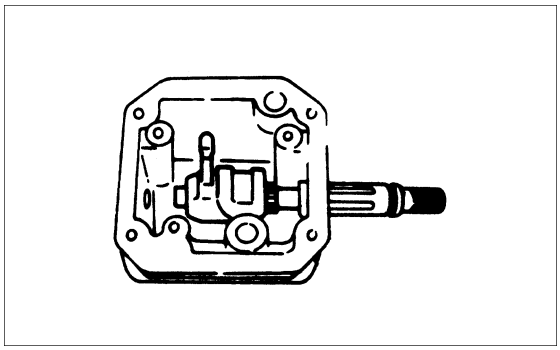


Transmission top cover

1.Install the spacer sleeve and O-ring on the gear shift shaft;



2.Assemble the gear shift block on the gear shift shaft, and pay attention that you should align with the marks which made when disassembling;

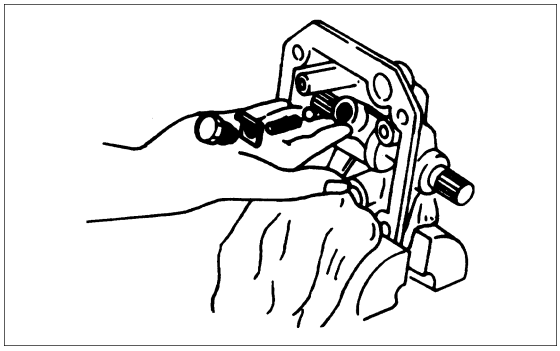


3.Make use of a hammer to knock the pin into the housing;

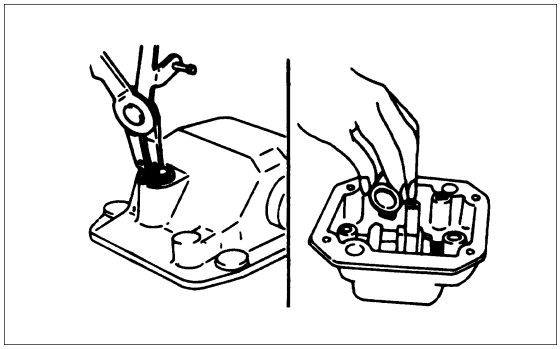
4.Install the steel ball and spring into the gear shift block, and make the screw plug on the gear shift block by a locking shim;

Note:

Bend the locking shim to lock the screw plug.



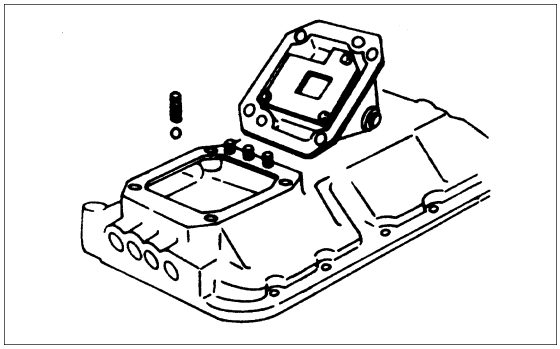
5.Install the O-ring into the slot of the gear select rocker arm, smear a layer of grease on the surface and then install it on the transmission top cover;



6.Install plain washer and elastic ring;

7.Install the steel ball and self-locked spring into the hole, and then assemble the top cover on the transmission upper cover;

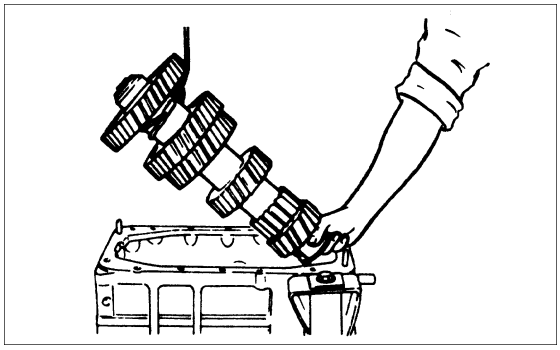
Tightening torque: 20~26N.m



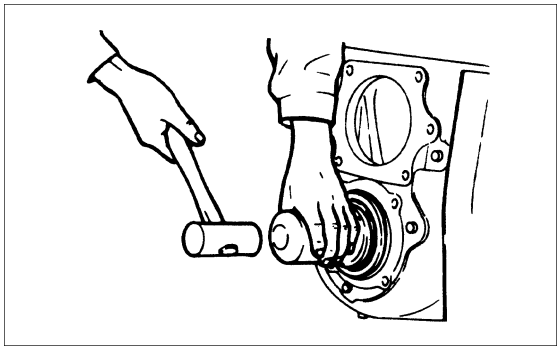
Transmission assembly

Before installing, smear some gear oil on the surface of bearing, O-ring, oil seal and the fitted bolt.

1.Install the countershaft assembly;

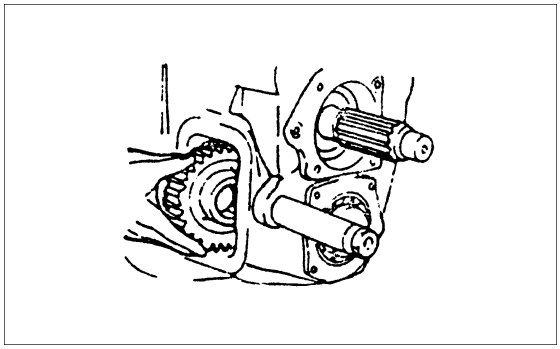


2.Install the front bearing then the elastic ring;



3.Install the reverse gear shaft assembly, and then install the locking spacer on the shaft;

Tightening torque: 20~26N.m

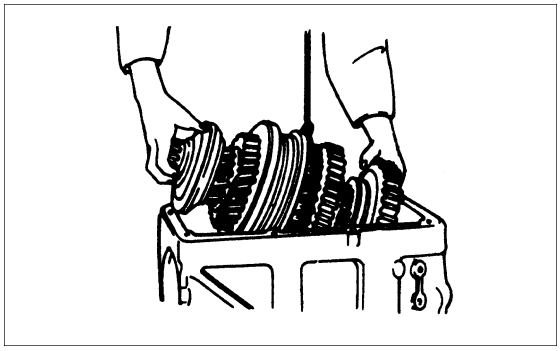


4.Measure the end clearance and backlash of the reverse gear, and you should assure the observed value among the repair standard;

End clearance: repair standard: 0.3~0.6mm

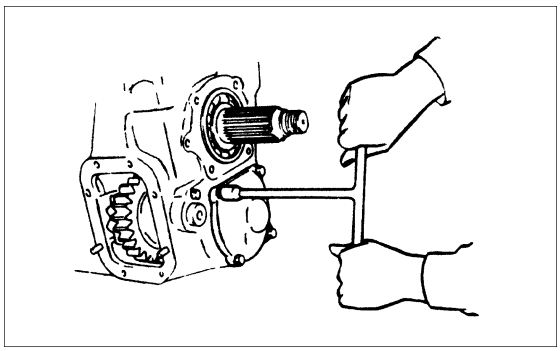
Backlash: repair standard: 0.15~0.25mm

5.Install the mainshaft assembly;

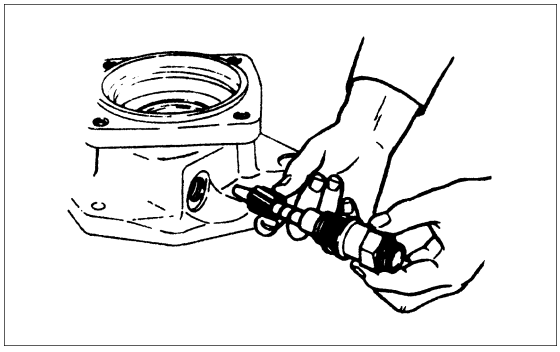


6.Install the countershaft rear bearing cover and gasket;

Tightening torque: 59~79N.m



7.Install the flexible joint, oil seal and the driven gear of the speedometer;

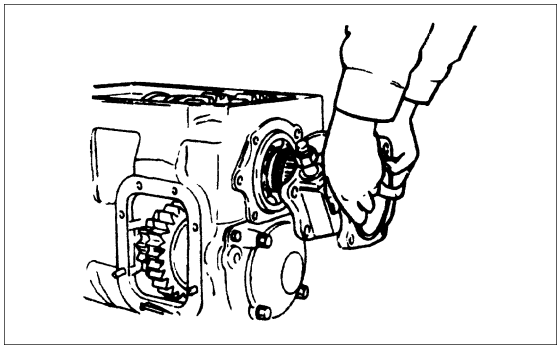


8.Install the ball bearing, spacer sleeve, speedometer drive gear, gasket and bearing seat in sequence;

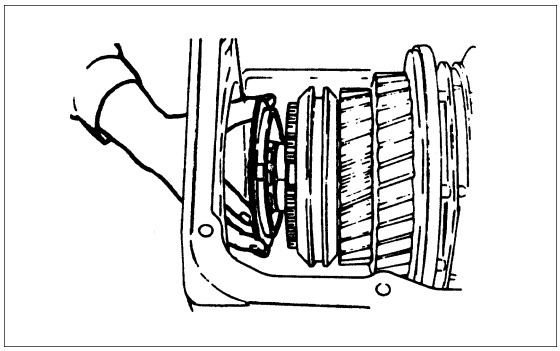
Tightening torque:

M12 59~79N.m

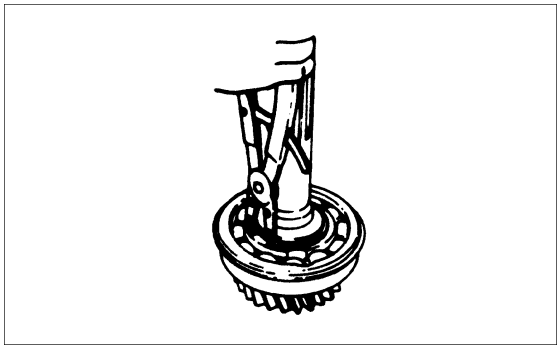
M14 93~124N.m



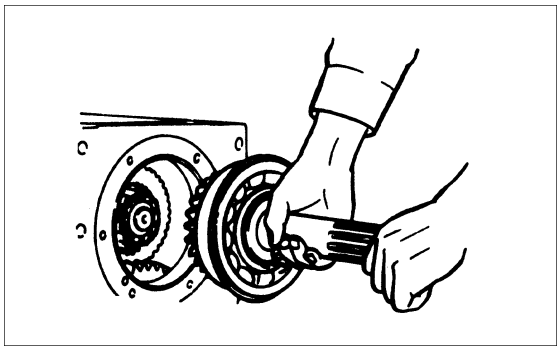
9.Install the 5th and 6th speed gear synchronizer baulk ring;



10.Press to install the ball bearing onto the drive gear shaft, and then assemble the elastic ring;



11.Assemble the drive gear shaft assembly;

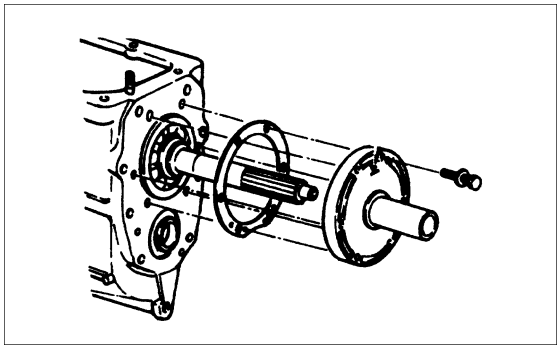


12.Assemble the bearing cover assembly;

Tightening torque: 33~44N.m

Note:

You must assure the oil hole of the bearing cover align to the hole of the transmission housing.



13.Measure the end clearance of the 1st speed gear (clearance between 1st speed gear and its thrust spacer) and make it among the repair standard;

Repair standard: 0.3~0.5mm

14.Measure the backlash of every gear.

Repair standard: 0.15~0.25mm

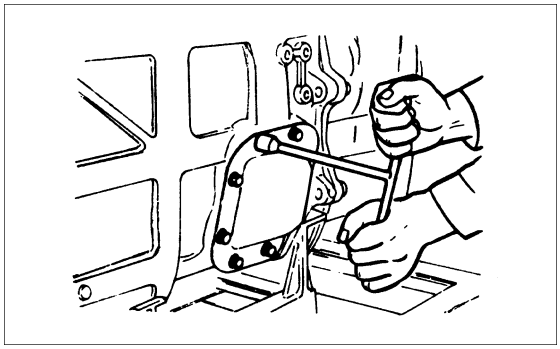
Transmission accessories

1.Install the propeller shaft connecting flange;

Tightening torque: 340~560N.m

Note:

When tightening the locking nut, first engaged the gear; after tightening, set to the neutral position.

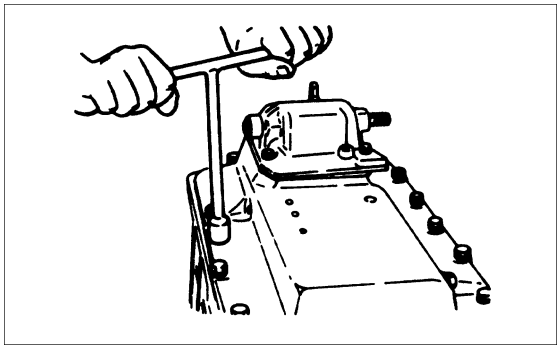


2.Install the power take-off hole cover and sealing shim;

Tightening torque: 47~63N.m

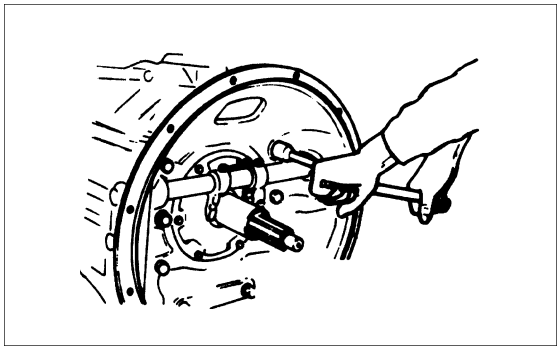
3.Install the sealing shim and the transmission upper cover assembly;

Tightening torque: 33~44N.m



4.Install the clutch housing assembly.

Tightening torque: 145~190N.m



Transmission Mount

Before assemble gearbox onto truck, make sure that the corresponding parts is tightened.

1.Install transmission and bracket as a assembly into truck with transmission jack and steel wire, make sure that drive gear shaft spline align to the clutch driven disc hub spline.

2.Install clutch booster or clutch slave cylinder, return spring and dowel pin. Adjust free running for clutch outer pull rod.

Free running for clutch outer pull rod 2~3mm

3.Install transmission operating lever.

4.Install propeller shaft and center bearing.

Propeller shaft tightening torque 215~245N • m

Center bearing tightening torque 160~220N • m

5.Connect all the lines and tubes;

6.Made sure that drain plug screw is tightened, and add some gear oil, then tighten plug screw of oil filler.

Tightening torque: 120~140N.m

Propeller Shaft

PR

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Propeller Shaft

Technical Parameter

Type	Open type, tubular propeller shaft, two segments. The front segment is midship shaft with bearing, the rear is double universal joints with flange inner slide
Universal joint type	Spider type
Center bearing	Slide a little along lengthways in the center bearing seat
Universal joint max oscillatory angle	± 20°
Max spline slippage (mm)	54

Maintenance Standard

Unit: mm

Item	Standard dimension	Service limit	Remark
Radial motion of propeller shaft	0~0.75	1.5	
Slip spline backlash	0.025~0.115	0.4	
Clearance of universal joint and needle bearing	-	0.1	
Axial clearance of center bearing	-	0.5	
Center bearing bearing seat inside hole surface worn	-	0.05	

Tightening Torque

Unit:N.m

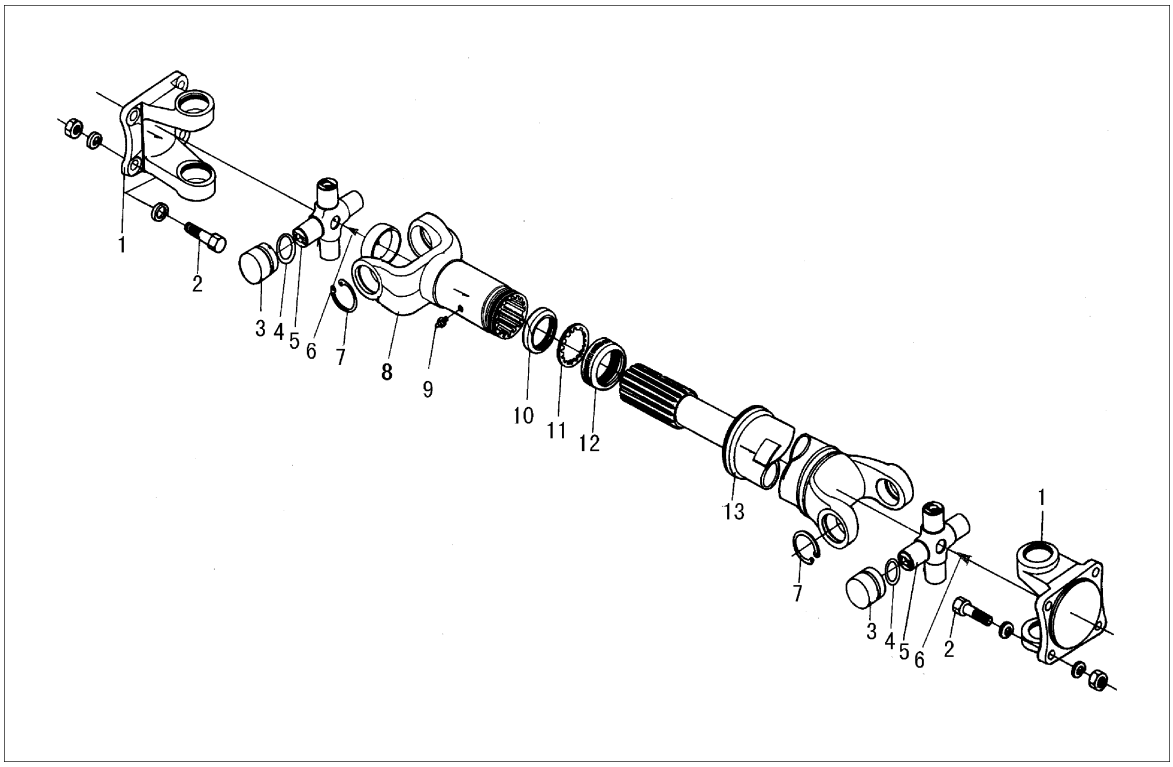
ItemItem	Tightening Torque
Propeller shaft flange fork connecting nut	90~110
Center bearing locking bolt and nut	901~10

Trouble Analysis

Trouble	Cause	Method
Abnormal vibration in the running	Connecting bolts on the propeller shaft loosely	Tighten bolts or nuts
Propeller shaft vibration	Propeller shaft has not been reassembled in accordance with the mark on it Propeller shaft tube is bent Renewed major components without dynamic balance Center bearing rubber washer slacken or failed	Reassemble it in accordance with the mark Check or renew Dynamic balance correct Tighten or replace
Universal joint or slip yoke worn out early	Oil seal failed Not fill grease regularly or not fill enough oil	Replace Fill with enough lubricating grease periodically

Propeller Shaft

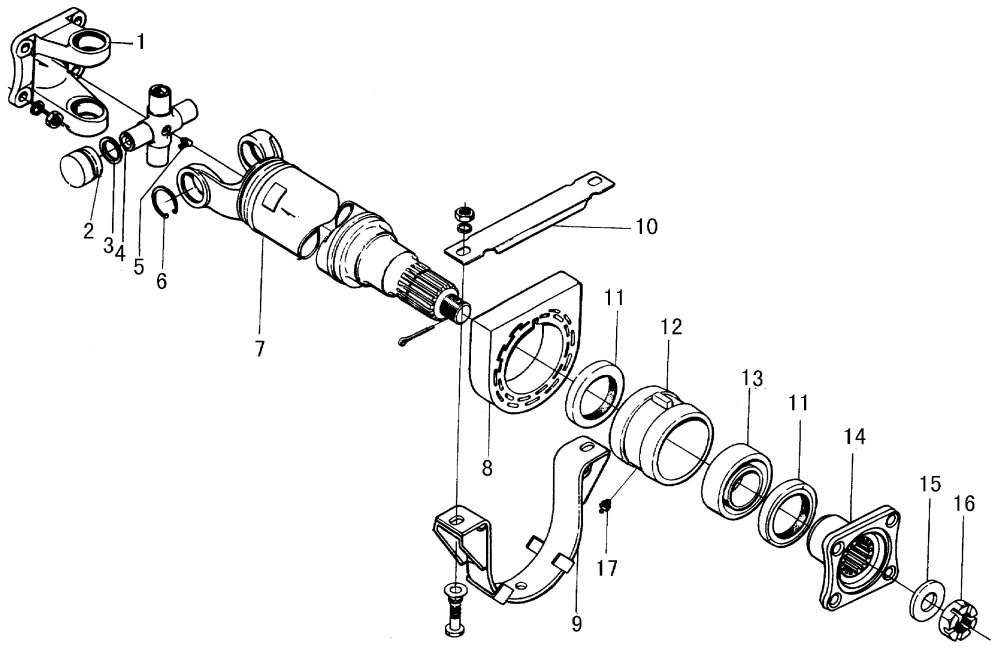
Structure



1.Flange fork
2.Bolt
3.Cross shaft needle bearing assy
4.Dust collar
5.Cross shaft
6.Grease nipple
7.Snap ring for holes
8.Slip york assy
9.Grease fitting
10.Slip york oil seal
11.Oil seal spacer
12.Oil seal cover
13.Propeller shaft assy

Intermediate Propeller and Center Bearing

Structure



1.Flange fork
2.Cross shaft needle bearing assy
3.Dust collar
4.Cross shaft
5.Grease elbow
6.Snap ring for holes
7.Intermediate propeller shaft assy
8.Washer--center bearing seat
9.Center bearing bracket assy
10.Upper cover board--center bearing
11.Oil seal--center bearing
12.Bearing seat--center bearing
13.Bearing--center bearing
14.Flange--driving conic gear
15.Washer--driving conic gear nut
16.Hex slotted flat nut
17.Grease fitting

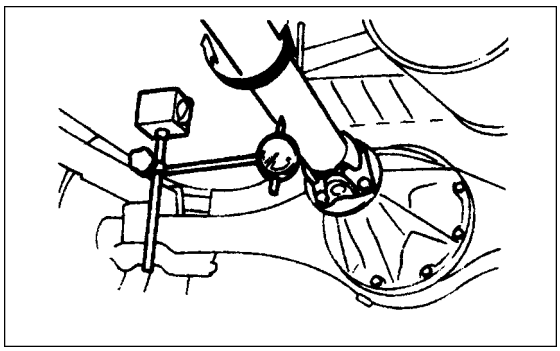
Propeller Shaft Maintenance

Propeller shaft vibration

If the propeller shaft vibrates during high speed, please first check its radial runout.

1.Support the rear axle up.

2.Turn the propeller shaft, and check one point of the propeller shaft for its radial runout.

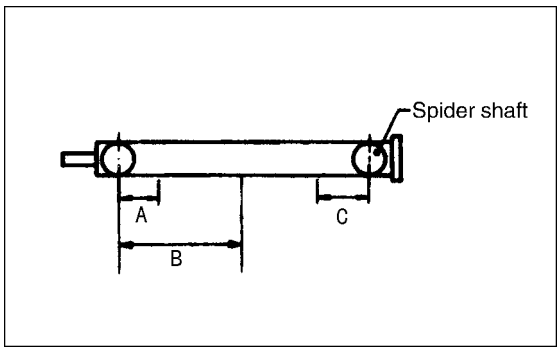


Measure point of the propeller shaft (mm):

A=155

B=165

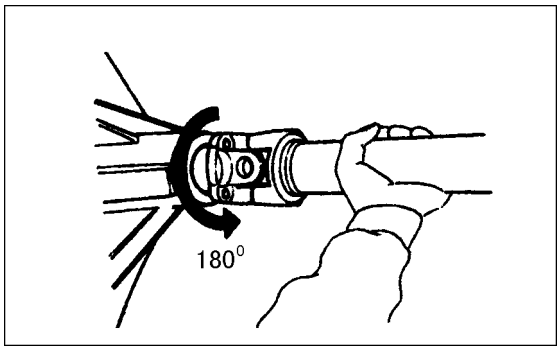
C=185



3.If the radial runout is above the limit value, remove the connecting flange of one end of the rear axle, and turn it for 180° then install the propeller shaft.

4.Check the radial runout again, if it still beyond the limit value, replace the propeller shaft.

5.Road tests.

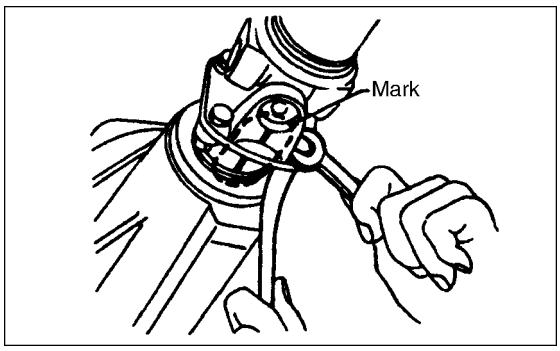


Appearance check

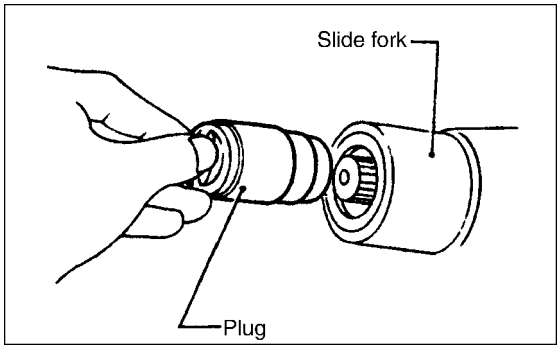
Check the surface of the propeller shaft for any cracks or pit. If there were, replace the propeller shaft.

Disassembly and assembly

Make marks on the flange disc and remove the propeller shaft from the end of the rear axle.

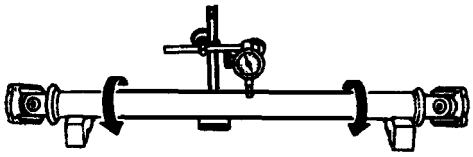


Pull the propeller shaft out from the power train, and plug the protruded part of the power train with plug.



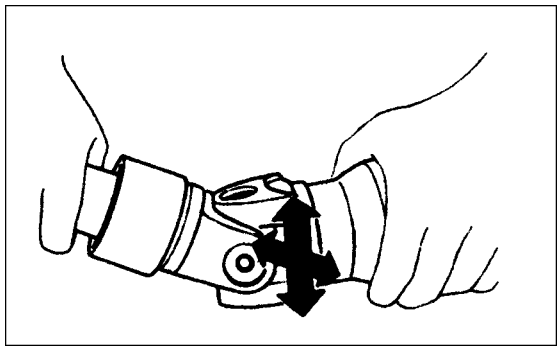
Check

Check teh radial runout of the propeller shaft, and if it is beyond the limit value, replace the propeller shaft.



Check the axial freedom of the spider shaft

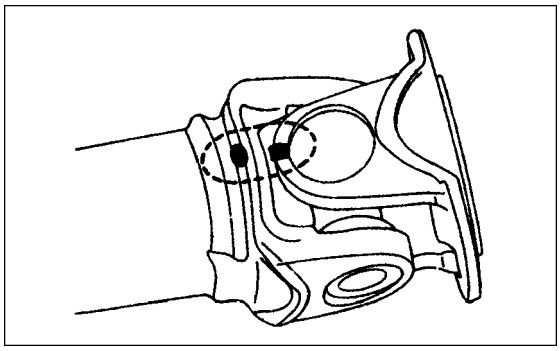
If the axial freedom of the spider shaft is beyond the limit value, you have to replace the spider shaft assembly.



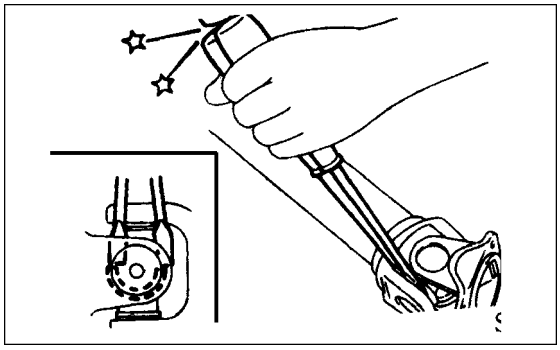
Disassembly

Disassemble the spider shaft.

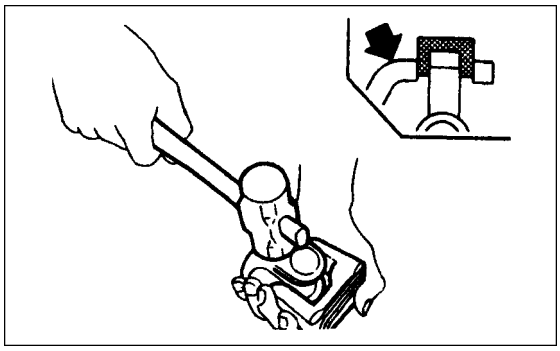
1. Make marks on the propeller shaft and flange fork.



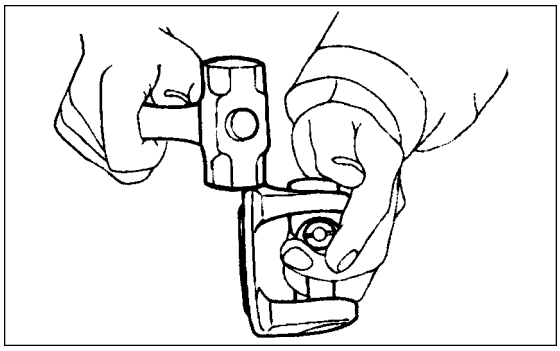
2.Remove the snap ring.



3.Knock the flange fork with a hammer, and don't damage the holes of the spider shaft and flange fork when disassembling the spider shaft.



4.Disassemble the spider shaft bearing of the other end in the same way. Make marks on the dismantled parts, and you may not change their original position when reassembling.

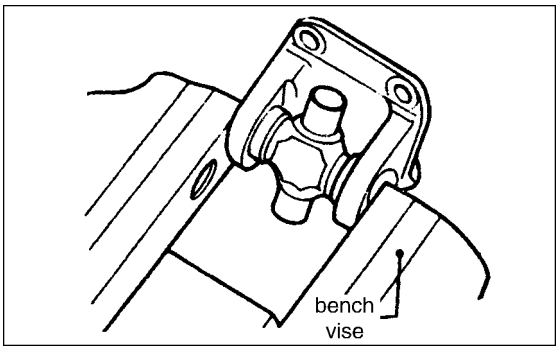


Assembly

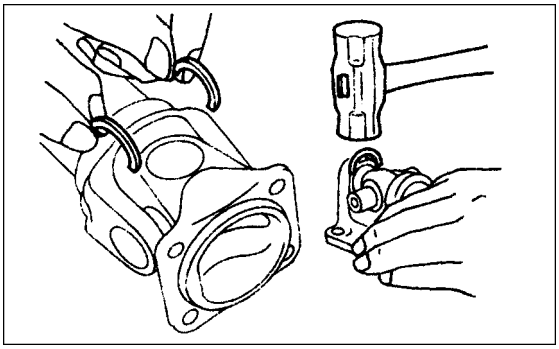
Spider shaft

1.Install the spider shaft bearing, apply some grease on the surface of the bearing inside face.

