

JAC motors

4DA1 SERIES

SHOP MANUAL

Foreword

This shop manual was prepared as reference to properly carry out servicing and maintenance on JAC vehicles.

All the maintenance data in this manual is based on the model HFC1042K2 (D800/D801). And it also can be as reference for the other models listed in the Chapter "General". Their main common configurations are as follows: HFC4DA1(HFC4DA1-1) engine; JAC MSB-5M transmission, hydraulic brake and JAC new model cabin.

All information in this manual is the latest data and status of the vehicle at the time of publishing for your reference. However, due to technological advance or product updating etc., all contents in this manual are subject to modification. We reserve the right of modification of this manual without prior notice.

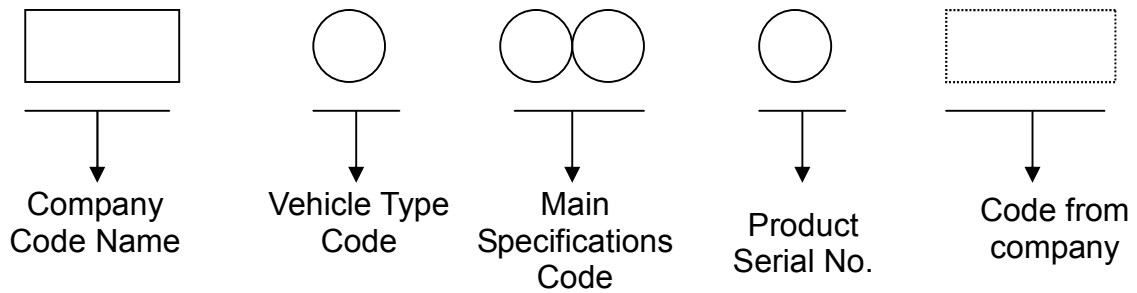
Please inform Customer Service Department of JAC International if there is any mistake, and you will be highly appreciated.

Contents

Group Code	Name	Page
0000	General	
1000	Engine	
1600	Clutch	
1700	Gearbox	
2200	Driveshaft	
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2901	Front suspension	
2911	Rear suspension	
3000	Front axle	
3400	Steering gear	
3500	Brake	
3700	Electric system	
5000	Cabin	

General

Vehicle Model



Company Code Name: HFC-----represents JAC motor

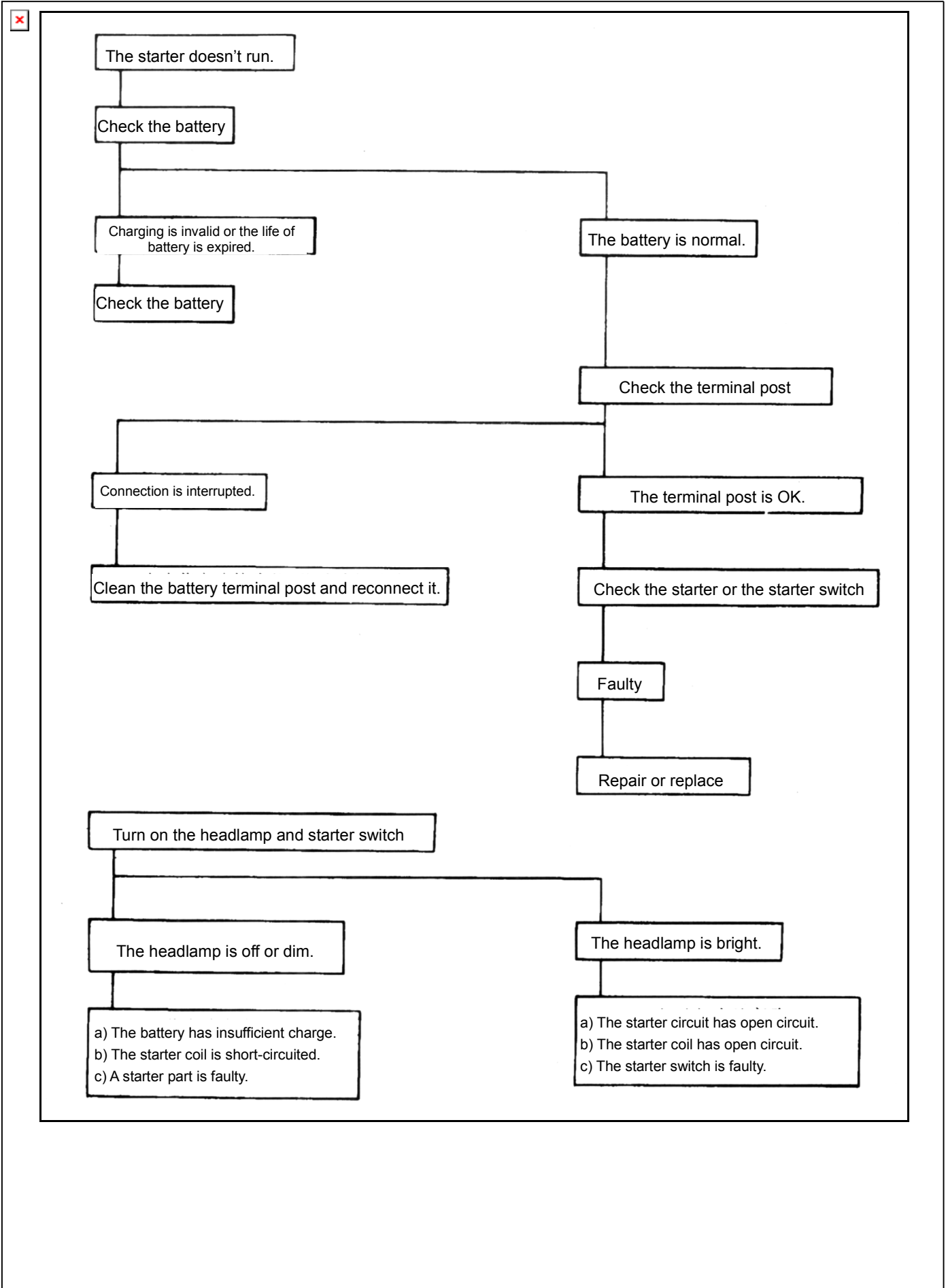
Vehicle Type Code: 1---Cargo truck 2---Off-road vehicle 3---Dumper
4---Tractor 5---Special purpose vehicle 6---Passenger car
7---Sedan 9---Semitrailer

