Chapter I Outline of vehicle

Section I Summary

The model MP.Midi is a brand new sedan independently developed and designed by BEIJING FOTON MOTOR CO.LTD, which is displayed in the world by its sculptural outlook, smooth and robust line and active visual effect.

It uses the engine, model 4G13S-7L/4G18S-7L, which is characterized by strong power, stable operability, smooth drivability, reliability, durability and easy maintainability

Product classification of the Foton, MP.Midi Maintenance Manuals:

By the classification of model uses: the model Foton MP.Midi is divided in to dual-purpose type and passenger type

Section II Technical parameters of main models

1. Size parameters of main model structures

Parameters / Size		Passenger type	Duo-purpose type
Outer dimension(L×W×H)(mm) free load		4288/1725/1728	4338/1725/1768
Trunk(cargo space)capacity(m3)		624～2800	824～3000
Axle base(mm)		269	2695
Wheel base(mm)	Front	1420	1420
	Rear	1440	1440
Front suspension(mm)		830	830
Rear suspension(mm)		763	813
Drive type		FF	FF
Dynamic displacement and gearbox pattern		1.3.L/1.6L,5MT	1.3.L/1.6L,5MT
Number of seats		6/7	7
Type of front rear suspension bracket		McPherson/vertical arm torsion bar	McPherson/vertical arm torsion bar
Drive brake type		Front disc/rear drum	Front disc/rear drum
Steering system type		Power steering by rack/pinion	Power steering by rack/pinion

2. Vehicle mass parameters

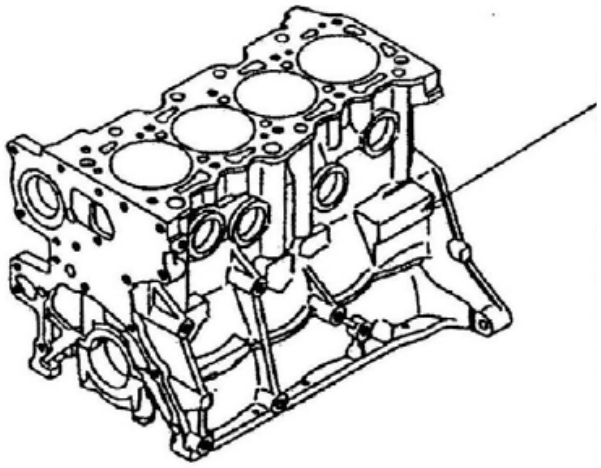
Mass parameters		Passenger type	Duo-purpose type
Full mass state	Full mass (kg)	1290	1320
	Front/rear shaft load(kg)	748/542	722/598
Half loaded state	Number of seats	2	2
	Vehicle mass	1440	1470
	Front/rear shaft load(kg)	830/610	804/666
Full loaded state	Number of seats	5	5
	Full loaded mass	1665	1695
	Front/rear shaft load(kg)	883/782	857/838
Max. passengers		7	7
Max. designed load mass(kg)		525	650
Max. designed total mass state	Max. designed mass (kg)	1815	1970
	Front/rear shaft load(kg)	873/942	881/1089

II. Engine technical performance and structural parameters

Table 2.1 Engine technical performance and structural parameters

Model		**4G13S-7L**	**4G18S-7L**
Type		L4/16V、SOHC、MPI	
Displacement		1299cm3	1584cm3
Cylinder bore		71.0mm	76.0mm
Stroke		4	4
Compression ratio		9.5	
Max.power		62.5Kw /6000r/min	74.2Kw /6000r/min
Max.Torque		108N.m / 4500r/min	134N.m / 4500r/min
Min. fuel consumption		272g/Kw.h	
Rated Speed rpm		6000r/min	
Idle		750±50r/min	
Steering		Counterclockwise(seen from rear to front)	
Ignition sequence		1-3-4-2	
Oil pressure		150kpa(750r/min)\540±50kpa(2000r/min)	
Overall dimension		Overall length×width×height=617.8mm×613.3mm×622.2mm	
Net weight		113±2kg	115±2kg
Fuel		Unleaded gasoline over 93#	
Use of oil		SAE5W-30(in winter, north); SAE15W-40(through year, south or in summer, north)	
Emissions regulation to meet		National 3	
Number of cylinders		4	4
Combustion chamber		Roof type	Roof type
Stroke mm		82	87.3
Valve and drive mechanism		SOHC-4	SOHC-4
Cylinder center distance		82	82
Cylinder height		201	201
Central distance between the connecting big/small rods		131	131
Number of valves	Intake valve	8	8
	Exhaust valve	8	8
Emissions regulation to meet		National 3	National 3
Lubrication system		Oil supply under pressure	Oil supply under pressure
Fuel supply mode		Electric fuel pump, non-return oil system	electric fuel pump 、non-return oil system
Type of oil pump		Cycloidal gear pump.	Cycloidal gear pump.
Cooling system		Forced water cooling cycle	Forced water cooling cycle
Type of water pump		Centrifugal, impeller	Centrifugal, impeller

IV. Position of engine No.and cylinder No.



e.g:

4G13S Engine Model

Engine no. print area ☆**7L 79A0001**☆

79A0001—production serial number

7—2007

9—Septermber

A0001—Production S/N

Identification sign of the engine model

Section II Use and maintenance of engine

I. Use of engine

1. Coolant

Checks to see whether the engine coolant is sufficient or not, if insufficient, adds the coolant adequately.