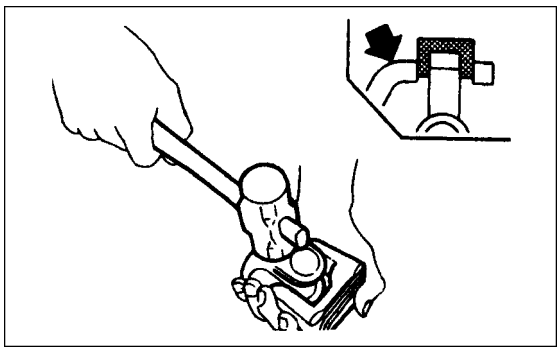
Never miss the needle of the needle bearing when assembling.



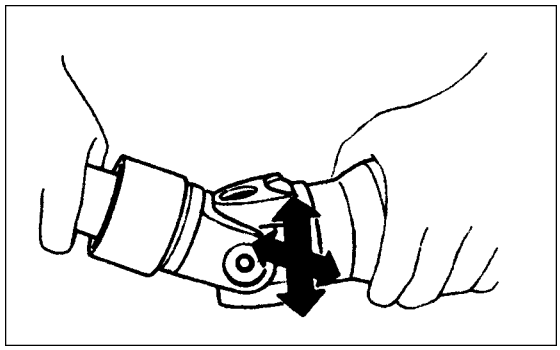
2.Select a snap ring to make the spider shaft among the required axial clearance and install it. The thickness of the selected snap ring should be below 0.06mm.



3.Eliminate the clearance between bearing and snap ring by knocking flange fork.



4.Check the flexibility and axial freedom of the spider shaft.

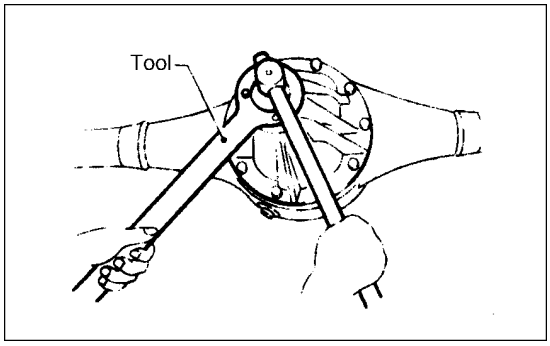


Maintain

Replace of the front oil seal

Note:

The adjusted spacer is used for the driveline. After the disassembly of the flange, it is necessary to adjust the pretightening force of the bearing, so the main retarder needs to be repaired.

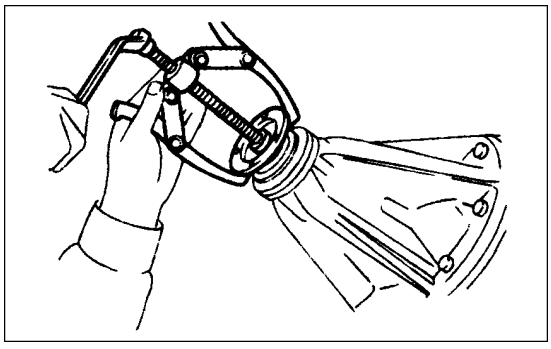


1.Remove the propeller shaft.

2.Loose the end face nut.

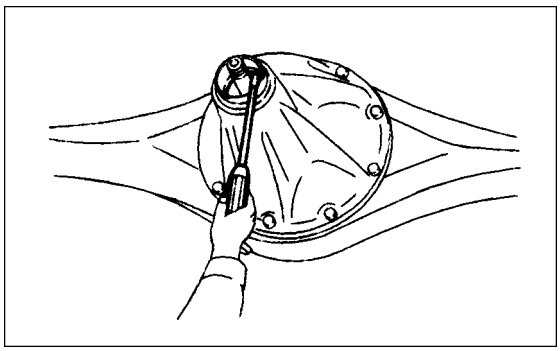
3.Remove the connecting flange.

4.Remove the front oil seal.

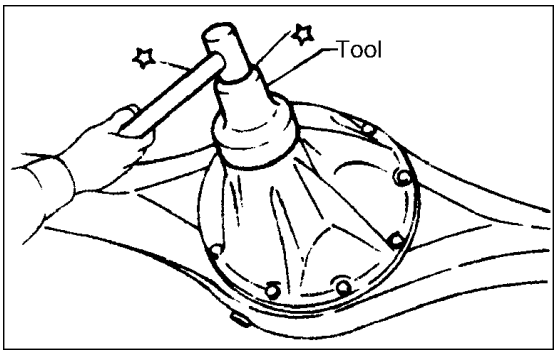


5.Apply some grease on the lip cavity of the oil seal and then press it into the oil seal seat.

6.Assemble the flange disc and drive gear nut.



7.Assembly the propeller shaft.



Disassembly and Assembly

Disassemble

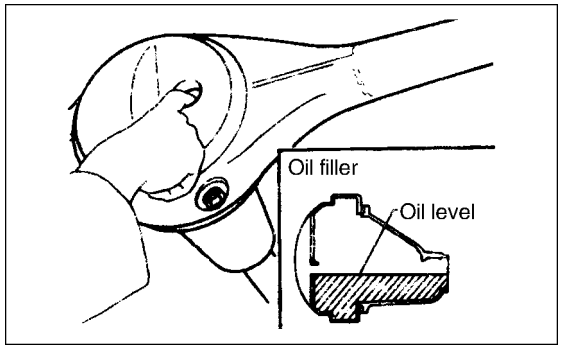
Remove the propeller shaft.

After removing the propeller shaft, plug the output port of the transmission by plug.

Remove the axle housing half axle.

Note:

Don't damage the spline, sleeve flange fork and front oil seal when removing the propeller shaft.



Assemble

Fill with recommended gear lubricant.

Steering System

ST

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Steering System

Note:

Before disassembly, carefully clean the surface of the parts.

Please do the disassembly in a cleaning invironment to avoid dust or any other filth enter the parts.

Put the removed parts in order and it may be convenient to reassemble.

Clean the parts with nylon or soft paper.

Before checking or assembling, clean all the parts with liquid carefully.

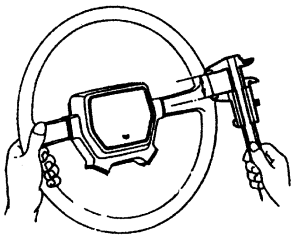
You'd better apply a layer of transmission lubricant on the surface of the parts before assembly. Apply a layer of vaseline on the surface of hydraulic pressure parts and O-type oil seal.

Replaceall of the oil seal, spacer and O-ring. Avoid using the used spacer, oil seal and O-ring when assembling. After assembly, you must have a test run.

Check

Check the free travel of the steering wheel

Measure the free travel of the steering wheel when it is set on the center.

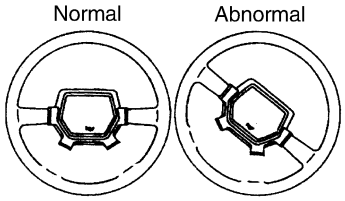


Free travel	⩽ 35mm

If the measured value isn't in this range, check the the steering gear clearance and the ball pin.

Check the center position of the steering wheel

Correct the center position of the steering wheel before dismantling.



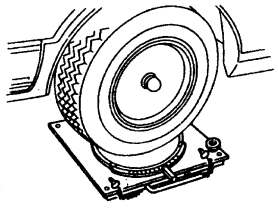
Check

When the vehicle is running straight, check to see if the steering wheel is in the center position.

If not, disassemble the steering wheel and reassemble it.

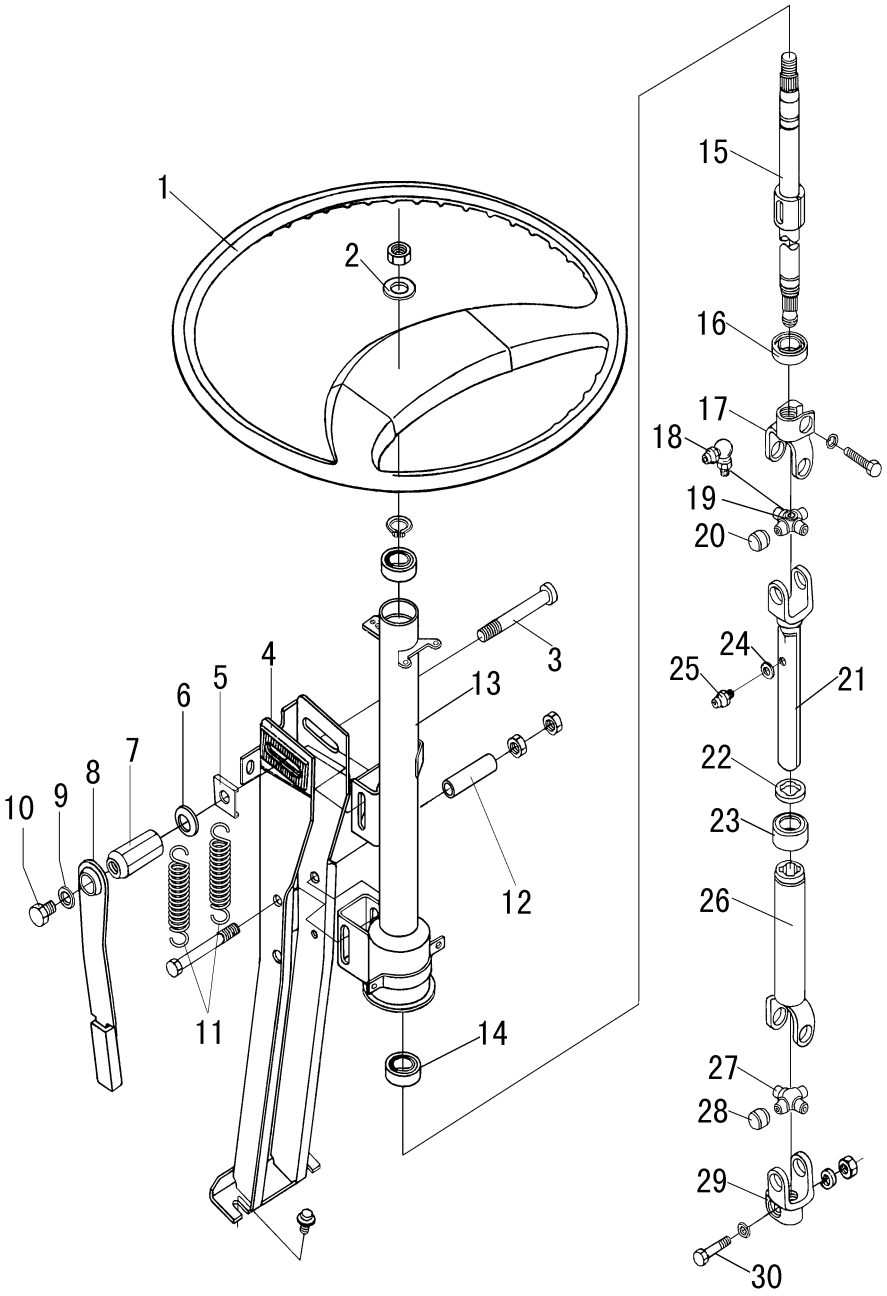
Check the turning angle of the front wheel

Turn the steering wheel left and right to measure its maximum turning angle.



Inner wheel	38.5° ± 30'
Outer wheel	29.5°

Steering Wheel and Steering Column

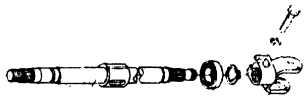


1.Steering wheel assy
2.Washer--steering wheel
3.Adjuster bolt
4.Steering column bracket welding assy
5.Plate,sliding
6.Taper washer, spring
7.Compaction nut
8.Spanner assy, adjuster
9.Washer--tighten immobility spanner
10.Bolt--tighten immobility spanner
11.Restoration spring
12. Limiting bush
13.Steering column welding assy
14.Bush--Steering column
15.Steering column
16.Bearing
17.Fork, universal joint
18.Fitting, grease
19.Spider
20.Needle bearing assy
21.Steering universal joint fork--slide fork
22.Oil seal--slide fork
23.Oil seal cover--slide fork
24.Grease fitting distance limited piece
25.Fitting, grease
26.Joint with spline shaft assy
27.Spider
28.Needle bearing assembly
29.Steering universal joint fork
30.Bolt

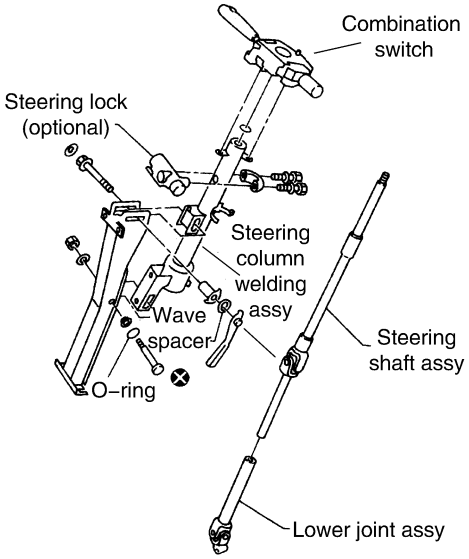
Steering column

When assembling the steering column, tighten the bolt and clip of the lower supporter by hand first. then tighten the steering column under the condition that the steering column is out of force.

When assemble the steering cross shaft, you must check if the locking bolt and the sunk part is aligned.



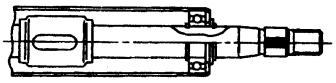
Disassembly and Assembly



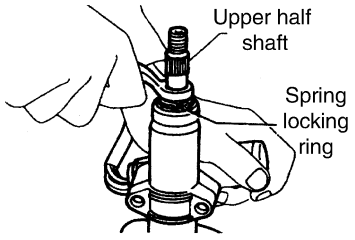
When do the disassembly and assembly, you have to unlock the steering lock by key.

Assure the surface of the spring lock ring is under the shaft.

Before insert the shaft into the sleeve, first install the spring lock ring.

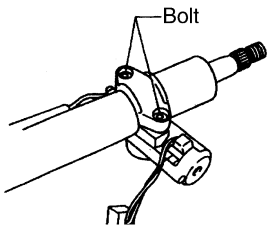


Assemble the spring lock ring on the upper half shaft by special tool.

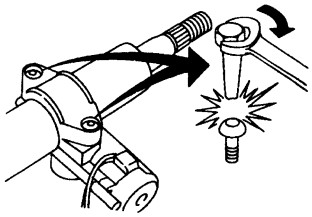


Turning lock

Remove the fixed bolt of the clip.



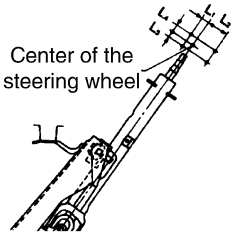
Tighten the fixed bolt.
Note:
Take a look if the installing position of the steering lock is correct.



Adjusting mechanism

After assembling the steering shaft adjusting mechanism, check its moving condition.

Front, rear	± 6°	
Up, down	L3:	± 15mm

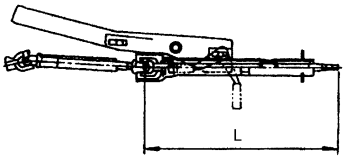


Check

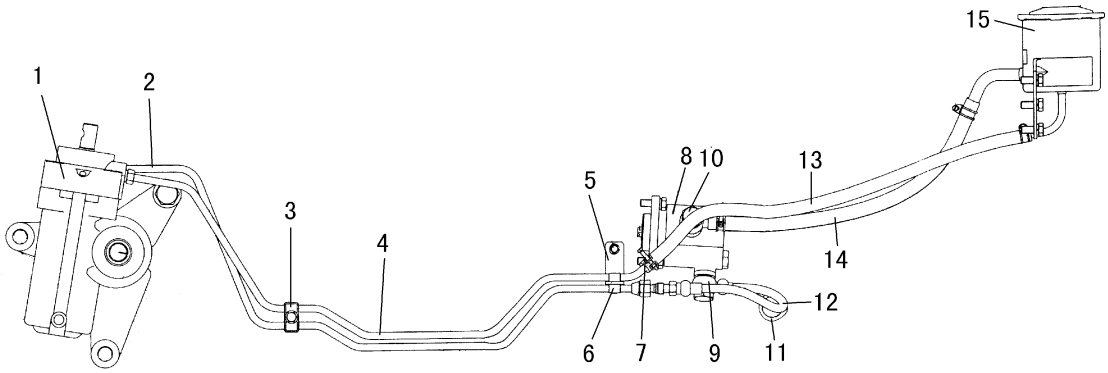
If the steering wheel can't be turned flexibly, please check the steering column by the following steps and replace the corresponding wearing parts.

Check the steering column bearing for any damage or wearness, and lubricate the bearing with proper grease. Replace the total steering column if necessary.

Check the steering column sleeve for distortion or damage, and replace it if necessary.



Power Steering Hydraulic Pressure System



1.Power steering gear assembly
2.Elbow assembly, inlet oil
3.Upper bracket
4.Elbow assembly, outlet oil,
5.Bracket
6.Clip
7.Clip
8.Oil pump
9.Bolt--joint of the oil pump
10.Joint--inlet oil tubing
11.Jacket
12.High pressure hose assembly
13.Hose
14.Hose--steering gear to oil reservoir
15.Oil reservoir assembly, steering

Steering Gear

Basic parameter

Basic parameter	M11-3411010
Appropriate maximum load of front axle (kg)	3500
Max. output torque (N.m)	2150
Max. oil pressure (MPa)	13
Recommended oil pump flow (L/min)	10
Drive ratio	18：1
Number of total turns	4.78
Pitman arm shaft turning angle	± 45°
Temperature range (° C)	-40~120
Diameter of the piston (mm)	80

Maintenance

1.After 2,500km, the new power steering gear need to replace its hydraulic pressure oil, and wash the filter in the oil reservoir. Replace the hydraulic pressure oil and wash the filter ever 50,000km or every year after that.

2.Check the oil quantity every month to see whether it reduced, deteriorated or too much impurities. If there is any badness, you have to refill or replace the oil immediately.

3.Check and keep the tire pressure accord with the requirement.

4.Procedure of replace or fill oil

(1)Support the front axle.

(2)Open the oil reservoir, screw down the oil outer bolt of the steering gear, drain off the remain oil in the oil pump and the oil reservoir(idle the engine), and turn the steering wheel left and right to the limit for several times, till there is not oil flowing out.

(3)Tighten the oil outer bolt (keep it clean and avoid dirt entered)

(4)Fill with new hydraulic pressure oil.

(5)Idle the engine, turn the steering wheel left and right to its limit for several times until there is no bubbles appeared in the oil reservoir and the oil level stop dropping.

(6)Refill the oil reservoir to its maximum.

(7)Tighten the upper cover of the oil reservoir.

Trouble Analysis

Trouble	Cause	Method
Bothway heavey steering	1.Oil level in steering gear is not sufficient	Add oil to the upper mark
	2..The connecting part between the oil outlet and the engine, and between the oil inlet of the steering oil pump and the engine, and between the oil pump and the engine sucked air.	Tighten oil pipe fitting or replace the sealing part
	3.Too small flow of the steering oil pump (flow control valve blocked)	Disassemble and wash the flow control vavle
	4.Strainer screen of the oil reservoir damaged or blocked	Replace the filter cartridge and wash the oil suction pipeline between oil reservoir and oil pump
	5.The movement between steering drive shaft and universal joint connecting with the steering gear is not flexible.	Move repeatedly until it becomes flexible, otherwise you have to replace the universal joint
	6.Rotary valve blocked	Repair the steering gear
	7.Improper oil pressure in the oil pump	Replace oil pump
	8.Vehicle overload too much	Reduce load
One-way heavey steering	1.Tire pressure of one side isn't enough.	Inflating
	2.Only one direction of the steering gear leak out too much.	Repair the steering gear
	3.The rotary valve isn't in the nuetral position.	
	4.The fixed pressure of left or right can,t be set up.	Replace sealing part
Heavey steering when quickly turning bothway	1.The connecting part between the oil outlet of the steering oil reservoir and the engine, and between the oil inlet of the steering oil pump and the engine sucked air.	
	2.Too small flow capacity of the steering oil pump	Replace the steering oil pump
Too large free travel of the steering wheel	1.Steering wheel and steering shaft fit is loose	Tighten
	2.Connecting part of the steering drive device loosed	
	3.Fixed bolt of the steering gear and its bracket loosed	
	4.Too big clearance between steering screw arbor and nut	Repair the steering gear
	5.Leaf spring bolt loosed	Tighten
	6.Steering universal joint locking bolt loosed	Tighten
	7.Improper adjustment of the steering gear	Adjust side cover adjusting bolt

Steering gear overheat (its temperature is over 65° C of the environment temperature)	1.Too much flow of the oil pump	Replace the oil pump
	2.The bending radius of the oil pipe is too small or the inner part is blocked and cause oil flowing difficult and heated	Replace the oil pump
	3.Steering to the limit position need more than 5 seconds.	Avoid to turn to the limited position
Steering control is not flexible	1.Parts of steering system loose or wear	Tighten or replace
	2.Steering gear is loose	Tighten
	3.Improper adjusting of the steering gear	Adjust the side cover bolt
	4.Oil level of the oil reservoir is lower than the lowest mark	Add oil
	5.Front axle leaf spring fixed bolt loosed	Tighten
	6.Steering universal joint locking bolt loosed	Tighten
Steering wheel return failed	1.Insufficient tyre pressure	Inflating
	2.Too tight fit of the front axle parts	Adjust
	3.Improper alignment of the front wheel	
Steering wheel return too quick	1.Insufficient oil in the steering oil reservoir	Add oil
	2.Air in the steering oil pipe	Exhaust
	3.Clearance between steering drive shaft and the steering universal joint	Replace the steering universal joint
	4.The input torque of the steering gear when idling is smaller than 40~60N.cm that the mesh of the nut and arm shaft loosed.	Adjust clearance

Front Axle

FA

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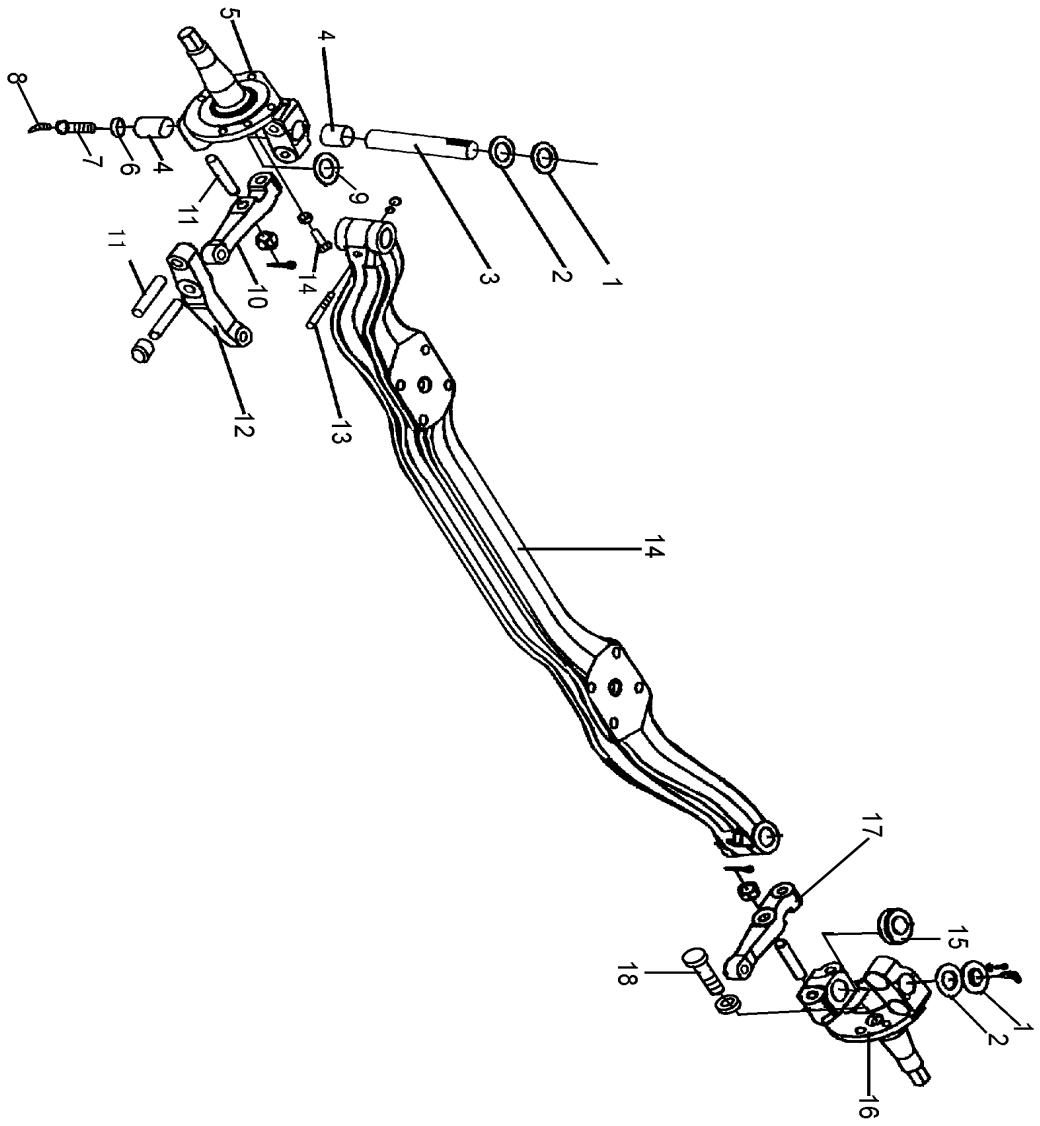
Front Axle

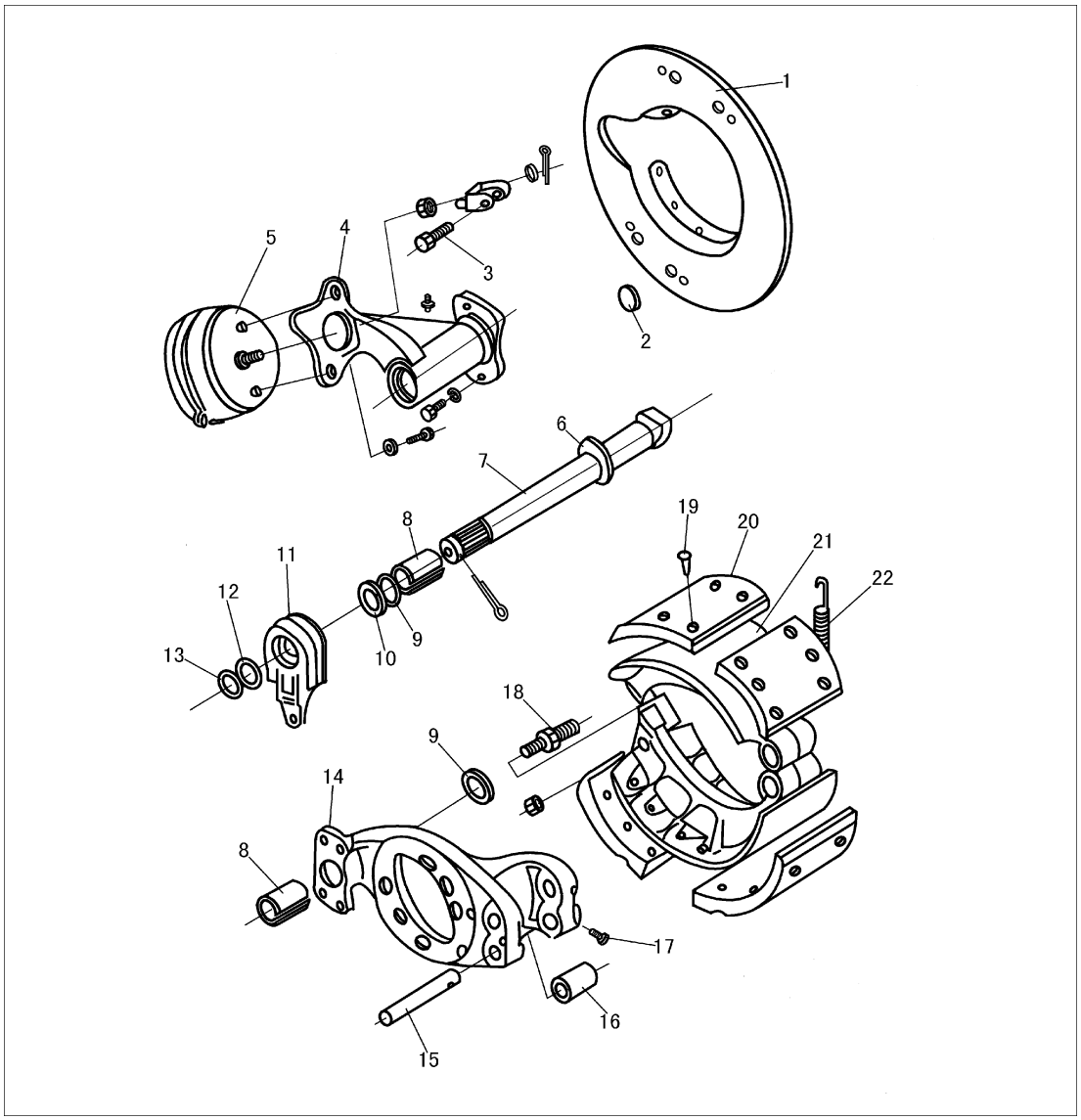
Structure

Front axle, steering knuckle



1.Upper cover--steering knuckle
2.Spacer--steering knuckle upper cover
3.Steering knuckle pin
4.Upper bushing
5.Left steering knuckle
6.Knuckle pin plug assy
7.Bolt--knuckle pin plug
8.Grease elbow
9.Adjusting spacer--steering knuckle
10.Left Steering knuckle arm
11.Double head bolt--upper steering arm
12.Upper steering arm--left steering knuckle
13.Wedge cotter pin--steering knuckle pin
14.Front axle
15.Thrust bearing
16.Right steering knuckle
17.Right steering knuckle arm
18.Steering limiting bolt

Disassembly of the Front Brake



1.Front dustproof shield
2.Rubber plug
3.Column pin--air chamber push-rod
4.Front brake bracket assy
5.Front brake air chamber assy
6.O-ring
7.Front brake cam
8.Bush--air chamber bracket
9.O-ring
10.Adjusting spacer
11.Front brake adjusting arm assy
12.Washer--brake cam
13.Adjusting washer
14.Front brake bottom plate assy
15.Shaft--brake shoe
16.Bush
17.Screw
18.Pin
19.Rivet
20.Brake friction plate
21.Front brake shoe
22.Return spring

Maintenance

Before using new axle, apply enough 2# lithium grease into every grease fitting.

First maintain

To assure the safe running of your vehicle and obtain a long service life, you have to do the first maintain after the first 1,500~2,500kmafter leaving factory. Please note the following items:

1.Dismantle and check the wheel hub for any abnormal wear (please go to the Assembly and Adjustment to see the reference)

2.Check the fastening piece.

Periodical maintain

Do the periodical maintain for the vehicle is a good way to prolong the service life and assure the safe running of the vehicle. If you follow the maintenance schedule to do the maintain, your vehicle may obtain the best economic benefit.