Main Specifications Code: 25---represents the maximum gross weight is 25 tons.

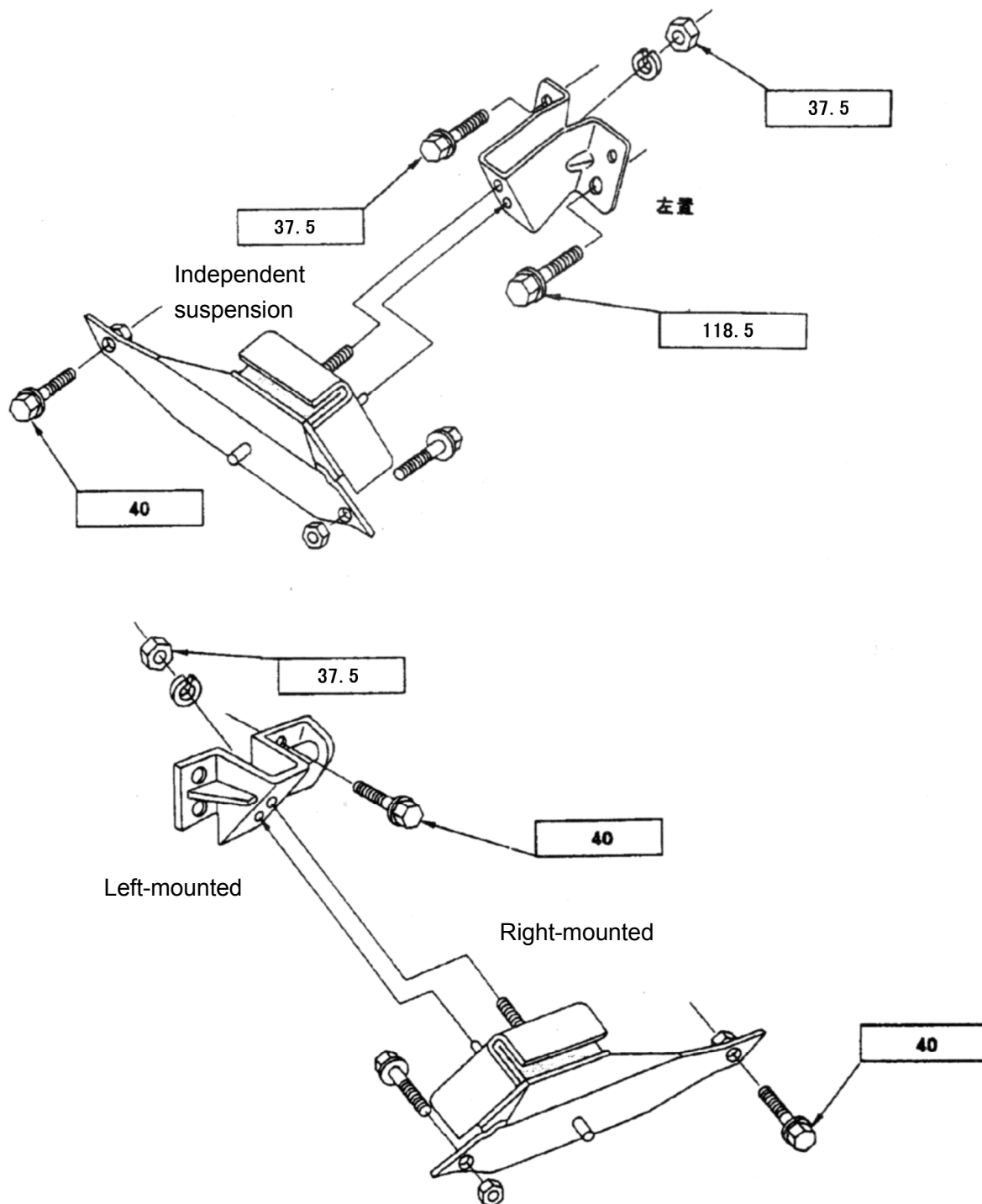
Product serial No.: 1---Product development serial No. (1st change, 2nd development)

Code from company: K---Diesel R1---King cabin

For example: HFC3251KR1 represents JAC vehicle with king cab, 25 tons maximum gross weight, the first change.



✖ 1.5.8 Torque for engine mounting bracket (N·m)





Cleaning

- Cylinder head bolt
- Cylinder head

Carefully clean up any oil sludge, smoke and carbon deposit until the natural color of metal is exposed. Never use an electrical wire brush on any gasket or sealing surface.

Inspection and repair

If excessive abrasion and damage is found during checking, adjust, repair and replace parts in time.

- Check whether there is leakage, corrosion or blow-by gas of cylinder head gasket and contact surface. If a gasket fails, investigate the causes:
 - Improper assembling
 - Loose or warping cylinder head
 - Insufficient tightening torque for the cylinder head bolt
 - Warping cylinder block surface
- 1. Check whether the cylinder head bolt thread is damaged or drawn out. Also, check whether the cylinder head is damaged caused by improper tool usage.