Attention: The cooling system includes the water pump, water pipe and water jacket etc.,.When the engine runs, the cooling system has to be sufficient of the coolant, to ensure the normal operation of engine, otherwise the car will be “boiling”. The gasoline consumed engine operating under the overheating condition will affect the service life and in serious case, cause the malignant failure such as cylinder score.

2. Oil

Checks the level of engine oil. In case of oil shortage, the adding should be made in tiem.

Attention: The oil insufficience will cause the oil pressure of gasoline engine very low, poor lubrication, worsen engine wear and bad cooling, which are easy to come about with the failures and affect the service life of gasoline engine.

3. Fuel grade

Fuel uses the unleaded gasoline graded higher than RON93# and 93#.

4. Engine startup

When starting the engine, twists the ignition switch key on the Startup position. The engine is activated by thestarter. Once the engine ignited, the key should be released, and the power supply of starter cut off.

Attention: Do not let the starter running more than 5s per each duty time. If the gasoline engine fails to start, try to restart in 10s, otherwise it will damage the starter. If failed to

Attention: Do not open the coolant tank lid or radiator lid when the engine remains in hot state. The cooling system in the hot state is under a certain pressure. If opening the lid, the hot coolant will spray out and scald the people around.

Drains the engine coolant through thedrainage plug of cylinder.

1) Removes the drainage plug, then radiator lid, and drains out the coolant from the engine.

2) Removes the drainage plug of cylinder and drains the engine coolant.

3) Removes the reserve tank and drains out the engine coolant (alternative dependint the availability of car)

4) After the engine coolant drained out, fills in the clean water through the radiator lid to clean up the pipleline of engine coolant.

5) Applies the specified sealant on the drainage plug thread of cylinder and thghtens as per the moment as specified.

6) Firmly tightens the drainage plug of radiator.

7) Fits the reserve tank (alternative dependint the availability of car).

8) Removes the bleed bolt and replaces the seal washer (alternative dependint the availability of engine).

9) Fills the radiator with the engine coolant until it overflows from the bleed bolt. Then closes the bleed bolt (alternative dependint the availability of engine)

10) Slowly poors the engine coolant through the filler of radiator into the radiator until it is filled up, while filling the reserve tank with the engine coolant unti the level is up to the FULL line (alternative dependint the availability of car).

11) Fits tightly the radiator lid.

12) Starts up the engine and lets it run unti the thermostat turns on(touches by hands the radiator hose to verify if the hot water is flowing).

13) After the thermostat is turned on, keeps the engine run idle at the high speed for several times, then shuts down the engine。

14) After the engine cooled, fills the reserve tank with the engine coolant as long as the level reaches the FULL line. If the level is still lower, please repeat the procedure from (13).

7. Checks if there are any blocks and damages on the air filter elements.

(1) Checks if there any blocks and damages on the filter elements

(2) Removes the dirt deposit on the filter elements as per the method as below.

- Tpas one side of filter elements.
- Blows the compressed air from the internal side of filter elements.

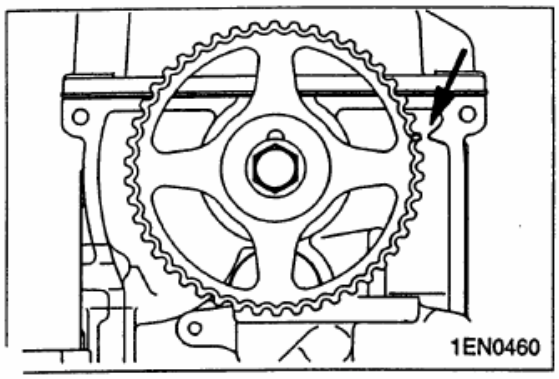
(3) Scraps out the dirts in the air filter.

(4) For the gasoline consumed vehicles, places, while installing, the dirty part of filter elements at intake port of channeling gas (prevent the greasy dirt from spreading) if the old filter elements are intended to be reused.

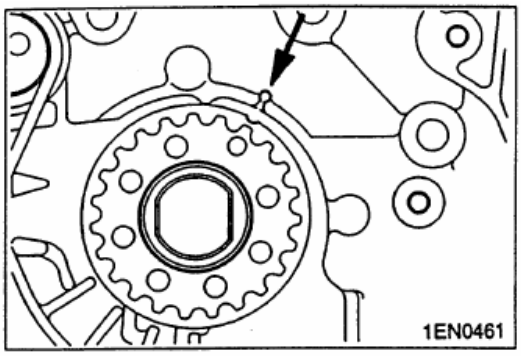
8. Replacement of air filter elements.