The items of the periodical maintain are as following:

1.Add some grease to the grease nipple

2.Avoid important nut loosed

3.Adjust wheel hub bearing pretightening force and toe-in

4.Adjust the brake clearance

Periodical Maintain Schedule

Item	Maintenance Interval Mileage (× 1000km)												
	First maintain	4	8	12	16	20	24	28	32	36	40	44	48	80
Clean the axle assy		●	●	●	●	●	●	●	●	●	●	●	●	
Check the important nut for its tightness	●	●	●	●	●	●	●	●	●					
Clean and adjust wheel hub bearing				●			●			●			●	
Check service brake and park brake efficiency	●	●	●	●	●	●	●	●	●	●	●	●	●	
Check the brake bottom plate for tightness	●	●		●			●			●				
Clean the brake air chamber													●	
Check brake pipeline for leakage	●	●	●	●	●	●	●	●	●	●	●	●	●	

Assembly and Adjustment

Disassemble and asseble of the assembly

Front wheel hub brake drum assembly

1.Fixed the front axle and remove the wheel hub end cover;

2.Take off the cotter pin, adjusting nut and spacer;

3.Turn the wheel hub brake drum a little and pull it, gently knock at the brake drum at the same time to loose the inner ring of the outer bearing, then take down the wheel hub brake drum, but you need to pay attention that the assembly is so heavy that may be fallen down or hurt someone, and the inner ring of the outer bearing need to care at the same time, don't fall it.

The assembling sequence of the front wheel hub brake drum assembly is opposite to the above sequence, and you must to pay attention to the tightening torque of the thread connecting parts and the adjustment of the bearing pretightening force.

Adjustment of axle

Ajustment of axial clearance between front axle and steering knuckle

1.Installl the steering knuckle and thrust bearing on teh front axle, select the proper adjusting spacer(Note:only use one) to adjust the clearance and assure the clearance is ⩽ 0.1mm;

2.Apply a layer of grease on the surface of the kingpin, align the lock pin slot of the kingpin to the lock pin hole of the front axle, then insert the kingpin and tighten the lock pin;

3.Before add the grease, measure both left and right of the starting force at cotter pin of steering knuckle journal, and the starting force should be ⩽ 10N.

Adjustment of front wheel hub pretightening force

1.Apply some 2# lithium grease on the thread of the steering knuckle shaft end and the wearproof spacer;

2.Tighten the locking nut by a torque of 120~150N.m;

3.Turn the wheel hub for 2~3 circles to correct the alignment of the bearing;

4.Tighten the locking nut by a torque of 120~150N.m;

5.Unscrew the locking nut for 1/3 circle, install the locking washer and limit spacer, and make the limit spacer align to the steering knuckle key slot and the adjusting nut limit pin;

6.Install the outer nut, tighten it with a torque of 120~150N.m;

7.Make sure if the pretightening force is correct. First, turn the wheel hub for 2~3 circles, then confirm the tangential force of the wheel hub bolt;

The tangential force of the wheel hub is 20~50N.

Adjustment of the toe-in

1.First, loose the locking bolt of the tie rod;

2.Turn the tie rod and make the toe-in is 0~4mm at the external diameter of the tire;

3.Tighten the fixed nut of the tie rod, and make the angle between left and right joint is no t larger than 4° , and the angle of oscillation of the tie rod joint during the largest turning angle must have some over measure.

Adjustment of the steering angle

1.Adjust the limit screw of the turning angle, and make the max.turning anggle of the the inner wheel is 40° ;

2.After adjusting the limit screw, tighten the locking nut.

Adjustment of the brake clearance

Turn the worm shaft and shoe shaft of the brake adjusting arm, made the surface of the brake shoe totally connected with the inner face of the brake drum, then loose 3~4 circles of the worm shaft, and adjust the clearance between brake drum inner face and brake shoe:

Shoe shaft end: 0.25~0.45mm;

Cam shaft end: 0.40~0.70mm, the clearance should be corresponding and the clearance difference between the upper and lower shoe is ⩽ 0.1mm.

Trouble Analysis

Trouble	Cause	Method
Wheel hub bearing is stugnant	Big pretightening force of the wheel hub bearing	Adjust pretightening force
	Bearing lack of lubricating or improper grease	Add or replace the grease
	Dust on the bearing	Clean and add some grease
Insufficient brake force	Cam shaft turns inflexibly	Check the cam for its working condition
	Improper adjustment of the brake air chamber push rod travel	Adjust travel
	Friction plate overheated or deterioration	Replace friction plate
	Improper connceting condition of the friction plate	Correct the joint position of friction plate
	Water enterred the brake drum	Press down the brake pedal during running to exhaust the water
	Grease on the connecting face of the friction plate or the brake drum	Cleanup the grease or replace friction plate
Abnormal noise while braking	Friction plate worn and rivet appeared	Replace friction plate
	Friction plate surface hardening or deterio-ration	Replace friction plate
	Brake drum uneven worn or loose installed	Correct brake drum or tighten the bolt
	Brake shoe and friction plate connected loosely	Replace rivet
	Brake shoe fixed pin loosed	Tighten fixed pin locking screw
	Wheel hub bearing worn	Replace wheel hub bearing
	Brake drum distortion	Replace brake drum
Wheel unsmooth	Cam shaft lack of lubricating or adjusting arm doesn't return	Add grease or correct troubled parts
	Return spring of the brake shoe or air chamber broken or fatigue	Replace troubled parts
Steering wheel heavily manipulated	Improper adjustment of the wheel alignment	(too big caster) Check and adjust
	Too big clearance between kingpin and bush	Check and adjust the clearance
	Thrust bearing installed on the contrary	Correct the installation
	Front axle lacks of lubricating	Add some grease
	Ball connecting overtighten or too loose	Check and lubricate ball head pin

Pendulate	Front wheel hub bearing worn	Replace wheel hub bearing
	Kingpin and bush overworn	Correct or replace troubled parts
	Steering knuckle distortion	Replace
	Improper wheel alignment	Check and adjust
Pulling to one side	Improper wheel alignment	Check and adjust
	Front axle bent	Correct or replace
	Brake unsmooth	See the relative brake items
	Front wheel hub bearing nut loosed	Tighten accord to the required torque
Tire unevenly worn or earlier worn	Improper wheel alignment	Check and adjust
	Wheel hub bearing worn or damaged	Replace wheel hub bearing
	Bearing nut loosed	Tighten accord to the required torque
	Ball pin, kingpin and bush overtightened or slackened	Correct or replace the troubled parts

Appendix 1 Lubricating Parts and Lubricant

Lubricating parts

Item	Maintenance Interval Mileage (× 1000km)												
	First maintain	4	8	12	16	20	24	28	32	36	40	44	48
Steering knuckle kingpin	●	●	●	●	●	●	●	●	●	●	●	●	●
Tie rod ball pin	●	●	●	●	●	●	●	●	●	●	●	●	●
Wheel hub bearing	●			●			●			●			●
Adjusting arm	●			●			●						●
Cam braccket	●						●						

Lubricant

Part	Lubricant	Type
Steering knuckle kingpin	lithium grease	2#
Tie rod ball pin	lithium grease	2#
Wheel hub bearing	lithium grease	2#
Adjusting arm	lithium grease	2#
Cam bracket	lithium grease	2#

Appendix 2 Tightening Torque of the Bolts and Nuts

Part	Tighten Torque (N.m)
Steering draglink arm nut	120~140
Nut of the left and right steering knuckle arm	120~140
Front brake bottom plate bolt	140~170
Air chamber bracket fixed bolt	55~70
Air chamber fixed bolt	55~70
Pin lock nut	55~70
Steering limit bolt locking nut	80~100
Steering ball pin nut	130~160
Tie rod clamp nut	40~60
Front adjusting nut	120~150
Kingpin plug cover screw	40~60

Appendix 3 Main Adjusting Data and Maintaining Standard

Main adjusting data

Adjusting Item	Adjusting Data
Toe-in	0~4mm
Turning angle of the inside wheel	40°
Clearance between front axle fist surface and the steering knuckle	≤ 0.1mm
Clearance between front fiction plate and brake drum	Shoe shaft end 0.25~0.45mm Cam shaft end 0.40~0.70mm Clearance difference between two shoes of the same side is ＜ 0.1mm

Maintaining Standard

Item	Maintaining Standard	Wear Limit	Remark
Outside diameter of kingpin	31.9~32mm	31.9mm	
Clearance between kingpin and steering knuckle bush	0.025~0.077mm	0.20mm	
Clearance between kingpin and front axle hole	0.01~0.052mm	0.10mm	
Clearance between steering knuckle and front axle	≤ 0.05mm	0.15spacer adjustment	
Starting force of steering knuckle	≤ 10N		Measure at cotter pin of shaft head
Starting force of front wheel hub	20~50N		Measure at the bolt of wheel

Rear Axle

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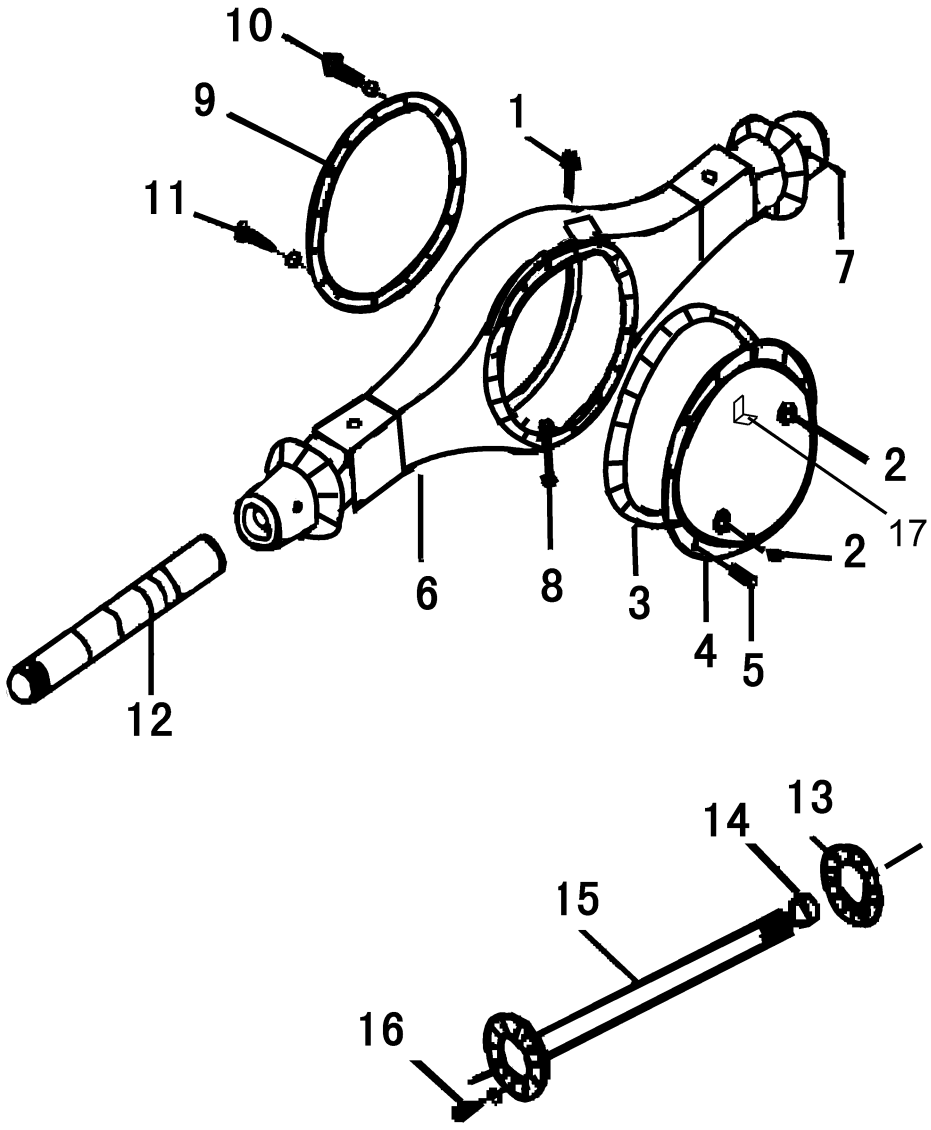
Rear Axle

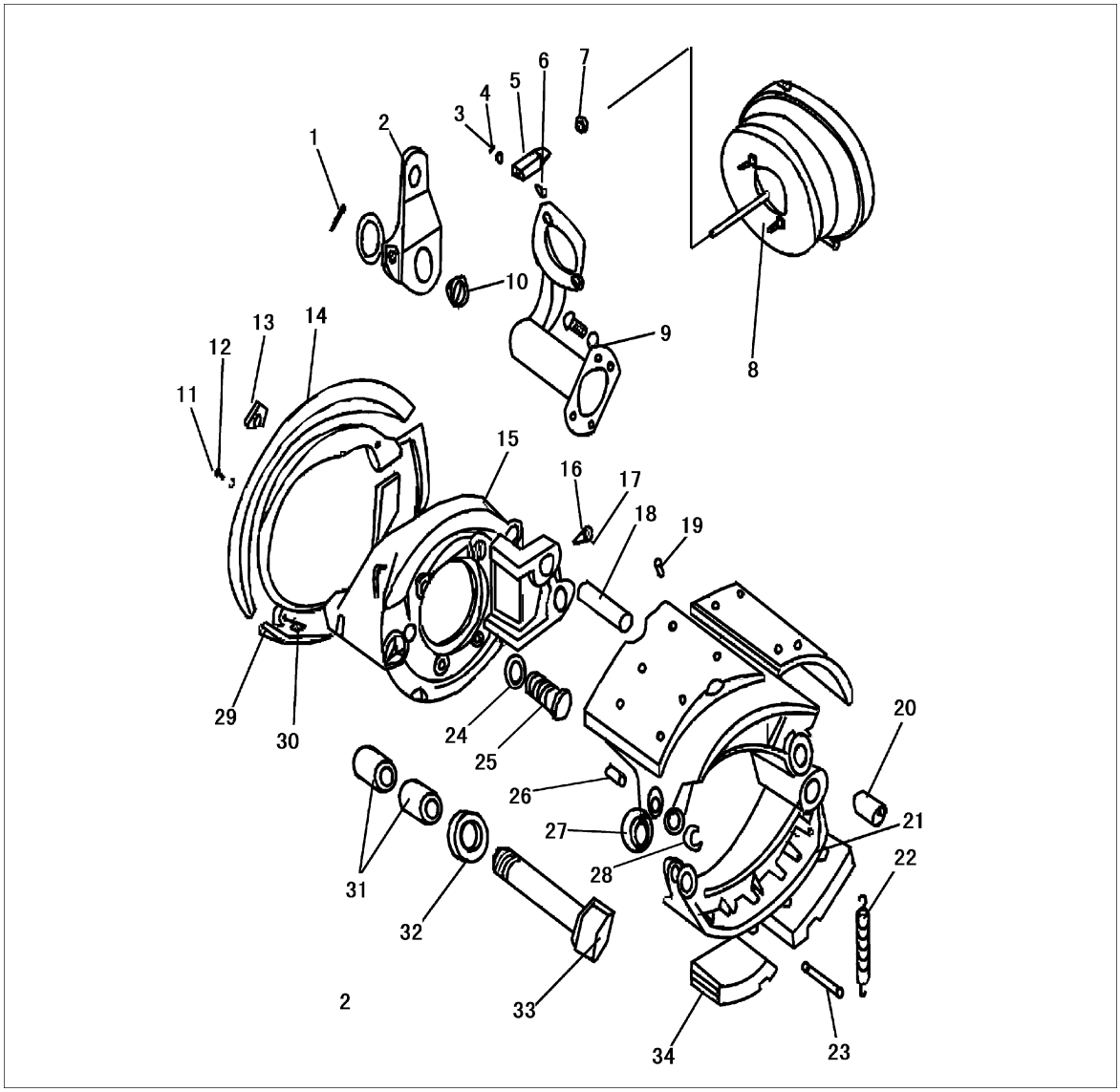
Structure

Rear axle housing and half axle



1.Vent plug
2..Screw plug--oil level hole
3.Gasket--axle housing rear cover
4.Rear axle housing cover assy
5.Bolt--fix the rear axle housing cover
6.Rear axle housing
7.Set pin
8.Square slotted conical screw plug with glue
9.Gasket
10.Bolt--fix the differential
11.Heavy spring washer
12.Half-axle bushing
13.Rear axle half-axle gasket
14.Half-axle oil seal assy
15.Rear axle half-axle
16.Rear axle half-axle bolt
17.Bracket--sensitive valve

Disassembly of the brake



1.Cotter pin
2. Brake adjusting arm
3.Cotter pin
4.Plain washer
5.U-fork
6.Flat pin
7.Locking nut
8.Spring air chamber
9.Air chamber bracket
10.Cam ring cage ring
11.Bolt
12.Spring washer
13.Rubber plug
14.Dustproof shield
15.Brake bottom plate
16.Set screw
17.Steel lock wire
18.Supporting pin
19.Rivet
20.Brake bush
21.Brake shoe
22.Return spring
23.Return spring pin
24.Spring washer
25.Screw
26.Roller pin shaft
27.Roller
28.Clamp ring
29.Dustproof shield
30.Grease nipple
31.Bush
32.Oil seal
33.Cam shaft
34.Brake friction plate

Maintenance

Before using new axle, apply enough 2# lithium grease into every grease fitting.

First maintain

To assure the safe running of your vehicle and obtain a long service life, you have to do the first maintain after the first 1,500~2,500kmafter leaving factory. Please note the following items:

1.Add or replace the gear oil for the reductor;

2.Dismantle and check the wheel hub brake drum assembly for any abnormal wear (please go to the Assembly and Adjustment to see the reference)

3.Check the fastening piece.

Periodical maintain

Do the periodical maintain for the vehicle is a good way to prolong the service life and assure the safe running of the vehicle. If you follow the maintenance schedule to do the maintain, your vehicle may obtain the best economic benefit.

The items of the periodical maintain are as following:

1.Add some grease to the grease nipple

2.Avoid important nut loosed

3.Adjust wheel hub bearing pretightening force and brake clearance

4.Add and replace the gear oil for the reductor

Periodical Maintain Schedule

Item	Maintenance Interval Mileage (× 1000km)													
	First maintain	4	8	12	16	20	24	28	32	36	40	44	48	80
Clean the axle assy		●	●	●	●	●	●	●	●	●	●	●	●	
Check main reductor for leakage	●	●	●	●	●	●	●	●	●	●	●	●	●	
Replace grease of main reductor	●			●			●						●	
Check lubricant level of the main reductor and clean the vent plug				●			●			●			●	
Check tightness of the important bolts	●	●	●	●	●	●	●	●	●					
Clean and adjust wheel hub bearing				●			●			●			●	
Do the magnetic particle test to half axle sleeve														●
Check service brake and parking brake efficiency	●	●	●	●	●	●	●	●	●	●	●	●	●	
Check the tightness of the brake bottom plate	●			●			●			●				
Clean brake air chamber													●	
Check brake pipeline for leakage	●	●	●	●	●	●	●	●	●	●	●	●	●	

Assembly and Adjustment

Disassemble and asseble of the assembly

Rear wheel hub brake drum assembly

1.Fixed the rear axle and remove the half axle bolt by a spanner;

2.Pull out the half axle gently and when the spline passing the oil seal, turn the half axle slowly to avoid damage the half axle oil seal;

3.Take down three screws of the stop spacer by a screwdriver, then remove the stop spacer and dismantle the adjusting nut by a spanner;

4.Turn the wheel hub brake drum a little and pull it, gently knock at the brake drum at the same time to loose the inner ring of the outer bearing, then take down the wheel hub brake drum, but you need to pay attention that the assembly is so heavy that may be fallen down or hurt someone, and the inner ring of the outer bearing need to care at the same time, don't fall it.

The assembling sequence of the rear wheel hub brake drum assembly is opposite to the above sequence, and you must to pay attention to the tightening torque of the thread connecting parts and the adjustment of the bearing pretightening force.

Assembly of the main reductor assembly

1) Assembly of the drive gear

1.Press the outer ring of the front inner and outer bearing into the bearing seat;

2.Press the oil seal on the oil seal seat;

3.Press the inner ring of the front inner bearing onto the drive gear, and install the spacer sleeve, adjusting spacer, bearing seat assembly and front outer bearing inner ring in sequence at the spline end of the gear;

4.Measure the pretightening load of the drive gear bearing: install the oil seal assembly, thrust washer, flange fork and washer, then tighten the castle nut with a torque 350~500N.m and measure the pretightening force at this time, the starting force of pulling the flange hole of the bearing seat should be 12~30N;

5.If the pretightening force is disqualified, you need to replace the adjusting spacer, reassemble to qualified;

6.Make use of a cotter pin to lock the castle nut.

2) Assembly of the differential

1.Install the bearing to the left and right differential housing;

2.Install planet gear, half axle gear, cross shaft, planet gear supporting washer, and half axle gear supporting washer;

3.Measure the tooth space of the planet gear of the differential, check the clearance between half axle gear supporting end face and the supporting washer with a clearance gauge, it should be $\leqslant$ 0.8 mm;

4.Align the marks of left and right differential housing and then assemble.

Tightening torque: 140~160N.m

3) Assembly of the main reductor assembly

1.After assembled the bearing outer ring of the differential, install it onto the main reductor housing;

2.Install the adjusting nut and the bearing cover, then fasten with bolts;

3.Equably tighten the adjusting nut to pretighten the load until the pretightening load is between 16.4~24.3N;

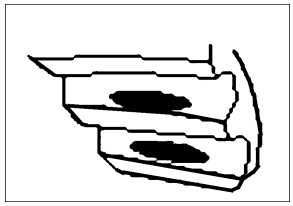
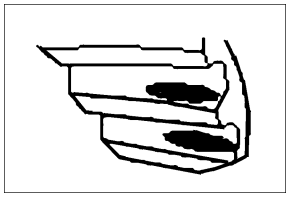
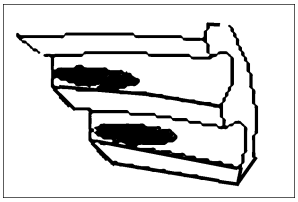
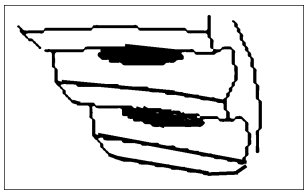
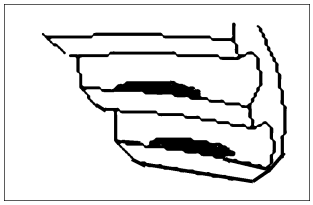
4.Install the adjusting spacer of main cone to the bearing seat and assemble the drive conical gear assembly;

5.Adjust the gear tooth space to 0.20~0.40mm:

The change value of the tooth space $\leqslant$ 0.15 mm

6.Paint two or three engaged teeth of driven gear red to chaeck the contact zone, if the contact area is improper, increase or reduce the thickness of the adjusting spacer until it is proper;

Sketch map of the contact zone is as follows:

	Gear contact zone		Adjusting method
1		Proper contact zone	No need to adjust
2		The drive gear & the driven gear is too far	The drive gear and the driven gear is too far (reduce the thickness of the spacer)
3		The drive gear & the driven gear is too near	The drive gear and the driven gear is too near (increase the thickness of the spacer)
4		The contacting area of the driven taped gear is too low	The drive gear and the driven gear is too near (increase the thickness of the spacer)
5		The contacting area of the driven tapered gear is too high	The drive gear and the driven gear is too far (reduce the thickness of the spacer)

7.Tighten the bearing cover fixed bolt, reassemble the stop spacer.

Adjustment of the axle

Adjustment of the brake clearance

No matter if the brake clearance is too big or too small, it will effect the brake efficiency of the vehicle. Please adjust the worm shaft hex-head of the adjusting arm by a spanner. Firstly, turn it with the clockwise until you can't turn to make the clearance become zero, then turn with the counter clockwise until you hear two sounds of steel ball, and the middle part clearance of the brake friction plate is 0.4~0.7mm.

Adjustment of the rear wheel bearing pretightening force

1.Remove the stop spacer first;

2.Tighten the adjusting nut by a special spanner with a torque of 150~180N.m;

3.Turn the wheel hub 2~3 circles, and make the bearing aligned correctly;

4.Fasten the adjusting nut with a tightening torque of 150~180N.m;

5.Reverse the adjusting nut for 1/8~1/6circle;

6.Make sure if the pretightening force is correct. First, turn the wheel hub for 2~3 circles, then confirm the tangential force of the wheel hub bolt;

The tangential force of the wheel hub bolt is 30~ 60 N.

Trouble Analysis

Trouble	Cause	Method
Wheel hub bearing is stugnant	Big pretightening force of the wheel hub bearing	Adjust pretightening force
	Bearing lack of lubricating or improper grease	Add or replace the grease
	Dust on the bearing	Clean and add some grease
Insufficient brake force	Cam shaft turns inflexibly	Check the cam for its working condition
	Improper adjustment of the brake air chamber push rod travel	Adjust travel
	Friction plate overheated or deterioration	Replace friction plate
	Improper connceting condition of the friction plate	Correct the joint position of friction plate
	Water enterred the brake drum	Press down the brake pedal during running to exhaust the water
	Grease on the connecting face of the friction plate or the brake drum	Cleanup the grease or replace friction plate
Abnormal noise while braking	Friction plate worn and rivet appeared	Replace friction plate
	Friction plate surface hardening or deterioration	Replace friction plate
	Brake drum uneven worn or loose installed	Correct brake drum or tighten the bolt
	Brake shoe and friction plate connected loosely	Replace rivet
	Brake shoe fixed pin loosed	Tighten fixed pin locking screw
	Wheel hub bearing worn	Replace wheel hub bearing
	Brake drum distortion	Replace brake drum
Wheel unsmooth	Cam shaft lack of lubricating or adjusting arm doesn't return	Add grease or correct troubled parts
	Return spring of the brake shoe or air chamber broken or fatigue	Replace troubled parts

Abnormal noise while driving	Improper gear space of the differential	Replace spacer or gear
	Too big clearance between drive gear and driven gear	Replace spacer or gear
	Drive gear bearing pretightening force too small	Adjust pretightening force
	Half axle gear, planet gear, and cross shaft worn or damaged	Correct or replace troubled parts
	Oil level too low	Add enough lubricant
Lubricant leaks	Oil seal worn, loosed or damaged	Replace oil seal
	Fasten bolt loosed or sealant failed	Tighten bolt or smear the sealant again
	Bearing seat fasten bolt loosed	Tighten bolt by the required torque
	Oil drain screw plug loosed or the gasket is damaged	Tighten screw plug or replace gasket
	Axle housing distorted because of over-load	Correct or replace axle housing
	Vent is blocked or damaged	Clean or replace vent plug
Brake unstably	Improper installation of the brake shoe or return spring is broken	Tighten fixed pin lock screw or replace return spring
	Oil on brake friction plate or deterioration	Clean or replace friction plate
	Brake bottom damaged	Replace brake bottom plate

Lubricating Parts and Lubricant

Lubricating parts

Item	Maintenance Interval Mileage (× 1000km)												
	First maintain	4	8	12	16	20	24	28	32	36	40	44	48
Reductor assy	●			●			●			●			●
Wheel hub bearing	●			●			●			●			●
Adjusting arm	●			●			●			●			●
Cam bracket	●						●						●

Lubricant

Part	Lubricant	Type
Reductor assy	gear oil	GL-5 double curve gear oil
Wheel hub bearing	lithium grease	2#
Adjusting arm	lithium grease	2#
Cam bracket	lithium grease	2#

Tightening Torque of Important Bolts and Nuts

Part	Tighten Torque (N.m)
Oil drain screw plug	130 ~ 150
Big nut of the drive gear	350 ~ 500
Rear brake bottom plate bolt	156 ~ 206
Air chamber bracket fixed bolt	55 ~ 70
Air chamber fixed bolt	50 ~ 75
Bearing seat bolt	50 ~ 70
Driven gear bolt	140 ~ 160
Differential housing bolt	140 ~ 160
Half axle nut	70 ~ 95
Rear adjusting nut	150 ~ 180
Reductor housing and axle housing connecting bolt	140 ~ 170
Axle housing rear cover and axle housing connecting bolt	90 ~ 120

Main Adjusting Data and Maintaining Standard

Main adjusting data

Adjusting Item	Adjusting Data
Tooth space	0.2~0.4mm
Clearance between rear fiction plate and brake drum	0.4~0.7mm

Maintaining Standard

Item	Maintaining Standard	Wear Limit	Remark
Feedhole of the rear axle leaf spring worn	Φ 27mm	Φ 28mm	
Radial runout of left and right half axle sleeve outer bearing journal	0.03mm	0.1mm	
Radial runout of the middle part rough surface of half axle	1mm	1.5mm	Repair limit: 1.5mm
Face runout of the wheel hub and half axle flange connecting face	0.1mm	0.15mm	

Suspension System

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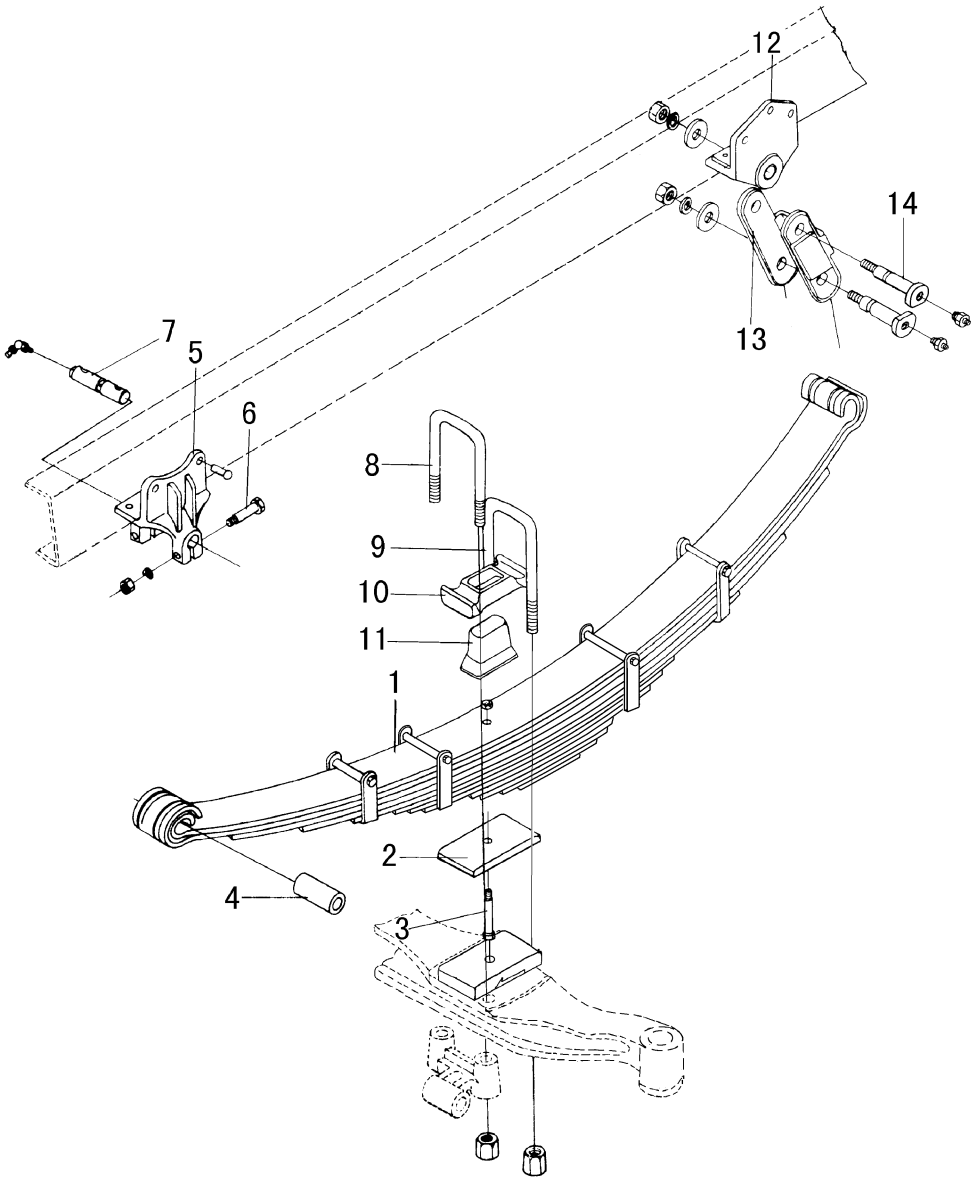
Suspension