Caution

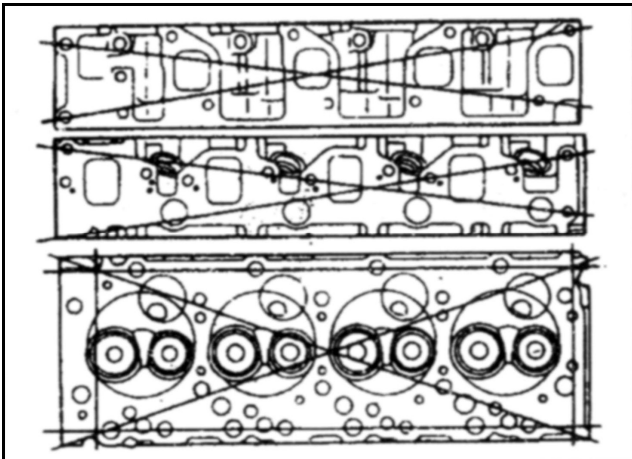
Any questionable bolt must be replaced by a new one.

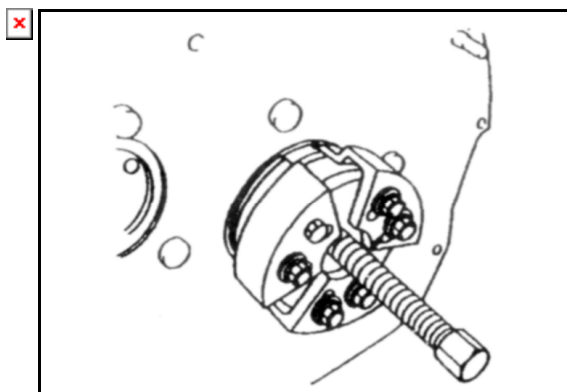
2. Check whether there is any crack on the cylinder head, particularly the valve edge and exhaust port.
3. Check whether there is any corrosion at the cylinder head cover plate, any sand or loose hole inside the cylinder head.

Caution

Never repair the key surface of cylinder head. If it is broken, replace it with a new one.

4. There are strict requirements for flatness of cylinder head undersurface and contact surface of intake and exhaust manifolds. Use grinding process to repair these surfaces. If the surface "flatness" exceeds the specified value, you should grind the surface until the flatness meets the requirement. If the flatness exceeds the specified value too much, the part shall be replaced by a new one.





7. Piston and connecting rod
8. Flywheel
9. Flywheel baffle
10. Rear oil seal

- Push in the oil seal, install the special tools according to the sequence shown in the diagram to facilitate removing the oil seal.

Rear oil seal remover: 1002430FA-9102

Note: Take care not to damage the flywheel baffle and crankshaft sealing surface during oil seal removal.

11. Main bearing cap
12. Crankshaft

Inspection and repair

If excessive abrasion or damage is found during checking, adjust, repair and replace parts in time.

1. Crankshaft

Thrust clearance

Install dial gauge according to the sequence shown in the diagram and measure the thrust clearance of crankshaft.

If the thrust clearance exceeds prescribed limit, the thrust bearing shall be replaced in pair.

Thrust clearance mm

Nominal	Limit
0.040-0.201	0.30

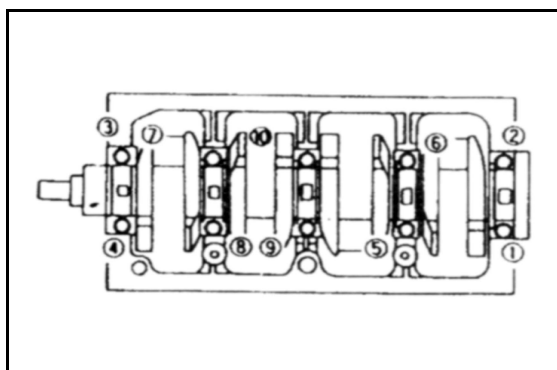
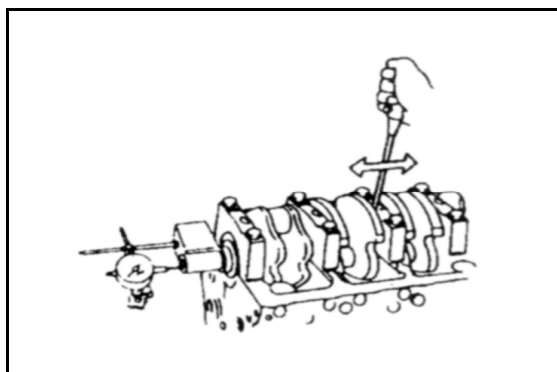
2. Main bearing clearance