(1) Removes the air filter cover and filter elements. Scraps the filth in the filter.

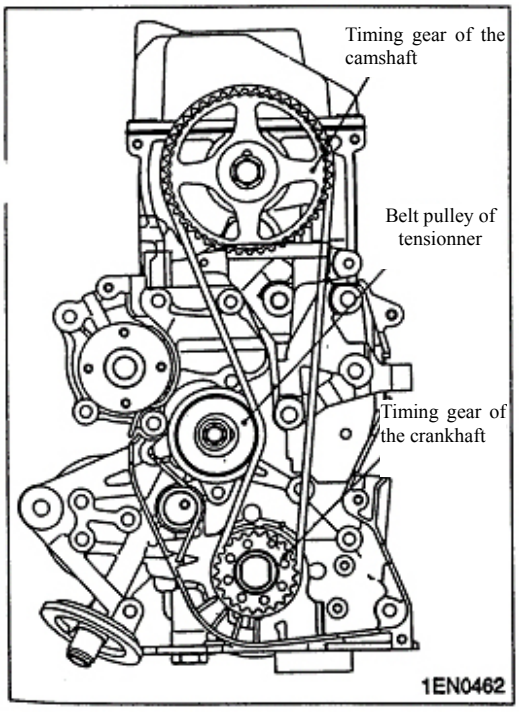
Items	Nm
assembly bolt, rocker arm shaft	28~34
governing screw	8~10
Cylinder head and valves	
Cylinder headbolt	①Tightens up to 49Nm ②Releases ③20±2 ④90° to 94° ⑤90° to 94°
Oil pump and oil sump	
Gearbox bracket bolt(10×20-7T)	42~54
Gearbox bracket bolt(8×40-7T)	19~27
Oil drain plug	34~44
Oil sump bolt(M6)	6~8
Oil sump bolt(M8)	22~25
Oil filter	12~16
Front cover bolt	12~15
Connecting rod	
Connecting rod nut	16.7±2.0＋90° to 94°
Crankshaft and cylinder body	
Flywheel bolt	127~137
Backboard bolt	8~12
Flywheel shell bolt	8~12
Rear seal shell bolt	10~12
Bearing cap bolt	34.3±2.0＋30° to 34°
Engine and vehicle interface	
Fitting bolts, exhaust manifold and exhaust front tube	40~50
Fitting nuts, engine right bracket and vehicle frame	57±5
A/C generator and ignition system	
Pulley bolt, water pump	7~11
A/C generator stay bolt (side of the A/C generator)	20~25
Master-pin bolt, A/C generator	34~54
Dipstick guided-tube bolt	19~28
crankshaft bolt M14×1.5	176~186
Spark plug	20~29
A/C generator nut	34~54
Ignition coil	8~12
Camshaft position sensor bolt	7.5~8.5
Camshaft position sensor, bracket bolt	12~15
Camshaft position sensor, tooth plate bolt	17~26
Timing belt	
Fitting bolt, timing belt shell,	10~12
Fitting bolt, timing belt tensioner	20~27
Fitting bolt, crankshaft, winkel-sensor (speed sensor)	6~10



(2) Aligs the timing mark on the timing gear of camshaft with that on the front shell.



(3) Keeps the tension side of timing belt tightened, and fits orderly, the timing belt into the timing gear of crankshaft and tensioner pulley.

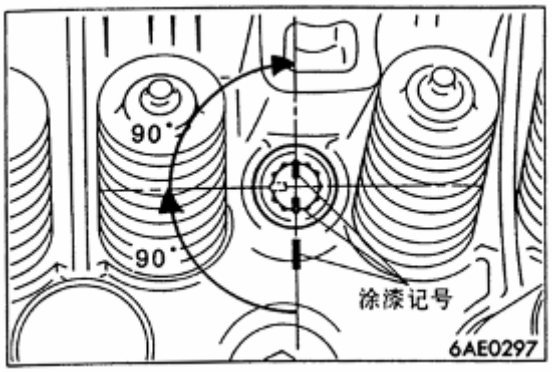


(4) Unscrews the fitting bolts of tensioner pulley by the turn of 1/4–1/2, enabling the tension effect of tensioner springto act on the timing belt.

(5) Turns the crankshaft for two cycles in the normal direction of rotation (clockwise) to check if the timing marks is properly aligned.

Attention: by this method, the tension effect acts evenly on the timing belt by the driving

(7) Marks the plaint signs on the cylinder head bolts and cylinder head(shown in figure)。



Print mark

(8) Each bolt is screwed by a plus 90° as per the tightening order.

(9) Each bolt is tightened by 90° to check whether the paint mark on the bolt head is aligned with that on the cylinder head.

Attention: If the tightening angle of bolts is less than 90°, it is impossible for them to have sufficient power to fasten the； if the tightening angle of bolt is larger than 90°, they should be removed down and refixed.