Trouble Analysis

Trouble	Cause	Repair
Bumpy ride	Spring leaf damaged Overload	Replace the spring leaf Load as required
Vehicle rocked severely	Damper failed	Replace the damper
Spring leaf center bolt is broken	U-bolt and nut loosed	Replace center bolt
Spring leaf is broken at the center hole	U-bolt and nut loosed	Replace spring leaf

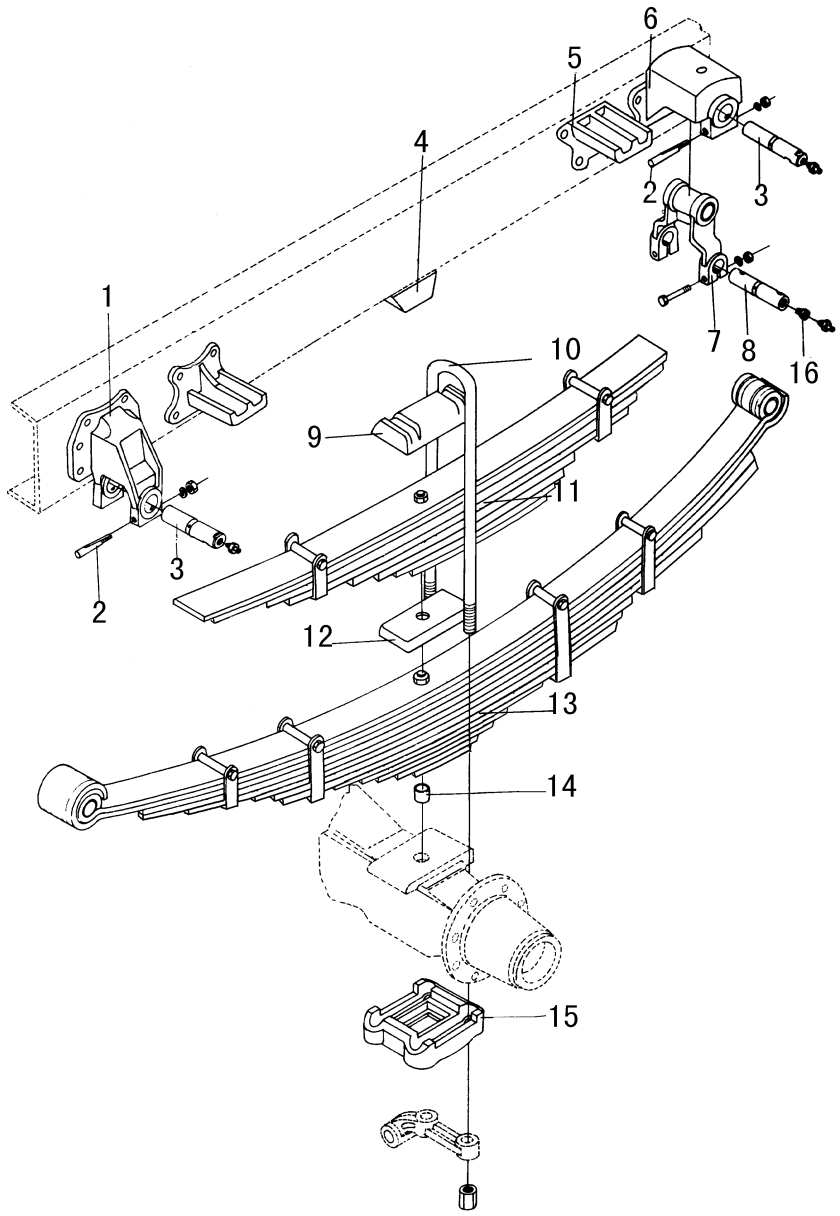
Structure

Front leaf spring



1.Front spring leaf assy
2.Inclined underplate with set sleeve assy
3.Center bolt
4.Bush
5.Fixed end bracket
6.Spring pin set bolt
7.Spring leaf pin--front suspension
8.U-bolt
9.U-bolt
10.Cover board--front suspension
11.Limit block--front suspension
12.Lifting eye bracket
13.Front lifting eye
14.Lifting eye oin set

Rear leaf spring



1.Fixed end bracket
2.Wedge lock pin
3.Leaf spring pin
4.Limit block assy
5.Sub-leaf spring bracket
6.Bracket--lifting eye end
7.Lifting eye with bush assy
8.Leaf spring pin
9.Cover board
10.U-bolt
11.Sub-leaf spring assy
12.Sub-leaf spring underplate
13.Rear leaf spring assy
14.Set pin sleeve
15.U-bolt underplate

Disassembly

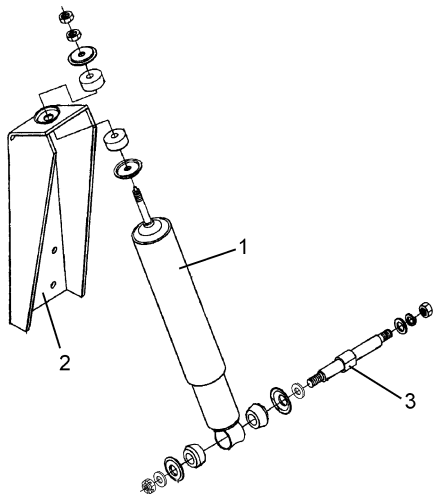
Clean the suspension system before disassembling. Set the truck in brake state, and block up the front and rear wheel with wooden stand.

Dismounting of front suspension

1.Wedge the rear wheel, lift the front axle and front part of the frame with a jack and the safety support, then take down the front wheel;

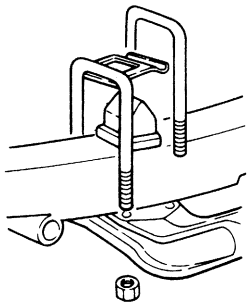
2.Unscrew the set nut from the lower end of the front damper, dismantle the front damper lower end, and take off the related parts.

3.Loosen the set nut from the upper end of the damper, dismantle the front damper upper end, and take off the front damper.



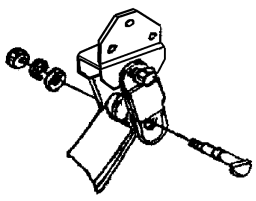
1.Front damper assy 3.Damper lower pin
2.Damper bracket assy

4.After loose U-bolts and nuts, remove the U-bolt, cover board and limit block;

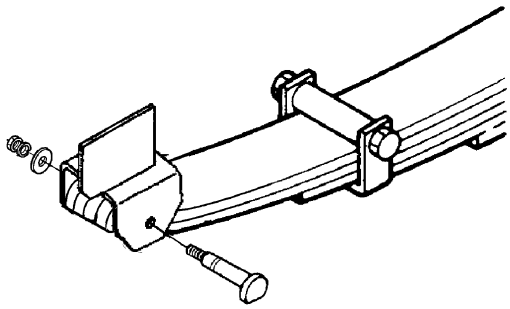


5.Down the front axle by loose the jack and then the leaf soring is in a free condition;;

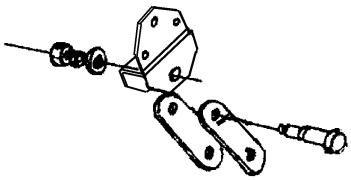
6.Remove the spring rear end, loose the lifting pin fasten nut at the lower end, tahe down the lifting pin and the leaf spring rear end can be removed;



7.Remove the fixed bolt of the leaf spring front enf spring pin, then take down the leaf spring pin and let down the jack and take out the leaf spring;



8.Loose the lifting eye locking nut, and take down the lifting eye pin and you can remove the lifting eye.

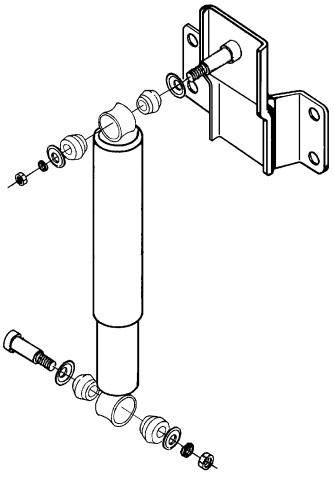


Disassembly of the rear suspencion

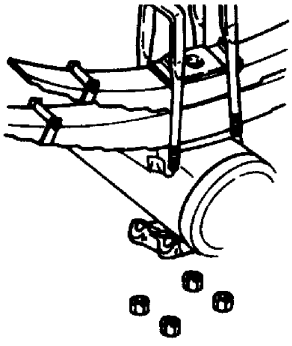
1.Wedge the front wheel, lift the rear axle and rear part of the frame with a jack and the safety support, then take down the rear wheel;

2.Unscrew the set nut from the lower end of the damper, and take off the related parts;

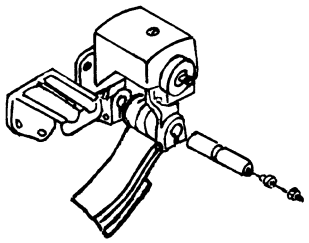
3.Loosen the set nut of the damper pin from the upper end of the damper, remove the related parts, and take down the damper;



4.Loose the U-bolts and nuts, remove U-bolt underplate, U-bolt and cover board;



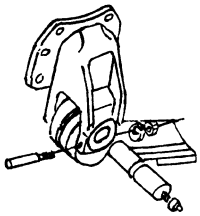
5.Slowly down the jack to fall the rear axle to the ground, and remove the sub leaf spring assembly and sub-leaf spring underplate;



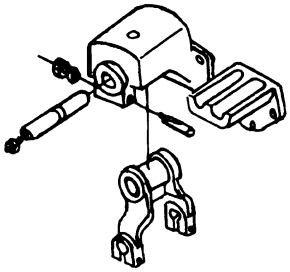
6.Disassemble the the rear end of the the leaf spring. Remove the fasten bolt of the leaf spring pin and pull the spring pin out then you can disassemble the rear end of the leaf spring rear end;

Note: When pulling the spring pin, you must use the the threaded sleeve of the spring pin. Before remove the lock bolt of the leaf spring pin, screw the threaded sleeve off a little then pull, or you can use the pin puller with thread.

7.Remove the cotter pin used to fix the front pin of the rear leaf spring, then take down the front pin of the rear leaf spring, down the jack then remove the rear leaf spring finally;



8.Take down the cotter pin of the lifting eye pin, and make use of an iron rod(diameter=15mm) went through the special hole used to remove the lifting eye pin, then push the pin out to take down the lifting eye.



Disassembly of the front and rear leaf spring

1.Take down the clamp;

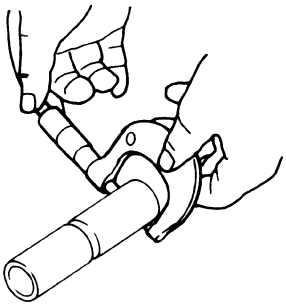
2.Clamp the center part of the leaf spring by a C-shape clip;

3.Take down the center bolt;

4.Loose the C-shape clip slowly and detach the spring leaf.

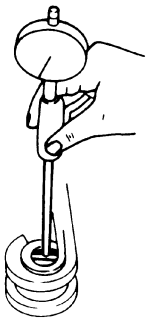
Check

1.Measure the outer diameter of the spring pin and lifting eye pin



Wear limit	Front suspension	17.5mm
	Rear suspension	29.5mm

2.Inner diameter of the spring bush and lifting eye bush



Wear limit	Front suspension	19mm
	Rear suspension	31mm

3.Clearance between spring pin, lifting pin and bush:

Spring pin and bush:

Repair standard 0~0.302mm

Wear limit 1.0mm

Lifting pin and bush

Repair standard 0.08~0.252mm

Wear limit 1.0mm

4.Check the spring leaf for any cracks or wear condition;

5.Measure the wear condition of the spring leaf, if the wear value is over 15% of the standard thickness, please replace the spring leaf.

Standard thickness of the front leaf spring is 9mm, wear limit is 7.65mm;

Standard thickness of the rear leaf spring is 10mm, wear limit is 8.5mm;

Standard thickness of the sub-leaf spring is 8mm, wear limit is 6.8mm.

Note: If one of the leaf spring is broken, you'd better replace the whole leaf spring assembly. Only replace the broken one may cause others damaged very soon.

Assembly

Assembly of the sub-assembly

Assemble the leaf spring by center bolt accord the sequence of the spring leaf;
Note: Smear some black lead lime grease on the relative friction surface of the spring leaf.

Clamp the leaf spring by a C-shape clip, and tighten the center bolt and nut;

Take down the C-shape clip from the leaf spring;

After tightening the center bolt, rivet the connecting thread of the bolt and nut to lock;

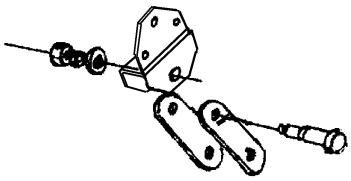
Install sleeve and bolt on the clamp and tighten the nut;

After tightening the clamp bolt, rivet the connecting thread of the bolt and nut to lock.

Assembly of the front suspension

1.Smear a layer of grease on the spring bush and lifting eye bush before assembling;

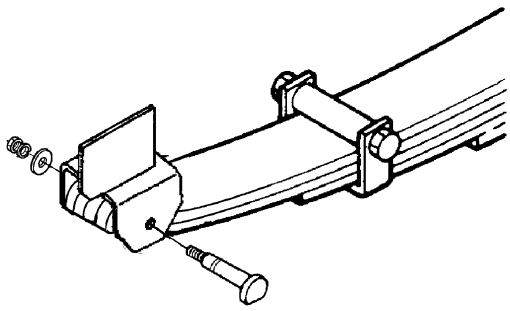
2.Install the lifting eye to its bracket and insert the pin, then tighten the locking nut;



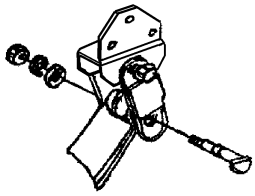
3.Install the front leaf spring assembly, cover board, limit block to the front axle and lift the front axle with a jack;

4.Align the bracket hole of the fixed end to the spring eye, then insert the spring pin;
Note: Make the spring pin slot align to the set bolt.

5.Install the set bolt;



6.Install the rear end of the spring, align the lifting eye and spring eye, then insert the lifting eye pin;

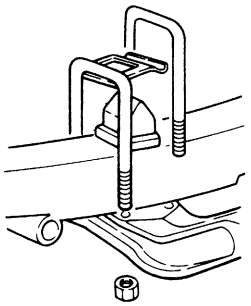


7.Assemble the U-bolt;

8.Lift the front axle by the jack, and then take down the support of the frame then own the jack;

9.Tighten the U-bolts and nuts;

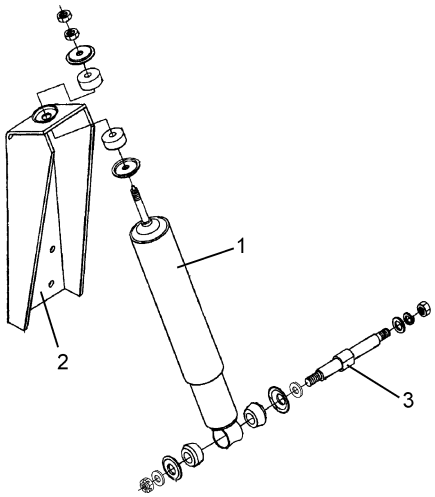
Tightening torque 200~250N • m



10.Install the damper to the bracket, then the plain washer, spring washer and nut, then tighten them;

Tightening torque 140~170N • m

11.Add grease to the leaf spring pin and lifting eye pin as required;

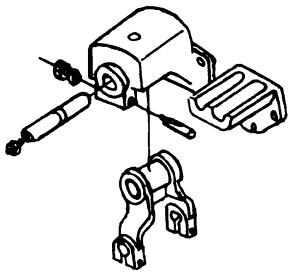


Assembly of the rear suspension

1.Smear a layer of grease on the spring bush and lifting eye bush, and install the lifting eye to its bracket, then insert lifting eye pin, then the cotter pin and tighten its lock nut;

Tightening torque 90~110N • m

Note:When inserting the cotter pin, make the inclined face contact to the face of lifting eye pin.

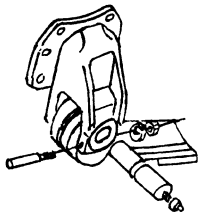


2.Set the rear spring to the rear axle, and lift the rear axle by the jack;

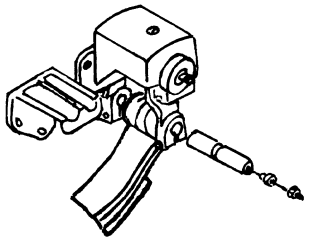
3.Align the fixed end bracket hole to the spring eye, insert the spring pin, then the cotter pin and tighten the nut;

Tightening torque 32~42N • m

Note:When inserting the cotter pin, make the inclined face contact to the face of lifting eye pin.



4.Install the rear end of the spring, align the lifting eye hole to t spring eye, insert the spring pin, then install the lock nut;



Tightening torque 32~42N • m

Note:When inserting the cotter pin, make the inclined face contact to the face of lifting eye pin.

5.Install the underplate, sub-spring and cover board to the upper of the rear spring, then install the U-bolt;

6.Lift the rear end of the vehicle by a jack, take down the support under the frame then down the jack;

7.Install the U-bolt underplate and damper lower bracket;

8.Install the U-bolts and nuts and tighten;

Tightening torque: 300~350N • m

9.Add grease to the leaf spring pin and lifting eye pin;

10.Install the rear damper by referring to the assembling method of the front damper.

Brake System

BR

Table of Contents

Brake System

Technical Parameter

Structure type		Air-pressure, with shoe, drum type
Brake type		S type cam roller type
Brake bottom plate	Front	Pressing bottom plate
	Rear	Foundry bottom plate
Brake specification	Front	Φ 310 × 120mm
	Rear	Φ 310 × 150mm
Brake cam type	Front	Rectangle cam
	Rear	S type cam (involute)

Tightening Torque

Item	Tightening Torque
Fasten bolt of the front brake air chamber and its bracket	55~70
Fasten bolt and nut of the front air chamber and brake bottom plate	55~70
Fasten bolt of front brake bottom plate and steering knuckle	160~220
Lock nut of front brake anchor pin with conical sleeve	128~167
Fasten bolt of the rear brake air chamber and its bracket	55~70
Fasten bolt and nut of the rear air chamber and brake bottom plate	80~110
Flange bolt of rear brake bottom plate and two end of rear axle housing	130~160
Fasten nut of brake air chamber clamp	15~20

Trouble Analysis of Wheel Brake

The trouble of brake system including insufficient braking effectiveness, brake being seized, or only one brake shoe expanded, and having abnormal sounding. The worn-out brake shoe lining and the overlarge clearance between the lining and brake drum cause the insufficient braking effectiveness. If you cannot find any causes in the whole brake system, you should consider the brake's condition.

When the brake is seized, it is necessary to check and make sure whether one brake is seized or all the brakes are seized. If only one brake is seized, it may this brake down; if all the brakes are seized, the problem may be in the control mechanism.

In case of only one brake shoe expands the condition of tires and brake unit should be considered.

The abnormal sounding of brake is caused by the worn out brake shoe lining.

Abnormal sound

Trouble	Cause	Repair
Abnormal sound when press down the brake pedal	The rivet or bolt protrude due to the wear of the brake lining	Replace brake lining
	The brake lining surface is harden	Replace brake lining
	The brake lining surface deteriorated	Replace brake lining
	Bad contact of brake shoe and brake lining	Rivet up the rivet or screw up the bolt
	Uneven wear of brake drum inner surface or incorrect installation	Adjust a screw up brake drum
	Brake shoe supporting pin loosed	Adjust the clearance and tighten the lock nut
	The wheel hub bearing worn out	Replace the wheel hub bearing
	The brake drum deformed	Adjust or replace the brake drum

Unsteady brake

Trouble	Cause	Repair
Unsteady brake	The pressure in the tires are uneven or the dimension of tires are not the same	See regulations
	Improper installation of the brake shoe or return spring damaged	Tighten the lock nut and replace the return spring
	Incorrect joint of brake lining	Adjust the joint of brake lining
	Incorrect adjustment of left or right brake	Adjust
	The brake lining deteriorate	Replace brake lining
	The brake lining have oil	Clean with petrol, eliminate the oil leakage of wheel hub
	The brake bottom plate is damaged	Replace brake bottom plate
	The U bolt of the spring is loosen	Screw up U bolt

Insufficient brake

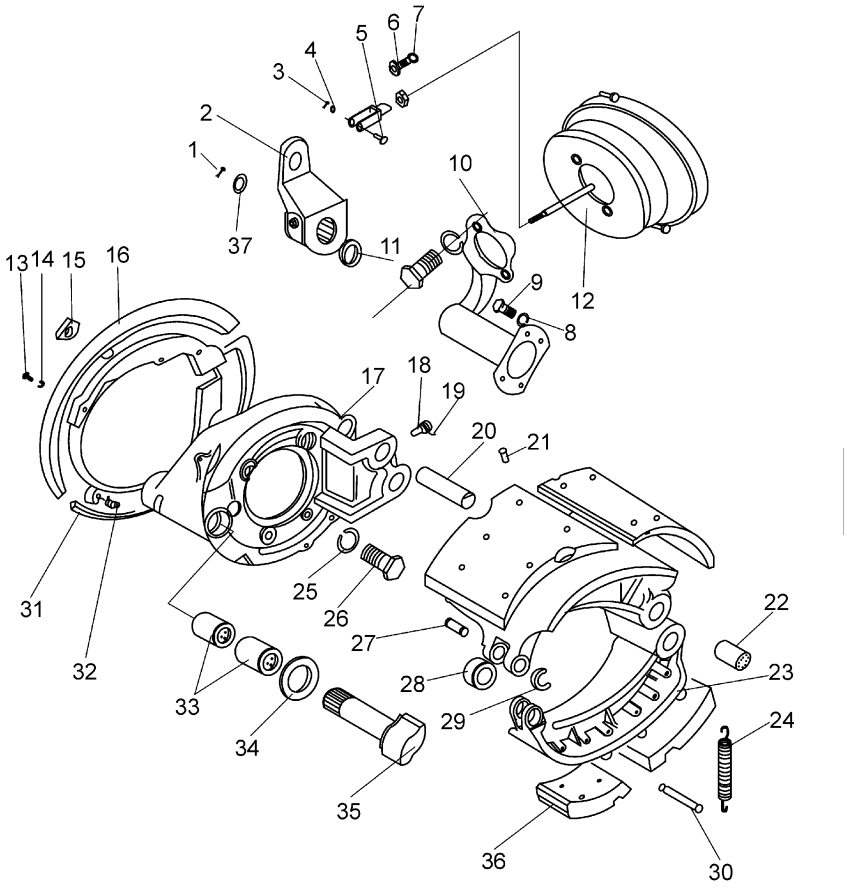
Trouble	Cause	Repair
Insufficient brake under any conditions	Normal air pressure Brake valve travel is too short Cam shaft doesn't run (bush lacks lubricant) Improper push rod travel of the brake air chamber Bad contact of relay valve Brake shoe lining is overheat or deteriorate Incorrect engaging of brake shoe lining There is lubricant on brake shoe lining or brake drum	 Check and replace the brake valve if necessary Check and replace cam shaft if necessary Adjust the travel Disassemble and repair Replace friction lining Correct the engaging position Clean with proper cleanser or replace the friction lining
	Abnormal air pressure Air pipes leak air Air compressor doesn't work Improper adjustment of the unloader valve or it failed because of impurities Brake valve leaks air	 Repair Disassemble and repair the air compressor Adjust or clean Disassemble and repair the brake valve

All the wheel is seized

Trouble	Cause	Repair
Wheel seized	Air in brake air chamber Improper lubricant of cam shaft or adjusting arm return incorrect Return spring of brake shoe or air chamber is broken or fatigue Spring brake is in use Vent of relay valve or quick-release valve blocked Primary or secondary piston of brake valve return failed	Check and correct the exhaust valve of relay valve and quick-release valve Correct Replace Release the spring brake and eliminate the question Disassemble and clean troubled parts Disassemble and clean brake valve, replace troubled parts if necessary

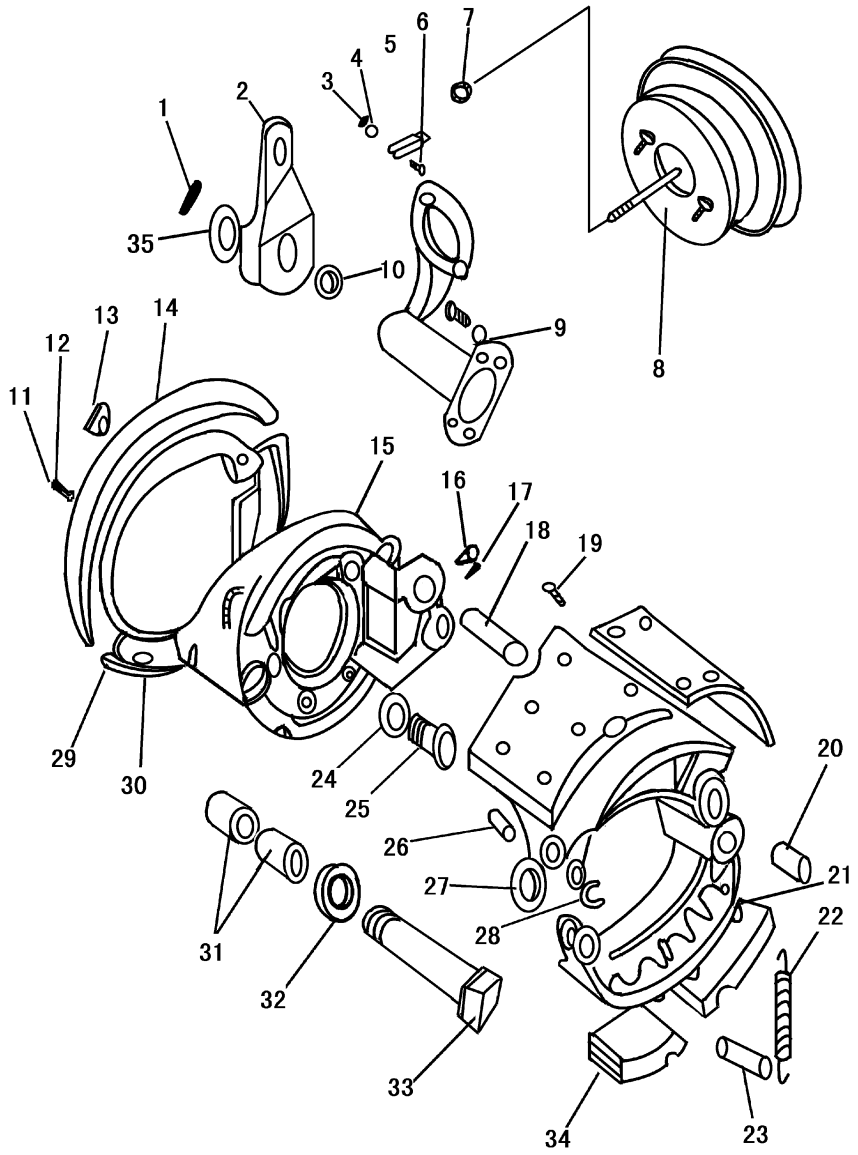
Structure

Front brake



1.Pin, cotter
2.Front brake adjust arm assembly
3.Pin, cotter
4.Washer
5.Pin shaft--chamber push rod
6.Hex bolt
7.Washer, spring
8.Washer, spring
9.Bolt
10.Front brake bracket assembly L. H.
11.Shim, adjusting
12.Front brake chamber assembly L. H.
13.Hex bolt-to fix dust shield
14.Washer, spring
15.Plug-rear dust shield
16.Front dust shield
17.Front brake plate L. H.
18.Screw
19.Wire, lock
20.Anchor pin-front brake
21.Rivet
22.Bushing-brake shoe
23.Front brake shoe
24.Return spring-rear brake shoe
25.Washer, spring
26.Hex bolt
27.Roller shoe-brake shoe
28.Roller
29.Lock ring--brake shoe roller shaft
30.Pin shaft-Washer, spring
31.Front dust shield
32.Fitting, grease
33.Bush-brake plate
34.Seal washer,O type
35.Camshaft-front brake L. H.
36.Brake lining
37.Washer--brake cam
38.

Rear brake



1.Pin, cotter
2.Brake adjust arm
3.Pin, cotter
4.Washer
5.Fork,cotter
6.Pin,crew cut
7.Hex bolt
8.Rear spring accumulator chamber L. H.
9.Rear brake bracket assembly L. H.
10.Washer-camshaft
11.Hex bolt
12.Washer, spring
13.Rubber plug
14.Rear dustproof tray--rear brake
15.Rear brake plate
16.Screw--to fix brake shoe
17.Wire, lock
18.Shaft-shoe
19.Rivet
20.Bush--rear brake shoe
21.Rear brake shoe
22.Return spring--rear brake shoe
23.Pin, return spring
24.Washer, spring
25.Screw--to fix brake plate
26.Roller shaft--rear brake shoe
27.Roller--rear brake shoe
28.Lock ring--brake shoe roller shaft
29.Rear dustproof tray--rear brake
30.Fitting, grease
31.Bush-brake plate
32.Seal washer,O type
33.Cam-rear brake L. H.
34.Brake lining--rear brake shoe
35.Washer--brake cam

Front Brake

Disassembly

Remove the brake drum and wheel hub assembly, take down the return spring, brake shoe, brake cam, air chamber bracket and brake bottom plate in sequence.

Check

1.Make sure whether the brake drum is damaged or distorted, replace in necessary.

2.When the brake drum is worn out and becomes out of round, it is allowed to bore, but the accumulative machining quantity should not exceed 4mm for the diameter direction.

3.When the brake drum assembly has been bored:

The run-out of the drum inside surface to the bearing axis (mm) <0.25

The difference of the inside diameters of left and right drums on one vehicle (mm) <1mm

4.The wear allowance of the lining thickness is 7mm. The distance from the lining surface to the rivet head should not be less than 1mm. The lining surface should not be cracked and broken away. Otherwise, it should be replaced.

5.The wear allowance of the shoe flat face at one end should not exceed 0.30mm.

6.Check carefully. There should not be any crack (especially at the two end hooks).

7.The diaphragm of the brake chamber should be in good condition. It should not have any ageing crazing or crack. It is not allowed to use the same size diaphragms of different hardness on one truck.

8.Check clearance of all fitting surface.

Assembly

1.Install the assembled brake backing plate assembly on the front axle steering knuckle.

Tighten bolts with the specified torque 160~220N • m

2.Put the tightening bolts with the locking wires into the holes around the brake camshaft seat from the inside. Install anchor pin into its seating holes and make two eccentric journals of the anchor pins opposite each other.