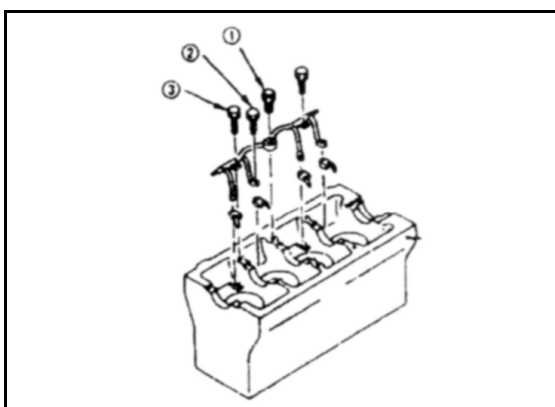
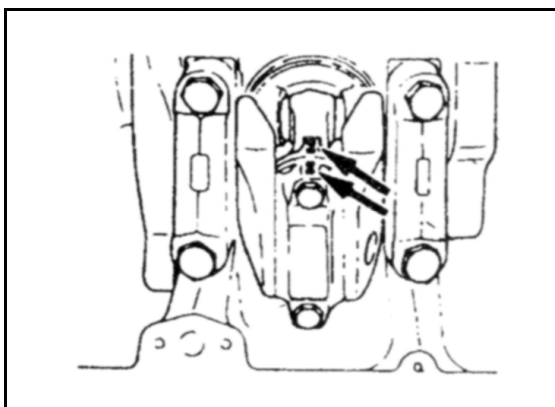
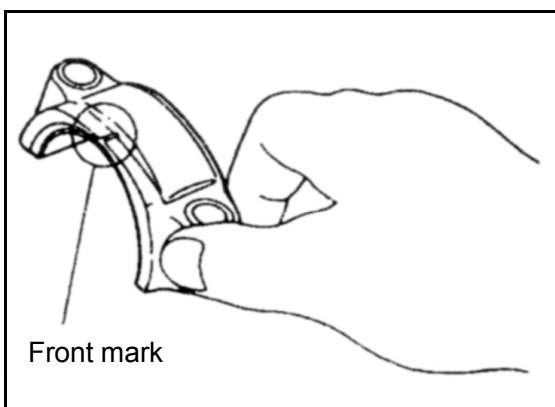
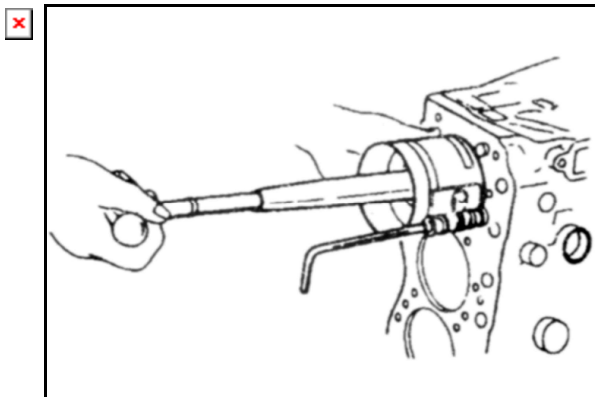
- 1) Remove the main bearing cap according to the sequence shown in the diagram.

Place the removed main bearing cap according to the sequence number of cylinder.

- 2) Remove crankshaft. Dismantle main bearing.
- 3) Clean the upper and lower bearings and main journal of crankshaft.
- 4) Check the bearing is damaged or excessively worn.

If excessive abrasion or damage is found during checking, the bearing has to be replaced in pair.





14) Place the piston in such a way that the front mark on the bearing cap must be toward the engine forepart.

Encase the piston into engine block with piston installation taper sleeve.

Piston installation taper sleeve:

1004001FA-9102

15) Push in the piston with a hammer handle until the connecting rod touches the crankpin. In addition, rotate the crankshaft until the crankpin is at bottom dead center.

16) Place the bearing cap in such a way that its front mark is toward the engine forepart.

17) Install connecting rod bearing cap.

Align the cylinder sequence mark on connecting rod bearing cap with the one on connecting rod.

18) Apply oil to the thread and mating surface of each connecting rod bearing cap bolt.

19) Screw down the connecting rod bearing cap bolt to the specified torque in two steps via torque tightening method.

Torque of connecting rod bearing cap bolt N · m

	First step (pre-tightening)	Second step (tightening)
4DA1 Series	20	85

Note:

Manually rotate the crankshaft to check whether it is flexible.

7. Piston cooling oil pipe

6. Oil pump assembly

5. Timing pulley chamber

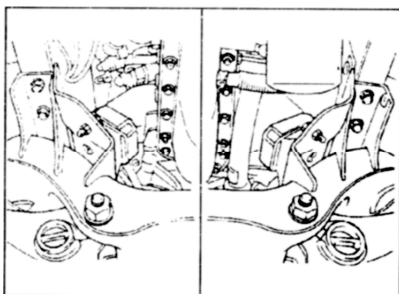
4. Front oil seal

3. Timing gear

2. Oil pan assembly

1. Cylinder head assembly and gasket

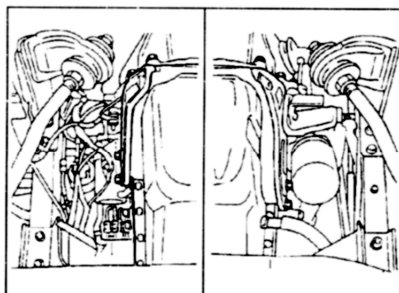
See “Crankshaft” in 2.6 for the reassembly of “7 - 1”.



2. Engine support bolt

- Remove engine support bolts at both left and right sides.

3. Stiffener plate



- Remove exhaust pipe bracket.
- Remove the stiffener plates out of oil pan (both left and right).

4. Oil pan assembly

- Lift the engine for about 50mm.
- Remove the oil pan from the cylinder block.

5 Oil pump assembly

- Remove oil pump assembly from the cylinder block.



Assembly

- Prepare some solution containing 80% oil and 20% supramoly.
- Apply solution to the oil pump pinion teeth.