(10) If the old cylinder head bolts have been replaced during the maintenance, the overhaul should be carried out as per the sequence (2)~(9).

(11) If no used cylinder head bolts have been replaced, the overhaul should be effected following the order of (2),(3),(6),(7),(8) and(9).

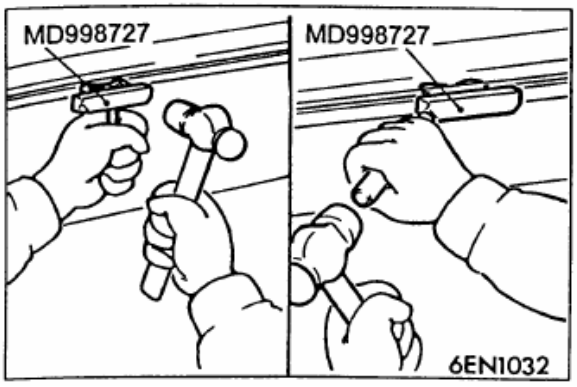
2.8 Oil pump and oil sump

Essentials for removal operation:

◄A► Removal of oil sump

(1) Removes the fitting bolts of oil sump.

(2) As shown in figure drives the special tool between the oil sump and cylinder body.

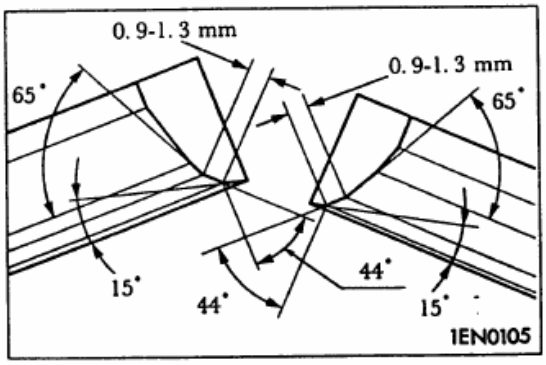


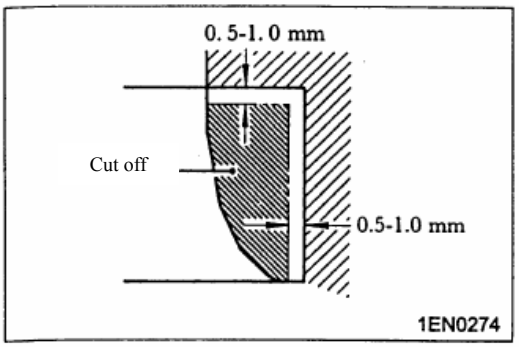
(3) Taps the side of special tool and makes it move along the sealing side of oil sump /cylinder body, than removes the oil sump.

Essentials for installation operation

►A◄ Installation of front oil seal shell (oilpump shell)

(1) Cleans out the sealant painted surface of cylinder body and front oil seal shell.





(2) **Rebores the hole of valve seat on the cylinder boring head to match it with the selected extra diameter of valve seat.**

Aperture of intake valve seat (Extra. 0.3mm)

Intake valve 4G13S-7L : 28.425-28.445mm

Intake valve 4G18S-7L: 30.425-30.445mm

Aperture of intake valve (Extra. 0.6mm)

Intake valve 4G13S-7L : 28.725-28.745mm

Intake valve 4G18S-7L : 30.725-30.745mm

Aperture of exhaust valve seat (Extra. 0.3mm)

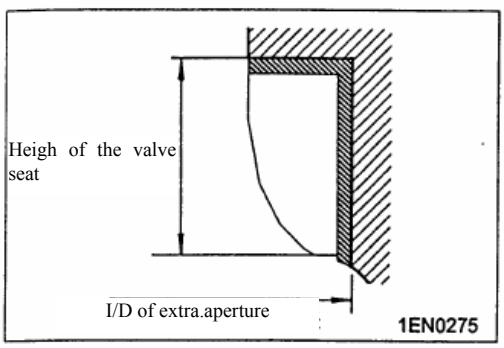
Exhaust valve 4G13S-7L: 26.425-26.445mm

Exhaust valve 4G18S-7L: 28.425-28.445mm

Aperture of exhaust valve seat (Extra. 0.6mm)

Exhaust valve 4G13S-7L: 26.425-26.445mm

Exhaust valve 4G18S-7L: 28.425-28.445mm



- PID 0EIgnition timing advance
- PID 0F Air intake temperature
- PID 10Airflow
- PID 11Output value of the thottle valve position sensor
- PID 12State of secondary air(upstream, downstream or admosphere)
- PID 1C Requirement of the OBD system
- PID 21Drive mileage after the MIL has been activated.

In addition, the output of the Mode 1 includes in general the information of the oxygen sensor position (PID 13) and the voltage value of each oxygen sensor output (The oxygen sensors in different types and positions correspond to different PID). The outcomes from the Mode 1 are the current true values of the electric control system(In case of some failures, the system may use the default or alternative value), these results provide important reference values to the maintenance service.