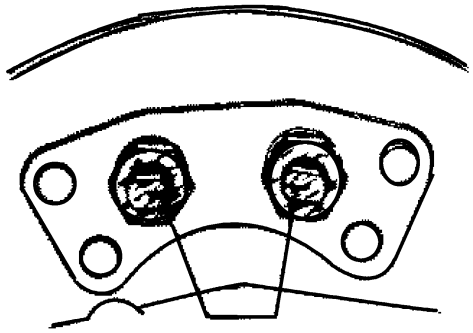
3.Assemble brake chamber brackets (with brake chamber assembly) in turn and tighten them. Put in the brake camshaft and the adjusting washer. Then assemble the front brake slack adjuster on the brake camshaft and lock it with the cotter pin. The brake air chamber push rod will be connected with the brake adjust arm by a pin.

4.Fit the brake shoes inside the brake backing plate. At anchor pin ends lock brake shoes with lock plate and cotter pins.

5.The return spring is hooked between two brake shoes.

Adjust

After the brake linings have been replaced, the brake bottom plates have been dismounted, causing the positions of the anchor pins and the camshaft changed, the normal contact of the brake linings and the brake drum is destroyed; adjust the brake entirely as follows:



1.Take off the cover of the inspection hole on the drum.
Loosen the securing nuts of the anchor pins and the nuts of the securing nuts for the air chamber bracket.

2.Turn the anchor pins to make the marks at their ends opposite each other inwardly.

3.Turn the anchor pins and the worm shaft of the slack adjuster again and again to keep the linings fitted to the drum fully. At the adjusted position, tighten the nuts of the air chamber bracket and the nuts of the anchor pins. (Be careful to keep the positions of the anchor pin and the air chamber bracket fixed.)

4.Loosen the worm shaft 1/2~2/3 turn. The drum should rotate freely, but not touch the linings or any other parts. The clearances between the brake linings and the drum should be:

Near the anchor pins	0.25~0.40mm
Near the camshaft	0.40~0.55mm
The difference of clearance at the same end of the two shoes	≤ 0.1mm

When braking linings worn out and the push rod stroke of the chamber exceeds 40mm, partial adjustment should be done immediately to reduce the clearance between the linings and the drum. (Never turn the anchor pins to destroy the good match of linings and drum.) When adjusting, face the worm shaft of slack adjusters, turn the worm shaft clockwise, clearance decreased, and turn anticlockwise, clearance increased. It is wrong to adjust clearance by tightening the push rod clevis for changing the stroke of push rod.

Note:

During adjusting the brake clearance, clean up dirt and filth on the head of the adjusting arm worm shaft. Make use of a double offset ring spanner, cover it onto the worm shaft head, press the lock bush to release the worm shaft and then turn the worn shaft. If the lock bush can't be pressed down, knock it with a hammer gently and then press. After adjusting, cover with a rubber dust shield.

Lubricate

1.The brake cam surface

2.Camshaft journal

3.The anchor pins and the holes

4.Brake slack adjust arm assembly

5.Bearing holes of the camshafts on the brake chamber bracket

Rear Brake

Disassembly

After remove the rear axle half axle, take down the brake drum and wheel hub assembly, then dismount rear brake adjust arm, brake cam, air chamber bracket, brake shoe with bottom plate assembly, and dust shield in sequence.

Check

1.Make sure whether the brake drum is damaged or distorted, replace if necessary.

2.Make sure whether the brake shoe with linings is cracked, replace if necessary.

3.Check the roller surface for any cracks and damages, replace if necessary.

4.Check the return springs.

Note:

After replace the friction plate, the excircle of the friction plate needs to be wholly machined. That is to install the brake shoe and brake bottom plate together, and make use of the bottom plate to position to machine the excircle of the friction plate.

Assembly

1.Install the brake to the bottom plate, screw on the screw and fasten with steel wire, then machine the excircle of the brake shoe friction plate.

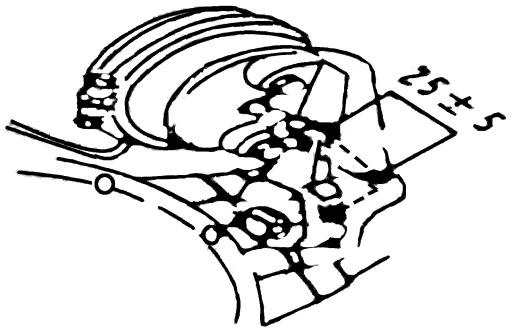
2.Install the brake shoe and brake bottom plate to the two ends of the rear axle housing, the tightening torque of the bolt is 130~160N.m, and then install the pressing dust shield.

3.Install the air chamber bracket and fasten, then set to the brake cam and assemble the adjusting spacer. After that, install the brake adjust arm to the brake cam and lock with a clamp ring, connecting the air chamber push rod to the brake adjust arm with flat pin.

4.The return spring is hooked between two brake shoes.

Adjust

Disassemble the rubber dust shield of the inspection hole and the adjust arm. Make use of a double offset ring spanner to press the lock bush of the worn shaft head, turn the worm shaft to let the friction plate surface and inner surface of brake drum contact, then turn worm shaft loose for 1/2~2/3 circle. At this time, the clearance between center of two brake shoe friction wafers and brake drum is about 0.7mm, and the brake drum can turn freely without interfere with other parts.



After air entered the chamber, the push rod must be out immediately, and after exhaust, it can return without block. The travel of the air chamber push rod is between 25 ± 5mm.

Lubricate

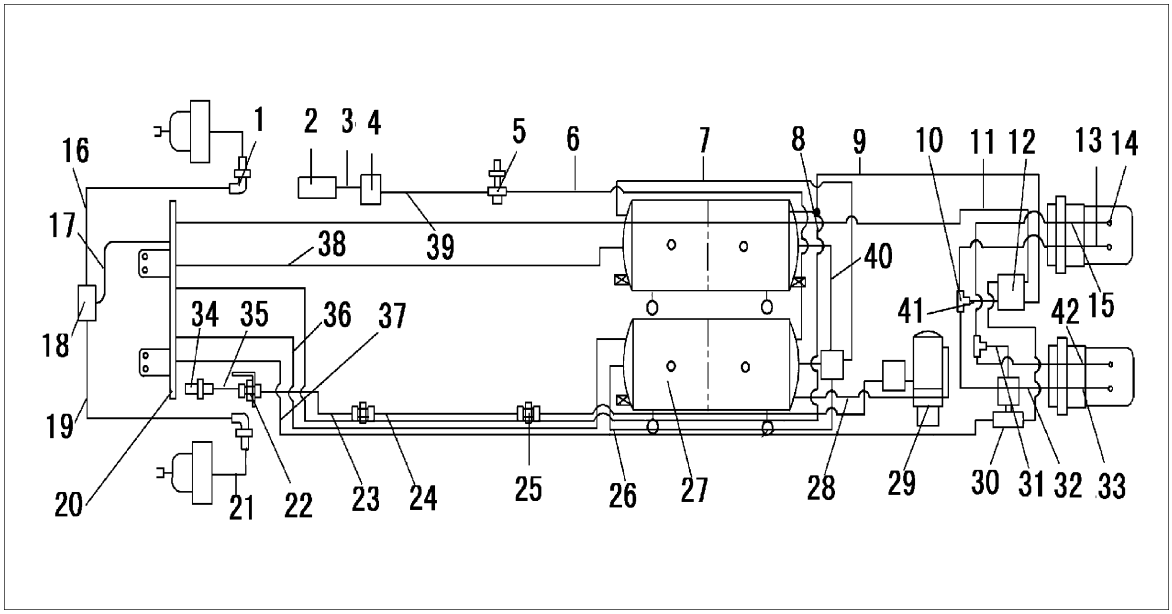
1.Brake shoe roller shaft

2.Roller hole

3.Roller surface

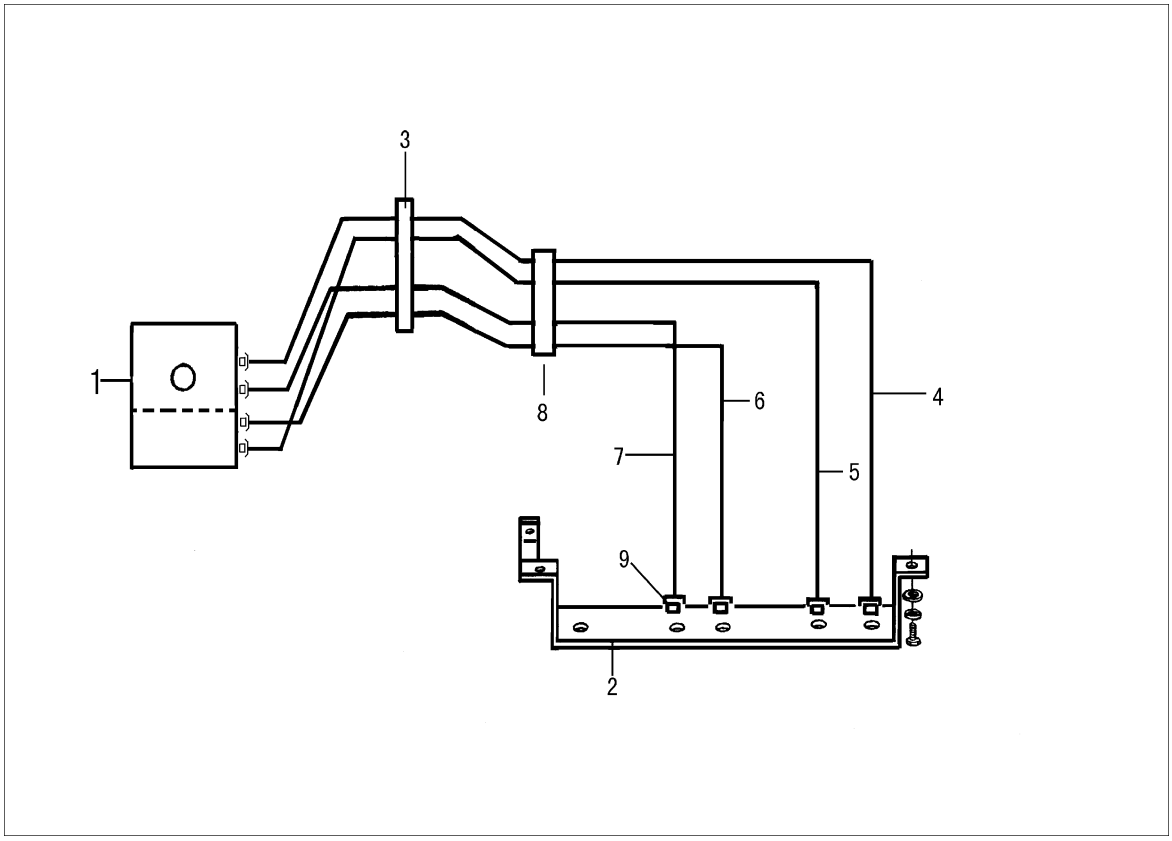
4.Other parts refer to the front brake

Frame Brake Pipeline



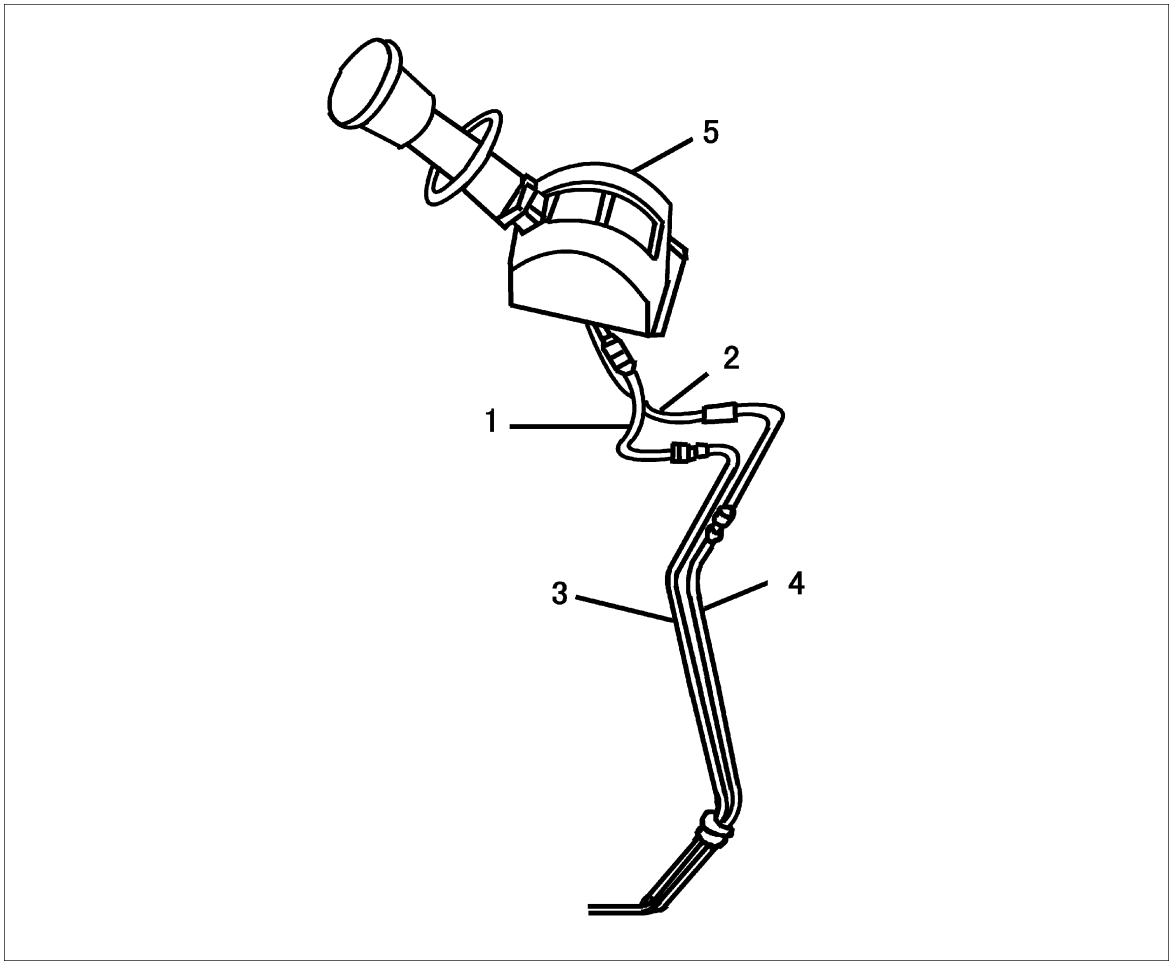
1.Elbow fitting
2.Exhaust brake valve assembly
3.Air line assembly--electromagnetic valve toexhaust brake valve
4.Fitting, tube
5.Three way fitting
6.Nylon pipe assembly
7.Nylon pipe assembly
8.Nylon pipe assembly
9.Nylon pipe assembly
10.Three way fitting
11.Nylon pipe assembly
12.loading sensing valve assembly
13.Air line assembly
14.Fitting
15.Air line assembly
16.Nylon pipe assembly
17.Nylon pipe assembly
18.Quick release valve subassembly
19.Nylon pipe assembly
20.Hose assembly
21.Hose assembly
22.Hose bracket
23.Hose assembly
24.Fitting, elbow
25.Hose assembly
26.Nylon pipe assembly
27.Hose assembly
28.Air line assembly--desiccator to dampAir tank assembly
29.Air desiccator and unloader valve subassembly
30.double direction valve and Quick release valve subassembly
31.Hose assembly
32.Nylon pipe assembly
33.Hose assembly
34.Fitting, elbow
35.Hose assembly
36.Nylon pipe assembly
37.Nylon pipe assembly
38.Nylon pipe assembly
39.Nylon pipe assembly
40.Nylon pipe assembly
41.Hose assembly
42.Air line assembly

Cab Brake Pipeline



1.Brake valve assembly
2.Hose bracket
3.Bracket, upper
4.Nylon pipe assembly--Brake valve 21 connect hole to hose bracket
5.Nylon pipe assembly--Brake valve 22 connect hole to hose bracket
6.Nylon pipe assembly--Brake valve12 connect hole to hose bracket
7.Nylon pipe assembly--Brake valve11connect hole to hose bracket
8.Jacket
9.Transition tie-in

Hand Control Valve Control System



1.Air line assembly--hose bracket to hand control valve 1 connect hole
2.Air line --hose bracket to hand control valve 1 connect hole
3.Air line assembly--hose bracket to hand control valve 2 connect hole
4.Air line--hose bracket to hand control valve 2 connect hole
5.Hand control valve assembly

Cab

BF

Table of Contents

Cab

Precautions

When removing or installing various parts, place a cloth or padding onto the vehicle body to prevent scratches.

Disassemble or assemble the handle device, molding parts, instrument, inner trims and so on carefully not to soil or damage them.

Apply seal glue on necessary place when assembling.

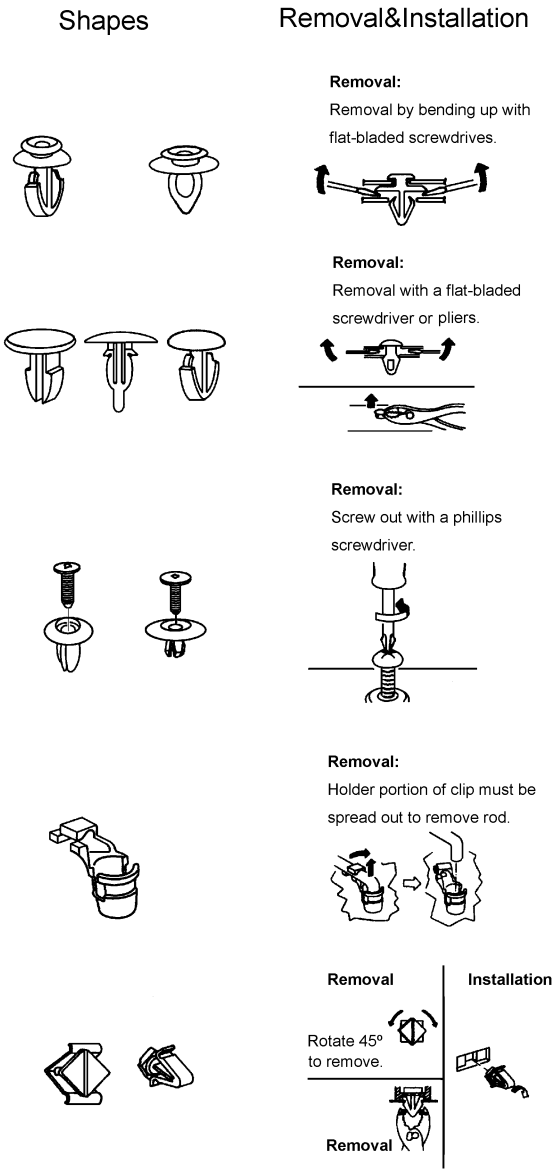
Be careful not let the glue flow out of the parts when applying.

When replacing the metal parts extarnal plate of the body, be sure to take rust prevention measures.

Clip and Fastener

The following codel and pictures and symbols are subiect ot the clip and fastener in the BF section.

The clip and fastener must be replaced if damaged during assembling or disassembling.



Cab Front Panel

Disassembling the front bumper ass'y:

1.Release off the six fixed nuts from the front bumper (each three on left and right side).

2.Release off the bumper ass'y.

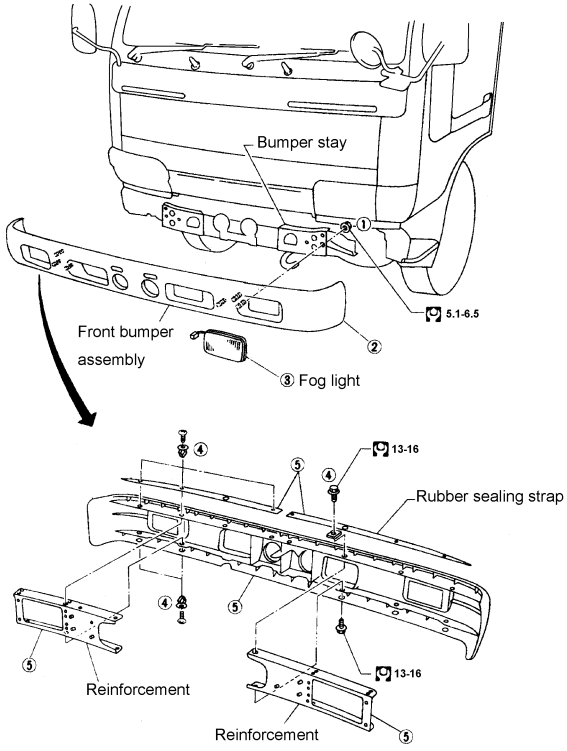
3.Disassemble the connection device for right and left fog light.

4.Disassemble the clip and bolt.

5.Disassemble reinforcement, seal washer and i

6.nstallation board for the lights

.



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Door

Front Door

When disassembling the front door, it is better to disassemble the cover at front side first.
Afler adjusting the door or door lock, check the door lock open and lock condit ion

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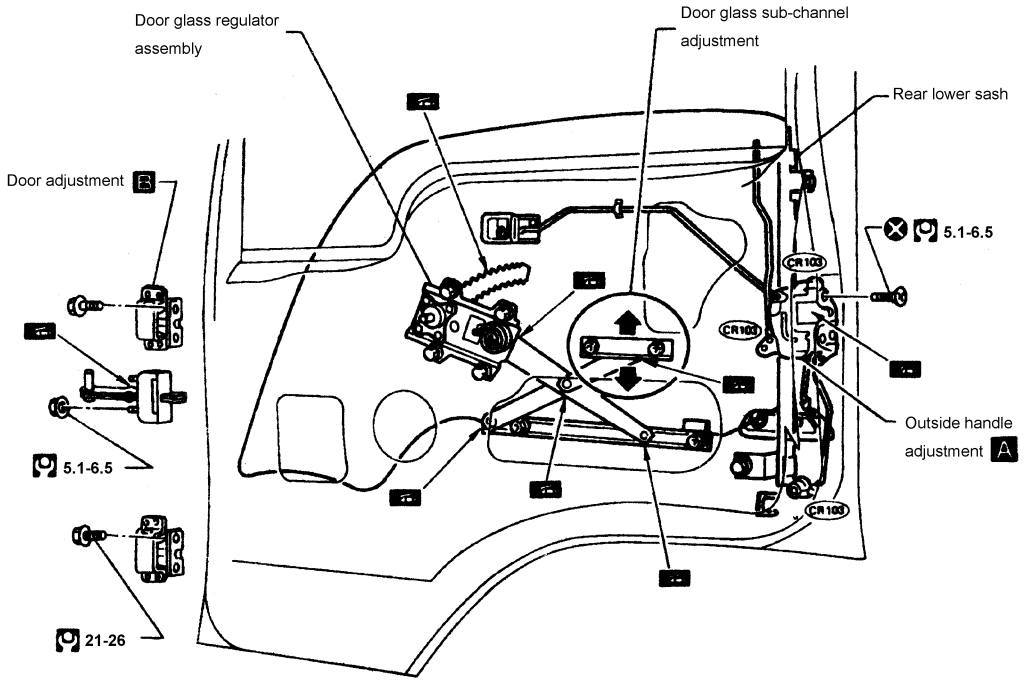

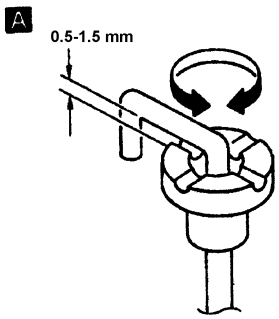

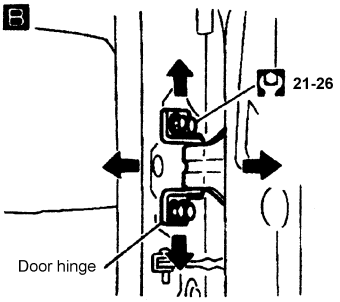

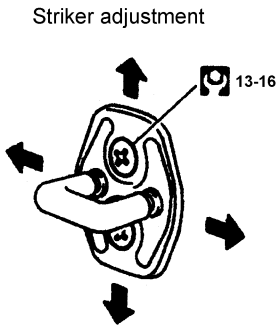

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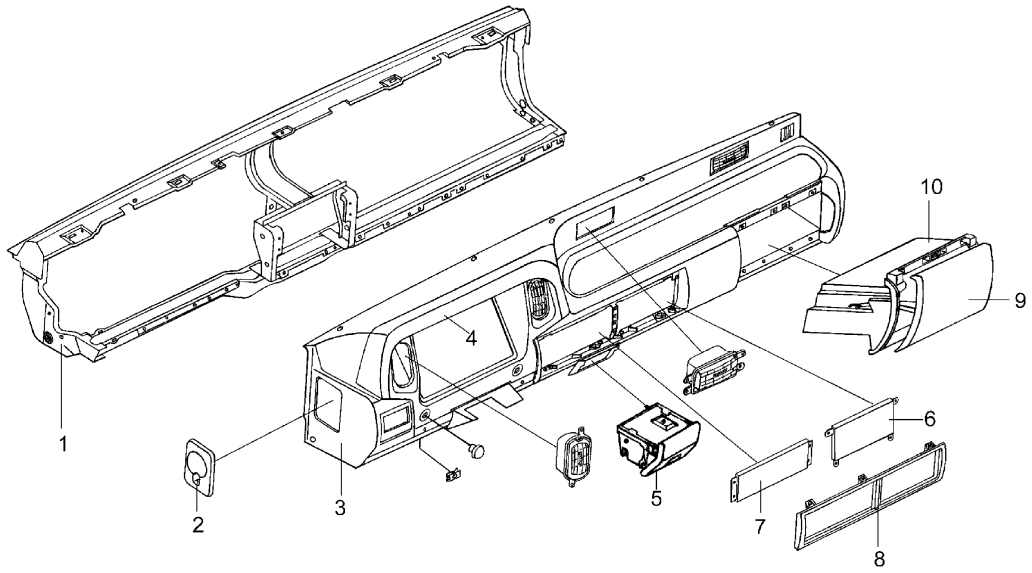
Instrument Panel

Caution:

Before disassembling the instrument panel, switch off the power-supply.
Be careful not to scratch pad and other parts.
These parts are made of plactic. Excessive force will damage them.
The structune of the instrument panel in shown as below:

•



1.Instrument frame welding ass'y.
2.Oil can cap
3.Instrument frame welding ass'y.
4.Instrument panel upper cover ass'y.
5.Ashtray assy.
6.Block cover, Small glove box ass'y.
7.Block cover, warm air control
8.Lower trim grille ass'y.
9.Glove box cover
10.Glove box ass'y.

Cab Internal Trims and External Trims

Internal trims

Side ard floor trims-Passenger area

Caution:

Wrap the tip of flat-bladed screwdriver with a cloth when removing metal clips from garnishes.
Disassembly of the side inner trims:

① Disassemble the sun visor.

② Disassemble the rearview mirror.

③ Disassemble the roof lamp ass'y.

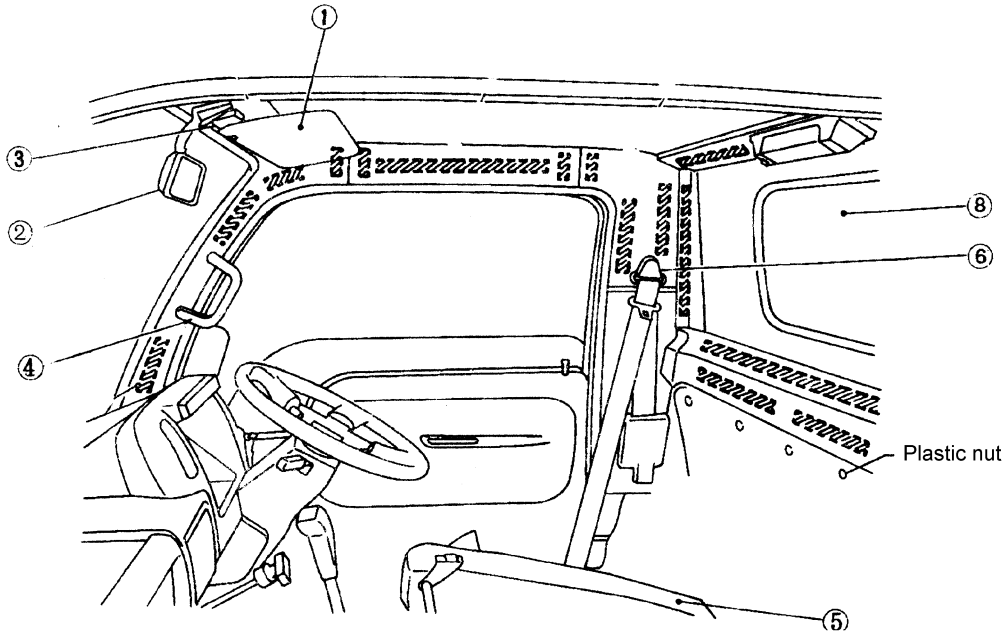
④ Disassemble the handrail.

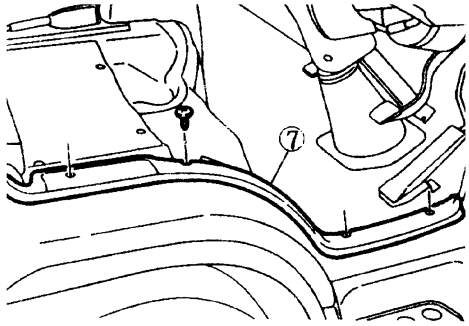
⑤ Disassemble the seats.

⑥ Disassemble the safely belt.

⑦ Disassemble the door guardrail.

⑧ Disassemble the rear window glass.





Door trims

Disassembly of the door trims:

① Disassemble lock knob.

② Disassemble inside seal.

③ Disassemble inside handle escutcheon rear door).

④ Disassemble pull handle.

⑤ Pull out regulator handle.

⑥ Disassemble inner guard board of door (front door).

⑦ Disassemble inner guard board of door (rear door)

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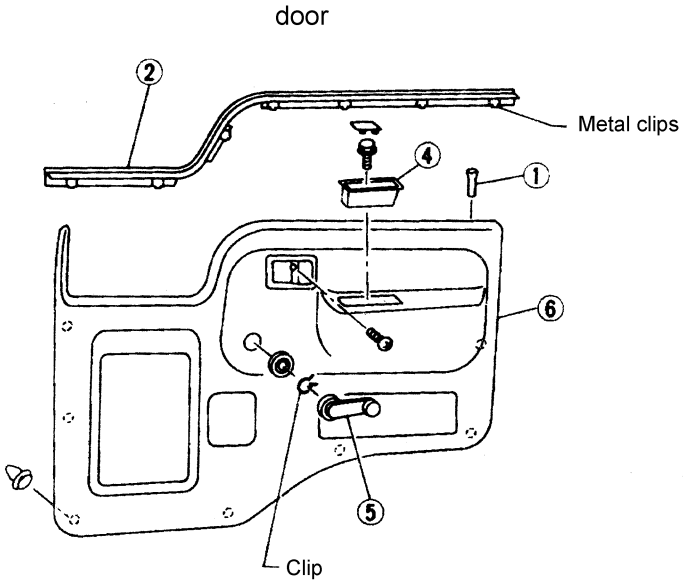


Roof trims

Disassembly of the roof trims

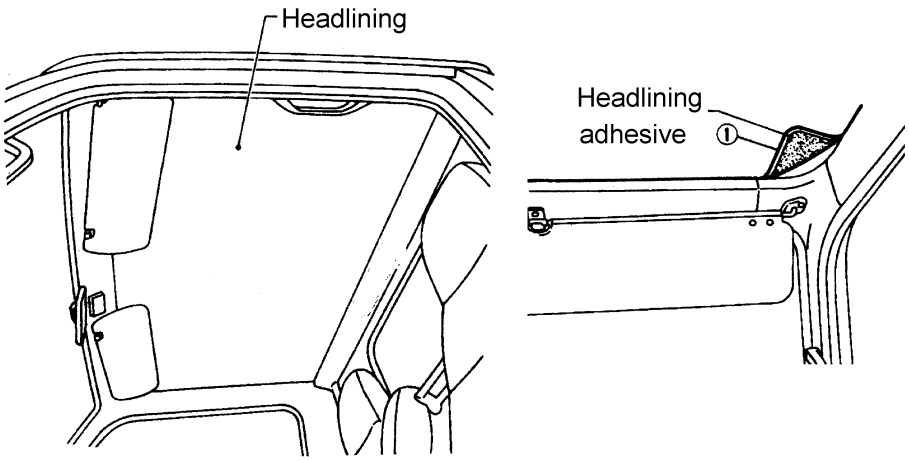
Single seater cab

① Remove part of headlining from corner and gradually peel headlining off.