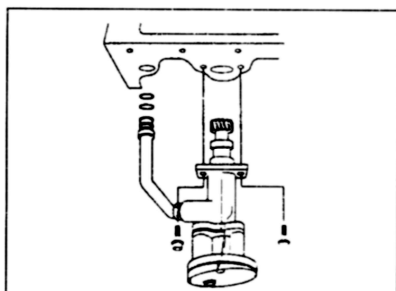
5. Oil pump assembly

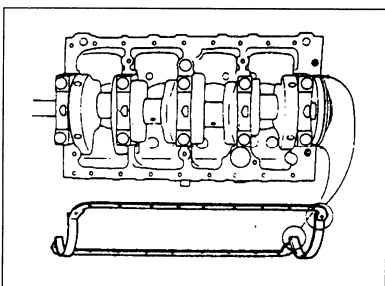
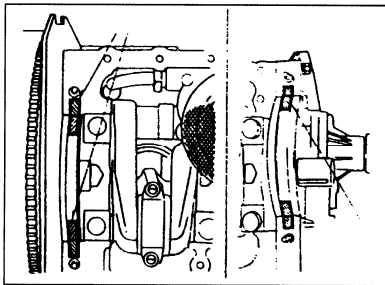
- Apply some oil to the oil pipe O-ring and put it into the cylinder block O-ring groove.
- Install the oil pump assembly with oil pipe to the cylinder block, and tighten fixing bolts to the specified torque.



N.m

25





5. Oil pan

- Apply recommended liquid sealant or equivalents to the fifth bearing cap arch section, groove and timing gear chamber arch section shown in the diagram.
- Install back lip portion of the gasket into the fifth groove.
- Make sure that the lip portion is compact with the groove.
- Install the oil pan to the cylinder block.
- Tighten oil pan bolt(s) to the specified torque.

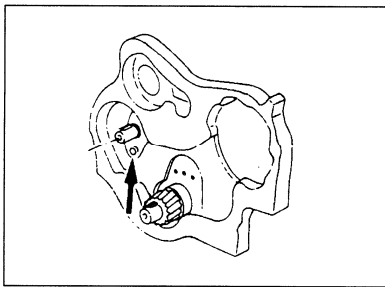
Oil pan bolt torque	N • m
23.5	

4. Timing gear

7) Camshaft timing gear

- Install the thrust washer onto the cylinder block and tighten thrust washer bolt(s) to the specified torque.

	N • m
25	



- Install camshaft timing gear to the camshaft.

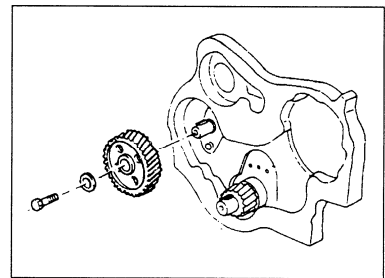
The timing gear mark (“Y—Y”) has to face the outside.

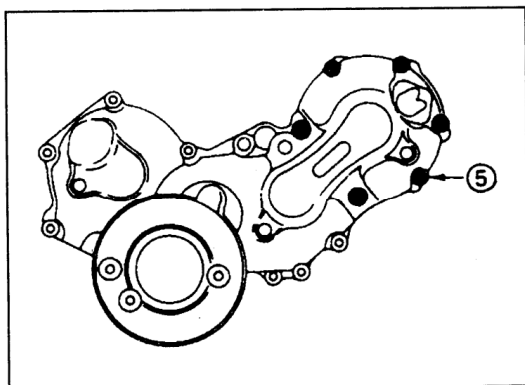
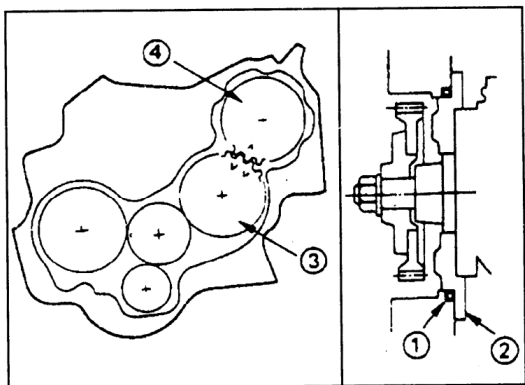
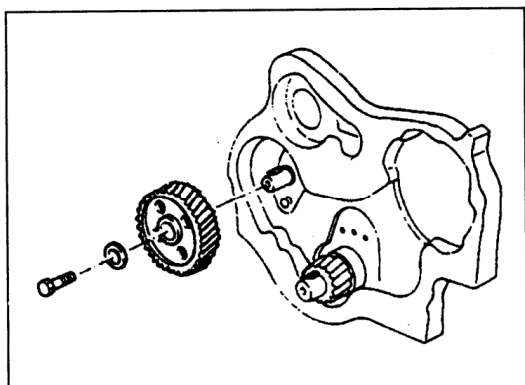
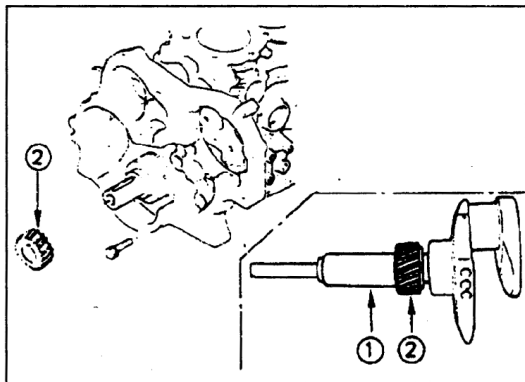
Align idler gear marks “B” “V-V” with injection pump timing gear mark “V”.

Align idler gear marks “B” “Z” with idler gear marks “A” “Z-Z”.

Arrange idler gear setting marks “X” and “Y” so that they both face the engine forepart.

Align idler gear mark “X” with crankshaft timing gear mark “X—X”.