It is particularly noteworthy that the PID 01 reflects the state of OBD system.

(2) Mode 2

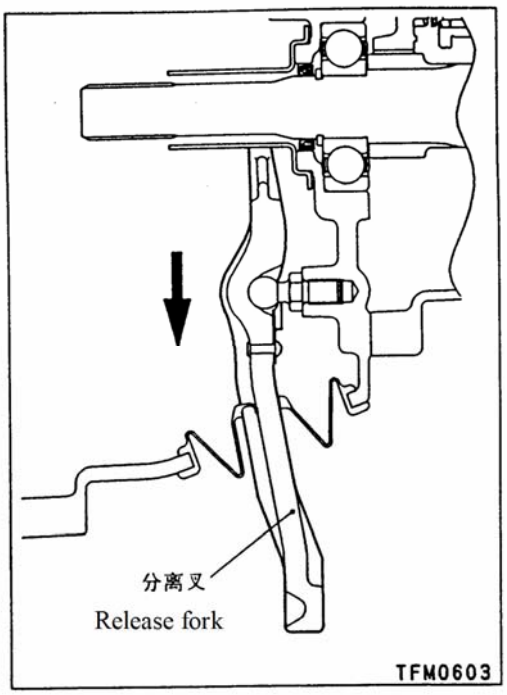
According to the requirements of regulations, once the initial failure has been detected by the ODB system on any of the parts or systems, the blocked data frame of the engine state has to be stored into the ECU memory. The function of the Mode 2 is to output the information of blocked frames of OBD system.

Each information of the blocked frames output by the Mode 2, same as the Mode 1, has to be conform to the relevant definition of the International Standard ISO/DIS 15031-5. All states of engine saved, include but not limited to the following parameters:

- PID 03 Run under close/open ring state(If available)
- PID 04 Calculated load value
- PID 05 Coolant temperature
- PID 06, 07 Fuel revision of the cylinders 01 and 03(if available)
- PID 08, 09 Fuel revision of the cylinders 02 and 04(if available)
- PID 0A Fuel pressure(if available)
- PID 0B Manifold pressure of air intake(if available)
- PID 0C Engine in rpm
- PID 0D Speed(if available)
- PID 02 The saved failure code of he above initiated data.

It is noteworthy that only one group of the blocked frame information can be saved in the Mode 2. In case of multiple failures detected by the system, only the failure possessing the higher priority of blocked frames will display in the output of Mode 2.

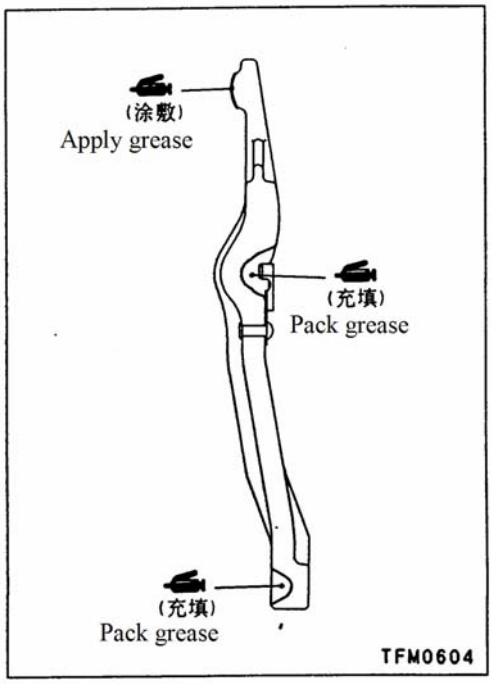
Higher priority



A Removal of the release fork

Removes the release fork as per the direction shown in figure .Removes the reset clip from the release thrust bearing.

Essentials to the assembly operation

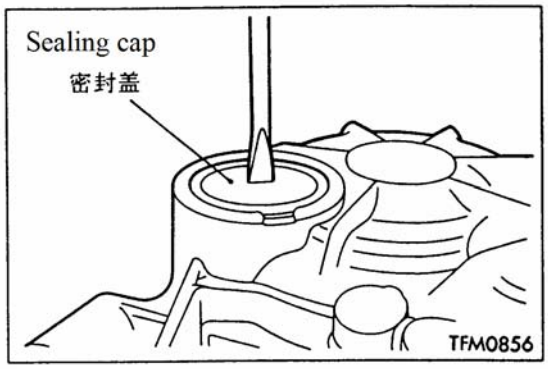


A Assembly of the release fork

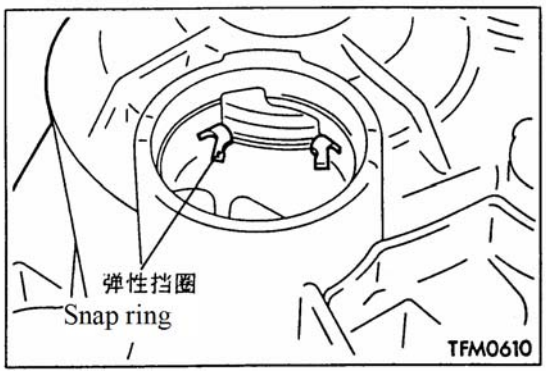
Applies the grease on the position of release fork as shown in figure and packs with grease.