Double seater cab

① Disassemble the screw and roof bow.

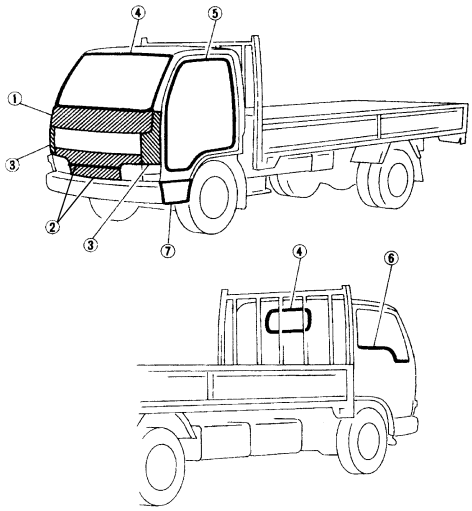
② Remove headlining by peeling if off, starting with middle portion



Single seater cab

Cab External Trims

Single seat cab



① Front upper cover

② Front lower cover and lower cover board

③ Side external cover board

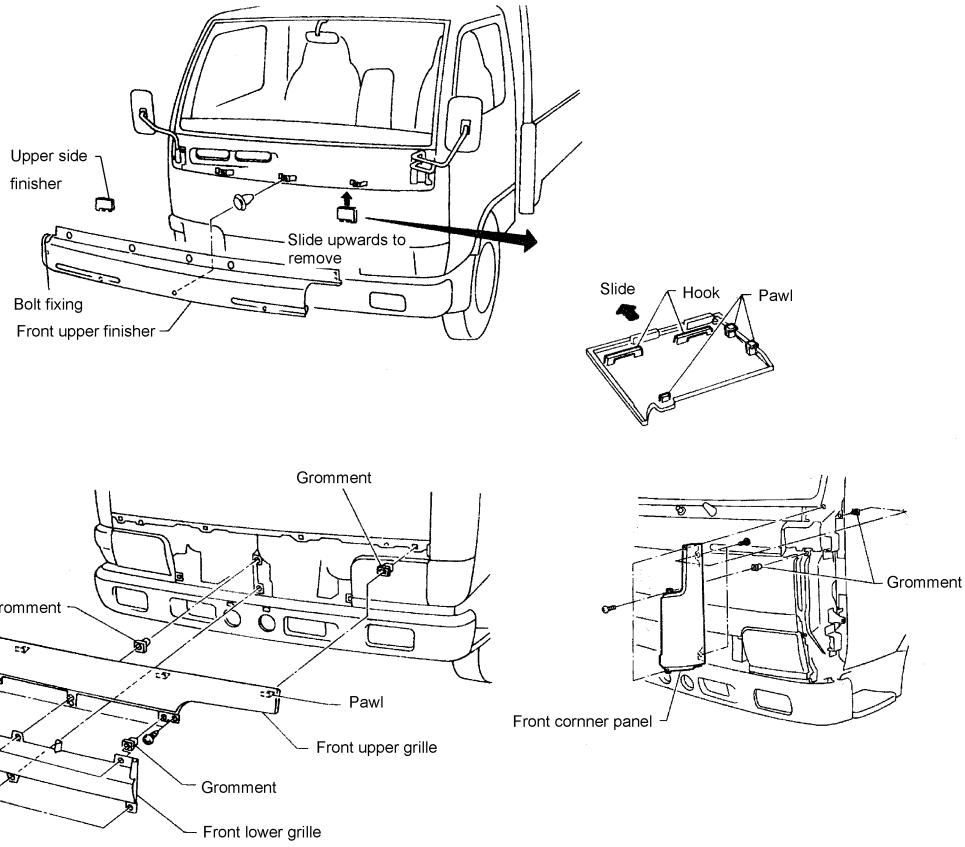
④ Front and rear windows

⑤ Cab door seal strips

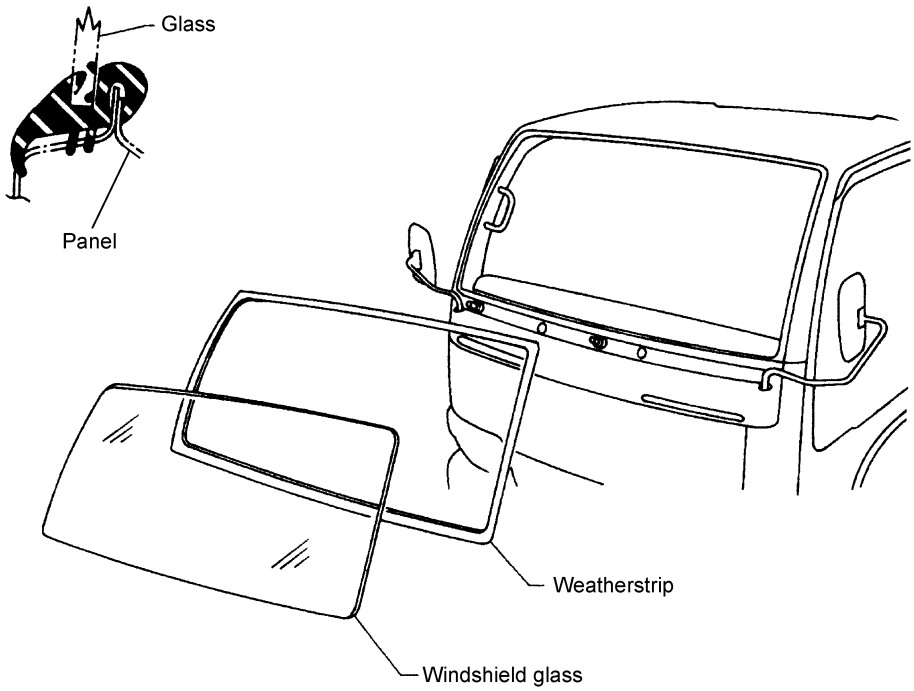
⑥ Door and window seal strips

⑦ Front pedal cover and pedal mat (option).

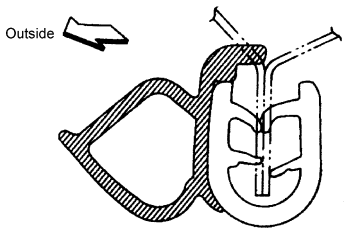
Front upper finisher, Front grille, Front corner panel



Front and rear window

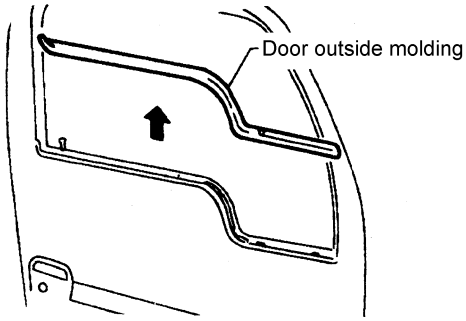


Cab door seal strip

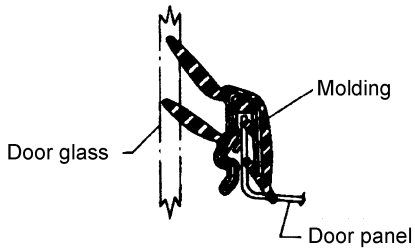


Door outside molding

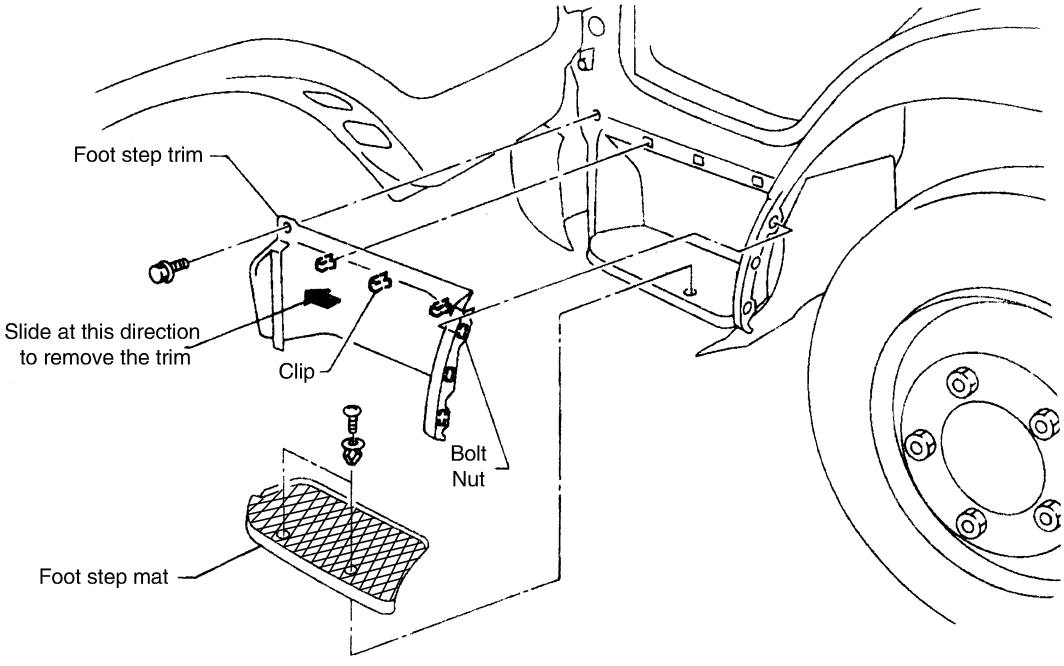
door



Section



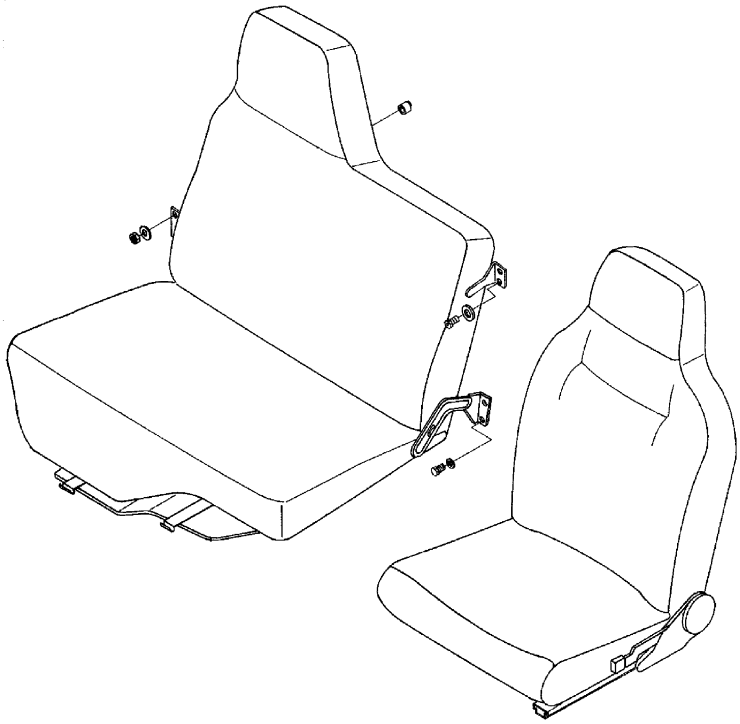
Foot step shield and mat



Seat

When assemble or disassemble the seat, it should be maintarined clean and well.

Front seat



Cab Safety Belt

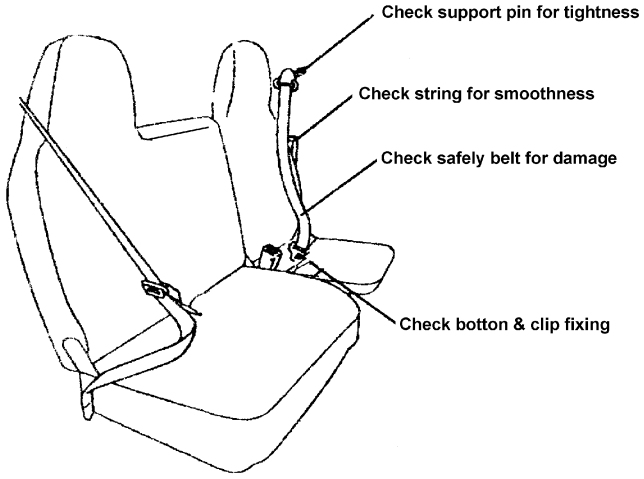
Notes:

If the vehicle in severely dashed in an accident, whatever the nature of the accident is, the belt assembly must be replaced.

If any part of the belt has quality problems, it must be replaced instead of repairing it.

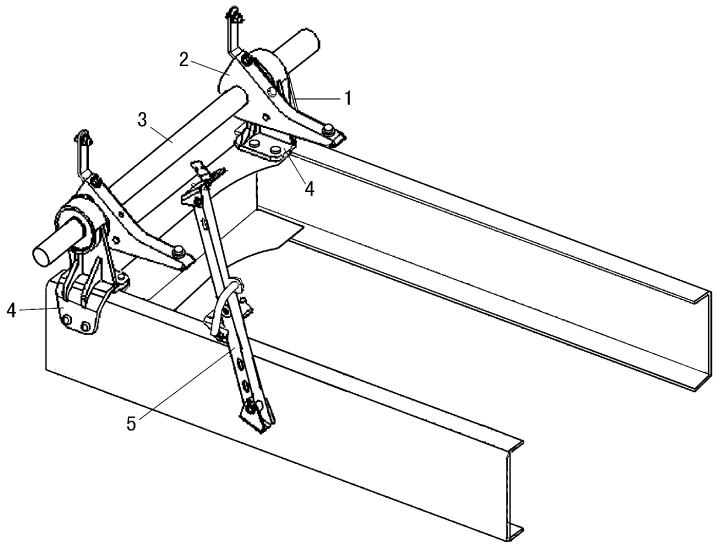
If there is any cut, looseness or damage on the texture, etc., replace the assembly.

Wine, oil or other material should not be sprayed into the buckle hole lock, so does not the huckle and the knob.



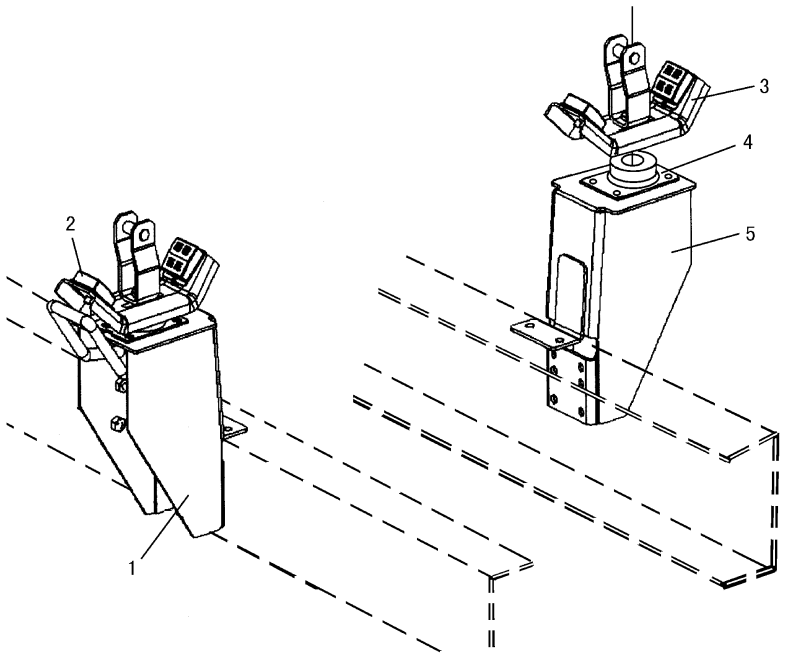
Cab Mounting

Cab front mounting



1.Torsion bar arm assy
2.Tilting bracket assy
3.Torsion bar
4.Left bracket--front mounting
5.Retainer lower assy

Cab rear mounting



1.Left connecting bracket assy--rear mounting
2.Upper cushion assy
3.U-suppot welding assy
4.Rear mounting lower cushion assy
5.Right connecting bracket assy--rear mounting

Cab

Cab

The following parts at least should be disassembled in the area of cab engine:

Main electric system and wire harness.

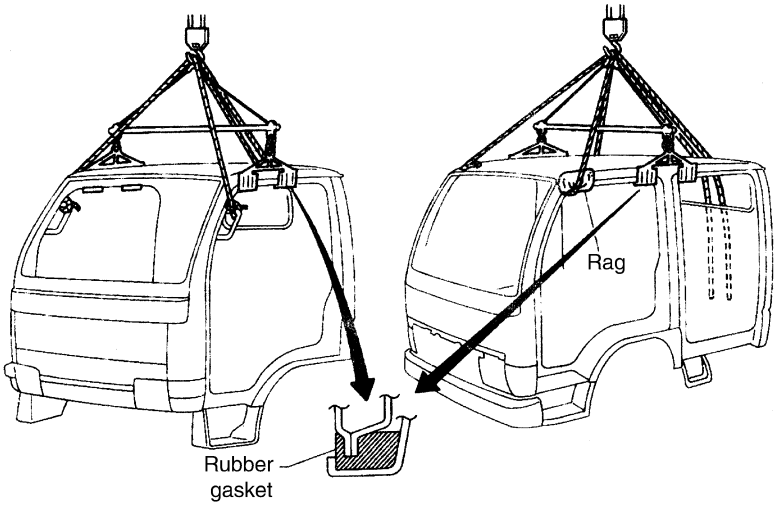
Sparate the engine part from steering transminsion device, brake system and clutch operation system.

The following parts at least should be disassembled in the area of cab:

1.Transmission system and steering control system.

2.Hand brake operation and brake drag wire.

3.Electric system, wire harness and tube

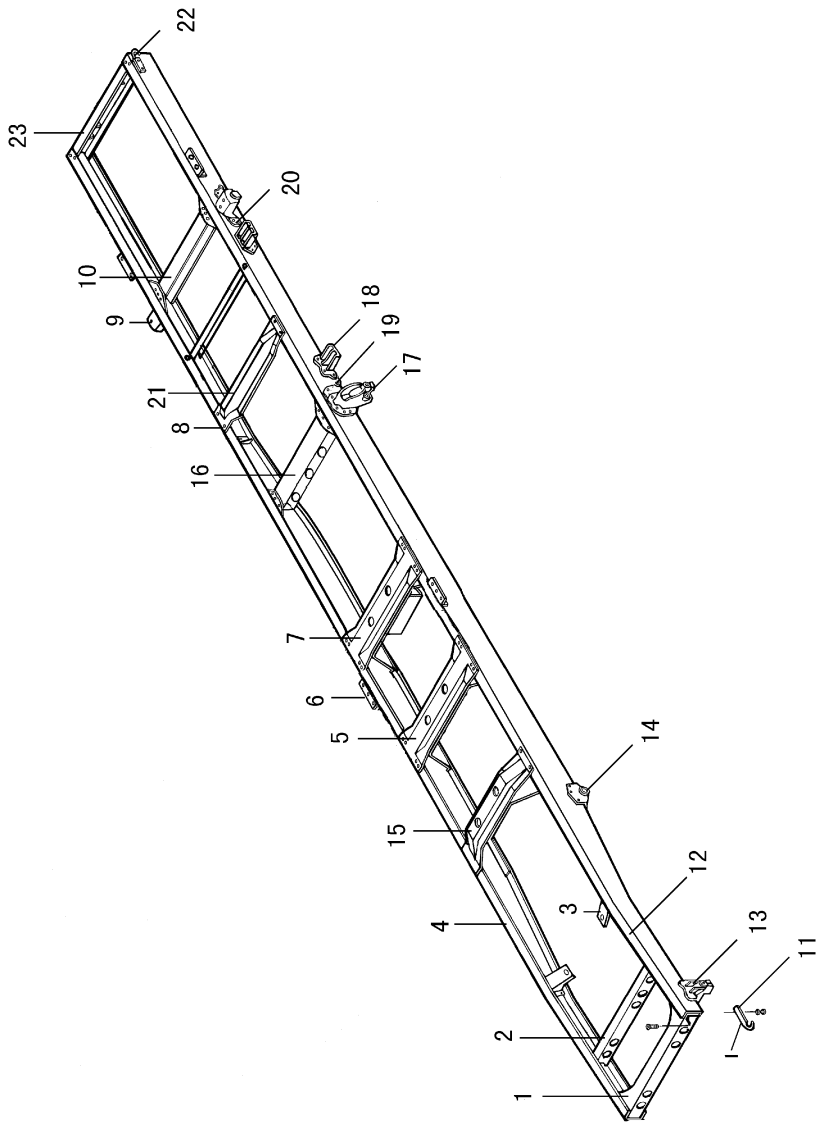


Note:

Different model has different shape of cargo body.

Chassis Frame

Chassis Frame



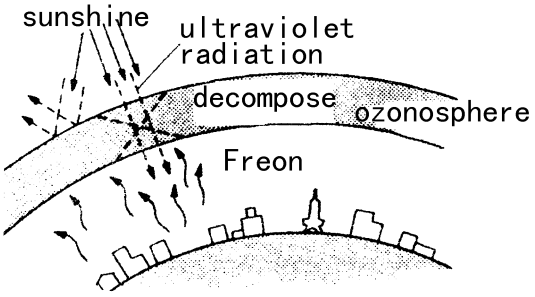
1.Front cross member assy
2.2nd cross member
3.Right bracket of rear mounting
4.Left side member
5.4th cross member
6.Lower angle iron for fixing chassis frame
7.Propeller midship mounting cross member
8.Damper cross member
9.Lifting eye end bracket
10.Rear leaf spring cross member
11.Hook bracket
12.Right side member
13.Fixed end bracket
14.Lifting eye end bracket
15.Engine rear mounting cross member
16.Rear leaf spring cross member
17.Fixed end bracket
18.Sub-spring bracket
19.Stiffening plate--rear bracket of rear spring
20.Stiffening plate--rear bracket of front spring
21.Bolt
22.Rear hook set
23.Rear cross member

Air-conditioner and Heater

Exhaust the refrigerant of the air-conditioner

Note:

Don't exhaust the refrigerant directly, otherwise it will destroy the ozonosphere. Please take use of the reclaim device of the refrigerant when exhausting.



Do remember wear the blinkers.

Avoid to touch the refrigerant directly.

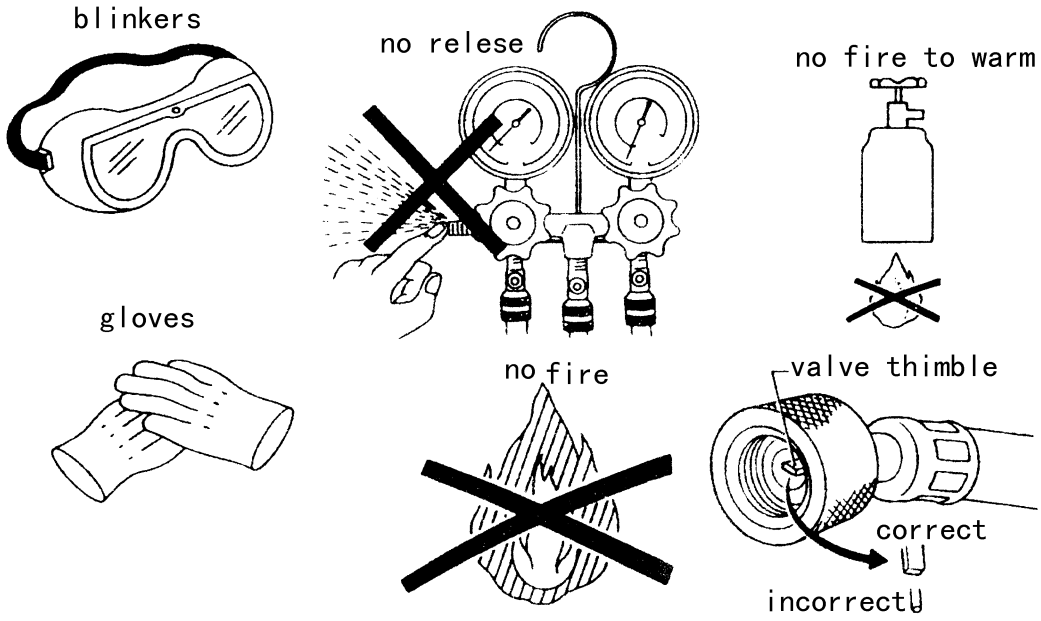
Keep the refrigerant container under 40 ℃ and avoid to drop from high.

Work in a drafty environment, because the vaporizing of the refrigerant will consume a lot oxygen and cause dyspnea.

The refrigerant should avoid the fire, because its combustion will produce toxic gas.

The temperature can't be higher than 40 ℃ too much when fill the refrigerant.

Don't warm the refrigerant container with the fire, because it may cause the container exploded.



Note：

Don't wash the surface of the condensor and evaporator with vapor. Please use the cold water or compressed air.

Don't wash the contaminative air-conditioning pipe with compressed air. If the pipe has too much water or dirt, change it. Don't use your mouth to blow the pipe with refrigerant.

Don't use the compound gauge with biggish error.

Don't screw down the filler bonnet too much.

Use the refrigerant reclaim device according to the instructions of the factory.

Remove and Install the Air-conditioner

Note：

Make sure that the pressure of the air-conditioning system is lower than the air pressure, then gradually loosen the exhaust pipe and remove it.

Change and clean the component of the air-conditioner

1.Don't put the compressor sideward or convert it for more than 10 minutes, otherwise, the oil of the compressor will flow into the low-pressure chamber.

2.Use a torque spanner and an engineer's spanner at the same time when connect the pipe.

3.Plug the hole after remove the pipe to avoid the dust and moisture come into.

4.Install the pipe according to the requestment. The sealing plug of the pipe and other component could be removed when need.

5.Before installing the component in the cold place to the vehicle under the sunshine, please first put the component under the sunshine to warm it up. It is necessory for avoiding the moisture emerge on the inner wall of the component.

6.Get rid of the moisture before filling the refrigerant.

7.The O-sealing ring should be changed.

8.Lubricating as the figure showed when install the pipe, and don't put the lubricating oil on the screw thread.

9.The O-ring should be put about on the seat of the pipe.

10.Insert the guide pipe into the screw pipe fitting, then screw down follow the required torque.

11.After connecting the pipe, make sure there is not any leakage. If there is , dismantle the leaky part of the pipe, and change the O-sealing ring, then screw down.

The Maintenance of the Compressor

Note:

1.Plug the inlet and outlet of the compressor to avoid the leakage and dirt.

2.Don't put the compesso sideward or revert it for more than 10 minutes.

3.Do remember to discharge the oil of the compressor and check its capacity when change or maintain the compressor.

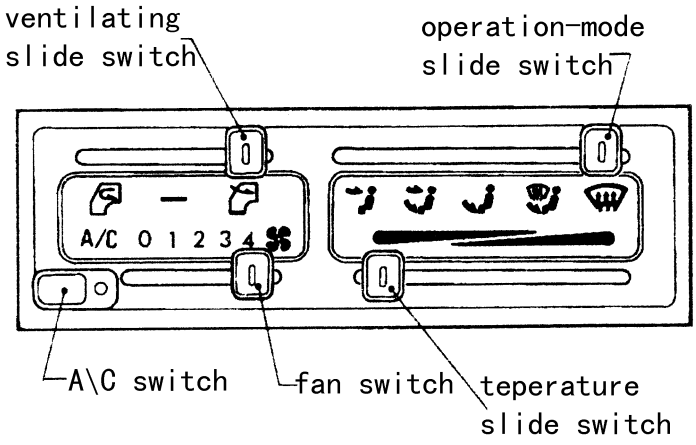
4.When change the compressor, first take out the oil of the old compressor, then fill the new compressor according to the required capacity or the capacity of the old compressor.

5.After the maintenance of the compressor, take the shaft of the compressor with your hand to turn for 5 times to make the oil in the comprssor well-distributed, then run the compressor under the condition that the engine is idling for 1 hour.

6.When change the electomagnetic clutch, please check if it is working normally under the power supplied.

The Using of the Air-conditioner and Heater

Control panel



Fan switch：

It is used to control the on-off and rotate speed of the bloer.Airflow

Operating-mode chosen switch：

It is used to control the directions of the airflow.

Temperature slide switch：

It is used to adjust the tmperature of the outlet.

Ventilating slide switch：

It is used to introduce the external air.

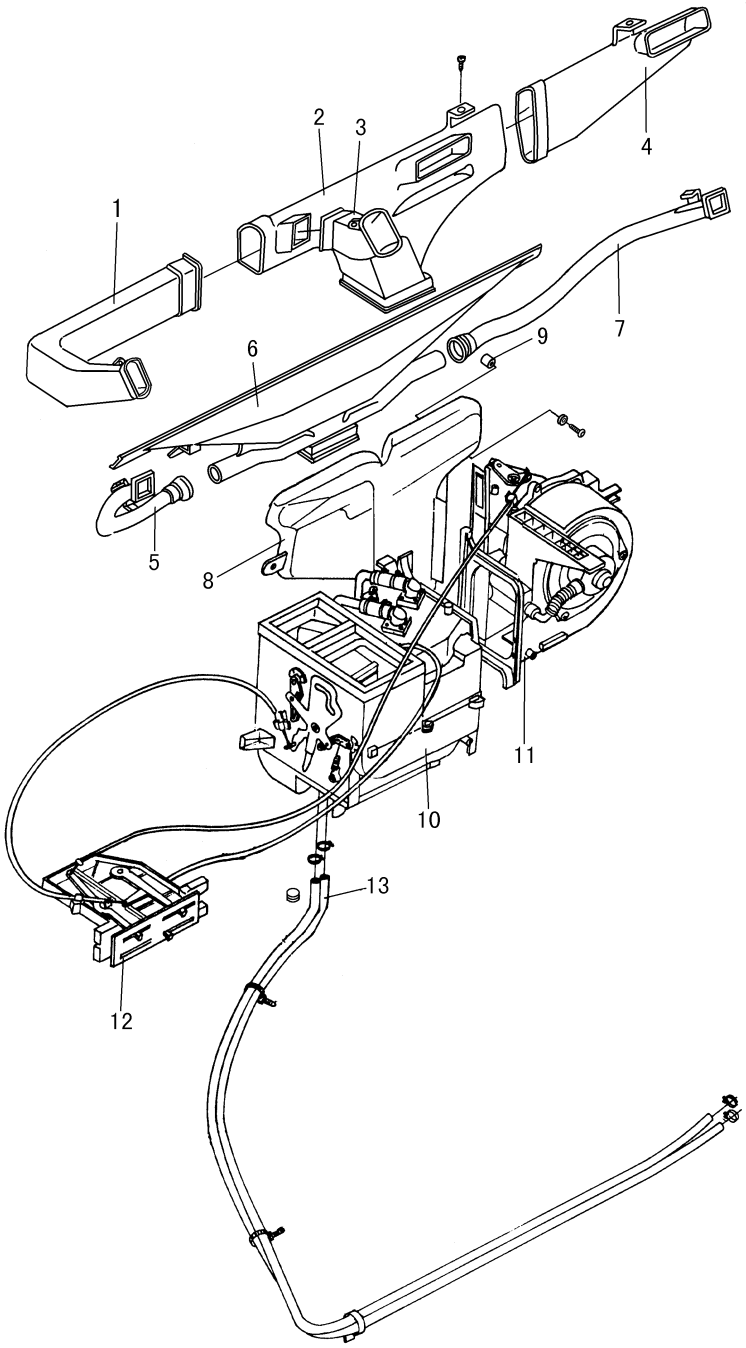
It is used to circulate the internal air.