4. Timing gear

12) Crankshaft gear



- Install crankshaft gear
- Install crankshaft gear ② with crankshaft gear erector ①.
- Crankshaft timing gear mark ("X-X") should face outwards.

Crankshaft gear erector: 1007011FA-9102

11) Camshaft timing gear

- Install the thrust washer onto the cylinder block.
- Tighten thrust washer bolt(s) to the specified torque.



N·m

25

- Install camshaft timing gear to the camshaft.

The timing gear mark ("Y—Y") has to face outwards.

- Tighten the timing gear to the specified torque.

Timing gear bolt torque

N·m

110

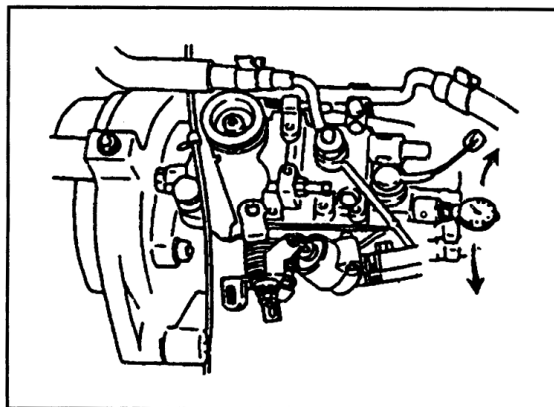
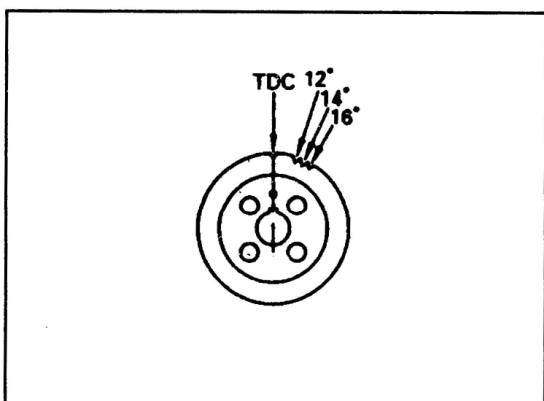
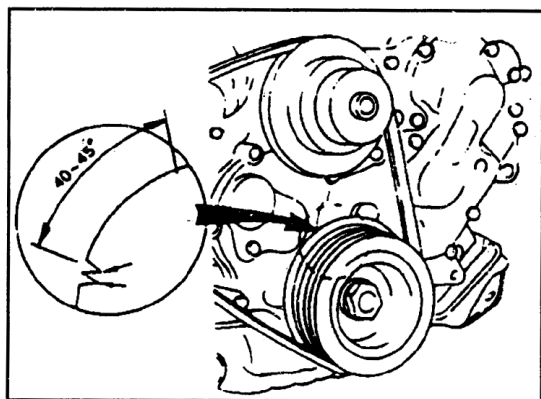
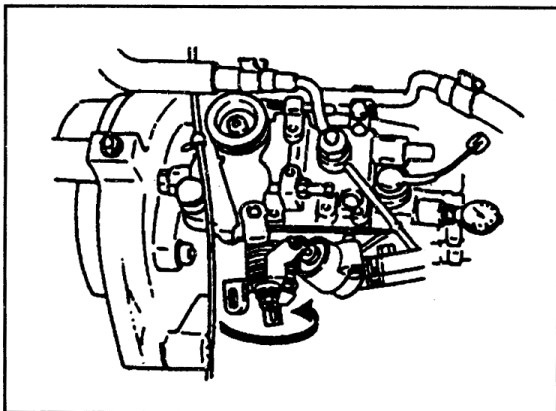
10) Injection pump

- ① Install O-ring ① to the injection pump flange ②.
- ② Install the injection pump to the timing gear chamber.

Align the mark "V-V" of idler gear "B" ③ with the mark "V" of injection pump timing gear ④.

- ③ Temporarily tighten Six injection pump nuts ⑤.

The final screwing down of injection pump nuts is conducted after tightening the injection pump rear bracket bolt(s).



Fuel supply and timing adjustment

- Place the piston of the first cylinder on the top dead center.
- Remove the top plug of the injection pump distributor.
- Dismantle wax type cold start device with screwdriver hand lever.
- Mount a dial indicator and pre-elevate to 1 mm.



Measuring instrument: 1100300FA—9101

- Place the top dead center mark on the crankshaft damper pulley at a position 30°-45° to the index.
- Place the dial indicator at the "0" position.
- Turn the crankshaft left and right slightly and observe if the dial indicator is still at the "0" position.
- Turn the crankshaft in normal direction and read out the dial gauge readings in the following cases.

4DA1 16° to the top dead center (before)

4DA1-1 12° to the top dead center (before)

Dial indicator readings mm

4DA1	1.60
4DA1-1	1.50

If the readings are improper, unscrew the injection pump fixing nut and the bracket adjusting bolt. Adjust the readings by changing the injection pump mounting position. When the dial gauge readings change to the specified values, tighten the fixing nut and bolt to the specified torques.

Injection pump fixing nut torque N·m
25

Adjusting Bolt torque N·m
25

- Tighten the top plug of the injection pump distributor to the specified torque after removing the measuring instrument.