Specified grease: Esso Ronex, Esso Beacon EP2 or 3# calcium-based grease.

Essentials to the break-down procedures:



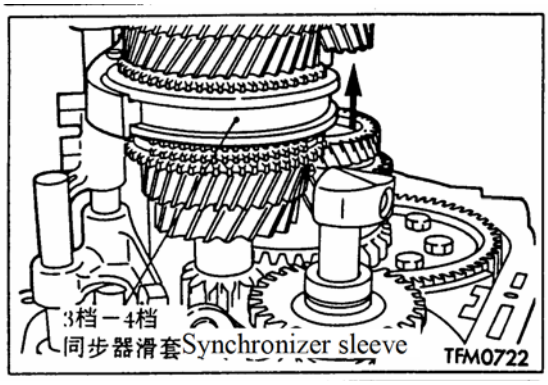
◄A►Removal of sealing cap



◄B►Removal of gearbox shell

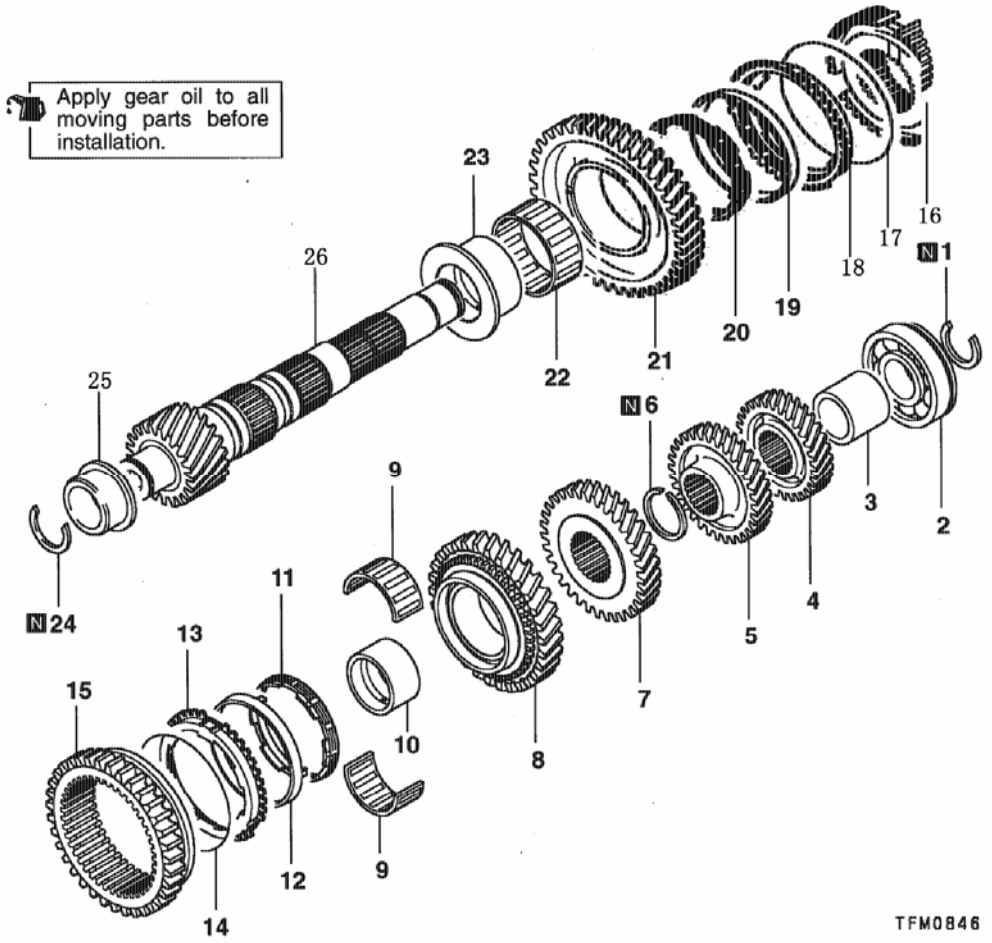
Widens the snap ring and removes it from the snap ring of ball bearing.

Attention: If expanding the snap ring，the snap ring groove will deviate with the input shaft under the effect of dead weight.