Air-conditioner swich：

Start the engine, put the fan switch at your wanted place, then press the air-conditioner switch. The indicator light will go on when the air-conditioner is working. Press again the air-conditioner switch to stop it.

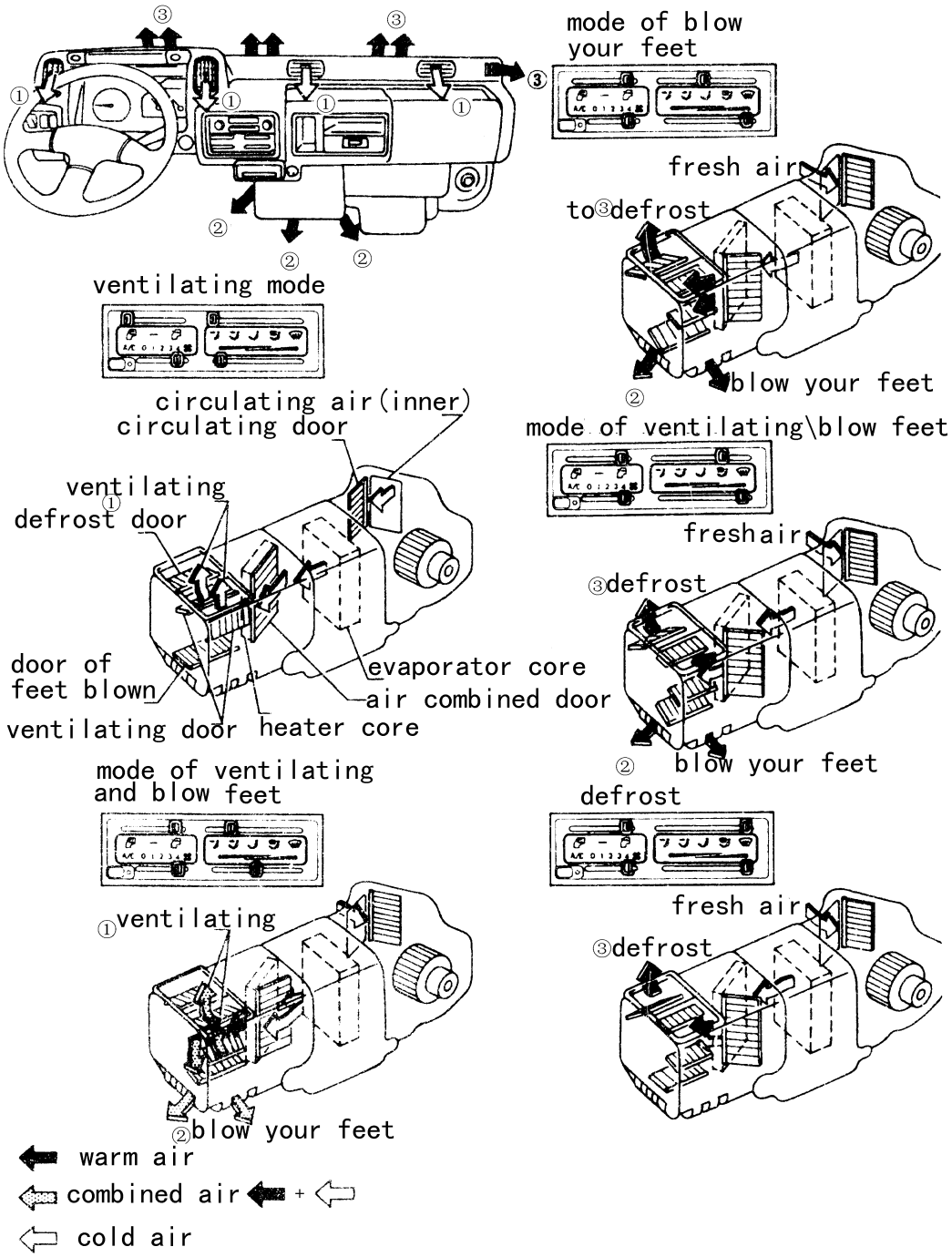
The air-conditioning system only works under the condition of the running of the engine.

Construction of the Heater



1.Left air pipe
2.Wind channel ass'y
3.Middle air pipe
4.Right air pipe ass'y
5.Left door defroster hose ass'y
6.Defroster nozzle ass'y
7.Right door defroster hose ass'y
8.Wind inlet channel ass'y
9.Plastic nut ass'y
10.Heater ass'y
11.Air blower ass'y
12.Heater control ass'y
13.Water inlet tube

Air Flowing Direction



Note: The specific operate method refer to its maintenance tool manual.

Check the Leakage of the Refrigerant

Operational procedure

In order to be convenient for checking the leakage of the refrirator, please follow the method below:

1.Start the engine;

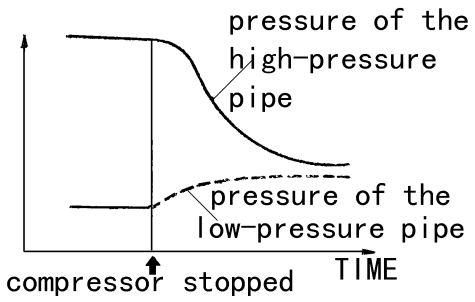
2.Start the air-conditioner;

3.Adjust the fan switch to the "4" position;

4.Set the temperature to the lowest;

5.Then operate the refrigerating system for more than 5 minutes.

The checking of the refrigrant leakage should be after the stop of the engine immediately. Begin from the high-pressure pipe. That is because after the stop of the circulation, the pressure of the high-pressure pipe will be down, and the pressure of the low-pressure pipe will be up, but it is easier to check the leakage at the high pressure condition.



Check

Clean the checking part with a piece of cloth before checking the fitting of the pipe carefuly.

Compressor:check the shaft seal, the hole of the bolt, and the around of the electromagnetic clutch.

Oil storage container:check the pressure-protecting switch,fuse plug and fuse pin.

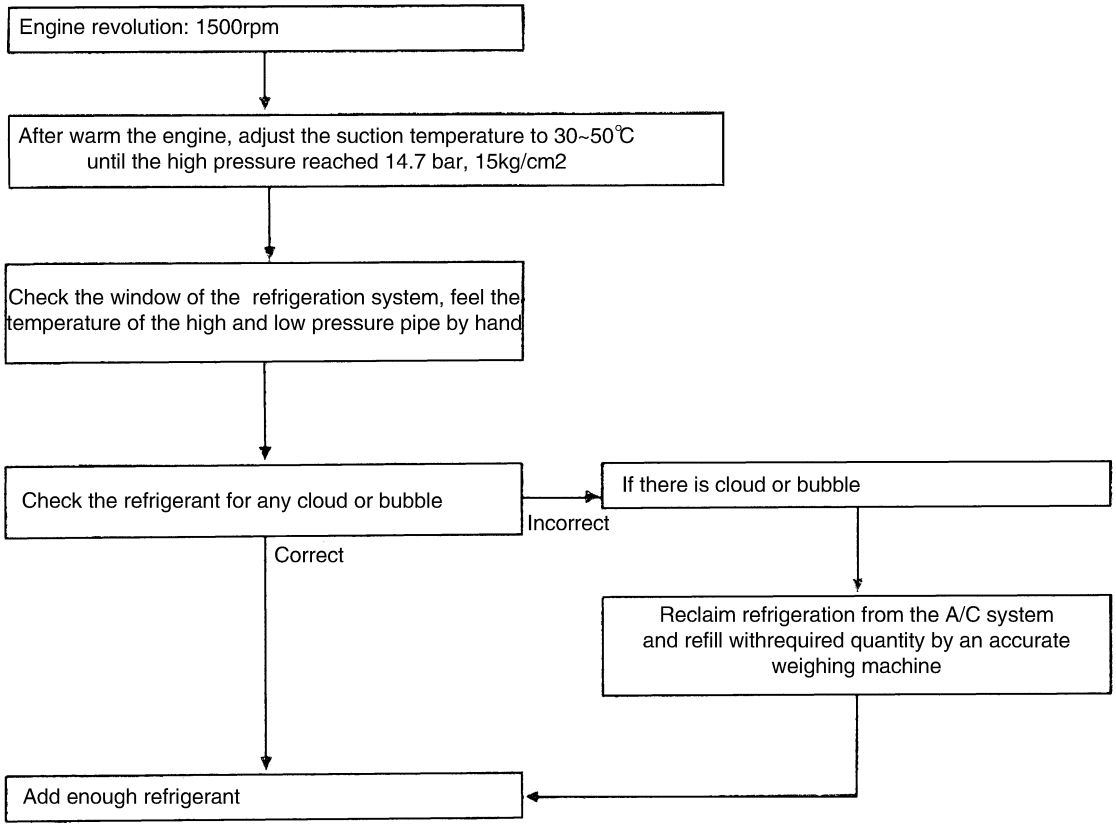
Check the around of the maintenance valve, make sure the valve core is tightening, the maintenance bonnet must be connected on the valve(avoid leakage), and check if there is anything in the bonnet.

Evaporator:after the stop of the engine, put the device into the outlet pipe immediately, staying for more than 10 seconds.

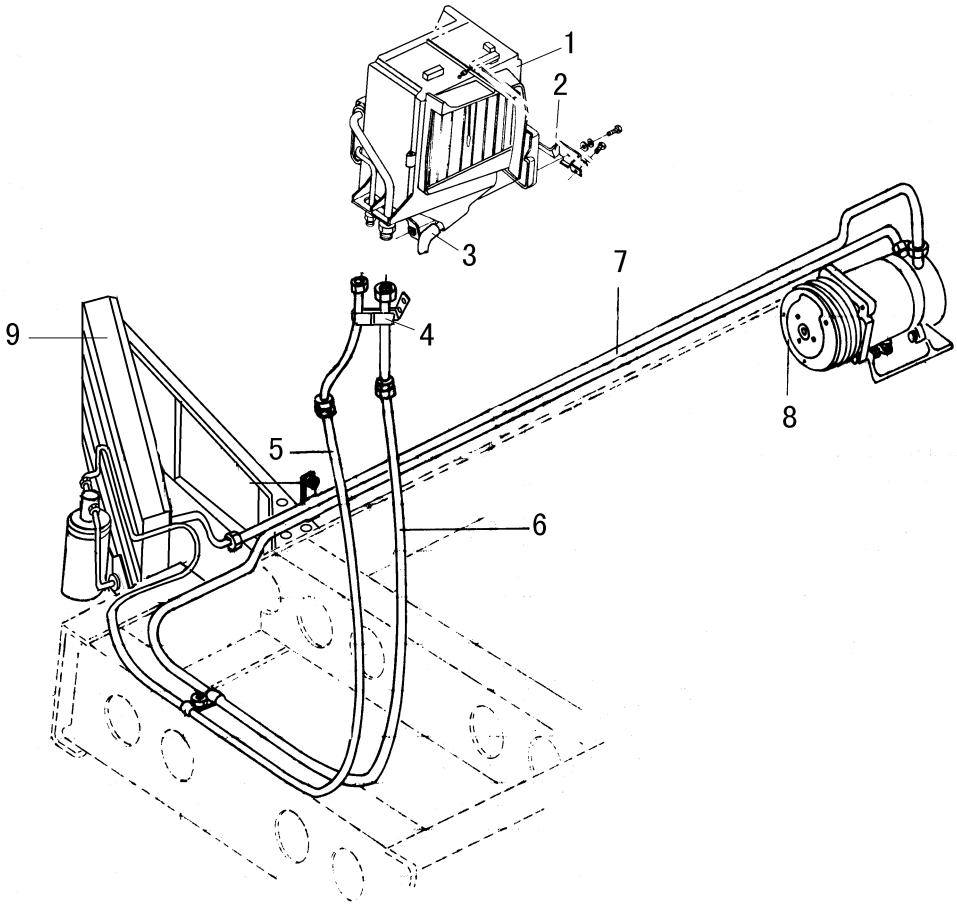
Make sure the quantity of the filled refrigerant

As for the quantity of the filled refrigerant, you can measure by inspecting the flow of the refrigerant from the window, and read the pressure gauge of the high and low pressure pipe.

Procedure



Air-conditioning System



1.Evaporator assy
2.Evaporator lower bracket
3.Evaporator exhaust pipe
4.Bracket assy--evaporator inlet and outlet pipe
5.Pipe assy--connecting evaporator and condensator
6.Pipe assy--connecting evaporator and compressor
7.Pipe assy--connecting compressor and condensator
8.Compressor assy--with clutch
9.Condensator assy--with drier and bracket

Oil of the Compressor

Keep enough oil in the compressor.

The lubricating oil and the refriferant circulate in the inner system, when change the component or the oil leaks a lot, please add the oil to the requirement capacity. If the oil capacity is not proper, the compressor will be in abnormal condition.

Short of oil: the cylinder of the compressor may be nicked by the piston or the compressor may be locked-up

Excessive oil：the effect of the refrigeration may go down

Capacity of the adding oil

substitute part	capacity （mm）	ratio （%）	
evaporator	45~75	30	—
condenser	30~50	20	—
oil storage container	15~25	10	compressor, no change
others	30~50	—	leak a great deal
	—	—	leak a little bit

Check the operational function

Its purpose is to check if the system worked under the requirements. These parts need to check: blower(fan), circulation of the operational-mode(outlet), inlet, temperature lower,and upper, and the A\C switch.

Checking condition：

The engine is running and the temperature is in normal condition.

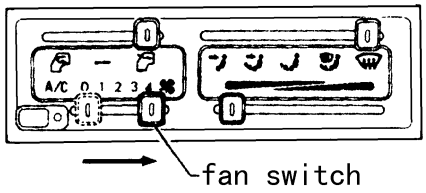
Approach：

1.Check the blower(fan)

Move the fun switch to the "1" position, the fan should be in the speed of "1";

Then move to the "2" position;

Check the other speed of the fan;



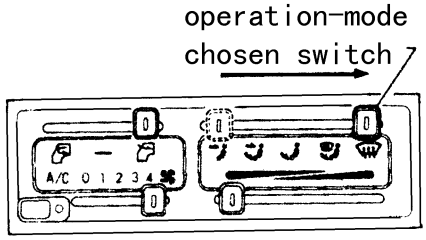
2.Chexk the ventilation

Move the switch to the position, check if the air is blown to your face;

Move the switch to the position, check if the air is blown to your face and feet;

Move the switch to the position, check if the air is blown to your feet;

Move the switch to the position, check if the air is blown to your feet and defrost;

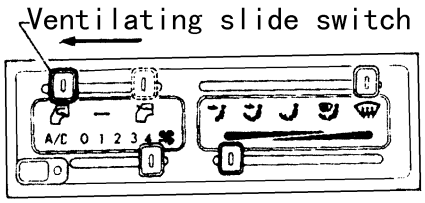


Move the switch to the position, check if the air is vented from the defroster.

3.Check the inlet

Move the switch to the position, the inner air of the cab will be used in the circulation.

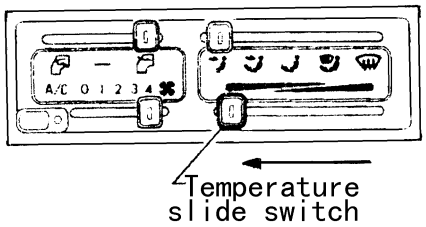
Move the switch to the position, the external fresh air will be blown into the cab by the blower.



4.Temperature lower checking

Move the switch to the lowest position;

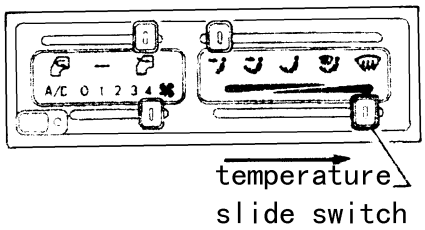
Check the cold air from the vent.



5.Temperature upper checking

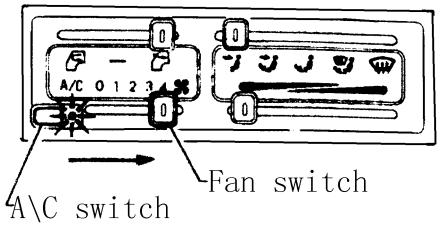
Move the switch to the highest position;

Check the warm air from the vent.

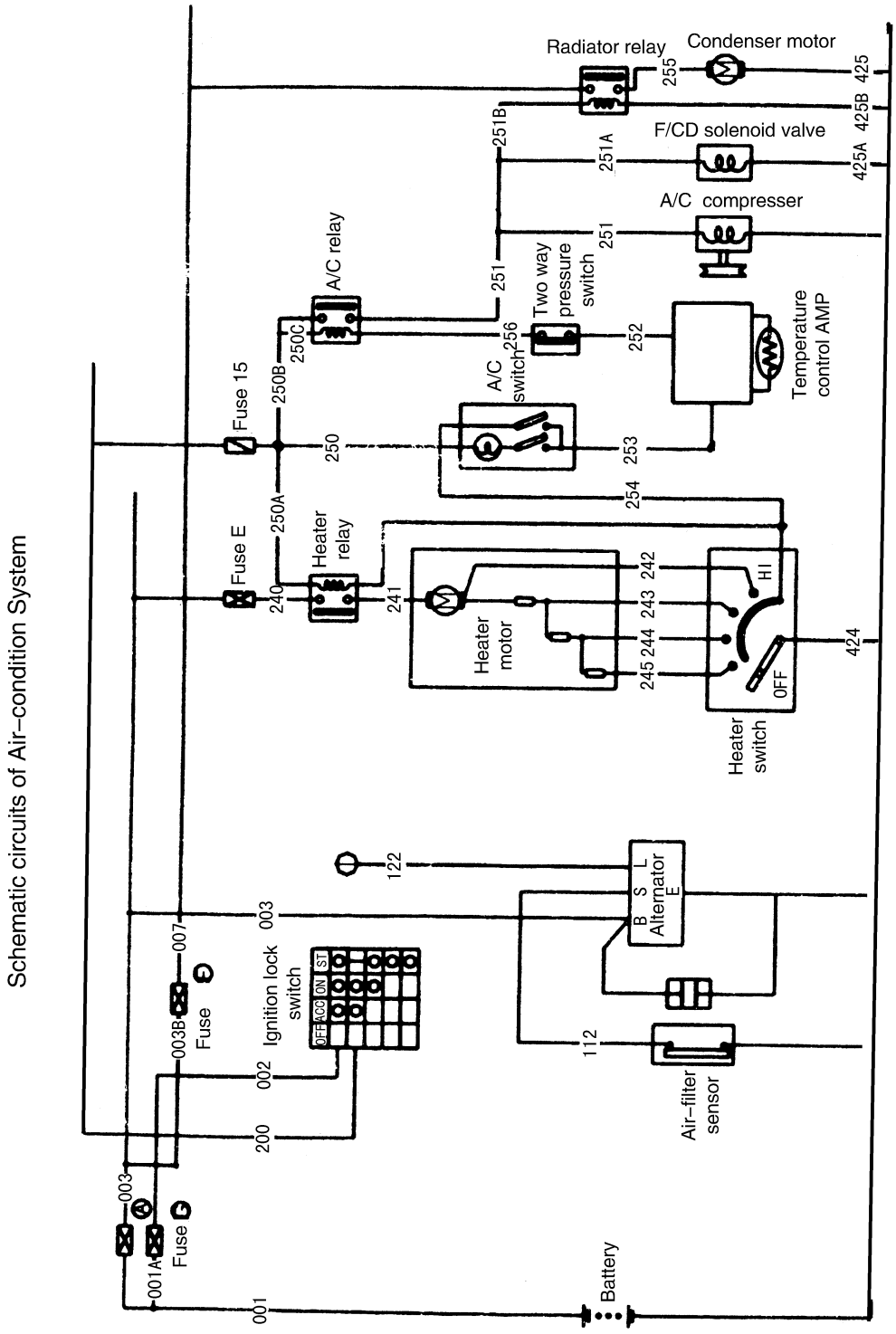


6.Check the A\C switch

Move the fan switch to the position of 1~4, and press the air-conditioner switch, the indicator will goes on.



Schematic Circuit of Air-condition System



Electric and Instrument

EL

Table of Contents

Electric and Instrument

Specification

Vehicle Model		DFA1101GZ5AD6J-907
Wire system		24V, Single lead type, negative earth
Starter	Nominal Voltage (V)	24
	Nominal Power (kW)	3.7
Alternator	Specified voltage (V)	28
	Specified current (A)	45
Battery (A • h)		90

Bulb Type

Light name	Bulb specification	Bulb type	Remark
Front headlamp	H4 75/70P	P43t-38	
Fog light	H3 70	PK22s	
Front combination light	PY21W	BAV15s	Turning light
	R10W	BA15s(BA15d)	Front light
Side turning light	R10	BA15s(BA15d)	
Doom light	QT24-5SV	SV8.5	
Inspection light	QT24-21	BA15s/19	
Rear combination light	P21W	BA15s(BA15d)	Reverse light
	PY21W	BAU15s	Turning light
	P21/5W	BAY15d	Brake light, rear light
License plate light	R10W	BA15s(BA15d)	

Trouble Analysis

The trouble in the electric system is divided into line trouble, which caused by wire crack or circuit short, and parts trouble, which caused by parts wear or fire. On the other hand, according to the service and maintenance, the system that approaches the final life car easily has trouble.

When check the circuit, first check the harness for wearing earth or cracking if exist please wrap up or connect and continue to check.

If the circuit has no problems, check the parts associated with the system to find out causes.

If the fuse burns out frequently during the operation, please check the harness for wearing earth and the output voltage of generator to see if over loaded.

No electricity

Trouble	Cause	Remedy
No electricity	Battery capacity insufficient Earth line contact not good Main supply switch failed One-position failed Fusible wire and fuse burnt When turn on the one-position switch the switch has not good contact	Recharge or replace Make earth line steady Make line steady Replace one-position switch Replace fusible wire Replace or repair main supply switch

Engine cannot start

Trouble	Cause	Remedy
Engine can not start and starter runs abnormally	Fuel cutoff solenoid fuse burnt Fuel cutoff solenoid failed Fuel lacks or fuel line jammed Battery capacity insufficient or contact abnormally Starter damages	Replace fuse Repair or replace Add fuel or clear the line Replace battery or tighten Repair or replace
Engine can not start and starter car run	Starter one-way ditch damages Fork and starter driving have trouble	Repair or replace Repair or replace
Starter can't run	Starter relay has not good contact Breaker damages Ignition lock damages	 Repair or replace Repair or replace
	Starter solenoid switch hasn't good contact Solenoid switch damages Starter relay damages	 Repair or replace Repair or replace

Front headlamp

Trouble	Cause	Remedy
The headlamp doesn't light when turn on the switch	Fuse burnt Circuit breaks Earth line hasn't good contact Lamp wire burnt Lamp switch has trouble Dimmer switch has trouble	Check cause and replace Check and repair Get off rust and restring then the joint Replace bulb Repair or replace switch Repair or replace switch

Turning signal light

Trouble	Cause	Remedy
When turning the switch, the turning signal light doesn't run	When turning "left" or "right", turn on signal light, light goes on Flasher has trouble	Replace flasher
	When turning "left" or "right", turn on signal light, light goes on Fuse burnt Flasher joint or others are not good, circuit breaks	Find out cause to solve and replace fuse Check and repair
Right (left) turning signal light goes on, but left (right) turning signal light doesn't go on	Left turning light (right turning light)'s joint doesn't contact well	Check the circuit, from turning signal light switch to lamp
When turn on the switch, the light continues to go on, but does not flash	Flasher failed (contact maintains engage) Front/rear bulb failed	Replace flasher Replace bulb
Turning signal light flashes too quickly	Flasher failed Reduce overall kW to specified value Check and repair	Replace flasher Bulb's overall kW exceeds the specified value Contact or joint has not good contact
Turning signal light flashes too slowly	Flasher failed Bulb's power is over low	Replace flasher Check bulb's power according to specified value

Horn doesn't sound

Trouble	Cause	Remedy
Horn doesn't sound	Brake light doesn't go on, fuse burnt Harness looses or wears Electric brush contacts not well Horn relay damages Horn damages	Replace Connect or strap up Adjust brush's height Replace Replace

Brake light doesn't go on

Trouble	Cause	Remedy
Brake light doesn't go on	Horn doesn't sound, fuse burnt Brake light bulb burns out	Replace Replace

Fog light doesn't go on

Trouble	Cause	Remedy
Fog light doesn't go on	Fuse burnt Earth line contacts not well Bulb burns out Fog light switch damages	Replace Tighten Replace Replace

Position light doesn't go on

Trouble	Cause	Remedy
Position light doesn't go no when turn on the fog light	Fog light switch damages Bulb burns out	Replace Replace
Position light doesn't go on when turn on the signal light	Harness connecting is not firm Combination switch circuit contacts not well Combination switch damages	Check the connection Connect Repair or replace

Windshield and wiper

Trouble	Cause	Remedy
Wiper doesn't operate	Fuse burnt Circuit breaks or contacts not well Wiper switch failed or contacts not well Synchronous connecting board breaks away Wiper arm's tightening bolt loosens Wiper motor assembly failed 1.Internal coil burns out 2.Wiper motor overlade because of current over-powering (The rectifier is polluted, carbon, rotary bearing is seized, wiper arm connect not well, motor wears, constant speed gear fails)	Find out cause and replace fuse Check and repair Replace wiper switch Check and repair Tighten bolt Check and repair wiper motor assembly if necessary replace parts
Motor creaks	The lube grease in the gearbox qualitative change	Replace lube grease
Wiping picture is not correct	Wiper arm spring fatigue (pull force descends) Wiper blade rubber damages	Replace wiper arm Replace blade
The wiper can't return to its original position when turn off the switch	Main guideline and contactor Wilding is not good The contactor has not good contact	 Repair Repair
	Cam switch The joint is not good	 Repair or replace switch
Wiper doesn't stop	The contact is not good	Repair or replace switch

General Instruction

Constitution

Power supply division: Alternator, battery

Starting system

Power supply warning system

Instrument indicator system

Lighting system

Others: Wiper, horn, cigar lighter, radio cassette player

Features

Using integrated alternator

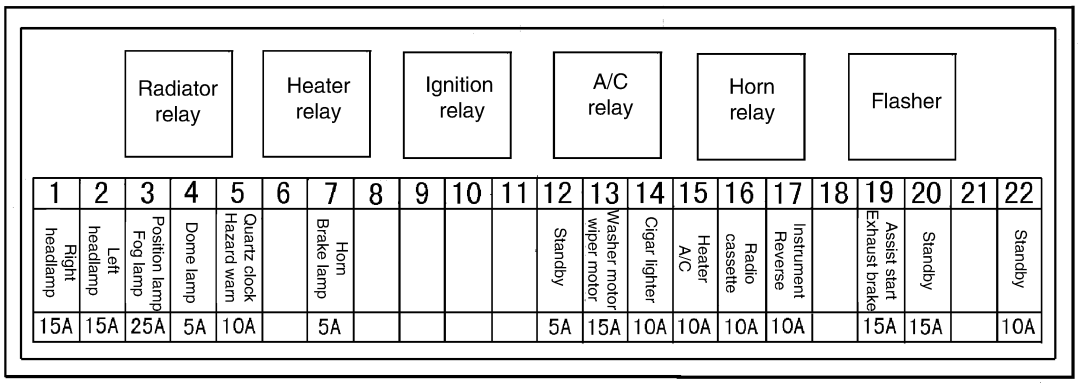
Using electromagnetic main power switch

Two fusible wires at starter

22-way fuse box

The complete truck wiring

The wires of 22-way fuse box of the complete truck are connected as follow



In the normal conditions, the output of alternator reaches ignition switch, lighting and instruments by the way of two fusible wires. If the alternator fusible wires are burnt, the above systems will continue to operate using the battery power. But if the engine stops at the time, the systems can't start until replace the fusible wires. The fusible wire must be replaced immediately to prevent the battery from over discharging.

Bedsides the safety control described above, there are another 6 small relays: start relay, ignition relay, heater relay, A/C relay, radiator relay, and horn relay.

Battery

Specifications

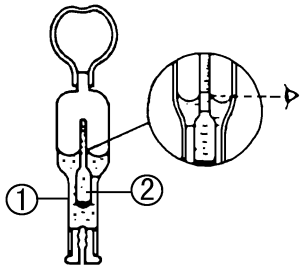
Battery	Two batteries 6-QW-90DF are in series
Type	Less maintenance
Nominal voltage (V)	12
Nominal capacity (A · h)	165

Check

1.Electrolyte density when fully charged: 1.26~1.285g/ cm^3

① Density meter

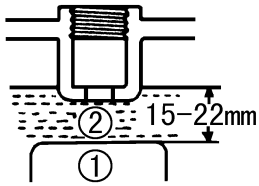
② Floater



2.Fill distilled water in time if the electrolyte is found insufficient. Charging for over half an hour after filling in order to let the filled distilled water fully fix with the former electrolyte.

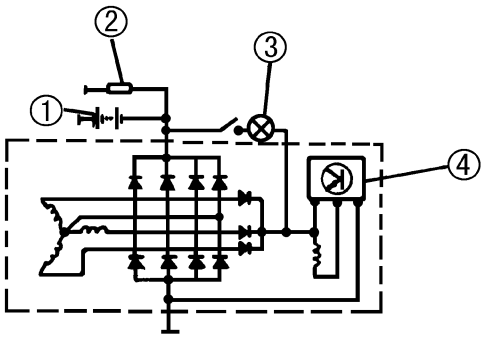
Electrolyte level (above the top of the battery plate) 15~20mm

① Battery plate ② Electrolyte



Alternator

Alternator operation principle diagram



1.Battery
2.Electric using equipment
3.Charging indicator
4.Regulator

Specification

Vehicle model	DFA1101GZ5AD6J-907		
Nominal voltage (V)	28	Adjusting voltage (V)	28 ± 0.3
Nominal current (A)	45	Nominal revolution （r/min）	6000
Starting revolution （r/min）	＜ 1150	Output current (A)	18-20

Construction Principle

Features

Improve the magnetic circuit and use 8-diode rectifier to increase the output power.

Construction without brush to make it simplified, and ease of servicing

Use the alternator with built-in rectifier and electric regulator.

Operation principle

The alternator produces self-excitation field and operates normally when the charging indicator lamp is extinguished.

Trouble analysis

Trouble	Cause	Method
Charging indicator does not extinguish and the truck starts difficultly during operation	Short circuit or too large contact resistance	Check the circuit and repair or replace the damaged parts
	Short circuit between the 3 phases and rotor winding and casing	
	Diode damaged	
	Regulator failed	
Charging current is too small, the battery is insufficient. No charging at low speed.	Output voltage is over low.	Exclude the trouble and replace the damaged parts
	Diode is partly damaged	
	The rotor winding has 1 phase or 3 phases bad contact	
	Slipping belt	
The instrument indicator sometimes charges and sometimes not	Belt is too loose and slippery.	Tighten the contactors, and replace the instrument if it is damaged.
	Built-in regulator works abnormally	
	The contact from engine fire wire connector to battery connector is loose	
	Alternator interior connection is loose.	
	Instrument failed	
Engine has abnormal noise during running.	Belt is loose or worn, shaken during running	Adjust the belt, replacebearing
	Bearing damaged or too large clearance	
	Too large clearance of bearing caused interference	

Note:

The self-excitation speed is very low (about 1000r/min) with battery operation. So be sure to see if the charging indicator is perfect or not during the operation.