N·m

35

Clutch

Main technical parameters

Slave disc

Type	Dry single diaphragm type with damping spring
Size	Φ250mm
Quantity of damping springs	4

Friction disc

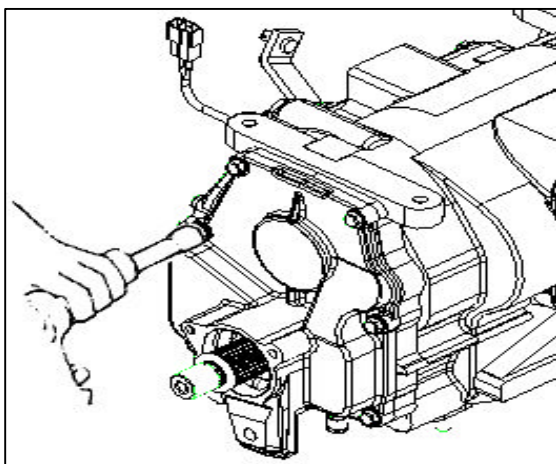
ID×OD	160×250
Quantity × thickness	2×3.5

Pressure plate

Type	Diaphragm spring
Max. pressing force	6276N

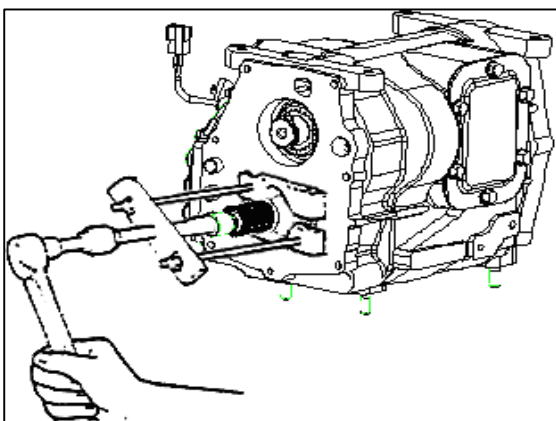
Hydraulic cylinder

Clutch master cylinder bore × stroke	Φ19.05×35 (mm)
Clutch cylinder bore × stroke	Φ26.99×19.05 (mm)



Gearbox rear cover bolts

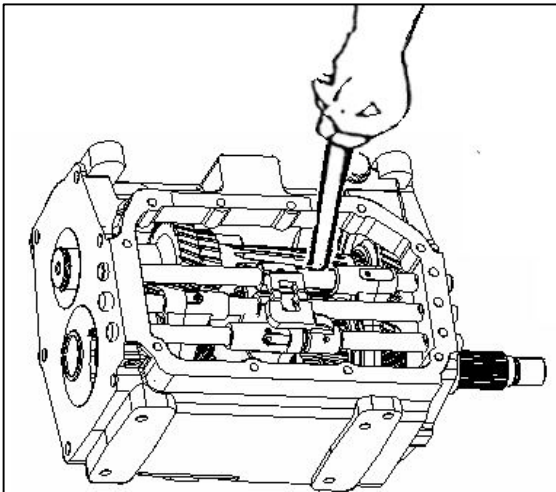
Torque (N·M) 68.6-91.3



Secondary axle ball bearing

Use a copper bar and a hammer to strike the rear end of the axle; move the secondary axle for about 3mm.

Use special tool to insert into the brake ring groove; remove the bearing.

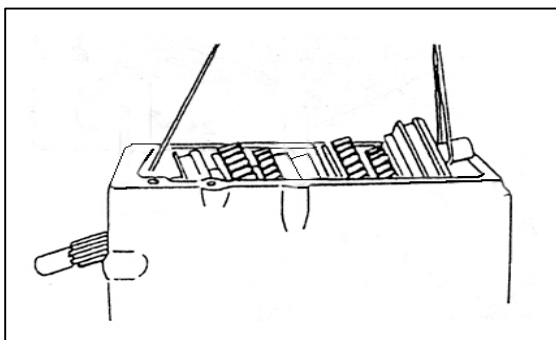


Spring pin, shifting yoke, shifting yoke shaft

Before disassembling, put all the shifting yoke axles at neutral position.

After pushing out the spring pin, push the rear end of the shifting yoke shaft forward.