◄C►Removal of reverse gear

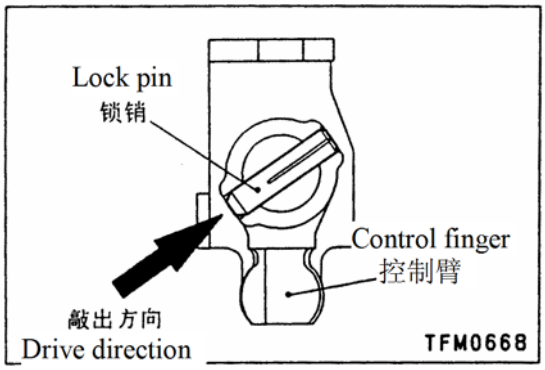
Laterally moves the synchronizer sleeve of the3rd – 4th gears to the 4th gear.



Break-down procedure:

►J◄ 1. Snap ring
◄A► ►I◄ 2. Ball bearing
3. Snap ring
4. 5th gear, driven gear
5. 4th gear, driven gear
►H◄ 6. Snap ring
7. 3rd gear, driven gear
8. 2nd gear, driven gear
9. Needle bearing
◄B► ►G◄10. 2nd gear, driven gear sleeve
11. Bicone inner race
►D◄ 12. Intermediate steel ring
►F◄ 13. Bicone outer ring
►E◄ 14. Synchronizer spring
15. 1-2nd gear, synchronizer gear sleeve
►D◄ 16. 1-2nd gear, synchronizer hub
17. Synchronizer spring
18. Bicone outer ring
◄C► ►C◄ 19. Intermediate steel ring
►B◄ 20. Bicone inner race
◄D► ►A◄ 21.1st gear, driven gear
22. Needle bearing
23. 1st gear, driven gear sleeve
24. Snap ring
25. Bearing inner race
26. Output shaft

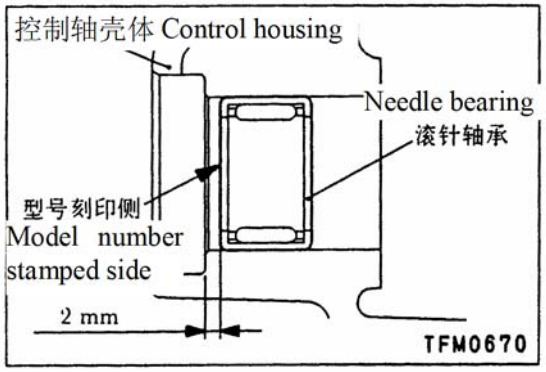
Essentials to the break-down procedures



◄A► Fitting of the lock pin

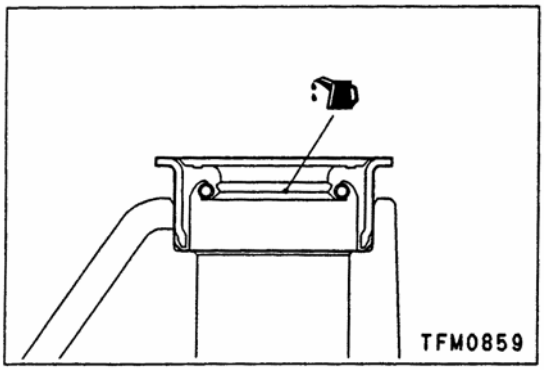
Knocks out the lock pin along the direction shown in figure.

Operating essentials to the reassembly



►A◄Fitting of the needle bearing

Pushes it in to the size shown in figure. to make the model print in the direction shown in figure.

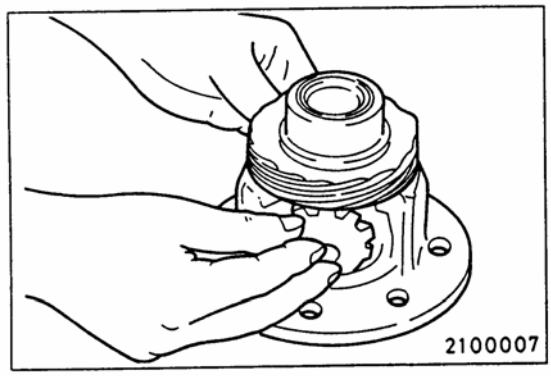


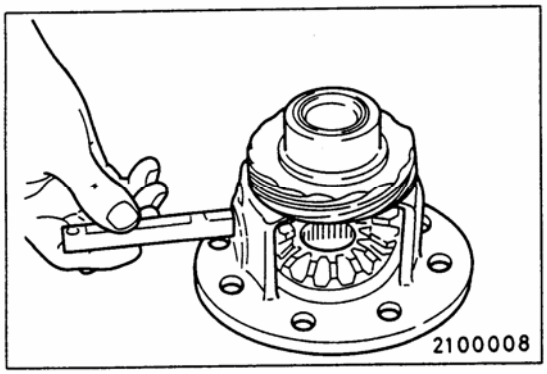
►B◄Fitting of the oil seal

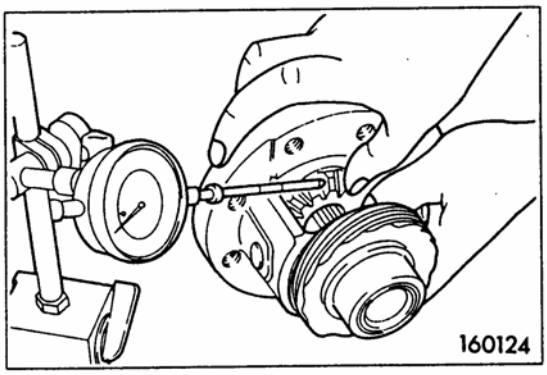
Applies the gearbox on the oil seal lip.