Alternator negative earthing.

Be sure to use the original factory's parts as possible if it has to replace the diode.

During the alternator operation, if the temperature of the casing reaches to 105℃＋ambient temperature, and the output of the alternator is normal, the alternator is not burnt down.

Starting Division

Starter

Vehicle model	DFA1101GZ5AD6J-907
Nominal voltage (V)	24
Nominal power (kW)	3.7
Pinion teeth	10
Pinion module	2.54/2.1167
Brake torque (N · m)	40
Brake current (A)	800
Brake voltage (V)	12

Starting relay

Operating voltage (V)	18~32
Operating current (A)	50
Pull-in voltage (V)	9~17
Drop-off voltage (V)	1~8

Assistant start button

The assistant start button is located at the right side of cab rear support. When the engine need to be repaired under the truck, put the ignition switch to "ON" position and make the ignition relay's contactor pull-in. Let the transmission in idle position and join up the idle switch. Press the sub-starting button under the truck to start the starter.

Electromagnetic Main Power Switch

Operation principle

When this switch is turned on, the current passes through the coil and the contactor closed to connect the battery cathode and chassis frame.

As soon as fuse is burnt the electromagnetic main supply switch will automatically cut off the battery negative earthed circuit. So there will be no electricity in the complete truck.

Specification

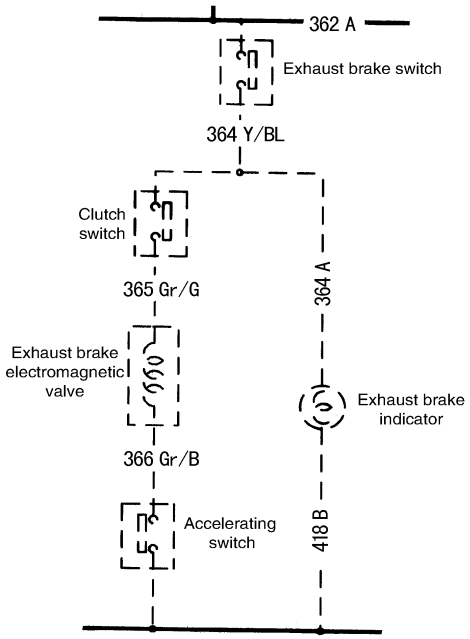
Mode	Nominal voltage	Operating voltage	Operating current	Main contacts current in operation
DK238	24V	20~30V	⩽ 0.5A	300A

Trouble analysis

Trouble	Cause	Remedy
Jamming	The electromagnetic main supply switch is jammed	Slap the housing gently or repair
Not working	The electromagnetic main supply switch's interior trouble	Repair or replace

Exhaust Brake System

The exhaust brake is operative when the foot is removed from both the clutch pedal and the accelerator pedal; and the exhaust brake switch, clutch switch, accelerator switch and electromagnetic solenoid are all on. But the exhaust brake will be released when either the clutch pedal or the accelerator pedal is depressed.

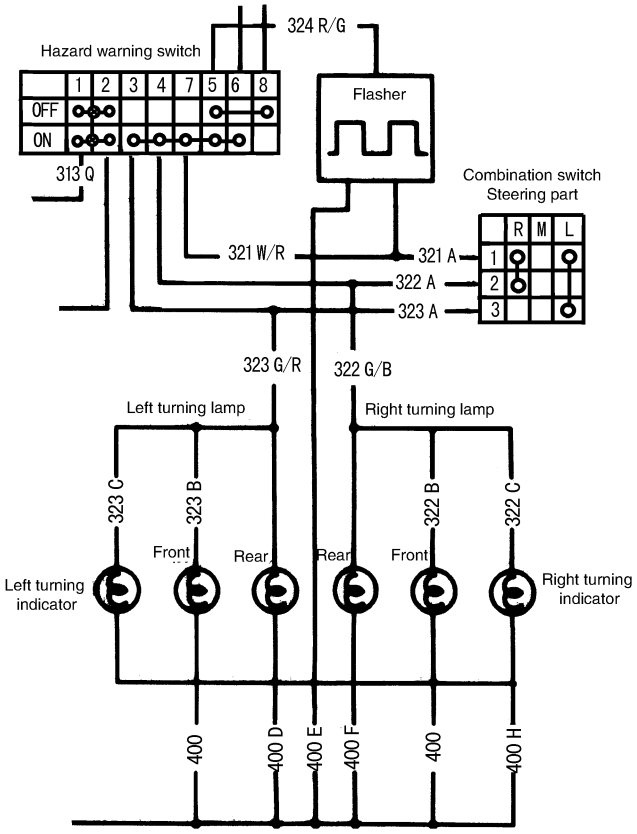


Note:

The exhaust brake indicator lamp comes on, which only indicates the exhaust brake switch is ready for operation, not indicates the exhaust brake is operative.

Hazard Warning System

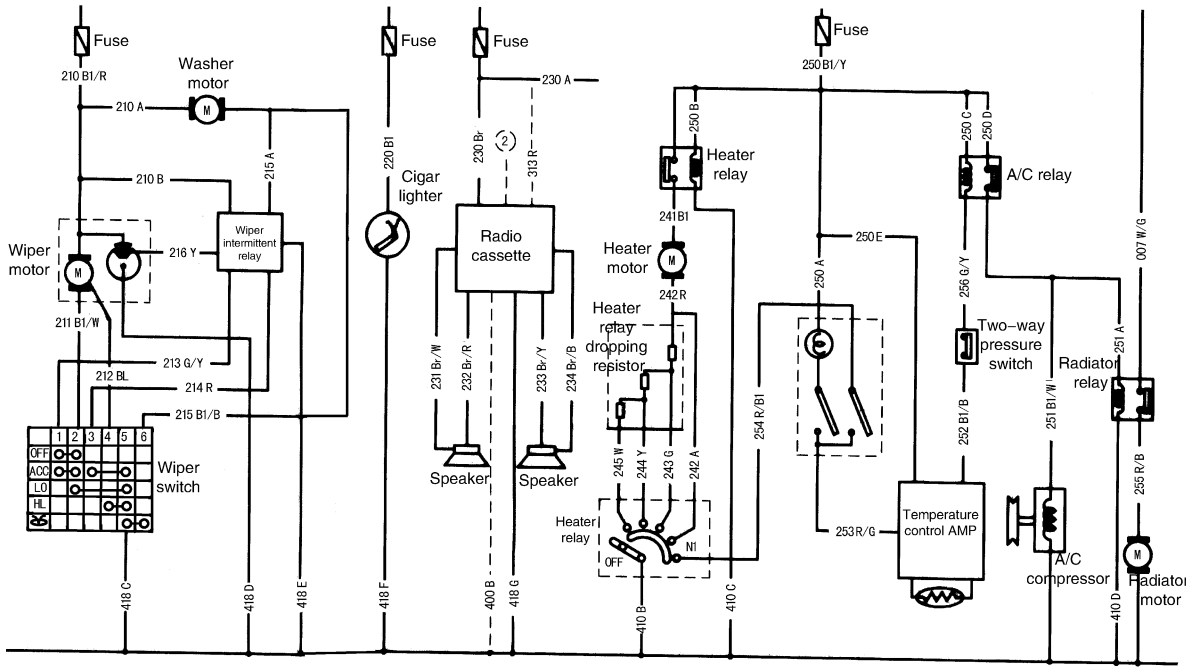
When the hazard warning switch is in the alarm position, the left and right turning signal lamps will flash simultaneously.



Accessories

Wiper motor

Power		50
Revolution	Low speed	40^{+3}_{-2}
	High speed	60 ± 6



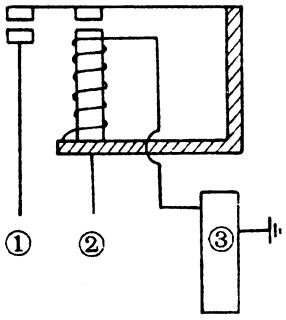
Horn

Horn

Press the horn button, the normal-open contact of the horn relay is connected and make the electric horn work.

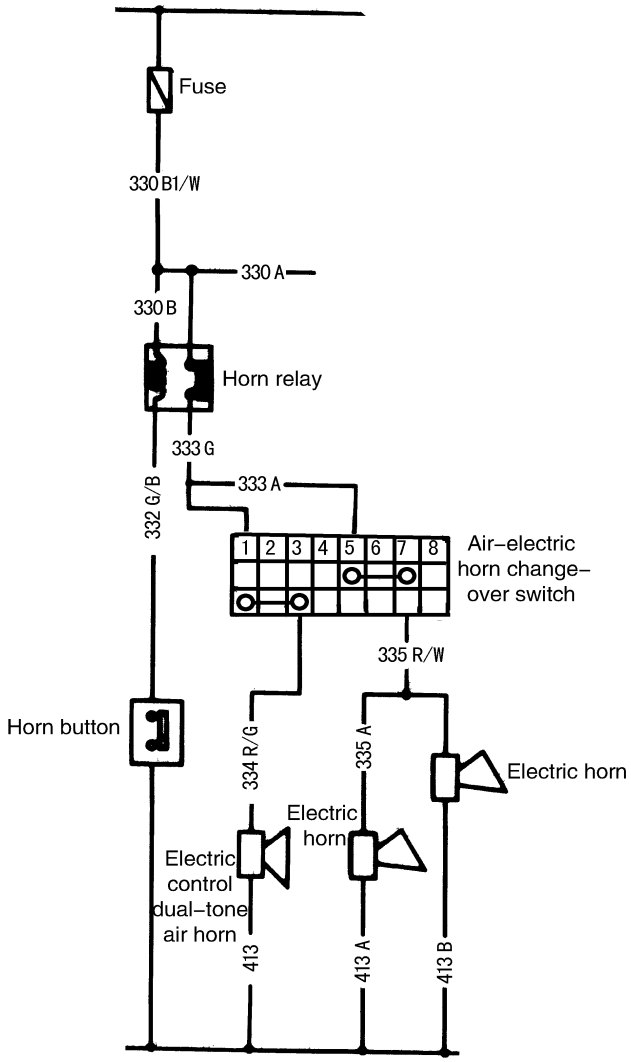
Horn relay

Decrease the current flowing through horn button via an iron core with high resistance so as to prevent the horn button from burning out.



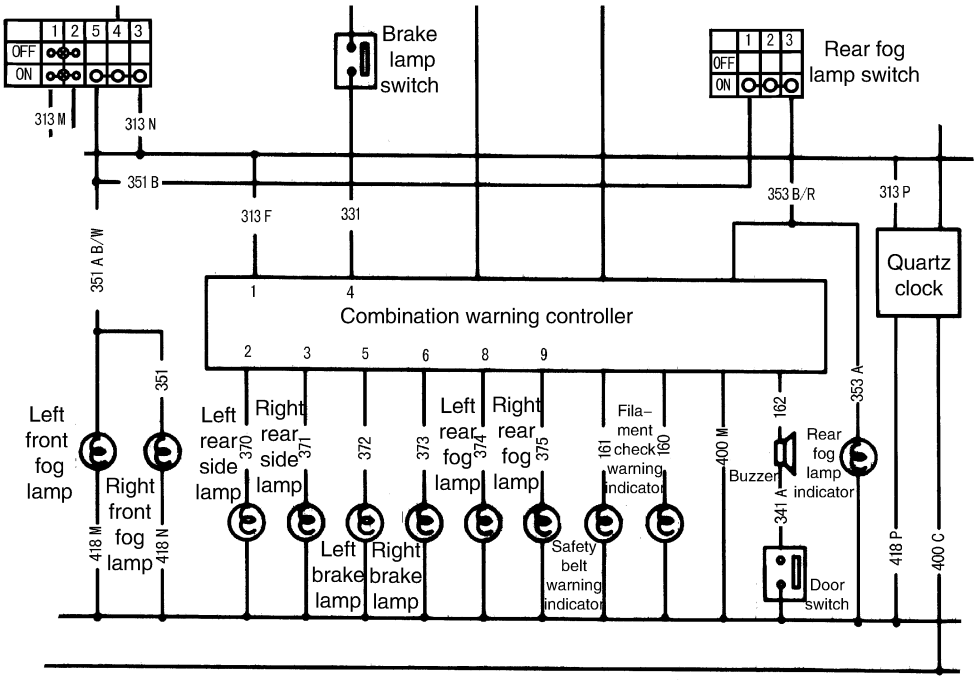
1.To horn
2.To power supply
3.To horn button

Electric wiring diagram



Fog Lamps

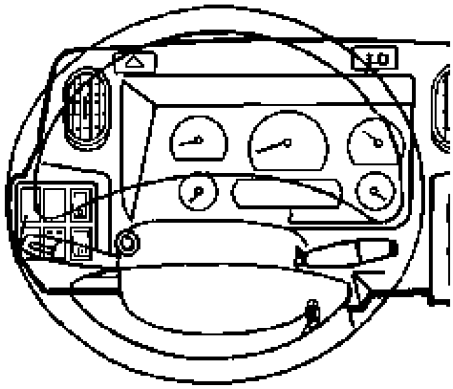
Double rocker switch in parallel is used as a fog switch. That is because when the front lamps go on, the tail lamps, license lamp, instrument and quartz clock illuminators should be all lighted simultaneously, while the foglamp is not included, but when the foglamp goes on, the front lamps, tail lamps, license lamp, instrument and quartz clock illuminator should be all lighted.



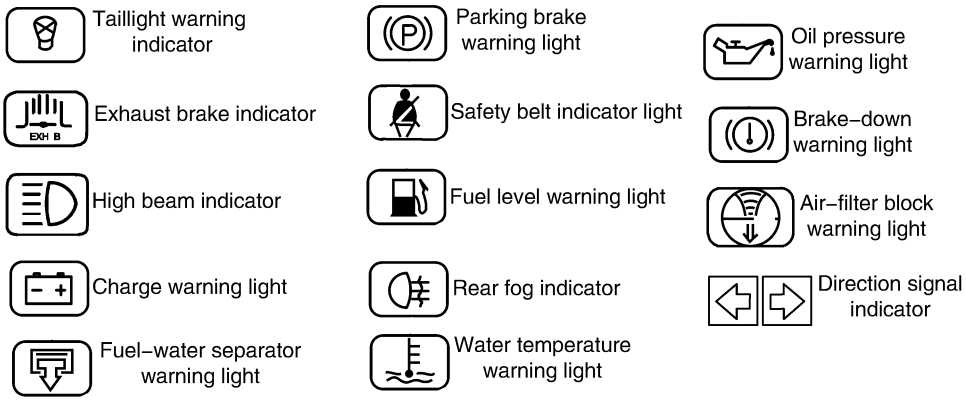
Instruments

Structure

This part consists of air pressure meter, fuel meter, water temperature meter, tachometer and speedometer.



Name of the indicators and warning lights



Instrument Panel

Technical parameter and function

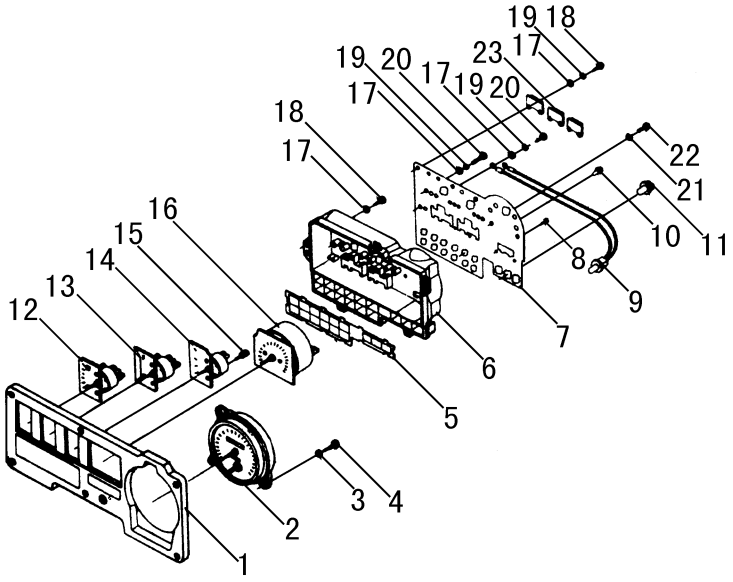
Technical parameter

Speedometer (km/h)	0~140
Tachometer (r/min)	0~5000
Fuel meter	0-1/2-1
Water temperature meter (℃)	40-80-100-120
Nominal voltage (V)	24

Constitution and function

The instrument panel assembly is consisted by speedometer, tachometer, water temperature meter, fuel meter, warning system (14 warning indicator), and matched with the sensor and warner.

Disassembly



1.Panel assembly
2.Speedometer
3.Washer
4.Self-tapping screw
5.Warning lamp pattern piece
6.Big case
7.Soft printed circuit board
8.Nylon rivet
9.Speedometer lighting bulb holder
10.Small warning signal lamp bulb holder assembly
11.Big warning signal lamp holder
12.Oil pressure gauge assembly
13.Fuel level gauge
14.Water temperature gauge
15.Small gauge transition connector
16.Electronic tachometer
17.Washer
18.Self-tapping screw
19.Spring washer
20.Screw
21.Spring washer
22.Screw
23.Small gauge voltage drop resistor

Disassembly

Pull out connectors and the flexible shaft, and then detach wires connected with the electronic tachometer before removing the instrument panel assembly.

1.Remove the speedometer after detaching 3 tapping screw.

2.Pull out bulb when turning the bulb holder counter clockwise to make it aligned with the notch.

3.The voltage drop resistors of small meters are also tightened by tapping screws so that they can be removed.

4.The wire connectors of the speedometer are connected to the big case by the tapping screws and they can be pulled out after removing the bulb holder and loosening screws. When assembling, fit lamps by passing through the circuit board or by removing all the warning lamps first, connect wires and fit the lamps.

5.The circuit board is riveted to the case, so pull it out by force when detaching.

6.After removing the big case, the pattern pieces can be removed because they are stuck with glue which will not dry. But they should be put in appropriate positions when assembling.

7.Remove meters after loosening screws at the back of the big case. Fit it carefully when assembling to avoid the bad fit between transition connecting parts and the big case.

8.Take out the circuit board only after all the bulbs and screws are removed.

Instruments replacing

The speedometer and tachometer can be replaced directly after disassembling according to the above method. The three small meters can be replaced after the transition connecting parts have been removed which should be fit and tightened after the meters are replaced.

Reassembly and check

Reassemble the removed parts in the reverse order of removal and tighten screws when reassembling. Check if there is any part assembled wrongly or any scratches, damages and so on. Then attach the connectors, the tachometer wires and the flexible shaft of the speedometer. Assemble the instrument panel assembly and operate it for a while to see if the meters work normally.

Notice

Attach connectors A and B appropriately and note if the voltage of the electric system is connected.

Stop the vehicle to check immediately if the warning indicator illuminated and something troubled happened.

The light spring washer and washer of the small meters should be copper plated or galvanized.

Meters on the instrument panel should be matched with appropriately specified sensors.

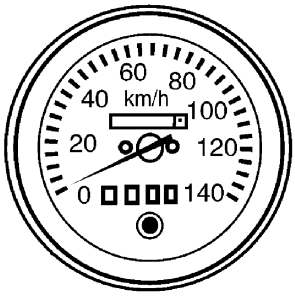
The speedometer assembly and the big case are connected with panel by tapping screws, so please be careful when assembling and disassembling in order to avoid damages of the tapping thread and result in loose connecting.

Trouble analysis

Trouble	Cause	Method
Warning lamps does not go on	Bulb holder slackened	Tighten the holder
	Bulb damaged	Replace bulb
	Wire slackened	Connect wire or tighten
	Warning sensor damaged	Replace
Illuminator does not go on or in bad condition	Power of the bulb is over sufficient, insufficient or the bulb is aging.	Replace
	Holder is not tightened or bulb is damaged.	Tighten or replace
	Wire slackened or broken	Tighten, connect

Speedometer

Dial description



The speedometer needle indicates the vehicle speed in kilometers per hour. The odometer indicates the accumulated driving distance in kilometers.

The trip odometer indicates the distance driven per day or driving distance between specified regions. Firmly press the reset knob to reset the meter indicator to zero and then release it before using this speedometer. The red figure at the far right with the white background indicates readings in units of 0.1km.

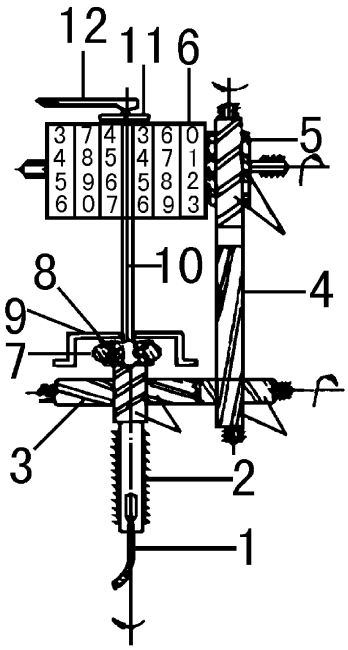
Note:
Do not press the reset button during the driving period.
Do not pull or turn the reset button when press it.

Technical parameter

Type		Magnetic inductive
Speed indicator range (km/h)		0~140
Mileage counting figures (km)）	Total	99999
	Sum	999.9
Speed ratio		1：625
Connector thread		M18 × 1.5
The inner square hole of drive (mm)		$2.6C^{+0.12}_{11\ +0.06} \times 2.6C^{+0.12}_{11\ +0.06}$

Structure

The speedometer is used to indicate the vehicle driving speed and the accumulated driving distance. It comprises a speed and a mileage unit which records vehicle driving mileage. These two units are integrated into one body and driven by the flexible shaft which is connected with transmission output shaft.



The mileage unit records the driven mileage of the vehicle in order to do necessary maintenance on mileage. The counter is divided into an accumulated counter and a day counter. The speed unit indicates the transient speed of the vehicle. It is convenient to control the vehicle speed so as to obtain safety, economy and high efficiency.

1.Flexible shaft 2.Drive shaft 3.Worm and lateral shaft

4.Worm and vertical shaft 5.Worm wheel 6.Digital wheel

7.Magnetic ring 8.Temperature compensated ring

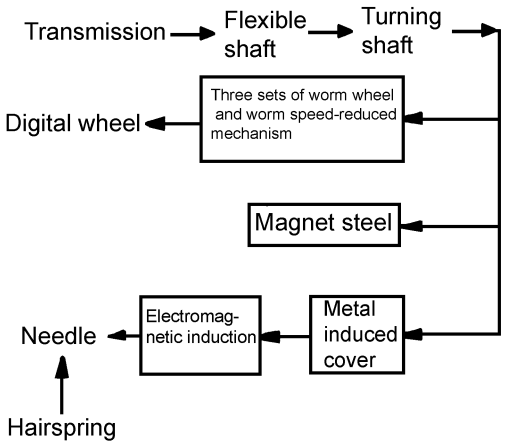
9.Inductive aluminum cover 10.Needle shaft

11.Hairspring 12.Needle

Working principle

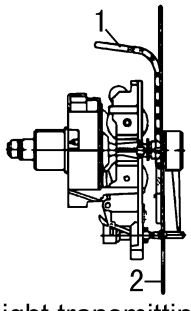
Drive of speedometer

The flexible shaft (driven by transmission main shaft) mounted on the back of the transmission is driven by pulling the square connector into the square hole at the outside of the speedometer turning shaft which drives the digital wheel through three sets of worm wheel and worm.



Indication of odometer

When the flexible shaft drives the speedometer turning shaft to rotate, the magnetic steel on the drive shaft rotates simultaneously, causing the eddy current within the inductive cover, which also produce magnetic field. Both fields interact on each other to produce deflecting torque. The higher the vehicle speed is, the larger the deflecting torque is, which can be indicated by the needle deflection. When the needle deflecting torque of the hairspring, the needle will stay at the appropriate speed value. The needle deflecting angle is proportional to the speed of the speedometer turning shaft, that is, the vehicle speed, causing the needle to indicate various speed.



1. Light transmitting glass

2. Dial

Trouble analysis

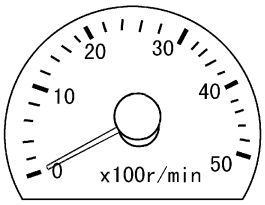
Trouble	Cause	Method
Both the speed division and the distance counting division of the speedometer do not work	Flexible shaft core broken	Replace
	Odometer rotating shaft seized	Replace the odometer
	Square connector nut slackened	Tighten again
Only the speed division of the speedometer does not work	Needle deformed and seized with dial or glass	Correct
	Drive worm wheel and worm, and inductive plate seized, broken, or dirtied	Replace or clean
The needle and the accumulated machine do not run simultaneously	Drive gear or driven gear of the speedometer damaged	Replace meter
	Meter failed	Replace meter
The deflection indication of the needle is too high.	Speedometer flexible shaft deformed or radius area bent	Correct the flexible shaft
	Input shaft or gear worn	Replace meter
The speedometer indication is on the low side	Transmission output shaft slipped	Tighten the flange fork under the recommended torque
	The magnetic effect of the magnetic steel reduced	Replace
Needle indication error	Hairspring deformed or deviate from the original position	Move the hairspring to one side to adjust the indication of the needle
	Magnetic body cracked	Replace meter
	Dimension of tyre is wrong	Replace and use the recommended tyre
	Speed gear worn or damaged	Replace meter
The needle deflection exceeds the dial	Grease on the magnet	Clean out the grease
The speed needle of the speedometer works unsteadily	Hairspring broken	Replace meter
	At the constance velocity of the vehicle when the speed needle's indication unsteadily reaches to 3km/h, it is in trouble. Check the curvature of the flexible shaft to see if it is too small.	Adjust
	Flexible shaft core seized	Clean and lubricate
Speedometer needle oscillates severely	The axial clearance of the flexible shaft is too big causes the flexible shaft and speedometer's rotating shaft sometimes engaged, sometimes separated.	Replace shaft core

Trouble	Cause	Method
The needle seized or failed that can not return to zero	Grease on the magnet	Clean out the grease
	Hairspring deformed	Replace meter
	Wrong assembling of the needle (needle slackened)	Tighten
	There are impurities absorbed on the magnet of the indication board.	Clean
The day distance counter does not work or can not return to zero	Odometer drive pinion damaged	Repair or replace
	Return zero button damaged	Repair or replace
Speedometer noise	Speedometer bearing worn and damaged	Replace meter
	Speedometer gear lacks of lubricating and causing worn	Fill with grease
	Speedometer flexible shaft lacks of lubricating and causing worn	Fill with grease

Tachometer

Dial description

The needle of the electronic tachometer indicates the engine speed in revolutions per minute. The red zone indicates the range of the critical engine speed. Strictly be sure to always keep the indicator below this critical zone. The green zone indicates the most economical engine operation. Driving within this green zone will save fuel and extend the engine life.



Technical specification

Type	Moving coil
Range(r/min)	0~5000
Deflecting angle(°)	245
Min. graduation (r/min)	100
Accuracy level	1.5
Connector	DJ7043-6.3-20 type, 4-cable combined socket

Constructional description

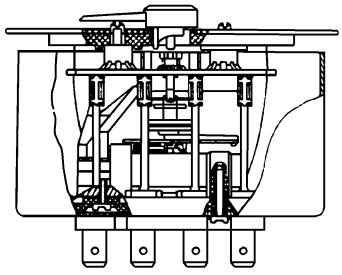
The electronic tachometer construction including:

The indication division: comprise of needle, dial and so on.

The signal processing division: comprise of printed-circuit plate and electronic parts.

The measuring mechanism: comprise of magnetic steel, pole plate, pole ring, and needle shaft coil assembly, bracket assembly, upper and lower bearing and so on.

Auxiliary part: Base, housing, screws and electrical connectors.

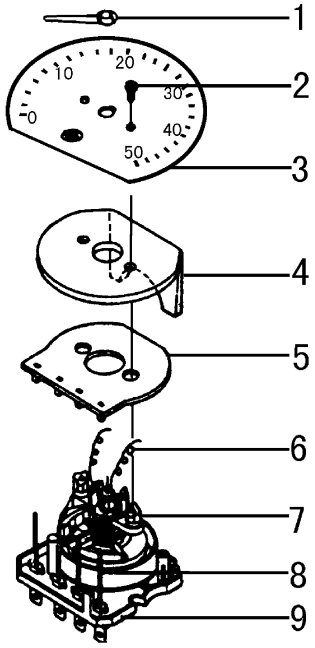


Instrument assembly and disassembly

Before disassembling the instrument, pull out needle 1, and then loosen two screws 2.

When disassembling the printed-circuit board; pull it out directly after welding off two wires 9(the printed board and blade connector are directly connected together through a spring blade socket on the board).

Generally, do not disassemble the unit core. If it has to be disassembled, weld off both the upper and the lower hairsprings, and the conductive blade at first so as not to damage the hairsprings In addition, do not break the coil output wire.



1.Needle 2.Screw 3.Dial 4.Light guiding glass

5.Printed circuit-board 6.Connection wire 7.Bracket

8.Blade connector 9.Base

Trouble analysis

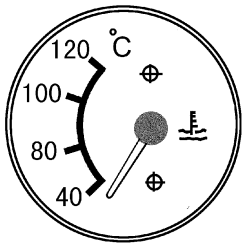
Trouble	Case	Repair
The instrument doesn't work	Circuit broke Sensor damaged Instrument burnt out	Check wire connection and connector with socket's contact Replace sensor Replace instrument
Needle shakes abnormally	Wire connection is not good Integrated body damaged	Check wire connection Replace integrated body
Needle clicked	There's foreign objects in the core	Remove foreign objects
Needle doesn't return to zero	Needle slacked Core is clicked by foreign objects	Press the needle firmly and turn to zero Remove foreign objects

Water Temperature Meter and Fuel Meter

Dial description

Water temperature meter

The water temperature meter is used to indicate the temperature of the engine coolant. The temperature of the coolant will change because of the temperature of the atmosphere and vehicle running condition. If the indication of the meter is over its normal range, stop the vehicle as soon as possible. Under the condition of too hot engine, continuously drive the vehicle will cause the damages of the engine.



Fuel meter

The fuel meter is used to indicate the fuel level in the tank. The indication may change slightly because of braking, turning, or accelerating of the vehicle. Please fill the fuel tank in time before the fuel is used up.

Technical parameter

Water temperature meter	Type	Moving magnet
	Indicating range (℃)	40 ～ 80 ～ 100 ～ 120
	Meter seat connection	3-M3-6g screw
Fuel meter	Type	Moving magnet
	Indicating range	0 ～ 1/2 ～ 1
	Meter seat connection	3-M3-6g

Trouble analysis

Trouble	Cause	Method
Fuel meter does not work	Open circuit of the sensor resistance wire	Replace
	Open circuit of the sensor and meter electric wire	Connect
Wrong indication of the fuel meter	Sensor floater cracked and does not float	Replace
	Wrong connection between meter and sensor	Check and connect
	Floater lever deformed or seized	Repair or replace
	Sensor does not match with fuel meter	Replace
Water temperature meter does not work	Instrument power supply opened	Check and connect
	Open circuit of the sensor	Replace
	Open circuit of the water temperature meter	Repair or replace
Water temperature meter indication stays at 40 ℃	Sensor damaged	Replace
Water temperature meter indication increase to 120 ℃ suddenly	Short circuit of the circuit or induced plug	Check or replace