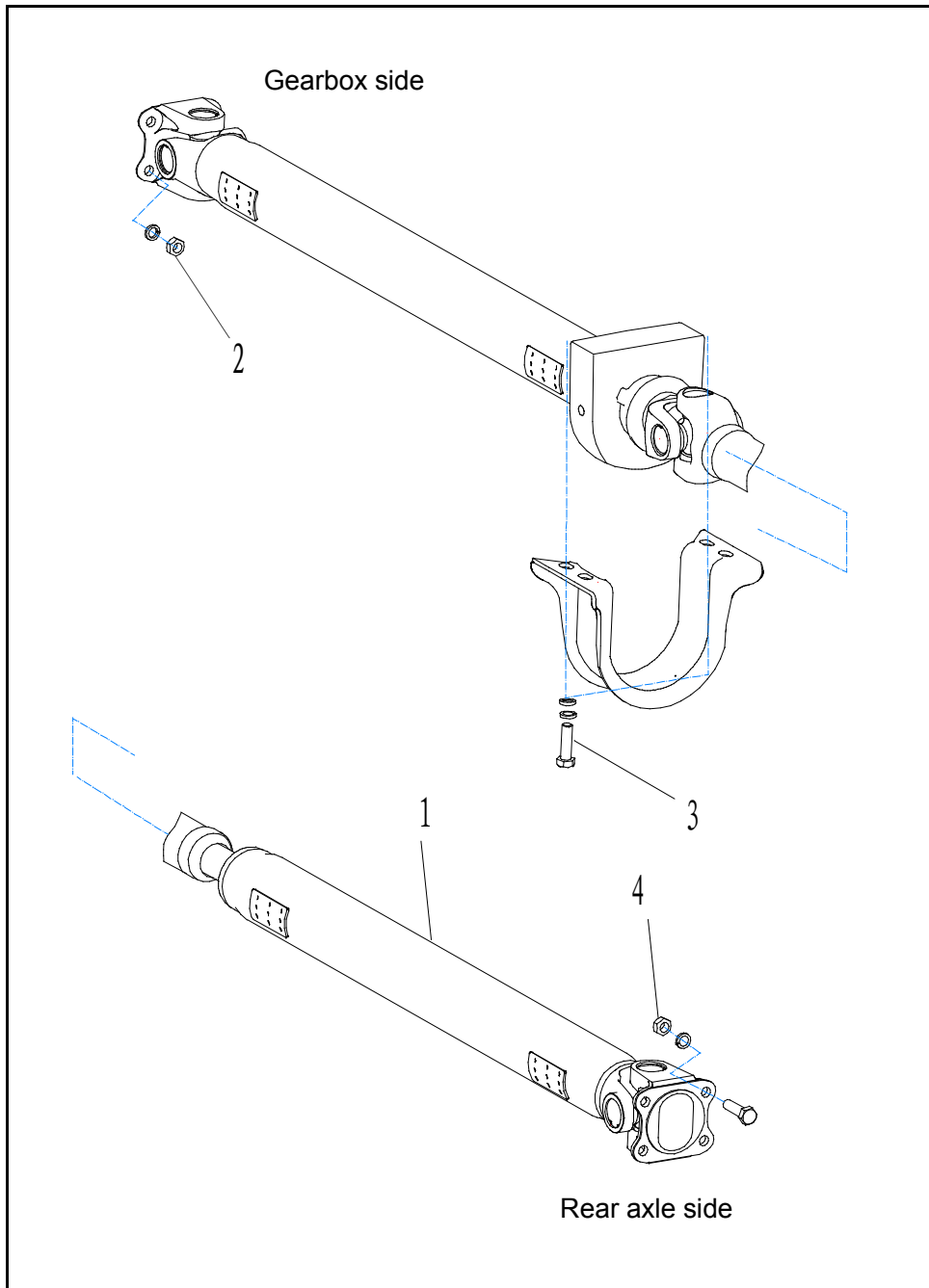
Then, strike the rear end of the shifting yoke shaft forward and gently, remove the shifting yoke and the shifting yoke shaft.



Secondary axle assembly

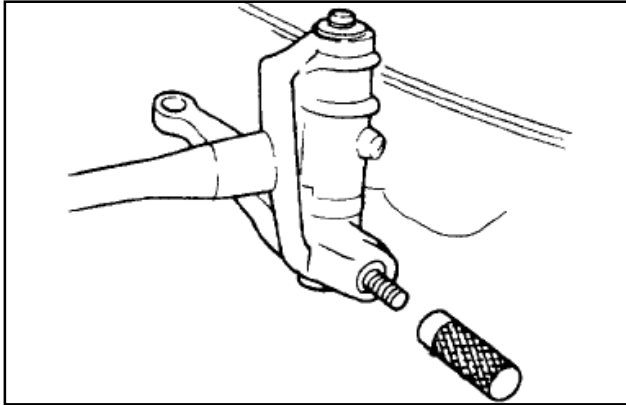
When disassembling, use strong steel cable, and pay attention to safety.

Assembly

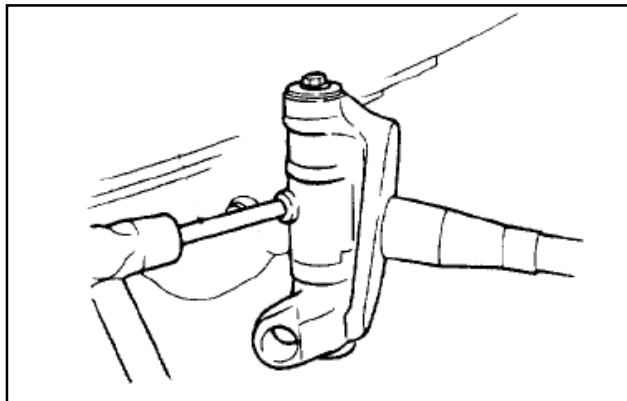


Assembling steps

1. Drive shaft assembly
2. Transmission end nut
3. Middle suspension
4. Differential end nut



Put a brass stick on the steering straight arm and punch with a hammer when removing the steering straight arm.



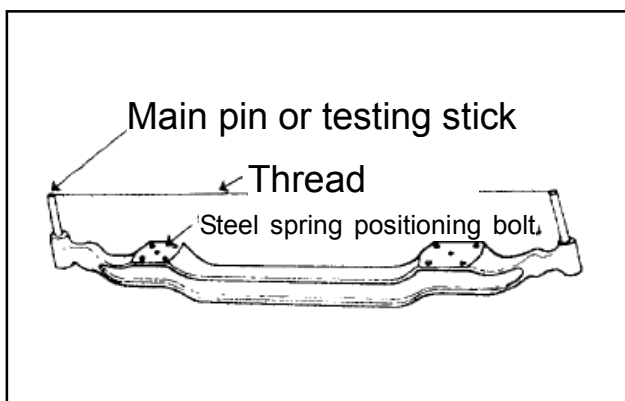
Remove lock bolt.

I beam
Steering knuckle
Steering straight arm
String rod Main pin
Thrust bearing
Adjusting gasket and bushing
String rod ball



Inspection and repair

Visual inspection of the parts listed in the left for damage or failure.



Repair I beam

Insert main pin or testing stick into I beam hole.

Pull straight a thread between the centres of the sticks

Observe if the thread aligns with two steel spring positioning bolt holes.