Gearbox oil: gear oil Esso Gear Oil GX80W-90

Operating essentials to the reassembly







►A◄ Fitting of the gasket/differential gear/gasket/planet pinion/planet pinion.

(1) Fits up the gasket on the back of the differential gear，then the differential gear in the differential case.

Remark: When fitting up the new differential gear，please select the gasket in the medium thickness (0.93−1.00mm).

(2) Fits up the gasket on the back of the planet pinion to mesh in with the differential gear when it is in the position 7, and fits up on the specified position while turning it.

(3) Inserts the planet pinion shaft.

(4) Measures the teeth clearance between the differential gear and the planet pinion. Standard value: 0−0.150mm.

1in the front wheel hub LH。Inserts the sliding end 2 of CS axle shaft, RH into in the right end of differential, and fits the fixing end 1in the front wheel hub LH (See figure 1.1).

Attention: be sure to insert the ends 2 and 3 of differential on the position until a “Click” from the snap spring is heard. There is a clearance in 3-5mm on the outermost face of gearbox in the sections 4 and 5 of the universal joint at the sliding end (See figure 1.1)

4) Checks by hand the drive shaft after the assembly.

5) Fits up the axle nuts and locks the nut caps and lock pins (See figure 1.2)

6) Fits up the wheel assembly.

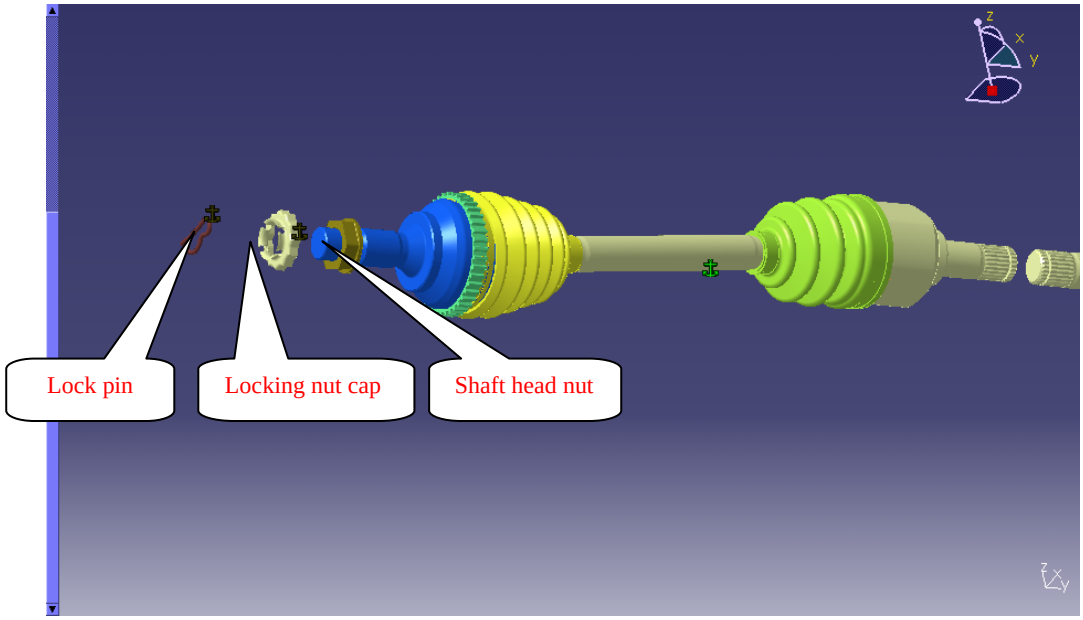


Figure 1.2

Section II Common faults of transmission shaft and troubleshooting

I. Abnormal noise of front drive shaft

1) If the “Click” sounds from the front drive shaft when turning off, it indicates that the CS universal joint at the outer side has been seriously worn

Solution: Replace the CS universal joint at the outer side.

2) When the car accelerates, decelerates or turns off, the abnormal metal knocking sounds from the drive shaft, then, this indicates the CS universal joint at the inner side has been seriously worn.

Solution: Replace the CS universal joint at the inner side.

3) Whatever you turn off, accelerate or decelerate, there is always the abnormal noise from the drive shaft at some of sides, this indicates there is defection in the front wheel bearing at the side concerned.

Solution: Replaces the front wheel hub bearing.

II. Vibration of the front drive shaft

If driving by acceleration, the vibration or turning run-out occurs on the drive shaft, it is possibly caused by the excessive wear on the liquid channel surface of inner sided universal joint.

Solution: Replaces the inner sided CS universal joint.